



INDICATOR TUBE

+ - × ÷ 1234567890 KC KV KΩ 1234567890 % °C PH
567890 % °C PH + - × ÷ 1234567890 KC KV KΩ 1234
KC KV KΩ 1234567890 % °C PH + - × ÷ 1234567890
+ - × ÷ 1234567890 KC KV KΩ 1234567890 % °C PH
567890 % °C PH + - × ÷ 1234567890 KC KV KΩ 123
KC KV KΩ 1234567890 % °C PH + - × ÷ 1234567890
+ - × ÷ 1234567890 KC KV KΩ 1234567890 % °C PH
567890 % °C PH + - × ÷ 1234567890 KC KV KΩ 123
KC KV KΩ 1234567890 % °C PH + - × ÷ 1234567890
+ - × ÷ 1234567890 KC KV KΩ 1234567890 % °C PH
56/890 % °C PH + - × ÷ 1234567890 KC KV KΩ 123
KC KV KΩ 1234567890 % °C PH + - × ÷ 1234567890
+ - × ÷ 1234567890 KC KV KΩ 1234567890 % °C PH
567890 % °C PH + - × ÷ 1234567890 KC KV KΩ 123
KC KV KΩ 1234567890 % °C PH + - × ÷ 1234567890
+ - × ÷ 1234567890 KC KV KΩ 1234567890 % °C PH
567890 % °C PH + - × ÷ 1234567890 KC KV KΩ 123
KC KV KΩ 1234567890 % °C PH + - × ÷ 1234567890



CD66
CD66P



GR-111
GR-111P



GR-116D
GR-116P



MG-17G



MG-137



MG-157



CD28



CD25



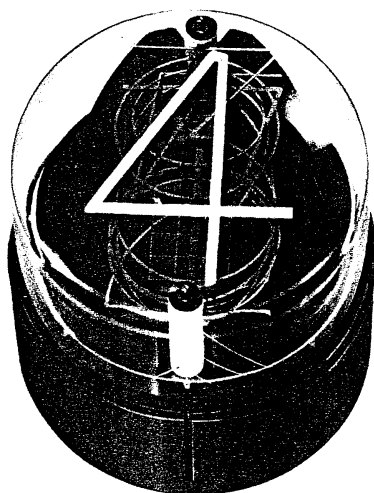
CD13



CD12



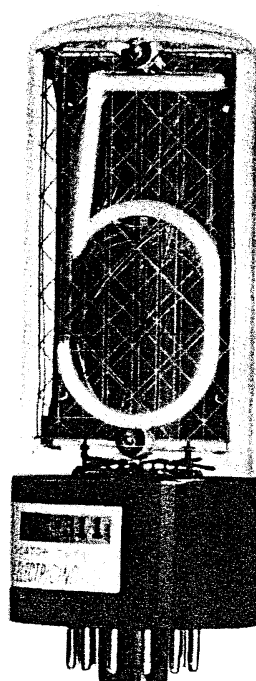
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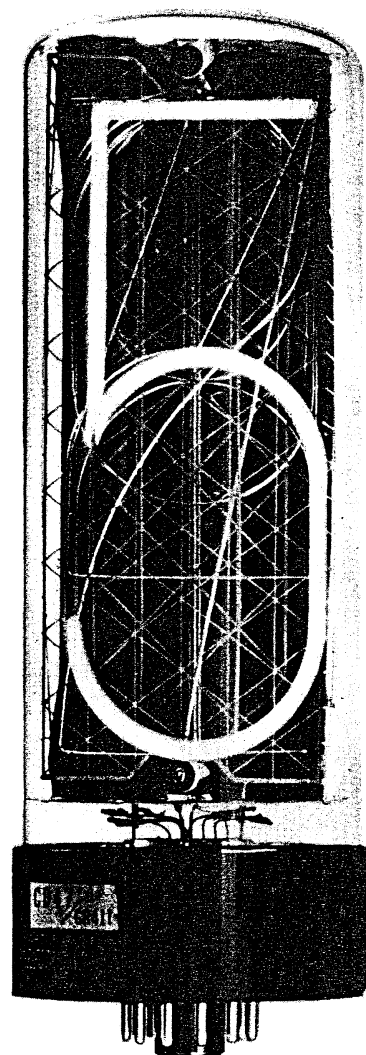
CD27



CD11



GR-311



GR-414



GR-211

TOP VIEW TYPE (DC OPERATION)									SIDE VIEW TYPE			
REFERENCE NUMBER	CD11	CD12	CD13	CD24	CD25	CD27	CD28	CD43	GR-110	GR-116D	GR-111	CD66
Outline Drawing												
Pin Connections												
Socket	TSB-14P	TSB-12P	TSM-11P	TSB-13P	TSR-11P	TSB-12P	TSM-13P	TSR-11P				
Construction	0~9	0~9	0~9	0~9	0~9	0~9	0~9	0~9	0~9 Decimal Point	0~9 Decimal Point Left-Right	0~9 Decimal Point	0~9 Decimal Point
ELECTRICAL SPECIFICATIONS	Supply Voltage (Vdc) Ebb	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 200 — —	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 200 — —	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 175 — —	MIN. ST. MAX. 170 — —	MIN. ST. MAX. 170 — —
	Ionization Voltage (Vdc) Ez	— — 170	— — 170	— — 170	— — 170	— — 170	— — 170	— — 170	— — 170	— — 170	— — 170	— — 170
	Cathode Current (mA _{dc}) Numerical Cathode <i>ik</i> Decimal Point <i>ik</i> (·)	1.5 2.5 3.5 (Ebb=170Vdc, R _p =10kΩ)	3.5 5.0 6.5 (Ebb=200Vdc, R _p =12kΩ)	0.6 0.9 1.2 (Ebb=170Vdc, R _p =33kΩ)	1.5 2.25 3.0 (Ebb=170Vdc, R _p =10kΩ)	1.5 2.5 3.5 (Ebb=170Vdc, R _p =10kΩ)	7.5 10 12.5 (Ebb=200Vdc, R _p =5kΩ)	1.0 1.8 2.5 (Ebb=170Vdc, R _p =15kΩ)	1.5 2.25 3.0 (Ebb=170Vdc, R _p =10kΩ)	1.2 1.9 2.6 (Ebb=190Vdc, R _k =27kΩ)	2.2 3 3.8 (Ebb=180Vdc, R _k =15kΩ)	1.5 2.25 3.0 (Ebb=190Vdc, R _p =20kΩ)
	Average Each Cathode Power Dissipation (w) Numerical Cathode P _k Decimal Point P _k (·)	— — 0.5	— — 1	— — 0.2	— — 0.5	— — 0.5	— — 2	— — 0.4	— — 0.5	0.15 0.3 0.5 (Ebb=190Vdc, R _k (·)=180kΩ)	0.2 0.4 0.6 (Ebb=180Vdc, R _k (·)=100kΩ)	— 0.4 — (Ebb=170Vdc, R _k (·)=50kΩ)
ABSOLUTE RATINGS	Peak Cathode Current (mA _{dc}) Numerical Cathode <i>ik</i> Decimal Point <i>ik</i> (·)	— — 4.0	— — 10	— — 1.5	— — 3.5	— — 4.0	— — 12.5	— — 3	— — 3.5	3.0 0.8	4 1.3	— — 3.5
	Range of Average Cathode Current (mA _{dc}) Numerical Cathode Decimal Point	1.5 ~ 3.5	3.5 ~ 6.5	0.6 ~ 1.2	1.5 ~ 3.0	1.5 ~ 3.5	7.5 ~ 12.5	1.0 ~ 2.5	1.5 ~ 3.0	1.2 ~ 2.6	2.2 ~ 3.8	1.5 ~ 3.0
	Ambient Temperature (for storage) T _s (deg C)	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70	-65 ~ +70
	Operating Ambient Temperature T _c (deg C)	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55	-10 ~ +55
MECHANICAL DATA	Maximum Viewing Angle (deg) Weight (g) (approx)	160 25	160 75	160 4	160 12	160 13	160 130	160 9	160 10	90 2.3	100 4 (INCL. STAND-OFF)	100 7
TYPICAL OPERATING CONDITIONS	Supply Voltage (Vdc) Anode Series Resistor (KΩ) Decimal Point Series Resistor (KΩ) Pulse Duration (mS)	170 200 250 300 10 22 42 62	200 250 300 12 22 32	170 200 250 300 33 65 120 180	170 200 250 300 10 24 47 68	170 200 250 300 10 22 43 62	200 250 300 5 10 15	170 200 250 300 15 35 65 100	170 200 250 300 10 24 47 68	190 200 230 R _k 27 33 47 180 200 300	R _k 180 200 15 20 100 150	190 200 250 300 R _p 20 24 47 68

(DC OPERATION)			(PULSE OPERATION)			
GR-414	GR-211	GR-311	GR-110	GR-116p	GR-111p	CD66P
TSB - 12P	TSB - 14P	TSB - 12P				
0 ~ 9	0 ~ 9	0 ~ 9	0 ~ 9 Decimal Point	0 ~ 9 Decimal Point Left • Right	0 ~ 9 Decimal Point	0 ~ 9 Decimal Point
MIN. ST. MAX. 250 — — — — 200 17.5 25 32.5 (Ebb = 250Vdc, Rp = 5.1kΩ) — — 5	MIN. ST. MAX. 200 — — — — 170 3.5 5 6.5 (Ebb = 200Vdc, Rp = 12kΩ) — — 1	MIN. ST. MAX. 200 — — — — 170 12 15 18 (Ebb = 21.5Vdc, Rp = 5kΩ) — — 2.5	MIN. ST. MAX. 190 — — — — 170 5 (duty $\frac{1}{10}$ Ebb = 190Vdc, Rp = 6.8kΩ) 0.9 — — 0.3 — — 0.1	MIN. ST. MAX. 175 — — — — 170 14 (duty $\frac{1}{20}$ Ebb = 200Vdc, Rp = 2.5kΩ) 4 — — 0.45 — — 0.1	MIN. ST. MAX. 190 — — — — 170 5.5 (duty $\frac{1}{10}$ Ebb = 190Vdc, Rp = 5kΩ) 0.9 — — 0.45 — — 0.1	MIN. ST. MAX. 190 — — — — 190 15 (duty $\frac{1}{10}$ Ebb = 190Vdc, Rp = 2kΩ) 3 — — 0.5 — — 0.1
— — 35	— — 10	— — 18	2.4 ~ 8	11 ~ 17	3 ~ 8	9 ~ 20
17.5 ~ 32.5	3.5 ~ 6.5	10.0 ~ 18.0	0.4 ~ 2	1 ~ 6	0.7 ~ 1.5	1 ~ 6
—65 ~ +70	—65 ~ +70	—65 ~ +70	0.25 ~ 0.8	0.5 ~ 1.9	0.3 ~ 0.8	1 ~ 2
—10 ~ +55	—10 ~ +55	—10 ~ +55	0.04 ~ 0.2	0.05 ~ 0.6	0.07 ~ 0.15	0.1 ~ 0.5
—65 ~ +70	—65 ~ +70	—65 ~ +70	—65 ~ +70	—65 ~ +70	—65 ~ +70	—65 ~ +70
—10 ~ +55	—10 ~ +55	—10 ~ +55	—10 ~ +55	—10 ~ +55	—10 ~ +55	—10 ~ +55
120 230	120 35	120 125	90 2.3	100 4 (INCL. STAND-OFF)	100 7	100 9
250 300 Rp 5.1 6.8	200 250 300 Rp 12 22 32	200 250 300 Rp 4.3 7.5 11	190 200 230 Rk 6.8 9.1 15 36 47 82 0.05 ~ 0.5	200 235 Rp 2.5 5	190 200 250 300 Rp 5 7 18 27	190 200 250 Rp 2 2.7 7.4

(DC OPERATION)

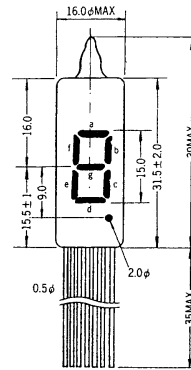
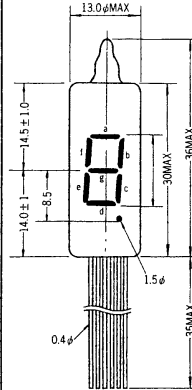
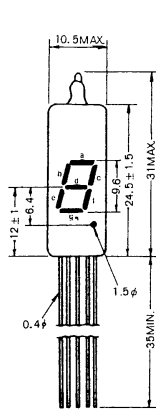
REFERENCE NUMBER (7 Segment)

MG-17G

MG-137

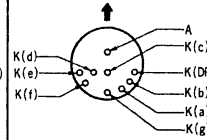
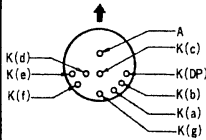
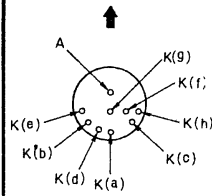
MG-157

Outline Drawing



Pin Connections

A : ANODE
K : CATHODE
I.C : INTER CONNECTION
NP : NO PIN
NC : NO CONNECTION



Socket

Construction

ELECTRICAL SPECIFICATIONS

Supply Voltage (Vdc) Ebb
Ionization Voltage (Vdc) Ez
Cathode Current (mAcd)
Numerical Cathode ik
Decimal Point ik(·)

MIN.	ST.	MAX.
180		
		160
0.28	0.35	0.42
0.14	0.18	0.22

MIN.	ST.	MAX.
170		
		170
0.35	0.45	0.55
0.08	0.10	0.12

MIN.	ST.	MAX.
170		
		170
0.4	0.6	0.8
0.1	0.15	0.2

ABSOLUTE RATINGS

Peak Cathode Current (mAcd)
Numerical Cathode ik
Decimal Point ik(·)
Range of Average Cathode Current (mAcd)
Numerical Cathode
Decimal Point
Ambient Temperature (for storage) Ts (deg C)
Operating Ambient Temperature Tc (deg C)

1.6		
0.6		
0.2	~	0.6
0.1	~	0.4
-65	~	+70
-10	~	+60

0.6		
0.15		
0.3	~	0.6
0.07	~	0.15
-65	~	+70
-10	~	+60

1.0		
0.3		
0.3	~	1.0
0.07	~	0.3
+65	~	+70
+10	~	+60

MECHANICAL DATA

Maximum Viewing Angle (deg)
(approx)
Weight (g)
(approx)

120
3

120
4

120
6

TYPICAL OPERATING CONDITIONS

Supply Voltage (Vdc)
Anode Series Resistor (KΩ)
Decimal Point Series Resistor (KΩ)

180	200	250	300
110	160	300	430
240	330	620	910

170	190	210
62	100	130
240	360	510

170	190	210
62	110	150
270	470	680

(PULSE OPERATION)

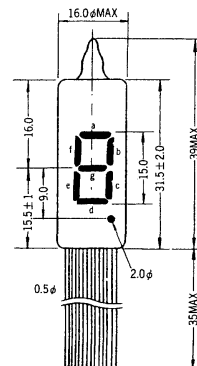
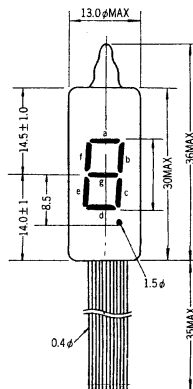
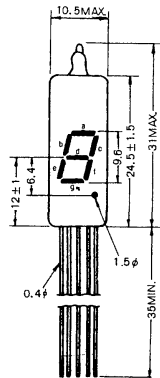
REFERENCE NUMBER (7 Segment)

MG-17G

MG-137

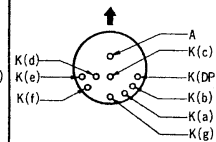
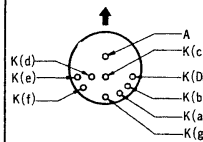
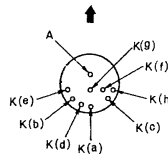
MG-157

Outline Drawing



Pin Connections

A : ANODE
K : CATHODE
IC : INTER CONNECTION
NP : NO PIN
NC : NO CONNECTION



Socket

Construction

ELECTRICAL SPECIFICATIONS

Supply Voltage (Vdc) Ebb
Ionization Voltage (Vdc) Ez
Cathode Current (mA dc) ik
Numerical Cathode ik
Decimal Point ik(·)

MIN. ST. MAX.
190
170
1.2 mA
0.4 mA
(duty 1/10 Ebb = 200 vdc
Rk = 43 kΩ Rk(·) = 120 kΩ)

MIN. ST. MAX.
180
180
2 mA
0.5 mA
(duty 1/10 Ebb = 200 vdc
Rk = 30 kΩ Rk(·) = 120 kΩ)

MIN. ST. MAX.
180
180
1.75 mA
0.6 mA
(duty 1/10 Ebb = 280 kΩ
Rk = 36 kΩ Rk(·) = 100 kΩ)

ABSOLUTE RATINGS

Peak Cathode Current (mA dc) ik
Numerical Cathode ik
Decimal Point ik(·)
Range of Average Cathode Current (mA dc) ik
Numerical Cathode
Decimal Point
Ambient Temperature (for storage) Ts (deg C)
Operating Ambient Temperature Tc (deg C)

1 ~ 4
0.4 ~ 1.5
0.04 ~ 0.6
0.02 ~ 0.4
50 ~ 300
-65 ~ +70
-10 ~ +60

1 ~ 4
0.35 ~ 1.0
0.04 ~ 0.6
0.02 ~ 0.4
50 ~ 500
-65 ~ +70
-10 ~ +60

1.0 ~ 4.0
0.35 ~ 1.0
0.1 ~ 0.6
0.04 ~ 0.15
50 ~ 500
-65 ~ +70
-10 ~ +55

MECHANICAL DATA

Maximum Viewing Angle (deg) (approx)
Weight (g) (approx)

120
3

120
4

120
6

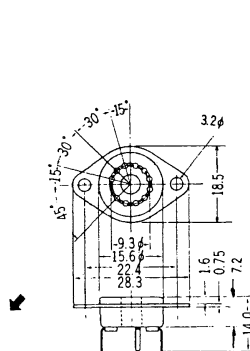
TYPICAL OPERATING CONDITIONS

Supply Voltage (Vdc)
Anode Series Resistor (KΩ)
Decimal Point Series Resistor (KΩ)
Pulse Duration (mS)

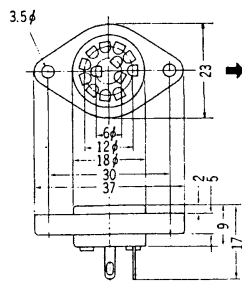
190 200 250
36 43 82
90 120 240

180 200 220
20 30 40
82 120 150

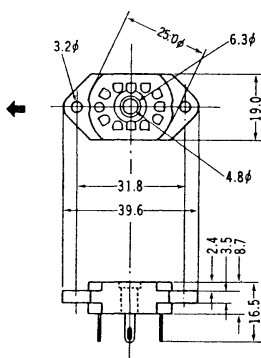
180 200 220
24 36 47
68 100 120



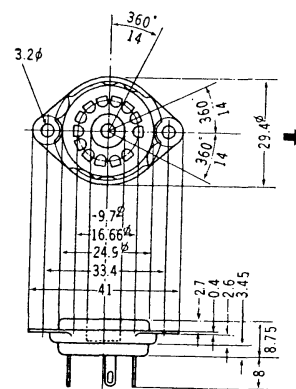
TSM-11P
CD 13



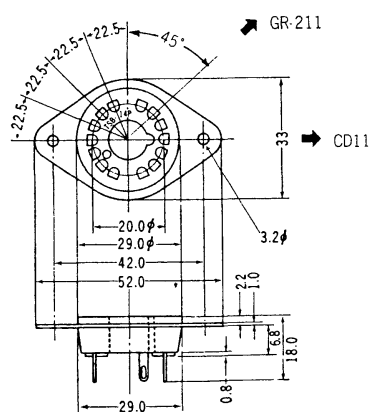
TSM-13P
CD 28



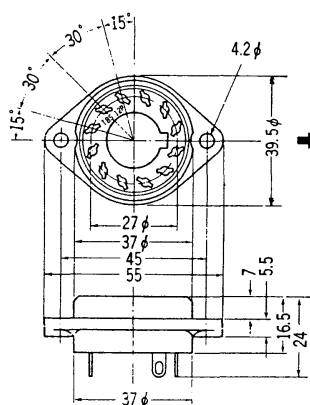
TSR-11P
CD 25, CD 43



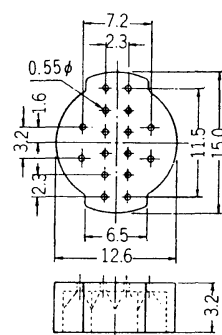
TSB-13P
CD 24



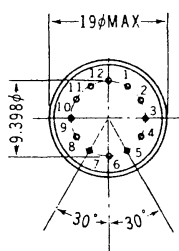
TSB-14P
CD11, GR-211



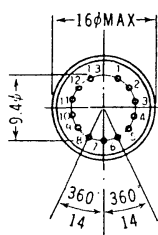
TSB-12P
CD12, CD27, GR-414, GR-311



GR-116D
GR-116P



CD 66
CD 66p



GR-111
GR-111p



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