

Complementary Silicon Power Plastic Transistors

MJE200G (NPN), MJE210G (PNP)

These devices are designed for low voltage, low-power, high-gain audio amplifier applications.

Features

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

MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{CEO}	Collector–Emitter Voltage	40	Vdc
V_{CB}	Collector–Base Voltage	25	Vdc
V_{EB}	Emitter–Base Voltage	8.0	Vdc
I_C	Collector Current – Continuous	5.0	Adc
I_{CM}	Collector Current – Peak	10	Adc
I_B	Base Current	1.0	Adc
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	15 0.12	W mW/ $^\circ\text{C}$
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	1.5 0.012	W mW/ $^\circ\text{C}$
T_J, T_{stg}	Operating and Storage Junction Temperature Range	–65 to +150	$^\circ\text{C}$

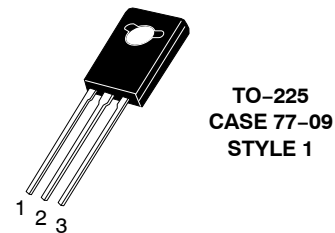
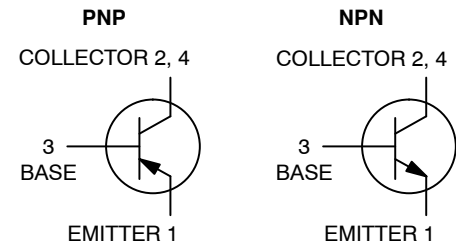
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

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

*For additional information on our Pb–Free strategy and soldering details, please download the [onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D](#).

5.0 AMPERES POWER TRANSISTORS COMPLEMENTARY SILICON 25 VOLTS, 15 WATTS



MARKING DIAGRAM



Y = Year
 WW = Work Week
 JE2x0 = Device Code
 x = 0 or 1
 G = Pb–Free Package

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the dimensions section on page 5 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

MJE200G (NPN), MJE210G (PNP)

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit
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OFF CHARACTERISTICS

$V_{CE(sus)}$	Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 10\text{ mAdc}$, $I_B = 0$)	25	–	Vdc
I_{CBO}	Collector Cutoff Current ($V_{CB} = 40\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 40\text{ Vdc}$, $I_E = 0$, $T_J = 125^\circ\text{C}$)	– –	100 100	nAdc μAdc
I_{EBO}	Emitter Cutoff Current ($V_{BE} = 8.0\text{ Vdc}$, $I_C = 0$)	–	100	nAdc

ON CHARACTERISTICS

h_{FE}	DC Current Gain (Note 1) ($I_C = 500\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 5.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$)	70 45 10	– 180 –	–
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage (Note 1) ($I_C = 500\text{ mAdc}$, $I_B = 50\text{ mAdc}$) ($I_C = 2.0\text{ Adc}$, $I_B = 200\text{ mAdc}$) ($I_C = 5.0\text{ Adc}$, $I_B = 1.0\text{ Adc}$)	– – –	0.3 0.75 1.8	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage (Note 1) ($I_C = 5.0\text{ Adc}$, $I_B = 1.0\text{ Adc}$)	–	2.5	Vdc
$V_{BE(on)}$	Base-Emitter On Voltage (Note 1) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$)	–	1.6	Vdc

DYNAMIC CHARACTERISTICS

f_T	Current-Gain – Bandwidth Product (Note 2) ($I_C = 100\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f_{test} = 10\text{ MHz}$)	65	–	MHz
C_{ob}	Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1\text{ MHz}$) MJE200G MJE210G	– –	80 120	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.

1. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\approx 2.0\%$.

2. $f_T = |h_{fe}| \cdot f_{test}$.

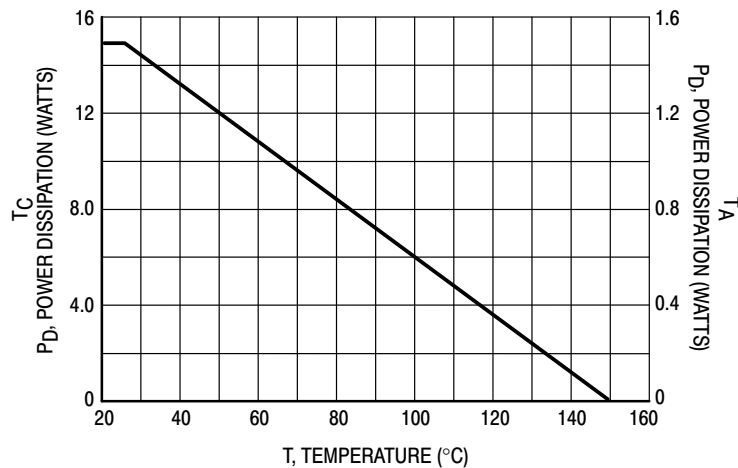


Figure 1. Power Derating

MJE200G (NPN), MJE210G (PNP)

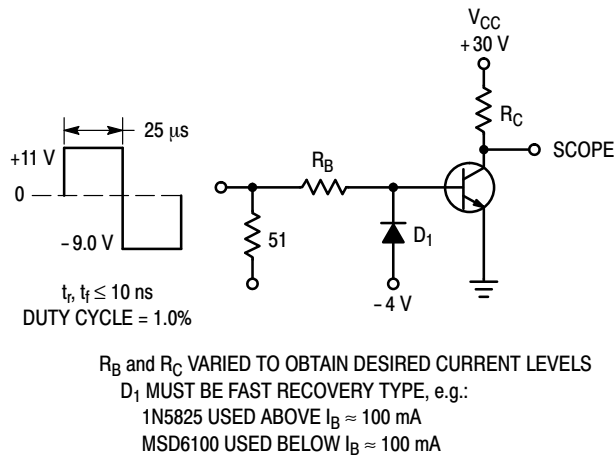


Figure 2. Switching Time Test Circuit

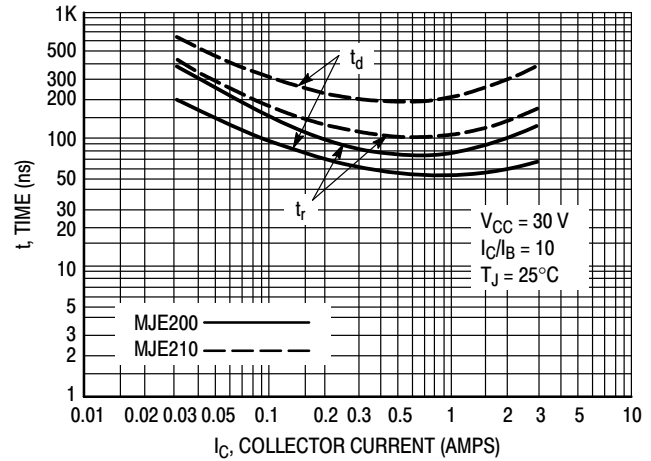


Figure 3. Turn-On Time

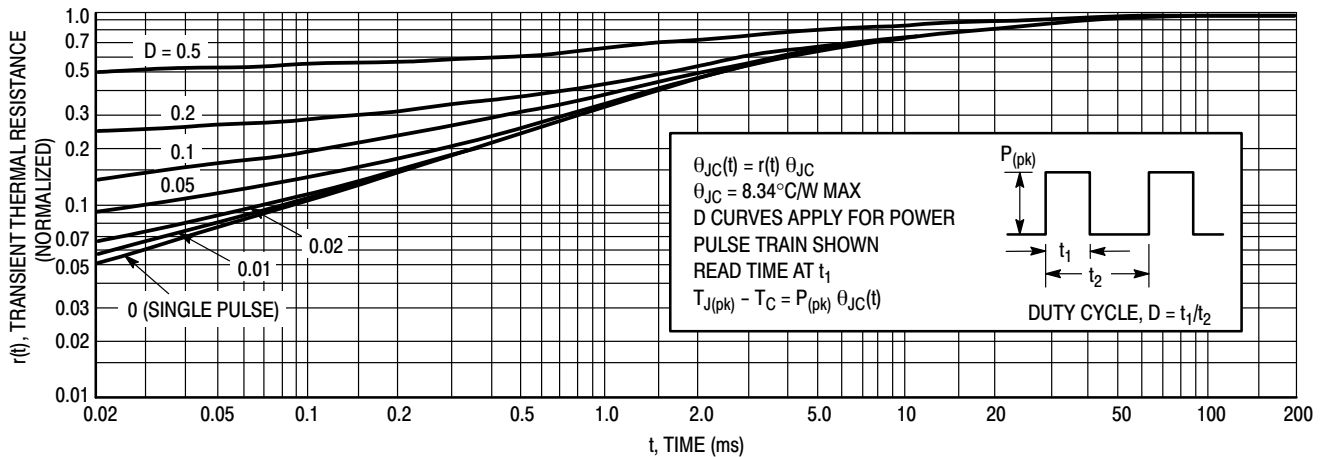


Figure 4. Thermal Response

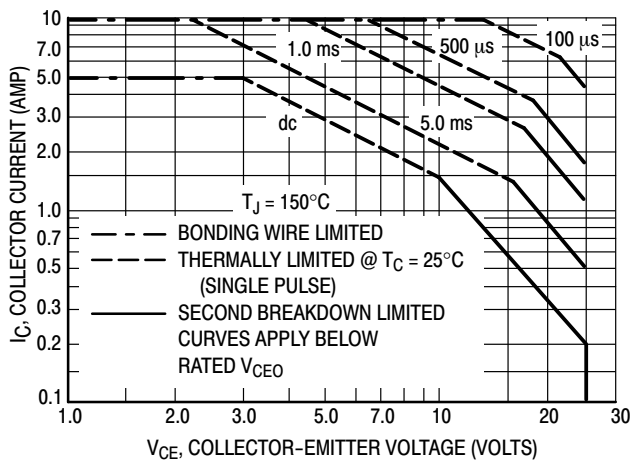


Figure 5. Active Region Safe Operating Area

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.

MJE200G (NPN), MJE210G (PNP)

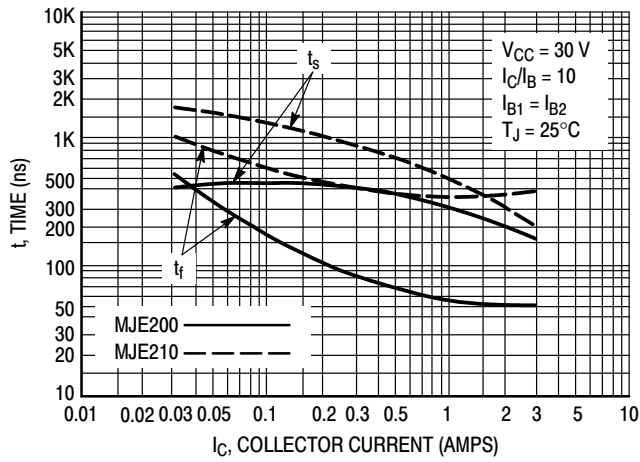


Figure 6. Turn-Off Time

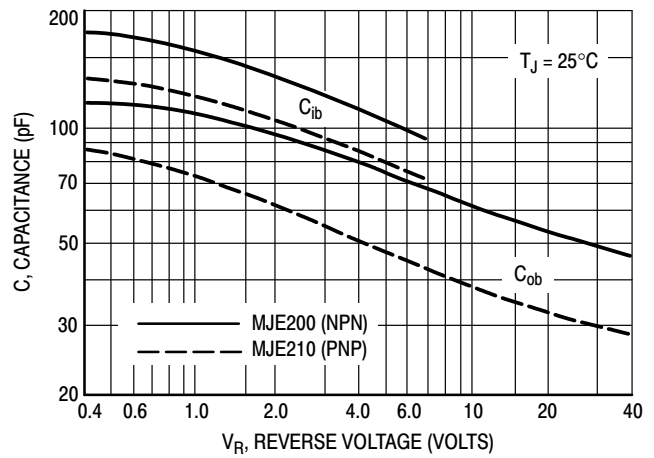


Figure 7. Capacitance

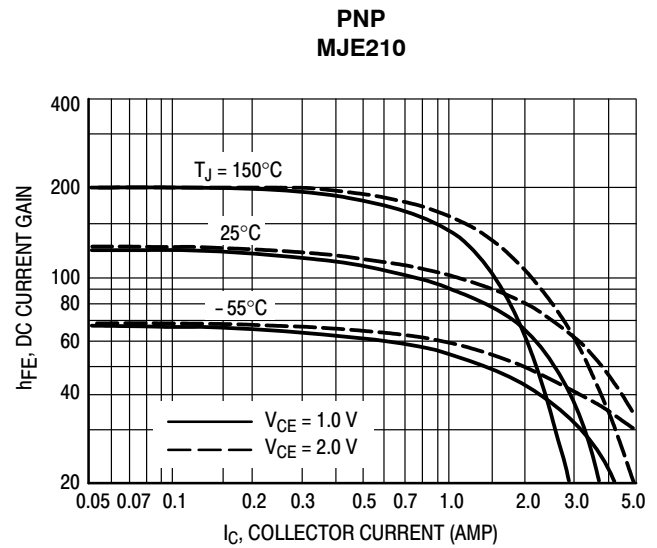
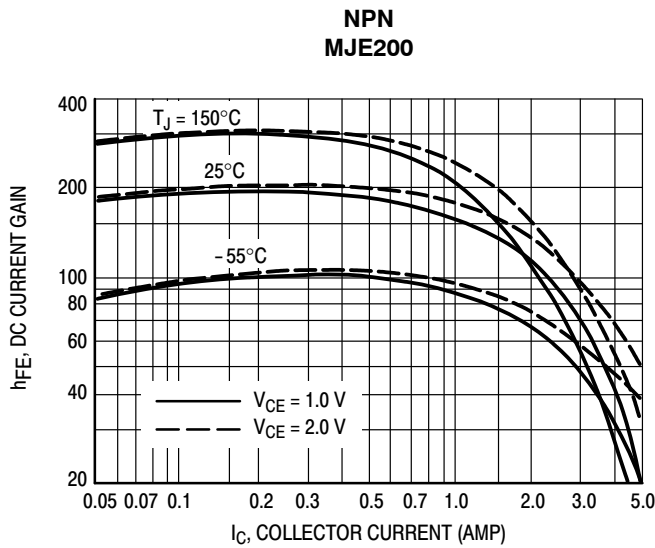


Figure 8. DC Current Gain

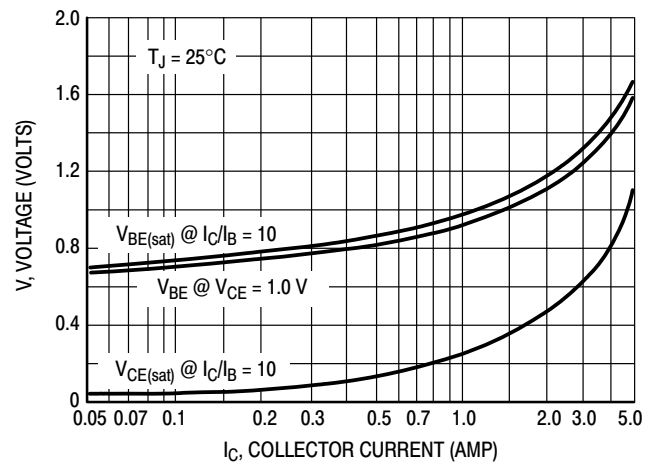
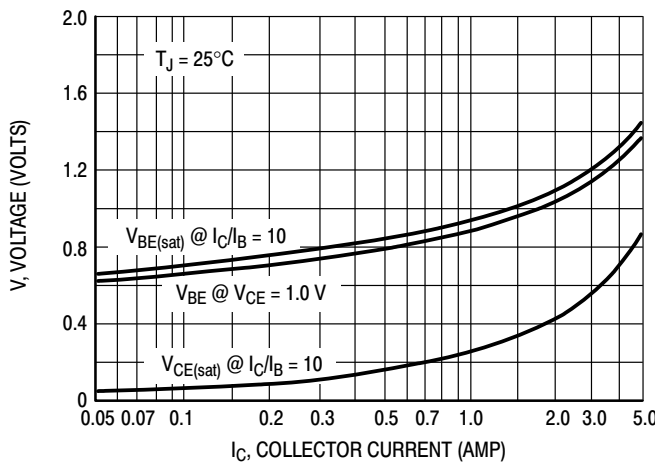


Figure 9. "On" Voltage

MJE200G (NPN), MJE210G (PNP)

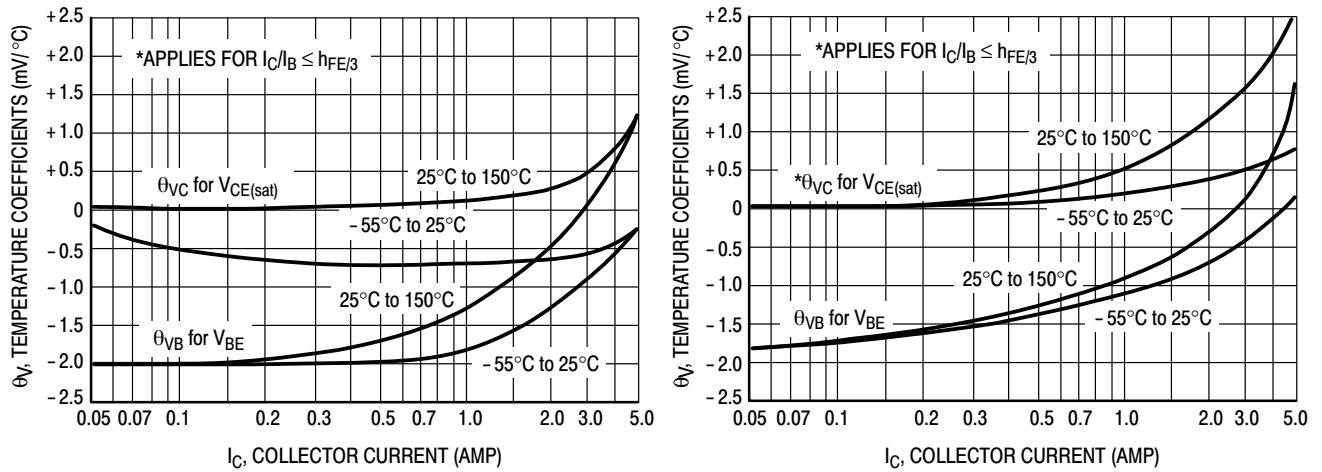


Figure 10. Temperature Coefficients

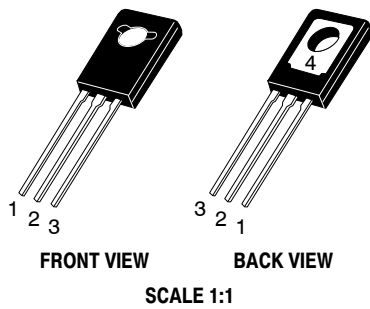
DEVICE ORDERING INFORMATION

Device	Package	Shipping
MJE200G	TO-225 (Pb-Free)	500 Bulk / Box

DISCONTINUED (Note 3)

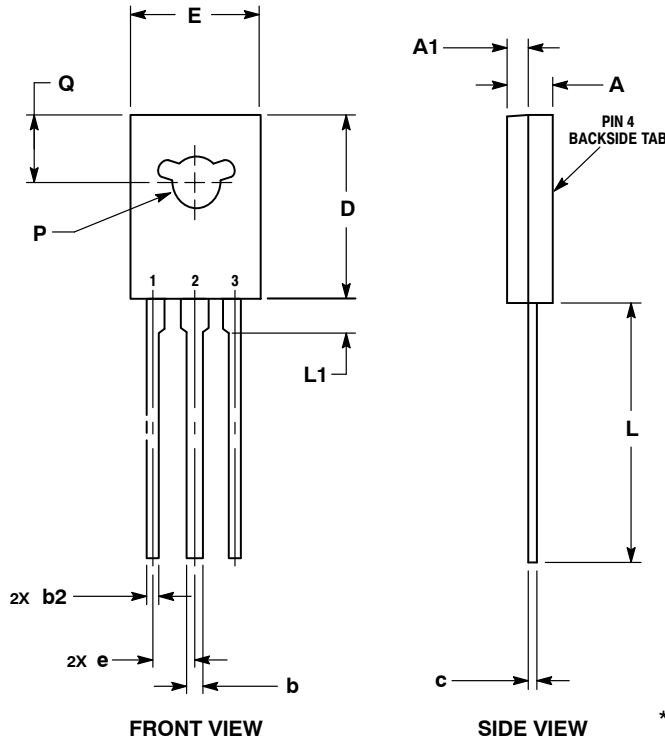
MJE210G	TO-225 (Pb-Free)	500 Bulk / Box
MJE210TG	TO-225 (Pb-Free)	500 Bulk / Box

3. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.



TO-225
CASE 77-09
ISSUE AD

DATE 25 MAR 2015

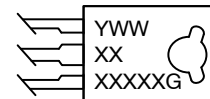


NOTES:

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

MILLIMETERS		
DIM	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 "•", may or may not be present. Some products may not follow the Generic Marking.

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

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