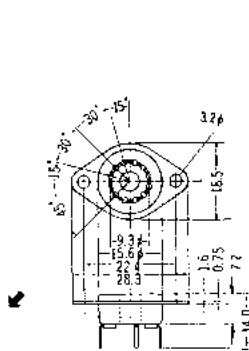
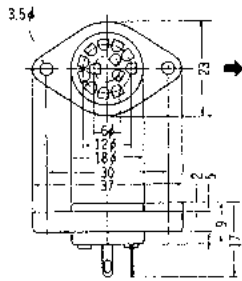


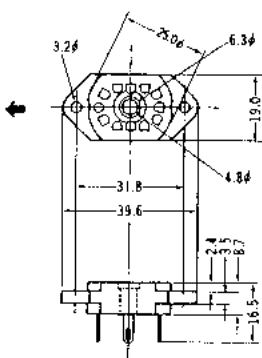
|  |   | TOP VIEW TYPE (DC OPERATION)         |                                      |                                      |                                       |                                      |                                     |                                      |                                       | SIDE VIEW TYPE                       |                                    |                                       |                                       |
|--|---|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|
| REFERENCE NUMBER   |   | CD11                                 | CD12                                 | CD13                                 | CD24                                  | CD25                                 | CD27                                | CD28                                 | CD43                                  | GR-110                               | GR-116D                            | GR-111                                | CD66                                  |
| Outline Drawing  |   |                                      |                                      |                                      |                                       |                                      |                                     |                                      |                                       |                                      |                                    |                                       |                                       |
| Pin Connections  |   |                                      |                                      |                                      |                                       |                                      |                                     |                                      |                                       |                                      |                                    |                                       |                                       |
| A : ANODE<br>K : CATHODE<br>IC : INTER CONNECTION<br>NP : NO PIN<br>NC : NO CONNECTION |   |                                      |                                      |                                      |                                       |                                      |                                     |                                      |                                       |                                      |                                    |                                       |                                       |
| 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<br>Decimal Point                 | 0~9<br>Decimal Point<br>Left-Right | 0~9<br>Decimal Point                  | 0~9<br>Decimal Point                  |
| ELECTRICAL SPECIFICATIONS  | Supply Voltage (Vdc) Ebb  | MIN. 170 ST. — MAX. —                | MIN. 200 ST. — MAX. —                | MIN. 170 ST. — MAX. —                | MIN. 170 ST. — MAX. —                 | MIN. 170 ST. — MAX. —                | MIN. 200 ST. — MAX. —               | MIN. 170 ST. — MAX. —                | MIN. 170 ST. — MAX. —                 | MIN. 170 ST. — MAX. —                | MIN. 175 ST. — MAX. —              | MIN. 170 ST. — MAX. —                 | MIN. 170 ST. — MAX. —                 |
|  | Ionization Voltage (Vdc) Ez   | — — 170                              | — — 170                              | — — 170                              | — — 170                               | — — 170                              | — — 170                             | — — 170                              | — — 170                               | — — 170                              | — — 170                            | — — 170                               | — — 170                               |
| ABSOLUTE RATINGS   | Cathode Current (mA)dc<br>Numerical Cathode ik<br>Decimal Point ik(·)                     | 1.5 2.5 3.5<br>(Ebb=170Vdc, Rp=10kΩ) | 3.5 5.0 6.5<br>(Ebb=200Vdc, Rp=12kΩ) | 0.6 0.9 1.2<br>(Ebb=170Vdc, Rp=33kΩ) | 1.5 2.25 3.0<br>(Ebb=170Vdc, Rp=10kΩ) | 1.5 2.5 3.5<br>(Ebb=170Vdc, Rp=10kΩ) | 7.5 10 12.5<br>(Ebb=200Vdc, Rp=5kΩ) | 1.0 1.8 2.5<br>(Ebb=170Vdc, Rp=15kΩ) | 1.5 2.25 3.0<br>(Ebb=170Vdc, Rp=10kΩ) | 1.2 1.9 2.6<br>(Ebb=190Vdc, Rk=27kΩ) | 2.2 3 3.8<br>(Ebb=180Vdc, Rk=15kΩ) | 1.5 2.25 3.0<br>(Ebb=190Vdc, Rp=20kΩ) | 1.5 2.25 3.0<br>(Ebb=170Vdc, Rp=12kΩ) |
|  | Average Each Cathode Power Dissipation (w)<br>Numerical Cathode Pk<br>Decimal Point Pk(·) | — — 0.5                              | — — 1                                | — — 0.2                              | — — 0.5                               | — — 0.5                              | — — 2                               | — — 0.4                              | — — 0.5                               | — — 0.5                              | — — 0.5<br>(Ebb=190Vdc, Rk=180kΩ)  | — — 0.5<br>(Ebb=180Vdc, Rk=100kΩ)     | — — 0.5                               |
| MECHANICAL DATA  | Peak Cathode Current (mA)dc<br>Numerical Cathode ik<br>Decimal Point ik(·)                | — — 4.0                              | — — 10                               | — — 1.5                              | — — 3.5                               | — — 4.0                              | — — 12.5                            | — — 3                                | — — 3.5                               | — — 3.0                              | — — 4                              | — — 3.5                               | — — 3.5                               |
|  | Range of Average Cathode Current (mA)dc<br>Numerical Cathode<br>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                             | 1.5 ~ 3.0                             |
|  | Ambient Temperature (for storage) Ts (deg C)  | -65 ~ +70                            | -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 Tc (deg C)  | -10 ~ +55                            | -10 ~ +55                            | -10 ~ +55                            | -10 ~ +55                             | -10 ~ +55                            | -10 ~ +55                           | -10 ~ +55                            | -10 ~ +55                             | -10 ~ +55                            | -10 ~ +55                          | -10 ~ +55                             | -10 ~ +55                             |
| TYPICAL OPERATING CONDITIONS   | Maximum Viewing Angle (deg)   | 160                                  | 160                                  | 160                                  | 160                                   | 160                                  | 160                                 | 160                                  | 160                                   | 90                                   | 100                                | 100                                   | 100                                   |
|  | Weight (g) (approx)   | 25                                   | 75                                   | 4                                    | 12                                    | 13                                   | 130                                 | 9                                    | 10                                    | 2.3                                  | 4<br>(INCL. STAND-OFF)             | 7                                     | 10                                    |
| TYPICAL OPERATING CONDITIONS   | Supply Voltage (Vdc)  | 170 200 250 300                      | 200 250 300                          | 170 200 250 300                      | 170 200 250 300                       | 170 200 250 300                      | 200 250 300                         | 170 200 250 300                      | 170 200 250 300                       | 190 200 230                          | Rk 180 200                         | 190 200 250 300                       | 190 200 250 300                       |
|  | Anode Series Resistor (KΩ)<br>Decimal Point Series Resistor (KΩ)<br>Pulse Duration (mS)   | 10 22 42 62                          | 12 22 32                             | 33 65 120 180                        | 10 24 47 68                           | 10 22 43 62                          | 5 10 15                             | 15 35 65 100                         | 10 24 47 68                           | Rk 27 33 47<br>180 200 300           | Rk 15 20<br>100 150                | Rp 20 24 47 68                        | Rk 20 24 47 68<br>91 110 200 300      |



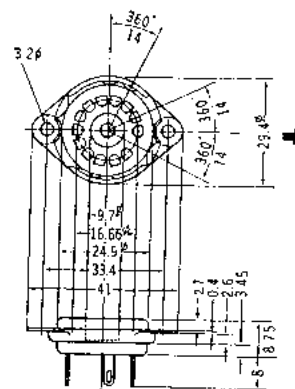
**TSM-11P**  
CD 13



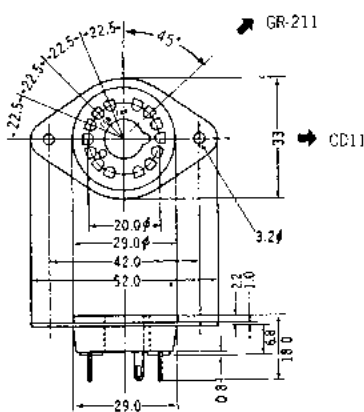
**TSM-13P**  
CD 28



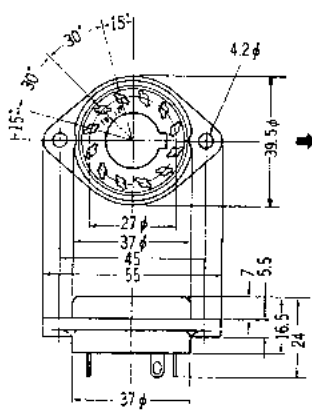
**TSR-11P**  
CD 25, CD 43



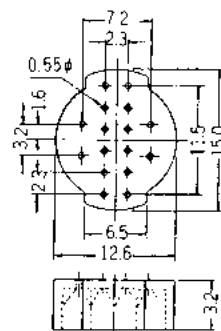
**TSB-13P**  
CD 24



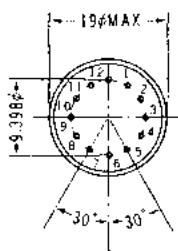
**TSB-14P**  
CD11, GR-211



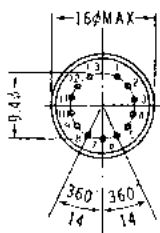
**TSB-12P**  
CD12, CD27, GR-414, GR-311



GR-116D  
GR-116P



CD 66  
CD 66p



GR-111  
GR-111p



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