

**FAIRCHILD**  
SEMICONDUCTOR™

 **GENERAL**  
SEMICONDUCTOR

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**IOR** Rectifier

**ON Semiconductor**  
*Formerly a Division of Motorola*



**Philips Semiconductors**



**TOSHIBA**

 **ZETEX**

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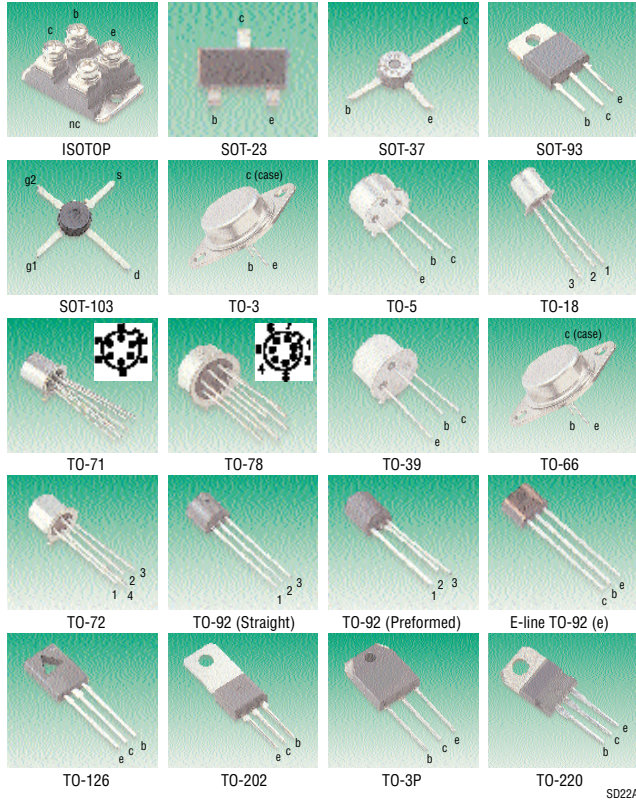


## Supplier Abbreviations

Code	Supplier	Code	Supplier
AGI	Agilent Technologies	PI	Power Innovations
APT	Advanced Power Technology	PLES	GEC-Plessey Semiconductor
FCH	Fairchild Semiconductor	PS	Philips Semiconductors
GS	General Semiconductor	RHM	Rohm
HIT	Hitachi	SEM	Semelab
INF	Infineon	SLX	Vishay-Siliconix
INTS	Intersil	SKN	Semikron
IR	International Rectifier	ST	STMicroelectronics
IXYS	IXYS Semiconductor	TFK	Vishay-Telefunken
MS	Microsemi	TOSH	Toshiba
ON	ON Semiconductor	ZET	Zetex

SD107

## Transistor Packages and Pin-Outs



SD22A

Package	Pin Out						
	1	2	3	4	5	6	7
TO-18	(a) C	B	E				
	(b) G	D	S				
TO-71	(a) E1	E2	C2	B2	B1	C1	
	(b) S1	D1	G1	S2	D2	G2	
TO-72	(a) B	E	C	Scrn			
	(b) E	B	C	Scrn			
	(c) D	G	B+case	S			
	(d) D	G2	G1	S+case			
	(e) S	D	G	case			
TO-78	(a) S1	G1	D1	C	D2	G2	S2
TO-78	(b) S1	D1	G1	C	S2	D2	G2
TO-92 (Straight)	(a) B	C	E				
	(b) C	B	E				
	(c) B	E	C				
	(d) E	B	C				
	(j) C	E	B				
	(k) S	G	D				
	(m) G	S	D				
	(n) G	D	S				
	(p) D	G	S				
(Preformed Leads)	(f) E	B	C				
	(g) B	E	C				
	(h) B	C	E				
	(r) D	S	G				

SD22B

## Low Power Bipolar Transistors – SMD

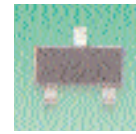
(P<sub>tot</sub> to 0.65W)

### General Purpose Transistors

Philips Semiconductors



SOT-23



SOT-323



V <sub>CEO</sub> max. V	I <sub>C</sub> max. mA	h <sub>FE</sub> (h <sub>FE</sub> *) min.	@ I <sub>C</sub> mA	f <sub>T</sub> typ. (min.*) MHz	F max. dB	P <sub>tot</sub> mW	Device Marking	Mfrs. List No.
<b>SOT-323 NPN</b>								
30	100	420	—	100	—	200	2Ct	BC849CW
45	100	420	—	100	—	200	1Gt	BC847CW
45	100	420	2	100*	4	200	2Gt	BC850CW
<b>SOT-23 NPN</b>								
30	100	125	2	100	4	250	2Fp	BC850B
30	100	200	2	300	10	250	1Kp	BC848B
30	100	200	2	100*	4	250	2Bp	BC849B
30	100	420	2	100*	4	250	2Cp	BC849C
32	100	110	2	300	10	250	D1p	BCW31
32	100	180	—	100	—	250	ABp	BCW60B
32	100	200	0.01	—	10	250	D2p	BCW32
32	100	250	2	250	6	250	Aap	BCW60C
32	100	380	—	100	—	250	ADp	BCW60D
32	100	420	2	300	10	250	D3p	BCW33
40	600	100	150	250	—	250	p2X	PMBT4401
45	100	110	2	300	10	250	1Ep	BC847A
45	100	110	2	300	10	250	K1p	BCW71
45	100	125*	2	300	10	250	1Hp	BC847
45	100	180	2	100	6	250	AHp	BCX70H
45	100	200	—	100	—	250	2Hp	BC850
45	100	200	2	300	10	250	K2p	BCW72
45	100	200	2	300	10	200	1Fp	BC847B
45	100	250	2	100*	6	250	AJp	BCX70J
45	100	380	2	100*	6	250	AKp	BCX70K
45	100	420	2	100	10	250	1Gp	BC847C
45	100	420	2	100	3	250	2Gp	BC850C
45	500	100	—	100	—	250	6Dp	BC817
45	500	100	100	200	—	200	U1p	BCX19
45	500	160	100	200	—	250	6Bp	BC817-25
45	500	250	100	200	—	250	6Cp	BC817-40
60	10	110	—	100	—	250	K7P	BCV71
65	100	110	2	100*	10	250	1Ap	BC846A
65	100	125*	2	300	10	250	1Dp	BC846
65	100	200	2	300	10	250	1Bp	BC846B
<b>SOT-23 PNP</b>								
30	100	125	—	100	—	250	4Dp	BC859
30	100	420	2	—	10	350	3Lp	BC858C
30	100	420	—	100	—	250	4Cp	BC859C
32	100	120	2	100*	10	250	C1p	BCW29
32	100	120	—	100	—	250	BAp	BCW61A
32	100	180	—	100	—	250	BBp	BCW61B
32	100	215	10	—	10	250	C2p	BCW30
32	100	250	—	100	—	250	BCp	BCW61C
32	100	380	2	100*	6	250	BDp	BCW61D
40	600	100	150	250	—	250	p2T	PMBT4403
45	100	120	2	150	10	250	H1p	BCW69
45	100	125	2	100	10	250	3Hp	BC857
45	100	125	—	100	—	250	3Ep	BC857A
45	100	125	—	100	—	250	4Hp	BC860
45	100	160	100	100	—	250	5Bp	BC807-25
45	100	180	—	100	—	250	BHp	BCX71H
45	100	215	2	150	10	250	H2p	BCW70
45	100	220	2	150	10	200	3Fp	BC857B
45	100	250	—	100	—	250	BJp	BCX71J
45	100	380	—	100	—	250	BKp	BCX71K
45	100	420	2	—	3	250	4Gp	BC860C
45	500	100	—	80	—	250	5Dp	BC807
45	500	100	—	80	—	250	5Ap	BC807-16
45	500	100	100	100	—	200	T1p	BCX17
45	500	250	100	100	—	250	5Cp	BC807-40
60	100	120	2	100*	10	250	H3p	BCW89
65	100	75	2	150	10	250	3Dp	BC856
65	100	125	—	100	—	250	3Ap	BC856A
65	100	220	2	150	10	250	3Bp	BC856B

SD78 / SD78A

### Order Multiple=10

Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BC807	302-3345				
BC807-16	302-3357				
BC807-25	506-310				
BC807-40	506-321				
BC817	302-3369				
BC817-25	506-291				
BC817-40	506-308				
BC846	516-831				
BC846A	316-2874				
BC846B	516-740				
BC847	516-843				
BC847A	516-752				
BC847B	506-175				
BC847C	506-199				
BC847CW	302-3370				
BC848B	506-163 †				
BC849B	316-2886				
BC849C	316-2898				

continued

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BC849CW	302-3382				
BC850	302-3394				
BC850B	305-0506				
BC850C	506-280				
BC850CW	316-4883				
BC856	506-266				
BC856A	302-3400				
BC856B	506-217				
BC857	300-0709				
BC857A	302-3412				
BC857B	506-229				
BC858C	506-242				
BC859	302-3424				
BC859C	302-3448				
BC860	302-3450				
BC860C	506-278				
BCV71	302-3461				
BCW29	305-0543				
BCW30	516-764				
BCW31	516-776				
BCW32	516-788				
BCW33	516-790				
BCW60B	302-3473				
BCW60C	300-0771				
BCW60D	302-3485				
BCW61A	302-3497 †				
BCW61B	302-3503				
BCW61C	302-3515				
BCW61D	305-0555				
BCW69	516-867				
BCW70	516-806				
BCW71	516-879				
BCW72	516-818				
BCW89	316-2941				
BCX17	516-880				
BCX19	516-820				
BCX70H	300-0904				
BCX70J	316-2904				
BCX70K	305-0567				
BCX71H	302-3527				
BCX71J	302-3539				
BCX71K	302-3540				
PMBT4401	316-2916				
PMBT4403	316-2953				

† Available until stocks are exhausted

## SOT-23 General Purpose, NPN



V <sub>CEO</sub> V	I <sub>c</sub> mA	f <sub>T</sub> typ. (*min.) MHz	h <sub>FE</sub> @ (h <sub>FE</sub> *) min	I <sub>c</sub> mA	F max. dB	P <sub>tot</sub> mW	Device Marking	Mfr.	Mfrs. List No.
25	1000	50	100	100	—	350	U2	FCH	BCX20
25	1500	200	250	100	—	350	6G	FCH	BC818-40
30	100	—	110	2	10	350	1J	FCH	BC848A
30	100	100	200	2	4	300	9	ON	BC849BLT1
30	100	—	420	2	10	250	1L	FCH	BC848C
30	1200	220	20000	100	—	350	FF	FCH	BCV27
32	100	300	110	2	10	250	D1	FCH	BCW31
32	100	—	200	0.01	10	250	D2	FCH	BCW32
32	100	300	420	2	10	250	D3	FCH	BCW33
32	500	100	250	100	10	350	ED	FCH	BCW65C
40	200	300	100	10	5	350	1A	FCH	MMBT3904
40	1000	300	100	150	4	350	1P	FCH	MMBT2222A
40	600	300*	100	150	4	300	1P	ON	MMBT2222A
45	100	100	420	2	10	250	1G	FCH	BC847C
45	100	100	420	2	3	250	—	ON	BC850C
45	500	—	100	100	—	300	U1	ON	BCX19LT1
45	500	300	110	2	10	350	K1	FCH	BCW71
45	500	200	160	100	—	250	6B	ON	BC817-25
45	500	200	250	100	—	250	6C	FCH	BC817-40
45	800	100	100	100	10	225	EF	ON	BCW66GLT1
60	50	—	250*	1	3	300	1U	ON	MMBT2484LT1
65	100	100*	110	2	—	300	1A	ON	BC846ALT1
65	100	300	200	2	10	250	1Bs	INF	BC846B
160	200	100	80	10	8	350	3S	FCH	MMBT5551

SD174

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BC817-25	933-946				
BC817-40	932-991				
BC818-40	934-197				
BC846ALT1	933-958				
BC846B	743-100				
BC847C	932-980				
BC848A	934-203				
BC848C	934-215				
BC849BLT1	933-960				
BC850C	933-983 †				
BCV27	934-318				
BCW31	934-276				
BCW32	934-288				
BCW33	934-290				
BCW65C	934-320				
BCW66GLT1	933-995				
BCW71	934-306 †				
BCX19LT1	934-021				
BCX20	934-343				
MMBT2222A (FCH)	742-971				
MMBT2222A (ON)	334-3479				
MMBT2484LT1	NEW 952-6446				
MMBT3904	742-960				
MMBT5551	743-057				

† Available until stocks are exhausted

## SOT-323 General Purpose, 200mW



V <sub>CEO</sub> V	I <sub>c</sub> mA	f <sub>T</sub> typ. (*min.) MHz	h <sub>FE</sub> @ min	I <sub>c</sub> mA	F max. dB	P <sub>tot</sub> mW	Device Marking	Mfr.	Mfrs. List No.	
NPN	65	100	300	200	2	10	200	1B	INF	BC846BW
PNP	30	100	100*	420	2	4	200	4Ct	PS	BC859CW
	65	100	150	200	2	10	200	3B	INF	BC856BW

SD233

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BC846BW	743-069				
BC856BW	743-070				
BC859CW	305-0520				

## SOT-323 High Performance Transistors



Application code key:- GP = General Purpose

V <sub>CEO</sub> V	V <sub>CEO</sub> V	I <sub>c (sat)</sub> A	h <sub>FE</sub> min.	@ I <sub>c</sub> mA	V <sub>CEO (sat)</sub> max. (V)	I <sub>c</sub> mA	f <sub>T</sub> min. (*Typ.)	P <sub>tot</sub> W	App'n Code	Mfrs. List No.	
NPN	15	15	1.5	200	1000	0.2	1000	180	0.5	GP	ZUMT617
	20	20	1.25	200	500	0.2	1000	210	0.5	GP	ZUMT618
	50	50	1.0	200	500	0.2	500	215	0.5	GP	ZUMT619
PNP	12	12	1.25	125	1250	0.175	—	220	0.5	GP	ZUMT717
	20	20	1.0	200	500	0.175	500	210	0.5	GP	ZUMT718
	40	40	1.0	90	500	0.25	750	220	0.5	GP	ZUMT720

SD121

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
ZUMT617	301-4794				
ZUMT618	301-4800				
ZUMT619	301-4812				
ZUMT717	301-4824				
ZUMT718	301-4836				
ZUMT720	301-4848				

## MiniReel<sup>®</sup> SOT-23 Transistors



Tape width = 8mm

- 100mm reel size
- 500 pieces on each reel
- Complete with leader tape
- Ideal for pre-production, prototyping and production shortfalls



SD496

500 Pieces Per Reel		Price Per Reel		
MiniReel List No.	Order Code	1+	3+	5+
BC807-25-MR	344-8204			
BC817-25-MR	344-8216			
BC817-40-MR	344-8228			
BC846A-MR	344-8230			
BC846B-MR	344-8241			
BC847A-MR	344-8253			
BC847B-MR	344-8265			
BC847C-MR	344-8277			
BC847-MR	344-8289			
BC848C-MR	344-8290			
BC856B-MR	344-8307			
BC857B-MR	344-8319			
BCV27-MR	344-8320			
BCW71-MR	344-8332			
BCX19-MR	344-8344			
BSR14-MR	344-8356			
BSR17A-MR	344-8368			
MMBT2222A-MR	344-8538			
MMBT2907A-MR	344-8540			
MMBT3904-MR	344-8551			

Continued

## Low Power Bipolar Transistors – SMD ( $P_{tot}$ to 0.65W) — continued

### SOT-23 General Purpose, PNP

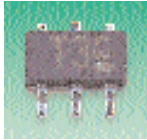


$V_{CE0}$ V	$I_C$ mA	$f_T$ typ. MHz	$h_{FE}$ (min.)	$h_{FE}$ (typ.) @ mA	$I_C$ mA	F max. dB	$P_{tot}$ mW	Device Marking	Mfr.	Mfrs. List No.
30	100	—	420	2	10	350	3L	FCH	BC858C	
30	1200	220	20000	100	10	350	FD	FCH	BCV26	
32	100	—	215	10	10	250	C2	FCH	BCW30	
40	200	250	100	10	4	350	2A	FCH	MMBT3906	
45	100	—	420	2	3	250	4G	FCH	BC860C	
45	500	—	100	100	—	300	T1	ON	BCX17LT1	
45	500	100	160	100	—	250	5B	ON	BC807-25	
45	500	100	250	100	—	250	5C	FCH	BC807-40	
45	500	100	420	2	10	350	3G	FCH	BC857C	
60	800	200	100	150	—	350	2F	FCH	MMBT2907A	
65	100	150	220	2	10	250	3Bs	INF	BC856B	SD259

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BC807-25	933-934				
BC807-40	934-185				
BC856B	.743-112				
BC857C	.934-239				
BC858C	934-252				
BC860C	934-227 †				
BCV26	934-240				
BCW30	934-264				
BCX17LT1	934-010				
MMBT2907A	743-010				
MMBT3906	.742-983				

† Available until stocks are exhausted

### SuperSOT-4 Low Saturation Switching Transistors



- Very low conduction losses
- Ideal for battery operated applications
- High current
- High gain
- High power dissipation

$V_{CE0}$ V	$V_{CBO}$ max. V	$I_C$ A	$I_C$ (pk.) A	$h_{FE}$ (min.) @ mA	$I_C$ mA	$V_{CE}$ (sat.) max. mV @ A	$P_{tot}$ W	Device Marking	Mfrs. List No.
<b>NPN</b>									
15	40	5	15	300	1	8	0.1	N15D	ZXT13N15DE6
20	50	4.5	15	300	1	8	0.1	N20D	ZXT13N20DE6
50	100	5	10	300	1	12	0.1	N50D	ZXT13N50DE6
<b>PNP</b>									
12	20	4	15	300	1	10	0.1	P12D	ZXT13P12DE6
20	25	4	10	300	1	15	0.1	P20D	ZXT13P20DE6
40	40	3	10	300	1	25	0.1	P40D	ZXT13P40DE6

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	250+ 1K+
ZXT13N15DE6	334-6869				
ZXT13N20DE6	334-6870				
ZXT13N50DE6	334-6882				
ZXT13P12DE6	334-6894				
ZXT13P20DE6	334-6900				
ZXT13P40DE6	334-6912				

### Switching Transistors



SOT-23



SOT-89

$V_{CE0}$ max. V	$I_C$ max. A	$P_{tot}$ mW	$h_{FE}$ min.	@ mA	$t_{(on)/t_{(off)}}$ max. ns	$V_{CE}$ (sat.) max. V	Package	Device Marking	Mfrs. List No.
<b>NPN</b>									
12	0.1	250	40	10	12/18	0.2	SOT-23	B2p	BSV52
15	0.2	250	40	10	10/30	0.25	SOT-23	p1J	PMBT2369
40	0.1	250	100	10	65/240	0.2	SOT-23	p1A	PMBT3904
40	0.2	300	100	10	70/250	0.2	SOT-23	U92p	BSR17A
40	0.6	250	40	500	35/250	1.0	SOT-23	p1P	PMBT2222A
40	0.8	250	100	150	35/285	1.0	SOT-23	U8p	BSR14
<b>PNP</b>									
40	0.1	250	100	10	65/300	0.2	SOT-23	p2A	PMBT3906
40	0.2	300	100	10	70/300	0.25	SOT-23	T92p	BSR18A
40	0.6	250	30	500	40/365	1.6	SOT-23	p2B	PMBT2907
40	0.6	1200	100	150	35/250	1.0	SOT-89	p1P	PXT2222A
60	0.6	250	50	500	40/365	0.4	SOT-23	p2F	PMBT2907A
60	0.6	250	100	150	45/100	1.6	SOT-23	T8p	BSR16
60	0.6	1250	100	150	40/365	1.6	SOT-89	p2F	PXT2907A

SD19

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	100+	1K+	5K+
BSR14	506-333				
BSR16	506-345				
BSR17A	549-381				
BSR18A	549-393				
BSV52	506-357				
<b>Order Multiple=10</b>					
PMBT2222A	302-3643	10+	100+	1K+	3K+
PMBT2369	305-1316				
PMBT2907	302-3655				
PMBT2907A	305-1328				
PMBT3904	305-1330				
PMBT3906	302-3667				
<b>Order Multiple=5</b>					
PXT2222A	305-1377	5+	100+	1K+	3K+
PXT2907A	302-3679				

### SOT-23 Switching

Supplied on 8mm tape.



$V_{CE0}$ max V	$I_C$ max A	$P_{tot}$ mW	$h_{FE}$ min. @	$I_C$ mA	$t_{on}/t_{off}$ max. ns	$V_{CE}$ (sat) max V	Device Marking	Mfr.	Mfrs. List No.
<b>NPN</b>									
15	0.2	225	40	100	12/18	0.20	1S	FCH	MMBT2369A
15	3.0	625	300	200	120*/160*	0.15	617	ZET	FMMT617
20	2.5	625	300	200	170/400	0.20	618	ZET	FMMT618
40	0.2	300	100	10	70/250	0.20	U92	FCH	BSR17A
50	2.0	625	300	200	170/750	0.22	619	ZET	FMMT619
80	0.5	225	100	100	—	0.25	1GM	ON	MMBTA06LT1
<b>PNP</b>									
12	2.5	625	300	100	70*/130*	0.22	717	ZET	FMMT717
15	0.2	225	50	10	15/20	0.18	3R	FCH	MMBT5771
20	1.5	625	300	100	40*/670*	0.22	718	ZET	FMMT718
30	1.0	310	100	500	—	—	G3	ON	MMBT589LT1
40	0.2	300	100	10	70/300	0.25	T92	FCH	BSR18A
40	1.5	625	300	100	40*/435*	0.33	720	ZET	FMMT720
80	0.5	225	100	100	—	0.25	2GM	ON	MMBTA56LT1

\*typ.

SD175

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	100+	1K+	5K+
BSR17A	740-962				
BSR18A	740-974				
BSV52	506-357				
FMMT617	.549-400				
FMMT618	.549-411				
FMMT619	.549-423				
FMMT717	.549-435				
FMMT718	.549-447				
FMMT720	.549-459				
MMBT589LT1	300-5513				
MMBT2369A	743-033				
MMBT5771	932-978				
MMBTA06LT1	247-376				
MMBTA56LT1	247-388				

### SOT-23 High Voltage



$V_{CE0}$ max. V	$I_C$ max. mA	$f_T$ typ. (min.)* MHz	$h_{FE}$ min. @	$I_C$ mA	$P_{tot}$ mW	Device Marking	Mfrs. List No.
140	600	100	60	10	250	p1F	PMBT5550
160	300	100*	80	10	250	pG1	PMBT5551
250	50	60*	50	25	250	1Wt	BF822
300	100	60	50	25	250	1Vt/1Wp	BF820
300	200	50	40	10	250	p1D/p2D	PMBTA42

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	100+	1K+	3K+
BF820	302-3552				
BF821	302-3564				
BF822	316-2928				
PMBT5550	302-3576				
PMBT5551	305-1341				
PMBTA42	302-3588				
PMBTA92	302-3590				

SD3





Low Power Bipolar Transistors – Leaded (P<sub>tot</sub> to 1.0W) — continued

TO-92 General Purpose Amplifiers/Switches, NPN

Table with columns: V<sub>ceo</sub>, V<sub>cbo</sub>, I<sub>c</sub>, h<sub>fe</sub>, I<sub>c</sub> @, f<sub>r</sub> min., P<sub>tot</sub>, Package, Mfrs. List No., Mfrs. List No.

\*\* Denotes modified TO-92 package, body height = 8.2 mm.

Order Multiple=5

Table with columns: Mfrs. List No., Order Code, Price Each (5+, 25+, 100+, 1K+, 3K+)

continued

Order Multiple=5

Table with columns: Mfrs. List No., Order Code, Price Each (5+, 25+, 100+, 1K+, 3K+)

† Available until stocks are exhausted

TO-92 General Purpose Amplifiers/Switches, PNP

Table with columns: V<sub>ceo</sub>, V<sub>cbo</sub>, I<sub>c</sub>, h<sub>fe</sub>, I<sub>c</sub> @, f<sub>r</sub> min., P<sub>tot</sub>, Package, Mfrs. List No., Mfrs. List No.

SD19

Order Multiple=5

Table with columns: Mfrs. List No., Order Code, Price Each (5+, 25+, 100+, 1K+, 3K+)

† Available until stocks are exhausted

## E-Line (TO-92) General Purpose Amplifiers/Switches



V <sub>CEO</sub> V	V <sub>CBO</sub> max. V	I <sub>c</sub> A	h <sub>FE</sub> min. @	I <sub>c</sub> mA	f <sub>T</sub> min. MHz	P <sub>tot</sub> mW	Package	Mfrs. List No.	NPN	PNP
25	25	0.5	50	10	150	300	TO-92(e)	ZTX300	ZTX500	—
30	45	0.1	125	2	150	300	TO-92(e)	ZTX108	—	—
30	45	0.1	450	2	150	300	TO-92(e)	ZTX108C	—	—
35	35	0.5	100	10	150	300	TO-92(e)	ZTX302	ZTX502	—
45	50	0.8	100	100	200*	750	TO-92(e)	ZTX337	—	—
50	60	0.1	125	2	150	300	TO-92(e)	ZTX107	—	—
50	60	0.1	240	2	150	300	TO-92(e)	ZTX107B	—	—
50	60	0.2	60	2	200	500	TO-92(e)	—	ZTX212	—
50	60	0.2	200	2	200	500	TO-92(e)	—	ZTX212B	—
70	70	0.5	50	10	150	300	TO-92(e)	ZTX304	ZTX504	—
80	80	0.5	50	100	100	625	TO-92(e)	MPSA06	MPSA56	—

SD27

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	1K+	5K+
MPSA06	357-716					
MPSA56	357-777					
ZTX107	357-856					
ZTX107B	357-870					
ZTX108	357-881					
ZTX108C	357-893					
ZTX212	357-935					
ZTX212B	357-947					
ZTX300	357-996					
ZTX302	358-010					
ZTX304	358-022					
ZTX337	358-095					
ZTX500	358-162					
ZTX502	358-186					
ZTX504	358-204					

## TO-77 Dual Matched Differential Amplifiers, NPN

V <sub>CEO</sub> V	V <sub>CBO</sub> max. V	I <sub>c</sub> A	h <sub>FE</sub> min. @	I <sub>c</sub> mA	f <sub>T</sub> min. MHz	P <sub>tot</sub> mW	Package	Mfrs. List No.
45	45	0.1	10*	3	—	500	TO-77	BFY81

SD22

Mfrs. List No.		Price Each			
Order Code	1+	10+	30+	100+	
BFY81	357-595				

## TO-39, TO-92 High Voltage

Devices with breakdown voltages of 200V minimum, for applications requiring relative low collector current, such as lamp drivers and neon tubes.

V <sub>CEO</sub> max. V	I <sub>c</sub> max. A	h <sub>FE</sub> min. @	V <sub>CE(SAT)</sub> max. V @ I <sub>c</sub> mA	f <sub>T</sub> min. MHz	P <sub>tot</sub> @ 25°C mW	Package and Pin Out	Mfrs. List No.	NPN	PNP		
200	0.5	50	30	0.5	20	50	680	TO-92(e)	ZET MPSA43	MPSA93	
250	0.1	50	25	0.5	20	60	830	TO-92(h)	—	BF422	BF423
300	0.1	25	30	1.0	30	25	500	TO-39	ST	BF259	—
300	0.5	40	10	2.0	20	35	625	TO-92(b)	ON	BF393	—
300	0.5	40	30	0.5	20	50	625	TO-92(b)	ON	MPSA42	MPSA92
300	0.5	40	10	0.5	20	50	625	TO-92(b)	FCH	MPSA42	MPSA92
300	0.5	40	10	0.5	20	50	680	TO-92(e)	ZET	MPSA42	MPSA92
400	0.3	40	100	0.75	50	—	625	TO-92(b)	ON	MPSA44	—

(\*typ.) FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

SD267

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	1K+	3K+
BF259	357-364					
BF393	933-636					
BF422	357-418					
BF423	357-420					
MPSA42 (FCH)	357-741					
MPSA42 (ON)	933-867					
MPSA42 (ZET)	357-730					
MPSA43	357-753					
MPSA44	682-287					
MPSA92 (FCH)	357-790					
MPSA92 (ON)	933-879					
MPSA92 (ZET)	357-789					
MPSA93	357-807					

## High Speed Switching

Fast switching devices exhibiting short turn-off and low saturation voltage characteristics.

V <sub>CEO</sub> max. V	I <sub>c</sub> max. A	V <sub>CE(SAT)</sub> max. V @ I <sub>c</sub> mA	t <sub>off</sub> max. ns @ I <sub>c</sub> mA	h <sub>FE</sub> min. @ I <sub>c</sub> mA	P <sub>tot</sub> @ 25°C mW	Package and Pin Out	Mfrs. List No.				
15	0.2	0.25	10	18	10	40	10	360	TO-18(a)	MC	2N2369
15	0.2	0.25	10	18	10	40	10	360	TO-18(a)	ST	2N2369
15	0.2	0.2	10	18	10	40	10	360	TO-18(a)	MC	2N2369A
15	0.2	0.2	10	18	10	40	10	360	TO-18(a)	ST	2N2369A
15	0.5	0.6	100	21	100	40	10	360	TO-18(a)	MC/ST	BSX20
15	0.5	0.5	100	18	10	40	10	300	TO-92(e)	ZET	ZTX314
15	0.5	0.24	10	18	10	40	10	300	TO-92(e)	ZET	ZTX313
30	0.8	0.4	150	—	—	100	150	800	TO-5	ST	2N2219
30	0.8	0.4	150	—	—	100	150	500	TO-18(a)	MC/ST	2N2222
40	0.2	0.2	10	250	10	100	10	500	TO-92(b)	—	2N3904
40	0.6	0.4	150	255	150	40	1	625	TO-92(b)	—	2N4401
40	0.8	0.3	150	60	150	100	150	800	TO-5	ON/ST	2N2219A
40	0.8	0.3	150	60	150	100	150	400	TO-18(a)	ST	2N2222A
45	1.0	0.7	500	100	500	25	500	800	TO-39	—	BSX61
50	1.0	0.52	500	60	500	35	500	800	TO-39	ST	2N3725
60	5.0	—	—	1200	5000	40	2000	870	TO-39	—	BSV64
120	2.0	—	—	900	500	40	100	800	TO-39	—	BSW67A

FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

SD268

Order Multiple = 1		Price Each				
Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
BSV64	357-601					
BSW67A	357-625					
BSX20 (MC)	301-0533					
BSX20 (ST)	357-650					
BSX61	357-686					
Order Multiple = 5		5+	25+	100+	1K+	3K+
MPS404A	682-330 †					
ZTX313	358-034					
ZTX314	358-046					
ZTX510	358-216					
2N2219	358-496					
2N2219A	358-502					
2N2222 (MC)	301-0545					
2N2222 (ST)	358-526					
2N2222A	358-538					
2N2369 (MC)	301-0510					
2N2369 (ST)	358-551					
2N2369A (MC)	301-0521					
2N2369A (ST)	358-563					
2N2905	358-617					
2N2905A	358-629					
2N2906A (MC)	301-0569					
2N2906A (ST)	358-642 †					
2N2907 (MC)	301-0557					
2N2907 (ST)	358-654 †					
2N2907A (MC)	301-0570					
2N2907A (ST)	358-666					
2N3209	358-680					
2N3725	358-794					
2N3904	358-812					
2N3904 (FCH)	358-824					
2N3904 (ON)	933-673					
2N3906	358-848					
2N3906 (ON)	933-582					
2N4401	358-976					
2N4401 (FCH)	358-988					
Order Multiple = 1		1+	25+	100+	1K+	
2N5771	434-474					

† Available until stocks are exhausted

Continued

## Metric Values

Yes, we're metric! All dimensions appear in metric values unless otherwise stated.

Low Power Bipolar Transistors – Leaded  
(P<sub>tot</sub> to 1.0W) — continued

TO-18, TO-92 Low Noise

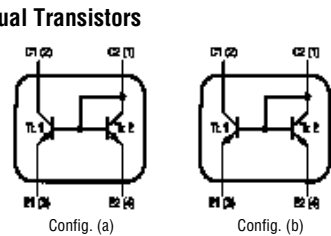
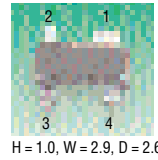
Suitable for applications requiring low noise and good h<sub>FE</sub> linearity, eg. audio pre-amplifiers, and instrumentation.

V <sub>CEO</sub> max.	I <sub>C</sub> max.	h <sub>FE</sub> min.	f <sub>T</sub> min.	NF max.	P <sub>tot</sub> @ 25°C	Package and Pin Out	Mfr.	Mfrs. List No.
20	0.1	200	2.0	4	150	600	TO-18(a)	MC BC109
20	0.1	200	2.0	4	150	600	TO-18(a)	MC BC109B
20	0.1	240	2.0	4	200*	300	TO-18(a)	— BC179
20	0.1	240	2.0	2*	150	300	TO-92(f)	— BC239
20	0.1	420	2.0	4	150	600	TO-18(a)	MC BC109C
25	0.1	125	2.0	10	200*	300	TO-18(a)	— BC178
30	0.1	125	2.0	1.2*	150*	500	TO-92(f)	PS — BC559
30	0.1	240	2.0	4	150	300	TO-92(e)	ZET ZTX109
30	0.1	420	2.0	1.4*	300*	500	TO-92(f)	PS/FCH BC549C
30	0.1	450	2.0	4	150	300	TO-92(e)	ZET ZTX109C
30	0.2	140	2.0	10	200	500	TO-92(e)	ZET — ZTX214
30	0.2	350	2.0	10	200	500	TO-92(e)	ZET — ZTX214C
45	0.1	75	2.0	3	300*	625	TO-92(f)	FCH — BC560
45	0.1	200	2.0	3	300*	625	TO-92(f)	FCH BC550
50	0.05	250	0.1	2	40	350	TO-92(b)	FCH — 2N5087

(\*typ.) FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

Mfrs. List No.	Order Code	5+	25+	100+	1K+
BC109	301-0442				
BC109B	301-0454				
BC109C	301-0466				
BC178	356-463				
BC179	356-475				
BC239	356-888				
BC549C (FCH)	434-681				
BC549C (PS)	234-333				
BC550	434-838				
BC559	357-194				
BC560	434-863				
ZTX109	357-900				
ZTX109C	357-923				
ZTX214	357-960				
ZTX214C	357-972				
2N5087	359-014				

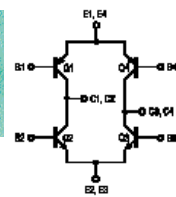
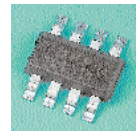
Current Mirror, Dual Transistors  
SOT-143



V <sub>CEO</sub> max.	I <sub>C</sub> max.	f <sub>T</sub> min.	h <sub>FE</sub> min.	I <sub>C</sub> @	V <sub>CE(sat)</sub> @	I <sub>C</sub> @	P <sub>tot</sub> mW	Pin Config.	Mfr.	Mfrs. List No.
30	NPN	100	250	110	2.0	0.60	100	300	a	INF BCV61C
30	PNP	200	100	100	0.1	—	—	250	b	PS BCV62B
30	PNP	100	250	125	2.0	0.65	100	300	b	INF BCV62C

Order Multiple=5	Price Each
Mfrs. List No.	Order Code
BCV61C	743-197
BCV62B	316-2930
BCV62C	743-203

SM-8 Quad Packaged Transistors



- H-Bridge configured, complimentary npn/pnp devices
- 8 Lead SOT-223
- Low on-state losses
- Low drive requirements

V <sub>CEO</sub> V	V <sub>cb0</sub> V	I <sub>cm</sub> (pk) A	I <sub>C</sub> A	h <sub>FE</sub> (min)	@ I <sub>C</sub> mA	V <sub>CE(sat)</sub> max. (mV)	@ I <sub>C</sub> A	Mfrs. List No.
20	20	6	2.5	300	300	100	150	200
40	50	6	2.0	500	300	100	500	450

Mfrs. List No.	Order Code	1+	25+	100+	1K+
ZHB6718	996-166				
ZHB6790	996-178				

Low Power Transistor Arrays

General Purpose Dual Transistors

Philips Semiconductors



SOT-363

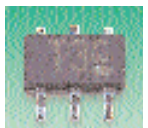
- Low collector capacitance
- Low V<sub>CE(sat)</sub>
- Matched current gain
- Reduced component count
- No mutual interference between transistors
- Supplied on 8mm tape

V <sub>CEO</sub> max. V	V <sub>cb0</sub> max. V	I <sub>C</sub> (pk) max. mA	f <sub>T</sub> min. MHz	h <sub>FE</sub> min.	@	I <sub>C</sub> mA	P <sub>tot</sub> mW	P <sub>tot</sub> per device mW	Device Marking	Mfrs. List No.
<b>Dual NPN</b>										
40	50	200	100	120	1	200	300	300	ZiZ	PUMX1
40	50	200	100	120	1	200	300	300	FiZ	PUMZ1
45	50	200	100	200	2	200	300	300	1fT	BC847BS
<b>Dual PNP</b>										
40	50	200	100	120	1	200	300	300	FiF	PUMT1
45	50	200	100	200	2	200	300	300	3fT	BC857BS
<b>NPN/PNP Complement</b>										
45	50	200	100	200	2	200	300	300	13t	BC847BPN

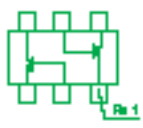
Order Multiple=5	Price Each
Mfrs. List No.	Order Code
BC847BPN	305-0476
BC847BS	305-0488
BC857BS	305-0518
PUMT1	316-4895
PUMX1	316-4950
PUMZ1	316-4949

Dual Transistors

Supplied on 8mm tape.



IMD H = 1.1, W = 2.9, D = 2.8

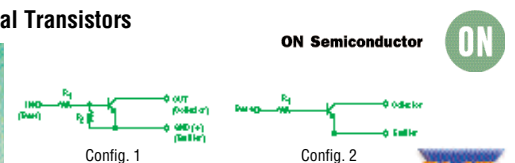
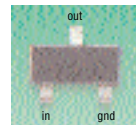


ROHM

Equivalent Devices	NPN/ PNP	V <sub>CEO</sub> V	I <sub>C</sub> mA	h <sub>FE</sub> typ	I <sub>C</sub> mA	Device Marking	Mfrs. List No.
2SA1037AK	PNP	40	100	120	1	Z1	IMZ1A

Order Multiple=5	Price Each
Mfrs. List No.	Order Code
IMZ1A	663-098

SOT-23 Digital Transistors



V <sub>(br)CEO</sub> min. V	I <sub>C</sub> max. mA	h <sub>FE</sub> min.	@ I <sub>C</sub> mA	Config.	R1 Ohm	R2 Ohm	Mfrs. List No.
50	100	35	5	1	10K	10K	MMUN2211LT1
50	100	60	5	1	22K	22K	MMUN2212LT1
50	100	80	5	1	47K	47K	MMUN2213LT1
50	100	80	5	1	10K	47K	MMUN2214LT1
50	100	160	5	2	10K	—	MMUN2215LT1
50	100	160	5	2	4.7K	—	MMUN2216LT1

Order Multiple=10			Price Each		
Mfrs. List No.	I.D.	Order Code	10+	100+	3K+
MMUN2211LT1	A8A	473-583			
MMUN2212LT1	A8B	473-595			
MMUN2213LT1	A8C	473-601			
MMUN2214LT1	A8D	473-613			
MMUN2215LT1	A8E	473-625			
MMUN2216LT1	A8F	473-637			
MMUN2111LT1	A6A	473-649			
MMUN2113LT1	A6C	473-662			
MMUN2115LT1	A6E	473-686			
MMUN2116LT1	A6F	473-698			

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	250+ 1K+
BC868	305-0531				
BCP51	316-4822				
BCP51-16	316-4834				
BCP53	541-436				
BCP53-16	302-3606				
BCP54	316-4792				
BCP56	541-448				
BCP56-16	302-3618				
BCP69	302-3620				
BSR42	305-0580				
BSR43	302-3631				
BST15	316-4664				
BST40	316-4627				

## Special Function Transistors

### AC Line Switch



- Dedicated AC line switch with in-built transient voltage suppression
- Meets **IEC1000-4-5**
- Direct microcontroller compatibility
- Suitable for driving low power inductive or resistive loads
- Single or quad packaged array

$I_T$ rms	$V_{RRM}/V_{DRM}$	$V_{PP}$	$I_{TSM}$	$I_{GT}$	$V_{GT}$	Package	Mfrs. List No.
0.8	500	2	7.3	10	1	TO-92	ACS108-SA
0.8	500	2	7.3	10	1	SOT-223	ACS108-SN
0.2	500	2	5.0	10	1	DIL20	ACS402-5SB4

Mfrs. List No.		Order Code	1+	25+	100+	250+	1K+
ACS108-SA		302-2808					
ACS108-SN		302-2810					
ACS402-5SB4		302-2821					

## Medium Power Bipolar Transistors (P<sub>tot</sub> 1W to 3W)

### SOT-89

Phillips Semiconductors



$V_{CE0}$	$I_C$	$f_T$ typ.	$h_{FE}$ min.	$I_C$	$P_{tot}$	Device Marking	Mfrs. List No.
<b>NPN</b>							
45	1000	130	40	150	1390	BA	BCX54
60	1000	130	40	150	1390	BE	BCX55
60	1000	130	100	150	1390	BM	BCX55-16
80	1000	130	40	150	1300	BH	BCX56
80	1000	130	100	150	1300	BL	BCX56-16
<b>PNP</b>							
20	1000	40	100	500	1400	CEC	BC869
45	1000	50	40	150	1300	AA	BCX51
45	1000	50	100	150	1300	AD	BCX51-16
60	1000	50	40	150	1300	AE	BCX52
80	1000	50	40	150	1300	AH	BCX53
80	1000	50	100	150	1300	AL	BCX53-16

Order Multiple=10			Price Each		
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BC869	300-0722				
<b>Order Multiple=5</b>					
BCX51	300-0886	5+	25+	100+	1K+
BCX51-16	316-4639				
BCX52	300-0898				
BCX53	316-4640				
BCX53-16	316-4652				
BCX54	316-4573				
BCX55	316-4585				
BCX55-16	316-4597				
BCX56	316-4603				
BCX56-16	316-4615				

### SOT-89, SOT-223

Phillips Semiconductors



$V_{CE0}$	$V_{CBO}$	$I_C$ (av)	$h_{FE}$ min.	$I_C$	$P_{tot}$	Package	Mfrs. List No.
20	32	1.0	85	0.5	1.4	SOT-89	BC868
20	32	2.0	85	0.5	1.35	SOT-223	BCP69
45	—	1.0	40	0.15	1.3	SOT-223	BCP54
45	—	1.0	100	0.15	1.3	SOT-223	BCP51-16
80	90	1.0	40	0.1	1.0	SOT-89	BSR42
80	90	2.0	100	0.1	1.4	SOT-89	BSR43
80	100	1.0	25	0.5	1.5	SOT-223	BCP56
80	100	1.5	100	0.15	1.3	SOT-223	BCP53-16
200	200	0.2	30	0.05	1.3	SOT-89	BST15
250	300	0.1	—	—	1.3	SOT-89	BST40

### SOT-223 General Purpose

Application Code Key: GP = General Purpose Amplifier/Switch, HV = High Voltage

	$V_{CBO}$	$V_{CBO}$	$I_C$	$h_{FE}$	$I_C$	$P_{tot}$	Appln. Code	Mfrs. Mfr.	Mfrs. List No.
<b>NPN</b>									
	40	75	1.0	100	0.15	1.0	GP	FCH	PZT2222A
	60	60	1.0	40	0.15	1.0	GP	FCH	BCP55
	80	100	1.0	40	0.15	1.0	GP	FCH	BCP56
	300	300	0.2	40	0.03	1.0	HV	FCH	PZTA42
	60	60	0.8	100	0.15	1.0	GP	FCH	PZT2907A
	80	100	1.2	40	0.15	1.5	GP	FCH	BCP53
<b>PNP</b>									
	300	300	0.1	40	0.01	1.0	HV	FCH	PZTA92

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	250+ 1K+
BCP53	932-966				
BCP55	932-930				
BCP56	932-942				
PZT2222A	932-875				
PZT2907A	932-899				
PZTA42	932-917				
PZTA92	932-929				

### General Purpose TO-92, T0-39, T0-5

High performance, low frequency devices typically with current ratings 1A to 2A. Up to 1W power dissipation.

$V_{CE0}$ max.	$I_C$ max.	$h_{FE}$ min.	$I_C$	$V_{CE(Sat)}$ max.	$I_C$	Package and Pin Out	Mfrs. Mfr.	Mfrs. List No.
25	2.0	100	1000	0.5	2000	TO-92(e)	ZET	ZTX649
40	1.0	50	150	1.4	150	TO-5	—	2N4037
45	1.0	40	150	—	—	TO-92(h)	PS	BC635
45	1.0	100	150	0.25	150	TO-92(e)	ZET	ZTX450
45	2.0	100	500	0.5	2000	TO-92(e)	ZET	ZTX650
50	2.0	30	500	0.8	500	TO-35	ST	2N5323
60	1.0	40	150	—	—	TO-92(h)	PS	BC638
60	1.0	50	150	0.35	150	TO-92(e)	ZET	ZTX451
60	2.0	40	500	1.0	1000	TO-39	—	BC441
60	2.0	100	500	0.5	2000	TO-92(e)	ZET	ZTX651
65	1.0	40	150	0.65	150	TO-39	—	2N4036
75	2.0	30	500	0.5	500	TO-39	ST	2N5320
80	1.0	40	150	0.7	150	TO-92(e)	ZET	ZTX552
80	1.0	40	150	—	—	TO-92(h)	PS	BC639
80	1.0	63	150	0.5	500	TO-92(e)	PS	BC639-10
100	1.0	40	150	0.7	150	TO-92(e)	ZET	ZTX453
100	2.0	100	500	0.5	2000	TO-92(e)	ZET	ZTX653

FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	1K+
BC441	.356-992				
BC461	.357-005				
BC635	.357-200				
BC638	305-0440				
BC639	357-248				
BC639-10	305-0452				
BC640	357-250				
ZTX450	.358-137				
ZTX451	.358-149				
ZTX453	.358-150				
ZTX550	.358-230				
ZTX551	.358-241				
ZTX552	358-253				
ZTX553	.432-829				
ZTX649	358-265				
ZTX650	358-277				
ZTX651	.358-289				
ZTX653	.358-290				
ZTX749	432-970				
ZTX750	.358-344				
ZTX751	.358-356				
ZTX753	.358-368				
2N2102	358-460				
2N4036	358-885				
2N4037	358-897				
<b>Order Multiple=1</b>					
2N5320	359-051	1+	25+	100+	1K+ 3K+
2N5322	359-063				
2N5323	359-075				

Continued

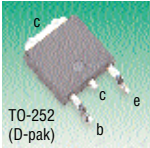


Order Multiple=5

Table with columns: Mfrs. List No., Order Code, Price Each (5+, 25+, 100+, 1K+). Rows include FZT560, MPSW92, ZTX458, ZTX558, ZTX657, ZTX658, ZTX757, ZTX758, ZTX857.

High Power Bipolar Transistors – V<sub>CEO</sub> to 150V

D-pak, General Purpose



H = 2.38, W = 6.73, D = 10.28

Table with columns: I<sub>c</sub> max., V<sub>CEO</sub> max., h<sub>FE</sub> min., I<sub>c</sub> @, f<sub>T</sub> min., P<sub>tot</sub> @ 25°C, Mfrs. List No. Rows include TO-252 (D-pak) with various specifications.

Table with columns: Mfrs. List No., Order Code, Price Each (1+, 25+, 100+, 500+). Rows include MJD200T4, MJD31C, MJD32C, MJD41C, MJD44H11, MJD45H11, MJD50.

† Available until stocks are exhausted

General Purpose

Large table with columns: I<sub>c</sub> (av) max., V<sub>CEO</sub> max., h<sub>FE</sub> min., I<sub>c</sub> @, P<sub>tot</sub> @ 25°C, Package, Mfr., Mfrs. List No. (NPN, PNP). Rows list various transistor models like TO-126, TO-202, TO-18, TO-9, etc.

continued

Summary table with columns: I<sub>c</sub> (av) max., V<sub>CEO</sub> max., h<sub>FE</sub> min., I<sub>c</sub> @, P<sub>tot</sub> @ 25°C, Package, Mfr., Mfrs. List No. (NPN, PNP). Rows include TO-3, TO-18, TO-18, TO-18, TO-3.

FOR PACKAGE AND PIN OUT DETAILS, SEE PAGE 358

SD37 / SD36

Large table with columns: Mfrs. List No., Order Code, Price Each (1+, 25+, 100+, 500+, 1K+). Rows include BD131, BD132, BD133, BD135, BD136, BD136-16, BD138, BD139, BD140 (ON), BD140 (ST), BD179, BD180, BD231, BD237 (ON), BD237 (ST), BD238 (ON), BD238 (ST), BD249C, BD433, BD434, BD435, BD436, BD437 (ON), BD437 (ST), BD438 (ON), BD438 (ST), BD440, BD442, BD791, BDX35, BDX36, BDX37, BDY90, BF469, BF470, BF869, BF870, BFX34, BUP40, BUP41, BUS50, BUT90, BUV20, BUV60, BUW48, BUW49, MJ802, MJ2955, MJ15001, MJ15002, MJ15003, MJ15004, MJ15015, MJ15016, MJ15022, MJ15023, MJ15024, MJ15025, MJE340 (ON), MJE340 (ST), MJE350 (ON), MJE350 (ST), MJE4343, MJE4353, PNP3055, SM3159, TIP33A, TIP34A, TIP34A, TIP34A, TIP35C, TIP36A, TIP36C, TIP2955, TIP3055, 2N3055, 2N3055H, 2N3716, 2N3771, 2N3772, 2N3773, 2N3773, 2N4919, 2N4920, 2N4923, 2N5038, 2N5192, 2N5195, 2N5882, 2N5883, 2N5886, 2N5888, 2N5888 (ON), 2N5888 (ST), 2N6254, 2N6328, 2N6331, 2N6438.

† Available until stocks are exhausted

High Power Bipolar Transistors – V<sub>CE0</sub> to 150V  
— continued

TO-220, General Purpose

Table with columns: I<sub>c</sub> (av) max., V<sub>CE0</sub> max., h<sub>FE</sub> @ I<sub>c</sub>, P<sub>tot</sub> @ 25°C, Mfrs. List No., NPN, PNP. Lists various transistor models like TIP29A, TIP30A, etc.

FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

SD283

Table with columns: Mfrs. List No., Order Code, Price Each (1+, 25+, 100+, 500+, 1K+). Lists models like BD202, BD203, etc.

continued

Table with columns: Mfrs. List No., Order Code, Price Each (1+, 25+, 100+, 500+, 1K+). Lists models like TIP42A, TIP42C (ON), etc.

High Voltage Power Transistors – V<sub>CE0</sub> 150V to 800V

High Voltage Switching

Table with columns: I<sub>c</sub> (av) max., V<sub>CE0</sub> max., V<sub>CE(sat)</sub>, V<sub>CE(sat)</sub> @ I<sub>c</sub>, t<sub>f</sub> max., P<sub>tot</sub> @ 25°C, Package, Mfrs. List No., NPN, PNP. Lists models like BD956, BD955, etc.

FOR PACKAGE AND PIN OUT DETAILS, SEE PAGE 358

SD33 / SD32

Table with columns: Mfrs. List No., Order Code, Price Each (1+, 25+, 100+, 500+, 1K+). Lists models like BD159, BF858, BU326A, etc.

continued



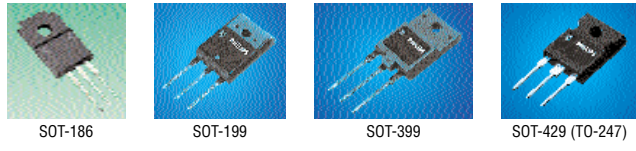
Mfrs. List No.	Order Code	Price Each				
		1+	5+	10+	25+	50+
BUV298AV	359-725					
		1+	25+	100+	500+	1K+
BUX48	359-830					
BUX48A	260-447					
BUX80	359-853					
BUX81	274-926 †					
BUX88	359-919					
BUX98	359-920					
BUX98A	359-932					
BUX98C	359-944					
BUY69A	359-968					
BUY89	359-981					
MJ423 (ON)	233-2437					
MJ13333	233-1974					
MJ16018	300-4960					
MJE13003	<b>NEW</b> 352-6367					
MJE13005	931-433					
MJE13007 (ON)	931-445					
MJE13007 (ST)	234-850					
MJE13009 (ON)	931-457					
MJE13009 (ST)	360-041					
MJE18204	300-4934					
MJE5731A	<b>NEW</b> 352-6380					
MJE5852	247-327					
MJW16010A	.638-195					
TIP47	.360-077					
TIP48 (ON)	334-3390					
TIP48 (PI)	360-089					
TIP50 (ON)	931-512					
TIP50 (PI)	360-107					
T1PL760A	.360-156					
2N3439	360-235					
2N3440	360-247					
2N3584	360-260					
2N6547	.360-338					
2SC2898	.572-676 †					
2SC2979	.572-688					

† Available until stocks are exhausted

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	500+
BUV48AFI	.251-069				
BUW12AF	.681-910 †				
BUW13AF	.681-921 †				
MJF18004	.931-469				

† Available until stocks are exhausted

## High Voltage Deflection Transistors Philips Semiconductors



- Fast switching, high performance deflection transistors for TV and monitor applications
- Low losses in all applications
- Full range of isolated and industry standard packages
- Integrated damper diode option

I <sub>C</sub> (DC) (A)	V <sub>CESM</sub> (V)	I <sub>C</sub> (SAT) (A)	t <sub>f</sub> max. (μs)	PACKAGE		
				SOT199	SOT399 (TOP3D)	TO247 (SOT429)
8	1700	4	0.52		BU2708AX	
8	1500	4.5	1.0	BU508AF		BU508AW
8	1500	4.5	0.6		BU2508AX	
8	1500	4.5	0.6	BU2508DF		
10	1700	4.5	0.25		BU2722AX	
10	1500	6	0.5	BU2520AF	BU2520AX	BU2520AW
10	1500	6	0.25			BU2522AW
12	1700	5	0.25		BU2727AX	
12	1500	8	0.35		BU2525AX	BU2525AW
12	1500	6	0.2		BU2527AX	BU2527AW
16	1500	9	0.25			BU2530AW
16	1500	7	0.1			BU2532AW

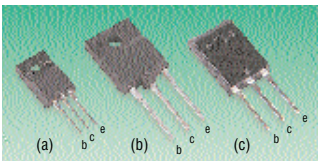
## Audio Power Transistors



I <sub>C</sub> (av) max. A	I <sub>C</sub> pk. A	V <sub>CEO</sub> max. V	V <sub>cb0</sub> max. V	h <sub>FE</sub> min. @ I <sub>C</sub> A	P <sub>tot</sub> @ 25°C W	Package	Mfrs. List No. NPN	Mfrs. List No. PNP	
1	—	250	—	50	1	50	TO-220	MJE15032	MJE15033
8	16	150	150	40	3	50	TO-220	MJE15030	MJE15031
15	25	200	200	60	7	200	TO-264	MJL3281A	MJL1302A
16	30	250	400	25	8	200	TO-264	MJL21194	MJL21193
16	30	250	400	25	8	250	TO-3	MJ21194	MJ21193

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	500+	1K+
MJ21193	448-965					
MJ21194	448-953					
MJE15030	708-598					
MJE15031	708-604					
MJE15032	449-039					
MJE15033	473-522					
MJL1302A	708-501					
MJL21193	162-255					
MJL21194	162-267					
MJL3281A	708-495					

## High Voltage, Switching – Isolated Packages



- (a) ISOWATT220  
Lead spacing = 2.54; Isolation voltage = 2kV
- (b) ISOWATT218  
Lead spacing = 5.45; Isolation voltage = 4kV
- (c) SOT-199  
Lead spacing = 5.45; Isolation voltage = 1.5kV

For use in converters, inverters, switch mode power supplies, motor control and other inductive switching applications. Isolated packages offer simpler and safer heatsinking.

I <sub>C</sub> max. A	V <sub>CEO</sub> max. V	V <sub>CEs</sub> max. V	V <sub>CE</sub> (sat) V @ I <sub>C</sub> A	t <sub>f</sub> max. μs	P <sub>tot</sub> @ 25°C W	Package	Mfrs. List No.
5	450	1000	1.1	1.0	0.4	35	(a) ON MJF18004
8	450	1000	1.5	6.0	0.8	34	(c) PS BUW12AF
15	450	1000	1.5	8.0	0.8	65	(b) ST BUV48AFI
15	450	1000	1.5	10.0	0.8	37	(c) PS BUW13AF

## CRT Deflection Transistors

NPN bipolar power transistors for use in horizontal deflection circuits of CRTs. Suitable for medium, high, and very high resolution monochrome and colour applications.

I <sub>C</sub> cont. A	V <sub>CEO</sub> (sus) V	V <sub>CEs</sub> V	V <sub>CE</sub> (sat) V @ I <sub>C</sub> A	P <sub>tot</sub> @ 25°C W	Package	Mfr.	Mfrs. List No.
5	600	1500	5.0	4.0	80	TO-247 (BS)	TOSH 2SD1427
5	700	1500	1.0	4.5	150	TO-3	— BU208A
6	250	550	0.6	1.0	80	TO-220	ON MJE16204
7	150	330	1.0	5.0	60	TO-220	ON/ST BU407
7	200	400	1.0	5.0	60	TO-220	ST BU406
10	650	1500	1.0	5.5	150	TO-247	ON MJW16212
10	800	1500	—	—	150	TO-247	ON MJW16018
12	500	1200	1.0	6.5	150	TO-247	ON MJW16206
15	650	1500	0.5	3.0	170	TO-264	ON MJL16218

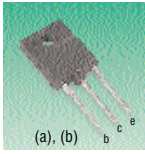
FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	500+
BU208A	.359-403				
BU406	359-427				
BU407 (ON)	.931-317				
BU407 (ST)	359-439				
MJE16204	233-0696				
MJL16218	300-5537				
MJW16018	.638-201				
MJW16206	.681-672				
MJW16212	681-684				
2SD1427	.572-585				

Continued

High Voltage Power Transistors –  
V<sub>CE0</sub> 150V to 800V — continued

CRT Deflection Transistors – Isolated Packages



(a) ISOWATT218  
Lead spacing = 5.45  
Isolation voltage = 4000V dc  
(b) TO-3P (IS)  
Isolation voltage = 2500V dc

I <sub>C</sub> (A)	V <sub>CE0</sub> (V)	V <sub>CB0</sub> (V)	V <sub>CE</sub> (sat) (V)	I <sub>C</sub> (A)	P <sub>tot</sub> (W)	Package	Mfr.	Mftrs. List No.
5.0	700	1500	1.5	3.0	50	a	ST	BUH315
6.0	600	1500	5.0	4.0	50	b	TOSH	2SC3884A
6.0	600	1500	5.0	5.0	50	b	TOSH	2SD2125
7.0	600	1500	5.0	5.0	50	b	TOSH	2SC4757
8.0	600	1500	5.0	6.0	50	b	TOSH	2SC3886A
8.0	700	1700	1.5	5.0	60	a	ST	BUH517
8.0	1500**	1500	1.0	4.5	50	b	TOSH	S2000N
10.0	700	1500	1.5	7.0	65	a	ST	BUH715

\*\*Specified as V<sub>CEs</sub>

SD157

Mftrs. List No.	Order Code	1+	25+	100+	500+	1K+
BUH315	.233-948					
BUH517	.233-973					
BUH715	.233-985 †					
2SD2125	572-603					
S2000N	572-615					
2SC4757	572-639					
2SC3886A	572-652					
2SC3884A	572-664					

† Available until stocks are exhausted

NPN Lighting Transistors

Philips Semiconductors



TO-220AB

SD471

V <sub>CE</sub> (V)	I <sub>C</sub> (A)	Mftrs. List No.	Order Code	1+	25+	100+	500+	1K+
700	4	BUJ103A	316-5188					
700	10	BUJ106A	316-5462					
850	6	BUJ204A	316-5190					
1000	5	BUJ303A	316-5206					
1200	6	BUJ403A	316-5218					

SMPS and Lighting Transistors

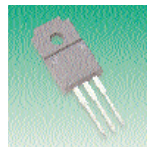
Philips Semiconductors



SOD-82



TO-220AB



SOT-186

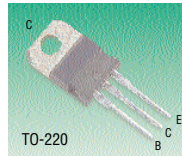
V <sub>CESM</sub> (V)	I <sub>C(DC)</sub> (A)	I <sub>C(SAT)</sub> (A)	t <sub>r</sub> (max.) (µs)	LEADED PACKAGES		
				SOT82	TO220AB (SOT78)	SOT186
800	0.5	—	0.28	BUX86P		
800	2	1	0.4		BUX84	
850	5	3	0.8		BUT11	
1000	0.5	—	0.28	BUX87P		
1000	2	1	0.4		BUX85	BUX85F
1000	5	2.5	0.8		BUT11A	
1000	6	4	0.8			BUT18AF
1000	8	5	0.8		BUT12A	

SD44

Mftrs. List No.	Order Code	1+	25+	100+	500+	1K+
BUT11	359-646					
BUT11A	359-658					
BUT12A	359-660					
BUT18AF	681-880					
BUX84	359-877					
BUX85	359-889					
BUX85F	681-969					
BUX86P	663-890					
BUX87P	663-906					

Electronic Lamp Ballast Transistors

ON Semiconductor



TO-220

NPN bipolar power transistors optimised for use in energy-saving compact fluorescent, industrial and halogen lamp ballasts.

◊ Integrated collector-emitter diode and anti-saturation network

I <sub>C</sub> cont. (max.) (A)	I <sub>C</sub> (op) operating (A)	V <sub>CE0</sub> (min.) (V)	V <sub>CEs</sub> (min.) (V)	h <sub>FE</sub> min. @ I <sub>C</sub> (op) V <sub>CE</sub> = 1V	Inductive Switching T <sub>SI</sub> (max.) (µs)	P <sub>D</sub> @ 25°C (W)	Mftrs. List No.
4	2	500	800	8	2.5	50	BUH50
5	2	400	700	7	3.8	75	BUL45
5	2	400	700	10	2.25	75	◊ BUL45D2
5	2	450	1000	6	2.5	75	MJE18004
6	3	400	700	8	3.8	100	BUL146
6	3	450	1000	6	3.2	100	MJE18006
10	—	400	700	15	6.0	100	BUH100

SD281

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
BUH50	.681-568					
BUH100	334-3480					
BUL45	.681-593					
BUL45D2	931-329					
BUL146	.681-600					
MJE18004	.681-623					
MJE18006	.681-635					

Darlington Transistors

SOT-23 Darlington NPN

Philips Semiconductors

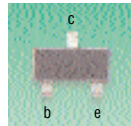


V <sub>CE0</sub> max. (V)	V <sub>CB0</sub> max. (V)	I <sub>C</sub> (av) max. (A)	h <sub>FE</sub> min. @	I <sub>C</sub> (A)	Device Marking	Package	Mftrs. List No.
60	80	0.5	20000	0.1	FGp	SOT-23	BCV47

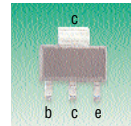
SD76

Order Multiple=5	Mftrs. List No.	Order Code	5+	100+	200+	500+	1K+
	BCV47	302-3333					

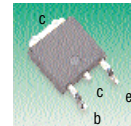
SOT-23, SOT-223 and D-pak Darlington



(a) SOT-23  
H = 1.12, W = 3.05, D = 2.5



(b) SOT-223  
H = 1.7, W = 6.7, D = 7.3



(c) TO-252/D-pak  
H = 2.55, W = 6.8, D = 10.5



V <sub>CE0</sub> max (V)	V <sub>CB0</sub> max (V)	I <sub>C</sub> (dc) max. (A)	h <sub>FE</sub> min @	I <sub>C</sub> (mA)	Device Marking	Package	Mfr.	Mftrs. List No.	NPN
30	30	0.3	10000	10.0	1M	a	FCH	MMBTA13	—
60	80	0.3	1000	0.5	4J	a	ZET	FMMT38A	—
60	80	0.3	4000	0.5	5J	a	ZET	FMMT38B	—
60	80	0.3	10000	0.5	7J	a	ZET	FMMT38C	—
100	—	8.0	1000	4.0	—	c	ON	MJD122	MJD127
120	140	1.5	5000	0.5	—	b	ZET	FZT605	—
120	140	2.0	3000	1.0	—	b	ZET	—	FZT705
140	160	2.0	2000	0.5	—	b	ZET	FZT600	—

SD177

Order Multiple=5	Mftrs. List No.	Order Code	5+	100+	200+	500+	1K+
	FMMT38A	302-6980					
	FMMT38B	302-6991					
	FMMT38C	.516-934					
	FZT600	707-806					
	FZT605	.538-279					
	FZT705	.538-280					
Order Multiple=1	Mftrs. List No.	Order Code	1+	25+	100+	500+	1K+
	MJD122	708-550					
	MJD127	708-562					
Order Multiple=10	Mftrs. List No.	Order Code	10+	100+	250+	1K+	3K+
	MMBTA13	743-021					



## Darlington Transistors — continued

0.3A to 60A – continued

SD30

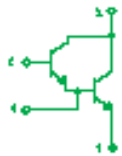
Order Multiple=1		Price Each				
Mfrs. List No.	Order Code	1+	25+	100+	500+	1K+
MJE5742	233-1070					
MJH6284	300-4909					
MJH6287	233-1536					
MJH11022	682-482 †					
2N6405	<b>NEW</b> 352-5430					
Order Multiple=5		5+	25+	100+	1K+	5K+
MPSA13 (FCH)	.426-568 †					
MPSA13 (ON)	334-3327					
MPSA13 (ZET)	426-556					
MPSA14	426-570					
MPSA27	992-756					
MPSA29	682-238					
MPSA63	.434-516					
Order Multiple=1		1+	25+	100+	500+	1K+
TIP102	<b>NEW</b> 352-6574					
TIP107	<b>NEW</b> 352-6586					
TIP110	.426-593					
TIP112 (ON)	334-3352					
TIP112 (ST)	426-623					
TIP115	.426-635					
TIP117 (ON)	334-3364					
TIP117 (ST)	426-659					
TIP120	426-660					
TIP121 (PI)	426-696					
TIP121 (ST)	.426-684					
TIP122 (ON)	931-524					
TIP122 (ST)	426-702					
TIP125	426-726					
TIP126	426-740					
TIP127 (ON)	.931-536					
TIP127 (ST)	426-775					
TIP132	.426-799					
TIP135	426-805					
TIP136	426-817					
TIP137	.426-829					
TIP140	426-830					
TIP141	.426-842					
TIP142	426-854					
TIP146	.426-878					
TIP147	426-880					
TIP150	426-891					
TIP162	426-910					
TIPP110	.426-933					
TIPP111	.426-945					
TIPP112	.426-957					
TIPP115	.426-969					
TIPP116	.426-970					
TIPP117	.426-982					
Order Multiple=5		5+	25+	100+	1K+	5K+
ZTX600	426-994					
ZTX600B	.427-007					
ZTX603	427-032					
ZTX605	.427-044					
ZTX614	432-969					
ZTX704	427-056					
ZTX705	.432-933					
ZTX712	427-068					
Order Multiple=1		1+	25+	100+	500+	1K+
2N6052	241-9348					
2N6056	241-9373					
2N6058	241-9397					
2N6059 (ON)	300-4077					
2N6059 (ST)	260-368					
2N6388	427-196					

† Available until stocks are exhausted

## NPN Darlington Power Modules



ISOTOP  
H = 12.2, W = 25.4, D = 38.2



Pin Config. a



Pin Config. b

I <sub>C</sub> A	V <sub>CE0</sub> V	I <sub>C</sub> (pk) A	I <sub>B</sub> A	h <sub>FE</sub> typ.	h <sub>FE</sub> @	I <sub>C</sub> A	P <sub>TOT</sub> W	Pin Config.	Mfrs. List No.
24	450	36	2.5	120	20	125	b	b	ESM3045DV
42	450	63	4	220	35	150	b	b	ESM4045DV
60	450	90	6	150	50	175	b	b	ESM5045DV
67	300	100	3	300	56	150	b	b	ESM2030DV
72	450	108	8	150	60	250	a	a	ESM6045AV
84	450	126	8	120	70	250	b	b	ESM6045DV
100	300	150	5	300	85	225	b	b	ESM3030DV
120	125	128	2	1200	120	175	b	b	ESM2012DV

SD230

Mfrs. List No.	Order Code	1+	5+	Price Each		
				10+	25+	50+
ESM2012DV	<b>739-364</b>					
ESM2030DV	<b>739-376</b>					
ESM3030DV	<b>739-352</b>					
ESM3045DV	<b>646-088</b>					
ESM4045DV	<b>.739-388</b>					
ESM5045DV	<b>646-090</b>					
ESM6045AV	<b>426-374</b>					
ESM6045DV	<b>646-106</b>					

## RF Bipolar Transistors

TO-39, TO-72 and TO-92

I <sub>C</sub> max. A	V <sub>CE0</sub> max. V	V <sub>CE0</sub> max. V	P <sub>TOT</sub> @ 25°C W	f <sub>T</sub> typ. (*min.) MHz	h <sub>FE</sub> @	I <sub>C</sub> mA	F typ. (*max.)	Package and Pin Out	Mfrs. List No.
<b>NPN</b>									
0.025	25	40	0.5	550*	38	7	—	TO-92(g)	PS BF199
0.05	25	30	350	625	60	4	—	TO-92(j)	ON MP5H10
0.05	25	30	0.35	625	60	4	—	TO-92(j)	FCH MP5H10
0.4	30	55	0.5	800*	63	100	—	TO-92(e)	ZET ZTX327
0.5	15	30	0.25	600	20	3	—	TO-92(e)	ZET ZTX320
0.5	15	30	0.25	600	20	3	—	TO-92(e)	ZET ZTX321
0.5	40	40	0.2	1400	40	150	5.5	TO-72(b)	ST BFY90
<b>PNP</b>									
0.025	40	40	0.3	350*	50	1	—	TO-92(c)	PS BF450
1.0	200	200	10	15*	30	50	—	TO-39	— 2N5415
1.0	300	350	10	15*	30	50	—	TO-39	ST 2N5416

FOR PACKAGE AND PIN OUT DETAILS, SEE PAGE 358

SD145

Order Multiple=1		Price Each				
Mfrs. List No.	Order Code	1+	25+	100+	300+	1K+
2N5415	<b>.360-284</b>					
2N5416	<b>.360-296</b>					
Order Multiple=5		5+	25+	100+	1K+	3K+
BF199 (PS)	357-339					
BF450	300-0916					
Order Multiple=1		1+	25+	100+	250+	1K+
BFY90	<b>.359-233 †</b>					
Order Multiple=5		5+	25+	100+	1K+	5K+
MP5H10 (FCH)	<b>.434-528 †</b>					
MP5H10 (ON)	<b>334-3339</b>					
ZTX320	<b>358-058</b>					
ZTX321	<b>358-060</b>					
Order Multiple=1		1+	25+	100+	1K+	5K+
ZTX327	<b>358-071</b>					

† Available until stocks are exhausted

## Wideband



SOT-23



211-11

ON Semiconductor

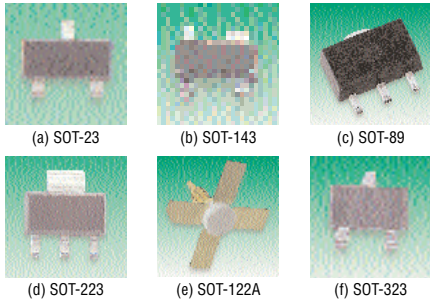


NPN/ PNP	V <sub>CE0</sub> max. V	I <sub>C</sub> max. mA	f <sub>T</sub> MHz	Package	Mfrs. List No.				
<b>Low Power</b>									
NPN	10	50	8	SOT-23	MMBR941LT1				
NPN/ PNP	V <sub>s</sub> supply V	P <sub>output</sub> W	P <sub>input</sub> W	f <sub>T</sub> MHz	G <sub>PE</sub> min. @ 30dB	Package	Mfrs. List No.		
<b>High Power</b>									
NPN	12.5/13.6	80	5	14-30	12	211-11/1	MRF454		
NPN	28	150	15	1.5-30	10	211-11/1	MRF422		
NPN	50	250	15.7	1.5-30	13	211-11/1	MRF448		
NPN/ PNP	V <sub>CE0</sub> V	P <sub>output</sub> W	I <sub>C</sub> A	P <sub>TOT</sub> W	ηD* min. %	f <sub>T</sub> MHz	G <sub>PE</sub> min. @ 30dB	Package	Mfrs. List No.
<b>Push-Pull Configuration</b>									
NPN	30	125	16	270	50	30-500	8	744A-01	MRF392

SD95

		Price Each				
Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
MMBR941LT1	<b>233-3053</b>					
MRF392	<b>234-2455</b>					
MRF422	<b>234-2522</b>					
MRF448	<b>300-5379</b>					
MRF454	<b>234-2625</b>					

## Low Power, Wideband



NPN/PNP	V <sub>CEO</sub> max V	I <sub>C</sub> max mA	P <sub>tot</sub> mW	f <sub>i</sub> GHz	h <sub>FE</sub> min	I <sub>C</sub> @ mA	Package	Device Marking	Mfrs. List No.
<b>f<sub>i</sub> up to 3.5GHz</b>									
NPN	5	6.5	30	2.3	20	1	a	V1p	PS BFT25
NPN	15	25	300	1.0	25	25	a	E1p	PS BFS17
NPN	15	25	300	2.8	25	25	a	E2p	PS BFS17A
NPN	15	50	280	2.5	20	25	a	MC	INF BFS17P
NPN	15	50	300	1.6	25	25	f	E1	PS BFS17W
NPN	20	25	330	0.45	40	7	a	G1	ZET BFS20
NPN	20	30	250	0.26	65	1	a	F2p/F2t	PS BFS19
NPN	25	300	1000	1.5	25	150	c	FA	PS BFG17
NPN	25	150	1000	1.6	25	150	d	—	PS BFG16A
PNP	30	25	250	0.4	25	4	a	F8p	PS BF824
PNP	40	25	250	0.325	50	1	a	LAp/LAT	PS BFE550
<b>f<sub>i</sub> up to 6GHz</b>									
NPN	5	6.5	32	5.0	50	0.5	f	N6	PS BFS25A
NPN	12	35	300	5.0	40	30	a	R1	PS BFR93
NPN	12	35	300	6.0	40	30	a	R2	PS BFR93A
PNP	12	35	300	5.0	20	30	a	X1p	PS BFT93
NPN	15	25	300	5.0	40	14	a	P1p	PS BFR92
NPN	15	25	300	5.0	40	15	a	P2p	PS BFR92A
NPN	15	25	300	5.0	40	15	f	P2	PS BFR92AW
NPN	15	30	280	5.0	40	14	a	GF	INF BFR92P
NPN	15	100	500	5.0	25	50	a	R7	PS BFR106
NPN	15	100	1000	5.5	25	70	c	FB	PS BFG19
NPN	15	100	1000	5.5	25	70	d	—	PS BFG97
NPN	15	200	400	5.0	50	35	b	N38	PS BFG590
PNP	15	35	200	5.0	20	14	a	W1	INF BFT92
NPN	16	30	280	5.8	50	15	a	RA	INF BFG81
NPN	18	150	2700	4.0	25	150	e	—	PS BFG34
NPN	18	300	4500	4.0	25	240	e	—	PS BFG68
<b>f<sub>i</sub> up to 8GHz</b>									
NPN	8	18	500	7.3	60	5	SOT-353	—	PS BFC505
NPN	8	70	1000	7.0	60	20	SOT-353	—	PS BFC520
NPN	10	50	300	8.0	60	15	b	V3	PS BFG67
NPN	10	100	500	7.5	40	50	b	V5	PS BFG197
NPN	12	80	400	8.0	100*	30	b	RC	INF BFP193
NPN	15	150	1000	7.0	80	100	d	—	PS BFG135
NPN	15	200	2000	7.0	80	70	d	—	PS BFG591
<b>f<sub>i</sub> up to 10GHz</b>									
NPN	8	18	500	9.0	60	5	SOT-353	—	PS BFE505
NPN	8	70	1000	9.0	60	20	SOT-353	—	PS BFE520
NPN	8	250	250	—	25	50	b	N70	PS BFG10
NPN	8	500	400	—	25	100	b	N72	PS BFG11
NPN	15	18	150	9.0	60	5	b	N33	PS BFG505
NPN	15	18	150	9.0	60	5	a	N30	PS BFR505
NPN	15	70	300	9.0	60	20	a	N28	PS BFR520
NPN	15	70	300	9.0	60	20	f	N2	PS BFS520
NPN	15	70	300	9.0	60	20	b	N36	PS BFG520
NPN	15	120	500	9.0	60	40	a	N29	PS BFR540
NPN	15	120	500	9.0	60	40	b	N37	PS BFG540
NPN	15	120	650	9.0	60	40	d	—	PS BFG541

♦ **Warning:** These products contain a beryllium oxide disc, the dust of which is toxic. Provided this disc is not damaged, the device is entirely safe. Safe disposal precautions must be carried out according to local regulations.

SD348 / SD348A

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	1K+
BF550	316-2850				
BF824	305-0579				
Order Multiple=1		1+	30+	100+	1K+
BFC505	163-272				
BFC520	163-284				
BFE505	163-296				
BFE520	163-302				
BFG10	163-314				
BFG11	163-326				
BFG16A	741-565				
BFG97	741-590				
BFG135	741-619				
BFG197	741-620 †				
BFG505	163-338				
BFG520	741-656				
BFG540	741-668 †				
BFG541	163-340 †				
BFG590	163-351				
BFG591	163-363				
BFR505	163-375				
BFP193	516-983				
BFG17	741-670				
BFG19	741-681				

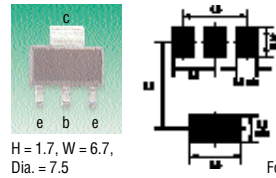
continued

Order Multiple=1		Price Each			
Mfrs. List No.	Order Code	1+	30+	100+	1K+
BFG34	741-693				
BFG68	741-711				
BFG81	516-971				
BFR92	741-723				
BFR92A	741-735				
BFR92AW	549-370				
BFR92P	516-946				
BFR93	549-277				
BFR93A	549-289				
BFR106	549-290				
BFR520	741-747				
BFR540	741-759				
Order Multiple=5		5+	30+	100+	1K+
BFS17	741-760				
BFS17A	741-796				
BFS17P	516-958				
BFS17W	549-368				
BFS19	316-2862				
BFS20	663-281				
BFS25A	316-4860				
BFS520	316-4871				
Order Multiple=1		1+	30+	100+	1K+
BFT25	741-772				
BFT92	516-960				
BFT93	741-784				

† Available until stocks are exhausted

## SOT-223, Medium Power – NPN

Philips Semiconductors



- Designed for hand held radio equipment
- SMD package
- 470MHz and 900MHz wavebands
- Reliable, gold metalisation process



V <sub>CEO</sub> max V	I <sub>C</sub> av mA	P <sub>tot</sub> W	f <sup>*</sup> MHz	V <sub>S</sub> Supply V	G <sub>p</sub> P <sub>LOAD</sub> * W	G <sub>p</sub> min dB	η <sub>C</sub> min %	Mfrs. List No.
8	250	2	900	4.8	2.0	6	60	BLT70
8	500	2	900	4.8	2.0	6	60	BLT71
9.5	500	2	900	7.5	1.2	6	60	BLT81
10	500	2	470	7.5	1.2	10	55	BLT50
10	750	2	900	7.5	0.8	6	60	BLT80
16	200	2	900	12.5	1.0	7	55	BLU86

\* RF performance at T<sub>S</sub> ≤ 60°C in common-emitter Class-B test circuit

SD355

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	1+	30+	100+	1K+
BLT50	742-065				
BLT70	742-119				
BLT71	742-077				
BLT80	742-090				
BLT81	742-120				
BLU86	742-107				

Continued

### Fixed Prices

We aim to maintain all prices in this book for the lifetime of this issue.

RF Bipolar Transistors — continued

High Power, HF/VHF and UHF Philips Semiconductors



SOT-121      SOT-123      SOT-122A

- Suitable for mobile radio transmitters    ● Optimised temperature profile
- HF/VHF and UHF wave-band

V <sub>CEO</sub> max V	I <sub>C</sub> av A	P <sub>tot</sub> W	f* MHz	V <sub>S</sub> * Supply V	P <sub>LOAD</sub> * W	G <sub>p</sub> * min dB	η <sub>D</sub> * min %	Package	Mfrs.
									List No.
<b>HF/VHF</b>									
16	9	100	1.6-28	12.5	30	19.5 typ.	35 typ.	SOT-120	BLW60C
18	4	20	175Δ	13.5Δ	8Δ	9Δ	70Δ	SOT-123	BLV10
33	15	230	1.6-28	28	175	11.5	40	SOT-121	BLW97
55	2.5	94	1.6-28	50	65	18 typ.	45 typ.	SOT-123	BLW50F
55	12	340	1.6-28	50	200	6.5 typ.	67 typ.	SOT-121	BLW96
<b>UHF</b>									
16	1.2	22.5	470Δ	12.5Δ	7Δ	8.5Δ	55Δ	SOT-122A	BLU97

\* RF performance measured under SSB (Class A-B) mode of operation  
 Δ RF performance measured under CW (Class B) mode of operation

**Warning:** These products contain a beryllium oxide disc, the dust of which is toxic. Provided this disc is not damaged, the device is entirely safe. Safe disposal precautions must be carried out according to local regulations.

SD341

Mfrs. List No.	Order Code	Price Each		
		1+	5+	10+
BLU97	<b>742-132</b> †			
BLV10	<b>742-144</b>			
BLW50F	<b>742-168</b>			
BLW60C	<b>742-170</b>			
BLW96	<b>742-181</b>			
BLW97	<b>742-193</b>			

† Available until stocks are exhausted

Transistor/Diode Kits

A.F. Transistor and Diode Kit



A unique, 41 piece kit including:

- 24 AF transistors and arrays
- 16 AF diodes and arrays
- Product CD-ROM, with datasheets, package outlines, and footprints
- Application CD-ROM with application notes, Spice models and S-parameters
- Active bias controller
- Wide range of package styles
- Refills available separately

Mfrs. List No. HLSK030

V <sub>CEO</sub> V	I <sub>C</sub> mA	P <sub>tot</sub> mW	H <sub>fe</sub> min.	H <sub>fe</sub> max.	I <sub>C</sub> @ mA	V <sub>CE(Sat)</sub> max. V	I <sub>C</sub> @ mA	Package	Device marking	Mfrs.
										List No.
<b>Single NPN Transistor</b>										
40	200	330	100	300	10	0.3	50	SOT-23	1A	SMBT3904
40	600	330	100	300	150	0.3	500	SOT-23	1P	SMBT2222A
45	200	250	200	450	2	0.65	100	SOT-323	1F	BC847BW
45	200	250	200	450	2	0.25	10	SOT-323	2F	BC850BW
45	1000	250	160	400	100	0.7	50	SOT-323	6B	BC817-25W
65	200	250	200	450	2	0.65	100	SOT-323	1B	BC846BW
80	500	330	100	—	100	0.25	100	SOT-23	1G	SMBTA06
<b>Dual NPN Transistor</b>										
40	200	250	100	300	10	0.3	50	SOT-363	1A	SMBT3904S
45	200	250	100	630	2	0.65	100	SOT-363	1C	BC847S
65	200	250	100	450	2	0.65	100	SOT-363	1D	BC846S
<b>Dual NPN/PNP Transistor</b>										
40	200	250	100	300	10	0.4	50	SOT-363	S3p	SMBT3904PN
45	200	250	110	630	2	0.65	100	SOT-363	1P	BC847PN
65	200	250	200	450	2	0.65	100	SOT-363	10	BC846PN
<b>Single PNP Transistor</b>										
15	6000	1700	85	475	500	0.15	2000	SOT-595	PA5	BCP72M
40	200	330	100	300	10	0.4	50	SOT-23	2A	SMBT3906
45	200	250	220	475	2	0.65	100	SOT-323	3F	BC857BW
45	200	250	220	475	2	0.65	100	SOT-323	4F	BC860BW
45	200	250	420	800	2	0.65	100	SOT-323	3G	BC857CW
45	1000	250	160	400	100	0.7	500	SOT-323	5B	BC807-25W
60	600	330	100	300	150	0.4	150	SOT-23	2F	SMBT2907A
80	500	330	100	—	100	0.25	100	SOT-23	2G	SMBTA56
<b>Dual PNP Transistor</b>										
40	200	250	100	300	10	0.4	50	SOT-363	2A	SMBT3906S
45	200	250	100	630	2	0.65	100	SOT-363	3C	BC857S
65	200	250	200	475	2	0.65	100	SOT-363	3D	BC856S

V <sub>r</sub> V	I <sub>r</sub> mA	V <sub>br</sub> V	I <sub>r(max.)</sub> µA	V <sub>r</sub> V	V <sub>r</sub> V @ I <sub>r</sub> mA	t <sub>rr</sub> ns	Package	Device marking	Mfrs. List No.	
<b>Single Diode</b>										
10	3	10	300	5	0.2	100	—	SOD-323	3	BAT60A
10	3	10	5	5	0.3	100	—	SOD-323	3	BAT60B
40	750	40	50	30	0.7	250	—	SOD-323	C	BAT165
75	250	75	0.005	75	1.25	150	—	SOT-23	JV	BAS116
75	250	75	1	75	1.25	150	6	SOD-323	A6	BAS16-03W
<b>Dual Diode</b>										
75	200	85	1	75	1.25	150	6	SOT-343	JT	BAS28W
<b>Dual Diode – Common Anode</b>										
40	250	40	2	30	0.75	100	—	SOT-323	67	BAT64-07W
<b>Dual Diode – Common Cathode</b>										
40	250	40	2	30	0.75	100	—	SOT-323	65	BAT64-05W
70	200	70	2.5	70	1.25	150	6	SOT-363	A4	BAV70W
<b>Dual Diode – Series</b>										
40	250	40	2	30	0.75	100	—	SOT-323	64	BAT64-04W
70	200	70	5	70	1.25	150	3	SOT-23	JY	BAV199
70	200	70	2.5	70	1.25	150	6	SOT-323	A7	BAV99W
240	400	240	50	240	0.37	20	—	SOT-23	4Ms	BAT240A
<b>Quad Diode – Common Anode</b>										
70	70	70	0.1	50	0.75	10	—	SOT-363	76s	BAS70-06S
<b>Quad Diode – Common Cathode</b>										
70	200	70	2.5	70	1.25	150	6	SOT-363	A4	BAV70S
<b>Quad Diode – Series</b>										
70	200	70	2.5	70	1.25	150	6	SOT-363	A7	BAV99S

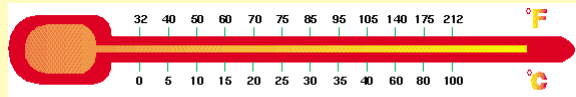
DC Characteristics with stabilised NPN transistors

V <sub>CC</sub> V	vs. h <sub>FE</sub>	Relative Change of DIC/IC		Package	Device Marking	Mfrs. List No.
		vs. V <sub>s</sub>	vs. T (amb)			
<b>Active Bias Controller</b>						
50	0.08	0.15	2%/K	SOT-343	W4s	BCR400W

SD122 / SD122A

Order Multiple=1		Price Each				
Mfrs. List No.	Order Code	1+	5+	1K+	3K+	
<b>Transistor/Diode Kit</b>						
HLSK030	<b>301-0235</b>					
<b>Order Multiple=10</b>						
BAS116	<b>743-215.</b>	10+	100+	1K+	3K+	
BAS16-03W	<b>300-7789</b>	10+	100+	250+	1K+	3K+
BAS28W	<b>300-7881</b>					
BAS70-06S	<b>300-7893</b>					
BAT165	<b>300-7790</b>					
BAT240A	<b>300-9002</b>					
BAT60A	<b>300-7807</b>					
BAT60B	<b>300-7819</b>					
BAT64-04W	<b>300-7820</b>					
BAT64-05W	<b>300-7832</b>					
BAT64-07W	<b>300-7856</b>	10+	100+	1K+	3K+	
BAV199	<b>743-227.</b>	10+	100+	250+	1K+	3K+
BAV70S	<b>300-7868</b>					
BAV70W	<b>300-8629</b>					
BAV99S	<b>300-7870</b>					
BAV99W	<b>300-8630</b>					
BC80725W	<b>300-7571</b>					
BC817-25W	<b>300-7558</b>	10+	100+	1K+	3K+	
BC846BW	<b>743-069.</b>	10+	100+	250+	1K+	3K+
BC846PN	<b>300-7765</b>					
BC846S	<b>300-7741</b>					
BC847BW	<b>300-7560</b>					
BC847PN	<b>300-7704</b>					
BC847S	<b>300-7686</b>					
BC850BW	<b>300-7601</b>					
BC856S	<b>300-7753</b>					
BC857BW	<b>300-7583</b>					
BC857CW	<b>300-7595</b>					
BC857S	<b>300-7698</b>					
BC860BW	<b>300-7613</b>					
BCP72M	<b>300-8307</b>					
BCR400W	<b>300-8319.</b>					
SMBT2222A	<b>300-7625</b>					
SMBT2907A	<b>300-7637</b>					
SMBT3904	<b>300-7649</b>					
SMBT3904PN	<b>300-7730</b>					
SMBT3904S	<b>300-7716</b>					
SMBT3906	<b>300-7650</b>					
SMBT3906S	<b>300-7728</b>					
SMBTA06	<b>300-7662</b>					
SMBTA56	<b>300-7674</b>					

Temperature Conversion



## R.F. Transistor Kit



Mftrs. List No. HLSK010

- 30 different types
- 10 devices of each type (5 devices for SOT-223 and SOT-89 packages)
- Transition frequencies 1GHz to 25GHz
- Power ratings up to 1 Watt
- Product CD-ROM, with datasheets, package outlines, and footprints
- Application CD-ROM with application notes, Spice models and S-parameters
- Active bias controller
- Wide range of package styles

### Contents:

$V_{CE0}$ V	$I_C$ mA	$P_{tot}$ mW	$f_T$ (typ.) GHz	$f_c$ (typ.) dB	@ $I_C$ mA	$G_{ms}$ (typ.) dB	@ $I_C$ mA	Package	Device marking	Mftrs. List No.
<b>NPN</b>										
4.5	12	55	25	1.15	2	22.0	5	SOT-343	ALs	BFP405
4.5	35	160	25	1.05	5	20.0	20	SOT-343	AMs	BFP420
4.5	100	450	24	1.25	10	14.0	50	SOT-343	ANs	BFP450
4.5	600	1000	25	4.0	40	9.5	200	SOT-343	AOs	BFP490
8	4	30	7	2.25	1	11.5	1	SOT-343	RDs	BFP180W
8	10	80	7.5	2.0	1.5	15.0	3	SOT-343	REs	BFP280W
8	10	80	7.5	1.5	1.5	18.0	3	SOT-363	REs	BFS480N
12	20	175	8	1.8	2	16.5	5	SOT-343	RFs	BFP181W
12	20	175	8	1.45	2	19.0	5	SOT-363	RFs	BFS481N
12	20	250	8	12.0	3	19.5	10	SOT-363	RGs	BFS482N
12	35	250	8	1.9	3	15.5	10	SOT-343	RGs	BFP182W
12	50	300	6	2.0	5	15.0	30	SOT-323	R1s	BFR93AW
12	65	450	8	2.0	5	14.5	15	SOT-343	RHs	BFP183W
12	65	450	8	1.2	5	19.0	15	SOT-363	RHs	BFS483N
12	80	580	8	2.1	10	13.0	30	SOT-343	RCs	BFP193W
12	100	700	7.5	2.5	20	11.5	50	SOT-343	RIs	BFP196W
12	150	1000	5.5	3.3	30	9.5	80	SOT-343	PAs	BFP136W
15	25	280	2.5	3.5	2	11.0	14	SOT-323	MCs	BFS17S
15	25	280	2.5	3.5	2	11.0	14	SOT-323	MCs	BFS17W
15	30	280	5	1.8	2	15.5	15	SOT-323	P1s	BFR92W
15	75	1000	5.5	2.5	20	11.5	70	SOT-89	FGs	BFG19S
15	300	2000	5.5	2.7	60	12.0	200	SOT-223	—	BFG235
16	30	280	5.8	1.45	5	19.0	15	SOT-23	RAs	BFP81
20	35	280	1.1	3.0	5	11.2	5	SOT-323	LKs	BF799W
<b>PNP</b>										
12	35	300	5.5	2.7	2	11.5	30	SOT-93	X1s	BFT93
15	25	200	5	2.0	2	14.0	15	SOT-323	W1s	BFT92W
15	100	700	5	2.8	20	10.0	70	SOT-23	RKs	BFR194

$V_d$ V	$I_D$ mA	$P_{tot}$ W	@ $f = 100\text{MHz}$		@ $f = 1\text{GHz}$		Package	Device Marking	Mftrs. List No.
			Gain (typ.) dB	NF (typ.) dB	Gain (typ.) dB	NF (typ.) dB			
<b>Si-MMIC-Amplifiers</b>									
6	15	90	19	1.9	17	2	SOT-343	BLs	BGA420
6	25	150	27	1.9	22	2	SOT-363	BMs	BGA425

### DC Characteristics with stabilised NPN transistors

$V_{CC}$ V	Relative Change of DIC/IC			Package	Device Marking	Mftrs. List No.
	vs. $h_{FE}$	vs. $V_s$	vs. T (amb)			
<b>Active Bias Controller</b>						
15	0.08	0.15	2%/K	SOT-343	W4s	BCR400W SD123 / SD123A

### Order Multiple=1

Mftrs. List No.	Order Code	1+	5+	10+	100+	250+	1K+	3K+
<b>R.F. Transistor Kit</b>								
HLSK010	301-0247							
<b>Order Multiple=10</b>								
BCR400W	300-8319.							
<b>Order Multiple=5</b>								
BF799W	300-6750							
<b>Order Multiple=1</b>								
BFG235	300-6736							
BFP136W	300-6670							
BFP180W	300-6682							
BFP181W	300-6621							
BFP182W	300-6633							
BFP183W	300-6645							
BFP193W	300-6657							
BFP196W	300-6669							
BFP280W	300-6694							
BFP405	300-6580							
BFP420	300-6591							
BFP450	300-6608							
BFP490	300-6610							
BFP81	300-6761							
BFG19S	300-6773							
BFR194	300-6724							

continued

Order Multiple=5	Order Code	5+	100+	250+	1K+	3K+
<b>Mftrs. List No.</b>						
BFR92W	300-6700					
BFR93AW	300-6712					
BFS17S	300-6785					
BFS17W	300-8654					
<b>Order Multiple=1</b>						
BFS480N	300-6797	1+	100+	250+	1K+	3K+
BFS481N	300-6803					
BFS482N	300-6815					
BFS483N	300-6827					
<b>Order Multiple=5</b>						
BFT92W	300-6748	5+	100+	250+	1K+	3K+
BFT93	300-6852					
<b>Order Multiple=1</b>						
BGA420	300-6839	1+	25+	100+	250+	1K+
BGA425	300-6840	1+	100+	250+	1K+	3K+

## Health & Safety Data Sheets

Ring our Dataline on (65) 788 1922 to have COSHH sheets sent upon request.

## Online Catalogue!

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100,000 products available for ordering online at [www.farnell.com](http://www.farnell.com)

## Summary of IP Protection Numbers

**FIRST NUMBER** — Protection against solid objects.

### IP Tests

- 0 No protection
- 1 Protected against solid objects up to 50mm, e.g. accidental touch by hands.
- 2 Protected against solid objects up to 12mm, e.g. fingers.
- 3 Protected against solid objects over 2.5mm (tools and wires).
- 4 Protected against solid objects over 1mm (tools, wire, and small wires).
- 5 Protected against dust limited ingress (no harmful deposit).
- 6 Totally protected against dust.

**SECOND NUMBER** — Protection against liquids

### IP Tests

- 0 No protection
- 1 Protection against vertically falling drops of water, e.g. condensation.
- 2 Protection against direct sprays of water up to 15° from the vertical.
- 3 Protected against direct sprays of water up to 60° from the vertical.
- 4 Protection against water sprayed from all directions – limited ingress permitted.
- 5 Protected against low pressure jets of water from all directions – limited ingress permitted.
- 6 Protected against low pressure jets of water, e.g. for use on shipdecks – limited ingress permitted.
- 7 Protected against the effect of immersion between 15cm and 1m.
- 8 Protects against long periods of immersion under pressure.

**THIRD NUMBER** — Protection against mechanical impacts (commonly omitted).

### IP Tests

- 0 No protection.
- 1 Protects against impact of 0.225 joule. (e.g. 150g weight falling from 15cm height).
- 2 Protected against impact of 0.375 joule. (e.g. 250g weight falling from 15cm height).
- 3 Protected against impact of 0.5 joule. (e.g. 250g weight falling from 20cm height).
- 4 Protected against impact of 2.0 joule. (e.g. 500g weight falling from 40cm height).
- 5 Protected against impact of 6.0 joule. (e.g. 1.5kg weight falling from 40cm height).
- 6 Protected against impact of 20.0 joule. (e.g. 5kg weight falling from 40cm height).

## Transistor/Diode Kits — continued

### Digital Transistor Kit



A unique, 40 piece kit including:-

- 33 single and 5 dual digital transistor types
- 10 pieces of each type
- Product CD-ROM, with datasheets, package outlines, and footprints
- Application CD-ROM with application notes, Spice models and S-parameters
- Power dissipation up to 1W
- Transistor arrays, 50Ω Silicon MMIC's and active bias controller
- Refills available separately

Mfrs. List No. HLSK020

**Contents:**

$V_{CE0}$ V	$V_{I(on)}$ V	$I_c$ mA	$P_{tot}$ mW	R1 kW	R2 kW	$h_{FE}$ @ $I_c = 5mA$ $V_{ce} = 5V$	$V_{I(on) min.}$ @ $I_c = 2mA$ V	Package	Device marking	Mfrs. List No.
<b>Single NPN, SOT-23</b>										
50	10	500	330	1	1	20	1.0	SOT-23	XVs	BCR521
50	12	500	330	2.2	2.2	40	1.0	SOT-23	XAs	BCR503
50	12	500	330	2.2	10	70	0.5	SOT-23	XWs	BCR505
50	12	500	330	1	10	70	0.4	SOT-23	XGs	BCR523
50	15	100	250	4.7	47	70	0.5	SOT-323	WGs	BCR116
50	30	500	330	4.7	47	60	1.0	SOT-23	XFs	BCR512
50	50	70	250	47	22	50	1.5	SOT-323	WLs	BCR146
<b>Single NPN, SOT-323</b>										
50	10	100	250	2.2	47	70	0.5	SOT-323	WHs	BCR108W
50	20	100	250	10	10	30	1.0	SOT-323	WCs	BCR133W
50	20	100	250	10	47	70	0.5	SOT-323	WJs	BCR135W
50	30	100	250	22	22	50	1.0	SOT-323	WDs	BCR141W
50	30	100	250	22	47	70	1.5	SOT-323	WZs	BCR142W
50	50	70	250	47	47	70	1.0	SOT-323	WEs	BCR148W
<b>Single NPN, SOT-363</b>										
50	10	100	200	2.2	47	70	0.5	SOT-363	WHs	BCR108S
50	15	100	200	4.7	—	120	0.5	SOT-363	WKs	BCR119S
50	20	100	200	10	10	30	1.0	SOT-363	WCs	BCR133S
50	20	100	200	10	47	70	0.5	SOT-363	WJs	BCR135S
50	20	100	250	10	10	30	1.0	SOT-363	WMs	BCR183S
50	30	100	200	22	22	50	1.0	SOT-363	WDs	BCR141S
50	50	100	200	47	47	70	1.0	SOT-363	WEs	BCR148S
<b>Single PNP, SOT-23</b>										
50	10	100	250	2.2	47	70	0.5	SOT-23	WIs	BCR158
50	12	500	330	2.2	2.2	40	1.0	SOT-23	XBs	BCR553
50	12	500	330	2.2	10	70	0.5	SOT-23	XDs	BCR555
50	12	500	330	1	10	70	0.7	SOT-23	XHs	BCR573
50	15	100	250	4.7	47	70	0.5	SOT-323	WTs	BCR166
50	30	500	330	4.7	47	60	1.0	SOT-23	XUs	BCR562
50	40	500	330	10	10	70	1.1	SOT-23	XMs	BCR583
<b>Single PNP, SOT-323</b>										
50	20	100	250	10	47	70	0.5	SOT-323	WNs	BCR185W
50	50	70	250	47	47	70	1.0	SOT-323	WRs	BCR198W
<b>Dual PNP, SOT-363</b>										
50	15	100	200	4.7	—	120	0.5	SOT-363	WSs	BCR169S
50	20	100	200	10	47	70	1.0	SOT-363	WNs	BCR185S
50	30	100	200	22	22	50	1.0	SOT-363	WOs	BCR191S
50	50	100	200	47	47	70	1.0	SOT-363	WRs	BCR198S
<b>Dual NPN/PNP</b>										
50	10	100	250	2.2	47	70	0.5	SOT-363	WFs	BCR08PN
50	25	100	250	10	10	30	1.0	SOT-363	W1s	BCR10PN
50	30	100	250	22	22	50	1.0	SOT-363	WPs	BCR22PN
50	20	100	250	10	47	70	0.5	SOT-363	WUs	BCR35PN
50	50/10	100	250	2.2/47	47/47	70	1.0	SOT-363	WTs	BCR48PN

$V_{ce0}$ V	$I_c$ mA	$P_{tot}$ W	$f_T$ MHz	$I_{cbo}$ nA	$V_{ce0}$ V	$V_{ce(sat)}$ @ $I_c = 2A$ V	Package	Device Marking	Mfrs. List No.
<b>PNP AF Power Transistor</b>									
15	6	1.7	100	100	15	0.15	SCT-595	PAs	BCP72M
<b>DC Characteristics with stabilised NPN transistors</b>									
$V_{cc}$ V	Relative Change of $I_{C/I_C}$ vs. $I_{FE}$		vs. $V_s$		vs. $T$ (amb)		Package <td>Device Marking <td>Mfrs. List No.</td> </td>	Device Marking <td>Mfrs. List No.</td>	Mfrs. List No.
<b>Active Bias Controller</b>									
50	0.08		0.15		2%/K		SOT-343	W4s	BCR400W SD124 / SD124A

Mfrs. List No.	Order Code	Price Each					
		1+	5+	10+	100+	250+	1K+
<b>Order Multiple=1</b>							
Digital Transistor Kit HLSK020	300-9403						
<b>Order Multiple=10</b>							
BCP72M	300-8307						
BCR08PN	300-8149						
BCR108S	300-8198						
BCR108W	300-7911						
BCR10PN	300-8150						
BCR116	300-7923						
BCR119S	300-8204						
BCR133S	300-8216						
BCR133W	300-7935						
BCR135S	300-8228						
BCR135W	300-7947						

continued

**Order Multiple=10**

Mfrs. List No.	Order Code	10+	100+	250+	1K+	3K+
BCR141S	300-8230					
BCR141W	300-7959					
BCR142W	300-7960					
BCR146	300-7972					
BCR148S	300-8241					
BCR148W	300-7984					
BCR158	300-7996					
BCR166	300-8009					
BCR169S	300-8253					
BCR183S	300-8265					
BCR185S	300-8277					
BCR185W	300-8010					
BCR191S	300-8289					
BCR198S	300-8290					
BCR198W	300-8022					
BCR22PN	300-8162					
BCR35PN	300-8174					
BCR400W	300-8319					
BCR48PN	300-8186					
BCR503	300-8034					
BCR505	300-8046					
BCR512	300-8058					
BCR521	300-8060					
BCR523	300-8071					
BCR553	300-8095					
BCR555	300-8101					
BCR562	300-8113					
BCR573	300-8125					
BCR583	300-8137					

## Unijunction Transistors

### TO-18, TO-92 Unijunction

Package and Pin Out	Intrinsic Standoff Ratio	Interbase Resistance kΩ	Max Point Emitter Current	Reverse Current @ V (be)	Minimum Valley Current	Mfrs. List No.
TO-18	0.56-0.75	4.7 to 9.1	5μA	12μA @ 30V	4mA	2N2646

Maximum interbase voltage 35V (all types)

### Programmable Unijunction Transistors

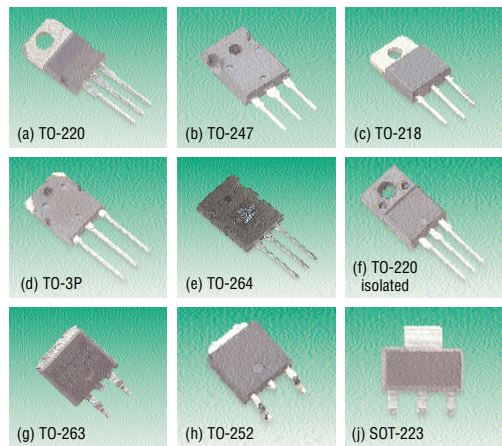
Package and Pin Out	Max point Current @ RG = 10kΩ	Min valley Current @ RG = 10kΩ	Pulsed Output Voltage $V_o$	Max dc Anode Current	Mfrs. List No.
TO-92	5μA	70μA	6V min	150mA	2N6027
TO-92	1μA	25μA	6V min	150mA	2N6028

Mfrs. List No.	Order Code	1+	25+	100+	1K+
2N2646	.290-282				
2N6027	.438-789				
2N6028	.290-300				

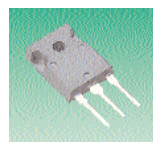
## Insulated Gate Bipolar Transistors (IGBTs)

IGBT's combine the simple gate drive characteristics of MOSFETs with the high current and low saturation voltage capability of bipolar transistors.

### IGBT Package Types



### SMPS Series IGBT's



- Replacement for industry standard IRFP450, IRFP460
- Optimised for high frequency SMPS applications >100kHz
- 600V switching SOA capability
- Low conduction losses
- Increased reliability – cooler operating temperatures
- Integral anti-parallel Hyperfast™ diode
- Reduced component count





$V_{ce0}$ V	$I_c$ cont 25°C A	$V_{ce}$ sat max. V	$I_{cm}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. (*typ.) ns	$P_d$ 25°C W	Package	Mfrs. List No.
600	54	2.7	96	16.0	95	167	TO-247	HGTG12N60A4D
600	70	2.7	280	12.0	32*	290	TO-247	HGTG20N60A4D
600	75	2.6	240	12.0	38*	463	TO-247	HGTG30N60A4D

SD495

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
HGTG12N60A4D	335-3680					
HGTG20N60A4D	335-3692					
HGTG30N60A4D	335-3709					

### Warp Speed™ IGBTs

- Class-leading low switching losses
- Low-cost alternative to power MOSFETs in switch mode power supplies <150kHz
- Ideal for Power Factor Correction applications



$V_{ce0}$ V	$I_c$ cont 25°C A	$V_{ce}$ sat max. V	$I_{cm}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. (*typ.) ns	$P_d$ 25°C W	Package	Mfrs. List No.
----------------	-------------------------	---------------------------	-------------------------	---------------------	-----------------------------	--------------------	---------	----------------

Warp Speed™								
600	11.8	2.16	52	14	64*	34	TO-220 Fullpak	IRG4IBC20W
600	13	2.6	52	15	150	60	TO-220	IRG4BC20W
600	17	2.1	92	16	67*	45	TO-220 Fullpak	IRG4IBC30W
600	23	2.7	92	17	150	100	TO-220	IRG4BC30W
600	23	2.7	92	16	67	100	TO-247	IRG4PC30W
600	40	2.5	160	22	74	160	TO-220	IRG4BC40W
600	40	2.5	160	23	124	160	TO-247	IRG4PC40W
600	55	2.3	220	33	120	200	TO-247	IRG4PC50W
900	51	2.7	204	26	220	200	TO-247	IRG4PF50W

Warp Speed™, with Integral Anti-Parallel Diode								
900	51	2.25	204	52	190	200	TO-247	IRG4PF50WD

SD408

Mfrs. List No.	Order Code	Price Each		
		1+	25+	100+
IRG4BC20W	.995-617			
IRG4BC30W	.995-629			
IRG4BC40W	.995-630			
IRG4IBC20W	315-7090			
IRG4IBC30W	315-7106			
IRG4PC30W	.995-642			
IRG4PC40W	.995-654			
IRG4PC50W	.995-666			
IRG4PF50W	168-300			
IRG4PF50WD	315-7118			

### Generation IV, N-Channel



$V_{ce0}$ V	$I_c$ cont @ 25°C A	$V_{CE}$ (sat) max V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ max (*typ.) ns	$P_d$ @ 25°C W	Package	Mfrs. List No.
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Ultra-fast Switching, with Integral Antiparallel Diode								
600	11.4	1.85	52	17	220	34	TO-220-Fullpak	IRG4IBC20UD
600	13	2.4	52	15	110	60	TO-220	IRG4BC20UD
600	17	1.95	92	21	180	45	TO-220-Fullpak	IRG4IBC30UD
600	23	2.5	92	21	80	100	TO-220	IRG4BC30UD
600	23	2.5	92	21	80	100	TO-247	IRG4PC30UD
600	70	2.2	280	25	140	200	TO-247	IRG4PC50UD
1200	30	3.5	120	59	150	160	TO-247	IRG4PH40UD
1200	45	3.7	180	24	260	200	TO-247	IRG4PH50UD

Fast Switching, with Integral Antiparallel Diode								
600	14.3	1.66	64	22	290	34	TO-220-Fullpak	IRG4IBC20FD
600	20.3	1.59	120	27	310	45	TO-220-Fullpak	IRG4IBC30FD
600	31	1.9	120	26	160	100	TO-220	IRG4BC30FD
600	31	1.9	120	26	160	100	TO-247	IRG4PC30FD
600	49	1.8	200	32	170	160	TO-247	IRG4PC40FD
600	70	1.7	280	25	140	200	TO-247	IRG4PC50FD

Fast Switching								
600	31	1.9	120	15	180	100	TO-220	IRG4BC30F
600	31	1.9	120	15	180	100	TO-247	IRG4PC30F
600	49	1.8	200	18	170	160	TO-220	IRG4BC40F
600	49	1.8	200	18	170	160	TO-247	IRG4PC40F
600	70	1.7	280	25	130	200	TO-247	IRG4PC50F

Low Saturation Voltage								
250	98	1.5	196	44	760	200	TO-247	IRG4P254S
600	19	1.6	38	9.7	640	60	TO-220	IRG4BC20S
600	34	1.6	68	18	590	100	TO-220	IRG4BC30S
600	34	1.6	68	18	590	100	TO-247	IRG4PC30S
600	60	1.6	120	18	380	160	TO-247	IRG4PC40S
600	70	1.36	140	30	600	200	TO-247	IRG4PC50S

Ultra-Fast Switching								
600	13	2.4	52	13	120	60	TO-220	IRG4BC20U
600	23	2.5	92	9.6	97	100	TO-220	IRG4BC30U
600	23	2.5	92	9.6	97	100	TO-247	IRG4PC30U
1200	30	3.5	120	18	190	160	TO-247	IRG4PH40U
1200	45	3.7	180	15	500	200	TO-247	IRG4PH50U

SD383

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
IRG4BC20S	162-280				
IRG4BC20U	.934-355				
IRG4BC20UD	.934-367				
IRG4BC30F	934-379				
IRG4BC30FD	934-380				
IRG4BC30S	162-292				
IRG4BC30U	934-392				
IRG4BC30UD	934-409				
IRG4BC40F	934-410				
IRG4IBC20FD	315-7155				
IRG4IBC20UD	315-7167				
IRG4IBC20W	315-7090				
IRG4IBC30FD	315-7179				
IRG4IBC30UD	315-7180				
IRG4P254S	168-191				
IRG4PC30F	934-422				
IRG4PC30FD	934-434				
IRG4PC30S	162-309				
IRG4PC30U	.934-446				
IRG4PC30UD	934-458				
IRG4PC40F	934-460				
IRG4PC40FD	934-471				
IRG4PC40S	934-495				
IRG4PC50F	934-501				
IRG4PC50FD	934-513				
IRG4PC50UD	.934-525				
IRG4PC50S	162-310				
IRG4PH40U	162-322				
IRG4PH40UD	162-334				
IRG4PH50U	162-346				
IRG4PH50UD	162-358				

### Generation IV, 10µs Short-Circuit Rated



$V_{ce0}$ V	$I_c$ cont 25°C A	$V_{ce}$ sat typ. V	$I_{cm}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. (*typ.) ns	$P_d$ 25°C W	Package	Mfrs. List No.
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Ultra-Fast Switching – N Channel								
600	9	2.39	18	24	190	38	TO-220	IRG4BC10K
600	16	2.27	32	27	150	60	TO-220	IRG4BC20K
600	28	2.21	58	28	170	100	TO-220	IRG4BC30K
600	28	2.21	58	28	170	100	TO-220	IRG4PC30K
600	42	2.1	84	18	*150	160	TO-220	IRG4BC40K
600	42	2.1	84	15	210	160	TO-247	IRG4PC40K
600	52	1.84	104	34	120	200	TO-247	IRG4PC50K
1200	11	3.17	22	28	620	60	TO-247	IRG4PH20K
1200	20	3.1	40	23	170	100	TO-247	IRG4PH30K
1200	30	2.74	60	22	230	160	TO-247	IRG4PH40K
1200	45	2.77	90	29	280	200	TO-247	IRG4PH40K

Ultra-Fast Switching, with Integral Soft-Recovery Diode – N Channel								
600	9	2.39	18	32	310	38	TO-220	IRG4BC10KD
600	16	2.27	32	37	*160	60	TO-220	IRG4BC20KD
600	28	2.21	58	42	120	100	TO-220	IRG4BC30KD
600	42	2.1	84	37	*140	160	TO-247	IRG4PC40KD
600	52	1.84	104	49	140	104	TO-247	IRG4PC50KD
1200	11	3.17	22	30	620	60	TO-247	IRG4PH20KD
1200	20	3.1	40	79	*97	100	TO-247	IRG4PH30KD
1200	30	3.4	60	31	330	160	TO-247	IRG4PH40KD
1200	45	2.77	90	100	300	200	TO-247	IRG4PH50KD

SD432

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
IRG4BC10K	315-7120				
IRG4BC10KD	315-7143				
IRG4BC20K	162-474				
IRG4BC20KD	162-486				
IRG4BC30K	162-498				
IRG4BC30KD	162-504				
IRG4BC40K	162-516				
IRG4PC30K	162-371 †				
IRG4PC40K	162-395 †				
IRG4PC40KD	162-401				
IRG4PC50K	162-413				
IRG4PC50KD	162-425				
IRG4PH20K	315-7131				
IRG4PH20KD	315-7192				
IRG4PH30K	162-437				
IRG4PH30KD	162-449				
IRG4PH40K	162-450				
IRG4PH40KD	168-210				
IRG4PH50K	162-462				
IRG4PH50KD	162-176				

† Available until stocks are exhausted

Continued

Insulated Gate Bipolar Transistors (IGBTs)  
— continued

Ultra-Fast Switching IGBTs  
60 – 300kHz



- Ultra-low switching losses
- Minimal dynamic losses
- NPT (Non-Punch Through) technology
- Extremely rugged
- Cost-effective alternative to power MOSFETs in switch mode and uninterrupted power supplies, up to 300kHz
- Ideal for Power Factor Correction (PFC)

$V_{CE0}$ V	$I_C$ cont. @ 25°C A	$V_{CE SAT}$ max. V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. ns	$P_D$ @ 25°C W	Pack- age	Mftrs. List No.
600	10.0	2.5	50	25	65	125	TO-220	SGP10N60
600	20.0	2.5	80	35	63	175	TO-220	SGP20N60
600	30.0	2.5	116	45	70	250	TO-220	SGP30N60

SD451

Mftrs. List No.	Order Code	1+	25+	100+	250+
SGP10N60	165-360				
SGP20N60	165-372 †				
SGP30N60	165-384				

† Available until stocks are exhausted

Ultra-High Speed Switching

- High frequency operation >10kHz
- N-Channel polarity
- Very low switching losses
- Low tail current
- Latch-up free
- Avalanche rated

$V_{CE0}$ V	$I_C$ cont. @ 25°C A	$V_{CE SAT}$ max. V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. (typ.) ns	$P_D$ @ 25°C W	Pack- age	Mftr.	Mftrs. List No.
600	40	2.4	160	19	180	160	a	IR	IRG4BC40U
600	40	2.4	160	19	180	160	b	IR	IRG4PC40U
600	55	2.4	220	20	130	200	b	IR	IRG4PC50U
1200	32	3.2	64	45	95	200	a	INF	BUP213
1200	52	3.2	104	65	60	300	c	INF	BUP314

SD151

Mftrs. List No.	Order Code	1+	25+	100+	250+
BUP213	743-586				
BUP314	743-598				
IRG4BC40U	742-820				
IRG4PC40U	742-831				
IRG4PC50U	742-855				

Short Circuit Rated, N-Channel

ON Semiconductor



- 10µs min. short circuit withstand time
- Robust high voltage termination
- Robust RBSOA
- Options include in-built anti-parallel ultra-fast soft recovery diodes

$V_{CE0}$ V	$I_C$ cont. @ 25°C A	$V_{CE SAT}$ max. V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ typ. ns	$P_D$ @ 25°C W	Package	Mftrs. List No.
600	32	2.86	64	61	212	142	b	MGW20N60D*
600	50	2.9	100	80	188	202	b	MGW30N60
600	66	2.8	132	95	180	260	b	MGY40N60D*
1200	20	3.37	40	83	231	123	b	MGW12N120D*

\* Incorporates a soft recovery, anti-parallel diode

SD369

Mftrs. List No.	Order Code	1+	25+	100+	250+
MGW12N120D	877-979				
MGW20N60D	877-980 †				
MGW30N60	877-992				
MGY40N60D	878-054 †				

† Available until stocks are exhausted

Fast Switching

$V_{CE0}$ V	$I_C$ cont. @ 25°C A	$V_{CE SAT}$ max. V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. (typ*) ns	$P_D$ @ 25°C W	Pack- age	Mftr.	Mftrs. List No.
600	29	2.7	56	60	500*	125	a	INF	BUP401
600	42	2.7	104	80	500*	200	a	INF	BUP403
600	50	4.0	100	300	350	200	e	TOSH	GT50J101
600	80	3.5	160	300	400	200	e	TOSH	GT80J101
1000	12	3.0	16	100	150*	100	a	INF	BUP202
1000	21	3.0	30	150	200*	165	a	INF	BUP203
1000	35	3.0	50	200	300*	310	c	INF	BUP304
1200	8	4.0	16	300	500	100	d	TOSH	GT8Q101
1200	15	4.0	30	300	500	150	d	TOSH	GT15Q101
1200	25	4.0	50	300	500	200	e	TOSH	GT25Q101

SD136

Mftrs. List No.	Order Code	1+	25+	100+	250+
GT8Q101	737-859 †				
GT15Q101	737-872				
GT25Q101	737-896				
GT50J101	737-914				
GT80J101	737-926				
BUP202	210-780				
BUP203	210-791				
BUP304	210-808				
BUP401	743-604				
BUP403	743-616				

† Available until stocks are exhausted

Internally Clamped IGBTs

ON Semiconductor



- Temperature compensated gate-collector clamped
- Overload protected
- Logic level gate drive
- High pulsed current capability
- ESD protected
- Low saturation voltage

Clamped $V_{CE0}$ V	$I_C$ cont 25°C A	$V_{CE sat}$ max. V	$I_{CM}$ Pulsed A	$P_D$ 25°C W	Package	Mftrs. List No.
135	20.0	1.9	60	150	TO-220	MGP20N14CL
400	20.0	1.8	—	150	TO-220	MGP20N40CL

SD98

Mftrs. List No.	Order Code	1+	25+	100+	250+
MGP20N14CL	300-5720				
MGP20N40CL	300-5732				

UFS Series N-Channel



$V_{CE0}$ V	$I_C$ cont @ 25°C A	$V_{CE SAT}$ max. V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. ns	$P_D$ @ 25°C W	Pack- age	Mftrs. List No.
600	63	1.8	252	45.0	275	208	b	HGTG30N60C3

Ultra-Fast Switching

Rugged, Ultra-Fast Switching (10µs Short-Circuit Rated)

600	40	2.2	80	40.0	400	164	b	HGTG20N60C3R
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SD386

Mftrs. List No.	Order Code	1+	25+	100+	250+
HGTG30N60C3	935-323				
HGTG20N60C3R	935-335				

Ultra-Fast IGBT

With Anti-Parallel Hyperfast Diode



- >100kHz operation @ 390V, 12A
- 200kHz operation @ 390V, 9A
- 600V switching SOA capability
- Typical fall time 70ns @  $T_j = 125^\circ\text{C}$
- Low conduction losses
- High pulsed current capability

$V_{CE0}$ V	$I_C$ cont 25°C A	$V_{CE sat}$ max. V	$I_{CM}$ Pulsed A	$t_r$ typ. ns	$t_f$ max. typ. ns	$P_D$ 25°C W	Package	Mftrs. List No.
600	54	2.7	96	8	18	167	TO-220	HGTP12N60A4D

SD97

Mftrs. List No.	Order Code	1+	25+	100+	250+
HGTP12N60A4D	302-0666				

## Ultra-High Speed with Integral Antiparallel Diode

IGBTs and ultra-fast, soft recovery diodes combined in a single package to give improved thermal management, space saving, ease of design and total cost reduction.

$V_{CE0}$ V	$I_c$ cont @ 25°C A	$V_{CE(SAT)}$ max V	$I_{CM}$ Pulsed A	$t_r$ typ ns	$t_r$ max (▲ typ) ns	$P_d$ @ 25°C W	Package	Mfr.	Mfrs. List No.
500	14	2.9	28	11.0	140	60	a	IR	IRGB420UD2
600	14	2.0	56	11.5	275	60	a	INTS	HGTP7N60C3D
600	40	2.0	160	20.0	200	165	b	INTS	HGTG20N60B3D
600	40	2.4	160	57.0	120	160	b	IR	IRG4PC40UD
600	63	1.8	252	45.0	275	208	b	INTS	HGTG30N60C3D

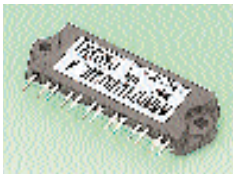
\* Short circuit rated

SD199

Mfrs. List No.	Order Code	Price Each		
		1+	25+	100+
HGTG20N60B3D	<b>.739-558</b>			
HGTG30N60C3D	<b>.739-534</b> †			
HGTP7N60C3D	<b>.739-595</b>			
IRGB420UD2	<b>.484-957</b>			
IRG4PC40UD	<b>.742-843</b>			

† Available until stocks are exhausted

## SIP Modules



- PCB mounted
- Fully isolated, 2.5kV isolation voltage
- Incorporates HEXFRED soft ultra-fast diodes
- Frequency optimised
- Switching loss rating includes all 'tail' losses

International  
ICR Rectifier

$V_{CES}$ V	$I_c$ @ $T_c = 25^\circ\text{C}$ A	$I_{CM}$ Pulsed A	$V_{CE(SAT)}$ max. A	@ $I_c$ A	$t_r$ (typ.) ns	$t_r$ (max.) ns	$P_d$ @ $T_c = 25^\circ\text{C}$ W	Mfrs. List No.
<b>Fast Switching, 1kHz to 10kHz optimised</b>								
600	8.8	26	1.7	4.8	22	320	23	CPV362M4F
600	16.0	50	1.5	8.7	16	240	36	CPV363M4F
600	27.0	80	1.5	15.0	18	240	63	CPV364M4F
<b>Ultra-Fast Switching, &gt;5kHz optimised</b>								
600	7.2	22	2.2	3.9	22	180	23	CPV362M4U
600	13.0	40	2.2	6.8	14	190	36	CPV363M4U
600	20.0	60	2.1	10.0	13	160	63	CPV364M4U
<b>Ultra-Fast Switching, Short Circuit Rated</b>								
600	5.7	11	1.93	3.0	54	180	23	CPV362M4K
600	11.0	22	2.1	6.0	24	140	36	CPV363M4K
600	24.0	48	2.3	13.0	30	140	63	CPV364M4K

SD460

Mfrs. List No.	Order Code	Price Each		
		1+	5+	25+
CPV362M4F	<b>.166-042</b>			
CPV362M4K	<b>.166-054</b>			
CPV362M4U	<b>.166-066</b>			
CPV363M4F	<b>.166-078</b>			
CPV363M4K	<b>.167-782</b>			
CPV363M4U	<b>.167-794</b>			
CPV364M4F	<b>.167-800</b>			
CPV364M4K	<b>.167-812</b>			
CPV364M4U	<b>.167-824</b>			

## Power Modules



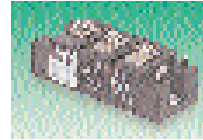
International  
ICR Rectifier

$V_{CES}$ V	$I_c$ cont 25°C, A	$V_{CE(SAT)}$ typ., V	$I_{CM}$ Pulsed, A	$t_r$ typ., ns	$t_r$ max. (*typ.), ns	$P_d$ 25°C, W	Package	Mfrs. List No.
<b>Ultra-Fast Switching</b>								
600	200	1.6	400	75	460	500	SOT-227	GA200SA60U
<b>Low Conduction Loss</b>								
600	200	1.1	400	60	660	630	SOT-227	GA200SA60S

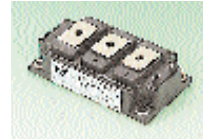
SD469

Mfrs. List No.	Order Code	Price Each				
		1+	5+	10+	25+	50+
GA200SA60S	<b>315-7209</b>					
GA200SA60U	<b>315-7210</b>					

## Power Modules



(a) INT-A-PAK



(b) DOUBLE INT-A-PAK

$V_{CES}$ V	$I_c$ @ $T_c = 25^\circ\text{C}$ A	$I_{CM}$ Pulsed A	$V_{CE(SAT)}$ max. A	@ $I_c$ A	$t_r$ (typ.) ns	$t_r$ (typ.) ns	$P_d$ @ $T_c = 25^\circ\text{C}$ W	Package	Mfr.	Mfrs. List No.
<b>Single Switch Configuration</b>										
250	600	1200	1.4	600	950	934	1920	(c)	IR	GA600GD25S
1200	200	400	4.0	200	300	200	1400	2-109A4A	TOSH	MG200Q1US41
1200	300	600	4.0	300	300	200	2000	2-109F1A	TOSH	MG300Q1US41
1200	300	600	3.6	200	50	100	1500	2-109F1A	TOSH	MG200Q1US51
1200	400	800	4.0	400	300	800	2400	2-109A4A	TOSH	MG400Q1US41
1200	400	800	3.6	300	50	100	2500	2-109F1A	TOSH	MG300Q1US51
1200	520	1040	3.6	400	50	100	3000	2-109F1A	TOSH	MG400Q1US51
<b>Half-Bridge Configuration</b>										
250	400	800	1.6	400	365	792	1350	(b)	IR	GA400TD25S
600	50	100	2.7	50	120	150	280	2-94D1A	TOSH	MG50J2YS50
600	75	150	2.7	75	120	150	390	2-94D1A	TOSH	MG75J2YS50
600	100	200	2.7	100	120	150	450	2-94D1A	TOSH	MG100J2YS50
600	150	300	2.7	150	150	150	780	2-95A1A	TOSH	MG150J2YS50
600	200	400	2.7	200	150	150	900	2-95A1A	TOSH	MG200J2YS50
600	400	800	2.7	400	120	150	1800	2-109D1A	TOSH	MG400J2YS50
1200	25	50	4.0	25	600	500	200	2-93A3A	TOSH	MG25Q6ES42
1200	50	100	3.0	50	82	327	280	(a)	IR	GA50TS120U
1200	50	100	4.0	50	300	200	400	2-94D1A	TOSH	MG50Q2YS40
1200	75	150	3.1	75	119	402	390	(a)	IR	GA75TS120U
1200	78	156	3.6	50	50	100	400	2-94D4A	TOSH	MG50Q2YS50
1200	100	200	4.0	100	300	200	700	2-109C1A	TOSH	MG100Q2YS42
1200	100	200	3.6	75	50	100	600	2-94D4A	TOSH	MG75Q2YS50
1200	150	300	4.0	150	300	200	1100	2-109C1A	TOSH	MG150Q2YS40
1200	150	300	3.6	100	50	100	660	2-95A4A	TOSH	MG100Q2YS50
1200	150	300	3.6	100	50	100	660	2-109C4A	TOSH	MG100Q2YS51
1200	200	400	3.6	150	50	100	1250	2-95A4A	TOSH	MG150Q2YS50
1200	200	400	3.6	150	50	100	1250	2-109C4A	TOSH	MG150Q2YS51
1200	300	600	3.6	200	50	100	1400	2-109C4A	TOSH	MG200Q2YS50

SD195

Mfrs. List No.	Order Code	Price Each		
		1+	4+	8+
GA50TS120U	<b>167-848</b>			
GA75TS120U	<b>167-861</b>			
GA400TD25S	<b>167-836</b>			
GA600GD25S	<b>167-850</b>			
<b>1+ 5+ 10+</b>				
MG25Q6ES42	<b>327-2497</b>			
MG50Q2YS40	<b>327-2503</b>			
MG75Q2YS50	<b>327-2515</b>			
MG100J2YS50	<b>327-2527</b>			
MG100Q2YS42	<b>327-2539</b>			
MG100Q2YS50	<b>327-2540</b>			
MG100Q2YS51	<b>327-2552</b>			
MG150Q2YS40	<b>327-2564</b>			
MG150Q2YS50	<b>327-2576</b>			
MG150Q2YS51	<b>327-2588</b>			
MG200Q1US41	<b>327-2590</b>			
MG200Q1US51	<b>327-2606</b>			
MG200Q2YS50	<b>327-2618</b>			
MG300Q1US41	<b>327-2620</b>			
MG300Q1US51	<b>327-2631</b>			
MG400Q1US41	<b>327-2643</b>			
MG400Q1US51	<b>327-2655</b>			
MG50J2YS50	<b>327-9029</b>			
MG50Q2YS50	<b>327-9030</b>			
MG75J2YS50	<b>327-9042</b>			
MG150J2YS50	<b>327-9054</b>			
MG200J2YS50	<b>327-9066</b>			
MG400J2YS50	<b>327-9078</b>			

## MiniSKiiP IGBT/Diode Power Converters



- User configurable, combined 3-phase bridge rectifier, 3-phase IGBT bridge and IGBT chopper brake
- Pressure contact pcb connection
- Low switching loss IGBT with fast, soft-recovery diode
- Simple, low cost snap-on assembly
- Highly conductive ceramic substrate
- Through hole, screw connection to heatsink
- Integrated temperature sensor

**SEMİKRON**  
Innovation | Service

Bridge Rectifier			Inverter			Mfrs. List No.
$V_{RM}$ V	$I_d$ @ 80°C A	$I_{TSM}$ A	$V_{CES}$ V	$I_c$ @ 25°C IGBT/Cal diode A	Rthj-h IGBT/Cal diode K/W	
800	25	370	600	30/20	1.8/1.6	SKiiP30NAB06
1500	35	700	1200	33/22	1.0/1.6	SKiiP30NAB12

SD409

Mfrs. List No.	Order Code	Price Each		
		1+	25+	100+
SKiiP30NAB06	<b>.994-959</b>			
SKiiP30NAB12	<b>.994-960</b>			

Continued

## Insulated Gate Bipolar Transistors (IGBTs)

— continued

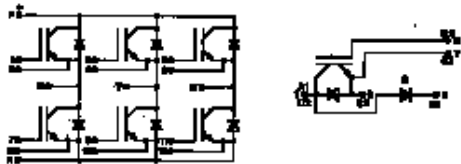
### Power Modules

SEMISTRANS IGBT Modules – Dual and Six Pack



**A : Six Pack** H = 24, W = 105, D = 45  
Mounting holes = 5.5 dia,  
Fixing centres = 93

**B : Dual** H = 29.5, W = 94, D = 34  
Mounting holes = 6.4 dia,  
Fixing centres = 80



- MOS input (voltage controlled)
- N channel
- Low inductance case
- Very low tail current
- Used with Driver Module, Order Code 663-359, see **page 401**
- High short circuit capability
- Latch-up free
- Fast and soft inverse CAL diodes
- Isolated copper baseplate

V <sub>GES</sub> V	I <sub>C</sub> cont.		V <sub>CE(SAT)</sub> V	P <sub>TOT</sub> W	Package	Mfrs. List No.
	@ 25°C A	@ 80°C A				
1200	40	25	3.3/2.7	200	A	SKM40GD123D
1200	50	40	2.8/2.7	400	B	SKM50GB123D
1200	78	50	3.2/2.7	400	B	SKM75GB123D
1200	100	75	3.0/2.7	625	B	SKM100GB123D

Mfrs. List No.	Order Code	Price Each		
		1+	25+	100+
SKM40GD123D	.663-293			
SKM50GB123D	.663-300			
SKM75GB123D	.663-311			
SKM100GB123D	.663-335			

### Low Power MOSFETs

#### Digital FETs



- Easy to drive
- Replacements for digital bipolar transistors
- Suitable for 5V and 3V logic signals
- >6kV ESD protected
- Industry standard SOT-23 package
- No additional bias resistors required

V <sub>DS</sub> V	N/P Channel	R <sub>DS(on)</sub> @ 2.7V Ω	I <sub>D</sub> A	I <sub>D</sub> (pulsed) A	V <sub>GS</sub> (th) V	P <sub>d</sub> W	Mfrs. List No.
25	N	0.6	0.68	2.0	1.5	0.35	FDV303N
25	N	5.0	0.22	0.5	1.5	0.35	FDV301N
25	P	1.5	0.46	1.5	1.5	0.35	FDV304P
25	P	13.0	0.12	0.5	1.5	0.35	FDV302P

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	1K+
FDV303N	995-708				
FDV301N	995-848				
FDV304P	995-850				
FDV302P	996-180				

#### MiniReel® SOT-23 Digital FETs



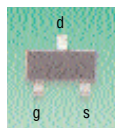
Tape width = 8mm

- 100mm reel size
- 500 pieces on each reel
- Ideal for pre-production, prototyping and production shortfalls
- Complete with leader tape

FOR DEVICE SPECIFICATION, SEE ABOVE

500 Pieces Per Reel MiniReel List No.	Order Code	Price Per Reel		
		1+	3+	5+
FDV301N-MR	344-8496			
FDV302P-MR	344-8502			
FDV303N-MR	344-8514			

### SOT-23



H = 1.12,  
W = 3.05,  
D = 2.5



Footprint

Supplied on 8mm tape.



V <sub>DS</sub> V	R <sub>DS</sub> (on) Ω	I <sub>C</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	V <sub>GS</sub> (th) max. (*min) V	P <sub>D</sub> @ 25°C W	Mfrs.	Device Marking	Mfrs. List No.
<b>N Channel</b>								
20	1.0	0.3	0.75	3.0	0.2	SLX	N1	TN0201T
20	0.4	0.6	4.0	1.0	0.23	SLX	N0	TN0200T
20	0.14	1.7	10.0	2.7	0.5	FCH	335	NDS335N
20	0.085	0.75	—	2.4	0.4	ON	N2	MGSF1N02LT1
20	0.07	1.7	8.0	1.5	0.5	FCH	335	FDN335N
20	0.052	2.5	—	—	0.5	FCH	337	FDN337N
30	0.3	0.85	—	2.5	0.4	IR	1B	IRLML2803
30	0.25	1.2	10.0	2.0	0.5	FCH	—	NDS351AN
30	0.2	1.1	10.0	2.0	0.5	FCH	351	NDS351N
30	0.125	1.7	10.0	2.0	0.5	FCH	—	NDS355AN
30	0.1	1.6	10.0	2.0	0.5	FCH	355	NDS355N
30	0.1	1.8	8.0	3.0	0.5	FCH	361	FDN361AN
30	0.08	2.5	—	—	0.5	FCH	357	FDN357N
50	3.5	0.22	0.88	1.6	0.36	FCH	SS	BSS138
60	7.5	0.115	0.8	2.5	0.2	FCH	702	2N7002
60	7.5	0.115	0.8	2.5	0.2	ON	702	2N7002LT1
60	7.5	0.18	0.8	2.5	0.36	SLX	72	2N7002
60	5.0	0.15	3.0	2.5	0.33	ZET	MY	VN10LF
60	5.0	0.15	3.0	2.4	0.33	ZET	MC	ZVN3306F
60	5.0	0.19	0.76	2.0	0.36	INF	sSG	SN7002
60	5.0	0.5	0.8	3.0	0.3	FCH	—	MMBF170
60	2.5	0.2	3.0	3.0	0.33	ZET	MZ	ZVN4106F
60	2.0	0.28	1.5	2.5	0.3	FCH	712	NDS7002A
60	0.16	2.0	10.0	1.25	1.5*	SLX	A8	SI2308DS
100	10.0	0.1	2.0	2.4	0.33	ZET	MF	ZVN3310F
100	6.0	0.17	0.68	2.8	0.225	ON	SA	BSS123LT1
100	6.0	0.17	0.68	2.0	0.36	FCH	—	BSS123
100	6.0	0.17	0.68	2.0	0.36	INF	SAs	BSS123
200	25.0	0.06	1.0	3.0	0.33	ZET	MU	ZVN3320F
240	16.0	0.1	0.4	2.0	0.36	INF	SRs	BSS131
<b>N Channel Depletion Mode</b>								
250	100.0	0.04	0.12	0.7	0.36	INF	STs	BSS139
<b>P Channel</b>								
12	0.65	0.5	3.0	1.1	0.23	SLX	P0	TP0101T
12	0.5	0.75	3.0	0.68*	0.417	SLX	pJ0	BSH205
12	0.055	3.5	12.0	1.25	0.45	SLX	C5	SI2315DS
20	1.4	0.31	0.75	3.0	0.2	SLX	P3	TP0202T
20	0.6	0.6	—	1.4	0.4	IR	1C	IRLML6302
20	0.5	0.75	2.0	1.25	0.4	ON	PC	MGSF1P02ELT1
20	0.5	0.85	10.0	2.5	0.5	FCH	352	NDS352P
20	0.41	1.0	10.0	1.0	0.5	FCH	332	NDS332P
20	0.35	0.75	—	2.4	0.4	ON	PC	MGSF1P02LT1
20	0.3	1.1	10.0	2.5	0.5	FCH	356	NDS356P
20	0.27	1.2	10.0	1.0	0.5	FCH	336	NDS336P
20	0.13	1.6	—	—	0.5	FCH	338	FDN338P
20	0.07	2.0	10.0	1.5	0.5	FCH	340	FDN340P
30	0.6	0.6	—	2.0	0.4	IR	1D	IRLML5103
30	0.5	0.9	10.0	2.5	0.5	FCH	—	NDS352AP
30	0.3	1.1	10.0	2.5	0.5	FCH	—	NDS356AP
30	0.2	1.6	—	—	0.56	FCH	358	FDN358P
50	10.0	0.13	0.52	2.0	0.36	FCH	SP	BSS84
50	10.0	0.13	0.52	1.6	0.36	INF	SDs	BSS284
60	14.0	0.09	1.6	3.5	0.33	ZET	ML	ZVP3306F
60	10.0	0.12	0.4	2.4	0.36	SLX	TO	TP0610T
60	10.0	0.12	1.0	3.5	0.30	FCH	610	NDS0610
60	5.0	0.18	1.0	3.0	0.36	FCH	605	NDS0605
60	0.34	1.25	8.0	1.25	1.0	SLX	A9	SI2309DS
100	20.0	0.075	1.2	3.5	0.33	ZET	MR	ZVP3310F

#### Order Multiple= 5

Mfrs. List No.	Order Code	Price Each				
		5+	25+	100+	1K+	3K+
BSH205	316-3052					
BSS84	.516-557					
BSS123 (FCH)	932-498					
BSS123 (SIE)	516-569					
BSS123LT1	.934-094					
BSS131	.548-649					
BSS138	.518-621					
BSS139	743-641					
BSS284	743-665 †					
FDN335N	NEW 354-4965					
FDN337N	996-191					
FDN340P	NEW 354-4977					
FDN357N	996-208					
FDN338P	996-210					
FDN358P	996-221					
FDN361AN	NEW 354-4989					
IRLML2402	.567-826					
IRLML2803	.567-802					
IRLML5103	.567-814					
IRLML6302	.567-838					
MGSF1N02LT1	300-5549					
MGSF1P02LT1	300-5550					
MGSF1P02ELT1	NEW 352-6343					
MMBF170	932-504					
NDS0605	932-516					
NDS0610	518-610					
NDS332P	932-474					
NDS335N	932-449					

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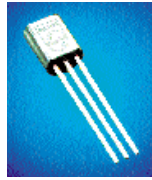
Order Multiple= 5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	1K+ 3K+
NDS336P	932-486				
NDS351AN	932-413				
NDS351N	706-966				
NDS352AP	932-450				
NDS352P	706-978				
NDS355AN	932-425				
NDS355N	706-980				
NDS356AP	932-462				
NDS356P	706-991				
NDS7002A	518-633				
SI2308DS	<b>NEW</b> 334-5245				
SI2309DS	<b>NEW</b> 334-5257				
SI2315DS	<b>NEW</b> 334-5324				
SN7002	743-653				
TN0200T	739-108				
TN0201T	739-121				
TP0101T	739-110				
TP0202T	739-133				
TP0610T	739-145				
VN101F	516-636				
ZVN3306F	516-600				
ZVN3310F	516-648				
ZVN3320F	302-7247				
ZVN4106F	516-650				
ZVP3306F	516-612				
ZVP3310F	516-661				
2N7002 (FCH)	518-402				
2N7002 (SLX)	516-624				
2N7002LT1	934-045				

† Available until stocks are exhausted

		Price Each		
Mfrs. List No.	Order Code	1+	25+	100+ 500+
IRFD014	.353-048			
IRFD024	.353-050			
IRFD110 (HAR)	301-0788			
IRFD110 (IR)	.353-073			
IRFD120	.353-085			
IRFD210	.353-097			
IRFD9014	.291-330			
IRFD9024	.291-341			
IRFD9110	.353-103			
IRFD9120 (HAR)	301-0855			
IRFD9120 (IR)	.353-115			
IRFD9210	.353-127			
IRLD014	291-298			
IRLD024	291-304			

### T0-92, P-Channel

Phillips Semiconductors



V <sub>DS</sub> (V)	R <sub>DS(ON)</sub> (Ω) @ V <sub>GS</sub> (V)	I <sub>DS</sub> (A)	T092 (SOT54)
60	6	10	BST100
200	15	10	BSP204
240	20	10	BSS92
250	15	10	BSP254A

SD5

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	250+ 1K+
BSP204	936-194				
BSP254A	316-4550				
BSS92	936-200				
BST100	936-182				

Continued

### MiniReel<sup>®</sup> SOT-23 MOSFETs



Tape width = 8mm



- 100mm reel size
- 500 pieces on each reel
- Ideal for pre-production, prototyping and production shortfalls
- Complete with leader tape



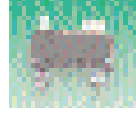
FOR DEVICE SPECIFICATION, SEE ABOVE

SD498

500 Pieces Per Reel		Price Per Reel		
MiniReel List No.	Order Code	1+	3+	5+
BSS123-MR	344-8370			
BSS138-MR	344-8381			
MMBF170-MR	344-8526			
NDS0605-MR	344-8563			
ZVN3306F-MR	344-8575			
ZVP3306F-MR	344-8587			
2N7002-MR	344-8113			

### SOT-143 MOSFET, PNP

Phillips Semiconductors



V <sub>DS</sub> (V)	R <sub>DS(ON)</sub> (Ω)	I <sub>D</sub> cont. @ 25°C (A)	I <sub>DM</sub> pulsed (A)	V <sub>GS</sub> (th) max. (V)	P <sub>D</sub> @ 25°C (W)	Device Marking	Mfrs. List No.
10	45	0.05	—	2	0.23	M74	BSS83

SD87

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	1K+ 3K+
BSS83	300-0930				

### 4 pin DIL



Pin spacing = 2.54, Row spacing = 7.62

V <sub>DS</sub> (V)	N or P Channel	R <sub>DS(ON)</sub> (Ω)	I <sub>D</sub> cont. @ 25°C (A)	I <sub>DM</sub> Pulsed (A)	P <sub>D</sub> @ 25°C (W)	Mfrs. List No.
60	N	0.2	1.7	14.0	1.3	IR IRFD014
60	N	0.2	1.7	14.0	1.0	IR ● IRLD014
60	N	0.1	2.5	19.0	1.3	IR IRFD024
60	N	0.1	2.5	20.0	1.0	IR ● IRLD024
60	P	0.5	1.1	8.8	1.3	IR IRFD9014
60	P	0.28	1.6	13.0	1.3	IR IRFD9024
100	N	0.6	1.0	8.0	1.0	HAR IRFD110
100	N	0.54	1.0	8.0	1.3	IR IRFD110
100	N	0.27	1.3	10.4	1.3	IR IRFD120
100	P	1.2	0.7	5.6	1.3	IR IRFD9110
100	P	0.6	1.0	8.0	1.3	IR IRFD9120
100	P	0.6	1.0	8.0	1.0	HAR IRFD9120
200	N	1.5	0.6	4.8	1.0	IR IRFD210
200	P	3.0	0.4	3.2	1.0	IR IRFD9210

● Logic level MOSFET with design optimised for 5V gate drive

SD9

## Major International Brands

All the leading brand names from over 1,000 major international manufacturers.



Config.	V <sub>ds</sub> V	N or P Channel	I <sub>d</sub> cont. @ 25°C A	V <sub>gs</sub> (th) min. V	R <sub>ds</sub> (on) max. Ω	@ V <sub>gs</sub> V	Mftrs. List No.
<b>MSOP8</b>							
Single	20	N	5.4	0.7	0.04	4.5	ZXM64N02X
Single	30	N	5.0	1.0	0.045	10	ZXM64N03X
Single	20	P	3.5	0.7	0.09	4.5	ZXM64P02X
Single	30	P	3.8	1.0	0.075	10	ZXM64P03X
Dual	20	N	2.4	0.7	0.13	0.45	} ZXM63C02X
			P	1.7	0.7		
Dual	30	N	2.3	1.0	0.135	10	} ZXM63C03X
			P	2.0	1.0		
Dual	20	N	2.4	0.7	0.13	4.5	ZXM63N02X
Dual	30	N	2.3	1.0	0.135	10	ZXM63N03X
Dual	20	P	1.7	0.7	0.27	4.5	ZXM63P02X
Dual	30	P	2.0	1.0	0.185	10	ZXM63P03X

SD462

### Order Multiple=5

Mftrs. List No.	Order Code	5+	25+	Price Each 100+	250+	1K+
ZXM61N02F	325-6182					
ZXM61N03F	325-6194					
ZXM61P02F	325-6200					
ZXM61P03F	325-6212					
ZXM62N02E6	325-6224					
ZXM62N03E6	325-6236					
ZXM62P02E6	325-6248					
ZXM62P03E6	325-6250					
ZXM64N02X	325-6261					
ZXM64N03X	325-6273					
ZXM64P02X	325-6285					
ZXM64P03X	325-6297					
ZXM63C02X	325-6303					
ZXM63C03X	325-6315					
ZXM63N02X	325-6327					
ZXM63N03X	325-6339					
ZXM63P02X	325-6340					
ZXM63P03X	325-6352					

## SuperSOT-6 and SuperSOT-8



- High power dissipation
- High cell density
- 3V logic-level drive options
- Low R<sub>DS</sub> (on)



SuperSOT<sup>™</sup>-6      SuperSOT<sup>™</sup>-8  
H = 1.02, W = 2.85, D = 2.92      H = 1.02, W = 4.55, D = 4.06

V <sub>ds</sub> V	N/P Channel	R <sub>ds</sub> (on) Ω	I <sub>d</sub> cont @ 25°C A	V <sub>gs</sub> (th) max V	P <sub>D</sub> @ 25°C W	Mftrs. List No.
<b>SuperSOT<sup>™</sup>-6 – Single Package</b>						
20	P	0.2	2.7	2.7	1.6	NDC632P
20	P	0.045	4.5	1.5	1.6	FDC638P
30	P	0.05	4.0	3.0	1.6	FDC658P
<b>SuperSOT<sup>™</sup>-6 – Dual Package</b>						
20	NN	0.08	2.7	1.5	0.96	FDC6305N
30	PP	0.17	1.8	3.0	0.96	FDC6506P
50	NN	2.0	0.51	10.0	0.7	NDC7002N
50	N	2.0	0.51	10.0	0.7	} NDC7001C
		P	5.0	0.34	10.0	
<b>SuperSOT<sup>™</sup>-8 – Single Package</b>						
20	N	0.025	7.1	2.7	1.8	NDH833N
20	P	0.8	4.2	2.7	1.8	NDH832P
20	P	0.045	5.6	2.7	1.8	NDH834P
30	N	0.025	7.6	4.5	1.8	NDH853N
30	P	0.095	4.4	4.5	1.8	NDH8447
30	P	0.052	5.1	4.5	1.8	NDH854P
<b>SuperSOT<sup>™</sup>-8 – Dual Package</b>						
20	NN	0.045	3.8	2.7	0.8	NDH8303N
20	PP	0.095	2.7	2.7	0.8	NDH8304P
20	N	0.045	3.8	2.7	0.8	} NDH8321C
		P	0.095	2.7	2.7	
30	NN	0.1	2.8	4.5	0.8	NDH8501N
30	PP	0.18	2.2	4.5	0.8	NDH8502P
30	N	0.05	3.8	0.45	0.8	} NDH8521C
		P	0.115	2.7	0.45	

V <sub>in</sub> V	V <sub>on/off</sub> V	Vdrop @ V <sub>in</sub> = 12V V	IL cont. A	IL pulsed A	R (on) P <sub>tot</sub> Ω	P <sub>tot</sub> W	Mftrs. List No.
<b>Integrated load switch – 6kV ESD protected</b>							
3-20	1.5-8	0.2	2.3	10	0.08	0.7	FDC6330L

SD342

Mftrs. List No.	Order Code	1+	25+	Price Each 100+	250+	1K+
FDC6305N	NEW 354-4904					
FDC6330L	NEW 354-4916					
FDC638P	NEW 354-4928					
FDC6506P	NEW 354-4930					
FDC658P	NEW 354-4941					
FDC6305N	354-4904					
FDC6330L	354-4916					
FDC638P	354-4928					
FDC6506P	354-4930					
FDC658P	354-4941					

continued

Mftrs. List No.	Order Code	1+	25+	Price Each 100+	250+	1K+
NDC632P	741-589					
NDC7001C	741-413					
NDC7002N	741-383					
NDH832P	741-607					
NDH8303N	932-528					
NDH8304P	932-565					
NDH8321C	932-619					
NDH833N	932-530					
NDH834P	932-577					
NDH8447	741-437					
NDH8501N	932-541					
NDH8502P	932-589					
NDH8521C	932-607 †					
NDH853N	932-553					
NDH854P	932-590 †					

† Available until stocks are exhausted

## SO-8



V <sub>DS</sub> V	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> pulsed A	V <sub>GS</sub> (th) min. V	P <sub>D</sub> @ 25°C W	Mftrs. List No.
<b>SO-8 Single N-Channel</b>						
20	0.02	9.9	20	1.0	2.5	NDS8426
30	0.042	7.3	20	3.0	2.5	NDS9410A
30	0.018	10.8	50	3.0	2.5	NDS8410A
30	0.0125	11.0	50	3.0	2.5	FDS6690A
30	0.01	11.0	50	3.0	2.5	FDS6680
60	0.02	8.0	50	4.0	2.5	FDS5680
<b>SO-8 Single P-Channel</b>						
20	0.115	5.3	—	—	2.5	NDS9430
20	0.032	7.8	25	1.0	2.5	NDS8434A
20	0.013	10.0	50	1.5	2.5	FDS6575
30	0.035	7.9	25	3.0	2.5	NDS8435A
30	0.014	11.0	50	3.0	2.5	FDS6675
<b>SO-8 Dual N-Channel</b>						
20	0.045	5.5	20	1.0	2.0	NDS8926
20	0.018	7.5	20	1.5	2.0	FDS6890A
30	0.015	8.6	30	3.0	2.0	} FDS6982
30	0.028	6.3	20	3.0	2.0	
30	0.018	7.5	20	3.0	2.0	FDS6990A
<b>SO-8 Dual P-Channel</b>						
20	0.19	3.5	10	3.0	2.0	NDS9947
20	0.1	3.8	15	1.0	2.0	NDS8934
<b>SO-8 Complementary N and P Channel</b>						
20 (N)	0.045	5.5	20	1.0	2.0	} NDS8928
20 (P)	0.1	3.8	15	1.0	2.0	
30 (N)	0.05	5.3	20	2.8	2.0	} NDS8958
30 (P)	0.1	4.0	15	2.8	2.0	

SD401

Mftrs. List No.	Order Code	1+	25+	Price Each 100+	250+	1K+
FDS5680	NEW 354-4990					
FDS6575	NEW 354-5003					
FDS6675	NEW 354-5015					
FDS6680	NEW 354-5027					
FDS6690A	NEW 354-5039					
FDS6890A	NEW 354-5040					
FDS6982	NEW 354-5052					
FDS6990A	NEW 354-5064					
NDS8410A	932-322					
NDS8426	932-292					
NDS8434A	932-360					
NDS8435A	932-383					
NDS8926	932-280					
NDS8928	932-401					
NDS8934	932-358					
NDS8958	932-395					
NDS9410A	932-310					
NDS9430	932-346					
NDS9947	932-334					

## FETKY MOSFET and Schottky Rectifier, Logic Level



V <sub>DS</sub> V	N/P Chnl.	R <sub>DS</sub> (on) Ω	I <sub>D</sub> @ 25°C A	I <sub>D</sub> pulsed A	V <sub>GS</sub> (th) min V	P <sub>D</sub> @ 25°C W	Schottky Diode			Mftrs. List No.	
							I <sub>r</sub> (av) A	V <sub>rm</sub> V	I <sub>ism</sub> A	Package	
30	N	0.029	6.5	52	1	20	2.7	0.39	11	SO-8	IRF7353D1

SD467

Mftrs. List No.	Order Code	1+	25+	Price Each 100+	250+	1K+
IRF7353D1	315-7076					

Continued

Power MOSFETs — continued

SO-8, Little Foot



V <sub>ds</sub> (V)	R <sub>ds</sub> (on) (Ohms)			I <sub>D</sub> (A)	Typ. Qg (nC)	Configuration	Mfrs. List No.
	V <sub>gs</sub> = 10V	V <sub>gs</sub> = 4.5V	V <sub>gs</sub> = 2.5V				
<b>Single N-Channel, Low Gate Threshold Vgs=2.5V</b>							
20	—	0.009	0.013	±13.2	50.0	Single	Si4466DY
<b>Dual N-Channel, Low Gate Threshold Vgs=2.5V</b>							
20	—	0.025	0.035	±7.2	25.0	Dual	Si4966DY
<b>Single N-Channel, 30V to 100V</b>							
30	0.030	0.050	—	±7.0	24.0	Single	Si9410DY
30	0.028	0.042	—	±7.0	19.5	Single	Si4412DY
30	0.009	0.013	—	±12.5	70.0	Single	Si4420DY
60	0.024	0.030	—	±7.5	31.0	Single	Si4450DY
100	0.060	0.08 @ 6V	—	±4.6	30.0	Single	Si4482DY
<b>Dual N-Channel, 30V to 100V</b>							
20	—	0.200	—	±3.5	—	Dual	Si9956DY
30	0.050	0.080	—	±5.0	13.5	Dual	Si9936DY
30	0.025	0.035	—	±6.9	30.0	Dual	Si4920DY
60	0.055	0.075	—	±4.5	19.0	Dual	Si4946EY
<b>Single P-Channel, Low Gate Threshold Vgs=2.5V</b>							
-12	—	0.040	0.060	±6.4	30.0	Single	Si9434DY
-12	—	0.025	0.033	±7.7	46.0	Single	Si9424DY
-20	—	0.014	0.020	±10.0	48.0	Single	Si4463DY
<b>Dual P-Channel, Low Gate Threshold Vgs=2.5V</b>							
-20	—	0.075	0.115	±3.4	10.0	Dual	Si9933ADY
-20	—	0.033	0.050	±6.2	22.0	Dual	Si4963DY
<b>Single P-Channel, -20V to -60V</b>							
-20	—	0.160	—	±4.3	—	Single	Si9405DY
-20	0.050	0.090	—	±5.8	27.0	Single	Si9430DY
-30	0.014	0.023	—	±11.0	74.0	Single	Si4425DY
<b>Dual P-Channel, -20V to -60V</b>							
-20	0.250	0.400	—	±2.3	6.7	Dual	Si9953DY
-30	0.032	0.045	—	±6.1	32.0	Dual	Si4925DY
-60	0.170	0.260	—	±2.6	10.0	Dual	Si9948AEY-T1
-60	0.120	0.150	—	±3.1	16.0	Dual	Si4948EY
<b>Dual N/P-Channel, Low Gate Threshold Vgs=2.5V</b>							
20	—	0.030	0.040	±6.0	21.0	N-Channel	Si9529DY
-12	—	0.050	0.074	±5.0	21.0	P-Channel	
20	—	0.025	0.035	±7.1	25.0	N-Channel	Si4562DY
-20	—	0.033	0.050	±6.2	22.0	P-Channel	
<b>Dual N/P-Channel, 25V to 60V</b>							
30	0.050	0.080	—	±3.5	14.0	N-Channel	Si9939DY
-30	0.100	0.160	—	±3.5	14.5	P-Channel	
30	0.025	0.035	—	±6.9	30.0	N-Channel	Si4542DY
-30	0.032	0.045	—	±6.1	32.0	P-Channel	

SD433 / SD433A

Single/ Dual	V <sub>GS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Pin Config.	Mfrs. List No.
Single	20	N	0.022	8.7	35	2.5	b	IR IRF7401
Single	20	P	0.04	5.3	21	1.6	b	IR IRF7404
Single	30	N	0.03	7.0	37	2.5	a	IR IRF9410
Single	30	N	0.025	7.0	42	2.5	b	ST STS7NF30L
Single	30	N	0.022	6.7	27	1.6	b	IR IRF7403
Single	30	N	0.0135	12.0	58	2.5	b	IR IRF7413A
Single	30	N	0.01	12.0	48	2.5	b	ST STS12NF30L
Single	30	N	0.01	12.0	58	2.5	b	IR IRF7413
Single	30	P	0.25	2.5	10	2.5	a	FCH NDS9400A
Single	30	P	0.05	5.3	15	2.5	b	FCH NDS9435A
Single	30	P	0.045	5.2	20	1.6	b	IR IRF7406
Single	30	P	0.02	8.8	45	2.5	b	IR IRF7416
Dual	12	N	0.05	3.5	20	2.0	c	HAR RF1K49090
Dual	20	N	0.1	3.5	14	2.0	c	FCH NDS9956A
Dual	20	N	0.05	4.3	17	1.4	c	IR IRF7301
Dual	20	P	0.4	2.3	10	2.5	c	FCH NDS9953
Dual	20	P	0.11	3.2	10	2.0	c	FCH NDS9933
Dual	20	P	0.053	4.2	23	1.4	c	IR IRF7314
Dual	20	N	0.25	3.0	10	2.5	c	FCH NDS9943
Dual	20	P	0.3	2.8	10			
Dual	30	N	0.1	3.5	16	2.0	c	IR IRF9956
Dual	30	N	0.08	5.0	20	2.0	c	HIT HAT2016R
Dual	30	N	0.05	4.9	20	2.0	c	IR IRF7303
Dual	30	N	0.03	6.7	15	2.0	c	FCH NDS8936
Dual	30	P	0.25	2.3	10	2.0	c	IR IRF9953
Dual	30	P	0.25	2.3	10	2.0	c	FCH NDS9953A
Dual	30	P	0.1	3.0	12	1.4	c	IR IRF7306
Dual	30	P	0.1	4.0	—	2.0	c	FCH NDS8947
Dual	30	P	0.058	4.9	30	2.0	c	IR IRF7316
Dual	30	N	0.1	3.5	16	2.0	c	IR IRF9952
Dual	30	P	0.25	2.3	10			
Dual	30	N	0.05	4.0	16	1.4	c	IR IRF7309
Dual	30	P	0.1	3.0	12			
Dual	60	N	0.2	3.5	10	2.0	c	FCH Si9945DY

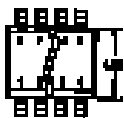
SD169 / SD169A

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
HAT1024R	739-390 †					
HAT2016R	739-406 †					
IRF7301	538-450					
IRF7303	167-976					
IRF7306	538-486					
IRF7309	538-504					
IRF7311	934-550					
IRF7314	934-574					
IRF7316	934-586					
IRF7401	167-988					
IRF7403	538-413 †					
IRF7404	538-449					
IRF7406	538-437					
IRF7413	706-530					
IRF7413A	167-990					
IRF7416	706-541					
IRF9410	934-604					
IRF9952	934-630					
IRF9953	934-641					
IRF9956	934-653					
NDS8936	707-170					
NDS8947	707-181					
NDS9400A	707-193					
NDS9435A	707-211					
NDS9933	707-223					
NDS9943	518-372					
NDS9953	518-384					
NDS9953A	707-235					
NDS9956A	707-247					
RF1K49090	548-893					
STS12NF30L	323-9378					
STS7NF30L	323-9380					

† Available until stocks are exhausted

Semiconductors — Discretes 384

SO-8 Logic Level



H = 1.75, W = 6.3, D = 5.2



Pin Configurations

	1	2	3	4	5	6	7	8
a	NC	S	S	G	D	D	D	D
b	S	S	S	G	D	D	D	D
c	S1	G1	S2	G2	D2	D2	D1	D1

Single or dual high performance MOSFETs in a space efficient, small outline package. All devices may be driven directly by 5V logic signals.

'Fetky™ Combined HEXFET and Schottky Diode



SO-8



TO-220

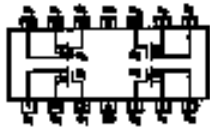
V <sub>DS</sub> V	N/P Chnl.	R <sub>DS</sub> (on) Ω	I <sub>D</sub> A	I <sub>DM</sub> A	V <sub>GS</sub> (th) max. V	P <sub>D</sub> @ 25°C W	Schottky Diode			Pin Config.	Mfrs. List No.
							I <sub>F</sub> (av) A	V <sub>FM</sub> V	I <sub>FSM</sub> A		
20	P	0.09	4.6	23	4.0	2.5	4.0	0.52	20	SO-8	IRF7422D2
30	N	0.035	6.4	33	4.0	2.5	4.0	0.42	15	SO-8	IRF7421D1
30	N	0.014	5.4	220	1.0	2.0	2.0	0.5	220	TO-220	IRL3103D1

SD353

Mfrs. List No.	Order Code	1+	25+	100+	250+
IRF7421D1	740-860				
IRF7422D2	740-871				
IRL3103D1	934-537				



## 14 pin Quad



Q<sub>1</sub> Q<sub>2</sub> Q<sub>3</sub> Q<sub>4</sub>  
 VQ1000J N N N N  
 VQ3001J N P N P

V <sub>DS</sub> V	Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> * cont. @ 25°C A	I <sub>DM</sub> * Pulsed A	P <sub>D</sub> @ 25°C W	Mftrs. List No.
30	2 N	1.0	0.85	3.0	2.0	VQ3001J
	2 P	2.0	0.6	2.0		
60	4 N	5.5	0.225	1.0	2.0	VQ1000J

\* per mosfet

SD10

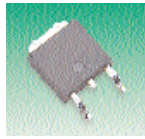
Mftrs. List No.	Order Code	1+	25+	100+
VQ1000J	.353-139	18.27	14.52	10.47
VQ3001J	353-140	48.24	26.46	19.53

## 25V to 600V

## Philips Semiconductors



SO-8



TO-252



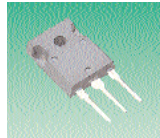
TO-220AB



SOT-23



SOT-223



TO-247

V <sub>DS</sub> V	N/P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> pulsed A	V <sub>GS</sub> (th) max. (*typ) V	P <sub>D</sub> @ 25°C W	Package	Mftrs. List No.
<b>Single N Channel</b>								
25	N	0.016	9.6	38	2	2.5	SO-8	PHN1018
25	N	0.016	48.0	180	2	86	TO-252	PHD50N03LT
25	N	0.014	55.0	220	2	103	TO-252	PHD55N03LT
25	N	0.012	69.0	—	2	—	TO-252	PHD69N03LT
30	N	0.1	4.0	16	2.8	2.8	SO-8	PHN110
30	N	0.03	8.5	35	2.8	4	SO-8	PHN103
30	N	0.0135	10.0	50	4	2.5	SO-8	PHN1013
55	N	0.15	10.5	42	4	36	TO-220AB	PHP3055E
55	N	0.15	10.5	42	2	36	TO-220AB	PHP3055L
55	N	0.07	21.0	84	2	69	TO-252	PHD21N06LT
55	N	0.032	37.0	148	2	100	TO-252	PHD37N06LT
55	N	0.028	44.0	176	2	114	TO-252	PHD44N06LT
60	N	5.0	0.25	0.5	3	0.25	SOT-23	PMBF170
60	N	0.15	12.0	48	4	50	TO-252	PHD3055E
60	N	0.15	12.0	48	2	50	TO-252	PHD3055L
100	N	0.28	1.8	7.2	4	1.8	SOT-223	BUK482-100A
300	N	8.0	0.25	1	2	1	TO-92	BSN304A
400	N	3.5	2.5	10	4	50	TO-220AB	PHP3N40E
400	N	3.5	2.5	10	4	50	TO-252	PHD3N40E
400	N	1.0	7.2	29	4	125	TO-220AB	PHP7N40E
400	N	0.55	10.6	42	4	147	TO-220AB	PHP10N40E
400	N	0.55	10.6	42	4	147	TO-247	PHW10N40E
500	N	5.0	2.0	8	4	50	TO-220AB	PHP25N50E
500	N	1.5	5.9	24	4	125	TO-220AB	PHP6N50E
500	N	0.85	8.5	34	4	147	TO-247	PHW8N50E
600	N	6.0	1.9	11	4	83	TO-220AB	PHP2N60E
600	N	6.0	1.9	11	4	83	TO-220AB	PHP3N60E
600	N	4.4	2.8	11	4	83	TO-252	PHD2N60E
600	N	2.5	4.5	18	4	125	TO-220AB	PHP4N60E
600	N	1.2	7.0	28	4	147	TO-220AB	PHP7N60E
<b>Single P Channel</b>								
12	P	0.5	0.75	3	0.68*	0.417	SOT-23	BSH205
30	P	0.25	2.5	10	2.8	2.8	SO-8	PHP125
30	P	0.09	5.0	20	2.8	4	SO-8	PHP109
250	P	15.0	0.2	0.6	2.8	1	TO-92	BSP254A
<b>Dual P Channel</b>								
30	P	0.25	2.3	10	2.8	2	SO-8	PHP225
30	P	0.12	4.0	16	2.8	3.5	SO-8	PHP212
<b>Dual Gate R.F. MOSFET</b>								
7	N	40	—	36	200	200	SOT-143	BF909R

SD484/SD484A

Order Multiple=1	Order Code	1+	25+	100+	250+	1K+
Mftrs. List No.						
BF909R	SMD316-4743					
BSH205	SMD316-3052					
<b>Order Multiple=5</b>						
BSN304A	316-4548					
BSP254A	316-4550					
<b>Order Multiple=1</b>						
BUK482-100A	316-4858	1+	25+	100+	250+	1K+
PHD21N06LT	SMD316-5073					
PHD2N60E	SMD316-5048					
PHD3055E	SMD316-5050					
PHD3055L	SMD316-4998					
PHD37N06LT	SMD316-5085					
PHD3N40E	SMD316-5061					
PHD44N06LT	SMD316-5000					
PHD50N03LT	SMD316-5012					
PHD55N03LT	SMD316-5024					
PHD69N03LT	SMD316-5036					
PHN1013	SMD316-4688					
PHN1018	SMD316-4676					
PHN103	SMD316-2370					
PHN110	SMD316-4731					
PHP109	SMD316-4690					
PHP125	SMD316-4706					
PHP212	SMD316-4718					
PHP225	SMD316-4720					
PHP10N40E	316-5279 †					
PHP2N50E	316-5280					
PHP2N60E	316-5292					
PHP3055E	316-5309					
PHP3055L	316-5220					
PHP3N40E	316-5310					
PHP3N60E	316-5322					
PHP4N60E	316-5334					
PHP6N50E	316-5346					
PHP7N40E	316-5358					
PHP7N60E	316-5360					
PHW10N40E	316-5097					
PHW8N50E	316-5115					
PMBF170	SMD316-3106					

† Available until stocks are exhausted

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### Insulation Groups to VDE0110

Depending on the application equipment is classified in insulation groups A<sub>0</sub>, A, B, C or D relating to reduction in the performance of insulation caused by environmental influences eg. dust, dirt, humidity, condensation and ageing. In addition the groups are determined both by the effects of damage produced by failure of the performance of an insulation material and also flashover voltages.

**Insulation Group A<sub>0</sub>.**  
 Relates to low power equipment which is located in air conditioned or clean and dry locations or which is protected by appropriate measures and on which overheating will not be excessive in case of a short circuit.

**Insulation Group A**  
 Relates to equipment located in air conditioned, clean, dry locations and protected by acceptable measures.

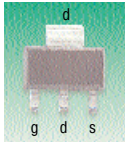
**Insulation Group B**  
 Relates to equipment housed in living rooms, stores, premises, precision engineering, workshops, laboratories, control rooms, medical rooms, etc.

**Insulation Group C**  
 Relates to equipment mainly used in industrial, commercial and agricultural works housed in unheated stores, repair shops, boiler houses or on machine tools etc.

**Insulation Group D**  
 Relates to equipment used on power vehicles or rolling stock exposed to damp resulting from condensation or melting snow and conductive dust caused by braking devices that are not satisfactorily enclosed.

Power MOSFETs — continued

SOT-223



Supplied on 12mm tape.

V <sub>DS</sub> V	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	V <sub>GS</sub> (th) max. V	Mfr.	Mfrs. List No.
<b>N-Channel</b>							
30	0.05	5.5	25.0	3.0	3.0	FCH	NDT451N
30	0.031	4.6	37.0	2.1	2.5	IR	● IRLL3303
30	0.03	8.0	15.0	3.0	3.0	FCH	NDT453N
30	0.015	11.5	—	3.0	3.0	FCH	NDT455N
50	0.3	1.7	6.8	1.5	2.0	INF	● BSP295
50	0.1	2.9	11.6	1.5	4.0	INF	BSP17
50	0.07	3.8	15.0	1.8	2.0	INF	● BSP319
55	0.14	2.0	16.0	1.0	2.0	IR	● IRLL014N
55	0.04	3.8	30.0	2.1	2.5	IR	● IRLL2705
60	2.0	0.7	8.0	2.0	2.4	ZET	ZVN2106G
60	1.5	1.0	8.0	2.0	3.0	ZET	ZVN4206G
60	0.2	2.7	22.0	3.1	4.0	IR	IRFL014
60	0.2	2.7	22.0	3.1	2.0	IR	● IRLL014
60	0.15	3.5	25.0	3.0	2.0	FCH	NDT3055L
60	0.14	1.5	5.0	2.0	2.0	ON	MMFT3055VL
60	0.13	1.7	6.0	2.0	4.0	ON	● MMFT3055V
100	4.0	0.5	6.0	2.0	2.4	ZET	● ZVN2110G
100	0.8	1.0	4.0	1.5	2.0	INF	● BSP296
100	0.31	1.7	6.8	1.8	2.0	INF	BSP372
100	0.3	1.7	6.8	1.8	4.0	INF	BSP373
100	0.2	1.6	13.0	2.1	4.0	IR	IRFL4310
200	10.0	0.32	2.0	2.0	3.0	ZET	ZVN2120G
200	2.0	0.6	2.4	1.5	2.0	INF	● BSP297
240	8.0	0.32	1.2	1.7	1.2	INF	● BSP88
240	6.0	0.36	1.4	1.7	2.0	INF	● BSP89
240	6.0	0.5	1.5	2.5	1.8	ZET	● ZVN4424G
500	4.0	0.4	1.6	1.5	4.0	INF	● BSP299
600	60.0	0.1	0.3	1.7	0.7	INF	◇ BSP135
<b>P-Channel</b>							
30	0.18	3.0	20.0	3.0	3.0	FCH	NDT452P
30	0.065	5.0	15.0	3.0	2.8	FCH	NDT452AP
30	0.035	7.3	—	3.0	3.0	FCH	● NDT456P
50	0.8	1.0	4.0	1.5	2.0	INF	● BSP315
60	5.0	0.45	4.0	2.0	3.5	ZET	ZVP2106G
60	0.8	1.17	4.68	1.8	2.0	INF	● BSP315P
60	0.5	1.8	14.0	3.1	4.0	IR	IRFL9014
60	0.3	1.2	—	0.8	4.0	ON	MMFT2955E
60	0.3	1.9	7.6	1.8	2.0	INF	● BSP171P
60	0.3	2.5	15.0	3.0	4.0	FCH	NDT2955
100	1.2	1.1	8.8	3.1	4.0	IR	IRFL9110
200	25.0	0.2	1.2	2.0	3.5	ZET	ZVP2120G
200	6.0	0.37	1.4	1.8	2.0	INF	● BSP317
240	11.0	0.48	1.0	2.5	2.0	ZET	ZVP4424G

● Logic level MOSFET with design optimised for 3V gate drive ◇ Depletion mode

SD171 / SD171A

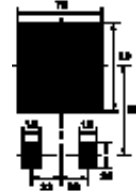
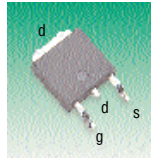
Mfrs. List No.	Order Code	1+	100+	Price Each	500+	1K+
BSP17	.516-673					
BSP88	.743-720 †					
BSP89	.743-719					
BSP135	.743-689					
BSP171	.516-685					
BSP295	.516-697					
BSP296	.516-703					
BSP297	.516-715					
BSP299	.516-727					
BSP315	.516-739 †					
BSP315P	.333-4855					
BSP317P	.548-601					
BSP319	.548-560					
BSP372	.548-571 †					
BSP373	.743-707					
IRFL014	.168-099	1+	25+	100+	300+	1K+
IRFL4310	.706-504					
IRFL9014	.538-360					
IRFL9110	.538-371					
IRLL014	.538-383					
IRLL014N	.168-282					
IRLL2705	.706-516					
IRLL3303	.706-528					
NDT451N	.707-030					
NDT452AP	.932-632					
NDT452P	.707-041					
NDT453N	.707-053					
NDT455N	.707-077					
NDT456P	.707-089					
NDT2955	.707-016					
NDT3055L	.707-090					
MMFT2955E	.708-471					
MMFT3055VL	.934-161					
MMFT3055V	.934-150					

continued

Mfrs. List No.	Order Code	1+	100+	Price Each	500+	1K+
ZVN2106G	.291-250					
ZVN2110G	.707-946					
ZVN2120G	.302-7259					
ZVN4206G	.538-243					
ZVN4424G	.707-958					
ZVP2106G	.291-262					
ZVP2120G	.302-7260					
ZVP4424G	.707-971					

† Available until stocks are exhausted

TO-252 (D-pak)



H = 2.55, W = 6.8, D = 10.5

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
30	N	0.031	33.0	120.0	57	IR	IRFR3303
30	N	0.015	30.0	120.0	120	INF	SDP30N03
50	N	0.15	12.0	48.0	45	ST	STD12N05
50	N	0.1	14.0	35.0	48	INTS	RFD14N05SM
50	N	0.08	17.0	68.0	55	ST	STD17N05
50	P	0.3	8.0	20.0	48	INTS	RFD8P05SM
50	P	0.15	15.0	40.0	80	INTS	RFD15P05SM
55	N	0.1	14.0	54.0	35	INF	SDP14N05
55	N	0.07	16.0	68.0	38	IR	IRFR024N
55	N	0.04	25.0*	100.0	46	IR	IRFR4105
55	N	0.04	31.0	124.0	75	INF	SDP31N05
55	N	0.02	37.0*	150.0	69	IR	IRFR1205
60	N	0.25	8.0	—	35	ST	STD8N06
60	N	0.2	7.7	31.0	25	IR	IRFR014
60	P	0.5	5.1	20.0	25	IR	IRFR9014
60	P	0.2	12.0	42.0	60	ON	MTD2955V
60	N	0.15	12.0	—	45	ST	STD12N06
60	N	0.15	12.0	—	20	ON	MTD3055V
60	N	0.12	15.0	45.0	55	ON	MTD15N06V
60	N	0.12	12.0	48.0	35	ST	STD12N06
60	N	0.1	14.0	56.0	42	IR	IRFR024
60	N	0.085	16.0	—	45	ST	STD16N06
60	N	0.085	20.0	70.0	60	ON	MTD2N06V
60	N	0.045	20.0	60.0	40	ON	MTD2N06HD
60	N	0.04	20.0	—	40	ST	STD2N06
60	N	0.027	30.0	100.0	50	FCH	FDD5690
60	P	0.45	5.0	18.0	40	ON	MTD5P06V
60	P	0.28	8.8	35.0	42	IR	IRFR9024
100	N	0.54	4.3	17.0	25	IR	IRFR110
100	N	0.4	6.0	18.0	40	ON	MTD6N10E
100	N	0.33	8.0	32.0	45	ST	STD8N10
100	N	0.27	9.0	36.0	45	ST	STD9N10
100	N	0.25	9.0	27.0	40	ON	MTD9N10E
100	N	0.21	9.1	38.0	39	IR	IRFR120N
100	N	0.16	12.0	48.0	50	ST	STD12N10
100	N	0.14	14.0	49.0	72	ON	MTD14N10E
100	N	0.11	15.0	60.0	52	IR	IRFR3910
100	P	0.66	6.0	18.0	50	ON	MTD6P10E
150	N	0.3	6.0	20.0	20	ON	MTD6N15
200	N	1.2	4.0	12.0	40	ON	MTD4N20E
200	N	0.8	4.8	19.0	42	IR	IRFR220
200	N	0.7	6.0	18.0	50	ON	MTD6N20E
250	N	1.0	5.0	15.0	50	ON	MTD5N25E
250	P	3.0	2.7	11.0	50	IR	IRFR9214
500	N	5.0	1.0	3.0	40	ON	MTD1N50E
500	N	3.6	2.0	6.0	40	ON	MTD2N50E
500	N	3.0	2.4	8.0	42	IR	IRFR420
500	N	3.0	2.7	—	50	ST	STD3NA50
600	N	8.0	1.0	3.0	40	ON	MTD1N60E
600	N	3.6	2.6	10.4	50	ST	STD2NB06
800	N	12.0	1.0	3.0	48	ON	MTD1N80E

\* Exceeds package current handling capability

SD172 / SD172A

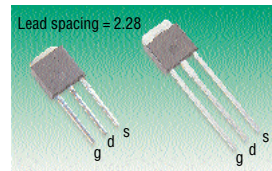
Mfrs. List No.	Order Code	1+	25+	Price Each	250+	1K+
FDD5690	NEW .354-4953					
IRFR014	.421-224					
IRFR024	.421-236 †					
IRFR024N	.706-334					
IRFR110	.421-248					
IRFR120N	.706-346					
IRFR220	.996-002					
IRFR420	.168-117					
IRFR1205	.706-474					
IRFR3303	.168-105					
IRFR3910	.706-486					
IRFR4105	.706-462					
IRFR9014	.168-129					
IRFR9024	.421-285					
IRFR9214	.168-130 †					
MTD1N50E	.236-690					
MTD1N60E	.234-4762					
MTD1N80E	.300-5057					

continued

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+ 1K+
MTD2N50E	878-005				
MTD4N20E	878-017				
MTD5N25E	234-5079				
MTD5P06V	112-0554				
MTD6N10E	234-5146				
MTD6N15	300-5094				
MTD6N20E	259-597				
MTD6P10E	234-5201				
MTD9N10E	878-029				
MTD14N10E	300-5586				
MTD15N06V	300-5010				
MTD20N06HD	300-5069				
MTD20N06V	300-5070				
MTD2955V	236-706				
MTD3055V	682-500				
RFD8P05SM	526-691				
RFD14N05SM	526-710				
RFD15P05SM	526-680				
SDP14N05	165-098				
SDP30N03	165-037				
SDP31N05	165-074				
STD2NB60	494-173				
STD3NA50	538-735 †				
STD8N06	538-693 †				
STD8N10	538-681 †				
STD9N10	934-926				
STD12NE06	494-112				
STD12N05	538-620				
STD12N06	538-668 †				
STD12N10	934-884				
STD16NE06	494-136				
STD17N05	538-607				
STD17N06	538-644				
STD20NE06	494-161				

† Available until stocks are exhausted

## TO-251 (I-Pak)



TO-251AA (I-Pak)  
HARRIS, IR, ST  
Lead length = 9.65 max  
D-Pak  
HITACHI  
Lead length = 16.3

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	t <sub>1</sub> /t <sub>2</sub> typ. ns (*max.)	Mfrs. List No.
30	N	0.031	33.0	120	57	99/28	IR IRFU3303
50	N	0.1	14.0	35	48	26/17	INTS RFD14N05
50	N	0.047	16.0	45	60	30/16	INTS RFD16N05
50	P	0.3	8.0	20	40	30/20	INTS RFD8P05
50	P	0.15	15.0	40	67.5	30/20	INTS RFD15P05
55	N	0.09	13.0	—	35	40/45	INTS HUF75307D3
55	N	0.032	31.0	—	70	55/66	INTS HUF75321D3
60	N	0.2	8.4	34	30	50/19	IR IRFU014
60	N	0.1	16.0	64	50	47/37	IR IRFU024
60	P	0.55	3.0	12	20	30/85	HIT 2SJ182L
60	P	0.5	5.6	22	30	40/17	IR IRFU9014
60	P	0.28	9.6	38	50	68/29	IR IRFU9024
100	N	0.7	3.0	6	20	25/20	HIT 2SK429L
100	P	1.2	3.4	14	30	27/17	IR IRFU9110
100	P	0.6	6.3	25	50	29/25	IR IRFU9120
200	N	1.5	2.6	10	25	—	IR IRFU210
200	N	0.7	5.0	20	50	90/30	ST STD5N20-1
300	N	1.4	3.0	—	50	—	ST STD3N30-1
400	P	7.0	1.8	7.2	50	10/24	IR IRFU9310
500	N	5.5	2.0	1.25	45	85/15	ST STD2N50-1
500	N	3.0	2.4	7.7	42	8.6/16	IR IRFU420

## TO-252 (D-pak), Logic Level

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> Pulsed A	V <sub>GS</sub> (th) max. V	P <sub>D</sub> @ 25°C W	Mfrs.	Mfrs. List No.
30	N	0.035	20.0	—	2.5	20	ON	MTD20N03HDL
30	N	0.022	16.0	80	2.0	90	INTS	RFD16N03LSM
30	N	0.02	20.0	100	2.5	50	ST	STD20NE03L
30	N	0.019	46.0	69	2.0	69	IR	IRLR3103
30	N	0.018	30.0	120	2.0	120	INF	SDP30N03L
30	N	0.01	30.0	90	1.9	96	ON	MTD3302
30	P	0.2	10.0	25	2.0	60	INTS	RFD10P03LSM
30	P	0.099	19.0	—	2.5	20	ON	MTD20P03HDL
50	N	0.12	14.0	35	2.0	40	INTS	RFD14N05LSM
50	N	0.085	17.0	68	2.5	55	ST	STD17N05L
50	N	0.047	16.0	45	2.0	60	INTS	RFD16N05LSM
55	N	0.12	13.0	50	2.0	35	INF	SDP13N05L
55	N	0.05	28.0	112	2.0	75	INF	SDP28N05L
55	N	0.027	36.0	160	2.0	69	IR	IRLR2905
60	N	0.25	8.0	—	2.5	—	ST	STD8N06L
60	N	0.18	12.0	—	2.5	20	ON	MTD3055VL
60	N	0.12	12.0	48	2.5	35	ST	STD12NE06L
60	N	0.085	15.0	53	2.0	60	ON	MTD15N06VL
60	N	0.045	20.0	—	2.5	20	ON	MTD20N06HDL
60	N	0.035	25.0	30	3.0	50	SLX	SUD25N06-45L
60	N	0.022	30.0	100	3.0	75	SLX	SUD40N06-25L
60	P	0.01	15.0	100	1.0	70	SLX	SUD45P03-10
60	P	0.15	20.0	—	2.5	20	ON	MTD20P06HDL
100	N	0.33	8.0	32	2.5	45	ST	STD8N10L
100	N	0.27	9.0	36	2.5	45	ST	STD9N10L
100	N	0.22	10.0	35	2.0	45	ON	MTD10N10EL

\* Provisional data

SD234

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+ 1K+
IRLR2905	738-360				
IRLR3103	738-372				
MTD10N10EL	113-3615				
MTD15N06VL	300-5045				
MTD20N03HDL	708-409				
MTD20N06HDL	708-380				
MTD20P03HDL	708-392				
MTD20P06HDL	708-379				
MTD3055VL	682-512				
MTD3302	300-5598				
RFD10P03LSM	526-721				
RFD14N05LSM	301-0934				
RFD16N03LSM	646-234				
RFD16N05LSM	526-733				
SDP13N05L	165-130				
SDP28N05L	165-116				
SDP30N03L	165-050				
STD8N06L	742-272				
STD8N10L	538-700				
STD9N10L	494-197				
STD12NE06L	494-124				
STD17N05L	538-619				
STD20NE03L	494-150				
SUD25N06-45L	334-5221				
SUD40N06-25L	334-5233				
SUD45P03-10	334-5350				

† Available until stocks are exhausted

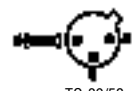
Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+ 1K+
HUF75307D3	996-300				
HUF75321D3	996-294				
IRFU014	273-685				
IRFU024	273-715				
IRFU210	996-014				
IRFU420	273-740				
IRFU3303	168-154				
IRFU9014	273-752				
IRFU9024	273-764				
IRFU9110	273-776				
IRFU9120	273-788				
IRFU9310	168-178				
RFD8P05	353-164				
RFD14N05	273-818				
RFD15P05	353-188				
RFD16N05	353-190				
STD2N50-1	538-796				
STD3N30-1	538-772 †				
STD5N20-1	538-759				
2SJ182L	353-218				
2SK429L	353-220				

† Available until stocks are exhausted

## TO-39 & TO-52



TO-39  
(TO-205AF)  
Leads on  
5.08 dia circle  
TO-52  
Leads on  
2.54 dia circle



TO-39/52

Hermetically sealed metal can packages

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Package	Mfrs.	Mfrs. List No.
60	N	3.0	1.1	3.0	6.25	TO-39	SLX	2N6660
90	N	4.0	0.9	3.0	6.25	TO-39	SLX	2N6661
100	N	0.6	3.5	8.0	15.0	TO-39	SEM	2N6782
100	N	0.18	8.0	25.0	25.0	TO-39	SEM	2N6796
100	P	0.6	4.0	16.0	20.0	TO-39	SEM	2N6845
100	P	0.3	6.5	26.0	25.0	TO-39	SEM	2N6849

\* Zener protected gate

● Logic level MOSFET with design optimised for 5V gate drive

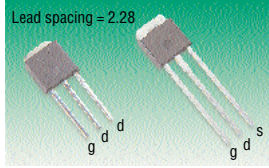
SD16

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+ 1K+
2N6660	353-279				
2N6661	353-280				
2N6782	664-157				
2N6796	664-169				
2N6845	664-170				
2N6849	664-182				

Continued

Power MOSFETs — continued

TO-251 (I-Pak), Logic Level



V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> Pulsed A	V <sub>GS</sub> (th) max. V	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
30	N	0.022	16.0	80	2.0	90	INTS	RFD16N03L
30	P	0.2	10.0	25	2.0	60	INTS	RFD10P03L
50	N	0.1	14.0	35	2.0	40	INTS	RFD14N05L
50	N	0.047	16.0	45	2.0	60	INTS	RFD16N05L
55	N	0.065	17.0	72	2.0	46	IR	IRLU024N
60	N	0.6	4.0	10	2.5	30	INTS	RFD4N06L
60	N	0.3	5.0	—	2.0	20	TOSH	2SK2231
60	N	0.135	12.0	26	2.0	40	INTS	RFD12N06RLE
60	N	0.047	16.0	100	2.0	90	INTS	RFD16N06LE
60	P	0.28	5.0	—	2.0	20	TOSH	2SJ377
100	N	0.54	4.6	18	2.0	30	IR	IRLU110
100	N	0.45	3.0	—	2.0	20	TOSH	2SK2201
100	N	0.27	8.4	31	2.0	50	IR	IRLU120
120	N	0.55	3.0	12	2.0	20	HIT	2SK1254L

SD235

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	V <sub>GS</sub> (th) max. V	P <sub>D</sub> @ 25°C W	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
200	N	0.18	18	4.0	3.0	125	IR	IRF640S
250	N	0.25	16	4.0	2.5	125	ON	MTB16N25E
400	N	0.55	10	4.0	2.5	125	ON	MTB10N40E
400	N	0.55	10	4.0	—	125	IR	IRF740S
1000	N	4.0	3	4.0	2.5	125	ON	MTB3N100E
1200	N	5.0	3	4.0	2.5	125	ON	MTB3N120E

● Logic level device, optimised for 5V gate drive

\*When mounted on 1" square PCB

SD16 / SD192A

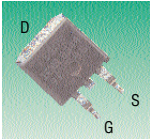
Mfrs. List No.	Order Code	1+	25+	100+	1K+
IRLU024	259-883 †				
IRLU024N	317-7269				
IRLU110	259-895				
IRLU120	259-901				
RFD4N06L	507-003				
RFD10P03L	516-387				
RFD12N06RLE	516-399				
RFD14N05L	516-405				
RFD16N03L	646-222				
RFD16N05L	526-678				
RFD16N06LE	516-417				
2SJ377	327-2102	1+	25+	100+	500+
2SK1254L	353-243				
2SK2201	327-2163				
2SK2231	327-2175				

† Available until stocks are exhausted

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	1K+
IRF9Z34S	541-345				
IRF530S	437-610				
IRF540S	437-621				
IRF640S	437-645				
IRF740S	538-966				
IRF3205S	740-810				
IRF3710S	740-822				
IRF4905S	740-858				
IRF9520S	437-657				
IRL3103S	740-846				
IRL3803S	740-834				
MTB3N100E	234-4579				
MTB3N120E	113-3597				
MTB10N40E	300-4971				
MTB16N25E	234-4555				
MTB23P06V	300-4983				
MTB36N06V	162-7727				
MTB40N10E	300-5562				
MTB50N06V	300-4995				
MTB52N06V	300-5574				
MTB60N06HD	300-5008				
MTB75N06HD	878-042				
NDB6030L	741-449 †				
NDB6050L	741-486 †				
NDB6060L	741-528				
NDB7050	741-450				
NDB7050L	741-474				
NDB7060	741-498				
NDB7060L	741-516				
RF1S50N06SM	646-350				
RF1S60P03SM	646-430				
STB40NE03L-20	323-9299				
STB50NE10	323-9305				
STB80NE03L-06	323-9317				
SUB65P06-20	549-265				
SUB75N06-08	549-230				

† Available until stocks are exhausted

TO-263, (D<sup>2</sup>-Pak)



H = 4.69, W = 10.54, D = 15.49



Footprint



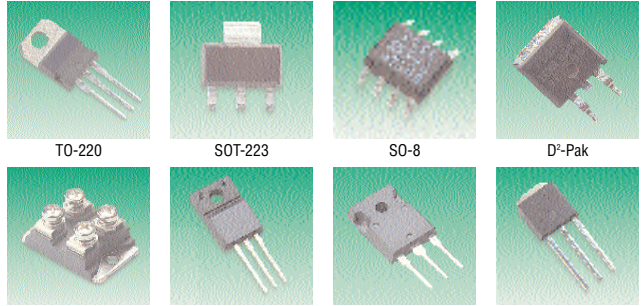
● Surface mount equivalent of TO-220 package

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	V <sub>GS</sub> (th) max. V	P <sub>D</sub> @ 25°C W	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
30	N	0.02	40	2.5	—	80	ST	* STB40NE03L-20
30	N	0.02	52	3.0	—	75	FCH	NDB6030L
30	N	0.014	56	2.5	3.7	83	IR	IRL3103S
30	N	0.006	80	2.5	—	150	ST	STB80NE03L-06
30	N	0.006	120*	2.5	3.7	150	IR	IRL3803S
30	N	0.027	60	4.0	3.7	176	INTS	RF1S60P03SM
50	N	0.025	48	2.0	—	100	FCH	NDB6050L
50	N	0.015	75	2.0	—	150	FCH	NDB7050L
50	N	0.015	75	4.0	—	150	FCH	NDB7050
55	N	0.008	98*	4.0	3.7	150	IR	IRF3205S
55	P	0.02	64	4.0	3.7	150	IR	IRF4905S
60	N	0.12	23	4.0	3.0	90	ON	MTB23P06V
60	N	0.04	32	4.0	3.0	90	ON	MTB36N06V
60	N	0.028	42	4.0	3.0	125	ON	MTB50N06V
60	N	0.025	48	2.0	—	100	FCH	NDB6060L
60	N	0.022	50	4.0	3.7	131	INTS	RF1S50N06SM
60	N	0.022	52	4.0	3.0	165	ON	MTB52N06V
60	N	0.014	60	4.0	2.5	125	ON	MTB60N06HD
60	N	0.013	75	4.0	—	150	FCH	NDB7060
60	N	0.013	75	2.0	—	150	FCH	NDB7060L
60	N	0.01	75	4.0	—	125	ON	MTB75N06HD
60	N	0.008	75	4.0	3.7	187	SLX	SUB75N06-08
60	P	0.14	18	4.0	3.7	88	IR	IRF9Z34S
60	P	0.02	60	4.0	3.7	150	SLX	SUB65P06-20
100	N	0.16	14	4.0	3.7	88	IR	IRF530S
100	N	0.077	28	4.0	3.7	150	IR	IRF540S
100	N	0.04	40	4.0	2.5	169	ON	MTB40N10E
100	N	0.028	46	4.0	3.7	150	IR	IRF3710S
100	N	0.027	50	4.0	—	150	ST	STB50NE10
100	P	0.6	6.8	4.0	3.7	60	IR	IRF9520S

continued

HEXFETS<sup>®</sup>

International  
Rectifier



V <sub>DS</sub> V	N/P Chnl	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont. @ 25°C A	I <sub>DM</sub> pulsed A	V <sub>GS</sub> (th) max (*min) V <sub>GS</sub> (th)	P <sub>D</sub> @ 25°C W	Package	Mfrs. List No.
20	N	0.009	77	308	3.0	87	D <sup>2</sup> -Pak	IRF3704S
20	N	0.009	77	308	3.0	87	TO-220	IRF3704
20	N	0.007	15	120	3.0	2.5	SO-8	IRF7457
30	N	0.0125	62	248	3.0	87	D <sup>2</sup> -Pak	IRF3707S
30	N	0.0125	62	248	3.0	87	TO-220	IRF3707
30	N	0.008	14	110	4.0	2.5	SO-8	IRF7458
30	N	0.0028	210	1000	4.0	230	TO-247	IRFP3703
30	N	0.0025	260	1000	4.0	3.8	Super D <sup>2</sup> -Pak	IRFBL3703
40	N	0.009	100*	400	4.0	170	TO-220	IRF1104
55	N	0.075	2.8	11.2	4.0	2.1	SOT-223	IRFL024N
60	N	0.028	50	200	4.0	150	TO-220	IRFZ44R
60	N	0.018	50	290	4.0	190	TO-220	IRFZ48R
60	N	0.0165	55	220	4.0	115	TO-220	IRFZ44V
60	N	0.012	72	290	4.0	150	TO-220	IRFZ48V
100	N	0.06	4.5	36	5.5	2.5	SO-8	IRF7452
100	N	0.025	59	236	5.5	200	TO-220	IRFB59N10D
100	N	0.0065	180	720	4.0	480	SOT-227	FB180SA10
150	N	0.125	18	72	5.5	110	D-Pak	IRFR18N15D
150	N	0.09	23	92	5.5	3.8	D <sup>2</sup> -Pak	IRFS23N15D
150	N	0.09	23	92	5.5	136	TO-220	IRFB23N15D
150	N	0.045	41	164	5.5	3.1	D <sup>2</sup> -Pak	IRFS41N15D
150	N	0.045	41	164	5.5	200	TO-220	IRFB41N15D
200	N	0.73	1.2	10	5.5	2.5	SO-8	IRF7464
200	N	0.38	9.4	38	5.5	86	D-Pak	IRFR9N20D
200	N	0.3	9.3	37	4.0	82	TO-220	IRF630N

continued

$V_{ds}$ V	N/P Chnl	$R_{ds}$ $\Omega$ (on)	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max (*min) $V_{gs}$ (th)	$P_d$ @ 25°C W	Package	Mfrs. List No.
<b>Single N Channel – continued</b>								
200	N	0.235	13	52	5.5	110	D-Pak	IRFR13N20D
200	N	0.15	18	72	4.0	150	TO-220	IRF640N
200	N	0.15	18	72	4.0	150	D <sup>-</sup> -Pak	IRF640NS
200	N	0.1	24	96	5.5	3.8	D <sup>-</sup> -Pak	IRFS23N20D
200	N	0.1	24	96	5.5	170	TO-220	IRFB23N20D
200	N	0.082	31	124	5.5	3.1	D <sup>-</sup> -Pak	IRFS31N20D
200	N	0.082	31	124	5.5	200	TO-220	IRFB31N20D
200	N	0.075	30	120	4.0	214	TO-247	IRFP250N
200	N	0.04	50	200	4.0	300	TO-247	IRFP260N
300	N	0.45	9.3	96	4.0	96	TO-220	IRFB9N30A
400	N	1.0	5.5	22	4.5	74	TO-220	IRF730A
400	N	0.55	10	40	4.0	125	TO-220	IRF740A
500	N	3.0	2.5	10	4.5	50	TO-220	IRF820A
500	N	1.4	5	20	4.0	125	D <sup>-</sup> PAK	IRF830AS
500	N	1.4	5	20	4.0	74	TO-220	IRF830A
500	N	0.85	8	32	4.0	125	D <sup>-</sup> PAK	IRF840AS
500	N	0.85	8	32	4.0	125	TO-220	IRF840A
500	N	0.52	6.6	44	4.0	60	TO-220 Fullpak	IRFIB7N50A
500	N	0.52	11	44	4.0	170	TO-220	IRFB11N50A
500	N	0.4	14	56	4.0	190	TO-247	IRFP450A
500	N	0.28	17	68	5.5	200	TO-220	IRFB17N50L
500	N	0.27	20	80	4.0	280	TO-247	IRFP460A
500	N	0.25	18	72	5.5	200	TO-220	IRFB18N50K
500	N	0.23	22	88	4.0	277	TO-247	IRFP22N50A
500	N	0.13	38	150	4.0	500	SOT-227	FA38SA50LC
500	N	0.08	57	228	4.0	625	SOT-227	FA57SA50LC
600	N	7.0	1.4	5.6	4.0	36	D-Pak	IRFR1N60A
600	N	7.0	1.4	5.6	4.0	36	I-Pak	IRFU1N60A
600	N	2.2	3.6	14	4.5	74	TO-220	IRFBC30A
600	N	1.2	6.2	25	4.0	125	D <sup>-</sup> -Pak	IRFBC40AS
600	N	1.2	6.2	25	4.0	125	TO-220	IRFBC40A
600	N	0.75	5.5	37	4.0	60	TO-220 Fullpak	IRFIB6N60A
600	N	0.75	9.2	37	4.0	170	TO-220	IRFB9N60A
600	N	0.75	9.2	37	4.0	170	TO-220	IRFS9N60A
600	N	0.58	11	44	4.0	180	TO-247	IRFPC50A
650	N	0.93	5.1	21	4.0	60	TO-220 Fullpak	IRFIB5N65A
650	N	0.93	8.5	21	4.0	167	TO-220	IRFB9N65A
<b>Single N Channel – Logic Level Gate Drive</b>								
20	N	0.009	12	100	2.0	2.5	SO-8	IRF7459
20	N	0.0085	77	280	2.0	88	D <sup>-</sup> Pak	IRF3706S
20	N	0.0085	77	280	2.0	88	TO-220	IRF3706
20	N	0.0065	16	130	2.0	2.5	SO-8	IRF7456
30	N	0.4	24	96	1.0*	45	TO-220	IRL2703
30	N	0.045	3.9	16	2.4	2.1	SOT-223	IRLL2703
30	N	0.025	8.3	66	1.0*	2.5	SO-8	IRF7807
30	N	0.0135	10	50	1.0*	2.5	SO-8	SI4410DY
30	N	0.012	11	90	2.0	2.5	SO-8	IRF7467
30	N	0.012	62	248	2.0	87	D <sup>-</sup> Pak	IRF3708S
30	N	0.012	62	248	2.0	87	TO-220	IRF3708
30	N	0.011	13	100	1.0*	2.5	SO-8	IRF7805
30	N	0.0075	15	120	2.0	2.5	SO-8	IRF7455
30	N	0.007	100**	400	2.5	3.8	D <sup>-</sup> Pak	IRL2203S
40	N	0.009	100**	400	2.5	170	TO-220	IRL1104L
40	N	0.008	104**	416	1.0*	167	TO-220	IRL1104
40	N	0.008	104**	416	1.0*	2.4	D <sup>-</sup> Pak	IRL1104S
40	N	0.0065	130**	520	1.0*	200	TO-220	IRL1004
40	N	0.0065	110**	450	1.0*	3.1	D <sup>-</sup> Pak	IRL1004S
55	N	0.065	3.1	12	2.0	2.1	SOT-223	IRLL024N
150	N	0.166	12	48	2.0	80	TO-220	IRL3215
<b>Single P Channel – Logic Level Gate Drive</b>								
12	P	0.02	9.5	76	0.6*	2.5	SO-8	IRF7233
14	P	0.012	11	88	0.6*	2.5	SO-8	IRF7220
20	P	0.06	5.4	43	1.0*	2.5	SO-8	IRF7207
<b>Dual N/P Channel – Logic Level Gate Drive</b>								
30	N/P	0.029/0.058	7.3/5.3	30/30	1.0*	2.5	SO-8	IRF7389
30	N/P	0.045/0.09	5.8/4.3	46/34	1.0*	2.5	SO-8	IRF7379

\*\* Denotes calculated value - exceeding package limits

SD485 / SD485A

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
FA38SA50LC	315-7489					
FA57SA50LC	315-7490					
FB180SA10	315-7507					
IRF1104	315-7325					
IRF1104L	315-7337					
IRF3704	NEW 353-8114					
IRF3704S	NEW 353-8102					
IRF3706	NEW 353-8084					
IRF3706S	NEW 353-8072					
IRF3707	NEW 353-8205					
IRF3707S	NEW 353-8199					
IRF3708	NEW 353-8151					
IRF3708S	NEW 353-8140					
IRF630N	NEW 350-8894					
IRF640N	NEW 350-8900					
IRF640NS	NEW 350-8912					
IRF7207	SMD 315-7799					
IRF7220	SMD 315-7740					
IRF7233	SMD 315-7787					
IRF730A	NEW 353-7614					
IRF7379	SMD 315-7441					
IRF7389	SMD 315-7453					
IRF740A	NEW 353-7626					
IRF7452	NEW 353-7912					
IRF7455	NEW 353-8163					
IRF7456	NEW 353-8096					
IRF7457	NEW 353-8126					
IRF7458	NEW 353-8217					
IRF7459	NEW 353-8060					

continued

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
IRF7464	NEW 353-8059					
IRF7467	NEW 353-8138					
IRF7805	315-7465					
IRF7807	315-7477					
IRF820A	NEW 353-7638					
IRF830A	315-7672					
IRF830AS	SMD 315-7684					
IRF840A	315-7696					
IRF840AS	SMD 315-7702					
IRFB11N50A	315-7349					
IRFB17N50L	NEW 353-7602					
IRFB18N50K	NEW 353-7596					
IRFB23N15D	NEW 353-7973					
IRFB23N20D	NEW 353-7997					
IRFB31N20D	NEW 353-8035					
IRFB41N15D	NEW 353-7950					
IRFB59N10D	NEW 353-7900					
IRFB9N30A	315-7350					
IRFB9N60A	315-7362					
IRFB9N65A	315-7374					
IRFBC30A	NEW 353-7663					
IRFBC40A	315-7714					
IRFBC40AS	SMD 315-7726					
IRFBL3703	NEW 353-8175					
IRFIB5N65A	315-7222					
IRFIB6N60A	315-7234					
IRFIB7N50A	315-7246					
IRFL024N	SMD 315-7751					
IRFP22N50A	315-7386					
IRFP250N	NEW 350-8924					
IRFP260N	NEW 350-8936					
IRFP3703	NEW 353-8187					
IRFP450A	NEW 353-7640					
IRFP460A	NEW 353-7651					
IRFP50A	315-7738					
IRFR13N20D	NEW 353-8000					
IRFR18N15D	NEW 353-7936					
IRFR9024N	NEW 350-8845					
IRFR9120N	NEW 350-8882					
IRFR920D	NEW 353-8011					
IRFR1N60A	315-7398					
IRFS23N15D	NEW 353-7961					
IRFS23N20D	NEW 353-7985					
IRFS31N20D	NEW 353-8023					
IRFS41N15D	NEW 353-7948					
IRFS9N60A	315-7404					
IRFU1N60A	315-7428					
IRFZ44R	NEW 351-0335					
IRFZ44V	NEW 351-0323					
IRFZ48R	NEW 351-0359					
IRFZ48V	NEW 351-0347					
IRL1004	315-7258					
IRL1004S	SMD 315-7260					
IRL1104	315-7271					
IRL1104S	SMD 315-7283					
IRL2203S	SMD 315-7295					
IRL2703	315-7301					
IRL3215	315-7313					
IRLL024N	SMD 315-7763					
IRLL2703	SMD 315-7775					
SI4410DY	SMD 315-7430					

Continued

## Value for Money

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## Metric Values

Yes, we're metric! All dimensions appear in metric values unless otherwise stated.

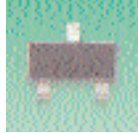
Power MOSFETs — continued

20V – 50V N-Channel PowerMOS

Philips Semiconductors



SOT-22



SOT-23



D²-PAK



TO-220AB

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω) @ V <sub>GS</sub> (V)	I <sub>D</sub> (max.) @ 25°C (A)	PACKAGE			
			SURFACE MOUNT			LEADED
			SOT223	SOT23	D²-PAK (SOT404)	TO220AB (SOT78)
25	0.012	10				PHP69N03(L)T
25	0.014	10				PHP55N03(L)T
25	0.016	10				PHP50N03LT
30	0.005	10				PHP130N03(L)T
30	0.0095	10				PHP87N03(L)T
30	0.021	10			PHP45N03LT	PHP45N03(L)T
30	0.023	10				PHP42N03(L)T
30	0.028	10			PHT6N03(L)T	
30	0.05	10				PHP24N03(L)T
30	0.4	10				
30	0.45	2.5			BSH103	
50	15	10			BSN20	

SD6

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
BSH103	163-405					
BSN20	163-510					
PHB45N03LT	935-918					
PHP130N03LT	936-080					
PHP130N03T	935-827					
PHP24N03LT	936-091					
PHP24N03T	164-719					
PHP42N03LT	164-800					
PHP42N03T	164-811					
PHP45N03LT	936-108					
PHP45N03T	935-840					
PHP50N03LT	305-1249					
PHP55N03LT	164-847					
PHP55N03T	164-859					
PHP69N03LT	936-121					
PHP69N03T	935-864					
PHP87N03LT	164-914					
PHP87N03T	164-926					
PHT6N03LT	935-979					
PHT6N03T	935-980					

55V – 60V N-Channel PowerMOS

Philips Semiconductors



SOT-223



SOT-23



TO-220AB (SOT78)

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω) @ V <sub>GS</sub> (V)	I <sub>D</sub> (max.) @ 25°C (A)	TECHNOLOGY	PACKAGE		
				SURFACE MOUNT		LEADED
				SOT223	SOT23	TO220AB (SOT78)
55	0.007	10	TrenchMOS			PHP125N06(L)T
55	0.013	10	TrenchMOS			PHP80N06(L)T
55	0.016	10	TrenchMOS			PHP65N06LT
55	0.018	10	TrenchMOS			PHP60N06(L)T
55	0.022	10	TrenchMOS			PHP50N06(L)T
55	0.026	10	TrenchMOS			PHP44N06(L)T
55	0.032	10	TrenchMOS			PHP37N06(L)T
55	0.04	5	TrenchMOS	PHT11N06(L)T		
55	0.07	10	TrenchMOS			PHP21N06(L)T
55	0.08	5	TrenchMOS	PHT8N06LT		
55	0.15	5	TrenchMOS	PHT6N06(L)T		
60	0.6	10	VDMOS		BSH101	

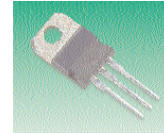
SD21

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
BSH101	163-387					
PHP125N06LT	936-078					
PHP125N06T	935-815					
PHP21N06LT	164-690					
PHP21N06T	164-707					
PHP37N06LT	164-756					
PHP37N06T	164-768					
PHP44N06LT	164-823					
PHP44N06T	164-835					

continued

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
PHP50N06LT	936-110					
PHP50N06T	935-852					
PHP60N06LT	305-1250					
PHP60N06T	164-872					
PHP65N06LT	164-884					
PHP80N06LT	164-896					
PHP80N06T	164-902					
PHT11N06LT	164-951					
PHT11N06T	935-967					
PHT6N06LT	164-963					
PHT6N06T	164-975					
PHT8N06LT	164-987					

TO-220



intersil

	V <sub>DS</sub> V	R <sub>DS(on)</sub> max. Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> pulsed A	V <sub>GS</sub> (th) max. (*min) V	P <sub>D</sub> @ 25°C W	Mfrs. List No.
<b>N Channel</b>							
30	0.01	70.0	200	4	150	RFP70N03	
50	0.12	13.0	48	4	40	BUZ71A	
50	0.1	14.0	56	4	40	BUZ71	
50	0.04	30.0	120	4	75	BUZ11	
50	0.022	50.0	120	4	110	RFP50N05	
60	0.022	50.0	120	4	131	RFP50N06	
60	0.014	70.0	180	4	150	RFP70N06	
100	0.54	5.6	20	4	43	IRF510	
100	0.16	14.0	56	4	79	IRF530	
100	0.077	28.0	110	4	150	IRF540	
100	0.04	40.0	100	4	160	RFP40N10	
200	1.5	2.5	10	4	20	IRF610	
200	0.4	9.0	36	4	75	IRF630	
200	0.18	18.0	72	4	125	IRF640	
400	1.0	5.5	22	4	75	IRF730	
400	0.55	10.0	40	4	125	IRF740	
450	0.85	8.0	32	4	125	IRF841	
500	1.5	4.5	18	4	75	IRF830	
500	0.85	8.0	32	4	125	IRF840	
<b>P Channel</b>							
30	0.02	60.0	500	—	176	RFP60P03	
30	0.027	60.0	—	—	176	RF1S60P03*	
50	0.3	8.0	20	—	40	RFP8P05	
50	0.15	15.0	40	—	80	RFP15P05	
50	0.065	30.0	75	—	120	RFP30P05	
60	0.075	30.0	75	—	100	RFP30P06	
100	0.6	6.0	24	4	40	IRF9520	
100	0.3	12.0	48	4	75	IRF9530	
100	0.2	19.0	76	4	125	IRF9540	
200	0.5	11.0	44	4	125	IRF9640	

\*Tab-less TO-220

SD100

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
BUZ11	301-0703					
BUZ71	301-0909					
BUZ71A	301-0879					
IRF510	301-0806					
IRF530	301-0752					
IRF540	301-0697					
IRF610	354-405					
IRF630	301-0831					
IRF640	301-0739					
IRF730	301-0910					
IRF740	301-0790					
IRF830	301-0892					
IRF840	301-0740					
IRF841	526-630					
IRF9520	301-0818					
IRF9530	301-0715					
IRF9540	301-0727					
IRF9640	301-0922					
RFP8P05	273-820					
RFP15P05	273-831					
RFP30P05	273-843					
RFP30P06	354-910					
RFP40N10	301-0843					
RFP50N05	250-612					
RFP50N06	516-466					
RFP60P03	646-416					
RFP70N03	291-584					
RFP70N06	526-599					
RF1S60P03	646-428					

## TO-220 UltraFETs™ N-Channel



$V_{ds}$ V	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mftrs. List No.
30	0.052	20	3	35	HUF76107P3
30	0.021	47	3	75	HUF76121P3
30	0.016	56	3	105	HUF76129P3
30	0.011	75	3	120	HUF76132P3
30	0.0045	75	3	270	HUF76145P3
55	0.09	13	3	35	HUF75307P3
55	0.016	56	3	111	HUF75333P3
55	0.009	75	3	150	HUF75343P3
55	0.007	75	3	215	HUF75345P3

SD101

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
HUF75307P3	<b>996-282</b> †					
HUF75333P3	<b>996-269</b>					
HUF75343P3	<b>996-257</b>					
HUF75345P3	<b>996-245</b>					
HUF76107P3	<b>302-0654</b>					
HUF76121P3	<b>302-0642</b>					
HUF76129P3	<b>302-0630</b>					
HUF76132P3	<b>302-0629</b>					
HUF76145P3	<b>302-0617</b>					

† Available until stocks are exhausted

## TO-220



ON Semiconductor



$V_{ds}$ V	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mftrs. List No.
25	0.009	75	225	2	225	MTP75N03HDL
30	0.022	42	126	2	74	MTP1302
30	0.015	52	—	2	120	MTP1304Z
30	0.0065	75	225	2	150	MTP1306
50	0.1	15	—	2	75	MTP15N05EL
50	0.009	75	225	4	150	MTP75N05HD
60	0.2	12	42	4	60	MTP2955V
60	0.18	12	42	2	48	MTP3055VL
60	0.15	12	48	4	48	MTP3055V
60	0.085	15	53	2	60	MTP15N06VL
60	0.085	20	70	4	60	MTP20N06V
60	0.05	30	105	2	90	MTP30N06VL
60	0.04	32	112	4	90	MTP36N06V
60	0.032	42	147	2	125	MTP50N06VL
60	0.028	42	—	4	125	MTP50N06V
60	0.022	52	182	4	165	MTP52N06V
60	0.01	75	—	4	125	MTP75N06HD
100	0.27	8	32	4	40	IRF520
100	0.25	10	25	4.5	75	MTP10N10E
100	0.22	10	35	2	40	MTP10N10EL
100	0.16	12	—	4	75	MTP12N10E
100	0.16	14	56	4	75	IRF530
100	0.077	27	108	4	125	IRF540
100	0.06	33	—	4	150	MTP33N10E
100	0.04	40	140	4	169	MTP40N10E
150	0.07	29	102	4	125	MTP29N15E
200	0.7	7	21	4	50	MTP7N20E
200	0.4	9	36	4	75	IRF630
200	0.18	18	72	4	125	IRF640
200	0.16	20	—	4	125	MTP20N20E
250	0.45	9	32	4	80	MTP9N25E
250	0.25	16	56	4	125	MTP16N25E
400	3.5	2	40	4	40	MTP2N40E
400	1.8	4	12	4	74	MTP4N40E
400	1.0	5	—	4	75	MTP5N40E
400	0.55	10	—	4	125	MTP10N40E
400	0.55	10	40	4	125	IRF740
500	5.0	1	3	4	40	MTP1N50E
500	3.6	2	6	4	75	MTP2N50E
500	1.5	4	—	4	75	MTP4N50E
500	1.5	4.5	18	4	75	IRF830
500	0.85	8	32	4	125	IRF840
500	0.8	8	—	4	125	MTP8N50E
500	0.41	12	42	4	202	NTP12N50
600	8.0	1	3	4	50	MTP1N60E
600	3.8	2	9	4	50	MTP2N60E
600	2.2	3	10	4	75	MTP3N60E
600	0.75	10	35	4	201	NTP10N60
600	1.2	6	30	4	125	MTP6N60E
600	1.2	6	21	4	142	NTP6N60
800	3.0	4	12	4	125	MTP4N80E
1000	9.0	1	3	4	75	MTP1N100E
1000	4.0	3	9	4	125	MTP3N100E
1200	5.0	3	11	4	125	MTP3N120E

continued

$V_{ds}$ V	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mftrs. List No.
30	0.007	75	—	—	150	MTP50P03HDL
60	0.45	5	18	4	40	MTP5P06V
60	0.3	12	—	—	75	MTP2955E
60	0.12	23	81	—	90	MTP23P06V
60	0.08	30	105	4	125	MTP30P06V
100	0.3	12	—	—	88	MTP12P10
200	1.0	6	21	4	75	MTP6P20E
500	6.0	2	—	4	75	MTP2P50E

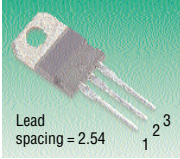
SD105 / SD105A

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
IRF520	<b>877-827</b>					
IRF530	<b>877-839</b>					
IRF540	<b>877-840</b>					
IRF630	<b>877-852</b>					
IRF640	<b>877-864</b>					
IRF740	<b>877-876</b>					
IRF830	<b>877-888</b>					
IRF840	<b>877-890</b>					
MTP1N50E	<b>234-5341</b>					
MTP1N60E	<b>234-5353</b>					
MTP1N100E	<b>234-5330</b>					
MTP2N40E	<b>300-5150</b>					
MTP2N50E	<b>300-5185</b>					
MTP2N60E	<b>877-931</b>					
MTP2P50E	<b>707-983</b>					
MTP3N60E	<b>638-249</b>					
MTP3N100E	<b>877-943</b>					
MTP3N120E	<b>112-0578</b>					
MTP4N40E	<b>234-5638</b>					
MTP4N50E	<b>708-021</b>					
MTP4N80E	<b>300-5290</b>					
MTP5N40E	<b>708-045</b>					
MTP5P06V	<b>300-5689</b>					
MTP6N60E	<b>708-010</b>					
MTP6P20E	<b>448-930</b>					
MTP7N20E	<b>300-5343</b>					
MTP8N50E	<b>708-033</b>					
MTP9N25E	<b>234-5821</b>					
MTP10N10E	<b>234-5365</b>					
MTP10N10EL	<b>300-5124</b>					
MTP10N40E	<b>708-057</b>					
MTP12N10E	<b>708-070</b>					
MTP12P10	<b>707-995</b>					
MTP15N05EL	<b>234-5432</b>					
MTP15N06VL	<b>300-5630</b>					
MTP16N25E	<b>234-5456</b>					
MTP20N06V	<b>300-5641</b>					
MTP20N20E	<b>708-069</b>					
MTP23P06V	<b>259-639</b>					
MTP29N15E	<b>300-5148</b>					
MTP30N06VL	<b>300-5197</b>					
MTP30P06V	<b>300-5227</b>					
MTP33N10E	<b>708-094</b>					
MTP36N06V	<b>259-640</b>					
MTP40N10E	<b>300-5677</b>					
MTP50N06V	<b>259-664</b>					
MTP50N06VL	<b>112-0591</b>					
MTP50P03HDL	<b>708-355</b>					
MTP52N06V	<b>448-928</b>					
MTP75N03HDL	<b>300-5320</b>					
MTP75N05HD	<b>448-941</b>					
MTP75N06HD	<b>708-112</b>					
MTP1302	<b>300-5604</b>					
MTP1304Z	<b>300-5616</b>					
MTP1306	<b>300-5628</b>					
MTP2955E	<b>708-008</b>					
MTP2955V	<b>300-5653</b>					
MTP3055V	<b>877-955</b>					
MTP3055VL	<b>877-967</b>					
NTP6N60	<b>NEW 353-4765</b>					
NTP10N60	<b>NEW 353-4741</b>					
NTP12N50	<b>NEW 353-4753</b>					

Continued

Power MOSFETs — continued

TO-220, N Channel 20V to 80V



Pin Out 1 2 3  
 (a) g d/tab s  
 (b) s g d/tab

V <sub>DS</sub> V	R <sub>DS(on)</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Pin Out	Mfr.	Mfrs. List No.
20	0.028	35.0	—	50	a	FCH	NDP6020
30	0.006	80.0	320	300	a	INF	SPP80N03
33	0.008	80.0	320	160	a	ST	STP80NS04Z**
50	0.08	20.0	80	85	a	ST	BUZ10
50	0.055	27.0	108	95	a	ST	BUZ11A
50	0.05	30.0	—	105	a	ST	STP30N05
50	0.04	36.0	144	120	a	ST	BUZ11
50	0.018	60.0	240	250	a	INF	BUZ100
50	0.015	75.0	225	150	a	FCH	NDP7050
50	0.01	75.0	225	150	a	FCH	NDP7052
55	0.07	17.0	68	45	a	IR	IRFZ24N
55	0.04	26.0	100	56	a	IR	IRFZ34N
55	0.04	31.0	124	75	a	INF	BUZ103S
55	0.024	41.0	160	83	a	IR	IRFZ44N
55	0.02	46.0	180	88	a	IR	IRFZ46N
55	0.016	53.0	210	94	a	IR	IRFZ48N
55	0.015	77.0	308	170	a	INF	BUZ100S
55	0.0125	68.0	270	115	a	IR	IRF1010N
55	0.008	80.0	320	250	a	INF	BUZ111S
55	0.008	98.0*	390	150	a	IR	IRF3205
60	3.5	1.46	3	15	b	SLX	VN66AFD
60	0.2	10.0	40	36	a	IR	IRFZ14
60	0.12	16.0	64	60	a	ST	STP16NE06
60	0.1	15.0	45	50	a	FCH	NDP4060
60	0.05	26.0	—	60	a	FCH	NDP5060
60	0.042	28.0	112	68	a	IR	IRFZ34E
60	0.04	20.0	—	50	a	ST	STP20NE06
60	0.04	36.0	—	100	a	ST	STP36NE06
60	0.025	48.0	144	100	a	FCH	NDP6060
60	0.023	48.0	192	110	a	IR	IRFZ44E
60	0.022	55.0	220	130	a	ST	STP55NE06
60	0.018	60.0	240	120	a	SLX	SUP60N06-18
60	0.016	60.0	240	150	a	ST	STP60NE06-16
60	0.016	64.0	190	130	a	FCH	NDP7061
60	0.012	81.0	330	170	a	IR	IRF1010E
60	0.01	80.0	320	150	a	ST	STP80NE06-10
60	0.01	80.0	320	150	a	ST	STP80NE06-10
60	0.008	75.0	240	187	a	SLX	SUP75N06-08
75	0.013	75.0	—	160	a	ST	STP75NE75
75	0.013	71.0	280	150	a	IR	IRF2807
80	0.01	75.0	240	187	a	SLX	SUP75N08-10

\*Exceeds package current handling capability  
 \*\*Denotes fully protected, MESH Overlay<sup>®</sup>, voltage clamped

SD364 / SD364A

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
BUZ10	.353-980					
BUZ11	.353-991					
BUZ11A	.354-016					
BUZ100	.523-320					
BUZ100S	.165-232					
BUZ103S	.165-256					
BUZ111S	.165-219					
IRF1010E	.167-897					
IRF1010N	.637-397					
IRF2807	.996-117					
IRF3205	.706-425					
IRFZ14	.354-790					
IRFZ24N	.637-403					
IRFZ34E	.168-180					
IRFZ34N	.637-350					
IRFZ44E	.168-208					
IRFZ44N	.637-385					
IRFZ46N	.637-361					
IRFZ48N	.637-452					
NDP4060	.707-284 †					
NDP5060	.932-747					
NDP6020	.932-644					
NDP6060	.707-296					
NDP7050	.707-302					
NDP7052	.932-711					
NDP7061	.932-759					
SPP80N03	.165-153					
STP16NE06	.162-139					
STP20NE06	.494-239 †					
STP30N05	.484-660 †					
STP36NE06	.494-290					
STP55NE06	.497-976					
STP60NE06-16	.498-038					
STP75NE75	.323-9354					
STP80NE06-10	.498-129					
STP80NS04Z	.163-200					
STP80N06-10	.935-050 †					
SUP60N06-18	.549-174					
SUP75N06-08	.549-186					
SUP75N08-10	.549-204					
VN66AFD	.355-010					
VN88AFD	.355-021					

† Available until stocks are exhausted

80V – 200V N-Channel PowerMOS

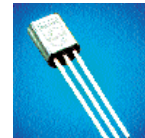
Philips Semiconductors



SOT-23



TO-220AB



TO-92

- Choice of packages including SMD
- Best-in-class repetitive ruggedness – safe operation during avalanche conditions
- Ruggedness specified in terms of current and time – to ease the design process
- 100% avalanche energy rated
- Low capacitance for improved switching performance
- Low R<sub>DS(on)</sub> in TO-220 package

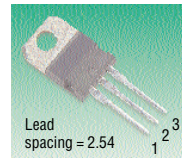
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	@ V <sub>GS</sub> (V)	I <sub>D</sub> (max.) @ 25°C (A)	PACKAGE		
				SOT223	TO220AB (SOT78)	TO92 (SOT54)
80	10	5	0.3			BST72A
80	10	5	0.175	BST82		
100	0.057	10	34		PHP33N10	
100	0.057	10	34		BUK456-100A	
100	0.065	10	32		BUK456-100B	
100	0.08	10	26		BUK455-100A	
100	0.085	5	25		BUK555-100A	
100	0.1	10	23		BUK455-100B	
100	0.11	5	22		BUK555-100B	
100	0.16	10	14		PHP12N10E	
100	0.18	5	13		BUK553-100A	
100	0.2	10	13		BUK453-100B	
100	0.22	5	12		BUK553-100B	
100	0.25	10	10		PHP10N10E	
100	0.35	5	8.5		BUK552-100B	
200	0.16	10	19		BUK456-200A	
200	0.23	10	14		BUK455-200A	
200	0.28	10	13		BUK455-200B	
200	0.28	5	13		BUK555-200B	
200	0.4	10	9.2		PHP8N20E	
200	0.9	10	5		PHP5N20E	

SD18

Mfrs. List No.	Order Code	Price Each				
		5+	25+	100+	250+	1K+
BST72A	.352-664 †					
BST82	.516-594					
BUK453-100B	.353-840	1+	25+	100+	250+	1K+
BUK455-100A	.353-887					
BUK455-100B	.353-899					
BUK455-200A	.353-905					
BUK455-200B	.353-917					
BUK456-100A	.300-0953					
BUK456-100B	.164-033					
BUK456-200A	.164-045					
BUK552-100B	.164-082					
BUK553-100A	.164-094 †					
BUK553-100B	.353-504					
BUK555-100A	.435-065					
BUK555-100B	.353-528					
BUK555-200B	.164-112					
PHP10N10E	.305-1237					
PHP12N10E	.164-665					
PHP33N10	.164-732					
PHP5N20E	.164-860					
PHP8N20E	.164-938					

† Available until stocks are exhausted

TO-220, N Channel 100V to 500V



Pin Out 1 2 3  
 (a) g d/tab s  
 (b) g s/tab d

V <sub>DS</sub> V	R <sub>DS(on)</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Pin Out	Mfr.	Mfrs. List No.
100	0.54	5.6	20	43	a	IR	IRF510
100	0.4	7.0	28	45	a	ST	STP7NE10
100	0.27	9.2	37	60	a	IR	IRF520
100	0.27	10.0	40	70	a	ST	IRF520
100	0.25	11.0	44	40	a	ST	BUZ72A
100	0.2	9.5	38	47	a	IR	IRF520N
100	0.16	14.0	56	79	a	IR	IRF530
100	0.16	16.0	64	110	a	ST	IRF530
100	0.11	15.0	60	63	a	IR	IRF530N
100	0.1	20.0	—	85	a	ST	STP20NE10
100	0.1	21.0	84	105	a	ST	BUZ21

continued



V <sub>DS</sub> V	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Pin Out	Mftr.	Mftrs. List No.
100	0.077	28.0	112	150	a	ST	IRF540
100	0.077	28.0	118	150	a	IR	IRF540
100	0.06	33.0	132	150	a	ST	STP33N10
100	0.055	34.0	136	125	a	INF	BUZ22
100	0.052	27.0	110	94	a	IR	IRF540N
100	0.04	40.0	160	125	a	SLX	SMP40N10
100	0.036	41.0	160	170	a	IR	IRF1310N
100	0.028	46.0	180	150	a	IR	IRF3710
100	0.027	50.0	200	150	a	ST	STP50NE10
100	0.022	60.0	240	160	a	ST	STP60NE10
150	0.042	37.0	150	150	a	IR	IRF3415
200	8 (typ)	0.5	—	30	b	HIT	2SK216
200	1.5	2.5	10	20	a	IR	IRF610
200	0.8	5.0	20	40	a	IR	IRF620
200	0.8	6.0	24	75	a	ST	IRF620
200	0.6	5.5	22	40	a	INF	BUZ73A
200	0.4	9.0	36	75	a	IR	IRF630
200	0.4	10.0	40	85	a	ST	STP10NB20
200	0.4	10.0	40	100	a	ST	IRF630
200	0.2	13.5	54	75	a	INF	BUZ31
200	0.18	18.0	72	125	a	IR	IRF640
200	0.18	18.0	72	125	a	ST	IRF640
200	0.18	19.0	76	125	a	ST	STP19NB20
200	0.13	21.0	84	125	a	INF	BUZ30A
250	2.0	2.7	8	36	a	IR	IRF614
300	0.4	12.0	48	125	a	ST	STP12NB30
400	3.6	1.5	6	20	a	IR	IRF710
400	2.0	4.0	16	80	a	ST	STP4NA40
400	1.8	3.0	12	40	a	IR	IRF720
400	1.8	4.7	80	80	a	ST	STP5NB40
400	1.0	5.5	22	75	a	IR	IRF730
400	1.0	5.5	22	75	a	ST	IRF730
400	1.0	5.5	22	75	a	INF	BUZ60
400	1.0	6.5	26	100	a	ST	STP7NA40
400	0.9	7.0	—	100	a	ST	STP7NB40
400	0.55	10.0	40	125	a	IR	IRF740
400	0.55	10.0	40	125	a	ST	IRF740
400	0.55	10.7	42.8	125	a	ST	STP11NB40
400	0.4	12.5	50	150	a	INF	BUZ61
450	0.63	8.8	35	125	a	IR	IRF744
500	3.0	2.5	10	40	a	IR	IRF820
500	2.8	3.8	—	80	a	ST	STP4NB50
500	1.5	4.5	15	100	a	ST	IRF830
500	1.5	4.5	18	75	a	INF	BUZ41A
500	1.5	4.5	18	75	a	IR	IRF830
500	1.5	5.0	—	75	a	TOSH	2SK2661
500	1.5	5.3	21	100	a	PS	BUK455-500B
500	1.5	5.5	22	100	a	ST	STP5NC50
500	1.5	5.8	23.2	100	a	ST	STP6NB50
500	1.1	6.0	24	100	a	ST	STP6N50
500	0.85	8.0	32	125	a	IR	IRF840
500	0.85	8.0	32	125	a	ST	IRF840
500	0.85	8.0	32	135	a	ST	STP8NC50
500	0.85	8.0	—	80	a	TOSH	2SK2542
500	0.85	8.6	34.4	125	a	ST	STP9NB50
500	0.52	10.0	40	135	a	ST	STP10NC50

SD365 / SD365A

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
BUK455-500B	.353-930 †					
BUZ21	742-478					
BUZ22	.354-053					
BUZ30A	.354-065					
BUZ31	.354-077					
BUZ41A	.354-090					
BUZ60	.541-394					
BUZ61	.523-288					
BUZ72A	234-783					
BUZ73A	.354-144					
IRF510	.354-259					
IRF520 (IR)	.354-296 †					
IRF520 (ST)	260-186					
IRF520N	738-359					
IRF530 (IR)	.354-338					
IRF530 (ST)	260-198					
IRF530N	.637-439					
IRF540 (IR)	.354-375					
IRF540 (ST)	260-204					
IRF540N	.637-440					
IRF610	.354-430					
IRF614	.995-873					
IRF620 (IR)	427-251					
IRF620 (ST)	.260-216					
IRF630 (IR)	.354-454					
IRF630 (ST)	742-480					
IRF640 (IR)	.354-491					
IRF640 (ST)	.260-228					
IRF710	.354-521					
IRF720	.354-533					
IRF730 (IR)	.354-545					
IRF730 (ST)	260-230					
IRF740 (IR)	.354-582					
IRF740 (ST)	260-241					
IRF744	168-002					
IRF820	.354-600					
IRF830 (IR)	.354-636					
IRF830 (ST)	260-265					
IRF840 (IR)	.354-661					
IRF840 (ST)	260-277					

continued

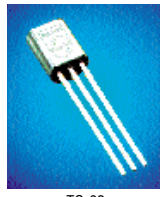
Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
IRF1310N	.637-373					
IRF3415	.996-518					
IRF3710	.706-449					
SMP40N10	.354-958					
STP2NA50	.934-975					
STP4NA40	.523-161 †					
STP4NB50	162-164					
STP5NB40	.498-002					
STP5NC50	.332-8624					
STP6NE10	.484-740 †					
STP6NB50	.498-063					
STP7NA40	.738-268					
STP7NB40	.498-087					
STP7NE10	.332-8570					
STP8NC50	.332-8612					
STP9NB50	.498-130					
STP10NB20	.332-8090					
STP10NC50	.332-8600					
STP11NB40	.332-8144					
STP12NB30	.332-8168					
STP19NB20	.332-8156					
STP20NE10	.494-264					
STP33N10	.484-696					
STP50NE10	.332-8533					
STP60NE10	.332-8065					
2SK216	.355-070					
2SK2542	.327-2280					
2SK2661	.327-2357					

† Available until stocks are exhausted

## 250V – 1000V N-Channel PowerMOS Philips Semiconductors



TO-220AB



TO-92

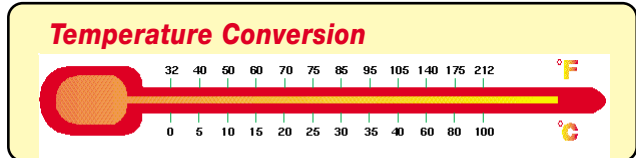
V <sub>DS</sub> (V)	R <sub>DS(ON)</sub> (Ω) @ V <sub>GS</sub> (V)	I <sub>D</sub> (max.) @ 25°C (A)	PACKAGE	
			TO220AB (SOT78)	TO92 (SOT54)
250	7	10	0.3	BSN254A
400	1	10	7.2	PHP5N40
400	1.8	10	4.4	PHP4N40
500	1.5	10	5.9	PHP4N50
500	3	10	3.4	PHP3N50
600	1.8	10	5.4	PHP6N60E
800	3	10	4.0	BUK456-800A
800	4	10	3.5	BUK456-800B

SD20

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
BSN254A	.936-145					
BUK456-800A	.353-954					
BUK456-800B	.353-966 †					
PHP3N50	.936-017					
PHP4N40	.936-029 †					
PHP4N50	.936-030					
PHP5N40	.936-042					
PHP6N60E	.313-5299					

† Available until stocks are exhausted

Continued

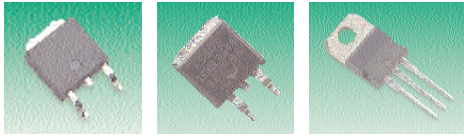


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Power MOSFETs — continued

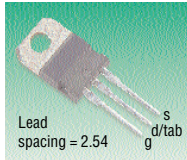
CoolMOS™ Power MOSFETs  
High Voltage



$V_{DS}$ V	N/P Channel	$R_{DS}$ (on) max. $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ pulsed A	$V_{GS}$ (th) max. (*min) V	$P_D$ @ 25°C W	Mfrs. List No.
<b>TO-252 (D-Pak)</b>							
600	N	1.4	3.2	5.7	5.5	38	SPD03N60S5
600	N	0.6	7.3	14.6	5.5	83	SPD07N60S5
<b>TO-220</b>							
600	N	0.6	7.3	14.6	5.5	83	SPP07N60S5
600	N	0.19	20.0	40.0	5.5	208	SPP20N60S5
<b>TO-263 (D2-Pak)</b>							
600	N	3.0	1.8	3.2	5.5	25	SPB02N60S5
600	N	1.4	3.2	5.7	5.5	38	SPB03N60S5
600	N	0.95	4.5	7.7	5.5	50	SPB04N60S5
600	N	0.6	7.3	14.6	5.5	83	SPB07N60S5
600	N	0.38	11.0	22.0	5.5	125	SPB11N60S5
600	N	0.19	20.0	40.0	5.5	208	SPB20N60S5
<b>TO-247</b>							
600	N	0.38	11.0	22.0	5.5	125	SPW11N60S5
600	N	0.19	20.0	40.0	5.5	208	SPW20N60S5

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
SPD03N60S5	<b>SMD301-3121</b>					
SPD07N60S5	<b>SMD301-3133</b>					
SPP07N60S5	<b>301-3145</b>					
SPP20N60S5	<b>301-3157</b>					
SPB02N60S5	<b>NEW 353-9647</b>					
SPB03N60S5	<b>NEW 353-9659</b>					
SPB04N60S5	<b>NEW 353-9660</b>					
SPB07N60S5	<b>NEW 353-9672</b>					
SPB11N60S5	<b>NEW 353-9684</b>					
SPB20N60S5	<b>SMD301-3169</b>					
SPW11N60S5	<b>NEW 353-9696</b>					
SPW20N60S5	<b>NEW 353-9702</b>					

TO-220, N Channel 600V to 1000V



$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ Pulsed A	$P_D$ @ 25°C W	Mfr.	Mfrs. List No.
600	4.4	2.2	8.0	50	IR	IRFBC20
600	3.6	3.3	13.2	80	ST	STP3NB60
600	3.5	2.9	11.5	75	INF	BUZ77B
600	2.2	3.6	12.0	74	IR	IRFBC30
600	2.2	4.2	16.8	100	ST	STP4NC60
600	2.0	3.0	20.0	100	ST	STP5NB60
600	2.0	4.0	18.0	75	INF	BUZ90A
600	1.6	4.5	18.0	75	INF	BUZ90
600	1.2	6.0	24.0	125	ST	STP6NC60
600	1.2	7.2	28.8	125	ST	STP7NB60
600	0.9	8.0	32.0	150	INF	BUZ91A
600	0.75	9.0	36.0	125	ST	STP9NC60
800	3.3	4.0	16.0	100	ST	STP4NB80
800	3.0	3.0	12.0	75	ST	BUZ80A
800	3.0	4.1	16.0	125	IR	IRFBE30
800	2.2	5.0	20.0	110	ST	STP5NB80
900	8.0	1.7	3.1	54	IR	IRFBF20
900	4.2	3.5	14.0	100	ST	STP3NB90
900	3.7	3.6	14.0	125	IR	IRFBF30
900	2.0	5.8	23.0	135	ST	STP6NB90
1000	11.5	1.3	5.2	50	IR	IRFBG20
1000	8.0	2.0	8.0	75	INF	BUZ50B
1000	6.0	3.0	12.0	100	ST	STP3NB100
1000	5.0	3.1	12.0	125	IR	IRFBG30
1000	4.4	3.8	2.4	125	ST	STP4NB100
1000	3.8	4.0	12.0	100	TOSH	2SK1119
1000	3.5	4.2	4.2	125	ST	STP4NA100
1000	2.7	5.0	—	—	ST	STP5NB100

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
BUZ50B	<b>.523-276</b>					
BUZ77B	<b>541-400</b>					
BUZ80A	<b>.354-181</b>					
BUZ90	<b>.354-211</b>					
BUZ90A	<b>.523-318</b>					
BUZ91A	<b>.354-223</b>					

continued

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
IRFBC20	<b>995-897</b>					
IRFBC30	<b>354-776</b>					
IRFBE30	<b>168-026</b>					
IRFBF20	<b>168-038</b>					
IRFBF30	<b>168-040</b>					
IRFBG20	<b>354-788</b>					
IRFBG30	<b>168-051</b>					
STP3NB60	<b>494-320</b>					
STP3NB90	<b>332-8510</b>					
STP3NB100	<b>323-9329</b>					
STP4NA100	<b>494-367</b>					
STP4NB80	<b>332-8030</b>					
STP4NB100	<b>323-9330</b>					
STP4NC60	<b>332-8650</b>					
STP5NB60	<b>498-014</b>					
STP5NB80	<b>332-8041</b>					
STP5NB100	<b>323-9342</b>					
STP6NB90	<b>332-8053</b>					
STP6NC60	<b>332-8648</b>					
STP7NB60	<b>498-105</b>					
STP9NC60	<b>332-8636</b>					
2SK1119	<b>.251-744</b>					

TO-220, N-Channel Fast Switching

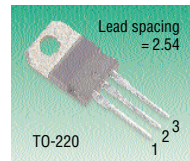
- Fast switching
- Low input capacitance
- Advanced cell structure
- 100% avalanche tested

$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ cont. A	$I_{DM}$ Pulsed A	$V_{GS}$ (th) max. V	$t_r$ typ. ns	$t_f$ typ. ns	$P_D$ @ 25°C W	Mfr.	Mfrs. List No.
400	0.55	10.0	32.0	4.0	31	30	125	IR	IRF740LC
400	0.55	10.0	40.0	3.75	115	30	125	ST	STP10NA40
500	0.85	8.0	28.0	4.0	25	19	125	IR	IRF840LC
600	4.0	2.9	11.6	3.75	25	24	80	ST	STP3NA60
600	1.6	5.3	21.0	3.75	75	18	110	ST	STP5NA60
600	1.2	6.2	25.0	4.0	20	17	125	IR	IRFBC40LC
800	4.5	3.2	13.0	3.75	20	15	100	ST	STP3NA80
800	3.5	3.8	—	3.75	—	—	100	ST	STP4NA80
800	2.4	4.8	19.0	3.75	25	25	125	ST	STP5NA80

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
IRF740LC	<b>.538-516</b>					
IRF840LC	<b>.538-528</b>					
IRFBC40LC	<b>.538-530</b>					
STP3NA60	<b>523-150 †</b>					
STP3NA80	<b>434-954 †</b>					
STP4NA60	<b>738-300</b>					
STP4NA80	<b>706-309</b>					
STP5NA60	<b>434-978</b>					
STP5NA80	<b>.434-980</b>					
STP5NA90	<b>567-851 †</b>					
STP10NA40	<b>435-004</b>					

† Available until stocks are exhausted

TO-220, P Channel



$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ Pulsed A	$P_D$ @ 25°C W	Package/ Pin Out	Mfr.	Mfrs. List No.
20	0.07	24.0	—	50	a	FCH	NDP6020P
30	0.007	75.0	240	187	a	SLX	SUP75P03-07
50	0.008	75.0	240	250	a	SLX	SUP75P05-08
55	0.172	12.0	48	45	a	IR	IRF924N
55	0.1	17.0	68	56	a	IR	IRF9234N
55	0.06	31.0	110	110	a	IR	IRF5305
55	0.02	64.0	260	150	a	IR	IRF4905
60	0.3	8.8	35.2	42	a	INF	SPP08P06P
60	0.28	9.7	39	40	a	IR	IRF9224
60	0.25	10.0	40	40	a	HIT	2SJ172
60	0.2	10.0	—	50	a	HIT	2SJ122
60	0.14	18.0	—	88	a	IR	IRF9234
60	0.13	18.6	74.4	80	a	INF	SPP18P06P
60	0.02	60.0	240	150	a	SLX	SUP65P06-20
100	1.2	3.0	12	20	a	IR	IRF9510
100	0.48	6.8	27	48	a	IR	IRF9520N
100	0.2	13.0	52	75	a	IR	IRF9530N
100	0.117	19.0	76	94	a	IR	IRF9540N
100	0.06	40.0	140	200	a	IR	IRF5210
150	0.29	13.0	44	110	a	IR	IRF6215
200	10 (typ)	0.5	—	30	b	HIT	2SJ79
200	3.0	1.75	7	20	a	IR	IRF9610
200	1.5	3.5	14	40	a	IR	IRF9620
200	0.8	6.5	26	75	a	IR	IRF9630
200	0.5	11.0	44	125	a	IR	IRF9640
400	7.0	2.0	—	40	a	HIT	2SJ117

SD363

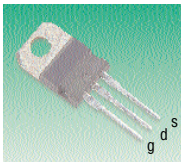
Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+ 1K+
IRF4905	.706-450				
IRF5210	167-915				
IRF5305	167-927				
IRF6215	167-940 †				
IRF9510	259-846				
IRF9520N	162-541				
IRF9530N	.934-616				
IRF9540N	934-628				
IRF9610	354-740				
IRF9620	.354-752				
IRF9630	.354-764				
IRF9640	259-858				
IRF9Z24	259-834				
IRF9Z24N	.934-665				
IRF9Z34	438-157				
IRF9Z34N	.934-677				
NDP6020P	932-814				
SPP08P06P	333-4831				
SPP18P06P	333-4843				
SUP65P06-20	549-216				
SUP75P03-07	334-5336				
SUP75P05-08	334-5348				
2SJ79	355-033				
2SJ117	355-057				
2SJ122	355-069				
2SJ172	739-467				

† Available until stocks are exhausted

V <sub>DS</sub> V	N/P Chn.	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	V <sub>GS</sub> (th) max. (*min.) V	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
100	N	0.16	14	52	2.0	79	IR	IRL530
100	N	0.13	27	—	1.0	75	TOSH	2SK2314
100	N	0.1	15	60	2.0	63	IR	IRL530N
100	N	0.077	28	110	2.0	150	IR	IRL540
100	N	0.044	30	120	2.0	94	IR	IRL540N
100	N	0.025	50	200	2.5	150	ST	STP50NE10L
100	P	0.22	20	80	2.0	75	HIT	2SJ221
200	N	0.4	7	28	2.5	40	INF	BUZ73L

\*Exceeds package current handling capability ● Denotes tabless TO-220 package SD141 / SD141A

## TO-220 Logic Level



- Low gate drive
- Ideal for direct logic interfacing
- 2.54 lead spacing

V <sub>DS</sub> V	N/P Chn.	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>DM</sub> Pulsed A	V <sub>GS</sub> (th) max. (*min.) V	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
20	N	0.016	48	190	*0.7	69	IR	IRL3202
20	N	0.01	85	340	*0.7	110	IR	IRL3402
20	N	0.007	110	420	*0.7	140	IR	IRL3502
30	N	0.05	22	88	2.5	60	ST	STP22NE03L
30	N	0.04	30	120	2.5	70	ST	STP30NE03L
30	N	0.026	34	140	2.5	56	IR	IRL3303
30	N	0.022	25	100	3.0	50	FCH	NDP603AL
30	N	0.02	52	156	3.0	75	FCH	NDP6030L
30	N	0.018	46	184	2.0	120	INF	SPP46N03L
30	N	0.014	56	220	2.5	83	IR	IRL3103
30	N	0.013	55	220	2.5	80	ST	STP55NF03L
30	N	0.01	60	240	2.5	100	ST	STP60NF03L
30	N	0.008	80	320	2.0	300	INF	SPP80N03L
30	N	0.007	100*	400	2.5	130	IR	IRL2203N
30	N	0.006	80	320	2.5	150	ST	STP80NE03L-06
30	N	0.006	120*	480	2.0	150	IR	IRL3803
50	N	0.8	4	10	2.0	25	INTS	RFP4N05L
50	N	0.15	15	60	2.5	70	ST	STP15N05L
50	N	0.14	15	40	2.0	60	INTS	RFP15N05L
50	N	0.1	17.5	70	2.0	60	INF	BUZ104L
50	N	0.1	15	45	2.0	50	FCH	NDP4050L
50	N	0.085	21	84	2.5	80	ST	STP21N05L
50	N	0.06	29	116	2.0	100	INF	BUZ101L
50	N	0.055	32	128	2.5	105	ST	STP32N05L
50	N	0.05	35	140	2.0	120	INF	BUZ103AL
50	N	0.047	25	65	2.0	60	INTS	RFP25N05L
50	N	0.028	42	168	2.0	200	INF	BUZ102AL
50	N	0.018	48	—	—	100	FCH	NDP6051L
50	N	0.018	60	240	2.5	250	INF	BUZ100L
50	N	0.011	67	200	2.0	130	FCH	NDP7051L
55	N	0.06	18	72	2.0	45	IR	IRL224N
55	N	0.035	27	110	2.0	56	IR	IRL234N
55	N	0.022	41	160	2.0	83	IR	IRL244N
55	N	0.01	77	310	2.5	130	IR	IRL3705N
55	N	0.01	80	320	2.0	250	INF	BUZ111SL
60	N	0.6	4	10	2.0	25	INTS	RFP4N06L
60	N	0.2	10	40	2.0	43	IR	IRL214
60	N	0.15	12	—	2.0	48	INTS	RFP3055LE
60	N	0.14	15	40	2.0	60	INTS	RFP15N06L
60	N	0.135	12	26	2.0	40	INTS	RFP12N06RLE
60	N	0.12	16	64	2.5	60	ST	STP16NE06L
60	N	0.085	20	—	2.5	65	ST	STP20NE06L
60	N	0.055	45	180	2.0	65	TOSH	2SK2266 ●
60	N	0.05	26	—	—	60	FCH	NDP5060L
60	N	0.047	30	100	2.0	96	INTS	RFP30N06LE
60	N	0.03	30	—	2.5	50	ST	STP30NE06L
60	N	0.028	45	180	2.5	100	ST	STP45NE06L
60	N	0.025	48	144	2.0	100	FCH	NDP6060L
60	N	0.022	55	220	2.5	130	ST	STP55NE06L
60	N	0.016	60	240	2.5	150	ST	STP60NE06L-16
60	N	0.015	75	225	2.0	150	FCH	NDP7060L
60	P	0.13	20	80	2.0	75	HIT	2SJ174
100	N	1.25	2	5	2.0	25	INTS	RFP2N10L
100	N	0.54	5.6	18	2.0	43	IR	IRL510
100	N	0.3	7	14	2.0	47	INTS	RFP7N10LE
100	N	0.27	9.2	31	2.0	60	IR	IRL520
100	N	0.2	10	40	2.5	40	INF	BUZ72L
100	N	0.2	12	30	2.0	60	INTS	RFP12N10L

continued

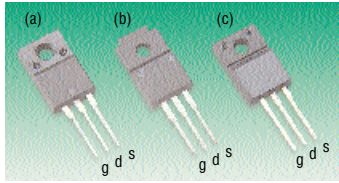
Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+ 1K+
BUZ21L	.523-240				
BUZ72L	.523-306				
BUZ73L	.291-006				
BUZ100L	548-443				
BUZ101L	743-768				
BUZ102AL	743-732				
BUZ103AL	743-744				
BUZ104L	743-756				
BUZ111SL	165-281				
IRL510	438-443				
IRL520	353-541				
IRL530	353-553				
IRL530N	738-347				
IRL540	353-565				
IRL540N	740-690				
IRL2203N	.637-464				
IRL3103	738-335				
IRL3202	168-245				
IRL3402	168-269				
IRL3502	168-270				
IRL3303	740-809				
IRL3705N	.637-476				
IRL3803	.706-437				
IRL214	353-577				
IRL224N	637-415				
IRL234N	637-427				
IRL244N	637-488				
NDP4050L	707-107				
NDP5060L	932-723				
NDP603AL	707-120				
NDP6030L	932-668				
NDP6051L	932-681				
NDP6060L	707-132				
NDP7051L	932-693				
NDP7060L	707-156				
RFP2N10L	.353-620				
RFP4N05L	273-855				
RFP4N06L	353-644				
RFP7N10LE	.516-429				
RFP12N06RLE	353-668				
RFP12N10L	.353-670				
RFP15N05L	.353-681				
RFP15N06L	.353-693				
RFP25N05L	353-700				
RFP30N06LE	516-442				
RFP3055LE	681-490				
SPP46N03L	165-190				
SPP80N03L	165-189				
STP15N05L	484-544 †				
STP16NE06L	494-215				
STP20NE06L	494-240				
STP21N05L	484-635				
STP22NE03L	<b>NEW</b> 332-8119				
STP30NE03L	<b>NEW</b> 332-8557				
STP30NE06L	494-288				
STP32N05L	484-623				
STP36N05L	484-570				
STP45NE06L	<b>NEW</b> 332-8120				
STP50NE10L	<b>NEW</b> 332-8107				
STP55NF03L	<b>NEW</b> 332-8545				
STP55NE06L	497-990				
STP60NE06L-16	498-051				
STP60NF03L	<b>NEW</b> 332-8089				
STP80NE03L-06	323-9366				
2SJ174	353-723				
2SJ221	353-735				
2SK2266	327-2199				
2SK2314	327-2230				

† Available until stocks are exhausted

Continued

## Power MOSFETs — continued

### TO-220 Isolated



Isolated packages offer simplified heatsink mounting, without the need for additional isolating washers, mica etc.

ISOWATT220 Isolation voltage 2kV  
TO-220FM/SOT-186 Isolation voltage 2kV  
TO-220 FULLPAK Isolation voltage 2.5kV

$V_{DS}$ V	N or P Channel	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ Pulsed A	$P_D$ @ 25°C W	Package	Mftr.	Mftrs. List No.
50	N	0.04	20.0	144.0	35	(a)	ST	BUZ11-FI
55	N	0.04	19.0	100.0	31	(c)	IR	IRFIZ34N
55	N	0.024	28.0	160.0	38	(c)	IR	IRFIZ44N
55	N	0.02	31.0	180.0	40	(c)	IR	IRFIZ46N
55	N	0.012	44.0	290.0	47	(c)	IR	IRFI1010N
60	N	0.12	11.0	—	30	(a)	ST	STP16NE06FP
60	N	0.028	30.0	120.0	48	(c)	IR	IRFIZ44G
60	N	0.022	30.0	220.0	35	(a)	ST	STP5NE06FP
60	N	0.016	35.0	240.0	45	(a)	ST	STP6NE06-16FI
60	N	0.016	35.0	240.0	40	(c)	ST	STP6NE06-16FP
100	N	6.0	3.0	12.0	35	(c)	ST	STP3NB100FP
100	N	0.27	7.0	40.0	30	(a)	ST	IRF520FI
100	N	0.16	10.0	64.0	40	(a)	ST	IRF530FI
100	N	0.108	11.0	60.0	33	(c)	IR	IRFI530N
100	N	0.077	17.0	68.0	48	(c)	IR	IRFI540G
100	N	0.052	18.0	110.0	42	(c)	IR	IRFI540N
100	N	0.036	22.0	140.0	45	(c)	IR	IRFI1310N
100	P	0.6	5.2	21.0	37	(c)	IR	IRFI9520G
100	P	0.3	7.7	31.0	38	(c)	IR	IRFI9530G
100	P	0.22	15.0	60.0	35	(b)	HIT	2SJ222
200	N	0.8	4.0	24.0	30	(a)	ST	IRF620FI
200	N	0.4	5.9	24.0	32	(c)	IR	IRFI630G
200	N	0.18	9.8	39.0	40	(c)	IR	IRFI640G
200	P	0.8	4.3	17.0	35	(c)	IR	IRFI9630G
400	N	1.0	3.7	15.0	32	(c)	IR	IRFI730G
400	N	1.0	4.1	26.0	40	(a)	ST	STP7NA40FI
400	N	0.9	4.4	—	35	(a)	ST	STP7NB40FP
400	N	0.55	5.4	22.0	40	(c)	IR	IRFI740G
400	N	0.55	6.0	40.0	45	(a)	ST	STP10NA40FI
500	N	2.8	2.5	15.2	35	(a)	ST	STP4NB50FP
500	N	1.5	3.1	12.0	32	(c)	IR	IRFI830G
500	N	0.85	4.5	18.0	40	(c)	IR	IRFI840GLC
500	N	0.85	4.6	18.0	40	(c)	IR	IRFI840G
500	N	0.85	4.9	34.4	40	(a)	ST	STP9NB50FP
600	N	2.0	3.0	20.0	35	(a)	ST	STP5NB60FP
600	N	1.2	3.5	14.0	40	(c)	IR	IRFIBC40G
600	N	1.2	3.5	14.0	40	(c)	IR	IRFIBC40GLC
600	N	1.2	4.1	28.8	40	(a)	ST	STP7NB60FP
800	N	5.0	2.8	—	40	(a)	TOSH	2SK1602
1000	N	5.0	2.0	14.0	40	(a)	ST	STP3NA100FP

SD114 / SD114A

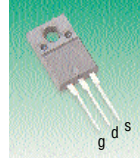
Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
BUZ11FI	353-371					
IRF520FI	353-383 †					
IRF530FI	740-573 †					
IRF620FI	740-603					
IRF740FI	353-413 †					
IRFI530N	706-360					
IRFI540G	438-390					
IRFI540N	706-371					
IRFI630G	438-340 †					
IRFI640G	438-352					
IRFI730G	438-364					
IRFI740G	438-431					
IRFI830G	438-376					
IRFI840G	438-388					
IRFI840GLC	168-075 †					
IRFI1010N	934-689					
IRFI1310N	934-690					
IRFI9520G	438-406					
IRFI9530G	438-418					
IRFI9630G	995-903					
IRFIBC40GLC	168-087 †					
IRFIBC40G	995-927					
IRFIZ34N	934-732					
IRFIZ44G	438-420					
IRFIZ44N	706-358					
IRFIZ46N	934-744					
STP2NA50FI	740-639					
STP3NA100FP	494-318					
STP3NB100FP	332-8508					
STP4NB50FP	494-379					
STP5NA90FI	935-037					
STP5NB60FP	498-026					
STP7NA40FI	740-627					
STP7NB40FP	498-099					
STP7NB60FP	498-117					
STP9NB50FP	498-142					
STP10NA40FI	740-615					
STP16NE06FP	162-140					

continued

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
STP5NE06FP	497-988					
STP6NE06-16FI	498-040					
STP6NE06-16FP	332-8521					
2SJ222	353-486					
2SK1602	738-001					

† Available until stocks are exhausted

### TO-220 Isolated, Logic Level



- 2kV dc min. isolation
- Fully compatible with TO-220
- High thermal conductivity moulded resin
- No additional isolation required
- Excellent hermeticity

$V_{DS}$ V	N/P Chn.	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ Pulsed A	$V_{GS}$ (th) max V	$P_D$ @ 25°C W	Mftr.	Mftrs. List No.
30	N	0.007	61.0	400	2.5	47	IR	IRLI2203N
50	N	0.15	10.0	60	2.5	35	ST	STP15N05LFI
50	N	0.085	14.0	84	2.5	35	ST	STP21N05LFI
50	N	0.04	21.0	144	2.5	40	ST	STP36N05LFI
55	N	0.06	14.0	77	2.0	26	IR	IRLI224N
55	N	0.035	20.0	110	2.0	31	IR	IRLI234N
55	N	0.022	28.0	160	2.0	38	IR	IRLI244N
55	N	0.01	47.0	310	2.0	47	IR	IRLI3705N
60	N	0.12	11.0	64	4.0	30	ST	STP16NE06LFP
60	N	0.085	10.0	—	2.5	30	ST	STP20NE06LFP
60	N	0.085	14.0	84	2.5	35	ST	STP21N06LFI
60	N	0.08	25.0	—	2.0	35	TOSH	2SK2232
60	N	0.025	45.0	180	2.0	45	TOSH	2SK2312
60	N	0.016	50.0	200	2.0	35	HIT	2SK2529
60	P	0.09	20.0	80	2.0	35	TOSH	2SJ349
60	P	0.06	30.0	120	2.0	45	TOSH	2SJ334
100	N	0.18	7.7	35	2.0	27	IR	IRLI520N
100	N	0.13	20.0	—	2.0	35	TOSH	2SK2391
100	N	0.10	11.0	60	2.0	33	IR	IRLI530N
100	N	0.044	20.0	120	2.0	42	IR	IRLI540N
100	P	0.32	12.0	—	2.0	35	TOSH	2SJ380
200	N	0.80	5.0	20	3.5	25	TOSH	2SK2381
200	N	0.40	8.5	—	3.5	30	TOSH	2SK2350
200	N	0.18	15.0	—	3.5	45	TOSH	2SK2382
200	P	1.00	5.0	—	3.5	30	TOSH	2SJ407
400	N	1.20	5.5	—	4.0	35	TOSH	2SK2679
500	N	1.50	5.0	—	4.0	35	TOSH	2SK2662
500	N	0.85	8.0	—	4.0	40	TOSH	2SK2543
600	N	2.50	3.5	—	3.5	40	TOSH	2SK1767
600	N	0.75	10.0	—	4.0	40	TOSH	2SK2843
800	N	2.20	5.0	—	4.0	45	TOSH	2SK2605

SD312

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
IRLI520N	934-793					
IRLI530N	740-779					
IRLI540N	934-800					
IRLI2203N	934-770					
IRLI3705N	934-781					
IRLI224N	934-811					
IRLI234N	934-823					
IRLI244N	740-780					
STP15N05LFI	740-512					
STP16NE06LFP	494-227					
STP20NE06LFP	494-252					
STP21N05LFI	740-500					
STP21N06LFI	484-878					
STP36N05LFI	740-494 †					
2SJ334	327-2084					
2SJ349	327-2096					
2SJ380	327-2114					
2SJ407	327-2126					
2SK1767	738-037					
2SK2232	327-2187					
2SK2350	327-2242					
2SK2381	327-2254					
2SK2382	327-2266					
2SK2391	327-2278					
2SK2529	739-431					
2SK2543	327-2291					
2SK2605	327-2310					
2SK2662	327-2369					
2SK2679	327-2370					
2SK2843	327-2394					

† Available until stocks are exhausted

### Max220™



$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ (cont) A	Mftrs. List No.
500	0.36	14	STU14NA50
600	0.8	9	STU9NA60
900	2.0	6	STU6NA90

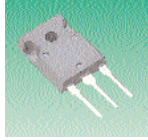


- New low-cost clip mounted package
- Lower cost alternative to TO-218/TO-247 packages
- Larger die capacity
- Pin compatible with TO-220
- Higher power handling

SD352

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
STU6NA90	742-430					
STU9NA60	742-429					
STU14NA50	742-442					

## Standard Power MOSFETs



TO-247



Mini-Bloc (SOT-227B)



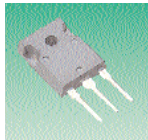
TO-3

$V_{ds}$ V	N/P Channel	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mfrs. List No.
<b>TO-247</b>							
100	N	0.02	75	300	4	300	IXTH75N10
200	N	0.045	50	200	4	300	IXTH50N20
300	N	0.085	40	160	4	300	IXTH40N30
500	N	0.23	24	96	4	300	IXTH24N50
600	N	0.35	20	80	4.5	300	IXTH20N60
800	N	0.7	14	56	4.5	300	IXTH14N80
1000	N	1.05	12	48	4.5	300	IXTH12N100
1000	N	0.82	14	56	4	360	IXTH14N100
<b>Mini-Bloc (SOT-227B)</b>							
200	N	0.025	85	340	5	400	IXTN79N20
500	N	0.12	36	133	5	400	IXTN36N50
1000	N	0.6	15	60	5	400	IXTN15N100
1000	N	0.55	21	84	4.5	520	IXTN21N100
<b>TO-3 (TO-204)</b>							
100	N	0.025	67	268	4	300	IXTM67N10
100	N	0.02	75	300	4	300	IXTM75N10
200	N	0.045	50	200	4	300	IXTM50N20
300	N	0.088	40	160	4	300	IXFM40N30
500	N	0.23	24	96	4	300	IXTM24N50

SD482

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
IXTH12N100	315-3708					
IXTH14N100	305-2758					
IXTH14N80	315-3599					
IXTH20N60	305-2746					
IXTH24N50	315-3605					
IXTH40N30	315-3617					
IXTH50N20	315-3629					
IXTH75N10	305-2771					
IXTM24N50	315-3680					
IXFM40N30	315-3678					
IXTM50N20	315-3666					
IXTM67N10	315-3654					
IXTM75N10	315-3642					
		1+	5+	10+	25+	50+
IXTN15N100	315-3630					
IXTN21N100	305-2760					
IXTN36N50	305-2643					
IXTN79N20	305-2655					

## HiPerFET<sup>®</sup> Power MOSFETs



TO-247



Mini-Bloc (SOT-277)



TO-264

The HiPerFET<sup>®</sup> range feature a high performance, intrinsic fast-recovery diode, significantly improving dv/dt ruggedness, and eliminating the need for additional 'freewheeling' diodes.

$V_{ds}$ V	N/P Channel	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mfrs. List No.
<b>TO-247</b>							
70	N	0.011	76	304	3.4	360	IXFH76N07-1
100	N	0.02	75	300	4	300	IXFH75N10
200	N	0.045	50	200	4	300	IXFH50N20
200	N	0.04	58	232	4	300	IXFH58N20
300	N	0.085	40	160	4	300	IXFH40N30
500	N	0.25	21	84	4	300	IXFH21N50
500	N	0.2	26	104	4	300	IXFH26N50
500	N	0.15	32	128	4	360	IXFH32N50
800	N	0.7	14	56	4.5	300	IXFH14N80
1000	N	2.0	6	24	4.5	180	IXFH6N100
1000	N	1.05	12	48	4.5	300	IXFH12N100
1000	N	0.7	15	60	4.5	360	IXFH15N100

continued

$V_{ds}$ V	N/P Channel	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mfrs. List No.
<b>Mini-Bloc (SOT-227B)</b>							
100	N	0.01	170	680	4	600	IXFN170N10
200	N	0.017	120	480	4	600	IXFN120N20
300	N	0.045	73	292	4	520	IXFN73N30
500	N	0.1	48	192	4	520	IXFN48N50
<b>TO-264</b>							
200	N	0.02	90	360	4	500	IXFK90N20
300	N	0.045	73	292	4	500	IXFK73N30
500	N	0.1	48	192	4	500	IXFK48N50

SD483

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
IXFH12N100	305-2692					
IXFH14N80	305-2680					
IXFH15N100	315-3691					
IXFH21N50	305-2552					
IXFH26N50	305-2564					
IXFH32N50	305-2620					
IXFH40N30	305-2576					
IXFH50N20	305-2588					
IXFH58N20	315-3587					
IXFH6N100	315-3575					
IXFH75N10	305-2618					
IXFH76N07-11	305-2710					
IXFK48N50	305-2590					
IXFK73N30	305-2722					
IXFH90N20	305-2606					
		1+	5+	10+	25+	50+
IXFN120N20	305-2709					
IXFN170N10	305-2667					
IXFN48N50	305-2679					
IXFN73N30	305-2734					

## D<sup>3</sup>-PAK N-Channel

ON Semiconductor



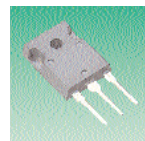
$V_{ds}$ V	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$P_{d}^*$ @ 25°C W	$P_d$ @ 25°C W	Mfrs. List No.
250	0.08	32	96	3.57	250	MTV32N25E
500	0.24	20	60	3.57	250	MTV20N50E
1000	1.3	10	30	3.57	250	MTV10N100E

SD116

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
MTV10N100E	112-0451				
MTV20N50E	112-0475				
MTV32N25E	112-0499				

## TO-247 N-Channel

ON Semiconductor



$V_{ds}$ V	$R_{ds}$ (on) max. $\Omega$	$I_d$ cont @ 25°C A	$I_{dm}$ pulsed A	$V_{gs}$ (th) max. V	$P_d$ @ 25°C W	Mfrs. List No.
100	0.035	45	135	4	180	MTW45N10E
150	0.05	35	102	4	180	MTW35N15E
200	0.075	32	128	4	180	MTW32N20E
250	0.08	32	96	4	250	MTW32N25E
400	0.24	16	56	4	180	MTW16N40E
400	0.16	24	—	4	250	MTW24N40E
500	0.4	14	60	4	180	MTW14N50E
500	0.24	20	—	4	250	MTW20N50E
600	0.55	8	24	4	180	MTW8N60E
800	1.0	7	21	4	180	MTW7N80E
1000	1.5	6	18	4	180	MTW6N100E
1000	1.3	10	—	4	250	MTW10N100E

SD104

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
MTW7N80E	877-906					
MTW8N60E	992-872					
MTW10N100E	708-446					
MTW14N50E	877-918					
MTW16N40E	234-5894					
MTW20N50E	708-458					
MTW24N40E	708-460					
MTW32N20E	877-920					
MTW32N25E	234-5973					
MTW35N15E	234-5997					
MTW45N10E	300-5355					
MTW6N100E	300-5367					

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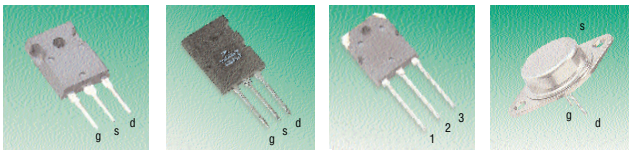


SD140A

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
STW5NA100	498-191					
STW7NA100	498-210					
STW8NA60	935-104					
STW10NB60	323-9391					
STW10NC60	332-8673					
STW13NB60	498-154					
STW14NC50	332-8661					
STW15NB50	935-062 †					
STW16NA40	935-074 †					
STW18NB40	498-178					
STW20NB50	935-086					
STW33N20	437-920					
STW34NB20	498-180					
STW38NB20	323-9408					
STW50N10	935-098					
STW60N10	437-918					
STW80NE06-10	498-221					
2SJ114	355-884					
2SJ217	355-938					
2SK560	355-987					
2SK1120	251-240					
2SK1166	739-455					
2SK1317	356-013					
2SK1489	737-963					
2SK1544	737-987					
2SK1745	738-025					
2SK2057	327-2138					
2SK2150	327-2140					
2SK2173	327-2151					
2SK2312	327-2217					
2SK2313	327-2229					
2SK2554	739-418					
2SK2586	739-420					
2SK2604	327-2308					
2SK2607	327-2321					
2SK2610	327-2333					
2SK2611	327-2345					
2SK2698	327-2382					

† Available until stocks are exhausted

### Audio FETs

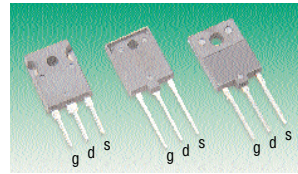


V <sub>DS</sub> V	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	P <sub>D</sub> 25°C W	Package	Mfr.	Mfrs. List No.	
						N-Channel	P-Channel
140	1.71	7	100	TO-3P(a)	HIT	2SK1057	2SJ161
140	0.5	8	100	TO-3P(b)	HIT	2SK413	2SJ118
160	1.7	7	100	TO-3P(a)	HIT	2SK1058	2SJ162
160	1.5	8	125	TO-3	SEM	BUZ900	BUZ905
160	1.5	8	125	TO-247	SEM	BUZ900P	BUZ905P
160	0.75	16	250	TO-3	SEM	BUZ900D	BUZ905D
160	0.5	8	100	TO-3P(b)	HIT	2SK414	2SJ119
180	1.5	8	100	TO-3P(a)	HIT	2SK2220	2SJ351
200	1.5	8	100	TO-3P(a)	HIT	2SK2221	2SJ352
200	1.5	8	125	TO-3	SEM	BUZ901	BUZ906
200	1.5	8	125	TO-247	SEM	BUZ901P	BUZ906P
200	0.75	16	250	TO-3	SEM	BUZ901D	BUZ906D
200	0.75	16	250	TO-264	SEM	BUZ901CDP	BUZ906DP

SD289

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
BUZ900	290-312				
BUZ900D	484-337				
BUZ900P	567-474				
BUZ901	290-324				
BUZ901D	484-349				
BUZ901CDP	162-565				
BUZ901P	567-486				
BUZ905	290-336				
BUZ905D	484-350				
BUZ905P	567-498				
BUZ906	290-348				
BUZ906D	484-362				
BUZ906DP	706-206				
BUZ906P	567-504				
2SJ118	355-896				
2SJ119	355-902				
2SJ161	739-479				
2SJ162	355-926				
2SJ351	506-473				
2SJ352	506-485				
2SK413	355-951				
2SK414	355-963				
2SK1057	739-443				
2SK1058	356-001				
2SK2220	506-450				
2SK2221	506-461				

### TO-3P Isolated



(a) TO-247 (b) TO-3PFM (c) ISOWATT218

Isolated packages offer simplified heatsink mounting, without the need for additional isolating washers, mica etc. Isolation voltage 4kV, lead spacing 5.45.

V <sub>DS</sub> V	N/P Chnl.	R <sub>DS</sub> (on) Ω	I <sub>D</sub> cont @ 25°C A	I <sub>D</sub> cont @ 100°C A	I <sub>DM</sub> Pulsed A	P <sub>D</sub> @ 25°C W	Pack- age	Mfr.	Mfrs. List No.
60	P	0.06	45.0	—	180.0	60	b	HIT	● 2SJ218
100	N	0.025	36.0	—	22.0	240	c	ST	STH60N10FI
400	N	0.3	10.0	7.0	64.0	70	c	ST	STH16NA40FI
400	N	0.3	12.4	7.8	73.6	80	a	ST	STH18NB40FI
500	N	0.36	10.6	—	—	80	c	ST	STH15NB50FI
800	N	1.0	5.6	3.5	34.0	60	c	ST	STH9NA80FI
800	N	1.0	5.9	—	36.4	80	a	ST	STW9NA80FI

● Logic level MOSFET with design optimised for 5V gate drive

SD142

Mfrs. List No.	Order Code	Price Each				
		1+	25+	100+	250+	1K+
STH9NA80FI	739-017 †					
STH15NB50FI	162-152					
STH16NA40FI	934-951					
STH18NB40FI	332-8491					
STH60N10FI	484-854					
STW9NA80FI	498-233					
2SJ218	356-062					

† Available until stocks are exhausted

### TO-264



- High power led package
- Clip or screw mounted body
- Pin compatible with TO-247 packages
- Accommodates large die sizes
- Cost effective alternative to ISOTOP modules
- Avalanche energy rated

H = 47.09, W = 20.5, D = 5.21, Lead spacing = 5.25

V <sub>DS</sub> V	N or P Channel	R <sub>DS</sub> (on) Ω	I <sub>D</sub> @ 25°C A	I <sub>DM</sub> Pulsed A	V <sub>GS</sub> (th) max V	P <sub>D</sub> @ 25°C W	Mfr.	Mfrs. List No.
60	N	0.015	60	240	2.0	150	TOSH	2SK2267
100	N	0.011	100	300	4.0	300	ON	MTY100N10E
200	N	0.028	55	165	4.0	300	ON	MTY55N20E
500	N	0.26	20	60	4.0	250	ON	MTY20N50E
500	N	0.15	30	80	4.0	300	ON	MTY30N50E
500	N	0.1	47	188	4.0	520	APT	APT5010LVR
600	N	0.15	38	152	4.0	520	APT	APT6015LVR
1000	N	0.8	14	49	4.0	300	ON	MTY14N100E

SD357

Mfrs. List No.	Order Code	Price Each		
		1+	25+	100+
APT5010LVR	992-604			
APT6015LVR	992-598			
MTY14N100E	112-0517			
MTY20N50E	300-5707			
MTY30N50E	877-797			
MTY55N20E	877-803			
MTY100N10E	877-815			
2SK2267	327-2205			

Continued

### SI Prefixes

The following prefixes are used to indicate decimal multiples and sub-multiples of SI units.

Symbol	Prefix	Factor	Symbol	Prefix	Factor
T	tera	10 <sup>12</sup>	d	deci	10 <sup>-1</sup>
G	giga	10 <sup>9</sup>	c	centi	10 <sup>-2</sup>
M	Mega	10 <sup>6</sup>	m	milli	10 <sup>-3</sup>
k	kilo	10 <sup>3</sup>	μ	micro	10 <sup>-6</sup>
h	hecto	10 <sup>2</sup>	n	nano	10 <sup>-9</sup>
da	deca	10 <sup>1</sup>	p	pico	10 <sup>-12</sup>
			f	femto	10 <sup>-15</sup>
			a	atto	10 <sup>-18</sup>

Power MOSFETs — continued

TO-3



Lead spacing = 11,  
Fixing centres = 30

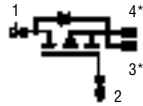
$V_{DS}$ V	N or P Channel	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ Pulsed A	$P_D$ @ 25°C W	Mfr.	Mfrs. List No.
60	N	0.028	30.0	210	150	SEM	IRF044
100	N	0.18	14.0	56	75	IR/INTS	IRF130
100	N	0.085	27.0	108	125	IR	IRF140
100	N	0.055	40.0	160	150	IR	* IRF150
100	P	0.2	19.0	76	125	IR	IRF9140
200	N	0.085	30.0	120	150	IR	* IRF250
200	P	0.8	6.5	26	75	IR	IRF9230
400	N	1.0	5.5	22	75	INTS	IRF330
400	N	0.3	17.0	68	198	SEM	BFD88
500	N	0.85	8.0	32	125	INTS	IRF440
500	N	0.4	14.5	58	198	SEM	BFD82
800	N	2.4	5.0	20	150	SEM	BFD71
1000	N	0.125	6.0	24	198	SEM	BFD63

\*Modified TO-3 out-  
line 1.5 dia. pins

SD14

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
BFD63	664-145				
BFD71	664-133				
BFD82	664-108				
BFD88	664-091				
IRF044	664-042				
IRF130 (INTS)	301-0958				
IRF130 (IR)	664-054				
IRF140	664-066				
IRF150	664-078				
IRF250	664-080				
IRF330	301-1008				
IRF440	301-1045				
IRF9140	664-110				
IRF9230	664-121				

ISOTOP, SOT-227B – N Channel



Internal schematic diagram

H = 12.2, W = 25.4, D = 38, Fixing centres = 31.6

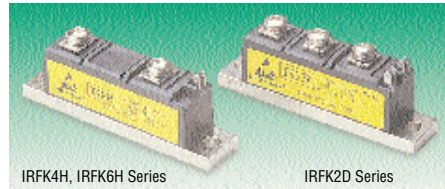
- High power modules
- Isolated base
- 2.5kV rms isolation voltage
- 4mm screw terminals

$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ pulsed A	$P_D$ @ 25°C W	Mfr.	Mfrs. List No.
60	0.004	250	750	450	ST	STE250N06
100	0.007	180	540	450	ST	STE180N10
100	0.006	180	540	360	ST	STE180NE10
100	0.0055	215	—	460	ON	MTE215N10E
200	0.019	110	440	450	ST	STE110NA20
200	0.011	175	700	700	APT	APT20M11JVR
300	0.019	130	520	700	APT	APT30M19JVR
400	0.035	93	372	700	APT	APT40M35JVR
500	0.13	38	152	400	ST	STE38NB50
500	0.085	53	212	460	ST	STE53NA50
500	0.05	77	308	700	APT	APT50M50JVR
600	0.135	40	160	460	ST	STE40NA60
600	0.075	62	248	700	APT	APT60M75JVR
800	0.15	44	176	700	APT	APT8015JVR
900	0.3	26	104	450	ST	STE26NA90
1000	0.77	15	60	300	ST	STE15NA100
1000	0.385	24	96	450	ST	STE24NA100
1000	0.25	34	136	700	APT	APT10025JVR
1200	0.4	26	—	700	APT	APT12040JVR

SD130

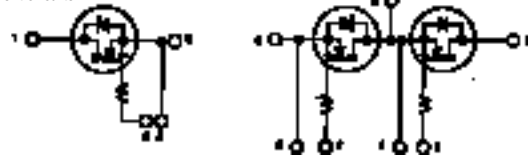
Mfrs. List No.	Order Code	Price Each			
		1+	5+	10+	25+
APT10025JVR	992-628				
APT12040JVR	992-616				
APT20M11JVR	992-689				
APT30M19JVR	992-677				
APT40M35JVR	992-665				
APT50M50JVR	992-653				
APT60M75JVR	992-641				
APT8015JVR	992-630				
MTE215N10E	708-422				
STE15NA100	934-938				
STE24NA100	934-940				
STE26NA90	332-8193				
STE38NB50	332-8181				
STE40NA60	738-980				
STE53NA50	646-003				
STE110NA20	738-967				
STE180N10	274-914				
STE180NE10	332-8480				
STE250N06	526-745				

HEXPAK



H = 37 (incl terminals), W = 92, D = 20, Mounting holes = 6.5 dia, Fixing centres = 80

Equivalent circuits



IRFK4H, IRFK6H Series

IRFK2D Series

HEXPAK Modules contain 4 HEXFET power MOSFET's (IRFK4H and IRFK2D Series) and 6 HEXFET power MOSFET's (IRFK6H Series) on an electrically isolated base plate. They are ideally suited for high power applications where space saving and ease of assembly is important.

$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ cont @ 25°C A	$I_{DM}$ Pulsed A	$P_D$ @ 25°C W	Mfrs. List No.
100	0.014	137	548	500	IRFK4H150
200	0.043	54	216	500	IRFK2D250
200	0.021	108	432	500	IRFK4H250
200	0.015	140	560	625	IRFK6H250
400	0.075	50	200	500	IRFK4H350
500	0.200	22	88	500	IRFK2D450
500	0.100	44	176	500	IRFK4H450
500	0.067	66	264	625	IRFK6H450

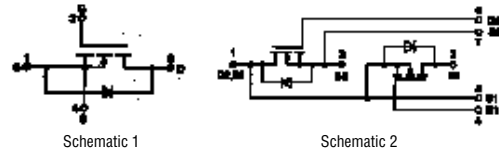
SD58

Mfrs. List No.	Order Code	Price Each		
		1+	4+	10+
IRFK2D250	356-074			
IRFK2D450	356-086			
IRFK4H150	356-098			
IRFK4H250	356-104			
IRFK4H350	356-116			
IRFK4H450	356-128			
IRFK6H250	356-141			
IRFK6H450	356-153			

SEMISTRANS Module  
N Channel – Single and Dual



A : Single H = 30, W = 80, D = 42 B : Dual H = 30, W = 94, D = 34  
Mounting holes = 6.4 dia, Fixing centres = 65



Schematic 1

Schematic 2

- N channel, enhanced mode
- Isolated copper baseplate
- Avalanche characteristics (SKM111xxx, SKM224A)
- Fast inverse diode (SKM181F, SKM284F)
- Short internal connections avoid oscillations (SKM111xxx, built-in gate resistors)
- Switching kW's in less than 1  $\mu$ s
- Used with Driver Module, Order Code 663-359, see page 401

	$V_{DS}$ V	$R_{DS}$ (on) $\Omega$	$I_D$ cont. @ 25°C A	$I_{DM}$ pulsed A	$P_D$ @ 25°C W	Package/ Schematic	Mfrs. List No.
Single	100	0.007	200	600	700	A/1	SKM111AR
	800	0.250	34	136	700	A/1	SKM181F
Dual	800	0.360	20	80	400	B/2	SKM284F

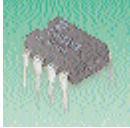
SD256

Mfrs. List No.	Order Code	Price Each		
		1+	25+	100+
SKM111AR	663-360			
SKM181F	663-384			
SKM284F	663-402			



## MOSFET Drivers

### High and Low Side Drivers



8-pin DIL

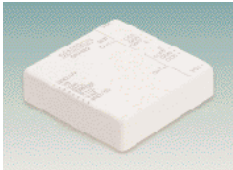
V <sub>offset</sub> V	I <sub>o+</sub> mA	I <sub>o-</sub> mA	V <sub>out</sub> (min) V	V <sub>out</sub> (max) V	t <sub>on</sub> (typ) ns	t <sub>off</sub> (typ) ns	Delay matching ns	Deadttime (typ) ns	Mfrs. List No.
600	100	210	10	20	130	90	—	30	IR2101
600	100	210	10	20	600	90	—	500	IR2103
600	100	210	10	20	600	90	—	500	IR2104

SD285

Mfrs. List No.	Order Code	1+	25+	100+	250+
IR2101	<b>935-256</b>				
IR2103	<b>935-270 †</b>				
IR2104	<b>935-281</b>				

† Available until stocks are exhausted

### MOSFET/IGBT Driver Module



H = 14, W = 55, D = 55

- Double driver for Semikron half bridge modules
- Produces negative V<sub>GE</sub> at switch-off
- Drives MOSFETS V<sub>GS(on)</sub> < 10V
- CMOS compatible inputs
- Short circuit protected
- Drive interlock top/bottom
- Internal isolation transformers
- Supply undervoltage protection (13V)



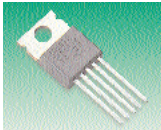
V <sub>S</sub> V	V <sub>IH</sub> V	I <sub>IH</sub> mA	I <sub>G(ON)</sub> A	I <sub>G(OFF)</sub> A	V <sub>LE</sub> V	dv/dt kV/μs	V <sub>ISOL</sub> kV
18	18	0.34	3.3	3.3	1600	25	2.5

SD238

Mfrs. List No.	Order Code	1+	Price Each	50+
SKH122	<b>.663-359</b>		10+	

## Smart Power MOSFETs

### Fully Protected MOSFET Switches



TO-220/5



TO-220



SOT-223



SO-8

- Short-circuit protected
- Over-temperature protected
- Negative clamped output
- Reverse battery protection
- Open-circuit ground protection
- V<sub>CC</sub> short-circuit protection
- Low noise charge pump
- Sleep mode supply current
- 4kV ESD protected
- Diagnostic feedback

V <sub>clamp</sub> V	V <sub>input</sub> High min. V	V <sub>input</sub> Low max. V	R <sub>ds</sub> (on), Ω	Shut- down A	Shut- down °C	T <sub>on</sub> /T <sub>off</sub> ms	P <sub>d</sub> @ 25°C W	Package	Mfrs. List No.
50	4	0.5	0.025	35	165	0.0015	2	TO-220	IPS0151
50	4	0.5	0.15	5	165	1.5	2	TO-220	IPS021
50	4	0.5	0.15	5	165	0.0015	1	SOT-223	IPS021L
50	4	0.5	0.06	12	165	1.5	2	TO-220	IPS031
50	4	0.5	0.07	12	165	1.5	1	SO-8	IPS031G
50	4	0.5	0.5	2	165	1.5	1	SOT-223	IPS041L
50	4	0.5	0.5	2	165	1.5	1	SO-8	IPS042G

V <sub>clamp</sub> V	V <sub>cc</sub> (op.) min. V	V <sub>cc</sub> (op.) max. V	R <sub>ds</sub> (on), W	I <sub>lim</sub> A	T <sub>shut-down</sub> °C	V <sub>open load</sub> C	P <sub>d</sub> @ 25°C W	Package	Mfrs. List No.
50	4	0.5	0.15	5	165	1.5	1	SO-8	IPS022G

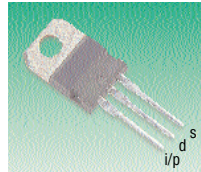
V <sub>clamp</sub> V	V <sub>cc</sub> (op.) min. V	V <sub>cc</sub> (op.) max. V	R <sub>ds</sub> (on), W	I <sub>lim</sub> A	T <sub>shut-down</sub> °C	V <sub>open load</sub> C	P <sub>d</sub> @ 25°C W	Package	Mfrs. List No.
50	5.5	35	0.1	10	165	3	1	SO-8	IPS521G
50	5.5	35	0.13	5	165	3	25	TO-220/5	IPS511
50	5.5	35	0.15	5	165	3	1	SO-8	IPS511G
50	5.5	35	0.08	10	165	3	40	TO-220/5	IPS521
50	5.5	35	0.025	35	165	—	2	TO-220/5	IPS5451

SD468

Mfrs. List No.	Order Code	1+	25+	Price Each	100+	250+	1K+
IPS0151	<b>315-7520</b>						
IPS021	<b>315-7532</b>						
IPS021L	<b>SMD 315-7544</b>						
IPS022G	<b>SMD 315-7556</b>						
IPS031	<b>315-7568</b>						
IPS031G	<b>SMD 315-7570</b>						
IPS041L	<b>SMD 315-7581</b>						
IPS042G	<b>SMD 315-7593</b>						
IPS511	<b>315-7600</b>						
IPS511G	<b>SMD 315-7611</b>						
IPS521	<b>315-7623</b>						
IPS521G	<b>SMD 315-7635</b>						
IPS5451	<b>315-7647</b>						

### 'OmniFET'

#### Fully Autoprotected Power MOSFET



TO-220/TO-247

- Current limited
- Thermal shut-down
- Short-circuit protected
- Integral clamp
- High input impedance
- ESD protected to 2KV

V <sub>CLAMP</sub> V	R <sub>DS(ON)</sub> Ω	I <sub>LIMIT</sub> A	P <sub>TOT</sub> W	Package	Mfrs. List No.
42	0.14	7	60	D-Pak	VND7N04
42	0.07	14	50	D2-Pak	VNB14N04
42	0.02	49	125	TO-220	VNP49N04
42	0.02	49	125	D2-Pak	VNB49N04
42	0.012	100	208	TO-247	VNW100N04
60	0.3	10	35	D-Pak	VND10N06
70	0.2	5	60	D-Pak	VND5N07
70	0.1	10	50	TO-220	VNP10N07
70	0.2	5	31	TO-220	VNB5N07
70	0.1	10	50	D2-Pak	VNB10N07
70	0.05	20	83	TO-220	VNP20N07
70	0.028	35	125	TO-220	VNP35N07
70	0.028	35	125	D2-Pak	VNB35N07

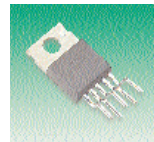
SD310

Mfrs. List No.	Order Code	1+	25+	Price Each	100+	250+	1K+
VND10N06	<b>NEW 353-8655</b>						
VND5N07	<b>NEW 353-8667</b>						
VND7N04	<b>NEW 353-8679</b>						
VNB10N07	<b>NEW 353-8590</b>						
VNB14N04	<b>NEW 353-8606</b>						
VNB35N07	<b>NEW 353-8618</b>						
VNB49N04	<b>NEW 353-8620</b>						
VNP5N07	<b>332-8582</b>						
VNP10N07	<b>332-8594</b>						
VNP20N07	<b>742-302</b>						
VNP35N07	<b>742-326</b>						
VNP49N04	<b>742-338</b>						
VNW100N04	<b>332-8569</b>						

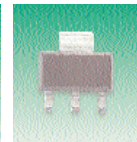
### HITFET® Low Side Switches



(a) TO-220



(b) TO-220/5



(c) SOT-223



- Overload/overvoltage protected
- Short circuit protection
- Logic level input
- Status feedback
- Open load detection in ON or OFF condition
- Current limited
- Thermal shut-down
- ESD protected
- Analogue driving capability

#### Additional Current Sense HITFET Features:

- Max current adjustment with external resistor
- Current measurement

V <sub>DS</sub> V	R <sub>DS(ON)</sub> mΩ	I <sub>D-NOM/ISO</sub> min	I <sub>D-LIM</sub> min	Package	Mfrs. List No.
55	500	1 N <sub>OM</sub>	1	(c)	BSP75
60	100	3.5 I <sub>SO</sub>	7	(a)	BTS117
60	50	7 I <sub>SO</sub>	21	(a)	BTS133
60	28	12 I <sub>SO</sub>	25	(a)	BTS141
60	18	19 I <sub>SO</sub>	30	(a)	BTS149

Current Sense HITFET®	Package	Mfrs. List No.
60	(b)	BTS949

SD112

Mfrs. List No.	Order Code	1+	25+	Price Each	100+	250+	500+
BSP75	<b>SMD 743-434</b>						
BTS117	<b>743-446</b>						
BTS133	<b>743-458</b>						
BTS141	<b>743-460</b>						
BTS149	<b>743-471</b>						
BTS949	<b>743-495</b>						

Continued

## Smart Power MOSFETs — continued

### TO-220, SOT-263 TOPFET™ Temperature and Overload Protected

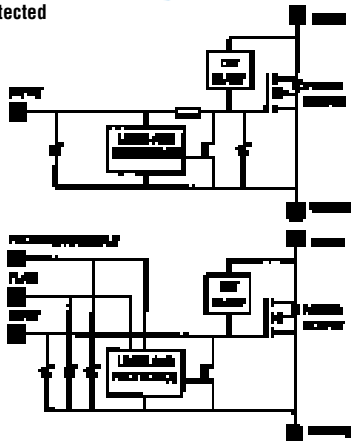
Philips Semiconductors



(a) TO-220  
Lead spacing 2.54



(b) SOT-263  
Lead spacing 1.7



Fully protected n-channel power MOSFET's, in 3 pin TO-220 or 5 pin SOT-263 packages.

**3 Pin:** Offers inherent protection against overtemperature, short circuits and overvoltage. Full ESD protection to 1.5kV.

**5 Pin:** In addition, offers direct gate access, a fault reporting flag and an independent protection circuit supply.

Suitable for low voltage high reliability switching and linear applications, and for use in harsh environments.

V <sub>DS</sub> V	R <sub>DS(on)</sub> Ω	I <sub>D</sub> A	P <sub>D</sub> @ 25°C W	Package	Mfrs. List No.
50	0.125	13.5	40	a	● BUK100-50GL
50	0.1	15.0	40	a	● BUK100-50GS
50	0.06	26.0	75	a	● BUK101-50GL
50	0.05	29.0	75	a	● BUK101-50GS
50	0.035	45.0	125	a	● BUK102-50GL
50	0.035	50.0	125	b	● BUK106-50L

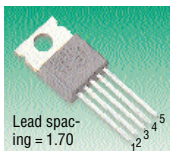
● Logic level MOSFET with design optimised for 5V gate drive.

SD161

Mfrs. List No.	Order Code	1+	25+	100+	300+
<b>3 Pin – Standard</b>					
BUK100-50GS	.291-651 †				
BUK101-50GS	.259-755				
<b>3 Pin – Logic Level</b>					
BUK100-50GL	.291-640 †				
BUK101-50GL	.259-767				
BUK102-50GL	291-663				
<b>5 Pin – Logic Level</b>					
BUK106-50L	291-729				

† Available until stocks are exhausted

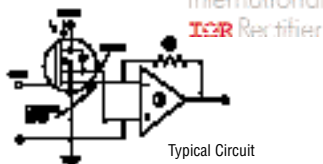
### TO-220 HEXSense™



Lead spacing = 1.70

Connections:

- Gate
- Current Sense
- Drain
- Kelvin Source
- Source



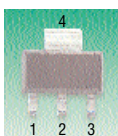
N-channel power MOSFET's incorporating a current sensing feature, providing an accurate fraction of the drain current as feedback parameters for control and/or protection. Sensing accuracy ± 2½%.

V <sub>DS</sub> V	R <sub>DS(on)</sub> Ω	I <sub>D cont</sub> @ 25°C A	Sensing Ratios min. max.	@ I <sub>D</sub> (V <sub>DS</sub> = 10V) A	P <sub>D</sub> @ 25°C W	Mfrs. List No.
60	0.028	50.0	2460 2720	52	150	IRCZ44
100	0.16	14.0	1395 1465	14	79	IRC530
100	0.077	28.0	2610 2740	29	125	IRC540

SD7

Mfrs. List No.	Order Code	1+	25+	100+	250+
IRC530	.353-784				
IRC540	.353-796				
IRCZ44	438-455				

### SOT-223, MiniSmart Protected High-Sided Switch



H = 1.6, W = 6.5, D = 7.0

SMD

- Short-circuit and over temperature protected
- Overload and overvoltage protected
- Input protected
- Internally current limited
- Switching Inductive load

Pin Out	1	2	3	4
BSP350	IN	V <sub>bb</sub>	OUT	V <sub>bb</sub>
BSP452	OUT	GND	IN	V <sub>bb</sub>

Infineon  
technologies

Supplied on 12mm tape.

V <sub>bb</sub> V	R <sub>on</sub> Ω	IL (sc) A	I <sub>in</sub> mA	E <sub>as</sub> mJ	P <sub>tot</sub> W	Mfrs. List No.
50	5.0	1	±15	5	1.7	BSP350
40	0.2	1	±15	—	1.8	BSP452

SD222

Mfrs. List No.	Order Code	1+	100+	200+	500+	1K+
BSP350	548-613					
BSP452	548-625					

### TO-220/5, TO-220/7 PROFET™ Protected MOSFET



(a) TO-220/5



(b) TO-220/5 SMD

Infineon  
technologies

- Surface mount options
- ESD protected

- High-side switch
- Inductive switching
- Short-circuit and overtemperature protected
- BTS629 light dimmer
- Overload and overvoltage protected
- BTS611L1/BTS622L1 dual output
- Reverse input protected
- Internal current limit

V <sub>bb</sub> (BR) max. V	R <sub>on</sub> (max.) mΩ	I <sub>L</sub> -MOS @ 25°C	P <sub>D</sub> @ 25°C W	Package	Mfrs. List No.
40	60	20	75	a	BTS426L1
50	220	13	75	a	BTS410E
50	220	13	75	b	BTS410E-E3062
50	38	20	125	a	BTS432E
50	38	20	125	b	BTS432E-E3062

SD150

Mfrs. List No.	Order Code	1+	25+	100+	250+	500+
BTS410E	.210-821					
BTS432E	.210-833					
BTS410E-E3062	SMD 548-662					
BTS432E-E3062	SMD 548-674					
BTS426L1	548-686					

### PROFET® High Sided Switches



(a) TO-220/5



(c) TO-220/5 SMD



(d) DSO-20

Infineon  
technologies

- 2nd Generation PROFET with additional protection
- Overload/current limited
- Overvoltage protection (inc. load dump)
- Reverse battery protected
- Over/undervoltage shutdown, with auto-restart and hysteresis
- Loss of ground and V<sub>bb</sub> protection
- ESD protected
- Fast demagnetisation of inductive loads
- Diagnostic feedback
- Open load detection
- CMOS and TTL compatible input

	V <sub>bb</sub> V	R <sub>on</sub> * mΩ	IL (iso)* A	IL (scr)* A	Pin Config.	Mfrs. List No.
<b>Single Channel</b>	40	200	2.3	4.0	(a)	BTS409L1
	60	220	1.8	5.0	(a)	BTS410E2
	60	220	1.8	5.0	(c)	BTS410E2-3062
	60	220	1.8	5.0	(a)	BTS412B2
	60	38	11.0	35.0	(a)	BTS432E2
	60	32	11.0	35.0	(c)	BTS432E2-3062
<b>Lamp Dimmer</b>	40	65	3.0	20.0	(d)	BTS730
	40	65	3.9	12.0	(d)	BTS726L1
<b>Dual Channel</b>	40	40	4.8	21.0	(d)	BTS734L1
	40	210	1.9	3.7	(d)	BTS711L1
<b>Quad Channel</b>	40	110	2.7	7.2	(d)	BTS721L1

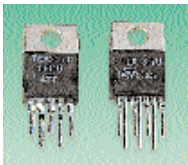
\* per channel

SD115

Mfrs. List No.	Order Code	1+	25+	100+	250+	500+
BTS409L1	743-306					
BTS410E2	743-318					
BTS410E2-3062	SMD 743-320					
BTS412B2	743-331					
BTS432E2	743-343					
BTS432E2-3062	SMD 743-355					
BTS442E2	743-367					
BTS711L1	SMD 743-380					
BTS721L1	SMD 743-392					
BTS726L1	SMD 743-409					
BTS730	SMD 743-410					
BTS734L1	SMD 743-422 †					

† Available until stocks are exhausted

## Smart Power Solid State Relays



- Intelligent power MOSFET switch
- On-board control, protection and diagnostic circuitry
- Protection against thermal overload, overcurrent, overvoltage and short circuit
- ESD protected
- Electromechanical relay substitute
- 5 and 7 pin TO-220 packages

(a) Pentawatt® (b) Heptawatt®

V <sub>CC</sub> V	V <sub>DSS</sub> V	R <sub>DS(on)</sub> /Chnl. Ω	I <sub>OUT</sub> @ 25°C A	P <sub>TOT</sub> W	Package	Mfrs. List No.	Features								
							1	2	3	4	5	6			
<b>High Side</b>															
7-36	60	0.35	7	31	Pentawatt	VN02AN	●						●	●	
7-36	60	0.35	7	31	Power SO-10	VN02ANSP	●						●	●	
7-26	60	0.7	6	29	Pentawatt	VN02N		●							
5.5-26	60	0.5	4	14	Power SO-10	VN03SP	●						●	●	
7-26	60	0.18	13	56	Pentawatt	VN05N		●							
5.5-36	45	0.18	12	52	Power SO-10	VN05HSP		●							
6-26	40	0.06	5.6	82	Power SO-10	VN16BSP	●								
7-26	60	0.05	3.3	100	Pentawatt	VN20N		●							
<b>High Side, Dual Channel</b>															
6-26	40	0.2	9*	59	Heptawatt	VND05B	●	●							
6-26	40	0.2	1.6	59	Power SO-10	VND05BSP	●	●							
6-26	40	0.1	3.4	75	Power SO-10	VND10BSP	●	●							
<b>Quad Packaged, H-Bridge Configuration</b>															
6-26	40	0.24	9	lim	SO-28	VN770		●	●	●	●				
6-26	40	0.27	9	lim	SO-28	VN770P		●	●	●	●				
6-26	60	0.14	14	lim	SO-28	VN771		●	●	●	●				
6-26	40	0.135	14	lim	SO-28	VN771P		●	●	●	●				

\* I<sub>OUT</sub> @ T<sub>C</sub> = 85°C

### Features Key:

1. Load fast demagnetisation
2. Open load detection OFF state "stuck ON" to V<sub>CC</sub> detection
3. Open load detection ON state
4. Over temperature and short cct. protection
5. Under voltage detection (V<sub>CC</sub>)
6. Open load and over load discrimination (on status pin)

SD360

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
VN02AN	742-340					
VN02ANSP	<b>NEW</b> 353-8515					
VN02N	742-351					
VN03SP	<b>NEW</b> 353-8527					
VN05HSP	<b>NEW</b> 353-8539					
VN05N	742-363					
VN16BSP	<b>NEW</b> 353-8540					
VN20N	742-387					
VN770	<b>NEW</b> 353-8552					
VN770P	<b>NEW</b> 353-8564					
VN771	<b>NEW</b> 353-8576					
VN771P	<b>NEW</b> 353-8588					
VND05B	742-399					
VND05BSP	<b>NEW</b> 353-8631					
VND10BSP	<b>NEW</b> 353-8643					

## RF MOSFETs

### High Performance



SOT-343

SOT-143



NPN/ PNP	V <sub>CEO</sub> max. V	I <sub>C</sub> max. mA	P <sub>TOT</sub> mW	f <sub>T</sub> GHz	h <sub>FE</sub> min.	I <sub>C</sub> @ mA	Package	Device Marking	Mfrs. List No.
<b>Isolated Collector</b>									
NPN	4.5	12	54	25	50	2	SOT-343	02x*	HBFP-0405
NPN	4.5	36	162	25	50	2	SOT-343	03x*	HBFP-0420
NPN	4.5	100	450	25	50	2	SOT-343	08x*	HBFP-0450
NPN	5.5	32	200	10	70	2	SOT-143	320	AT-32011
NPN	12	50	225	10	30	5	SOT-143	415	AT-41511

N.B. x\* denotes monthly date code

SD463

Order Multiple=5	Order Code	5+	25+	100+	250+	1K+
Mfrs. List No.						
AT-32011	323-6511					
AT-41511	323-6523					
<b>Order Multiple=1</b>						
HBFP-0405	323-6456	1+	25+	100+	250+	1K+
HBFP-0420	323-6468					
HBFP-0450	323-6470					

### Low Noise, Pseudomorphic HEMT



SOT-343

SOT-363



V <sub>DS</sub> max. V	I <sub>D</sub> /I <sub>DSS</sub> max. mA	P <sub>DISS</sub> max. mW	P <sub>IN</sub> max. dBm	NF (typ.) dB	G <sub>s</sub> (typ.) dB	OIP3 (typ.) dBm	Test Freq. GHz	Package	Device Marking	Mfrs. List No.
<b>450MHz – 10GHz</b>										
5.5	145	725	17	0.5	17.5	31.5	2	SOT-343	4Px	AFT-34143
5.5	80	300	14	0.4	18.0	19.0	2	SOT-343	5Px	AFT-35143
<b>1.5GHz – 18GHz</b>										
3.0	40	180	10	0.6	15.8	—	4	SOT-363	36	AFT-36163

N.B. x\* denotes date code

SD461

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
AFT-34143	323-6481					
AFT-35143	323-6493					
AFT-36163	323-6500					

## SOT-103, SOT-143 and TO-72 (see page XXX for pin connection data)

### Application Code:

- ◆ High frequency switch/chopper/commutator (RF/VHF/UHF) — ●● Dual-Gate (HF) MOSFET

V <sub>DS</sub> max. V	I <sub>D</sub> max. mA	I <sub>DSS</sub> min. mA	G <sub>s</sub> min. mA/V	P <sub>TOT</sub> @ 25°C mW	Zener Protected Gate	App'n Code	Package and Pin-Out	Mfrs. List No.
7	N	30	—	22	200	X	SOT-143R	PS BF904R
12	N	30	4.0	24	200	X	SOT-103	SLX BF988A
12	N	30	2.0	21	200	X	SOT-143	PS BF998
20	N	30	4.0	25	200	X	SOT-143	SLX BF994S
20	N	50	—	9	300	✓	SOT-143	SLX SST215
30	N	50	—	9	300	✓	SOT-143	SLX SST211
40	P	50	0.2	2	375	X	TO-72(e)	SLX 3N163

SD38

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
3N163	352-561					
BF904R	<b>SMD</b> 163-259					
BF988A	663-712					
BF994S	<b>SMD</b> 663-700					
BF998	.663-876					
SST211	<b>SMD</b> 739-261 †					
SST215	<b>SMD</b> 739-273 †					

† Available until stocks are exhausted

## MOS RF Transistors



211-11



375/2

ON Semiconductor



V <sub>DS</sub> max. V	I <sub>D</sub> A	P <sub>TOT</sub> mW	f* MHz	V <sub>DS</sub> * V	G <sub>p</sub> * typ. dB	η <sub>D</sub> * typ. %	Mode of Operation	Package	Mfrs. List No.
125	16	300	30	5	17	45	SSB	211-11/2	MRF150
125	40	500	175	5	16	55	CW	375/2	MRF151G

SD96

Mfrs. List No.	Order Code	1+	5+	10+
MRF150	234-1670			
MRF151G	300-5719			

## High Power HF/VHF and UHF

Philips Semiconductors



SOT-123



SOT-172D



SOT-171

- High power gain
- Low noise figure
- Good thermal stability
- Full load mismatch tolerant

V <sub>DS</sub> max V	I <sub>D</sub> A	P <sub>TOT</sub> W	f* MHz	V <sub>DS</sub> * V	P <sub>1</sub> * W	G <sub>p</sub> * min dB	η <sub>D</sub> * min %	Mode of Operation	Package	Mfrs. List No.
<b>HF/VHF</b>										
65	6.0	68	28	28.5	8	24	—	SSB	SOT-123	BLF145
65	1.0	16	175	28.0	5	13	50	CW	SOT-123	BLF242
<b>UHF</b>										
65	1.5	20	500	28.0	5	13	50	CW	SOT-171	BLF542
65	2.0	25	500	28.0	10	12	50	CW	SOT-171	BLF543

\* RF performance in common source test conditions

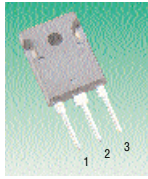
SD340

Mfrs. List No.	Order Code	1+	5+	10+
BLF145	742-200			
BLF242	742-223			
BLF542	742-247 †			
BLF543	742-259			

† Available until stocks are exhausted

## RF MOSFETs — continued

### High Power, TO-247 (1 – 15MHz Operation)



Pin Out	1	2	3
a	G	S	D
b	D	S	G

- Symmetrical pairs
- Low cost TO-247 package
- Mirror image pin-outs for simplified 'push-pull' topographies
- Very high breakdown for improved ruggedness
- Low thermal resistance
- Nitride passivated die for improved reliability

Characteristics @ 13.56MHz				Max. ratings @ 25°C				C <sub>iss</sub> (typ.) pF	Pin Out	Mftrs. List No.
V <sub>DD</sub> V	Gain (min.) dB	Efficiency (typ.)	P <sub>out</sub> W	V <sub>DS</sub> V	I <sub>D</sub> A	P <sub>tot</sub> W	W			
50	18	63%	125	150	11	167	755	a	ARF440	
50	18	63%	125	150	11	167	755	b	ARF441	
100	20	65%	200	300	8	167	730	a	ARF442	
100	20	65%	200	300	8	167	730	b	ARF443	
300	20	80%	300	900	6.5	208	1500	a	ARF444	
300	20	80%	300	900	6.5	208	1500	b	ARF445	

Mftrs. List No.	Order Code	1+	20+	100+
ARF440	740-421			
ARF441	740-433			
ARF442	740-445			
ARF443	740-457			
ARF444	740-469			
ARF445	740-470			

## Junction FETs

### SOT-23

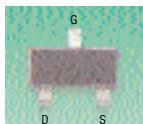
Philips Semiconductors



V <sub>DS</sub> max. V	Channel Polarity	R <sub>DS(on)</sub> max. (*typ.) Ω	V <sub>GS(off)</sub> min. max. V V		I <sub>DSS</sub> min. max. mA mA		C <sub>iss</sub> max. pF	Device Marking	Mftrs. List No.
25	N	50*	0.2	6.5	24	60	5	M10	PMBFJ310
25	N	—	0.1	1.0	0.2	1.5	5	M3p	BFT46

Mftrs. List No.	Order Code	5+	25+	100+	250+	1K+
BFT46	300-0928					
PMBFJ310	316-2849					

### SOT-23



V <sub>DS</sub> max. V	Channel Polarity	R <sub>DS(on)</sub> max. (*typ.) Ω	V <sub>GS(off)</sub> min. max. V V		I <sub>DSS</sub> min. max. mA mA		C <sub>iss</sub> max. pF	Device Marking	Mftrs. List No.
25	N	—	—	5.0	4.0	10.0	5.0	M1	ON BFR30LT1
25	N	35*	2.0	6.5	24.0	60.0	5.0	Z0	SLX SST310
40	N	750*	0.3	1.5	0.2	1.0	4.5	P1	SLX SST201

#### Analogue Switches

35	N	100	—	3.0	2.0	—	12.0	C3	SLX SST113
35	N	50	1.0	3.0	5.0	—	12.0	C2	SLX SST112
30	P	300	0.8	2.25	1.5	20.0	20.0	S7	SLX SST177

Mftrs. List No.	Order Code	5+	25+	100+	250+	1K+
BFR30LT1	934-057					
SST112	739-194					
SST113	739-200					
SST177	739-212					
SST201	739-224					
SST310	739-250					

## TO-18, TO-72 and TO-92 (see page 358 for pin connection data)

Applications Key:

GPA = General Purpose Amplifier, GPS = General Purpose Switch, HFA = High Frequency Amplifier, HFS = High Frequency Switch, LNA = Low Noise Amplifier, V = Voltage Controlled Attenuators

V <sub>DS</sub> max. V	I <sub>G</sub> (*I <sub>G</sub> ) max. mA	V <sub>GS</sub> (off) max. V	I <sub>DSS</sub> min. max. mA mA		G <sub>fs</sub> min. max. mA/V mA/V		P <sub>tot</sub> @ 25°C mW	Package and Pin-Out	App'n Code	Mftrs. List No.
<b>N Channel</b>										
15	10	7.0	—	—	—	—	300	TO-18(b)	V	SLX VCR2N
15	10	7.0	—	—	—	—	300	TO-18(b)	V	SLX VCR4N
25	10	4.5	7.0	20.0	6.0	12.0	360	TO-92(m)	HFA	SLX J211
25	10	8.0	2.0	20.0	2.0	6.5	200	TO-92(p)	GPA	SLX 2N3819
25	10	8.0	2.0	20.0	2.0	6.5	200	TO-92(k)	GPA	FCH 2N3819
25	10	6.0	—	5.0	—	—	310	TO-92(m)	GPA	ON 2N5457
25	10	6.0	—	20.0	—	—	310	TO-92(g)	HFA	ON 2N5486
25	20	6.0	24.0	60.0	10.0	18.0	500	TO-18(b)	HFA	SLX U310
25	50	10.0	80.0	—	—	—	360	TO-92(m)	GPS	SLX J108
25	50	4.0	10.0	—	—	—	360	TO-92(m)	GPS	SLX J110
30	10	8.0	2.0	6.5	3.0	6.5	350	TO-92(k)	HFA	FCH BF244A
30	10	8.0	6.0	15.0	3.0	6.5	350	TO-92(k)	HFA	FCH BF244B
30	10	8.0	2.0	6.5	3.0	6.5	350	TO-92(r)	HFA	FCH BF245A
30	10	8.0	2.0	6.5	3.0	6.5	350	TO-92(q)	HFA	ON BF245A
30	10	8.0	6.0	15.0	3.0	6.5	350	TO-92(r)	HFA	FCH BF245B
30	10	8.0	12.0	25.0	3.0	6.5	350	TO-92(r)	HFA	FCH BF245C
30	10	7.5	3.0	7.0	4.5	—	300	TO-92(m)	HFA	— BF256A
30	10	7.5	3.0	7.0	4.5	—	300	TO-92(r)	HFA	FCH BF256A
30	10	6.0	5.0	15.0	4.5	7.5	360	TO-92(m)	HFA	SLX J304
30	10	6.0	5.0	15.0	4.5	7.5	300	TO-72(e)	HFA	SLX 2N4416
40	50	1.8	0.03	0.09	0.07	0.21	300	TO-72(e)	GPA	SLX 2N4117A
50	50	1.0	0.2	0.6	0.6	1.8	300	TO-18(b)	HFA	SLX 2N4338
<b>P Channel</b>										
20	15	8.0	0.3	15.0	0.8	5.0	360	TO-92(k)	GPA	— 2N3820
30	50	4.0	2.0	35.0	—	—	360	TO-92(k)	GPS	SLX J176
30	50	2.25	1.5	20.0	—	—	360	TO-92(k)	GPS	SLX J177
40	10	7.5	—	9.0	—	—	310	TO-92(k)	LNA	ON 2N5461
40	16	9.0	4.0	16.0	2.0	6.0	310	TO-92(n)	LNA	— 2N5462

Mftrs. List No.	Order Code	5+	25+	100+	250+	1K+
BF244A	518-670					
BF244B	518-682					
BF245A (FCH)	518-694					
BF245A (ON)	352-044					
BF245B	518-700					
BF245C	518-712					
BF256A	352-070 †					
BF256A (FCH)	519-509					
<b>Order Multiple=1</b>						
J108	352-111	1+	25+	100+	250+	1K+
J110	352-123					
J176	352-172					
J177	352-184					
J211	352-202					
J304	352-226					
U310	352-251					
VCR2N	352-275					
VCR4N	352-287					
2N3819 (FCH)	434-759					
2N3819 (SLX)	352-299					
2N3820	352-305					
2N4117A	352-330					
2N4338	352-342					
2N4416	352-380					
2N5457	682-366					
<b>Order Multiple=5</b>						
2N5461	645-953	5+	25+	100+	250+	1K+
2N5462	352-408					
<b>Order Multiple=1</b>						
2N5486	645-965	1+	25+	100+	250+	1K+

## Dual, TO-71 and TO-78

(see page 358 for pin connection data)

Application Key: HFA = High Frequency Amplifier, LNA = Low Noise Amplifier

V <sub>DS</sub> max. V	I <sub>G</sub> (*I <sub>G</sub> ) max. mA	V <sub>GS</sub> (off) max. V	I <sub>DSS</sub> min. max. mA mA		G <sub>fs</sub> min. max. mA/V mA/V		V <sub>DS1</sub> -V <sub>DS2</sub> max. mV	Package and Pin-Out	App'n Code	Mftrs. List No.
<b>N Channel</b>										
25	10	4.0	12.0	30	10.0	—	—	TO-78(a)	HFA	U430
25	50	5.0	7.0	40	5.0	10	15	TO-78(b)	HFA	2N5912
25	50	6.0	6.0	30	4.5	9	10	TO-71(b)	HFA	U440
50	10	2.5	0.5	10	2.0	7	15	TO-71(b)	LNA	U404

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
U404	352-433					
U430	352-445					
U440	352-470					
2N5912	352-410					

**TO-92**

V <sub>DS</sub> V	N/P Channel	I <sub>G</sub> mA	V <sub>DS</sub> V	V <sub>GS</sub> (off) V	I <sub>LOSS</sub> mA min. max.	Package	Mfr.	P <sub>tot</sub> mW	Mfrs. List No.
25	N	10	25	-4.0	12 30	TO-92(m)	FCH/SLX	350	J309
25	N	10	25	-6.5	24 60	TO-92(m)	FCH	350	J310
30	P	50	30	6.0	7 60	TO-92(k)	FCH/SLX	350	J175
35	N	50	35	-10.0	20 —	TO-92(m)	FCH/SLX	350	J111
35	N	50	35	-5.0	5 —	TO-92(m)	FCH/SLX	350	J112
35	N	50	35	-3.0	2 —	TO-92(m)	FCH/SLX	350	J113
40	N	50	-40	-1.5	0.2 1.0	TO-92(m)	FCH/SLX	625	J201

FOR PACKAGE AND PIN-OUT DETAILS, SEE PAGE 358

SD315

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	250+ 1K+
J111 (FCH)	740-883				
J111 (SLX)	352-135				
J112 (FCH)	740-895				
J112 (SLX)	352-147				
J113 (FCH)	740-901				
J113 (SLX)	352-159				
J175 (FCH)	740-913				
J175 (SLX)	352-160				
J201 (FCH)	740-937				
J201 (SLX)	352-196				
J309 (FCH)	740-949				
J309 (SLX)	352-238 †				
J310	740-950				

† Available until stocks are exhausted

**Transistor/Diode Testers**

**Atlas Component Analyser**



- Automatically identifies transistors, Darlingtons, diode protected transistors, resistor shunted transistors, enhancement mode MOSFETs, depletion mode MOSFETs, junction FETs, low power triacs, low power thyristors, diodes, diode networks, LEDs and bicolor LEDs
- Automatic pinout identification for all of the above components

- Gain measurement for transistors
- Gate threshold measurement for enhancement mode MOSFETs
- Forward voltage drop measurements for all diodes, LEDs and transistor base-emitter junctions
- 2 Line scrollable LCD
- Simple two button control
- Battery supplied
- Colour coded, universal clips
- Auto and manual power-off



SD505

		Price Each		
Mfrs. List No.	Order Code	1+	5+	10+
DCA55	335-7107			

**Universal Component Analyser**



- Tests and identifies MOSFETs, bipolar transistors, diodes and LEDs
- Detects 3-pin diode arrays
- Automatically displays device pin-out, polarity and operation
- Measures semiconductor junction voltage drop
- Measures semiconductor junction test current
- Checks for o/c, s/c and low gain
- Simple to use, single button operation
- Clear 2 line, 16 character supertwist LCD
- Auto power on/off
- Low battery detection
- BJT gain measured from 5-1000 (H<sub>FE</sub>)

- Gain accuracy ±4%
- Portable, pocket sized
- 9V PP3 battery supplied

SD412

		Price Each		
Mfrs. List No.	Order Code	1+	5+	10+
DCA50e	473-534			

**BA to Metric Conversion**

BA Number	Full Diameter mm	BA Number	Full Diameter mm
8	2.2	3	4.1
7	2.5	2	4.7
6	2.8	1	5.3
5	3.2	0	6.0
4	3.6		

**Bipolar Transistor Analyser**



- LED indication of base, collector, emitter, NPN, PNP, and functionality
- Tests for junction o/c, s/c and low gain
- Suitable for bipolar and germanium transistors
- Single button operation
- Handy pocket size
- Battery operated (supplied)
- Microprocessor controlled
- Low test signals safeguards against device damage
- Battery saving auto power-on/power-off
- CE approved

Transistor type	NPN/PNP	Display duration,	PASS 20s FAIL 5s
h <sub>FE</sub> range (@ I <sub>C</sub> = 3mA)	> 20 (typ)	Replacement battery	PX28L, Order Code 300-482
o/c test voltage	5.5V pk	Battery life	2000 tests or 2 yrs (typ)
s/c test current	4mA		
Test duration	0.5s		

SD306

		Price Each		
Mfrs. List No.	Order Code	1+	5+	10+
DTA30	.738-384			

**MOSFET Analyser**



- Indicator pin configuration and polarity at the press of a button
- Bicolour LED indicators
- Tests for o/c, s/c and low gain
- Suitable for enhancement mode devices
- Convenient pocket size
- Fully microprocessor controlled
- Long-life battery included
- Auto power-on/power-off
- CE approved

Peak test voltage	5.5V	Display duration	PASS 20s FAIL 5s
Peak test current	4mA	Replacement battery	PX28L, Order Code 300-482
Gain range	>25mA/V	Battery life	2000 tests min.
Test duration	400ms		

SD328

		Price Each		
Mfrs. List No.	Order Code	1+	5+	10+
HMA20	.740-305			

**Diode Tester**



- Provides LED indication of semiconductor junction condition
- Shows LED identities
- Indicates o/c or s/c fault conditions
- Verifies loudspeaker and headphone operation
- Single test-button operation
- Handy pocket size
- Battery operated (supplied)
- Auto power-on/power-off
- Low, internally limited test signals
- CE approved

O/C test voltage	2.7V pk	Test duration	6s (typ)
S/C test current	10mA pk	Replacement battery	Order Code 300-378
Detectable junction voltage	0 to 2.5V	Battery life	1500 tests/2 yrs

SD305

		Price Each		
Mfrs. List No.	Order Code	1+	5+	10+
DCH10	.738-396			

## Zener Diodes

Low Power, 2% and 5% Tolerance **Philips Semiconductors**



DO-35

SOD-57



SOD-80



SOD-87



SOT-23

	If, mW	Ptot, mW	Package
BZX79...Series	250	500	DO-35
BZT03...Series	-	3250	SOD-57
BZV55...Series	250	500	SOD-80
BZD27...Series	-	2300	SOD-87
BZX84...Series	200	250	SOT-23

SD474

Order Multiple=10		Price Each					
Zener Voltage, V	Mfrs. List No.	Order Code	10+	50+	100+	1K+	5K+
<b>2% Tolerance, DO-35</b>							
4.7	BZX79-B4V7	316-2400					
5.1	BZX79-B5V1	316-2412					
5.6	BZX79-B5V6	316-2424					
6.2	BZX79-B6V2	316-2436					
12	BZX79-B12	316-2394					
<b>5% Tolerance, DO-35</b>							
43	BZX79-C43	316-2448					
51	BZX79-C51	316-2450					
62	BZX79-C62	316-2461					
68	BZX79-C68	316-2473					
<b>Order Multiple=1</b>			<b>1+</b>	<b>100+</b>	<b>1K+</b>	<b>3K+</b>	<b>10K+</b>
<b>5% Tolerance, SOD-57</b>							
13	BZT03-C13	316-2485					
<b>Order Multiple=10</b>			<b>10+</b>	<b>50+</b>	<b>100+</b>	<b>1K+</b>	<b>5K+</b>
<b>2% Tolerance, SOD-80</b>							
12	BZV55-B12	SMD 316-2552					
<b>5% Tolerance, SOD-80</b>							
13	BZV55-C13	SMD 316-2564					
18	BZV55-C18	SMD 316-2576					
20	BZV55-C20	SMD 316-2588					
36	BZV55-C36	SMD 316-2590					
<b>Order Multiple=5</b>			<b>5+</b>	<b>50+</b>	<b>100+</b>	<b>1K+</b>	<b>5K+</b>
<b>5% Tolerance, SOD-87</b>							
5.6	BZD27-C5V6	SMD 316-2813					
12	BZD27-C12	SMD 316-2746					
15	BZD27-C15	SMD 316-2758					
18	BZD27-C18	SMD 316-2760					
27	BZD27-C27	SMD 316-2783					
33	BZD27-C33	SMD 316-2795					
36	BZD27-C36	SMD 316-2801					
75	BZD27-C75	SMD 316-2825					
200	BZD27-C200	SMD 316-2771					
<b>Order Multiple=5</b>			<b>5+</b>	<b>100+</b>	<b>1K+</b>	<b>3K+</b>	<b>10K+</b>
<b>2% Tolerance, SOT-23</b>							
16	BZX84-B16	SMD 316-3118					
5.1	BZX84-B5V1	SMD 316-3120					
5.6	BZX84-B5V6	SMD 316-3131					

## BZV55 Series

SOD-80C, 5% Tolerance, 500mW

**Philips Semiconductors**



Zener Voltage, V	Mfrs. List No.	Order Code	Zener Voltage, V	Mfrs. List No.	Order Code	Zener Voltage, V	Mfrs. List No.	Order Code
2.4	BZV55-C2V4	305-0830	6.2	BZV55-C6V2	305-0956	16	BZV55-C16	305-0798
2.7	BZV55-C2V7	305-0841	6.8	BZV55-C6V8	305-0968	22	BZV55-C22	305-0804
3.3	BZV55-C3V3	305-0889	7.5	BZV55-C7V5	305-0970	24	BZV55-C24	305-0816
3.9	BZV55-C3V9	305-0890	8.2	BZV55-C8V2	305-0981	27	BZV55-C27	305-0828
4.3	BZV55-C4V3	305-0907	9.1	BZV55-C9V1	305-0993	30	BZV55-C30	305-0853
4.7	BZV55-C4V7	305-0919	10	BZV55-C10	305-0762	33	BZV55-C33	305-0865
5.1	BZV55-C5V1	305-0932	12	BZV55-C12	305-0774	39	BZV55-C39	305-0877
5.6	BZV55-C5V6	305-0944	15	BZV55-C15	305-0786	56	BZV55-C56	305-0920

SD4

Order Multiple=5		Price Each				
Order Code	5+	25+	100+	1K+	3K+	
BZV55C Series	All Values					

## MMBZ5200B Series

SOT-23, 5% Tolerance, 350mW



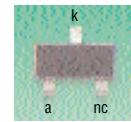
Supplied on 8mm tape.

Zener Voltage, V	Mfrs. List No.	Device Marking	Order Code	Zener Voltage, V	Mfrs. List No.	Device Marking	Order Code
3.3	MMBZ5226B	8A	931-962	12	MMBZ5242B	8S	932-127
3.6	MMBZ5227B	8B	931-974	13	MMBZ5243B	8T	932-139
3.9	MMBZ5228B	8C	931-986	14	MMBZ5244B	8U	932-140
4.3	MMBZ5229B	8D	931-998	16	MMBZ5246B	8W	932-164
4.7	MMBZ5230B	8E	932-000	17	MMBZ5247B	8X	932-176
5.1	MMBZ5231B	8F	932-012	18	MMBZ5248B	8Y	932-188
5.6	MMBZ5232B	8G	932-024	19	MMBZ5249B	8Z	932-190
6.0	MMBZ5233B	8H	932-036	20	MMBZ5250B	81A	932-206
6.2	MMBZ5243B	8J	932-048	22	MMBZ5251B	81B	932-218
6.8	MMBZ5235B	8K	932-050	24	MMBZ5252B	81C	932-220
7.5	MMBZ5236B	8L	932-061	25	MMBZ5253B	81D	932-231
8.2	MMBZ5237B	8M	932-073	27	MMBZ5254B	81E	932-243
8.7	MMBZ5238B	8N	932-085	28	MMBZ5255B	81F	932-255
9.1	MMBZ5239B	8P	932-097	30	MMBZ5256B	81G	932-267
10	MMBZ5240B	8Q	932-103	33	MMBZ5257B	81H	932-279
11	MMBZ5241B	8R	932-115				

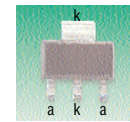
SD403

Order Multiple=5		Price Each			
Order Code	5+	100+	500+	1K+	3K+
MMBZ5200B Series	All Values				

## BZV90C and BZX84C Series, 5% Tolerance



BZX84C Series: SOT-23  
H = 1.12, W = 3.05, D = 2.3



BZV90C Series: SOT-223  
H = 1.8, W = 6.7, D = 7.3

Equivalents to the popular BZX55/BZX79 series, and the BZX85/BZV85 series. Supplied on 8mm tape (SOT-23) and 12mm tape (SOT-223). ±5% working voltage tolerance.

BZX84C Series, SOT-23 350mW					BZV90C Series, SOT-223 1.3W	
Zener Voltage, V	Mfrs. List No.	Device ID FCH/PS	Order Code FCH	PS	Mfrs. List No.	Order Code PS
2.4	BZX84C2V4	Z11	—	251-537	—	—
2.7	BZX84C2V7	Z12	—	251-549	—	—
3	BZX84C3V0	Z13	—	738-128	—	—
3.3	BZX84C3V3	Z14	—	251-550	—	—
3.6	BZX84C3V6	Z15	—	305-1043	—	—
3.9	BZX84C3V9	Z16	—	251-562	—	—
4.3	BZX84C4V3	Z17	—	738-130	—	—
4.7	BZX84C4V7	Z1/Z1p	931-548	251-574	—	—
5.1	BZX84C5V1	Z2/Z2p	931-550	251-586	BZV90C5V1	541-540
5.6	BZX84C5V6	Z3/Z3p	931-561	251-598	BZV90C5V6	541-552
6.2	BZX84C6V2	Z4/Z4p	931-573	251-604	BZV90C6V2	541-564
6.8	BZX84C6V8	Z5/Z5p	931-585	251-616	—	—
7.5	BZX84C7V5	Z6/Z6p	—	738-049	—	—
8.2	BZX84C8V2	Z7/Z7p	931-603	738-050	BZV90C8V2	541-590
9.1	BZX84C9V1	Z8/Z8p	931-615	251-628	—	—
10	BZX84C10	Z9/Z9p	931-627	251-630	—	—
11	BZX84C11	Y1/Y1p	931-639	738-062	—	—
12	BZX84C12	Y2/Y2p	931-640	251-641	BZV90C12	541-631
13	BZX84C13	Y3	931-652	—	—	—
15	BZX84C15	Y4/Y4p	931-664	251-653	BZV90C15	541-655
16	BZX84C16	Y5	931-676	—	—	—
18	BZX84C18	Y6/Y6p	931-688	738-074	BZV90C18	541-679
20	BZX84C20	Y7	931-690	—	BZV90C20	541-680
24	BZX84C24	Y9/Y9p	—	738-086	—	—
27	BZX84C27	Y10	931-720	738-098	BZV90C27	541-709
30	BZX84C30	Y11	931-731	—	—	—
33	BZX84C33	Y12	931-743	738-104	—	—
36	BZX84C36	Y13	—	738-116	—	—
39	BZX84C39	Y14	—	305-1031	—	—
43	BZX84C43	Y15	—	305-1055	—	—
47	BZX84C47	Y16	—	251-665	—	—
51	BZX84C51	Y17	—	305-1067	—	—
56	BZX84C56	Y18	—	305-1079	—	—
62	BZX84C62	Y19	—	305-1080	—	—
68	BZX84C68	Y20	—	305-1171	—	—
75	BZX84C75	Y21	—	305-1183	—	—

SD41

Order Multiple=1		Price Each				
Series	Mfrs. PS	Order Code	1+	100+	1K+	3K+
BZV90C...	PS	All Values				
<b>Order Multiple=5</b>			<b>5+</b>	<b>100+</b>	<b>1K+</b>	<b>3K+</b>
BZX84C...	FCH	All Values				
BZX84C...	PS	All Values				

## MiniReel<sup>®</sup> SOT-23 Zener Diodes



Tape width = 8mm

- 100mm reel size
- 500 pieces on each reel
- Ideal for pre-production, prototyping and production shortfalls
- Complete with leader tape



FOR DEVICE SPECIFICATION, SEE PREVIOUS COLUMN

MiniReel List No.	Order Code	Price Per Reel		
		1+	3+	5+
BZX84C3V3-MR	344-8423			
BZX84C4V7-MR	344-8435			
BZX84C5V1-MR	344-8447			
BZX84C5V6-MR	344-8459			
BZX84C6V2-MR	344-8460			
BZX84C6V8-MR	344-8472			
BZX84C8V2-MR	344-8484			
BZX84C10-MR	344-8393			
BZX84C12-MR	344-8400			
BZX84C15-MR	344-8411			

## SM2Z Series, 2W SMA Package



Zener Voltage, V	Mfrs. List No.	Device Marking	Order Code
5.1	SM2Z5V1	ZHK	996-580
5.6	SM2Z5V6	ZHL	996-592
12	SM2Z12	ZHW	996-609
18	SM2Z18	ZJF	996-610
30	SM2Z30	ZJQ	996-622
150	SM2Z150	ZKR	996-634

Order Code	5+	Price Each		
		25+	100+	250+
SM2Z Series	All Values	MIXED QUANTITY PRICING		

## BZX79C Series, 5% Tolerance



Ptot = 250mW  
DO-35 L = 4.5, Dia. = 2.0

Zener Voltage, V	Mfrs. List No.	Order Code FCH	Order Code PS	Zener Voltage, V	Mfrs. List No.	Order Code FCH	Order Code PS
2.4	BZX79C2V4	—	369-329	11	BZX79C11	.931-846	369-482
2.7	BZX79C2V7	—	369-330	12	BZX79C12	.931-858	369-494
3	BZX79C3V0	—	369-342	13	BZX79C13	.931-860	369-500
3.3	BZX79C3V3	—	369-354	15	BZX79C15	.931-871	369-512
3.6	BZX79C3V6	—	369-366	16	BZX79C16	.931-883	369-524
3.9	BZX79C3V9	—	369-378	18	BZX79C18	—	369-536
4.3	BZX79C4V3	—	369-380	20	BZX79C20	.931-901	369-548 †
4.7	BZX79C4V7	.931-755	369-391	22	BZX79C22	—	369-550
5.1	BZX79C5V1	.931-767	369-408	24	BZX79C24	.931-925	369-561
5.6	BZX79C5V6	.931-779	369-410	27	BZX79C27	.931-937	369-573
6.2	BZX79C6V2	.931-780	369-421	30	BZX79C30	.931-949	369-585
6.8	BZX79C6V8	—	369-433	33	BZX79C33	.931-950	369-597
7.5	BZX79C7V5	.931-809	369-445	36	BZX79C36	—	369-603
8.2	BZX79C8V2	.931-810	369-457	39	BZX79C39	—	369-615
9.1	BZX79C9V1	.931-822	369-469	47	BZX79C47	—	369-639
10	BZX79C10	.931-834	369-470	75	BZX79C75	—	369-664

† Available until stocks are exhausted

Order Code	5+	Price Each		
		25+	100+	1K+
BZX79C... FCH	All Values	MIXED QUANTITY PRICING		
BZX79C... PS	All Values	10+	50+	100+

## Medium Current Transient Voltage Suppressor



Case 194

- Avalanche voltage 24V to 32V
- High power capability
- Economical

Vrrm	Irrms	Io	Ifsm	Vf max.	Ir max.	Vbr @ 25°C		Mfrs. List No.
						min.	max.	
V	A	A	A	V	nA	V	V	
20	62	6	600	1.1	200	24	32	MR2535L

Mfrs. List No.	Order Code	Price Each		
		1+	25+	1K+
MR2535L	352-6501			

## BZX99C Series, 5% Tolerance

## Philips Semiconductors



- Low noise/low power
- Improved I<sub>Z</sub>/V<sub>Z</sub> characteristic at I<sub>Z</sub> = 50µA
- P<sub>tot</sub> = 300mW
- Plastic SOT-23 package



Zener Voltage, V	Mfrs. List No.	Order Code	Zener Voltage, V	Mfrs. List No.	Order Code
2.4	BZX99-C2V4	354-7073	5.1	BZX99-C5V1	354-7140
2.7	BZX99-C2V7	354-7085	5.6	BZX99-C5V6	354-7152
3.0	BZX99-C3V0	354-7097	6.2	BZX99-C6V2	354-7164
3.3	BZX99-C3V3	354-7103	6.8	BZX99-C6V8	354-7176
3.6	BZX99-C3V6	354-7115	7.5	BZX99-C7V5	354-7188
4.3	BZX99-C4V3	354-7127	8.2	BZX99-C8V2	354-7190
4.7	BZX99-C4V7	354-7139	9.1	BZX99-C9V1	354-7206

Series	Order Code	Price Each			
		5+	25+	100+	1K+
BZX99	All Values				

## BZX399C Series, 5% Tolerance

## Philips Semiconductors



- Low noise/low power
- Improved I<sub>Z</sub>/V<sub>Z</sub> characteristic at I<sub>Z</sub> = 50µA
- P<sub>tot</sub> = 300mW
- Plastic SOD-323 package



Zener Voltage, V	Mfrs. List No.	Order Code	Zener Voltage, V	Mfrs. List No.	Order Code
1.8	BZX399-C1V8	354-6792	4.7	BZX399-C4V7	354-6883
2.0	BZX399-C2V0	354-6809	5.1	BZX399-C5V1	354-6895
2.2	BZX399-C2V2	354-6810	5.6	BZX399-C5V6	354-6901
2.4	BZX399-C2V4	354-6822	6.2	BZX399-C6V2	354-6913
2.7	BZX399-C2V7	354-6834	6.8	BZX399-C6V8	354-6925
3.0	BZX399-C3V0	354-6846	7.5	BZX399-C7V5	354-6937
3.3	BZX399-C3V3	354-6858	8.2	BZX399-C8V2	354-6949
3.6	BZX399-C3V6	354-6860	9.1	BZX399-C9V1	354-6950
4.3	BZX399-C4V3	354-6871			

Series	Order Code	Price Each			
		5+	25+	100+	1K+
BZX399	All Values				

## BZV85C, BZX55C and BZX85C Series, 5% Tolerance



Family	Mfr.	Package	L	Dia.	P <sub>tot</sub> (W)
BZX55C	FCH	DO-35	4.5	2.0	0.5
BZV85C/BZX85C	PS/FCH	DO-41	4.8	2.6	1.3

Zener Voltage, V	Mfrs. List No.	Order Code	Mfrs. List No.	Order Code	Mfrs. List No.	Order Code
3.3	BZX55C3V3	368-921	BZX85C3V3	368-920	—	—
3.6	BZX55C3V6	368-933	BZX85C3V6	368-921	—	—
3.9	BZX55C3V9	368-945	BZX85C3V9	368-922	—	—
4.3	BZX55C4V3	368-957	BZX85C4V3	368-923	—	—
4.7	BZX55C4V7	368-969	BZX85C4V7	368-924	—	—
5.1	BZX55C5V1	368-970	BZX85C5V1	368-925	BZV85C5V1	368-570
5.6	BZX55C5V6	368-982	BZX85C5V6	368-926	BZV85C5V6	368-581
6.2	BZX55C6V2	368-994	BZX85C6V2	368-927	BZV85C6V2	368-593
6.8	BZX55C6V8	369-007	BZX85C6V8	368-928	BZV85C6V8	368-600
7.5	BZX55C7V5	369-019	BZX85C7V5	368-929	BZV85C7V5	368-611
8.2	BZX55C8V2	369-020	BZX85C8V2	368-930	BZV85C8V2	368-623
9.1	BZX55C9V1	369-032	BZX85C9V1	368-931	BZV85C9V1	368-635
10	BZX55C10	369-044	BZX85C10	368-932	BZV85C10	368-647
11	BZX55C11	369-056	BZX85C11	368-933	—	—
12	BZX55C12	369-068	BZX85C12	368-934	BZV85C12	368-660
13	BZX55C13	369-070	BZX85C13	368-935	—	—
15	BZX55C15	369-081	BZX85C15	368-936	BZV85C15	368-684
16	BZX55C16	369-093	BZX85C16	368-937	BZV85C16	368-696
18	BZX55C18	369-100	BZX85C18	368-938	BZV85C18	368-702
20	—	—	BZX85C20	368-939	—	—
22	BZX55C22	369-123	BZX85C22	368-940	—	—
24	—	—	BZX85C24	368-941	—	—
27	BZX55C27	369-147	BZX85C27	368-942	BZV85C27	368-740
30	BZX55C30	369-159 †	BZX85C30	368-943	BZV85C30	368-751
33	BZX55C33	369-160 †	BZX85C33	368-944	BZV85C33	368-763
36	—	—	—	—	BZV85C36	484-910
39	—	—	—	—	BZV85C39	368-775
43	—	—	—	—	BZV85C43	484-921
47	—	—	—	—	BZV85C47	368-799
51	—	—	—	—	BZV85C51	484-933
56	—	—	—	—	BZV85C56	368-805
62	—	—	—	—	BZV85C62	484-945
68	—	—	—	—	BZV85C68	368-817
75	—	—	—	—	BZV85C75	368-829

† Available until stocks are exhausted

Series	Mfr.	Order Code	Price Each			
			5+	25+	100+	1K+
BZX55C...	FCH	All Values				
BZX85C...	FCH	All Values				
BZV85C...	PS	All Values	5+	100+	1K+	3K+

## Zener Diodes — continued

### BZX284C Series – 5% Tolerance

Philips Semiconductors



$I_{FRM}$ (max) mA	$I_{TOT}$ (max) mW	$T_A$ °C
250	400	25



Supplied on 8mm tape.

Zener Voltage, V	Mfrs. List No.	Order Code	Zener Voltage, V	Mfrs. List No.	Order Code
2.4	BZX284C2V4	.935-505	10	BZX284C10	.935-657
3.0	BZX284C3V0	.935-529	11	BZX284C11	.935-669
3.3	BZX284C3V3	.935-530	12	BZX284C12	.935-670
3.6	BZX284C3V6	.935-542	13	BZX284C13	.935-682
3.9	BZX284C3V9	.935-554	15	BZX284C15	.935-694
4.3	BZX284C4V3	.935-566	16	BZX284C16	.935-700
4.7	BZX284C4V7	.935-578	18	BZX284C18	.935-712
5.1	BZX284C5V1	.935-580	20	BZX284C20	.935-724
5.6	BZX284C5V6	.935-591	22	BZX284C22	.935-736
6.2	BZX284C6V2	.935-608	24	BZX284C24	.935-748
6.8	BZX284C6V8	.935-610	27	BZX284C27	.935-750
7.5	BZX284C7V5	.935-621	30	BZX284C30	.935-761
8.2	BZX284C8V2	.935-633	33	BZX284C33	.935-773
9.1	BZX284C9V1	.935-645			

Order Multiple=5

Price Each

MIXED QUANTITY PRICING

Mfrs. List No.	Order Code	5+	100+	250+	1K+
BZX284C Series	All Values				

### SOD106A Zener Diodes

Philips Semiconductors



Zener Voltage, V	Mfrs. List No.	Order Code
10	BZG03C10	567-231
12	BZG03C12	567-243
15	BZG03C15	567-255
18	BZG03C18	567-267
20	BZG03C20	567-279
24	BZG03C24	567-280
30	BZG03C30	567-292
33	BZG03C33	567-309
100	BZG03C100	567-322
180	BZG03C180	567-346

SOD106A  
H = 2.65, W = 5.5, D = 2.5

$P_{TOT} = 3W$

Equivalents to the BZT03 series, supplied on 12mm tape.

Order Multiple=5

Price Each

MIXED QUANTITY PRICING

Order Code	5+	100+	1K+	3K+
BZG03 Series	All Values			

### BZT03C Series, 5% Tolerance

Philips Semiconductors



Package	L	Dia.	$P_{TOT}$ (W)
SOD-57	4.57	3.81	3

Zener Voltage, V	Mfrs. List No.	Order Code	Zener Voltage, V	Mfrs. List No.	Order Code
7.5	BZT03C7V5	368-210	47	BZT03C47	368-404
8.2	BZT03C8V2	368-222	51	BZT03C51	368-416
9.1	BZT03C9V1	368-234	56	BZT03C56	368-428
10	BZT03C10	368-246	62	BZT03C62	368-430
12	BZT03C12	368-260	68	BZT03C68	368-441
15	BZT03C15	368-283	75	BZT03C75	368-453
16	BZT03C16	368-295	82	BZT03C82	368-465
18	BZT03C18	368-301	91	BZT03C91	368-477
20	BZT03C20	368-313	100	BZT03C100	368-489
22	BZT03C22	368-325	120	BZT03C120	368-490
24	BZT03C24	368-337	130	BZT03C130	368-507
27	BZT03C27	368-349	150	BZT03C150	368-519
30	BZT03C30	368-350	160	BZT03C160	368-520
33	BZT03C33	368-362	180	BZT03C180	368-532
36	BZT03C36	368-374	200	BZT03C200	368-544
39	BZT03C39	368-386	220	BZT03C220	368-556
43	BZT03C43	368-398	270	BZT03C270	368-568

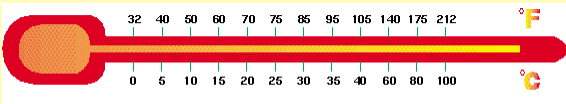
Order Code

Price Each

MIXED QUANTITY PRICING

Order Code	1+	100+	1K+	3K+
All Values				

### Temperature Conversion



### 1N5300B Series



Package	L	Dia.	$P_{TOT}$ (W)
17-02	8.9	3.7	5

Zener Voltage, V	Mfrs. List No.	Order Code ON	Order Code ST	Zener Voltage, V	Mfrs. List No.	Order Code ON	Order Code ST
3.3	1N5333B	.933-077	370-526	24	1N5359B	.933-338	—
3.6	1N5334B	.933-089	—	25	1N5360B	.933-340	—
3.9	1N5335B	.933-090	370-540	27	1N5361B	.933-351	370-745
4.3	1N5336B	.933-107	—	28	1N5362B	.933-363	370-757
4.7	1N5337B	.933-119	370-563	30	1N5363B	.933-375	—
5.1	1N5338B	.933-120	370-575	33	1N5364B	.933-387	—
5.6	1N5339B	.933-132	370-587	36	1N5365B	.933-399	—
6	1N5340B	.933-144	—	39	1N5366B	.933-405	—
6.2	1N5341B	.933-156	370-599	43	1N5367B	.933-417	—
6.8	1N5342B	.933-168	370-605	47	1N5368B	.933-429	370-800
7.5	1N5343B	.933-170	370-617	51	1N5369B	.933-430	370-812
8.2	1N5344B	.933-181	370-629	56	1N5370B	.933-442	—
8.7	1N5345B	.933-193	—	60	1N5371B	.933-454	—
9.1	1N5346B	.933-200	370-630	62	1N5372B	.933-466	370-836
10	1N5347B	.933-211	370-642	68	1N5373B	.933-478	370-848
11	1N5348B	.933-223	370-654	75	1N5374B	.933-480	370-850
12	1N5349B	.933-235	370-666	82	1N5375B	.933-491	370-861
13	1N5350B	.933-247	—	91	1N5377B	.933-508	—
14	1N5351B	.933-259	—	100	1N5378B	.933-510	—
15	1N5352B	.933-260	—	120	1N5380B	.933-521	—
16	1N5353B	.933-272	—	130	1N5381B	.933-533	—
17	1N5354B	.933-284	—	150	1N5383B	.933-545	370-927
18	1N5355B	.933-296	370-708	160	1N5384B	.933-557	—
19	1N5356B	.933-302	—	180	1N5386B	.933-569	—
20	1N5357B	.933-314	370-710	200	1N5388B	.933-570	—
22	1N5358B	.933-326	—				

Order Code	1+	25+	100+	500+	1K+
1N5300B Series (ON)	All Values				
1N5300B Series (ST)	All Values †				

† Available until stocks are exhausted

### BZY91C and BZY93C Series, 5% Tolerance

CRYDOM



Series	Polarity	Package	$P_{TOT}$ (W)
BZY93...	Stud cathode	DO-4 10/32 UNF 2A	20
BZY93...R	Stud anode	DO-4 10/32 UNF 2A	20
BZY91...	Stud cathode	DO-5 28 UNF 2A	75
BZY91...R	Stud anode	DO-5 28 UNF 2A	75

Suitable for transient suppression in addition to voltage regulation.

Suppressors are normally chosen with a stand-off voltage equal to that of the steady state voltage of the line on which they will be used. The stand-off voltage is the maximum reverse voltage that can be applied without causing significant reverse dissipation.

In practice, the stand-off voltage of a device is 'three steps down' in the series from the zener voltage given by the suffix. For example, a BZY93C15 would be used as a voltage regulator on a 15V line and as a transient suppressor on a 11V line.

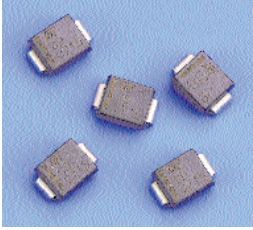
Zener Voltage, V	Mfrs. List No.	Order Code	Mfrs. List No.	Order Code	Mfrs. List No.	Order Code
7.5	BZY93C7V5	.370-277	BZY93C7V5R	.427-550	—	—
8.2	BZY93C8V2	.370-289	—	—	—	—
9.1	BZY93C9V1	.370-290	—	—	—	—
10	BZY93C10	.370-307	—	—	BZY91C10	370-125
11	BZY93C11	.370-319	—	—	—	—
12	BZY93C12	.370-320	BZY93C12R	.427-469	BZY91C12	370-137
13	BZY93C13	.370-332	BZY93C13R	.427-470	—	—
15	BZY93C15	.370-344	BZY93C15R	.427-482	BZY91C15	370-149
15	—	—	—	—	BZY91C15R	427-457
16	BZY93C16	.370-356	—	—	—	—
18	BZY93C18	.370-368	BZY93C18R	.427-494	BZY91C18	370-150
20	BZY93C20	.370-370	BZY93C20R	.427-500	—	—
22	BZY93C22	.370-381	—	—	—	—
24	BZY93C24	.370-393	BZY93C24R	.427-512	BZY91C24	370-162
27	BZY93C27	.370-400	BZY93C27R	.427-524	—	—
30	BZY93C30	.370-411	—	—	BZY91C30	370-186
33	BZY93C33	.370-423	—	—	BZY91C33	370-198
36	BZY93C36	.370-435	—	—	BZY91C36	370-204
39	BZY93C39	.370-447	BZY93C39R	.427-548	—	—
43	BZY93C43	.370-459	—	—	BZY91C43	370-216
47	BZY93C47	.370-460	—	—	BZY91C47	370-228
51	BZY93C51	.370-472	—	—	BZY91C51	370-230
56	BZY93C56	.370-484	—	—	—	—
62	BZY93C62	.370-496	—	—	—	—
68	BZY93C68	.370-502	—	—	BZY91C68	370-253
75	BZY93C75	.370-514	—	—	BZY91C75	370-265

Order Code	1+	5+	25+
BZY91... All Values			
BZY93... All Values			



## Protection Diodes

### 'Transil' - 3V Logic Systems



- Unidirectional transil diode dedicated to the protection of 3V3 CMOS and BiCMOS technologies
- Low clamping voltage at high current level ensures excellent protection of sensitive components
- Plastic SOD 6 case style



Reverse stand-off voltage 3.3V Peak pulse power 600W @ 1ms FIL257

Order Multiple=5	Price Each					
Order Code	5+	10+	50+	100+	500+	2500+
976-131						

### 'Transil' Voltage Suppression Diodes



- 400W Peak Pulse Power capability
- Low clamping factor
- Low incremental surge resistance
- Fast response time



SMA H = 2.9, W = 2.9, D = 5.6

Max. Reverse Leakage Current $\mu$ A	$V_{rm}$ @ V	$V_{br}$ Min. V	$I_r$ @ mA	$P_{pp}$ W	Clamping Voltage V (cl) max.		$I_{FSM}$ A	Package Marking	Mfrs. List No.	
					V	V			Unidirectional (d.c.)	Bidirectional (a.c.)
800	5	6.4	10	400	13.4	40	AE/AA	SMAJ5.0A	SMAJ5.0CA	
5	12	13.3	1	400	19.9	40	DUK/DBK	SMAJ12A	SMAJ12CA	
1	15	16.7	1	400	24.4	40	BM/AJ	SMAJ15A	SMAJ15CA	
1	30	33.3	1	400	48.4	40	CK/CL	SMAJ30A	SMAJ30CA	
1	33	36.7	1	400	53.3	40	CM/CN	SMAJ33A	SMAJ33CA	

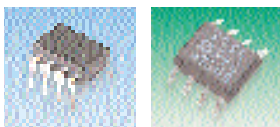
Order Multiple=5	Price Each					
Mfrs. List No.	Order Code	5+	25+	100+	250+	1K+
<b>Unidirectional</b>						
SMAJ5.0A	302-2973					
SMAJ12A	302-3096					
SMAJ15A	302-2936					
SMAJ30A	302-3114					
SMAJ33A	302-2950					
<b>Bidirectional</b>						
SMJA5.0CA	302-2985					
SMAJ12CA	302-3102					
SMAJ15CA	302-2948					
SMAJ30CA	302-3126					
SMAJ33CA	302-2961					

### Voltage Suppression Diodes Arrays

Breakdown Voltage $V_{br}$	Min. V		$I_r$ mA	$V_{pp}$ kV	$P_{pk}$ W	Reverse Leakage Current $\mu$ A	Package	Package Marking	Mfrs. List No.
	Max. V	Max. V							
<b>Two Unidirectional Transils</b>									
14.2	15.8	1	25	300	5	SOT-23	EL15	ESDA14V2L	
6.1	7.2	1	25	300	20	SOT-23	EL61	ESDA6V1L	
<b>Four Unidirectional Transils</b>									
6.1	7.2	1	25	300	20	SOT-23-5L	EC61	ESDA6V1SC5	
6.1	7.2	1	25	300	20	SOT-23-5L	ES61	ESDA6V1SC6	
<b>Six Unidirectional Transils</b>									
6.1	7.2	1	25	200	20	SO-8	—	ESDA6V1U1	

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
ESDA14V2L	302-2882					
ESDA6V1L	302-2894					
ESDA6V1SC5	302-2900					
ESDA6V1SC6	302-2912					
ESDA6V1U1	302-2924					

### USB Port Protection



- Full diode bridge with in-built suppression
- $V_{br}$  = 6V min.
- Peak pulse power dissipation = 500W
- Low capacitance
- Through hole or surface mount
- Complies with MIL STD 883C – Method 3015-6 and IEC-1000-4-2 level 4

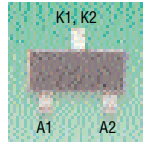
$V_{BR}$ min. V	$I_r$ @ mA	$I_{pp}$ A	$V_{pp}$ kV	$P_{pk}$ W	$I_{rm}$ max. $\mu$ A	Package	Mfrs. List No.
6	1	25	15	500	10	SO-8	USB6B1
6	1	25	15	500	10	DIL8	USB6B2

SD129

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
USB6B1	SMB302-3072					
USB6B2	302-3084					

### 40W Dual Transient Voltage Suppression Diodes

ON Semiconductor



- 40W peak power dissipation
- Common cathode configuration
- SOT-23 package



V <sub>rrm</sub> Stand-Off Voltage V	V <sub>br</sub> Breakdown Voltage			I (test) mA	Clamping Voltage V (cl) max.	Max. Pulse Current A	Max. Reverse Leakage Current $\mu$ A	Package Marking	Mfrs. List No.
	Min. V	Nom. V	Max. V						
12.8	14.3	15.0	15.8	1	21.2	1.9	100	15D	MMBZ15VDLT1

SD506

Mfrs. List No.	Order Code	1+	25+	100+	1K+	3K+
MMBZ15VDLT1	352-6471					

### 600W Transient Voltage Suppression Diodes



- Glass passivated junction
- 600W Peak Pulse Power capability
- Excellent clamping capability
- Low incremental surge resistance
- Fast response time

SMB H = 2.44, W = 5.59, D = 3.56

V <sub>rm</sub> Stand-off Voltage V	V <sub>br</sub> Breakdown Voltage			I (test) mA	Clamping Voltage V (cl) max.	Max. Peak Current A	Max. Reverse Leakage Current $\mu$ A	Mfrs. List No.	
	Min. V	Max. V	Max. V					Unidirectional (d.c.)	Bidirectional (a.c.)
<b>600W Peak Pulse Power</b>									
5	6.4	7.0	10	9.2	65.2	800	KE/AE	SMBJ5.0A	SMBJ5.0CA
9	10.0	11.1	1	15.4	39.0	10	KV/AV	SMBJ9.0A	SMBJ9.0CA
12	13.3	14.7	1	19.9	30.2	5	LE/BE	SMBJ12A	SMBJ12CA
15	16.7	18.5	1	24.4	24.6	5	LM/BM	SMBJ15A	SMBJ15CA
16	17.8	19.7	1	26.0	23.1	5	LP/LM	SMBJ16A	SMBJ16CA
18	20.0	22.1	1	29.2	20.5	5	LT/BT	SMBJ18A	SMBJ18CA
22	24.4	26.9	1	35.5	16.9	5	LX/BX	SMBJ22A	SMBJ22CA
24	26.7	29.5	1	38.9	15.4	5	LZ/BZ	SMBJ24A	SMBJ24CA
30	33.3	36.8	1	48.4	12.4	5	MK/CK	SMBJ30A	SMBJ30CA
33	36.7	40.6	1	53.3	11.3	5	MM/CM	SMBJ33A	SMBJ33CA
36	40.0	44.2	1	58.1	10.3	5	MP/CP	SMBJ36A	SMBJ36CA

SD447

Order Multiple=5	Price Each					
Mfrs. List No.	Order Code	5+	25+	100+	500+	1000+
<b>Unidirectional</b>						
SMBJ5.0A	167-125					
SMBJ9.0A	167-137					
SMBJ12A	167-149					
SMBJ15A	167-150					
SMBJ16A	167-162					
SMBJ18A	167-174					
SMBJ22A	167-186					
SMBJ24A	167-198					
SMBJ30A	167-204					
SMBJ33A	167-216					
SMBJ36A	167-228					
<b>Bidirectional</b>						
SMBJ5.0CA	167-230					
SMBJ9.0CA	167-241					
SMBJ12CA	167-253					
SMBJ15CA	167-265					
SMBJ16CA	167-277					
SMBJ18CA	167-289					
SMBJ22CA	167-290					
SMBJ24CA	167-307					
SMBJ30CA	167-319					
SMBJ33CA	167-320					
SMBJ36CA	167-332					

Continued

Protection Diodes — continued

1500W Transient Voltage Suppression Diodes



- Glass passivated junction
- 1500W peak pulse power capability
- Excellent clamping capability
- Low incremental surge resistance
- Fast response time

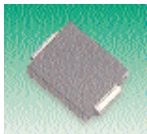


SMC H = 2.62, W = 8.23, D = 6.22

Stand-off Voltage V	Breakdown Voltage V		Clamping Voltage V (cl) max.	Max. Pulse Current A	Max. Reverse Leakage Current $\mu$ A	Package Marking	Mfrs. List No.	
	Min. V	Max. V					Unidirectional (d.c.)	Bidirectional (a.c.)
<b>1500W Peak Pulse Power</b>								
5	6.4	7.0	10	9.2	163.0	1000	GDE/BDE	SMCJ5.0A SMCJ5.0CA
6	6.67	7.37	10	10.3	145.6	1000	GDG/BDG	SMCJ6.0A SMCJ6.0CA
7.5	8.33	9.21	1	12.9	116.3	100	GDP/BDP	SMCJ7.5A SMCJ7.5CA
9	10.0	11.1	1	15.4	9.4	10	GDV/BDV	SMCJ9.0A SMCJ9.0CA
12	13.3	14.7	1	19.9	75.3	5	GEE/BEE	SMCJ12A SMCJ12CA
15	16.7	18.5	1	24.4	61.5	5	GEM/BEM	SMCJ15A SMCJ15CA
18	20.0	22.1	1	29.2	51.4	5	GET/BET	SMCJ18A SMCJ18CA
22	24.4	26.9	1	35.5	42.3	5	GEX/BEX	SMCJ22A SMCJ22CA
24	26.7	29.5	1	38.9	38.6	5	GEZ/BEZ	SMCJ24A SMCJ24CA
30	33.3	36.8	1	48.4	31.0	5	GFK/BFK	SMCJ30A SMCJ30CA
33	36.7	40.6	1	53.3	28.1	5	GFM/BFM	SMCJ33A SMCJ33CA
36	40.0	44.2	1	58.1	25.8	5	GFP/BFP	SMCJ36A SMCJ36CA

Mfrs. List No.	Order Code	1+	25+	100+	500+	1000+
<b>Unidirectional</b>						
SMCJ5.0A	167-368					
SMCJ6.0A	167-370					
SMCJ7.5A	167-381					
SMCJ9.0A	167-393					
SMCJ12A	167-400					
SMCJ15A	167-411					
SMCJ18A	167-423					
SMCJ22A	167-435					
SMCJ24A	167-447					
SMCJ30A	167-459					
SMCJ33A	167-460					
SMCJ36A	167-472					
<b>Bidirectional</b>						
SMCJ5.0CA	167-484					
SMCJ6.0CA	167-496					
SMCJ7.5CA	167-502					
SMCJ9.0CA	167-514					
SMCJ12CA	167-526					
SMCJ15CA	167-538					
SMCJ18CA	167-540					
SMCJ22CA	167-551					
SMCJ24CA	167-563					
SMCJ30CA	167-575					
SMCJ33CA	167-587					
SMCJ36CA	167-599					

Surge Suppression Diodes



Supplied on 8mm tape.

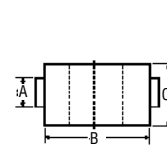
DO-214AA

- UL recognised component **UL497B Listed**
- Rated for Telecom industry transient surge levels: Bell Core GR-1089; ITU CCITT K.20/0.21; CC PART 68
- Low profile package, compatible with PCMCIA Cards
- **UL-94V-0 Listed**
- Offered in the most common  $V_{DRM}$  voltage types
- Low on-state voltage
- Cross to common industry types
- High minimum holding current

$V_{DRM}$ (max.) V	$I_{DRM}$ (max.) @ $V_{DRM}$ mA	$V_f$ (Typ.) @ 2A V	$V_{80}$ (min.) @ $I_{80} = 800mA$ V	$I_H$ (min.) mA	$C_0$ (Typ.) @ 1MHz/1V <sub>RMS</sub> pF	Package	Mfrs. List No.
65	5	1.25	70	150	80	DO-214AA	SGT0720SBT
120	5	1.15	130	150	140	DO-214AA	SGT1300SCT
250	5	1.6	275	150	90	DO-214AA	SGT2900SCT

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
SGT0720SBT	302-0538					
SGT1300SCT	302-0563					
SGT2900SCT	302-0587					

Transient Voltage Suppressors



600W Range: A = 2.11 B = 4.57 C = 3.94 1500W Range: A = 3.15 B = 7.11 C = 6.22

- Silicon surface mount transient voltage suppressors
- Low profile package
- Excellent clamping capability
- Fast response time
- Glass passivated junction
- High temperature soldering 250°C/10 seconds at terminals
- Plastic package has flammability rating **UL94V-0**

Stand-Off Voltage VRM (V)	Breakdown Voltage VBR (V)	Clamping Voltage Max. (V)	Test Current (Max) (V)	Peak Pulse Current (A)	Device Marking Code	Mfrs. List No.	Order Code
<b>600 W Range (Unidirectional – dc)</b>							
5.0	6.4 - 7.25	9.2	10	65.2	KE	SMBJ5.01A	967-592
7.5	8.33 - 9.58	12.9	1	46.5	KP	SMBJ7.5A	967-609
12.0	13.3 - 15.3	19.9	1	30.2	LE	SMBJ12A	967-610
15.0	16.7 - 19.2	24.4	1	24.0	LM	SMBJ15A	967-622
24.0	26.7 - 30.7	38.9	1	15.4	LZ	SMBJ24A	967-634
30.0	33.3 - 38.3	48.4	1	12.4	MK	SMBJ30A	967-646
<b>1500 W Range (Unidirectional – dc)</b>							
5.0	6.4 - 7.25	9.2	10	163.0	GDE	SMCJ5.0A	967-658
6.0	6.67 - 7.67	10.3	10	145.6	GDG	SMCJ6.0A	967-660
9.0	10.0 - 11.5	15.4	1	97.4	GDV	SMCJ9.0A	967-671
12.0	13.3 - 15.3	19.9	1	75.3	GEE	SMCJ12A	967-683
15.0	16.7 - 19.2	24.4	1	61.5	GEM	SMCJ15A	967-695
22.0	24.4 - 28	35.5	1	42.2	GEX	SMCJ22A	967-701
33.0	36.7 - 42.2	53.3	1	28.1	GFM	SMCJ33A	967-713
48.0	53.3 - 61.3	77.4	1	19.4	GFX	SMCJ48A	967-725
<b>600W Range (Bidirectional – ac)</b>							
5.0	6.4 - 7.25	9.2	10	65.2	AE	SMBJ5.0CA	967-737
7.5	8.33 - 9.58	12.9	1	46.5	AP	SMBJ7.5CA	967-749
12.0	13.3 - 15.3	19.9	1	30.2	BE	SMBJ12CA	967-750
15.0	16.7 - 19.2	24.4	1	24.0	BM	SMBJ15CA	967-762
24.0	26.7 - 30.7	38.9	1	15.4	BZ	SMBJ24CA	967-774
30.0	33.3 - 38.3	48.4	1	12.4	CK	SMBJ30CA	967-786
<b>1500W Range (Bidirectional – ac)</b>							
5.0	6.4 - 7.25	9.2	10	163.0	BDE	SMCJ5.0CA	967-798
6.0	6.67 - 7.67	10.3	10	145.6	BDG	SMCJ6.0CA	967-804
9.0	10.0 - 11.5	15.4	1	97.4	BDV	SMCJ9.0CA	967-816
12.0	13.3 - 15.3	19.9	1	75.3	BEE	SMCJ12CA	967-828
15.0	16.7 - 19.2	24.4	1	61.5	BEM	SMCJ15CA	967-830
22.0	24.4 - 28.0	35.5	1	42.2	BEX	SMCJ22CA	967-841
33.0	36.7 - 42.2	53.3	1	28.1	BFM	SMCJ33CA	967-853
48.0	53.3 - 61.3	77.4	1	19.4	BFX	SMCJ48CA	967-865

Order Multiple=5

Stand-Off Voltage	Order Code	5+	50+	100+	250+	1000+	3000+
<b>600W Range (Unidirectional – dc)</b>							
5.0	967-592						
7.5	967-609						
12.0	967-610						
15.0	967-622						
24.0	967-634						
30.0	967-646						
<b>1500W Range (Unidirectional – dc)</b>							
5.0	967-658						
6.0	967-660						
9.0	967-671						
12.0	967-683						
15.0	967-695						
22.0	967-701						
33.0	967-713						
48.0	967-725						
<b>600W Range (Bidirectional – ac)</b>							
5.0	967-737						
7.5	967-749						
12.0	967-750						
15.0	967-762						
24.0	967-774						
30.0	967-786						
<b>1500W Range (Bidirectional – ac)</b>							
5.0	967-798						
6.0	967-804						
9.0	967-816						
12.0	967-828						
15.0	967-830						
22.0	967-841						
33.0	967-853						
48.0	967-865						

## 'Transil'



Packages: a L = 6.35, Dia. = 3.05, Lead Dia. = 0.86. b L = 9.8, Dia. = 5.1, Lead Dia. = 1.06

- Unidirectional and bidirectional transient voltage suppressors offering a high surge capability and ultra fast clamping times
- Typical applications include the protection of IC's, MOS, hybrids and other voltage sensitive components
- Unidirectional types are suitable for dc applications and bidirectional types are suitable for ac applications

Stand-Off Voltage $V_{RM}$ (V)	Breakdown Voltage $V_{BR}$ (V)	Clamping Voltage Max. $V_{CL}$ (V)	Peak Pulse Current Max. $I_{PP}$ (A)	Temp. Coefficient (10 <sup>3</sup> /°C)	Package	Mftrs. List No.	Order Code
<b>400W Range (Unidirectional - dc)</b>							
20.5	22.8 - 26.4	42.8	112.0	9.4	a	BZW04P20	446-427
33.3	37.1 - 42.9	69.7	69.0	10.0	a	BZW04P33	446-439
58.1	64.6 - 74.8	121.0	39.5	10.4	a	BZW04P58	446-440
<b>1500W Range (Unidirectional - dc)</b>							
5.8	6.45 - 7.48	13.4	746.0	5.7	b	1.5KE6V8A	446-452
12.8	14.2 - 15.8	27.2	662.0	8.4	b	1.5KE15A	446-464
28.2	31.4 - 34.7	59.0	305.0	9.8	b	1.5KE33A	446-476
40.2	44.7 - 49.4	84.0	214.0	10.1	b	1.5KE47A	446-488
53.0	58.9 - 65.1	111.0	162.0	10.4	b	1.5KE62A	446-490
171.0	190 - 210	353.0	51.0	10.8	b	1.5KE200A	446-506
342.0	380 - 420	706.0	37.0	11.0	b	1.5KE400A	446-518
<b>400W Range (Bidirectional - ac)</b>							
5.8	6.45 - 7.48	13.4	174.0	5.7	a	BZW04P5V8B	446-520
12.8	14.3 - 16.5	27.2	176.0	8.4	a	BZW04P13B	446-531
18.8	20.9 - 24.2	39.3	122.0	9.2	a	BZW04P19B	446-543
28.2	31.4 - 36.3	59.0	81.5	9.8	a	BZW04P28B	446-555
<b>1500W Range (Bidirectional - ac)</b>							
10.2	11.4 - 12.6	21.7	829.0	7.8	b	1.5KE12CA	446-567
12.8	14.3 - 15.8	27.2	662.0	8.4	b	1.5KE15CA	446-579
15.3	17.1 - 18.9	32.5	55.4	8.8	b	1.5KE18CA	446-580
53.0	58.9 - 65.1	111.0	162.0	10.4	b	1.5KE62CA	446-592

FIL102

### Order Multiple=5

Stand-Off Voltage	Order Code	5+	25+	100+	500+	1000+
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#### 400W Range (Unidirectional - dc)

20.5	446-427					
33.3	446-439					
58.1	446-440					

#### 1500W Range (Unidirectional - dc)

5.8	446-452					
12.8	446-464					
28.2	446-476					
40.2	446-488					
53.0	446-490					
171.0	446-506					
342.0	446-518					

#### 400W Range (Bidirectional - ac)

5.8	446-520					
12.8	446-531					
18.8	446-543					
28.2	446-555					

#### 1500W Range (Bidirectional - ac)

10.2	446-567					
12.8	446-579					
15.3	446-580					
53.0	446-592					

## 500W Transient Voltage Suppression Diodes



DO-15 Body L = 7.62, Dia. = 3.56

- Glass passivated junction
- 500W Peak Pulse Power capability at 1.0ms
- Excellent clamping capability
- Low incremental surge resistance
- Fast response time

Stand-Off Voltage $V_{RM}$ (V)	Breakdown Voltage $V_{BR}$ (V)		Clamping Voltage $V_{CL}$ (V)	Max. Pulse Current $I_{PP}$ (mA)	Max. Reverse Leakage Current $I_{R}$ ( $\mu$ A)	Package	Mftrs. List No.	
	Min.	Max.					Unidirectional (d.c.)	Bidirectional (a.c.)
<b>500W Peak Pulse Power (1.0W Steady State @ Ta=75 C)</b>								
5.0	6.4	7.0	10	9.2	54.3	600	DO-15	SA5.0A SA5.0CA
6.0	6.7	7.4	10	10.3	48.5	600	DO-15	SA6.0A SA6.0CA
12.0	13.3	14.7	1	19.9	25.1	1	DO-15	SA12A SA12CA
13.0	14.4	15.9	1	21.5	23.2	1	DO-15	SA13A SA13CA
15.0	16.7	18.5	1	24.4	20.6	1	DO-15	SA15A SA15CA
18.0	20.0	22.1	1	29.2	17.2	1	DO-15	SA18A SA18CA
20.0	22.2	24.5	1	32.4	15.4	1	DO-15	SA20A SA20CA
24.0	26.7	29.5	1	38.9	12.8	1	DO-15	SA24A SA24CA
28.0	31.1	34.4	1	45.4	11.0	1	DO-15	SA28A SA28CA
30.0	33.3	36.8	1	48.4	10.3	1	DO-15	SA30A SA30CA

SD448

### Order Multiple=5

Mftrs. List No.	Order Code	5+	25+	100+	500+	1000+
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Unidirectional	
SA5.0A	166-984
SA6.0A	166-996
SA12A	167-009
SA13A	167-010
SA15A	167-022
SA18A	167-034
SA20A	167-046
SA24A	167-344
SA28A	167-356
SA30A	167-605

Bidirectional	
SA5.0CA	167-058
SA6.0CA	167-060
SA12CA	167-071
SA13CA	167-083
SA15CA	167-095
SA18CA	167-101
SA20CA	167-113
SA24CA	167-617
SA28CA	167-629
SA30CA	167-630

## 600W Transient Voltage Suppression Diodes



DO-15 Body L = 7.62, Dia. = 3.56

- Glass passivated junction
- 600W Peak Pulse Power capability at 1.0ms
- Excellent clamping capability
- Low incremental surge resistance
- Fast response time

Stand-Off Voltage $V_{RM}$ (V)	Breakdown Voltage $V_{BR}$ (V)		Clamping Voltage $V_{CL}$ (V)	Max. Pulse Current $I_{PP}$ (mA)	Max. Reverse Leakage Current $I_{R}$ ( $\mu$ A)	Package	Mftrs. List No.	
	Min.	Max.					Unidirectional (d.c.)	Bidirectional (a.c.)
<b>600W Peak Pulse Power (5.0W Steady State @ Ta=75 C)</b>								
5.8	6.45	7.14	10	10.5	57.1	1000	DO-15	P6KE6.8A P6KE6.8CA
6.4	7.13	7.88	1	11.3	53.1	500	DO-15	P6KE7.5A P6KE7.5CA
7.02	7.79	8.61	1	12.1	50.0	200	DO-15	P6KE8.2A P6KE8.2CA
7.78	8.65	9.55	1	13.4	45.0	50	DO-15	P6KE9.1A P6KE9.1CA
8.55	9.5	10.5	1	14.5	41.0	10	DO-15	P6KE10A P6KE10CA
10.2	11.4	12.6	1	16.7	36.0	5	DO-15	P6KE12A P6KE12CA
11.1	12.4	13.7	1	18.2	33.0	5	DO-15	P6KE13A P6KE13CA
12.8	14.3	15.8	1	21.2	28.0	5	DO-15	P6KE15A P6KE15CA
13.6	15.2	16.8	1	22.5	27.0	5	DO-15	P6KE16A P6KE16CA
15.3	17.1	18.9	1	25.2	24.0	5	DO-15	P6KE18A P6KE18CA
17.1	19.0	21.0	1	27.7	22.0	5	DO-15	P6KE20A P6KE20CA
18.8	20.9	23.1	1	30.6	20.0	5	DO-15	P6KE22A P6KE22CA
20.5	22.8	25.2	1	33.2	18.1	5	DO-15	P6KE24A P6KE24CA
23.1	25.7	28.4	1	37.5	16.0	5	DO-15	P6KE27A P6KE27CA
25.6	28.5	31.5	1	41.4	14.5	5	DO-15	P6KE30A P6KE30CA
28.2	31.4	34.7	1	45.7	13.2	5	DO-15	P6KE33A P6KE33CA
30.8	34.2	37.8	1	49.9	12.0	5	DO-15	P6KE36A P6KE36CA
33.3	37.1	41.0	1	53.9	11.2	5	DO-15	P6KE39A P6KE39CA
40.2	44.7	49.4	1	64.8	9.3	5	DO-15	P6KE47A P6KE47CA
53.0	58.9	65.1	1	85.0	7.1	5	DO-15	P6KE62A P6KE62CA
58.1	64.6	71.4	1	92.0	6.5	5	DO-15	P6KE68A P6KE68CA
85.5	95.0	105.0	1	137.0	4.4	5	DO-15	P6KE100A P6KE100CA
128.0	143.0	158.0	1	207.0	2.9	5	DO-15	P6KE150A P6KE150CA
136.0	152.0	168.0	1	219.0	2.7	5	DO-15	P6KE160A P6KE160CA
171.0	190.0	210.0	1	274.0	2.2	5	DO-15	P6KE200A P6KE200CA
342.0	380.0	420.0	1	548.0	1.1	5	DO-15	P6KE400A P6KE400CA

SD449

### Order Multiple=5

Mftrs. List No.	Order Code	5+	25+	100+	500+	1000+
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Unidirectional	
P6KE6.8A	166-601
P6KE7.5A	166-613
P6KE8.2A	166-625
P6KE9.1A	166-637
P6KE10A	166-649
P6KE12A	166-650
P6KE13A	166-662
P6KE15A	166-674
P6KE16A	166-686
P6KE18A	166-698
P6KE20A	166-704
P6KE22A	166-716
P6KE24A	166-728
P6KE27A	166-730
P6KE30A	166-741
P6KE33A	166-753
P6KE36A	166-765
P6KE39A	166-777
P6KE47A	166-789
P6KE62A	167-642
P6KE68A	167-654
P6KE100A	167-666
P6KE150A	167-678
P6KE160A	167-680
P6KE200A	167-691
P6KE400A	167-708

continued

Protection Diodes — continued

600W Transient Voltage Suppression Diodes – continued

SD449

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	500+	1000+
<b>Bidirectional</b>						
P6KE6.8CA	166-790					
P6KE7.5CA	166-807					
P6KE8.2CA	166-819					
P6KE9.1CA	166-820					
P6KE10CA	166-832					
P6KE12CA	166-844					
P6KE13CA	166-856					
P6KE15CA	166-868					
P6KE16CA	166-870					
P6KE18CA	166-881					
P6KE20CA	166-893					
P6KE22CA	166-900					
P6KE24CA	166-911					
P6KE27CA	166-923					
P6KE30CA	166-935					
P6KE33CA	166-947					
P6KE36CA	166-959					
P6KE39CA	166-960					
P6KE47CA	166-972					
P6KE62CA	167-710					
P6KE68CA	167-721					
P6KE100CA	167-733					
P6KE150CA	167-745					
P6KE160CA	167-757					
P6KE200CA	167-769					
P6KE400CA	167-770					

1500W Transient Voltage Suppression Diodes



DO-201AE Body L = 9.52, Dia. = 5.33

- Glass passivated junction
- 1500W Peak Pulse Power capability at 1.0ms
- Excellent clamping capability
- Low incremental surge resistance
- Fast response time

V <sub>off</sub> Stand-off Voltage V	V <sub>BR</sub> Breakdown Voltage V		I <sub>(test)</sub> mA	Clamping Voltage V (cl) max.	Max. Peak Pulse Current A	Max. Reverse Leakage Current µA	Package	Mfrs. List No.		
	Min.	Max.						Unidirectional (d.c.)	Bidirectional (a.c.)	
<b>1500W Peak Pulse Power (5.0W Steady State @ Ta=75 C)</b>										
5.8	6.45	7.14	10	10.5	143.0	1000	DO-201AE	1.5KE6.8A	1.5KE6.8CA	
6.4	7.13	7.88	10	11.3	133.0	500	DO-201AE	1.5KE7.5A	1.5KE7.5CA	
7.02	7.79	8.61	10	12.1	124.0	200	DO-201AE	1.5KE8.2A	1.5KE8.2CA	
7.78	8.65	9.55	1	13.4	112.0	50	DO-201AE	1.5KE9.1A	1.5KE9.1CA	
8.55	9.5	10.5	1	14.5	103.0	10	DO-201AE	1.5KE10A	1.5KE10CA	
10.2	11.4	12.6	1	16.7	90.0	5	DO-201AE	1.5KE12A	1.5KE12CA	
11.1	12.4	13.7	1	18.2	82.0	5	DO-201AE	1.5KE13A	1.5KE13CA	
12.8	14.3	15.8	1	21.2	71.0	5	DO-201AE	1.5KE15A	1.5KE15CA	
13.6	15.2	16.8	1	22.5	67.0	5	DO-201AE	1.5KE16A	1.5KE16CA	
15.3	17.1	18.9	1	26.2	59.5	5	DO-201AE	1.5KE18A	1.5KE18CA	
17.1	19.0	21.0	1	27.7	54.2	5	DO-201AE	1.5KE20A	1.5KE20CA	
18.8	20.9	23.1	1	30.6	49.0	5	DO-201AE	1.5KE22A	1.5KE22CA	
20.5	22.8	25.2	1	33.2	45.2	5	DO-201AE	1.5KE24A	1.5KE24CA	
23.1	25.7	28.4	1	37.5	40.0	5	DO-201AE	1.5KE27A	1.5KE27CA	
25.6	28.5	31.5	1	41.4	36.2	5	DO-201AE	1.5KE30A	1.5KE30CA	
28.2	31.4	34.7	1	45.7	33.0	5	DO-201AE	1.5KE33A	1.5KE33CA	
30.8	34.2	37.8	1	49.9	30.1	5	DO-201AE	1.5KE36A	1.5KE36CA	
33.3	37.1	41.0	1	53.9	28.0	5	DO-201AE	1.5KE39A	1.5KE39CA	
40.2	44.7	49.4	1	64.8	23.2	5	DO-201AE	1.5KE47A	1.5KE47CA	
53.0	58.9	65.1	1	85.0	17.7	5	DO-201AE	1.5KE62A	1.5KE62CA	
58.1	64.6	71.4	1	92.0	16.3	5	DO-201AE	1.5KE68A	1.5KE68CA	
85.5	95.0	105.0	1	137.0	11.0	5	DO-201AE	1.5KE100A	1.5KE100CA	
128.0	143.0	158.0	1	207.0	7.2	5	DO-201AE	1.5KE150A	1.5KE150CA	
136.0	152.0	168.0	1	219.0	6.8	5	DO-201AE	1.5KE160A	1.5KE160CA	
171.0	190.0	210.0	1	274.0	5.5	5	DO-201AE	1.5KE200A	1.5KE200CA	
342.0	380.0	420.0	1	548.0	2.8	5	DO-201AE	1.5KE400A	1.5KE400CA	

SD450

Mfrs. List No.		Price Each				
Unidirectional	Order Code	1+	25+	100+	500+	1000+
1.5KE6.8A	166-080					
1.5KE7.5A	166-091					
1.5KE8.2A	166-108					
1.5KE9.1A	166-110					
1.5KE10A	166-121					
1.5KE12A	166-133					
1.5KE13A	166-145					
1.5KE15A	166-157					
1.5KE16A	166-169					
1.5KE18A	166-170					
1.5KE20A	166-182					
1.5KE22A	166-194					
1.5KE24A	166-200					
1.5KE27A	166-212					
1.5KE30A	166-224					
1.5KE33A	166-236					
1.5KE36A	166-248					
1.5KE39A	166-250					
1.5KE47A	166-261					
1.5KE62A	166-273					
1.5KE68A	166-285					

continued

Mfrs. List No.	Order Code	1+	25+	100+	500+	1000+
<b>Unidirectional – continued</b>						
1.5KE100A	166-297					
1.5KE150A	166-303					
1.5KE160A	166-315					
1.5KE200A	166-327					
1.5KE400A	166-339					
<b>Bidirectional</b>						
1.5KE6.8CA	166-340					
1.5KE7.5CA	166-352					
1.5KE8.2CA	166-364					
1.5KE9.1CA	166-376					
1.5KE10CA	166-388					
1.5KE12CA	166-390					
1.5KE13CA	166-406					
1.5KE15CA	166-418					
1.5KE16CA	166-420					
1.5KE18CA	166-431					
1.5KE20CA	166-443					
1.5KE22CA	166-455					
1.5KE24CA	166-467					
1.5KE27CA	166-479					
1.5KE30CA	166-480					
1.5KE33CA	166-492					
1.5KE36CA	166-509					
1.5KE39CA	166-510					
1.5KE47CA	166-522					
1.5KE62CA	166-534					
1.5KE68CA	166-546					
1.5KE100CA	166-558					
1.5KE150CA	166-560					
1.5KE160CA	166-571					
1.5KE200CA	166-583					
1.5KE400CA	166-595					

Trans-Zorb®

GENERAL SEMICONDUCTOR



a L = 6.5, Dia. = 3.2; b L = 8.5, Dia. = 4.6; c L = 9.4, Dia. = 5.2  
Connections: Band to positive supply. No band on bipolar types.

- TransZorbs® are semiconductor devices which are designed for transient voltage suppression applications
- They offer ultra-fast response time, high surge handling capability and flat voltage clamping at high currents
- Typical applications include the protection of CMOS, NMOS, TTL and MPU devices
- Unidirectional types are suitable for dc applications and bidirectional types are suitable for ac applications
- All 5% tolerance devices

Stand-Off Voltage V <sub>RM</sub> (V)	V <sub>BR</sub> Breakdown Voltage (V)	Clamping Voltage Max. V <sub>(CL)</sub> R <sub>(V)</sub>	I <sub>T</sub> mA	Ptot @ T <sub>c</sub> = 75° C (W)	Max. Peak Pulse Current (A)	Pack- age	Mfrs. List No.	Order Code
<b>500W Range (Unidirectional – dc)</b>								
5.0	6.4 - 7.3	9.6	10	1	52.0	a	SA5.0A	607-812
12.0	13.3 - 16.3	22.0	1	1	22.7	a	SA12A	607-824
15.0	16.7 - 20.4	26.9	1	1	18.8	a	SA15A	607-836
24.0	26.7 - 32.6	43.0	1	1	11.6	a	SA24A	607-848
30.0	33.3 - 40.7	53.5	1	1	9.3	a	SA30A	607-850
<b>1500W Range (Unidirectional – dc)</b>								
5.5	6.12 - 7.48	10.8	10	5	139.0	c	1.5KE6.8A	607-861
9.4	10.5 - 11.6	15.6	1	5	96.0	c	1.5KE11A	318-840
12.9	14.4 - 17.6	23.5	1	5	64.0	c	1.5KE16A	607-873
15.3	17.1 - 18.9	25.2	1	5	59.5	c	1.5KE18A	318-875
17.8	19.8 - 24.2	31.0	1	5	47.0	c	1.5KE22A	607-885
21.8	24.3 - 29.7	39.1	1	5	38.5	c	1.5KE27A	607-897
24.3	27.0 - 33.0	43.5	1	5	34.5	c	1.5KE30A	607-903
29.1	32.4 - 39.6	52.0	1	5	29.0	c	1.5KE36A	607-927
38.1	42.3 - 51.7	67.8	1	5	22.2	c	1.5KE47A	607-939
130.0	144 - 276	230.0	1	5	6.5	c	1.5KE160A	607-940
140.0	360 - 440	574.0	1	5	5.0	c	1.5KE400A	607-952
<b>500W Range (Bidirectional – ac)</b>								
12.0	13.3 - 16.3	22.0	1	1	22.7	a	SA12CA	607-976
15.0	16.7 - 20.4	18.8	1	1	18.8	a	SA15CA	607-988
24.0	26.7 - 32.6	43.0	1	1	11.6	a	SA24CA	607-990
30.0	33.3 - 40.7	53.5	1	1	9.3	a	SA30CA	608-002
<b>1500W Range (Bidirectional – ac)</b>								
5.5	6.12 - 7.48	10.8	1	5	139.0	c	1.5KE6.8CA	608-014
8.92	9.9 - 12.1	16.2	1	5	93.0	c	1.5KE11CA	608-026
12.9	14.4 - 17.6	23.5	1	5	64.0	c	1.5KE16CA	608-038
14.5	16.2 - 19.8	26.5	1	5	56.5	c	1.5KE18CA	608-040
17.8	19.8 - 24.2	31.9	1	5	47.0	c	1.5KE22CA	608-051
21.8	24.3 - 29.7	39.1	1	5	38.5	c	1.5KE27CA	608-063
24.3	27.0 - 33.0	43.5	1	5	34.5	c	1.5KE30CA	608-075
26.8	29.7 - 36.3	47.7	1	5	31.5	c	1.5KE33CA	608-087
29.1	32.4 - 39.6	52.0	1	5	29.0	c	1.5KE36CA	608-099
38.1	42.3 - 51.7	67.8	1	5	22.2	c	1.5KE47CA	608-105
130.0	144 - 276	230.0	1	5	6.5	c	1.5KE160CA	608-117
324.0	360 - 440	574.0	1	5	4.0	c	1.5KE400CA	608-129

FIL47

Stand-Off Voltage	Order Code	1+	Price Each		
			25+	100+	500+
<b>500W Range (Unidirectional – dc)</b>					
5.0V	.607-812				
12.0V	.607-824				
15.0V	.607-836				
24.0V	.607-848				
30.0V	.607-850				
<b>1500W Range (Unidirectional – dc)</b>					
5.5V	.607-861				
9.4V	318-840				
12.9V	.607-873				
15.3V	318-875				
17.8V	.607-885				
21.8V	.607-897				
24.3V	.607-903				
29.1V	.607-927				
38.1V	.607-939				
130.0V	.607-940				
140.0V	.607-952				
<b>500W Range (Bidirectional – ac)</b>					
12.0V	.607-976				
15.0V	.607-988				
24.0V	.607-990				
30.0V	.608-002				
<b>1500W Range (Bidirectional – ac)</b>					
5.5V	.608-014				
8.92V	.608-026				
12.9V	.608-038				
14.5V	.608-040				
17.8V	.608-051				
21.8V	.608-063				
24.3V	.608-075				
26.8V	.608-087				
29.1V	.608-099				
31.8V	.608-105				
130.0V	.608-117				
324.0V	.608-129				

Stand-Off Voltage	Order Code	1+	25+	100+	500+	1000+
<b>500W Range (Unidirectional – dc)</b>						
5.0V	752-010					
12.0V	752-022					
15.0V	752-034					
24.0V	752-046					
30.0V	752-058					
<b>1500W Range (Unidirectional – dc)</b>						
5.5V	752-060					
9.4V	752-071					
13.6V	752-083					
15.3V	752-095					
18.8V	752-101					
23.1V	752-113					
25.6V	752-125					
28.2V	752-137					
30.8V	752-149					
40.2V	752-150					
136.0V	752-162					
342.0V	752-174					
<b>500W Range (Bidirectional – ac)</b>						
5.0V	752-186					
12.0V	752-198					
15.0V	752-204					
24.0V	752-216					
30.0V	752-228					
<b>1500W Range (Bidirectional – ac)</b>						
5.8V	752-230					
9.4V	752-241					
13.6V	752-253					
15.3V	752-265					
18.8V	752-277					
23.1V	752-289					
25.6V	752-290					
28.2V	752-307					
30.8V	752-319					
40.2V	752-320					
136.0V	752-332					
342.0V	752-344					

## Transient Voltage Suppressors



500W Range:	min L = 5.8	max 7.6	min Dia = 2.6	max 3.6	Connections:-
1500W Range:	L = 7.2	9.5	Dia = 4.8	5.3	Band to Positive supply. No band on bipolar type.

Silicone axial lead TVS's offering advantages of:-

- Low clamping voltages
- No wear-out limitation
- Small physical size
- Wide voltage range
- High transient power dissipation

Stand-Off Voltage V <sub>RM</sub> (V)	Breakdown Voltage V <sub>BR</sub> (V)	Clamping Voltage Max. V <sub>(CL)</sub> R <sub>(V)</sub>	I <sub>T</sub> mA	P <sub>tot</sub> @ T <sub>L</sub> = 75° C (W)	Max. Peak Pulse Current (A)	JEDEC No	Mftrs. List No.	Order Code
<b>500W Range (Unidirectional – dc)</b>								
5.0	6.4 - 7.0	9.6	10	1	54.3	—	SA5.0A	752-010
12.0	13.3 - 14.7	19.9	1	1	25.1	—	SA12A	752-022
15.0	16.7 - 18.5	24.4	1	1	20.6	—	SA15A	752-034
24.0	26.7 - 29.5	38.9	1	1	12.8	—	SA24A	752-046
30.0	33.3 - 36.8	48.4	1	1	10.3	—	SA30A	752-058
<b>1500W Range (Unidirectional – dc)</b>								
5.5	6.45 - 7.14	10.5	10	5	143.0	1N6267A	1.5KE6.8A	752-060
9.4	10.5 - 11.6	15.6	1	5	96.0	1N6272A	1.5KE11A	752-071
13.6	15.2 - 16.8	22.5	1	5	67.0	1N6276A	1.5KE16A	752-083
15.3	17.1 - 18.9	25.2	1	5	59.5	1N6277A	1.5KE18A	752-095
18.8	20.9 - 23.1	30.6	1	5	49.0	1N6279A	1.5KE22A	752-101
23.1	25.7 - 28.4	37.5	1	5	40.0	1N6281A	1.5KE27A	752-113
25.6	28.5 - 31.5	41.4	1	5	36.0	1N6282A	1.5KE30A	752-125
28.2	31.4 - 34.7	45.7	1	5	33.0	1N6283A	1.5KE33A	752-137
30.8	34.2 - 37.8	49.9	1	5	30.0	1N6284A	1.5KE36A	752-149
40.2	44.7 - 49.4	64.8	1	5	23.2	1N6287A	1.5KE47A	752-150
136.0	152 - 162	219.0	1	5	6.8	1N6300A	1.5KE160A	752-162
342.0	380 - 420	548.0	1	5	4.0	—	1.5KE400A	752-174
<b>500W Range (Bidirectional – ac)</b>								
5.0	6.4 - 7.0	9.2	10	1	54.3	—	SA5CA	752-186
12.0	13.3 - 14.7	19.2	1	1	25.1	—	SA12CA	752-198
15.0	16.7 - 18.5	24.4	1	1	20.6	—	SA15CA	752-204
24.0	26.7 - 29.5	38.9	1	1	12.8	—	SA24CA	752-216
30.0	33.3 - 36.8	48.4	1	1	10.3	—	SA30CA	752-228
<b>1500W Range (Bidirectional – ac)</b>								
5.8	6.45 - 7.14	10.5	10	5	143.0	1N6267CA	1.5KE6.8CA	752-230
9.4	10.5 - 11.6	15.6	1	5	96.0	1N6272CA	1.5KE11CA	752-241
13.6	15.2 - 16.8	22.5	1	5	67.0	1N6276CA	1.5KE16CA	752-253
15.3	17.1 - 18.9	25.2	1	5	59.5	1N6277CA	1.5KE18CA	752-265
18.8	20.9 - 23.1	30.6	1	5	49.0	1N6279CA	1.5KE22CA	752-277
23.1	25.7 - 28.4	37.5	1	5	40.0	1N6281CA	1.5KE27CA	752-289
25.6	28.5 - 31.5	41.4	1	5	36.0	1N6282CA	1.5KE30CA	752-290
28.2	31.4 - 34.7	45.7	1	5	33.0	1N6283CA	1.5KE33CA	752-307
30.8	34.2 - 37.8	49.9	1	5	30.0	1N6284CA	1.5KE36CA	752-319
40.2	44.7 - 49.4	64.8	1	5	23.2	1N6287CA	1.5KE47CA	752-320
136.0	152 - 168	219.0	1	5	6.8	1N6300CA	1.5KE160CA	752-332
342.0	380 - 420	548.0	1	5	4.0	—	1.5KE400CA	752-344

FIL183

## Regulator Diodes

Low Voltage, Avalanche

Philips Semiconductors



DO-35 L = 4.25, Dia = 1.85  
Coloured band indicates cathode



- Low dynamic resistance at very low currents
- Very low leakage currents
- Very steep I-V (breakdown) characteristics
- Low noise

Suitable for low current, low power and low noise application, such as memory back-up, voltage stabilisers, voltage limiters and smoke detector relays.

Working Voltage V <sub>Z</sub> V	Dynamic Resistance R <sub>Z</sub> Ω	Reverse Current I <sub>R</sub> μA	Line Regulation ΔV <sub>Z</sub> V @	I <sub>LO</sub> μA	P <sub>TOT</sub> mW	Device Marking	Package	Mftrs. List No.
5.0	700	10	0.4	100	400	—	DO-35	PLVA450A
5.0	700	20	0.4	100	250	*9A	SOT-23	PLVA650A
5.3	250	5	0.2	100	250	*9B	SOT-23	PLVA653A
5.6	100	1	0.1	50	400	—	DO-35	PLVA456A
5.6	100	1	0.1	50	250	*9C	SOT-23	PLVA656A
6.2	100	0.1	0.1	10	250	*9E	SOT-23	PLVA662A

SD122

Order Multiple = 5

Mftrs. List No.	Order Code	5+	Price Each		
			25+	100+	1K+
PLVA450A	.541-450				
PLVA456A	.541-461				
PLVA650A	SMD 305-1262				
PLVA653A	SMD 305-1274				
PLVA656A	SMD 305-1286				
PLVA662A	SMD 305-1298				

Continued

## Regulator Diodes — continued

### Voltage Regulator (Stabistor)

Philips Semiconductors



DO-35: L = 4.25, Dia = 1.85  
Coloured band indicates cathode



SOD-80: L = 3.5, Dia. = 1.5

$V_{FRM}$ (max) V	$I_{FRM}$ (max) mA	$V_F$ V @	$I_F$ mA	Package	Mfrs. List No.
10	125	2.35-2.8	5	SOD-80	BZV87-2V6
10	200	1.3-1.5	5	SOD-80	BZV87-1V4
10	250	1.3-1.5	5	DO-35	BZV86-1V4
10	250	1.85-2.15	5	DO-35	BZV86-2V0

SD137

Order Multiple= 5		Price Each			
Mfrs. List No.	Order Code	5+	100+	1K+	3K+
BZV86-1V4	370-964				
BZV86-2V0	370-976				
BZV87-1V4	305-1006				
BZV87-2V6	305-1018				

### Current Regulator Diodes

ON Semiconductor



DO-204AA

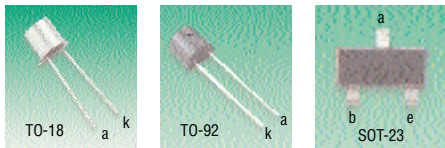
- High impedance
- Rugged, hermetically sealed glass encapsulation

Regulator Current, $I_p$ (mA) @ $V_T = 25V$			Min. Dynamic Impedance @ $V_T = 25V$ M $\Omega$	Min. Knee Impedance @ $V_k = 6V$ M $\Omega$	Max. Limiting Voltage @ $I_L = 0.8I_p$ V	Mfrs. List No.
Nom.	Min.	Max.				
1.0	0.9	1.21	0.7	0.18	1.4	1N5298
2.0	1.8	2.2	0.4	0.06	1.85	1N5305

SD146

		Price Each				
Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
1N5298	240-9215					
1N5305	240-9252					

### Current Regulator



$I_L$ (nom.) A	$I_L$ tol. %	Limiting Voltage (max.) V	Peak Operating Voltage (min.) V	Dynamic Impedance (min.) k $\Omega$	Knee Impedance (typ.) k $\Omega$	Package	Device Marking	Mfrs. List No.
0.2	20	1.2	50	4000	2500	TO-92	—	J500
0.6	20	1.7	50	1200	800	TO-92	—	J503
1.0	20	2.1	50	500	400	TO-92	—	J505
1.0	20	2.1	45	400	300	SOT-23	L5	SST505
1.8	20	2.8	50	200	190	TO-92	—	J507
2.0	10	1.85	100	395	280	TO-18	—	CR200
2.4	20	3.1	50	200	130	TO-92	—	J508
2.4	20	3.1	45	100	80	SOT-23	L8	SST508
3.0	10	2.25	100	300	160	TO-18	—	CR300
3.3	10	2.35	100	280	140	TO-18	—	CR330
3.6	20	3.9	50	150	70	TO-92	—	J510
3.6	20	3.9	45	80	40	SOT-23	L10	SST510
4.7	10	2.9	100	235	90	TO-18	—	CR470
4.7	20	4.2	50	120	50	TO-92	—	J511
4.7	20	4.2	45	70	30	SOT-23	L1	SST511

SD77

		Price Each				
Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
CR200	370-988					
CR300	370-990					
CR330	371-002					
CR470	371-014					
J500	371-026					
J503	371-038					
J505	371-040					
J507	371-051					
J508	371-063					
J510	371-075					
J511	371-087					
SST505	SMD 334-5180					
SST508	SMD 334-5191					
SST510	SMD 334-5208					
SST511	SMD 334-5210					

## Low Power Signal Diodes

### High Speed Diodes

Philips Semiconductors



SOT-363



SOD-80C



SOT-23



DO-34

Application code key:  
HS = High Speed  
LL = Low Leakage

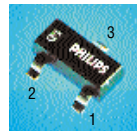
$V_{FRM}$ V	$I_F$ mA	$V_F$ V	@ $I_F$ mA	Package	Application Code	Mfrs. List No.
50	215	1	100	SOT-23	HS	BAV74
70	200	1	100	SOT-80C	HS	PMLL4448
75	200	1	10	DO-34	HS	1N4531
85	250	0.715	1	SOT-363	HS	BAW56S
125	250	1	100	DO-34	LL	BAS45AL

SD486

Order Multiple=10		Price Each				
Mfrs. List No.	Order Code	10+	100+	250+	1K+	3K+
BAV74	SMD 316-3064					
BAW56S	SMD 316-4901					
BAS45AL	316-2539					
PMLL4448	SMD 316-2540					
1N4531	316-2382					

### High Speed Switching

Philips Semiconductors



SOT-23



SOD-80C



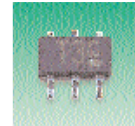
SOT-323



SOT-143



SOD-110



SOT-363

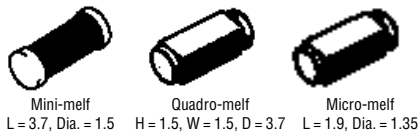
Pin Config.	1	2	3
(a)	nc	a	k
(b)	a1	a2	k
(c)	k1	a2	a1, k2
(d)	k1	k2	a

$V_{FRM}$ max. V	$I_F$ (av) max. mA	$V_F$ max. V @	$I_F$ mA	Device Marking	Package	Pin. Config.	Mfrs. List No.
<b>Single Diode</b>							
75	200	1	10	—	SOD-80C	—	PMLL4148
75	200	1	100	—	SOD-80C	—	BAS32L
85	100	1.1	50	A6p	SOT-23	a	BAS16
85	175	1	50	A6	SOT-23	a	BAS16W
85	250	1.25	150	—	SOD-110	—	BAS216
150	250	1	100	—	SOD-80C	—	BAV102
200	200	1	100	JRp	SOT-23	a	BAS20
200	250	1	200	—	SOD-80C	—	BAS103
<b>Dual Diode – Common Diode</b>							
75	150	1	50	A1	SOT-323	d	BAW56W
75	215	1	50	A1p	SOT-23	d	BAW56
<b>Dual Diode – Common Cathode</b>							
70	175	1	50	A4	SOT-323	b	BAV70W
70	215	1	50	A4p	SOT-23	b	BAV70
<b>Dual Diode – In Series</b>							
75	150	1	50	A7	SOT-323	c	BAV99W
75	215	1	50	A7p	SOT-23	c	BAV99
100	125	1	50	p5C	SOT-23	c	PMBD7000
<b>Dual Diode – In Parallel</b>							
60	200	1	200	L51	SOT-143	—	BAS56
75	215	1	50	JTp	SOT-143	—	BAS28
200	225	1	100	L30	SOT-143	—	BAV23
<b>Double Dual Diode – Common Anode/Common Cathode</b>							
75	250	1	50	—	SOT-363	—	BAV756S

SD232

Order Multiple=10		Price Each				
Mfrs. List No.	Order Code	10+	100+	1K+	3K+	
BAS16	517-008					
BAS16W	646-544					
BAS20	304-9395					
BAS216	304-9401					
BAS28	304-9413					
BAS32L	300-0230					
BAS56	304-9437					
BAV102	304-9528					
BAV103	304-9541					
BAV23	304-9553					
BAV70	517-010					
BAV70W	646-556					
BAV756S	304-9565					
BAV99	517-021					
BAV99W	646-568					
BAW56	517-033					
BAW56W	646-570					
MBD7000	305-1304					
PMLL4148L	305-1365					

## Switching



Leadless, hermetically sealed versions of the IN4148. The quadro-melf and micro-melf packages have square cross-sectional housings designed to provide stability, and greater 'pick and place' accuracy. Micro-melf has the same footprint as industry standard SOT-23/SOD-232 outlines. Supplied on 8mm tape.

$V_{RRM}$ V	$V_R$ V	$I_{FSM}$ A	$I_{FRM}$ mA	$I_F$ mA	$I_F$ (av) mA	$P_V$ mW	Package	Mfrs. List No.
100	75	2	450	200	150	500	Mini-melf	LL4148
100	75	2	450	200	150	500	Quadro-melf	LS4148
100	75	2	450	200	150	500	Micro-melf	MCL4148

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	250+	1K+	2500+
LL4148	739-182				
LS4148	739-170				
MCL4148	739-169				

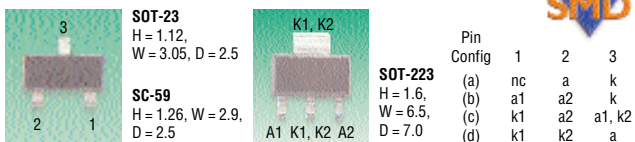
## LL-34 and SOT-23



Characteristic	$V_{rrm}$ V	$I_F$ (av) mA	$V_F$ V	@ mA	$I_F$ mA	Device Marking	Package	Mfrs. List No.
High conductance	75	200	1.0	10	5D	SOT-23	MMBD914	
High conductance	75	200	1.0	10	5H	SOT-23	MMBD4148	
High conductance	75	200	1.0	10	—	LL-34	FDLL4148	
General purpose	90	200	1.0	200	L21	SOT-23	BAS31	
High voltage	100	200	1.0	100	A8	SOT-23	BAS19	
High voltage	180	200	1.1	200	A11	SOT-23	MMBD1501A	
In series	180	200	1.1	200	A13	SOT-23	MMBD1503A	
Common cathode	180	200	1.1	200	A14	SOT-23	MMBD1504A	
Common anode	180	200	1.1	200	A15	SOT-23	MMBD1505A	
High voltage	200	200	1.0	100	A82	SOT-23	BAS21	

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	10K+
BAS19	885-290				
BAS21	885-370				
BAS31	885-319				
FDLL4148	885-289				
MMBD1501A	885-332				
MMBD1503A	885-344				
MMBD1504A	885-356				
MMBD1505A	885-368				
MMBD4148	885-277				
MMBD914	885-265				

## SOT-23 and SOT-223 High Speed Switching



Supplied on 8mm tape, except SOT-223 (12mm tape width).

Character- istic	$V_{RRM}$ max. V	$I_F$ (AV) max mA	$V_F$ max V	@ mA	Device Marking	Package	Pin Config.	Mfrs. List No.
<b>Single Diode</b>								
High speed	75	200	1.0	50	A6	SOT-23	(a)	ON BAS16LT1
High speed	85	200	1.0	50	A6	SOT-23	(a)	FCH/INF BAS16
High speed	85	300	1.2	100	F3	SC-59	(a)	TOSH 1SS193
High voltage	100	200	1.0	10	5I	SOD-123	—	ON MMSD4148T1
High voltage	100	200	1.0	5D	SOD-123	—	ON MMSD914T1	
High voltage	200	250	1.25	200	JS	SOT-23	(a)	INF BAS21
<b>Dual Diode, Common Cathode</b>								
High speed	70	200	1.0	50	A4	SOT-23	(a)	ON BAV70LT1
High speed	70	200	1.0	50	A4	SOT-23	(b)	FCH/INF BAV70
High speed	85	300	1.2	100	B3	SC-59	(b)	TOSH 1SS184
High speed	400	1000	2.0	2000	—	SOT-223	—	INF BAS79D
High speed	100	200	0.7	1	M5C	SOT-23	(c)	ON MMBD7000LT1
<b>Dual Diode, In Series</b>								
High speed	70	200	1.0	50	A7	SOT-23	(c)	FCH/INF BAV99
High speed	70	215	1.0	50	A7	SOT-23	(c)	ON BAV99LT1
<b>Dual Diode, Common Anode</b>								
High speed	70	200	1.25	150	A1	SOT-23	(d)	FCH/INF BAW56
High speed	85	300	1.2	100	A3	SC-59	(d)	TOSH 1SS181

Order Multiple=10		Price Each			
Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BAS16 (FCH)	740-998				
BAS16 (INF)	743-124				
BAS16LT1	934-100				
BAS21	743-185				
BAV70 (FCH)	740-986				
BAV70 (INF)	743-150				
BAV70LT1	934-112				

continued

## Order Multiple=10

Mfrs. List No.	Order Code	10+	100+	1K+	3K+
BAV99 (FCH)	741-000				
BAV99 (INF)	743-136				
BAV99LT1	934-136				
BAW56 (FCH)	741-863				
BAW56 (INF)	743-148				
MMBD7000LT1	247-340				
MMSD4148T1	334-3455				
MMSD914T1	334-3467				
1SS181	327-2400				
1SS184	327-2412				
1SS193	327-2424				

## Order Multiple=5

Mfrs. List No.	Order Code	5+	100+	1K+	3K+
BAS79D	743-239 †				

## Reels of 3K pieces, 180mm Ø

Order Multiple=10		Price Per Reel		
Mfrs. List No.	Order Code	1+	5+	10+
BAS16 (INF)	743-264			
BAV70 (INF)	743-276			
BAV99 (INF)	743-288			
BAW56 (INF)	743-290			

† Available until stocks are exhausted



## SOT-23 Switching Diodes



Tape width = 8mm



- 100mm reel size
- 500 pieces on each reel
- Ideal for pre-production, prototyping and production shortfalls
- Complete with leader tape

FOR DEVICE SPECIFICATION, SEE PREVIOUS COLUMN

## 500 Pieces Per Reel

Order Multiple=10		Price Per Reel			
Configuration	MiniReel List No.	Order Code	1+	3+	5+
Single	BAS16-MR	344-8125			
Single	BAS21-MR	344-8137			
Common cathode	BAV70-MR	344-8174			
In series	BAV99-MR	344-8186			
Common anode	BAW56-MR	344-8198			

## Small-Signal



DO-34

Config.	$V_{RRM}$ max. V	$I_F$ (av) max. mA	$V_F$ max. V	@ mA	Device Marking	Package	Pin Config.	Mfrs. List No.
Single diode	50	200	0.3	0.1	—	DO-34	—	BAT86

## Order Multiple=5

Order Multiple=5		Price Each			
Mfrs. List No.	Order Code	5+	25+	100+	3K+
BAT86	316-2527				

Continued

## Insulation Groups to VDE0110

Depending on the application equipment is classified in insulation groups A<sub>0</sub>, A, B, C or D relating to reduction in the performance of insulation caused by environmental influences eg. dust, dirt, humidity, condensation and ageing. In addition the groups are determined both by the effects of damage produced by failure of the performance of an insulation material and also flashover voltages.

### Insulation Group A<sub>0</sub>.

Relates to low power equipment which is located in air conditioned or clean and dry locations or which is protected by appropriate measures and on which overheating will not be excessive in case of a short circuit.

### Insulation Group A

Relates to equipment located in air conditioned, clean, dry locations and protected by acceptable measures.

### Insulation Group B

Relates to equipment housed in living rooms, stores, premises, precision engineering, workshops, laboratories, control rooms, medical rooms, etc.

### Insulation Group C

Relates to equipment mainly used in industrial, commercial and agricultural works housed in unheated stores, repair shops, boiler houses or on machine tools etc.

### Insulation Group D

Relates to equipment used on power vehicles or rolling stock exposed to damp resulting from condensation or melting snow and conductive dust caused by braking devices that are not satisfactorily enclosed.

## Low Power Signal Diodes — continued

### Small Signal

### Philips Semiconductors



Application code key:  
HS = High speed, AV = Avalanche

V <sub>RRM</sub> max V	I <sub>F</sub> (AV) max mA	V <sub>F</sub> max V @ I <sub>F</sub> mA	Package	App'n Code	Mfrs. List No.
30	200	0.4	10	DO-34	HS BAT85 ◆
40	30	0.41	1	DO-34	HS BAT81 ◆
50	30	0.41	1	DO-34	HS BAT82 ◆
50	75	1.0	20	DO-35	HS BAX13
60	30	0.41	1	DO-34	HS BAT83 ◆
60	300	1.25	500	DO-35	HS BAV10
75	100	1.0	100	DO-35	HS BAW62
75	150	1.0	10	DO-35	HS 1N4148
75	150	1.0	100	DO-35	HS 1N4448
100	75	1.0	10	DO-35	HS 1N914
120	250	1.25	200	DO-35	HS BAV19
200	250	1.2	200	DO-35	HS BAV20
250	250	1.2	200	DO-35	HS BAV21

◆ Schottky barrier

SD94

Order Multiple=5	Order Code	5+	25+	100+	1K+	3K+
Mfrs. List No.						
BAT81	367-849					
BAT82	304-9516					
BAT83	367-850					
BAT85	367-862					
BAV10	300-0280					
BAV19	300-0308					
BAV20	367-898					
<b>Order Multiple=10</b>						
BAV21	367-904	10+	100+	1K+	3K+	
BAW62	367-928					
BAX13	367-930					
<b>Order Multiple=10</b>						
1N914	368-076	10+	100+	250+	1K+	
1N4148	368-106					
1N4448	368-143					

### Small Signal



V <sub>RRM</sub> max V	I <sub>F</sub> (AV) max mA	V <sub>F</sub> max V @ I <sub>F</sub> mA	Appln. Code	Mfrs. List No.
25	200	1.0	GP	1N456A
35	150	1.0	SW	BAY71
50	150	1.0	SW	BAW76
75	150	0.9	10	SW 1N4305
75	150	1.0	100	SW BAW62
75	200	1.0	10	SW 1N914
75	200	1.0	100	SW 1N4448
100	150	1.0	10	SW 1N4149
100	225	1.0	HV	BAY72
120	200	1.0	HV	BAY80
125	200	1.0	GP	1N458A
175	200	1.0	3	GP 1N459
175	200	1.0	GP	1N459A
200	100	1.0	HV	1N4938

Application Code Key: GP = General Purpose, HV = High Voltage, SW = High Freq. Switching

SD398

Order Multiple=10	Order Code	10+	100+	1K+	10K+
Mfrs. List No.					
1N4149	885-095				
1N4305	885-058				
1N4448	885-101				
1N456A	884-959				
1N458A	885-149				
1N459	885-198				
1N459A	885-204				
1N4938	885-186				
1N914	885-060				
BAW62	885-022				
BAW76	885-034				
BAY71	884-972				
BAY72	885-125				
BAY80	885-162				

### Small Signal



Coloured band indicates cathode

a) L = 4.25, Dia = 1.85 b) L = 5.2, Dia = 2.7 c) L = 3.81, Dia = 1.71 d) L = 7.6, Dia = 2.7

Application Code: ○ General Purpose — ◇ Switching — ● High speed — ▲ Avalanche

V <sub>RRM</sub> max V	I <sub>F</sub> (AV) max mA	V <sub>F</sub> max V @ I <sub>F</sub> mA	Package	Mfr	App'n Code	Mfrs. List No.
20	350	0.44	10	(a)	ST	○ BAT47 ◆
30	100	0.4	10	(a)	ST	○ BAT42 ◆
30	100	0.45	15	(a)	ST	○ BAT43 ◆
30	110	0.54	130	(d)	—	○ OA47 ◆
40	350	0.4	10	(a)	ST	○ BAT48 ◆
50	200	0.75	10	(a)	FCH	● 1N4150
75	140	0.8	250	(d)	—	○ AAZ17 ■
75	200	1.0	10	(a)	FCH	● 1N4148

continued

V <sub>RRM</sub> max V	I <sub>F</sub> (AV) max mA	V <sub>F</sub> max V @ I <sub>F</sub> mA	Package	Mfr	App'n Code	Mfrs. List No.
80	1000	0.42	100	(b)	ST	○ BAT49 ◆
100	100	0.45	1	(a)	ST	○ BAT41 ◆
100	140	0.8	250	(d)	—	○ AAZ15 ■
100	150	0.45	10	(a)	ST	○ BAT46 ◆
100	200	1.2	200	(c)	FCH	○ 1S921
115	50	2.1	30	(d)	—	○ OA9105 ■
115	50	1.85	30	(d)	—	○ OA9505 ■
150	200	1.3	100	(a)	FCH	○ BAX16
200	200	1.2	200	(c)	FCH	○ 1S923
350	400	1.5	5	(b)	GS	○ BY206

■ Germanium ◆ Silicon schottky barrier

SD62

Order Multiple=5	Order Code	5+	25+	100+	1K+	3K+
Mfrs. List No.						
AAZ15	367-722					
AAZ17	367-734					
BAT41	367-771					
BAT42	367-783					
BAT43	367-795					
BAT46	367-801					
BAT47	367-813					
BAT48	367-825					
BAT49	367-837					
<b>Order Multiple=10</b>						
BAX16	367-941	10+	100+	1K+	3K+	
<b>Order Multiple=5</b>						
BY206	309-2471	5+	25+	100+	1K+	10K+
OA47	368-003					
OA91 05	368-027					
OA95 05	368-039					
<b>Order Multiple=10</b>						
1N4148	368-118	10+	250+	1K+	5K+	
<b>Order Multiple=10</b>						
1N4150	368-131	10+	100+	250+	1K+	3K+
1S921	368-180					
1S923	368-209					

### High Voltage Rectifier Stacks

### Philips Semiconductors



SOD-61

- Glass passivated for excellent stability
- Glass packages with Al-bonded chips allow use under high operating temperature conditions

- Controlled avalanche capable of absorbing transients during flash-over at high voltage output

V <sub>RWM</sub> (kV)	V <sub>RRM</sub> (kV)	I <sub>F</sub> (AV) (mA)	t <sub>rr</sub> ns	PACKAGE	TYPICAL APPLICATIONS
1.5	1.8	85	200*	BY584	General / TV
10	12	5	100	BY8410	TV
12	14	5	100	BY8412	TV
14	17	—	5	BY8414	General
16	19	3	100	BY8416	TV
18	22	3	100	BY8418	TV

\* = typical

SD35

Order Multiple=5	Order Code	5+	100+	1K+	3K+
Mfrs. List No.					
BY584	367-539				
BY8410	164-161				
BY8412	663-803				
BY8414	316-2503				
BY8416	164-173				
BY8418	663-815				

### High Voltage



DO-41: Plastic, L = 5.2, Dia. = 2.7  
Coloured band indicates cathode

V <sub>RRM</sub> , kV	V <sub>RRM</sub> , kV	I <sub>F</sub> (AV) max, mA	I <sub>FRM</sub> , A	Package	Mfr.	Mfrs. List No.
0.18	1.6	360	15.0	DO-41	GS	BYX10
2.0	—	250	—	SOD-57	TFK	BY203/20S

Order Multiple=5	Order Code	5+	100+	1K+	3K+
Mfrs. List No.					
BY203/20S	995-411				
BYX10	367-540				

## Low Power, Low Leakage Diodes

### DO-34

### Philips Semiconductors



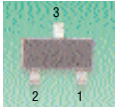
V <sub>RRM</sub> max V	I <sub>F</sub> max mA @ V <sub>F</sub> max V	I <sub>F</sub> max mA	Device Marking	Package	Mfrs. List No.
125	250	1	100	—	DO-34 BAS45A

SD92



Order Multiple=5		Price Each	
Mfrs. List No.	Order Code	5+	25+ 100+ 1K+
BAS45A	300-0266		

### SOT-23



Pin Config	1	2	3
(a)	A2	A1	K1, K2
(b)	K2	K1	A1, A2
(c)	NC	A	K
(d)	K1	A2	A1, K2



$V_{RRM}$ max. V	$I_F$ (AV) max. mA	$I_R$ nA @ V	$V_F$ V @ mA	$I_F$ mA	Device Marking	Pin Config.	Mfrs. List No.
75	250	5	75	1.25	150	JV	BAS116
75	200	5	70	1.25	150	JY	BAV199
100	250	3	50	1.4	200	D58	FLLD258
100	250	5	100	1.4	200	P8A	FLLD261
100	250	5	100	1.4	200	D63	FLLD263

SD208

Order Multiple=10		Price Each				
Mfrs. List No.	Order Code	10+	100+	1K+	3K+	
BAS116	743-215					
BAV199	743-227					
Order Multiple=5		5+	25+	100+	1K+	5K+
FLLD258	538-292					
FLLD261	538-309					
FLLD263	663-207					

### Low Leakage



DO-35 L = 3.8, Dia. = 1.88



LL-34 L = 3.5, Dia. = 1.5



TO-18 1 a 2 case 3 k



$V_{RRM}$ max. V	$I_F$ (av) max. mA	$V_F$ V @ mA	$I_F$ mA	Package	Mfrs. List No.
35	10	1.5	5	TO-92	SLX JPAD50
45	50	1.5	5	TO-18	SLX PAD5
125	200	0.8	10	DO-35	FCH 1N3595
150	200	1.0	200	LL34	FCH FDL300
150	200	1.15	300	DO-35	FCH FDH333
150	500	1.0	200	DO-35	FCH FDH300

SD343

Order Multiple=1		Price Each			
Mfrs. List No.	Order Code	1+	25+	100+	1K+
FDH300	367-989				
FDH333	741-036				
FDLL300	741-012				
JPAD50	367-990				
PAD5	368-052				
Order Multiple=10		10+	100+	250+	1K+
1N3595	368-090				

### Low Power Schottky Diodes

#### Small Signal Schottky

Philips Semiconductors



Pin Config	1	2	3
(a)	nc	a	k
(b)	a1	a2	k
(c)	k1	a2	a1, k2
(d)	k1	k2	a

Supplied on 8mm tape.



Configuration	$V_{RRM}$ max. V	$I_F$ (AV) max. mA	$V_F$ max. V @ mA	$I_F$ mA	Device Marking	Package	Pin Config.	Mfrs. List No.
Single diode	4	30	0.3	0.1	S7	SOD-323	—	1PS76SB17
Single diode	25	1000	0.3	100	P1	SOT-457	—	1PS74SB23
Single diode	30	200	0.2	0.1	2K	SOT-23	(a)	BAT754
Single diode	30	200	0.24	0.1	S0	SOD-323	—	1PS76SB10
Single diode	30	200	0.4	10	L4p	SOT-23	(a)	BAT54
Single diode	30	200	0.4	1	—	SOD-110	—	BAT254
Single diode	30	200	0.4	1	L4	SOT-323	(a)	BAT54W
<b>Dual diode</b>								
Common cathode	30	200	0.4	10	L43p	SOT-23	(b)	BAT54C
Common cathode	30	200	0.4	1	43	SOT-323	(b)	BAT54CW
Common cathode	30	200	0.2	0.1	2M	SOT-23	(b)	BAT754C
In series	30	200	0.4	10	L44p	SOT-23	(c)	BAT54S
In series	30	200	0.4	1	44	SOT-323	(c)	BAT54SW
In series	30	200	0.2	0.1	2N	SOT-23	(c)	BAT754S
In parallel	30	200	0.4	1	L41	SOT-143	—	BAT74

Configuration	$V_{RRM}$ max. V	$I_F$ (AV) max. mA	$V_F$ max. V @ mA	$I_F$ mA	Device Marking	Package	Pin Config.	Mfrs. List No.
<b>Dual diode</b>								
Common anode	30	200	0.4	10	L42p	SOT-23	(d)	BAT54A
Common anode	30	200	0.4	1	42	SOT-323	(d)	BAT54AW
Common anode	30	200	0.2	0.1	2L	SOT-23	(d)	BAT754A
Common anode	40	200	0.3	10	L8*	SOT-23	(d)	BAT721A
Common cathode	40	200	0.3	10	L9*	SOT-23	(b)	BAT721C
In series	40	200	0.3	10	L0*	SOT-23	(c)	BAT721S
<b>Dual diode array</b>								
Dual diode array	85	250	0.715	1	A4t	SOT-363	—	BAV70S

SD26

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	1K+	3K+
1PS74SB23	354-6962					
1PS76SB10	354-6974					
1PS76SB17	354-6986					
BAT54	437-578					
BAT54A	437-580					
BAT54AW	304-9462					
BAT54C	437-591					
BAT54CW	304-9474					
BAT54S	437-608					
BAT54SW	304-9486					
BAT54W	304-9498					
BAT74	304-9504					
BAT254	304-9450					
BAT721A	354-6998					
BAT721C	354-7000					
BAT721S	354-7012					
BAT754	354-7024					
BAT754A	354-7036					
BAT754C	354-7048					
BAT754S	354-7050					
BAV70S	354-7061					

### 'Mini-melf' Schottky



L = 3.6, Dia. = 1.62  
Ring denotes cathode

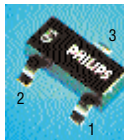
$I_F$ (av) A	$I_{FSM}$ A	$I_{FRM}$ A	$V_{RRM}$ V	$P_{TOT}$ mW	Mfrs. List No.
0.2	4.0	0.5	30	200	TMMBAT42
0.35	7.5	1.0	40	330	TMMBAT48

SD346

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	100+	250+	1K+	3K+
TMMBAT-42	742-624					
TMMBAT-48	742-636					

### SOT-23, SOD-87 Schottky Diodes

Philips Semiconductors



Pin Config.	1	2	3
(a)	a1	a2	k
(b)	k1	k2	a



Configuration	$V_{RRM}$ max. V	$I_F$ (av) max. mA	$V_F$ max. V @ mA	$I_F$ mA	Device Marking	Package	Pin Config.	Mfrs. List No.
<b>Dual Diode</b>								
Common cathode	70	70	0.41	1	75p	SOT-23	(a)	BAS70-05
Common anode	70	70	0.41	1	76p	SOT-23	(b)	BAS70-06
<b>Single Diode</b>								
Single diode	20	1000	0.45	1000	—	SOD-87	—	PRLL5817
Single diode	30	1000	0.55	1000	—	SOD-87	—	PRLL5818
Single diode	40	1000	0.65	1000	—	SOD-87	—	PRLL5819

SD71

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	1K+	3K+
BAS70-05	302-3266					
BAS70-06	302-3278					
		5+	25+	100+	250+	1K+
PRLL5817	302-3280					
PRLL5818	302-3291					
PRLL5819	302-3308					

Continued

## Value for Money

When you're looking for quality and cost effectiveness check out some of our thousands of Best Value products.

## Low Power Schottky Diodes — continued

### Schottky Diodes, 0.03A – 1A

Philips Semiconductors



**SOD80C** (Mini-melf)  
L = 3.7, Dia. = 1.6  
Grey band denotes cathode



**SOT-23**



**SOD-81** L = 5.0, Dia. = 2.15

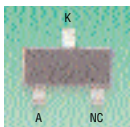
$I_F$ A	$V_{r_{rm}}$ V	$V_f$ max. V	$I_F$ @ mA	$I_{FSM}$ A	$I_{FRM}$ A	Device Marking	Package	Mfrs. List No.
0.2	30	—	—	5	0.3	—	SOD80C	BAS85
1	20	0.55	1	—	—	—	SOD81	BYV10-20
0.03	4	0.6	10	—	—	A3p	SOT-23	BAT17

SD75

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	250+	1K+
BAS85	<b>SMD304-9449</b>					
BAT17	<b>SMD300-0278</b>	0				
Order Multiple=1		1+	25+	100+	250+	1K+
BYV10-20	<b>300-0989</b>					

### High Current, 'SuperBAT' Schottky

- High current capability
- Low forward voltage



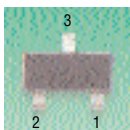
H = 1.12, W = 3.05, D = 2.5

$V_{RRM}$ V	$I_F$ mA	$V_f$ @ mV	$I_F$ @ mA	$I_{FSM}$ A	$P_{tot}$ mW	Device Marking	Mfrs. List No.
30	750	490	750	12	500	ZS7	ZHCS750
30	1000	425	1000	12	500	ZS1	ZHCS1000
40	400	500	400	6.75	250	BD	ZHCS400
40	500	550	500	6.75	330	ZS5	ZHCS500
60	500	630	500	5.5	330	S56	ZHCS506
60	750	610	750	12	500	S76	ZHCS756
60	900	600	1000	12	500	S16	ZHCS1006

SD109

Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	1K+	5K+
ZHCS400	<b>301-4850</b>					
ZHCS500	<b>301-4678</b>					
ZHCS506	<b>301-4680</b>					
ZHCS750	<b>743-770</b>					
ZHCS756	<b>301-4691</b>					
ZHCS1000	<b>743-781</b>					
ZHCS1006	<b>301-4708</b>					

### SOT-23, SOD-232 Schottky



SOT-23  
H = 1.12,  
W = 3.05,  
D = 2.5



Pin Config	1	2	3
(a)	nc	a	k
(b)	a1	a2	k
(c)	k1	a2	a1, k2
(d)	k1	k2	a

Very low turn-on voltage and ultra-fast switching diodes, suitable for UHF detectors and other high frequency switching circuits. Supplied on 8mm tape. The SC-59 is the Japanese equivalent to SOT-23, utilising the same pcb footprint and pin configuration.

Connection	$V_{RRM}$ max. V	$I_F$ (AV) max mA	$V_f$ max V	$I_F$ @ mA	Device Marking	Package	Pin Config.	Mfr.	Mfrs. List No.
Single diode	20	500	0.3	10	D3E	SOT-23	(a)	RHM	RB411D
Single diode	30	100	0.4	10	D94	SOT-23	(a)	ST	BAR42
Single diode	30	100	0.33	2	D95	SOT-23	(a)	ST	BAR43
Single diode	30	200	0.4	10	L4p/L4Z	SOT-23	(a)	ZET	BAT54
Single diode	30	300	0.24	0.1	D86	SOD-232	—	ST	BAT54J
Single diode	30	300	0.4	10	D86	SOT-23	(a)	ST	BAT54
Single diode	70	15	0.41	1	D76	SOD-232	—	ST	BAS70J
Single diode	70	30	0.41	1	D76	SOT-23	(a)	ST	BAR18
Double diode									
Common cathode	30	100	0.33	2	DB2	SOT-23	(b)	ST	BAR43C
Common cathode	30	200	0.4	10	L43	SOT-23	(b)	ZET	BAT54C
Common cathode	30	300	0.4	10	D87	SOT-23	(b)	ST	BAT54C
In series	30	100	0.33	2	DA5	SOT-23	(c)	ST	BAR43S
In series	30	200	0.4	10	L44	SOT-23	(c)	ZET	BAT54S
In series	30	300	0.4	10	D88	SOT-23	(c)	ST	BAT54S
In series	40	120	0.38	1	44	SOT-23	(c)	INF	BAS40-04
In series	70	30	0.41	1	D96	SOT-23	(c)	ST	BAS70-04
In series	70	70	0.41	1	74	SOT-23	(c)	INF	BAS70-04
Common anode	30	100	0.33	2	DB1	SOT-23	(d)	ST	BAR43A
Common anode	30	200	0.4	10	L42	SOT-23	(d)	ZET	BAT54A

SD183

### Order Multiple=5

Mfrs. List No.	Order Code	5+	25+	100+	1K+	3K+
BAR18	<b>421-558</b>					
BAR42	<b>437-876</b>					
BAR43	<b>421-560</b>					
BAR43A	<b>421-571</b>					
BAR43C	<b>421-583</b>					
BAR43S	<b>421-595</b>					
BAS40-04	<b>743-161</b>					
BAS70-04 (INF)	<b>743-173</b>					
BAS70-04 (ST)	<b>437-943</b>					
BAS70J	<b>323-9743</b>					
BAT54 (ST)	<b>302-2833</b>					
BAT54 (ZET)	<b>646-507</b>					
BAT54A	<b>646-519</b>					
BAT54C (ST)	<b>302-2845</b>					
BAT54C (ZET)	<b>646-520</b>					
BAT54J	<b>323-9731</b>					
BAT54S (ST)	<b>302-2857</b>					
BAT54S (ZET)	<b>646-532</b>					
RB411D	<b>663-153</b>					

### miniReel™

### SOT-23 Schottky Diodes



Tape width = 8mm



- 100mm reel size
- 500 pieces on each reel
- Ideal for pre-production, prototyping and production shortfalls
- Complete with leader tape

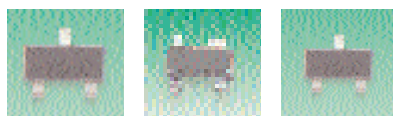
FOR DEVICE SPECIFICATION, SEE PREVIOUS COLUMN

SD501

### 500 Pieces Per Reel

Configuration	MiniReel List No.	Order Code	1+	3+	5+
Single	BAT54-MR	<b>344-8150</b>			
Common cathode	BAT54C-MR	<b>344-8149</b>			
In series	BAT54S-MR	<b>344-8162</b>			

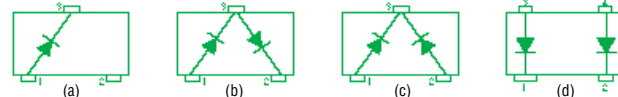
### SOT-23, SOT-323 and SOT-143 Schottky



SOT-23 SOT-143 SOT-323

Supplied on 8mm tape.

(Top view)



Min $V_{BR}$ @ $I_R$ 10µA	Max $V_f$ mV	Max Power @ 25°C mW	Max $C_T$ @ 1MHz pF	Device Marking	Package	Pin Config.	Mfr.	Mfrs. List No.
8♦	340	250	1.0	C2	SOT-23	b	AGI	HSMS-2822
20	410	250	1.2	B0	SOT-23	a	AGI	HSMS-2810
20	410	250	1.2	B2	SOT-23	b	AGI	HSMS-2812
20	410	250	1.2	B4	SOT-23	c	AGI	HSMS-2814
20	410	250	1.2	B5	SOT-143	d	AGI	HSMS-2815
70	410	250	2.0	A0	SOT-23	a	AGI	HSMS-2800
70	410	250	2.0	A2	SOT-23	b	AGI	HSMS-2802

♦  $I_R = 100\mu A$

SD228

### Order Multiple=5

Mfrs. List No.	Order Code	5+	100+	1K+	5K+
HSMS-2800	<b>549-678</b>				
HSMS-2810	<b>549-680</b>				
HSMS-2802	<b>549-708</b>				
HSMS-2812	<b>549-710</b>				
HSMS-2822	<b>549-721</b>				
HSMS-2814	<b>549-745</b>				
HSMS-2815	<b>549-770</b>				

### SOT-23 and SOT-143 Microwave Schottky Mixer Diodes

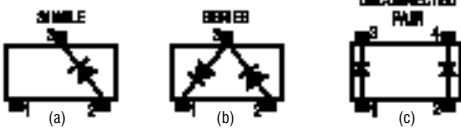


SOT-23 SOT-143

- Optimised for use at 10–14GHz
- Low capacitance
- Low conversion loss
- Low RD
- Designed for use at X/Ku-bands, ideal for DBS and VSAT downcontroller applications



(Top view)



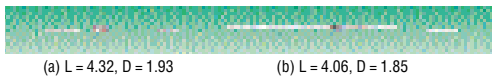
Min $V_{BR}$ @ $I_R$ 10 $\mu$ A	Max $V_F$ mV	Max Power @ 25°C mW	Max $C_T$ @ 1MHz pF	Device Marking	Package	Pin Config.	Mftrs. List No.
4	350	75	0.26	R1	SOT-23	a	HSMS-8101
4	350	75	0.26	2R	SOT-23	b	HSMS-8202
4	350	75	0.26	R5	SOT-143	c	HSMS-8205

SD429

Mftrs. List No.	Order Code	1+	100+	1K+	2500+
HSMS-8101	994-649				
HSMS-8202	994-650				
HSMS-8205	994-662 †				

† Available until stocks are exhausted

## Schottky Barrier



High performance devices for UHF/VHF applications, detecting, mixing, switching etc. Low turn-off voltage, as low as 0.34V @ 1mA. Pico-second switching speed. High breakdown voltage, up to 70V.

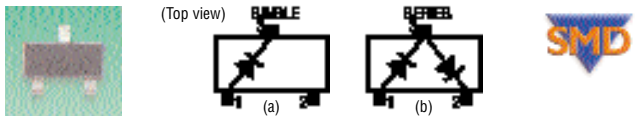
Min $V_{BR}$ @ $I_R$ 10 $\mu$ A	Max $V_F$ mV	Max Power @ 25°C mW	Max $C_T$ @ 1MHz pF	Mftr.	Package	Mftrs. List No.
8 $\diamond$	340	150	1.0	AGI	(a)	5082-2835
15	410	250	1.2	AGI	(a)	5082-2811
20	410	250	1.2	AGI	(a)	5082-2810
20	550	250	1.2	—	(a)	1N5712
60	410	400	2.2	ST	(b)	1N6263
70	410	250	2.0	AGI	(a)	5082-2800
70	410	250	2.0	ST	(a)	1N5711

$\diamond I_R=100\mu$ A

SD70

Mftrs. List No.	Order Code	5+	25+	100+	1K+	3K+
1N5711	367-552					
1N5712	367-564					
1N6263	367-576					
5082-2800	367-590					
5082-2810	367-618					
5082-2811	367-620					
5082-2835	367-631					

## SOT-23 Microwave Schottky Detector Diode



- HSMS-285x zero biased, HSMS286x DC biased
- Optimised for use from 915MHz to 5.8GHz
- Ideal for RF/ID and RF/Tag applications requiring a small and large signal detection, modulation, RF to DC conversion or voltage doubling
- High reliability, flexible package options

Max. $V_F$ mV @ 1mA	Max. Power @ 25°C mW	Typ $C_T$ @ 1MHz pF	Typical Video Resistance RV (K $\Omega$ )	Device Marking	Package	Pin Config.	Mftrs. List No.
250	75	0.30	8.0	P0	SOT-23	a	HSMS-2850
250	75	0.30	8.0	P2	SOT-23	b	HSMS-2852

SD430

Mftrs. List No.	Order Code	1+	100+	1K+	2500+
HSMS-2850	994-546				
HSMS-2852	994-560				

## RF Diodes

### Band-Switching Diodes

Philips Semiconductors



- High performance SOT-23 Package
- Used in TV VHF tuners



$V_R$ max. V	$I_F$ max. mA	$V_F$ max. V	$I_R$ @ $V_R=20V$ nA	$C_d$ @ $V_R=3V$ pF	$r_D$ max. $\Omega$
35	100	1.2	100	1	0.7

SD488

Mftrs. List No.	Order Code	5+	100+	250+	1K+	3K+
BAT18	316-3040					

### Band-Switching Diodes

Philips Semiconductors



DO-34  
L = 3.04, Dia = 1.6

- High performance hermetically sealed glass package
- Used in TV VHF tuners

$V_R$ max. V	$I_F$ max. mA	$V_F$ max. V	$I_R$ @ $V_R=20V$ nA	$C_d$ @ $V_R=3V$ pF	$r_D$ max. $\Omega$
35	100	1.2	100	1.2	0.7

SD65

Mftrs. List No.	Order Code	5+	100+	250+	1K+	3K+
BA482	300-0187 †					

† Available until stocks are exhausted

## Variable Capacitance



SOT-23  
H = 1.1, W = 3.0, D = 2.5



SOD-323

$V_R$ max. V	$I_R$ max. @ $V_R=28V$ nA	$C_d$ typ (*min) @ $V_R=1V$ pF	$C_d$ max. @ $V_R=28V$ pF	$C_d$ ratio min.	$r_s$ max.	Package	Device Marking	Mftr.	Mftrs. List No.
30	10	18.22*	2.225	8.45	0.75	SOD-323	PL	PS	BB149A
30	10	16.5	2	8	1.2	SOT-23	S12	PS	BBY39
30	10	16.5	2	8.3	1.2	SOT-23	S1	PS	BBY31
30	10	26*	6	5	0.7	SOT-23	S2	PS	BBY40

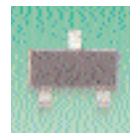
  

$V_R$ max. V	$I_R$ max. @ $V_R=25V$ nA	$C_d$ typ (*min) @ $V_R=4V$ pF	$C_d$ max. @ $V_R=4V$ pF	Tuning Ratio min.	Q@VR = 4V typ.	Package	Device Marking	Mftr.	Mftrs. List No.
30	100	33	36.6	2.5	200	SOT-23	4J	ON	MMBV2109LT1

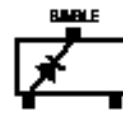
SD489

Mftrs. List No.	Order Code	5+	100+	1K+	3K+
BB149A	316-2837				
BBY31	NEW 300-0310				
BBY39	316-3076				
BBY40	316-3088				
MMBV2109LT1	NEW 352-6458				

## SOT323 PIN



H = 1.0, W = 2.2, D = 2.2



(Top View)

- If 1A (pulsed)
- High reliability
- Characterised for different applications

Agilent Technologies  
Innovating the HF Way



### Low Current, Fast Switching Diodes

Min $V_{BR}$ @ $I_R \leq 10\mu$ A	Max $C_T$ @ 1MHz pF	Max $R_s$ @ 100MHz $\Omega$	$I_F$ mA	Device Marking	Mftrs. List No.
100	0.30	5	5	G0	HSMP-389B

SD431


Mftrs. List No.	Order Code	5+	100+	250+	1K+
HSMP-389B	994-418				

Continued

## RF Diodes — continued

### AM PIN Diodes

Philips Semiconductors



SOD81

$V_{rrm}$ max. V	$t_{rr}$ (µs)	$C_{ij}$ @ $V_i = 2V$ & 1MHz typ. (pF)	$r_{fd}$ @ $I_f = 10\mu A$ max. Ω	$r_{fs}$ @ $I_f = 10mA$ max. Ω	$r_s$ @ $V_i = 2V$ & 100kHz min. Ω	Mftrs. List No.
100	20	6	6000	10	5000	BAQ800

SD443

Order Multiple=5	Order Code	5+	100+	500+	1K+
Mftrs. List No. BAQ800	163-211				

### PIN

Agilent Technologies  
Innovating the HP Way



L = 4.32, Dia = 1.93

For low power RF switching and attenuating applications. Low distortion, large dynamic range, low series resistance, low capacitance. Max power dissipation 250mW @ 25°C.

#### General Purpose Diodes

Min $V_{BR}$ @ $I_R \leq 10\mu A$ V	Max $C_T$ @ 1MHz pF	$V_R$ @ V	Max $R_S$ @ 100MHz Ω	$I_F$ @ mA	$t_{rr}$ (typ) ns	Mftrs. List No.
35	1.0	20	0.6	10	12	5082-3188
200	0.3	50	1.5	100	100	5082-3077

#### RF Current Controlled Resistor Diodes

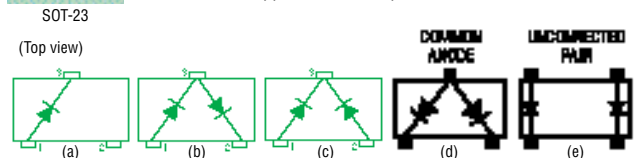
Min $V_{BR}$ @ $I_R \leq 10\mu A$ V	Max $C_T$ @ 1MHz pF	$V_R$ @ V	Max $R_S$ @ 100MHz, $I_F 100mA$ Ω	Min $R_{th}$ @ 100MHz Ω	Max $R_C$ Ω	Mftrs. List No.
100	0.4	50	2.5	1000	8	5082-3080
100	0.4	50	3.5	1500	8	5082-3081

SD72

Mftrs. List No.	Order Code	1+	25+	100+	250+
<b>General Purpose Diodes</b>					
5082-3077	367-643				
5082-3188	367-667				
<b>RF Current Controlled Resistor Diodes</b>					
5082-3080	367-679				
5082-3081	367-680				

### SOT-23 PIN and SOT-143 PIN

- $I_F = 1A$  (pulsed),  $P_{tot} = 250mW$
- Characterised for different applications
- Flexible packing options
- High reliability
- Supplied on 8mm tape



#### General Purpose Diodes

Min $V_{BR}$ @ $I_R \leq 10\mu A$ V	Max $C_T$ @ 1MHz pF	Max $R_S$ @ 100MHz Ω	Min $R_{th}$ @ 100MHz Ω	Max $R_{th}$ @ 100MHz Ω	Pin Config	Device Marking	Mftr.	Mftrs. List No.	
50	0.2	50	1.5	100	—	b	L2	AGI	HSMP-3862
200	0.3	50	1.5	100	80	a	K0	AGI	HSMP-3830
200	1.0	20	1.0	10	300	a	4R	ON	MMBV3700LT1

#### Low Distortion Attenuator Diodes

Min $V_{BR}$ @ $I_R \leq 10\mu A$ V	Max $C_T$ @ 1MHz pF	Max $R_S$ @ 100MHz, $I_F 100mA$ Ω	Min $R_{th}$ @ 100MHz Ω	Max $R_{th}$ @ 100MHz Ω	Pin Config	Device Marking	Mftr.	Mftrs. List No.
100	0.35	2.5	1000	8	a	D0	AGI	HSMP-3800
100	0.35	2.5	1000	8	c	D4	AGI	HSMP-3804
100	0.35	4.0	1500	10	c	E4	AGI	HSMP-3814

#### Low Current, Fast Switching Diodes

Min $V_{BR}$ @ $I_R \leq 10\mu A$ V	Max $C_T$ @ 1MHz pF	$V_R$ @ V	Max $R_S$ @ 100MHz Ω	$I_F$ @ mA	Pin Config	Device Marking	Mftr.	Mftrs. List No.
35	1.0	20	0.6	10	a	F0	AGI	HSMP-3820
35	1.0	20	0.6	10	b	F2	AGI	HSMP-3822
35	1.0	20	0.6	10	c	F4	AGI	HSMP-3824
35	0.3	5	2.5	5	a	G0	AGI	HSMP-3890
35	0.3	5	2.5	5	b	G2	AGI	HSMP-3892
100	0.3	5	2.5	5	e	G5	AGI	HSMP-3895

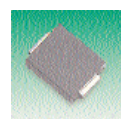
SD227

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
HSMP-3800	549-794					
HSMP-3804	549-903					
HSMP-3814	549-915					
HSMP-3820	549-812					
HSMP-3822	549-873					
HSMP-3824	572-548					
HSMP-3830	549-824					
HSMP-3862	994-431					
HSMP-3890	549-848					
HSMP-3892	549-897 †					
MMBV3700LT1	NEW 352-6460					

† Available until stocks are exhausted

## Power Diodes – Standard Recovery

### DO-214



	H	L	D	W	X	Y	Z
DO-214BA	3.00	5.74	2.90	5.9	2.3	1.7	1.8
DO-214AC	2.44	5.28	2.79	5.9	2.3	1.7	1.8
DO-214AA	2.43	5.45	3.58	6.9	3.3	2.2	1.8
DO-214AB	2.62	8.13	6.22	8.13	5.08	3.2	1.52

Footprint

High reliability glass passivated rectifiers. GF1 and S1 series equivalent to the 1N4000 series. Supplied on 12mm tape in any quantity.

$I_{AV}$ A	$I_{FSM}$ A	$V_F$ V	$I_F$ @ 25°C A	Package	Mftr.	Type/ Series
1.0	30	1.2	1.0	DO-214	TOSH	U1...
1.0	30	1.1	1.0	DO-214AC	ON	MRA...
1.0	30	1.1	5.0	DO-214BA	GS	GF1...
1.0	30	1.0	1.0	DO-214AC	FCH/GS	S1...
1.5	30	1.1	1.5	DO-214AC	TFK	BYG10M
2.0	50	1.15	5.0	DO-214AA	FCH	S2M
3.0	100	1.15	1.0	DO-214AB	FCH	S3...


SD185

Order Multiple=10	Order Code	10+	100+	200+	500+	1K+
<b>General Purpose Diodes</b>						
1000	BYG10M	995-162				
50	GF1A	.251-460				
100	GF1B	.251-471				
200	GF1D	.251-483				
400	GF1G	.251-495				
600	GF1J	.251-501				
800	GF1K	.251-513				
1000	GF1M	.251-525				
200	MRA4003T3	162-7697				
400	MRA4004T3	165-8244				
600	MRA4005T3	165-8256				
800	MRA4006T3	165-8268				
1000	MRA4007T3	165-8270				
50	S1A (FCH)	165-669				
50	S1A (GS)	547-499				
100	S1B	547-505				
200	S1D (GS)	547-517				
400	S1G (FCH)	165-694				
400	S1G (GS)	547-529				
600	S1J (FCH)	165-700				
600	S1J (GS)	547-530				
1000	S1M	165-724				
1000	S2M	646-982				

† Available until stocks are exhausted

### Controlled Avalanche

Philips Semiconductors



SOD-87

- High reliability glass passivation process
- Low leakage current
- Good stability
- Guaranteed avalanche energy absorption capability
- Supplied on 8mm tape

$I_{F(AV)}$ A	$I_r$ mA	$V_F$ @ V	$I_F$ @ A	Series
1.4	0.001	1.05	1	BYD17
1.5	0.001	1.1	1	BYD37

SD490

Order Multiple=5	Order Code	5+	100+	1K+	3K+
<b>General Purpose Diodes</b>					
200	BYD17D	17DPH	300-0965		
400	BYD17G	17GPH	316-2692		
600	BYD17J	17JPH	316-2709		
800	BYD17K	17KPH	316-2710		

continued

### Order Multiple=5

$V_{RM}$ max., V	Mfrs. List No.	Device Code	Order Code	Price Each			
				5+	100+	1K+	3K+
1000	BYD17M	17MPH	<b>316-2722</b>				
200	BYD37D	37DPH	<b>316-2643</b>				
400	BYD37G	37GPH	<b>316-2655</b>				
600	BYD37J	37JPH	<b>316-2680</b>				

### Order Multiple=1

$V_{RM}$ max., V	Mfrs. List No.	Order Code	Price Each				
			1+	25+	100+	1K+	5K+
50	1N4001 (MC)	<b>251-677</b>					
100	1N4002 (MC)	<b>251-689</b>					
200	1N4003 (MC)	<b>251-690</b>					
400	1N4004 (MC)	<b>251-707</b>					
600	1N4005 (MC)	<b>251-719</b>					
800	1N4006 (MC)	<b>251-720</b>					
1000	1N4007 (MC)	<b>251-732</b>					

## General Purpose Rectifiers

Philips Semiconductors



SOD-87      SOD-57      SOD-81      SOD-59

$I_D$ (AV)/ $I_F$ (AV) (A)	$V_{RM}$ (V)	$V_F$ (V) @	$I_F$ (A)	PACKAGE			
				SMD		LEADED	
				SOD87	SOD57	SOD81	SOD59 (TO220AC)
1.4	1000	1.05	1			BYD13M	
1.6	100	1.1	1	PRLL4002	BYW54		
1.8	600	1	1		BYW54		
1.8	800	1	1		BYW55		
1.8	1000	1	1		BYW56		
7	300	1.05	5				BT249-300
7	600	1.05	5				BY249-600

SD31

### Order Multiple=1

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
BY249-300	<b>364-710</b>					
BY249-600	<b>364-721</b>					

Order Multiple=5	5+	100+	250+	1K+	3K+
BYD13M	<b>682-056</b>				
BYW54	<b>367-230</b>				
BYW56	<b>367-254</b>				
PRLL4002	<b>SMD 316-2734</b>				

## 1A to 6A, Standard Axial Rectifiers



DO-41, 30S, DO-201AD, 60S, P600, R-6      DO-204AP, G3      194-04

$I_F$ (av) A	$I_{SM}$ A	Package	Mfr.	Type/*Series	$I_F$ (av) A	$I_{SM}$ A	Package	Mfr.	Type/*Series
<b>Glass Package</b>					<b>Plastic Package (continued)</b>				
1	50	DO-204AP	GS	1N5060	3	200	DO-201AD	MC	1N5400*
3	125	G3	GS	1N5624/6	6	400	60S	MS	60S*
<b>Plastic Package</b>					6	400	P600	GS	GI750*
1	30	DO-41	FCH/MC/ON	1N4000*	6	250	R-6	MC	6A*
1	30	DO-41	GS	1N4007GP	6	400	P600	MC	P600*
3	150	30S	MS	30S*	6	400	194-04	ON	MR700*

SD63

### Order Multiple=5

$V_{RM}$ max., V	Mfrs. List No.	Order Code	5+	30+	100+	300+	1K+
50	GI750	<b>364-940</b>					
100	GI751	<b>364-952</b>					
200	GI752	<b>364-964</b>					
400	GI754	<b>434-360</b>					
600	GI756	<b>364-976</b>					
800	GI758	<b>434-371</b>					

Order Multiple=1	1+	25+	100+	1K+
50 MR750			<b>NEW 352-6513</b>	
100 MR751			<b>234-3848</b>	
200 MR752			<b>638-213</b>	
400 MR754			<b>234-3861</b>	
600 MR756			<b>638-225</b>	
1000 MR760			<b>300-4867</b>	
50 P600A			<b>331-0050</b>	
200 P600D			<b>331-0061</b>	
400 P600G			<b>330-6835</b>	
800 P600K			<b>330-6847</b>	
1000 P600M (MC)			<b>330-6823</b>	
1000 P600M (GS)			<b>518-591</b>	
50 1N4001 (ON)			<b>NEW 352-5326</b>	
400 1N4004 (ON)			<b>NEW 352-5338</b>	
1000 1N4007 (ON)			<b>NEW 352-5340</b>	

Order Multiple=10	10+	500+	1K+	5K+
50 1N4001 (FCH)			<b>365-117</b>	
100 1N4002 (FCH)			<b>365-142</b>	
200 1N4003 (FCH)			<b>365-178</b>	
400 1N4004 (FCH)			<b>365-208</b>	
600 1N4005 (FCH)			<b>365-233</b>	
800 1N4006 (FCH)			<b>365-257</b>	
1000 1N4007 (FCH)			<b>365-282</b>	
1000 1N4007GP (FCH)			<b>365-294</b>	

continued

## High Current, Metal Stud Diodes

International  
ICR Rectifier



DO-4 (10-32 UNF 2A)      DO-5 (¼-28 UNF 2A)      DO-8 (½-20 UNF 2A)  
DO-9 (¾-16 UNF 2A)

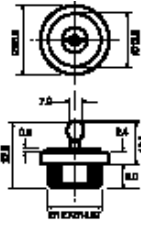
SD69

$I_F$ (av) A	$V_{RM}$ max. V	Package	Mfrs. List No.	Order Code	1+	25+	100+
<b>Stud Cathode</b>							
12	200	DO-4	12F20	<b>365-397</b>			
12	1000	DO-4	12F100	<b>365-403</b>			
12	1200	DO-4	12F120	<b>506-606</b>			
16	100	DO-4	16F10	<b>365-427</b>			
16	200	DO-4	16F20	<b>365-439</b>			
16	400	DO-4	16F40	<b>365-440</b>			
16	800	DO-4	16F80	<b>365-452</b>			
16	1000	DO-4	16F100	<b>365-464</b>			
16	1200	DO-4	16F120	<b>365-476</b>			
25	600	DO-4	25F60	<b>506-620</b>			
25	1200	DO-4	25F120	<b>506-643</b>			
40	100	DO-5	40HF10	<b>365-609</b>			
40	200	DO-5	40HF20	<b>365-622</b>			
40	400	DO-5	40HF40	<b>365-646</b>			
40	600	DO-5	40HF60	<b>365-660</b>			
40	800	DO-5	40HF80	<b>365-683</b>			
40	1000	DO-5	40HF100	<b>365-701</b>			
40	1200	DO-5	40HF120	<b>365-725</b>			
70	100	DO-5	70HF10	<b>365-920</b>			
70	200	DO-5	70HF20	<b>365-944</b>			
70	400	DO-5	70HF40	<b>365-968</b>			
70	600	DO-5	70HF60	<b>365-981</b>			
70	800	DO-5	70HF80	<b>366-006</b>			
70	1000	DO-5	70HF100	<b>366-020</b>			
70	1200	DO-5	70HF120	<b>366-043</b>			
70	1600	DO-5	70HF160	<b>366-067</b>			
85	200	DO-5	85HF20	<b>366-183</b>			
85	400	DO-5	85HF40	<b>366-201</b>			
85	600	DO-5	85HF60	<b>366-225</b>			
85	1200	DO-5	85HF120	<b>366-286</b>			

continued



## High Current



(a) B-47PP  
L = 22.5 (overall),  
Dia. = 13.27



(b) DO-200AA  
L = 14.4, Dia. = 42

International  
ICAR Rectifier

$I_F$ (AV) A @	$T_C$ °C	$V_{RRM}$ V	$I_{FSM}$ @ 50Hz A	$R_{th(jc)}$ °C/W	Package	Mfrs. List No.
50	150	400	600	0.6	(a)	8AF4NPP*
50	150	400	600	0.6	(a)	8AF4RPP**
540	55	2500	5090	0.073	(b)	SD300C25C
650	55	800	5090	0.073	(b)	SD300C08C
650	55	1200	5090	0.073	(b)	SD300C12C
650	55	1600	5090	0.073	(b)	SD300C16C
800	55	800	6490	0.073	(b)	SD400C08C
800	55	1200	6490	0.073	(b)	SD400C12C
800	55	2400	6490	0.073	(b)	SD400C24C

\* Stud cathode \*\* Stud anode

SD361

Mfrs. List No.	Order Code	1+	6+	24+
SD300C08C	741-905			
SD300C12C	741-917			
SD300C16C	741-929			
SD300C25C	741-930			
SD400C08C	741-942			
SD400C12C	741-954			
SD400C24C	741-966			
8AF4NPP	741-887	1+	50+	100+
8AF4RPP	741-899			

## High Voltage Rectifiers



- Hermetically sealed ceramic tubes
- 663-931 is wire ended
- Avalanche rated
- Screw connections
- Air or oil mounting

663-931 (not illustrated) L (excl. leads) = 42, dia = 10.5, lead length = 40  
663-943 L = 101, dia = 15, 663-955 L = 246, dia = 21

$V_{RRM}$ KV	$V_{BR}$ KV	$V_{RMS}$ KV	$I_F$ AV A	$I_F$ AV (oil) A	$V_R$ @ $I_R = 1A$ A	$R_{thja}$ °C/W	Mfrs. List No.
6	7.5	2.5	0.45	0.45	5	60	HSKE2500/1100-0.3
12	15.0	5.0	0.6	0.72	11	15	HSKE5000/2200-0.5
24	30.0	10.0	1.3	1.55	20	5	HSKE10000/4500-1.2

SD244

Mfrs. List No.	Order Code	1+	10+	50+
HSKE2500/1100-0.3	663-931			
HSKE5000/2200-0.5	663-943			
HSKE10000/4500-1.2	663-955			

## 3800A to 4700A – 'Puk' Style



case style A-24 (K-PLIK)

- High current
- High voltage rating <1000V
- High surge current capability
- Diffused junction
- Choice of body sizes

$I_F$ (av) A @	$T_C$ °C	$V_{RRM}$ V @	$I_{FSM}$ 50Hz, A	$R_{th(jc)}$ C/W	Package	Mfrs. List No.
3800	56	1000	35800	0.020	K-PUK	SD3000C10K
4700	55	400	35800	0.014	T-PUK	SD3000C04T
4700	55	800	35800	0.014	T-PUK	SD3000C08T
4700	55	1000	35800	0.014	T-PUK	SD3000C10T

SD475

Mfrs. List No.	Order Code	1+	6+	24+
SD3000C10K	315-6114			
SD3000C04T	315-6096			
SD3000C08T	315-6102			
SD3000C10T	315-6126			

## Diode Capsules



- 720A and 1110A current rating
- Metal-ceramic package
- Precious metal pressure contacts
- 1200V reverse voltage

SKN501/12 H = 14, Dia = 41, Contact Dia = 19  
SKN870/12 H = 26, Dia = 57.3, Contact Dia = 32

$I_F$ (AV) A	$V_{RRM}$ V	$I_{FSM}$ A	$V_F$ V @	$I_F$ A	$R_{th(jc)}$ (DSC) °C/W	Mfrs. List No.
720	1200	7000	1.65	1500	0.075	SKN501/12

SD248

Mfrs. List No.	Order Code	1+	Price Each	50+
SKN501/12	.663-918		25+	

## Power Diodes – Fast Recovery

### SMA, SMC, SOD-106A



	H	W	D	X	Y	Z
SMA	2.29	5.28	2.79	4.1	1.7	1.8
SMC	2.62	8.13	6.22	6.5	3.2	1.8
SOD106A	2.65	5.50	2.50	5.5	2.5	3.1



High reliability glass passivated rectifiers. Supplied on 12mm tape in any quantity.

$I_F$ (AV) A	$V_{RRM}$ V	$I_{FSM}$ A	$t_{rr}$ max ns	$V_F$ V @	$I_F$ A	Package	Mfr.	Mfrs. List No.
1.0	50	30	150	1.2	0.6	SMA	GS	RS1A
1.0	100	30	150	1.2	0.6	SMA	GS	RS1B
1.0	200	30	150	1.2	0.6	SMA	GS	RS1D
1.0	400	30	150	1.2	0.6	SMA	GS	RS1G
1.0	600	30	250	1.2	0.6	SMA	GS	RS1J
1.5	1000	300	120	1.5	1.0	SOD106A	TFK	BYG21M
3.0	100	100	150	1.3	2.5	SMC	GS	RS3B
3.0	800	100	500	1.3	2.5	SMC	GS	RS3K

SD204

Order Multiple=5	Order Code	5+	100+	1K+	3K+	
BYG21M	995-435					
Order Multiple=10		10+	100+	200+	500+	1K+
RS1A	547-037					
RS1B	547-049					
RS1D	547-050					
RS1G	547-062					
RS1J	547-074					
Order Multiple=5		5+	100+	200+	500+	1K+
RS3B	.547-098					
RS3K	.547-130					

Continued

## Scheduled Deliveries

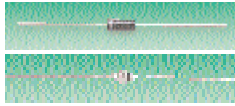
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## Ex-stock Products

The world's largest choice of electronic, and industrial products available worldwide for same day despatch.

## Power Diodes – Fast Recovery — continued

### 0.5A to 6A Axial



<b>TS-1</b> L = 3.3, Dia. = 2.7	<b>R-1</b> L = 3.5, Dia. = 2.6
<b>DO-41</b> L = 5.2, Dia. = 2.7	<b>R-6</b> L = 9.1, Dia. = 7.2
<b>DO-15</b> L = 7.6, Dia. = 3.6	<b>F126</b> L = 6.35, Dia. = 3.05
<b>DO-201AD</b> L = 9.5, Dia. = 5.6	<b>DO-27A</b> L = 9.8, Dia. = 5.1

I <sub>F</sub> (av)	I <sub>FSM</sub>	t <sub>rr</sub> max.	V <sub>F</sub> @ I <sub>F</sub>	I <sub>F</sub>	Package	Mftr.	List No./Series
1.0	150	30	1.3	1.0	TS-1	MC	F1T1
1.0	150	30	1.3	1.0	R-1	MC	1F4
1.0	150	30	1.2	1.0	DO-41	MC	1N493...
1.0	150	30	1.3	1.0	DO-41	MC	FR10...
1.0	150	30	1.3	1.0	DO-41	MC	BA157/9
1.0	500	30	1.3	1.0	DO-41	MC	PS1010R
1.5	150	50	1.3	1.5	DO-15	MC	FR15...
2.0	250	70	1.3	3.0	DO-201AD	MC	BY298/9
3.0	100	300	1.25	3.0	DO-201AD	ON	MR85...
3.0	200	150	1.25	3.0	DO-27A	ST	PFR856
3.0	150	100	1.3	3.0	DO-27A	ST	BYT13-1000
3.0	150	150	1.3	3.0	DO-201AD	MC	FR30...
3.0	500	200	1.3	3.0	DO-201AD	MC	PS3010R
6.0	150	200	1.3	6.0	R-6	MC	FR60...

I <sub>F</sub> (av)	I <sub>FSM</sub>	t <sub>rr</sub> max.	V <sub>F</sub> @ I <sub>F</sub>	I <sub>F</sub>	Package	Mftr.	List No./Series
0.5	20	150	1.5	1.0	DO-41	GS	BA157GP
0.5	20	500	1.5	1.0	DO-41	GS	BA159GP

SD320

V <sub>RRM</sub> max., V	Mftrs. List No.	Order Code	5+	25+	100+	1K+
400	BA157	739-923				
400	BA157GP	366-365				
1000	BA159	739-935				
1000	BA159GP	366-377				
400	BY298	739-947				
800	BY299	739-959				
1000	BYT13-1000	366-523				
<b>Order Multiple=10</b>			<b>10+</b>	<b>100+</b>	<b>1K+</b>	<b>5K+</b>
200	FR103	739-870				
1000	FR107	739-893				
<b>Order Multiple=5</b>			<b>5+</b>	<b>25+</b>	<b>100+</b>	<b>1K+</b>
600	FR155	739-911				
<b>Order Multiple=5</b>			<b>5+</b>	<b>100+</b>	<b>1K+</b>	<b>5K+</b>
600	FR305	739-984				
1000	FR307	739-996				
50	FR601	740-007 †				
200	FR603	740-019				
1000	FR607	740-032 †				
200	MR852RL	NEW 352-6537				
400	MR854RL	NEW 352-6549				
600	MR856RL	NEW 352-6550				
1000	PS1010R	330-6940				
1000	PS3010R	330-7001				
<b>Order Multiple=10</b>			<b>10+</b>	<b>100+</b>	<b>1K+</b>	<b>5K+</b>
50	F1T1	739-844				
600	PFR856	366-791				
400	1F4	330-6902				
50	1N4933	366-924				
100	1N4934	366-936				
200	1N4935	366-948				
400	1N4936	366-950				
600	1N4937	366-961				

† Available until stocks are exhausted

### High Efficiency



- Fast reverse recovery time, t<sub>rr</sub>
- Low forward voltage, V<sub>F</sub>
- Low cost axial packages

I <sub>F</sub> (av)	I <sub>FSM</sub>	t <sub>rr</sub> max.	V <sub>F</sub> @ I <sub>F</sub>	I <sub>F</sub>	Package	L	Dia.	Mftrs. List No./Series
1.0	30	50	1.0	1.0	DO-41	5.2	2.7	HER10*
1.0	30	50	1.0	1.0	DO-41	5.2	2.7	UF102
1.0	30	75	1.7	1.0	DO-41	5.2	2.7	UF108
1.5	50	50	1.0	1.5	DO-15	7.5	3.6	HER15*
3.0	150	50	1.0	3.0	DO-201AD	9.5	5.6	HER30*
3.0	150	50	1.1	3.0	DO-201AD	9.5	5.3	UF304
3.0	150	75	1.7	3.0	DO-201AD	9.5	5.3	UF308
6.0	200	60	1.3	6.0	R-6	9.1	7.2	HER60*
6.0	300	50	1.0	6.0	P600	9.1	9.1	UF600/601

SD298

V <sub>RRM</sub> max., V	Mftrs. List No.	Order Code	10+	100+	1K+	5K+
50	HER101	646-738 †				
200	UF102	330-7086				
400	HER105	646-751 †				
800	HER107	646-763				
800	UF108	330-7098				
50	HER151	739-777				
200	HER153	739-789				
300	HER154	739-790				

continued

V <sub>RRM</sub> max., V	Mftrs. List No.	Order Code	5+	100+	500+	1K+
50	HER301	706-693 †				
300	HER304	739-819 †				
400	HER305	706-711				
400	UF304	330-7104				
800	UF308	330-7116				
<b>Order Multiple=1</b>			<b>1+</b>	<b>25+</b>	<b>100+</b>	<b>1K+</b>
50	HER601	706-735				
50	UF600	330-7128				
100	HER602	706-747 †				
100	UF601	330-7130				
200	HER603	739-820				
400	HER605	706-759				
600	HER604	739-832				

† Available until stocks are exhausted

### Fast Recovery Diodes



SOD-81

### Philips Semiconductors



SOD-57



SOD-64



SOD-59

- Soft recovery design to minimise circuit switching oscillations and EMI
- Glass passivation and sealing for excellent stability under all conditions
- Very high maximum reverse voltages

I <sub>D</sub> (AV)/I <sub>F</sub> (AV) (A)	V <sub>RRM</sub> (V)	t <sub>rr</sub> (ns)	LEADED PACKAGES			
			SOD81	SOD57	SOD64	SOD59
1.3	200	250	BYD33D			
1.3	600	250	BYD33J			
1.3	1000	300	BYD33M			
1.3	1400	500	BYD33V			
1.6	200	250		BYV95A		
1.6	400	250		BYV95B		
1.6	600	250		BYV95C		
1.6	800	300		BYV96D		
1.6	1000	300		BYV96E		
3.1	200	250			BYW95A	
3.1	600	250			BYW95C	
3.1	800	300			BYW96D	
3.1	1000	300			BYW96E	
8	200	135				BY229-200
8	600	135				BY229-600
8	800	135				BY229-800
8	800	135				BY329-800
8	1000	135				BY329-1000

SD24

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
BY229-200	366-389					
BY229-600	366-390					
BY229-800	366-407					
BY329-1000	366-420					
BY329-800	435-030					
<b>Order Multiple=5</b>		<b>5+</b>	<b>100+</b>	<b>500+</b>	<b>1K+</b>	<b>3K+</b>
BYD33D	367-308					
BYD33J	367-310					
BYD33M	367-321					
BYD33V	164-148 †					
BYV95A	367-412					
BYV95B	367-424					
BYV95C	367-436					
BYV96D	367-448					
BYV96E	367-450					
BYW95A	367-461					
BYW95C	367-485					
BYW96D	437-505					
BYW96E	367-497					

† Available until stocks are exhausted

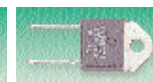
### 5A to 60A



DO-220



SOD-93



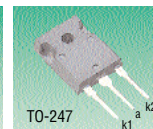
Isolated (DOP-3I)



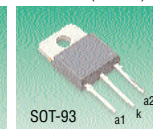
(a) 10-32 UNF24  
(b) Metric M5



TO-220



TO-247



SOT-93



$I_f$ (av)	$V_{RM}$ max.	$t_{rr}$ (max.)	Package	Mfrs.	Mfrs. List No.	$I_f$ (av)	$V_{RM}$ max.	$t_{rr}$ (max.)	Package	Mfrs.	Mfrs. List No.
* A	V	ns	age			* A	V	ns	age		
8	200	35	DO-220	ST	BYW80-200	16	600	90	DO-4(b)	IR	16FL60S02
8	200	35	DO-220	ST	BYW29-200	20	200	35	TO-220	ST	BYW51-200
8	400	35	DO-220	ST	BYT08P-400	25	200	50	SOD-93	ST	BYW77P-200
8	400	75	DO-220	ST	BYT08PI-400	25	200	50	DOP-3I	ST	BYW77PI-200
8	600	150	DO-220	ST	BY233-600	27	400	60	TO-247	—	C25P40FR
8	1000	155	DO-220	ST	BYT08PI-1000	30	150	25	SOT-93	ST	BYW99P-150
10	1500	600	DO-220	PS	BY359-1500	30	200	35	SOT-93	ST	BYW99P-200
12	1000	50	DO-220	ST	BYT12P-1000	30	400	50	SOD-93	ST	BYT30P-400
12	1000	50	DO-220	ST	BYT12PI-1000	30	400	50	DOP-3I	ST	BYT30PI-400
12	1000	65	DO-220	TFK	BYT12P/1000A	30	1000	70	SOD-93	ST	BYT30PI-1000
12	1500	350	DO-220	PS	BY459-1500	30	1000	70	DOP-3I	ST	BYT30PI-1000
15	200	35	DO-220	ST	BYW81P-200	60	200	50	SOT-93	ST	BYV52-200
15	200	35	DO-220	ST	BYW81PI-200	60	400	100	SOD-93	ST	BYT60P-400
16	400	35	TO-220	ST	BYT16P-400						

\*Total forward current with both diodes conducting

SD80

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
BY233-600	<b>366-419</b>					
BY359-1500	<b>366-444</b>					
BY459-1500	<b>164-150</b>					
BYT08P-400	<b>437-761</b>					
BYT08PI-400	<b>742-521</b>					
BYT08PI-1000	<b>742-533</b>					
BYT12PI-1000	<b>505-997</b>					
BYT12P-1000	<b>437-700</b>					
BYT12P/1000A	<b>995-265</b>					
BYT16P-400	<b>437-748</b>					
BYT30P-400	<b>437-736</b>					
BYT30P-1000	<b>366-559</b>					
BYT30PI-400	<b>742-545</b>					
BYT30PI-1000	<b>366-560</b>					
BYT60P-400	<b>742-557</b>					
BYV52-200	<b>742-569</b>					
BYW29-200	<b>742-582</b>					
BYW51-200	<b>505-900</b>					
BYW77P-200	<b>505-924</b>					
BYW77PI-200	<b>996-567</b>					
BYW80-200	<b>366-705</b>					
BYW81P-200	<b>505-950</b>					
BYW81PI-200	<b>505-961</b>					
BYW99P-150	<b>367-175</b>					
BYW99P-200	<b>505-973</b>					
C25P40FR	<b>737-835</b>					
16FL60S02	<b>366-997</b>					

## Fast Recovery Power Modules



Pin Out	1	2	3	4
a	K1	A2	K2	A1
b	A1	K1	K2	A2
c	A2	K2	K1	A1

$V_{RRM}$ V	$I_F^*$ (av) A	$t_{rr}$ max. ns	$V_F$ max. V	Pin Out	Mfrs. List No.
200	100	60	1.25	a	BYV54V-200
200	100	60	1.15	b	BYV541V-200
200	200	80	1.25	b	BYV255V-200
400	60	100	1.5	a	BYT230PIV-400
400	120	100	1.5	b	BYT261PIV-400
600	60	65	1.75	b	STTA6006TV1
600	60	65	1.5	a	STTA6006TV2
600	120	80	1.75	b	STTA12006TV1
1000	60	165	1.9	a	BYT230PIV-1000
1000	120	170	1.9	b	BYT1261PIV-1000
1200	50	60*	2.1	b	STTA5012TV1
1200	90	115	2.05	a	STTA9012TV2
1200	90	115	2.05	b	STTA9012TV1

\*Total forward current with both diodes conducting

SD290

Mfrs. List No.	Order Code	1+	5+	10+	25+	50+
BYT230PIV-400	<b>367-084</b>					
BYT230PIV-1000	<b>367-096</b>					
BYT261PIV-400	<b>367-102</b>					
BYT261PIV-1000	<b>367-114</b>					
BYV54V-200	<b>367-140</b>					
BYV255V-200	<b>367-151</b>					
BYV541V-200	<b>705-688</b>					
STTA5012TV1	<b>332-8296</b>					
STTA6006TV1	<b>705-860</b>					
STTA6006TV2	<b>707-582</b>					
STTA9012TV1	<b>705-871</b>					
STTA9012TV2	<b>519-650</b>					
STTA12006TV1	<b>707-594</b>					

## Fast, Soft-Recovery



Glass DO-41 L = 5.2, Dia. = 2.7 Glass DOT-30B L = 4.2, Dia. = 3.0

Soft recovery diodes offer reduced RFI emission due to the reduced slope of their reverse recovery current characteristic.

$V_{RRM}$ V	$I_F$ (AV) A	$I_{FRM}$ A	$I_{FSM}$ A	$t_{rr}$ max. ns	Package	Mfrs.	Mfrs. List No.
600	1.25	—	30	150	DOT-30B	TFK	BYT42J
1000	1.0	—	30	500	DO-41	GS	RGP10M
1000	1.25	—	30	200	DOT-30B	TFK	BYT42M

SD125

Order Multiple=5	Order Code	5+	25+	100+	250+	1K+
Mfrs. List No.						
BYT42J	<b>995-472 †</b>					
BYT42M	<b>995-484</b>					
Order Multiple=1		1+	100+	1K+	3K+	
RGP10M	<b>259-810</b>					

† Available until stocks are exhausted

## Parallel Efficiency Diodes



Glass BY228: L = 5.0, Dia = 4.5  
Glass BY448: L = 4.57, Dia = 3.81

Parallel efficiency diodes offer high reverse voltage capability and controlled recovery time, for use in horizontal scan circuits of TV monitors and receivers.

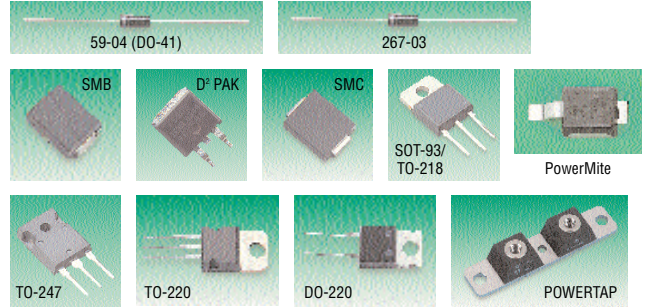
$V_{RRM}$ max. V	$I_{FRM}$ max. A	$I_{FRM}$ max. A	$T_{100}$ max. $\mu$ s	Mfrs. List No.
1500	4	8	20	PS/TFK
1500	5	10	20	PS/TFK

SD127

Mfrs. List No.	Order Code	1+	100+	1K+	3K+
BY228 (PS)	<b>366-304</b>				
BY228 (TFK)	<b>995-149</b>				
BY448 (PS)	<b>366-316</b>				
BY448 (TFK)	<b>995-150</b>				

## Power Diodes – Ultra-Fast Recovery

### Power Diode Package Outlines



SD382

### Ultra Fast, Epitaxial

Philips Semiconductors



SOD-87



- $I_{RRM}$  repetitive ruggedness guaranteed
  - Wide package range available (including SMD)
  - Best  $V_f/I_F/T_j$  combination available giving low losses
  - Excellent reverse recovery behaviour gives reduced switching losses:
    - 150V/200V types offer  $T_{rr} < 25$ ns
    - 300V/400V/500V types offer  $T_{rr} < 60$ ns
- All feature low stored charge giving a soft recovery characteristic

\* Power Factor Correction Diodes

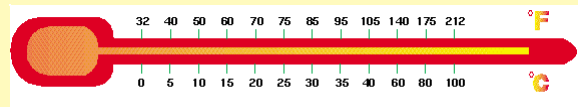
$I_O$ (AV)/ $I_F$ (av) (A)	$V_{RRM}$ (V)	$V_F$ (V) @	$I_F$ (A)	SINGLE/DUAL	SOD87
2	50	0.98	1	SINGLE	BYD77A
2	100	0.98	1	SINGLE	BYD77B
2	200	0.98	1	SINGLE	BYD77D
1.85	400	1.05	1	SINGLE	BYD77G

SD491

Order Multiple=5	Order Code	5+	25+	100+	250+	1K+
Mfrs. List No.						
BYD77A	<b>316-2606</b>					
BYD77B	<b>316-2618</b>					
BYD77D	<b>316-2620</b>					
BYD77G	<b>316-2631</b>					

Continued

## Temperature Conversion



## Power Diodes – Ultra-Fast Recovery — continued

### Ultra-Fast Recovery Diodes



$I_F$ (av) A	$I_F$ (rms) A	$V_{RRM}$ V	$V_{FSM}$ V	$I_{FSM}$ A	$t_{rr}$ max (*typ) ns	$V_F$ V	@ $I_F$ A	Package	Mfrs. List No.
8	16	600	—	120	30	2.1	8	TO-220AC	8ETH06
8	—	1200	1300	170	80	1.3	8	D-Pak	8EWF12S
10	—	1000	1100	160	80	1.33	10	TO-220AC	10ETF10
10	—	1200	1300	160	80	1.33	10	TO-220AC	10ETF12
10	—	1200	1300	160	80	1.33	10	D2-PAK	10ETF12S
15	30	600	—	200	35	2.1	15	TO-220AC	15ETH06
20	—	1000	1100	355	95	1.31	20	TO-220AC	20ETF10
20	—	1200	1300	355	95	1.31	20	TO-220AC	20ETF12
30	—	1000	1100	350	95	1.41	30	TO-247	30CPF10
30	—	1200	1300	350	95	1.41	30	TO-247	30CPF12
30	—	1000	1100	350	95	1.41	30	TO-247AC	30EPF10
30	—	1200	1300	350	95	1.41	30	TO-247AC	30EPF12
40	—	1000	1100	475	95	1.25	20	TO-247AC	40EPF10
40	—	1200	1300	475	95	1.25	20	TO-247AC	40EPF12
60	—	1000	1100	700	95	1.2	30	TO-247	60CPF10
60	—	1200	1300	700	95	1.2	30	TO-247	60CPF12
60	—	1000	1100	700	95	1.2	30	TO-247AC	60EPF10
60	—	1200	1300	700	95	1.2	30	TO-247AC	60EPF12
70	135	200	—	600	70	1.35	80	PowlRtab <sup>®</sup>	70EPF02
70	135	400	—	600	70	1.35	80	PowlRtab <sup>®</sup>	70EPF04
70	135	600	—	600	70	1.35	80	PowlRtab <sup>®</sup>	70EPF06
70	135	1000	1100	700	95	1.4	85	PowlRtab <sup>®</sup>	70EPF10
70	135	1200	1300	700	95	1.4	85	PowlRtab <sup>®</sup>	70EPF12
80	—	1000	1100	1100	90	1.2	40	PowlRtab <sup>®</sup>	80EPF10
80	—	1200	1300	1300	90	1.2	40	PowlRtab <sup>®</sup>	80EPF12
100	160	200	—	800	95	1.4	100	PowlRtab <sup>®</sup>	85EPF02
100	160	400	—	800	95	1.4	100	PowlRtab <sup>®</sup>	85EPF04
100	160	600	—	800	95	1.4	100	PowlRtab <sup>®</sup>	85EPF06
100	160	1000	1100	800	95	1.4	100	PowlRtab <sup>®</sup>	85EPF10
100	160	1200	1300	800	95	1.4	100	PowlRtab <sup>®</sup>	85EPF12

$I_F$ (av) A	$V_{RRM}$ A	$I_{FSM}$ @ 50Hz A	$t_{rr}$ ns	$V_F$ V	@ $I_F$ A	Mfrs. List No.	
2	3	0	600	35	1.4	30	DSEI2x31-06C
2	6	0	600	35	1.5	60	DSEI2x61-06C
2	6	0	1000	35	1.8	60	DSEI2x61-10B
2	7	1	200	35	0.88	60	DSEI2x61-02A
2	9	6	600	35	1.17	100	DSEI2x101-06A
2	12	3	200	35	0.95	120	DSEI2x121-02A

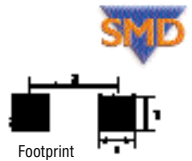
SD479

Mfrs. List No.	Order Code	1+	25+	100+	250+	1K+
DSEI2x101-06A	305-2930					
DSEI2x121-02A	305-2928					
DSEI2x31-06C	305-2898					
DSEI2x61-02A	305-2916					
DSEI2x61-06C	305-2904					
DSEI2x61-10B	305-2941					
DSEI8-06A	305-2825					
DSEI12-06A	305-2837					
DSEI12-12A	305-2849					
DSEI30-06A	305-2783					
DSEI30-10A	305-2795					
DSEI60-06A	305-2801					
DSEI60-10A	305-2813					
DSEI120-06A	305-2874					
DSEK60-02A	305-2886					
DSEK60-06A	305-2862					

### SMA, SMC, SOD-106A



	H	W	D	X	Y	Z
SMA	2.29	5.28	2.79	4.1	1.7	1.8
SMC	2.62	8.13	6.22	6.5	3.2	1.8
SOD106A	2.65	5.50	2.50	5.5	2.5	3.1
SOD6	2.41	5.59	3.93	4.27	2.3	1.52



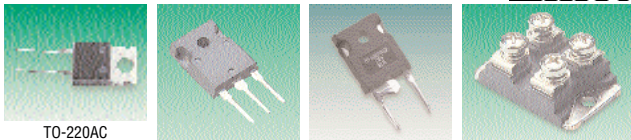
Supplied on 12mm tape.

$I_F$ (AV) A	$V_{RRM}$ V	$I_{FSM}$ A	$t_{rr}$ max ns	$V_F$ V	@ $I_F$ A	Package	Mfr	Mfrs. List No.
1.0	100	30	15	0.92	1	SMA	GS	ES1B
1.0	150	30	15	0.92	1	SMA	GS	ES1C
1.0	200	30	15	0.92	1	SMA	GS	ES1D
1.5	600	30	75	1.3	1	SOD106A	TFK	BYG20J
2.0	200	35	25	1.0	1	SOD106A	TFK	BYG22D
2.0	200	50	35	0.85	2	SOD6	ST	SMBYW02-200
3.0	100	100	20	0.9	3	SMC	GS	ES3B
3.0	150	100	20	0.9	3	SMC	GS	ES3C
3.0	200	100	20	0.9	3	SMC	GS	ES3D

SD203

Order Multiple=5	Order Code	5+	100+	250+	1K+	3K+
BYG20J	995-216					
BYG22D	995-228					
ES1B	.484-465	5+	100+	200+	500+	1K+
ES1C	.484-477					
ES1D	.484-489					
ES3B	.484-490					
ES3C	.484-507					
ES3D	.484-519					
SMBYW02-200	996-579					

### Ultra-Fast Recovery, Epitaxial Diodes



$I_F$ (av) A	$V_{RRM}$ A	$I_{FSM}$ @ 50Hz A	$t_{rr}$ ns	$V_F$ V	@ $I_F$ A	Mfrs. List No.		
TO-220								
8	660	110	35	1.3	8	DSEI8-06A		
11	1200	75	50	2.2	12	DSEI12-12A		
14	600	100	35	1.5	14	DSEI12-06A		
TO-247(AC)								
30	1000	200	35	2.0	30	DSEI30-10A		
37	600	300	35	1.4	37	DSEI30-06A		
60	600	550	35	1.5	70	DSEI60-06A		
65	1000	500	35	1.8	60	DSEI60-10A		
130	600	600	35	1.55	70	DSEI120-06A		
TO-247(AB)								
2	3	0	600	35	1.4	37	DSEK60-06A	
2	3	4	200	325	35	0.85	30	DSEK60-02A

continued

### Metric Values

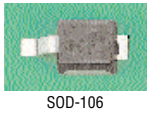
Yes, we're metric! All dimensions appear in metric values unless otherwise stated.

### Over 100,000 Ex-stock Products

The world's largest choice of electronic, electrical, industrial and mechanical products available for same day despatch.

## UltraFast Epitaxial Rectifiers

Philips Semiconductors



SOD-106



D<sup>2</sup>-PAK



SOD-57



SOD-81



SOD-64



SOD-59



TO-220AB



TO-247

- $I_{RRM}$  repetitive ruggedness guaranteed
- Wide package range available (including SMD)
- Best  $V_F/I_F/T_J$  combination available giving low losses

- Excellent reverse recovery behaviour gives reduced switching losses: 150V/200V types offer  $T_{rr} < 25ns$   
300V/400V/500V types offer  $T_{rr} < 60ns$
- All feature low stored charge giving a soft recovery characteristic

$I_O$ (AV)/ $I_F$ (AV) (A)	$V_{RRM}$ (V)	$V_F$ (V)	@	$I_F$ (A)	PACKAGE														
					SURFACE MOUNT		LEADED												
					SOD106	D <sup>2</sup> -PAK (SOT404)	SOD57	SOD81	SOD64	SOD59 (TO220AC)	TO220AB (SOT78)	TO247 (SOT429)							
0.9	600	3.6		1	BYG70J														
1.7	400	1.05		1				BYD73G											
2	600	1.25		2			BYV27-600*												
2.2	400	1.05		2			BYV27-400												
2.4	50	0.98		2			BYV27-50												
2.4	100	0.98		2			BYV27-100												
2.4	150	0.98		2			BYV27-150												
2.4	200	0.98		2			BYV27-200												
3.7	600	1.25		3.5						BYV28-600*									
4.2	50	1.02		3.5						BYV28-50									
4.2	100	1.02		3.5						BYV28-100									
4.2	150	1.02		3.5						BYV28-150									
4.2	200	1.02		3.5						BYV28-200									
4.2	300	1.05		3.5						BYV28-300									
4.2	400	1.05		3.5						BYV28-400									
8	150	0.895		8							BYW29E-150								
8	200	0.895		8							BYW29E-200								
9	300	1.03		8							BYV29-300								
9	400	1.03		8							BYV29-400								
9	500	1.03		8							BYV29-500								
2 5	100	0.895		5														BYQ28E-100	
2 5	200	0.895		5														BYQ28E-200	
14	150	0.9		14			BYV79EB-150				BYV79E-150								
14	200	0.9		14			BYV79EB-200				BYV79E-200								
15	500	1.05		15							BYT79-500								
2 8	200	0.95		8														BYQ30E-200	
2 10	150	0.85		8														BYV32E-150	
2 10	200	0.85		8														BYV32E-200	
2 10	300	1.05		10														BYV34-300	
2 10	400	1.05		10														BYV34-400	
2 10	500	1.05		10														BYV34-500	
2 15	150	0.85		15														BYV42E-150	
2 15	200	0.82		15															BYV72EW-200
2 15	200	0.85		15														BYV42E-200	

\*Power Factor Correction Diodes

SD28

SD28A

Order Multiple=5	Order Code	5+	25+	100+	250+	1K+
Mfrs. List No.						
BYD73G	367-345					
BYG70J	567-413					
Order Multiple=1		1+	25+	100+	250+	1K+
BYQ28E-100	682-081					
BYQ28E-200	682-100					
BYQ30E-200	164-409					
BYT79-500	305-0713					
Order Multiple=5		5+	25+	100+	250+	1K+
BYV27-50	437-487					
BYV27-100	367-357					
BYV27-150	367-369					
BYV27-200	367-370					
BYV27-400	164-434					
BYV27-600	164-446					
BYV28-50	437-499					
BYV28-100	367-382					
BYV28-150	367-394					
BYV28-200	367-400					
BYV28-300	164-458					
BYV28-400	164-460 †					
BYV28-600*	164-471					

continued

Order Multiple=1	Order Code	1+	25+	100+	250+	1K+
Mfrs. List No.						
BYV29-300	366-572					
BYV29-400	366-584					
BYV29-500	366-596					
		1+	25+	100+	250+	1K+
BYV32E-150	250-648					
BYV32E-200	250-650					
BYV34-300	305-0725					
BYV34-400	305-0737					
BYV34-500	302-3310					
BYV42E-150	250-673					
BYV42E-200	682-123					
BYV72EW-200	164-495					
		1+	25+	100+	250+	1K+
BYV79E-150	259-974					
BYV79E-200	259-986					
BYV79EB-150	305-0749					
BYV79EB-200	305-0750					
BYW29E-150	250-697					
BYW29E-200	250-715					

† Available until stocks are exhausted



Order Multiple=5		Price Each				
Mfrs. List No.	Order Code	5+	25+	100+	250+	1K+
STTA106U	332-8260					
STTA112U	332-8272					
STTA206S	332-8284					
Order Multiple=1		1+	25+	100+	250+	1K+
STTA1206D	291-754					
STTA1206DI	741-632					
STTA1512P	519-637					
STTA2006P	291-766					
STTA3006CW	935-396					
STTA3006P	291-778					
STTA3006PI	741-644					
STTA506D	291-742 †					
STTA506F	332-8302					
STTA512F	332-8314					
STTA806D	519-601					
STTA806DI	935-402					
STTB506D	519-546					
STTH12003TV1	162-991					
STTH2003CT	163-004†					
STTH6003CW	163-144					
STTH6003TV1	163-028					
STTH803D	163-132 †					
STTH806T-T1	302-3047					

† Available until stocks are exhausted

## 8A to 80A Soft-Recovery

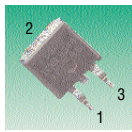
Soft recovery diodes offer reduced RFI emission due to the reduced slope of their reverse recovery current characteristic.

V <sub>RRM</sub> V	I <sub>F</sub> (AV) A	I <sub>FRM</sub> A	I <sub>FSM</sub> A	t <sub>rr</sub> max. ns	V <sub>F</sub> max. V	Pack- age	Mfrs.	Mfrs. List No.
50	8.0	—	150	20	1.0	DO-220	GS	UG8AT
200	8.0	—	150	20	1.0	DO-220	GS	UG8DT
200	15.0	—	200	35	1.05	DO-220	ON	MUR1520
200	30.0	70	325	45	1.0	DO-220	INTS	▲ RURP3020
200	2 3 0	70	325	50	1.0	TO-247	INTS	▲ RURG3020CC
400	8.0	—	100	50	1.3	DO-220	TFK	BYT108/400
400	8.0	—	100	50	1.3	DO-220	ON	MUR840
400	15.0	—	150	60	1.25	DO-220	ON	MUR1540
400	2 8 5	—	300	100	1.5	D-61-8	IR	▲ HFA80NC40C
600	4.0	8	40	35	2.1	TO-251	INTS	▲ RHRD460
600	8.0	24	60	55	1.7	DO-220	IR	▲ HFA08TB60
600	8.0	16	100	60	1.5	DO-220	INTS	RURP860
600	8.0	16	100	35	2.1	DO-220	INTS	▲ RHRP860
600	12.0	420	—	100	1.4	DO-220	ST	STTB1206D
600	15.0	60	150	60	1.7	DO-220	IR	▲ HFA15TB60
600	15.0	30	200	40	2.1	DO-220	INTS	▲ RHRP1560
600	30.0	700	—	110	1.4	SOD-93	ST	STTB3006P
600	2 1 5	30	200	60	1.5	TO-247	INTS	▲ RURG1560CC
600	30.0	70	325	40	2.1	DO-220	INTS	▲ RHRP3060
600	30.0	70	325	55	1.5	DO-220	INTS	▲ RURP3060
600	30.0	70	325	60	1.5	DO-247	INTS	▲ RURG3060
600	50.0	100	500	75	1.6	DO-247	INTS	▲ RURG5060
600	80.0	160	800	85	1.6	DO-247	INTS	▲ RURG8060
600	2 5 6	—	200	110	1.5	D-61-8	IR	▲ HFA70NC60C
1200	5.0	75	—	95	2.2	DO-220	ST	STTA512D
1200	8.0	120	—	100	2.2	DO-220	ST	STTA812D
1200	10.0	—	100	175	2.2	DO-220	ON	MUR10120E
1200	12.0	180	—	100	2.2	DO-220	ST	STTA1212D
1200	20.0	30	150	80	2.5	DO-220	SKN	SKR20F12
1200	25.0	300	—	110	2.1	SOD-93	ST	STTA2512P
1200	30.0	60	300	75	3.2	DO-247	INTS	▲ RHRG30120
1200	31.0	47	320	100	2.35	SOD-93	SKN	SKR31F12
1200	30.0	60	300	65	2.1	DO-247	INTS	▲ RHRG3060
1200	48.0	72	500	80	2.5	SOD-93	SKN	SKR48F12
1200	50.0	100	500	100	3.2	DO-247	INTS	▲ RHRG50120
1200	50.0	100	500	200	2.1	DO-247	INTS	▲ RURG50120
1500	10.0	—	100	175	2.4	DO-220	ON	MUR10150E

▲ Denotes reverse avalanche energy rated

SD106 / SD106A

## TO-263



Pin Config. 1 2 3  
a K K A  
b A K A  
H = 4.83,  
W = 10.67, D = 15.88



- Ultra-fast recovery times
- Low forward voltage
- Glass passivated chip junctions
- Soft reverse recovery options
- **UL94V-0** rated

I <sub>F</sub> (AV) A	V <sub>RRM</sub> V	I <sub>FSM</sub> V	t <sub>rr</sub> ns	V <sub>F</sub> V @	I <sub>F</sub> A	Pin Config.	Mfrs. List No.
16	200	250	35	0.975	16	a	FESB16DT
16	600	250	50	1.5	16	a	FESB16JT
18	100	150	35	1.15	20	b	BYVB32-100
18	200	150	35	1.15	20	b	BYVB32-200

### Soft Recovery Characteristics

8	100	150	20	1.0	8	a	UGB8BT
8	200	150	20	1.0	8	a	UGB8DT
18	100	175	20	1.2	20	b	UGB18BCT
18	200	175	20	1.2	20	b	UGB18DCT

SD108

Mfrs. List No.		Price Each			
Order Code	1+	25+	100+	250+	1K+
BYVB32-100	877-050				
BYVB32-200	877-062				
FESB16DT	877-037				
FESB16JT	877-049				
UGB8BT	.743-811				
UGB8DT	877-001				
UGB18BCT	877-013				
UGB18DCT	877-025				

## Soft-Recovery, Axial For Improved EMI Suppression



DO-15 L = 7.6, Dia. = 3.6  
DO-201AD L = 9.5, Dia. = 5.3

Nitride oxide passivated junction, soft-gold doped. **UL94V-0** rated.

I <sub>F</sub> av A	I <sub>FSM</sub> A	t <sub>rr</sub> max ns	V <sub>F</sub> max V	Package	Series
2.0	80	15	1.07	DO-15	SBYV27...
3.5	150	20	1.1	DO-201AD	SBYV28...

SD303

Order Multiple=5		Price Each					
V <sub>RRM</sub> max., V	Mfrs. List No.	Order Code	5+	25+	100+	250+	1K+
50	SBYV27-50	.737-756					
100	SBYV27-100	.737-768					
150	SBYV27-150	.737-770					
200	SBYV27-200	.737-781					
Order Multiple=1		1+	25+	100+	250+	1K+	
150	SBYV28-150	.737-811 †					
200	SBYV28-200	.737-823					

† Available until stocks are exhausted

Mfrs. List No.		Price Each			
Order Code	1+	25+	100+	250+	1K+
BYT108/400	995-241				
HFA08TB60	.273-612				
HFA15TB60	.273-624				
HFA70NC60C	.167-873				
HFA80NC40C	.167-885				
MUR840	708-276				
MUR1520	708-306				
MUR1540	708-318				
MUR10120E	708-288				
MUR10150E	708-290				
RHRD460	.506-989				
RHRG3060	.516-521				
RHRG30120	.506-990				
RHRG50120	.549-083				
RHRP860	.516-491				
RHRP1560	.516-508				
RHRP3060	.516-510				
RURG1560CC	.549-034				
RURG3020CC	.549-046				
RURG3060	.548-984				
RURG5060	.506-977 †				
RURG8060	.549-009				
RURG50120	.548-996				
RURP3020	.432-647				
RURP3060	.432-659				
RURP860	.432-611				
SKR20F12	936-960				
SKR31F12	936-972				
SKR48F12	936-984				
STTA512D	.519-595				
STTA812D	.519-613				
STTA1212D	.519-625				
STTA2512P	.519-649				
STTB1206D	.519-560				
STTB3006P	.519-583				
UG8AT	433-512				
UG8DT	434-322				

† Available until stocks are exhausted

Continued

















## 22A



- Isolated metal base plate
- Wire leads for pcb's
- High surge current capability
- M5 fixing hole

H = 10, W = 28.8, D = 28.8

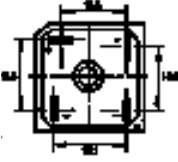
$I_0 = 22A$  dc @  $T_c = 50^\circ C$   $I_{FSM} = 370A$  @  $T_{vj} = 25^\circ C$

SD245

$V_{RRM}$	$V_{RMS}$	Mfrs. List No.	Order Code	1+	25+	100+
800	250	SKB26/08	.663-529			
1200	380	SKB26/12	.663-530			

## 25A/35A/40A/50A

Glass Passivated



$I_0$  @  $55^\circ C$

A	I <sub>FSM</sub> A	Mfr.	Series
12	200	GS	GBPC12...
25	300	GS/FCH	GBPC25...
35	400	GS/MC	GBPC35...
40	400	MC	GBPC40...
50	400	MC	GBPC50...

Body H = 7.62 (GS), 11.1 (MC), W = 28.8, D = 28.8  
Mounting hole = 5.6 dia., Terminals = 6.3 0.8

The glass passivation process offers improvements to reliability at high operating temperatures, moisture resistance capability and overall durability. Temperature range  $-50^\circ C$  to  $+150^\circ C$ , UL approved.

SD225

$V_{RRM}$	Max ac Input Voltage	Mfrs. List No.	Order Code	1+	25+	100+	1K+
<b>12A Series</b>							
50	35	GBPC12005	433-275				
200	140	GBPC1202	433-287				
400	280	GBPC1204	433-299				
800	560	GBPC1208	433-317				
<b>25A Series</b>							
50	35	GBPC25005 (GS)	210-900				
50	35	GBPC25005 (FCH)	.572-937				
100	70	GBPC2501 (GS)	210-912				
200	140	GBPC2502 (GS)	210-924				
200	140	GBPC2502 (FCH)	.572-949				
400	280	GBPC2504 (GS)	210-936				
400	280	GBPC2504 (FCH)	.740-287				
600	420	GBPC2506 (GS)	210-948				
600	420	GBPC2506 (FCH)	.572-950				
800	560	GBPC2508 (GS)	.210-950				
1000	700	GBPC2510 (GS)	210-961				
1000	700	GBPC2510 (FCH)	.572-962				
<b>35A Series</b>							
50	35	GBPC35005 (MC)	.572-974				
200	140	GBPC3502 (GS)	234-140				
200	140	GBPC3502 (MC)	.572-986				
400	280	GBPC3504 (MC)	.740-299				
600	420	GBPC3506 (GS)	.234-151				
600	420	GBPC3506 (MC)	.572-998				
1000	700	GBPC3510 (FCH)	.573-000				
<b>40A Series</b>							
200	140	GBPC4002	573-024				
600	420	GBPC4006	573-036				
1000	700	GBPC4010	573-048 †				
<b>50A Series</b>							
200	140	GBPC5002	573-061 †				
600	420	GBPC5006	573-073 †				

† Available until stocks are exhausted

NOTE: On devices above 2.7 amps, the maximum values of  $I_0$  dc quoted are based on the assumption that the device is mounted on a chassis or some form of heatsink.

## 30A/50A



- Isolated metal case
- High surge current
- M4 2 mounting points
- UL recognised

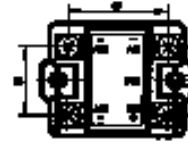
A: H = 24, W = 45, D = 45 B: H = 30, W = 71, D = 30

$I_0 = 30A$  dc @  $T_c = 94^\circ C$   $I_{FSM} = 370A$  @  $T_{vj} = 25^\circ C$

SD246

$I_0$ (A)	$V_{RRM}$ (V)	Package	Mfrs. List No.	Order Code	1+	25+	100+
30	800	A	SKB30/08A1	.663-542			
50	800	B	SKB50/08A3	.663-554			

## 60A



H = 34, W = 65, D = 48  
Mounting holes = 5.3,  
Fixing Centres = 49

$I_0 = 67A$  dc max @  $T_c = 85^\circ C$   
 $I_{FSM} = 1000A$  @  $T_{vj} = 25^\circ C$

Current ratings ( $I_0$ ) @  $45^\circ C$  for the following heatsinks:  
175-647 = 30A, 175-648 = 35A, 170-753 = 55A

SD134

$V_{RRM}$	Mfrs. List No.	Order Code	1+	25+	100+
800	SKB6008	.372-067	203.55	183.00	164.55
1200	SKB6012	.372-079	241.29	217.20	195.30

## 70A



$I_0 = 70A$  dc max @  $T_c = 101^\circ C$   
 $I_{FSM} = 750A$

H = 30 (excl terminals), W = 72, D = 42

SD219

$V_{RRM}$	Mfrs. List No.	Order Code	1+	25+	100+
800	SKB7208	.541-813			

## 105A to 125A



$V_{rrm}$ V	$V_{rms}$ V	$I_d$ (av) A	$T_c$ @ C	$I_{FSM}$ A	Mfrs. List No.
1200	400	105	85	1500	VBO105-12N07
1200	400	125	85	1800	VBO125-12N07

H = 31 (excl. terminals), W = 67, D = 50  
Mounting holes = 5.5, fixing centres = 50

SD480

Mfrs. List No.	Order Code	1+	Price Each	10+
VBO105-12N07	305-3295		5+	
VBO125-12N07	315-3710			

## Three Phase Bridge Rectifiers

### 20A/25A/35A



H = 10, W = 28.5, D = 28.5  
Mounting hole = 5.2 dia,  
Terminals = 6.3 0.8

**SKD Series**  
 $I_0 = 20A$  dc max @  $T_c = 73^\circ C$   
 $I_{FSM} = 320A$

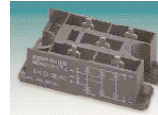
**26MT Series**  
 $I_0 = 25A$  dc max @  $T_c = 55^\circ C$   
 $I_{FSM} = 330A$

**36MT Series**  
 $I_0 = 35A$  dc max @  $T_c = 60^\circ C$   
 $I_{FSM} = 400A$

SD110

$I_0$ A	$V_{RRM}$ V	Mfr.	Mfrs. List No.	Order Code	1+	25+	100+
20	800	SKN	SKD2508	.372-080			
20	1200	SKN	SKD2512	.372-092			
25	600	IR	26MT60	.707-661			
25	1200	IR	26MT120	.707-673			
35	600	IR	36MT60	.707-685			
35	1200	IR	36MT120	.707-697			

## 30A



- Isolated metal base plate
- Fast-on terminals, solder tips
- High surge current rating
- Suitable for wave soldering
- M5 2 mounting points

H = 23.5, W = 63, D = 32

$I_0 = 30A$  @  $T_c = 100^\circ C$   $I_{FSM} = 370A$  @  $T_{vj} = 25^\circ C$

SD249

$V_{RRM}$ (V)	Mfrs. List No.	Order Code	1+	25+	100+
800	SKD31/08	.663-438			
1200	SKD31/12	.663-566			

Continued

## Three Phase Bridge Rectifiers — continued

### 30A/50A



- Isolated metal case
- High surge current
- M4 2 mounting points

H = 30, W = 71, D = 60

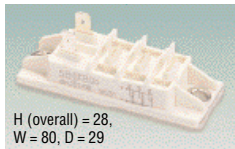
$I_o = 30A$  dc @  $T_c = 98^\circ C$   $I_{FSM} = 370A$  @  $T_{vj} = 25^\circ C$   
 $I_o = 50A$  dc @  $T_c = 92^\circ C$   $I_{FSM} = 750A$  @  $T_{vj} = 25^\circ C$



SD242

$I_o$ A	$V_{RRM}$ (V)	Mfrs. List No.	Order Code	1+	25+	100+
30	1200	SKD30/12A1	936-947			
50	1200	SKD50/12	663-591			

### 50A



- Glass passivated diodes
- Fast-on terminals
- Isolated metal base
- Low thermal impedance
- High surge current capability

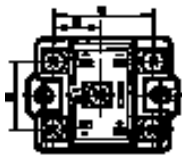
$I_o = 50A$  @  $T_c = 125^\circ C$   $I_{FSM} = 775A$  @  $T_{vj} = 25^\circ C$



SD239

$V_{RRM}$ (V)	Mfrs. List No.	Order Code	1+	25+	100+
800	SKD51/08	.663-578			
1200	SKD51/12	.663-580			

### 60A



H = 34, W = 65, D = 48  
 Mounting holes = 5.3,  
 Fixing Centres = 49



SD135

$I_o = 92A$  dc max @  $T_c = 85^\circ C$   
 $I_{FSM} = 1000A$  @  $T_{vj} = 25^\circ C$   
 Current ratings ( $I_o$ ) @  $45^\circ C$  for the following heatsinks:  
 175-647 = 26A, 175-648 = 30A, 170-753 = 60A

$V_{RRM}$	Mfrs. List No.	Order Code	1+	25+	100+
800	SKD6008	.372-146			
1200	SKD6012	.372-158			

### 80A



- Robust plastic case
- Isolated base plate
- High surge current capability
- 2 5.3 mounting points

H = 36, W = 65, D = 48

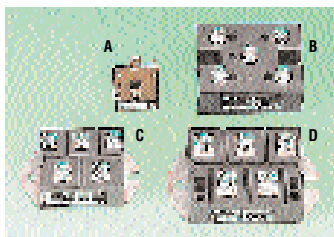
$I_o = 80A$  @  $T_c = 114^\circ C$   $I_{FSM} = 750A$  @  $T_{vj} = 25^\circ C$



SD241

$V_{RRM}$ (V)	Mfrs. List No.	Order Code	1+	25+	100+
800	SKD82/08	.663-608			
1200	SKD82/12	.663-610			

### 25A to 186A 8BU Configuration



- A:** H = 10 (excl. terminals), W/D = 28.5, Mounting holes = 5.2 dia.
- B:** H = 31 (excl. terminals), W = 67, D = 50 Mounting holes = 5.5 dia., fixing centres = 50
- C:** H = 30 (excl. terminals), W = 72, D = 42 Mounting holes = 5.3 dia., fixing centres = 60
- D:** H = 30 (excl. terminals), W = 94, D = 54 Mounting holes = 6.5 dia., fixing centres = 80

$I_d$ (av) A	$T_c$ C	$V_{rr}$ V	$V_{rms}$ V	$I_{FSM}$ A	Package	Mfrs. List No.
25	63	1200	400	380	A	VU025-12N08
35	62	1200	400	550	A	VU036-12N08
63	110	1200	400	550	C	VU062-12N07
88	110	1200	400	750	C	VU082-12N07
127	110	1200	400	1200	D	VU0110-12N07
160	85	1200	400	1500	B	VU0105-12N07
175	110	1200	400	1800	D	VU0160-12N07
186	85	1200	400	1800	B	VU0125-12N07

SD481

Mfrs. List No.	Order Code	1+	5+	25+
VU025-12N08	305-3260			
VU036-12N08	305-3271			
VU062-12N07	305-2953			
VU082-12N07	305-2965			
VU0105-12N07	315-3733			
VU0110-12N07	315-3721			
VU0125-12N07	305-3283			
VU0160-12N07	305-3258			

## Controlled Bridge Rectifiers

### PACE-Pak, 25A and 40A



Thyristor/diode bridge



Thyristor bridge

Body: H = 14 (excl terminals), W = 48, D = 32  
 Base plate: W = 64, D = 32, Fixing Centres = 49.5

PACE-pak modules give single phase bridge configurations of thyristors and diodes, mounted on an alumina substrate to provide a completely isolated assembly. A free wheeling diode is included with the half-controlled bridges which are in B2HKF configuration. Connections are by 6.4 0.8mm faston terminals. Isolation voltage = 2500V.

SD61

$I_D$ @ $T_c = 85^\circ C$ A	$I_{TSM}$ A	$V_{RRM}$ V	Mfrs. List No.	Order Code	1+	10+	25+
<b>Thyristor/Diode Bridges</b>							
25	300	600	P102W	362-530			
25	300	1200	P105W	362-542			
40	385	600	P402W	362-554			
40	385	1200	P405W	438-200			
<b>Thyristor Bridge</b>							
25	300	1200	P135	362-566	111.99	67.20	51.69

### SEMIPONT, 30A



- Isolated base plate to 2500V
- Fast-on terminals with solder tips
- High surge current rating

H = 25.3, W = 63, D = 32  
 Mounting holes = 5.3 dia,  
 Fixing centres = 48



SD119

$I_o$ @ $T_c = 85^\circ C$ A	$I_{TSM}$ A	$V_{RRM}$ V	Mfrs. List No.	Order Code	1+	5+	50+
30	320	800	SKCH2808	.425-321			
30	320	1200	SKCH2812	.541-898			

## Thermionic Valves

### Amplifier and Rectifier Valves

### CHELMER VALVE



(a) ECC81/82/83 (b) EL34 (c) EL84

Pin Outs (viewed from base)



(d) KT88 (e) 6L6GC (/5881) (f) GZ34

- Used in high quality audio amplifiers, pre-amplifiers, oscillators
- High quality construction
- Low noise, hum and microphony
- GZ34 is a full-wave rectifier for power supply applications
- PCB and chassis mounting sockets available separately

Overall	Heater	Heater		V <sub>A</sub> max	P <sub>a</sub> W	Base Type	Pin Out	Mftrs. List No.
		Voltage V	Current A					
H Dia.								
56	22.2	6.3/12.6	0.3/0.15	300	1.0	B9A	a	○ ECC83
112	38.0	6.3	1.5	800	100	Octal	b	△ EL34
78	22.2	6.3	0.76	300	12	B9A	c	△ EL84
125	52.0	6.3	1.6	800	42	Octal	d	△ KT88
111	40.0	6.3	0.9	360	19	Octal	e	△ 6L6GC
99	36.0	6.3	0.9	400	26	Octal	e	△ 6L6WGC/5881
86	38.0	5.0	1.9	2 550	—	Octal	f	◆ GZ34

Application Codes: ○ = Audio pre-amplifier, mixer, oscillator, cathode follower  
 △ = Audio amplifier output stages  
 ◆ = Full-wave rectification in ac mains power supplies

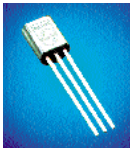
SD304

Mftrs. List No.	Order Code	1+	10+	50+	Price Each
<b>Amplifier Valves</b>					
ECC83	.738-165				
EL34	.738-189				
EL84	.738-177				
KT88	.738-190				
6L6GC	.738-207				
6L6WGC/5881	.738-219				
<b>Rectifier Valves</b>					
GZ34	.738-220				
<b>Valve Bases – Chassis Mounting</b>					
B9A Chassis	.738-244	1+	10+	25+	50+
Octal Chassis	.331-764.				
<b>Valve Bases – PCB Mounting</b>					
B9A PCB	.738-256	1+	25+	100+	
Octal PCB	.331-790.				

## Thyristors

Phillips Semiconductors

### Thyristors



TO-92

- High reliability glass mesa and planar technologies
- Glass passivated, where applicable, for stable voltage blocking beyond 125°C
- Reduces % rating to eliminate MT2 to MT1 false triggering
- High reliability
- Snubbers and % limiting inductors can be eliminated

IT (rms) (A)	Voltage Grades	IGT (max) (μA)	T092 (SOT54)
0.8	200	200	BT169
0.8	200/400	200	BT149
0.8	500/600	200	BT168

SD493

I <sub>T</sub> A	V <sub>rrm</sub> V	Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+	Price Each
0.8	200	BT149B	316-3167						
0.8	400	BT149D	316-3179						
0.8	600	BT168G	316-3210						
0.8	200	BT169B	316-3222						
0.8	500	BT168E	316-3209						

## Thyristors and Triacs

Phillips Semiconductors



SOT-223



D²-PAK



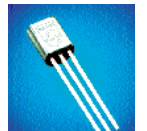
SOT-82



SOT-186A



TO-220AB



TO-92

- High reliability glass mesa and planar technologies
- Glass passivated, where applicable, for stable voltage blocking beyond 125°C
- High reliability
- SMD package options for optimised PCB size and reduce assembly costs
- Logic level and sensitive gate triacs can be driven directly by low power ICs
- 3 Quadrant Triacs offer enhanced dV<sub>D</sub>/dt, dV<sub>com</sub>/dt and dI<sub>com</sub>/dt capabilities
- Snubbers and dI/dt limiting inductors can be eliminated

### FOUR-QUADRANT TRIACS

IT (R <sub>MS</sub> ) (A)	VOLTAGE GRADES (V)	I <sub>GT</sub> (max.) (μA)	PACKAGE				
			SOT223	D²-PAK (SOT404)	SOT82	SOT186A (isolated TO220AB)	TO220AB (SOT78)
1	500 / 600 / 800	D*/E	BT134W				
4	500 / 600 / 800	D*/E			BT134		
4	500 / 600 / 800	D*/E/F		BT136B			BT136
8	500 / 600 / 800	D*/E/F		BT137B			BT137
12	500 / 600 / 800	E/F		BT138B		BT138X	BT138
16	500 / 600 / 800	E/F		BT139B			BT139
25	500 / 600 / 800	—		BTA140B			BTA140

### THREE-QUADRANT TRIACS

8	500 / 600 / 800	B					BTA208
12	500 / 600 / 800	B					BTA212
16	500 / 600 / 800	B					BTA216
25	500 / 600 / 800	B					BTA225

### THYRISTORS

IT (R <sub>MS</sub> ) (A)	VOLTAGE GRADES (A)	I <sub>GT</sub> (max.) (μA)	PACKAGE			
			SOT223	T092 (SOT54)	SOT82	TO220AB (SOT78)
0.8	200 / 400 / 500 / 600	200μA		BT169		
0.8	200 / 400 / 500 / 600	200μA		BT149		
1	400 / 500 / 600	200μA	BT148W			
4	400 / 500 / 600	200μA			BT148	
8	500 / 600 / 800	15mA				BT300
12	500 / 650 / 800	15mA				BT151
12	500 / 650	4mA			BTA151	
20	400 / 600 / 800	32mA				BT152

### DIAC

I <sub>FRM</sub> (A)	V <sub>BO</sub> (V)	I <sub>BO</sub> (μA)	PACKAGE	TYPICAL APPLICATIONS
			SOD27	
2	28 – 36	50	BR100/03	Home Appliances

\* 'D' version Triacs are only available in 500 & 600V range

BT149 has reversed pinning to BT169

SD64 / SD64A

### Order Multiple=5

Mftrs. List No.	Order Code	5+	25+	100+	250+	1K+
BR100/03	363-480					

### Order Multiple=1

Mftrs. List No.	Order Code	1+	25+	100+	250+	1K+
BT134-600	163-533					
BT134-600D	305-0592					
BT134-800	163-545					
BT134-800E	305-0609					
BT134W-600	163-570 †					
BT134W-600D	305-0622					
BT134W-800	163-600					
BT136-500	363-510					
BT136-600	363-522					
BT136-800	936-224					
BT136B-600	936-273					
BT137-500G	305-0634					
BT137-600	363-546					
BT137-600D	302-3680					
BT137-600F	305-0646					
BT137B-600	936-285					
BT138-500	363-558 †					
BT138-600	363-560					
BT138-800	936-248					
BT138B-600	936-297					
BT138X-600	305-0658					
BT139-600	363-583					
BT139-800	936-250					
BT139B-600	936-303					
BT148-400R	305-0660					
BT148W-400R	305-0671					
BT149E	305-0683					
BT151-500R	362-578					
BT151-650R	362-580					
BT151-800R	362-591					
BT151F-650R	305-0695					
BT152-400R	362-608					
BT152-600R	362-610					
BT152-800R	362-621					
BT169G	163-697					
BT300-600R	302-3321					
BTA140-500	163-703					
BTA140-600	363-753					
BTA140-800	936-261					
BTA140B-600	936-315					
BTA151-650R	305-0701					
BTA208-800B	936-364 †					
BTA212-600B	936-339					
BTA216-800B	936-388					
BTA225-600B	936-352					

† Available until stocks are exhausted

Continued







## Thyristors — continued

### ISOTOP Power Modules



H = 12.2, W = 38, D = 25.4  
Isolation voltage = 2500Vrms  
Fixing centres = 31.6

Configuration	Pin Out				Schematic
	1	2	3	4	
Thyristor	A1	G2	A2	G1	
Thyristor/ Diode	I	K	G	A	

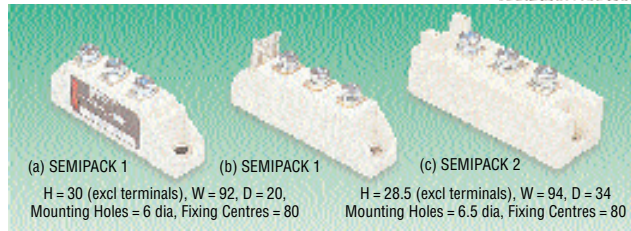
A range of power modules, configured as either 2 SCRs or a single SCR and diode. The Isotop is a compact package with isolated base mounting.

$V_{DRM}/V_{DRM}$ V	$I_O$ (AV) @ $T_C = 90^\circ\text{C}$ A	$I_{TSM}$ @ $T_J = 25^\circ\text{C}$ A	$I_T$ (RMS) @ $T_C = 90^\circ\text{C}$ A	di/dt A/ $\mu\text{s}$	Mftrs. List No.
<b>Thyristor Modules</b>					
800	25	475	40	100	MSS40-800
800	—	600	70	1000	MSS50-800
1200	—	400	55	100	MSS40-1200
1200	32	550	50	100	MSS50-1200
<b>Thyristor/Diode Modules</b>					
800	25	400	50	100	MDS35-800
800	32	650	50	100	MDS50-800
1200	25	400	50	100	MDS35-1200
1200	30	600	70	100	MDS50-1200

SD159

Mftrs. List No.	Order Code	1+	5+	10+	25+	50+
<b>Thyristor Modules</b>						
MSS40-800	.234-023					
MSS40-1200	<b>NEW</b> 332-8247					
MSS50-800	<b>NEW</b> 332-8259					
MSS50-1200	.234-059					
<b>Thyristor/Diode Modules</b>						
MDS35-800	<b>NEW</b> 332-8211					
MDS35-1200	<b>NEW</b> 332-8223					
MDS50-800	.234-060					
MDS50-1200	<b>NEW</b> 332-8235					

### SEMIPACK 1/SEMIPACK 2 Power Modules



(a) SEMIPACK 1  
H = 30 (excl terminals), W = 92, D = 20,  
Mounting Holes = 6 dia, Fixing Centres = 80

(b) SEMIPACK 1  
H = 28.5 (excl terminals), W = 94, D = 34  
Mounting Holes = 6.5 dia, Fixing Centres = 80

(c) SEMIPACK 2



- 3 SCR/diode configuration options
- Isolated base plate to 2.5kV
- Standard 80mm fixing centres

Applications include general power control, motor speed control, battery charging, welding, lamp dimming etc. Auxiliary gate and cathode connections are made by 2.8 0.8 faston tabs (supplied), or may be soldered. Screw terminals are M5 (SEMIPACK 1) and M6 (SEMIPACK 2).

FOR SUITABLE HEATSINKS SEE **BOOK 2, SECTION 7**

SD59

$V_{DRM}/V_{DRM}$ V	Pack- age	Mftrs. List No.	Order Code	1+	5+	50+
<b>Thyristor Modules</b>						
$I_O(AV) = 18A, I_{TSM} = 320A$						
800	(b)	SKKT20B08D	.362-190			
1200	(b)	SKKT20B12E	.362-207			
1600	(b)	SKKT20B16E	.741-838			
$I_O(AV) = 25A, I_{TSM} = 470A$						
800	(b)	SKKT27B08D	.362-219			
1200	(b)	SKKT27B12E	.362-220			
1400	(b)	SKKT27B14E	.741-826			
1600	(b)	SKKT27B16E	.310-2865			
$I_O(AV) = 40A, I_{TSM} = 1000A$						
800	(b)	SKKT42B08D	.362-232			
1200	(b)	SKKT42B12E	.362-244			
1600	(b)	SKKT42B16E	.234-540			
2200	(b)	SKKT42B22E	.310-2877			
$I_O(AV) = 55A, I_{TSM} = 1500A$						
800	(b)	SKKT57B08D	.362-256			
1200	(b)	SKKT57B12E	.362-268			
1600	(b)	SKKT57B16E	.234-552			
2201	(b)	SKKT57B22E	.310-2889			

continued

$V_{DRM}/V_{DRM}$ V	Pack- age	Mftrs. List No.	Order Code	1+	5+	50+
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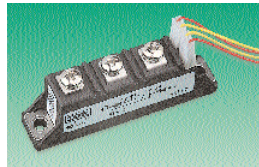
#### Thyristor Modules — continued

$I_O(AV) = 95A, I_{TSM} = 2000A$						
800	(b)	SKKT92B08D	.362-270			
1200	(b)	SKKT92B12E	.362-281			
1600	(b)	SKKT92B16E	.234-564			
$I_O(AV) = 115A, I_{TSM} = 6000A$						
800	(b)	SKKT106B08D	.310-2804			
1200	(b)	SKKT106B12E	.362-293			
1600	(b)	SKKT106B16E	.741-840			
$I_O(AV) = 130A, I_{TSM} = 4700A$						
1200	(c)	SKKT13212E	.362-311			
1600	(c)	SKKT13216E	.741-851			
2200	(c)	SKKT13222E	.310-2828			
$I_O(AV) = 160A, I_{TSM} = 5400A$						
800	(c)	SKKT16208D	.310-2830			
1200	(c)	SKKT16212E	.362-335			

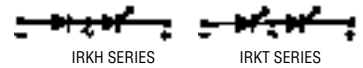
#### Thyristor/Diode Modules

$I_O(AV) = 25A, I_{TSM} = 470A$						
800	(b)	SKKH2708D	.362-347			
1200	(b)	SKKH2712E	.362-359			
1600	(b)	SKKH2716E	.310-2774			
$I_O(AV) = 40A, I_{TSM} = 1000A$						
800	(b)	SKKH4208D	.362-360			
1200	(b)	SKKH4212E	.362-372			
1600	(b)	SKKH4216E	.310-2786			
$I_O(AV) = 95A, I_{TSM} = 2000A$						
800	(b)	SKKH9208D	.362-384			
1200	(b)	SKKH9212E	.362-396			
1600	(b)	SKKH9216E	.310-2798			
<b>Diode Modules</b>						
$I_O(AV) = 45A, I_{TSM} = 700A$						
800	(a)	SKKD4608	.362-402			
1200	(a)	SKKD4612	.362-414			
1600	(b)	SKKD4616	.310-2750			
$I_O(AV) = 80A, I_{TSM} = 2000A$						
800	(a)	SKKD8108	.362-426			
1200	(a)	SKKD8112	.362-438			
1600	(a)	SKKD8116	.234-539			
2200	(b)	SKKD8122	.310-2762			

### ADD-A-Pak Power Modules



H = 37 (incl terminals), W = 92, D = 20  
Mounting holes = 6.2 dia, Fixing centres = 80



IRKH SERIES

IRKT SERIES

The ADD-A-pak range of power modules containing either two thyristors or a thyristor and diode offers simple circuit elements that can be interconnected to form various circuits. The isolated base allows mounting on an earthed heatsink alongside other modules and devices. They are intended for general purpose phase control applications. Screw terminals are M5. **Auxiliary gate and cathode leads are supplied separately.**

FOR SUITABLE HEATSINKS SEE **BOOK 2, SECTION 7**

SD60

$I_O$ (AV) A	$I_{TSM}$ A	$V_{DRM}/V_{DRM}$ V	Mftrs. List No.	Order Code	1+	10+	25+
<b>Thyristor Modules</b>							
25	595	1200	IRKT26-12	.362-440			
40	850	1200	IRKT41-12	.362-451			
55	1310	1200	IRKT56-12	.362-463			
70	1400	600	IRKT71-06	.438-170			
70	1400	1200	IRKT71-12	.438-169			
90	1500	600	IRKT91-06	.362-475			
90	1500	1200	IRKT91-12	.362-487			
<b>Thyristor/Diode Modules</b>							
40	850	600	IRKH41-06	.362-499			
55	1310	600	IRKH56-06	.438-182			
90	1500	600	IRKH91-06	.362-505			
<b>Leads for IRKT modules</b>			64432115AA	.162-530			
<b>Leads for IRKH modules</b>			64432116AA	.162-528			

## Major International Brands

All the leading brand names from over 1,100 major international manufacturers.

## SEMIPACK 3 Thyristor Power Module



SEMIPACK 3

- Thyristor power module
- Ceramic isolated baseplate to 2.5 kV
- UL recognised

H = 52, W = 115, D = 50.6, Fixing 80 38, Ø 6.4

$I_0$ (AV) @ $T_C = 85^\circ\text{C}$	$I_0$ (RMS) @ $25^\circ\text{C}$	$I_{TSM}$ @ $25^\circ\text{C}$	Package	Mftrs. List No.
A	A	A	a	SKKT213 Series
230	370	8500		

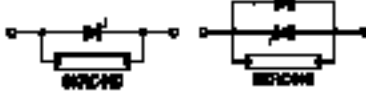
SD224

$V_{RRM}/V_{DRM}$ V	Mftrs. List No.	Order Code	1+	5+	25+
800	SKKT213/08D	310-2841			
1600	SKKT213/16E	541-916			
2200	SKKT213/22E	310-2853			

## Snubber Network



Typical Applications



Single SCR

Inverse pair

H = 35 (excl terminals), W = 92, D = 21  
Mounting holes = M5, Fixing centres = 80

- Protects thyristor modules from over voltage
- Upto 500A load current
- Encapsulated
- Standard 80mm fixing centres
- Assists SCR latching

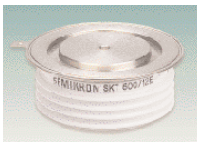
Connections are by 2.8mm push-on connectors (not supplied).

dv/dt suppression For SCRs with dv/dt rating 100V/ $\mu\text{s}$  nom.  
Operating voltage 440V rms  $\pm 10\%$   
Operating frequency 50/60 Hz  
Temperature range  $-40^\circ\text{C}$  to  $+50^\circ\text{C}$   
Plastic encapsulation material **UL94V-0**

SD132

Mftrs. List No.	Order Code	1+	25+	100+
SKRC440	362-517			

## SCR Capsules



- Hermetic metal/ceramic cases
- International standard cases
- Capsule package for double sided cooling
- Amplifying gates (SKT551/12E)
- Shallow design for single sided cooling
- Supplied with leads

SKT551/12E H = 14, Dia = 41, Lead length = 230  
SKT600/12E H = 26, Dia = 57.3, Lead length = 250

$V_{RRM}$ V	$I_{TAV}$ @ $85^\circ\text{C}$ A	$I_{TSM}$ @ $25^\circ\text{C}$ A	$V_T$ V	$R_{thjc}$ $^\circ\text{C}/\text{W}$	F kN	Mftrs. List No.
1200	550	9000	1.65	0.045	5.2-8	SKT551/12E
1200	600	11500	2.00	0.038	10-13	SKT600/12E

SD243

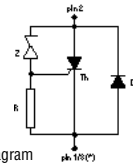
Mftrs. List No.	Order Code	1+	5+	25+
SKT551/12E	663-414			
SKT600/12E	663-426			

## Special Application Thyristor

### FLC10-200D Fire Lighter Circuit



Circuit diagram



- Integrated SCR/Zener/resistor and diode package
- Dedicated thyristor for capacitive discharge ignition operation
- High pulse current operation
- Ideal for gas ignition applications
- Space saving SOT-82 package

$I_{TSM}$ A	$I_{TAV}$ A	di/dt $\mu\text{s}$	$V_i$ V @	$I_i$ A	$I_{TSM(max)}$ $\mu\text{A}$	$V_{DO(max)}$ mA	$I_{BO(max)}$ mA	$V_T(max)$ V
240	240	200	1.7	2	100	250	0.5	1.7

SD455

Mftrs. List No.	Order Code	1+	25+	100+	250+
FLC10-200D	163-120				

## Triacs

### SOT-223

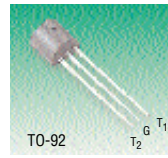


$V_{DRM}$ V	$I_T$ (rms) A	$I_{TSM}$ A	$I_{GT}$ , mA			$V_{GT}$ V	Mftrs. List No.
			t+/g+	t+/g-	t-/g+		
<b>Sensitive Gate</b>							
600	1	8.5	3	3	3	5	Z0103MN
600	1	8.5	3	3	3	5	Z0107MN

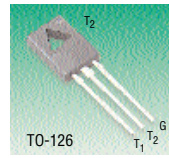
SD85

Order Multiple=5	Order Code	5+	25+	100+	250+	1K+
Mftrs. List No.						
Z0103MN	247-017					
Z0107MN	247-029					

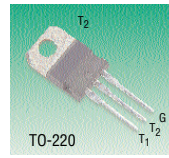
### TO-92, TO-126, TO-220



TO-92



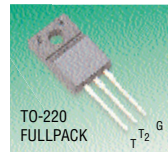
TO-126



TO-220

ON Semiconductor

ON



TO-220 FULLPACK

$V_{DRM}$ V	$I_T$ rms A	$I_{TSM}$ A	$I_{GT}$ , mA				$V_{GT}$ V	Package	Mftrs. List No.
			t <sub>2+</sub> g+	t <sub>2+</sub> g-	t <sub>2-</sub> g-	t <sub>2-</sub> g+			
<b>Sensitive Gate</b>									
600	4.0	30	3	3	3	5	2.5	TO-126	2N6075
<b>Standard TO-220</b>									
400	15.0	150	50	50	50	—	1.5	TO-220	MAC16D
600	8.0	80	50	50	50	—	1.5	TO-220	MAC9M
600	12.0	100	50	50	50	75	2.0	TO-220	MAC212A8
600	12.0	100	35	35	35	—	1.5	TO-220	MAC12M
600	15.0	150	50	50	50	75	2.0	TO-220	MAC15A8
600	25.0	250	50	50	50	75	2.0	TO-220	MAC223A8
600	40.0	350	50	50	50	75	2.0	TO-220	MAC224A8
800	8.0	100	50	50	50	75	2.0	TO-220 Full-Pack	MAC218A10FP
800	15.0	150	50	50	50	—	1.5	TO-220	MAC16N
800	25.0	250	50	50	50	75	2.0	TO-220	MAC223A10
800	40.0	350	50	50	50	75	2.0	TO-220	MAC224A10
<b>High Commutation</b>									
600	15.0	150	50	50	50	—	1.5	TO-220	MAC16M

SD370

Order Multiple=1	Order Code	1+	25+	100+	250+	1K+
Mftrs. List No.						
MAC9M	992-860					
MAC12M	334-3492					
MAC15A8	878-285					
MAC16D	162-188					
MAC16M	878-273					
MAC16N	992-859					
MAC212A8	878-339					
MAC218A10FP	NEW 352-6239					
MAC223A8	878-248					
MAC223A10	878-200					
MAC224A8	878-352					
MAC224A10	878-145					
2N6075B	878-121					

Continued

## Flammability Classifications

- UL94V-0** Self extinguishing within 10 secs. No flame drips which ignite
- UL94V-1** Self extinguishing within 30 secs. No flame drips which ignite
- UL94V-2** Self extinguishing within 30 secs. Flame drips which ignite
- UL94-HB** Reduced burning rate when burnt horizontally

The UL specifications above are flammability tests carried out on plastic materials by the Underwriters Laboratory. The specifications are split into vertical and horizontal burning tests, dependent on the viscosity of the material.

The vertical tests measure the extinguishing time and whether any flame drips (burning droplets) fall onto and ignite gauze.

The horizontal tests measure the burning rate of the material.

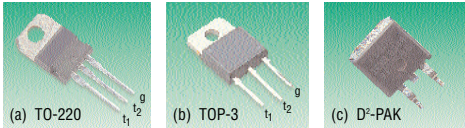
Extract from Underwriters Laboratory specification – UL94 – 'Tests for flammability of plastic materials'.



Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
BTB16-600B	505-572				
BTB16-600SW	302-2870				
BTB24-400B	363-832				
BTB24-600B	505-584				
BTB24-800B	302-3229				
BTB26-600B	682-172				
TIC206D	363-893				
TIC206M	363-900				
TIC216M	363-911				
TIC225M	363-935				
TIC246M	363-996				
TIC253D	364-009 †				
T410-600T	234-631				
Z0405DE	364-113				
2N5446	364-137				
2N6073A	364-150				
2N6075A	364-162				

† Available until stocks are exhausted

## High Commutation



- No additional snubber networks required
- Isolated or non-isolated tab
- Sensitive gate, logic-level drive options
- Optimised for high inductive load switching

$V_{DRM}$ V	$I_T$ rms A	$I_{TSM}$ A	$I_{GT}$ mA				$V_{GT}$ V	Pack- age	Mfrs. List No.
			$t_{2+}$ g+	$t_{2-}$ g-	$t_{2-}$ g-	$t_{2-}$ g+			
<b>Isolated tab (to 2.5kV rms)</b>									
600	6	63	50	50	50	—	1.5	a	BTA06-600BW
600	8	80	50	50	50	—	1.5	a	BTA08-600BW
600	8	80	10	10	10	—	1.5	a	BTA08-600SW ●
600	8	80	5	5	5	—	1.5	a	BTA08-600TW ●
600	10	105	50	50	50	—	1.5	a	BTA10-600BW
600	12	126	50	50	50	—	1.5	a	BTA12-600BW
600	12	126	10	10	10	—	1.5	a	BTA12-600SW ●
600	16	157	50	50	50	—	1.5	a	BTA16-600BW
600	16	160	35	35	35	—	1.5	a	BTA16-600CW
600	20	210	50	50	50	—	1.5	a	BTA20-600CW
600	24	240	50	50	50	—	1.5	a	BTA24-600BW
600	25	262	50	50	50	—	1.5	b	BTA26-600BW
700	12	120	35	35	35	—	1.5	a	BTA12-700CW
<b>Non-isolated tab (= <math>t_2</math>)</b>									
600	10	100	50	50	50	—	1.5	a	BTB10-600BW
600	12	126	35	35	35	—	1.3	c	T1235-600G
600	16	170	35	35	35	—	1.3	c	T1635-600G

- Low gate drive, logic level devices

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
<b>Isolated tab</b>					
BTA06-600BW	.234-667				
BTA08-600BW	.363-649				
BTA08-600SW	484-830				
BTA08-600TW	505-481				
BTA10-600BW	.234-679				
BTA12-600BW	.234-680				
BTA12-600SW	484-842				
BTA12-700BW	682-597				
BTA12-700CW	682-603				
BTA16-600BW	.234-710				
BTA16-600CW	.682-615				
BTA20-600CW	.234-692				
BTA24-600BW	705-585				
BTA26-600BW	.234-709				
<b>Non-isolated tab</b>					
BTB10-600BW	363-819				
BTB16-600CW	705-652				
T1235-600G	SMD 302-3059				
T1635-600G	SMD 302-3060				

## Alternistors



- High commutation
- High surge current capability
- High voltage
- Suitable for inductive load power control

$I_T$ rms A	$V_{DRM}$ $V_{RRM}$ V	$I_{TSM}$ A	$I_{GT}$ mA				$V_{GT}$ V	Package	Mfrs. List No.
			$t_{2+}$ g+	$t_{2-}$ g-	$t_{2-}$ g-	$t_{2-}$ g+			
12	800	120	100	100	100	—	1.5	TO-220	TXDV812
25	800	230	150	150	150	—	1.5	TOP3	TPDV825
25	1000	230	150	150	150	—	1.5	TOP3	TPDV1025
25	1200	230	150	150	150	—	1.5	TOP3	TPDV1225
25	1200	230	150	150	150	—	1.5	RD91	TODV1225
40	600	350	200	200	200	—	1.5	TOP3	TPDV640
40	800	350	200	200	200	—	1.5	TOP3	TPDV840
40	800	350	200	200	200	—	1.5	RD91	TODV840
40	1200	350	200	200	200	—	1.5	TOP3	TPDV1240
40	1200	350	200	200	200	—	1.5	RD91	TODV1240

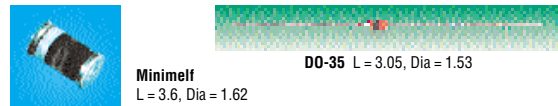
\*  $I_{TSM}$  @  $t_p = 10ms$

Mfrs. List No.	Order Code	Price Each			
		1+	25+	100+	250+
TODV840	742-790				
TODV1225	742-788				
TODV1240	742-776				
TPDV640	742-740				
TPDV825	742-752 †				
TPDV840	742-764				
TPDV1025	742-715				
TPDV1225	742-727				
TPDV1240	742-739				
TXDV812	705-901				

† Available until stocks are exhausted

## Thyristor/Triac Trigger Devices

### Diacs



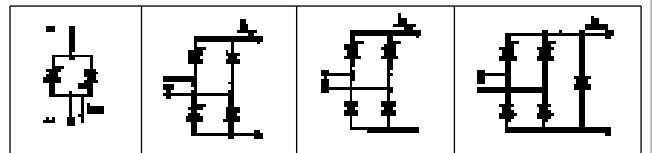
Minimelf  
L = 3.6, Dia = 1.62

$V_{bo}$ min. V	$V_{bo}$ typ. V	$V_{bo}$ max. V	$I_{trm}$ max. A	$V_o$ min. V	$I_{bo}$ max. $\mu$ A	Package	$P_{tot}$ mW	Mfrs. List No.
28	32	36	2	5	100	Minimelf	150	TMMDB3
28	32	36	2	5	100	DO-35	150	DB3
35	40	45	2	5	100	DO-35	150	DB4

Mfrs. List No.	Order Code	Price Each			
		5+	25+	100+	250+
DB3	.363-509				
DB4	705-706				
TMMDB3	SMD 332-8200				

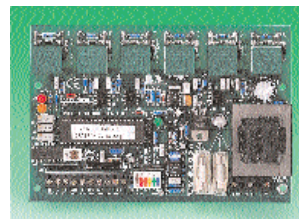
## Trigger Modules

### Converter Stack Configurations



Typical output configurations for SCR/diode trigger modules.

### Three Phase Thyristor Driver



H = 36, W = 100, L = 160

- Phase angle or burst firing options
- No external phasing transformers or pcb wiring required
- Opto coupled, digital isolated control 5-25V dc
- Analogue control inputs 0.5V dc or 4-20mA
- Output status indicator
- Selectable current limit switch 0-100mA dc
- Over current latching trip
- Selectable phase reversal switch
- Resistive or inductive load select
- Adjustable ramp control 0-30s

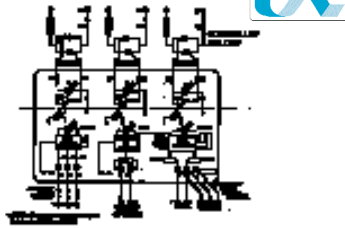
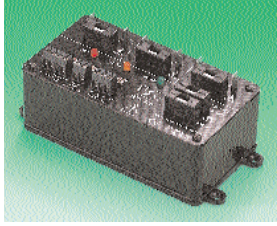
Integral transformer	380/415V ac	Voltage signal into	10kW	0-5V
Secondary voltage	20V ac	Sustaining pulse voltage	8V	
Current consumption	300mA	Initial gate pulse rate of rise	1A/ $\mu$ s	
Initial short circuit gate current	1A	Pulse width	50/60Hz	22 $\mu$ s
Sustaining short circuit gate current	0.5A	Pulse train frequency		25kHz
Initial pulse voltage	15V	Operating temperature		-5°C to +85°C

Mfrs. List No.	Order Code	Price Each		
		1+	5+	10+
FC36M	328-2790			

Continued

## Trigger Modules — continued

### Phase Angle, Three Phase



H = 65, W = 150, D = 80, Fixing centres = 160 48, M4D

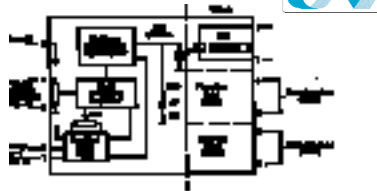
A compact, sealed, 3 phase trigger module designed for simplified wiring without the need for phasing transformers. The unit features phase rotation error and phase loss detection and shut down, built in variable soft-start, gate or fuse failure indication, a feedback with indication facility and unique MONO-LINK® failsafe hardfiring circuitry. Suitable for AC or DC, resistive or inductive loads, via thyristor or hybrid diode modules.

Signal span	0V to 2V dc min.	Thyristor line voltage	415V
2V to 30V dc max	Mono-link rating		3A cont.
Signal zero offset	30% of span	Gate trigger current	250mA cont.
Input impedance	5000Ω nom.	Off state dv/dt	200V/μs
Aux output	5V @ 5mA nom.	Operating temperature	10°C to 65°C
Signal/mains isolation	2.5kV	Power consumption	2W nom.

SD153

Mfrs. List No.	Order Code	Price Each		
		1+	5+	10+
HFM36A	234-096			

### Burst Firing Single and Three Phase



H (overall) = 43, W = 92, D = 60  
Fixing centres = 80 (M5 clear)

Terminals 1-5 Screw clamp, wires 2.5mm² max  
6-11 Push on tabs ¼

Burst firing trigger modules for regulating AC heater power stacks from 110V to 440V at 1, 2 or 3 phase into loads up to 2000 A. The varying switching ratio (nominal 1 second time base), is proportional to signal input, as is indicated by a flashing LED.

RFI free firing of thyristors, triacs or thyristor/diode modules, is due to zero voltage, time proportional switching. Opto-isolated output stages eliminate the need for phase timing or matching.

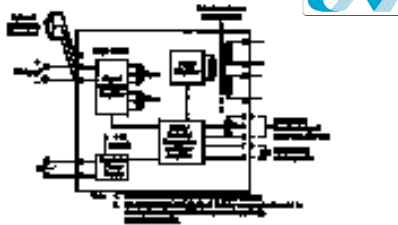
Input power @ 50mA	18V ac or 24V dc	Trigger o/p rating (cont.)	100mA max.
Signal voltage max	2V to 30V dc	Trigger level (typ.)	5V from zero crossover
Zero offset	0-30% of span	Auxiliary output (protected)	5V dc @ 5mA max
Signal input resistance	5KΩ ±20%	Isolation	2500V rms
Trigger/output channel	1A for 1mS (pk)	Line voltage	110V to 415V rms
Off state dv/dt	100V/μs	Operating Temp (ambient)	60°C max.

FOR SUGGESTED CONVERTER STACK CONFIGURATIONS SEE PAGE 445

SD54

	Mfrs. List No.	Order Code	Price Each		
			1+	10+	25+
Single phase	BM1	176-396			
Three phase	BM3	176-398			

### Phase Angle, Single Phase



H = 43, W = 92, D = 60  
Fixing centres = 80 (M5 clear)

A versatile, single phase universal trigger module for firing thyristors, triacs and thyristor-diode stacks from 1A to 1000A, of 100V to 1600V rating. The unit provides adjustable signal matching to voltage or current signals, selectable soft start delay and adjustable current limit control.

When used with a suitable transformer (not supplied), the module will trigger to 110V and 240V.

Signal span min	0 to 2V dc	Trigger isolation	2500V rms
Signal span max	0 to 25V dc	AC i/p voltage	18V rms ±15% @ 65mA
Signal zero offset	0 to 30% of span	Auxiliary o/p	5V dc @ 5mA protected
Signal i/p resistance	5000Ω ±20%	Manual potentiometer	2K, 4K7, 5K or 10K
Trigger pulse height	8V (open circuit)	Thyristor line voltage	110V to 550V rms 50/60Hz
Trigger pulse rating	250mA into 10Ω	Max. ambient temp	65°C operational
Trigger shorted o/p	Protected		

FOR SUITABLE TRANSFORMERS SEE BOOK 4, SECTION 24

FOR SUGGESTED CONVERTER STACK CONFIGURATIONS SEE PAGE 445

SD133

Mfrs. List No.	Order Code	Price Each		
		1+	5+	50+
AFM-11	178-756			

### Phase Angle and Burst Firing



- 110V to 550V single phase supplies
- Suitable for SCR pairs
- MONO-LINK® system eliminates extra cathode connections
- Universal span and zero matching, voltage or current controlled
- Flashing LED power indicator
- Zero-voltage, non-RFI emitting
- Isolated output
- Auxiliary 5V dc output
- Selectable soft-start on FC11-AL

Signal span min.	0 to 2V dc	Isolation voltage	5kV
Signal span max.	0 to 25V dc	AC input power	18V rms ±15% @ 65mA
Signal zero offset	0 to 30%	Aux. output	5V dc @ 5mA
Signal i/p resistance	5kΩ ±20%	Manual potentiometer	2K, 4K7, 5K or 10K
Trigger output dv/dt	100V/μs	SCR/Triac line voltage	110V to 550V
		Cycle time	1s

SD300

	Mfrs. List No.	Order Code	Price Each		
			1+	5+	10+
Phase angle	FC11AL	.707-569			
Burst firing	FC11BL	.707-570			

### Logic Driven Trigger Module



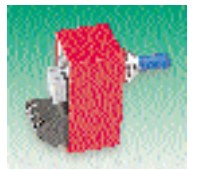
- Zero crossing, RFI-free switching
- Opto-isolated control
- Accepts TTL, CMOS, microprocessor or other digital inputs
- Compact
- Easy to use
- Solid state reliability
- MONO-LINK® gate-to-gate firing
- 230V and 415V versions

H = 26, W = 43, D = 56

SD465

Mfrs. List No.	Order Code	Price Each		
		1+	10+	25+
LTM-Z2	328-2752			
LTM-Z4	328-2764			

### Low Cost, Manual Triac Trigger



- Low cost
- Simple, 3 screw terminal connection
- No heatsink required
- Panel mounted via the control potentiometer
- 110/240V, 50/60Hz operation, 1.5W

H = 42, W = 22, D = 22  
Panel fixing 10mm hole dia.

SD164

Mfrs. List No.	Order Code	Price Each		
		1+	10+	50+
MAT	273-806			

### Zero Voltage, Single Phase



- Hard-fire SCR/triac triggering
- No external transformer required
- Standrad package size – simple to connect
- Reverse polarity protected logic inputs
- Extended voltage and frequency ranges
- Conforms to UL94V-0, CSA and VDE specifications

H = 30, W = 92, D = 21, Fixing centres = 80 (M5 clear)

Supply voltage	352V to 484V ac	Zero voltage crossing inhibit voltage	70V max.
Supply frequency	45 to 450Hz	Off-state dv/dt	100V/μs min.
Logic input voltage	4 to 32V dc	Isolation voltage	2.5kV rms
Non-trigger voltage	2V dc max.	Operating temperature	-30°C to +100°C
Output current (per gate)	1.7A max.		

FOR SUGGESTED CONVERTER STACK CONFIGURATIONS SEE PAGE 445

SD148

Mfrs. List No.	Order Code	1+	5+	50+
SKPC100Z-440	.210-729			

## Power Modules

### Combined Trigger Module and 25A Triac



H = 44, W = 73, D = 44

- In-built triac reduces system complexity
- Requires additional heatsink
- Universal span and zero matching to voltage or current control signals
- +5V dc output
- LED output power indicator
- Low power consumption
- Isolated output
- Selectable soft-start on FC11AL/2

N.B. FC11AL/2 requires external RFI Suppression Module, order code 663-864 see [page 448](#), for **CE Approval**.

Signal span	0 to 2V dc min. 0 to 25V dc max.	AC input power	18V rms ±15% 110V to 240V
Signal zero offset	0 to 30% of span	Triac rms on current	25A
Signal i/p resistance	5kΩ, ±20%	Surge current	250A
Manual pot	2kΩ, 5kΩ or 10kΩ @ 1W	Max. pk voltage	600V
Soft start capacitor	22µF 16V	Power consumption	0.5W

SD117

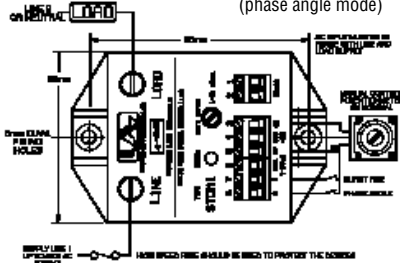
Mfrs. List No.	Order Code	1+	10+	50+
Phase angle	FC11AL/2	.877-086		
Burst firing	FC11BL/2	.877-098		

### 25A, Selectable Phase Angle/Burst Firing



H = 44, W = 92.5, D = 62

- Microprocessor controlled
- Selectable burst fire or phase angle
- Presettable soft-start or automatic switching
- Adjustable cold start ramp-up
- Isolated voltage or current driven output, via temperature controller or PC
- Earthable integral heatsink
- Recommended mounting on thermally conductive, unpainted surface
- AC input should be in-phase with line and load supply (phase angle mode)



Input voltage control	0-5V, manual control potentiometer 5K nominal
Input current control	4-20mA, 200R
Phase reference setting	9-24V ac at 50mA
Output voltage	Up to 440V ac max. 50/60Hz
Load current	25 Amps
Insulation connections to heatsink	1500V rms

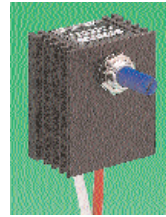
FOR SUITABLE LINE FILTERS SEE [BOOK 2, SECTION 2](#)  
FOR SUITABLE HIGH SPEED FUSES SEE [BOOK 4, SECTION 9](#)

SD206

Mfrs. List No.	Order Code	1+	5+	10+
STOM1	.547-323			

## Power Regulators

### 6A, 10A, 15A, Enclosed or IC only



H = 44, W = 33, D = 23 (exc spindle), Shaft dia = 6.3  
Bush L = 6, Fixing hole dia = 10, Cable L = 170 mm.

Connections: Red – Line 220/240V, 50/60Hz  
White – Neutral through load

H (excl pins) = 27.7 (small mounting hole series)  
34.1 (large mounting hole series)  
W = 16.0, D = 6.4

- Solid state reliability
- 0–99% phase angle power control (resistive load)
- Enclosed design incorporates earthable, isolated heatsink
- Power IC offers 6.3mm or 10.3mm mounting holes, and requires an additional potentiometer
- Uses include heating control, lighting and motor speed control
- Earthable heatsink

Connections:



AC input 240V ac, R = 250kΩ  
AC input 110V ac, R = 120kΩ

N.B. FC11AL/2 requires external RFI Suppression Modules, see [page 448](#), for **CE Approval**.

RMS max. on state current (tab 70°C)	6A, 10A and 15A
Peak one cycle surge current	6A = 100A, 10A = 120A, 15A = 150A
Minimum holding load current	30mA
Repetitive peak voltage (tab 70°C)	400V
Hysteresis (typical)	5%
Total conduction phase angle (typical)	0 to 160°
Controlled conduction phase angle (typical)	30 to 160°
Tab surface operating range	-40 to +70°C
Insulation withstand capability (tab 70°C)	1600V for 1 minute

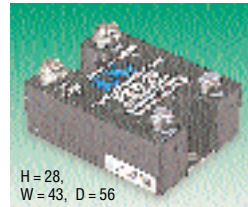
**Recommended heatsink to achieve quoted ratings:** Below 5A use 8°C/W heatsink, or 7.7cm panel.  
10A use 4°C/W heatsink or 10.1cm panel. 15A use 2°C/W heatsink or 17.1cm panel.

**Fusing:** Use only high speed fuses – See [BOOK 4, SECTION 9](#)

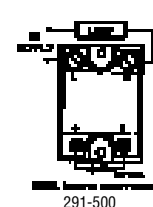
SD55

Mfrs. List No.	Order Code	1+	10+	25+	100+
<b>Enclosed Controller</b>					
6A	CSR2-6E	.170-631			
10A	CSR2-10E	.103-851			
15A	CSR2-15E	.103-852			
<b>IC Only – 3.6mm Dia Mtg Hole</b>					
6A	CSR604A	.170-630			
10A	CSR1004A	.103-849			
15A	CSR1504A	.103-850			
<b>IC Only – 10.3mm Dia Mtg Hole</b>					
15A	CSR1504B	.170-656			

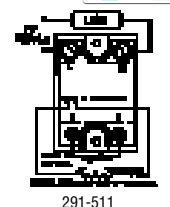
### 25A Enclosed



H = 28,  
W = 43, D = 56



291-500



291-511

Compact, reliable phase angle power controllers for loads up to 6kW at 240V ac, in epoxy encapsulated, simple to wire packages.

Order code 291-511 incorporates a thermistor input to allow for fan speed regulation in heating, ventilation and air conditioning systems.

Suitable thermistor available separately.

N.B. Requires external RFI Suppression Module, order code 663-864 see [page 448](#), for **CE Approval**.

RMS max. on state current	25A	Off state voltage	400V
Hysteresis	15%	Forward voltage drop	1.5V
Leakage current	5mA	Base isolation voltage	1500V rms

Mfrs. List No. PSR25 = 291-500, TPSR25 = 291-511

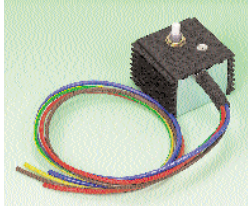
SD166

	Order Code	1+	10+	25+	50+
Thermistor input	.291-500				
Thermistor sensor	.291-511				
	.328-2788				

Continued

## Power Regulators — continued

### 17A, With RFI Suppression



H = 58, W = 65, D = 41 (excl. spindle)  
Shaft dia. = 6.3, bush L = 5

- Integrated RFI filter to EMC (Class A) regulations
- Choice of **switched** (QLC) or **variable** (QVR) output control
- QLC has 3 pre-set voltage levels, and 'off' position
- QVR output range is from 0–98%, with 'off' position
- Single 10mm dia. hole fixing
- Compact, rugged design ● **CE approved**
- Optional self-adhesive label and knob sets available
- Applications include quartz lamps, resistance heating, transformers and motors

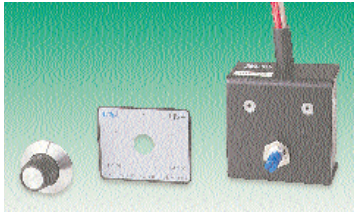


Triac current limit	25A rms	Isolation voltage	2.5kV rms
Surge current	320A	It max. for fusing	112As
Max. fwd voltage drop	1.5V	Max. unit temperature	65°C
Max. load @ 20°C	10A		

SD413

Controllers	Mfrs. List No.	Order Code	Price Each		
			1+	10+	25+
Switched output	QLC/RFI-17A	<b>474-046</b>			
Variable output	QVR/S-RFI 17A	<b>474-058</b>			
<b>Label/knob Set</b>					
Switched output	QLC-KL	<b>175-004.</b>			
Variable output	QVR-KL	<b>175-265.</b>			

### 15A Enclosed



Controller  
H = 58, W = 54, D = 32 (excl spindle)  
Shaft dia = 6.3, Bush L = 5  
Fixing hole dia = 10  
Cable length = 200 min

Connections:  
Brown – Line 240V 50Hz  
Red – Neutral through load  
Green/Yellow – Earth



Solid state mains power regulators in robust hermetically sealed enclosures, featuring triac control up to 15A 240V ac rating. The 25A power triac and all main components are hermetically sealed to ensure long life and reliable high ambient temperature operation. Switched output with three preselected voltage levels and 'off' position.

Applications include quartz lamp and conventional resistance heating.

Adhesive backed silver anodised labels and hairline knobs are available for front panel mounting.

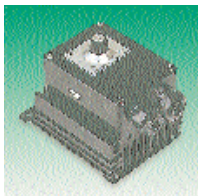
N.B. Requires external RFI Suppression Module, order code 663-852 see page 448, for **CE Approval**.

Supply	240V ac ±10%, 50Hz ±10%
Triac limiting RMS on-state current	25A
Max recommended load	10A @ 20°C, 5A @ 70°C ambient
Peak one cycle surge current (10ms)	320A
I <sub>t</sub> for fusing (10ms)	250 A <sup>2</sup> s
Max recommended unit temperature	70°C
Output load voltage	175-003 0 = 0V, 1 = 120V, 2 = 145V, 3 = 225V

SD56

Controllers	Mfrs. List No.	Order Code	Price Each	
			1+	10+
Switched output	QLC-240-R	<b>175-003</b>		
<b>Knobs + Labels</b>				
Switched output	QLC-KL	<b>175-004.</b>		
Pot output	QVR-KL	<b>175-265.</b>		

### 25A Enclosed, with Integral Heatsink



- Phase angle firing
- Suitable for direct or transformer coupled single phase loads
- High reliability, robust design
- Integral heatsink
- 41A in-rush current rated
- Surface or through panel mounted
- Reversible base plate supplied

H = 100, W = 100, D = 80



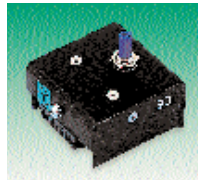
N.B. Requires external RFI Suppression Module, Order Code 663-864, see page 448, for **CE Approval**.

Supply	240Vac ±6%, 50-60Hz	Isolation in/out	2.5kV rms
Integral fuse	25A max.	Off state dv/dt	500V/μs
Main control	Knob and dial	Operating temperature	0 to 65°C
Min. level set	0 to 50%	Storage temperature	-20 to 85°C
Triac rating	41A for 2S	Mains/Load terminals	2 each 2.5mm <sup>2</sup>
Heatsink	1.3°C/W	Earth terminal	M4 stud and clamp

SD154

Phase angle	Mfrs. List No.	Order Code	Price Each		
			1+	5+	10+
	AVR-240	<b>.234-084</b>			

### 16A, Burst Firing, Dual Voltage



- Low RFI emission, zero voltage cross-over
- Dual voltage input
- Low power consumption
- Variable mark/space output 0-100%
- Suitable for resistive loads <3.6kW @ 240V ac
- **CE approved**
- Improved heat dissipation

H = 55, W = 55, D = 35 (excl. spindle)

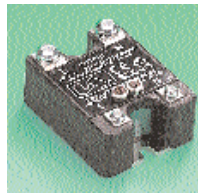
Nominal power rating	3.6kW (240V ac) 1.6kW (110V ac)	Input voltage range	100V to 240V rms
On-state current	16A rms max	Peak repetitive voltage	600V max
Peak surge current	200A	Power consumption	0.5W
		Operating temperature	-20°C to +70°C

SD118

Mfrs. List No.	Order Code	1+	Price Each	50+
ZVS16DV	<b>.877-074</b>		10+	

## Power Regulator Accessories

### Soft-Start Control Module



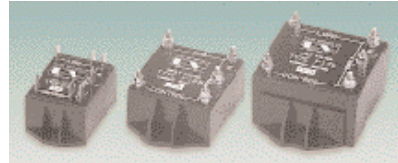
H = 26, W = 43, D = 56

- Mains operated
- Adjustable ramp-up 1s-40s.
- 10%–50% pedestal, allows variable set point for voltage ramp-up
- Suitable for loads up to 25A
- In-built snubber network
- High in-rush capability
- Solid state reliability
- 5kV isolation voltage
- Triac limiting current 26A rms
- Unit current rating 15A

SD464

Mfrs. List No.	Order Code	Price Each			
		1+	10+	25+	50+
SSC-25	<b>328-2776</b>				

### RFI Suppression Modules



663-839/663-840 H = 43, W = 44, D = 72  
663-852 H = 45, W = 62, D = 92  
663-864 H = 55, W = 75, D = 105

Choke-capacitor filter modules for use with United Automation phase-angle power controllers.

SD251

Current Rating	Mfrs. List No.	Order Code	Price Each		
			1+	5+	10+
6A	F155-6A	<b>.663-839</b>			
10A	F155-10A	<b>.663-840</b>			
15A	F165-15A	<b>.663-852</b>			
25A	F175-25A	<b>.663-864</b>			

## Insulation Groups to VDE0110

Depending on the application equipment is classified in insulation groups A<sub>0</sub>, A, B, C or D relating to reduction in the performance of insulation caused by environmental influences eg. dust, dirt, humidity, condensation and ageing. In addition the groups are determined both by the effects of damage produced by failure of the performance of an insulation material and also flashover voltages.

### Insulation Group A<sub>0</sub>.

Relates to low power equipment which is located in air conditioned or clean and dry locations or which is protected by appropriate measures and on which overheating will not be excessive in case of a short circuit.

### Insulation Group A

Relates to equipment located in air conditioned, clean, dry locations and protected by acceptable measures.

### Insulation Group B

Relates to equipment housed in living rooms, stores, premises, precision engineering, workshops, laboratories, control rooms, medical rooms, etc.

### Insulation Group C

Relates to equipment mainly used in industrial, commercial and agricultural works housed in unheated stores, repair shops, boiler houses or on machine tools etc.

### Insulation Group D

Relates to equipment used on power vehicles or rolling stock exposed to damp resulting from condensation or melting snow and conductive dust caused by braking devices that are not satisfactorily enclosed.