





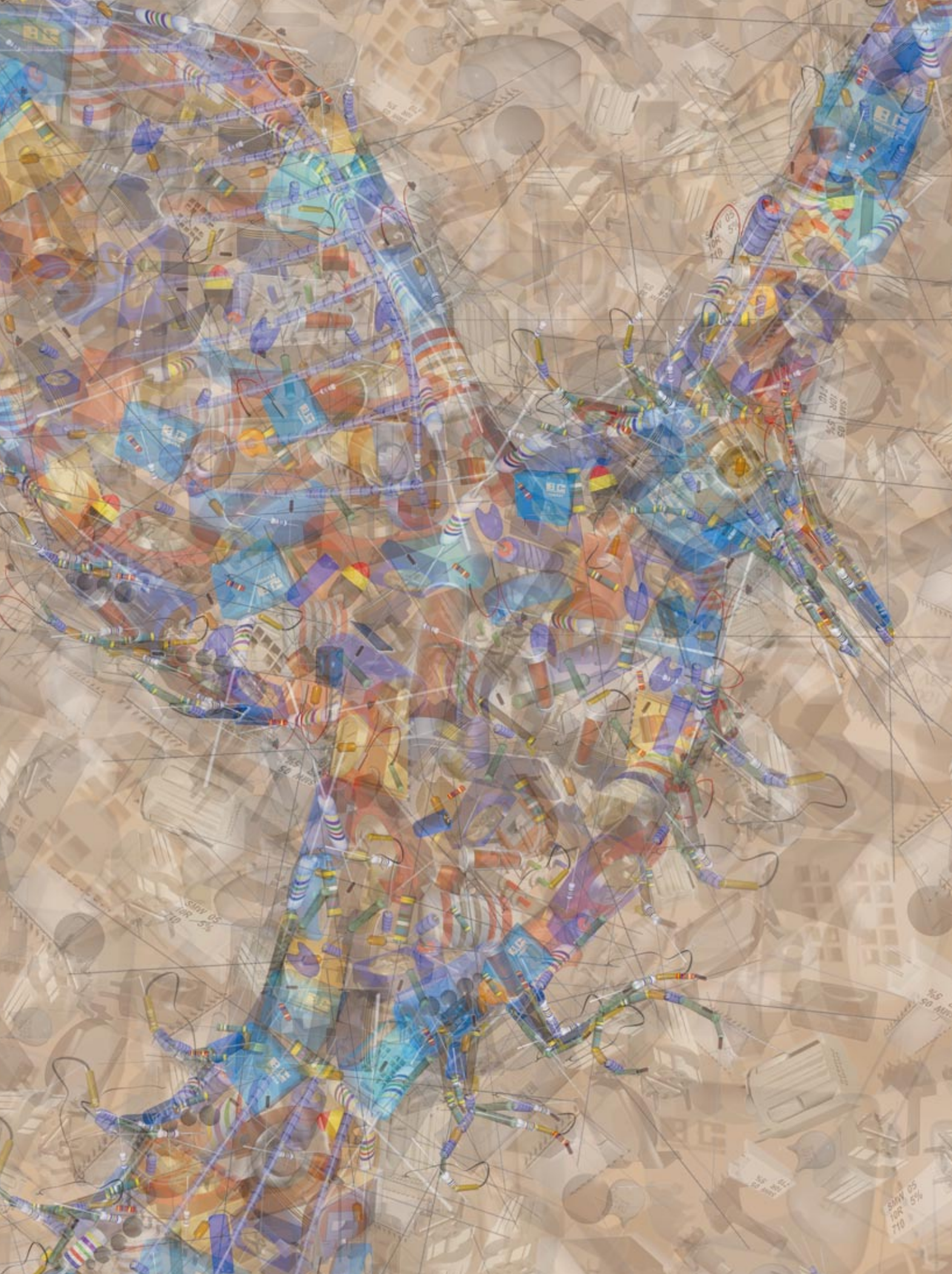


BC Components Product Guide

1999

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BC Components

Providing knowledge, creating solutions

BC Components

built on the strong heritage of Philips, Beyschlag and Centralab, is one of the major players in the passive components business of today. We are committed to service demanding markets such as consumer, telecommunications, automotive- and industrial applications. We offer one of the broadest ranges of passive components in the industry, but our main concern is to delight our customers with fully integrated design solutions that maximise the potential of their products.

Our global presence is backed up by efficient and strategically positioned manufacturing facilities. Together with the experience and skills of our teams this enables us to support your high quality operations with our value-added logistics services. As you would expect, our high quality standards are also reflected in ISO9001/9002 approved organizations.

We are determined to listen, understand and respond to the needs of our customers. Right now, tomorrow, in the future.



A handwritten signature in black ink, appearing to read 'Gerrit van Grol'. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Gerrit van Grol
President & CEO

Notice

By 1 January 1999 BC Components was set up as an independent company, formerly belonging to Philips Components. As a consequence it may initially happen that logos on products, documentation and packaging are not corresponding. This situation will solve itself.

*We thank you for your understanding.
BC Components*

Please visit us on

<http://www.bccomponents.com>

On line services

Visit our new Internet web site for the latest information on BC Components.

Comprehensive search tool

We realise that a web site should be your right hand and must provide solutions. For that reason we are continuously improving our web site and adding information to it. So make sure you visit us more than once to see how we are improving! If you have any comments or suggestions to make your life easier, then please let us know either via our web site or just send an e-mail to: bcc.marcom@comp.philips.com

Address details

As a new company we are on the move and because we listen to the demands of the industry it may happen that some organizations will move during the year. For the most updated address details our web site will be the solution.

Distributors

BC Components is a global player and to make sure you receive the support you need, when you need it, we are working with the best distributors. These distributors can be found on our web site, sorted by region. So you can easily find the one nearest to you and in nearly all cases you can link directly to your selected distributor's home page.

BC Components are the people who listen, understand and respond to the demands of the industry. Therefore it will be much appreciated, in case you have any subject you want to share that you contact us.

Order the product catalogue CD-ROM

If you wish to have the product catalogue on CD-ROM you can order it via our web site <http://www.bccomponents.com>

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Preferred type indication

In this catalogue you will find a broad range of passive components meeting the many and varied requirements of today's equipment manufacturers.

For each product section we clearly indicate the preferred types.

"Preferred" means types which are generally easily available from our factories and through franchised distributors. These products are recommended for design-in.

Besides the products listed in this catalogue, we can also offer application specific components and a custom-design service for customers with special requirements.

How to order

For most of the preferred types you will be able to obtain the clear text code or the 12-digit ordering code from this catalogue.

For ordering information of all other types, consult the relevant data handbook as referred to in the appropriate pages of this catalogue. This information can also be found on the Product Data Finder CD-ROM.

Minimum shipment quantities, price and delivery details can be obtained from the BC Components sales organization in your country or from one of our franchised distributors.



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New Products & Highlights

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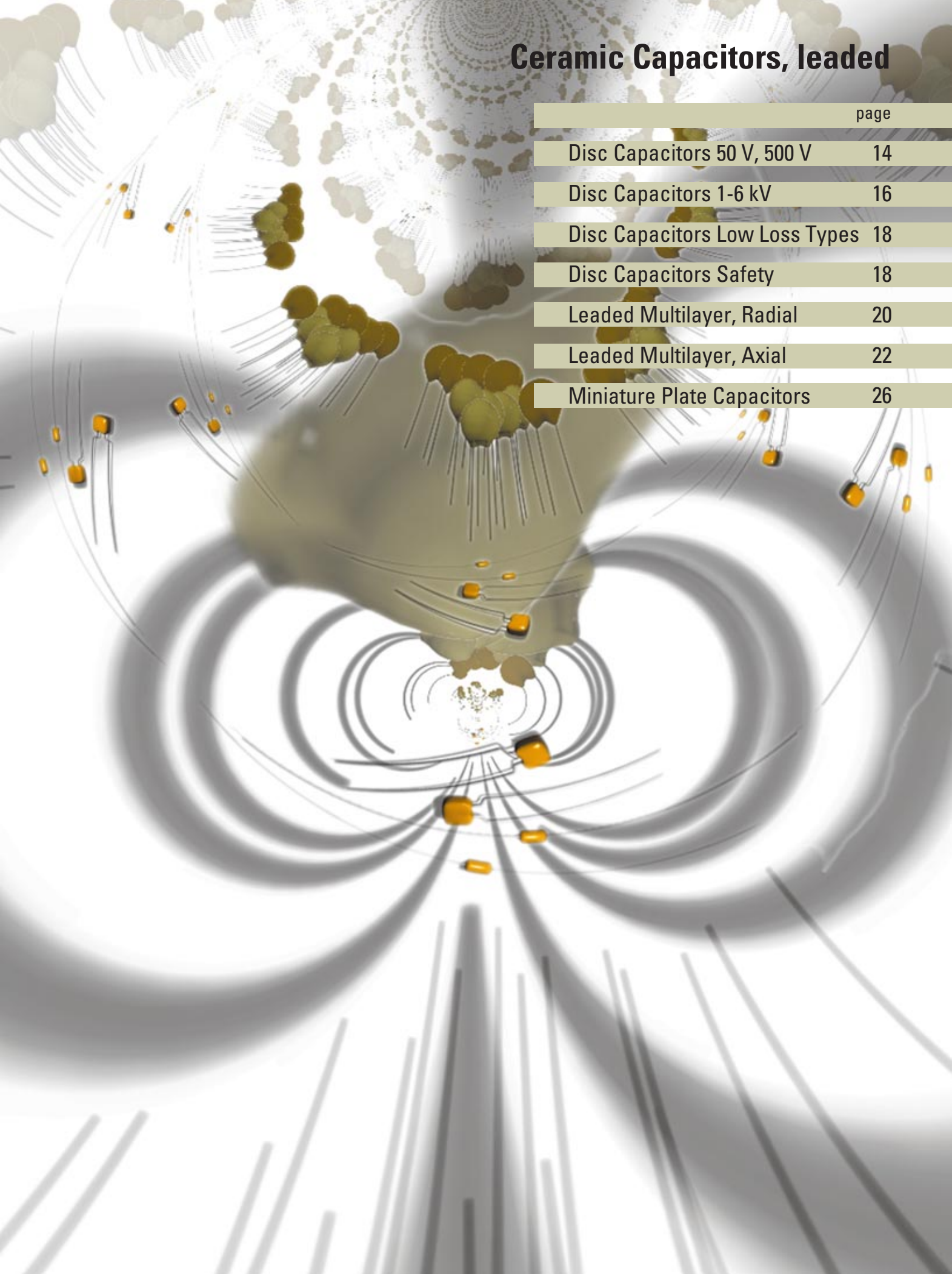
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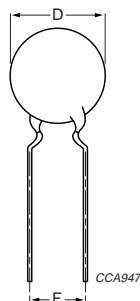
General purpose 50 V, 500 V



U_{RDC}	50 V					500 V				
Dielectric	Class 1		Class 2			Class 1		Class 2		
	NPO	SLO	Y5P	Z5U	Z5V	NPO	SLO	Y5P	Z5U	
Capacitance (pF)	1.0									
	1.5									
	2.2									
	3.3									
	4.7									
	6.8									
	10.0					5.0				
	12					5.0				
	15					5.0				
	18					5.0				
	22					5.0				
	27					6.5				
	33						5.0			
	39						5.0			
	47						5.0			
	56	5.0					5.0			
	68	5.0					6.5			
	82	5.0					6.5			
	100	5.0						5.0		
	150		5.0					5.0		
	180		5.0							
	220		5.0					5.0		
	330		5.0					5.0		
	470		5.0					5.0		
	680		5.0					6.5		
	1000		5.0	5.0				6.5	5.0	
	1500		5.0	5.0				7.5	6.5	
	1800		6.5	5.0						
	2200		6.5	5.0				8.5	6.5	
	3300		7.5	5.0				10.0	7.5	
	4700		8.5	5.0	5.0			12.0	8.5	
	6800		10.0	6.5				13.5	10.0	
	10 000		11.0	7.5	6.5			17.5	12.0	
	15 000			8.5					13.5	
	22 000			10.0	8.5				15.0	
	47 000				11.0					
	 preferred									
Tolerance	± 5%	± 5%	± 10%	± 20%	+ 80%/ - 20%	± 5%	± 5%	± 10%	± 20%	
Dissipation factor: $C \leq 30$ pF $C > 30$ pF	$\leq 20 \times (10/C + 0.7) \times 10^{-4}$ max $\leq 20 \times 10^{-4}$		$\leq 2.5\%$	$\leq 3.0\%$		$\leq 20 \times (10/C + 0.7) \times 10^{-4}$ max $\leq 20 \times 10^{-4}$		$\leq 2.5\%$	$\leq 3.0\%$	
Insulation resistance	$\geq 10\,000\text{ M}\Omega$ at 50 V_{DC}					$\geq 10\,000\text{ M}\Omega$ at 500 V_{DC}				
Operating temp. range	- 30 to + 85 $^{\circ}\text{C}$					- 30 to + 85 $^{\circ}\text{C}$				
Climatic category	55/085/21		10/085/21			55/085/21		10/085/21		
Dielectric strength	250% of rated voltage									
Reference specification	IEC 384-8, IEC 384-9, EIA 198									
Features	low losses, high stability									
Applications	bypass, coupling, resonant circuit									

Ordering information Preferred types

U _{RDC} = 50 V, kinked			
C (pF)	F (mm)	clear text code*	catalogue number 12NC
Class 1 NP0			
1.0	5.0	D109C20C0KF6 .J5	2252 505 .. 044
1.5	5.0	D159C20C0KF6 .J5	2252 505 .. 144
2.2	5.0	D229C20C0JF6 .J5	2252 505 .. 244
3.3	5.0	D339C20C0JF6 .J5	2252 505 .. 344
4.7	5.0	D479C20C0HF6 .J5	2252 505 .. 444
6.8	5.0	D689D20C0HF6 .J5	2252 505 .. 645
10	5.0	D100J20C0GF6 .J5	2252 505 .. 005
12	5.0	D120J20C0GF6 .J5	2252 505 .. 055
15	5.0	D150J20C0GF6 .J5	2252 505 .. 105
18	5.0	D180J20C0GF6 .J5	2252 505 .. 155
22	5.0	D220J20C0GF6 .J5	2252 505 .. 205
27	5.0	D270J20C0GF6 .J5	2252 505 .. 255
33	5.0	D330J20C0GF6 .J5	2252 505 .. 305
39	5.0	D390J20C0GF6 .J5	2252 505 .. 355
47	5.0	D470J20C0GF6 .J5	2252 505 .. 405
Class 1 SL0			
56	5.0	D560J20SL0F6 .J5	2252 565 .. 505
68	5.0	D680J20SL0F6 .J5	2252 565 .. 605
82	5.0	D820J20SL0F6 .J5	2252 565 .. 805
100	5.0	D101J20SL0F6 .J5	2252 565 .. 015
150	5.0	D151K20Y5PF6 .J5	2252 615 .. 111
180	5.0	D181K20Y5PF6 .J5	2252 615 .. 165
220	5.0	D221K20Y5PF6 .J5	2252 615 .. 215
Class 2 Y5P			
330	5.0	D331K20Y5PF6 .J5	2252 615 .. 311
470	5.0	D471K20Y5PF6 .J5	2252 615 .. 411
680	5.0	D681K20Y5PF6 .J5	2252 615 .. 611
1000	5.0	D102K20Y5PF6 .J5	2252 615 .. 021
1500	5.0	D152K20Y5PF6 .J5	2252 615 .. 121
1800	5.0	D182K25Y5PF6 .J5	2252 615 .. 171
2200	5.0	D222K25Y5PF6 .J5	2252 615 .. 221
3300	5.0	D332K29Y5PF6 .J5	2252 615 .. 321
4700	5.0	D472K33Y5PF6 .J5	2252 615 .. 421
6800	5.0	D682K39Y5PF6 .J5	2252 615 .. 621
10 000	5.0	D103K43Y5PF6 .J5	2252 615 .. 031
Class 2 Z5U			
1000	5.0	D102M20Z5UF6 .J5	2252 645 .. 022
1500	5.0	D152M20Z5UF6 .J5	2252 645 .. 122
2200	5.0	D222M20Z5UF6 .J5	2252 645 .. 222
3300	5.0	D332M20Z5UF6 .J5	2252 645 .. 322
4700	5.0	D472M20Z5UF6 .J5	2252 645 .. 422
6800	5.0	D682M25Z5UF6 .J5	2252 645 .. 622
10 000	5.0	D103M29Z5UF6 .J5	2252 645 .. 032
15 000	5.0	D153M33Z5UF6 .J5	2252 645 .. 132
22 000	5.0	D223M39Z5UF6 .J5	2252 645 .. 232
Class 2 Z5V			
4700	5.0	D472Z20Z5VF6 .J5	2252 655 .. 423
10 000	5.0	D103Z25Z5VF6 .J5	2252 655 .. 033
22 000	5.0	D223Z33Z5VF6 .J5	2252 655 .. 233
47 000	5.0	D473Z43Z5VF6 .J5	2252 655 .. 433



U _{RDC} = 500 V, kinked			
C (pF)	F (mm)	clear text code*	catalogue number 12NC
Class 1 NP0			
10	5.0	D100J20C0GL6 .J5	2252 508 .. 005
12	5.0	D120J20C0GL6 .J5	2252 508 .. 055
15	5.0	D150J20C0GL6 .J5	2252 508 .. 105
18	5.0	D180J20C0GL6 .J5	2252 508 .. 155
22	5.0	D220J20C0GL6 .J5	2252 508 .. 205
27	5.0	D270J25C0GL6 .J5	2252 508 .. 255
Class 1 SL0			
33	5.0	D330J20SL0L6 .J5	2252 568 .. 305
39	5.0	D390J20SL0L6 .J5	2252 568 .. 355
47	5.0	D470J20SL0L6 .J5	2252 568 .. 405
56	5.0	D560J20SL0L6 .J5	2252 568 .. 505
68	5.0	D680J25SL0L6 .J5	2252 568 .. 605
82	5.0	D820J25SL0L6 .J5	2252 568 .. 805
Class 2 Y5P			
100	5.0	D101K20Y5PL6 .J5	2252 618 .. 011
150	5.0	D151K20Y5PL6 .J5	2252 618 .. 111
220	5.0	D221K20Y5PL6 .J5	2252 618 .. 211
330	5.0	D331K20Y5PL6 .J5	2252 618 .. 311
470	5.0	D471K20Y5PL6 .J5	2252 618 .. 411
680	5.0	D681K25Y5PL6 .J5	2252 618 .. 611
1000	5.0	D102K25Y5PL6 .J5	2252 618 .. 021
1500	5.0	D152K29Y5PL6 .J5	2252 618 .. 121
2200	5.0	D222K33Y5PL6 .J5	2252 618 .. 221
3300	5.0	D332K39Y5PL6 .J5	2252 618 .. 321
4700	7.5	D472K47Y5PL6J7	2252 618 31421
6800	7.5	D682K53Y5PL6J7	2252 618 31621
10 000	7.5	D103K69Y5PL6J7	2252 618 31031
Class 2 Z5U			
1000	5.0	D102M20Z5UL6 .J5	2252 648 .. 022
1500	5.0	D152M25Z5UL6 .J5	2252 648 .. 122
2200	5.0	D222M25Z5UL6 .J5	2252 648 .. 222
3300	5.0	D332M29Z5UL6 .J5	2252 648 .. 322
4700	5.0	D472M33Z5UL6 .J5	2252 648 .. 422
6800	5.0	D682M39Z5UL6 .J5	2252 648 .. 622
10 000	7.5	D103M47Z5UL6 .J7	2252 648 31032 ³⁾
15 000	7.5	D153M53Z5UL6 .J7	2252 648 31132 ³⁾
22 000	7.5	D223M59Z5UL6 .J7	2252 648 31232 ³⁾

Packaging quantities

Dmax (mm / inches)	quantities		
	bulk	reel	ammo
5.0 (0.20")	1000	2000 ⁴⁾	2000
6.5 (0.25")	1000	2000 ⁴⁾	2000
7.5 (0.29")	1000	2000 ⁴⁾	2000
8.5 (0.33")	1000	2000 ⁴⁾	2000
10.0 (0.39")	1000	2000 ⁴⁾	2000
11.0 (0.43")	1000	2000 ⁴⁾	2000
12.0 (0.47")	1000	-	-
13.5 (0.53")	500	-	-
15.0 (0.59")	500	-	-
17.5 (0.69")	500	-	-

- 1) T = reel
U = ammo
3 = bulk
- 2) 06 = reel
08 = ammo
10 = bulk
- 3) bulk
4) 2500 for 50 V

* preferred ordering method

Ceramic Disc Capacitors

General purpose 1 kV, 2 kV, 3 kV, 6 kV

U_{RDC}	1 kV			2 kV			3 kV			6 kV		
U_{RDC} , lead form	1000 V, kinked			2000 V, kinked			3000 V, kinked			6000 V, straight		
Dielectric	class 1		class 2	class 1		class 2	class 1		class 2	class 1		class 2
	SLO	Y5P	Z5U	SLO	Y5P	Z5U	SLO	Y5P	Z5U	SLO	S3N	Z5U
Capacitance (pF)	10	6.5		6.5			8.5			15.0		
	12											
	15	6.5		6.5			8.5			15.0		
	18											
	22	6.5		6.5			8.5			15.0		
	27											
	33	6.5		6.5			8.5			15.0		
	39											
	47	6.5		7.5			8.5				15.0	
	56											
	68	6.5		8.5			10.0			15.0		
	82											
	100	7.5	6.5	10.0	6.5			8.5			15.0	
	120											
	150	10.0	6.5	11.0	6.5			8.5			15.0	
	180											
	220	10.0	6.5		6.5			8.5				15.0
	270											
	330		6.5		6.5			8.5				15.0
	390											
	470		6.5		6.5			8.5	8.5			15.0
	560											
	680		6.5		7.5			10.0	8.5			15.0
	820											
	1000		7.5	6.5		8.5	7.5		11.0	8.5		15.0
	1200											
	1500		8.5	6.5		10.0	7.5		12.0	10.0		17.5
	1800											
	2200		10.0	6.5		11.0	8.5		15.0	11.0		19.0
	2700											
	3300		11.0	8.5		13.5	10.0		17.5	13.5		
	3900											
	4700		13.5	10.0		17.5	12.0			15.0		
	5600											
	6800		15.0	11.0			13.5					
	8200											
	10 000		17.5	12.0			17.5					
	15 000			15.0								
	22 000			17.5								
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> in columns: diameter D_{max} (mm) </div>										
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> preferred </div>										
Max. thickness	4.5 mm			5.0 mm			6.0 mm			8.0 mm		
Tolerance	± 10%	± 10%	± 20%	± 10%	± 10%	± 20%	± 10%	± 10%	± 20%	± 20%		
Packing	reel, ammo, loose						loose					
Dissipation factor	class 1, $C \leq 30$ pF: $\leq 20 \times (10/c + 0.7) \times 10^{-4} \max$ $C > 30$ pF: $\leq 20 \times 10^{-4}$ class 2, $\leq 3.0\%$											
Insulation resistance at 500 V (DC)	$\geq 10\,000\text{ M}\Omega$											
Operating temperature	— 30 °C to + 85 °C											
Climatic category	class 1: 55/85/21 class 2: 10/85/21											
Dielectric strength	200% of rated voltage											
Reference specification	IEC 384-8, IEC 384-9, EIA 198											
Features	low losses, high stability, high capacitance in smaller size											
Applications	DC high voltage, pulse high voltage, SMPS, HV power supply, HF ballast											
	<div style="border: 1px solid black; padding: 10px;"> <h3>Mechanical outlines</h3> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> kinked flanged straight </div> </div>											

Ordering information Preferred types

U_{RDc} = 1000 V, kinked

C (pF)	F (mm)	clear text code*	cat. number 12NC
Class 1 SL0			
10	5.0	S100K25SL0N6 .K5	2252 561 .. 006
15	5.0	S150K25SL0N6 .K5	2252 561 .. 106
22	5.0	S220K25SL0N6 .K5	2252 561 .. 206
33	5.0	S330K25SL0N6 .K5	2252 561 .. 306
47	5.0	S470K25SL0N6 .K5	2252 561 .. 406
68	5.0	S680K25SL0N6 .K5	2252 561 .. 606
100	5.0	S101K29SL0N6 .K5	2252 561 .. 016
150	5.0	S151K39SL0N6 .K5	2252 561 .. 116
220	5.0	S221K39SL0N6 .K5	2252 561 .. 216
Class 2 Y5P			
100	5.0	S101K25Y5PN6 .K5	2252 611 .. 016
150	5.0	S151K25Y5PN6 .K5	2252 611 .. 116
220	5.0	S221K25Y5PN6 .K5	2252 611 .. 216
330	5.0	S331K25Y5PN6 .K5	2252 611 .. 316
470	5.0	S471K25Y5PN6 .K5	2252 611 .. 416
680	5.0	S681K25Y5PN6 .K5	2252 611 .. 616
1000	5.0	S102K29Y5PN6 .K5	2252 611 .. 026
1500	5.0	S152K39Y5PN6 .K5	2252 611 .. 126
2200	5.0	S222K39Y5PN6 .K5	2252 611 .. 226
3300	5.0	S332K43Y5PN6 .K5	2252 611 .. 326
4700	7.5	S472K53Y5PN6K37	2252 611 37426 ³⁾
6800	7.5	S682K59Y5PN6K37	2252 611 37626 ³⁾
10 000	7.5	S103K75Y5PN6K37	2252 611 37036 ³⁾
Class 2 Z5U			
1000	5.0	S102M25Z5UN6 .K5	2252 641 .. 027
1500	5.0	S152M25Z5UN6 .K5	2252 641 .. 127
2200	5.0	S222M25Z5UN6 .K5	2252 641 .. 227
3300	5.0	S332M33Z5UN6 .K5	2252 641 .. 327
4700	5.0	S472M39Z5UN6 .K5	2252 641 .. 427
6800	5.0	S682M43Z5UN6 .K5	2252 641 .. 627
10 000	7.5	S103M47Z5UN6K37	2252 641 37037 ³⁾
15 000	7.5	S153M59Z5UN6K37	2252 641 37137 ³⁾
22 000	7.5	S223M69Z5UN6K37	2252 641 37237 ³⁾

U_{RDc} = 6000 V, straight, bulk packing

C (pF)	F (mm)	clear text code*	cat. number 12NC
Class 1 SL0			
10	10.0	S100M59SL0U83L0	2252 564 52007
15	10.0	S150M59SL0U83L0	2252 564 52107
22	10.0	S220M59SL0U83L0	2252 564 52207
33	10.0	S330M59SL0U83L0	2252 564 52307
Class 1 S3N			
47	10.0	S470M59S3NU83L0	2252 574 52307
68	10.0	S680M59S3NU83L0	2252 574 52607
100	10.0	S101M59S3NU83L0	2252 574 52017
150	10.0	S151M59S3NU83L0	2252 574 52117
Class 2 Z5U			
220	10.0	S221M59Z5UU83L0	2252 644 52217
330	10.0	S331M59Z5UU83L0	2252 644 52317
470	10.0	S471M59Z5UU83L0	2252 644 52417
680	10.0	S681M59Z5UU83L0	2252 644 52617
1000	10.0	S102M59Z5UU83L0	2252 644 52027
1500	10.0	S152M69Z5UU83L0	2252 644 52127
2200	10.0	S222M75Z5UU83L0	2252 644 52227

U_{RDc} = 2000 V, kinked

C (pF)	F (mm)	clear text code*	cat. number 12NC
Class 1 SL0			
10	5.0	S100K25SL0P6 .K5	2252 562 .. 006
15	5.0	S150K25SL0P6 .K5	2252 562 .. 106
22	5.0	S220K25SL0P6 .K5	2252 562 .. 206
33	5.0	S330K25SL0P6 .K5	2252 562 .. 306
47	5.0	S470K29SL0P6 .K5	2252 562 .. 406
68	5.0	S680K33SL0P6 .K5	2252 562 .. 606
100	5.0	S101K39SL0P6 .K5	2252 562 .. 016
150	5.0	S151K43SL0P6 .K5	2252 562 .. 116
Class 2 Y5P			
100	5.0	S101K25Y5PP6 .K5	2252 612 .. 016
150	5.0	S151K25Y5PP6 .K5	2252 612 .. 116
220	5.0	S221K25Y5PP6 .K5	2252 612 .. 216
330	5.0	S331K25Y5PP6 .K5	2252 612 .. 316
470	5.0	S471K25Y5PP6 .K5	2252 612 .. 416
680	5.0	S681K29Y5PP6 .K5	2252 612 .. 616
1000	5.0	S102K33Y5PP6 .K5	2252 612 .. 026
1500	5.0	S152K39Y5PP6 .K5	2252 612 .. 126
2200	5.0	S222K43Y5PP6 .K5	2252 612 .. 226
3300	7.5	S332K53Y5PP6K37	2252 612 37326 ³⁾
4700	7.5	S472K69Y5PP6K37	2252 612 37426 ³⁾
Class 2 Z5U			
1000	5.0	S102M29Z5UP6 .K5	2252 642 .. 027
1500	5.0	S152M29Z5UP6 .K5	2252 642 .. 127
2200	5.0	S222M33Z5UP6 .K5	2252 642 .. 227
3300	5.0	S332M39Z5UP6 .K5	2252 642 .. 327
4700	7.5	S472M47Z5UP6K37	2252 642 37427 ³⁾
6800	7.5	S682M59Z5UP6K37	2252 642 37627 ³⁾
10 000	7.5	S103M69Z5UP6K37	2252 642 37037 ³⁾

U_{RDc} = 3000 V, kinked, bulk packing

C (pF)	F (mm)	clear text code*	cat. number 12NC
Class 1 SL0			
10	7.5	S100K33SL0R63K7	2252 563 37006
15	7.5	S150K33SL0R63K7	2252 563 37106
22	7.5	S220K33SL0R63K7	2252 563 37206
33	7.5	S330K33SL0R63K7	2252 563 37306
47	7.5	S470K33SL0R63K7	2252 563 37406
68	7.5	S680K39SL0R63K7	2252 563 37606
Class 2 Y5P			
100	7.5	S101K33Y5PR63K7	2252 613 37016
150	7.5	S150K33Y5PR63K7	2252 613 37116
220	7.5	S221K33Y5PR63K7	2252 613 37216
330	7.5	S331K33Y5PR63K7	2252 613 37316
470	7.5	S471K33Y5PR63K7	2252 613 37416
680	7.5	S681K39Y5PR63K7	2252 613 37616
1000	7.5	S102K43Y5PR63K7	2252 613 37026
1500	7.5	S152K47Y5PR63K7	2252 613 37126
2200	7.5	S222K59Y5PR63K7	2252 613 37226
3300	10.0	S332K69Y5PR83K0	2252 613 48326
Class 2 Z5U			
470	7.5	S471M33Z5UR63K7	2252 643 37417
680	7.5	S681M33Z5UR63K7	2252 643 37617
1000	7.5	S102M33Z5UR63K7	2252 643 37027
1500	7.5	S152M39Z5UR63K7	2252 643 37127
2200	7.5	S222M43Z5UR63K7	2252 643 37227
3300	7.5	S332M53Z5UR63K7	2252 643 37327
4700	7.5	S472M59Z5UR63K7	2252 643 37427

Packaging quantities

kinked leads D _{max} (mm / inches)	bulk	reel	ammo
5.0 / 0.20"	1000	2000	1 kV
6.5 / 0.25"	1000	2000	2000
7.5 / 0.29"	1000	2000	
8.5 / 0.33"	1000	2000	2 kV
10.0 / 0.39"	1000	2000	1500
11.0 / 0.43"	1000	2000	
12.0 / 0.47"	1000	-	-
13.5 / 0.53"	500	-	-
15.0 / 0.59"	500	-	-
17.5 / 0.69"	500	-	-
19.0 / 0.75"	500	-	-

1) T = reel
U = ammo
3 = bulk

2) 13 = reel
14 = ammo
15 = bulk

3) bulk

Ordering information Preferred types

Low loss (0.5% max), kinked

C (pF)	F (mm)	clear text code*	catalogue number 12NC
U_{RDC} = 1 kV			
100	5.0	F101K25Y5PN6 .K5	2252 701 .. 016
150	5.0	F151K25Y5PN6 .K5	2252 701 .. 116
220	5.0	F221K25Y5PN6 .K5	2252 701 .. 216
330	5.0	F331K25Y5PN6 .K5	2252 701 .. 316
470	5.0	F471K25Y5PN6 .K5	2252 701 .. 416
680	5.0	F681K29Y5PN6 .K5	2252 701 .. 616
1000	5.0	F102K33Y5PN6 .K5	2252 701 .. 026
1500	5.0	F152K39Y5PN6 .K5	2252 701 .. 126
2200	5.0	F222K43Y5PN6 .K5	2252 701 .. 226
3300	7.5	F332K59Y5PN63K7 ³⁾	2252 701 37326 ³⁾
4700	7.5	F472K69Y5PN63K7 ³⁾	2252 701 37426 ³⁾
U_{RDC} = 2 kV			
100	5.0	F101K25Y5PP6 .K5	2252 702 .. 016
150	5.0	F151K25Y5PP6 .K5	2252 702 .. 116
220	5.0	F221K25Y5PP6 .K5	2252 702 .. 216
330	5.0	F331K29Y5PP6 .K5	2252 702 .. 316
470	5.0	F471K29Y5PP6 .K5	2252 702 .. 416
680	5.0	F681K33Y5PP6 .K5	2252 702 .. 616
1000	5.0	F102K43Y5PP6 .K5	2252 702 .. 026
1500	7.5	F152K47Y5PP6 .K5	2252 702 .. 126
2200	7.5	F222K59Y5PP63K5 ³⁾	2252 702 37226 ³⁾
3300	7.5	F332K69Y5PP63K7 ³⁾	2252 702 37326 ³⁾
4700	10.0	F472K75Y5PP83K0 ³⁾	2252 702 48426 ³⁾
U_{RDC} = 3 kV			
100	7.5	F101K33Y5PR6 .K7	2252 703 .. 016
150	7.5	F151K33Y5PR6 .K7	2252 703 .. 116
220	7.5	F221K33Y5PR6 .K7	2252 703 .. 216
330	7.5	F331K33Y5PR6 .K7	2252 703 .. 316
470	7.5	F471K33Y5PR6 .K7	2252 703 .. 416
680	7.5	F681K39Y5PR6 .K7	2252 703 .. 616
1000	7.5	F102K43Y5PR6 .K7	2252 703 .. 026
1500	7.5	F152K53Y5PR6 .K7	2252 703 .. 126
2200	7.5	F222K59Y5PR63K7 ³⁾	2252 703 37226 ³⁾
2700	7.5	F272K69Y5PR83K7 ³⁾	2252 703 38326 ³⁾

Low loss (0.2% max), flanged

C (pF)	F (mm)	clear text code*	catalogue number 12NC
U_{RDC} = 1 kV			
100	5.0	D101K28Y5RN .. SP	2251 711 .. 016
120	5.0	D121K28Y5RN .. SP	2251 711 .. 066
150	5.0	D151K28Y5RN .. SP	2251 711 .. 116
180	5.0	D181K28Y5RN .. SP	2251 711 .. 166
220	5.0	D221K28Y5RN .. SP	2251 711 .. 216
270	5.0	D271K28Y5RN .. SP	2251 711 .. 266
330	5.0	D331K28Y5RN .. SP	2251 711 .. 316
390	5.0	D391K28Y5RN .. SP	2251 711 .. 366
470	5.0	D471K28Y5RN .. SP	2251 711 .. 416
560	5.0	D561K28Y5RN .. SP	2251 711 .. 516
680	5.0	D681K31Y5RN .. SP	2251 711 .. 616
820	5.0	D821K31Y5RN .. SP	2251 711 .. 816
1000	5.0	D102K35Y5RN .. SP	2251 711 .. 026
1200	5.0	D122K39Y5RN .. SP	2251 711 .. 076
1500	5.0	D152K43Y5RN .. SP	2251 711 .. 126
1800	5.0	D182K43Y5RN .. SP	2251 711 .. 176
2200	5.0	D222K47Y5RN .. SP	2251 711 .. 226
U_{RDC} = 2 kV			
100	5.0	D101K28Y5RP .. SP	2251 712 .. 016
120	5.0	D121K28Y5RP .. SP	2251 712 .. 066
150	5.0	D151K28Y5RP .. SP	2251 712 .. 116
180	5.0	D181K28Y5RP .. SP	2251 712 .. 166
220	5.0	D221K28Y5RP .. SP	2251 712 .. 216
270	5.0	D271K28Y5RP .. SP	2251 712 .. 266
330	5.0	D331K31Y5RP .. SP	2251 712 .. 316

390	5.0	D391K31Y5RP .. SP	2251 712 .. 366
470	5.0	D471K35Y5RP .. SP	2251 712 .. 416
560	5.0	D561K35Y5RP .. SP	2251 712 .. 516
680	5.0	D681K39Y5RP .. SP	2251 712 .. 616
820	5.0	D821K43Y5RP .. SP	2251 712 .. 816
1000	5.0	D102K47Y5RP .. SP	2251 712 .. 026

Safety, Class X1 / Y2

C (pF)	F (mm)	clear text code*	catalogue number 12NC
Class Y2 (Y5U), flanged			
100	5.0	B101K31Y5PQ .. SP	2251 827 .. 016
150	5.0	B151K31Y5PQ .. SP	2251 827 .. 116
220	5.0	B221K31Y5PQ .. SP	2251 827 .. 216
330	5.0	B331K31Y5PQ .. SP	2251 827 .. 316
470	5.0	B471K31Y5PQ .. SP	2251 827 .. 416
Class Y2 (Y5U), kinked			
680	5.0	B681M35Y5UQ .. SP	2251 827 .. 617
1000	5.0	B102M35Y5UQ .. SP	2251 827 .. 027
1500	5.0	B152M35Y5UQ .. SP	2251 827 .. 127
2200	5.0	B222M35Y5UQ .. SP	2251 827 .. 227
3300	5.0	B332M39Y5UQ .. SP	2251 827 .. 327
4700	5.0	B472M43Y5UQ .. SP	2251 827 .. 427

Safety, Class X1/Y2

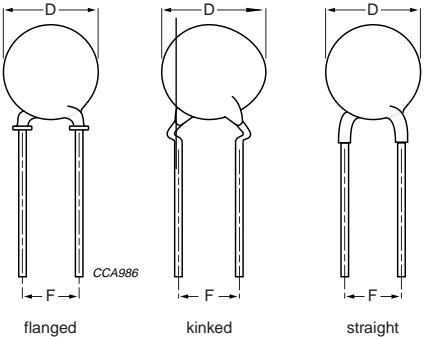
C (pF)	F (mm)	clear text code*	catalogue number 12NC
Class X1 / Y2 (Y5P), kinked			
100	7.5	S101K33Y5PS6 .K7	2252 812 .. 016
150	7.5	S151K33Y5PS6 .K7	2252 812 .. 116
220	7.5	S221K33Y5PS6 .K7	2252 812 .. 216
330	7.5	S331K33Y5PS6 .K7	2252 812 .. 316
470	7.5	S471K33Y5PS6 .K7	2252 812 .. 416
680	7.5	S681K39Y5PS6 .K7	2252 812 .. 616
Class X1 / Y2 (Z5U), kinked			
1000	7.5	S102M33Z5US6 .K7	2252 812 .. 027
1500	7.5	S152M39Z5US6 .K7	2252 812 .. 127
2200	7.5	S222M43Z5US6 .K7	2252 812 .. 227
3300	7.5	S332M53Z5US6 .K7	2252 812 .. 327
3900	7.5	S392M53Z5US6 .K7	2252 812 .. 377
4700	7.5	S472M59Z5US63K7 ³⁾	2252 812 37427 ³⁾
10000	10.0	S103M84Z5US63K7 ³⁾	2252 812 48037 ³⁾

Safety, Class X1 / Y1

C (pF)	F (mm)	clear text code*	catalogue number 12NC
Class X1 / Y1 (Y5U), straight			
100	10.0	C101M35Y5UQ .. SP	2251 837 .. 017
150	10.0	C151M35Y5UQ .. SP	2251 837 .. 117
220	10.0	C221M35Y5UQ .. SP	2251 837 .. 217
330	10.0	C331M35Y5UQ .. SP	2251 837 .. 317
470	10.0	C471M35Y5UQ .. SP	2251 837 .. 417
680	10.0	C681M39Y5UQ .. SP	2251 837 .. 617
1000	10.0	C102M39Y5UQ .. SP	2251 837 .. 027
1500	10.0	C152M43Y5UQ .. SP	2251 837 .. 127
2200	10.0	C222M47Y5UQ .. SP	2251 837 .. 227
3300	10.0	C332M55Y5UQ .. SP	2251 837 .. 327
4700	10.0	C472M63Y5UQ .. SP	2251 837 .. 427

Packaging quantities

High voltage low loss				
kinked leads		bulk	reel	ammo
D _{max} (mm)				
6.5 to 11.0	1 kV	1000	2000	2000
6.5 to 11.0	2 kV	1000	2000	1500
12.0	1 kV, 2 kV	1000	1500	2000
13.5	1 kV, 2 kV	500	1500	2000
13.5	3 kV	500	1000	1500
8.5 to 12.0	3 kV	1000	1000	1500
15.0 to 21.5	1 kV, 2 kV, 3 kV	500	-	-
flanged leads, all diameters		1 kV 2 kV	1 kV 2 kV	1 kV 2 kV
		500	250	2000
		2000	1500	2000
		1500	2000	1500
Safety Capacitors				
kinked leads		bulk	reel	ammo
D _{max} (mm / inches)				
6.5 / 0.25"		1000	1000	1500
7.5 / 0.29"		1000	1000	1500
8.5 / 0.33"		1000	1000	1500
10.0 / 0.39"		1000	1000	1500
11.0 / 0.43"		1000	1000	1500
12.0 / 0.47"		1000	1000	1500
13.5 / 0.53"		500	-	-
15.0 / 0.59"		500	-	-
17.5 / 0.69"		500	-	-
19.0 / 0.75"		500	-	-
21.5 / 0.85"		500	-	-
flanged leads X1 / Y2 all diameters		250	1500	1500
straight leads X1 / Y1 all diameters		500	750	750



- 1) T = reel
U = ammo
3 = bulk
- 2) 13 = reel
14 = ammo
15 = bulk
- 3) bulk
- 4) 35 = reel
36 = ammo
37 = bulk
- 5) WG = reel
WJ = ammo
WF = bulk
- 6) 53 = reel
54 = ammo
51 = bulk
- 7) YG = reel
YJ = ammo
YF = bulk

* preferred ordering method

Ceramic Disc Capacitors

High voltage low loss



Dielectric	NPO (COG)			X7R			Z5U			Y5V			
	Rated DC voltage	50 V	100 V	25 V	50 V	100 V	25 V	50 V	100 V	25 V	50 V		
Capacitance range (pF/nF/μF)	10 pF	15	15	100 pF	15	15	1.0 nF	15	15	10 nF	15	15	
	12	15	15	120	15	15	1.2	15	15	15	15	15	
	15	15	15	150	15	15	1.5	15	15	22	15	15	
	180	15	15	820	15	15	8.2	15	15	33	15	15	
	220	15	15	1.0 nF	15	15	10	15	15	47	15	15	
	270	15	15	1.2	15	15	12	15	20	68	15	15	
	330	15	15	1.5	15	15	15	15	20	100	15	15	
	390	15	15	3.9	15	15	39	15	20	150	15	15	
	470	15	15	4.7	15	15	47	15	15	220	15	15	
	560	15	15	5.6	15	15	56	15	15	330	20	20	
	680	15	15	6.8	15	15	68	15	15	470	20	20	
	820	15	15	8.2	15	15	82	15	15	680	20	20	
	1.0 nF	15	20	10	15	15	100	15	15	20	1.0 μF	20	20
	1.2	15	20	12	15	15	120	15	15	30			
	1.5	15	20	15	15	15	150	15	15	30			
	1.8	15	20	18	15	15	180	15	15	30			
	2.2	15	20	22	15	20	220	15	15	30			
	2.7	20	20	27	15	20	270		20	30			
	3.3	20	20	33	15	20	330		20	20			
	3.9	20	20	39	15	20	390		20	30			
4.7	20	20	47	15	15	470		20	30				
5.6	20	30	56	15	15	560		20	30				
6.8	20	30	68	15	15	680		20	30				
8.2	20	30	82	15	15	820		20	30				
10	20	30	100	15	15	20	1.0 μF	20	30				
			120	20	20	30	1.2	30					
			150	20	20	30	1.5	30					
			180	20	20	30	1.8	30					
			220	20	20	30	2.2 μF	30					
			270		30	30							
			330		30	30							
			390		30	30							
			470		30								
			560		30								
			680		30								
			820		30								
			1.0 μF		30								

in columns:
size code

size code	w _{max}	h _{max}	t _{max}	pitch	d
15	4.0	4.0	2.5	2.5/5.0	0.5
20	5.0	5.0	3.2	2.5/5.0	0.5
30	7.5	7.5	3.8	5.0	0.5

¹⁾ indication of lead length for bulk packing version

Size code and dimensions in mm

Packing

loose, reel, ammpack

Tolerance on temperature coefficient at -55 to +125 °C

- 30 x 10⁻⁶/K

Maximum capacitance variation with respect to capacitance value at 25 °C

- 15 %

+ 22/ - 56%

+ 22/ - 82%

Operating temperature range

- 55 to + 125 °C

- 55 to + 125 °C

+ 10 to + 85°C

- 30 to + 85°C

Tolerance on capacitance

- 5%, - 10%

- 10%, - 20%

- 20%, + 80 / - 20%

+ 80 / - 20%

Dissipation factor

≤ 1.5 x 10⁻³

≤ 25 x 10⁻³

≤ 40 x 10⁻³

≤ 50 x 10⁻³

Insulation resistance

≥ 10¹¹ Ω

≥ 10¹¹ Ω

≥ 10¹¹ Ω

≥ 10¹¹ Ω

Features

very high capacitance per unit volume, good HF behaviour, non-flammable epoxy housing, suitable for automatic insertion equipment

Applications

telecom, automotive, EDP, test & measurement equipment, medical systems

Note

for ordering information also see page 24

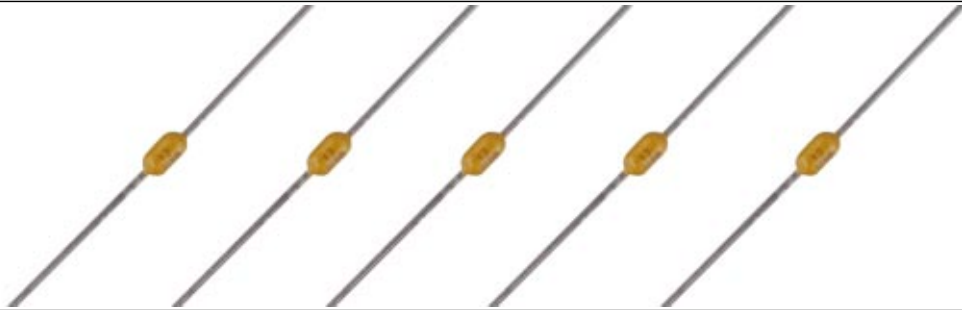
Ordering information Preferred types				X7R ± 10% tolerance				Z5U ± 20% tolerance			
NPO (C0G) ± 5% tolerance				C				C			
C (pF)	F (mm)	clear text code*	catalogue number 12NC	C	F (mm)	clear text code*	catalogue number 12NC	C (μF)	F (mm)	clear text code*	catalogue number 12NC
U_{RDC} = 50 V				U_{RDC} = 50 V				U_{RDC} = 50 V			
10	5.0	K100J15C0GF5 .H5	2252 305 .. 109	220 pF	5.0	K221K15X7RF5 .H5	2252 325 .. 221	0.01	5.0	K103M15Z5UF5 .H5	2252 345 .. 103
12	5.0	K120J15C0GF5 .H5	2252 305 .. 129	330	5.0	K331K15X7RF5 .H5	2252 325 .. 331	0.022	5.0	K223M15Z5UF5 .H5	2252 345 .. 223
15	5.0	K150J15C0GF5 .H5	2252 305 .. 159	470	5.0	K471K15X7RF5 .H5	2252 325 .. 471	0.047	5.0	K473M15Z5UF5 .H5	2252 345 .. 473
18	5.0	K180J15C0GF5 .H5	2252 305 .. 189	680	5.0	K681K15X7RF5 .H5	2252 325 .. 681	0.1	5.0	K104M15Z5UF5 .H5	2252 345 .. 104
22	5.0	K220J15C0GF5 .H5	2252 305 .. 229	1000	5.0	K102K15X7RF5 .H5	2252 325 .. 102	0.15	5.0	K154M15Z5UF5 .H5	2252 345 .. 154
27	5.0	K270J15C0GF5 .H5	2252 305 .. 279	1500	5.0	K152K15X7RF5 .H5	2252 325 .. 152	0.22	5.0	K224M15Z5UF5 .H5	2252 345 .. 224
33	5.0	K330J15C0GF5 .H5	2252 305 .. 339	2200	5.0	K222K15X7RF5 .H5	2252 325 .. 222	0.33	5.0	K334M20Z5UF5 .H5	2252 345 .. 334 ⁴⁾
39	5.0	K390J15C0GF5 .H5	2252 305 .. 399	3300	5.0	K332K15X7RF5 .H5	2252 325 .. 332	0.47	5.0	K474M20Z5UF5 .H5	2252 345 .. 474 ⁴⁾
47	5.0	K470J15C0GF5 .H5	2252 305 .. 479	4700	5.0	K472K15X7RF5 .H5	2252 325 .. 472	0.68	5.0	K684M20Z5UF5 .H5	2252 345 .. 684 ⁴⁾
56	5.0	K560J15C0GF5 .H5	2252 305 .. 569	6800	5.0	K682K15X7RF5 .H5	2252 325 .. 682	1.0	5.0	K105M20Z5UF5 .H5	2252 345 .. 105 ⁴⁾
68	5.0	K680J15C0GF5 .H5	2252 305 .. 689	0.01 μF	5.0	K103K15X7RF5 .H5	2252 325 .. 103	U_{RDC} = 50 V			
82	5.0	K820J15C0GF5 .H5	2252 305 .. 829	0.015	5.0	K153K15X7RF5 .H5	2252 325 .. 153	0.01	2.5	K103M15Z5UF5 .L2	2252 345 .. 103
100	5.0	K101J15C0GF5 .H5	2252 305 .. 101	0.022	5.0	K223K15X7RF5 .H5	2252 325 .. 223	0.022	2.5	K223M15Z5UF5 .L2	2252 345 .. 223
150	5.0	K151J15C0GF5 .H5	2252 305 .. 151	0.033	5.0	K333K15X7RF5 .H5	2252 325 .. 333	0.047	2.5	K473M15Z5UF5 .L2	2252 345 .. 473
220	5.0	K221J15C0GF5 .H5	2252 305 .. 221	0.047	5.0	K473K15X7RF5 .H5	2252 325 .. 473	0.1	2.5	K104M15Z5UF5 .L2	2252 345 .. 104
330	5.0	K331J15C0GF5 .H5	2252 305 .. 331	0.068	5.0	K683K15X7RF5 .H5	2252 325 .. 683	0.15	2.5	K154M15Z5UF5 .L2	2252 345 .. 154
470	5.0	K471J15C0GF5 .H5	2252 305 .. 471	0.1	5.0	K104K15X7RF5 .H5	2252 325 .. 104	0.22	2.5	K224M15Z5UF5 .L2	2252 345 .. 224
680	5.0	K681J15C0GF5 .H5	2252 305 .. 681	0.15	5.0	K154K20X7RF5 .H5	2252 325 .. 154 ⁴⁾	U_{RDC} = 100 V			
1000	5.0	K102J15C0GF5 .H5	2252 305 .. 102	0.22	5.0	K224K20X7RF5 .H5	2252 325 .. 224 ⁴⁾	0.01	5.0	K103M15Z5UH5 .H5	2252 346 .. 103 ²⁾
1500	5.0	K152J15C0GF5 .H5	2252 305 .. 152	0.33	5.0	K334K30X7RF5 .H5	2252 325 .. 334 ⁶⁾	0.1	5.0	K104M20Z5UH5 .H5	2252 346 .. 104 ⁴⁾
2200	5.0	K222J15C0GF5 .H5	2252 305 .. 222	0.47	5.0	K474K30X7RF5 .H5	2252 325 .. 474 ⁶⁾	U_{RDC} = 100 V			
3300	5.0	K332J20C0GF5 .H5	2252 305 .. 332 ⁴⁾	0.68	5.0	K684K30X7RF5 .H5	2252 325 .. 684 ⁶⁾	0.01	2.5	K103M15Z5UH5 .L2	2252 346 .. 103 ³⁾
4700	5.0	K472J20C0GF5 .H5	2252 305 .. 472 ⁴⁾	1.0	5.0	K105K30X7RF5 .H5	2252 325 .. 105 ⁶⁾	0.1	2.5	K104M20Z5UH5 .L2	2252 346 .. 104 ⁵⁾
6800	5.0	K682J20C0GF5 .H5	2252 305 .. 682 ⁴⁾	U_{RDC} = 50 V				Y5V +80 / -20% tolerance			
0.01 μF	5.0	K103J20C0GF5 .H5	2252 305 .. 103 ⁴⁾	220 pF	2.5	K221K15X7RF5 .L2	2252 325 .. 221	C (μF)	F (mm)	clear text code*	catalogue number 12NC
U_{RDC} = 50 V				330	2.5	K331K15X7RF5 .L2	2252 325 .. 331	U_{RDC} = 25 V			
10	2.5	K100J15C0GF5 .L2	2252 305 .. 109	470	2.5	K471K15X7RF5 .L2	2252 325 .. 471	0.1	5.0	K104Z15Y5VE5 .H5	2252 362 .. 104
12	2.5	K120J15C0GF5 .L2	2252 305 .. 129	680	2.5	K681K15X7RF5 .L2	2252 325 .. 681	0.22	5.0	K224Z15Y5VE5 .H5	2252 362 .. 224
15	2.5	K150J15C0GF5 .L2	2252 305 .. 159	1000	2.5	K102K15X7RF5 .L2	2252 325 .. 102	0.47	5.0	K474Z20Y5VE5 .H5	2252 362 .. 474 ⁴⁾
18	2.5	K180J15C0GF5 .L2	2252 305 .. 189	1500	2.5	K152K15X7RF5 .L2	2252 325 .. 152	1.0	5.0	K105Z20Y5VE5 .H5	2252 362 .. 105 ⁴⁾
22	2.5	K220J15C0GF5 .L2	2252 305 .. 229	2200	2.5	K222K15X7RF5 .L2	2252 325 .. 222	U_{RDC} = 25 V			
27	2.5	K270J15C0GF5 .L2	2252 305 .. 279	3300	2.5	K332K15X7RF5 .L2	2252 325 .. 332	0.1	2.5	K104Z15Y5VE5 .L2	2252 362 .. 104
33	2.5	K330J15C0GF5 .L2	2252 305 .. 339	4700	2.5	K472K15X7RF5 .L2	2252 325 .. 472	0.22	2.5	K224Z15Y5VE5 .L2	2252 362 .. 224
39	2.5	K390J15C0GF5 .L2	2252 305 .. 399	6800	2.5	K682K15X7RF5 .L2	2252 325 .. 682	0.47	2.5	K474Z20Y5VE5 .L2	2252 362 .. 474 ⁵⁾
47	2.5	K470J15C0GF5 .L2	2252 305 .. 479	0.01 μF	2.5	K103K15X7RF5 .L2	2252 325 .. 103	1.0	2.5	K105Z20Y5VE5 .L2	2252 362 .. 105 ⁵⁾
56	2.5	K560J15C0GF5 .L2	2252 305 .. 569	0.015	2.5	K153K15X7RF5 .L2	2252 325 .. 153	U_{RDC} = 50 V			
68	2.5	K680J15C0GF5 .L2	2252 305 .. 689	0.022	2.5	K223K15X7RF5 .L2	2252 325 .. 223	0.1	5.0	K104Z15Y5VF5 .H5	2252 365 .. 104
82	2.5	K820J15C0GF5 .L2	2252 305 .. 829	0.033	2.5	K333K15X7RF5 .L2	2252 325 .. 333	0.22	5.0	K224Z15Y5VF5 .H5	2252 365 .. 224
100	2.5	K101J15C0GF5 .L2	2252 305 .. 101	0.047	2.5	K473K15X7RF5 .L2	2252 325 .. 473	0.47	5.0	K474Z20Y5VF5 .H5	2252 365 .. 474 ⁴⁾
150	2.5	K151J15C0GF5 .L2	2252 305 .. 151	0.068	2.5	K683K15X7RF5 .L2	2252 325 .. 683	1.0	5.0	K105Z20Y5VF5 .H5	2252 365 .. 105 ⁴⁾
220	2.5	K221J15C0GF5 .L2	2252 305 .. 221	0.1	2.5	K104K15X7RF5 .L2	2252 325 .. 104	U_{RDC} = 50 V			
330	2.5	K331J15C0GF5 .L2	2252 305 .. 331	U_{RDC} = 100 V				0.1	2.5	K104Z15Y5VF5 .L2	2252 365 .. 104
470	2.5	K471J15C0GF5 .L2	2252 305 .. 471	220 pF	5.0	K221K15X7RH5 .H5	2252 326 .. 221	0.22	2.5	K224Z15Y5VF5 .L2	2252 365 .. 224
680	2.5	K681J15C0GF5 .L2	2252 305 .. 681	470	5.0	K471K15X7RH5 .H5	2252 326 .. 471	0.47	2.5	K474Z20Y5VF5 .L2	2252 365 .. 474 ⁴⁾
0.01 μF	2.5	K102J15C0GF5 .L2	2252 305 .. 102	1000	5.0	K102K15X7RH5 .H5	2252 326 .. 102	1.0	2.5	K105Z20Y5VF5 .L2	2252 365 .. 105 ⁴⁾
U_{RDC} = 100 V				2200	5.0	K222K15X7RH5 .H5	2252 326 .. 222	U_{RDC} = 50 V			
10	5.0	K100J15C0GH5 .H5	2252 306 .. 109	4700	5.0	K472K15X7RH5 .H5	2252 326 .. 472	0.1	2.5	K104Z15Y5VF5 .L2	2252 365 .. 104
22	5.0	K220J15C0GH5 .H5	2252 306 .. 229	0.01 μF	5.0	K103K15X7RH5 .H5	2252 326 .. 103	0.22	2.5	K224Z15Y5VF5 .L2	2252 365 .. 224
47	5.0	K470J15C0GH5 .H5	2252 306 .. 479	0.022	5.0	K223K15X7RH5 .H5	2252 326 .. 223 ⁴⁾	0.47	2.5	K474Z20Y5VF5 .L2	2252 365 .. 474 ⁵⁾
100	5.0	K101J15C0GH5 .H5	2252 306 .. 101	0.047	5.0	K473K20X7RH5 .H5	2252 326 .. 473 ⁴⁾	1.0	2.5	K105Z20Y5VF5 .L2	2252 365 .. 105 ⁵⁾
220	5.0	K221J15C0GH5 .H5	2252 306 .. 221	0.1	5.0	K104K20X7RH5 .H5	2252 326 .. 104 ⁴⁾	U_{RDC} = 50 V			
470	5.0	K471J15C0GH5 .H5	2252 306 .. 471	U_{RDC} = 100 V				0.1	2.5	K104Z15Y5VF5 .L2	2252 365 .. 104
1000	5.0	K102J20C0GH5 .H5	2252 306 .. 102 ⁴⁾	220 pF	2.5	K221K15X7RH5 .L2	2252 326 .. 221	0.22	2.5	K224Z15Y5VF5 .L2	2252 365 .. 224
U_{RDC} = 100 V				470	2.5	K471K15X7RH5 .L2	2252 326 .. 471	0.47	2.5	K474Z20Y5VF5 .L2	2252 365 .. 474 ⁵⁾
10	2.5	K100J15C0GH5 .L2	2252 306 .. 109	1000	2.5	K102K15X7RH5 .L2	2252 326 .. 102	1.0	2.5	K105Z20Y5VF5 .L2	2252 365 .. 105 ⁵⁾
22	2.5	K220J15C0GH5 .L2	2252 306 .. 229	2200	2.5	K222K15X7RH5 .L2	2252 326 .. 222	U_{RDC} = 50 V			
47	2.5	K470J15C0GH5 .L2	2252 306 .. 479	4700	2.5	K472K15X7RH5 .L2	2252 326 .. 472	0.1	2.5	K104Z15Y5VF5 .L2	2252 365 .. 104
100	2.5	K101J15C0GH5 .L2	2252 306 .. 101	0.01 μF	2.5	K103K15X7RH5 .L2	2252 326 .. 103	0.22	2.5	K224Z15Y5VF5 .L2	2252 365 .. 224
220	2.5	K221J15C0GH5 .L2	2252 306 .. 221	0.022	2.5	K223K20X7RH5 .L2	2252 326 .. 223 ⁵⁾	0.47	2.5	K474Z20Y5VF5 .L2	2252 365 .. 474 ⁵⁾
470	2.5	K471J15C0GH5 .L2	2252 306 .. 471	0.047	2.5	K473K20X7RH5 .L2	2252 326 .. 473 ⁵⁾	1.0	2.5	K105Z20Y5VF5 .L2	2252 365 .. 105 ⁵⁾
1000	2.5	K102J20C0GH5 .L2	2252 306 .. 102 ⁵⁾	0.1	2.5	K104K20X7RH5 .L2	2252 326 .. 104 ⁵⁾	U_{RDC} = 50 V			

- 1) T = reel
U = ammo
3 = bulk
- 2) 10 = reel
12 = ammo
08 = bulk
- 3) 02 = reel
03 = ammo
00 = bulk
- 4) 24 = reel
26 = ammo
22 = bulk
- 5) 16 = reel
17 = ammo
14 = bulk
- 6) 48 = reel
50 = ammo
46 = bulk

* preferred ordering method

Ceramic Capacitors

Leaded multilayer, Mono-axial" series



NEW

Dielectric	NPO			X7R			Z5U			Y5V			
Rated DC voltage	50 V	100 V		25 V	50 V	100 V		25V	50 V	100 V	25 V	50 V	
Capacitance range (pF/nF)	10 pF	15	15					1.0 nF	15	15	10 nF	15	15
	12	15	15					1.2	15	15	12	15	15
	15	15	15					1.5	15	15	15	15	15
	18	15	15					1.8	15	15	18	15	15
	22	15	15	220 pF		15	15	2.2	15	15	22	15	15
	27	15	15	270		15	15	2.7	15	15	27	15	15
	33	15	15	330		15	15	3.3	15	15	33	15	15
	39	15	15	390		15	15	3.9	15	15	39	15	15
	47	15	15	470		15	15	4.7	15	15	47	15	15
	56	15	15	560		15	15	5.6	15	15	56	15	15
	68	15	15	680		15	15	6.8	15	15	68	15	15
	82	15	15	820		15	15	8.2	15	15	82	15	15
	100	15	15	1.0 nF		15	15	10	15	15	100	15	15
	120	15	15	1.2		15	15	12	15	20	120	15	15
	150	15	15	1.5		15	15	15	15	20	150	15	15
	180	15	15	1.8		15	15	18	15	20	180	15	15
	220	15	15	2.2		15	15	22	15	20	220	15	20
	270	15	15	2.7		15	15	27	15	20	270	15	20
	330	15	15	3.3		15	15	33	15	20	330	15	20
	390	15	15	3.9		15	15	39	15	20	390	15	20
	470	15	15	4.7		15	15	47	15	20	470	20	20
	560	15	15	5.6		15	15	56	15	20	560	20	20
	680	15	15	6.8		15	15	68	15	20	680	20	20
	820	15	15	8.2		15	15	82	15	20	820	20	20
1.0 nF	15	20	10		15	15	100	15	20	1.0 nF	20		
1.2	15	20	12		15	20	120	20		1.2			
1.5	15	20	15		15	20	150	20		1.5			
1.8	15	20	18		15	20	180	20		1.8			
2.2	15	20	22		15	20	220	20		2.2			
2.7	20	20	27		15	20	270	20		2.7			
3.3	20	20	33		15	20	330	20		3.3			
3.9	20	20	39	15	15	20	390	20		3.9			
4.7 nF	20		47	15	15	20	470 nF	20		4.7 nF			
			56	15	15	20							
			68	15	15	20							
			82	15	15	20							
			100	15	15	20							
			120	20	20								
			150	20									
			180	20									
			220 nF	20									

in columns:
size code

preferred

Size code and dimensions in mm	size code	diameter (max)	length (max)
	15	2.5	3.8
	20	3.0	5.0

Tolerance on temperature coefficient — 55 to +125 μ C	$-30 \times 10^{-6}/K$			
Maximum capacitance variation with respect to capacitance value at 25 μ C		- 15 %	+22 / -56%	+22 / -82%
Operating temperature range	- 55 to + 125 μ C	- 55 to + 125 μ C	+ 10 to + 85 μ C	- 30 to + 85 μ C
Tolerance on capacitance	- 5%, - 10%	- 10%, - 20%	- 20%, +80 / -20%	+80 / -20%
Dissipation factor	$\leq 1.5 \times 10^{-3}$	$\leq 25 \times 10^{-3}$	$\leq 40 \times 10^{-3}$	$\leq 50 \times 10^{-3}$
Insulation resistance	$\geq 10^{11} \Omega$	$\geq 10^{11} \Omega$	$\geq 10^{11} \Omega$	$\geq 10^{11} \Omega$
Features	non-flammable epoxy housing, excellent HF behaviour, low ESR, suitable for automatic insertion equipment			
Applications	telecom, automotive, EDP, test & measurement equipment, medical systems			
Note	for ordering information also see page 25			

Ordering information Preferred types

NPO (C0G) ± 5% tolerance				X7R ± 10% tolerance				Z5U ± 20% tolerance			
C (pF)	F (mm)	clear text code*	catalogue number 12NC	C	F (mm)	clear text code*	catalogue number 12NC	C	F (mm)	clear text code*	catalogue number 12NC
U_{RDC} = 50 V				U_{RDC} = 25 V				U_{RDC} = 25 V			
10	15	A100J15C0GF5UAA	2252 205 21109	0.1 μF	15	A104K15X7RE5UAA	2252 222 21104	0.1 μF	15	A104M15Z5UE5UAA	2252 242 21104
12	15	A120J15C0GF5UAA	2252 205 21129	0.15	20	A154K20X7RE5UAA	2252 222 41154	U_{RDC} = 50 V			
15	15	A150J15C0GF5UAA	2252 205 21159	0.22	20	A224K20X7RE5UAA	2252 222 41224	1000 pF	15	A102M15Z5UF5UAA	2252 245 21102
18	15	A180J15C0GF5UAA	2252 205 21189	U_{RDC} = 50 V				2200	15	A222M15Z5UF5UAA	2252 245 21222
22	15	A220J15C0GF5UAA	2252 205 21229	220 pF	15	A221K15X7RF5UAA	2252 225 21221	4700	15	A472M15Z5UF5UAA	2252 245 21472
27	15	A270J15C0GF5UAA	2252 205 21279	330	15	A331K15X7RF5UAA	2252 225 21331	0.01 μF	15	A103M15Z5UF5UAA	2252 245 21103
33	15	A330J15C0GF5UAA	2252 205 21339	470	15	A471K15X7RF5UAA	2252 225 21471	0.022	15	A223M15Z5UF5UAA	2252 245 21223
39	15	A390J15C0GF5UAA	2252 205 21399	680	15	A681K15X7RF5UAA	2252 225 21681	0.047	15	A473M15Z5UF5UAA	2252 245 21473
47	15	A470J15C0GF5UAA	2252 205 21479	1000	15	A102K15X7RF5UAA	2252 225 21102	0.1	15	A104M15Z5UF5UAA	2252 245 21104
56	15	A560J15C0GF5UAA	2252 205 21569	1500	15	A152K15X7RF5UAA	2252 225 21152	0.22	20	A224M20Z5UF5UAA	2252 245 41224
68	15	A680J15C0GF5UAA	2252 205 21689	2200	15	A222K15X7RF5UAA	2252 225 21222	0.47	20	A474M20Z5UF5UAA	2252 245 41474
82	15	A820J15C0GF5UAA	2252 205 21829	3300	15	A332K15X7RF5UAA	2252 225 21332	U_{RDC} = 100 V			
100	15	A101J15C0GF5UAA	2252 205 21101	4700	15	A472K15X7RF5UAA	2252 225 21472	1000 pF	15	A102M15Z5UH5UAA	2252 246 21102
150	15	A151J15C0GF5UAA	2252 205 21151	6800	15	A682K15X7RF5UAA	2252 225 21682	0.01 μF	15	A103M15Z5UH5UAA	2252 246 21103
220	15	A221J15C0GF5UAA	2252 205 21221	0.01 μF	15	A103K15X7RF5UAA	2252 225 21103	0.1	20	A104M20Z5UH5UAA	2252 246 41104
330	15	A331J15C0GF5UAA	2252 205 21331	0.015	15	A153K15X7RF5UAA	2252 225 21153	Y5V +80 / -20 % tolerance			
470	15	A471J15C0GF5UAA	2252 205 21471	0.022	15	A223K15X7RF5UAA	2252 225 21223	C (μF)	F (mm)	clear text code*	catalogue number 12NC
680	15	A681J15C0GF5UAA	2252 205 21681	0.033	15	A333K15X7RF5UAA	2252 225 21333	U_{RDC} = 25 V			
1000	15	A102J15C0GF5UAA	2252 205 21102	0.047	15	A473K15X7RF5UAA	2252 225 21473	0.1	15	A104Z15Y5VE5UAA	2252 262 21104
1500	15	A152J15C0GF5UAA	2252 205 21152	0.068	15	A683K15X7RF5UAA	2252 225 21683	0.22	15	A224Z15Y5VE5UAA	2252 262 21224
2200	15	A222J15C0GF5UAA	2252 205 21222	0.1	15	A104K15X7RF5UAA	2252 225 21104	0.47	20	A474Z20Y5VE5UAA	2252 262 41474
3300	15	A332J20C0GF5UAA	2252 205 41332	U_{RDC} = 100 V				1.0	20	A105Z20Y5VE5UAA	2252 262 41105
U_{RDC} = 100 V				220 pF	15	A221K15X7RH5UAA	2252 226 21221	U_{RDC} = 50 V			
10	15	A100J15C0GH5UAA	2252 206 21109	470	15	A471K15X7RH5UAA	2252 226 21471	0.01	15	A103Z15Y5VF5UAA	2252 265 21103
22	15	A220J15C0GH5UAA	2252 206 21229	1000	15	A102K15X7RH5UAA	2252 226 21102	0.022	15	A223Z15Y5VF5UAA	2252 265 21223
47	15	A470J15C0GH5UAA	2252 206 21479	2200	15	A222K15X7RH5UAA	2252 226 21222	0.047	15	A473Z15Y5VF5UAA	2252 265 21473
100	15	A101J15C0GH5UAA	2252 206 21101	4700	15	A472K15X7RH5UAA	2252 226 21472	0.1	15	A104Z15Y5VF5UAA	2252 265 21104
220	15	A221J15C0GH5UAA	2252 206 21221	0.01 μF	15	A103K15X7RH5UAA	2252 226 21103	0.22	20	A224Z20Y5VF5UAA	2252 265 41224
470	15	A471J15C0GH5UAA	2252 206 21471	0.022	20	A223K20X7RH5UAA	2252 226 41223	0.47	20	A474Z20Y5VF5UAA	2252 265 41474
1000	15	A102J20C0GH5UAA	2252 206 41102	0.047	20	A473K20X7RH5UAA	2252 226 41473				
				0.1	20	A104K20X7RH5UAA	2252 226 41104				

* preferred ordering method

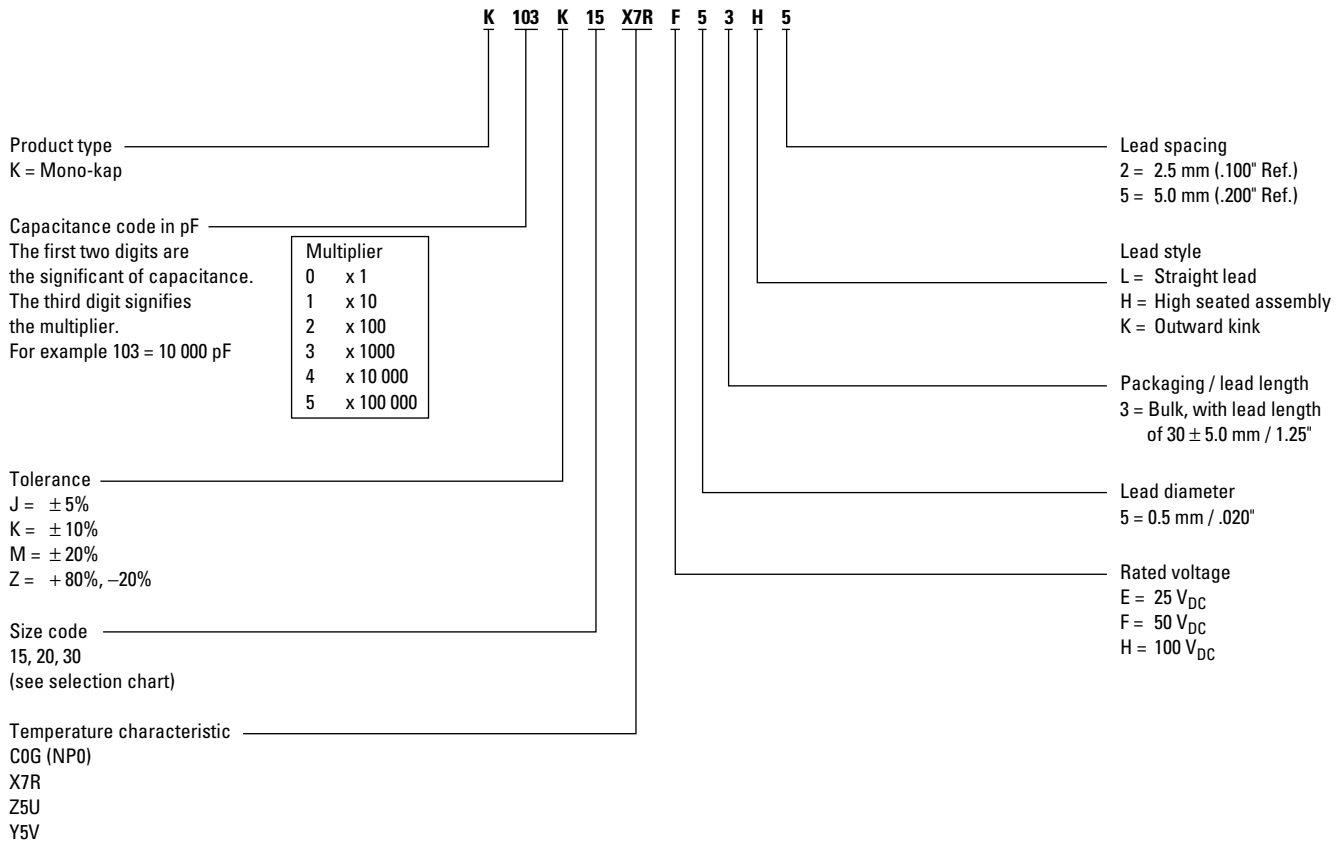
Ceramic Capacitors

Leaded multilayer, Mono-kap™ series

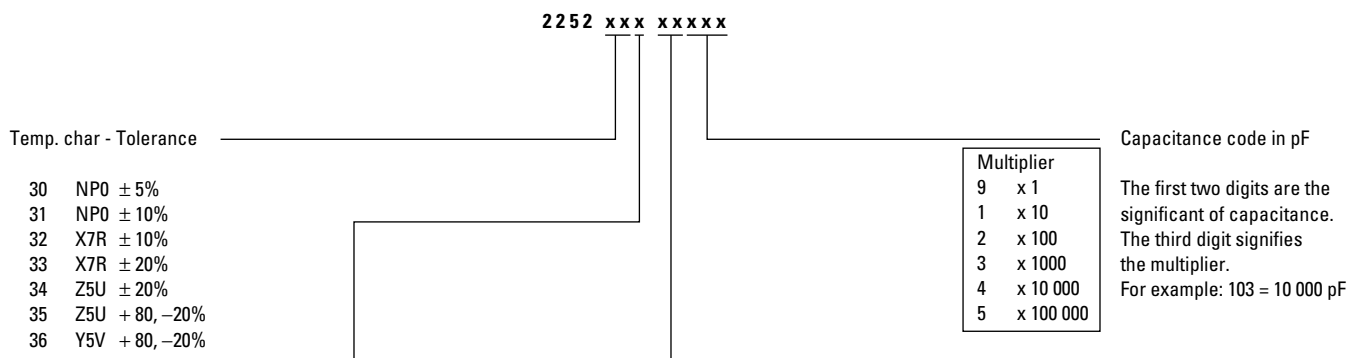
Ordering information

Clear text code (preferred)

K103K15X7RF53H5 (example)



12-digit code (12NC)



Rated voltage

2	25 V _{DC}
5	50 V _{DC}
6	100 V _{DC}

Size, lead style & packaging

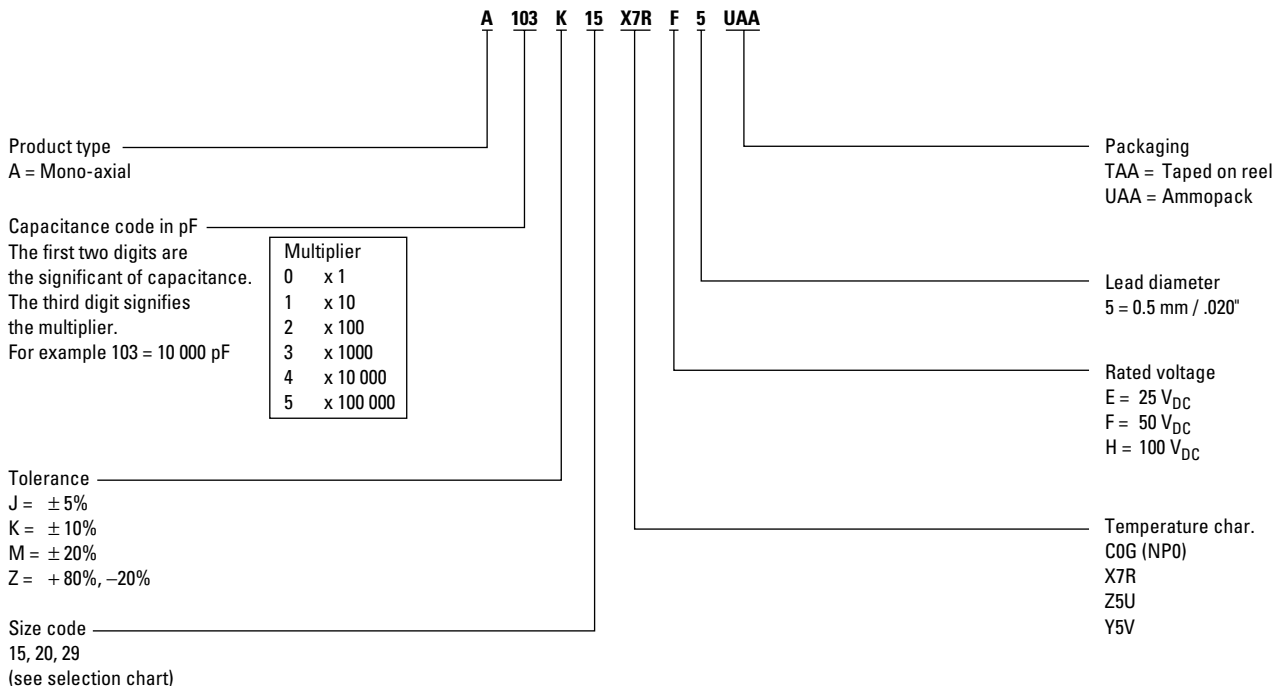
Size	Lead spacing mm (inch)	Lead style	Bulk*	Reel	Ammo
			digit eight and nine		
15	2.5 (.100 Ref)	Straight lead	00	02	03
		Outward kink	04	06	07
	5.0 (.200 Ref)	High seated assembly	08	10	12
20	2.5 (.100 Ref)	Straight lead	14	16	17
		Outward kink	18	20	21
	5.0 (.200 Ref)	High seated assembly	22	24	26
30	5.0 (.200 Ref)	Straight lead	38	40	41
		High seated assembly	46	48	50

* Lead length 30 ± 5 mm (1.25" Ref.) for Bulk package

Ordering information

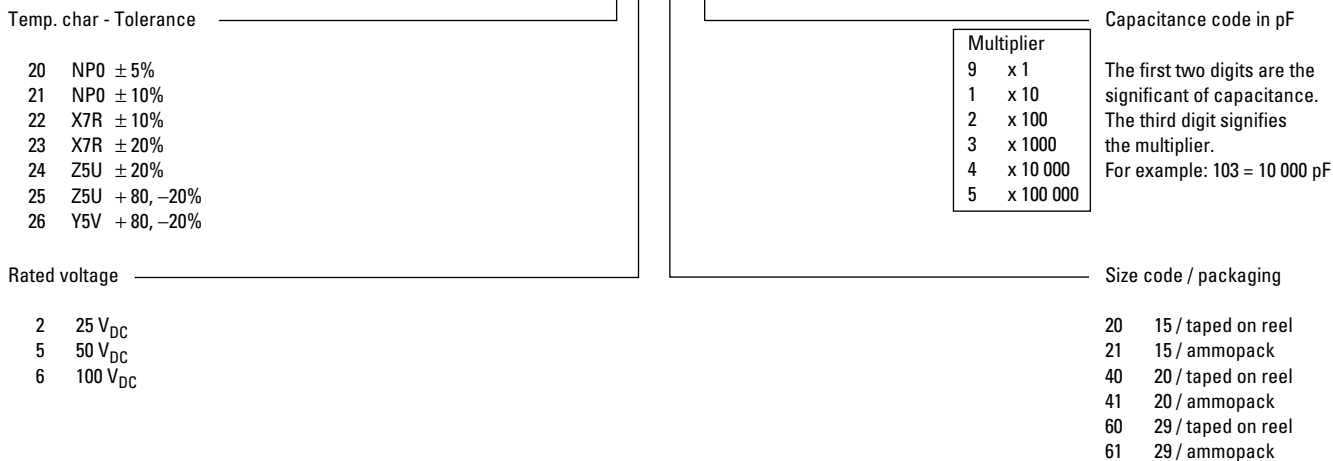
Clear text code (preferred)

A103K15X7RF5UAA (example)



12-digit code (12NC)

2 2 5 2 x x x x x x x x



Ceramic Capacitors

Miniature Plate Capacitors, class 1



Rated DC voltage U_R	100 V					500 V					1000 V ³⁾	
Temp. Coefficient TC(10 ⁻⁶ /K)	P100 +100	NPO 0	N150 -150	N750 -750	N1500 -1500	P100 +100	NPO 0	N150 -150	N750 -750	N1500 -1500	SL +150/-1500	
Capacitance (pF)	0.47											C(pF)
	0.56											0.56
	0.68											0.68
	0.82											0.82
	1.0											1.0
	1.2											1.2
	1.5											1.5
	1.8											1.8
	2.2											2.2
	2.7											2.7
	3.3											3.3
	3.9											3.9
	4.7											4.7
	5.6											5.6
	6.8											6.8
	8.2											8.2
	10											10
	12											12
	15											15
	18											18
	22											22
	27											27
	33											33
	39											39
	47											47
	56											56
	68											68
	82											82
	100											100
	120											120
	150											150
	180											180
	220											220
	270											270
	330											330
	390											390
	470											470
	560											560
	<div style="border: 1px solid black; display: inline-block; width: 10px; height: 10px; background-color: #f0f0f0;"></div> preferred											
Tolerance	for all TC values $C < 10 \text{ pF}$: - 0.25 pF $C \geq 10 \text{ pF}$: - 2% for NPO precision $C < 10 \text{ pF}$: - 0.1 pF $C \geq 10 \text{ pF}$: - 1%											
Dissipation factor	$\leq 50 \text{ pF}$ $\leq 15 (15/C + 0.7) \times 10^{-4}$; max. 55×10^{-4} $> 50 \text{ pF}$ $\leq 15 \times 10^{-4}$											
Insulation resistance	$\geq 10^{10} \Omega$											
Operating temp. range Climatic category (IEC 68)	— 55 jC to + 85 jC for N150 and N750, — 55 jC to + 125 jC for P100, NPO and N1500 55/085/21 for N150 and N750, 55/125/56 for P100, NPO and N1500										— 55 jC to + 150 jC 55/150/56	
Proof voltage	for $U_R = 100 \text{ V}$: 300 V $U_R = 500 \text{ V}$: 1250 V $U_R = 1000 \text{ V}$: 2000 V											
Reference specification	IEC 384-8											
Features	linear change of capacitance with temperature, copper leads, high stability, space saving										high reliability, high temp circuits	
Applications	tuning, filtering, temperature compensation, coupling											
Notes	all types have thickness classification of $\leq 2.3 \text{ mm}$ except for: note ¹⁾ $\leq 2.5 \text{ mm}$ note ²⁾ $\leq 2.7 \text{ mm}$ note ³⁾ $\leq 3.0 \text{ mm}$											
	for ordering information see pages 28, 29 and 30											

Ceramic Capacitors

Miniature Plate Capacitors, class 1



Ordering information Preferred types

Capacitance range P100 (M7G)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
0.47	-0.25 pF	I ⁽²⁾	R478C13M7GH..AP	2222 ... 03477
0.56	-0.25 pF	I ⁽²⁾	R568C13M7GH..AP	2222 ... 03567
0.68	-0.25 pF	I ⁽²⁾	R688C13M7GH..AP	2222 ... 03687
0.82	-0.25 pF	I ⁽²⁾	R828C13M7GH..AP	2222 ... 03827
1.0	-0.25 pF	I ⁽¹⁾	R109C13M7GH..AP	2222 ... 03108
1.2	-0.25 pF	I	R129C13M7GH..AP	2222 ... 03128
1.5	-0.25 pF	I	R159C13M7GH..AP	2222 ... 03158
1.8	-0.25 pF	I	R189C13M7GH..AP	2222 ... 03188
2.2	-0.25 pF	I	R229C13M7GH..AP	2222 ... 03228
2.7	-0.25 pF	I	R279C13M7GH..AP	2222 ... 03278
3.3	-0.25 pF	I	R339C13M7GH..AP	2222 ... 03338
3.9	-0.25 pF	I	R399C13M7GH..AP	2222 ... 03398
4.7	-0.25 pF	I	R479C13M7GH..AP	2222 ... 03478
5.6	-0.25 pF	I	R569C13M7GH..AP	2222 ... 03568
6.8	-0.25 pF	I	R689C13M7GH..AP	2222 ... 03688
8.2	-0.25 pF	IIA	R829G13M7GH..AP	2222 ... 03828
10	-2%	IIA	R100G13M7GH..AP	2222 ... 04109
12	-2%	IIB	R120G23M7GH..AP	2222 ... 04129
15	-2%	IIB	R150G23M7GH..AP	2222 ... 04159
18	-2%	III	R180G33M7GH..AP	2222 ... 04189
22	-2%	III	R220G33M7GH..AP	2222 ... 04229
27	-2%	IV	R270G43M7GH..AP	2222 ... 04279
33	-2%	IV	R330G43M7GH..AP	2222 ... 04339
39	-2%	V	R390G53M7GH..AP	2222 ... 04399
47	-2%	V	R470G53M7GH..AP	2222 ... 04479

Capacitance range N150 (P2G)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
3.3	-0.25 pF	I ⁽¹⁾	R339C13P2GH..AP	2222 ... 33338
3.9	-0.25 pF	I ⁽¹⁾	R399C13P2GH..AP	2222 ... 33398
4.7	-0.25 pF	I	R479C13P2GH..AP	2222 ... 33478
5.6	-0.25 pF	I	R569C13P2GH..AP	2222 ... 33568
6.8	-0.25 pF	I	R689C13P2GH..AP	2222 ... 33688
8.2	-0.25 pF	I	R829C13P2GH..AP	2222 ... 33828
10	-2%	I	R100G13P2GH..AP	2222 ... 34109
12	-2%	I	R120G13P2GH..AP	2222 ... 34129
15	-2%	I	R150G13P2GH..AP	2222 ... 34159
18	-2%	I	R180G13P2GH..AP	2222 ... 34189
22	-2%	I	R220G13P2GH..AP	2222 ... 34229
27	-2%	I	R270G13P2GH..AP	2222 ... 34279
33	-2%	I	R330G13P2GH..AP	2222 ... 34339
39	-2%	IIA	R390G13P2GH..AP	2222 ... 34399
47	-2%	IIA	R470G13P2GH..AP	2222 ... 34479
56	-2%	IIB	R560G23P2GH..AP	2222 ... 34569
68	-2%	IIB	R680G23P2GH..AP	2222 ... 34689
82	-2%	III	R820G33P2GH..AP	2222 ... 34829
100	-2%	III	R101G33P2GH..AP	2222 ... 34101
120	-2%	IV	R121G43P2GH..AP	2222 ... 34121
150	-2%	IV	R151G43P2GH..AP	2222 ... 34151
180	-2%	IV	R181G43P2GH..AP	2222 ... 34181
220	-2%	V	R221G53P2GH..AP	2222 ... 34221

Capacitance range NPO (C0G)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
1.5	-0.25 pF	I ⁽¹⁾	R159C13C0GH..AP	2222 ... 09158
1.8	-0.25 pF	I ⁽¹⁾	R189C13C0GH..AP	2222 ... 09188
2.2	-0.25 pF	I	R229C13C0GH..AP	2222 ... 09228
2.7	-0.25 pF	I	R279C13C0GH..AP	2222 ... 09278
3.3	-0.25 pF	I	R339C13C0GH..AP	2222 ... 09338
3.9	-0.25 pF	I	R399C13C0GH..AP	2222 ... 09398
4.7	-0.25 pF	I	R479C13C0GH..AP	2222 ... 09478
5.6	-0.25 pF	I	R569C13C0GH..AP	2222 ... 09568
6.8	-0.25 pF	I	R689C13C0GH..AP	2222 ... 09688
8.2	-0.25 pF	I	R829C13C0GH..AP	2222 ... 09828
10	-2%	I	R100G13C0GH..AP	2222 ... 10109
12	-2%	I	R120G13C0GH..AP	2222 ... 10129
15	-2%	I	R150G13C0GH..AP	2222 ... 10159
18	-2%	I	R180G13C0GH..AP	2222 ... 10189
22	-2%	I	R220G13C0GH..AP	2222 ... 10229
27	-2%	I	R270G13C0GH..AP	2222 ... 10279
33	-2%	I	R330G13C0GH..AP	2222 ... 10339
39	-2%	IIA	R390G13C0GH..AP	2222 ... 10399
47	-2%	IIA	R470G13C0GH..AP	2222 ... 10479
56	-2%	IIA	R560G13C0GH..AP	2222 ... 10569
68	-2%	IIB	R680G23C0GH..AP	2222 ... 10689
82	-2%	IIB	R820G23C0GH..AP	2222 ... 10829
100	-2%	III	R101G33C0GH..AP	2222 ... 10101
120	-2%	III	R121G43C0GH..AP	2222 ... 10121
150	-2%	IV	R151G43C0GH..AP	2222 ... 10151
180	-2%	IV	R181G43C0GH..AP	2222 ... 10181
220	-2%	V	R221G53C0GH..AP	2222 ... 10221

Capacitance range N750 (UJ2)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
3.3	-0.25 pF	I ⁽¹⁾	R339C13U2JH..AP	2222 ... 57338
3.9	-0.25 pF	I ⁽¹⁾	R399C13U2JH..AP	2222 ... 57398
4.7	-0.25 pF	I	R479C13U2JH..AP	2222 ... 57478
5.6	-0.25 pF	I	R569C13U2JH..AP	2222 ... 57568
6.8	-0.25 pF	I	R689C13U2JH..AP	2222 ... 57688
8.2	-0.25 pF	I	R829C13U2JH..AP	2222 ... 57828
10	-2%	I	R100G13U2JH..AP	2222 ... 58109
12	-2%	I	R120G13U2JH..AP	2222 ... 58129
15	-2%	I	R150G13U2JH..AP	2222 ... 58159
18	-2%	I	R180G13U2JH..AP	2222 ... 58189
22	-2%	I	R220G13U2JH..AP	2222 ... 58229
27	-2%	I	R270G13U2JH..AP	2222 ... 58279
33	-2%	I	R330G13U2JH..AP	2222 ... 58579
39	-2%	I	R390G13U2JH..AP	2222 ... 58399
47	-2%	I	R470G13U2JH..AP	2222 ... 58479
56	-2%	IIA	R560G13U2JH..AP	2222 ... 58569
68	-2%	IIA	R680G13U2JH..AP	2222 ... 58689
82	-2%	IIB	R820G23U2JH..AP	2222 ... 58829
100	-2%	IIB	R101G23U2JH..AP	2222 ... 58101
120	-2%	III	R121G33U2JH..AP	2222 ... 58121
150	-2%	III	R151G33U2JH..AP	2222 ... 58151
180	-2%	IV	R181G43U2JH..AP	2222 ... 58181
220	-2%	IV	R221G43U2JH..AP	2222 ... 58221
270	-2%	V	R271G53U2JH..AP	2222 ... 58271
330	-2%	V	R331G53U2JH..AP	2222 ... 58331
390	-2%	V	R391G53U2JH..AP	2222 ... 58391

1) WF = bulk
WG = reel
WJ = ammo

2) 681 = bulk
679 = reel
689 = ammo

1. Other capacitance values and tolerances are available on request
2. 5th - 6th - 7th digit of the catalogue number to be completed with the packaging code

tabel 1

all types have thickness classification of ≤ 2.3 mm except for:

note ¹⁾ ≤ 2.5 mm

note ²⁾ ≤ 2.7 mm

note ³⁾ ≤ 3.0 mm

Ordering information Preferred types

Capacitance range N1500 (P3K)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
15	-2%	I ⁽¹⁾	R150G13P3KH...AP	2222 ... 70159
18	-2%	I ⁽¹⁾	R180G13P3KH...AP	2222 ... 70189
22	-2%	I	R220G13P3KH...AP	2222 ... 70229
27	-2%	I	R270G13P3KH...AP	2222 ... 70279
33	-2%	I	R330G13P3KH...AP	2222 ... 70579
39	-2%	I	R390G13P3KH...AP	2222 ... 70399
47	-2%	I	R470G13P3KH...AP	2222 ... 70479
56	-2%	I	R560G13P3KH...AP	2222 ... 70569
68	-2%	I	R680G13P3KH...AP	2222 ... 70689
82	-2%	I	R820G13P3KH...AP	2222 ... 70829
100	-2%	IIA	R101G13P3KH...AP	2222 ... 70101
120	-2%	IIA	R121G13P3KH...AP	2222 ... 70121
150	-2%	IIB	R151G23P3KH...AP	2222 ... 70151
180	-2%	IIB	R181G23P3KH...AP	2222 ... 70181
220	-2%	III	R221G33P3KH...AP	2222 ... 70221
270	-2%	III	R271G43P3KH...AP	2222 ... 70271
330	-2%	IV	R331G43P3KH...AP	2222 ... 70331
390	-2%	IV	R391G43P3KH...AP	2222 ... 70391
470	-2%	V	R471G53P3KH...AP	2222 ... 70471
560	-2%	V	R561G53P3KH...AP	2222 ... 70561

Capacitance range P100 (M7G)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 500 V				
0.47	-0.25 pF	I ⁽¹⁾	R478C13M7GL...AP	2222 ... 03477
0.56	-0.25 pF	I ⁽¹⁾	R568C13M7GL...AP	2222 ... 03567
0.68	-0.25 pF	I ⁽¹⁾	R688C13M7GL...AP	2222 ... 03687
0.82	-0.25 pF	I	R828C13M7GL...AP	2222 ... 03827
1.0	-0.25 pF	I	R109C13M7GL...AP	2222 ... 03108
1.2	-0.25 pF	I	R129C13M7GL...AP	2222 ... 03128
1.5	-0.25 pF	I ⁽¹⁾	R159C13M7GL...AP	2222 ... 03158
1.8	-0.25 pF	I	R189C13M7GL...AP	2222 ... 03188
2.2	-0.25 pF	I	R229C13M7GL...AP	2222 ... 03228
2.7	-0.25 pF	I	R279C13M7GL...AP	2222 ... 03278
3.3	-0.25 pF	I	R339C13M7GL...AP	2222 ... 03338
3.9	-0.25 pF	I	R399C13M7GL...AP	2222 ... 03398
4.7	-0.25 pF	IIA	R479C13M7GL...AP	2222 ... 03478
5.6	-0.25 pF	IIA	R569C13M7GL...AP	2222 ... 03568
6.8	-0.25 pF	IIB	R689C23M7GL...AP	2222 ... 03688
8.2	-0.25 pF	IIB	R829C23M7GL...AP	2222 ... 03828
10	-2%	III	R100G33M7GL...AP	2222 ... 04109
12	-2%	III	R120G33M7GL...AP	2222 ... 04129
15	-2%	III	R150G33M7GL...AP	2222 ... 04159
18	-2%	IV	R180G43M7GL...AP	2222 ... 04189
22	-2%	IV	R220G43M7GL...AP	2222 ... 04229
27	-2%	V	R270G53M7GL...AP	2222 ... 04279
33	-2%	V	R330G53M7GL...AP	2222 ... 04339

table 1

all types have thickness classification of ≤ 2.3 mm except for:

note ¹⁾ ≤ 2.5 mm

note ²⁾ ≤ 2.7 mm

note ³⁾ ≤ 3.0 mm

Capacitance range NP0 (COG)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 500 V				
0.82	-0.25 pF	I ⁽²⁾	R828C13COGL...AP	2222 ... 09827
1.0	-0.25 pF	I ⁽¹⁾	R109C13COGL...AP	2222 ... 09108
1.2	-0.25 pF	I ⁽¹⁾	R129C13COGL...AP	2222 ... 09128
1.5	-0.25 pF	I	R159C13COGL...AP	2222 ... 09158
1.8	-0.25 pF	I	R189C13COGL...AP	2222 ... 09188
2.2	-0.25 pF	I	R229C13COGL...AP	2222 ... 09228
2.7	-0.25 pF	I	R279C13COGL...AP	2222 ... 09278
3.3	-0.25 pF	I	R339C13COGL...AP	2222 ... 09338
3.9	-0.25 pF	I	R399C13COGL...AP	2222 ... 09398
4.7	-0.25 pF	I	R479C13COGL...AP	2222 ... 09478
5.6	-0.25 pF	I	R569C13COGL...AP	2222 ... 09568
6.8	-0.25 pF	I	R689C13COGL...AP	2222 ... 09688
8.2	-0.25 pF	I	R829C13COGL...AP	2222 ... 09828
10	-2%	I	R100G13COGL...AP	2222 ... 10109
12	-2%	I	R120G13COGL...AP	2222 ... 10129
15	-2%	IIA	R150G13COGL...AP	2222 ... 10159
18	-2%	IIA	R180G13COGL...AP	2222 ... 10189
22	-2%	IIA	R220G13COGL...AP	2222 ... 10229
27	-2%	IIB	R270G23COGL...AP	2222 ... 10279
33	-2%	IIB	R330G23COGL...AP	2222 ... 10339
39	-2%	IIB	R390G23COGL...AP	2222 ... 10399
47	-2%	III	R470G33COGL...AP	2222 ... 10479
56	-2%	III	R560G33COGL...AP	2222 ... 10569
68	-2%	IV	R680G43COGL...AP	2222 ... 10689
82	-2%	IV	R820G43COGL...AP	2222 ... 10829
100	-2%	IV	R101G43COGL...AP	2222 ... 10101
120	-2%	V	R121G53COGL...AP	2222 ... 10121
150	-2%	V	R151G53COGL...AP	2222 ... 10151

Capacitance range N150 (P2G)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 500 V				
2.2	-0.25 pF	I ⁽¹⁾	R229C13P2GL...AP	2222 ... 33228
2.7	-0.25 pF	I ⁽¹⁾	R279C13P2GL...AP	2222 ... 33278
3.3	-0.25 pF	I	R339C13P2GL...AP	2222 ... 33338
3.9	-0.25 pF	I	R399C13P2GL...AP	2222 ... 33398
4.7	-0.25 pF	I	R479C13P2GL...AP	2222 ... 33478
5.6	-0.25 pF	I	R569C13P2GL...AP	2222 ... 33568
6.8	-0.25 pF	I	R689C13P2GL...AP	2222 ... 33688
8.2	-0.25 pF	I	R829C13P2GL...AP	2222 ... 33828
10	-2%	I	R100G13P2GL...AP	2222 ... 34109
12	-2%	I	R120G13P2GL...AP	2222 ... 34129
15	-2%	IIA	R150G13P2GL...AP	2222 ... 34159
18	-2%	IIA	R180G13P2GL...AP	2222 ... 34189
22	-2%	IIA	R220G13P2GL...AP	2222 ... 34229
27	-2%	IIB	R270G23P2GL...AP	2222 ... 34279
33	-2%	IIB	R330G23P2GL...AP	2222 ... 34339
39	-2%	IIB	R390G23P2GL...AP	2222 ... 34399
47	-2%	III	R470G33P2GL...AP	2222 ... 34479
56	-2%	III	R560G33P2GL...AP	2222 ... 34569
68	-2%	IV	R680G43P2GL...AP	2222 ... 34689
82	-2%	IV	R820G43P2GL...AP	2222 ... 34829
100	-2%	IV	R101G43P2GL...AP	2222 ... 34101
120	-2%	V	R121G53P2GL...AP	2222 ... 34121
150	-2%	V	R151G53P2GL...AP	2222 ... 34151

1) WF = bulk
WG = reel
WJ = ammo

2) 681 = bulk
679 = reel
689 = ammo

3) 652 = bulk
654 = reel
691 = ammo

1. Other capacitance values and tolerances are available on request
2. 5th - 6th - 7th digit of the catalogue number to be completed with the packaging code

Ceramic Capacitors

Miniature Plate Capacitors, class 1



Ordering information Preferred types

Capacitance range N750 (U2J)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 500 V				
1.8	-0.25 pF	I ⁽³⁾	R189C13U2JL..AP	2222 ... 57188
2.2	-0.25 pF	I ⁽¹⁾	R229C13U2JL..AP	2222 ... 57228
2.7	-0.25 pF	I	R279C13U2JL..AP	2222 ... 57278
3.3	-0.25 pF	I	R339C13U2JL..AP	2222 ... 57338
3.9	-0.25 pF	I	R399C13U2JL..AP	2222 ... 57398
4.7	-0.25 pF	I ⁽²⁾	R479C13U2JL..AP	2222 ... 57478
5.6	-0.25 pF	I	R569C13U2JL..AP	2222 ... 57568
6.8	-0.25 pF	I	R689C13U2JL..AP	2222 ... 33 688
8.2	-0.25 pF	I	R829C13U2JL..AP	2222 ... 57828
10	-2%	I	R100G13U2JL..AP	2222 ... 57109
12	-2%	I	R120G13U2JL..AP	2222 ... 58129
15	-2%	I	R150G13U2JL..AP	2222 ... 58159
18	-2%	IIA	R189G13U2JL..AP	2222 ... 58189
22	-2%	IIA	R220G13U2JL..AP	2222 ... 58229
27	-2%	IIB	R270G23U2JL..AP	2222 ... 58279
33	-2%	IIB	R330G23U2JL..AP	2222 ... 58339
39	-2%	IIB	R390G23U2JL..AP	2222 ... 58399
47	-2%	III	R470G33U2JL..AP	2222 ... 58479
56	-2%	III	R560G33U2JL..AP	2222 ... 58569
68	-2%	IV	R680G43U2JL..AP	2222 ... 58689
82	-2%	IV	R820G43U2JL..AP	2222 ... 58829
100	-2%	IV	R101G43U2JL..AP	2222 ... 58101
120	-2%	V	R121G53U2JL..AP	2222 ... 58121
150	-2%	V	R151G53U2JL..AP	2222 ... 58151

1. Other capacitance values and tolerances are available on request
2. 5th - 6th - 7th digit of the catalogue number to be completed with the packaging code

Capacitance range N1500 (P3K)

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 500 V				
8.2	-0.25 pF	I ⁽³⁾	R829C13P3KL..AP	2222 ... 69828
10	-2%	I ⁽¹⁾	R100G13P3KL..AP	2222 ... 70109
12	-2%	I ⁽¹⁾	R120G13P3KL..AP	2222 ... 70129
15	-2%	I	R150G13P3KL..AP	2222 ... 70159
18	-2%	I	R180G13P3KL..AP	2222 ... 70189
22	-2%	I	R220G13P3KL..AP	2222 ... 70229
27	-2%	I	R270G13P3KL..AP	2222 ... 70279
33	-2%	IIA	R330G13P3KL..AP	2222 ... 70339
39	-2%	IIA	R390G13P3KL..AP	2222 ... 70399
47	-2%	IIA	R470G13P3KL..AP	2222 ... 70479
56	-2%	IIB	R560G23P3KL..AP	2222 ... 70569
68	-2%	IIB	R680G23P3KL..AP	2222 ... 70689
82	-2%	IIB	R820G23P3KL..AP	2222 ... 70829
100	-2%	III	R101G33P3KL..AP	2222 ... 70101
120	-2%	III	R121G33P3KL..AP	2222 ... 70121
150	-2%	IV	R151G43P3KL..AP	2222 ... 70151
180	-2%	IV	R181G43P3KL..AP	2222 ... 70181
220	-2%	IV	R221G43P3KL..AP	2222 ... 70221
270	-2%	V	R271G53P3KL..AP	2222 ... 70271
330	-2%	V	R331G53P3KL..AP	2222 ... 70331

1. Other capacitance values and tolerances are available on request
2. 5th - 6th - 7th digit of the catalogue number to be completed with the packaging code

table 1

all types have thickness classification of ≤ 2.3 mm except for:

note ¹⁾ ≤ 2.5 mm

note ²⁾ ≤ 2.7 mm

note ³⁾ ≤ 3.0 mm

Capacitance range SL

C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 1000 V				
0.47	-0.25 pF	I	R478C13SL0N..AP	2222 694 ..477
0.56	-0.25 pF	I	R568C13SL0N..AP	2222 694 ..567
0.68	-0.25 pF	I	R688C13SL0N..AP	2222 694 ..687
0.82	-0.25 pF	I	R828C13SL0N..AP	2222 694 ..827
1.0	-0.25 pF	I	R109C13SL0N..AP	2222 694 ..108
1.2	-0.25 pF	I	R129C13SL0N..AP	2222 694 ..128
1.5	-0.25 pF	I	R159C13SL0N..AP	2222 694 ..158
1.8	-0.25 pF	I	R189C13SL0N..AP	2222 694 ..188
2.2	-0.25 pF	I	R229C13SL0N..AP	2222 694 ..228
2.7	-0.25 pF	I	R279C13SL0N..AP	2222 694 ..278
3.3	-0.25 pF	I	R339C13SL0N..AP	2222 694 ..338
3.9	-0.25 pF	I	R399C13SL0N..AP	2222 694 ..398
4.7	-0.25 pF	I	R479C13SL0N..AP	2222 694 ..478
5.6	-0.25 pF	I	R569C13SL0N..AP	2222 694 ..568
6.8	-0.25 pF	I	R689C13SL0N..AP	2222 694 ..688
8.2	-0.25 pF	I	R829C13SL0N..AP	2222 694 ..828
10	-5%	I	R100J13SL0N..AP	2222 694 ..109
12	-5%	I	R120J13SL0N..AP	2222 694 ..129
15	-5%	I	R150J13SL0N..AP	2222 694 ..159
18	-5%	IIA	R180J13SL0N..AP	2222 694 ..189
22	-5%	IIA	R220J13SL0N..AP	2222 694 ..229
27	-5%	IIB	R270J23SL0N..AP	2222 694 ..279
33	-5%	IIB	R330J23SL0N..AP	2222 694 ..339
39	-5%	IIB	R390J23SL0N..AP	2222 694 ..399
47	-5%	III	R470J33SL0N..AP	2222 694 ..479
56	-5%	III	R560J33SL0N..AP	2222 694 ..569
68	-5%	III	R680J33SL0N..AP	2222 694 ..689
82	-5%	IV	R820J43SL0N..AP	2222 694 ..829
100	-5%	IV	R101J43SL0N..AP	2222 694 ..101
120	-5%	V	R121J53SL0N..AP	2222 694 ..121
150	-5%	V	R151J53SL0N..AP	2222 694 ..151

1. Other capacitance values and tolerances are available on request
2. 8th - 9th digit of the catalogue number to be completed with the packaging code

1) WF = bulk
WG = reel
WJ = ammo

2) 681 = bulk
679 = reel
689 = ammo

3) 652 = bulk
654 = reel
691 = ammo

4) 09 = bulk
53 = reel
63 = ammo

Ordering information Preferred types

Capacitance range 2F6 (Y5V)				
C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 63 V				
1000	-20 /+ 80%	I	R102Z13Z5VF..SP	2222 629 ..102
2200	-20 /+ 80%	I	R222Z13Z5VF..SP	2222 629 ..222
4700	-20 /+ 80%	I	R472Z13Z5VF..SP	2222 629 ..472
10000	-20 /+ 80%	IIB	R103Z23Z5VF..SP	2222 629 ..103
22000	-20 /+ 80%	IV	R223Z43Z5VF..SP	2222 629 ..223
47000	-20 /+ 80%	V	R473Z53Z5VF..SP	2222 629 ..473

Capacitance range 2C2/2D1 (Y5P/X5S/X7T)				
C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
180	-10%	I ⁽¹⁾	R181K13Y5PH..SP	2222 630 ..181
220	-10%	I ⁽¹⁾	R221K13Y5PH..SP	2222 630 ..221
270	-10%	I	R271K13Y5PH..SP	2222 630 ..271
330	-10%	I	R331K13Y5PH..SP	2222 630 ..331
390	-10%	I	R391K13Y5PH..SP	2222 630 ..391
470	-10%	I	R471K13Y5PH..SP	2222 630 ..471
560	-10%	I	R561K13Y5PH..SP	2222 630 ..561
680	-10%	I	R681K13Y5PH..SP	2222 630 ..681
820	-10%	I	R821K13Y5PH..SP	2222 630 ..821
1000	-10%	I	R102K13Y5PH..SP	2222 630 ..102
1200	-10%	IIA	R122K13Y5PH..SP	2222 630 ..122
1500	-10%	IIA	R152K13Y5PH..SP	2222 630 ..152
1800	-10%	IIB	R182K23Y5PH..SP	2222 630 ..182
2200	-10%	IIB	R222K23Y5PH..SP	2222 630 ..222
2700	-10%	III	R272K33Y5PH..SP	2222 630 ..272
3300	-10%	III	R332K33Y5PH..SP	2222 630 ..332
3900	-10%	IV	R392K43Y5PH..SP	2222 630 ..392
4700	-10%	IV	R472K43Y5PH..SP	2222 630 ..472
5600	-10%	V	R562K53Y5PH..SP	2222 630 ..562
6800	-10%	V	R682K53Y5PH..SP	2222 630 ..682

Capacitance range 2E2 (X5U)				
C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 100 V				
1000	-20%	I	R102M13X5UH..SP	2222 640 ..102
1500	-20%	I	R152M13X5UH..SP	2222 640 ..152
2200	-20%	I	R222M13X5UH..SP	2222 640 ..222
3300	-20%	IIA	R332M13X5UH..SP	2222 640 ..332
4700	-20%	IIB	R472M23X5UH..SP	2222 640 ..472
6800	-20%	III	R682M33X5UH..SP	2222 640 ..682
10000	-20%	IV	R103M43X5UH..SP	2222 640 ..103
15000	-20%	V	R153M53X5UH..SP	2222 640 ..153

table 1

all types have thickness classification of ≤ 2.3 mm except for:

note ¹⁾ ≤ 2.5 mm

note ²⁾ ≤ 2.7 mm

note ³⁾ ≤ 3.0 mm

1. Other capacitance values and tolerances are available on request
2. 8th - 9th digit of the catalogue number to be completed with the packaging code

Capacitance range 2C2/2D1 (Y5P/X5S/X7T)				
C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 500 V				
100	-10%	I ⁽²⁾	R101K13Y5PL..SP	2222 655 ..101
120	-10%	I ⁽¹⁾	R121K13Y5PL..SP	2222 655 ..121
150	-10%	I	R151K13Y5PL..SP	2222 655 ..151
180	-10%	I	R181K13Y5PL..SP	2222 655 ..181
220	-10%	I	R221K13Y5PL..SP	2222 655 ..221
270	-10%	I	R271K13Y5PL..SP	2222 655 ..271
330	-10%	I	R331K13Y5PL..SP	2222 655 ..331
390	-10%	IIA	R391K13Y5PL..SP	2222 655 ..391
470	-10%	IIA	R471K13Y5PL..SP	2222 655 ..471
560	-10%	IIA	R561K13Y5PL..SP	2222 655 ..561
680	-10%	IIB	R681K23Y5PL..SP	2222 655 ..681
820	-10%	IIB	R821K23Y5PL..SP	2222 655 ..821
1000	-10%	IIB	R102K23Y5PL..SP	2222 655 ..102
1200	-10%	III	R122K33Y5PL..SP	2222 655 ..122
1500	-10%	III	R152K33Y5PL..SP	2222 655 ..152
1800	-10%	III	R182K33Y5PL..SP	2222 655 ..182
2200	-10%	IV	R222K43Y5PL..SP	2222 655 ..222
2700	-10%	IV	R272K43Y5PL..SP	2222 655 ..272
3300	-10%	V	R332K53Y5PL..SP	2222 655 ..332
3900	-10%	V	R392K53Y5PL..SP	2222 655 ..392
4700	-10%	V	R472K53Y5PL..SP	2222 655 ..472

Capacitance range 2C2/2D1 (Y5P/X5S/X8U)				
C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 1000 V				
100	-10%	I	R101K13Y5PN..SP	2222 693 ..101
120	-10%	I	R121K13Y5PN..SP	2222 693 ..121
150	-10%	I	R151K13Y5PN..SP	2222 693 ..151
180	-10%	IIA	R181K13Y5PN..SP	2222 693 ..181
220	-10%	IIA	R221K13Y5PN..SP	2222 693 ..221
270	-10%	IIA	R271K13Y5PN..SP	2222 693 ..271
330	-10%	IIB	R331K23Y5PN..SP	2222 693 ..331
390	-10%	IIB	R391K23Y5PN..SP	2222 693 ..391
470	-10%	IIB	R471K23Y5PN..SP	2222 693 ..471
560	-10%	III	R561K33Y5PN..SP	2222 693 ..561
680	-10%	III	R681K33Y5PN..SP	2222 693 ..681
820	-10%	IV	R821K43Y5PN..SP	2222 693 ..821
1000	-10%	IV	R102K43Y5PN..SP	2222 693 ..102
1200	-10%	IV	R122K43Y5PN..SP	2222 693 ..122
1500	-10%	V	R152K53Y5PN..SP	2222 693 ..152
1800	-10%	V	R182K53Y5PN..SP	2222 693 ..182
2200	-10%	V	R222K53Y5PN..SP	2222 693 ..222

Capacitance range 2E2 (X5U)				
C ¹ (pF)	TOL (PF or %)	size (see tabel 1)	clear text code 12th and 13th digit	catalogue number 12NC ²
U _{RDC} = 1000 V				
270	-20%	I	R271M13X5UN..SP	2222 695 ..271
330	-20%	I	R331M13X5UN..SP	2222 695 ..331
390	-20%	IIA	R391M13X5UN..SP	2222 695 ..391
470	-20%	IIA	R471M13X5UN..SP	2222 695 ..471
560	-20%	IIA	R561M13X5UN..SP	2222 695 ..561
680	-20%	IIB	R681M23X5UN..SP	2222 695 ..681
820	-20%	IIB	R821M23X5UN..SP	2222 695 ..821
2000	-20%	III	R102M33X5UN..SP	2222 695 ..202
1200	-20%	III	R122M33X5UN..SP	2222 695 ..122
1500	-20%	III	R152M33X5UN..SP	2222 695 ..152
1800	-20%	IV	R182M43X5UN..SP	2222 695 ..182
2200	-20%	IV	R222M43X5UN..SP	2222 695 ..222
2700	-20%	V	R272M53X5UN..SP	2222 695 ..272
3300	-20%	V	R332M53X5UN..SP	2222 695 ..332

1) WF = bulk
WG = reel
WJ = ammo

2) 681 = bulk
679 = reel
689 = ammo

3) 652 = bulk
654 = reel
691 = ammo

4) 09 = bulk
53 = reel
63 = ammo

Ceramic Capacitors

Miniature Plate Capacitors, class 1 & 2

Ordering information 12NC

Class 1, flanged type

12NC

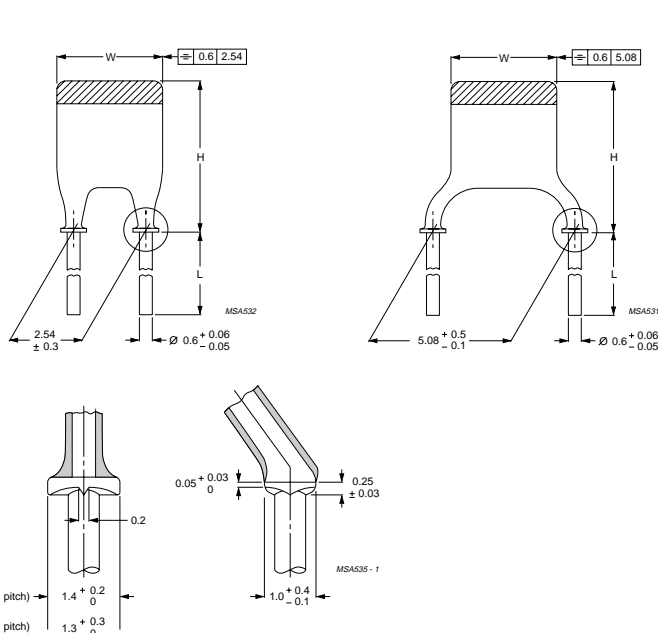
Packing/leads	Pitch	Voltage	Part No.	Temperature Coefficient (TC)	Capacitance		Capacitance (numerically)	Multiplier (pF)
					C < 10 pF	C ≥ 10 pF		
bulk/long	1e	100 V	680					
bulk/short	1e	100 V	682	P100	03	04	10	7 × 0.01
bulk/long	2e	100 V	681	NP0	09	10	12	8 × 0.1
bulk/short	2e	100 V	683	NP0 precision	90	90	15	9 × 1
reel	1e	100 V	678	N150	33	34	18	1 × 10
reel	2e	100 V	679	N750	57	58	22	2 × 100
ammopack	1e	100 V	688	N1500	69	70	27	3 × 1000
ammopack	2e	100 V	689	SL, bulk/long	09	09	33	
bulk/long	2e	500 V	652	SL, bulk/short	19	19	39	
bulk/short	2e	500 V	653	SL, reel	53	53	47	
reel	2e	500 V	654	SL, ammpack	63	63	56	
ammopack	2e	500 V	691				68	
for SL types, see TC	2e	1000 V	694				82	

Class 2, flanged type

12NC

Voltage	Dielectric constant	Part No.	Packing	Pitch	Capacitance (numerically)	Multiplier (pF)	
							63 V
100 V	K 2000 Y5P	630	bulk/long	2e	09	10	7 × 0.01
100 V	K 5000 X5U	640	bulk/short	1e	18	12	8 × 0.1
500 V	K 2000 Y5P	655	bulk/short	2e	19	15	9 × 1
1000 V	K 2000 Y5P	693	reel	1e	51	18	1 × 10
1000 V	K 5000 X5U	695	reel	2e	53	22	2 × 100
			ammopack	1e	61	27	3 × 1000
			ammopack	2e	63	33	
						39	
						47	
						56	
						68	
						82	

Mechanical overview



Dimensions in mm

size	W _{max}	H _{max}
I	3.6 (-1.1)	6.3 (-1.8)
IIA	3.9 (-1.4)	6.7 (-2.0)
IIB	4.5 (-1.8)	7.3 (-2.4)
III	5.3 (-1.8)	8.1 (-2.6)
IV	6.2 (-2.0)	9.0 (-2.7)
V	6.2 (-2.0)	11.2 (-3.1)

Packing

U _R	pitch	bulk		reel		ammo	
		L = 4 ± 0.5 mm	L ≥ 13 mm	2e	1e	2e	1e
63 V							
100 V							
500 V							
1000 V							

1e pitch = 2.54 mm

2e pitch = 5.08 mm

Ordering information Clear text code (preferred)

Class 1 & 2, flanged type

Clear text code (preferred)

R101G33COGHWGAP (example)

Product type _____

R plate capacitor

Capacitance (pF) _____

The first two digits are the significant figures of capacitance and the last digit is a multiplier as follows:

- 8 × 0.01
- 9 × 0.1
- 0 × 1
- 1 × 10
- 2 × 100
- 3 × 1000

Capacitance tolerance _____

- B ±0.1 pF (NP0 precision cap. < 10 pF)
- C ±0.25 pF (cap. < 10 pF)
- G ±2% (class 1 for cap. ≥ 10 pF)
- F ±1% (NP0 precision cap. ≥ 10 pF)
- J ±5% (class 1 for cap. ≥ 10 pF)
- K ±10% (class 2, Y5P)
- M ±20% (class 2, X5U)
- Z +80% / -20% (class 2, Z5V)

Size code _____

		W _{max}	H _{max}
19	IIA	3.9 mm (0.152")	6.7 mm (0.254")
29	IIB	4.5 mm (0.177")	7.3 mm (0.288")
33	III	5.3 mm (0.208")	8.1 mm (0.319")
43	IV	6.2 mm (0.244")	9.0 mm (0.354")
53	V	6.2 mm (0.244")	11.2 mm (0.441")

R 101 G 33 COG H WG AP

Class code

- AP class 1
- SP class 2

Packaging

	Space	Length	Leadform	Packaging
WC	0.100"	0.500" min.	flange	bulk
WD	0.200"	0.167 ±0.020"	flange	bulk
WE	0.100"	0.167 ±0.020"	flange	bulk
WF	0.200"	0.500" min.	flange	bulk
WG	0.200"	H ₀ = 18 mm	flange	tape on reel
WH	0.100"	H ₀ = 18 mm	flange	tape on reel
WJ	0.200"	H ₀ = 18 mm	flange	ammopack
WK	0.100"	H ₀ = 18 mm	flange	ammopack

Rated voltage (DC)

- F 50 V
- H 100 V
- L 500 V
- N 1000 V

TC codes (EIA)

	Temperature Coefficient	Marking
M7J	P100 ±30 ppm	class 1 red/violet
COG	NP0 ±30 ppm	class 1 black
P2G	N150 ±30 ppm	class 1 orange
U2J	N750 ±120 ppm	class 1 violet
P8K	N1500 +500 / -0 ppm	class 1 orange/orange
SLO	+150 to -1500 ppm	class 1 nil
Y5P	±10%; -30 to +85 °C	class 2 yellow
X5U	+22 / -58%; -55 to +85 °C	class 2 blue
Z5V	+22 / -82%; -10 to +85 °C	class 2 green

Film Capacitors

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General Purpose	35
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Interference Suppression	47
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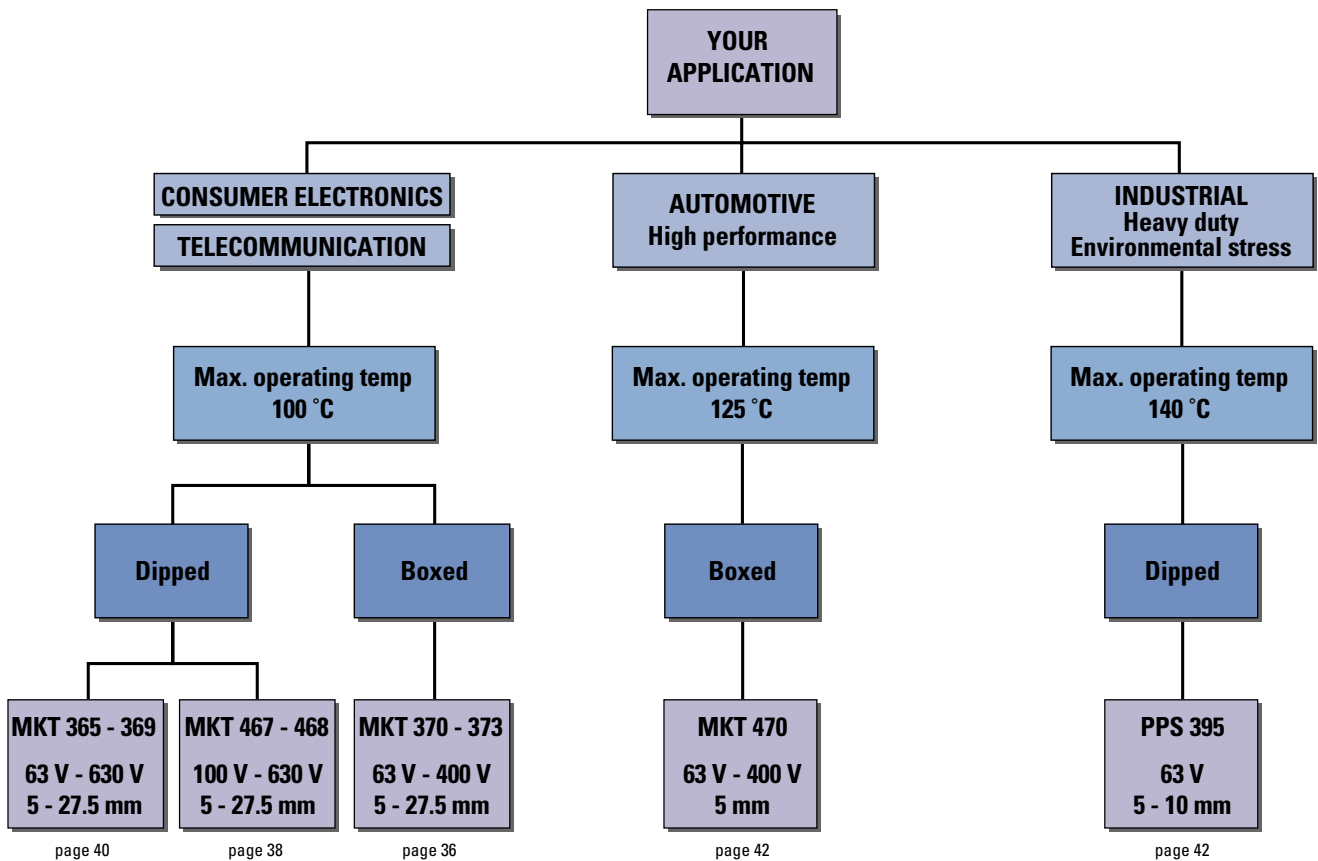
Broad range

In general-purpose capacitors we offer a broad range of products for general applications mostly for coupling and de-coupling functions including boxed and dipped capacitors. The range has recently been extended by high performance, high temperature products for automotive and industrial applications.

To help customers arrive at optimum solutions in their circuit designs, we can also offer products for specific applications (for example capacitor size and lead configuration).



How to select



Film Capacitors

General purpose, epoxy boxed

Series	MKT 370				MKT 371				MKT 372			MKT 373		
Applications	blocking, coupling and bypass capacitor													
Capacitance U_R (V _{DC})	63	100	250	400	63	100	250	400	100	250	400	100	250	400
100 pF														
150 pF														
220 pF														
330 pF														
470 pF														
680 pF														
1000 pF														
1500 pF														
2200 pF														
3300 pF														
4700 pF														
6800 pF														
0.01 μF														
0.015 μF														
0.022 μF														
0.033 μF														
0.047 μF														
0.068 μF														
0.10 μF														
0.15 μF														
0.22 μF														
0.33 μF														
0.47 μF														
0.68 μF														
1.0 μF														
1.5 μF														
2.2 μF														
3.3 μF														
4.7 μF														
6.8 μF														
10 μF														
15 μF														

in columns: pitch size (mm)

	preferred E6									
Tolerance / E-series	5%, 10% / E12									
Dielectric	metallized polyester									
Climatic category	55 / 100 / 56									
Tan δ (10 kHz)	≤ 150 × 10 ⁻⁴									
Reference specification	IEC 384-2									
Packing	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>ammopack</td> <td>ammopack, loose</td> <td>loose</td> <td>loose</td> </tr> </table>	ammopack	ammopack, loose	loose	loose					
ammopack	ammopack, loose	loose	loose							
Insulation resist.	<table border="1" style="width: 100%; text-align: center;"> <tr> <td></td> <td>$U_R \leq 100$ V_{DC}</td> <td>$U_R > 100$ V_{DC}</td> </tr> <tr> <td>R between leads for C ≤ 330 nF</td> <td>> 15 000 MΩ</td> <td>> 30 000 MΩ</td> </tr> <tr> <td>RC between leads for C > 330 nF</td> <td>> 5 000 s</td> <td>> 10 000 s</td> </tr> </table>		$U_R \leq 100$ V _{DC}	$U_R > 100$ V _{DC}	R between leads for C ≤ 330 nF	> 15 000 MΩ	> 30 000 MΩ	RC between leads for C > 330 nF	> 5 000 s	> 10 000 s
	$U_R \leq 100$ V _{DC}	$U_R > 100$ V _{DC}								
R between leads for C ≤ 330 nF	> 15 000 MΩ	> 30 000 MΩ								
RC between leads for C > 330 nF	> 5 000 s	> 10 000 s								
Pulse rise time at U _R	18 to 60 V/μs at U _R = 63 V 4 to 110 V/μs at U _R = 100 V 6 to 330 V/μs at U _R = 250 V 12 to 630 V/μs at U _R = 400 V									

Ordering information Preferred types

MKT 370 series, tol. 10%*, ammpack

C (μF)	dimensions b x h x l (mm)	catalogue number 2222 370	smallest packing quantity
--------	------------------------------	------------------------------------	---------------------------------

U_{RD} = 63 V, pitch 5.08 mm

0.1	2.5 x 6.5 x 7.2	75104	2000
0.15	2.5 x 6.5 x 7.2	75154	2000
0.22	3.5 x 8.0 x 7.2	75224	1500
0.33	3.5 x 8.0 x 7.2	75334	1500
0.47	3.5 x 8.0 x 7.2	75474	1500
0.68	4.5 x 9.0 x 7.2	75684	1000
1.0	6.0 x 11.0 x 7.2	75105	750

U_{RD} = 100 V, pitch 5.08 mm

0.022	2.5 x 6.5 x 7.2	85223	2000
0.033	2.5 x 6.5 x 7.2	85333	2000
0.047	2.5 x 6.5 x 7.2	85473	2000
0.068	2.5 x 6.5 x 7.2	85683	2000
0.10	3.5 x 8.0 x 7.2	85104	1500
0.15	3.5 x 8.0 x 7.2	85154	1500
0.22	4.5 x 9.0 x 7.2	85224	1000
0.33	5.0 x 10.0 x 7.2	85334	1000
0.47	6.0 x 11.0 x 7.2	85474	750

U_{RD} = 250 V, pitch 5.08 mm

0.01	2.5 x 6.5 x 7.2	35103	2000
0.015	2.5 x 6.5 x 7.2	35153	2000
0.022	3.5 x 8.0 x 7.2	35223	1500
0.033	3.5 x 8.0 x 7.2	35333	1500
0.047	4.5 x 9.0 x 7.2	35473	1000
0.068	5.0 x 10.0 x 7.2	35683	1000
0.1	6.0 x 11.0 x 7.2	35104	750

U_{RD} = 400 V, pitch 5.08 mm

0.001	2.5 x 6.5 x 7.2	65102	2000
0.0015	2.5 x 6.5 x 7.2	65152	2000
0.0022	2.5 x 6.5 x 7.2	65222	2000
0.0033	2.5 x 6.5 x 7.2	65332	2000
0.0047	2.5 x 6.5 x 7.2	65472	2000
0.0068	2.5 x 6.5 x 7.2	65682	2000
0.01	3.5 x 8.0 x 7.2	65103	1500
0.015	3.5 x 8.0 x 7.2	65153	1500
0.022	4.5 x 9.0 x 7.2	65223	1000
0.033	6.0 x 11.0 x 7.2	65333	750
0.047	6.0 x 11.0 x 7.2	65473	750

* 5% tolerance also preferred.

Change digit 9 from 5 to 6

Example: 0.1 μF, 63 V, 10% → 2222 370 75104

0.1 μF, 63 V, 5% → 2222 370 76104

MKT 371 series, tol. 10%***, ammpack

C (μF)	dimensions b x h x l (mm)	catalogue number 2222 371	smallest packing quantity
--------	------------------------------	------------------------------------	---------------------------------

U_{RD} = 63 V, pitch 7.62 mm

0.068	2.5 x 6.5 x 10.0	38683	2000
0.1	2.5 x 6.5 x 10.0	38104	2000
0.15	3.0 x 8.0 x 10.0	38154	1500
0.22	3.0 x 8.0 x 10.0	38224	1500
0.33	4.0 x 9.0 x 10.0	38334	1000
0.47	4.0 x 9.0 x 10.0	38474	1000
0.68	4.0 x 9.0 x 10.0	38684	1000
1.0	5.0 x 10.5 x 10.0	38105	1000

U_{RD} = 100 V, pitch 7.62 mm

0.022	2.5 x 6.5 x 10.0	68223	2000
0.033	2.5 x 6.5 x 10.0	68333	2000
0.047	2.5 x 6.5 x 10.0	68473	2000
0.068	3.0 x 8.0 x 10.0	68683	1500

0.10	3.0 x 8.0 x 10.0	68104	1500
0.15	4.0 x 9.0 x 10.0	68154	1000
0.22	4.0 x 9.0 x 10.0	68224	1000
0.33	5.0 x 10.5 x 10.0	68334	1000
0.47	5.0 x 10.5 x 10.0	68474	1000

U_{RD} = 250 V, pitch 7.62 mm

0.01	2.5 x 6.5 x 10.0	78103	2000
0.015	2.5 x 6.5 x 10.0	78153	2000
0.022	3.0 x 8.0 x 10.0	78223	1500
0.033	3.0 x 8.0 x 10.0	78333	1500
0.047	3.0 x 8.0 x 10.0	78473	1500
0.068	4.0 x 9.0 x 10.0	78683	1000
0.1	4.0 x 9.0 x 10.0	78104	1000

U_{RD} = 400 V, pitch 7.62 mm

0.0047	2.5 x 6.5 x 10.0	88472	2000
0.068	2.5 x 6.5 x 10.0	88682	2000
0.01	3.0 x 8.0 x 10.0	88103	1500
0.015	4.0 x 9.0 x 10.0	88153	1000

** 5% tolerance also preferred.

Change digit 9 from 8 to 9

Example: 0.01 μF, 250 V, 10% → 2222 371 78103

0.01 μF, 250 V, 5% → 2222 371 79103

MKT 372 series, tolerance 10%, loose in box

C (μF)	dimensions b x h x l (mm)	catalogue number 2222 372	smallest packing quantity
--------	------------------------------	------------------------------------	---------------------------------

U_{RD} = 100 V, pitch 10.0 mm

0.1	4.0 x 9.0 x 12.5	21104	1000
0.15	4.0 x 9.0 x 12.5	21154	1000
0.22	4.0 x 9.0 x 12.5	21224	1000
0.33	4.0 x 10.0 x 12.5	21334	1000
0.47	5.0 x 11.0 x 12.5	21474	1000

U_{RD} = 250 V, pitch 10.0 mm

0.047	4.0 x 9.0 x 12.5	41473	1000
0.068	4.0 x 9.0 x 12.5	41683	1000
0.1	4.0 x 10.0 x 12.5	41104	1000
0.15	5.0 x 11.0 x 12.5	41154	1000

U_{RD} = 400 V, pitch 10.0 mm

0.0047	4.0 x 9.0 x 12.5	51472	1000
0.0068	4.0 x 9.0 x 12.5	51682	1000
0.01	4.0 x 9.0 x 12.5	51103	1000
0.015	4.0 x 9.0 x 12.5	51153	1000
0.022	4.0 x 9.0 x 12.5	51223	1000
0.033	4.0 x 10.0 x 12.5	51333	1000
0.047	5.0 x 11.0 x 12.5	51473	1000

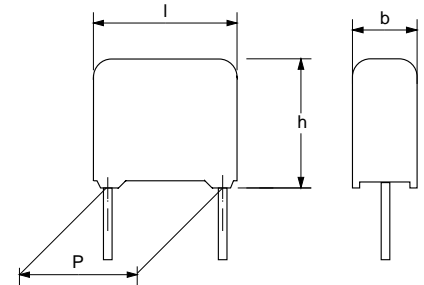
MKT 373 series, tolerance 10%, loose in box

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 373	smallest packing quantity
--------	---------------	------------------------------	---------------------------------------	---------------------------------

U_{RD} = 100 V

0.33	15.0	5.0 x 11.0 x 17.5	23334	1000
0.47	15.0	5.0 x 11.0 x 17.5	23474	1000
0.68	15.0	5.0 x 11.0 x 17.5	23684	1000
1.0	15.0	5.0 x 11.0 x 17.5	23105	1000
1.5	15.0	5.0 x 11.0 x 17.5	23155	1000
2.2	15.0	6.0 x 12.0 x 17.5	23225	1000
3.3	15.0	7.0 x 13.5 x 17.5	23335	1000
4.7	15.0	8.5 x 15.0 x 17.5	23475	1000
6.8	15.0	10.0 x 16.5 x 17.5	23685	1000
10	22.5	8.5 x 18.0 x 26.0	23106	200
15	27.5	11.0 x 21.0 x 31.0	23156	100

U _{RD} = 250 V				
0.15	15.0	5.0 x 11.0 x 17.5	43154	1000
0.22	15.0	5.0 x 11.0 x 17.5	43224	1000
0.33	15.0	5.0 x 11.0 x 17.5	43334	1000
0.47	15.0	6.0 x 12.0 x 17.5	43474	1000
0.68	15.0	7.0 x 13.5 x 17.5	43684	1000
1.0	15.0	8.5 x 15.0 x 17.5	43105	1000
1.5	22.5	8.5 x 18.0 x 26.0	43155	200
2.2	22.5	10.0 x 19.5 x 26.0	43225	200
3.3	27.5	11.0 x 21.0 x 31.0	43335	100
4.7	27.5	13.0 x 23.0 x 31.0	43475	100
U _{RD} = 400 V				
0.047	15.0	5.0 x 11.0 x 17.5	53473	1000
0.068	15.0	5.0 x 11.0 x 17.5	53683	1000
0.1	15.0	5.0 x 11.0 x 17.5	53104	1000
0.15	15.0	5.0 x 11.0 x 17.5	53154	1000
0.22	15.0	6.0 x 12.0 x 17.5	53224	1000
0.33	15.0	7.0 x 13.5 x 17.5	53334	1000
0.47	15.0	8.5 x 15.0 x 17.5	53474	1000
0.68	22.5	8.5 x 15.0 x 26.0	53684	200
1.0	22.5	8.5 x 18.0 x 26.0	53105	200
1.5	27.5	11.0 x 21.0 x 31.0	53155	100



Film Capacitors

General purpose, epoxy dipped, miniature

Series		MKT 467				MKT 468			
Applications		blocking, coupling and bypass capacitor							
Capacitance	U_R (V_{DC})	100	250	400	630	100	250	400	630
100 pF									
150 pF									
220 pF									
330 pF									
470 pF									
680 pF									
1000 pF									
1500 pF									
2200 pF									
3300 pF									
4700 pF									
6800 pF									
0.01 μF					10				
0.015 μF					10				
0.022 μF					10				
0.033 μF					10				
0.047 μF					10				
0.068 μF					10				
0.10 μF					10				
0.15 μF					10				
0.22 μF			10						
0.33 μF									
0.47 μF									
0.68 μF									
1.0 μF		10							
1.5 μF									
2.2 μF									
3.3 μF									
4.7 μF									
6.8 μF									
10 μF									
15 μF									
		■ preferred E6							
Tolerance / E-series	5%, 10% / E12								
Dielectric	metallized polyester								
Climatic category	55 / 100 / 56								
Tan δ (10 kHz)	≤ 120 × 10 ⁻⁴								
Reference specification	IEC 384 - 2								
Packing	■ ammpack, loose				■ loose, reel				
Insulation- R: C ≤ 0.33 μF resist. R × C: C > 0.33 μF	> 15 000 MΩ > 5 000 s								
Note	For ordering of non-preferred types see our Film Capacitor data handbook BC05, 1999 edition								

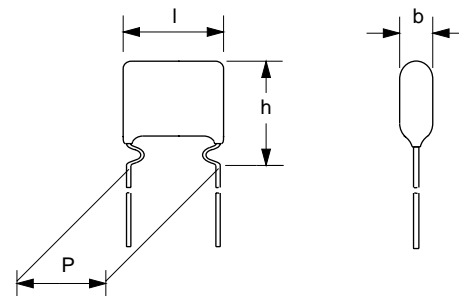
Ordering information Preferred types

MKT 467, loose in box

C (μF)	dimensions b x h x l (mm)	catalogue number 2222 467		smallest packing quantity
		±10%	±5%	
U_{RD} = 100 V, pitch 10.0 mm				
0.68	5.0 x 14.0 x 12.5	04684	05684	1500
1.0	6.0 x 15.0 x 12.5	04105	05105	1250
U_{RD} = 250 V, pitch 10.0 mm				
0.22	5.5 x 14.0 x 12.5	16224	17224	1500
U_{RD} = 400 V, pitch 10.0 mm				
0.047	5.5 x 14.0 x 12.5	28473	29473	1500
0.068	4.5 x 13.0 x 12.5	28683	29683	2000
0.1	5.5 x 14.0 x 12.5	28104	29104	1500
U_{RD} = 630 V, pitch 10.0 mm				
0.01	4.0 x 12.5 x 12.5	40103	41103	2000
0.015	5.0 x 13.0 x 12.5	40153	41153	2000
0.022	4.5 x 13.0 x 12.5	40223	41223	2000
0.033	5.5 x 13.5 x 12.5	40333	41333	1500

MKT 468, loose in box

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 468		smallest packing quantity
			±10%	±5%	
U_{RD} = 100 V					
1.5	15.0	6.0 x 15.0 x 17.5	04155	05155	2000
2.2	15.0	7.0 x 16.0 x 17.5	04225	05225	1250
3.3	15.0	8.5 x 17.5 x 17.5	04335	05335	1000
4.7	22.5	7.0 x 19.5 x 26.0	04475	05475	900
6.8	22.5	8.5 x 21.0 x 26.0	04685	05685	750
10.0	22.5	10.5 x 22.5 x 26.0	04106	05106	500
U_{RD} = 250 V					
0.33	15.0	5.5 x 14.5 x 17.5	16334	17334	2000
0.47	15.0	6.5 x 15.0 x 17.5	16474	17474	1500
0.68	15.0	8.0 x 16.5 x 17.5	16684	17684	1000
1.0	15.0	8.0 x 19.5 x 17.5	16105	17105	1000
1.5	22.5	8.0 x 19.5 x 26.0	16155	17155	750
2.2	22.5	9.5 x 21.0 x 26.0	16225	17225	750
3.3	22.5	12.0 x 25.0 x 26.0	16335	17335	500
4.7	22.5	14.5 x 27.5 x 26.0	16475	17475	250
U_{RD} = 400 V					
0.15	15.0	6.0 x 14.0 x 17.5	28154	29154	1750
0.22	15.0	7.0 x 15.0 x 17.5	28224	29224	1500
0.33	15.0	8.5 x 16.5 x 17.5	28334	29334	1000
0.47	15.0	8.5 x 20.0 x 17.5	28474	29474	750
0.68	22.5	8.0 x 19.5 x 26.0	28684	29684	750
1.0	22.5	9.5 x 21.0 x 26.0	28105	29105	750
1.5	27.5	11.0 x 24.5 x 30.0	28155	29155	450
2.2	27.5	14.0 x 26.5 x 30.0	28225	29225	300
U_{RD} = 630 V					
0.047	15.0	5.5 x 14.0 x 17.5	40473	41473	2000
0.068	15.0	7.0 x 14.5 x 17.5	40683	41683	1500
0.1	15.0	8.0 x 15.5 x 17.5	40104	41104	1250
0.15	15.0	8.5 x 19.0 x 17.5	40154	41154	1000
0.22	22.5	8.0 x 19.0 x 26.0	40224	41224	750
0.33	22.5	10.0 x 20.5 x 26.0	40334	41334	750
0.47	22.5	12.0 x 24.0 x 26.0	40474	41474	500
0.68	22.5	15.0 x 25.5 x 26.0	40684	41684	400



Film Capacitors

General purpose, epoxy dipped



Series	MKT 365				MKT 366				MKT 367				MKT 368				MKT 369																																						
Applications	blocking, coupling and bypass capacitor																																																						
Capacitance	U_R (V _{DC})																																																						
	63	100	250	400	63	100	250	400	63	100	250	400	63	100	250	400	630	63	100	250	400	630																																	
100 pF																																																							
150 pF																																																							
220 pF																																																							
330 pF																																																							
470 pF																																																							
680 pF																																																							
1000 pF																																																							
1500 pF																																																							
2200 pF																																																							
3300 pF																																																							
4700 pF																																																							
6800 pF																																																							
0.01 μF																																																							
0.015 μF																																																							
0.022 μF																																																							
0.033 μF																																																							
0.047 μF																																																							
0.068 μF																																																							
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0.47 μF																																																							
0.68 μF																																																							
1.0 μF																																																							
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4.7 μF																																																							
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15 μF																																																							
	<div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: #cccccc; margin-right: 5px;"></div> preferred E6 </div>																																																						
Tolerance / E-series	5%, 10% / E12																																																						
Dielectric	metallized polyester																																																						
Climatic category	55 / 100 / 56																																																						
Tan δ (10 kHz)	≤ 150 × 10 ⁻⁴																																																						
Reference specification	IEC 384 - 2																																																						
Packing	ammo, reel				loose								loose, reel																																										
Insulation resist.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td colspan="4">$U_R \leq 100 V_{DC}$</td> <td colspan="4">$U_R > 100 V_{DC}$</td> <td colspan="4"></td> </tr> <tr> <td>R between leads for C ≤ 330 nF</td> <td colspan="4">> 15 000 MΩ</td> <td colspan="4">> 30 000 MΩ</td> <td colspan="4"></td> </tr> <tr> <td>RC between leads for C > 330 nF</td> <td colspan="4">> 5 000 s</td> <td colspan="4">> 10 000 s</td> <td colspan="4"></td> </tr> </table>																	$U_R \leq 100 V_{DC}$				$U_R > 100 V_{DC}$								R between leads for C ≤ 330 nF	> 15 000 MΩ				> 30 000 MΩ								RC between leads for C > 330 nF	> 5 000 s				> 10 000 s							
	$U_R \leq 100 V_{DC}$				$U_R > 100 V_{DC}$																																																		
R between leads for C ≤ 330 nF	> 15 000 MΩ				> 30 000 MΩ																																																		
RC between leads for C > 330 nF	> 5 000 s				> 10 000 s																																																		
Pulse rise time at U_R	18 to 110 V/μs at $U_R = 63 V$ 7 to 110 V/μs at $U_R = 100 V$ 10 to 70 V/μs at $U_R = 250 V$ 16 to 110 V/μs at $U_R = 400 V$ 24 to 70 V/μs at $U_R = 630 V$																																																						
Note	For ordering of non-preferred types see our Film Capacitor data handbook BC05, 1999 edition																																																						

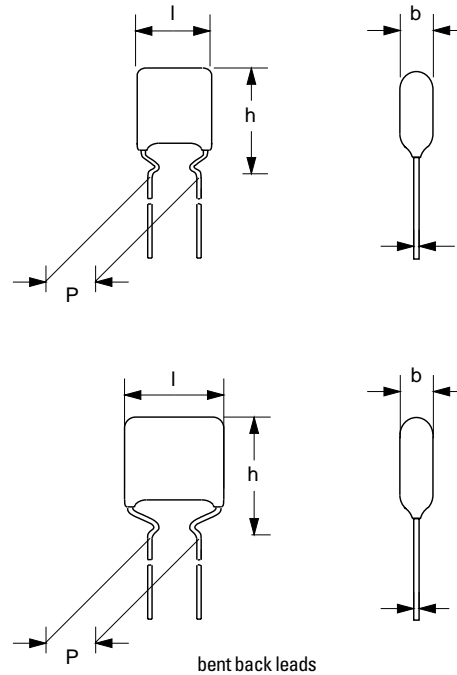
in columns: pitch size (mm)

Ordering information Preferred types

MKT 365 series, kinked leads, ammpack

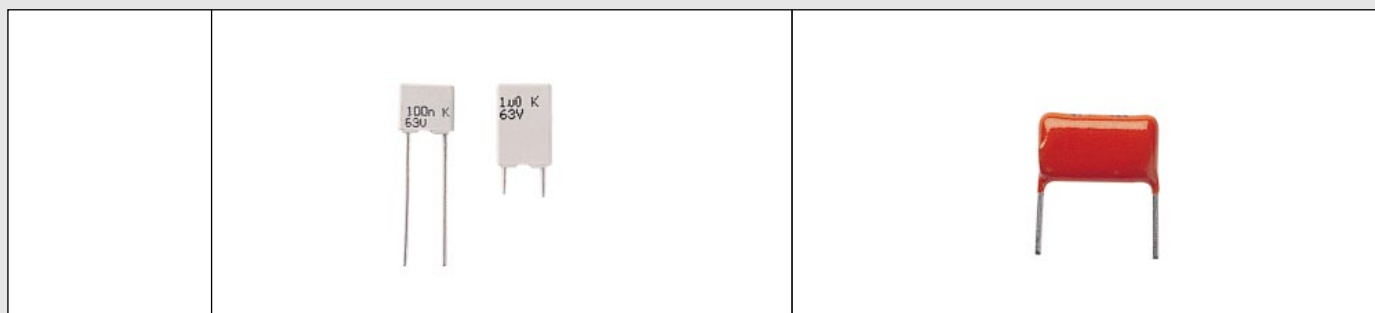
C (μF)	dimensions b x h x l (mm)	catalogue number 2222 365		smallest packing quantity
		±10%	±5%	
U_{RD}C = 63 V, pitch 5 mm				
0.047	4 x 12.5 x 7.3	75473	76473	1500
0.068	4 x 12.5 x 7.3	75683	76683	1500
0.1	3.7 x 12.5 x 7.3	75104	76104	1500
0.15	4 x 13.0 x 7.3	75154	76154	1500
	4.0 x 13.5 x 10.0	15154*	16154*	1500
0.22	4.2 x 13.5 x 7.3	75224	76224	1000
	4.0 x 13.5 x 10.0	15224*	16224*	1500
0.33	4.5 x 14.5 x 7.3	75334	76334	1000
	5.0 x 14.5 x 10.0	15334*	16334*	1000
0.47	4.5 x 15.5 x 7.3	75474	76474	1000
	5.5 x 15.0 x 10.0	15474*	16474*	1000
0.68	5.5 x 14.5 x 7.3	75684	76684	1000
	5.5 x 15.0 x 10.0	15684*	16684*	1000
1.0	5.5 x 15.5 x 7.3	75105	76105	1000
	5.5 x 15.0 x 10.0	15105*	16105*	1000
U_{RD}C = 100 V, pitch 5 mm				
0.01	3.7 x 12.5 x 7.3	85103	86103	1500
0.015	3.7 x 12.5 x 7.3	85153	86153	1500
0.022	3.7 x 12.5 x 7.3	85223	86223	1500
0.033	3.7 x 12.5 x 7.3	85333	86333	1500
0.047	4.0 x 12.5 x 7.3	85473	86473	1500
	4.0 x 13.5 x 10.0	25473*	26473*	1500
0.068	4.0 x 12.5 x 7.3	85683	86683	1500
	4.0 x 13.5 x 10.0	25683*	26683*	1500
0.1	4.0 x 13.5 x 7.3	85104	86104	1000
	4.0 x 13.5 x 10.0	25104*	26104*	1500
0.15	4.0 x 13.5 x 7.3	85154	86154	1000
	5.0 x 14.5 x 10.5	25154*	26154*	1000
0.22	4.2 x 13.5 x 7.3	85224	86224	1000
	5.5 x 15.0 x 10.5	25224*	26224*	1000
0.33	6.0 x 15.5 x 10.5	25334*	26334*	1000
0.47	6.0 x 15.5 x 10.5	25474*	26474*	1000
U_{RD}C = 250 V, pitch 5 mm (bent back leads)				
0.022	4.0 x 13.5 x 10.0	45223	46223	1500
0.033	4.0 x 13.5 x 10.0	45333	46333	1500
0.047	4.0 x 13.5 x 10.0	45473	46473	1500
0.68	4.5 x 13.0 x 10.0	45683	46683	1500
0.1	5.0 x 13.5 x 10.0	45104	46104	1500
0.15	5.5 x 15.5 x 10.0	45154	46154	1500
U_{RD}C = 400 V, pitch 5 mm (bent back leads)				
0.0033	4.0 x 13.5 x 10.0	55332	56332	1500
0.0047	4.0 x 13.5 x 10.0	55472	56472	1500
0.0068	4.0 x 13.5 x 10.0	55682	56682	1500
0.01	4.0 x 13.5 x 10.0	55103	56103	1500
0.015	4.0 x 13.5 x 10.0	55153	56153	1500
0.022	5.0 x 13.5 x 10.0	55223	56223	1500
0.033	4.5 x 13.0 x 10.0	55333	56333	1500
0.047	5.0 x 13.5 x 10.0	55473	56473	1500

* bent back leads to 5 mm pitch



Film Capacitors

General purpose, high temperature



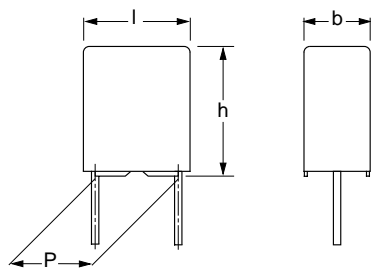
Series	MKT 470				PPS 395
Applications	blocking, coupling, bypass and energy reservoir, filter networks, pulse circuits, automotive				automotive and industrial where operating conditions are severe
Features	low inductance, high temp stability, harsh environments				excellent high-frequency performance, resistance to aggressive chemicals
U_R (V _{DC})	63	100	250	400	63
Size (l × w)					
Capacitance					
150 pF					
220 pF					
330 pF					
470 pF					
680 pF					
1000 pF					
1500 pF					
2200 pF					
3300 pF					
4700 pF					
6800 pF				5.0	
0.01 μF					
0.015 μF					
0.022 μF					
0.033 μF			5.0		
0.047 μF					
0.068 μF					10 mm pitch
0.10 μF		5.0			
0.15 μF					
0.22 μF	5.0				
0.33 μF					
0.47 μF					
0.68 μF					
1.0 μF					
1.5 μF					
2.2 μF					
3.3 μF					
4.7 μF					
	preferred E6				
Tolerance / E-series	5%, 10% / E12				10%, 20% / E6
Dielectric	metallized polyester				metallized PPS
Climatic category	55 / 125 / 56				55 / 125 / 56
Tan δ (10 kHz)	≤ 120 × 10 ⁻⁴				≤ 25 × 10 ⁻⁴
Insulation- R: C≤330 nF resist. R×C: C>330 nF	> 15 000 MΩ				> 10 000 MΩ
	> 5000 s				> 3 000 s
Pulse rise time at U _R	100 to 800 V/μs				200 V/μs
Reference specification	IEC 384-2				CECC WG3 (Germany)10
Packing	loose, reel, ammpack				loose, reel
Lead length	-				5 mm, 40 mm
Note					Rated temp. at 63 V : 125 °C at 50 V : 140 °C

in columns: pitch size (mm)

Ordering information Preferred types



MKT 470, ammopack

C (μF)	dimensions b x h x l (mm)	catalogue number 2222 470		smallest packing quantity
		±10%	±5%	
U_{RDC} = 63 V, pitch 5.0 mm				
0.068	2.5 x 6.5 x 7.2	75683	76683	2000
0.1	2.5 x 6.5 x 7.2	75104	76104	2000
0.15	3.5 x 8.0 x 7.2	75154	76154	1500
0.22	3.5 x 8.0 x 7.2	75224	76224	1500
0.33	3.5 x 8.0 x 7.2	75334	76334	1500
0.47	4.5 x 9.5 x 7.2	75474	76474	1000
0.68	4.5 x 9.5 x 7.2	75684	76684	1000
1.0	6.0 x 11.0 x 7.2	75105	76105	750
U_{RDC} = 100 V, pitch 5.0 mm				
0.022	2.5 x 6.5 x 7.2	85223	86223	2000
0.033	2.5 x 6.5 x 7.2	85333	86333	2000
0.047	2.5 x 6.5 x 7.2	85473	86473	2000
0.068	3.5 x 8.0 x 7.2	85683	86683	1500
0.1	3.5 x 8.0 x 7.2	85104	86104	1500
0.15	4.5 x 9.5 x 7.2	85154	86154	1000
0.22	4.5 x 9.5 x 7.2	85224	86224	1000
0.33	6.0 x 11.0 x 7.2	85334	86334	750
0.47	6.0 x 11.0 x 7.2	85474	86474	750
U_{RDC} = 250 V, pitch 5.0 mm				
0.01	2.5 x 6.5 x 7.2	35103	36103	2000
0.015	2.5 x 6.5 x 7.2	35153	36153	2000
0.022	3.5 x 8.0 x 7.2	35223	36223	1500
0.033	3.5 x 8.0 x 7.2	35333	36333	1500
0.047	4.5 x 9.5 x 7.2	35473	36473	1000
0.068	4.5 x 9.5 x 7.2	35683	36683	1000
0.1	6.0 x 11.0 x 7.2	35104	36104	750
U_{RDC} = 400 V, pitch 5.0 mm				
0.001	2.5 x 6.5 x 7.2	65102	66102	2000
0.0015	2.5 x 6.5 x 7.2	65152	66152	2000
0.0022	2.5 x 6.5 x 7.2	65222	66222	2000
0.0033	2.5 x 6.5 x 7.2	65332	66332	2000
0.0047	2.5 x 6.5 x 7.2	65472	66372	2000
0.0068	2.5 x 6.5 x 7.2	65682	66682	2000
0.01	3.5 x 8.0 x 7.2	65103	66103	1500
0.015	3.5 x 8.0 x 7.2	65153	66153	1500
0.022	4.5 x 9.5 x 7.2	65223	66223	1000
0.033	6.0 x 11.0 x 7.2	65333	66333	750
0.047	6.0 x 11.0 x 7.2	65473	66473	750





Film Capacitors

General purpose, specials

								
Series	KT 347				MKC 344			
Applications	consumer and industrial, where high currents and/or steep pulses occur				blocking and coupling, bypass and energy reservoir			
Capacitance	$U_R (V_{DC})$							
	100	250	400	630	100	250	400	630
47 pF								
68 pF								
100 pF								
150 pF								
220 pF								
330 pF	in columns: pitch size (mm)							
470 pF								
680 pF								
1000 pF				10.16				
1500 pF				10.16				
2200 pF				10.16				
3300 pF				10.16				
4700 pF			10.16	10.16				
6800 pF			10.16	10.16				
0.01 µF		10.16	10.16	15.24			10	10
0.015 µF	10.16	10.16	10.16	15.24			10	10
0.022 µF	10.16	10.16	15.24	15.24			10	10
0.033 µF	10.16	15.24	15.24	22.86			10	15
0.047 µF	10.16	15.24	15.24	22.86		10	15	15
0.068 µF	15.24	15.24	22.86	22.86		10	15	15
0.10 µF	15.24	22.86	22.86	27.94	10	15	15	22.5
0.15 µF	15.24	22.86	22.86	27.94	10	15	15	22.5
0.22 µF	22.86	22.86	27.94		10	15	22.5	22.5
0.33 µF	22.86	27.94	27.94		15	15	22.5	27.5
0.47 µF	22.86	27.94			15	22.5	22.5	27.5
0.68 µF	27.94	27.94			15	22.5	27.5	
1.0 µF	27.94				15	22.5	27.5	
1.5 µF					22.5	27.5		
2.2 µF					22.5	27.5		
3.3 µF					22.5			
4.7 µF					27.5			
6.8 µF					27.5			
	preferred E6							
Tolerance / E-series	10%, 20% / E12				5%, 10%, / E12			
Preferred tol. / E-series								
Dielectric	polyester				metall. polycarbonate			
Encapsulation	dipped				boxed with epoxy resin			
Climatic category	40 / 100 / 21				55 / 100 / 56			
Tan δ (10 kHz)	$\leq 110 \times 10^{-4}$				≤ 60 to 75×10^{-4}			
Insulation- R : C \leq 330 nF resist.	$> 50\ 000\ M\Omega$				$> 15\ 000\ M\Omega$ to $30\ 000\ M\Omega$			
R x C: C $>$ 330 nF	$> 16\ 500\ s$				$> 5\ 000\ s$ to $10\ 000\ s$			
Pulse rise time at U_R	10 000 V/ μ s				9 to 200 V/ μ s			
Reference specification	IEC 384 - 11				IEC 384 - 6			
Packing	loose				loose, reel			
Lead length	4 mm				5 mm			
Note	information for ordering see data handbook BC05, 1999 edition							

Starter capacitors



		
Series	KT 90028	KT 90032/33 KT 90036
Applications	fluorescent lamp starter capacitor	fluorescent lamp starter capacitor
Capacitance	$U_R (V_{DC})$	
	250	
0.0012 µF		7.5
0.0030 µF		7.5
0.0056 µF	11.5	
	in columns: pitch size in mm	
	preferred	
Tolerance	5 to 7 nF	20%
Dielectric	polyester	
Encapsulation	non	epoxy dipped
Temp. range	- 40 °C to + 100 °C	- 40 °C to + 125 °C
Reference specification	IEC 384 - 11 (KT)	IEC 384 - 11
Packing	loose	loose

Ordering information Preferred types

Starter capacitors

Series	C (µF)	dimensions b x h x l (mm)	catalogue number 2222 311	packing/ quantity
KT 90028	0.0056	3.6 x 9.0 x 14.2	90028	loose/5000
KT 90032	0.0030	4.2 x 10.0 x 10.0	90032	loose/5000
KT 90033	0.0012	4.2 x 10.0 x 10.0	90033	loose/5000
KT 90036	0.0030	4.2 x 10.0 x 10.0	90036	loose/5000



Series	MKP 416/420					KP 460/464				
Applications	tuned circuits, filter networks, timing networks					tuned circuits, filter networks, timing networks				
U_R (V _{DC})	63	100	250	400	630	63	160	250	400	630
Capacitance										
47 pF										
68 pF										
100 pF										
150 pF										
220 pF										
330 pF										
470 pF										
680 pF										
1000 pF										
1500 pF										
2200 pF										
3300 pF					5					
4700 pF		5		5						
6800 pF										
0.01 μF										
0.015 μF		10								
0.022 μF			5		10					
0.033 μF										
0.047 μF				10						
0.068 μF	5		10							
0.10 μF										
0.15 μF	10									
0.22 μF										
0.33 μF										
0.47 μF										
0.68 μF										
1.0 μF										
1.5 μF										
2.2 μF										
3.3 μF										
4.7 μF										
6.8 μF										
	preferred					preferred				
Tolerance / E-series	2%, 5%/E96					1%, 2%, 5%/E96				
Preferred tol. / E-series	2%/E24					2%/E12, 1%/E24				
Dielectric	metallized polypropylene					polypropylene				
Encapsulation	boxed with epoxy resin					epoxy dipped				
Climatic category	55 / 085 / 56					40 / 100 / 56				
Tan δ (10 kHz)	≤ 10 to 10 ⁻⁴					≤ 10 to 40 x 10 ⁻⁴				
Insulation-resist. R : C≤330 nF	> 100 000 MΩ					> 100 000 MΩ				
R x C: C>330 nF	-					-				
Pulse rise time at U _R	20 to 50 V/μs					10 000 V/μs				
Reference specification	IEC 60384 - 16					IEC 384 - 13				
Packing	loose, ammopack					loose, reel				
Lead length	4 mm									
Note	for ordering information see page 46					for ordering information see data handbook BC05, 1999 edition				

Film Capacitors

Precision



Ordering information Preferred types

MKP 416/420 ammopack

C (nF)	dimensions b x h x l (mm)	catalogue number 2%	smallest packing quantity
U_{RDC} = 63 V pitch 5 mm			
39	4,5 x 9 x 7,2	2222 416 13903	1000
47	4,5 x 9 x 7,2	2222 416 14703	1000
56	6 x 11 x 7,2	2222 416 15603	750
68	6 x 11 x 7,2	2222 416 16803	750
82	6 x 11 x 7,2	2222 416 18203	750
100	6 x 11 x 7,2	2222 416 11004	750
120	6 x 11 x 7,2	2222 416 11204	750
U_{RDC} = 63 V pitch 10 mm			
150	5 x 11 x 12,5	2222 416 11504	600
180	6 x 12 x 12,5	2222 416 11804	500
20	6 x 12 x 12,5	2222 416 12204	500
270	6 x 12 x 12,5	2222 416 12704	500
U_{RDC} = 160 V pitch 5 mm			
27	4,5 x 9 x 7,2	2222 417 12703	1000
33	4,5 x 9 x 7,2	2222 417 13303	1000
39	6 x 11 x 7,2	2222 417 13903	750
47	6 x 11 x 7,2	2222 417 14703	750
56	6 x 11 x 7,2	2222 417 15603	750
68	6 x 11 x 7,2	2222 417 16803	750
U_{RDC} = 160 V pitch 10 mm			
82	4 x 10 x 12,5	2222 417 18203	750
100	4 x 10 x 12,5	2222 417 11004	750
120	5 x 11 x 12,5	2222 417 11204	600
150	5 x 11 x 12,5	2222 417 11504	600
180	6 x 12 x 12,5	2222 417 11804	500
220	6 x 12 x 12,5	2222 417 12204	500
U_{RDC} = 250 V pitch 5 mm			
10	3,5 x 8 x 7,2	2222 418 11003	1500
12	3,5 x 8 x 7,2	2222 418 11203	1500
15	3,5 x 8 x 7,2	2222 418 11503	1500
18	4,5 x 9 x 7,2	2222 418 11803	1000
22	4,5 x 9 x 7,2	2222 418 12203	1000
27	6 x 11 x 7,2	2222 418 12703	750
33	6 x 11 x 7,2	2222 418 13303	750
39	6 x 11 x 7,2	2222 418 13903	750
U_{RDC} = 250 V pitch 10 mm			
47	4 x 10 x 12,5	2222 418 14703	750
56	4 x 10 x 12,5	2222 418 15603	750
68	4 x 10 x 12,5	2222 418 16803	750
82	5 x 11 x 12,5	2222 418 18203	600
100	6 x 12 x 12,5	2222 418 11004	500
120	6 x 12 x 12,5	2222 418 11204	500

MKP 416/420 ammopack

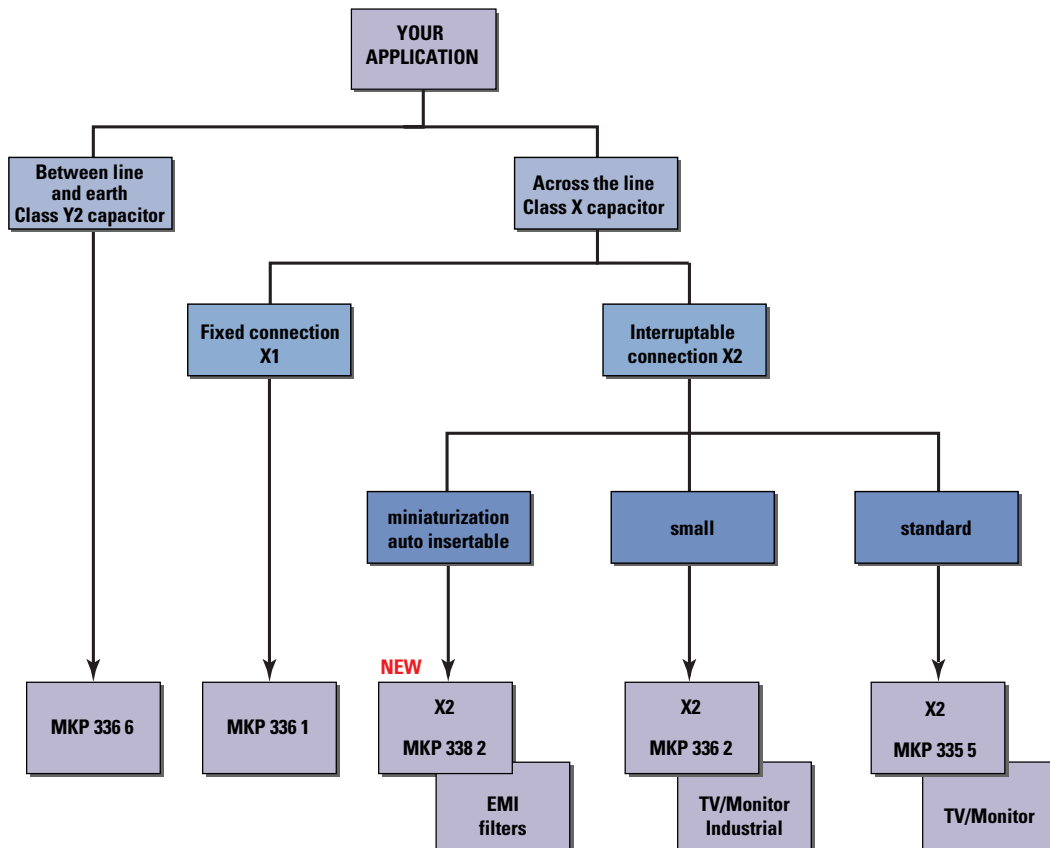
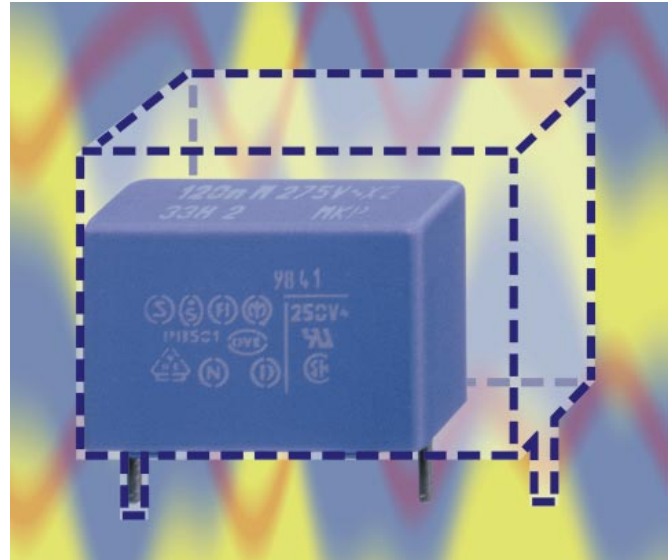
C (nF)	dimensions b x h x l (mm)	catalogue number 2%	smallest packing quantity
U_{RDC} = 400 V pitch 5 mm			
1.5	3,5 x 8 x 7,2	2222 419 11502	1500
1.8	3,5 x 8 x 7,2	2222 419 11802	1500
2.2	3,5 x 8 x 7,2	2222 419 12202	1500
2.7	3,5 x 8 x 7,2	2222 419 12702	1500
3.3	3,5 x 8 x 7,2	2222 419 13302	1500
3.9	3,5 x 8 x 7,2	2222 419 13902	1500
4.7	4,5 x 9 x 7,2	2222 419 14702	1000
5.6	4,5 x 9 x 7,2	2222 419 15602	1000
6.8	4,5 x 9 x 7,2	2222 419 16802	1000
8.2	4,5 x 9 x 7,2	2222 419 18202	1000
10	4,5 x 9 x 7,2	2222 419 11003	1000
12	4,5 x 9 x 7,2	2222 419 11203	1000
15	6 x 11 x 7,2	2222 419 11503	750
18	6 x 11 x 7,2	2222 419 11803	750
U_{RDC} = 400 V pitch 10 mm			
22	4 x 10 x 12,5	2222 419 12203	750
27	4 x 10 x 12,5	2222 419 12703	750
33	4 x 10 x 12,5	2222 419 13303	750
39	5 x 11 x 12,5	2222 419 13903	600
47	6 x 12 x 12,5	2222 419 14703	500
56	6 x 12 x 12,5	2222 419 15603	500
68	6 x 12 x 12,5	2222 419 16803	500
U_{RDC} = 630 V pitch 5 mm			
1.5	3,5 x 8 x 7,2	2222 420 11502	1500
1.8	3,5 x 8 x 7,2	2222 420 11802	1500
2.2	3,5 x 8 x 7,2	2222 420 12202	1500
2.7	3,5 x 8 x 7,2	2222 420 12702	1500
3.3	4,5 x 9 x 7,2	2222 420 13302	1000
3.9	4,5 x 9 x 7,2	2222 420 13902	1000
4.7	6 x 11 x 7,2	2222 420 14702	750
5.6	6 x 11 x 7,2	2222 420 15602	750
6.8	6 x 11 x 7,2	2222 420 16802	750
8.2	6 x 11 x 7,2	2222 420 18202	750
U_{RDC} = 630 V pitch 10 mm			
10	4 x 10 x 12,5	2222 420 11003	750
12	4 x 10 x 12,5	2222 420 11203	750
15	4 x 10 x 12,5	2222 420 11503	750
18	5 x 11 x 12,5	2222 420 11803	600
22	5 x 11 x 12,5	2222 420 12203	600
27	6 x 12 x 12,5	2222 420 12703	500
33	6 x 12 x 12,5	2222 420 13303	500
39	6 x 12 x 12,5	2222 420 13903	500
47	6 x 12 x 12,5	2222 420 14703	500

BC Components, the safe choice

To help equipment manufacturers comply with the latest international requirements on interference suppression and immunity, BC Components' range of interference suppression film capacitors meets important international approvals including the new IEC 384-14 (2nd edition) requirements. Several series meet even more stringent approvals such as UL1414 and CSA 22.2 no.1.

The range comprises:

- The new mini MKP 338 metallized polypropylene series (105°C, 275 V_{AC})
- The small MKP 336 metallized polypropylene series (100°C, 275 V_{AC})
- The standard size MKP 335 5 metallized polypropylene series (100°C, 275 V_{AC})



Film Capacitors

Interference Suppression Y2, X1



Series	MKP 336 6		MKP 336 1	
Applications	Class Y2		Class X1	
Rated Voltage U_R	250 V _{AC}		275 V _{AC}	
Safety approvals				
	Tested and approved according to IEC 384-14 (2nd edition) and EN 132400		Tested and approved according to IEC 384-14 (2nd edition) and EN 132400	
Capacitance				
0.001 μF	10		10	
0.0015 μF	10		10	
0.0022 μF	10		10	
0.0033 μF	10		10	
0.0047 μF	10		10	
0.0068 μF	10	15	10	
0.010 μF		15	10	15
0.015 μF		15		15
0.022 μF		15		15
0.033 μF		15		15
0.047 μF		15		15
0.068 μF				15
0.10 μF				15
0.15 μF				15
0.22 μF				22.5
0.33 μF				22.5
0.47 μF				27.5
0.68 μF				27.5
1.0 μF				27.5
1.5 μF				
2.2 μF				
3.3 μF				
	 preferred			
Tolerance ¹⁾ / E-series ²⁾	10%, 20% / E6		10%, 20% / E6	
Dielectric	metallized polypropylene		metallized polypropylene	
Climatic category	55 / 100 / 21/ B		55 / 100 / 21/ B	
Tan δ (10 kHz)	≤ 10 × 10 ⁻⁴		≤ 70 × 10 ⁻⁴	
Insulation- R: C≤330 nF resist. R × C: C>330 nF	> 15 000 MΩ		> 15 000 MΩ	
Pulse rise time at U_R	200 V/μs		200 V/μs	
Reference specification	IEC 384-14 2nd edition, EN 132400			
Packing	loose, taped on reel (ammopack available on request)			
Lead length	3.5 mm, 25 mm (lead lengths between 3.2 and 35 mm are available on request)			
Note	¹⁾ 5% tolerance available on request ²⁾ E12 capacitance values available on request			

Y2

in columns : pitch size (mm)

X1

Ordering information Preferred types

MKP 336 6 series, Class Y2, 250 V_{AC}, 20% tolerance

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 336
0.001	10.0	4.0 x 10.0 x 12.5	60102
0.0015	10.0	4.0 x 10.0 x 12.5	60152
0.0022	10.0	4.0 x 10.0 x 12.5	60222
0.0033	10.0	5.0 x 11.0 x 12.5	60332
0.0047	10.0	6.0 x 12.0 x 12.5	60472
0.0068	10.0	6.0 x 12.0 x 12.5	60682
0.01	15.0	5.0 x 11.0 x 17.5	60103
0.015	15.0	6.0 x 12.0 x 17.5	60153
0.022	15.0	7.0 x 13.5 x 17.5	60223
0.033	15.0	8.5 x 15.0 x 17.5	60333
0.047	15.0	10.0 x 16.5 x 17.5	60473

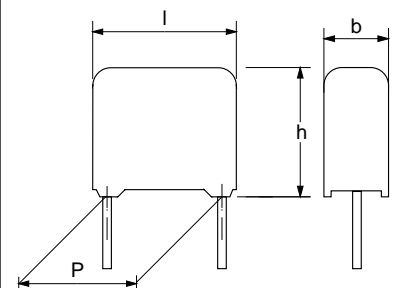
MKP 336 1 series, Class X1, 275 V_{AC}, 20% tolerance

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 336
0.001	10.0	4.0 x 10.0 x 12.5	10102
0.0015	10.0	4.0 x 10.0 x 12.5	10152
0.0022	10.0	4.0 x 10.0 x 12.5	10222
0.0033	10.0	5.0 x 11.0 x 12.5	10332
0.0047	10.0	5.0 x 11.0 x 12.5	10472
0.0068	10.0	5.0 x 11.0 x 12.5	10682
0.01	10.0	6.0 x 12.0 x 12.5	10103
0.015	15.0	5.0 x 11.0 x 17.5	10153
0.022	15.0	5.0 x 11.0 x 17.5	10223
0.033	15.0	6.0 x 12.0 x 17.5	10333
0.047	15.0	7.0 x 13.5 x 17.5	10473
0.068	15.0	8.5 x 15.0 x 17.5	10683
0.1	15.0	10.0 x 16.5 x 17.5	10104
0.15	22.5	8.5 x 18.0 x 26.0	10154
0.22	22.5	10.0 x 19.5 x 26.0	10224
0.33	27.5	13.0 x 23.0 x 31.0	10334
0.47	27.5	15.0 x 25.0 x 31.0	10474
0.68	27.5	18.0 x 28.0 x 31.0	10684
1.0	27.5	21.0 x 31.0 x 31.0	10105

Overview of safety approvals

	Safety approvals												
	V _{AC}	Class	UL1414 250 V _{AC}	UL1283 275 V _{AC}	CSA-C22-2 M08-M90 250 V _{AC}	IEC 384-14 2d/EN132400 275 V _{AC}							
						SEV (S)	VDF (VDE)	Fi (FI)	N (N)	D (D)	S (S)	öve (öve)	IMQ (IMQ)
MKP 336 6	250	Y2	•	•	•	•	•					•	
MKP 336 1	275	X1	•	•	•	•	•	•	•	•	•	•	•
MKP 338 2	275	X2	•	Pending	•	•	•	•	•	•	•	•	•
MKP 336 2	275	X2	•	•	•	•	•	•	•	•	•	•	•
MKP 335 5	275	X2	•		•	•	•	•	•	•	•	•	•

Component outline



Film Capacitors

Interference Suppression X2

	NEW				small				standard				
Series	MKP 338 2				MKP 336 2				MKP 335 5				
Applications	Class X2				Class X2				Class X2				
Rated Voltage U_R	275 V _{AC}				275 V _{AC}				275 V _{AC}				
Safety approvals													
	Tested and approved according to IEC 384-14 (2nd edition) and EN 132400				Tested and approved according to IEC 384-14 (2nd edition) and EN 132400				Tested and approved according to IEC 384-14 (2nd edition) and EN 132400				
Capacitance													
0.001 μF	7.5				10								
0.0015 μF	7.5				10								
0.0022 μF	7.5				10								
0.0033 μF	7.5				10								
0.0047 μF	7.5				10								
0.0068 μF	7.5				10								
0.010 μF	7.5				10	15			15				
0.015 μF	7.5				10	15			15				
0.022 μF	7.5				10	15			15				
0.033 μF	7.5				10	15			15				
0.047 μF	7.5					15			15				
0.068 μF		10				15			15				
0.10 μF		10				15			15				
0.15 μF			15			15	22.5		15				
0.22 μF			15			15	22.5				22.5		
0.33 μF			15				22.5				22.5		
0.47 μF				22.5			22.5	27.5			22.5		
0.68 μF				22.5				27.5				27.5	
1.0 μF				22.5				27.5				27.5	
1.5 μF					27.5			27.5				27.5	
2.2 μF					27.5			27.5				27.5	
3.3 μF		preferred			27.5			27.5				27.5	
Tolerance / E-series¹⁾					10%, 20% / E6				10%, 20% / E6				
Dielectric	10%, 20% / E6 metallized polypropylene				metallized polypropylene				metallized polypropylene				
Climatic category	55 / 105 / 56/ B				55 / 100 / 21/ B				55 / 100 / 56 / B				
Tan δ (10 kHz)	$\leq 10 \times 10^{-4}$				$\leq 70 \times 10^{-4}$				$\leq 70 \times 10^{-4}$				
Insulation- R: C\leq330 nF resist. R x C: C$>$330 nF	$> 15\,000\,M\Omega$ $> 5000\,s$				$> 15\,000\,M\Omega$ $> 5000\,s$				$> 30\,000\,M\Omega$ $> 10\,000\,s$				
Pulse rise time at U_R	100 V/ μ s				100 V/ μ s				100 V/ μ s				
Reference specification	IEC 384-14 2nd edition, EN 132400				IEC 384-14 2nd edition, EN 132400				IEC 384-14 2nd edition, EN 132400				
Packing	loose, taped on ammpack or reel				loose, taped on reel (ammpack available on request)				loose, taped on reel (ammpack available on request)				
Lead length	3.5 mm, 5 mm, 25 mm standard available				3.5, 25 mm				3.5, 25 mm				
Note	¹⁾ 5% tolerance available on request ²⁾ E12 capacitance values available on request												

Ordering information Preferred types

MKP 338 2 series, Class X2, 275 V_{AC}, 20% tolerance

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 338
0.001	7.5	4.0 x 9.0 x 10.0	20102
0.0015	7.5	4.0 x 9.0 x 10.0	20152
0.0022	7.5	4.0 x 9.0 x 10.0	20222
0.0033	7.5	4.0 x 9.0 x 10.0	20332
0.0047	7.5	4.0 x 9.0 x 10.0	20472
0.0068	7.5	4.0 x 9.0 x 10.0	20682
0.01	7.5	4.0 x 9.0 x 10.0	20103
0.015	7.5	4.0 x 9.0 x 10.0	20153
0.022	7.5	4.0 x 9.0 x 10.0	20223
0.033	7.5	5.0 x 10.5 x 10.0	20333
0.047	7.5	6.0 x 11.5 x 10.0	20473
0.068	10.0	6.0 x 14.0 x 12.5	20683
0.1	10.0	6.0 x 14.0 x 12.5	20104
0.15	15.0	7.0 x 13.5 x 17.5	20154
0.22	15.0	8.5 x 15.0 x 17.5	20224
0.33	15.0	10.0 x 16.5 x 17.5	20334
0.47	22.5	8.5 x 18.0 x 2.0	20474
0.68	22.5	10.0 x 19.5 x 26.0	20684
1.0	22.5	12.0 x 22.0 x 26.0	20105
1.5	27.5	15.0 x 25.0 x 31.0	20155
2.2	27.5	18.0 x 28.0 x 31.0	20225
3.3	27.5	21.0 x 31.0 x 31.0	20335

MKP 336 2 series, Class X2, 275 V_{AC}, 20% tolerance

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 336
0.001	10.0	4.0 x 10.0 x 12.5	20102
0.0015	10.0	4.0 x 10.0 x 12.5	20152
0.0022	10.0	4.0 x 10.0 x 12.5	20222
0.0033	10.0	5.0 x 11.0 x 12.5	20332
0.0047	10.0	5.0 x 11.0 x 12.5	20472
0.0068	10.0	5.0 x 11.0 x 12.5	20682
0.01	10.0	5.0 x 11.0 x 12.5	20103
0.015	10.0	5.0 x 11.0 x 12.5	20153
0.022	10.0	5.0 x 11.0 x 12.5	20223
0.033	10.0	6.0 x 12.0 x 12.5	20333
0.047	15.0	5.0 x 11.0 x 17.5	20473
0.068	15.0	5.0 x 11.0 x 17.5	20683
0.1	15.0	6.0 x 12.0 x 17.5	20104
0.15	15.0	8.5 x 15.0 x 17.5	20154
0.22	15.0	10.0 x 16.5 x 17.5	20224
0.33	22.5	8.5 x 18.0 x 26.0	20334
0.47	22.5	10.0 x 19.5 x 26.0	20474
0.68	27.5	11.0 x 21.0 x 31.0	20684
1.0	27.5	13.0 x 23.0 x 31.0	20105
1.5	27.5	18.0 x 28.0 x 31.0	20155
2.2	27.5	21.0 x 31.0 x 31.0	20225

MKP 335 5 series, Class X2, 275 V_{AC}, 20% tolerance

C (μF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 335
0.01	15.0	5.0 x 11.0 x 17.5	50103
0.015	15.0	5.0 x 11.0 x 17.5	50153
0.022	15.0	5.0 x 11.0 x 17.5	50223
0.033	15.0	5.0 x 11.0 x 17.5	50333
0.047	15.0	6.0 x 12.0 x 17.5	50473
0.068	15.0	7.0 x 13.5 x 17.5	50683
0.1	15.0	8.5 x 15.0 x 17.5	50104
0.15	15.0	10.0 x 16.5 x 17.5	50154
0.22	22.5	8.5 x 18.0 x 26.0	50124
0.33	22.5	10.0 x 19.5 x 26.0	50334
0.47	22.5	12.0 x 22.0 x 26.0	50474
0.68	27.5	15.0 x 25.0 x 31.0	50684
1.0	27.5	18.0 x 28.0 x 31.0	50105
1.5	27.5	21.0 x 31.0 x 31.0	50155

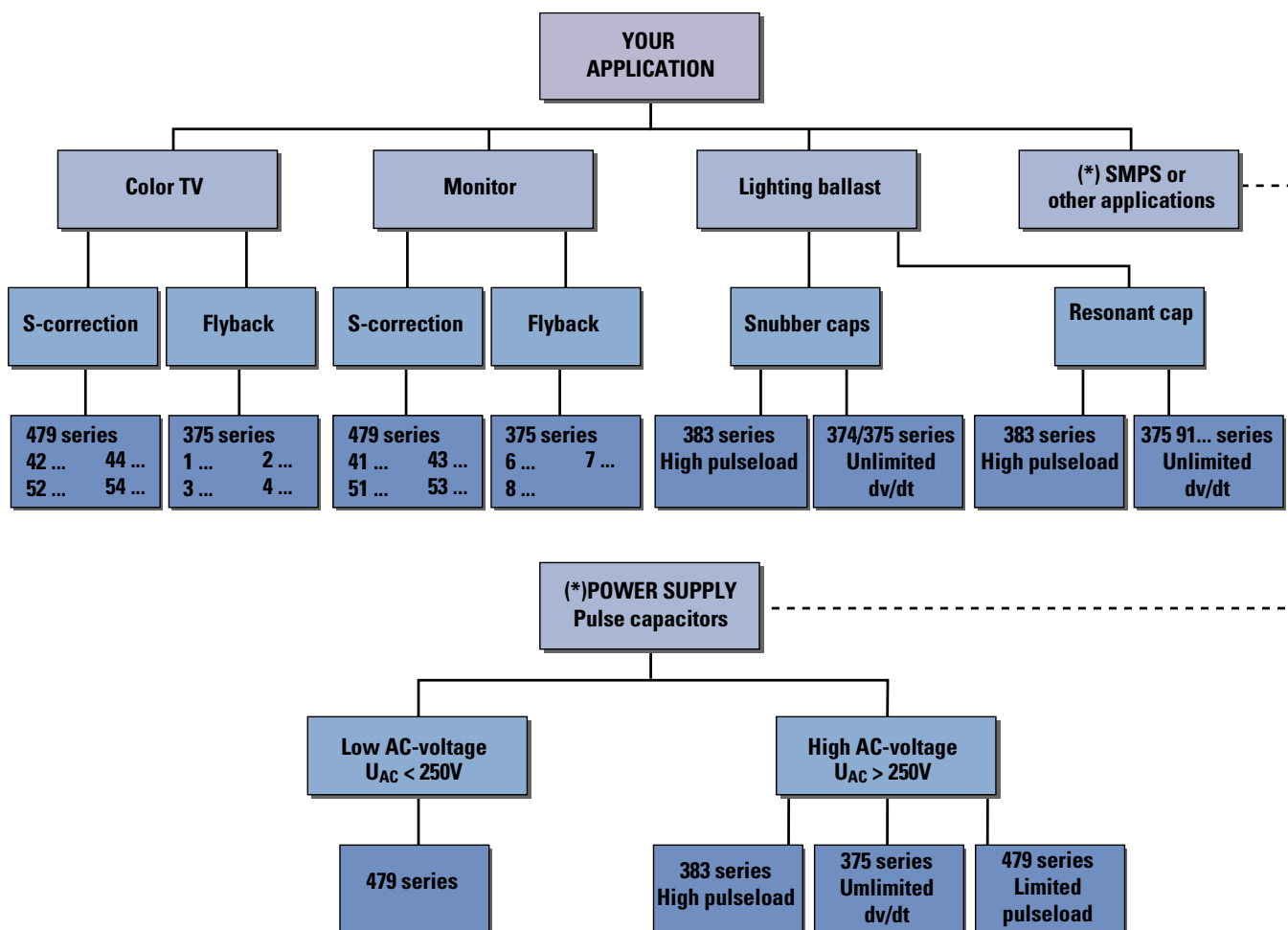
Power applications

BC Components' specialist experience in AC & Pulse capacitors for electronic ballast and TV/Monitor power control means that we can provide a unique service to manufacturers of power supplies and motor-control circuits. Not only do we offer an extensive standard range of polypropylene film capacitors tailored specifically to power applications, we also provide custom-designed products for manufacturers with special requirements.

The range comprises products offering:

- High pulse-load capability
- Low dissipation factor at high frequencies
- Small dimensions
- High voltage

How to select



Film Capacitors

AC & Pulse



Series	KP/MKP 375					KP 374
Features	high energy & repetition rate, dipped					
U_R (V _{DC})	630	1000	1600	2000	2500	630
U_R (V _{AC})	300	400	500	600 ⁴⁾	880	200
Capacitance						
0.10 nF						
0.12 nF						
0.15 nF						
0.18 nF						
0.22 nF						
0.27 nF						
0.33 nF						
0.39 nF		10				
0.47 nF				15 ²⁾		
0.56 nF						
0.68 nF						7.5 ³⁾
0.82 nF						
1 nF						
1.2 nF	10					
1.5 nF			15 ²⁾			
1.8 nF						
2.2 nF						10 ³⁾
2.7 nF						
3.3 nF		15 ²⁾				
3.9 nF					22.5 ¹⁾	
4.7 nF						
5.6 nF				22.5		
6.8 nF						
8.2 nF			22.5			
10 nF	15 ²⁾					
12 nF						
15 nF				27.5		
18 nF						
22 nF						
27 nF		22.5	27.5			
33 nF						
39 nF						
47 nF						
56 nF	22.5	27.5				
68 nF						
82 nF						
100 nF						
120 nF						
150 nF						
180 nF						
220 nF	27.5					
270 nF						
330 nF						
390 nF						
470 nF						
		preferred, E12				
Tolerance / E-series			3.5%, 5% / E24			5%, 10% / E12
Dielectric			polypropylene			polypropylene
Encapsulation			dipped			dipped
Climatic category			55 / 100 / 56			55 / 100 / 56
Tan δ (10 kHz)			$\leq 6 \times 10^{-4}$			$\leq 5 \times 10^{-4}$
Insulation- R : C \leq 1 μ F resist. R \times C : C $>$ 1 μ F			$> 100\,000\ M\Omega$			$> 100\,000\ M\Omega$
Pulse slope at U_R			$> 10\,000\ V/\mu s$			$> 10\,000\ V/\mu s$
Reference specification			IEC 384 - 17			IEC 384 - 13
Packing			loose			loose
Lead length			3.5, 5 mm			3.5 mm
Note	¹⁾ 27.5 mm pitch size available on request ²⁾ bent back leads to 7.5 mm pitch size available on request ³⁾ bent back leads to 5 mm pitch size available on request ⁴⁾ 700 V _{AC} for special flyback applications available on request (cat. nr. 2222 375 92...)					

Ordering information Preferred types (E6 series published only)

KP/MKP 375 series

C (nF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 375	smallest packing quantity
U_{RDC} = 630 V / U_{RAC} = 300 V				
0.68	10	5.0 x 13.0 x 14.5	14681	2000
1.0	10	5.5 x 13.5 x 14.5	14102	2000
1.5	10	5.5 x 13.5 x 14.5	14152	2000
2.2	10	6.0 x 14.0 x 14.5	14222	2000
3.3	15.0	5.0 x 14.0 x 18.5	14332	2000
4.7	15.0	5.5 x 14.5 x 18.5	14472	2000
6.8	15.0	6.0 x 15.0 x 18.5	14682	2000
10	15.0	6.0 x 15.0 x 18.5	14103	2000
15	15.0	6.0 x 15.0 x 18.5	14153	2000
22	15.0	7.0 x 16.0 x 18.5	14223	1500
33	15.0	8.5 x 17.5 x 18.5	14333	1000
47	22.5	7.0 x 20.0 x 26.0	14473	650
68	22.5	7.5 x 20.5 x 26.0	14683	600
100	22.5	9.0 x 22.0 x 26.0	14104	450
150	27.5	10.0 x 23.0 x 30.0	14154	500
220	27.5	12.5 x 25.5 x 30.0	14224	350

U_{RDC} = 1000 V / U_{RAC} = 400 V

0.1	10	5.0 x 13.0 x 14.5	24101	2000
0.15	10	5.5 x 13.5 x 14.5	24151	2000
0.22	10	5.5 x 13.5 x 14.5	24221	2000
0.33	10	5.5 x 13.5 x 14.5	24331	2000
0.47	10	5.5 x 13.5 x 14.5	24471	2000
0.68	10	5.5 x 13.5 x 14.5	24681	2000
1.0	10	6.0 x 14.0 x 14.5	24102	1750
1.5	10	6.0 x 14.0 x 14.5	24152	2000
2.2	15.0	5.5 x 14.5 x 18.5	24222	2000
3.3	15.0	6.0 x 15.0 x 18.5	24332	2000
4.7	15.0	6.0 x 15.0 x 18.5	24472	2000
6.8	15.0	6.0 x 15.0 x 18.5	24682	2000
10	15.0	7.5 x 16.5 x 18.5	24103	1250
15	15.0	9.0 x 18.0 x 18.5	24153	1000
22	22.5	6.5 x 19.5 x 26.0	24223	750
33	22.5	8.0 x 21.0 x 26.0	24333	550
47	27.5	6.0 x 19.0 x 30.0	24473	1000
68	27.5	8.5 x 21.5 x 30.0	24683	550
100	27.5	10.5 x 23.5 x 30.0	24104	450
150	27.5	12.5 x 25.5 x 30.0	24154	350

U_{RDC} = 1600 V / U_{RAC} = 500 V

0.68	15.0	5.5 x 14.5 x 18.5	34681	2000
1	15.0	6.0 x 15.0 x 18.5	34102	2000
1.5	15.0	5.5 x 14.5 x 18.5	34152	2000
2.2	15.0	6.5 x 15.5 x 18.5	34222	1500
3.3	15.0	8.0 x 17.0 x 18.5	34332	1250
4.7	22.5	6.0 x 19.0 x 26.0	34472	800
6.8	22.5	6.5 x 19.5 x 26.0	34682	750
10	22.5	8.0 x 21.0 x 26.0	34103	550
15	22.5	9.5 x 22.5 x 26.0	34153	400
22	27.5	9.5 x 22.5 x 30.0	34223	500
33	27.5	11.5 x 24.5 x 30.0	34333	400

U_{RDC} = 2000 V / U_{RAC} = 600 V

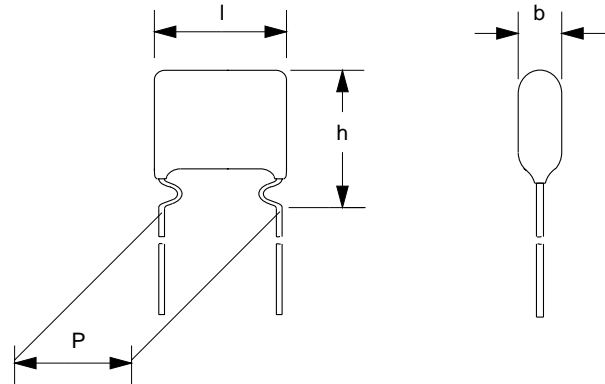
0.1	15.0	5.5 x 14.5 x 18.5	44101	2000
0.15	15.0	5.5 x 14.5 x 18.5	44151	2000
0.22	15.0	5.5 x 14.5 x 18.5	44221	2000
0.33	15.0	5.5 x 14.5 x 18.5	44331	2000
0.47	15.0	5.5 x 14.5 x 18.5	44471	2000
0.68	15.0	6.0 x 15.0 x 18.5	44681	2000
1.0	15.0	6.0 x 15.0 x 18.5	44102	2000
1.5	15.0	7.0 x 16.0 x 18.5	44152	1500
2.2	15.0	8.5 x 17.5 x 18.5	44222	1000
3.3	22.5	6.0 x 19.0 x 26.0	44332	800
4.7	22.5	6.5 x 19.5 x 26.0	44472	750
6.8	22.5	8.0 x 21.0 x 26.0	44682	550
10	22.5	9.5 x 22.5 x 26.0	44103	400
15	27.5	10.5 x 23.5 x 30.0	44153	450
22	27.5	13.0 x 26.0 x 30.0	44223	300

KP/MKP 375 series

C (nF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 375	smallest packing quantity
U_{RDC} = 2500 V / U_{RAC} = 880 V				
1.0	22.5	7.0 x 20.0 x 30.0	91001	800
1.5	22.5	7.0 x 20.0 x 30.0	91021	800
2.2	22.5	8.0 x 21.0 x 30.0	91041	550
3.3	22.5	9.5 x 22.5 x 30.0	91065	500
4.7	22.5	11.5 x 24.5 x 30.0	91085	400
6.8	22.5	14.0 x 27.5 x 30.0	91105	300

KP 374 series

C (nF)	pitch (mm)	dimensions b x h x l (mm)	catalogue number 2222 374	smallest packing quantity
U_{RDC} = 630 V / U_{RAC} = 200 V				
0.82	7.5	5.0 x 13.0 x 11.0	60821	2000
1	7.5	5.0 x 13.0 x 11.0	60102	2000
1.5	10	4.5 x 11.5 x 13.0	60152	2000
2.2	10	5.5 x 12.5 x 13.0	60222	2000
3.3	10	6.0 x 13.0 x 13.0	60332	1750



Film Capacitors

AC & Pulse

					NEW 								NEW 							
Series	MKP/MKP 378				MKP 479				MKP 379				MMKP 383							
Features	high voltage boxed				low voltage dipped				low voltage boxed											
U _R (V _{DC})	630	1000	1600	2000	160	250	400	630	160	250	400	630	250	400	630	1000	1400	1600	2000	2500
U _R (V _{AC})	300	400	500	600	100	160	200	200	100	160	200	250	125	200	220	350	500	550	700	900
Capacitance																				
820 pF																				
1 nF																				
1.2 nF																				
1.5 nF																				
1.8 nF																				
2.2 nF																				
2.7 nF																				
3.3 nF																			15	
3.9 nF		15																		22.5
4.7 nF																				
5.6 nF																	15			
6.8 nF																	15			
8.2 nF																				
10 nF																				
12 nF																				
15 nF											10									
18 nF														10						
22 nF																				
27 nF		15																		
33 nF																				
39 nF																				
47 nF																				
56 nF																				
68 nF																				
82 nF																				
100 nF		22.5	27.5																	
120 nF																				
150 nF																				
180 nF																				
220 nF																				
270 nF																				
330 nF																				
390 nF																				
470 nF																				
560 nF																				
680 nF																				
820 nF																				
1.0 μF																				
1.2 μF																				
1.5 μF																				
1.8 μF																				
2.2 μF																				
2.7 μF																				
3.3 μF																				
3.9 μF																				
4.7 μF																				
5.6 μF																				
	preferred, E12																			
Tolerance / E-series	5% / E24				5% / E24				5% / E24				5% / E24							
Dielectric	metallized polypropylene				metallized polypropylene				metallized polypropylene				double metallized polypropylene							
Encapsulation	boxed				epoxy dipped				boxed				boxed							
Climatic category	55 / 085 / 56				55 / 100 / 56				55 / 085 / 56				55 / 105 / 56							
Tan δ (10 kHz)	≤ 10 × 10 ⁻⁴				≤ 20 × 10 ⁻⁴				≤ 30 × 10 ⁻⁴				≤ 15 × 10 ⁻⁴							
Insulation- R : C ≤ 1 μF	> 100 000 MΩ				> 100 000 MΩ				> 100 000 MΩ				> 100 000 MΩ							
resist. R × C : C > 1 μF	-				> 100 000 s				> 100 000 s				-							
Pulse slope at U _R	120 to 2000 V/μs				15 to 100 V/μs				15 to 100 V/μs				up to 13000 V/μs							
Refer. specification	IEC 384 - 17				IEC 384 - 17				IEC 384 - 17				IEC 60384 - 17							
Packing	loose, reel				loose, reel				loose, reel				loose, taped on reel (bent back pitches to 7.5 mm standard available)							
Lead length	3.5, 5 mm				3.5 mm				3.5 mm				3.5 mm, 5.0 mm, 25 mm							

ELECTRONIC BALLAST

EL LIGHT BALLAST

S.M.P.S.

S-CORRECTION

S-CORRECTION

POWER SUPPLIES

in columns: pitch size (mm)

Film Capacitors

Design-in support

Designer's sample boxes

A wide selection of designer's sample boxes is available for quick design-in of a Film capacitor into your application. To order this and other support material, please contact your nearest BC Components sales office or one of our franchised Distributors.



Ordering information Designer's sample boxes					
Technology series	U _{DC} (V)	contents of box			ordering code
		tolerance	range	E-series	
General purpose, boxed					
MKT 370/371/372	63 / 100 / 250 / 400	10%	1 - 2200 nF	E12	8204 110 64211
MKT 373	100	10%	0.47 - 15 µF	E6	8204 110 64231
MKT 373	250	10%	0.15 - 4.7 µF	E6	8204 110 64241
MKT 373	400	10%	0.047 - 1.5 µF	E6	8204 110 64251
Precision					
KP 460/464	63 V - 630 V	2%	47 - 62 000 pF	E12	8204 110 64201
Interference Suppression					
MKP 338	275 V _{AC}	20%	1 nF - 3.3 µF	E6	8204 110 64491
MKP 336	275 V _{AC}	20%	1 nF - 1 µF	E6	8204 110 64431
MKP 335 5	275 V _{AC}	20%	10 nF - 470 nF	E6	8204 110 64481
AC & Pulse					
KP/MKP 375 1	630	5%	0.68 nF to 270 nF	E12	8204 110 64441
KP/MKP 375 2	1000	5%	0.10 nF to 150 nF	E12	8204 110 64451
KP/MKP 375 3	1600	5%	0.68 nF to 39 nF	E12	8204 110 64461
KP/MKP 375 4	2000	5%	0.10 nF to 22 nF	E12	8204 110 64471
MKP/MKP 378 6	630	5%	0.056 µF to 0.68 µF	E12	8204 110 64321
MKP/MKP 378 7	1000	5%	0.012 µF to 0.22 µF	E12	8204 110 64331
MKP/MKP 378 8	1600	5%	0.0056 µF to 0.1 µF	E12	8204 110 64341
MKP/MKP 378 9	2000	5%	0.0033 µF to 0.015 µF	E24	8204 110 64351
MKP 379 3	630	5%	0.082 µF to 5.6 µF	E12	8204 110 64371
MKP 379 4	1000	5%	0.047 µF to 3.0 µF	E12	8204 110 64381
MKP 379 5	1600	5%	0.022 µF to 1.8 µF	E12	8204 110 64391
MKP 379 6	2000	5%	0.010 µF to 1 µF	E12	8204 110 64401
MMKP 383	250-400-360 V	5%	47 µF to 2.7 µF	E12	8204 110 64701
MMKP 383	1000-1400 V	5%	12 µF to 470 µF	E12	8204 110 64711
MMKP 383	1600-2000-2500 V	5%	1.0 µF to 150 µF	E12	8204 110 64721
Application sample kits					
TV-kit (AC&P)					8204 110 64731
Monitor-kit (AC&P)					8204 110 64741
ADSL-kit					8204 110 64771
Light applications					8204 110 64781





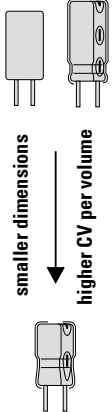
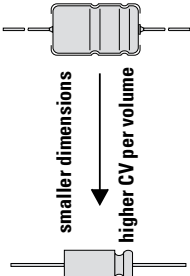




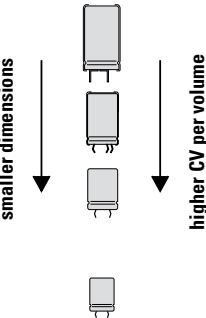
Electrolytic Capacitors


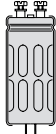

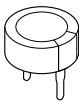

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Electrolytic Capacitors

Programme survey



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standard 085 CS 1500 h / 85 °C page 62	industrial 139 CLL 2000 h / 105 °C page 62		industrial 153 CLV 2000-3000 h / 105 °C page 62			
Radial	 <p style="text-align: center;">smaller dimensions ↓ higher CV per volume</p>	<table border="0"> <tr> <td style="text-align: center;"> standard & miniature 1500 - 3000 h/85 °C 044 RSH high voltage page 64 037 RSM low voltage page 64 097 RLP7 H: 7 mm 134 RLP5 H: 5 mm page 64 </td> <td style="text-align: center;"> semi-professional 750 - 2500 h/105 °C 013 RLC low leakage page 66 135 RLI low Z page 70 036 RSP 047 RMS page 66/68 </td> <td style="text-align: center;"> long-life 2000 - 4000 h/105 °C 151 RLH high voltage page 68 116 RLL 048 RML page 66/68 </td> <td style="text-align: center;"> extra long life or high temp. 1500 h/125 °C ≥ 4000 h/105 °C 165 RHT 125 °C page 68 140 RTM 125 °C page 70 136 RVI very low Z, 105 °C page 70 150 RMI very low Z, 105 °C page 70 </td> </tr> </table>	standard & miniature 1500 - 3000 h/85 °C 044 RSH high voltage page 64 037 RSM low voltage page 64 097 RLP7 H: 7 mm 134 RLP5 H: 5 mm page 64	semi-professional 750 - 2500 h/105 °C 013 RLC low leakage page 66 135 RLI low Z page 70 036 RSP 047 RMS page 66/68	long-life 2000 - 4000 h/105 °C 151 RLH high voltage page 68 116 RLL 048 RML page 66/68	extra long life or high temp. 1500 h/125 °C ≥ 4000 h/105 °C 165 RHT 125 °C page 68 140 RTM 125 °C page 70 136 RVI very low Z, 105 °C page 70 150 RMI very low Z, 105 °C page 70
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Axial	 <p style="text-align: center;">smaller dimensions ↓ higher CV per volume</p>	<table border="0"> <tr> <td style="text-align: center;"> miniature 1500 - 2000 h/85 °C 030 - 031 AS D = 3.3 mm Ø 117 ASD page 72 </td> <td style="text-align: center;"> standard & semi-professional 2500 - 8000 h/85 °C 030-031 AS LV 041 ASH HV page 72 021 ASM page 72 </td> <td style="text-align: center;"> long-life 10 000 - 20 000 h/85 °C 2000 - 10 000 h/105 °C 132-133 ALL-DIN 042-043 ASH 042-043 AMH-ELB page 74/72 138 AML page 74 </td> <td style="text-align: center;"> extra long-life or high temp. 4000 - 8000 h/125 °C 119 AHT-DIN page 76 118 AHT page 76 </td> </tr> </table>	miniature 1500 - 2000 h/85 °C 030 - 031 AS D = 3.3 mm Ø 117 ASD page 72	standard & semi-professional 2500 - 8000 h/85 °C 030-031 AS LV 041 ASH HV page 72 021 ASM page 72	long-life 10 000 - 20 000 h/85 °C 2000 - 10 000 h/105 °C 132-133 ALL-DIN 042-043 ASH 042-043 AMH-ELB page 74/72 138 AML page 74	extra long-life or high temp. 4000 - 8000 h/125 °C 119 AHT-DIN page 76 118 AHT page 76
miniature 1500 - 2000 h/85 °C 030 - 031 AS D = 3.3 mm Ø 117 ASD page 72	standard & semi-professional 2500 - 8000 h/85 °C 030-031 AS LV 041 ASH HV page 72 021 ASM page 72	long-life 10 000 - 20 000 h/85 °C 2000 - 10 000 h/105 °C 132-133 ALL-DIN 042-043 ASH 042-043 AMH-ELB page 74/72 138 AML page 74	extra long-life or high temp. 4000 - 8000 h/125 °C 119 AHT-DIN page 76 118 AHT page 76			
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professional 20 000 hours 125 °C 122 SAL- RP H: 12mm page 78	professional 20 000 hours 125 °C 128 SAL- RPM H: 9mm page 78	 123 SAL- A 20 000 hours 125 °C page 78				
Large	 <p style="text-align: center;">smaller dimensions ↓ higher CV per volume</p>	<table border="0"> <tr> <td style="text-align: center;"> economy 2500 to 15 000 hours 85 °C 051-053 PEC-PW page 86 166-167 PSM-4TSI page 82 056-057 PSM-SI page 82 198 PHR-SI page 80 157 PUM-SI page 80 </td> <td style="text-align: center;"> Euro-DIN 15 000 hours 85 °C 050-052 PED-PW page 86 </td> <td style="text-align: center;"> long-life 3000 to 10 000 hours 105 °C 162-163 PLL-PW page 86 168-169 PLL-4TSI page 84 058-059 PLL-SI page 84 159 PUL-SI page 80 </td> </tr> </table>	economy 2500 to 15 000 hours 85 °C 051-053 PEC-PW page 86 166-167 PSM-4TSI page 82 056-057 PSM-SI page 82 198 PHR-SI page 80 157 PUM-SI page 80	Euro-DIN 15 000 hours 85 °C 050-052 PED-PW page 86	long-life 3000 to 10 000 hours 105 °C 162-163 PLL-PW page 86 168-169 PLL-4TSI page 84 058-059 PLL-SI page 84 159 PUL-SI page 80	
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<p>Screw Terminal</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  ST </div> <div style="text-align: center;">  STB </div> </div> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>High CV & Standard</th> <th>high ripple</th> <th>economy</th> <th>Euro-DIN</th> </tr> </thead> <tbody> <tr> <td>3000 - 5000 hours 85 °C</td> <td>4000 - 5000 hours 105 °C</td> <td>5000 - 12 000 hours 85 °C</td> <td>5000 - 20 000 hours 85 °C</td> </tr> <tr> <td>086-087 PS-ST PS-STB page 88</td> <td>088-089 PHC-ST/ PHC-STB page 92</td> <td>154-155 PEC-ST PEC-STB page 94</td> <td>114-115 PED-ST/ PED-STB page 94</td> </tr> <tr> <td>002 HRC-ST page 90</td> <td>3188 page 97</td> <td></td> <td></td> </tr> <tr> <td>3186 page 96</td> <td>3198 page 98</td> <td></td> <td></td> </tr> <tr> <td>3191 page 99</td> <td>3199 page 99</td> <td></td> <td></td> </tr> </tbody> </table>	High CV & Standard	high ripple	economy	Euro-DIN	3000 - 5000 hours 85 °C	4000 - 5000 hours 105 °C	5000 - 12 000 hours 85 °C	5000 - 20 000 hours 85 °C	086-087 PS-ST PS-STB page 88	088-089 PHC-ST/ PHC-STB page 92	154-155 PEC-ST PEC-STB page 94	114-115 PED-ST/ PED-STB page 94	002 HRC-ST page 90	3188 page 97			3186 page 96	3198 page 98			3191 page 99	3199 page 99		
High CV & Standard	high ripple	economy	Euro-DIN																						
3000 - 5000 hours 85 °C	4000 - 5000 hours 105 °C	5000 - 12 000 hours 85 °C	5000 - 20 000 hours 85 °C																						
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EIA Type 1	EIA Type 2																								
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<p>Energy storage (double layer)</p>	<div style="text-align: center;">  Form A </div> <div style="text-align: center;">  Form B </div> <div style="text-align: center;"> <p>Energy storage</p> <p>196 DLC page 102</p> </div>																								

 **NEW**

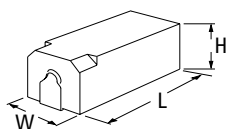
Ordering information Preferred types

085 CS series (tolerance -10 to +50%)

U _R (V)	C _R (μF)	case code	I _R 100 Hz 85 °C (mA)	Z 10 kHz (Ω)	catalogue number 2222	smallest packing quantity
6.3	10	1a	11	20	085 23109	2000
16	4.7	1a	9	26	085 25478	2000
	10	1	16	12	085 25109	2000
40	2.2	1a	7	32	085 27228	2000
	4.7	1	13	15	085 27478	2000
63	1	1a	6	55	085 28108	2000

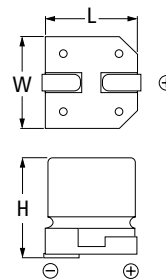
139 CLL series

U _R (V)	C _R (μF)	case code	I _R 100 Hz 105 °C (mA)	Z 10 kHz (Ω)	catalogue number 2222	smallest packing quantity
6.3	100	2	79	3.0	139 63101	700
	220	3	120	1.4	139 63221	700
16	47	2	66	3.4	139 65479	700
	100	3	100	1.6	139 65101	700
25	22	2	48	5.5	139 66229	700
	33	2	59	3.7	139 66339	700
	47	3	79	2.6	139 66479	700
40	33	3	75	2.7	139 67339	700
50	10	2	40	7.0	139 61109	700
	22	3	67	3.2	139 61229	700
63	4.7	2	28	17.0	139 68478	700
100	1	2	12	55.0	139 69108	700
	2.2	2	19	29.0	139 69228	700
	4.7	3	33	11.0	139 69478	700



153 CLV series





U _R (V)	C _R (μF)	nominal case size L x W x H (mm)	I _R 105 °C (mA)	ESR 100 kHz (Ω)	catalogue number 2222	smallest packing quantity
6.3	100	6.3 x 6.3 x 5.3	61	2	153 63101	1000
10	220	8.0 x 8.0 x 10	180	0.5	153 64221	500
	10	4.0 x 4.0 x 5.3	16	8	153 65109	2000
16	47	6.3 x 6.3 x 5.3	47	2.2	153 65479	1000
	470	10 x 10 x 14	370	0.25	153 65471	250
	100	8.0 x 8.0 x 10	180	0.5	153 66101	500
35	4.7	4.0 x 4.0 x 5.3	14	8	153 60478	2000
	22	6.3 x 6.3 x 5.3	50	2.2	153 60229	1000
	220	10 x 10 x 12	270	0.29	153 60221	250
50	1.0	4.0 x 4.0 x 5.3	7	12	153 61108	2000
	4.7	5.0 x 5.0 x 5.3	17	6	153 61478	1000
	10	6.3 x 6.3 x 5.3	26	3	153 61109	1000
	47	8.0 x 8.0 x 10	180	0.5	153 61479	500
	100	10 x 10 x 10	320	0.3	153 61101	500
63	100	10 x 10 x 14	240	0.41	153 68101	250



Electrolytic Capacitors




Radial, standard



																																	
Series	134 RLP 5 Radial Low Profile	097 RLP 7 Radial Low Profile	037 RSM Radial Standard Miniature	044 RSH Radial Standard High Voltage																													
Useful life	1500 h/85 °C	1500 h/85 °C	2500 h/85 °C	3000 h/85 °C																													
Features	low profile (5mm)	low profile (7 mm)	high CV product per unit volume, small dimensions	standard high voltage type																													
Applications	general purpose portable equipment	general purpose portable equipment	general purpose audio / video	general purpose, industrial, mains, lighting																													
C_R(μF)	U_R(V)					U_R(V)					U_R(V)					U_R(V)																	
	6.3	10	16	25	35	50	6.3	10	16	25	35	50	63	6.3	10	16	25	35	40	50	63	100	160	200	250	350	400	450					
0.1												71																					
0.22												71																					
0.47												71									11	11											
1						51						71									11	11		12	13	13	14						
1.5																																	
2.2					51	52						71									11	11		13	14	14	15						
3.3				51		53						71	72								11	11					16						
4.7				52	53	54						71	72	73							11	11		14	14	15	16	17					
6.8																																	
10			52		54	55				71		72	73	74							11	11	12	15	15	16	17	17	18				
15																																	
22	53		54		55		71		72		73	74									11	12	13	16	16	18	18	19	20				
33		54		55			72		73	74									11	12		12	14										
47	54		55				72		73	74									11	12		12	13	15		18	19	20					
68																			11	12			13	14									
100	55							73	74										11	12	12			13	14	16	19	20					
150																			12		13		14		15								
220							74												12	13	13	14		15	16	18							
330														12						13	14	15		16	17	19							
470																				13	14	15	16	17	17	18	20						
680																					15		17	18	18	19							
1000																				14	15	16	17	18	19	19	20						
1500																				16		17	18	19									
2200																				17	17	18	19	20									
3300																				17	18	19	20										
4700																					19	20											
6800																					20												
10 000																					20												
	preferred type																																
Case dimensions	case size / nominal dimensions $\varnothing \times L$ (mm)																																
	51	$\varnothing 3 \times 5$	71	$\varnothing 4 \times 7$	11	$\varnothing 5 \times 11$	14	$\varnothing 10 \times 12$	17	$\varnothing 12.5 \times 20$																							
	52	$\varnothing 3.5 \times 5$	72	$\varnothing 5 \times 7$	12	$\varnothing 6.3 \times 11$	15	$\varnothing 10 \times 16$	18	$\varnothing 12.5 \times 25$																							
	53	$\varnothing 4 \times 5$	73	$\varnothing 6.3 \times 7$	13	$\varnothing 8 \times 12$	16	$\varnothing 10 \times 20$	19	$\varnothing 16 \times 25$																							
	54	$\varnothing 5 \times 5$	74	$\varnothing 7 \times 7$																									20	$\varnothing 16 \times 31$			
55	$\varnothing 6.3 \times 5$																																
Endurance IEC	1000 h/85 °C							1000 h/85 °C							2000 h/85 °C							2000 h/85 °C											
Temp. range	-40 °C to +85 °C							-40 °C to +85 °C							-40 °C to +85 °C							≤ 400 V : -40 °C to +85 °C 450 V : -25 °C to +85 °C											
Tolerance	± 20%							± 20%							± 20%							± 20%											

Electrolytic Capacitors

Radial, semi-professional, long life

																									
Series	013 RLC Radial, Low Leakage Current	036 RSP Radial Semi-Professional	116 RLL Radial Long Life																						
Useful life	3000 h/85 °C	3000 h/85 °C	2000 h/105 °C																						
Features	low leakage current, e-pitch 2.5 / 5 mm, aluminium case all-insulated	high CV per unit volume, e-pitch 2.5 / 5 mm, aluminium case all-insulated	105 °C high CV product, e-pitch: 2.5 / 5 mm, aluminium case all-insulated																						
Applications	coupling, timing	general industrial, telecom, automotive	telecom, EDP, automotive, general industrial																						
C_R(μF)	U_R(V)						U_R(V)						U_R(V)												
	6,3	10	16	25	35	50	10	16	25	35	50	63	100	160	6.3	10	16	25	35	40	50	63	100		
0.1																									
0.22																									
0.47						11					11											11			
1				11		11					11											11			
1.5																						11			
2.2				11		11					11		13									11		13	
3.3				11		11					11											11			
4.7				11		11					11		13									11		13	
6.8											11											11			
10				11		11				11	11	13	13									11	13	13	13
15											11											11			
22				11		11			11		11	13	13									11/13		13	
33				11		11	13		11		11	13							11	11		13			
47		11	11	13		13	11			11	13	13						11				13			
68		11				13			11			13						11				13			
100		11	13		13			11	13		13						11			13	13				
150							11	13		13					11			13							
220		13					13	13	13								13								
330	13							13								13									
470	13						13								13										
680																									
1000																									
1500																									
2200																									
3300																									
4700																									
6800																									
10 000																									
	 preferred type																								
Case dimensions	case size / nominal dimensions $\varnothing \times L$ (mm)																								
	11 $\varnothing 5 \times 11$						13 $\varnothing 8.2 \times 12$																		
Endurance IEC	2000 h/85 °C						2000 h/85 °C						1500 h/105 °C or 5000 h/85 °C												
Temp. range	-40 °C to +85 °C						-55 °C to +85 °C						-55 °C to +105 °C												
Tolerance	± 20%, ± 10% on request						± 20%, ± 10% or - 10/+ 50% on request						± 20%												
Pref. packing	ammpack and loose in box (long leads for $\varnothing < 10$ mm, short leads for $\varnothing \geq 10$ mm)																								

Ordering information Preferred types

013 RLC series

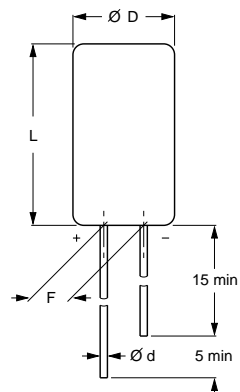
U_R (V)	C_R (μ F)	case code	I_{L2} 2 min (μ A)	Z 10 kHz +20 °C ($m\Omega$)	form	F (mm)	catalogue number 2222	smallest packing quantity
10	220	13	4.4	900	CA	5.0	013 54221	1000
					TFA	5.0	013 34221	1000
16	100	13	3.2	1000	CA	5.0	013 55101	1000
					TFA	5.0	013 35101	1000
25	4.7	11	0.7	8500	CA	2.5	013 56478	1000
					TFA	5.0	013 36478	2000
	22	11	1.1	2700	CA	2.5	013 56229	1000
					TFA	5.0	013 36229	2000
50	1	11	1.1	40000	CA	2.5	013 51108	1000
					TFA	5.0	013 31108	2000
	2.2	11	1.2	18000	CA	2.5	013 51228	1000
					TFA	5.0	013 31228	2000
	4.7	11	1.5	8500	CA	2.5	013 51478	1000
					TFA	5.0	013 31478	2000
	10	11	2.0	4000	CA	2.5	013 51109	1000
					TFA	5.0	013 31109	2000

036 RSP series

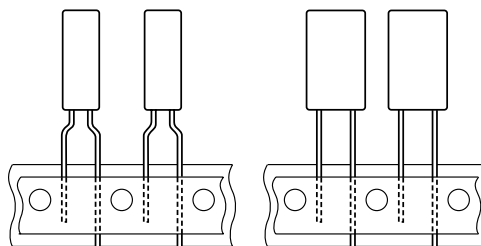
U_R (V)	C_R (μ F)	case code	I_R 85 °C (mA)	Z 10 kHz 20 °C ($m\Omega$)	form	F (mm)	catalogue number 2222	smallest packing quantity
10	47	11	95	2800	CA	2.5	036 54479	1000
					TFA	5.0	036 34479	2000
	470	13	400	430	CA	5.0	036 54471	1000
					TFA	5.0	036 34471	1000
16	100	11	160	1600	CA	2.5	036 55101	1000
					TFA	5.0	036 35101	2000
	220	13	280	550	CA	5.0	036 55221	1000
					TFA	5.0	036 35221	1000
330	13	390	480	CA	5.0	036 55331	1000	
				TFA	5.0	036 35331	1000	
25	100	13	210	700	CA	5.0	036 56101	1000
					TFA	5.0	036 36101	1000
	220	13	310	550	CA	5.0	036 56221	1000
35	47	11	130	1900	CA	2.5	036 90094	1000
					TFA	5.0	036 90098	2000
50	100	13	250	700	CA	5.0	036 90109	1000
					TFA	5.0	036 90113	1000
63	1	11	11	40000	CA	2.5	036 58108	1000
					TFA	5.0	036 38108	2000
	2.2	11	25	18000	CA	2.5	036 58228	1000
					TFA	5.0	036 38228	2000
	4.7	11	45	8500	CA	2.5	036 58478	1000
					TFA	5.0	036 38478	2000
	10	11	70	4000	CA	2.5	036 58109	1000
					TFA	5.0	036 38109	2000
	22	11	100	2700	CA	2.5	036 58229	1000
					TFA	5.0	036 38229	2000
	47	13	190	1000	CA	5.0	036 58479	1000
					TFA	5.0	036 38479	1000

116 RLL series

U_R (V)	C_R (μ F)	case code	I_R 100 kHz 105 °C (mA)	Z 100 kHz 20 °C ($m\Omega$)	form	F (mm)	catalogue number 2222	smallest packing quantity
10	100	11	130	1400	CA	2.5	116 54101	1000
					TFA	5.0	116 34101	2000
16	220	13	280	500	CA	5.0	116 55221	1000
					TFA	5.0	116 35221	1000
25	47	11	120	1600	CA	2.5	116 56479	1000
					TFA	5.0	116 36479	2000
35	100	13	240	550	CA	5.0	116 50101	1000
					TFA	5.0	116 30101	1000
50	1	11	40	6000	CA	2.5	116 51108	1000
					TFA	5.0	116 31108	2000
	2.2	11	60	3500	CA	2.5	116 51228	1000
					TFA	5.0	116 31228	2000
	4.7	11	70	2800	CA	2.5	116 51478	1000
					TFA	5.0	116 31478	2000
	10	11	80	2200	CA	2.5	116 51109	1000
					TFA	5.0	116 31109	2000
	22	11	110	1900	CA	2.5	116 51229	1000
					TFA	5.0	116 31229	2000
	22	13	190	900	CA	5.0	116 90025	1000
					TFA	5.0	116 90039	1000
47	13	210	650	CA	5.0	116 51479	1000	
				TFA	5.0	116 31479	1000	



Form CA: long leads



Form TFA: taped in box (ammopack), straight and formed

Ordering information Preferred types

047 RMS series

U _R (V)	C _R (μF)	case code	I _R 100 Hz 105 °C (mA)	Z 100 kHz (mΩ)	form	F (mm)	catalogue number 2222	smallest packing quantity
25	470	15	360	250	CB	5.0	047 66471	500
					TFA	5.0	047 36471	800
	1000	17	630	130	CB	5.0	047 66102	500
					TFA	5.0	047 36102	500
	2200	19	990	80	CB	7.5	047 66222	250
					TFA	7.5	047 36222	250
35	220	14	270	380	CB	5.0	047 60221	500
					TFA	5.0	047 30221	800
40	2200	21	1200	60	CB	7.5	047 67222	100
	3300	22	1500	40	CB	7.5	047 67332	100
50	470	17	540	170	CB	5.0	047 61471	500
					TFA	5.0	047 31471	500
	1000	19	940	90	CB	7.5	047 61102	250
					TFA	7.5	047 31102	250
63	100	14	210	650	CB	5.0	047 68101	500
					TFA	5.0	047 38101	800
	220	16	350	320	CB	5.0	047 68221	500
					TFA	5.0	047 38221	800
	470	18	620	160	CB	5.0	047 68471	250
					TFA	5.0	047 38471	500
2200	22	1500	40	CB	7.5	047 68222	100	

048 RML series

U _R (V)	C _R (μF)	case code	I _R 100 Hz 105 °C (mA)	Z 100 kHz (mΩ)	form	F (mm)	catalogue number 2222	smallest packing quantity
16	470	14	360	250	CB	5.0	048 65471	500
					TFA	5.0	048 35471	800
	1000	16	600	140	CB	5.0	048 65102	500
					TFA	5.0	048 35102	800
	2200	18	1000	70	CB	5.0	048 65222	250
					TFA	5.0	048 35222	500
4700	20	1500	45	CB	7.5	048 65472	100	
				TFA	7.5	048 35472	250	
25	1000	17	720	100	CB	5.0	048 66102	500
					TFA	5.0	048 36102	500
	3300	20	1450	45	CB	7.5	048 66332	100
					TFA	7.5	048 36332	250
35	220	14	310	280	CB	5.0	048 60221	500
					TFA	5.0	048 30221	800
	470	16	500	150	CB	5.0	048 60471	500
					TFA	5.0	048 30471	800
	2200	20	1340	45	CB	7.5	048 60222	100
					TFA	7.5	048 30222	250
50	470	17	620	110	CB	5.0	048 61471	500
					TFA	5.0	048 31471	500
	1000	19	1030	60	CB	7.5	048 61102	250
					TFA	7.5	048 31102	250
2200	22	1500	50	CB	7.5	048 61222	100	
63	100	14	240	310	CB	5.0	048 68101	500
					TFA	5.0	048 38101	800
	220	16	400	200	CB	5.0	048 68221	500
					TFA	5.0	048 38221	800
	470	18	700	80	CB	5.0	048 68471	250
					TFA	5.0	048 38471	500

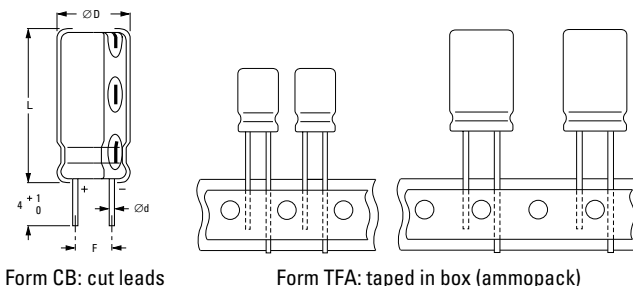
151 RLH series

U _R (V)	C _R (μF)	case code	I _R 100 Hz 105 °C (mA)	Z 10 kHz (mΩ)	form	F (mm)	catalogue number 2222	smallest packing quantity
160	100	19	380	1.1	CB	7.5	151 61101	250
					TFA	7.5	151 31101	250

200	10	15	95	6.3	CB	5.0	151 62109	500
					TFA	5.0	151 32109	800
	22	16	145	3.2	CB	5.0	151 62229	500
					TFA	5.0	151 32229	800
	47	18	280	1.7	CB	5.0	151 62479	250
					TFA	5.0	151 32479	500
100	20	410	1.1	CB	7.5	151 62101	100	
				TFA	7.5	151 32101	250	
250	4.7	14	60	13.0	CB	5.0	151 63478	500
					TFA	5.0	151 33478	800
	22	19a	180	3.2	CB	7.5	151 93226	250
					TFA	7.5	151 93223	250
	47	19	300	1.7	CB	7.5	151 63479	250
					TFA	7.5	151 33479	250
100	1825	410	1.1	CB	7.5	151 93106	100	
				TFA	7.5	151 93106	100	
350	4.7	15	65	16.0	CB	5.0	151 65478	500
					TFA	5.0	151 35478	800
	22	18	180	3.8	CB	5.0	151 65229	250
					TFA	5.0	151 35229	500
400	2.2	14	40	33.0	CB	5.0	151 66228	500
					TFA	5.0	151 36228	800
	4.7	16	70	16.0	CB	5.0	151 66478	500
					TFA	5.0	151 36478	800
	22	19	200	3.8	CB	7.5	151 66229	250
					TFA	7.5	151 36229	250
47	1831	300	2.0	CB	7.5	151 66479	100	
				TFA	7.5	151 36479	100	
450	10	19a	140	10.0	CB	7.5	151 67109	250
					TFA	7.5	151 37109	250
	22	1825	220	4.6	CB	7.5	151 97226	100

165 RHT series

U _R (V)	C _R (μF)	case code	I _R 100 Hz 125 °C (mA)	Z 100 kHz (mΩ)	form	F (mm)	catalogue number 2222	smallest packing quantity
10	470	16	340	260	CB	5.0	165 64471	500
					TFA	5.0	165 34471	800
16	2200	21	1100	-	CB	7.5	165 65222	100
25	220	16	280	320	CB	5.0	165 66221	500
					TFA	5.0	165 36221	800
	470	18	480	150	CB	5.0	165 66471	250
35	100	15	200	650	CB	5.0	165 60101	500
					TFA	5.0	165 30101	800
40	220	17	340	270	CB	5.0	165 67221	500
					TFA	5.0	165 37221	500
	470	20	650	130	CB	7.5	165 67471	100
50	100	17	260	500	CB	5.0	165 61101	500
					TFA	5.0	165 31101	500
	1000	21	1200	50	CB	7.5	165 90512	100



Form CB: cut leads

Form TFA: taped in box (ammopack)

Electrolytic Capacitors

Radial, high ripple current, low Z (for SMPS)

	NEW																					NEW												
Series	140 RTM Radial High Temperature Miniature							135 RLI Radial Low Impedance							136 RVI Radial Very Low Impedance							150 RMI Radial Miniature, Low Impedance												
Useful life	2500 - 4000 h/125°C dependent on case size							2500 h/105°C ($\varnothing \geq 10$ mm), 1500 h/105°C ($\varnothing = 8$ mm)							4000 - 10 000 h/105°C dependent on case size							4000 - 10 000 h/105°C dependent on case size												
Features	high temperature 125°C, high reliability, high ripple current							105°C, low impedance, high ripple current							105°C, very low impedance, extra long life, high ripple current							105°C, very low impedance, extra long life, high ripple current												
Applications	SMPS, DC/DC converters, automotive, industrial							industrial, SMPS, DC/DC converters							industrial, automotive, telecom, EDP, SMPS, DC/DC converters							industrial, automotive, telecom, EDP, SMPS, DC/DC converters												
$C_R(\mu F)$	$U_R(V)$							$U_R(V)$							$U_R(V)$							$U_R(V)$												
	10	16	25	35	50	63		6.3	10	16	25	35	50	63	100	10	16	25	35	50	63	100	10	16	25	35	50	63	10	16	25	35	50	63
22						10 x 12								8 x 12																				
33																											10 x 12							
47					10 x 12	10 x 12								8 x 12																				
56																																		
68																											10 x 12							
82																												10 x 16						
100					10 x 12	10 x 16	10 x 20																											
120																											10 x 12							
150																																		
180																																		
220		10 x 12			10 x 16	10 x 16	12.5 x 20	16 x 20																										
270																																		
330	10 x 12	10 x 16	10 x 20																															
390																																		
470	10 x 16	10 x 16	10 x 20	12.5 x 20	16 x 20	16 x 25	10 x 12	8 x 15	8 x 20	10 x 20	10 x 30	12.5 x 25	16 x 25	16 x 40	10 x 12	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 25	18 x 31													
560																																		
680							10 x 16		10 x 20						10 x 16	10 x 20	10 x 25																	
820																																		
1000	10 x 20	12.5 x 20	16 x 20	16 x 25	16 x 31	18 x 31																												
1200																																		
1500																																		
1800	16 x 20	16 x 25	16 x 31	18 x 31																														
2200							12.5 x 20	12.5 x 25	12.5 x 31	12.5 x 40	16 x 35	18 x 40																						
2700	16 x 25	16 x 31	18 x 31																															
3300																																		
3900	16 x 31	18 x 31																																
4700																																		
5600																																		
6800																																		
8200																																		
10 000																																		

in columns:
 $\varnothing \times L$ in mm

preferred type

Ordering information Preferred types

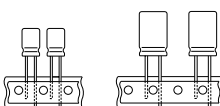
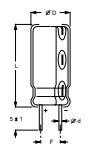
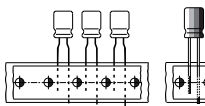
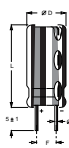
135 RLI series

U _R (V)	C _R (μF)	case dimensions ∅ D x L (mm)	I _R 100 kHz 105 °C (mA)	Z 100 kHz 20 °C (mΩ)	form	F (mm)	catalogue number 2222.....	smallest packing quantity
10	1000	12.5 x 16	970	120	CB	5.0	135 64102	1500
					TFA	5.0	135 34102	500
	2200	12.5 x 25	1300	73	CB	5.0	135 64222	250
					TFA	5.0	135 34222	500
16	2200	16 x 20	1400	73	CB	7.5	135 90008	250
					TFA	7.5	135 90043	250
25	470	10 x 20	860	140	CB	5.0	135 66471	500
					TFA	5.0	135 36471	800
	1000	12.5 x 25	1300	71	CB	5.0	135 66102	250
					TFA	5.0	135 36102	500
3300	16 x 35	2000	45	CB	7.5	135 66332	100	
				TFA	7.5	135 36332	100	
35	1000	12.5 x 31	1500	61	CB	5.0	135 60102	750
					TFA	7.5	135 90017	250
	1000	16 x 20	1370	71	CB	7.5	135 90017	250
					TFA	7.5	135 90044	250
2200	16 x 35	2000	44	CB	7.5	135 60222	100	
				TFA	7.5	135 36222	100	
50	100	10 x 16	640	200	CB	5.0	135 61101	500
					TFA	5.0	135 31101	800
	470	12.5 x 25	1300	68	CB	5.0	135 61471	250
					TFA	5.0	135 31471	500
	1000	16 x 31	1800	50	CB	7.5	135 61102	100
					TFA	7.5	135 31102	250
63	220	12.5 x 20	890	160	CB	5.0	135 68221	500
					TFA	5.0	135 38221	500
470	16 x 25	1400	91	CB	7.5	135 68471	250	
				TFA	7.5	135 38471	250	
100	100	12.5 x 20	890	150	CB	5.0	135 69101	500
					TFA	5.0	135 39101	500

150 RMI series

NEW

U _R (V)	C _R (μF)	case dimensions ∅ D x L (mm)	I _R 100 kHz 125 °C (mA)	Z 100 kHz (mΩ)	form	F (mm)	catalogue number 2222.....	smallest packing quantity
10	1000	10 x 16	950	66	CB	5.0	150 64102	500
					TFA	5.0	150 34102	800
	2200	12.5 x 20	1460	37	CB	5.0	150 64222	500
					TFA	5.0	150 34222	500
16	470	10 x 12	730	97	CB	5.0	150 65471	500
					TFA	5.0	150 35471	800
	2200	12.5 x 25	1950	29	CB	5.0	150 65222	250
					TFA	5.0	150 35222	500
25	470	10 x 16	950	66	CB	5.0	150 66471	500
					TFA	5.0	150 36471	800
	1000	12.5 x 20	1460	37	CB	5.0	150 66102	500
					TFA	5.0	150 36102	500
35	220	10 x 12	730	97	CB	5.0	150 60221	500
					TFA	5.0	150 30221	800
	470	10 x 20	1180	49	CB	5.0	150 60471	500
					TFA	5.0	150 30471	800
50	470	12.5 x 20	1100	62	CB	5.0	150 61471	500
					TFA	5.0	150 31471	500
	1000	16 x 25	1800	34	CB	7.5	150 61102	250
					TFA	7.5	150 31102	250
63	100	10 x 12	420	270	CB	5.0	150 68101	500
					TFA	5.0	150 38101	800
	470	12.5 x 25	1200	67	CB	5.0	150 68471	250
					TFA	5.0	150 38471	500



136 RVI series

U _R (V)	C _R (μF)	case dimensions ∅ D x L (mm)	I _R 100 kHz 105 °C (mA)	Z 100 kHz 20 °C (mΩ)	form	F (mm)	catalogue number 2222.....	smallest packing quantity
10	1000	10 x 20	1000	62	CB	5.0	136 64102	500
					TFA	5.0	136 34102	800
	2200	12.5 x 25	1700	34	CB	5.0	136 64222	250
					TFA	5.0	136 34222	500
16	470	10 x 16	830	84	CB	5.0	136 65471	500
					TFA	5.0	136 35471	800
	2200	16 x 20	1600	38	CB	7.5	136 65222	250
					TFA	7.5	136 35222	250
4700	16 x 35	2600	22	CB	7.5	136 65472	100	
				TFA	7.5	136 35472	100	
25	470	10 x 20	1000	62	CB	5.0	136 66471	500
					TFA	5.0	136 36471	800
	1000	12.5 x 25	1700	34	CB	5.0	136 66102	250
					TFA	5.0	136 36102	500
3300	16 x 35	2600	22	CB	7.5	136 66332	100	
				TFA	7.5	136 36332	100	
35	220	10 x 16	830	84	CB	5.0	136 60221	500
					TFA	5.0	136 30221	800
	1000	16 x 20	1700	38	CB	7.5	136 60102	250
					TFA	7.5	136 30102	250
2200	16 x 35	2600	22	CB	7.5	136 60222	100	
				TFA	7.5	136 30222	100	
50	100	10 x 12	480	200	CB	5.0	136 61101	500
					TFA	5.0	136 31101	800
	470	12.5 x 25	1500	44	CB	5.0	136 61471	250
					TFA	5.0	136 31471	500
1000	16 x 31	2200	30	CB	7.5	136 61102	100	
				TFA	7.5	136 31102	250	
63	47	10 x 12	380	300	CB	5.0	136 68479	500
					TFA	5.0	136 38479	800
	100	10 x 16	580	190	CB	5.0	136 68101	500
					TFA	5.0	136 38101	800
220	12.5 x 20	870	110	CB	5.0	136 68221	500	
				TFA	5.0	136 38221	500	
470	16 x 25	1500	55	CB	7.5	136 68471	250	
				TFA	7.5	136 38471	250	
100	47	10 x 16	450	320	CB	5.0	136 69479	500
					TFA	5.0	136 39479	800
	100	12.5 x 20	800	150	CB	5.0	136 69101	500
					TFA	5.0	136 39101	500
220	16 x 25	1300	81	CB	7.5	136 69221	250	
				TFA	7.5	136 39221	250	

140 RTM series

NEW

U _R (V)	C _R (μF)	case dimensions ∅ D x L (mm)	I _R 100 kHz 125 °C (mA)	Z 100 kHz (mΩ)	form	F (mm)	catalogue number 2222.....	smallest packing quantity
10	470	10 x 16	420	290	CB	5.0	140 64471	500
					TFA	5.0	140 34471	800
16	2200	16 x 25	1200	65	CB	7.5	140 65222	250
					TFA	7.5	140 35222	250
					CB	5.0	140 66221	500
25	220	10 x 16	420	290	TFA	5.0	140 36221	800
					CB	5.0	140 66471	500
35	100	10 x 12	320	350	TFA	5.0	140 36471	800
					CB	5.0	140 60101	500
50	100	10 x 16	380	350	TFA	5.0	140 30101	800
					CB	5.0	140 61101	500
	220	12.5 x 20	700	150	TFA	5.0	140 61221	500
					CB	5.0	140 61221	500
1000	16 x 31	1450	50	TFA	5.0	140 31221	500	
				CB	7.5	140 61102	100	
63	47	10 x 12	300	440	TFA	7.5	140 31102	250
					CB	5.0	140 68479	500
	470	16 x 25	1100	80	TFA	5.0	140 38479	800
					CB	7.5	140 68471	250
TFA	7.5	140 38471	250					

Electrolytic Capacitors

Axial, 85 °C



				 NEW MINIATURE																				
Series	021 ASM / 117 ASD Axial Standard Miniature / Axial Smallest Diameter	030, 031 AS Axial Standard	041, 042, 043 ASH Axial Standard High Voltage	042, 043 AMH-ELB Electronic Lighting Ballast																				
Useful life	8000 h/85 °C (case sizes 00-05) 2500 h/85 °C (case sizes 2-7) 2000 h/85 °C (case sizes 1a, 1)	3000 h/85 °C (case sizes 2-7), 1500 h/85 °C (case size 1)	15 000 h/85 °C (case sizes 00-05) 10 000 h/85 °C (450 V range) 5000 h/85 °C (case sizes 4-7)	20 000 h/85 °C 100 000 h/70 °C																				
Features	high CV product per unit volume, small dimensions, low mass	standard types, low voltage	standard types, high voltage	withstands 550 V for 24 hrs at 85 °C, high ripple current																				
Applications	general purpose, industrial, automotive	general industrial, telecom	general industrial, mains, power supplies, lighting	electronic lighting ballast power supplies																				
C _R (µF)	U _R (V)							U _R (V)							U _R (V)							U _R (V)		
	6.3	10	16	25	40	63	100	6.3	10	16	25	40	63	100	160	250	350	385	400	450	450			
0.22																								
0.33																								
0.47						1a/2															2			
1						1a 2	2						1 2	2						4				
1.5														2										
2.2					1a	1 2	2					1	2	2				4		5				
3.3				1a		1/2								2	2									
4.7			1a		1	2	2					1		2	3			4	5	6	7			
6.8		1a		1										2	3									
10	1a		1			2	3	1					2	2	3	4/5a	5	7/00	01	01	01	01	01	
15						2	4/5a						2	3				01	01	02	02	01	02	
22	1				2	3	4/5a						2	3	4/5a	5	7 00	01	02	03	03	02	03	
33						3	4					2		3		6	01	02	03	04	04	03	04	
47				2	3	4 5a	5					2		3	4 5a	5	7	02	03	04	04	04		
68			2			4/5a	6	2					3					02	04	05	05	05		
100		2		3	4 5a	5	7 00					3		4 5a	5	7		03	05					
150			3	4/5a	5	6	01	3					4/5a	5	6			04						
220		3	5a	4	6	7 00	01						4 5a	5	6	7		05						
330		5a	4	5	7	01	02						5	6	7									
470	5a	4	5	6	7 00	01	03	5	6	7														
680		5	6	7/00	01	02	04	6	7															
1000	5	6	7/00	01	01	03	05	7																
1500		7/00	01	01	02	04																		
2200	7	01	01	02	03	05																		
3300		01	02	03	04																			
4700		02	03	04	05																			
6800		03	04	05																				
10 000		04	05																					
15 000		05																						
	preferred type																							
Case dimensions	case size / nominal dimensions Ø × L (mm)																							
	1a Ø 3.3 × 8							4 Ø 6.5 × 18							7 Ø 10 × 25							03 Ø 18 × 30		
	1 Ø 3.3 × 11							5a Ø 8 × 11							00 Ø 10 × 30							04 Ø 18 × 40		
	2 Ø 4.5 × 10							5 Ø 8 × 18							01 Ø 12.5 × 30							05 Ø 21 × 40		
	3 Ø 6 × 10							6 Ø 10 × 18							02 Ø 15 × 30									
Endurance IEC	case sizes 00-05: 5000 h/85 °C case sizes 2-7: 1000 - 2000 h/85 °C case sizes 1a, 1: 1500 h/85 °C							case sizes 2-7: 2000 h/85 °C case size 1: 1000 h/85 °C							case sizes 00-05: 8000 h/85 °C 450 V range: 5000 h/85 °C case sizes 4-7: 2000 h/85 °C							8000 h/85 °C		
Temp. range	− 40 °C to + 85 °C							− 40 °C to + 85 °C							− 40 °C to + 85 °C (− 25 °C for 450 V range)							− 25 °C to + 85 °C		
Tolerance	± 20% (021 ASM), − 10 to + 50% (117 ASD)							− 10 to + 50%							− 10 to + 50%							− 10 to + 50%		
Pref. packing	see ordering information next page																							

Ordering information Preferred types

021 ASM series

U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 85 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	cat. nr. 2222
6.3	470	5a	260	0.85	0.64	BA	021 33471
10	100	2	100	3.2	2.0	BA	021 34101
	220	3	160	1.5	0.91	BA	021 34221
	470	4	310	0.68	0.43	BA	021 34471
	1000	6	550	0.32	0.20	BA	021 34102
	2200	01	800	0.177	0.095	AA	021 14222
						BR	021 24222
	4700	02	1180	0.100	0.07	AA	021 14472
						BR	021 24472
						MR	021 44472
	10000	04	1860	0.064	0.04	AA	021 14103
					MR	021 44103	
16	1000	7	660	0.26	0.18	BA	021 90518
	1000	00	700	0.260	0.175	AA	021 15102
						BR	021 25102
	2200	01	890	0.150	0.095	AA	021 15222
						BR	021 25222
	4700	03	1410	0.087	0.065	AA	021 15472
						MR	021 45472
	10000	05	2170	0.058	0.035	AA	021 15103
						MR	021 45103
	25	47	2	80	4.8	2.6	BA
100		3	150	2.3	1.2	BA	021 36101
220		4	250	1.0	0.55	BA	021 36221
470		6	450	0.48	0.26	BA	021 36471
1000		01	720	0.220	0.095	AA	021 16102
						BR	021 26102
2200		02	1030	0.132	0.07	AA	021 16222
						BR	021 26222
						MR	021 46222
4700		04	1680	0.079	0.04	AA	021 16472
					MR	021 46472	
40	22	2	60	8.0	3.2	BA	021 37229
	47	3	110	3.8	1.5	BA	021 37479
	100	4	190	1.8	0.70	BA	021 37101
	220	6	330	0.8	0.32	BA	021 37221
	470	00	570	0.404	0.175	AA	021 17471
						BR	021 27471
	1000	01	770	0.190	0.095	AA	021 17102
						BR	021 27102
	2200	03	1200	0.118	0.065	AA	021 17222
						MR	021 47222
4700	05	1880	0.072	0.035	AA	021 17472	
					MR	021 47472	
63	1	2	12	150	55	BA	021 38108
	2.2	2	21	65	25	BA	021 38228
	4.7	2	31	31	12	BA	021 38478
	10	2	50	13	5.5	BA	021 38109
	22	3	90	5.8	2.5	BA	021 38229
	47	4	150	2.7	1.2	BA	021 38479
	100	5	250	1.3	0.55	BA	021 38101
	220	00	480	0.614	0.20	AA	021 18221
						BR	021 28221
	470	01	630	0.287	0.10	AA	021 18471
					BR	021 28471	
1000	03	1120	0.135	0.065	AA	021 18102	
					MR	021 48102	
2200	05	1780	0.099	0.035	AA	021 18222	
					MR	021 48222	
100	100	00	360	1.150	1.0	AA	021 19101
						BR	021 29101
	220	01	460	0.610	0.56	AA	021 19221
						BR	021 29221
	470	03	740	0.310	0.29	AA	021 19471
						MR	021 49471
	1000	05	1260	0.160	0.15	AA	021 19102
						MR	021 49102

030, 031 AS series

U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 85 °C (mA)	Z 10 kHz (Ω)	cat. nr. 2222 form BA
6.3	470	5	330	0.43	031 33471
	1000	7	560	0.20	031 33102
10	47	2	70	3.4	030 34479
	100	3	110	1.6	030 34101
	220	4	210	0.73	031 34221
	470	6	410	0.34	031 34471
	16	33	2	65	3.6
	68	3	110	1.8	030 35689
	330	6	410	0.36	031 35331
	470	7	480	0.26	031 35471
25	10	2	50	9	030 36109
	22	2	60	4.1	030 36229
	47	3	100	1.9	030 36479
	100	5a	160	0.90	030 36101
	220	6	350	0.41	031 36221
40	22	3	75	3.2	030 37229
	47	5a	150	1.5	030 37479
	100	5	220	0.70	031 37101
	220	7	430	0.32	031 37221
	63	1.0	2	13	55
2.2		2	25	25	030 38228
4.7		2	40	12	030 38478
10		3	70	5.5	030 38109
47		5	190	1.2	031 38479
	100	7	300	0.55	031 38101
100	22	5	120	2.1	031 39229

041, 042, 043 ASH series

U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 85 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	cat. nr. 2222
160	22	00	120	6.8	5.5	AA	042 11229
						BR	042 21229
	47	02	190	3.2	2.1	AA	042 11479
						BR	042 21479
						MR	042 41479
	100	03	350	1.5	1.0	AA	042 11101
					MR	042 41101	
220	05	610	0.7	0.5	AA	043 11221	
					MR	043 41221	
250	2.2	4	35	72	50	BA	041 33228
	10	7	90	16	11	BA	041 33109
	10	00	72	15	11	AA	042 13109
						BR	042 23109
	22	01	130	6.8	5.0	AA	042 13229
						BR	042 23229
	47	03	220	3.2	2.3	AA	042 13479
						MR	042 43479
	100	05	390	1.5	1.1	AA	043 13101
						MR	043 43101
350	4.7	6	60	34	22	BA	041 35478
	10	01	90	15	10	AA	042 15109
						BR	042 25109
	22	02	140	6.8	4.5	AA	042 15229
						BR	042 25229
						MR	042 45229
47	04	270	3.2	2.1	AA	043 15479	
					MR	043 45479	
385	1	4	20	160	100	BA	041 38108
	2.2	5	40	72	45	BA	041 38228
	4.7	7	70	34	22	BA	041 38478
	10	01	90	15	10	AA	042 18109
						BR	042 28109
	22	03	150	6.8	4.1	AA	042 18229
					MR	042 48229	

400	47	04	270	3.2	2.1	AA	043 18479
						MR	043 48479
	10	01	130	7.5	4.6	AA	042 16109
						BR	042 26109
	22	03	210	3.5	2.1	AA	042 16229
					MR	042 46229	
450	47	04	330	1.7	1.1	AA	043 16479
						MR	043 46479
	10	01	90	15	10	AA	042 17109
						BR	042 27109
	22	02	140	6.8	4.1	AA	042 17229
						BR	042 27229
						MR	042 47229
	47	04	250	3.2	2.1	AA	043 17479
						MR	043 47479

042, 043 AMH-ELB series **NEW**

U _R (V)	C _R 100 Hz (μF)	case code	I _R 10 kHz 85 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	cat. nr. 2222
450	10	01	710	5.6	3.1	AA	042 81109
						BR	042 82109
	15	02	910	3.7	2.1	AA	042 81159
						BR	042 82159
	22	03	1190	2.4	1.4	AA	042 81229
	33	04	1610	1.7	1.0	AA	043 81339

Note: information about "form" see next page

Electrolytic Capacitors

Axial, 105 °C/ 85 °C



Series	138 AML Axial Miniature Long Life									132, 133 ALL-DIN Axial Long Life - DIN 45910 - T123														
Useful life	10 000 h/105 °C (case sizes 00-05), 2000 h/105 °C (case sizes 2*-7)									15 000 h/85 °C (case sizes 6-05), 10 000 h/85 °C (case sizes 4 and 5) or 3000 h/105 °C (case sizes 4-7),														
Features	105 °C, high CV product per unit volume									Industrial standard, LV and HV														
Applications	industrial, telecom, automotive, SMPS									industrial, telecom, EDP														
C _R (μF)	U _R (V)									U _R (V)														
	6.3	10	16	25	40	50	63	100		10	16	25	40	63	100	160	250	350	385	400				
0.22																								
0.33																								
0.47																								
1								2*							4			4						
1.5																								
2.2								2*							4	4	5	5						
3.3																								
4.7								2*	3**					4	4	5	6	6						
6.8																								
10				2*		2*	3**	4						4	5	6	7							
15																								
22			2*	2*		3**	4	5			4			5	6	7								
33				2*	3**																			
47			2*	3**	4			5	7		4		5	6	7/00									
68									00					00	01									
100	2*		3**	4	5	6	7	01		5		6	00	02										
150		3**						00	02			01	02	03										
220	3**	4	5	6	7			01	02	5	6	7/01	01	02	04									
330					00			01	03		7/01	01	02	03	04									
470	4	5	6	7	01			02	04	01	7 01	01	02	04	05									
680				00	01			03	05	01	02	03	03	05										
1000	6	7	00	01	02			04		02	02	03	04	05										
1500		00	01	02	03			05		03	03	04	05											
2200	7	01	02	03	04					03	04	05	05											
3300		02	03	04	05					04	05													
4700		03	03	04						05	05													
6800		04	04	05																				
10 000		04	05																					
15 000		05																						
	preferred type																							
Case dimensions	case size / nominal dimensions Ø × L (mm)																							
	2			4			7			03			2*			3			3**					
	Ø 4.5 × 10			Ø 6.5 × 18			Ø 10 × 25			Ø 18 × 30			Ø 6.3 × 12.7			Ø 8 × 11			Ø 10 × 30			Ø 18 × 40		
	3			5			01			04			02			05			03			05		
Ø 6 × 10			Ø 8 × 18			Ø 12.5 × 30			Ø 21 × 40			Ø 7.7 × 12.7			Ø 10 × 18			Ø 15 × 30						
Endurance IEC	case sizes 00-05: 5000 h/105 °C case sizes 2*-7: 1000 h/105 °C									case sizes 6-05: 8000 h/85 °C case sizes 4-5: 6000 h/85 °C case sizes 4-7: 2000 h/105 °C														
Temperature-range	- 40 °C to + 105 °C									- 40 °C to + 85 °C														
Tolerance	± 20%									- 10% to + 50%														
Pref. packing	ammopack for case sizes 2* to 7																							

see series
041, 042, 043 ASH
(page 72)

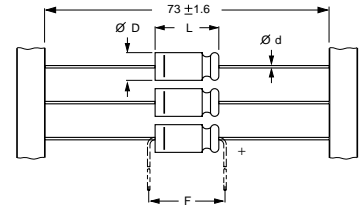
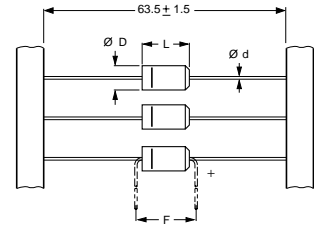
Ordering information Preferred types

138 AML series

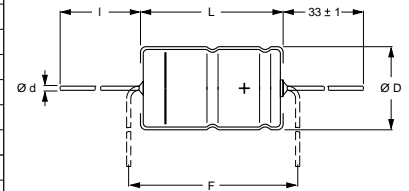
U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 105 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	catalogue number 2222
10	470	5	300	0.68	0.43	BA	138 34471
		2200	01	750	0.19	0.14	AA
	4700	03	1200	0.105	0.083	AA	138 14472
						MR	138 44472
	10000	04	1900	0.059	0.048	AA	138 14103
						MR	138 44103
16	47	2*	83	5.4	3.4	BA	138 35479
	100	3**	130	2.5	1.6	BA	138 35101
	220	5	230	1.2	0.73	BA	138 35221
	470	6	360	0.54	0.34	BA	138 35471
						AA	138 15102
	1000	00	530	0.29	0.20	AA	138 15102
						BR	138 25102
	2200	02	950	0.15	0.105	AA	138 15222
						BR	138 25222
						MR	138 45222
	4700	03	1400	0.093	0.073	AA	138 15472
						MR	138 45472
	10000	05	2100	0.055	0.044	AA	138 15103
						MR	138 45103
	25	22	2*	61	10	5.5	BA
33		2*	74	6.8	3.6	BA	138 36339
47		3**	96	4.7	2.6	BA	138 36479
100		4	160	2.1	1.2	BA	138 36101
220		6	270	0.94	0.55	BA	138 36221
470		7	440	0.44	0.26	BA	138 36471
1000		01	670	0.22	0.14	AA	138 16102
						BR	138 26102
2200		03	1200	0.12	0.083	AA	138 16222
						MR	138 46222
4700	04	1800	0.067	0.049	AA	138 16472	
					MR	138 46472	
40	100	5	180	1.6	0.9	BA	138 37101
	220	7	350	0.72	0.41	BA	138 37221
	470	01	550	0.33	0.18	AA	138 17471
						BR	138 27471
	1000	02	840	0.17	0.105	AA	138 17102
BR						138 27102	
2200	04	1500	0.09	0.055	AA	138 17222	
					MR	138 47222	
50	10	2*	51	14	7	BA	138 31109
	22	3**	82	6.5	3.2	BA	138 31229
63	4.7	2*	35	30	17	BA	138 38478
						AA	138 38229
	47	5	150	2.4	1.7	BA	138 38479
						AA	138 38101
	100	7	280	1.1	0.8	BA	138 38101
						AA	138 18221
220	01	470	0.50	0.28	AA	138 18221	
					BR	138 28221	
470	02	730	0.26	0.15	AA	138 18471	
					BR	138 28471	
1000	04	1300	0.13	0.08	AA	138 18102	
					MR	138 48102	
100	1.0	2*	16	140	55	BA	138 39108
	2.2	2*	24	65	25	BA	138 39228
	100	01	290	1.1	0.77	AA	138 19101
						BR	138 29101
	220	02	470	0.54	0.37	AA	138 19221
						BR	138 29221
470	04	840	0.27	0.19	AA	138 19471	
					MR	138 49471	

132, 133 ALL-DIN series

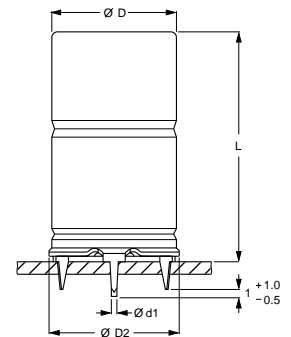
U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 85 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	catalogue number 2222
10	1000	02	640	0.28	0.12	AA	132 14102
						BR	132 24102
						MR	132 44102
	2200	03	1100	0.16	0.09	AA	132 14222
						MR	132 44222
						AA	132 14472
4700	05	1800	0.09	0.05	AA	132 14472	
					MR	132 44472	
16	100	5	150	2.2	1.2	BA	132 35101
	220	6	250	1.0	0.55	BA	132 35221
	470	01	450	0.47	0.26	AA	132 15471
						BR	132 25471
	1000	02	780	0.22	0.12	AA	132 15102
						BR	132 25102
2200	04	1300	0.11	0.06	AA	132 15222	
					MR	132 45222	
4700	05	2300	0.05	0.05	AA	132 15472	
					MR	132 45472	
25	220	7	340	0.8	0.40	BA	132 90504
	220	01	340	0.8	0.40	AA	132 16221
	470	01	560	0.37	0.20	AA	132 16471
						BR	132 26471
	1000	03	1000	0.17	0.10	AA	132 16102
						MR	132 46102
2200	05	1850	0.09	0.05	AA	132 16222	
					MR	132 46222	
40	47	5	120	3.0	1.6	BA	132 37479
	100	6	210	1.4	0.75	BA	132 37101
	220	01	410	0.65	0.34	AA	132 17221
						BR	132 27221
	470	02	700	0.30	0.16	AA	132 17471
BR						132 27471	
1000	04	1200	0.14	0.08	AA	132 17102	
					MR	132 47102	
2200	05	1900	0.07	0.05	AA	132 17222	
					MR	132 47222	
63	10	4	64	11	5.5	BA	132 38109
	22	5	100	5.1	2.5	BA	132 38229
	47	6	170	2.4	1.2	BA	132 38479
	100	00	300	1.1	0.60	AA	132 18101
220	02	520	0.50	0.25	AA	132 18221	
					BR	132 28221	
					MR	132 48221	
	470	04	970	0.24	0.12	AA	132 18471
						MR	132 48471
	1000	05	1600	0.11	0.06	AA	132 18102
MR						132 48102	
100	4.7	4	48	20	9.6	BA	132 39478
	10	5	73	9.5	4.5	BA	132 39109
	22	6	130	4.3	2	BA	132 39229
	47	7	220	2.0	1	BA	132 90506
						AA	132 19479
	100	02	380	0.95	0.50	AA	132 19101
BR						132 29101	
220	04	660	0.43	0.20	AA	132 19221	
					MR	132 49221	
470	05	1200	0.20	0.10	AA	132 19471	
					MR	132 49471	
160	2.2	4	22	72	55	BA	133 31228
350	4.7	6	43	34	21	BA	133 35478



Form BA: taped in box (ampopack)
Form BR: taped on reel

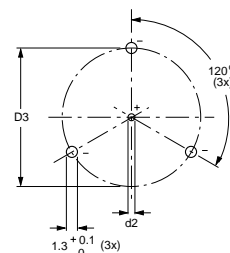


Form AA: axial in box



Form MR: single ended pin with
mounting ring and pins

Case not insulated
(insulation available on request)



mounting hole diagram

Electrolytic Capacitors

Axial, 125 °C



upgraded ripple current and life time

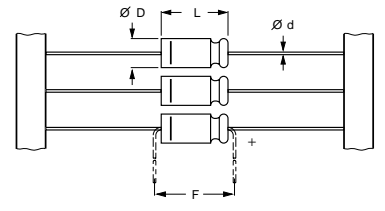


upgraded ripple current and life time

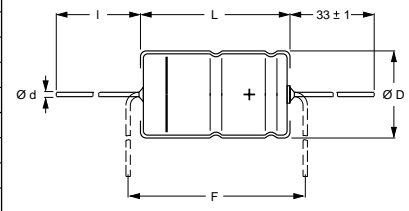
Series	118 AHT Axial High Temperature								119 AHT-DIN Axial High Temperature - DIN 45910 - T123 based							
Useful life	4000 h/125 °C case sizes 00-05 : 8000 h/125 °C or 10 000 h/105 °C case sizes 00-05 : 20 000 h/105 °C or 32 000 h/85 °C case sizes 00-05 : 64 000 h/85 °C								4000 h/125 °C case sizes 00-05 : 8000 h/125 °C or 10 000 h/105 °C case sizes 00-05 : 20 000 h/105 °C or 32 000 h/85 °C case sizes 00-05 : 64 000 h/85 °C							
Features	125 °C, high CV product per unit volume								125 °C, high ripple							
Applications	professional, automotive, military								professional, telecom, SMPS							
C _R (μF)	U _R (V)								U _R (V)							
	6.3	10	16	25	40	63	100	200	10	16	25	40	63	100	200	
0.22																
0.33																
0.47																
1						4										
1.5																
2.2						4		4								
3.3																
4.7						4	4	5						4	6	
6.8																
10						4	4	7					4	5	7	
15								00								
22						4	5	01			4		5	6		
33							6	02								
47					4	5	7	00	03		4		5	6	7	00
68								01	04					00	01	
100				4	5	7/00	01	05		4	5	6	7	00	02	
150					6	01	02						01	02	02	
220		4	5	6	7	00	01	03		6	7	7/01	01	02	03	
330		5	6	7	01	02	04				01	01	02	03	04	
470		5	6	7/00	01	03	05			7/01	01	01	02	04	05	
680			00	01	02	04				01	02	03	03	05		
1000	6	7	00	01	01	03	05			02	02	03	04	05		
1500	7	01	01	02	04					03	03	04	05			
2200		01	02	03	05					03	04	05	05			
3300		02	03	04						04	05					
4700		03	04	05						05	05					
6800		04	05													
10 000		05														
15 000																
	 preferred type															
Case dimensions	case size / nominal dimensions ∅ × L (mm)															
	4 ∅ 6.5 × 18				7 ∅ 10 × 25				03 ∅ 18 × 30							
	5a ∅ 8 × 11				00 ∅ 10 × 30				04 ∅ 18 × 40							
	5 ∅ 8 × 18				01 ∅ 12.5 × 30				05 ∅ 21 × 40							
	6 ∅ 10 × 18				02 ∅ 15 × 30											
Endurance IEC	case sizes 00-05 : 3000 h/125 °C 4-7 : 2000 h/125 °C								case sizes: 00-05 : 4000 h/125 °C 4-7 : 2000 h/125 °C							
Temperature-range	case sizes 4-7 : - 40 to + 125 °C case sizes 00-05: - 55 to + 125 °C								- 55 °C to + 125 °C							
Tolerance	± 20%								- 10% to + 50%							
Pref. packing	ammopack for case sizes 4 to 7															

Ordering information Preferred types

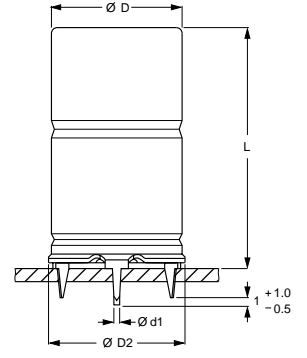
118 AHT series								119 AHT-DIN series								
upgraded I _r								upgraded I _r								
U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 125 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	catalogue number 2222	U _R (V)	C _R 100 Hz (μF)	case code	I _R 100 Hz 125 °C (mA)	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	form	catalogue number 2222	
10	470	5	179	1.19	1.0	BA	118 34471	10	470	7	380	0.61	0.49	BA	119 90502	
	1000	00	550	0.505	0.45	AA	118 14102		470	01	550	0.54	0.38	BR	119 14471	
	2200	01	830	0.290	0.27	AA	118 14222		1000	02	830	0.32	0.24	AA	119 14102	
						BR	118 24222							BR	119 24102	
	4700	03	1350	0.155	0.15	AA	118 14472		2200	03	1190	0.19	0.17	AA	119 14222	
	10000	05	1860	0.084	0.10	AA	118 14103							MR	119 44102	
MR						118 44103	MR	119 44222								
16	470	6	243	0.85	0.83	BA	118 35471	16	47	4	110	4.4	2.2	BA	119 35479	
	1000	01	720	0.345	0.28	AA	118 15102		470	01	560	0.51	0.38	AA	119 15471	
	2200	02	1010	0.205	0.18	AA	118 15222		1000	02	850	0.30	0.24	AA	119 15102	
						BR	118 25222							BR	119 25471	
						MR	118 45222							MR	119 25102	
	4700	04	1670	0.105	0.10	AA	118 15472		2200	04	1440	0.14	0.10	AA	119 15222	
MR						118 45472	MR	119 45222								
AA						118 16471	AA	119 15472								
25	100	4	102	2.86	2.3	BA	118 36101	25	22	4	85	7.2	3.2	BA	119 36229	
	220	6	196	1.30	1.25	BA	118 36221		100	6	210	1.6	1.0	BA	119 36101	
	470	7	327	0.61	0.57	BA	118 90509		220	7	350	0.72	0.58	BA	119 90504	
	470	00	490	0.61	0.50	AA	118 16471		220	01	500	0.65	0.38	AA	119 16221	
						BR	118 26471							BR	119 26221	
	1000	01	760	0.375	0.28	AA	118 16102		470	01	630	0.44	0.38	AA	119 16471	
2200	03	1240	0.185	0.17	AA	118 16222	BR	119 26471								
					MR	118 46222	MR	119 26471								
4700	05	1710	0.095	0.10	AA	118 16472	1000	03	1090	0.21	0.17	AA	119 16102			
40	47	4	89.8	3.72	2.8	BA						118 37479	MR	119 46102		
						100						5	147	1.75	1.3	BA
220	00	390	0.70	0.55	AA	118 17221	MR	119 46222								
40	470	01	620	0.38	0.30	AA	118 17471	40	220	01	480	0.65	0.48	AA	119 17221	
						BR	118 27471		BR	119 27221						
	1000	03	1070	0.205	0.18	AA	118 17102		470	02	720	0.41	0.37	AA	119 17471	
						MR	118 47102		BR	119 27471						
	2200	05	1540	0.105	0.10	AA	118 17222		1000	04	1250	0.19	0.14	AA	119 17102	
						MR	118 47222							MR	119 47102	
63	10	4	51.9	11	5.6	BA	118 38109	63	2200	05	1550	0.13	0.11	AA	119 17222	
	22	4	77.0	5.1	3.2	BA	118 38229		100	10	4	68	11	5.6	BA	119 38109
	47	5	126	2.4	1.5	BA	118 38479			22	5	110	5.1	2.8	BA	119 38229
	100	00	340	1.1	1.0	AA	118 18101			47	6	180	2.4	1.3	BA	119 38479
						BR	118 28101			100	00	360	1.3	0.75	AA	119 18101
	220	01	550	0.61	0.56	AA	118 18221			220	02	640	0.58	0.37	AA	119 18101
BR						118 28221	BR	119 28101								
470	03	970	0.31	0.29	AA	118 18471	470	04	1130	0.30	0.15	AA	119 18221			
					MR	118 48471						BR	119 28221			
					MR	118 48471						MR	119 48221			
1000	05	1400	0.16	0.15	AA	118 18102	1000	05	1430	0.16	0.11	AA	119 18471			
					MR	118 48102						MR	119 48471			
					AA	118 18102						MR	119 48221			
100	47	00	240	2.6	2.0	AA	118 19479	100	47	00	240	2.7	2.0	AA	119 19479	
	100	01	380	1.4	1.15	AA	118 19101		100	100	02	440	1.4	0.96	AA	119 19101
	220	03	690	0.66	0.55	AA	118 19221			BR	119 29479					
						MR	118 49221		MR	119 49101						
	470	05	1050	0.33	0.28	AA	118 19471		220	03	710	0.72	0.55	AA	119 19221	
						MR	118 49471							MR	119 49221	
200	22	01	210	3.17	2.22	AA	118 92229	470	05	1070	0.34	0.28	AA	119 19471		
	47	03	390	1.48	0.60	AA	118 92479						MR	119 49471		
						MR	118 90003						MR	119 92101		
100	05	610	0.96	0.39	AA	118 92101	MR	119 90005								



Form BA: taped in box (ammopack)
Form BR: taped on reel

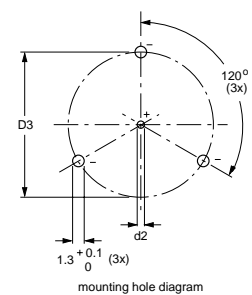


Form AA: axial in box



Form MR: single ended with
mounting ring and pins

Case not insulated
(insulation available on request)



mounting hole diagram

Electrolytic Capacitors

Solid Aluminium (SAL), 125 °C



Series	128 SAL-RPM Solid Aluminium Radial Pearls Miniature						122 SAL-RP Solid Aluminium Radial Pearls						123 SAL-A Solid Aluminium Axial					
Useful life	20 000 h/125 °C 2 000 h/175 °C						20 000 h/125 °C 2 000 h/175 °C						20 000 h/125 °C 2 000 h/175 °C					
Features	no derating, high reliability, small version of SAL-RP 122						no derating, high reliability, very low failure rate						can withstand extreme environmental conditions (– 80 °C to + 200 °C)					
Applications	automotive, telecommunications, SMPS						automotive, telecommunications, SMPS						military, aerospace, automotive					
C _R (μF)	U _R (V)						U _R (V)						U _R (V)					
	6.3	10	16	25	35	40	6.3	10	16	25	35	40	6.3	10	16	25	35	40
0.1						10												
0.15						10												
0.22						20												
0.33					20	30						1						
0.47					30	40						2						
0.68				20	30	40				1		2						
1				20	40	50				1	2	3						
1.5				20	50	60				1		4					1	
2.2			20	30	60	60			1	2		4					1	1
3.3			20	40	60				1	2	4						1	1
4.7		20	30	50				1	2	3							1	1
6.8		20	30	60				1	2	4							1	1
10	20	30	40	60			1	2	3	4					1	1	2A	2A
15		30	50				2	2	4						1	1	2A	2A
22	30	40	60				2	3							1	2A	2A	4
33	40	50					3	4						1	2A	2A	4	4
47	50	60					4						1	1	2A	2A	4	5
68	60						4						1	2A	2A	4	5	5
100														2A	4	4	6	6
150													2A	4	4	5	6	
220														4	5	6		
330													4	5	5	6		
470														5	6			
680													5	6	6			
1000													6	6				
1500													6					
	<input checked="" type="checkbox"/> preferred type																	
Case dimensions	case size H × W × T (mm)												case size ∅ × L (mm)					
	10	9.5 × 7 × 3					1	12.5 × 8 × 3.5					1	∅ 6.7 × 15.3				
	20	9.5 × 7 × 3.5					2	12.5 × 8 × 4.5					2A	∅ 7.6 × 20.4				
	30	9.5 × 7 × 4					3	12.5 × 8 × 5					4	∅ 9.3 × 23.3				
	40	9.5 × 7 × 5					4	12.5 × 8 × 6					5	∅ 10.3 × 32.0				
	50	9.5 × 8 × 5												6	∅ 12.9 × 32.0			
60	9.5 × 8 × 6																	
Endurance IEC	10 000 h/125 °C						10 000 h/125 °C						8000 h/125 °C					
Temp. range	– 55 °C to + 175 °C						– 55 °C to + 175 °C						– 80 °C to + 200 °C					
Tolerance	± 20%						± 20%						± 20%					
Pref. packing	ammopack						ammopack						ammopack					

Ordering information Preferred types

128 SAL-RPM series

U _C (V)	U _R (V)	C _R 100 Hz (μF)	max. case size H x W x T (mm)	I _R 100 Hz 125 °C (mA)	I _R 100 kHz 40 °C (mA)	ESR max. 100 Hz (Ω)	Z max. 100 kHz (Ω)	catalogue number 2222	
								form TFA ammo	
6.3	6.3	10	9.5 x 7 x 3.5	22.4	595	20	2	128 33109	
		22	9.5 x 7 x 4	32.9	870	9	1	128 33229	
		47	9.5 x 8 x 5	118.4	1360	4.3	0.5	128 33479	
10	10	4.7	9.5 x 7 x 3.5	16.1	425	43	3	128 34478	
		10	9.5 x 7 x 4	21.7	573	20	1.7	128 34109	
		22	9.5 x 7 x 5	51.7	870	9	0.9	128 34229	
		47	9.5 x 8 x 6	105.4	1140	4.3	0.4	128 34479	
16	16	2.2	9.5 x 7 x 3.5	14.0	370	91	4.5	128 35228	
		4.7	9.5 x 7 x 4	18.9	500	43	2.3	128 35478	
		10	9.5 x 7 x 5	42.9	720	20	1.1	128 35109	
		22	9.5 x 8 x 6	86.7	940	9	0.65	128 35229	
25	25	1	9.5 x 7 x 3.5	9.1	240	200	12.5	128 36108	
		2.2	9.5 x 7 x 4	13.6	360	91	7	128 36228	
		4.7	9.5 x 8 x 5	25.3	500	43	3.5	128 36478	
		10	9.5 x 8 x 6	64.8	660	20	2	128 36109	
25	35	0.47	9.5 x 7 x 4	6.3	165	430	20	128 30477	
		1	9.5 x 7 x 5	13.7	230	200	10	128 30108	
		2.2	9.5 x 8 x 6	33.1	360	91	4.5	128 30228	
25	40	0.1	9.5 x 7 x 3	2.0	75	1990	45	128 37107	
		0.22	9.5 x 7 x 3.5	4.2	115	910	27	128 37227	
		0.47	9.5 x 7 x 5	10.4	175	430	15	128 37477	
		1	9.5 x 8 x 5	20.0	230	200	7	128 37108	
		2.2	9.5 x 8 x 6	33.1	360	91	4.2	128 37228	

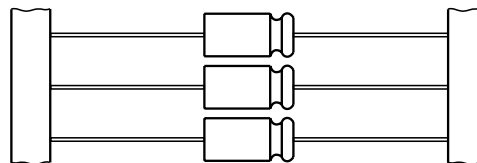
122 SAL-RP series

U _C (V)	U _R (V)	C _R 100 Hz (μF)	max. case size H x W x T (mm)	I _R 100 Hz 125 °C (mA)	I _R 100 kHz 40 °C (mA)	ESR max. 100 Hz (Ω)	Z max. 100 kHz (Ω)	catalogue number 2222	
								form TFA ammo	
6.3	6.3	10	12.5 x 8 x 3.5	9	211	30	5.0	122 33109	
		22	12.5 x 8 x 4.5	20	317	14	1.3	122 33229	
		47	12.5 x 8 x 6	42	502	6.4	0.7	122 33479	
10	10	4.7	12.5 x 8 x 3.5	7	158	64	7.0	122 34478	
		10	12.5 x 8 x 4.5	14	211	30	1.5	122 34109	
		22	12.5 x 8 x 5	31	317	14	0.7	122 34229	
16	16	2.2	12.5 x 8 x 3.5	5	132	91	10.0	122 35228	
		4.7	12.5 x 8 x 4.5	11	185	43	2.0	122 35478	
		10	12.5 x 8 x 5	23	164	20	1.0	122 35109	
25	25	1	12.5 x 8 x 3.5	4	85	200	20.0	122 36108	
		2.2	12.5 x 8 x 4.5	8	132	91	10.0	122 36228	
		4.7	12.5 x 8 x 5	17	185	43	5.0	122 36478	
		10	12.5 x 8 x 6	35	230	20	2.0	122 36109	
25	35	1	12.5 x 8 x 4.5	3	85	200	15.0	122 30108	
25	40	0.47	12.5 x 8 x 4.5	2	63	430	20.0	122 37477	
		1	12.5 x 8 x 5	4	85	200	10.0	122 37108	
		2.2	12.5 x 8 x 6	8	132	91	5.0	122 37228	

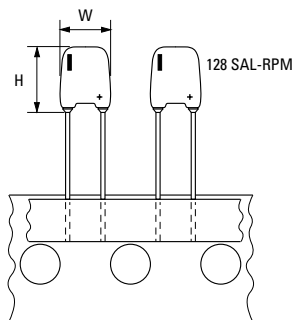
123 SAL-A series

U _R (V)	C _R 100 Hz (μF)	max. case size ∅ D x L (mm)	I _R 100 Hz 125 °C (mA)	I _R 100 kHz 40 °C (mA)	ESR max. 100 Hz (Ω)	Z max. 100 kHz (Ω)	catalogue number 2222	
							form BA	
6.3	47	6.7 x 15.3	58	640	7.6	1.2	123 13479	
	1000	12.9 x 32.0	940	4640	0.36	0.2	123 13102	
10	47	6.7 x 15.3	83	640	7.6	1.2	123 14479	
	100	7.6 x 20.4	160	1040	3.6	1.0	123 14101	
	220	9.3 x 23.3	350	1720	1.7	0.4	123 14221	
	470	10.3 x 32.0	570	2830	0.8	0.3	123 14471	
16	1000	12.9 x 32.0	1000	4920	0.36	0.2	123 14102	
	10	6.7 x 15.3	31	330	28	2.5	123 15109	
	22	6.7 x 15.3	63	490	13	2.5	123 15229	
	47	7.6 x 20.4	120	810	5.9	2.0	123 15479	
	100	9.3 x 23.3	260	1340	2.8	0.8	123 15101	
	220	10.3 x 32.0	420	2060	1.5	0.6	123 15221	
25	470	12.9 x 32.0	680	3330	0.7	0.4	123 15471	
	10	6.7 x 15.3	43	330	28	5.0	123 16109	
	22	7.6 x 20.4	88	550	13	2.5	123 16229	
	47	7.6 x 20.4	160	810	5.9	2.5	123 16479	
25	100	9.3 x 23.3	250	1250	3.2	1.0	123 16101	
	220	12.9 x 32.0	460	2270	1.5	0.6	123 16221	
	1	6.7 x 15.3	4	80	240	16.5	123 10108	
	2.2	6.7 x 15.3	10	120	109	7.5	123 10228	
35	4.7	6.7 x 15.3	20	170	51	7.5	123 10478	
	10	7.6 x 20.4	37	280	24	2.5	123 10109	
	22	7.6 x 20.4	78	420	11	2.5	123 10229	
	47	9.3 x 23.3	140	700	5.1	1.0	123 10479	
	100	12.9 x 32.0	220	1100	3.2	0.6	123 10101	
	220	12.9 x 32.0	460	2270	1.5	0.6	123 10221	
40	2.2	6.7 x 15.3	11	120	109	7.5	123 17228	
	4.7	6.7 x 15.3	22	170	51	7.5	123 17478	
	10	7.6 x 20.4	41	280	24	2.5	123 17109	
	22	9.3 x 23.3	89	480	11	1.5	123 17229	
	47	10.3 x 32.0	160	790	5.1	1.0	123 17479	
	100	12.9 x 32.0	220	1100	3.2	0.6	123 17101	
	220	12.9 x 32.0	460	2270	1.5	0.6	123 17221	

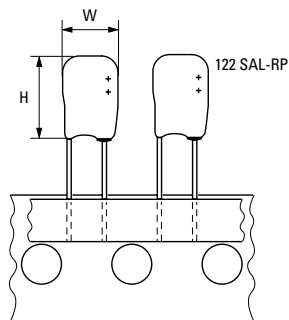
123 SAL-A



Form BA: taped in box (ammopack)



Form TFA: taped in box (ammopack)



Form TFA: taped in box (ammopack)

Electrolytic Capacitors

Snap-in, ultra miniature, 85 °C/ 105 °C



NEW



Series	157 PUM-SI Power Ultra Miniature Snap-In				159 PUL-SI Power Ultra Long life Snap-In				198 PHR-SI Power High Ripple current Snap-In	
Useful life	2500 h/85 °C				3000 h/105 °C				15 000 h/85 °C	
Features	small dimensions				small dimensions, long life, low ESR, high ripple current capability				very high ripple current capability terminal length is 4.0 ± 0.5 mm	
Applications	general purpose, industrial systems, SMPS				general purpose, industrial systems, SMPS				motor control, industrial systems	
C _R (μF)	U _R (V)				U _R (V)				U _R (V)	
	200	250	400	450	200	250	400	450	400	450
56				2225				2225		2225
68			2225	2230			2225	2230 2525	2225	2230
82			2225	2230 2525			2230 2525	2235	2225	2230 2525
100			2230	2235 2530			2235 2530	2240 2530 / 3025	2230	2235 2530
120			2230	2240 2530 3025			2235 2530 3025	2535	2230	2240 2530 3025
150			2235	2540 2530 3030			2240 2535 3030	2540 3030 3525	2235 2530	2540 3030
180			2240	2540 3035 3525			2540 3030 3525	2545 3035	2240 2535	2540 3035 3525
220		2230	2540 3030 3525	2550 3040 3530		2230 2525	2545 3035 3530	3040 3530	2540 3030 3525	2550 3040 3530
270	2225	2230 2525	2545 3035 3530	3045 3535		2235 2530 3025	2550 3040 3530	3045 3535	2545 3035 3530	3045 3535
330	2230	2235 2530	3040 3530	3050 3540	2230	2240 2530 / 3025	3045 3535	3050 3540	3040 3530	3050 3540
390	2230	2240 3025	3045 3535	3545	2235 2530	2535 3030	3050 3540	3545	3045 3535	3545
470	2235	2535 3030	3050 3540	3550	2240 3025	2540 3030 / 3525	3545	3550	3050 3540	3550
560	2240 2535 3025	2540 3030 3525	3545			2545 2535 3030 3530	3550		3545	3560
680	2540 3030 3525	2545 3035 3530	3550			2545 3030 3525	3045 3535		3550	3560
820	2545 3035 3530	3040 3535				2550 3035 3530	3045 3535 3540		3560	
1000	3040 3530	3045 3540				3045 3535	3540 3545			
1200	3045 3535	3545				3050 3535	3545 3550			
1500	3050 3540	3550				3545 3550				
1800	3545									
2200	3550									
explanation of case sizes: 2230 means ∅ 22 mm × L 30 mm										
<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #00AEEF; margin-right: 5px;"></div> preferred type </div>										
Endurance IEC	2000 h/85 °C				2000 h/105 °C				7000 h/85 °C	
Temperature range	- 25 °C to + 85 °C				- 25 °C to + 105 °C				- 25 °C to + 85 °C	
Tolerance	± 20%				± 20%				± 20%	

Ordering information Preferred types

157 PUM-SI series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 120 Hz 85 °C	ESR typical 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
200	330	22 x 30	1.36	260	500	157 52331
	470	22 x 35	1.68	190	400	157 32471
	680	25 x 40	2.18	170	340	157 42681
	1000	30 x 40	2.66	120	225	157 52102
	1500	30 x 50	3.31	90	155	157 42152
	2200	35 x 50	3.68	80	105	157 52222
250	220	22 x 30	1.23	340	700	157 53221
	330	22 x 35	1.53	230	430	157 33331
	470	25 x 35	1.87	180	320	157 33471
	680	25 x 45	2.29	130	260	157 63681
	1000	30 x 45	2.88	110	180	157 33102
	1500	35 x 50	3.49	90	140	157 53152
400	100	22 x 30	0.94	930	1220	157 56101
	150	22 x 35	1.13	700	900	157 36151
	220	25 x 40	1.54	520	590	157 46221
	330	30 x 40	1.97	320	525	157 56331
	470	30 x 50	2.40	240	350	157 46471
	680	35 x 50	2.79	190	265	157 56681
450	68	22 x 30	0.80	1230	1530	157 57689
	100	22 x 35	1.00	840	1050	157 37101
	150	25 x 40	1.35	570	705	157 47151
	220	25 x 50	1.73	400	525	157 47221
	330	30 x 50	2.19	280	390	157 47331
	470	35 x 50	2.60	210	290	157 57471

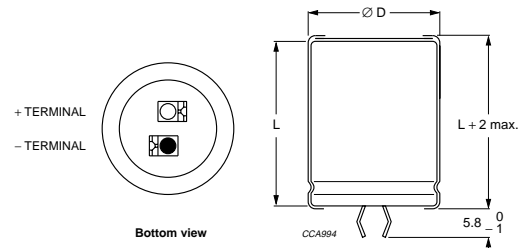
198 PHR-SI series

NEW

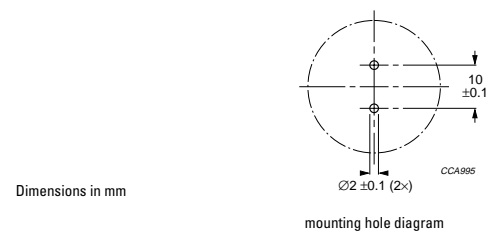
U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 100 Hz 85 °C	ESR typical 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
400	100	22 x 30	0.96	892	1220	198 56101
	150	22 x 35	1.21	602	900	198 46151
	220	25 x 40	1.59	419	590	198 46221
	330	30 x 40	2.03	296	525	198 46331
	470	30 x 50	2.51	212	350	198 46471
	680	35 x 50	3.03	165	265	198 56681
450	68	22 x 30	0.82	1182	1530	198 57689
	100	22 x 35	1.02	809	1050	198 47101
	150	25 x 40	1.36	547	705	198 47151
	220	30 x 40	1.75	387	525	198 57221
	330	30 x 50	2.22	264	390	198 47331
	470	35 x 50	2.73	200	290	198 57471
	680	35 x 60	3.30	147	220	198 57681

159 PUL-SI series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 120 Hz 105 °C	ESR typical 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
200	330	22 x 30	1.08	450	500	159 52331
	470	22 x 40	1.37	320	470	159 32471
	680	25 x 45	1.82	230	340	159 42681
	1000	30 x 45	2.23	170	225	159 42102
	1500	35 x 45	2.56	130	155	159 52152
250	220	22 x 30	1.00	540	700	159 43221
	330	22 x 40	1.20	360	430	159 33331
	470	25 x 40	1.58	270	400	159 33471
	680	30 x 40	1.93	210	260	159 43681
	1000	35 x 40	2.22	170	180	159 53102
400	100	22 x 35	0.69	990	1240	159 46101
	150	22 x 40	0.86	820	860	159 36151
	220	25 x 45	1.15	460	590	159 46221
	330	30 x 45	1.47	320	450	159 56331
	470	35 x 45	1.72	240	330	159 56471
450	68	22 x 30	0.56	1280	1530	159 47689
	100	22 x 40	0.74	870	1050	159 37101
	150	25 x 40	0.95	590	705	159 47151
	220	30 x 40	1.21	420	525	159 47221
	330	30 x 50	1.54	290	390	159 47331
	470	35 x 50	1.72	220	290	159 57471



(for 198 series terminal length is 4.0 ± 0.5 mm)



Dimensions in mm

Electrolytic Capacitors

Snap-in, 85 °C



Series	056, 057 PSM-SI Power Standard Miniature Snap-In	166, 167 PSM-4TSI Power Standard Miniature 4-Terminal Snap-In
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Useful life	12 000 h/85 °C (for 450 V, 5000 h/85 °C)	10 000 h/85 °C
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Features	very high CV per unit volume, long life	shock and vibration resistant, keyed polarity, long life
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Applications	general purpose, SMPS	general purpose, SMPS, general industrial
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C _R (μF)	U _R (V)												U _R (V)											
	10	16	25	40	50	63	100	200	250	385	400	450	10	16	25	40	63	100	200	250	385	400		
33																								
47										2225	2225	2230												
68										2230	2230	2230												
100										2225	2235	2235	2535											
150									2225	2230	3030	3030	3035											
220									2230	2240	2250	2550	3045											
330									2240	3030	3045	3540	3545								3540	3540		
470								2225	3030	2550	3545	3550									3545	3550		
680								2230	2550	3540									3540					
1000						2225	2530	3540	3550									3540	3550					
1500					2225	2230	3030	3550										3550						
2200				2225	2230	2530	3040																	
3300			2225	2230	2530	3030	3540											3540						
4700		2225	2230	2530	3030	3040	3550											3550						
6800	2225	2230	2530	3030	3040	3540											3540							
10 000	2230	2530	3030	3040	3540	3550										3550								
15 000	2530	3030	3040	3540	3550											3540								
22 000	3030	3040	3540	3550												3540	3550							
33 000	3040	3540	3550													3540	3550							
47 000	3540	3550														3540	3550							
68 000	3550															3550								

explanation of case sizes: 2225 means ∅ 22 mm × L 25 mm

preferred type

Endurance IEC	5000 h/85 °C (for 450 V, 2000 h/85 °C)
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Temperature range	- 40 °C to + 85 °C
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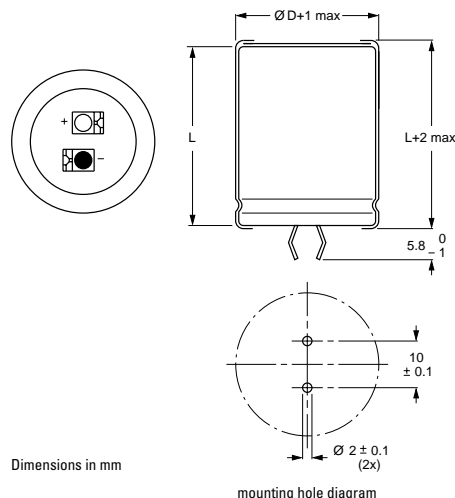
Tolerance	± 20%
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Ordering information Preferred types

056, 057 PSM-SI series

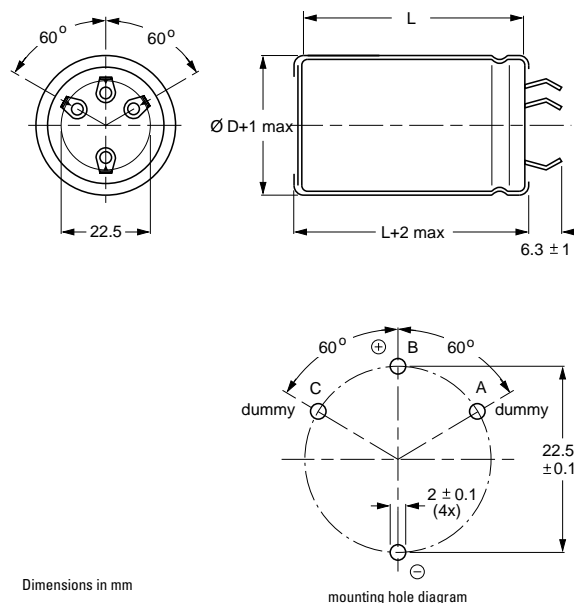
U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 100 Hz 85 °C	ESR max. 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
10	10 000	22 x 30	2.56	56	45	056 54103
	15 000	25 x 30	3.12	44	39	056 54153
	22 000	25 x 40	4.12	34	28	056 44223
	33 000	30 x 40	4.58	32	28	056 54333
	47 000	30 x 50	5.39	28	24	056 44473
	68 000	35 x 50	5.88	28	23	056 54683
16	6800	22 x 30	2.54	57	46	056 55682
	10 000	25 x 30	3.02	47	39	056 55103
	15 000	25 x 40	4.00	34	28	056 45153
	22 000	30 x 40	4.51	33	28	056 55223
	33 000	30 x 50	4.75	36	34	056 45333
	47 000	35 x 50	5.34	34	32	056 55473
25	4700	22 x 30	2.37	65	45	056 56472
	6800	25 x 30	2.81	54	41	056 56682
	10 000	25 x 40	3.73	39	30	056 46103
	15 000	30 x 40	4.73	30	28	056 56153
	22 000	30 x 50	4.96	36	23	056 46223
	33 000	35 x 50	4.98	39	33	056 56333
40	3300	22 x 30	2.09	67	45	056 57332
	4700	25 x 30	2.28	82	70	056 57472
	6800	25 x 40	3.06	58	50	056 47682
	10 000	30 x 40	4.20	38	28	056 57103
	15 000	30 x 50	4.45	41	34	056 47153
	22 000	35 x 50	4.86	40	33	056 57223
50	2200	22 x 30	1.75	120	91	056 51222
	3300	25 x 30	2.17	90	72	056 51332
	4700	25 x 40	2.89	65	52	056 41472
	6800	30 x 40	3.56	53	45	056 51682
	10 000	30 x 50	4.50	40	35	056 41103
	15 000	35 x 50	4.98	39	33	056 51153
63	1500	22 x 30	1.87	105	72	056 58152
	2200	25 x 30	2.32	79	59	056 58222
	3300	25 x 40	3.14	55	44	056 48332
	4700	30 x 40	3.67	50	38	056 58472
	6800	30 x 50	4.75	42	37	056 48682
	10 000	35 x 50	5.26	35	30	056 58103
100	680	22 x 30	0.99	375	328	056 59681
	1000	25 x 30	1.27	265	235	056 59102
	1500	25 x 40	1.75	180	160	056 49152
	2200	30 x 40	2.27	130	120	056 59222
	3300	30 x 50	2.97	92	85	056 49332
	4700	35 x 50	3.59	75	70	056 59472
200	220	22 x 30	1.00	650	435	057 52221
	330	25 x 30	1.36	430	310	057 52331
	470	25 x 40	1.80	310	230	057 42471
	680	30 x 40	2.39	210	180	057 52681
	1000	30 x 50	2.85	160	135	057 42102
	1500	35 x 50	3.66	120	105	057 52152
250	150	22 x 30	0.83	960	520	057 53151
	220	25 x 30	1.10	660	365	057 53221
	330	25 x 40	1.49	440	265	057 43331
	470	30 x 40	1.98	310	185	057 53471
	680	30 x 50	2.60	240	145	057 43681
	1000	35 x 50	3.12	160	105	057 53102
385	68	22 x 30	0.63	2100	1000	057 58689
	100	25 x 30	0.86	1400	780	057 58101
	150	25 x 40	1.16	950	520	057 48151
	220	30 x 35	1.50	650	400	057 38221
	330	30 x 45	1.75	480	280	057 38331
	470	35 x 45	2.29	340	220	057 48471
400	68	22 x 30	0.63	2100	1000	057 56689
	100	25 x 30	0.86	1400	780	057 56101
	150	25 x 40	1.16	950	520	057 46151
	220	30 x 35	1.50	650	400	057 36221
	330	30 x 50	1.85	480	280	057 46331
	470	35 x 50	2.40	340	220	057 56471

450						
	47	22 x 30	0.26	5600	4400	057 67479
	68	22 x 30	0.33	3900	3100	057 57689
	100	25 x 35	0.46	2600	2100	057 37101
	150	30 x 35	0.66	1600	1300	057 37151
	220	30 x 45	0.73	1100	900	057 37221
	330	35 x 45	1.20	700	600	057 47331



166, 167 PSM-4TSl series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 85 °C (A)	ESR max. 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
10	47 000	35 x 40	5.10	31	26	166 54473
16	47 000	35 x 50	5.34	34	32	166 55473
25	22 000	35 x 40	4.48	40	28	166 56223
40	22 000	35 x 50	4.86	40	33	166 57223
63	10 000	35 x 50	5.00	39	33	166 58103
100	4700	35 x 50	3.59	75	70	166 59472
200	1000	35 x 40	2.85	160	135	167 52102
250	1000	35 x 50	3.12	160	105	167 53102
385	470	35 x 45	2.29	340	220	167 48471
400	470	35 x 50	2.76	340	220	167 56471



Electrolytic Capacitors

Snap-in, 105 °C



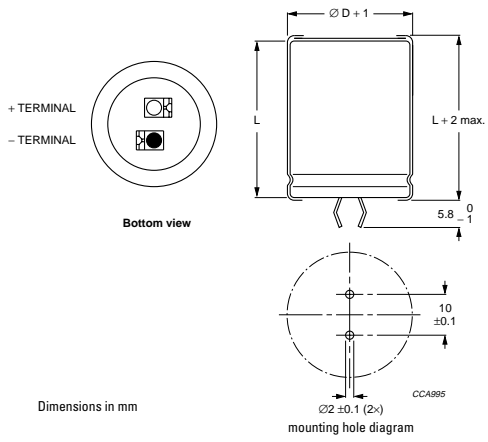
	snap-in										4-terminal snap-in										
Series	058, 059 PLL-SI Power Long Life Snap-In										168, 169 PLL-4TSI Power Long Life 4-Terminal Snap-In										
Useful life	≤ 50 V: 5 000 h/105 °C ≥ 63 V: 10 000 h/105 °C										5 000 h/105 °C										
Features	high temperature, long life, high ripple, low ESR										shock and vibration resistant, keyed polarity, very long life, low ESR										
Applications	industrial, SMPS										telecommunication, EDP, industrial systems, SMPS										
$C_R(\mu\text{F})$	$U_R(\text{V})$										$U_R(\text{V})$										
	10	16	25	40	50	63	100	200	250	385	400	10	16	25	40	63	100	200	250	385	400
33										2225											
47										2230	2230										
68										2225	2235	2235									
										2530	2530										
100										2225	2230	3030	3030								
										2540	2540										
150										2230	2235	2550	3035								
										2530	3040	2550									
220										2235	2535	3540	3050							3540	3540
										2530	3030	3050	3540								
330										2225	3030	3035	3550	3550						3550	3550
										2540	2550										
470										2230	3035	3045								3540	
										2550	3535										
680										2225	2240	3045	3545							3540	3545
										2530	3535									3550	
1000										2225	2230	3030	3550							3550	
										2540											
1500										2225	2230	2530	3040								
										2240	2550										
2200										2225	2230	2530	3030	3540						3540	
										2240	2540	3050									
3300										2225	2230	2530	3030	3040	3550					3550	
										2240	2540	2550									
4700										2225	2230	2530	3030	3040	3540					3540	
										2240	2540	2550	3050								
6800										2230	2530	3030	3040	3540	3550					3550	
										2240	2540	2550	3050								
10 000										2530	3030	3040	3540	3550						3540	
										2240	2540	2550	3050								
15 000										3030	3040	3540	3550							3540	3550
										2540	2550	3050									
22 000										3040	3540	3550								3540	3550
										2550	3050										
33 000										3540	3550									3540	3550
										3050											
47 000										3550										3550	
68 000																					
	explanation of case sizes: 2225 means $\varnothing 22 \text{ mm} \times L 25 \text{ mm}$																				
	 preferred type																				
Endurance IEC	≤ 50 V: 2000 h/105 °C ≥ 63 V: 5000 h/105 °C																				
Temperature range	− 40 °C to + 105 °C																				
Tolerance	± 20%																				

Ordering information Preferred types

058, 059 PLL-SI series

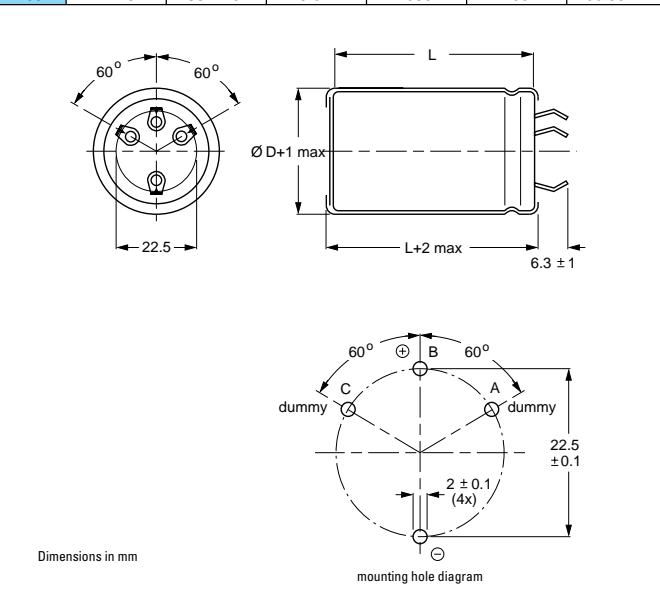
U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 105 °C (A)	ESR max. 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
10	6800	22 x 30	2.44	61	44	058 54682
	10 000	25 x 30	2.81	54	42	058 54103
	15 000	25 x 40	3.78	38	30	058 44153
	22 000	30 x 40	4.62	31	25	058 54223
	33 000	30 x 50	5.70	24	21	058 44333
	47 000	35 x 50	6.23	24	21	058 54473
16	4700	22 x 30	2.36	65	44	058 55472
	6800	25 x 30	2.75	56	42	058 55682
	10 000	25 x 40	3.66	40	30	058 45103
	15 000	30 x 40	4.55	32	25	058 55153
	22 000	30 x 50	5.67	25	21	058 45223
	33 000	35 x 50	6.23	25	21	058 55333
25	3300	22 x 30	2.23	73	44	058 56332
	4700	25 x 30	2.60	62	42	058 56472
	6800	25 x 40	3.49	44	30	058 46682
	10 000	30 x 40	4.37	35	25	058 56103
	15 000	30 x 50	5.43	27	21	058 46153
	22 000	35 x 50	6.07	27	21	058 56223
40	2200	22 x 30	2.04	87	50	058 57222
	3300	25 x 30	2.43	71	45	058 57332
	4700	25 x 40	3.26	51	32	058 47472
	6800	30 x 40	3.94	42	29	058 57682
	10 000	30 x 50	4.98	36	24	058 47103
	15 000	35 x 50	5.21	36	24	058 57153
50	1500	22 x 30	1.88	102	54	058 51152
	2200	25 x 30	2.27	82	47	058 51222
	3300	25 x 40	3.07	57	33	058 41332
	4700	30 x 40	3.77	47	30	058 51472
	6800	35 x 40	4.01	49	30	058 51682
	10 000	35 x 50	5.04	38	24	058 51103
63	1000	22 x 30	1.46	170	115	058 58102
	1500	25 x 30	1.76	137	85	058 58152
	2200	25 x 40	2.40	94	70	058 48222
	3300	30 x 40	3.07	70	50	058 58332
	4700	30 x 50	3.88	63	45	058 48472
	6800	35 x 50	4.58	46	35	058 58682
100	470	22 x 30	1.14	280	190	058 59471
	680	25 x 30	1.35	232	140	058 59681
	1000	25 x 40	1.85	158	115	058 49102
	1500	30 x 40	2.45	111	85	058 59152
	2200	30 x 50	3.13	82	65	058 49222
	3300	35 x 50	3.84	64	50	058 59332
200	150	22 x 30	0.67	850	540	059 52151
	220	25 x 30	0.87	610	430	059 52221
	330	25 x 40	1.12	435	300	059 42331
	470	25 x 50	1.25	335	225	059 42471
	680	30 x 45	1.87	235	155	059 32681
	1000	35 x 50	2.45	160	125	059 52102
250	100	22 x 30	0.62	1110	570	059 53101
	150	25 x 30	0.82	795	440	059 53151
	220	25 x 35	1.03	540	300	059 33221
	330	25 x 50	1.40	385	225	059 43331
	470	30 x 45	1.79	270	155	059 33471
	680	35 x 45	2.25	190	125	059 43681
385	47	22 x 30	0.41	2710	2100	059 58479
	68	25 x 30	0.52	1870	1460	059 58689
	100	25 x 40	0.72	1270	1010	059 48101
	150	30 x 40	0.99	850	675	059 58151
	220	30 x 50	1.31	580	465	059 48221
	330	35 x 50	1.75	390	320	059 58331

400						
	47	22 x 30	0.30	4260	3490	059 56479
	68	25 x 30	0.41	2950	2420	059 56689
	100	25 x 40	0.55	2020	1660	059 46101
	150	25 x 50	0.78	1350	1110	059 46151
	220	30 x 50	0.94	930	760	059 46221
	330	35 x 50	1.25	620	510	059 56331



168, 169 PLL-4TSL series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 105 °C (A)	ESR max. 100 Hz (mΩ)	Z max. 10 kHz (mΩ)	catalogue number 2222
10	47 000	35 x 50	6.23	24	21	168 54473
16	22 000	35 x 40	5.07	31	24	168 55223
25	22 000	35 x 50	6.07	27	21	168 56223
40	10 000	35 x 40	4.18	48	29	168 57103
63	4700	35 x 40	3.65	50	45	168 58472
100	2200	35 x 40	3.05	86	65	168 59222
200	1000	35 x 50	2.45	180	125	169 52102
250	470	35 x 40	1.82	270	155	169 53471
385	220	35 x 40	1.31	580	465	169 58221
400	220	35 x 40	0.94	930	760	169 56221



Electrolytic Capacitors

Printed wiring terminals, 85 °C/ 105 °C



Series	051, 053 PEC-PW Power Economic PW terminals								050, 052 PED-PW Power EURO DIN PW terminals								162, 163 PLL-PW Power Long Life PW terminals															
Useful life	12 000 h/85 °C,								15 000 h/85 °C								5 000 h/105 °C															
Features	high ripple, long life high CV per volume								high ripple, low ESR/ESL								low ESR, high ripple current, long life															
Applications	general industrial, telecom, SMPS								industrial, telecom, SMPS								industrial, telecom, computer															
C _R (µF)	U _R (V)								U _R (V)								U _R (V)															
	10	16	25	40	63	100	200	385	400	10	16	25	40	63	100	250	385	400	10	16	25	40	63	100	200	250	385	400				
33																																
47																1	1															
68															1	1											1	1				
100															2	2											1	2	2			
150															1	3	3										1	2	3	3		
220															2	4	4										2	3	4	4		
330															3	5/6	5/6										3	4	5/6	5/6		
470															4	7	7										3	4	5/6	5/6		
680															1	5 6	8 8										1	4	5 6	7 7		
1000															2	7	9										2	5/6	7	8	8	
1500															2	7	9										2	5/6	7	8	8	
2200															1	2	3	5 6									1	3	7	8	9	9
3300															1	2	3	5 6									1	3	5 6	9	9	
4700															1	2	3	4 7									2	4	7	8	8	
6800															1	2	3	4 7									2	4	7	8	8	
10 000															1	2	3	4 7									2	4	7	8	8	
15 000															1	2	3	4 7									2	4	7	8	8	
22 000															1	2	3	4 7									2	4	7	8	8	
33 000															1	2	3	4 7									2	4	7	8	8	
47 000															1	2	3	4 7									2	4	7	8	8	
68 000															1	2	3	4 7									2	4	7	8	8	
100 000															1	2	3	4 7									2	4	7	8	8	
150 000															1	2	3	4 7									2	4	7	8	8	
220 000															1	2	3	4 7									2	4	7	8	8	
330 000															1	2	3	4 7									2	4	7	8	8	
470 000															1	2	3	4 7									2	4	7	8	8	

preferred type

case size / nominal dimensions Ø × L (mm)

Case dimensions	1	Ø 25 × 30	4	Ø 35 × 40	7	Ø 40 × 50
	2	Ø 25 × 40	5	Ø 35 × 50	8	Ø 40 × 70
	3	Ø 30 × 40	6	Ø 40 × 40	9	Ø 40 × 100

Endurance IEC	5000 h/85 °C	5000 h/85 °C	2000 h/105 °C
Temperature range	- 40 °C to + 85 °C	- 40 °C to + 85 °C	- 40 °C to + 105 °C
Tolerance	± 20%	- 10% to + 30%	± 20%

Ordering information Preferred types

051, 053 PEC-PW series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 85 °C (A)	catalogue number 2222
10	10 000	25 x 30	3.10	051 54103
	22 000	30 x 40	5.00	051 54223
	47 000	35 x 50	6.80	051 54473
	100 000	40 x 70	9.20	051 54104
16	10 000	25 x 40	4.00	051 55103
	22 000	35 x 40	5.50	051 55223
	47 000	40 x 50	7.00	051 55473
	100 000	40 x 100	12.00	051 55104
25	4700	25 x 30	2.90	051 56472
	10 000	30 x 40	4.80	051 56103
	22 000	35 x 50	6.50	051 56223
	47 000	40 x 70	9.20	051 56473
40	4700	25 x 40	3.80	051 57472
	10 000	35 x 40	5.20	051 57103
	22 000	40 x 50	5.80	051 57223
	47 000	40 x 100	10.40	051 57473
63	2200	25 x 30	2.50	051 58222
	4700	30 x 40	4.10	051 58472
	10 000	35 x 50	5.40	051 58103
	22 000	40 x 100	10.00	051 58223
100	1000	25 x 40	2.34	051 59102
	2200	35 x 40	3.69	051 59222
	4700	40 x 50	5.21	051 59472
	10 000	40 x 100	9.50	051 59103
200	220	25 x 40	0.94	053 52221
	470	35 x 40	1.68	053 52471
	1000	40 x 50	2.86	053 52102
	2200	40 x 100	5.20	053 52222
385	100	25 x 40	0.84	053 58101
	220	35 x 40	1.15	053 58221
	470	40 x 50	1.96	053 58471
	1000	40 x 100	3.70	053 58102
400	100	25 x 40	0.73	053 56101
	220	35 x 40	1.28	053 56221
	470	40 x 50	2.12	053 56471
	1000	40 x 100	4.05	053 56102

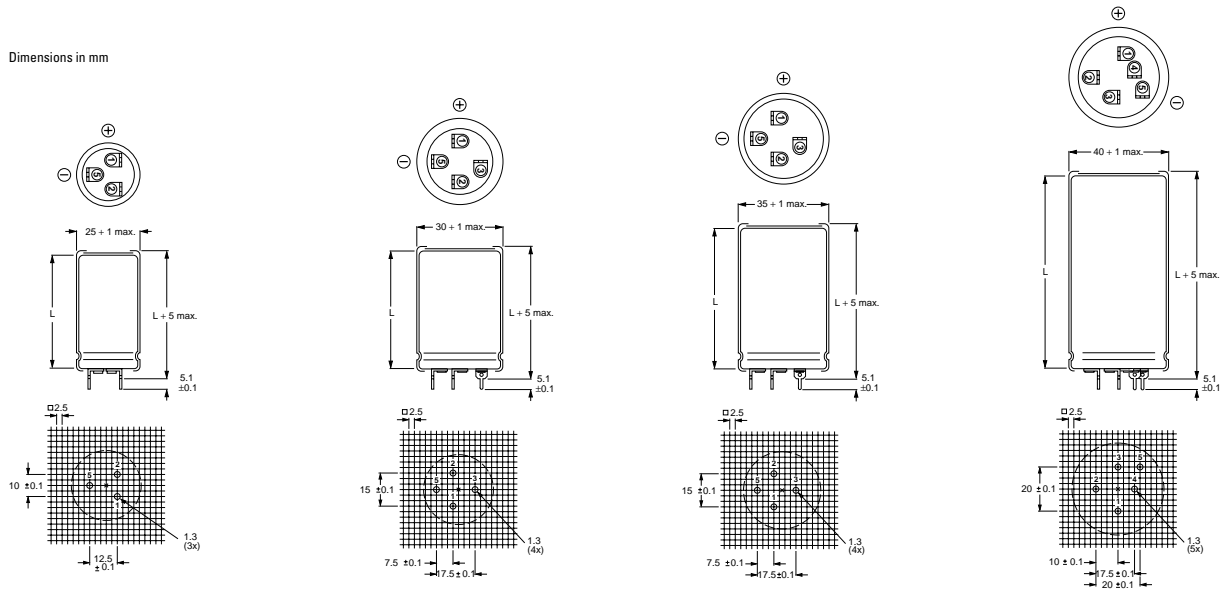
050, 052 PED-PW series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 85 °C (A)	catalogue number 2222
10	4700	25 x 30	2.40	050 54472
	10 000	30 x 40	3.80	050 54103
	22 000	35 x 50	5.00	050 54223
	47 000	40 x 70	6.80	050 54473
16	4700	25 x 40	3.10	050 55472
	10 000	35 x 40	4.10	050 55103
	22 000	40 x 50	5.00	050 55223
	47 000	40 x 100	9.10	050 55473
25	2200	25 x 30	2.30	050 56222
	4700	30 x 40	3.70	050 56472
	10 000	35 x 50	5.00	050 56103
	22 000	40 x 70	6.80	050 56223
40	2200	25 x 40	2.70	050 57222
	4700	35 x 40	3.80	050 57472
	10 000	40 x 50	4.90	050 57103
	22 000	40 x 100	9.00	050 57223
63	1000	25 x 30	1.80	050 58102
	2200	30 x 40	3.10	050 58222
	4700	35 x 50	4.40	050 58472
	10 000	40 x 70	6.20	050 58103
100	470	25 x 30	1.40	050 59471
	1000	30 x 40	2.50	050 59102
	2200	35 x 50	3.90	050 59222
	4700	40 x 70	6.20	050 59472
250	100	25 x 30	0.60	052 53101
	220	30 x 40	1.00	052 53221
	470	35 x 50	1.80	052 53471
	1000	40 x 70	3.00	052 53102
385	47	25 x 30	0.50	052 58479
	100	30 x 40	0.84	052 58101
	220	35 x 50	1.48	052 58221
	470	40 x 70	2.70	052 58471
400	47	25 x 30	0.47	052 56479
	100	30 x 40	0.84	052 56101
	220	35 x 50	1.41	052 56221
	470	40 x 70	2.54	052 56471

162, 163 PLL-PW series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 105 °C (A)	catalogue number 2222
10	10 000	25 x 30	3.17	162 54103
	22 000	30 x 40	5.05	162 54223
	47 000	35 x 50	6.19	162 54473
	100 000	40 x 70	10.0	162 54104
16	10 000	25 x 40	4.09	162 55103
	22 000	35 x 40	5.53	162 55223
	47 000	40 x 50	7.46	162 55473
	100 000	40 x 100	12.90	162 55104
25	4700	25 x 30	2.94	162 56472
	10 000	30 x 40	4.81	162 56103
	22 000	35 x 50	5.98	162 56223
	47 000	40 x 70	9.43	162 56473
40	2200	25 x 30	2.36	162 57222
	4700	30 x 40	3.93	162 57472
	10 000	35 x 50	5.03	162 57103
	22 000	40 x 70	8.34	162 57223
63	1000	25 x 30	1.55	162 58102
	2200	30 x 40	2.72	162 58222
	4700	35 x 50	4.09	162 58472
	10 000	40 x 70	6.86	162 58103
100	470	25 x 30	1.42	162 59471
	1000	30 x 40	2.48	162 59102
	2200	35 x 50	3.79	162 59222
	4700	40 x 70	6.49	162 59472
200	220	25 x 40	0.96	163 52221
	470	35 x 40	1.66	163 52471
	1000	40 x 50	2.71	163 52102
	2200	40 x 100	5.24	163 52222
250	100	25 x 30	0.67	163 53101
	220	30 x 40	1.28	163 53221
	470	35 x 50	2.01	163 53471
	1000	40 x 70	3.58	163 53102
385	100	25 x 30	0.82	163 58101
	220	35 x 40	1.44	163 58221
	470	40 x 50	2.37	163 58471
	1000	40 x 100	4.54	163 58102
400	100	25 x 40	0.53	163 56101
	220	35 x 40	0.94	163 56221
	470	40 x 50	1.59	163 56471
	1000	40 x 100	3.07	163 56102

Dimensions in mm



mounting hole diagrams viewed from component side

Electrolytic Capacitors

Screw terminals, 85 °C

Extended voltage



Series **086, 087 PS-ST**
Power Standard Screw Terminal

Useful life < 100 V: 5 000 h/85 °C ≥ 100 V: 3 000 h/85 °C

Features high ripple current capability, very high CV per volume

Applications industrial, welding, motor control devices, uninterruptable power supplies

C _R (μF)	U _R (V)													
	16	25	40	50	63	75	100	200	250	350	400	450	500	
220													35 x 54	
270														
330												35 x 54		
390											35 x 54		35 x 80	
470														
560												35 x 80	35 x 105	
680									35 x 54	35 x 80				
820												35 x 105	50 x 80	50 x 80
1000								35 x 54		35 x 105				
1200									35 x 80		50 x 80	50 x 105	50 x 105	
1500								35 x 80			50 x 80		50 x 130	
1800										35 x 105		50 x 105	50 x 143	
2200								35 x 105			50 x 105	50 x 130	63.5 x 105	63.5 x 105
2700							35 x 54			50 x 80	63.5 x 105	63.5 x 105	63.5 x 130	
3300							35 x 80				50 x 143	63.5 x 130	76 x 105	76 x 105
3900						35 x 54			50 x 80	50 x 105	63.5 x 130	76 x 105	76 x 118	
4700					35 x 54					50 x 130	76 x 105	76 x 118	76 x 143	76 x 143
5600								35 x 105	50 x 105	50 x 143	76 x 118	76 x 143		
6800							35 x 80		50 x 130	63.5 x 105	76 x 143			
8200				35 x 54	35 x 80				50 x 143	63.5 x 130			76 x 220	
10 000			35 x 54			35 x 105	50 x 80	63.5 x 105	76 x 105			76 x 220		
12 000				35 x 80	35 x 105				76 x 105	76 x 118	76 x 220			
15 000			35 x 80			50 x 80	50 x 105	76 x 118	76 x 143					
18 000		35 x 54		35 x 105	50 x 80		50 x 130							
22 000	35 x 54		35 x 105			50 x 105	63.5 x 105	76 x 143	76 x 220					
27 000		35 x 80		50 x 80	50 x 105	50 x 118	63.5 x 130							
33 000					50 x 118	63.5 x 105	76 x 105	76 x 220						
39 000	35 x 80	35 x 105	50 x 80		50 x 143	63.5 x 118	76 x 118							
47 000				50 x 105	63.5 x 105	76 x 105								
56 000	35 x 105		50 x 105	50 x 118	63.5 x 118	76 x 118	76 x 143							
68 000		50 x 80		50 x 118	63.5 x 105	76 x 105								
82 000	50 x 80		50 x 143	63.5 x 118	76 x 118	76 x 143	76 x 220							
100 000		50 x 105	63.5 x 105	76 x 105	76 x 143									
120 000	50 x 105	50 x 118	63.5 x 118	76 x 118		76 x 220								
150 000	50 x 118	63.5 x 105	76 x 105	76 x 143	76 x 220									
180 000	50 x 143	63.5 x 118	76 x 118											
220 000	63.5 x 105	76 x 105	76 x 143	76 x 220										
270 000	63.5 x 118	76 x 118												
330 000	76 x 105	76 x 143	76 x 220											
390 000	76 x 118													
470 000	76 x 143													
560 000		76 x 220												
820 000	76 x 220													

 preferred type

Endurance IEC 1000 h/85 °C

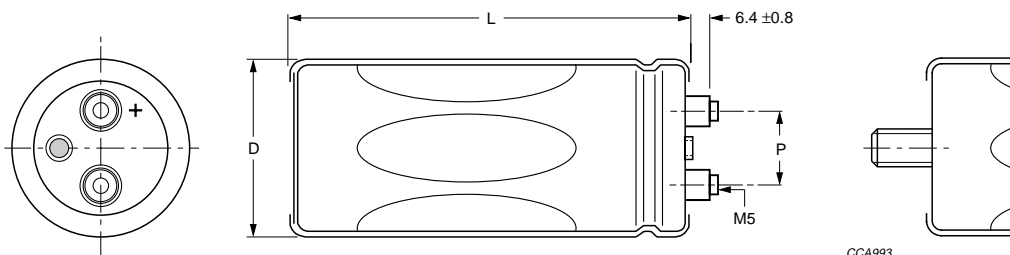
Temperature range - 40 °C to + 85 °C

Tolerance - 10% to + 30%

Ordering information Preferred types

086, 087 PS-ST series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 100 Hz 85 °C	ESR max. 100 Hz (mΩ)	catalogue number 2222
16	82 000	50 x 80	17.0	6	086 15823
	120 000	50 x 150	21.0	5	086 15124
	220 000	63.5 x 105	27.0	4	086 15224
	330 000	76 x 105	32.0	4	086 25334
	470 000	76 x 143	40.0	3	086 15474
40	39 000	50 x 80	15.0	7	086 17393
	56 000	50 x 105	19.0	6	086 17563
	100 000	63.5 x 105	24.0	5	086 17104
	150 000	76 x 105	29.0	4	086 27154
	220 000	76 x 143	37.0	3	086 17224
63	18 000	50 x 80	10.0	15	086 18183
	27 000	50 x 105	13.0	11	086 18273
	47 000	63.5 x 105	18.0	8	086 18473
	68 000	76 x 105	23.0	6	086 28683
	100 000	76 x 143	30.0	5	086 18104
100	10 000	50 x 80	5.5	52	086 19103
	15 000	50 x 105	7.3	37	086 19153
	22 000	63.5 x 105	11.0	19	086 29223
	33 000	76 x 105	14.0	14	086 29333
	56 000	76 x 143	22.0	8	086 19563
250	2700	50 x 80	4.4	67	087 13272
	3900	50 x 105	7.9	27	087 13392
	6800	63.5 x 105	10.0	24	087 13682
	10 000	76 x 105	11.0	25	087 23103
	15 000	76 x 143	14.0	19	087 13153
400	1200	50 x 80	3.7	95	087 16152
	1800	50 x 105	5.5	59	087 16182
	2700	63.5 x 105	7.3	48	087 26272
	3900	76 x 105	9.4	37	087 26392
	5600	76 x 143	11.0	28	087 16562
450	820	50 x 80	3.0	145	087 17821
	1200	50 x 105	4.6	85	087 17122
	2200	63.5 x 105	6.7	53	087 17222
	3300	76 x 105	9.5	35	087 27332
	4700	76 x 143	11.0	31	087 17472
500	820	50 x 80	3.4	132	087 18821
	1200	50 x 105	4.6	90	087 18122
	2200	63.5 x 105	6.6	59	087 18222
	3300	76 x 105	8.6	43	087 18332
	4700	76 x 143	11.7	30	087 18472



Electrolytic Capacitors

Screw terminals, 85 °C

NEW



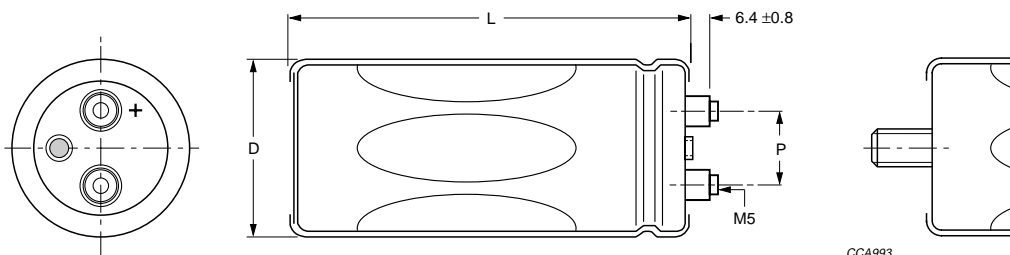
Series	002 HRC-ST High Ripple Current Screw Terminal		
Useful life	3 000 h/85 °C		
Features	high ripple current capability, very high CV per volume		
Applications	industrial, welding, motor control devices, uninterruptable power supplies		
C _R (μF)	U _R (V)		
	400	450	500
220			
270			
330			
390			
470			
560			
680			50 x 80
820		50 x 80	
1000			50 x 105
1200	50 x 80	50 x 105	
1500			63.5 x 105
1800	50 x 105		
2200		63.5 x 105	76 x 105
2700	63.5 x 105		
3300		76 x 105	76 x 143
3900	76 x 105		
4700		76 x 143	
5600	76 x 143		
6800			
8200			
10 000			
12 000			
15 000			
18 000			
22 000			
27 000			
33 000			
39 000			
47 000			
56 000			
68 000			
82 000			
100 000			
120 000			
150 000			
180 000			
220 000			
270 000			
330 000			
390 000			
470 000			
560 000			
820 000			
	preferred type		
Endurance IEC	1000 h/85 °C		
Temperature range	- 20 °C to + 85 °C		
Tolerance	- 10% to + 30%		

Ordering information Preferred types

002 HRC-ST series

NEW

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 100 Hz 85 °C	ESR max. 100 Hz (mΩ)	catalogue number 2222
400	1200	50 x 80	5.6	95	002 16122
	1800	50 x 105	8.8	59	002 16182
	2700	63.5 x 105	10.1	39	002 16272
	3900	76 x 105	13	37	002 16392
	5600	76 x 143	14.6	28	002 16562
450	820	50 x 80	5	145	002 17821
	1200	50 x 105	7.4	85	002 17122
	2200	63.5 x 105	9.8	53	002 17222
	3300	76 x 105	12.7	35	002 17332
	4700	76 x 143	14.2	31	002 17472
500	680	50 x 80	5.1	132	002 18681
	1000	50 x 105	6.7	90	002 18102
	1500	63.5 x 105	9	59	002 18152
	2200	76 x 105	11.1	43	002 18222
	3300	76 x 143	14.4	30	002 18332



Electrolytic Capacitors

Screw terminals, 105 °C



Extended voltage



Series		088, 089 PHC-ST Power High Current Screw Terminal												
Useful life	< 100 V: 5 000 h/105 °C												≥ 100 V: 4 000 h/105 °C	
Features	high ripple current capability, up to 105 °C ambient temperature													
Applications	industrial, welding, motor control devices, uninterruptable power supplies													
C _R (μF)	U _R (V)													
	16	25	40	50	63	75	100	200	250	350	400	450		
220														
270													35 x 54	
330											35 x 54			
390														
470										35 x 54			35 x 80	
560											35 x 80			
680									35 x 54				35 x 105	
820										35 x 80	35 x 105			
1000													50 x 80	
1200									35 x 80	35 x 105	50 x 80			
1500													50 x 105	
1800									35 x 54	35 x 105	50 x 80	50 x 105	50 x 105	
2200											50 x 118	63.5 x 105	63 x 105	
2700														
3300														
3900														
4700														
5600														
6800														
8200														
10 000														
12 000														
15 000														
18 000														
22 000														
27 000														
33 000														
39 000														
47 000														
56 000														
68 000														
82 000														
100 000														
120 000														
150 000														
180 000														
220 000														
270 000														
330 000														
390 000														
470 000														
820 000														

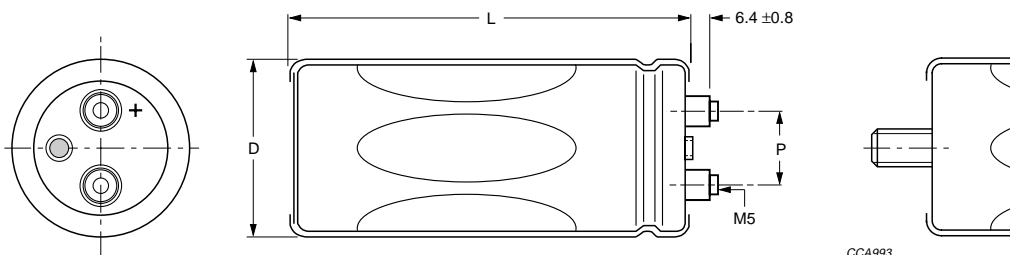
preferred type

Endurance IEC	2000 h/85 °C
Temperature range	-40 °C to +105 °C
Tolerance	-10% to +30%

Ordering information Preferred types

088, 089 PHC-ST series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R (A) 100 Hz 85 °C	ESR max. 100 Hz (mΩ)	catalogue number 2222
16	82 000	50 x 80	24.0	6	088 15823
	120 000	50 x 105	30.0	6	088 15124
	220 000	63.5 x 105	44.0	3	088 15224
	330 000	76 x 105	50.0	3	088 25334
	470 000	76 x 143	50.0	2	088 15474
40	27 000	50 x 80	19.0	9	088 17273
	47 000	50 x 105	25.0	6	088 17473
	68 000	63.5 x 105	32.0	5	088 27683
	100 000	76 x 105	38.0	5	088 27104
	150 000	76 x 143	46.0	4	088 17154
63	18 000	50 x 80	14.0	15	088 18183
	27 000	50 x 105	19.0	11	088 18273
	39 000	63.5 x 105	26.0	8	088 28393
	56 000	76 x 105	32.0	7	088 28563
	82 000	76 x 143	39.0	5	088 18823
100	6800	50 x 80	6.8	64	088 19682
	10 000	50 x 105	10.0	38	088 19103
	18 000	63.5 x 105	17.0	18	088 19183
	27 000	76 x 105	22.0	13	088 19273
	39 000	76 x 143	21.0	16	088 19393
250	1800	50 x 80	6.9	76	089 13182
	2700	50 x 105	8.4	52	089 13272
	4700	63.5 x 105	14.0	25	089 13472
	6800	76 x 105	18.0	17	089 23682
	10 000	76 x 143	21.0	18	089 13103
400	1000	50 x 80	4.8	127	089 16102
	1500	50 x 105	7.8	63	089 16152
	2200	63.5 x 105	9.8	45	089 26222
	3300	76 x 105	13.0	35	089 26332
	4700	76 x 143	15.0	31	089 16472
450	1000	50 x 80	5.5	102	089 17102
	1500	50 x 105	7.4	70	089 17152
	2200	63.5 x 105	10.5	46	089 17222
	3300	76 x 105	13.8	34	089 17332
	4700	76 x 143	19.1	22	089 17472



Electrolytic Capacitors

Screw terminals, 85 °C



Series	154,155 PEC-ST/STB Power Economic ST/STB terminals										114,115 PED-ST/STB Power EURO DIN ST/STB terminals									
Useful life	12 000 h/85 °C (400 V: 5 000 h/85 °C)										20 000 h/85 °C (400 V: 5 000 h/85 °C)									
Features	high ripple, high CV per volume										extremely low ESR, high ripple									
Applications	industrial, SMPS										industrial, SMPS									
C _R (µF)	U _R (V)										U _R (V)									
	10	16	25	40	63	100	250	350	385	400	10	16	25	40	63	100	250	350	385	400
33																				
47																				
68																				
100																				
150																			10	10
220								10	10									10	11	11
330							10	11	11							10	11	12a	12a	
470						10	11	11	11							11	12a	14	14	
680						11	12a	12a	12a							12a	14	15a	15a	
1000						12a	14	14	14						10	14	15a	16a	16a	
1500						14	15a	15a	15a						10	15a	16a	16a	16a	
2200						15a	16a	16a	16a						10	11	16a	16a	17	17
3300						10	16a	16a	17	17				10	10	12a	16a	17		
4700						11	16a						10	10	11	14	17			
6800					10	12a	17						10	11	12a	15a				
10 000					11	14							10	11	12a	14	16a			
15 000				10	12a	15a							10	11	12a	14	15a	16a		
22 000			10	11	14	16a							11	12a	14	15a	16a	17		
33 000		10	11	14	15a	17							12a	14	15a	16a	16a			
47 000	10	11	12a	14	16a								14	15a	16a	16a	17			
68 000	11	12a	14	15a	17								15a	16a	16a	17				
100 000	12a	14	15a	16a									16a	16a	17					
150 000	14	15a	16a	17									16a	17						
220 000	15a	16a	17										17							
330 000	16a	17																		
470 000	17																			
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> explanation of terms: ST = Screw Terminal STB = Screw Terminal, Bolt </div>																			
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> preferred type </div>																			
	case size / nominal dimensions Ø × L (mm)																			
Case dimensions	10 Ø 35 × 60					12a Ø 35 × 105					15a Ø 50 × 105									
	11 Ø 35 × 80					14 Ø 50 × 80					16a Ø 65 × 105									
											17 Ø 75 × 105									
Endurance IEC	5000 h/85 °C (400 V: 2000 h/85 °C)										8000 h/85 °C (400 V: 2000 h/85 °C)									
Temperature range	- 40 °C to + 85 °C										- 40 °C to + 85 °C									
Tolerance	± 20%										- 10% to + 30%									

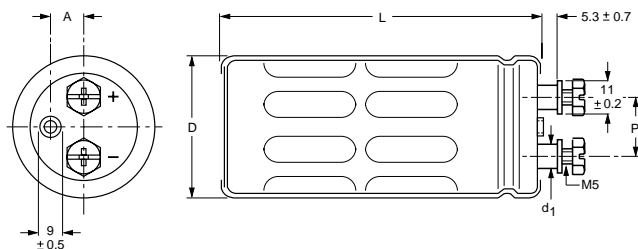
Ordering information Preferred types

154, 155 PEC-ST series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 85 °C (A)	ESR typ. 100 Hz (mΩ)	Z max. 20 kHz (mΩ)	catalogue number 2222
10	47 000	35 x 60	8.4	14	16.5	154 14473
	100 000	35 x 105	10.7	10.5	12	154 14104
	220 000	50 x 105	16.5	6.5	10.5	154 14224
	470 000	75 x 105	22.6	5.5	10.5	154 14474
16	47 000	35 x 80	8.7	11	13.5	154 15473
	100 000	50 x 80	13.2	8	12	154 15104
	220 000	65 x 105	20.8	5.5	10.5	154 15224
25	22 000	35 x 60	8.1	12	15	154 16223
	47 000	35 x 105	12.2	8	12	154 16473
	100 000	50 x 105	15.9	7	12	154 16104
	220 000	75 x 105	22.6	5.5	10.5	154 16224
40	22 000	35 x 80	9.8	11	13.5	154 17223
	47 000	50 x 80	11.8	10	13.5	154 17473
	100 000	65 x 105	17.3	9	12	154 17104
	220 000	75 x 105	22.6	5.5	10.5	154 16224
63	10 000	35 x 80	8.6	12.5	15	154 18103
	22 000	50 x 80	11.8	10	13.5	154 18223
	47 000	65 x 105	17.3	9	12	154 18473
100	4700	35 x 80	5.3	35	40	154 19472
	10 000	50 x 80	8.9	18	20	154 19103
	22 000	65 x 105	18.2	7.5	9	154 19223
250	470	35 x 60	1.6	360	450	155 13471
	1000	35 x 105	2.9	175	210	155 13102
	2200	50 x 105	5.3	80	105	155 13222
	4700	65 x 105	8.2	44	60	155 13472
350	470	35 x 80	2.1	260	335	155 15471
	1000	50 x 80	3.7	125	170	155 15102
	2200	65 x 105	6.5	70	95	155 15222
385	220	35 x 60	1.0	650	955	155 18221
	470	35 x 80	1.8	300	445	155 18471
	1000	50 x 80	3.4	125	210	155 18102
	2200	65 x 105	6.5	58	95	155 18222
400	220	35 x 60	1.0	650	995	155 16221
	470	35 x 80	1.8	300	445	155 16471
	1000	50 x 80	3.4	125	210	155 16102
	2200	65 x 105	6.5	58	95	155 16222

114, 115 PED-ST series

U _R (V)	C _R 100 Hz (μF)	nominal case size ∅ D x L (mm)	I _R 100 Hz 85 °C (A)	ESR typ. 100 Hz (mΩ)	Z max. 20 kHz (mΩ)	catalogue number 2222
10	22 000	35 x 60	7.5	14	14	114 14223
	47 000	50 x 80	14.0	7.5	9.5	114 14473
	100 000	65 x 105	30.0	3.5	5	114 14104
	220 000	75 x 105	37.0	2	4	114 14224
	470 000	75 x 105	37.0	2	4	114 14224
16	10 000	35 x 60	6.0	22	20	114 15103
	22 000	35 x 105	10.0	11	10	114 15223
	47 000	50 x 105	18.0	5.5	8	114 15473
	100 000	65 x 105	28.0	3	5	114 15104
	220 000	65 x 105	28.0	3	5	114 15104
25	4700	35 x 60	5.2	30	23	114 16472
	10 000	35 x 80	6.7	18	15	114 16103
	22 000	50 x 80	12.5	8.5	9.5	114 16223
	47 000	65 x 105	27.0	4	5	114 16473
	100 000	75 x 105	37.0	2.5	4	114 16104
	220 000	75 x 105	37.0	2.5	4	114 16104
40	4700	35 x 60	4.5	35	33	114 17472
	10 000	35 x 105	7.5	17.0	17	114 17103
	22 000	50 x 105	15.0	8	10.5	114 17223
	47 000	65 x 105	22.0	4.5	6	114 17473
63	2200	35 x 60	3.7	39	33	114 18222
	4700	35 x 80	5.2	23	21	114 18472
	10 000	50 x 80	9.5	12	14	114 18103
	22 000	65 x 105	21.0	5	6	114 18223
	47 000	75 x 105	30.0	3	4.5	114 18473
100	1000	35 x 60	3.0	85	67	114 19102
	2200	35 x 60	4.6	45	42	114 19222
	4700	50 x 80	7.4	27	25	114 19472
	10 000	65 x 105	15.0	11.0	11	114 19103
	22 000	75 x 105	20.5	7	8	114 19223
250	470	35 x 80	2.5	250	375	115 13471
	1000	50 x 80	4.2	110	130	115 13102
	2200	65 x 105	8.8	45	60	115 13222
	4700	75 x 105	14.0	25	40	115 13472
	2200	75 x 105	14.0	25	40	115 13472
350	220	35 x 60	1.6	400	550	115 15221
	470	35 x 105	3.1	200	260	115 15471
	1000	50 x 105	5.4	65	100	115 15102
	2200	65 x 105	8.1	55	80	115 15222
	4700	65 x 105	8.1	55	80	115 15222
385	220	35 x 80	1.4	520	630	115 18221
	470	50 x 80	2.7	200	300	115 18471
	1000	65 x 105	5.1	95	125	115 18102
	2200	75 x 105	7.3	55	75	115 18222
	4700	75 x 105	7.3	55	75	115 18222
400	220	35 x 80	1.4	520	630	115 16221
	470	50 x 80	2.7	200	300	115 16471
	1000	65 x 105	5.1	95	125	115 16102
	2200	75 x 105	7.3	55	75	115 16222
	4700	75 x 105	7.3	55	75	115 16222



Aluminium Electrolytic Capacitors

Power, Screw Terminal/Computer Grade Capacitors



Series	3186 Power Standard															
Useful life	See tables in technical notes section of PA01-A															
Features	Standard Series															
Applications	Power Applications															
Case codes	REPRESENTATIVE CAPACITANCE RATINGS BY CASE SIZE AT RATED WORKING VOLTAGE (µF)															
Case size (")	6.5 VDC	10 VDC	15 VDC	25 VDC	40 VDC	50 VDC	63 VDC	75 VDC	100 VDC	150 VDC	200 VDC	250 VDC	300 VDC	350 VDC	400 VDC	450 VDC
BA (1.375x2.125)	57000	44000	32000	20000	12000	9900	6800	5300	2700	1600	1000	790	520	430	350	250
BB (1.375x2.625)	68000	53000	38000	24000	15000	11000	8200	6400	3300	1900	1300	940	630	510	420	300
BC (1.375x3.125)	91000	71000	51000	33000	20000	15000	10000	8500	4400	2600	1700	1200	840	680	570	410
BD (1.375x3.625)	110000	89000	64000	41000	25000	19000	13000	10000	5500	3200	2100	1500	1000	860	710	510
BE (1.375x4.125)	130000	100000	76000	49000	31000	23000	16000	12000	6600	3900	2600	1800	1200	1000	850	610
BF (1.375x4.625)	160000	120000	89000	57000	36000	27000	19000	14000	7700	4500	3000	2200	1400	1200	900	710
BG (1.375x5.125)	180000	140000	100000	66000	41000	31000	21000	17000	8800	5200	3400	2500	1600	1300	1100	820
BH (1.375x5.625)	200000	160000	110000	74000	46000	35000	24000	19000	9900	5900	3900	2800	1800	1500	1200	920
DA (1.750x2.125)	100000	79000	56000	36000	22000	17000	12000	9400	4900	2900	1900	1400	930	760	630	460
DB (1.750x2.625)	120000	95000	68000	44000	27000	21000	14000	11000	5900	3500	2300	1600	1100	920	760	550
DC (1.750x3.125)	160000	120000	91000	58000	36000	28000	19000	15000	7800	4600	3000	2200	1400	1200	1000	730
DD (1.750x3.625)	200000	150000	110000	73000	45000	35000	24000	18000	9800	5800	3800	2800	1800	1500	1200	920
DE (1.750x4.125)	240000	190000	130000	88000	55000	42000	29000	22000	11000	7000	4600	3300	2200	1800	1500	1100
DF (1.750x4.625)	280000	220000	150000	100000	64000	49000	34000	26000	13000	8100	5400	3900	2600	2100	1700	1200
DG (1.750x5.125)	320000	250000	180000	110000	73000	56000	39000	30000	15000	9300	6100	4500	2900	2400	2000	1400
DH (1.750x5.625)	360000	280000	200000	130000	82000	63000	43000	34000	17000	10000	6900	5000	3300	2700	2200	1600
EA (2.000x2.125)	130000	100000	73000	47000	29000	22000	15000	12000	6300	3700	2500	1800	1200	990	820	590
EB (2.000x2.625)	150000	120000	88000	57000	35000	27000	18000	14000	7600	4500	3000	2100	1400	1100	980	710
EC (2.000x3.125)	210000	160000	110000	76000	47000	36000	25000	19000	10000	6000	4000	2900	1900	1500	1300	950
ED (2.000x3.625)	260000	200000	140000	95000	59000	45000	31000	24000	12000	7500	5000	3600	2400	1900	1600	1100
EE (2.000x4.125)	310000	240000	170000	110000	71000	54000	37000	29000	15000	9000	6000	4300	2900	2300	1900	1400
EF (2.000x4.625)	370000	280000	200000	130000	83000	64000	44000	34000	17000	10000	7000	5100	3300	2700	2300	1600
EG (2.000x5.125)	420000	330000	230000	150000	95000	73000	50000	39000	20000	12000	8000	5800	3800	3100	2600	1900
EH (2.000x5.625)	470000	370000	260000	170000	100000	82000	56000	44000	22000	13000	9000	6500	4300	3500	2900	2100
FB (2.500x2.625)	260000	200000	140000	95000	59000	45000	27000	21000	12000	7500	5000	3600	2400	1600	1300	1200
FC (2.500x3.125)	350000	270000	190000	120000	79000	61000	37000	28000	17000	10000	6700	4800	3200	2100	1800	1600
FD (2.500x3.625)	440000	340000	240000	150000	99000	76000	46000	35000	21000	12000	8300	6000	4000	2700	2200	2000
FE (2.500x4.125)	530000	410000	290000	190000	110000	91000	55000	42000	25000	15000	10000	7300	4800	3200	2700	2400
FF (2.500x4.625)	610000	480000	340000	220000	130000	100000	64000	50000	29000	17000	11000	8500	5600	3800	3100	2800
FG (2.500x5.125)	700000	550000	390000	250000	150000	120000	74000	57000	34000	20000	13000	9700	6400	4300	2600	3200
FH (2.500x5.625)	790000	620000	440000	280000	170000	130000	83000	64000	38000	22000	15000	10000	7300	4900	4000	3600
GC (3.000x3.125)	520000	400000	290000	180000	110000	90000	54000	42000	25000	14000	9800	7100	4700	3200	2600	2300
GD (3.000x3.625)	650000	500000	360000	230000	140000	110000	68000	52000	31000	18000	12000	8900	5900	4000	3300	2900
GE (3.000x4.125)	780000	610000	430000	280000	170000	130000	82000	63000	37000	22000	14000	10000	7100	4800	4000	3500
GF (3.000x4.625)	910000	710000	500000	320000	200000	150000	95000	73000	44000	26000	17000	12000	8300	5600	4700	4100
GG (3.000x5.125)	1000000	810000	580000	370000	230000	180000	100000	84000	50000	29000	19000	14000	9500	6400	5300	4700
GH (3.000x5.625)	1100000	910000	650000	420000	260000	200000	120000	95000	56000	33000	22000	16000	10000	7300	6000	5300
GN (3.000x8.625)	1900000	1500000	1000000	700000	430000	330000	200000	150000	94000	55000	37000	26000	14000	12000	10000	8800
	 preferred type															
Endurance	1000 h / 85°C															
Temp. range	-40°C to 85°C															
Tolerance	-10% to +50%; -10% to +30%; ± 20%															

Aluminium Electrolytic Capacitors

Power, Screw Terminal/Computer Grade Capacitors



Series	3188 Power Long Life														
Useful life	See tables in technical note section of PA01-A														
Features	High Ripple Current, Long Life														
Applications	Power Applications														
Case codes	REPRESENTATIVE CAPACITANCE RATINGS BY CASE SIZE AT RATED WORKING VOLTAGE (µF)														
Case size (")	7.5 VDC	10 VDC	15 VDC	25 VDC	35 VDC	50 VDC	60 VDC	75 VDC	100 VDC	150 VDC	200 VDC	250 VDC	300 VDC	350 VDC	400 VDC
BA (1.375x2.125)	45000	38000	28000	17000	12000	8300	6000	4000	1900	1200	790	520	430	350	310
BB (1.375x2.625)	54000	46000	33000	20000	15000	9900	7200	4800	2300	1400	940	630	510	420	370
BC (1.375x3.125)	72000	61000	45000	27000	20000	13000	9600	6400	3100	1900	1200	840	680	570	500
BD (1.375x3.625)	91000	76000	56000	34000	25000	16000	12000	8000	3900	2400	1500	1000	860	710	620
BE (1.375x4.125)	100000	92000	67000	40000	31000	19000	14000	9700	4700	2900	1800	1200	1000	850	750
BF (1.375x4.625)	120000	100000	79000	47000	36000	23000	16000	11000	5500	3400	2200	1400	1200	900	870
BG (1.375x5.125)	140000	120000	90000	54000	41000	26000	19000	12000	6300	3800	2500	1600	1300	1100	1000
BH (1.375x5.625)	160000	130000	100000	61000	46000	29000	21000	14000	7100	4300	2800	1800	1500	1200	1100
DA (1.750x2.125)	81000	68000	50000	30000	22000	14000	10000	7100	3500	2100	1400	930	760	630	550
DB (1.750x2.625)	97000	81000	60000	36000	27000	17000	12000	8600	4200	2500	1600	1100	920	760	670
DC (1.750x3.125)	120000	100000	80000	48000	36000	23000	17000	11000	5600	3400	2200	1400	1200	1000	890
DD (1.750x3.625)	160000	130000	100000	60000	45000	29000	21000	14000	7000	4300	2800	1800	1500	1200	1100
DE (1.750x4.125)	190000	160000	120000	72000	55000	35000	25000	17000	8400	5100	3300	2200	1800	1500	1300
DF (1.750x4.625)	220000	190000	140000	84000	64000	41000	30000	20000	9800	6000	3900	2600	2100	1700	1500
DG (1.750x5.125)	250000	210000	160000	96000	73000	47000	34000	22000	11000	6900	4500	2900	2400	2000	1700
DH (1.750x5.625)	290000	240000	180000	100000	82000	53000	38000	25000	12000	7700	5000	3300	2700	2200	2000
EA (2.000x2.125)	100000	88000	65000	39000	29000	19000	13000	9300	4500	2800	1800	1200	990	820	720
EB (2.000x2.625)	120000	100000	78000	47000	35000	22000	16000	11000	5400	3300	2100	1400	1100	980	860
EC (2.000x3.125)	160000	140000	100000	62000	47000	30000	22000	14000	7200	4400	2900	1900	1500	1300	1100
ED (2.000x3.625)	210000	170000	130000	78000	59000	38000	27000	18000	9100	5600	3600	2400	1900	1600	1400
EE (2.000x4.125)	250000	210000	150000	94000	71000	45000	33000	22000	10000	6700	4300	2900	2300	1900	1700
EF (2.000x4.625)	290000	240000	180000	100000	83000	53000	38000	26000	12000	7800	5100	3300	2700	2300	2000
EG (2.000x5.125)	330000	280000	200000	120000	95000	61000	44000	29000	14000	8900	5800	3800	3100	2600	2300
EH (2.000x5.625)	370000	310000	230000	140000	100000	68000	50000	33000	16000	10000	6500	4300	3500	2900	2600
FB (2.500x2.625)	210000	170000	130000	78000	59000	38000	24000	16000	9100	5600	3600	2400	1900	1300	1200
FC (2.500x3.125)	280000	230000	170000	100000	79000	51000	32000	21000	12000	7400	4800	3200	2600	1800	1600
FD (2.500x3.625)	350000	290000	210000	130000	99000	63000	40000	27000	15000	9300	6000	4000	3300	2200	2000
FE (2.500x4.125)	420000	350000	260000	150000	110000	76000	48000	32000	18000	11000	7300	4800	3900	2700	2400
FF (2.500x4.625)	490000	410000	300000	180000	130000	89000	56000	38000	21000	13000	8500	5600	4600	3100	2800
FG (2.500x5.125)	560000	470000	340000	200000	150000	100000	64000	43000	24000	14000	9700	6400	5300	3600	3200
FH (2.500x5.625)	630000	530000	390000	230000	170000	110000	73000	48000	27000	16000	10000	7300	5900	4000	3600
GC (3.000x3.125)	410000	340000	250000	150000	110000	75000	47000	32000	17000	11000	7100	4700	3900	2600	2300
GD (3.000x3.625)	510000	430000	320000	190000	140000	94000	59000	40000	22000	13000	8900	5900	4900	3300	2900
GE (3.000x4.125)	620000	520000	380000	230000	170000	110000	71000	48000	26000	16000	10000	7100	5800	4000	3500
GF (3.000x4.625)	720000	610000	440000	260000	200000	130000	83000	56000	31000	19000	12000	8300	6800	4700	4100
GG (3.000x5.125)	820000	690000	510000	300000	230000	150000	95000	64000	35000	22000	14000	9500	7800	5300	4700
GH (3.000x5.625)	930000	780000	570000	340000	260000	160000	100000	72000	40000	24000	16000	10000	8800	6000	5300
GN (3.000x8.625)	1500000	1300000	960000	570000	430000	280000	170000	120000	67000	41000	26000	14000	11000	10000	8800
	<input checked="" type="checkbox"/> preferred type														
Endurance	2000 h / 105°C														
Temp. range	-40°C to 105°C														
Tolerance	-10% to +50%; -10% to +30%; ±20%														

Aluminium Electrolytic Capacitors

Power, Screw Terminal/Computer Grade Capacitors



Series	3198 Power, low volt, -55°C											
Useful life	See tables in technical notes section of PA01-A											
Features	Very Long Life, Low ESR											
Applications	Industrial, Power Supplies, Audio											
Case codes	RESPRESENTATIVE CAPACITANCE RATINGS BY CASE SIZE AT RATED WORKING VOLTAGE (µF)											
Case size ("")	6.5 VDC	10 VDC	15 VDC	16 VDC	20 VDC	25 VDC	35 VDC	40 VDC	50 VDC	60 VDC	63 VDC	75 VDC
BA (1.375X2.125)	33000	27000	22000	22000	18000	12000	10000	8200	6800	4700	3300	2700
BB (1.375X2.625)	39000	33000	27000	27000	22000	15000	12000	10000	8200	5600	4700	3900
BC (1.375X3.125)	56000	47000	39000	39000	27000	22000	15000	12000	10000	6800	6800	4700
BD (1.375X3.625)	68000	56000	47000	47000	39000	27000	18000	15000	12000	8200	8200	5600
BE (1.375X4.125)	82000	68000	56000	56000	47000	33000	22000	18000	15000	10000	10000	6800
BF (1.375X4.625)							27000		18000	12000	12000	8200
BG (1.375X5.125)	100000	82000	68000	68000	56000	39000		22000				
BH (1.375X5.625)		100000				47000	33000	27000	22000	15000	15000	10000
DA (1.750X2.125)	56000	56000	39000	39000	33000	27000	18000	15000	12000	8200	6800	5600
DB (1.750X2.625)	68000	68000	47000	47000	39000		22000	18000	15000	10000	8200	6800
DC (1.750X3.125)	100000	82000	68000		56000	39000	27000	22000	18000	12000	12000	8200
DD (1.750X3.625)	120000	100000	82000	82000	68000	47000	39000	27000	22000	15000	15000	10000
DE (1.750X4.125)	150000	120000	100000	100000	82000	56000	47000	33000	27000	18000	18000	12000
DF (1.750X4.625)		150000	120000			68000		39000	33000	22000		15000
DG (1.750X5.125)	180000			120000	100000	82000	56000	47000	39000		22000	
DH (1.750X5.625)	220000	180000	150000	150000	120000		68000			27000	27000	18000
EA (2.000X2.125)	82000	68000	56000	56000	39000	33000	22000	18000	15000	10000	10000	6800
EB (2.000X2.625)	100000	82000	68000	68000	56000	39000	27000	22000	18000	12000	12000	8200
EC (2.000X3.125)	120000	120000	82000	82000	68000	56000	39000	27000	27000	18000	15000	12000
ED (2.000X3.625)	150000	150000	100000	100000	82000	68000	47000	39000	33000	22000	18000	15000
EE (2.000X4.125)	180000	180000	120000	120000	100000	82000	56000	47000	39000	27000	22000	18000
EF (2.000X4.625)	220000		150000	150000	120000		68000		47000		27000	
EG (2.000X5.125)	270000	220000	180000	180000		100000	82000	56000		33000	33000	22000
EH (2.000X5.625)		270000			150000	120000		68000	56000	39000		27000
FB (2.500X2.625)	150000	120000	100000	100000	82000	68000	47000	39000	27000	18000	18000	12000
FC (2.500X3.125)	220000	180000	150000	150000	120000	82000	68000	47000	39000	27000	22000	18000
FD (2.500X3.625)	270000	220000	180000	180000	150000	100000	82000	56000	47000	33000	27000	22000
FE (2.500X4.125)	330000	270000	220000	220000	180000	120000	100000	68000	56000	39000	33000	27000
FF (2.500X4.625)	390000	330000	270000			150000	120000	82000	68000	47000	39000	33000
FG (2.500X5.125)		390000		270000	220000	180000		100000		56000	47000	
FH (2.500X5.625)	470000		330000	330000	270000		150000		82000			39000
GC (3.000X3.125)	330000	270000	220000	220000	180000	120000	100000	68000	56000	39000	33000	27000
GD (3.000X3.525)	390000	330000	270000	270000	220000	150000	120000	82000	68000	47000	39000	33000
GE (3.000X4.125)	470000	390000	330000	330000	270000	180000	150000	100000	82000	56000	47000	39000
GF (3.000X4.625)	560000	470000	390000			220000		120000	100000	68000	56000	47000
GG (3.000X5.125)	680000	560000		390000	330000	270000	180000	150000	120000	82000	68000	
GH (3.000X5.625)			470000	470000	390000		220000					56000
GN (3.000X8.625)	1200000	1000000	820000	680000	680000	470000	330000	270000	220000	150000	120000	100000
	 preferred type											
Endurance	3000 h / 105°C											
Temp. range	-55°C to 105°C											
Tolerance	-10% to +50%; -10% to +30%; ±20%											

Aluminium Electrolytic Capacitors

Power, Screw Terminal/Computer Grade Capacitors



Series **3199**
Power Standard

Useful life See tables in technical notes section of PA01-A

Features Very Long Life, Low ESR

Applications Industrial, Audio Power Supplies

Case codes	REPRESENTATIVE CAPACITANCE RATINGS BY CASE SIZE AT RATED WORKING VOLTAGE (µF)							
	7.5 VDC	10 VDC	16.5 VDC	25 VDC	40 VDC	50 VDC	63 VDC	75 VDC
BA (1.375x2.125)	39000	33000	22000	18000	10000	8200	4700	3900
BB (1.375x2.625)	47000	39000	27000		12000	10000	5600	4700
BC (1.375x3.125)	56000	56000	39000	27000	15000	12000	8200	6800
BD (1.375x3.625)	82000	68000	47000	33000	18000	15000	10000	8200
BE (1.375x4.125)		82000	56000	39000	22000	18000	12000	10000
BF (1.375x4.625)	100000			47000	27000	22000		
BG (1.375x5.125)	120000	100000	68000	47000			15000	12000
BH (1.375x5.625)			82000	56000	33000	27000	18000	12000
DA (1.750x2.125)	68000	56000	39000	33000	18000	15000	8200	6800
DB (1.750x2.625)	82000	68000	47000	39000	22000	18000	10000	8200
DC (1.750x3.125)	120000	100000	68000	47000	27000	22000	15000	12000
DD (1.750x3.625)	150000	120000	82000	56000	39000	27000	18000	15000
DE (1.750x4.125)	180000	150000	100000	68000	47000	33000	22000	18000
DF (1.750x4.625)			120000	82000		39000		
DG (1.750x5.125)	220000	180000		100000	56000	47000	27000	22000
DH (1.750x5.625)		220000	150000		68000		33000	22000
EA (2.000x2.125)	100000	82000	56000	39000	22000	18000	12000	10000
EB (2.000x2.625)	120000	100000	68000	47000	27000	22000	15000	12000
EC (2.000x3.125)	150000	120000	82000	68000	39000	27000	18000	15000
ED (2.000x3.625)	180000	150000	100000	82000	47000	39000	22000	18000
EE (2.000x4.125)	220000	180000	120000	100000	56000	47000	27000	22000
EF (2.000x4.625)	270000	220000	150000	120000	68000	56000	33000	27000
EG (2.000x5.125)		270000	180000		82000		39000	
EH (2.000x5.625)	330000			150000		68000		33000
FB (2.500x2.625)	180000	150000	100000	82000	47000	33000	22000	18000
FC (2.500x3.125)	220000	220000	150000	100000	68000	47000	27000	22000
FD (2.500x3.625)	330000	270000	180000	120000	82000	56000	39000	27000
FE (2.500x4.125)	390000	330000	220000	150000	100000	68000	47000	33000
FF (2.500x4.625)		390000	270000	180000	120000	82000	56000	39000
FG (2.500x5.125)	470000			220000				47000
FH (2.500x5.625)	560000	470000	330000		150000	100000	68000	56000
GC (3.000x3.125)	390000	330000	220000	150000	100000	68000	47000	33000
GD (3.000x3.625)	470000	390000	270000	180000	120000	82000	56000	39000
GE (3.000x4.125)	560000	470000	330000	220000	150000	100000	68000	47000
GF (3.000x4.625)	680000	560000	390000	270000		120000	82000	56000
GG (3.000x5.125)				330000	180000			68000
GH (3.000x5.625)	820000	680000	470000		220000	150000	100000	82000
GN (3.000x8.625)	1200000	1200000	820000	560000	330000	220000	150000	120000

preferred type

Endurance 5000 h / 85°C

Temp. range -55°C to 85°C

Tolerance -10% to +50%; -10% to +30%; ±20%

3191
Output Capacitors

See tables in technical notes section of PA01-A

Symmetrical ESR

Power Supplies

Case codes	REPRESENTATIVE CAPACITANCE RATINGS BY CASE SIZE AT RATED WORKING VOLTAGE (µF)							
	7.5 VDC	10 VDC	16 VDC	20 VDC	28 VDC	35 VDC	55 VDC	
	15000	16000	10000	8800	6300	4500	2800	
	21000	19000	14000	12000	8800	6300	3900	
	27000	25000	18000	16000	11000	8100	5000	
	33000	31000	22000	20000	14000	10000	6200	
	39000	38000	26000	22000	16000	12000	7300	
	45000	44000	30000	27000	19000	14000	8400	
	51000	51000	34000	30000	22000	16000	9500	
	57000	57000	38000	34000	24000	17000	10000	

Sizes not available

48000	38000	26000	23000	15000	11000	7300
58000	46000	32000	27000	18000	13000	8800
76000	61000	43000	37000	24000	17000	11000
95000	76000	53000	46000	30000	22000	14000
110000	92000	64000	55000	36000	26000	17000
130000	10000	75000	64000	42000	31000	20000
150000	120000	86000	74000	48000	35000	23000
170000	130000	96000	83000	54000	40000	26000

Sizes not available

preferred type

1500 h / 85°C

-40°C to 85°C

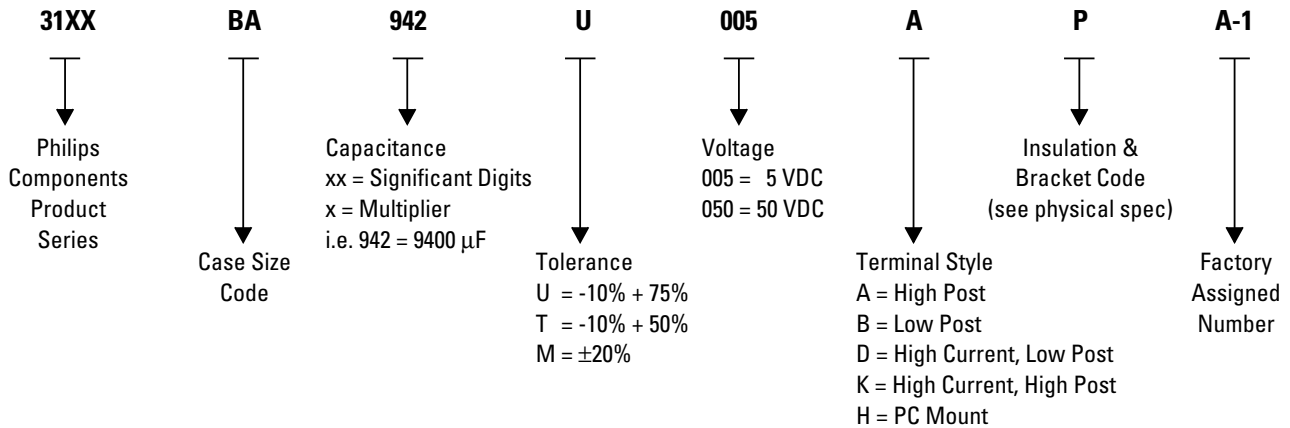
±20%

Aluminium Electrolytic Capacitors

Ordering information: screw terminal / computer grade capacitors



Screw Terminal Sample Part Number



Physical Specifications Computer Grade

Insulation Type	Inches			mm			Bracket Code	
	D	L	H	D	L	H	without	with
.008 inch Polymeric	.020	.032	.024	.508	.813	.61	P	R
.012 inch Polymeric	.025	.062	.045	.63	1.58	1.14	H	J
uninsulated	----	----	----	----	----	----	N	X

Terminal Styles, Dimensions and Codes

Terminal	T	T		Thread
Style	(inches)	(mm)	Code	Type
High Post	.250	6.4	A	10-32
Low Post	.063	1.6	B	10-32
High Current*	.125	3.2	D	1/4-28
High Current*	.250	6.4	K	1/4-28

The capacitors are marked with:

- nominal capacitance
- rated voltage
- EIA source and date code
- maximum ambient temperature
- polarity
- name of manufacturer
- part number
- capacitance tolerance

Reference data handbook: PA01-A

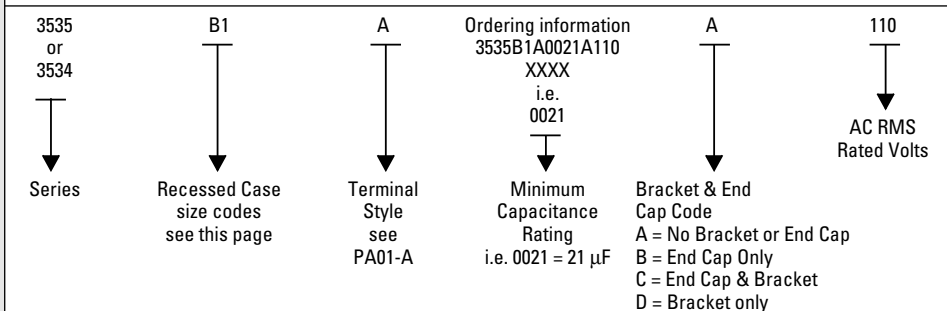
Aluminium Electrolytic Capacitors

AC Motor Start Capacitors



Series	3535 Type 1 E I A Standard					
Useful life	See performance specification for series 3500 in PA01-A					
Applications	Motor Starts					
Capacitance Range μF	Case codes					
	110 VAC	125 VAC	165 VAC	220 VAC	250 VAC	330 VAC
21 - 25	B1	B1	B1	B1	B1	B2
25 - 30	B1	B1	B1	B1	B1	B2
30 - 36	B1	B1	B1	B1	B2	B4
36 - 43	B1	B1	B1	B2	B2	B4
43 - 53	B1	B1	B1	B2	B4	B4
47 - 56	B1	B1	B1	B2	B4	B4
53 - 64	B1	B1	B1	B4	B4	B5
64 - 77	B1	B1	B1	B4	B4	B5
72 - 88	B1	B1	B1	B4	B4	B5
88 - 108	B1	B1	B2	B4	B5	B7
108 - 130	B1	B1	B2	B5	B5	B8
124 - 149	B1	B1	B4	B5	B7	
130 - 156	B1	B1	B4	B5	B8	
145 - 175	B1	B2	B4	B7	B8	
161 - 193	B1	B2	B4	B8	B8	
189 - 227	B2	B2	B4	B8		
216 - 259	B2	B4	B5			
233 - 280	B2	B4	B5			
243 - 292	B4	B4	B5			
270 - 324	B4	B4	B5			
340 - 408	B4	B5	B5			
378 - 440	B4	B5	B7			
400 - 480	B4	B5	B8			
430 - 516	B4	B7				
480 - 552	B4	B7				
540 - 648	B7	B8				
590 - 708	B7					
710 - 850	B8					
829 - 995						
1000 - 1200						
	<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #00AEEF; margin-right: 5px;"></div> preferred type </div>					
Endurance	See PA01-A					
Temp. range	-40°C to 65°C					

Series	3534 Type 2 E I A Standard					
Useful life	See performance specification for series 3500 in PA01-A					
Applications	Motor Starts					
Capacitance Range μF	Case codes					
	110 VAC	125 VAC	165 VAC	220 VAC	250 VAC	330 VAC
21 - 25	B1	B1	B1	B1	B1	B2
25 - 30	B1	B1	B1	B1	B1	B2
30 - 36	B1	B1	B1	B1	B1	B4
36 - 43	B1	B1	B1	B1	B1	B4
43 - 53	B1	B1	B1	B2	B2	B4
47 - 56	B1	B1	B1	B2	B2	B4
53 - 64	B1	B1	B1	B2	B2	B5
64 - 77	B1	B1	B1	B4	B4	B5
72 - 88	B1	B1	B1	B4	B4	B5
88 - 108	B1	B1	B1	B4	B4	B7
108 - 130	B1	B1	B2	B4	B4	B8
124 - 149	B1	B1	B2	B5	B5	B8
130 - 156	B1	B1	B4	B5	B5	B8
145 - 175	B1	B1	B4	B7	B7	B8
161 - 193	B1	B1	B4	B7	B7	
189 - 227	B1	B2	B4	B7	B7	
216 - 259	B2	B2	B4	B7	B8	
233 - 280	B2	B2	B5	B8	B8	
243 - 292	B2	B3	B5	B8	B8	
270 - 324	B2	B3	B5	B8	B8	
340 - 408	B4	B4	B7			
378 - 440	B4	B4	B7			
400 - 480	B4	B4	B7			
430 - 516	B4	B4	B7			
480 - 552	B4	B4	B8			
540 - 648	B5	B5				
590 - 708	B5	B7				
710 - 850	B7	B7				
829 - 995	B7	B8				
1000 - 1200	B8					
	<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #00AEEF; margin-right: 5px;"></div> preferred type </div>					
Endurance	See PA01-A					
Temp. range	-40°C to 65°C					



Case size code	D x L inches
B1	1.4375 x 2.750
B2	1.4375 x 3.375
B3	1.4375 x 4.375
B4	1.8125 x 3.375
B5	1.8125 x 4.375
B6	2.0625 x 4.375
B7	2.5625 x 4.375

Electrolytic Capacitors

Energy storage capacitors

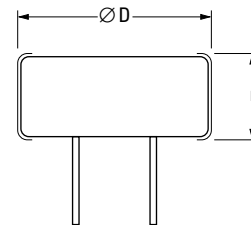


Series		196 DLC Double Layer Capacitor		
Useful life	1000 h at upper category temperature			
Features	polarized capacitor with high charge density, unlimited number of charge and discharge cycles, no charge/discharge control circuitry necessary, ecologically beneficial (no Cd, no Li)			
Applications	energy storage, for backup of semiconductor memories (CMOS) in all fields of electronics			
Rated voltage U_R	5.5 V	5.5 V	6.3 V	
Upper category temp.	85 °C	70 °C	70 °C	
C_R (F)	Form			
0.047	A	13 × 9	13 × 7	13 × 9
	B		11.5 × 13	
0.1	A	13 × 9	13 × 7	13 × 9
	B		11.5 × 13	
0.22	A		13 × 7	
	B		11.5 × 13	
0.33	A		13 × 7	
	B		11.5 × 13	
0.47	A	21 × 9	21 × 7.5	21 × 9
	B			
0.68	A	21 × 9		21 × 9
	B			
1.0	A		21 × 7.5	
	B			
in columns: ∅ D x L in mm				
		preferred type		
Temp. range	-25 °C to +85 °C	-25 °C to +70 °C	-25 °C to +70 °C	
Tolerance	-20 to +80%			
Pref. packing	bulk			

Ordering information Preferred types

196 DLC series (temp. range -25 to +70°C)

U_R (V)	C_R (F)	nominal dimensions ∅ D x L (mm)	form	catalogue number 2222	smallest packing quantity
5.5	0.047	13 x 7	A	196 12473	1000
	0.1	13 x 7	A	196 12104	1000
	0.22	13 x 7	A	196 12224	1000
	0.33	13 x 7	A	196 12334	1000
	0.47	21 x 7.5	A	196 12474	500
	1	21 x 7.5	A	196 12105	500



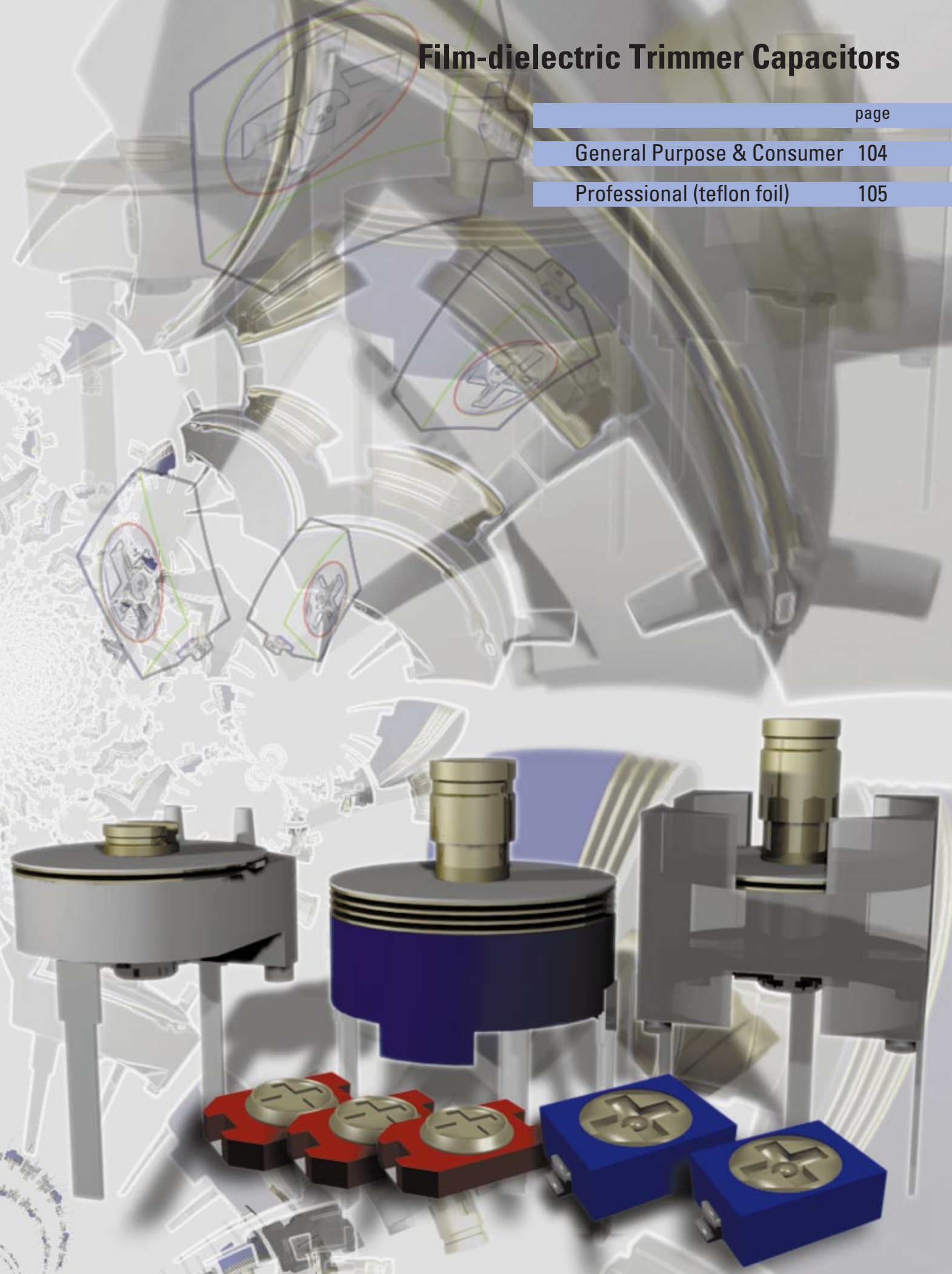
form A

Film-dielectric Trimmer Capacitors

page







General Purpose & Consumer 104

Professional (teflon foil) 105



Film-dielectric Trimmer Capacitors





General purpose and consumer

808 series	Case size Pitch size	$C_{\min} - C_{\max}$ at 200 kHz	$\tan \delta$ at C_{\max} (1 MHz)	TC_C	Dielectric ¹⁾	Colour of housing	Catalogue number Preferred types 2222 808	
	mm	pF	$\times 10^{-4}$	$\times 10^{-6}/K$				
	5 Ø 5.6	1.5 - 5	≤ 10	-200 ± 550	PP	grey	23508	
		3 - 10	≤ 10	-250 ± 550	PP	yellow	23109	
		3 - 15	≤ 10	-250 ± 550	PP	blue	23159	
		4 - 20	≤ 10	-250 ± 400	PP	green	23209	
		4 - 27	≤ 10	-250 ± 400	PP	red	23279	
		1.5 - 7	≤ 70	-50 ± 550	PC	grey	20126	
	7.5 Ø 3.5/7.1 (DIN)	7.5 Ø 3.5/7.1 (DIN)	2 - 10	≤ 10	-250 ± 350	PE	grey	11558
			2 - 15	≤ 10	-250 ± 800	PP	yellow	11109
			2.0 - 15	≤ 10	-250 ± 600	PP	blue	11159
			2.5 - 22	≤ 10	-200 ± 500	PP	green	11229
			2.5 - 27	≤ 70	-50 ± 500	PC	red	11279
			3 - 33	≤ 10	-250 ± 350	PP	brown	11339
	7.5 Ø 2.5/7.5	3 - 40	≤ 70	-50 ± 400	PC	violet	11409	
		3 - 50	≤ 70	-50 ± 500	PC	black	11509	
		2 - 10	≤ 10	-250 ± 800	PP	yellow	51109	
	7.5 Ø 2.5/7.5	2 - 22	≤ 10	-200 ± 500	PP	green	51229	
		2.5 - 27	≤ 70	-50 ± 500	PC	red	51279	
		5.5 - 40	≤ 10	-200 ± 400	PP	grey	32409	
	7.5/5 (DIN) not for design-in	5.5 - 65	≤ 10	-200 ± 500	PP	yellow	32659	
		6 - 80	≤ 70	-50 ± 400	PC	red	32809	
		7 - 105	≤ 70	-50 ± 400	PC	violet	32101	
		5.5 - 40	≤ 10	-200 ± 400	PP	grey	31409	
	10 Ø 5/10 (DIN)	5.5 - 65	≤ 10	-200 ± 500	PP	yellow	31659	
		6 - 80	≤ 70	-50 ± 400	PC	red	31809	
		7 - 105	≤ 70	-50 ± 400	PC	violet	31101	
		6 - 120	≤ 70	-50 ± 400	PC	violet	31121	
		5.5 - 40	≤ 10	-200 ± 400	PP	grey	61409	
	10 Ø 5/10 (DIN)	5.5 - 65	≤ 10	-200 ± 500	PP	yellow	61659	
		6 - 80	≤ 70	-50 ± 400	PC	red	61809	
		7 - 105	≤ 70	-50 ± 400	PC	violet	61101	
		7 - 105	≤ 70	-50 ± 400	PC	violet	61101	
Note	All trimmer capacitors can be supplied with hexagonal head for automatic trimming. ¹⁾ PP: polypropylene PC: polycarbonate PE: polyethylene							

Reference data handbook: PA04

Film-dielectric Trimmer Capacitors

Professional (teflon foil)

809 series	Case size Pitch size	$C_{\min} - C_{\max}$ at 200 kHz	Tan δ at C_{\max}		TC_c $\times 10^{-5}/K$	Dielectric ³⁾	Colour of housing	Catalogue number Preferred types	
	mm	pF	(1 MHz) $\times 10^{-4}$	(100 MHz) $\times 10^{-4}$				2222 809	
	6 x 8	0.5 - 2	≤ 10	≤ 20	-250 ± 350	PTFE	–	hex. head	round head
	5.08	1.2 - 3.5	≤ 10	≤ 20	-250 ± 350	PTFE	orange	05021	05011
		1.8 - 10	≤ 10	≤ 20	-250 ± 350	PTFE	white	05225	05215
		2 - 18	≤ 10	≤ 25	-250 ± 350	PTFE	red	05226	05216
	8 x 9 7.64 2-tags	1.4 - 5.5	≤ 10	≤ 15	-250 ± 350	PTFE	green		09004
		2 - 9	≤ 10	≤ 15	-250 ± 350	PTFE	white		09005
		3 - 18	≤ 10	≤ 15	-250 ± 350	PTFE	red		09006
	8 x 9 5.08/5.08 3-tags	1.4 - 5.5	≤ 10	≤ 15	-250 ± 350	PTFE	green		09001
		2 - 9	≤ 10	≤ 15	-250 ± 350	PTFE	white		09002
		3 - 18	≤ 10	≤ 15	-250 ± 350	PTFE	red		09003
	10 x 11 7.62/5.08	4 - 38	≤ 10	≤ 25	-200 ± 250	PTFE	yellow		08002
		5 - 57	≤ 10	≤ 25	-200 ± 250	PTFE	blue		08003
	11 x 14 x 9 5.08/7.62/5.08	single stator type							
		2.5 - 20	≤ 10	≤ 17	0 ± 200	PTFE	print marking		07004
		4 - 40	≤ 10	≤ 17	0 ± 200	PTFE			07008
		5 - 60	≤ 10	≤ 25	0 ± 200	PTFE			07011
		6 - 80	≤ 10	≤ 25	0 ± 200	PTFE			07013
		7 - 100	≤ 10	≤ 25	0 ± 200	PTFE			07015
		differential type							
		2 - 12	≤ 10	≤ 17	0 ± 200	PTFE	print marking		07018
		2.5 - 20	≤ 10	≤ 17	0 ± 200	PTFE			07006
		4 - 40	≤ 10	≤ 17	0 ± 200	PTFE			07009
		5 - 60	≤ 10	≤ 25	0 ± 200	PTFE			07012
		6 - 80	≤ 10	≤ 25	0 ± 200	PTFE			07014
		7 - 100	≤ 10	≤ 25	0 ± 200	PTFE			07016
		7 - 150	≤ 50		0 ± 200	PC			07107
Note	²⁾ Trimmer capacitors can be supplied with hexagonal head for automatic trimming. ³⁾ PTFE: polytetrafluorethylene PC: polycarbonate								

Reference data handbook: PA04

SMD Ceramic Trimmer Capacitors

General purpose and consumer



813 series	Case size mm	$C_{min} - C_{max}$ pF	Temp. Coefficient (ppm/°C)	Q value (1 MHz, C_{max})	Colour of housing	Catalogue number 12NC
	3.2mm(W) 4.5mm(L) 1.7mm(H) 3mm version	1.7 - 3 2.5 - 6 3 - 10 5 - 20 6 - 30	NPO ± 300 NPO ± 300 N400 ± 400 N900 ± 400 N1200 ± 500	500 500 500 300 300	brown blue white red green	2222 813 1103. 2222 813 1106. 2222 813 1110. 2222 813 1120. 2222 813 1130.
814 series	Case size mm	$C_{min} - C_{max}$ pF	Temp. Coefficient (ppm/°C)	Q value (1 MHz, C_{max})	Colour of housing	Catalogue number 12NC
	4.0mm(W) 4.5mm(L) 2.6mm(H) 4mm version	1.7 - 3 2 - 6 3 - 10 5 - 20 6.5 - 30 15 - 50	NPO ± 200 NPO ± 200 NPO ± 300 N900 ± 350 N1100 ± 450 N1700 ± 600	300 500 500 500 300 200	white blue white red green orange	2222 814 2.031 2222 814 2.061 2222 814 2.101 2222 814 2.201 2222 814 2.301 2222 814 2.501

Leaded Ceramic Trimmer Capacitor

General purpose and consumer

814 5x series	Case size mm	$C_{min} - C_{max}$ pF	Temp. Coefficient (ppm/°C)	Q value (1 MHz, C_{max})	Colour of housing	Catalogue number 12NC
	6 \emptyset	2 - 5 2.1 - 10 4.2 - 20 6.2 - 30 6.8 - 40 9.8 - 50 10.2 - 60 13 - 70 20 - 90 25 - 120	NPO ± 200 N200 ± 200 N450 ± 300 N750 ± 300 N1200 ± 500 N1200 ± 500 N1200 ± 500 N1200 ± 500 N1200 ± 500 N1200 ± 500 N1200 ± 500	500 500 500 500 300 200 200 200 150 150	blue blue red green yellow brown brown brown brown black	2222 814 5.051 2222 814 5.101 2222 814 5.201 2222 814 5.301 2222 814 5.401 2222 814 5.501 2222 814 5.601 2222 814 5.701 2222 814 5.901 2222 814 5.122

Reference data handbook: PA04

1) 1 = - terminal
2 = + terminal

2) 1 = A type
2 = B type
3 = C type

3) 5 = normal type
6 = rear type

Fixed Linear Resistors

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Dimensions	109
Quick Selection Guide	110
SMD	111
Leaded	116



Fixed Linear Resistors

General information

Standard series of values in a decade according to IEC 63																								
E6 series:	10	15	22	33	47	68																		
E12 series:	10	12	15	18	22	27	33	39	47	56	68	82												
E24 series:	10	11	12	13	15	16	18	20	22	24	27	30												
	33	36	39	43	47	51	56	62	68	75	82	91												
E48*/E96 series:	100	102	105	107	110	113	115	118	121	124	127	130												
	133	137	140	143	147	150	154	158	162	165	169	174												
	178	182	187	191	196	200	205	210	215	221	226	232												
	237	243	249	255	261	267	274	280	287	294	301	309												
	316	324	332	340	348	357	365	374	383	392	402	412												
	422	432	442	453	464	475	487	499	511	523	536	549												
	562	576	590	604	619	634	649	665	681	698	715	732												
	750	768	787	806	825	845	866	887	909	931	953	976												
E192 series:	100	101	102	104	105	106	107	109	110	111	113	114	115	117	118	120	121	123	124	126	127	129	130	132
	133	135	137	138	140	142	143	145	147	149	150	152	154	156	158	160	162	164	165	167	169	172	174	176
	178	180	182	184	187	189	191	193	196	198	200	203	205	208	210	213	215	218	221	223	226	229	232	234
	237	240	243	246	249	252	255	258	261	264	267	271	274	277	280	284	287	291	294	298	301	305	309	312
	316	320	324	328	332	336	340	344	348	352	357	361	365	370	374	379	383	388	392	397	402	407	412	417
	422	427	432	437	442	448	453	459	464	470	475	481	487	493	499	505	511	517	523	530	536	542	549	556
	562	569	576	583	590	597	604	612	619	626	634	642	649	657	665	673	681	690	698	706	715	723	732	741
	750	759	768	777	787	796	806	816	825	835	845	856	866	876	887	898	909	920	931	942	953	965	976	988

* E48 values in bold are the alternate values of E96

Ordering information 12 NC

The first 8 or 9 digits of the 12 digit catalogue number are given under "Ordering information Preferred types" (see following pages)

The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in the table

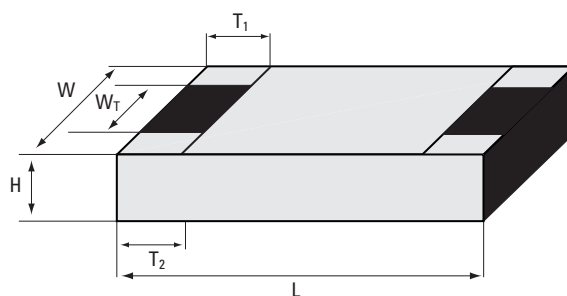
Example:

1 Ω = 1008 or 108 (1 R00 - N. American)
 33 k Ω = 3303 or 333 (33 k0 - N. American)
 10 M Ω = 1006 or 106 (1 M00 - N. American)

Last digit of 12 NC	
Resistance	Last digit
0.1 to 0.976 Ω	7
1 to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
1 to 9.76 k Ω	2
10 to 97.6 k Ω	3
100 to 976 k Ω	4
1 to 9.76 M Ω	5
10 to 68 M Ω	6

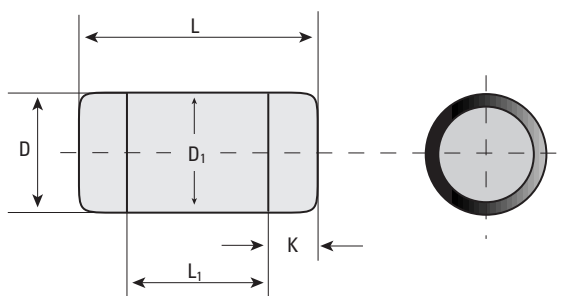


Flatchip case size dimensions



Series	Size code	H_{max} (mm)	W_{max} (mm)	L_{max} (mm)	W_{Tmin} (mm)	T_{1max} (mm)	T_{2max} (mm)	Mass (mg)
.CS 0402	0402	0.37	0.55	1.05	75% of W	0.3	0.3	0.8
.CT 0603	0603	0.55	0.95	1.6	75% of W	0.45	0.45	1.5
.CU 0805	0805	0.55	1.4	2.1	75% of W	0.5	0.5	3.2

MELF case size dimensions



Series	Size code	D_{max} (mm)	D_{1min} (mm)	L_{max} (mm)	L_{1min} (mm)	K_{max} (mm)	Mass (mg)
MMU 0102	RC 2211	1.1	1.06	2.2	1.2	0.45	7.8
.MA 0204	RC 3715	1.4	1.25	3.6	1.8	0.85	19.0
MMB 0207	RC 6123	2.2	2.0	5.8	2.8	1.4	78.0

Leaded case size dimensions



Series	D_{max} (mm)	L_{max} (mm)	d (mm)	l_{min} (mm)	M_{min} (mm)	Mass (g)
.BA 0204, .XA 0204	1.6	3.6	0.5	29.0	5.0	0.13
.BB 0207, .XB 0207	2.5	6.3	0.6	28.0	7.5	0.22
.BE 0414	4.0	11.9	0.8	31.0	15.0	0.75

Fixed Linear Resistors

Quick Selection Guide



Commodity/Professional Resistors								
Max. size (SMD : 1/10 inch leaded: mm)	SMD					Leaded		
	Tolerance	2512	1206	0805	0603	0402	4.0 x 11.9	2.5 x 6.5
5% / 1% standard							SFR25 / SFR25H	SFR16S
1% / 0.5% professional			MCU 0805	MCT 0603	MCS 0402		MRS25* / MBB 0207	MRS16S* / MBA 0204
	MMB 0207	MMA 0204	MMU 0102			MBE 0414		

* MRS25; MRS16S only in 1% Tolerance

Application Specific Resistors		
	SMD	Leaded
High Frequency	MCT 0603 HF	MBA 0204 HF
	MMU 0805 HF	
	MMA 0204 HF	
	MMB 0207 HF	
High Ohmic/ High Voltage	OCT 0603	VR25
	OCU 0805	VR37
		VR68
Low Ohmic	NCT 0603	MBA 0204
	NCU 0805	MBB 0207
	MMU 0102	MBE 0414
	MMA 0204	
	MMB 0207	LVR05
Fusible - (non flammable)		NFR25
		NFR25H
Trimmable	TCT 0603	
	TCU 0805	
High Voltage Surge		LSR37

Precision/Ultra Precision Resistors						
Size SMD: 1/10 inch TC Size leaded: mm. TC			Precision		Ultra Precision	
			0.5%	0.25%	0.1%	0.05% 0.02% 0.01%
SMD	0603	TC25	MCT 0603			
		TC15				
		TC10				
	0805	TC25	MMU 0102 MCU 0805			
		TC15				
		TC10	MCU 0805			
	1206	TC25	MMA 0204			
		TC15			UMA 0204	
		TC10				
		TC5				
	2512	TC25	MMB 0207			
		TC15				
Leaded	1.6x3.6	TC25	MBA 0204 (0.25 W)			
		TC15				
		TC10	UXA 0204 (0.05 W)			
		TC5				
	2.5x6.5	TC25	MPR24 (0.25 W) / MBB 0207 (0.4 W)		MPR24 / UXB 0207 (0.125 W)	
		TC10	MPR24 (0.25 W)			
		TC5				
4.0x11.9	TC25	MBE 0414 (0.65 W)				
	TC15					

Power Resistors					
P _{nom} at 70°C	Wirewound		Stand up	Radial mount	Metal film
	5%	1%	5%		1% / 5%
	AC (40°C)	PAC (25°C)	SMW SMF	RMW RMF	PR
1 Watt	01	01			01
2 Watt		02	02		02
3 Watt	03	03	03	03	03
4 Watt	04	04			
5 Watt	05	05	05	05	
6 Watt		06			
7 Watt	07			07	
10 Watt	10			10	
15 Watt	15			15*	
20 Watt	20			20*	

* RMW only

	Professional						Precision			
Technology	thin film						thin film			
Series	MCS 0402		MCT 0603		MCU 0805		MCT 0603		MCU 0805	
Body size (mm)	1.0 x 0.5		1.6 x 0.8		2.0 x 1.25		1.6 x 0.8		2.0 x 1.25	
Case Size	0402 (1005)		0603 (1608)		0805 (2012)		0603 (1608)		0805 (2012)	
Tolerance	1%	0.5%	1%	0.5%	1%	0.5%	0.25%	0.1%	0.25%	0.1%
Standard P_{70} Temp. range	0.063 W -55 to 125°C		0.1 W -55 to 125°C		0.125 W -55 to 125°C		0.1 W -10 to 125°C		0.125 W -10 to 125°C	
Power P_{70} Temp. range	0.1 W -55 to 155°C		0.125 W -55 to 155°C		0.2 W -55 to 155°C		-		-	
Precision P_{70} Temp. range	-		-		-		0.032 W -10 to 85°C		0.05 W -10 to 85°C	
U_{max}	50 V		75 V		150 V		25 V		35 V	
E-Series	E24 and E96	E24 and E192	E24 and E96	E24 and E192	E24 and E96	E24 and E192	any resistance value	any resistance value	any resistance value	any resistance value
Resistance range including temperature coefficient (TC)	jumper		jumper		jumper		jumper		jumper	
0 Ω	jumper		jumper		jumper		jumper		jumper	
0.1 Ω										
1 Ω										
10 Ω			TC 50							
100 Ω	TC 50	100 Ω	TC 50/25	47 Ω	TC 50	TC 50/25	100 Ω	100 Ω	100 Ω	100 Ω
1 kΩ	TC 50	TC25	TC 50/25	TC 50/25	TC 50	TC 50/25	TC 25/15/10	TC 25/15/10	TC 25/15/10	TC 25/15/10
10 kΩ							12.1 kΩ	12.1 kΩ	20 kΩ	20 kΩ
100 kΩ			221 kΩ			221 kΩ	TC 25/15	TC 25/15	TC 25/15	TC 25/15
1 MΩ		100 kΩ	TC 50	221 kΩ		TC 50	100 kΩ	100 kΩ	100 kΩ	100 kΩ
10 MΩ						475 kΩ				
Remarks	Available on request									

Ordering information Preferred types										
Series	MCS 0402		MCT 0603		MCU 0805		MCT 0603		MCU 0805	
Quantity	10 000		5000		5000		5000		5000	
Packing	Paper tape		Paper tape		Paper tape		Paper tape		Paper tape	
Cat. number	2312 275 1....	2312 276 5....	2312 21. 1....	2312 21. 5....	2312 255 1....	2312 25. 5....	2312 21. 6....	2312 21. 7....	2312 25. 6....	2312 25. 7....
Note	See page 108 and 109 for E24, E96 and E192 values and body dimensions									

Fixed Linear Resistors

SMD



	High Ohmic		Low Ohmic		Trimmable					
Technology	metal film		metal film		metal film					
Series	OCT 0603	OCU 0805	NCT 0603	NCU 0805	TCT 0603			TCU 0805		
Body size (mm)	1.6 x 0.8	2.0 x 1.25	1.6 x 0.8	2.0 x 1.25	1.6 x 0.8			2.0 x 1.25		
Case Size	0603 (1608)	0805 (2012)	0603 (1608)	0805 (2012)	0603 (1608)			0805 (2012)		
Tolerance	5%	5%	5%	5%	+0/-30%	+0/-20%	+0/-10%	+0/-30%	+0/-20%	+0/-10%
Standard P_{70} Temp. range	Limited by U_{max} -55°C to 125°C		0.1 W -25°C to 125°C	0.125 W -25°C to 125°C	0.1 W -55 to 125°C			0.125 W -55 to 125°C		
Power P_{70} Temp. range	Limited by U_{max} -55°C to 155°C		0.125 W -25°C to 155°C	0.2 W -25°C to 155°C	0.125 W -55 to 155°C			0.2 W -55 to 155°C		
U_{max}	75 V	150 V	Limited by P_{70}		75 V			150 V		
E-Series	E24		E24		E12			E12		
Resistance range including temperature coefficient (TC)										
0 Ω										
0.1 Ω			0.22 Ω	0.22 Ω						
1 Ω			TC 100	TC 100						
10 Ω			> 1 Ω	< 1 Ω						
100 Ω					TC 100			TC 100		
1 kΩ										
10 kΩ					TC 100/50			TC 100/50		
100 kΩ										
1 MΩ										
10 MΩ	> 10 MΩ	> 10 MΩ								
100 MΩ	TC 100 ≥ 51 MΩ	TC 100 ≥ 51 MΩ								
1 GΩ	TC 250	TC 250								
	130 MΩ	130 MΩ								
Remarks					Other values on request			Other values on request		

Ordering information Preferred types

Series	OCT 0603	OCU 0805	NCT 0603	NCU 0805	TCT 0603			TCU 0805		
Quantity	5000	5000	5000	5000	5000			5000		
Packing	Paper tape	Paper tape	Paper tape	Paper tape	Paper tape			Paper tape		
Cat. number	2312 219 3....	2312 259 3....	2312 219 3....	2312 259 3....	2312 30. 1....	2312 30. 2....	2312 30. 3....	2312 32. 1....	2312 32. 2....	2312 32. 3....
Note	See page 108 and 109 for E12 and E24 values and body dimensions									

	Precision							
Technology	thin film							
Series	MMU 0102			MMA 0204			MMB 0207	
Body size (mm)	Ø 2.2 x 1.1			Ø 3.6 x 1.4			Ø 5.8 x 2.2	
Case Size	0102 (RC 2211)			0204 (RC 3715)			0207 (RC 6123)	
Tolerance	0.5%	0.25%	0.1%	0.5%	0.25%	0.1%	0.25%	0.1%
Standard P_{70} Temp. range	0.2 W -55 to 125°C			0.25 W -55 to 125°C			0.4 W -55 to 125°C	
Precision P_{70} Temp. range	0.06 W -55 to 85°C			0.07 W -55 to 85°C			0.11 W -55 to 85°C	
U_{max}	150 V			200 V			300 V	
E-Series	E24 and E192		E192	E192			E192	
Resistance range including temperature coefficient (TC)								
10 Ω					22 Ω	43 Ω	15 Ω	33 Ω
100 Ω					TC 50/25/15/10	TC 50/25/15/10		
1 kΩ	TC 50	TC 50/25/15	TC 25/15	TC 15	TC 50/25/15/10/05	TC 50/25/15/10/05	TC 25	TC 25/15
10 kΩ								
100 kΩ		TC 50/25			100 kΩ	100 kΩ		
1 MΩ		221 kΩ		221 kΩ	TC 50/25/15/10 221 kΩ	TC 50/25/15/10 221 kΩ		
					332 kΩ	332 kΩ		
Remarks	TC 10/05 are specified over the temperature range -10 to +85°C							

Ordering information Preferred types								
Series	MMU 0102			MMA 0204			MMB 0207	
Quantity	1000			1000			1000	
Packing	Blister tape			Blister tape			Blister tape	
Cat. number	2312 172 5....	2312 17. 6....	2312 17. 7....	2312 142 5....	2312 14. 6....	2312 14. 7....	2312 181 6....	2312 18. 7....
N. American	9B08053A-D	9B08053A-C	9B08053A-B	9B14064A-D	9B14064A-C	9B14064A-B	9B02077A-C	9B02077A-B
Note	See page 108 and 109 for E24 and E192 values and body dimensions							

Fixed Linear Resistors

SMD



	Professional											
Technology	thin film											
Series	MMU 0102				MMA 0204				MMB 0207			
Body size (mm)	∅ 2.2 x 1.1				∅ 3.6 x 1.4				∅ 5.8 x 2.2			
Case Size	0102 (RC 2211)				0204 (RC 3715)				0207 (RC 6123)			
Tolerance	5%	2%	1%	0.5%	5%	1%	0.5%	5%	2%	1%	0.5%	
Standard P_{70}	0.2 W				0.25 W				0.4 W			
Temp. range	-55 to 125°C				-55 to 125°C				-55 to 125°C			
Power P_{70}	0.3 W				0.4 W				1.0 W			
Temp. range	-55 to 155°C				-55 to 155°C				-55 to 155°C			
U_{max}	150 V				200 V				300 V			
E-Series	E24	E24	E24 and E96	E24 and E192	E24	E24 and E96	E24 and E192	E24	E24 and E96	E24 and E96	E24 and E192	
Resistance range including temperature coefficient (TC)												
0 Ω	jumper				jumper				jumper			
0.1 Ω	0.22 Ω TC 50				0.22 Ω TC 50			0.1 - 0.2 Ω TC 100 TC 50	0.22 Ω TC 50			
1 Ω	< 1 Ω	TC 50			< 1 Ω	TC 50		< 1 Ω	< 1 Ω			
10 Ω		< 10 Ω		47 Ω								
100 Ω												
1 kΩ			TC 50/25	TC 50/25		TC 50/25	TC 50/25			TC 50	TC 25	
10 kΩ												
100 kΩ			221 kΩ			475 kΩ	475 kΩ					
1 MΩ			TC 50	221 kΩ								
10 MΩ			2.21 MΩ			TC 50				8.2 MΩ		
Remarks										available on request		

Ordering information Preferred types												
Series	MMU 0102				MMA 0204				MMB 0207			
Quantity	3000				3000				2000			
Packing	Blister tape				Blister tape				Blister tape			
Cat. number	2312 165 3....	2312 165 2....	2312 16. 1....	2312 16. 5....	2312 155 3....	2312 15. 1....	2312 15. 5....	2312 19. 3....	2312 195 2....	2312 195 1....	2312 196 5....	
N. American	9B08053A-J	9B08053A-G	9B08053A-F	9B08053A-D	9B14064A-J	9B14064A-F	9B14064A-D	9B02077A-J	9B02077A-G	9B02077A-F	9B02077A-D	
Note	See page 108 and 109 for E24, E96 and E192 values and body dimensions											

	High frequency			High pulse load
Technology	thin film			carbon
Series	MMU 0102 HF	MMA 0204 HF	MMB 0207 HF	CMA 0204
Body size (mm)	∅ 2.2 x 1.1	∅ 3.6 x 1.4	∅ 5.8 x 2.2	∅ 1.4 x 3.6
Case Size	0102 (RC 2211)	0204 (RC 3715)	0207 (RC 6123)	0204 (RC 3715)
Tolerance	2%	1%	2%	2%
Standard P_{70}	0.2 W	0.25 W	0.4 W	0.25 W
Temp. range	-55 to 125°C	-55 to 125°C	-55 to 125°C	-55 to 125°C
Power P_{70}	0.3 W	0.4 W	1.0 W	0.4 W
Temp. range	-55 to 155°C	-55 to 155°C	-55 to 155°C	-55 to 155°C
U_{max}	Limited by P_{70}	Limited by P_{70}	Limited by P_{70}	200 V
E-Series	E24	E24 and E96	E24	E24
Resistance range including temperature coefficient (TC)				
1 Ω	6.8 Ω	1.5 Ω	6.8 Ω	
10 Ω	TC 50	TC 50	TC 50	
100 Ω				
1 kΩ	470 Ω	475 Ω	470 Ω	
10 kΩ				
100 kΩ				
1 MΩ				
Remarks	Other values typical for RF applications are also available e.g. 50 Ω			

Ordering information Preferred types				
Series	MMU 0102 HF	MMA 0204 HF	MMB 0207 HF	CMA 0204
Quantity	3000	3000	2000	3000
Packing	Blister tape	Blister tape	Blister tape	Blister tape
Cat. number	2312 168 0....	2312 158 0....	2312 198 0....	please contact factory fax: +49 481 95 204
Note	See page 108 and 109 for E24 and E96 values and body dimensions			

Fixed Linear Resistors

Leaded

	General purpose				High & Ultra high precision	
Technology	metal film				metal film	
Series	SFR25 / SFR25H (5043E / 5043H*)	SFR16S (5033E*)	MRS25	MRS16S	MPR24	
Body size (mm)	∅ 2.5 x 6.5	∅ 1.9 x 3.2	∅ 2.5 x 6.5	∅ 1.9 x 3.2	∅ 2.5 x 6.5	
Tolerance	5%		1%		0.5% 0.25% 0.1%	0.05% 0.02% 0.01%
Power P_{70}	0.4 W / 0.5 W	0.5 W	0.6 W	0.4 W	0.25 W	0.125 W
Temp. range	-55 to 155 °C				-55 to 155	-55 to 125
U_{max}	250 V (350 V)	200 V	350 V	200 V	250 V	
E-Series	E24		E24/E96		E24/E96 and other values	
Resistance range including temperature coefficient (TC)						
1 Ω						
10 Ω					4.99 Ω	4.99 Ω
100 Ω						
1 kΩ	TC 100		TC 50	TC 50		
10 kΩ						
100 kΩ						
1 MΩ						
10 MΩ	TC 250	TC 250 3 MΩ			TC 25/TC 10/TC 5 and lower	
Remarks					extreme long term stability smaller tolerances and lower TC values are possible calibration resistors and resistor arrays are also available on request	
Ordering information Preferred types						
Series	SFR25 / SFR25H	SFR16S	MRS25	MRS16S	MPR24	
E-series	E12	E12	E24	E24	E24, 0.1%	
Quantity	5000	5000	5000	5000	1000	
Packing	ammopack		ammopack		ammopack	
*N-American	5043EM....J / 5043ED....F 5053HM....J / 5053HD....F	5033ED....F / 5033EM....J	2322 156 3....	2322 157 3....	on request	
Cat. number	2322 181 43... / 186 76...	2322 187 53...	2322 156 2....	2322 157 2....	on request	
Note	See page 108 for E values and the last 4 or 3 digits of the catalogue number					

	Fusible		High voltage surge	High ohmic / High voltage				
			NEW 					
Technology	metal film			thick film				
Series	NFR 25 (5063 F*)	NFR 25H	LSR37	VR 25 (5043 DM*)	VR 37 (5053 DM*)	VR 68 (5073 DM*)		
Body size (mm)	∅ 2.5 x 6.5		∅ 4 x 9	∅ 2.5 x 6.5		∅ 4 x 9		
Tolerance	5%		±10%, ±20%	5%, 10% (> 15 MΩ)	1%	5%	1%	
Power P_{70}	0.33 W	0.5 W	0.5 W	0.25 W		0.5 W	1 W	
Temp. range	-55 to 155 °C			-55 to 155 °C				
U_{max}	250 V	350 V	$U_r = \sqrt{P \cdot R}$	1.6 kV (DC), 1.15 kV (RMS)		3.5 kV (DC), 2.5 kV (RMS)		
E-series	E24		E12	E24/ E12 (> 1 MΩ)	E24/E96	E24	E24/E96	
Resistance range including temperature coefficient (TC)	1 Ω							
		TC 200						
	10 Ω	15 Ω						
	100 Ω							
	1 kΩ	TC 100						
	10 kΩ	15 kΩ						
	100 kΩ							
	1 MΩ				TC 200	TC 200	TC 200	TC 200
	10 MΩ				22 MΩ	15 MΩ	33 MΩ	68 MΩ
100 MΩ								
Remarks	non flammable, specified interruption, values < 1 Ω available on request		safety product preliminary	safety product		safety product VDE/BSI and UL approval for resistance range from 510 kΩ to 11 MΩ, BSI approved		

Ordering information Preferred types						
Series	NFR 25	NFR 25H	LSR 37	VR 25	VR 37	VR 68
E-series	E12	E12	E12, 20%	E12, 5%, 100 kΩ - 10 MΩ	E12, 5%	E12, 5%
Quantity	5000	5000	1000	1000	1000	500
Packing	ammopack	ammopack	ammopack	ammopack	ammopack	ammopack
*N-American	5063FM...J / 5063FD...J	2306 207 23...	2322 245 11...	5043DM...J / 5043DM...F	5053DM...J / 5053DM...F	5073DM...J / 5073DM...F
Cat. number	2322 205 33...	2322 207 33...	2322 245 11...	2322 241 13...	2322 242 13...	2322 244 13...
Note	See page 108 for E values and the last 3 digits of the catalogue number					

Fixed Linear Resistors

Leaded



	Professional								
Technology	metal film								
Series	MBA 0204			MBB 0207			MBE 0414		
Body size (mm)	∅ 1.6 x 3.6			∅ 2.5 x 6.3			∅ 4.0 x 11.9		
Case Size	0204			0207			0414		
Tolerance	5%	1%	0.5%	5%	1%	0.5%	5%	1%	0.5%
Long Term P_{70}	0.25 W			0.4 W			0.65 W		
Temp. range	-65 to 125°C			-65 to 125°C			-65 to 125°C		
Standard P_{70}	0.4 W			0.6 W			1.0 W		
Temp. range	-65 to 155°C			-65 to 155°C			-65 to 155°C		
U_{max}	200 V			300 V			500 V		
E-Series	E24	E24 and E96	E24 and E192	E24	E24 and E96	E24 and E192	E24	E24 and E96	E24 and E192
Resistance range including temperature coefficient (TC)									
0 Ω	jumper			jumper					
0.1 Ω	0.22 Ω			0.22 Ω			0.22 Ω		
1 Ω	TC 50			TC 50			TC 50		
10 Ω	< 1 Ω	TC 50		< 1 Ω	TC 50		< 1 Ω	TC 50	
100 Ω									
1 kΩ		TC 50/25	TC 50/25		TC 50/25	TC 50/25		TC 50/25	TC 50/25
10 kΩ									
100 kΩ		475 kΩ							
1 MΩ		TC 50	475 kΩ		TC 50			2.4 MΩ	
10 MΩ				> 10 MΩ	TC 50			TC 50	2.4 MΩ
100 MΩ				TC 50				22 MΩ	
100 MΩ				22 MΩ					
Remarks									

Ordering information Preferred types									
Series	MBA 0204			MBB 0207			MBE 0414		
Quantity	5000			5000			1000		
Packing	Cardboard box			Cardboard box			Cardboard box		
Cat. number	2312 905 3....	2312 90. 1....	2312 90. 5....	2312 915 3....	2312 91. 1....	2312 91. 5....	2312 920 3....	2312 92. 1....	2312 92. 5....
N. American	5063JD-J	5063JD-F		B0207-J	B0207-F	B0207-D	E0414-J	E0414-F	E0414-D
Note	See page 108 and 109 for E24, E96 and E192 values and body dimensions								

Precision							
Technology	metal film						
Series	MBA 0204		MBB 0207		MBE 0414		
Body size (mm)	∅ 1.6 x 3.6		∅ 2.5 x 6.3		∅ 4.0 x 11.9		
Case Size	0204		0207		0414		
Tolerance	0.25%	0.1%	0.25%	0.1%	0.25%	0.1%	
Long Term P_{70} Temp. range	0.25 W -55 to 125°C		0.4 W -55 to 125°C		0.65 W -55 to 125°C		
Precision P_{70} Temp. range	0.07 W -10 to 85°C		0.11 W -10 to 85°C		0.17 W -10 to 85°C		
U_{max}	200 V		300 V		500 V		
E-Series	E24 and E192		E24 and E192		E24 and E192		
Resistance range including temperature coefficient (TC)	10 Ω	22 Ω	43 Ω	43 Ω	22 Ω	43 Ω	
	100 Ω						
	1 kΩ	TC 50/25/15	TC 50/25/15	TC 50/25/15	TC 50/25/15	TC 50/25/15	
	10 kΩ						
	100 kΩ	221 kΩ	221 kΩ	562 kΩ	562 kΩ	TC 50/25/15	TC 50/25/15
		TC 50/25	TC 50/25	TC 50/25	TC 50/25		
	1 MΩ	332 kΩ	332 kΩ			TC 50/25 1.5 MΩ	
	10 MΩ						
Remarks							

Ordering information Preferred types						
Series	MBA 0204		MBB 0207		MBE 0414	
Quantity	1000		1000		1000	
Packing	Cardboard box		Cardboard box		Cardboard box	
Cat. number	2312 90. 6....	2312 90. 7....	2312 91. 6....	2312 91. 7....	2312 92. 6....	2312 92. 7....
Note	See page 108 and 109 for E24 and E192 values and body dimensions					



Fixed Linear Resistors

Leaded



	Ultra precision							
Technology	metal film							
Series	UXA 0204				UXB 0207			
Body size (mm)	∅ 1.6 x 3.6				∅ 2.5 x 6.3			
Case Size	0204				0207			
Tolerance	0.25%	0.1%	0.05%	0.01%	0.25%	0.1%	0.05%	0.01%
Precision P_{85}	0.05 W				0.125 W			
Temp. range	-20 to 125°C				-20 to 125°C			
U_{max}	200 V				250 V			
E-Series	any resistance value				any resistance value			
Resistance range including temperature coefficient (TC)								
10 Ω	22 Ω	43 Ω			22 Ω	40.2 Ω		
	TC 10	TC 10			TC 10	TC 10		
100 Ω	47 Ω	47 Ω			47 Ω	47 Ω		
		TC 10/05				TC 10/05		
			TC 10				TC 10	
			150 Ω				150 Ω	
1 kΩ	TC 10/05	TC 10/05/02	TC 10/05/02	TC 10/05/02	TC 10/05	TC 10/05/02	TC 10/05/02	TC 10/05/02
10 kΩ								
100 kΩ	150 kΩ	100 kΩ	100 kΩ	100 kΩ		150 kΩ	150 kΩ	150 kΩ
		150 kΩ	150 kΩ	150 kΩ		221 kΩ	221 kΩ	221 kΩ
	221 kΩ	221 kΩ	180 kΩ	150 kΩ	301 kΩ	301 kΩ	301 kΩ	301 kΩ
1 MΩ	TC 10	TC 10/05	TC 10/05	TC 10/05	TC 10	TC 10/05	TC 10/05	TC 10/05
		TC 10	TC 10			TC 10	TC 10	TC 10
Remarks	TC 10/05 are specified over the temperature range -20°C to +85°C TC 02 is specified over the temperature range 0°C to +60°C							

Ordering information Preferred types		
Series	UXA 0204	UXB 0207
Quantity	1000	1000
Packing	Cardboard box	Cardboard box
Cat. number	2312 66.	2312 67.
Note	See page 109 for body dimensions	

	High frequency	High pulse load
		
Technology	metal film	carbon
Series	MBA 0204 HF	CBB 0207
Body size (mm)	∅ 1.6 x 3.6	∅ 2.5 x 6.3
Case Size	0204	0207
Tolerance	2%	2%
Long Term P_{70} Temp. range	0.25 W -65 to 125°C	0.4 W -55 to 125°C
Power P_{70} Temp. range	0.4 W -65 to 155°C	0.6 W -55 to 155°C
U_{max}	Limited by P_{70}	350 V
E-Series	E24	E24
Resistance range including temperature coefficient (TC)		
1 Ω	1.5 Ω	
10 Ω	TC 50	
100 Ω		
1 kΩ	470 Ω	
10 kΩ		
100 kΩ		
1 MΩ		
10 MΩ		1.5 MΩ
Remarks	Other values typical for RF applications are also available e.g. 50 Ω	

Ordering information Preferred types		
Series	MBA 0204 HF	CBB 0207
Quantity	1000	1000
Packing	Cardboard box	Cardboard box
Cat. number	2312 903 0...	2312 950 2...
Note	See page 108 and 109 for E24 values and body dimensions	

Fixed Linear Resistors

Leaded



Power												
Technology	metal film			wirewound, axial cemented								
Series	PR01 (5073 NW*)	PR02 (5083 NW*)	PR03 (5093 NW*)	AC01	AC03	AC04	AC05	AC07	AC10	AC15	AC20	
Body size	∅ 2.5 x 6.5	∅ 3.9 x 10	∅ 5.2 x 16.7	∅ 4.3 x 10	∅ 5.5 x 13	∅ 5.5 x 17	∅ 7.5 x 17	∅ 7.5 x 25	∅ 8 x 44	∅ 10 x 51	∅ 10 x 67	
Tolerance	1%, 5% (2% on request)			5%								
Power P_{70} P_{40}	1 W ≥ 1 Ω	2 W ≥ 1 Ω	3 W ≥ 1 Ω	0.9 W 1 W	2.5 W 3 W	3.5 W 4 W	4.7 W 5 W	5.8 W 7 W	8.4 W 10 W	12.5 W 15 W	16 W 20 W	
Temp. range	-55 to 155 °C			-40 to 200 °C								
U_{max}	350 V	500 V	750 V	determined by maximum applicable power								
E-series	E24			E24								
Resistance range including temperature coefficient (TC)	E24			E24								
0.1 Ω	0.22 Ω	0.33 Ω	0.68 Ω									
1 Ω				TC ±600	TC ±600	TC ±600	TC ±600	TC ±600	0.68 Ω	0.82 Ω	1.2 Ω	
10 Ω									TC ±600	TC ±600	TC ±600	
100 Ω	TC 250	TC 250	TC 250	TC +140 -80	TC +140 -80	TC +140 -80	TC +140 -80	TC +140 -80	TC +140 -80	TC +140 -80	TC +140 -80	
1 kΩ				2 kΩ	4.7 kΩ	6.8 kΩ	8.2 kΩ	15 kΩ	27 kΩ	39 kΩ	56 kΩ	
10 kΩ												
100 kΩ												
1 MΩ												
Remarks	values < 1 Ω have 60% of P_{70} , high power dissipation at small case size, also usable as fusible resistor up to 560 Ω			high pulse load handling capability								

Ordering information Preferred types


Series	PR01	PR02	PR03	AC01	AC03	AC04	AC05	AC07	AC10	AC15	AC20
E-series	E24, 5%, 1 Ω - 1 MΩ	E24, 5%, 1 Ω - 1 MΩ	E24, 5%, 1 W - 1 MW	5%, 0.1 Ω - 3 kΩ	5%, 0.1 Ω - 4.7 kΩ	5%, 0.1 Ω - 6.8 kΩ	5%, 0.1 Ω - 8.2 kΩ	5%, 0.1 Ω - 15 kΩ	5%, 0.68 Ω - 27 kΩ	5%, 0.82 Ω - 39 kΩ	5%, 1.2 Ω - 56 kΩ
Quantity	5000	1000	500	1000	500	500	500	500	500	500	500
Packing	ammopack 52 mm	ammopack 52 mm	ammopack 63 mm	ammopack	ammopack	ammopack	ammopack	ammopack	ammopack	ammopack	ammopack
*N-American	5073NW....J	5083NW....J	5093NW....J	AC01W....J	AC03W....J	AC04W....J	AC05W....J	AC07W....J	AC10W....J	AC15W....J	AC20W....J
Cat. number	2322 193 14... (5%) 2322 196 1.... (1%)	2306 198 53... (5%) 2322 197 1.... (1%)	2322 195 14...	2306 328 33...	2322 329 03...	2322 329 04...	2322 329 05...	2322 329 07...	2322 329 10...	2322 329 15...	2322 329 20...
Note	See page 108 for E values and the last 3 digits of the catalogue number										

Power																				
Technology	stand-up						radial mounted													
Series	SMW02	SMF 02	SMW03	SMF 03	SMW05	SMF 05	RMW03	RMF 03	RMW05	RMF 05	RMW07	RMF 07	RMW10	RMF 10	RMW15	RMW20				
Case/body-size (mm)	W x T x H 11 x 7 x 20.5		W x T x H 12 x 8 x 25		W x T x H 13 x 9 x 25.5		W x L x H 9 x 24 x 9		W x L x H 9.5 x 27 x 9.5		W x L x H 9.5 x 35 x 9.5		W x L x H 9.5 x 48 x 9.5		W x L x H 12.5 x 48 x 12.5		W x L x H 12.5 x 63.5 x 12.5			
Tolerance	5%						5%	10%	5%	5%	10%	5%	5%	10%	10%	5%	10%	5%	10%	
Power P_{70}	2 W		3 W		5 W		3 W		5 W		7 W		10 W		15 W		20 W			
Temp. range	-40 to 200 °C						-25 to 155 °C													
U_{max}	determined by maximum applicable power						determined by maximum applicable power													
E-series	E24						E24													
Resistance range including temperature coefficient (TC)	0.01 Ω																			
0.1 Ω	0.1 Ω		0.1 Ω		0.1 Ω		0.22 Ω		0.47 Ω		0.68 Ω		1 Ω		2.2 Ω		1 Ω		1.5 Ω	
1 Ω	TC 600		TC 600		TC 600		TC 600		TC 600		TC 600		TC 600		TC 200		TC 200		TC 200	
10 Ω	TC 140/-80		TC 140/-80		TC 140/-80		TC 200		TC 200		TC 200		TC 200		TC 200		TC 200		TC 200	
100 Ω	200 Ω		220 Ω		620 Ω		3.9 kΩ		100 Ω		100 Ω		100 kΩ		10 kΩ		10 kΩ		15 kΩ	
1 kΩ	TC 250		560 Ω		560 Ω		TC 250		TC 200		TC 200		TC 200		TC 200		TC 200		TC 200	
10 kΩ	47 kΩ		47 kΩ		47 kΩ		47 kΩ		39 kΩ		51 kΩ		100 kΩ		150 kΩ		150 kΩ		150 kΩ	
100 kΩ	47 kΩ		47 kΩ		47 kΩ		47 kΩ		39 kΩ		51 kΩ		100 kΩ		150 kΩ		150 kΩ		150 kΩ	
1 MΩ	47 kΩ		47 kΩ		47 kΩ		47 kΩ		39 kΩ		51 kΩ		100 kΩ		150 kΩ		150 kΩ		150 kΩ	
10 MΩ	47 kΩ		47 kΩ		47 kΩ		47 kΩ		39 kΩ		51 kΩ		100 kΩ		150 kΩ		150 kΩ		150 kΩ	
Remarks	high power dissipation requiring little board space						series available with different mounting heights (10 mm and 25 mm) and termination styles													

Ordering information Preferred types																
Series	SMW02	SMF 02	SMW03	SMF 03	SMW05	SMF 05	RMW 03	RMF 03	RMW 05	RMF 05	RMW 07	RMF 07	RMW 10	RMF 10	RMW 15	RMW 20
E-series	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6
Quantity	500	500	500	500	500	500	500	500	500	500	500	500	400	400	300	50
Packing	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose	loose
N-American	SMW02W...J	SMF02W...J	SMW03W...J	SMF03W...J	SMW05W...J	SMF05W...J	RMW03W...J	RMF03W...J	RMW05W...J	RMF05W...J	RMW07W...J	RMF07W...J	RMW10W...J	RMF10W...J	RMW15W...J	RMW20W...J
Cat. number	2306 340 03...	2306 345 03...	2306 341 03...	2306 346 03...	2306 342 03...	2306 347 03...	2322 250	2322 256	2322 251	2322 257	2322 252	2322 258	2322 253	2322 259	2306 254 12... (terminal style 1, length 25 mm)	2306 255 12... (terminal style 1, length 25 mm)
Note	See page 108 for E values and the last 4 or 3 digits of the catalogue number															

Fixed Linear Resistors

Leaded

Power, precision							
							
Technology	wirewound, axial cemented, precision						
Series	LVR05	PAC01	PAC02	PAC03	PAC04	PAC05	PAC06
Case/Body size (mm)	W x L x H 22 x 8 x 8.0	∅ 4.3 x 10	∅ 5.5 x 13	∅ 5.5 x 17	∅ 7.5 x 17	∅ 7.5 x 23	∅ 7.5 x 25
Tolerance	5%	1% (0.5% on request)					
Power P_{25}	5 W	1 W	2 W	3 W	4 W	5 W	6 W
Temp. range	-55 to 155 °C	-55 to 200 °C					
U_{max}	determined by maximum applicable power						
E-series	E24	E24/E96					
Resistance range including temperature coefficient (TC)	0.01 Ω						
	0.1 Ω		0.1 Ω	0.1 Ω	0.1 Ω		
	1 Ω	0.1 Ω				0.68 Ω	0.68 Ω
	10 Ω	TC 100	TC 100	TC 100	TC 100		
	100 Ω					TC 100	TC 100
	1 kΩ	2.2 kΩ					
	10 kΩ		3.6 kΩ	4.7 kΩ	8.2 kΩ	10 kΩ	
	100 kΩ						12 kΩ
	1 MΩ						
	10 MΩ						
Remarks	high pulse load handling at narrow tolerance, lower TC values available on request						

Ordering information Preferred types							
Series	LVR05	PAC01	PAC02	PAC03	PAC04	PAC05	PAC06
E-series	E6	E6, 1%, 0.1 Ω - 2.2 kΩ	E6, 1%, 0.1 Ω - 3.6 kΩ	E6, 1%, 0.1 Ω - 4.7 kΩ	E6, 1%, 0.1 Ω - 8.2 kΩ	E6, 1%, 0.68 Ω - 10 kΩ	E6, 1%, 0.68 Ω - 12 kΩ
Quantity	250	500	500	500	500	500	500
Packing	loose	ammopack	ammopack	ammopack	ammopack	ammopack	ammopack
N-American	2306 283 5....	PAC01D...F	PAC02D...F	PAC03D...F	PAC04D...F	PAC05D...F	PAC06D...F
Cat. number	on request	2306 327 5....	2306 327 0....	2306 327 1....	2306 327 2....	2306 327 3....	2306 327 4....
Note	See page 108 for E values and the last 4 or 3 digits of the catalogue number						

NTC & PTC Thermistors, Varistors & Sensors

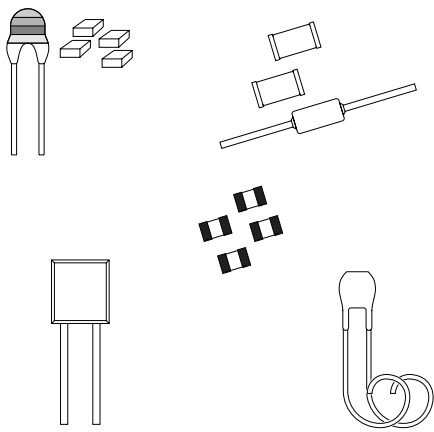
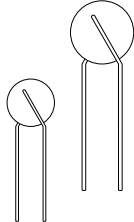
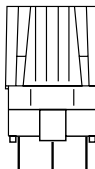
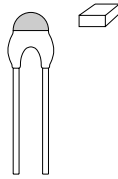
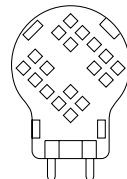
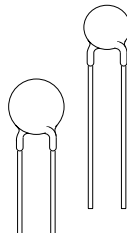
	page
Applications and Typical Functions	126
Programme Survey	127
For Temperature Sensing	128
For Overload Protection	132
For Picture Tube Degaussing	134
For Temperature Protection	137
For Humidity Sensing	137
For Overvoltage Protection	138



Applications and typical functions

APPLICATION	NTC THERMISTORS		PTC THERMISTORS			VARISTORS	HUMISTORS
	Temperature sensing	Temperature compensation	Degaussing	Temperature protection	Overloaded protection	Transient protection	Humidity sensing
Telecommunications		x			x	x	
Automotive	x			x	x	x	
Small domestic appliances	x			x	x	x	x
Large domestic appliances	x		x	x	x	x	
Colour televisions, monitors						x	
Other consumer equipment		x		x	x	x	
EDP		x		x	x	x	x
Lighting					x	x	
General industrial	x	x		x	x	x	x
Medical	x						
SMPS				x	x		



<p>NTC</p>		<p>for temperature sensing</p> <p style="text-align: right;">Page</p> <ul style="list-style-type: none"> • accuracy line, leaded and naked 128 • surface mount 128 • high temperature 130 • long leaded sensors 131 • moulded sensors 131
<p>PTC</p>		<p>for overload protection</p> <ul style="list-style-type: none"> • general purpose 132 • telecommunications 133 • test & measuring equipment 133 • lighting 133 • surface mount 133
		<p>for picture tube degaussing 134</p>
		<p>for temperature protection 137</p>
<p>Humidity sensor</p>		<p>for humidity sensing 137</p>
<p>VDR</p>		<p>for overvoltage protection 138</p>

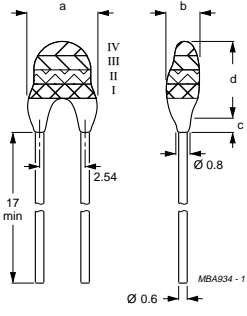
NTC Thermistors

for temperature sensing

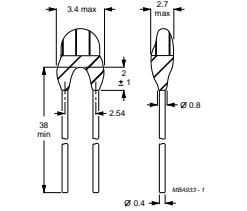
	Accuracy line			Surface mount
Series 2322	640 0	640 6....	640 5....	615 1....
Resistance at 25 °C	$R_{25} = 470 \Omega$ to 470 k Ω	$R_{25} = 3.3 \Omega$ to 470 k Ω	$R_{25} = 2.7 \text{ k}\Omega, 4.7 \text{ k}\Omega, 10 \text{ k}\Omega, 47 \text{ k}\Omega, 100 \text{ k}\Omega, 470 \text{ k}\Omega$	$R_{25} = 100 \Omega$ to 470 k Ω
Tolerance $\Delta R/R_{25}$	$\pm 5\%, \pm 3\%, \pm 2\%, \pm 1\%$	$\pm 5\%, \pm 3\%, \pm 2\%$	$\pm 3\%, \pm 2\%, \pm 1\%$	$\pm 10\%, \pm 5\%$
B-value $B_{25/85}$	3528 to 4570 K	3528 to 4570 K	3528 to 4570 K	2880 to 3650 K
Max. power dissipation P_{max}	0.1 W - 0.2 W	0.5 W	0.1 W	0.210 W
Operational temperature range at P_0 at P_{max}	-40 to +125 °C (+150 °C) 0 to +55 °C	-40 to +125 °C (+150 °C) 0 to +55 °C	-40 to +125 °C (+150 °C) 0 to +55 °C	-55 to +150 °C
Response time	approx. 1 s	approx. 1.2 s	approx. 1.7 s	approx. 10 s
Features	<p>new process technology means resistance tolerances as good as 1%, or better</p> <p>high stability over a long life</p> <p>small and excellent price/performance ratio</p> <p>high impedance, suitable for low-current electronic switching</p> <p>fast response time</p>			<p>high sensitivity</p> <p>suitable for wave or reflow soldering</p> <p>available in 8 mm tape on reel</p>
Applications	very accurate temperature sensing in domestic appliances, automotive and industrial electronics			for temperature sensing and compensation

Ordering information Preferred types

Series 640 6.... for temperature sensing

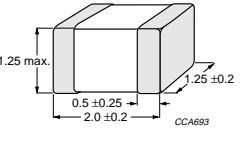
outline dimensions (mm)	5% tolerance			3% tolerance		
	$R_{25} \pm 5\%$ (k Ω)	$B_{25/85}$ (K)	catalogue number 2322 640	$R_{25} \pm 3\%$ (k Ω)	$B_{25/85}$ (K)	catalogue number 2322 640
 <p>tinned copper leads</p>	0.0033	2880 \pm 3%	63338	2.7	3977 \pm 0.75%	66272
	0.0047	2880 \pm 3%	63478	4.7	3977 \pm 0.75%	66472
	0.0068	2880 \pm 3%	63688	10	3977 \pm 0.75%	66103
	0.010	2995 \pm 3%	63109	47	4090 \pm 1.5%	66473
	0.015	3045 \pm 3%	63159	100	4190 \pm 1.5%	66104
	0.022	3140 \pm 3%	63229	470	4570 \pm 1.5%	66474
	0.033	3380 \pm 3%	63339			
	0.047	3380 \pm 3%	63479			
	0.068	3380 \pm 3%	63689			
	0.10	3560 \pm 0.75%	63101			
	0.15	3560 \pm 0.75%	63151			
	0.22	3560 \pm 0.75%	63221			
	0.33	3560 \pm 0.75%	63331			
	0.47	3560 \pm 0.75%	63471			
	1	3528 \pm 0.5%	63102			
	1.5	3528 \pm 0.5%	63152			
	2	3528 \pm 0.5%	63202			
	2.2	3977 \pm 0.75%	63222			
	3.3	3977 \pm 0.75%	63332			
	4.7	3977 \pm 0.75%	63472			
	6.8	3977 \pm 0.75%	63682			
	10	3977 \pm 0.75%	63103			
	12	3740 \pm 0.75%	63123			
	15	3740 \pm 2%	63153			
	22	3740 \pm 2%	63223			
	33	4090 \pm 1.5%	63333			
47	4090 \pm 1.5%	63473				
68	4190 \pm 1.5%	63683				
100	4190 \pm 1.5%	63104				
150	4370 \pm 2.5%	63154				
220	4370 \pm 2.5%	63224				
330	4570 \pm 2.5%	63334				
470	4570 \pm 1.5%	63474				
outline dimensions (mm)						
a	3.3 \pm 0.5 for 330 Ω to 470 k Ω 5 max for 100 Ω to 220 Ω					
b	3 max for 330 Ω to 470 k Ω 4 max for 100 Ω to 220 Ω					
c	2 \pm 1 for 330 Ω to 470 k Ω 1 min/ 4 max for 100 Ω to 220 Ω					
d	5 max for 330 Ω to 470 k Ω 6 max for 100 Ω to 220 Ω					

Series 640 5.... for temperature sensing

outline dimensions (mm)	2% tolerance			1% tolerance		
	$R_{25} \pm 2\%$ (k Ω)	$B_{25/85}$ (K)	catalogue number 2322 640	$R_{25} \pm 1\%$ (k Ω)	$B_{25/85}$ (K)	catalogue number 2322 640
 <p>long tinned nickel leads low heat conductivity through leads</p>	10	3977 \pm 0.75%	54103	10	3977 \pm 0.75%	55103
	47	4090 \pm 1.5%	54473	47	4090 \pm 1.5%	55473
	100	4190 \pm 1.5%	54104	100	4190 \pm 1.5%	55104

Smallest packing quantity SPQ = 500 for all preferred leaded types

Series 615 1.... for temperature sensing and compensation

outline dimensions (mm)	5% tolerance			5% tolerance		
	R_{25} (k Ω)	$B_{25/85}$ (K)	catalogue number 2322 615	R_{25} (k Ω)	$B_{25/85}$ (K)	catalogue number 2322 615
	0.10	2880 \pm 3%	13101	15	3528 \pm 1%	13153
	0.22	2995 \pm 3%	13221	22	3930 \pm 3%	13223
	0.33	3045 \pm 3%	13331	30	3960 \pm 1.5%	13330
	0.47	3140 \pm 3%	13471	33	3960 \pm 1.5%	13333
	0.68	3245 \pm 3%	13681	47	4090 \pm 1.5%	13473
	1.0	3380 \pm 3%	13102	68	3740 \pm 3%	13683
	2.2	3680 \pm 3%	13222	100	3650 \pm 1%	13104
	3.3	3880 \pm 3%	13332	150	3807 \pm 3%	13154
	4.7	3560 \pm 1%	13472	220	3872 \pm 3%	13224
	5.0	3560 \pm 1%	13502	330	4015 \pm 3%	13304
	10	3620 \pm 1%	13103	470	4130 \pm 3%	13474

Packing = 4000 pcs taped on reel in 8 mm blister

NTC Thermistors

for sensing of high temperatures

Series 2322	633 5....	633 8.... (bulk), 633 3.... (ammopack)	633 7.... (bulk), 633 4 (ammopack)
Type of leads	SMT-metallization	tinned	nickel-plated
Resistance at 25 °C	10 kΩ 20 kΩ 30 kΩ 40 kΩ 100 kΩ	10 kΩ 20 kΩ 30 kΩ 100 kΩ 220 kΩ	100 kΩ 220 kΩ
Tolerance on R-value	± 5%, ± 10%	± 5%, ± 10%	± 5%, ± 10%
B-value $B_{25/85}$	3977 K	3977 K, 3797 K	3977 K, 3797 K
Tolerance on B-value	± 1.3%	± 1.3%	± 1.3%
Max. power dissipation P_{max}	100 mW	100 mW	100 mW
Operational temperature range at P_0	- 40 to + 200 °C	- 40 to + 200 °C	- 40 to + 300 °C
at P_{max}	0 to + 55 °C	0 to + 55 °C	0 to + 55 °C
Temperature coefficient at 25 °C	- 4.38% /K	- 4.38% /K	- 4.38% /K
Response time	approx. 0.9 s	approx. 0.9 s	approx. 0.9 s
Type of housing,	glass SOD-80	glass SOD-27	glass SOD-27
Features	wide temperature range from - 40 to + 300 °C very small, available as surface-mount sensor and with leads because of their glass encapsulation they are ideal for use in corrosive atmospheres and harsh environments		

Ordering information Preferred types								
	SMD version			Leaded version				
	catalogue number	R_{25} (kΩ)	tolerance (%)	catalogue number	R_{25} (kΩ)	tolerance (%)	type of leads	
							tinned	nickel-plated
	2322 633 53103 2322 633 53203 2322 633 53303 2322 633 53104	10 20 30 100	5 5 5 5	2322 633 83103 2322 633 83203 2322 633 83303 2322 633 83104	10 20 30 100	5 5 5 5	√ √ √ √	- - - -
Outline dimensions (mm)								
Packing	smallest packing quantity SPQ=2500 (blister tape only)			smallest packing quantity SPQ=1000 , bulk				

	Screw	Insulated leads	Non-insulated leads	Encapsulated, long PVC leads	Moulded
Series 2322	640 7....	645 20 ...	645 10 ...	2338 640 9 / 7 / 8	641 6
Resistance at 25 °C	$R_{25} = 100 \Omega$ to 470 k Ω	$R_{25} = 3 \text{ k}\Omega$, 5 k Ω and 10 k Ω	3 k Ω , 5 k Ω and 10 k Ω	$R_{25} = 2.2 \text{ k}\Omega$ to 470 k Ω	2.2 k Ω to 470 k Ω
Tolerance $\Delta R/R_{25}$	$\pm 5\%$	ΔT between 0 °C and 50 °C : $\pm 0.5 \text{ }^\circ\text{C}$		$\pm 3\%$	$\pm 3\%$
B-value $B_{25/85}$	3528 to 4570 K	3977 K	3977 K	3977 to 4570 K	3740 to 4570 K
Max. power dissipation P_{max}	0.5 W	0.1 W	0.1 W	0.2 - 0.3 W	0.25 W
Operational temperature range at P_0	- 25 to + 100 °C	- 40 to + 125 °C	- 25 to + 125 °C	- 40 to + 80 °C	- 40 to + 125 °C
at P_{max}	0 to + 55 °C	0 to + 55 °C	0 to + 55 °C	0 to + 55 °C	0 to + 55 °C
Response time	-	approx. 2.5 s	approx. 1.24 s	approx. 2.5 s	approx. 2.7 s
Features	screw threaded sensor for optimal thermal contact all types of series 640 0 can be applied on special request	insulated leads	non-insulated leads	epoxy coated NTC 640 9 : - epoxy coating - small size, quick response - good humidity resistance water resistant NTC 640 7 : - epoxy coating - water resistant sleeve - excellent humidity resistance brass pipe NTC 640 8 : - 2 epoxy layers - brass sensing head - rigid execution	moulded NTC thermistor with same characteristics as the ceramic chip 640 0
Applications	heatsinks, boiler flanges, vessel walls, etc.	automotive, general industrial		air conditioning, fridges, freezers, dryers, fan-heaters automotive	ideal where good surface contact is essential

Ordering information Preferred types

Series 640 9 / 7 / 8 encapsulated, long PVC leads

epoxy-coated		water resistant		brass pipe		R_{25} (k Ω)	nominal B-value (K)
catalogue number		catalogue number		catalogue number			
new	old	new	old	new	old		
2338 640 90102	2322 641 26222	2338 640 70106	2322 641 36222	2338 640 80102	2322 641 46222	2.2 k $\Omega \pm 3\%$	3977 K $\pm 0.75\%$
2338 640 90104	2322 641 26502	2338 640 70105	2322 641 36502	-	-	5 k $\Omega \pm 3\%$	3977 K $\pm 0.75\%$
2338 640 90106	2322 641 26103	2338 640 70104	2322 641 36103	2338 640 80106	2322 641 46103	10 k $\Omega \pm 3\%$	3977 K $\pm 0.75\%$
2338 640 90452	2322 641 26473	2338 640 70452	2322 641 36473	-	-	47 k $\Omega \pm 3\%$	4190 K $\pm 2\%$
2338 640 90504	2322 641 26104	2338 640 70504	2322 641 36104	2338 640 80504	2322 641 46104	100 k $\Omega \pm 3\%$	4090 K $\pm 1.5\%$

Series 641 6 moulded

catalogue number 2322 641	R_{25} (k Ω)	nominal B-value (K)
66272	2.7 k $\Omega \pm 3\%$	3977 K $\pm 0.75\%$
66123	12 k $\Omega \pm 3\%$	3740 K $\pm 2\%$
66153	15 k $\Omega \pm 3\%$	3740 K $\pm 2\%$
66223	22 k $\Omega \pm 3\%$	3740 K $\pm 2\%$
66104	100 k $\Omega \pm 3\%$	4190 K $\pm 1.5\%$
66474	470 k $\Omega \pm 3\%$	4570 K $\pm 1.5\%$

PTC Thermistors

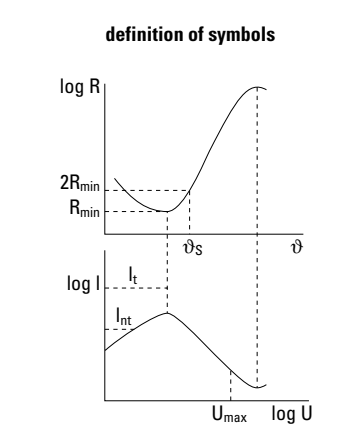
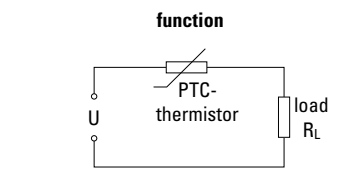
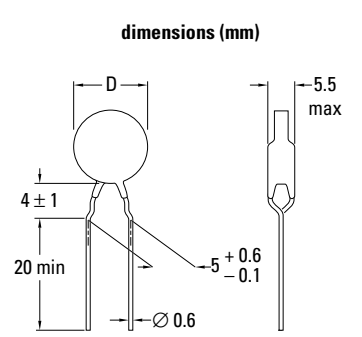
for overload protection, general purpose



Catalogue number 2322	I_{nt} 25 °C (mA)	I_t 25 °C (mA)	R_{25} ±25% (Ω)	U_{max} DC (V)	I_{max} (A)	D_{max} (mm)
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Low voltage types						
660 X9491	94	145	50	60	0.8	4.6
660 X1311	130	195	25	60	1.2	4.6
660 91049*	150	270	9.4	60	1.7	5
660 X1811	180	270	13	30	1.7	4.6
660 X2711	270	405	6	30	2.5	4.6
661 X3211	320	480	5	30	3.5	6.5
661 X4111	410	615	3	30	4.5	6.5
661 X4711	470	705	2.5	30	5	8.5
661 X5411	540	810	1.9	30	6	8.5
662 X6111	610	915	1.7	30	7	10.5
662 X7011	700	1050	1.3	30	8	10.5
662 X8311	830	1245	1.1	30	10	12.5
662 X9211	920	1380	0.9	30	11	12.5
663 X1121	1170	1755	0.7	30	13.5	16.5
663 X1321	1390	2085	0.5	30	16	16.5
664 X1721	1770	2655	0.4	30	20	20.5
664 X2021	2050	3075	0.3	30	23	20.5

Mains voltage types						
660 X1193	11	17	3000	265	0.08	5
660 X1593	15	23	1900	265	0.11	5
660 X1993	19	29	1200	265	0.14	5
660 X2893	28	42	500	265	0.2	5
660 X3993	39	59	260	265	0.3	5
660 X6393	63	95	120	265	0.45	5
660 X7693	76	115	85	265	0.55	5
660 X9593	95	143	56	265	0.6	5
661 X1113	110	165	48	265	0.65	7
661 X1413	140	210	29	265	0.8	7
661 X1713	170	255	22	265	0.9	8.5
661 X1913	190	285	18	265	1	8.5
662 X2113	210	315	17	265	1.3	10.5
662 X2513	250	375	12	265	1.5	10.5
662 X2813	280	420	11	265	1.8	12.5
662 X3213	320	480	8.4	265	2.2	12.5
663 X4013	400	600	6.6	265	3	16.5
663 X4913	490	735	4.4	265	3.5	16.5
664 X5913	590	855	4	265	4.5	20.5
664 X7013	700	1050	2.8	265	5.5	20.5



	 preferred
Packing	X = 4: bulk-packed, naked disc X = 5: bulk-packed X = 6: taped on reel (not for 663 and 664 range) * = bulk-packed
Features	<ul style="list-style-type: none"> - fast-acting for safe protection, time and time again - no need to reset supply after overload - well defined protection levels - small size with fully lacquered body - UL approved - Excellent long-term stability, even under humid conditions
Applications	non-destructive fuse overload protection for motors, transformers, SMPS, relays, loudspeakers, etc.

Telecommunications, PTCs for secondary overcurrent protection

Catalogue number 2322	Int at T (mA / °C)	It at T (mA / °C)	R ₂₅ (Ω)	V _{max} (V)	max. trip time at I		D _{max} (mm)	matched
					(sec.)	(mA)		
661 91066	85/ 65	280/ 25	4 ± 25%	100	180	280	7	0.5 Ω
661 93078	135/ 95	300/ 25	8 ± 25%	285	180	500	8	0.5 Ω
661 93124	100/ 70	270/ 25	10 ± 20%	245	4	1000	8.5	-
662 93128	110/ 70	300/ 25	9 ± 20%	400	7	1000	10.5	-
661 93056	70/ 70	220/ 25	35 ± 20%	600	3	1000	8	3 Ω
662 93074	110/ 70	270/ 25	10 ± 20%	245	30	500	10.5	-
662 93118	100/ 70	270/ 25	10 ± 15%	400	5	1000	10.5	0.5 Ω
661 93121	100/ 70	150/ 25	16 ± 25%	300	2	1000	7	-
662 93081	140/ 55	-	16 ± 20%	245	30	500	11	-
660 93071	60/ 85	220/ 25	35 ± 20%	245	1.7	670	5	0.8 Ω
661 93135	70/ 70	200/ 25	50 ± 20%	600	1	1000	8	1 Ω
662 93131	175/ 25	300/ 25	10 ± 20%	600	60	400	12	-
661 93138	70/ 70	180/ 25	35 ± 20%	425	1	1000	7	3 Ω
661 93058	80/ 70	200/ 25	25 ± 20%	265	1.5	1000	7	-
662 93113	70/ 70	170/ 25	25 ± 20%	600	8	700	10	-

Test & measuring equipment, PTCs for overload protection on input terminal

Catalogue number 2322	Int at 25°C (mA)	It at 25°C (mA)	R ₂₅ (Ω)	V _{max} (V)	D (mm)	D _{max} (mm)
660 93034*	10	20	1600	600	5	-
661 93113**	1 at 55°C	100 at -10°C	400	600	10	-

Note * insulated body version ** min. insulated voltage between leads and sealing: 1350 V rms

Lighting, PTCs for electronic starting of fluorescent lamp

Catalogue number 2322	R _{min} at 25°C (Ω)	R _{max} at 25°C (Ω)	R _{max} at 115°C (Ω)	V _{max} (peak) (V)	I _{res max} at 500 V rms (mA rms)	D _{max} (mm)
660 93066	75	125	-	500	-	5
660 93049	500	750	5000	700	3.2	5
660 93055	180	300	800	700	3.2	5
661 93102	225	375	-	1000	3.2	7
661 93114	100	300	-	650	-	7

NEW



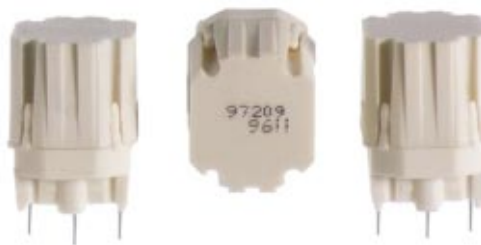
Telecommunications, PTCs for secondary overcurrent protection

Catalogue number 2322	Int at T (mA / °C)	It at T (mA / °C)	R ₂₅ (Ω)	V _{max} (V)	max. trip time at I		D _{max} (mm)	matched
					(sec.)	(mA)		
661 97002	50/ 70	130/ 25	40 ± 25%	265	2.5	500	6.5	-
661 97003	110/ 70	250/ 25	15 - 20%	300	1.5	1000	6.5	0.5 Ω
661 97004	110/ 70	250/ 25	15 - 20%	300	1.5	1000	6.5	-
661 97005	70/ 70	200/ 25	25 ± 20%	265	1.5	1000	6.5	-
661 97009	75/ 70	175/ 25	35 ± 15% / -20%	425	1	1000	6.5	1 Ω
661 97011	100/ 70	300/ 25	9.4 ± 25%	60	4	600	6.5	-
661 97012	100/ 70	270/ 25	10 ± 20%	245	3	1000	6.5	-

Note Product specification available on request

PTC Thermistors

Dual types for picture tube degaussing



Dual range

Catalogue number		R ₂₅		Min. I _{inr} ⁽²⁾⁽³⁾	Current attenuation maximal values ⁽²⁾⁽⁴⁾			Rcoil ⁽⁵⁾⁽⁶⁾		Typical Decay Performance for information only			Type ⁽¹⁰⁾
Pitch		Rs (Ω)	Tol. ⁽¹⁾ ±%		App	(After 5 s) (mApp)	(After 30 s) (mApp)	(After 180 s) (mApp)	reference (Ω)	minimal (Ω)	Decay		
4e/1e	4e/2e			time ⁽⁷⁾ ms							cycles ⁽⁸⁾ number		
Rated voltage: 220-240 V_{rms} (U_{max} is 276 V_{rms})													
2322 662 96209	2322 662 96309	30	25	11	50	5	2	25	17	60	3.0	36	
2322 662 96211	2322 662 96311	26	25	14	50	5	2	17	14	40	2.0	43	
2322 662 96216	2322 662 96316	22	25	16	80	8	4	17	14	40	2.0	44	
2322 662 96616	2322 662 96716	22	25	16	80	8	2	17	10	65	3.3	33	LD
2322 662 96624	2322 662 96724	18	25	20	80	8	2	13	10	50	2.5	38	
2322 662 96626	2322 662 96726	18	25	18	80	15	2	17	10	75	3.8	29	LD
2322 662 96602	2322 662 96702	14	25	25	80	10	4	10	10	40	2.0	45	
2322 662 96642 NEW	2322 662 96742 NEW	14	25	25	80	10	4	10	10	45	2.3	40	LD
2322 662 96606	2322 662 96706	12	20	21	80	10	5	17	10	70	3.5	36	LT
2322 662 96646 NEW	2322 662 96746 NEW	12	20	21	100	20	5	17	10	80	4.0	30	LD/LT
2322 662 96608	2322 662 96708	9	20	20	100	40	10	20	13	95	4.8	33	LT
2322 662 96648 NEW	2322 662 96748 NEW	9	20	20	100	25	10	20	13	115	5.8	26	LD/LT
	2322 662 96709 NEW	7	20	21	100	40	10	20	20	100	5.0	33	LD/LT
Rated voltage: 100-120 V_{rms} (U_{max} is 145 V_{rms})													
2322 662 96213	2322 662 96313	7	20	19	200	20	10	7	5	80	4.0	31	LT
2322 662 96605	2322 662 96705	5	20	27	200	50	14	6	5	85	4.3	30	
2322 662 96645 NEW	2322 662 96745 NEW	5	20	30	200	20	10	5	4	85	4.3	31	LD/LT
2322 662 96643 NEW	2322 662 96743 NEW	3	30/15	30	200	20	10	6	4	115	5.8	29	LD

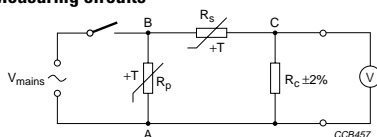
Notes:

- (1) Lower tolerances on resistance of degaussing PTC are available on special request.
- (2) All peak-to-peak currents and decay values are measured at reference resistance of the coil at 220 V_{rms} - 50Hz and at 25°C resp. 110 V_{rms} - 50Hz and at 25°C.
- (3) Inrush current minimal values in A_{pp}.
- (4) Lower residual currents are available on special request.
- (5) The values of the resistance of the coil have a tolerance of 2%.
- (6) Lower minimum coil resistance is available on special request.
- (7) Decay time is the time from the moment of maximum peak current until the half of the maximum peak inrush current.
- (8) The number of decay cycles is the decay time divided by 20 (measured at 50Hz).
- (9) Alpha maximum is the maximum decrease in current expressed in percent between two successive peaks.
- (10) LT = low tolerance; LD = Long decay.

Remarks:

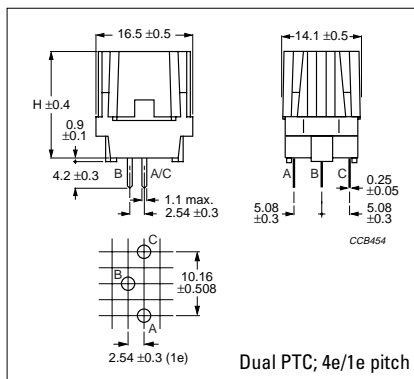
- (a) All types with rated voltage of 220-240 V_{rms} are suitable for global use (rated voltage of 100-240 V_{rms}).
- (b) Residual currents at lower voltages are guaranteed by 220 V_{rms} resp. 110 V_{rms} measurements.
- (c) Ordering information: M.O.Q. = S.P.Q. = P.Q. = 600 items per box.
- (d) Latest data is available on internet <http://www.bccomponents.com>

Measuring circuits

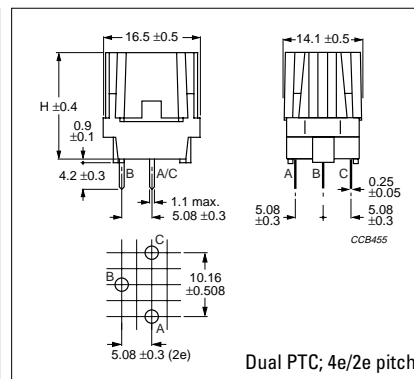


Dual cased PTC degaussing

- V = A/D converter or oscilloscope
 - R_s = resistance of series PTC or degaussing PTC
 - R_p = resistance of parallel PTC or heater PTC
 - R_c = replaces the degaussing coil
 - V_{mains} = AC power source with high output current capability; frequency = 50 Hz ±1%; total harmonic distortion < 2%
- For residual current measurement the R_c resistor can be increased to 100 Ω 1%, 30s after inrush



Dual PTC; 4e/1e pitch



Dual PTC; 4e/2e pitch

PTC Thermistors

Mono cased types for picture tube degaussing



Mono cased range

Catalogue number	R ₂₅		Min. I _{inr} ⁽²⁾⁽³⁾	Current attenuation maximal values ⁽²⁾			Rcoil ⁽⁴⁾⁽⁵⁾		Typical Decay Performance for information only			Type ⁽⁹⁾
	Pitch	R _s (Ω)		Tol. ⁽¹⁾ ±%	App	(After 5 s) (mApp)	(After 30 s) (mApp)	(After 180 s) (mApp)	reference (Ω)	minimal (Ω)	Decay	
4e										time ⁽⁶⁾ ms	cycles ⁽⁷⁾ number	Alpha max. ⁽⁸⁾ (%)
Rated voltage: 220-240 V_{rms} (U_{max} is 276 V_{rms})												
2322 662 96281	30	25	11	100	40	20	25	17	75	3.8	30	
2322 662 96688	26	25	12	50	30	20	25	14	90	4.5	30	
2322 662 96286	22	25	16	80	40	20	17	14	40	2.0	44	
2322 662 96682	18	25	20	100	50	25	13	10	50	2.5	38	
2322 662 96683	14	25	25	200	50	30	10	10	40	2.0	45	
2322 662 96692 NEW	14	25	25	200	80	30	10	10	45	2.3	40	LD
2322 662 96684	12	25	21	200	80	30	17	10	70	3.5	36	
2322 662 96696 NEW	12	25	21	200	80	30	17	10	80	4.0	30	LD
2322 662 96687	9	20	20	100	50	30	20	13	95	4.8	33	LT
2322 662 96698 NEW	9	20	20	200	50	25	20	13	115	5.8	26	LD/LT
2322 662 96681 NEW	7	20	21	100	50	30	20	20	100	5.0	33	LD/LT
Rated voltage: 100-120 V_{rms} (U_{max} is 145 V_{rms})												
2322 662 96285	7	20	19	200	70	40	7	5	80	4.0	31	
2322 662 96686	5	20	27	200	70	40	6	5	85	4.3	30	
2322 662 96695 NEW	5	20	30	200	70	40	5	4	85	4.3	31	LD
2322 662 96693 NEW	3	30/15	30	200	70	40	6	4	115	5.8	29	LD

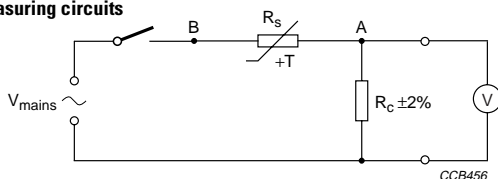
Notes:

- (1) Lower tolerances on resistance of degaussing PTC are available on special request.
- (2) All peak-to-peak currents and decay values are measured at reference resistance of the coil at 220 V_{rms} - 50Hz and at 25°C resp. 110 V_{rms} - 50Hz and at 25°C.
- (3) Inrush current minimal values in A_{pp}.
- (4) The values of the resistance of the coil have a tolerance of 2%.
- (5) Lower minimum coil resistance is available on special request.
- (6) Decay time is the time from the moment of maximum peak current until the half of the maximum peak inrush current.
- (7) The number of decay cycles is the decay time divided by 20 (measured at 50Hz).
- (8) Alpha maximum is the maximum decrease in current expressed in percent between two successive peaks.
- (9) LT = low tolerance; LD = Long decay.

Remarks:

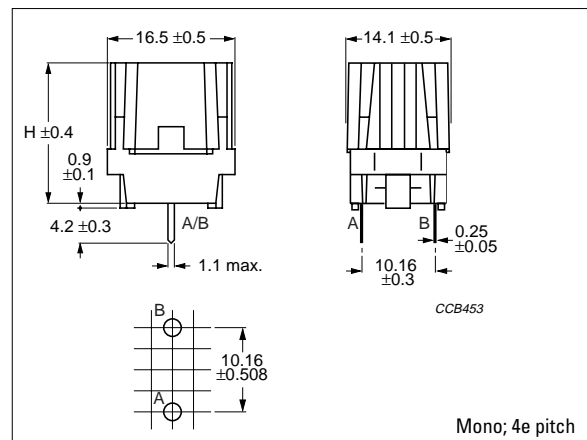
- All types with rated voltage of 220-240 V_{rms} are suitable for global use (rated voltage of 100-240 V_{rms}).
- Ordering information: M.O.Q. = S.P.Q. = P.Q. = 600 items per box.
- Latest data is available on internet <http://www.bccomponents.com>

Measuring circuits



Mono cased PTC degaussing

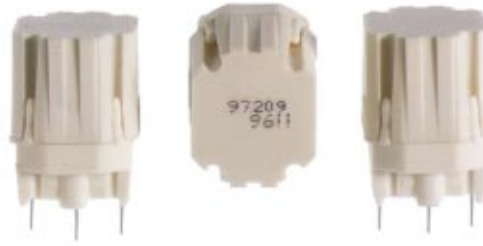
- V = A/D converter or oscilloscope
 - R_s = resistance of series PTC or degaussing PTC
 - R_p = resistance of parallel PTC or heater PTC
 - R_c = replaces the degaussing coil
 - V_{mains} = AC power source with high output current capability; frequency = 50 Hz ±1%; total harmonic distortion < 2%
- For residual current measurement the R_s resistor can be increased to 100 Ω 1%, 30s after inrush



Mono; 4e pitch

PTC Thermistors

Double mono cased types for picture tube degaussing



Double mono cased range

Catalogue number	R ₂₅ ⁽²⁾		Min. I _{inr} ⁽⁴⁾⁽⁵⁾	Current attenuation maximal values ⁽⁴⁾			Rcoil ⁽⁶⁾⁽⁷⁾		Typical Decay Performance for information only			Type ⁽¹¹⁾
	Pitch ⁽¹⁾	Rs (Ω)		Tol. ⁽³⁾ ±%	App	(After 5 s) (mApp)	(After 30 s) (mApp)	(After 180 s) (mApp)	reference (Ω)	minimal (Ω)	Decay	
4e/2e										time ⁽⁸⁾ ms	cycles ⁽⁹⁾ number	
Rated voltage: 220-240 V_{rms} (U_{max} is 276 V_{rms})												
2322 662 96754	9 (18x2)	25	33	200	35	25	10	7	80	4.0	31	LD
2322 662 96752	7 (14x2)	25	34	200	35	25	10	7	80	4.0	31	LD
2322 662 96756	6 (12x2)	20	36	200	35	25	10	7	85	4.3	31	LD/LT
2322 662 96758	4.5 (9x2)	20	33	200	40	30	13	10	130	6.5	27	LD/LT
2322 662 96759	3.5 (7x2)	20	35	200	40	30	13	13	TBF	TBF	TBF	LD/LT
Rated voltage: 100-120 V_{rms} (U_{max} is 145 V_{rms})												
2322 662 96757	3.5 (7x2)	20	27	250	80	45	7	3	TBF	TBF	TBF	LD/LT
2322 662 96755	2.5 (5x2)	20	34	250	80	45	6	3	TBF	TBF	TBF	LD/LT
2322 662 96753	1.5 (3x2)	20	39	250	80	45	6	3	TBF	TBF	TBF	LD/LT

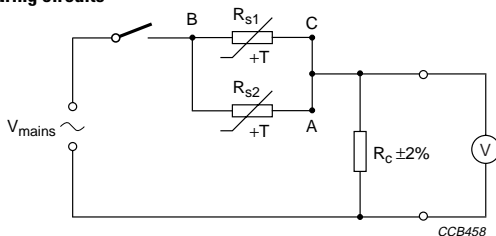
Notes:

- (1) These types are available with 4e/1e pitch on special request.
- (2) The indicated resistance value is the parallel combination of 2 PTCs.
- (3) Lower tolerances on resistance of degaussing PTC are available on special request.
- (4) All peak-to-peak currents and decay values are measured at reference resistance of the coil at 220 V_{rms} - 50Hz and at 25°C resp. 110 V_{rms} - 50Hz and at 25°C.
- (5) Inrush current minimal values in A_{pp}.
- (6) The values of the resistance of the coil have a tolerance of 2%.
- (7) Lower minimum coil resistance is available on special request.
- (8) Decay time is the time from the moment of maximum peak current until the half of the maximum peak inrush current.
- (9) The number of decay cycles is the decay time divided by 20 (measured at 50Hz).
- (10) Alpha maximum is the maximum decrease in current expressed in percent between two successive peaks.
- (11) LT = low tolerance; LD = Long decay.

Remarks:

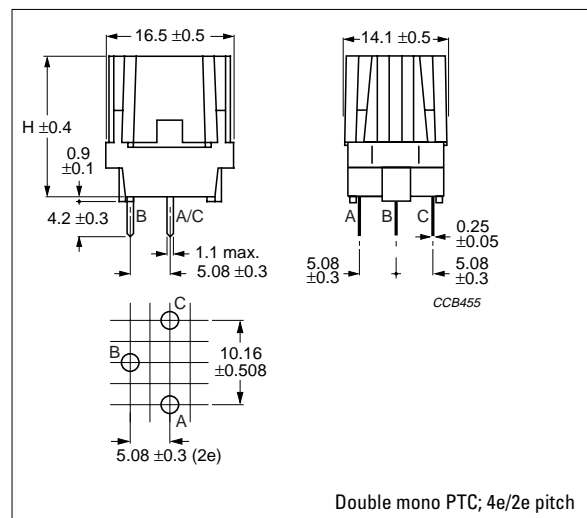
- (a) All types with rated voltage of 220-240 V_{rms} are suitable for global use (rated voltage of 100-240 V_{rms}).
- (b) Ordering information: M.O.Q. = S.P.Q. = P.Q. = 600 items per box.
- (c) Latest data is available on internet <http://www.bccomponents.com>

Measuring circuits



Double mono cased PTC degaussing

- V = A/D converter or oscilloscope
 - R_s = resistance of series PTC or degaussing PTC
 - R_p = resistance of parallel PTC or heater PTC
 - R_c = replaces the degaussing coil
 - V_{mains} = AC power source with high output current capability; frequency = 50 Hz ±1%; total harmonic distortion < 2%
- For residual current measurement the R_c resistor can be increased to 100 Ω 1%, 30s after inrush



Double mono PTC; 4e/2e pitch



Nominal working temperature					Type/catalogue number			
T _n °C	30 to 250 Ω from - 20 °C to T (°C)	50 to 550 Ω at T (°C)	1.33 to 50 kΩ at T (°C)	> 4 kΩ at T (°C)	leaded device		naked chip 1.7x1.7 mm	naked chip 1.5x1.5 mm
					2322 671	colour code	2322 671	2322 671
70	50	65	75	85	91102	black	91002	91052
80	60	75	85	95	91103	brown	91003	91053
90	70	85	95	105	91104	red	91004	91054
100	80	95	105	115	91105	orange	91005	91055
110	90	105	115	125	91106	yellow	91006	91056
120	100	115	125	130	91107	green	91007	91057
125	105	120	130	135	-	-	-	91058
130	110	125	135	140	91109	blue	91009	91059
135	115	130	140	145	-	-	-	91061
140	120	135	145	150	91112	violet	91012	91062
145	125	140	150	155	-	-	-	91063
150	130	145	155	160	91114	grey	91014	91064
155	135	150	160	165	-	-	-	91065
160	140	155	165	170	-	-	-	91066
170	150	165	175	175	-	-	-	91067

Remarks: for the 2322 671 91052/91002/91102: R at 25°C = 30 to 120 Ω
R at T_n-5°C = 50 to 570 Ω
R at T_n+5°C = 570 to 25 000 Ω
for all other types, R₂₅ is between 30 and 120 Ω. preferred

naked chips are packed in a hermetically sealed alu-plastic bag.

Humidity Sensor

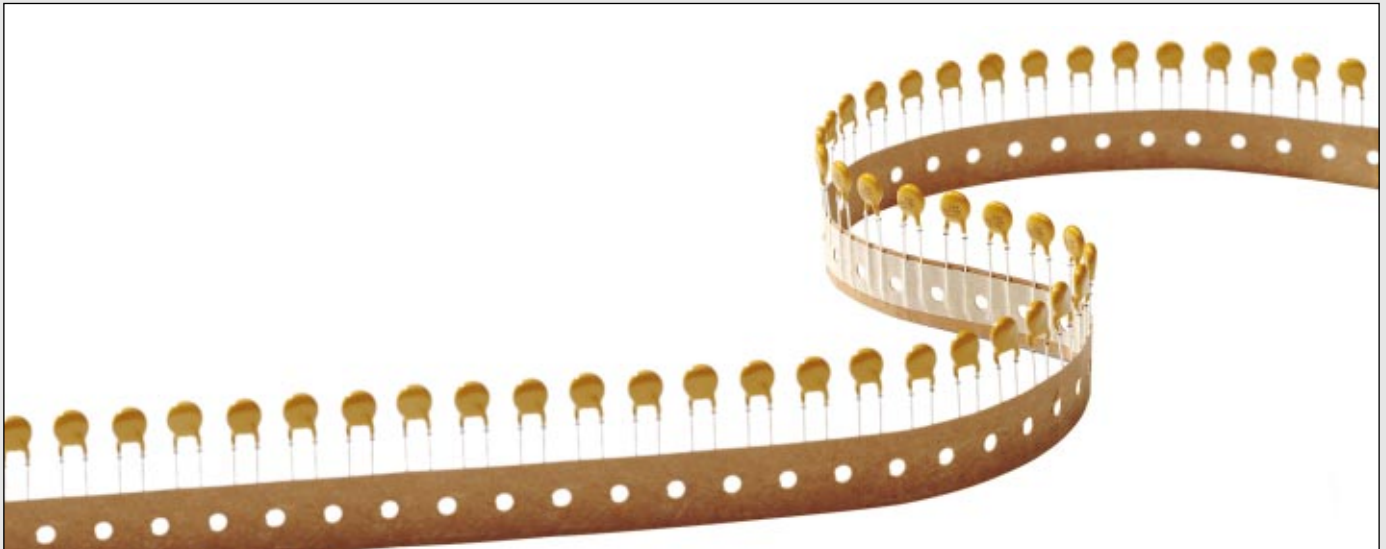
Humidity sensor	Type / catalogue number	2322 691 90001	Outline drawing
	Humidity range (RH)	10 to 90%	
	Capacitance at +25°C, 43% RH, 100 kHz	122 pF ± 15%	
	Sensitivity between 12 and 75% RH	0.4 pF/%RH ± 0.05	
	Frequency range	1 to 1000 kHz	
	Maximum AC or DC voltage	15 V	
	Storage humidity range (RH)	0 to 100%	
	Ambient temperature range:		
	operating	0 to +85 °C	
	storage	-25 to +85 °C	
	Drop test: height of free fall	1 m	
Mass	≈1.3 g		
Application	Humidity measurements in electronic hygrometers		
Typical capacitance as a function of relative humidity			

Zinc-Oxide Varistors (ZnO)

for overvoltage protection



Series 2322	592	593	594	595
Body diameter - with lacquer - without lacquer	7 mm 5 mm	9 mm 7 mm	13.5 mm 10 mm	17 mm 14 mm
Max. continuous AC voltage $U_{\text{eff max}}$	14 to 460 V	14 to 460 V	14 to 550 V	14 to 550 V
Max. continuous DC voltage U_{max}	18 to 615 V	18 to 615 V	18 to 745 V	18 to 745 V
Max. withstanding surge current I_{max}	100 to 400 A	250 to 1200 A	500 to 2500 A	1000 to 4500 A
Max. energy (10/1000 μs) E_{max}	0.5 to 21 J	1.7 to 63 J	4.3 to 98 J	5.4 to 160 J
Voltage at 1 mA $U_{1 \text{ mA}}$	22 to 750 V	22 to 750 V	22 to 910 V	22 to 910 V
Max. power dissipation P_{max}	100 mW	250 mW	400 mW	600 mW
Temperature range at P_0 at P_{max}	- 40 to + 125 °C - 40 to + 85 °C	- 40 to + 125 °C - 40 to + 85 °C	- 40 to + 125 °C - 40 to + 85 °C	- 40 to + 125 °C - 40 to + 85 °C
Features	the wide voltage range, extremely high energy-absorption capability, very short transient response time and long operational life under normal conditions make the ZnO varistor a reliable protection device			
Applications	ZnO varistors are extremely reliable protection devices against voltage transients produced, for example, by lightning or switching. They are also increasingly used for noise suppression in power lines			



Voltages			Max. body thickness (mm)		Catalogue number	Packing and mechanical overview Catalogue number				
$V_{rms\ max}$ (V)	$V_{DC\ max}$ (V)	$U_V\ 1\ mA$ (V)	592 593	594 595	2322 59	$\varnothing 7,2e$ 14 - 460 V 2322 592	$\varnothing 9,2e$ 14 - 460 V 2322 593	$\varnothing 13,5,3e$ 14-550 V 2322 594	$\varnothing 17,3e$ 14-550 V 2322 595	
14	18	22	4.6	5.0	.140.	on tape/on reel				
17	22	27	4.7	4.8	.170.	- straight leads H = 20	0 . . 6	0 . . 6	0 . . 6	0 . . 6
20	26	33	4.8	5.0	.200.	- straight leads with flange $H_0 = 16$	1 . . 6	1 . . 6	-	-
25	31	39	4.9	5.1	.250.	- straight leads with flange $H_0 = 18.25$	2 . . 6	2 . . 6	-	-
30	38	47	4.1	4.4	.300.	- kinked leads $H_0 = 18.25$	3 . . 6	3 . . 6	3 . . 6	3 . . 6
35	45	56	4.1	4.4	.350.	- kinked leads $H_0 = 16$	8 . . 6	8 . . 6	8 . . 6	8 . . 6
40	56	68	4.1	4.4	.400.					
50	65	82	4.1	4.4	.500.					
60	85	100	4.1	4.4	.600.					
75	100	120	4.1	4.4	.750.					
95	125	150	4.1	4.4	.950.					
130	170	205	4.2	4.6	.131.					
140	180	220	4.4	4.8	.141.					
150	200	240	4.4	4.8	.151.					
175	225	275	4.6	5.0	.171.					
230	300	360	4.9	5.4	.231.					
250	320	390	4.9	5.4	.251.					
275	350	430	4.9	5.4	.271.					
300	385	470	5.3	5.9	.301.					
320	420	510	5.5	6.2	.321.					
385	505	620	5.8	6.6	.381.					
420	560	680	5.9	6.6	.421.					
460	615	750	6.0	6.6	.461.					
510	670	820	-	6.9	.511.					
550	745	910	-	7.0	.551.					

preferred



53 138

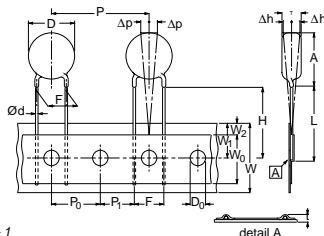


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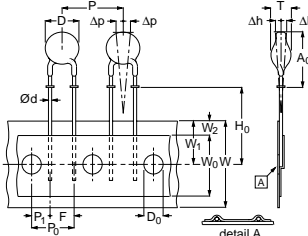
straight leads



MLA703 - 1

detail A

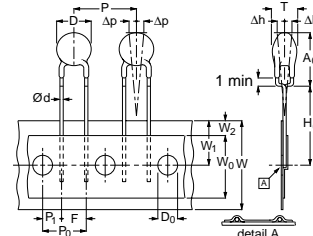
straight leads with flange



MSB069

detail A

kinked leads



MSB068

detail A

Control Potentiometers

Carbon 12, 17 mm

Series	CRC 12 module	CRC 12 potentiometer	CRC 17 module	CRC 17 potentiometer
Overall dimensions	12 x 16 mm	12 x 16 mm	17 x 21 mm	17 x 21 mm
Technology	carbon resistive layer on a phenolic paper base			
Mounting options	vertical horizontal	vertical	vertical horizontal	vertical horizontal (on request)
Features	<ul style="list-style-type: none"> module with bracket to be activated with a snap-in device multi - finger wiper without detent, with detent short tags (10 mm), long tags (12.5 mm) 	<ul style="list-style-type: none"> module with bush and spindle multi - finger wiper shaft executions: $\varnothing 4$, $\varnothing 6$, plain, flat length 20 mm, 30 mm plastic metal bush: M7, length 7 mm without detent, with detent long tags (12.5 mm) short tags (10 mm) solder tags 	<ul style="list-style-type: none"> module to be activated with a snap-in device without bracket with bracket multi - finger wiper flat rotor, protruding rotor tags in line, tags staggered 	<ul style="list-style-type: none"> module with bush and spindle multi - finger wiper shaft executions: - $\varnothing 4$, $\varnothing 6$ - metal, plastic - plain, flat - length 20 mm, 30 mm bush M10, M7 tags in line, tags staggered
Resistance range	470 Ω - 4.7 M Ω linear 2.2 k Ω - 470 k Ω log. E3 series (10-22-47)	470 k Ω - 4.7 M Ω linear 2.2 k Ω - 470 k Ω log. E3 series (10-22-47)	220 Ω - 2.2 M Ω linear 2.2 k Ω - 2.2 M Ω log. E3 series (10-22-47)	220 Ω - 2.2 M Ω linear 2.2 k Ω - 2.2 M Ω log. E3 series (10-22-47)
Tolerance	$\pm 20\%$	$\pm 20\%$	$\pm 20\%$	$\pm 20\%$
Maximum dissipation at 40 °C	0.2 W linear 0.1 W logarithmic	0.2 W linear 0.1 W logarithmic	0.2 W linear 0.1 W logarithmic	0.2 W linear 0.1 W logarithmic
Total mechanical angle of rotation	300° \pm 5°	300° \pm 5°	300° \pm 2°	300° \pm 2°
Temperature coefficient	$\pm 500 \times 10^{-6}/K$	$\pm 500 \times 10^{-6}/K$	$\pm 500 \times 10^{-6}/K$	$\pm 500 \times 10^{-6}/K$
Climatic category	25/070/10	25/070/10	25/070/10	25/070/10
	<input type="checkbox"/> preferred			

Ordering information Preferred types

Series	CRC 12 module	CRC 12 potentiometer	CRC 17 module	CRC 17 potentiometer
Catalogue number	2315 505 00 Resistance code 0 vertical, short tags (10 mm) no detent 1 vertical, long tags (12.5 mm) no detent 3 horizontal, no detent	2306 506 0 Resistance code 1 long tags (12.5 mm) no detent Shaft length 9 plain plastic shaft $\varnothing 4$ mm length 20 mm	2322 500 0 Resistance code 0 vertical, tags in line 5 horizontal 1 flat rotor, without bracket	2322 501 0 Resistance code 1 tags in line, shaft 30 mm, plain 0 bush M10, shaft $\varnothing 6$ & plastic
Quantity	1000	1000	1000	100
Packing	cardboard box	cardboard box	blister pack	expanded polystyrene shells

Resistance code for CRC 12 and CRC 17

	CRC 12			CRC 12			CRC 17					
	R	law	linear	logarithmic	R	law	linear	logarithmic	R	law	linear	logarithmic
	220 Ω		02	-	10 Ω		07	27	470 Ω		13	33
	470 Ω		03	-	22 Ω		08	28	1 Ω		14	34
	1 k Ω		04	24	47 k Ω		09	29	2.2 k Ω		15	35
	2.2 k Ω		05	25	100 k Ω		11	31	4.7 k Ω		16	-
	4.7 k Ω		06	26	220 k Ω		12	32				



Series	MRC 17 module	MRC 17 potentiometer	MRC 23 potentiometer
Overall dimensions	17 x 21 mm	17 x 21 mm	23 mm
Technology	metal glaze resistive layer on a ceramic base		
Mounting options	vertical horizontal	vertical horizontal (on request)	vertical
Features	<ul style="list-style-type: none"> module to be activated with a snap-in drive without bracket, with bracket multi-finger wiper flat rotor, protruding rotor tags in line, tags staggered 	<ul style="list-style-type: none"> module with bush and metal spindle multi - finger wiper shaft in several executions: <ul style="list-style-type: none"> ∅ 4, ∅ 6 metal, plastic plain, flat length 20 mm, 30 mm bush M10, M7 tags in line, tags staggered 	<ul style="list-style-type: none"> the bushing is profiled to act as a heatsink four - finger wiper low inductance metal shaft ∅ 6 mm plain bush M10 print tags, solder tags
Resistance range	220 Ω - 4.7 MΩ linear E3 series (10-22-47)	220 Ω - 4.7 MΩ linear E3 series (10-22-47)	47 Ω - 22 MΩ linear E3 series (10-22-47)
Tolerance	± 10%	± 10%	±10%, ±20%
Maximum dissipation at 40 °C	1.25 W	2 W	5 W
Total mechanical angle of rotation	300° ± 2°	300° ± 2°	300° ± 5°
Temperature coefficient	± 100 x 10 ⁻⁶ /K	± 100 x 20 ⁻⁶ /K	± 100 x 10 ⁻⁶ /K
Climatic category	25/070/36	25/070/56	55/125/56
	<input type="checkbox"/> preferred		

Ordering information Preferred types

Series	MRC 17 module	MRC 17 potentiometer	MRC 23																																																																																																																																																																								
Catalogue number	<p>2322 510 0</p> <p>Resistance code</p> <p>1 flatrotor without bracket</p> <p>0 vertical, tags in line</p> <p>5 horizontal</p>	<p>2322 511 051</p> <p>Resistance code</p> <p>metal shaft, ∅ 6, 30mm, plain, tags in line, bush M10</p>	<p>2322 481</p> <p>Resistance code</p> <p>03 Shaft length 30 mm</p> <p>0 solder tags</p>																																																																																																																																																																								
	<table border="1"> <thead> <tr> <th colspan="4">Resistance code for MRC 17</th> </tr> <tr> <th>R</th> <th>law</th> <th>linear</th> <th></th> </tr> </thead> <tbody> <tr><td>220 Ω</td><td></td><td>02</td><td>47 kΩ</td></tr> <tr><td>470 Ω</td><td></td><td>03</td><td>100 kΩ</td></tr> <tr><td>1 kΩ</td><td></td><td>04</td><td>220 kΩ</td></tr> <tr><td>2.2 kΩ</td><td></td><td>05</td><td>470 kΩ</td></tr> <tr><td>4.7 kΩ</td><td></td><td>06</td><td>1 MΩ</td></tr> <tr><td>10 kΩ</td><td></td><td>07</td><td>2.2 MΩ</td></tr> <tr><td>22 kΩ</td><td></td><td>08</td><td>4.7 MΩ</td></tr> <tr><td></td><td></td><td></td><td>09</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr> </tbody> </table>	Resistance code for MRC 17				R	law	linear		220 Ω		02	47 kΩ	470 Ω		03	100 kΩ	1 kΩ		04	220 kΩ	2.2 kΩ		05	470 kΩ	4.7 kΩ		06	1 MΩ	10 kΩ		07	2.2 MΩ	22 kΩ		08	4.7 MΩ				09	11	12	13	14	15	16	<table border="1"> <thead> <tr> <th colspan="4">Resistance code for MRC 17</th> </tr> <tr> <th>R</th> <th>law</th> <th>linear</th> <th></th> </tr> </thead> <tbody> <tr><td>220 Ω</td><td></td><td>02</td><td>47 kΩ</td></tr> <tr><td>470 Ω</td><td></td><td>03</td><td>100 kΩ</td></tr> <tr><td>1 kΩ</td><td></td><td>04</td><td>220 kΩ</td></tr> <tr><td>2.2 kΩ</td><td></td><td>05</td><td>470 kΩ</td></tr> <tr><td>4.7 kΩ</td><td></td><td>06</td><td>1 MΩ</td></tr> <tr><td>10 kΩ</td><td></td><td>07</td><td>2.2 MΩ</td></tr> <tr><td>22 kΩ</td><td></td><td>08</td><td>4.7 MΩ</td></tr> <tr><td></td><td></td><td></td><td>09</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr> </tbody> </table>	Resistance code for MRC 17				R	law	linear		220 Ω		02	47 kΩ	470 Ω		03	100 kΩ	1 kΩ		04	220 kΩ	2.2 kΩ		05	470 kΩ	4.7 kΩ		06	1 MΩ	10 kΩ		07	2.2 MΩ	22 kΩ		08	4.7 MΩ				09	11	12	13	14	15	16	<table border="1"> <thead> <tr> <th colspan="6">Resistance code for MRC 23</th> </tr> <tr> <th>R</th> <th>tol</th> <th>10%</th> <th>20%</th> <th>tol</th> <th>10%</th> <th>20%</th> </tr> </thead> <tbody> <tr><td>47 Ω</td><td></td><td>41</td><td>91</td><td>47 kΩ</td><td>09</td><td>59</td></tr> <tr><td>100 Ω</td><td></td><td>01</td><td>51</td><td>100 kΩ</td><td>11</td><td>61</td></tr> <tr><td>220 Ω</td><td></td><td>02</td><td>52</td><td>220 kΩ</td><td>12</td><td>62</td></tr> <tr><td>470 Ω</td><td></td><td>03</td><td>53</td><td>470 kΩ</td><td>13</td><td>63</td></tr> <tr><td>1 kΩ</td><td></td><td>04</td><td>54</td><td>1 MΩ</td><td>14</td><td>64</td></tr> <tr><td>2.2 kΩ</td><td></td><td>05</td><td>55</td><td>2.2 MΩ</td><td>15</td><td>65</td></tr> <tr><td>4.7 kΩ</td><td></td><td>06</td><td>56</td><td>4.7 MΩ</td><td>16</td><td>66</td></tr> <tr><td>10 kΩ</td><td></td><td>07</td><td>57</td><td>10 MΩ</td><td>17</td><td>67</td></tr> <tr><td>22 kΩ</td><td></td><td>08</td><td>58</td><td>22 MΩ</td><td>18</td><td>68</td></tr> </tbody> </table>	Resistance code for MRC 23						R	tol	10%	20%	tol	10%	20%	47 Ω		41	91	47 kΩ	09	59	100 Ω		01	51	100 kΩ	11	61	220 Ω		02	52	220 kΩ	12	62	470 Ω		03	53	470 kΩ	13	63	1 kΩ		04	54	1 MΩ	14	64	2.2 kΩ		05	55	2.2 MΩ	15	65	4.7 kΩ		06	56	4.7 MΩ	16	66	10 kΩ		07	57	10 MΩ	17	67	22 kΩ		08	58	22 MΩ	18	68
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Quantity	100		50																																																																																																																																																																								
Packing	expanded polystyrene shells																																																																																																																																																																										

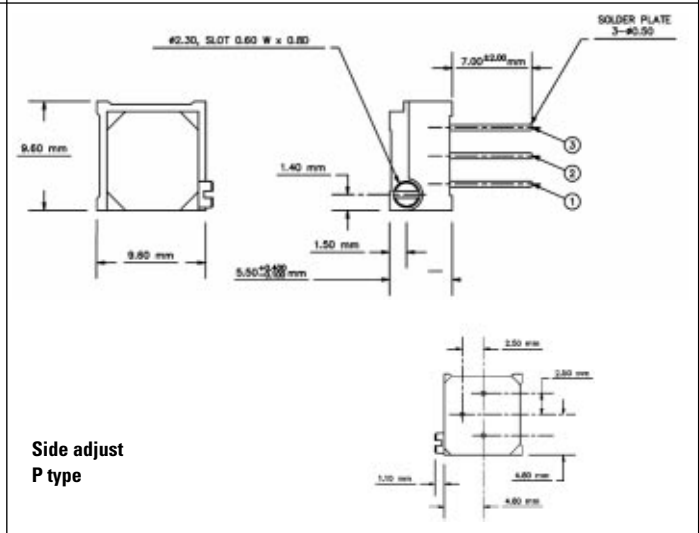
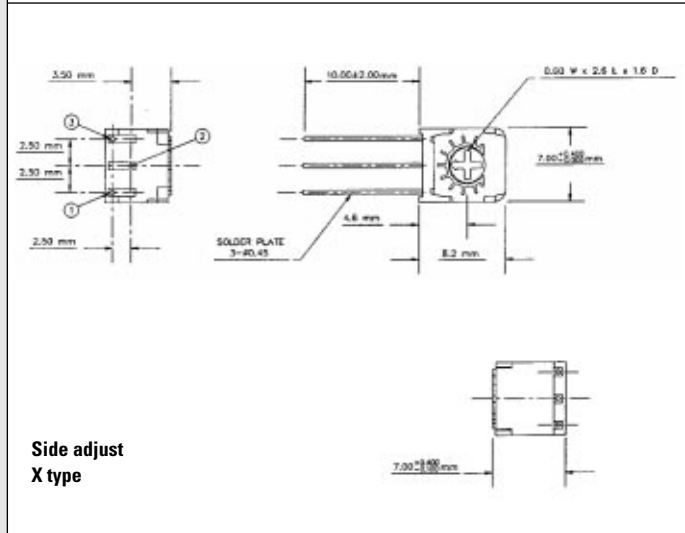
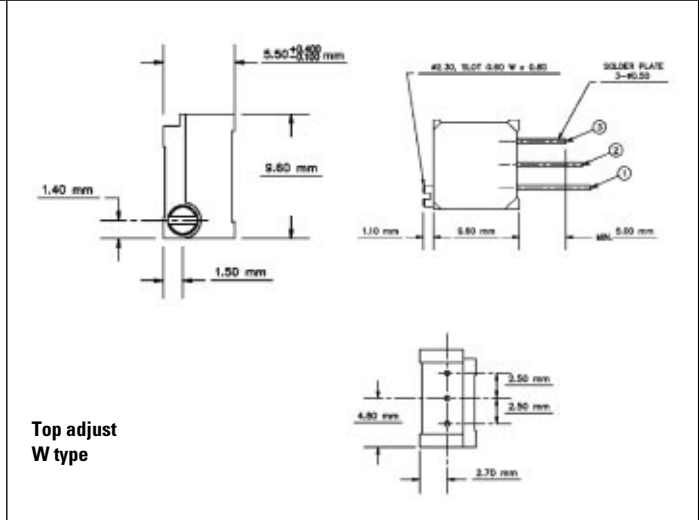
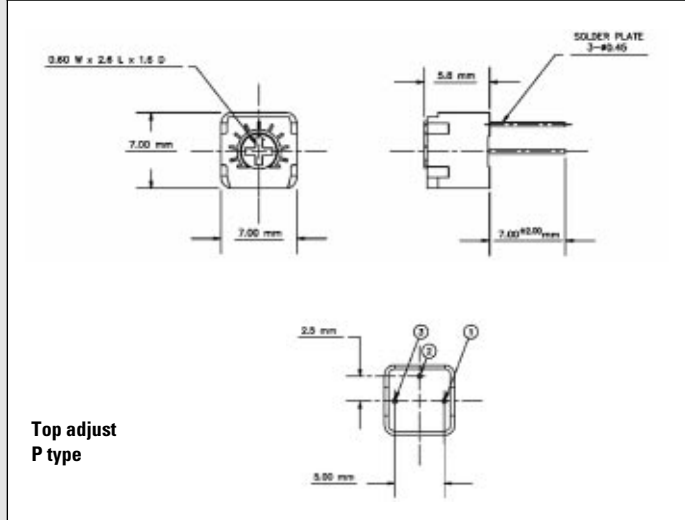
Preset Potentiometers

Cermet, sealed

	Single-turn	Multi-turn																																									
Series	EMP 06	MMP 09	MMP 20																																								
Overall dimensions	6 mm square	9 mm square	20 mm rectangular																																								
Technology	cermet	cermet	cermet																																								
Mounting options	through hole	through hole	through hole																																								
Adjustment options	top adjust side adjust	top adjust side adjust	side adjust																																								
Features	highly automated assembly, precious metal alloy contact sealed to allow for automatic processing	vertical and horizontal mount, precious metal alloy contact sealed to allow for automatic processing	highly automated assembly, precious metal alloy contact sealed to allow for automatic processing																																								
Resistance range	10 Ω - 2 MΩ	10 Ω - 5 MΩ	10 Ω - 5 MΩ																																								
Tolerance	± 10%	± 10%	± 10%																																								
Maximum dissipation	0.5 W / 70 °C	0.5 W / 70 °C	0.5 W / 70 °C																																								
Total mechanical angle of rotation	260°	18 turns	15 turns																																								
Temperature coefficient	± 100 x 10 ⁻⁶ /K (50 Ω - 2 MΩ) ± 250 x 10 ⁻⁶ /K (10 Ω - 20 Ω)	± 100 x 10 ⁻⁶ /K (50 Ω - 2 MΩ) ± 250 x 10 ⁻⁶ /K (10 Ω - 20 Ω)	± 100 x 10 ⁻⁶ /K (50 Ω - 2 MΩ) ± 250 x 10 ⁻⁶ /K (10 Ω - 20 Ω)																																								
Climatic category	55 / 125 / 56	55 / 125 / 56	55 / 125 / 56																																								
Catalogue number	<p>2322 491</p> <p>Resistance code</p> <p>0 EMP 06 0 P type 4 MMP 09 1 W type (for EMP 06 and MMP09) 6 MMP 20 5 X type</p> <table border="1"> <thead> <tr> <th colspan="4">Resistance code</th> </tr> </thead> <tbody> <tr><td>10 Ω</td><td>109</td><td>10 kΩ</td><td>103</td></tr> <tr><td>20 Ω</td><td>209</td><td>20 kΩ</td><td>203</td></tr> <tr><td>50 Ω</td><td>509</td><td>50 kΩ</td><td>503</td></tr> <tr><td>100 Ω</td><td>101</td><td>100 kΩ</td><td>104</td></tr> <tr><td>200 Ω</td><td>201</td><td>200 kΩ</td><td>204</td></tr> <tr><td>500 Ω</td><td>501</td><td>500 kΩ</td><td>504</td></tr> <tr><td>1 kΩ</td><td>102</td><td>1 MΩ</td><td>105</td></tr> <tr><td>2 kΩ</td><td>202</td><td>2 MΩ</td><td>205</td></tr> <tr><td>5 kΩ</td><td>502</td><td>5 MΩ</td><td>505</td></tr> </tbody> </table> <p>preferred types see page 111</p>			Resistance code				10 Ω	109	10 kΩ	103	20 Ω	209	20 kΩ	203	50 Ω	509	50 kΩ	503	100 Ω	101	100 kΩ	104	200 Ω	201	200 kΩ	204	500 Ω	501	500 kΩ	504	1 kΩ	102	1 MΩ	105	2 kΩ	202	2 MΩ	205	5 kΩ	502	5 MΩ	505
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5 kΩ	502	5 MΩ	505																																								
Packing	tape and reel or bulk packaging	bulk packaging	tape and reel or bulk packaging																																								



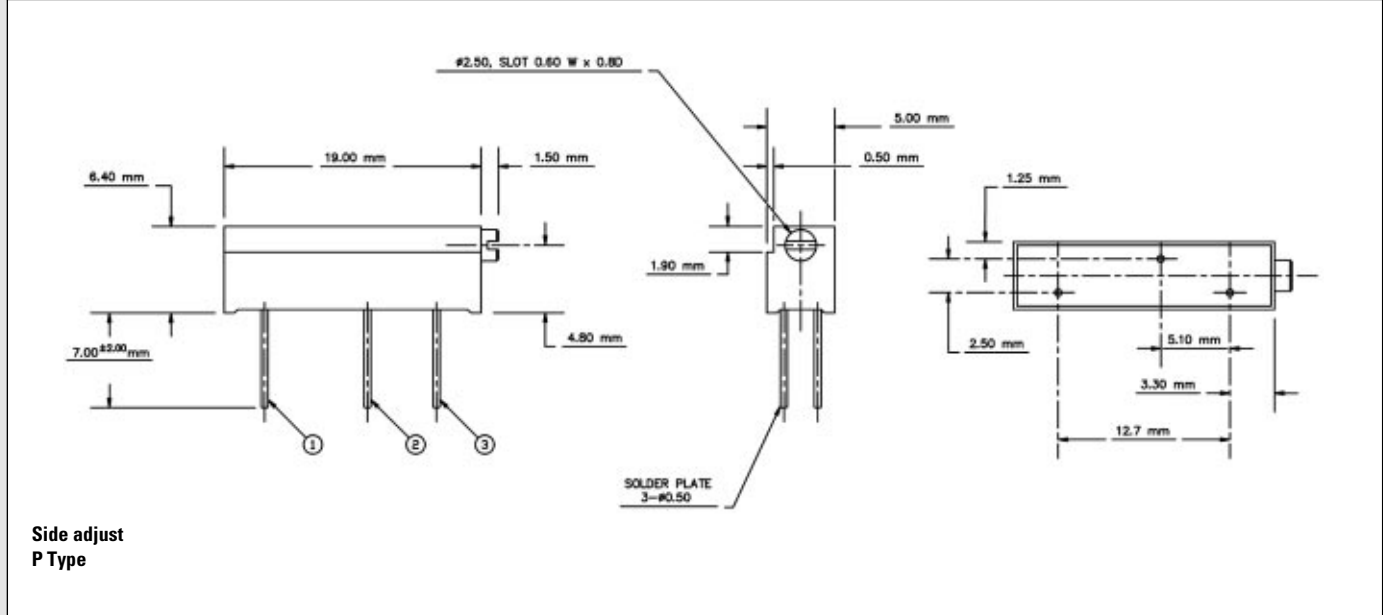
EMP 06, type P and X **MMP 09, type W and P**



packing: bulk 200 pcs/box

packing: bulk 100 pcs/box

MMP 20, type P



packing: bulk 100 pcs/box

Preset Potentiometers

Cermet and Carbon

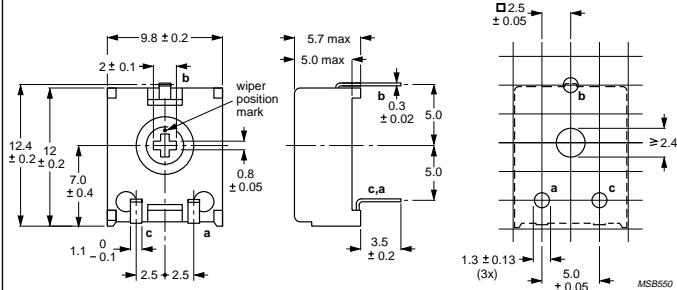
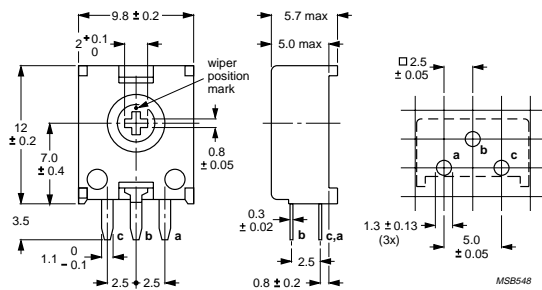
	Cermet, 10 mm	Carbon, 10 mm	
Series	EMP 10	ECP 10	OCP 10
Overall dimensions	10 x 12 mm	10 x 12 mm	10 x 12 mm
Technology	metal-glaze resistive layer on a ceramic base	carbon resistive layer on a phenolic paper base	
Mounting options	vertical horizontal	vertical horizontal	vertical horizontal
Features	enclosed type double-finger wiper insulated cross or hexagonal slot (for automatic adjustment) straight or snap-in pins rail packaging for automatic insertion available	enclosed type double-finger wiper insulated cross or hexagonal slot (for automatic adjustment) straight or snap-in pins rail packaging for automatic insertion available	open type double-finger wiper longitudinal slot straight or snap-in pins
Resistance range	47 Ω - 10 M Ω preferred : E3-series (10-22-47) additional : E6-series (15-33-68)	100 Ω - 4.7 M Ω E3-series (10-22-47)	47 Ω - 4.7 M Ω E3-series(10-22-47)
Tolerance	$\pm 20\%$, $\pm 10\%$	$\pm 20\%$, $\pm 10\%$	$\pm 20\%$
Maximum dissipation	0.5 W / 70 °C	0.1 W / 40 °C 0.05 W / 70 °C	0.1 W / 40 °C 0.05 W / 70 °C
Total mechanical angle of rotation	300° \pm 5°	300° \pm 5°	260° \pm 5°
Temperature coefficient	$\pm 200 \times 10^{-6}/K$ ($\leq 100 \Omega$) $\pm 50 \times 10^{-6}/K$ ($> 100 \Omega$ to $< 1 M\Omega$) $\pm 100 \times 10^{-6}/K$ ($\geq 1 M\Omega$)	$\pm 300 \times 10^{-6}/K$ (1 k Ω - 2.2 M Ω)	- 500 to + 300 $\times 10^{-6}/K$
Climatic category	55/125/56	25/085/10	25/070/21
Remarks	for ordering information preferred types see page 145	for ordering information preferred types see page 146	
	preferred		

Ordering information Preferred types

EMP 10, linear

Catalogue number 2322 484

Vertical mounting			Horizontal mounting			
Nominal resistance R_N	Insulated cross slot Snap-in pins 20 % tolerance	Insulated cross slot straight pins 10 % tolerance (see figure)	Nominal resistance R_N	Insulated cross slot Snap-in pins 20 % tolerance	Insulated cross slot Snap-in pins 10 % tolerance	Insulated cross slot straight pins 10 % tolerance (see figure)
47 Ω	22479	25479	47 Ω	72479	73479	75479
100 Ω	22101	25101	100 Ω	72101	73101	75101
220 Ω	22221	25221	220 Ω	72221	73221	75221
470 Ω	22471	25471	470 Ω	72471	73471	75471
1 k Ω	22102	25102	1 k Ω	72102	73102	75102
2.2 k Ω	22222	25222	2.2 k Ω	72222	73222	75222
4.7 k Ω	22472	25472	4.7 k Ω	72472	73472	75472
10 k Ω	22103	25103	10 k Ω	72103	73103	75103
22 k Ω	22223	25223	22 k Ω	72223	73223	75223
47 k Ω	22473	25473	47 k Ω	72473	73473	75473
100 k Ω	22104	25104	100 k Ω	72104	73104	75104
220 k Ω	22224	25224	220 k Ω	72224	73224	75224
470 k Ω	22474	25474	470 k Ω	72474	73474	75474
1 M Ω	22105	25105	1 M Ω	72105	73105	75105
2.2 M Ω	22225	25225	2.2 M Ω	72225	73225	75225
4.7 M Ω	22475	25475	4.7 M Ω	72475	73475	75475
10 M Ω	22106	25106	10 M Ω	72106	73106	75106



Preferred packing: 1000 pcs in cardboard box

Preset Potentiometers

Carbon, 10 mm (see reference page 110)

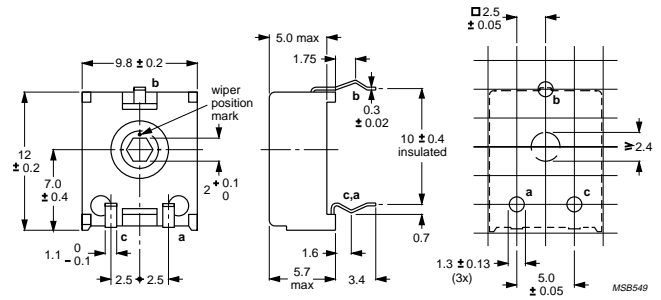
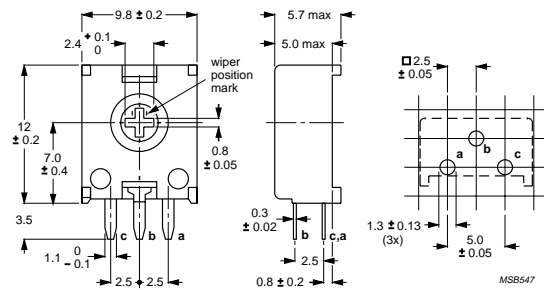


Ordering information Preferred types

ECP 10, linear, 20% tolerance

Catalogue number 2322 483

Vertical mounting			Horizontal mounting			
Nominal resistance R_N	Insulated hex. slot snap-in pins	Insulated cross slot straight pins	Nominal resistance R_N	Insulated hex. slot snap-in pins (see figure)	Insulated hex. slot straight pins	Insulated cross slot straight pins
100 Ω	12101	24101	100 Ω	62101	64101	74101
220 Ω	12221	24221	220 Ω	62221	64221	74221
470 Ω	12471	24471	470 Ω	62471	64471	74471
1 k Ω	12102	24102	1 k Ω	62102	64102	74102
2.2k Ω	12222	24222	2.2k Ω	62222	64222	74222
4.7k Ω	12472	24472	4.7k Ω	62472	64472	74472
10 k Ω	12103	24103	10 k Ω	62103	64103	74103
22 k Ω	12223	24223	22 k Ω	62223	64223	74223
47 k Ω	12473	24473	47 k Ω	62473	64473	74473
100 k Ω	12104	24104	100 k Ω	62104	64104	74104
220 k Ω	12224	24224	220 k Ω	62224	64224	74224
470 k Ω	12474	24474	470 k Ω	62474	64474	74474
1 M Ω	12105	24105	1 M Ω	62105	64105	74105
2.2 M Ω	12225	24225	2.2 M Ω	62225	64225	74225
4.7 M Ω	12475	24475	4.7 M Ω	62475	64475	74475



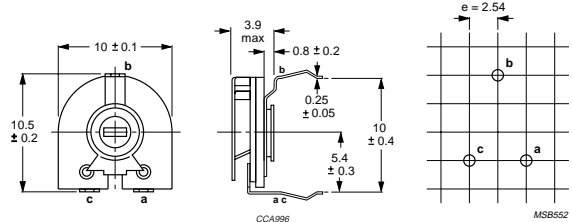
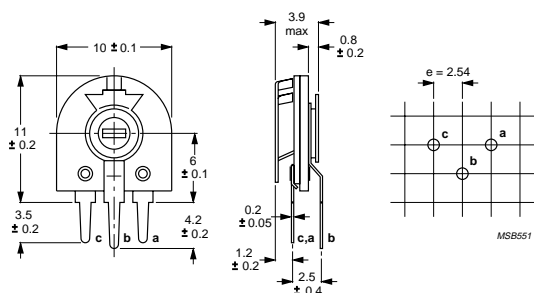
Preferred packing: 1000 pcs in cardboard box

OCF 10, linear, 20% tolerance

Catalogue number 2315 410 011..

Catalogue number 2315 410 033..






Vertical mounting						Horizontal mounting					
Nominal resistance R_N	Straight	Snap-in	Nominal resistance R_N	Straight	Snap-in	Nominal resistance R_N	Straight	Snap-in	Nominal resistance R_N	Straight	Snap-in
47 Ω	01191	01291	22 k Ω	01158	01258	47 Ω	03391	03491	22 k Ω	03358	03458
100 Ω	01151	01251	47 k Ω	01159	01259	100 Ω	03351	03451	47 k Ω	03359	03459
220 Ω	01152	01252	100 k Ω	01161	01261	220 Ω	03352	03452	100 k Ω	03361	03461
330 Ω	01169	01269	220 k Ω	01162	01262	330 Ω	03369	03469	220 k Ω	03362	03462
470 Ω	01153	01253	470 k Ω	01163	01263	470 Ω	03353	03453	470 k Ω	03363	03463
1 k Ω	01154	01254	1 M Ω	01164	01264	1 k Ω	03354	03454	1 M Ω	03364	03464
2.2 k Ω	01155	01255	2.2 M Ω	01165	01265	2.2 k Ω	03355	03455	2.2 M Ω	03365	03465
4.7 k Ω	01156	01256	4.7 M Ω	01166	01266	4.7 k Ω	03356	03456	4.7 M Ω	03366	03466
10 k Ω	01157	01257				10 k Ω	03357	03457			



Preferred packing: 1000 pcs in cardboard box





High Voltage Focus Units


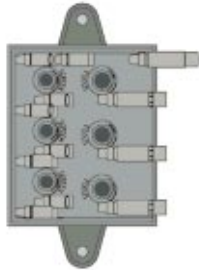
Slot versions for CTV-FBT applications

	NEW				
					
Series	FMP-MCS-UFX (kick)	FMP-MCS	FMP-MCS-U	FMP-DSB	FMP-SLD
Type	2322 461 900 ..	2322 460 903 .. / 913 ..	2322 460 913 ..	2322 460 903 .. / 923 ..	2322 460 903 .. / 933 ..
Function	focus and G2 potentiometer	focus and G2 potentiometer	focus and G2 potentiometer	focus and G2 potentiometer	focus and G2 potentiometer
Dimensions	29 x 39 mm	29 x 48 mm	29 x 48 mm	29 x 61 mm	33 x 57 mm
Mechanical execution	miniature microslot upgraded type for integration with the high voltage unit such as a LOT or DST	micro-slot (MCS) for integration with the high voltage unit such as a LOT or DST	upgraded micro-slot (MCS-U) for integration with the high voltage unit such as a LOT or DST	DSB-slot for integration with the high voltage unit such as a LOT or DST	SLD-slot for integration with the high voltage unit such as a LOT or DST
Rated resistance range	90 - 200 MΩ	69 - 125 MΩ	90 - 200 MΩ	69 - 200 MΩ	10- 500 MΩ
Max. application voltage	13 kV	11 kV	13 kV	16 kV	13 kV
Rated power dissipation at 70 °C	1.44 W	1.5 W	1.5 W	2 W	2 W
Max. capacitance	-	-	-	-	-
Climatic category (IEC 68)	25/070/21	25/070/21	40/070/21	25/070/21	40/070/21
Electrical connections	print tag or conductive rubber for earth connection conductive rubber or solder tag for high voltage input wire clamp connection for focus G2 control flexibility for connecting capacitors and bleeder resistors	print tag for earth connection conductive rubber contact for high voltage wire clamps for focus and G2	print tag for earth connection conductive rubber contact for high voltage wire clamps for focus and G2	print tag or conductive rubber for earth connection conductive rubber contact for high voltage wire clamps for focus and G2	print tag or solder tag for earth connection conductive rubber contact for high voltage connecting pin or wire clamp connection for focus solder tag or wire clamp connection for G2
Remarks					
Note for ordering	complete list of existing focus and G2 ranges available on request				

High Voltage Focus Units

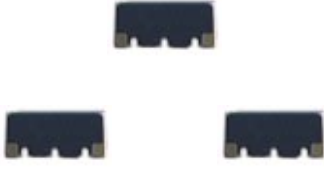

Print versions for CTV and monitors

				
Series	FMP-PRT-VRES	FMP-PRT-VERT	FMP-PRT-HOR1	FMP-PRT-DAF
Type	2322 460 0	2322 460 902 ..	2322 460 912 ..	2322 460 916 .. /926 .. /936 ..
Function	focus metal glaze variable resistor	focus and G2 potentiometer	focus and G2 potentiometer	double focus and G2 potentiometer for 16 : 9 picture tubes
Dimensions	23 x 23 mm	32 x 56 mm	29 x 60 mm	47 x 65 mm
Mechanical execution	horizontal snap-in mounting	vertical snap-in mounting	horizontal snap-in mounting adjustment via throughholes in PC board	mounting on chassis
Rated resistance range	10 - 150 MΩ	10 - 500 MΩ	30 -300 MΩ	10 - 200 MΩ
Max. application voltage	4.0 kV	13 kV	13 kV	17.5 kV
Rated power dissipation at 70 °C	0.6 W	2.3 W	2.3 W	4.4 W
Max. capacitance value	–	–	–	1000 pF (15 kV)
Climatic category (IEC 68)	25/070/21	25/070/21	25/070/21	40/070/56
Electrical connections	2 solder pins for variable resistor	2 print tags for earth and G2 wire clamps for screen and focus	2 solder pins for earth and G2 wire clamps for screen and focus pre-mounted cables are optional	connector for earth and dynamic input wire clamp connection for G2 2322 460 916 .. version: wire clamp connection for focus in and focus out 2322 460 926 .. version: connecting pins for focus in and focus out
Remarks				for 16 : 9 widescreen picture tubes
Note for ordering	complete list of existing focus and G2 ranges available on request			



		 NEW
Series	FMP-PTV	FMP-PTV-2
Type	2322 460 905 ..	2322 460 915 ..
Function	tripple focus and G2 potentiometer	tripple focus and G2 potentiometer
Dimensions	77 x 68 mm	71 x 58 mm
Rated resistance range	50 - 500 MΩ	50 - 500 MΩ
Max. application voltage	17.5 kV	17.5 kV
Rated power dissipation at 70 °C	10 W	10 W
Max. capacitance value	470 pF (12 kV)	1000 pF (12 kV)
Climatic category (IEC 68)	25/070/21	25/070/21
Electrical connections	connector for earth and dynamic input connecting pin or wire clamp connection for high voltage and focus wire clamp connection for G2	wire clamp connections suitable for cables with solid copper conductor or standard copper 0S1 conductors $\varnothing 0.8$ dynamic correction available for all colours stabilized screen voltage input connection
Remarks		
Note for ordering	see data sheets which are available on request	

High Voltage Focus Units

Fixed high voltage bleeder resistor


	High voltage resistor	R-block bleeder unit
		
Series	HVR	R-TNM
Type	2322 053 79 ...	2322 460 904 ..
Function	bleeder resistor voltage divider	high voltage R-block with connection wire and anode cap for discharge of the EHi
Dimensions	25.4 x 12.7 x 1 mm 25.4 x 6.35 x 0.76 mm	40 x 82 mm
Rated resistance range	50 M Ω - 900 M Ω	100 M Ω - 1.5 G Ω
Max. application voltage	35 kV	35 kV
Rated power dissipation at 70 °C	1.5 W	1.5 W
Max. capacitance value	-	-
Climatic category (IEC 68)	40/125/21	40/070/21
Electrical connections	solder paths	stripped EHT cable for high voltage input flat connector for earth anode wire with 58 mm cap for high voltage output
Remarks		R-element potted in plastic housing
Note for ordering	see data sheets which are available on request	



	NEW	NEW
		
Series	FMP-MLT-15	FMP-MLT-17
Type	2322 462 901..	2322 462 900 ..
Function	focus and G2 potentiometer dynamic correction circuits	double focus and G2 potentiometer dynamic correction circuits
Dimensions	46 x 62 mm	55 x 64 mm
Mechanical execution	clipped on the trafo integrated top bleeder smoothing high voltage capacitor coupling capacitors	clipped on the trafo integrated top bleeder or full bleeder smoothing high voltage capacitor coupling capacitors
Rated resistance range	potentiometer: 50M Ω - 300 M Ω bleeder: 400M Ω - 1 G Ω	potentiometer: 50M Ω - 300 M Ω bleeder: 400M Ω - 1 G Ω
Max. application voltage	28 kV	32 kV
Rated power dissipation at 70 °C	3 W	3 W
Max. capacitance value	3 nF	6 NF
Climatic category (IEC 68)	40/070/56	40/070/56
Electrical connections	metallic pin for high voltage input print tags for earth connections and dynamic correction circuits wire clamp connection for focus & screen control	metallic pin for high voltage input print tags for earth connections and dynamic correction circuits wire clamp connection for focus & screen control
Remarks	application 14" - 15" screen	application 17" - 19" - 21" screen
Note for ordering	lost of existing focus & G2 range available on request	

Quartz Crystals



	Series	Housing	Frequency range (MHz)	Frequency tolerance (ppm)	Temperature stability		Applications
					Temp. range (°C)	Freq. drift (ppm)	
	HC-45/U	metal resistance welded	6 - 150	± 10	-10 / +60	± 10	tight tolerance
				± 30	-20 / +70	± 30	consumer electronics
				± 10	+65 / +75	± 2	ovenized oscillators
				± 30	-55 / +130	± 80	automotive
	UM-1		6 - 200	± 30	-20 / +70	± 50	general industrial
	HC-49/U	metal resistance welded	1 - 125	± 10	-10 / +60	± 10	tight tolerance
				± 30	-20 / +70	± 30	consumer electronics
				± 10	+65 / +75	± 2	ovenized oscillators
				± 30	-55 / +130	± 80	automotive
			125 - 200	± 30	-20 / +70	± 50	general industrial
	HC-49/U low profile	metal resistance welded	3.5 - 66.7	± 50	-20 / +70	± 50	general purpose, industrial, automotive, high rel, ovenized oscillators
				± 50	-40 / +85	± 80, ± 100	
	NKS7	ceramic SMD 5 x 7 x 1.3 mm metal lid grounded	8 - 83	± 50	-20 / +70 -40 / +85	± 50	disk drives, PCMCIA, PCs, handheld instruments
	NES7/NLS7 (2pad / 4 pad)	ceramic SMD 5 x 7 x 1.3 mm ceramic lid	9.8304 - 100	± 30, ± 50	-20 / +70 -40 / +85	± 30, ± 50	disk drives, PCMCIA, PCs, handheld instruments
	NKS6	ceramic SMD 3.5 x 6 x 1.2 mm metal lid grounded	12 - 100	± 10, ± 20 ± 30, ± 50	-20 / +70 -40 / +85	± 10, ± 30	disk drives, PCMCIA, PCs, handheld instruments
	HFX4	tubular cold welded 2 x 5 mm	30 - 250 fundamental mode	± 25	-20 / +70	± 50	telecommunications, video graphics, low jitter / low noise high frequency oscillator
				± 50	-20 / +70	± 50	
	HFX7	ceramic SMD 5 x 7 x 1.15 mm metal lid grounded	90 - 250 third overtone	± 100	-20 / +70	± 50	
	NTF 3238/3226	tubular cold welded 3 x 8 / 2 x 7 mm	32.768 kHz	± 20	-10 / +60	-0.038 ppm/°C ² typical	real time clock (RTC) Xtal preferred type: NTF 3238 E C _L = 12.5 pF 12NC: 9922 524 20002
				32S12	plastic 10.4 x 4.2 x 3.4 mm 8.7 x 3.2 x 2.5 mm various footprints	± 20	-40 / +85
	HC-26/U & HC-29U	all glass vacuum sealed	4 - 150	± 10	-20 / +70	± 10	special and industrial
				± 10	-55 / +130	± 40	military equipment
				± 10	70 ± 5	± 2	ovenized oscillators

	Series	Housing	Frequency range (MHz)	Calibration tolerance (ppm)	Temperature stability		Applications
					Temp.range (°C)	Freq. drift (ppm)	
	HC-27/U 9922 527 10028	all glass vacuum sealed	10.0000	± 5	70 ± 1	± 2	ovenized oscillators



Selection of frequently used HC-45/U and HC-49/U standard crystals



Frequency	Mode	Catalogue number (12NC)	C-load	Packing	Standard packing quantity	Application	Related ICs
3575.611 kHz	1	9922 520 00383	series	bulk in box	1000 pcs	one chip colour decoder (PAL-M)	TDA 836x
3575.611 kHz	1	9922 520 00488	20.0 pF	tape ammpack	1000 pcs	BCTV video proc. & one chip 2nd gen. (PAL-M)	TDA 836x/TDA 91xx
3575.611 kHz	1	9922 520 08006	20.0 pF	bulk in box	1000 pcs	BCTV video proc. & one chip 3rd gen. (PAL-M)	TDA 836x/TDA 91xx
3579.545 kHz	1	9922 520 00382	series	bulk in box	1000 pcs	one chip colour decoder (NTSC)	TDA 836x
3579.545 kHz	1	9922 520 00487	20.0 pF	tape ammpack	1000 pcs	BCTV video proc. & one chip 2nd gen. (NTSC)	TDA 836x/TDA 91xx
3579.545 kHz	1	9922 520 08007	20.0 pF	bulk in box	1000 pcs	BCTV video proc. & one chip 3rd gen. (NTSC)	TDA 836x/TDA 91xx
3582.056 kHz	1	9922 520 00381	series	bulk in box	1000 pcs	one chip colour decoder (PAL-N)	TDA 836x
3582.056 kHz	1	9922 520 00486	20.0 pF	tape ammpack	1000 pcs	BCTV video proc. & one chip 2nd gen. (PAL-N)	TDA 836x/TDA 91xx
3582.056 kHz	1	9922 520 08008	20.0 pF	bulk in box	1000 pcs	BCTV video proc. & one chip 3rd gen. (PAL-N)	TDA 836x/TDA 91xx
3686.400 kHz	1	4322 143 04371	30.0 pF	bulk in box	1000 pcs	general purpose, µ-processor	
4000.000 kHz	1	4322 143 04093	30.0 pF	bulk in box	1000 pcs	digital tuning/gen. purpose	TSA 6060
4194.304 kHz	1	4322 143 04073	11.4 pF	bulk in box	1000 pcs	car clocks	PCF 117xC
4332.000 kHz	1	9922 520 00245	20.0 pF	bulk in box	1000 pcs	R.D.S. decoder	SAA 6579T
4433.619 kHz	1	4322 143 04043	20.0 pF	bulk in box	1000 pcs	colour encoder (PAL B/G)	TDA 8501
4433.619 kHz	1	9922 520 00384	series	bulk in box	1000 pcs	one chip colour decoder (PAL B/G)	TDA 836x
4433.619 kHz	1	9922 520 00489	20.0 pF	tape ammpack	1000 pcs	BCTV video proc. & one chip 2nd gen. (PAL-B/G)	TDA 836x/TDA 91xx
4433.619 kHz	1	9922 520 08009	20.0 pF	bulk in box	1000 pcs	BCTV video proc. & one chip 3rd gen. (PAL-B/G)	TDA 836x/TDA 91xx
4608.000 kHz	1	9922 520 00249	30.0 pF	bulk in box	1000 pcs	data communication (modem)	
6000.000 kHz	1	4322 143 04101	20.0 pF	bulk in box	1000 pcs	teletext video processor	SAA 5231/5243
7159.090 kHz	1	4322 143 04181	20.0 pF	bulk in box	1000 pcs	colour decoder (NTSC)	TDA 3566A
7372.800 kHz	1	9922 520 40021	20.0 pF	tape ammpack	1000 pcs	general purpose, µ-processor	
7680.000 kHz	1	4322 143 05221	11.4 pF	bulk in box	1000 pcs	telecommunication equipment	
8000.000 kHz	1	9922 520 00448	20.0 pF	tape ammpack	1000 pcs	general purpose, µ-processor	
8192.000 kHz	1	9922 520 00193	15.0 pF	bulk in box	1000 pcs	one chip nicam stereo sound decoder	SAA 7282
8192.000 kHz	1	9922 520 00464	15.0 pF	tape ammpack	1000 pcs	one chip nicam stereo sound decoder	SAA 7283
8664.000 kHz	1	9922 520 00048	20.0 pF	bulk in box	1000 pcs	R.D.S. decoder	SAA 6579T
8867.238 kHz	1	4322 143 04051	20.0 pF	bulk in box	1000 pcs	colour encoder (PAL B/G)	TDA 356xA
8867.570 kHz	1	9922 520 00385	series	bulk in box	1000 pcs	one chip colour decoder (PAL B/G)	TDA 4565
10000.000 kHz	1	9922 520 00429	20.0 pF	bulk in box	1000 pcs	TV stereo/dual sound proc. with I ² C bus contr.	TDA 8415/16/17, TDA 9845
11059.200 kHz	1	4312 065 02344	20.0 pF	bulk in box	1000 pcs	general purpose (low profile x-tal)	
11700.000 kHz	1	9922 520 00297	15.0 pF	bulk in box	1000 pcs	one chip nicam stereo sound decoder	SAA 7283
12000.000 kHz	1	9922 520 00076	20.0 pF	bulk in box	1000 pcs	general purpose, µ-processor	P 8XC5.. ect.
12000.000 kHz	1	9922 520 00169	20.0 pF	bulk in box	1000 pcs	single chip TV-processor/colour decoder	TDA 886x/7x/8x
13104.000 kHz	1	9922 520 00202	15.0 pF	bulk in box	1000 pcs	one chip nicam stereo sound decoder	SAA 7283
13500.000 kHz	1	9922 520 08014	20.0 pF	bulk in box	1000 pcs	super VGA, MPEG digital video	
13824.000 kHz	1	9922 522 20033	22.0 pF	tape, 45U SMD	1000 pcs	DECT mobile telecom (ABC chipset)	PCD 5091/2/3..
13875.000 kHz	1	9922 520 08004	20.0 pF	bulk in box	1000 pcs	various teletext video processors	SAA 5191/5231/..
14318.180 kHz	1	9922 520 08018	20.0 pF	bulk in box	1000 pcs	clock signal generator ICs	
14745.600 kHz	1	9922 520 08011	series	tape on reel	1000 pcs	general purpose, µ-processor	
15360.000 kHz	1	9922 520 00465	20.0 pF	bulk in box	1000 pcs	ISDN terminal	
15360.000 kHz	1	9922 522 40008	10.0 pF	tape, 49U SMD	700 pcs	ISDN terminal	
16000.000 kHz	1	4312 065 02345	20.0 pF	bulk in box	1000 pcs	general purpose	
16384.000 kHz	1	9922 524 00014	16.0 pF	tape, 49U SMD	700 pcs		
18432.000 kHz	1	9922 520 00369	10.0 pF	tape ammpack	1000 pcs	general purpose, µ-processor, nicam stereo	
18432.000 kHz	1	9922 522 20012	22.0 pF	tape, 45U SMD	1000 pcs	DECT mobile telephony	
18432.000 kHz	1	9922 520 08005	12.0 pF	tape ammpack	1000 pcs	general purpose, µ-processor, nicam stereo	
21059.153 kHz	1	9922 520 00475	17.0 pF	bulk in box	1000 pcs	color TV, picture in picture	
22579.000 kHz	1	9922 520 00435	20.0 pF	bulk in box	1000 pcs	digital audio broadcast	SAA 2501
24000.000 kHz	3	9922 520 30027	20.0 pF	bulk in box	1000 pcs	color TV, teletext micro controller	i.e. PE90C201
24576.000 kHz	1	9922 520 00436	20.0 pF	bulk in box	1000 pcs	digital audio broadcast, digital TV sound processor	SAA 2501 / TDA 9875
24576.000 kHz	1	9922 520 20106	20.0 pF	bulk in box	1000 pcs	digital TV sound proc. (low profile x-tal)	TDA 9875
24576.000 kHz	3	9922 520 30009	8.0 pF	bulk in box	1000 pcs	digital CCIR decoder	SAA 7151B/.....
24576.000 kHz	1	9922 520 08019	20.0 pF	bulk in box	1000 pcs	digital sound processor	TDA 9875
26800.000 kHz	3	9922 520 30004	8.0 pF	bulk in box	1000 pcs	digital square pixel decoder	SAA 71.../SAA 719.
27000.000 kHz	3	9922 520 30003	20.0 pF	bulk in box	1000 pcs	VIP teletext	SAA 5246/..
33868.000 kHz	3	9922 520 30033	20.0 pF	bulk in box	1000 pcs	digital audio	SAA 7345/TDA13..
33868.800 kHz	3	9922 520 08021	20.0 pF	bulk in box	1000 pcs	digital audio	
36864.000 kHz	3	9922 522 40031	7.0 pF	tape, 45U SMD	1000 pcs	various, i.e. nicam stereo decoder	TDA 9875
36864.000 kHz	3	9922 520 08015	20.0 pF	bulk in box	1000 pcs	Dolby prologic surround	SAA7710T
40000.000 kHz	3	9922 520 30018	18.0 pF	bulk in box	1000 pcs	full MPEG video audio decoder/video CD	SAA 7131/SAA 2510



Quartz Oscillators

Product family	freq. range (MHz)	housing	operating temp (°C)	freq. stab. (ppm)	supply voltage	output	applications	remarks
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  DIL-14 </div> <div style="text-align: center;">  plastic SMD </div> <div style="text-align: center;">  ceramic LCC </div> <div style="text-align: center;">  DIL-8 </div> </div>								
HELIX	1.0 - 24	DIL-14	-30/+80	± 20	3.0/5.0 V ±10%	HCMOS/TTL	EDP, telecom	ultra stable clock oscillator
NCC	0.0625 - 24	DIL-8/DIL-14	0/+70	± 25/50/100	5.0 V ±10%	CMOS		low power
NCT	0.5 - 66.67	DIL-14	0/+70	± 25/50/100	5.0 V ±10%	10 TTL		true TTL
NTC 020	0.032768	DIL-14	-20/+70 0/+50	+ 0/-80 + 0/-25	3.0/3.3/5.0 V	CMOS	real time CLK	ultra low power
NTH/ NCH	0.5 - 100	DIL-8/DIL-14	0/+70 -40/+85	± 25/50/100	3.3/5.0 V ±10%	HCMOS/TTL	EDP, telecom	for high speed HCMOS/ NMOS processors
NTH/ NTT	1.0 - 70	Plastic SMD 9 x 13 x 5 mm	0/+70	± 50/100	3.3/5.0 V ±10%	HCMOS/ACMOS		tri-state
S410H	32 - 125	Plastic SMD 9 x 13 x 5 mm	0/+70 -40/+85	± 50/100	3.3/5.0 V ±10%	HCMOS/ACMOS		
S1100/ 1109	20 - 110	DIL-8/DIL-14	0/+70	± 25/50/100	5.0 V ±10%	10 TTL		true TTL
S11041	0.25 - 75	DIL-14	0/+70	± 25/50/100	5.0 V ±10%	10 TTL		for high speed NMOS processors
S1903/ S1950	30 - 125	CERAMIC LCC 5 x 7 x 1.8 mm	0/+70 -40/+85	± 25/50/100	3.3/5.0 V ± 10%	ACMOS/ HCMOS/TTL		high fan-out tri-state
S1149/ 1150	70 - 140	DIL-8/DIL-14	0/+70	± 25/50/100	+ 5.0 or - 5.2 V	ECL		high speed applications
S1700/ S1800*	1.5 - 80	ceramic LCC 5 x 7 x 1.7 /1.1 mm	0/+70	± 50/100	5.0 V ±10%	HCMOS/TTL		tri-state
S1750/ S1850*	1.5 - 67	ceramic LCC 5 x 7 x 1.7 /1.1 mm	0/+70	± 50/100	5.0 V ±10%	HCMOS/TTL		high fan-out tristate
S1703/ S1803*	1.5 - 66.67	ceramic LCC 5 x 7 x 1.7 /1.1 mm	0/+70	± 50/100	3.0/3.3 V ±10%	HCMOS		tri-state
SEL 3400	20 - 622	DIL-14	0/+70	± 20/50/100	+ 3.3/+ 5.0/- 5.2 V	ECL/PECL		high speed applications
STA/ STT	0.25 - 135	DIL-8/ DIL-14	0/+70 -40/+85	± 25/50/100	3.3/5.0 V ±10%	ACMOS/HCMOS/ TTL		TTL compatible
STA/ STT	70 - 135	Plastic SMD 9 x 13 x 5 mm	0/+70	± 25/50	3.3/5.0 V ±10%	ACMOS/HCMOS/ TTL		
SEL 3600/ 3960	70 - 155.52	Plastic SMD 8 x 13 x 6 mm	0/+70	± 50/100	+ 3.3/+5.0/-5.2/-3.3 V	ECL/PECL		
Pro-S8002	1 - 125	Plastic SMD 9 x 13 x 5 mm	-20/+70 -40/+85	± 25/50 ± 100	3.3 V (1-90 MHz) 5.0 V	HCMOS/ TTL		Programmable ! Leadtime 5 days

* S1800-series also available in -40/+85

Product family	freq. range (MHz)	housing	operating temp (°C)	freq. stab. (ppm)	supply voltage	pull type	pull range	output	applications	remarks
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  DIL-14 </div> <div style="text-align: center;">  plastic SMD </div> </div>										
S1300/ 1500	1.5 - 100	DIL-14	0/+70 -40/+85	± 25/32/50	3.3/5.0 V ± 10%	0.5/4.5 V pos. slope	± 50/100/200	HCMOS	EDP, telecom	
S1328/ 1528	1.5 - 65	plastic SMD 9 x 13 x 6 mm	0/+70 0/+85 -40/+85	± 50	3.3/5.0 V ± 5%	0.5/4.5 V pos. slope	± 20/100	HCMOS/TTL		
S1550/ S1562	19 - 200	DIL-14	0/+70	± 20 to 100	5.0 V ± 10%	0.5/4.5 V pos. slope	± 50/100/200	PECL		
VCX02	7 - 23	DIL-14	-5/+60	± 20	5.0 V ± 5%	-5/+5 V neg. slope	± 160	HCMOS		
VCX03	1 - 10	DIL-14	-5/+55	± 20	5.0 V ± 5%	-4/+4 V neg. slope	± 220			
VCX04	7 - 30	DIL-14	0/+70	± 25	5.0 V ± 5%	0.5/4.5 V pos. slope	± 125			
VCX05	17 - 40	DIL-14/B5	0/+70	± 20	5.0 V ± 5%	0.5/4.5 V pos. slope	± 60			
VCX06	7 - 17	B5	0/+60	± 10	5.0 V ± 5%	1.0/4.0 V pos. slope	± 150			
S1318/ 1518	32 - 120	plastic SMD 9 x 13 x 6 mm	0/+70	± 50	3.3/5.0 V ± 10/5%	0.5/4.5/0.3/3.0 V pos. slope	± 25/50/75			-40/+85 °C available
S1310/ 1510	32 - 120	DIL-8/DIL-14	0/+70	± 25/50	3.3/5.0 V ± 10/5%	0.5/4.5/0.3/3.0 V pos. slope	± 25/50/75			-40/+85 °C available

VC-TCXO	 S54/55xxS		 ceramic LCC							
	Product family	freq. range (MHz)	housing	operating temp (°C)	freq. stab. (ppm)	supply voltage	pull type	pull range	output	applications
S54/55xxS	10 - 20	metal SMD 21x12x4.7 mm	-30/+80	± 2.0/2.5	3.0/5.0 V ± 5%	int.trim /ext.volt.	int.± 3/ ext.± 5	sinewave	mobile telecom	
S57/6700	10 - 20	ceramic LCC 7x9x2 mm	-30/+80	± 2.5 max.	3.0/5.0 V ± 5%	ext.volt.	± 12.5			
VTCXO-1	8 - 20	B8	-30/+80	± 1.0/1.5	5.0 V ± 5%	ext.volt.	± 8.5			DIL-14 footprint
VTCXO-2	8 - 20	B8	-30/+80	± 1.5/2.5	5.0 V ± 5%	ext.volt.	± 15			DIL-14 footprint
VTCXO-3	8 - 20	B8	-30/+80	± 2.5/4.0	5.0 V ± 5%	ext.volt.	± 40			DIL-14 footprint
VTCXO-4	8 - 20	B8	-30/+80	± 2.5/8.0	5.0 V ± 5%	ext.volt.	> ± 40			DIL-14 footprint

TCXO	 S52/53/54xxL		 B5							
	Product family	freq. range (MHz)	housing	operating temp (°C)	freq. stab. (ppm)	supply voltage	pull type	pull range	output	applications
S52/53/54xxL	8 - 35	12x19x10/7/5 mm	-10/+60	± 2.0 to 5.0	3.0/5.0 V ± 5%	int. trimmer	with int. trim.	TTL / sine	transmitters, EDP, test and measuring-equipment, mobile phone base stations	
S52xxL	8 - 35	12x19x10 mm	-30/+60	± 1.0 to 5.0	5.0 V ± 5%			sinewave		
TC501	6 - 20	B5	-40/+85	± 1.0	5.0 to 12.0 V	ext. resistor	with ext. res.	sinewave		
TC502	6 - 20	B5	-40/+85	± 1.0	5.0 V ± 5%					
TC601	6 - 20	B6	-20/+70	± 1.0	5.0 to 12.0 V					
TC602	6 - 20	B6	-20/+70	± 1.0	5.0 V ± 5%					

A low-angle, monochromatic photograph of the Statue of Liberty, showing her head with the crown and her right arm raised holding the torch. The background is a clear, light sky.

Switches and Trimming Potentiometers Only available in the NAFTA region

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Switches

Series	SS10	S8000	Model 700
Switch type	rotary selector	rotary coded	keyswitch
Overall dimensions	1	7.2 x 7.2 mm	10.8 x 12.0 mm
Termination type	0 x 10 mm	thru-hole	thru-hole
Features	thru-hole sealed to allow for automatic processing top or side setting flush or extended rotor	sealed to allow for automatic processing top or side setting binary coded octal flush or extended rotor	tactile feedback 1,000,000 actuation minimum numerous snap-on keycap designs
Contact resistance	positive detent action	100 MΩ	initial ≤ 20m
Circuit type	100 MΩ 1 pole, 4 positions 1 pole, 5 positions 1 pole, 6 positions 2 poles, 3 positions	binary coded octal	SPST
Contact rating	non-switching: DC 50V 100mA switching: DC 5V 100mA	non-switching: DC 50V 100mA switching: DC 5V 100mA	DC 50V 50mA
Insulation resistance	100 MΩ (DC 100V)	1,000 MΩ (DC 100V)	> 10 MΩ

Ordering Information			
SS10	S8000	Model 700	
<p>Part Number Designation</p> <p>SS-10 - 16 N P - L - A</p> <p>Series name</p> <p>No. of poles 1: 1 pole 2: 2 poles</p> <p>No. of contacts 3: 3 contacts (2 poles only) 4: 4 contacts (1 pole only) 5: 5 contacts (1 pole only) 6: 6 contacts (1 pole only)</p> <p>Contact timing N: Non-shorting S: Shorting (1 pole 5 contact, 1 pole 6 contacts without OFF)</p> <p>Schematic A: without OFF Blank: with OFF (1 pole 6 contacts only)</p> <p>Shape of rotor L: with knob Blank: without knob</p> <p>Setting position P: Top setting</p>	<p>Part Number Designation</p> <p>S - 8 0 1 0</p> <p>Series name</p> <p>Shape of rotor 0: without knob 1: with knob</p> <p>Setting position 0: top setting 1: side setting</p> <p>Code format 1: Real code 3: Complementary code</p>	<p>Part Number Designation</p> <p>Switch: 9922-167-03 0 11 Keycaps: 9922-167-01 0 11</p> <p>Keycap Color 0 = gray 4 = black 6 = dark gray 7 = white</p> <p>Keycap Type 11 = square - flat 31 = square - concave 61 = elongated</p>	
Preferred Packaging Quantity	50 pieces	100 pieces	Bulk - 3,000 pieces

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Series	CHS	CS4	S7000
Switch type	slide dipswitch	rotary selector	rotary coded
Overall dimensions	5.4 x 9.2 mm (6 positions)	4.5 x 5.0 mm	7.2 x 7.2 mm
Termination options	gull wing J-lead	gull wing J-lead thru-hole	gull wing J-lead thru-hole
Features	sealed to allow for automatic processing 2 through 10 positions gold plated contacts bulk or tape and reel packaging	sealed to allow for automatic processing with detent, without detent 2 or 3 positions bulk or tape and reel packaging	sealed to allow for automatic processing top or side adjust hexidecimal or decimal to binary bulk, magazine, or tape and reel packaging
Contact resistance	50MΩ max.	100MΩ	100Ω max.
Circuit type	SPST	1 pole, 2 positions 1 pole, 3 positions 2 poles, 2 positions	10 positions - BCD 16 positions - BCH
Contact rating	non-switching: DC 50V 100mA switching: DC 6V 100mA	DC 16V 100mA	non-switching: DC 50V 100mA switching: DC 5V 100mA
Insulation resistance	1,000 MΩ min @ 100 VDC	100 MΩ min @ 500 VDC	100 MΩ @ 100 VDC
Ordering Information			
	CHS	CS4	S7000
Part Number Designation		Part Number Designation	
<p>CHS - 06 T A</p> <p>Series name: CHS</p> <p>No. of bits: 06 01: 1 bit 02: 2 bits 04: 4 bits 06: 6 bits 08: 8 bits 10: 10 bits</p> <p>Style: A J-hook Gull wings</p> <p>Package option: T T: Tape & reel Blank: Bulk package</p>		<p>CS-4 1 3 N T A</p> <p>Series name: CS-4</p> <p>No. of poles: 1 1: 1 pole 2: 2 poles</p> <p>No. of contacts: 3 2: 2 contacts 3: 3 contacts</p> <p>Contact Timing: N N: Non-shorting (1 pole 3 contacts only) Y: Non-shorting with neutral detent (1 pole 2 contacts, 2 poles 2 contacts) X: Non-shorting without neutral detent (1 pole 2 contacts only)</p> <p>Style: A: J-hook B: Gull wings C: Through hole pin</p> <p>Package option: T: Tape & reel Blank: Bulk package</p>	
<p>S - 7 0 1 0 T A</p> <p>Series name: S</p> <p>Shape of rotor: 0 0: without knob</p> <p>Code format: 7 1: 10 positions, real code 3: 10 positions, complementary code 5: 16 positions, real code 7: 16 positions, complementary code</p> <p>Package option: T: Tape & reel M: Magazine (Top setting only) Blank: Bulk package</p> <p>Setting position: 0: Top setting 1: Side setting</p>			
Preferred Packaging Quantity	Tape and Reel - 500 pcs Bulk - 100 pcs	Tape and Reel - 500 pcs Bulk - 100 pcs	Tape and Reel - 500 pcs Bulk - 100 pcs

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Trimming Potentiometers

	Cermet, Single Turn	Cermet, Multiturn	Cermet, Single Turn	Cermet, Single Turn
Model	CT-6	CT-9	CT-20	TM-7
Dimensions (approx.)	6 mm square	9 mm square	20 mm rectangular	7 mm round
Technology	cermet	cermet	cermet	cermet
Mounting options	through hole	through hole	through hole	through hole
Adjustment options	top adjust side adjust	top adjust side adjust	side adjust	top adjust side adjust
Features	highly automated assembly precious metal alloy contact sealed to allow for automatic processing tape and reel or bulk backaging	vertical and horizontal mount precious metal alloy contact sealed to allow for automatic processing tape and reel or bulk backaging	highly automated assembly precious metal alloy contact sealed to allow for automatic processing bulk packaging	multiturn trimmer in compact size precious metal alloy contact sealed to allow for automatic processing bulk packaging
Resistance range	10 Ω to 2 MΩ	10 Ω to 5 MΩ	10 Ω to 5 MΩ	50 Ω to 2 MΩ
Tolerance	± 10%	± 10%	± 10%	± 10%
Maximum dissipation	0.50 W / 70°C	0.50 W / 70°C	0.50 W / 70°C	0.50 W / 70°C
Mechanical angle of rotation	260°	18 Turns	15 Turns	180°/ 3 Turns
Temperature coefficient	± 100 PPM/ °C (50 Ω to 2 Meg) ± 250 PPM/ °C (10 Ω to 20 Ω)	± 100 PPM/ °C (50 Ω to 2 Meg) ± 250 PPM/ °C (10 Ωs to 20 Ω)	± 100 PPM/ °C (50 Ω to 2 Meg) ± 250 PPM/ °C (10 Ω to 20 Ω)	± 100 PPM/ °C (50 Ω to 2 Meg)
Operating temperature	-55 to 125°C	-55 to 125°C	-55 to 125°C	-55 to 125°C

Ordering information

Part Number Designation	Standard Resistance values and Codes			
	Ω	Codes	Ω	Codes
<p>CT6 T P 103</p> <p>Model</p> <p>Packaging Option T = Tape and Reel Blank = Bulk</p> <p>Pin Style</p> <p>Resistance Code</p>	10	100	10K	103
	20	200	20K	203
	50	500	50K	503
	100	101	100K	104
	200	201	200K	204
	500	501	500K	504
	1K	102	1M	105
	2K	202	2M	205
	5K	502	5M	505

Model	CT-6	CT-9	CT-20	TM-7
Preferred Packaging Quantity	Tape and Reel - 1000 pcs Bulk - 200 pcs	Tape and Reel - 1000 pcs Bulk - 200 pcs	Bulk - 200 pcs	Bulk - 200 pcs

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	Cermet, Single Turn	Cermet, Multiturn	Cermet, Single Turn	Cermet, Single Turn
Model	RJ-4	RJ-5	RJ-6	RJ-13
Dimensions (approx.)	4 mm round	6 mm square	5 mm square	13 mm square
Technology	cermet	cermet	cermet	cermet
Mounting options	through hole	through hole	through hole	through hole
Adjustment options	top adjust side adjust	top adjust side adjust	top adjust side adjust	top, side adjust (knob optional) panel mount
Features	precious metal alloy contact sealed to allow for automatic processing bulk packaging	precious metal alloy contact sealed to allow for automatic processing bulk packaging	precious metal alloy contact sealed to allow for automatic processing bulk packaging	precious metal alloy contact sealed to allow for automatic processing bulk packaging
Resistance range	10 Ω to 2 MΩ	10 Ω to 2 MΩ	10 Ω to 5 MΩ	10 Ω to 5 MΩ
Tolerance	± 10%	± 10%	± 10%	± 10%
Maximum dissipation	0.50 W/ 70°C	0.25 W/ 85°C	0.50 W/ 70°C	0.75 W/ 70°C
Mechanical Angle of rotation	230°	14 turns	270°	270°
Temperature coefficient	± 100 PPM/ °C (100 Ω to 2 Meg) ± 250 PPM/ °C (10 Ω to 50 Ω)	± 100 PPM/ °C (100 Ω to 2 Meg) ± 250 PPM/ °C (10 Ω to 50 Ω)	± 100 PPM/ °C (50 Ω to 2 Meg) ± 250 PPM/ °C (Others)	± 100 PPM/ °C (50 Ω to 2 Meg) ± 250 PPM/ °C (Others)
Operating temperature	-55 to +125°C	-55 to +125°C	-55 to +125°C	-55 to +125°C

Ordering information

Part Number Designation	Standard Resistance values and Codes			
	Ω	Codes	Ω	Codes
	10	100	10K	103
20	200	20K	203	
50	500	50K	503	
100	101	100K	104	
200	201	200K	204	
500	501	500K	504	
1K	102	1M	105	
2K	202	2M	205	
5K	502	5M	505	

Model	RJ-4	RJ-5	RJ-6	RJ-13
Preferred Packaging Quantity	Bulk - 200 pcs	Bulk - 200 pcs	Bulk - 200 pcs	Bulk - 100 pcs

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Trimming Potentiometers

Cermet, Surface Mount



	Cermet, Single Turn, SMD		Cermet, Multiturn, SMD	
Model	ST-3	ST-4	ST-5	ST-7
Dimensions (approx.)	3 mm square	4 mm square	6 mm square	7 mm square
Technology	cermet	cermet	cermet	cermet
Mounting options	Surface Mount	Surface mount	Surface mount	Surface mount
Adjustment options	Top adjust	Top adjust Side adjust	Top adjust Side adjust	Top adjust
Features	chip style design for compact size precious metal alloy contact sealed to allow for automatic processing tape and reel or bulk packaging	gull wing, J-hook lead styles precious metal alloy contact sealed to allow for automatic processing tape and reel or bulk packaging	vertical and horizontal mount precious metal alloy contact sealed to allow for automatic processing tape and reel or bulk packaging	gull wing, J-hook lead styles precious metal alloy contact sealed to allow for automatic processing tape and reel or bulk packaging
Resistance range	10 Ω to 1 MΩ	10 Ω to 2 MΩ	10 Ω to 2 MΩ	50 Ω to 1 MΩ
Tolerance	± 20%	± 20%	± 10%	± 20%
Maximum dissipation	0.125 W/ 70°C	0.25 W/ 70°C	0.25 W/ 85°C	0.25 W/ 70°C
Mechanical Angle of rotation	250°	240°	14 turns	180°/ 3 turns
Temperature coefficient	± 100 PPM/ °C (100 Ω to 1 Meg) ± 250 PPM/ °C (10 Ω to 50 Ω)	± 100 PPM/ °C (100 Ω to 2 Meg) ± 250 PPM/ °C (10 Ω to 50 Ω)	± 100 PPM/ °C (100 Ω to 2 Meg) ± 250 PPM/ °C (10 Ω to 50 Ω)	± 100 PPM/ °C (100 Ω to 1 Meg) ± 250 PPM/ °C (50 Ω)
Operating temperature Range	-55 to +125°C	-55 to +125°C	-55 to +125°C	-55 to +125°C

Ordering information

Part Number Designation	Standard Resistance values and Codes			
	Ω		Codes	
	Ω	Codes	Ω	Codes
<p>ST4 T A 103</p> <p>Model</p> <p>Packaging Option T = Tape and Reel Blank = Bulk</p> <p>Pin Style</p> <p>Resistance Code</p>	10	100	10K	103
	20	200	20K	203
	50	500	50K	503
	100	101	100K	104
	200	201	200K	204
	500	501	500K	504
	1K	102	1M	105
	2K	202	2M	205
	5K	502		

Model	ST-3	ST-4	ST-5	ST-7
Preferred Packaging Quantity	Tape and Reel - 1000 pcs Bulk - 1000 pcs	Tape and Reel - 500 pcs Bulk - 500 pcs	Tape and Reel - 500 pcs Bulk - 200 pcs	Tape and Reel - 500 pcs Bulk - 200 pcs

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