

MJE243G (NPN), MJE253G (PNP)

Complementary Silicon Power Plastic Transistors

These devices are designed for low power audio amplifier and low-current, high-speed switching applications.

Features

- High Collector–Emitter Sustaining Voltage
- High DC Current Gain
- Low Collector–Emitter Saturation Voltage
- High Current Gain Bandwidth Product
- Annular Construction for Low Leakages
- These Devices are Pb–Free and are RoHS Compliant*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-------------|---------------------------|
| Collector–Emitter Voltage | V_{CEO} | 100 | Vdc |
| Collector–Base Voltage | V_{CB} | 100 | Vdc |
| Emitter–Base Voltage | V_{EB} | 7.0 | Vdc |
| Collector Current – Continuous | I_C | 4.0 | Adc |
| Collector Current – Peak | I_{CM} | 8.0 | Adc |
| Base Current | I_B | 1.0 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 15 120 | W mW/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.5 12 | W mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | –65 to +150 | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|------|---------------------------|
| Thermal Resistance, Junction–to–Case | $R_{\theta JC}$ | 8.34 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction–to–Ambient | $R_{\theta JA}$ | 83.4 | $^\circ\text{C}/\text{W}$ |

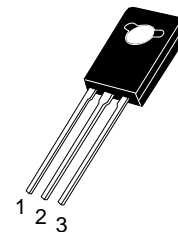
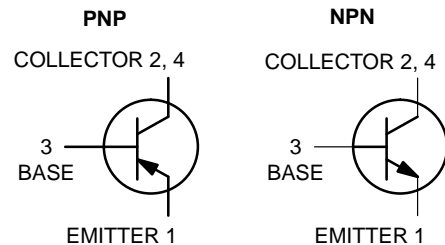
*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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4.0 AMPERES POWER TRANSISTORS COMPLEMENTARY SILICON 100 VOLTS, 15 WATTS



TO-225
CASE 77-09
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
JE2x3 = Device Code
x = 4 or 5
G = Pb–Free Package

ORDERING INFORMATION

| Device | Package | Shipping |
|---------|---------------------|---------------|
| MJE243G | TO-225 (Pb–Free) | 500 Units/Box |
| MJE253G | TO-225 (Pb–Free) | 500 Units/Box |

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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|-----------------------|----------|------------|------------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (I _C = 10 mA _{dc} , I _B = 0) | V _{CEO(sus)} | 100 | – | V |
| Collector Cutoff Current (V _{CB} = 100 V _{dc} , I _E = 0) (V _{CE} = 100 V _{dc} , I _E = 0, T _C = 125°C) | I _{CBO} | – – | 0.1 0.1 | μA mA |
| Emitter Cutoff Current (V _{BE} = 7.0 V _{dc} , I _C = 0) | I _{EBO} | – | 0.1 | μA _{dc} |
| ON CHARACTERISTICS | | | | |
| DC Current Gain (I _C = 200 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 1.0 A _{dc} , V _{CE} = 1.0 V _{dc}) | h _{FE} | 40 15 | 180 – | – |
| Collector–Emitter Saturation Voltage (I _C = 500 mA _{dc} , I _B = 50 mA _{dc}) (I _C = 1.0 A _{dc} , I _B = 100 mA _{dc}) | V _{CE(sat)} | – – | 0.3 0.6 | V |
| Base–Emitter Saturation Voltage (I _C = 2.0 A _{dc} , I _B = 200 mA _{dc}) | V _{BE(sat)} | – | 1.8 | V |
| Base–Emitter On Voltage (I _C = 500 mA _{dc} , V _{CE} = 1.0 V _{dc}) | V _{BE(on)} | – | 1.5 | V |
| DYNAMIC CHARACTERISTICS | | | | |
| Current–Gain – Bandwidth Product (I _C = 100 mA _{dc} , V _{CE} = 10 V _{dc} , f _{test} = 10 MHz) | f _T | 40 | – | MHz |
| Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f = 0.1 MHz) | C _{ob} | – | 50 | pF |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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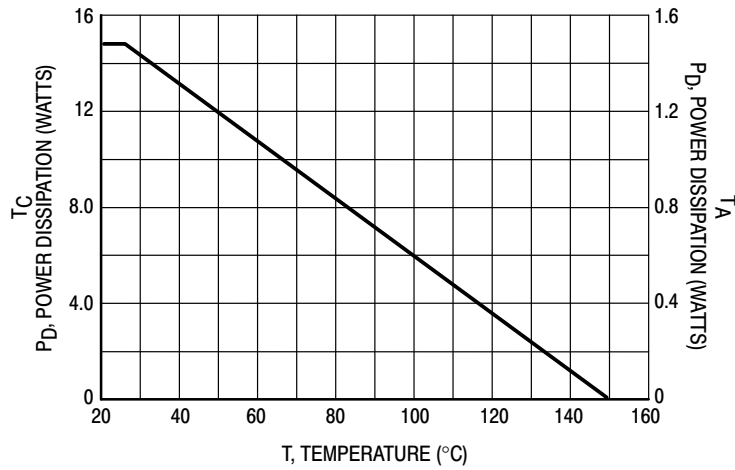
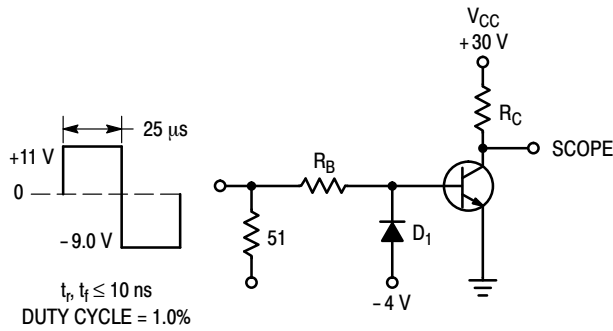


Figure 1. Power Derating



R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS
 D_1 MUST BE FAST RECOVERY TYPE, e.g.:
 1N5825 USED ABOVE $I_B \approx 100$ mA
 MSD6100 USED BELOW $I_B \approx 100$ mA
 FOR PNP TEST CIRCUIT, REVERSE ALL POLARITIES

Figure 2. Switching Time Test Circuit

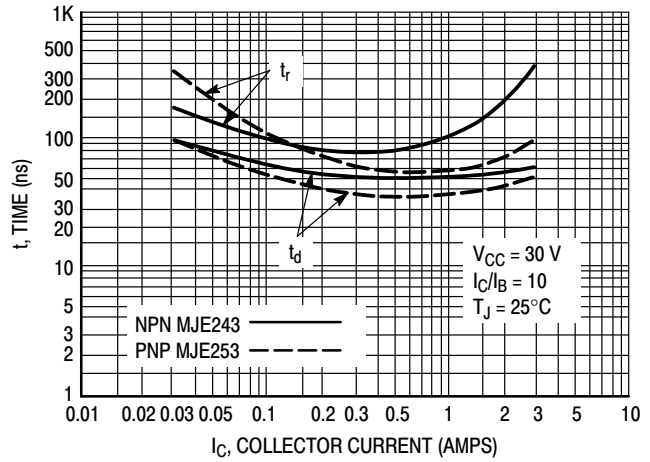


Figure 3. Turn-On Time

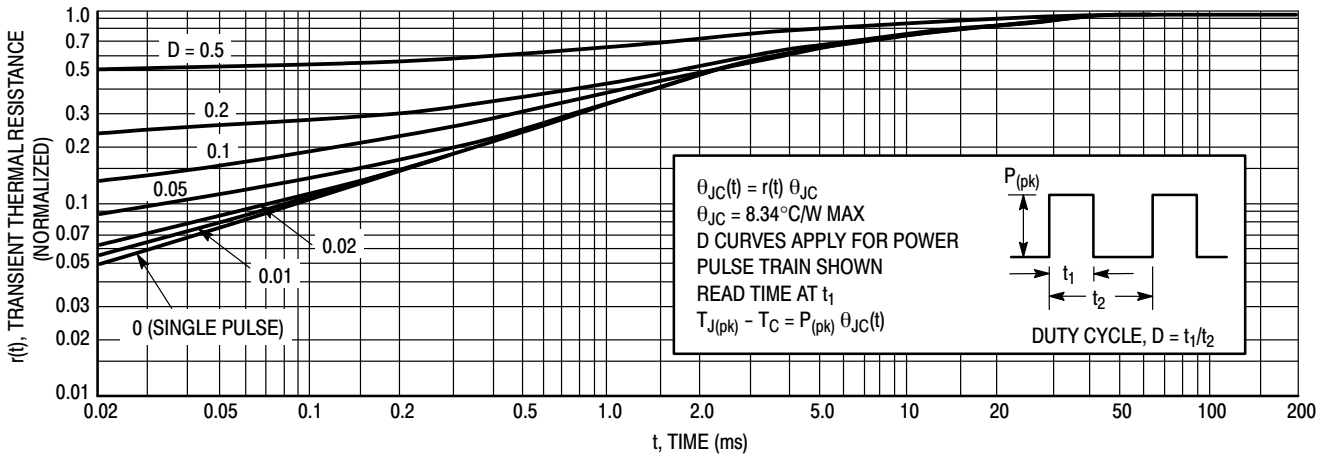


Figure 4. Thermal Response

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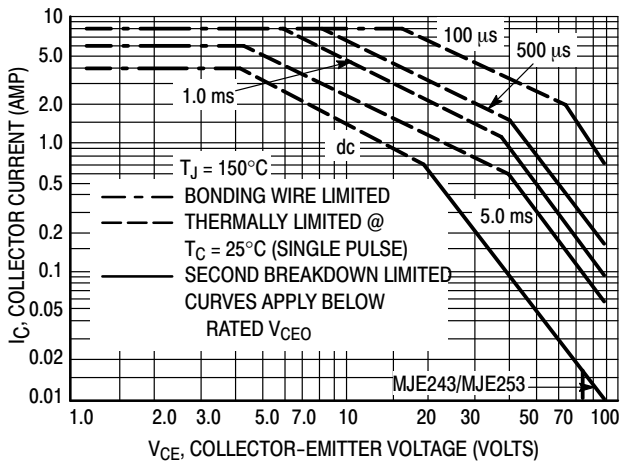


Figure 5. Active Region Safe Operating Area

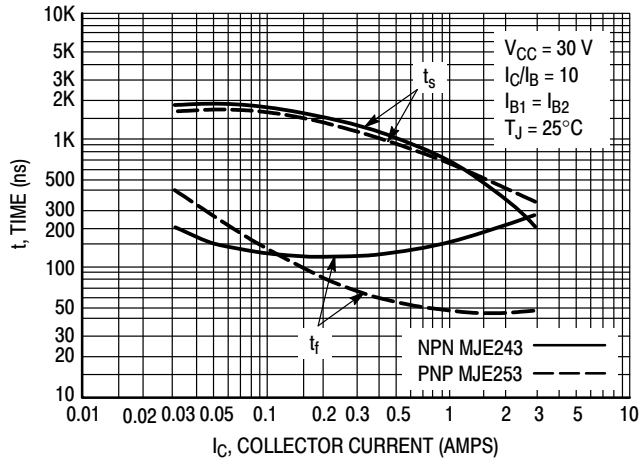


Figure 6. Turn-Off Time

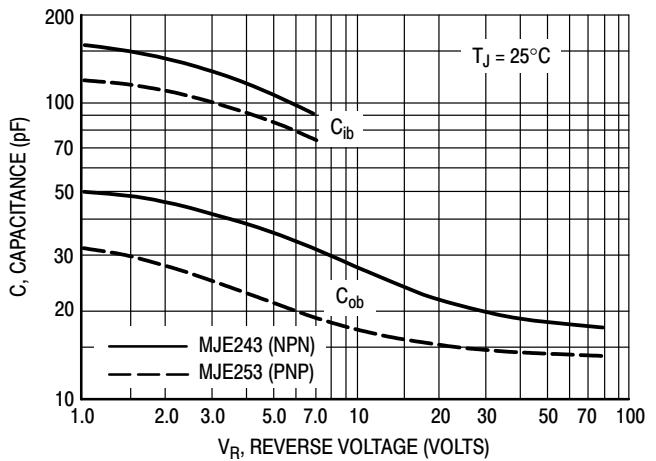


Figure 7. Capacitance

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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**NPN
MJE243**

**PNP
MJE253**

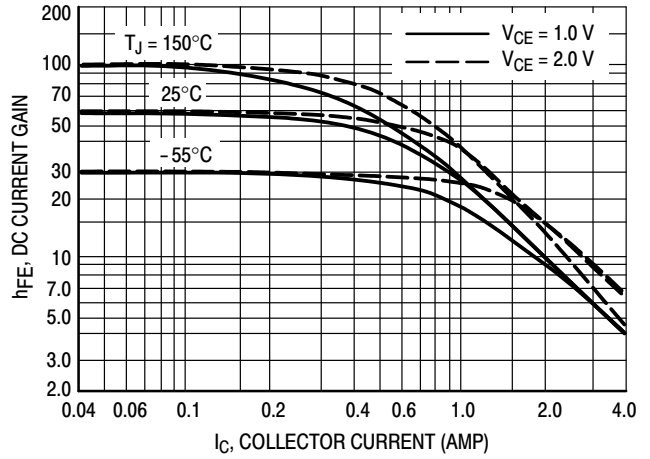
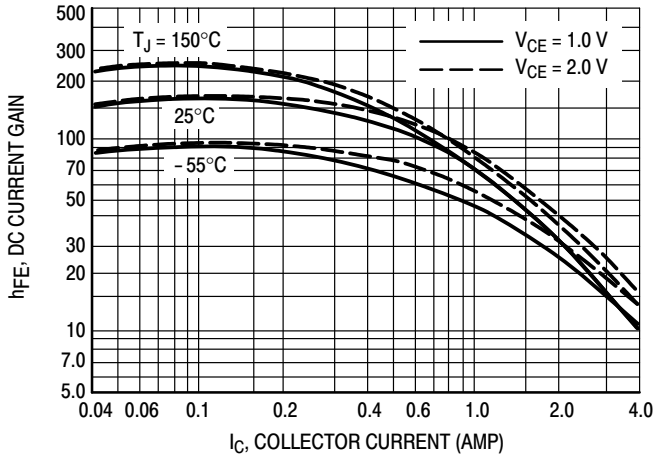


Figure 8. DC Current Gain

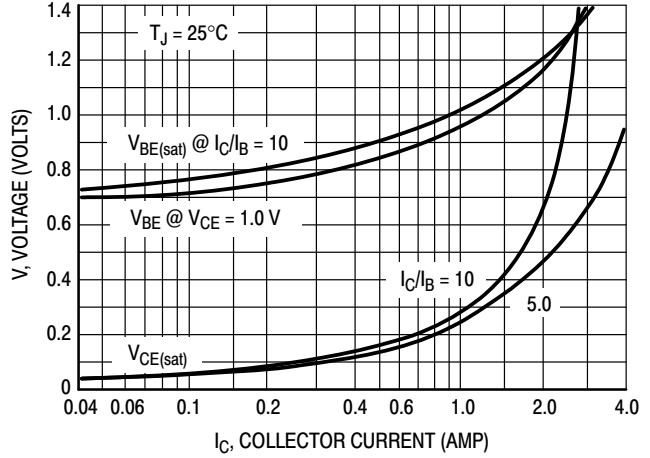
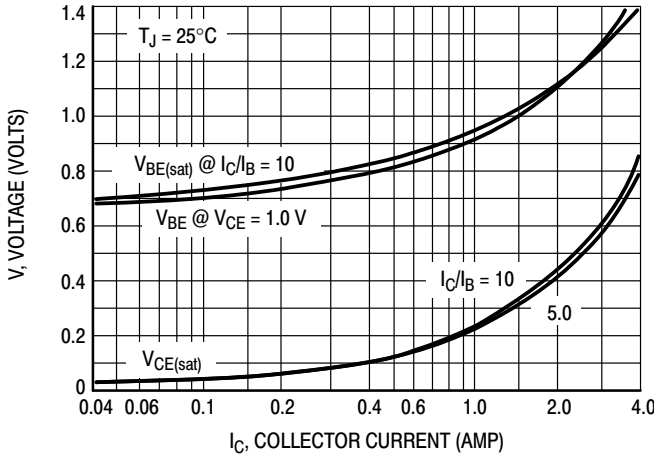


Figure 9. "On" Voltages

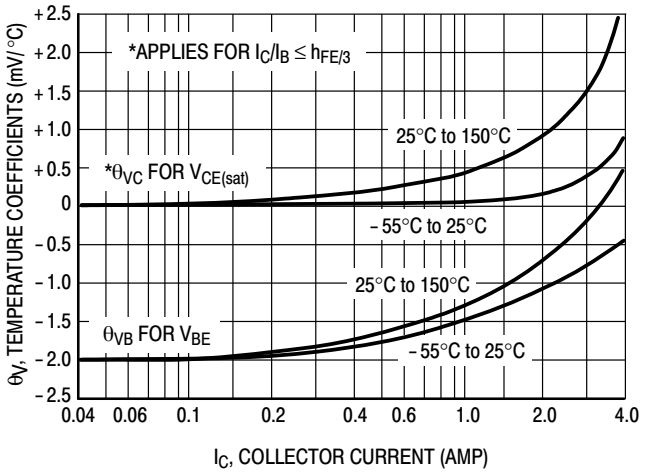
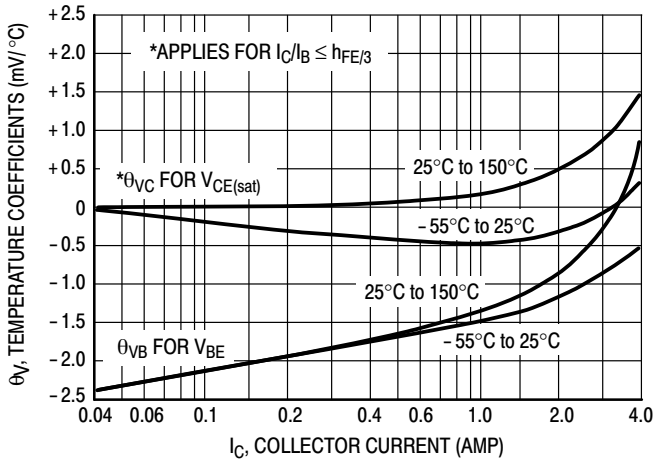
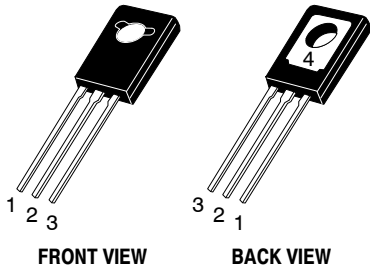


Figure 10. Temperature Coefficients

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

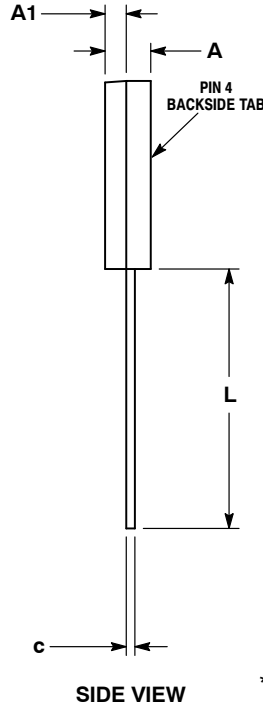
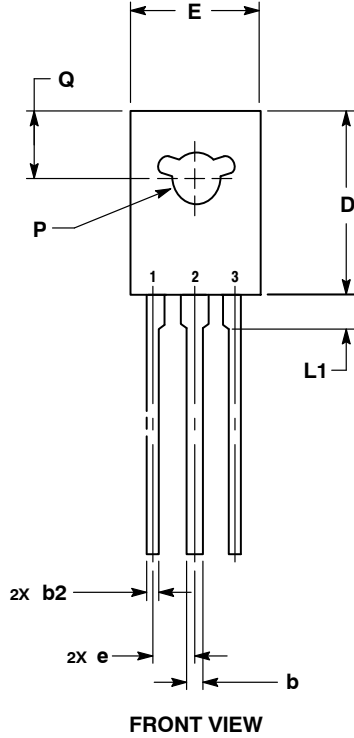
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TO-225
CASE 77-09
ISSUE AD

DATE 25 MAR 2015

SCALE 1:1

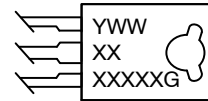


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. NUMBER AND SHAPE OF LUGS OPTIONAL.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 2.40 | 3.00 |
| A1 | 1.00 | 1.50 |
| b | 0.60 | 0.90 |
| b2 | 0.51 | 0.88 |
| c | 0.39 | 0.63 |
| D | 10.60 | 11.10 |
| E | 7.40 | 7.80 |
| e | 2.04 | 2.54 |
| L | 14.50 | 16.63 |
| L1 | 1.27 | 2.54 |
| P | 2.90 | 3.30 |
| Q | 3.80 | 4.20 |

GENERIC MARKING DIAGRAM*



- Y = Year
- WW = Work Week
- XXXXX = Device Code
- G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "µ", may or may not be present.

- | | | | | |
|---|---|---|---|---|
| <p>STYLE 1: PIN 1. EMITTER 2., 4. COLLECTOR 3. BASE</p> | <p>STYLE 2: PIN 1. CATHODE 2., 4. ANODE 3. GATE</p> | <p>STYLE 3: PIN 1. BASE 2., 4. COLLECTOR 3. EMITTER</p> | <p>STYLE 4: PIN 1. ANODE 1 2., 4. ANODE 2 3. GATE</p> | <p>STYLE 5: PIN 1. MT 1 2., 4. MT 2 3. GATE</p> |
| <p>STYLE 6: PIN 1. CATHODE 2., 4. GATE 3. ANODE</p> | <p>STYLE 7: PIN 1. MT 1 2., 4. GATE 3. MT 2</p> | <p>STYLE 8: PIN 1. SOURCE 2., 4. GATE 3. DRAIN</p> | <p>STYLE 9: PIN 1. GATE 2., 4. DRAIN 3. SOURCE</p> | <p>STYLE 10: PIN 1. SOURCE 2., 4. DRAIN 3. GATE</p> |

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