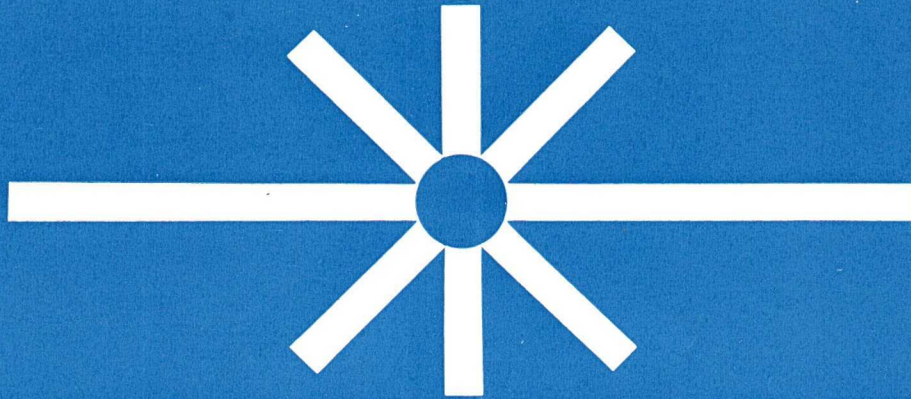


**Receiving Tubes  
Picture Tubes  
Oscillograph Tubes  
Vidicons  
Photo Tubes  
Semiconductors**



**TOSHIBA**

*Toshiba*

**Tubes Recevants  
Tubes d'Image  
Tubes d'Oscillographe  
Vidicons  
Tubes de Photographie  
Semiconducteurs**

**Empfängerröhren  
Bildröhren  
Oszillographröhren  
Vidikone  
Photoröhren  
Halbleiter**

THE UNIVERSITY OF CHICAGO

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# Receiving Tubes for TV Receiver

## Tubes Recevants de Télévision

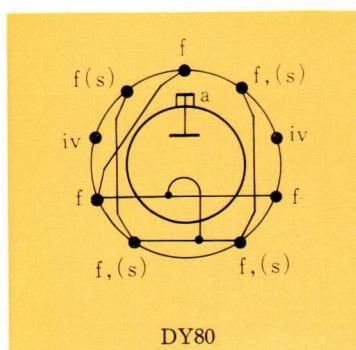
## Empfängerröhren für Fernsehapparat

European Type	Classification	Bulb Style	Cathode			Eb (V)	Ec or Ec <sub>1</sub> (V)	Ec <sub>2</sub> (V)	I <sub>b</sub> (mA)	I <sub>c<sub>2</sub></sub> (mA)	r <sub>p</sub> (kΩ)	g <sub>m</sub> (μS)	μ	R <sub>L</sub> (Ω)	P <sub>o</sub> (W)	Remarks	American Type
			Heater or Filament	Voltage (V)	Current (A)												
DY80	HV Half-Wave Rectifier	9mT	F	1.25	0.2	epx (V) 22,000 max. (Absolute), I <sub>peak</sub> (mA) 45 max. I <sub>o</sub> (mA) 0.5 max.											1X2B
DY87	HV Half-Wave Rectifier	9mT	H	1.4	0.55	epx (V) 27,000 max. (Absolute), I <sub>peak</sub> (mA) 40 max. I <sub>o</sub> (mA) 0.88 max.											1S2A
ECC82	Medium μ Twin Triode	9mT	H	6.3 12.6	0.3 0.15	250 100	-8.5 0	—	10.5 11.8	—	7.7 6.5	2200 3100	17 20	(Each Triode)			12AU7A
ECC83	High μ Twin Triode	9mT	H	6.3 12.6	0.3 0.15	250 100	-2.0 -1.0	—	1.2 0.5	—	62.5 80.0	1600 1250	100 100	(Each Triode)			12AX7A
EF80	Sharp-Cutoff RF Pentode	9mT	H	6.3	0.3	250	-3.5	250	10	2.8	650	6800	—	—	—		6BX6
EF183	Semi-Remote Cutoff RF Pentode	9mT	H	6.3	0.3	200	-2	90	12	4.5	500	12500	—	—	—	thw=14 sec.	6EH7
EF184	Sharp-Cutoff RF Pentode	9mT	H	6.3	0.3	200	-2.5	200	10	4.1	350	15000	—	—	—	thw=14 sec.	6EJ7
EL180	Sharp-Cutoff Pentode	9mT	H	12.6 6.3	0.3 0.6	250	R <sub>k</sub> =100Ω	180	26	5.75	93	11000	—	—	—	thw=14 sec.	12BY7A
PC900	Shield Triode	7mT	H	3.9	0.3	135	-1	—	11.5	—	—	14500	72	—	—		4HA5
PCF80	Triode Pentode	9mT	H	9.0	0.3	170 100	-2 -2	170 —	10 14	2.8 —	400 —	6200 5000	— 20	— —	— —	Pentode Triode	9A8
PCF801	Triode Pentode	9mT	H	8.5	0.3	100 170	-3 -1.2	— 120	15 10	— 3.0	— 350	9000 11000	20 55 (G <sub>1</sub> -G <sub>2</sub> )	— —	Triode Pentode		8GJ7
PCF802	Triode Pentode	9mT	H	9.0	0.3	200 100	-2 -1	— 100	3.5 6.5	— 1.7	— —	3500 5500	70 47	(Triode Unit) (Pentode Unit)		thw=14 sec.	9JW8
PCL82	Triode Pentode	9mT	H	16.0	0.3	200 100	-16 0	200 —	35 3.5	7.0 —	20 —	6400 2500	— 70	5600 —	3.5 —	(Pentode) (Triode)	16A8
PCL84	Triode Pentode	9mT	H	15	0.3	220 220	-3.4 -1.7	220 —	18 3	3.0 —	150 —	10000 4000	— 65	(Pentode) (Triode)			15DQ8
PCL85	Triode Pentode for Vertical Deflection	9mT	H	18.9	0.3	170 100	-15 -0.8	170 —	41 5	2.7 —	25 7.6	7250 6500	(g <sub>1</sub> -g <sub>2</sub> ) 7 50	(Pentode unit) (Triode unit)		thw=14 sec.	18GV8
PCL86	High μ Triode Power Pentode	9mT	H	14.5	0.3	250 250 250	-1.7 -7 R <sub>k</sub> =170Ω	— 250 250	1.2 36 36	— 5.5 5.5	— 45	1600 10000	100 21 G <sub>1</sub> -G <sub>2</sub>	(Triode unit) (Pentode unit)		4.2	14GW8
PFL200	Dissimilar Dual Pentode	10mT	H	17	0.3	170 150	-2.6 -2.3	170 150	30 10	6.5 3.0	40 160	21000 8500	(Section 1) (Section 2)			16Y9	
PL36	Beam Power Amplifier	GT	H	25	0.3	100	-7.7	100	100	7	5.3	14000	—	—	—	thw=14 sec.	25E5
PL84	Power Amplifier Pentode	9mT	H	15	0.3	170	-12.5	170	70	5	(Approx.) 23	10000	—	2400	5.6		15CW5
PL500	Beam Power Pentode	Mag.	H	27	0.3	75	-10	200	440	37	—	—	—	—	—		27GB5
PL504	Beam Power Pentode	Mag.	H	27	0.3	50	-10	200	420	37	—	—	—	—	—		
PY88	Damper Diode	9mT	H	30	0.3	epx (V) 7,500 max. (Absolute), I <sub>peak</sub> (mA)=550 max. I <sub>o</sub> (mA) 220 max.										thw=14 sec.	30AE3

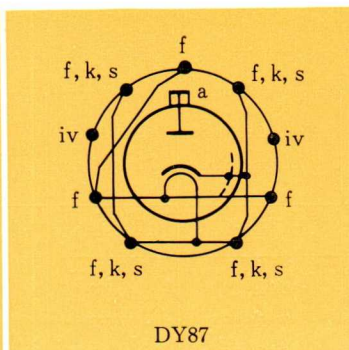
### Symbols For Electronic Terms

E <sub>b</sub> .....	Plate Voltage	r <sub>p</sub> .....	Plate Resistance	epx .....	Peak Plate Inverse Voltage
E <sub>c</sub> .....	Grid Voltage	g <sub>m</sub> .....	Transconductance	I <sub>peak</sub> .....	Peak Plate Current
E <sub>c1</sub> .....	Grid-No.1 Voltage	μ .....	Amplification Factor	I <sub>o</sub> .....	Output Current
E <sub>c2</sub> .....	Grid-No.2 Voltage	R <sub>L</sub> .....	Load Resistance	thw .....	Heater Warm Up Time
I <sub>b</sub> .....	Plate Current	P <sub>o</sub> .....	Power Output		
I <sub>c2</sub> .....	Grid-No.2 Current	R <sub>k</sub> .....	Cathode Resistance		

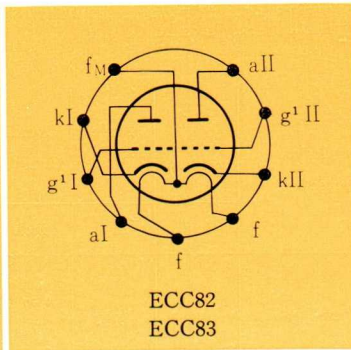
# SOCKET CONNECTION



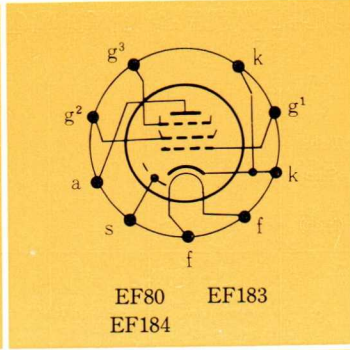
DY80



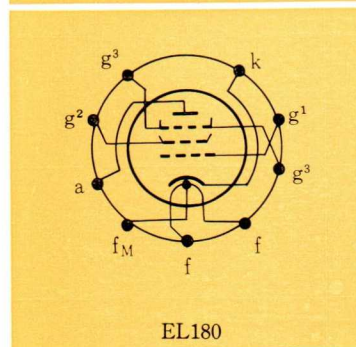
DY87



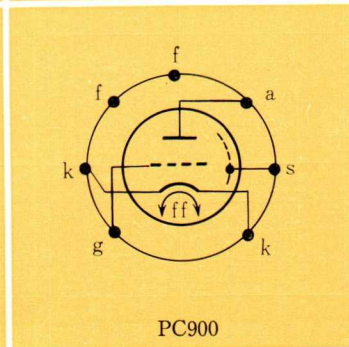
ECC82  
ECC83



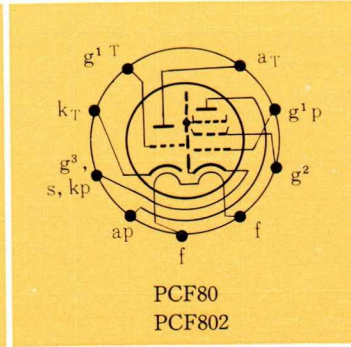
EF80 EF183  
EF184



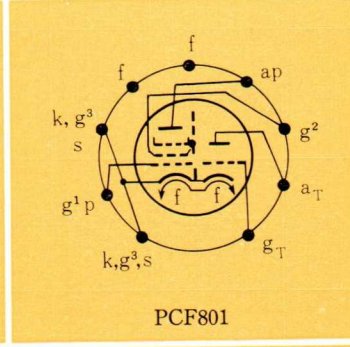
EL180



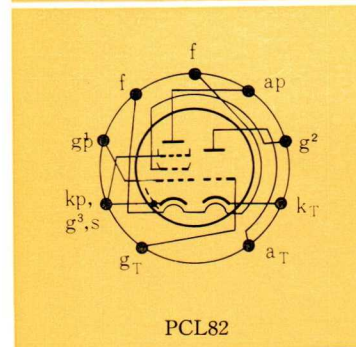
PC900



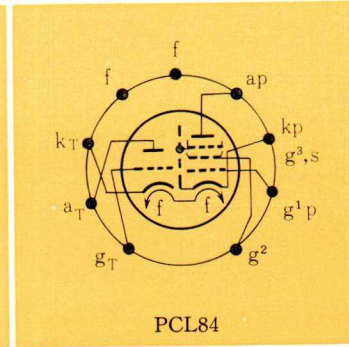
PCF80  
PCF802



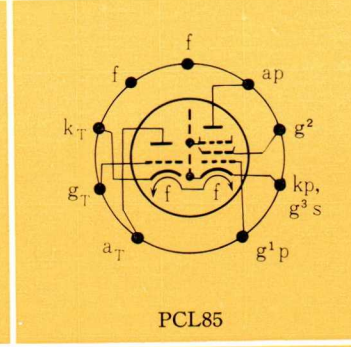
PCF801



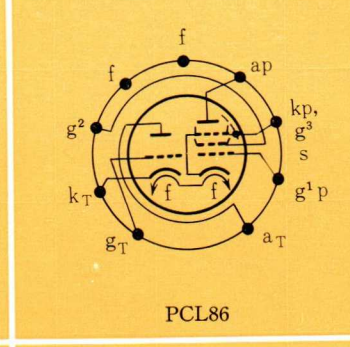
PCL82



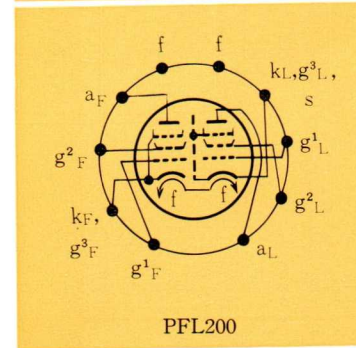
PCL84



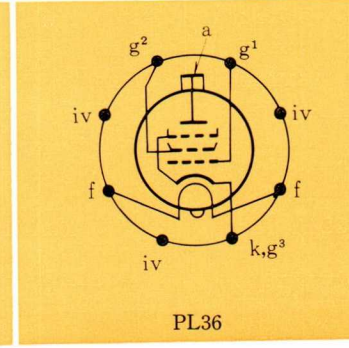
PCL85



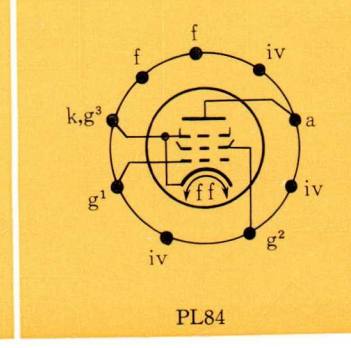
PCL86



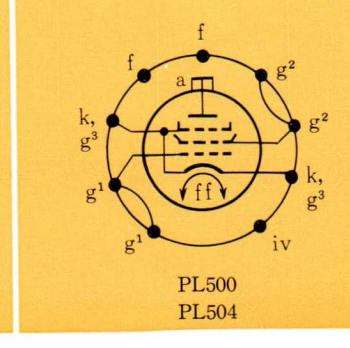
PFL200



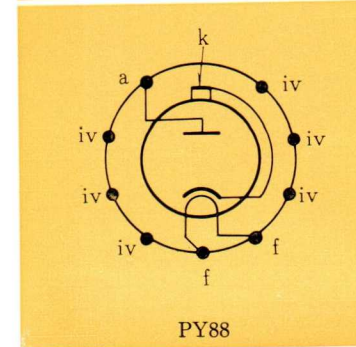
PL36



PL84



PL500  
PL504



PY88

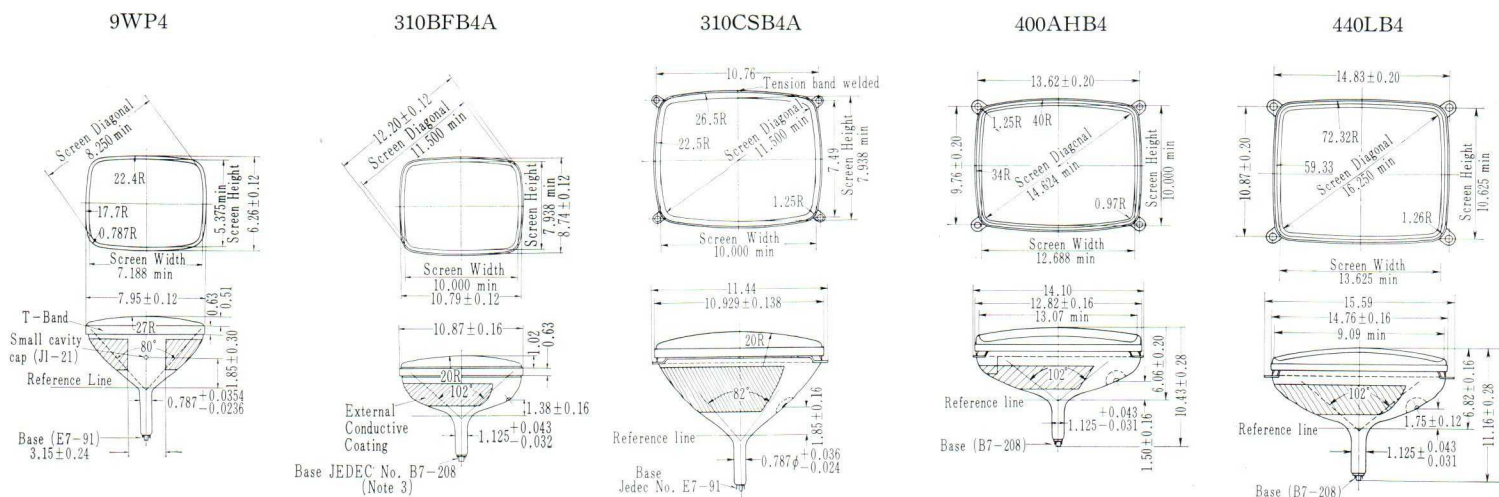
# Black & White Picture Tubes

## Tubes d'Image en Noir et Blanc

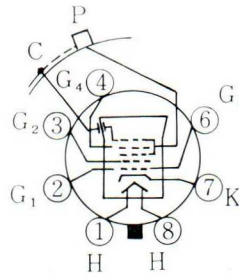
### Schwarz-weiss-Bildröhren

Tube Size (inch)	Tube Type	Face	Implosion Protection	Def. Angle (Diag.)	Neck Diameter	Overall Length	Tube Greatest Dimensions	Useful Screen Dimensions	Useful Screen Area	Base	Base Designation	Heater	
				deg.								Volts V	Current mA
9	9WP4	Tinted	T-Band	90	.787	8.27 Max.	9.02±.12 7.95±.12 6.26±.12	8.250 7.188 5.375	37	E7- 91	7GR	12.0	75
12	310BFB4A	Tinted	T-Band	110	1.125	9.29 ±.28	12.24±.16 10.87±.16 8.82±.16	11.500 10.000 7.938	75	B7-208	8HR	6.3	300
12	310CSB4A	Tinted	Panoramic type with Lugs	90	.787	10.07 max.	12.24±.12 10.80±.12 8.86±.12	11.500 10.000 7.938	75	E7- 91	7GR	6.3	300
16	400AHB4	Tinted	Rim-Banded with Lugs	114	1.125	10.43 ±.28	15.87±.16 13.86±.16 11.26±.16	14.625 12.688 10.000	119	B7-208	8HR	6.3	300
17	440LB4	Tinted	Rim-Banded with Lugs	114	1.125	11.18 ±.28	17.36±.16 14.76±.16 11.89±.16	16.250 13.625 10.625	141	B7-208	8HR	6.3	300
19	470UB4	Tinted	Rim-Banded with Lugs	114	1.125	11.61 ±.28	18.86±.16 16.54±.16 13.50±.16	17.562 15.185 12.000	172	B7-208	8HR	6.3	300
20	500TB4	Tinted	Rim-Banded with Lugs	114	1.125	12.18 ±.32	19.92±.16 16.89±.16 13.62±.16	18.625 15.500 12.125	184	B7-208	8HR	6.3	300

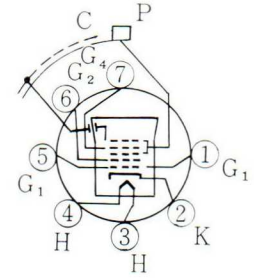
### DIMENSIONAL OUTLINE (Unit in inch)



## SOCKET CONNECTION



8HR



7GR

Max. Anode Volts kV	Typical Operating Conditions			
	Anode Volts kV	Focusing Volts V	Grid No. 2 Volts V	Raster Cutoff Volts V
14	9	0-300	100	33~52
14	10	0-400	400	-36~-94
14	10	0-300	300	-30~-72
18	16	0-400	500	-42~-100
17.5	14	0-400	300	-30~-72
20	16	0-400	400	-36~-94
23	16	0-400	400	-36~-94



9WP4



310BFB4A



310CSBA



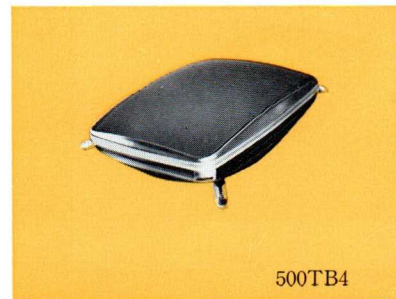
400AHB4



440LB4



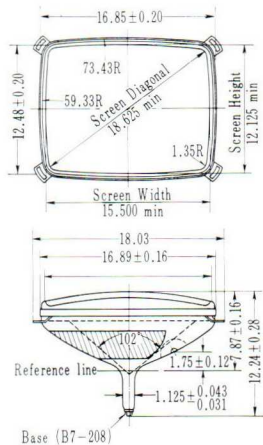
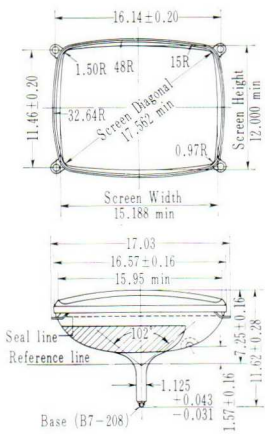
470UB4



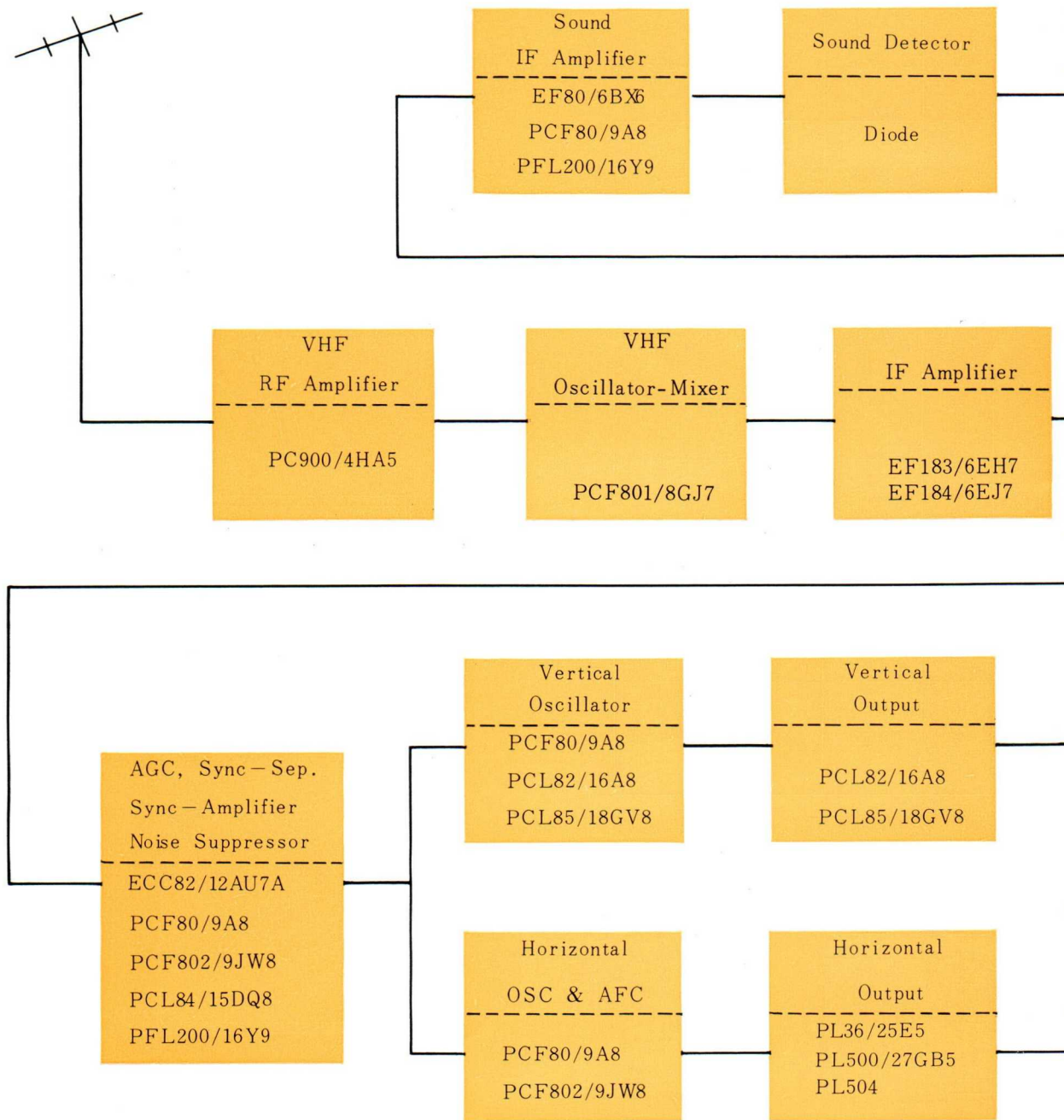
500TB4

470UB4

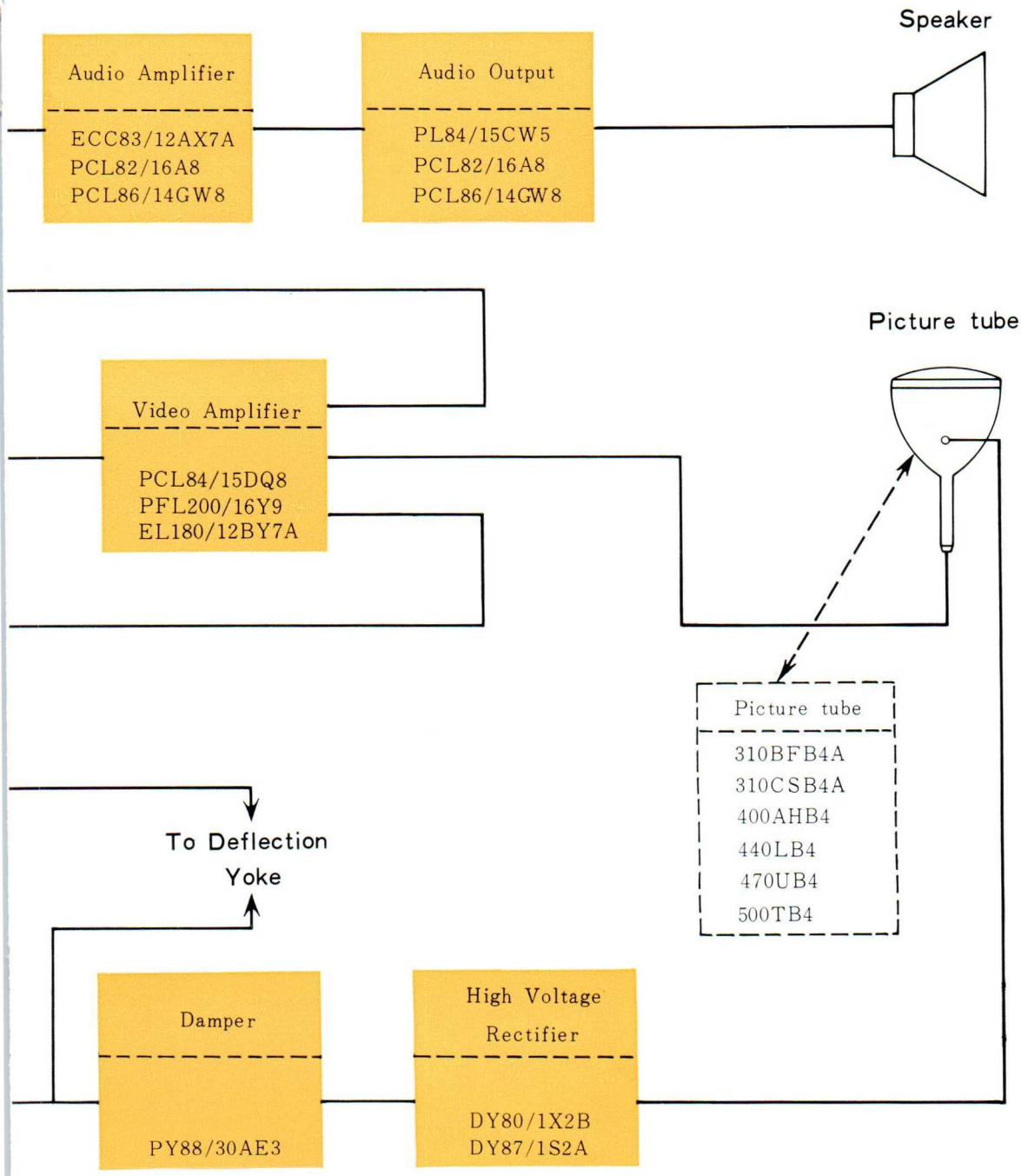
500TB4



# RECEIVING TUBES & PICTURE TUBES FOR BLACK & WHITE TV





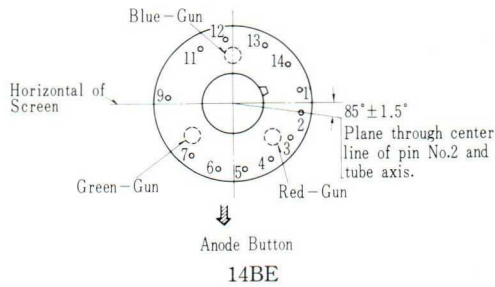


# Color Picture Tubes

## Tubes d'Image en Couleur

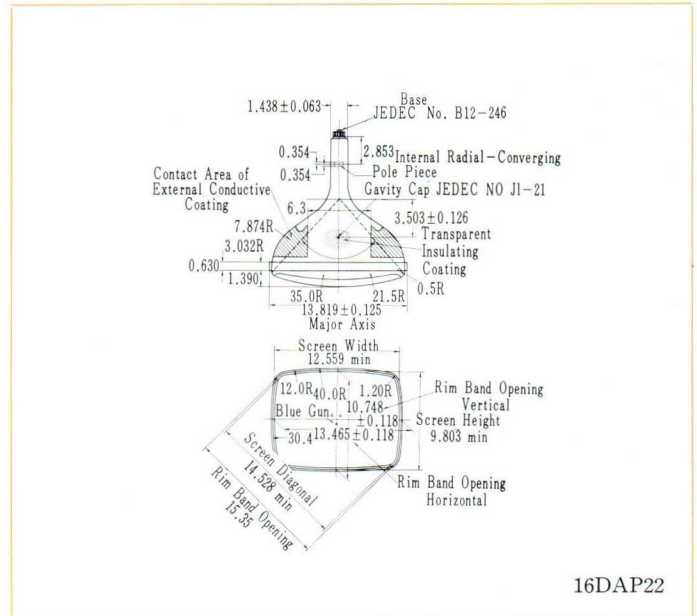
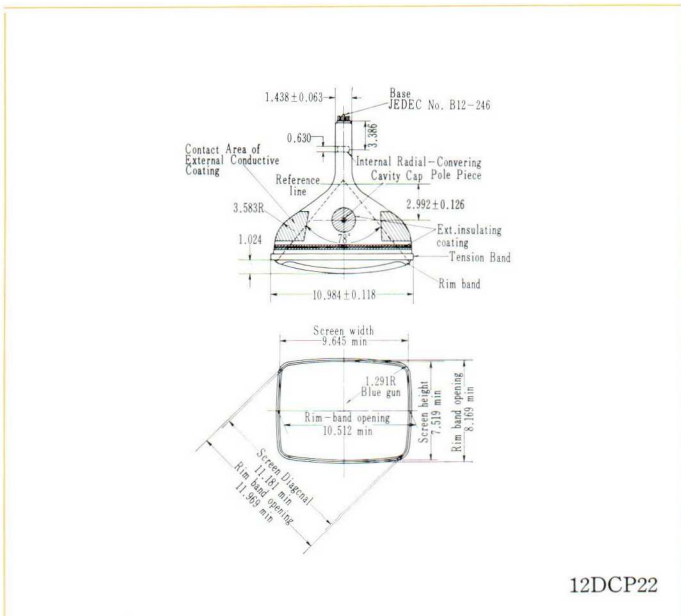
### Farb-Bildröhren

Tube Type	Face & Phosphor (Red)	Implosion Protection	Def. Angle (Diag.)	Neck Diameter	Overall Length	Tube Greatest Dimensions	Useful Screen Dimensions	Useful Screen Area	Base	Base Designation	Heater		
											Voltage	Current	
			deg	inch	inch	inch	min. inch	sq. inch			V	mA	
12	12DCP22	Tinted New Rare-earth	Rim-Banded	90	1.437 ±.063	13.78 ±.39	12.36±.12 10.98±.12 8.90±.12	11.181 9.645 7.519	70	B12-246	14BH	6.3	900
16	16DAP22	Tinted New Rare-earth	Rim-Banded	90	1.437 ±.063	15.12 ±.39	15.75±.12 13.82±.12 11.22±.12	14.528 12.559 9.803	117	B12-246	14BE	6.3	900
	16CYP22	Tinted New Rare-earth	Rim-Banded	90	1.437 ±.063	15.71 ±.39	15.75±.12 13.82±.12 11.22±.12	14.528 12.559 9.803	117	B12-246	14BH	6.3	900
19	490YB22	Antiglare Tinted New Rare-earth	Laminated	90	1.437 ±.063	17.76 ±.39	19.49±.12 17.09±.12 13.78±.12	17.816 15.298 11.888	171	B12-246	14BE	6.3	900

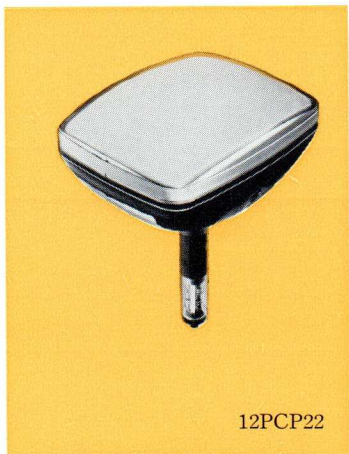


- |         |                         |         |                      |
|---------|-------------------------|---------|----------------------|
| Pin No. | Element                 | Pin No. | Element              |
| 1.      | Heater                  | 7.      | Grid No. 1           |
| 2.      | Cathode of Red Gun      | 9.      | Grid No. 2           |
| 3.      | Grid No. 1 of Red Gun   | 11.     | Cathode of Green Gun |
| 4.      | Grid No. 2 of Red Gun   | 12.     | Grid No. 1           |
| 5.      | Grid No. 2 of Green Gun | 13.     | Grid No. 2           |
| 6.      | Cathode of Green Gun    | 14.     | Heater               |

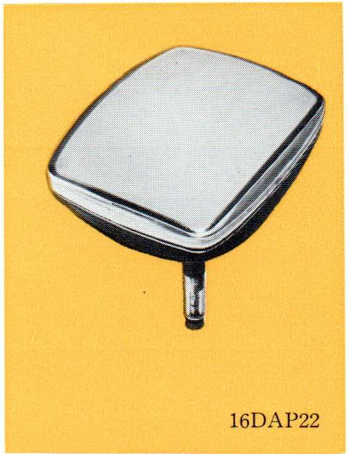
### DIMENSIONAL OUTLINE (Unit in inch)



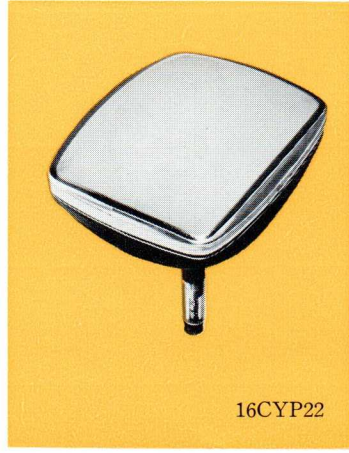
Max. Anode Volts	Typical Operating Conditions			
	Anode Volts	Focusing Volts	Grid No. 2 Volts	Grid No. 1 Volts
	kV	V	V	V
20	16	Ec4 -75~400	175~425	-63~-110
23	18	Ec3 3000~3600	130~300	-50~-100
23	19	Ec4 -75~400	125~370	-60~-135
25.5	23	Ec3 3860~4600	130~370	-50~-105



12PCP22



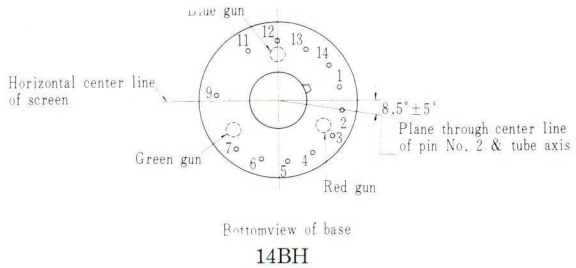
16DAP22



16CYP22

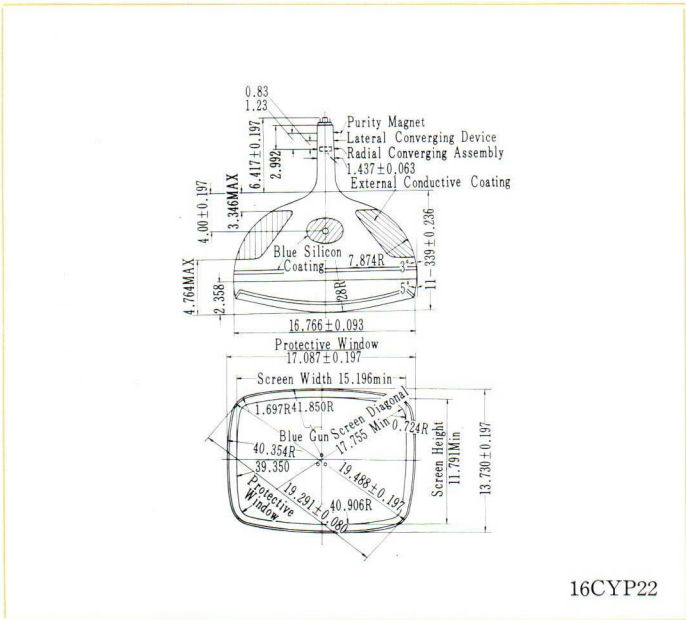


490YB22

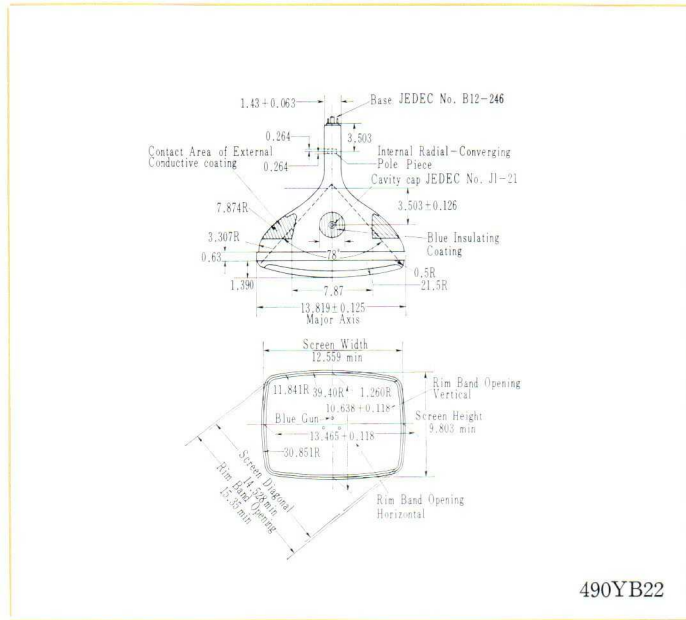


- |         |                         |         |                         |
|---------|-------------------------|---------|-------------------------|
| Pin No. | Element                 | Pin No. | Element                 |
| 1.      | Heater                  | 7.      | Grid No. 1 of Green Gun |
| 2.      | Cathode of Red Gun      | 9.      | Grid No. 4              |
| 3.      | Grid No. 1 of Red Gun   | 11.     | Cathode of Blue Gun     |
| 4.      | Grid No. 2 of Red Gun   | 12.     | Grid No. 1 of Blue Gun  |
| 5.      | Grid No. 2 of Green Gun | 13.     | Grid No. 2 of Blue Gun  |
| 6.      | Cathode of Green Gun    | 14.     | Heater                  |

ment  
No. 1 of Green Gun  
No. 3  
de of Blue Gun  
No. 1 of Blue Gun  
No. 2 of Blue Gun  
r



16CYP22



490YB22

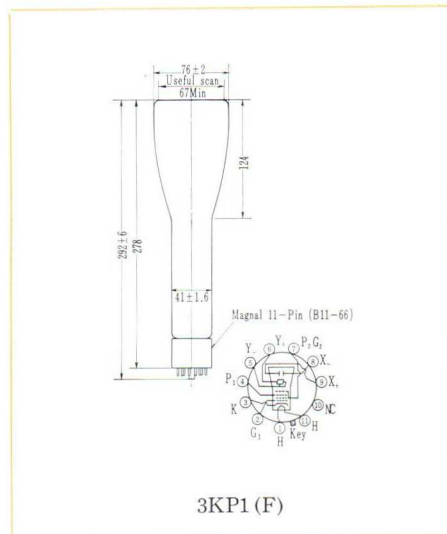
# Oscillograph Tubes

## Tubes d'Oscillographe

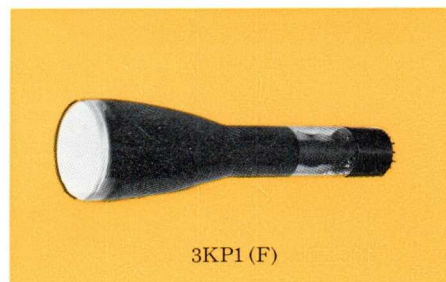
## Oszillographröhren

Type	Ratings												
	Application	Construction	Method		Max. Dimension		Fluorescence	Persistence	Heater		Anode No. 3 Voltage $E_{b3}$ (V) Max.	Anode No. 2 Voltage $E_{b2}$ (V) Max.	Anode No. 1 Voltage $E_{b1}$ (V) Max.
			Focusing Method	Deflecting Method	Overall Length (mm)	Max. Envelope Dia. (mm)			Voltage $E_f$ (V)	Current $I_f$ (A)			
3KP1 (F)	Observation	Flat Face	Ele. Static	Ele. Static	298	78	Green	Medium	6.3	0.6	—	2500	1000
5UP1 (F)	Observation	Flat Face	Ele. Static	Ele. Static	385	136	Green	Medium	6.3	0.6	—	2500	1000
120KB31	Observation Transistor Oscilloscope	Rectangular Flat Face Spiral Accelerator Blanking Electrode	Ele. Static	Ele. Static	350	118	Green	Medium	6.3	0.15	6000	2000	1000
150WB31	Observation	Rectangular Flat Face Spiral Accelerator Metal Back	Ele. Static	Ele. Static	434	153	Green	Medium	6.3	0.15	7700	2200	1100
170CB1	Observation Curvetracer	Rectangular Flat Face Spiral Accelerator	Ele. Static	Ele. Static	429	169	Green	Medium	6.3	0.6	6000	2600	1000

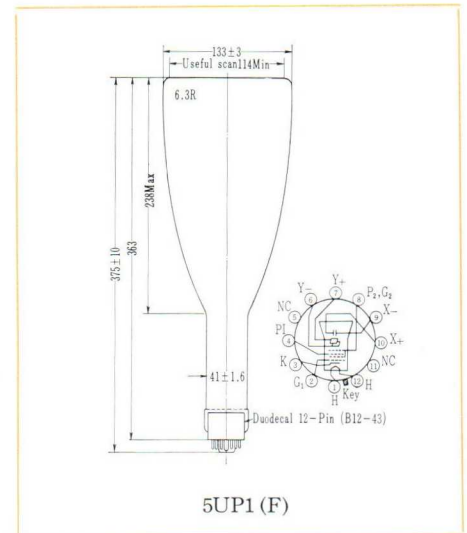
### DIMENSIONAL OUTLINE (Unit in mm)



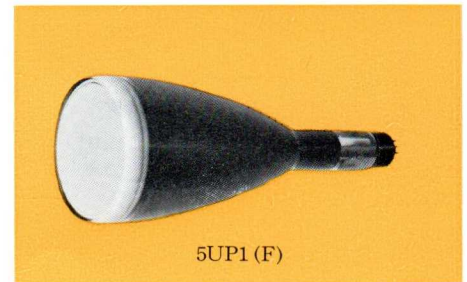
3KP1 (F)



3KP1 (F)

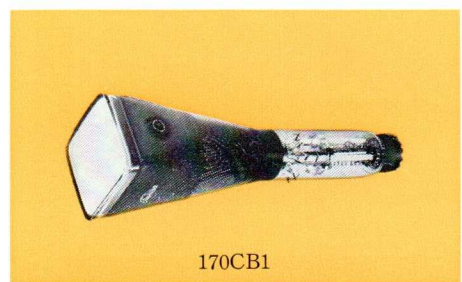
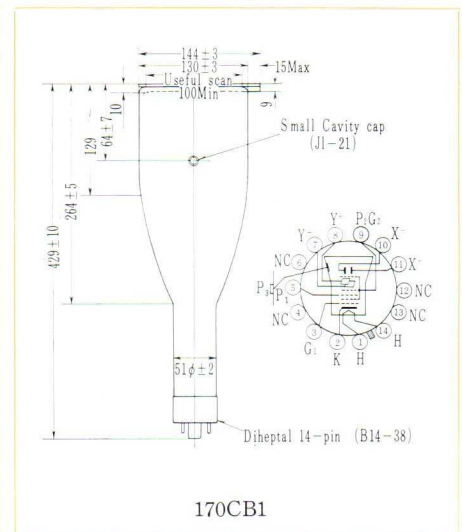
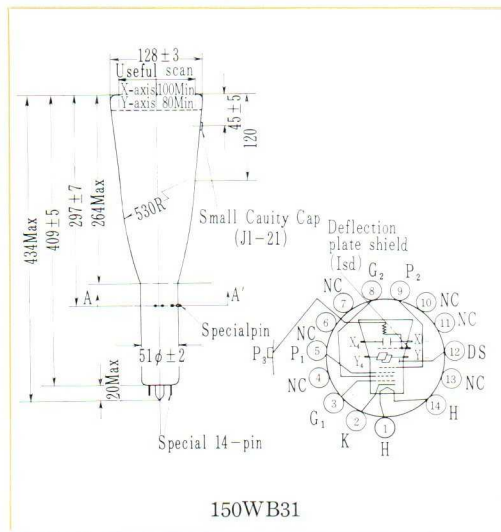
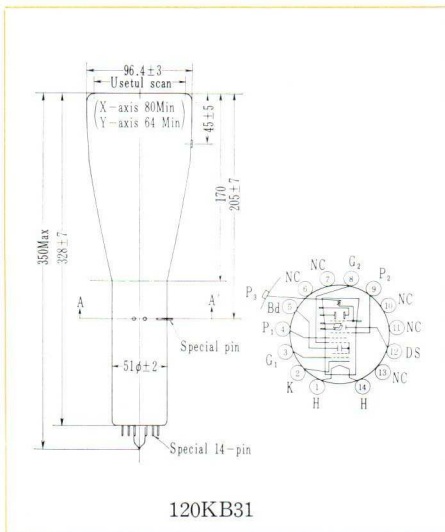


5UP1 (F)



5UP1 (F)

Grid No. 2 Voltage $E_{c2}$ (V) Max.	Grid No. 1 Voltage $E_{c1}$ (V) Max.	Deflection Factor		Base & Cap	Application Example							
		X-axis $10^{-3} \text{Vdc/cm} E_{b2}$	Y-axis $10^{-3} \text{Vdc/cm} E_{b2}$		Anode No. 3 Voltage $E_{b3}$ (V)	Anode No. 2 Voltage $E_{b2}$ (V)	Anode No. 1 Voltage $E_{b1}$ (V)	Grid No. 2 Voltage $E_{c2}$ (V)	Grid No. 1 Voltage for Visual Cut off $E_{c0}$ (V)	Min. Useful Scan. (mm)	Deflection Factor	
											X-axis (Vdc/cm)	Y-axis (Vdc/cm)
(2500)	Normally Negative -200 Max.	19.6~26.8	14.9~20.5	B11-66	—	1000	160~300	(1000)	-45 Max.	67	19.6~26.8	14.9~20.5
					—	2000	320~600	(2000)	-90 Max.		39.3~53.6	29.9~41.0
(2500)	Normally Negative -200 Max.	11.0~15.2	9.1~12.3	B12-43	—	1000	170~320	(1000)	-45 Max.	114	11.0~15.2	9.1~12.3
					—	2000	340~640	(2000)	-90 Max.		22.0~30.3	18.1~24.6
2000	Normally Negative -200 Max.	18.0~22.0	8.5~11.5	Special 14-pin J1-21	3000	1000	100~300	1000	-35~-65	X-axis 80 Y-axis 64	18~22	8.5~11.5
(2200)	Normally Negative -200 Max.	10.9~14.0	5.2~6.4	Special 14-pin J1-21	6000	1720	175~515	(1720)	-44~-70	X-axis 100 Y-axis 80	18.7~23.3	8.9~11.0
		(E <sub>b3</sub> /E <sub>b2</sub> =3.5)										
(2600)	Normally Negative -200 Max.	10.7~14.0	7.3~9.3	B14-38 J1-21	3000	1500	300~500	(1500)	-40~-65	X-axis 100 Y-axis 100	16.0~21.0	11.0~14.0
		(E <sub>b3</sub> /E <sub>b2</sub> =2)										



# Vidicons

## Vidicons

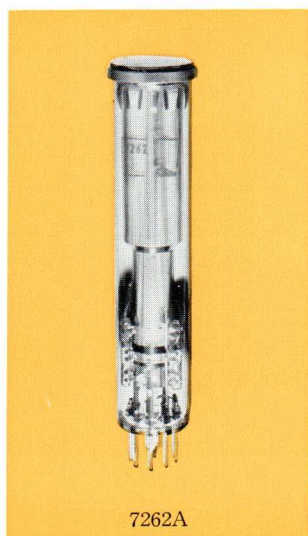
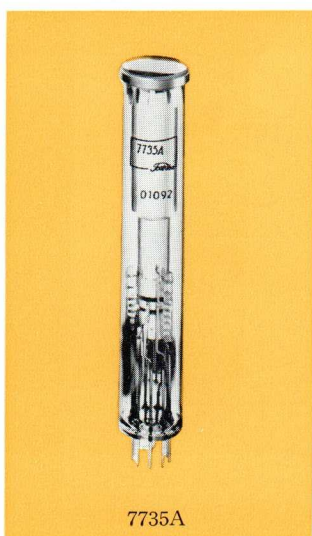
### Vidikone

Type	Descriptions	Dimensions		Focusing Method ※	Deflection Method ※	Typical Operation						U.S.A. Equivalent
		Length (mm)	Max. Dia. (mm)			Face Plate Illumination (high-light) (lx)	Target Voltage (V)	Dark Current ( $\mu$ A)	Signal Output Current ( $\mu$ A)	Center Resolution	Amplitude Response at 400 TV Lines (%)	
7735 A	Type featuring very high sensitivity. For live pick-up in color or black-and-white TV cameras.	159	28.6	M	M	10	20~40	0.02	0.20	*	*	7735 A
						5	30~60	0.1	0.27	650	40	
						1	35~70	0.2	0.14			
7262 A	Short type having low power (0.6 watt) heater. Has very high sensitivity. For small, compact, transistorized cameras. Electrical characteristics similar to type 7735 A.	130	28.6	M	M	5	30~60	0.1	0.27	*	*	7262 A
8507	A high-resolution version of type 7735A having separate mesh and wall electrodes. For live pick-up in black-and-white TV cameras.	159	28.6	M	M	10	20~40	0.02	0.2	□	□	8507
						5	30~60	0.1	0.27	750~800	50	
						1	35~70	0.2	0.14			
M 7075	Mesh separate and short type having low power heater. Has very high sensitivity. For small compact transistorized cameras.	100	19.6	M	M	15	10~40	0.02	0.2	700	45	

\* Grid No. 3 & No. 4 voltage (focusing voltage)=250~300V

□ Grid No. 4 voltage=345~510V, Grid No. 3 voltage (focusing voltage).=230~300 V

※ M: Magnetic. S: Electrostatic

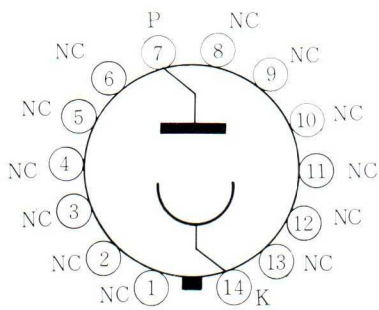


# Photo Tube & Photomultipliers

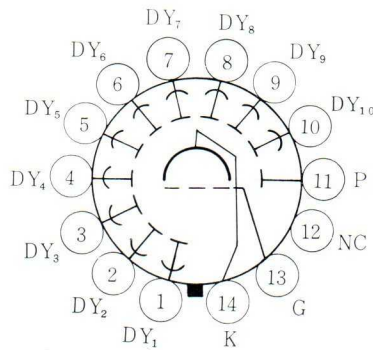
## Photo Tube et Photomultiplicateurs

### Photozelle und Photovervielfältiger

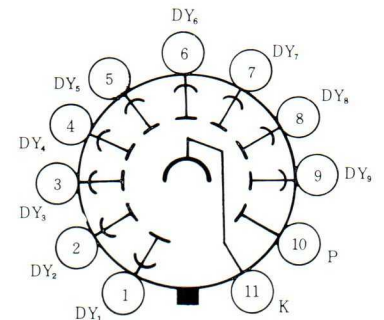
Type	Description	Feature	Maximum Ratings		Characteristics	
			Overall Voltage	Anode Current	Cathode Sensitivity	Anode Sensitivity
PV 52	2" End-on S20, Vacuum Photo Tube	High Red-response High Quantum Yield	250 Vdc	3 $\mu$ Adc	—	120 $\mu$ A/lm
PM 55	2" End-on S20, 10 Stage Photomultiplier	Low Dark Current High Quantum Yield	1800 Vdc	300 $\mu$ Adc	120 $\mu$ A/lm	50 A/lm
MS-9 S	Side-on S4, 9 Stage Photomultiplier	Small Size, High Current Amplification	1250 Vdc	1 mAdc	40 $\mu$ A/lm	80 A/lm



JEDEC No. B14-38 Diheptal 14 Pin  
PV52



JEDEC No. B14-38 Diheptal 14 Pin  
PM55



Direction of Light

JEDEC No. B11-88  
Small-Shell Submagnal 11 Pin  
MS-9S



PV52



PM55



MS-9S

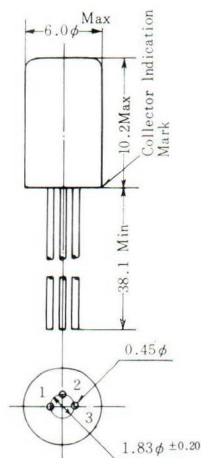
# Germanium Transistors

## Transistors Germanium

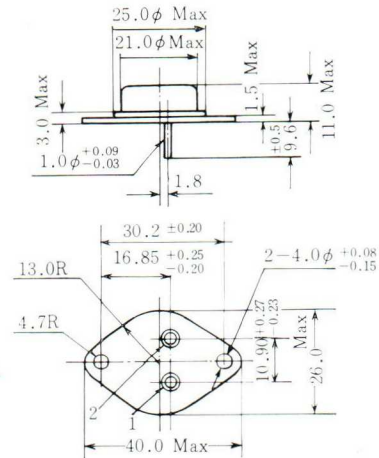
## Germanium Transistoren

Type No.	Usage	Maximum Ratings (Ta=25°C)							Electrical														
		V <sub>CB0</sub>	V <sub>EB0</sub>	I <sub>C</sub>	P <sub>C</sub>	T <sub>J</sub>	*V <sub>CEs</sub> φV <sub>CEr</sub> (V)	I <sub>CB0</sub>		h <sub>FE</sub> *h <sub>FE</sub>				Saturation Voltage				f <sub>T</sub>					
								Max.	Cond.	Min.	Max.	Condition		V <sub>CE</sub> (V)	I <sub>C</sub> *I <sub>F</sub> (mA)	V <sub>CE</sub> (sat) Typ. φMax. (V)	V <sub>BE</sub> Typ. φMax. (V)	Condition		Min.	Typ.		
												V <sub>CB</sub>	(μA)					(V)	(V)			(mA)	(mA)
2SA49	IF Amp.	-18	-12	- 5	60	75		- 10	-18	*11	* 20	-6	* 1										
2SA52	Conv., Mix., Osc.	-18	-12	- 5	60	75		- 10	-18	* 9	* 19	-6	* 1										
2SA53	IF Amp.	-18	-12	- 5	60	75		- 10	-18	* 5	* 13	-6	* 1										
2SA470	SW Conv.	-18	-0.5	- 10	55	85		- 10	-18	*40	*350	-6	* 1							20	35		
2SA471	FM IF Amp.	-18	-0.5	- 10	55	85		- 10	-18	*20	*350	-6	* 1										35
2SA472	HF Amp.	-18	-0.5	- 10	55	85		- 10	-18	*20	*350	-6	* 1										30
2SA517	HF Amp.	-18	-0.5	- 10	55	85		- 10	-18	*20	*350	-6	* 1									*40	*55
2SA518	HF Amp.	-18	-0.5	- 10	55	85		- 10	-18	*20	*350	-6	* 1									*35	*45
2SB44	LF Amp.	-30	-12	- 50	80	75		- 10	-12	*45	*115	-6	* 1									*0.2	
2SB54	Medium Power Amp.	-30	-12	-150	150	75		- 14	-30	*80	*300	-6	* 1										1
2SB56	Medium Power Amp	-30	-12	-150	150	75		- 14	-30	40	200	-1	- 50										1
2SB257	Low Noise Amp.	-18	-12	- 40	60	75		- 3	-12	*50	*200	-6	* 1										* 5
2SB364	Low Voltage Power Amp.	-20	-12	-400	150	75		- 14	-20	60	150	-0.5	*100										* 1
2SB365	Low Voltage Power Amp.	-20	-12	-400	150	75		- 14	-20	35	90	-0.5	*100										* 1
2SB415	Power Amp.	-32	- 6	-1A	200	85		- 14	-12	40	180	0	*300										* 1
2SB425	High Power Amp.	-60	-12	-7A	30W	85		-160	-12	30	200	-1.5	-1A										*0.4
2SB426	High Power Amp.	-32	-12	-7A	30W	85		-160	-12	30	200	-1.5	-1A										*0.4
2SB439	Low Noise Audio Amp.	-30	-12	-150	150	75		- 14	-12	*70	*270	-6	* 1										* 2
2SB440	Low Noise Audio Amp.	-30	-12	-150	150	75		- 14	-12	*70	*270	-6	* 1										* 2
2SB462	Medium Power Amp.	-60	-12	-2A	6W	85		- 70	-12	30	250	-1	-500										*0.9
2SB463	Medium Power Amp.	-32	-12	-2A	6W	85		- 70	-12	30	250	-1	-500										*0.9
2SA50	High Speed Switching	-18	-12	- 24	55	75	*-18	- 3	-12	30	150	-1	- 24	-0.1	-0.26	- 24	- 1	* 9	*14				
2SA478	High Speed Switching	-40	- 2	-400	125	85	*-40	- 8	-12	30	150	-1	-400	-0.3	-0.8	-400	-100	*25	*40				
2SA479	High Speed Switching	-40	- 2	-200	125	85	*-40	- 8	-12	30	150	-1	-200	φ-0.5	φ-1.2	-200	- 50	*25	*40				
2SA538	High Speed Switching	-25	-12	- 50	120	75	*-18	- 50	-25	*20	*200	-6	* 1	-0.09	-0.45	- 50	- 5	* 3	* 8				
2SB201	Medium Speed Switching	-35	-12	-400	250	85	φ-35	- 30	-12	37	300	-1	-150	-0.1	-0.35	-150	- 15	*0.2	*0.5				
2SB291	LF Amp.	-30	-12	-150	150	75	φ-25	- 10	-12	*22	*210	-6	* 1										* 1

### DIMENSIONAL OUTLINE (Unit in mm)



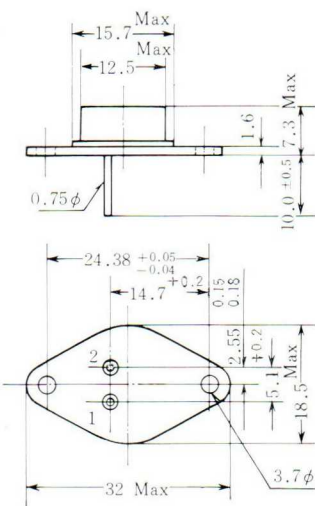
JEDEC Type TO-1  
1. Emitter  
2. Base  
3. Collector



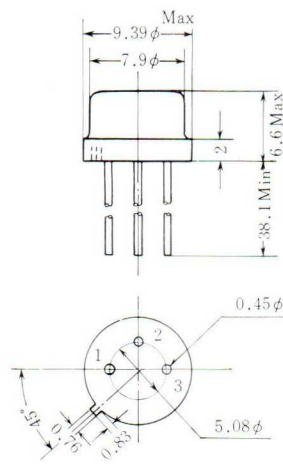
JEDEC Type TO-3  
1. Emitter  
2. Base  
Collector (case)



Characteristics													Similarity	Outline	Type No.	
*f <sub>αb</sub>		r <sub>bb'</sub>					C <sub>0b</sub>			Switching Time						
Condition		Typ. (Ω)	Max. (Ω)	Condition			Min. (pF)	Typ. (pF)	Max. (pF)	Cond. V <sub>CEB</sub> (V)	t <sub>r</sub> <sup>*</sup> Typ. (μS)	t <sub>stg</sub> Typ. (μS)				t <sub>f</sub> Typ. (μS)
V <sub>CE</sub> *V <sub>CB</sub> (V)	I <sub>E</sub> *I <sub>C</sub> (mA)			V <sub>CE</sub> (V)	I <sub>C</sub> (mA)	f (MHz)										
		90	160	-6	1	30	7.5	10.5	12.5	-6				OC44, OC613, SFT308	TO-1	2SA49
		80	160	-6	1	30		10.5		-6				OC44, OC613, SFT308	TO-1	2SA52
		90	160	-6	1	30	7.5	10.5	12.5	-6				OC45, OC612, SFT307	TO-1	2SA53
-6	1	40	120	-6	1	50		2.0	3.5	-6				AF126, AF127, AF134, AF135, AF136	TO-1	2SA470
-6	1	30	120	-6	1	50		2.0	3.5	-6				AF126, AF127, AF134, AF135, AF136	TO-1	2SA471
-6	1	45	120	-6	1	50		2.0	3.5	-6				AF126, AF127, AF134, AF135, AF136	TO-1	2SA472
*-3	0.5	50	120	-6	1									OC170, OC171, SFT317, AF134	TO-1	2SA517
*-3	0.5	45	120	-6	1	50		1.6	3.5	-6				OC170, OC171, SFT317, AF134	TO-1	2SA518
*-6	1							30		-6				OC71, OC75	TO-1	2SB44
-6	1	120		-6	1	6		35		-6				OC305	TO-1	2SB54
-6	1	120		-6	1	6		35		-6				TF65	TO-1	2SB56
*-6	1							13		-6					TO-1	2SB257
*-6	1													AC132, OC74	TO-1	2SB364
*-6	1													AC132	TO-1	2SB365
-1	100													AC128, OC74	TO-1	2SB415
-1.5	*500													ASZ16, AD138	TO-3	2SB425
-1.5	*500													AD149, AD138	TO-3	2SB426
*-6	1							30		-6				AC125, AC126	TO-1	2SB439
*-6	1							30		-6				AC125, AC126	TO-1	2SB440
-1	100													ASZ16, AD139	TO-66	2SB462
*-1	100													AD139	TO-66	2SB463
*-6	1		100	-6	1E 1	6		10		-6	0.6	0.5	0.4	AF125, AF134	TO-1	2SA50
*-6	1							3	6	-6	0.085	0.085	0.25		TO-1	2SA478
*-6	1							3	6	-6	0.03	0.2	0.05	ACY23, ACY32	TO-1	2SA479
*-6	1							12	20	-6	*0.40	0.35	0.50	AF125, AF134	TO-1	2SA538
*-1	100										0.6	5.0	0.7	ACY32, ACY23	TO-5	2SB201
-6	1							35		-6				ACY32, ACY23	TO-5	2SB291



JEDEC Type TO-66  
1. Base  
2. Emitter  
Collector (case)



JEDEC Type TO-5  
1. Emitter  
2. Base  
3. Collector

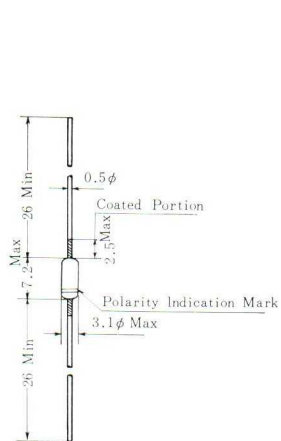
# Diodes

## Diodes

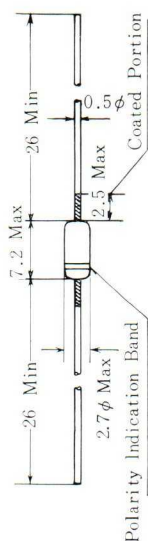
## Diodene

Typ.	Structure	S	Maximum Ratings (T <sub>a</sub> =25°C)					Outline	Electrical Characteristics (T <sub>a</sub> =25°C)							
			V <sub>RM</sub> (V)	I <sub>FM</sub> (mA)	I <sub>O</sub> (mA)	I <sub>surge</sub> (mA)	T <sub>stg</sub> (°C)		I <sub>F</sub> (mA)	V <sub>F</sub> (V)	I <sub>R</sub> Max. (μA)	V <sub>R</sub> (V)	C <sub>j</sub> (pF)	V <sub>R</sub> (V)	η (%)	t <sub>rr</sub> (μs)
1N60	Ge Point Contact	Video FM Detector	35*	150	50	500	-55~75	1-3D	Min. 4	1.0	75	10	0.8		Min. 55	(f=40MHz)
1S34	Ge Point Contact	Detector	75	90	30	300	-55~75	1-3D	Min. 4	1.0	350	50	0.8			
1S73A	Ge Gold Bond	High Speed Switching	30	360	120	600	-55~75	1-3G	100	Max. 1.0	55	10	Max. 0.8	6		0.9
1S1237	Si Diffused Junction	Phase Detector	300	30	10	500	-55~125	1-7B	Min. 4	2.0	3	300				1.8
1S1238	Si Diffused Junction	Phase Detector	500	30	10	500	-55~125	1-7B	Min. 4	2.0	3	500				1.8
1S1585	Si Epitaxial Planar	High Speed Switching	90	480	150	700	-65~175	1-2F	100	Max. 1.0	0.5	80	Max. 2			2 (ns)
1S1586	Si Epitaxial Planar	High Speed Switching	55	480	150	700	-65~175	1-2F	100	Max. 1.0	0.5	50	Max. 2			2 (ns)
1S1587	Si Epitaxial Planar	High Speed Switching	55	400	130	600	-65~175	1-2F	100	Max. 1.2	0.5	50	Max. 2			2 (ns)
1S1588	Si Epitaxial Planar	High Speed Switching	35	360	120	500	-65~175	1-2F	100	Max. 1.3	0.5	30	Max. 3			4 (ns)

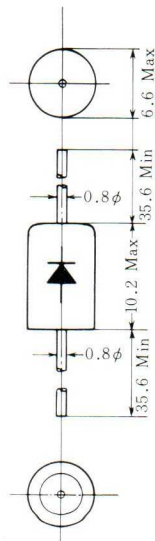
### OUTLINE (Unit in mm)



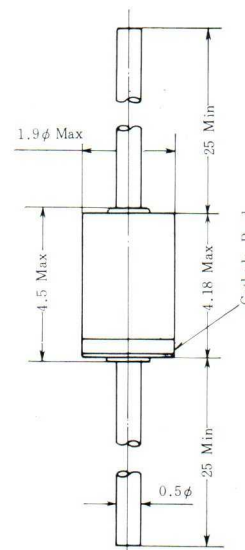
1N60 1S34



1S73A



1S1237 1S1238



1S1585  
1S1586  
1S1587  
1S1588

# Damper Diodes

## Diodes d'Efficacité

### Dampfer-Dioden

Typ.	Structure	Maximum Ratings ( $T_a=25^\circ\text{C}$ )						Outline	Electrical Characteristics				Note
		$V_{RM}$ (V)	Surge Voltage (V)	$I_F$ (peak) (A)	1 Cycle Peak Surge Current (A)	$T_J$ ( $^\circ\text{C}$ )	$T_{stg}$		$V_F$ (V)		$I_R$ (mA)		
									Max.	$I_F$ (A)	Max.	$V_R$ (V)	
1S1465	Ge	200	250	10	30*	75	-55~85	1-13A	0.75	5	55	150	* 50Hz Sine Half Wave
1S1720/R	Si	250		20	60**	150	-40~150		1.0	3	1.0	250	** $T_a=50^\circ\text{C}$ , 50Hz Sine Half Wave

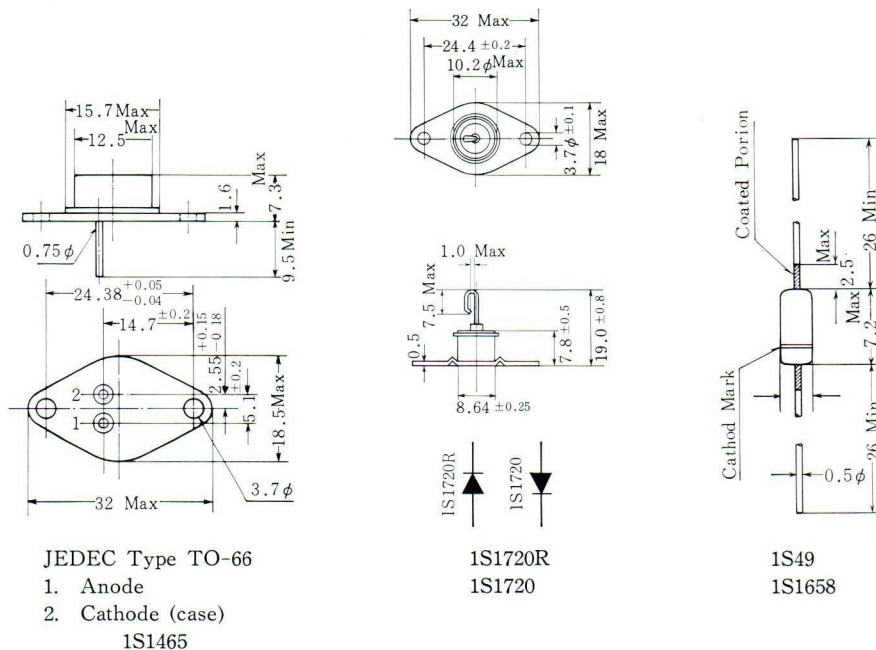
# Variable Capacitance Diodes

## Diodes a Variation de Capacité

### Kapazitätsdioden

Typ.	Structure	Service	Max. Ratings		Outline	Electrical Characteristics ( $T_a=25^\circ\text{C}$ )							Note	
			Continuous Inverse Voltage (V)	Operating Temp. ( $^\circ\text{C}$ )		$I_R$ Max. ( $\mu\text{A}$ )	Cond. $V_R$ (V)	C (@ $V_R=10$ V)			Q (@ $V_R=10$ V)			
								Min.(pF)	Typ.(pF)	Max.(pF)	Min.	Typ.		f (MHC)
1S49	Si Epitaxial Planar	A.F.C.	20	-55~150	1-3	1.5	20	18	—	28	—	80	20	
1S1658	Si Epitaxial Planar	A.F.C.	20	-55~150	1-3	0.5	20	20*	32*	45*	40	100	50	* $V_R=4$ V

### OUTLINE (Unit in mm)



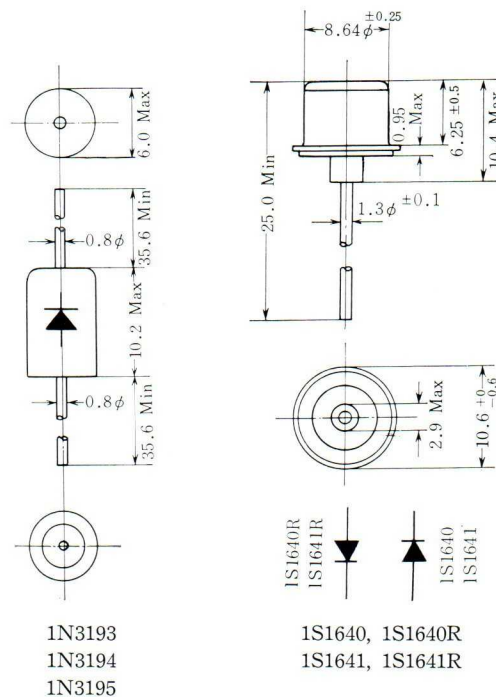
# Rectifiers

## Redresseurs

## Gleichrichter

Type	Maximum Ratings					Cutline	Electrical Characteristics				Note
	$V_{RM}$ (V) @ $T_j=150^\circ\text{C}$	AC Input Voltage (V) @ $V_j=150^\circ\text{C}$	$I_O$ (A) @ $T_C=120^\circ\text{C}$	1 Cycle Peak Surge Current (A)	$T_{stg}$ ( $^\circ\text{C}$ )		Forward Voltage Drop		Reverse Current		
							Max. (V)	$I_F$ (A)	Max (mA)	$V_R$ (V)	
1N3193	200*		0.75**	45***	-65~100	3-6B	1.2	0.5	0.4	200	* $T_j=175^\circ\text{C}$ ** $T_a=75^\circ\text{C}$ *** $T_a=25^\circ\text{C}$ , 50Hz Sine Wave
1N3194	400*		0.75**	45***	-65~100	3-6B	1.2	0.5	0.4	400	
1N3195	600*		0.75**	45***	-65~100	3-6B	1.2	0.5	0.4	600	
1S1640/R	100		15	250***	-20~150	3-9A 3-9C	1.2	22	1.5	100	
1S1641/R	100		22	350***	-20~150	3-9A 3-9C	1.2	35	1.5	100	

### OUTLINE (Unit in mm)



**Toshiba**  
QUALITY SINCE 1875

**TOKYO SHIBAURA ELECTRIC CO., LTD.**

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