

Complementary Silicon Plastic Power Transistors

MJE15028, MJE15030 (NPN), MJE15029, MJE15031 (PNP)

These devices are designed for use as high-frequency drivers in audio amplifiers.

Features

- High Current Gain – Bandwidth Product
- TO-220 Compact Package
- These Devices are Pb-Free and are RoHS Compliant*

MAXIMUM RATINGS

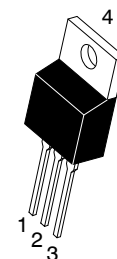
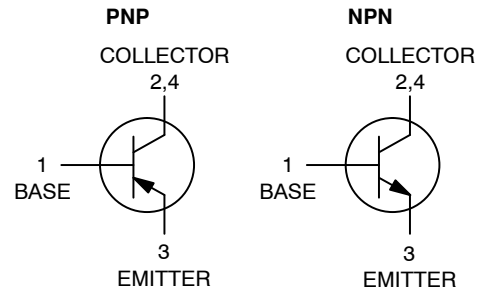
Rating	Symbol	Value	Unit
Collector-Emitter Voltage MJE15028G, MJE15029G MJE15030G, MJE15031G	V_{CEO}	120 150	Vdc
Collector-Base Voltage MJE15028G, MJE15029G MJE15030G, MJE15031G	V_{CB}	120 150	Vdc
Emitter-Base Voltage	V_{EB}	5.0	Vdc
Collector Current – Continuous	I_C	8.0	Adc
Collector Current – Peak	I_{CM}	16	Adc
Base Current	I_B	2.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	50 0.40	W W/ $^\circ\text{C}$
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	2.0 0.016	W W/ $^\circ\text{C}$
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

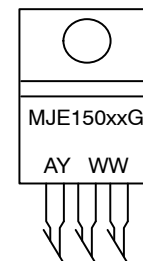
Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

8 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 120–150 VOLTS, 50 WATTS



TO-220
CASE 221A
STYLE 1

MARKING DIAGRAM



MJE150xx = Device Code
x = 28, 29, 30, or 31
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

ORDERING INFORMATION

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

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

MJE15028, MJE15030 (NPN), MJE15029, MJE15031 (PNP)

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 10\text{ mAdc}$, $I_B = 0$) MJE15028, MJE15029 MJE15030, MJE15031	$V_{CEO(sus)}$	120 150	– –	Vdc
Collector Cutoff Current ($V_{CE} = 120\text{ Vdc}$, $I_B = 0$) MJE15028, MJE15029 ($V_{CE} = 150\text{ Vdc}$, $I_B = 0$) MJE15030, MJE15031	I_{CEO}	– –	0.1 0.1	mAdc
Collector Cutoff Current ($V_{CB} = 120\text{ Vdc}$, $I_E = 0$) MJE15028, MJE15029 ($V_{CB} = 150\text{ Vdc}$, $I_E = 0$) MJE15030, MJE15031	I_{CBO}	– –	10 10	μAdc
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	10	μAdc

ON CHARACTERISTICS (Note 1)

DC Current Gain ($I_C = 0.1\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 3.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 4.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$)	h_{FE}	40 40 40 20	– – – –	–
DC Current Gain Linearity (V_{CE} From 2.0 V to 20 V, I_C From 0.1 A to 3 A) (NPN to PNP)	h_{FE}	Typ 2 3		
Collector-Emitter Saturation Voltage ($I_C = 1.0\text{ Adc}$, $I_B = 0.1\text{ Adc}$)	$V_{CE(sat)}$	–	0.5	Vdc
Base-Emitter On Voltage ($I_C = 1.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$)	$V_{BE(on)}$	–	1.0	Vdc

DYNAMIC CHARACTERISTICS

Current Gain – Bandwidth Product (Note 2) ($I_C = 500\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f_{test} = 10\text{ MHz}$)	f_T	30	–	MHz
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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 $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.
2. $f_T = |h_{fe}| \cdot f_{test}$.

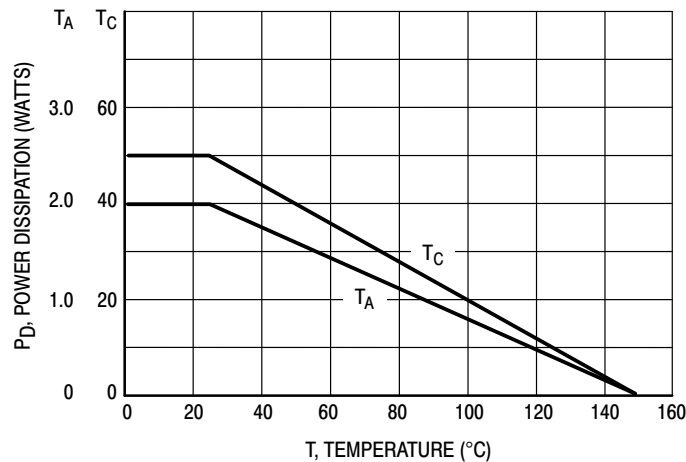


Figure 1. Power Derating

MJE15028, MJE15030 (NPN), MJE15029, MJE15031 (PNP)

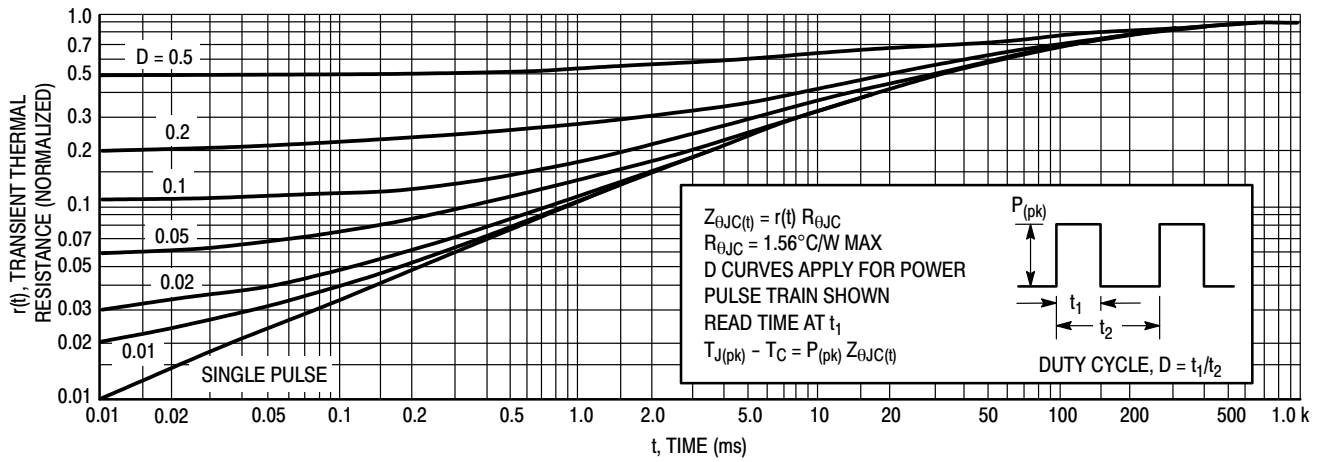


Figure 2. Thermal Response

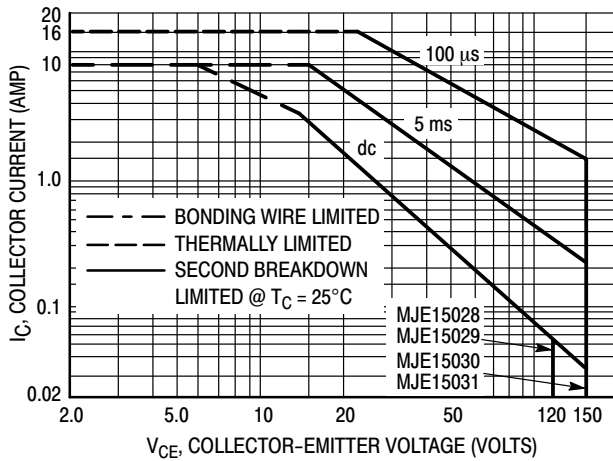


Figure 3. Forward Bias Safe Operating Area

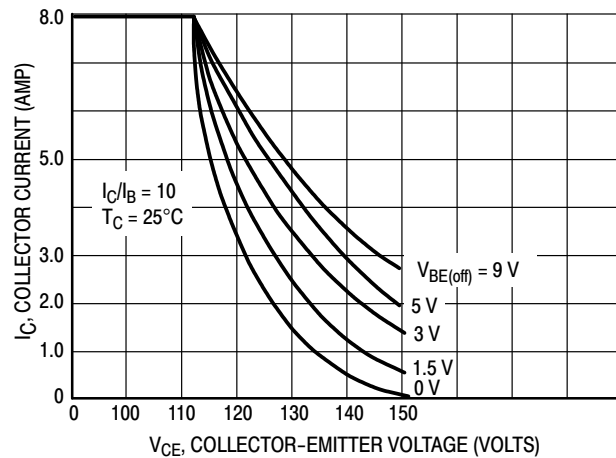


Figure 4. Reverse-Bias Switching Safe Operating Area

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 Figures 3 and 4 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 $T_{J(pk)} < 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 2. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

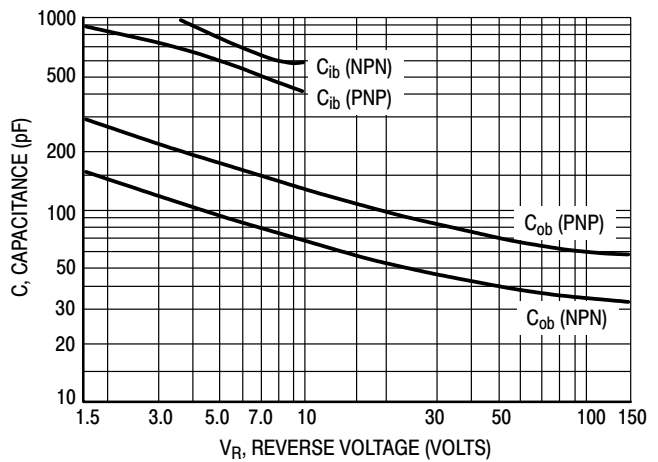


Figure 5. Capacitances

MJE15028, MJE15030 (NPN), MJE15029, MJE15031 (PNP)

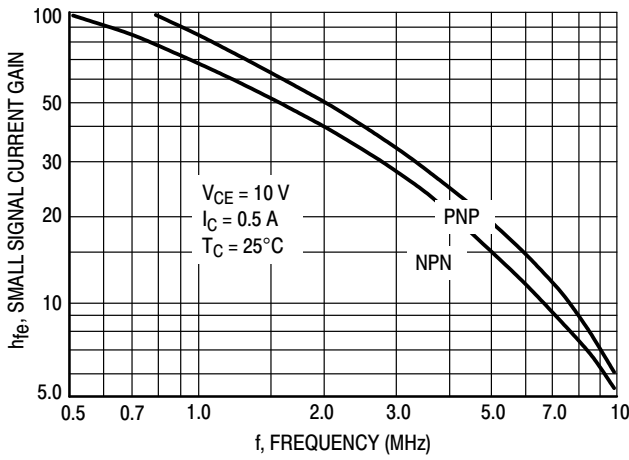


Figure 6. Small-Signal Current Gain

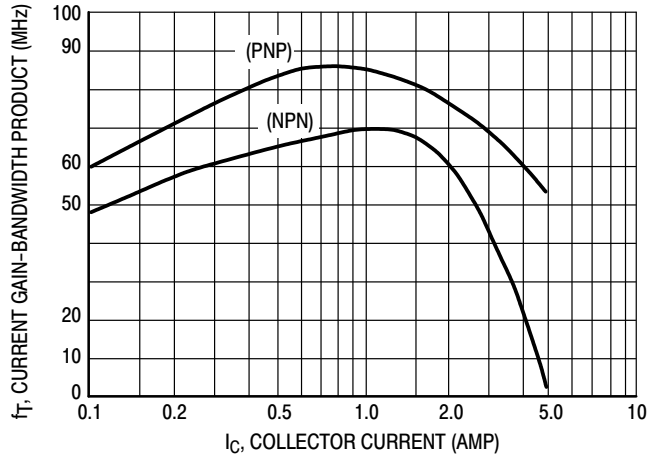
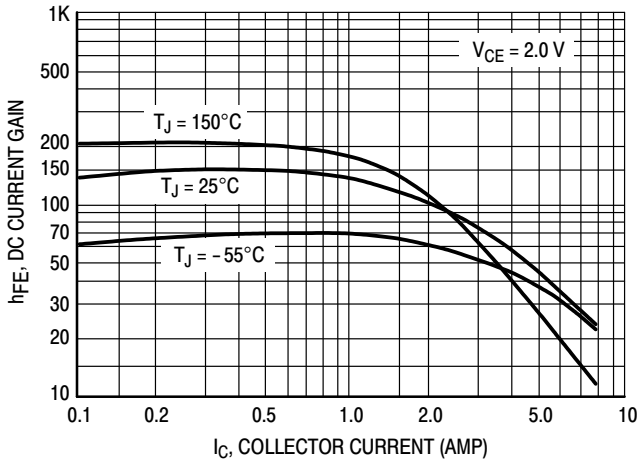


Figure 7. Current Gain-Bandwidth Product

NPN — MJE15028 MJE15030



PNP — MJE15029 MJE15031

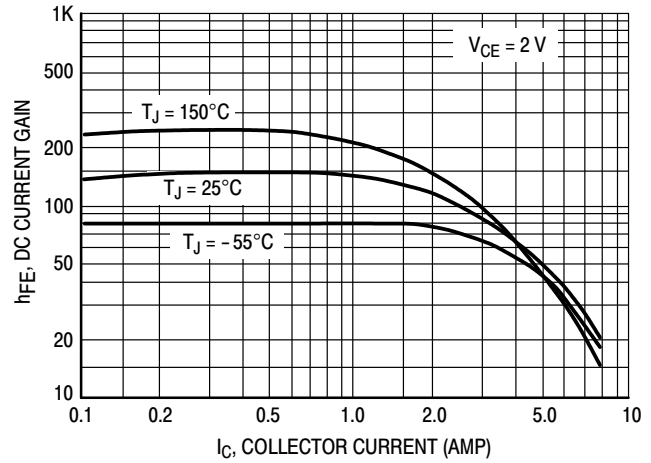
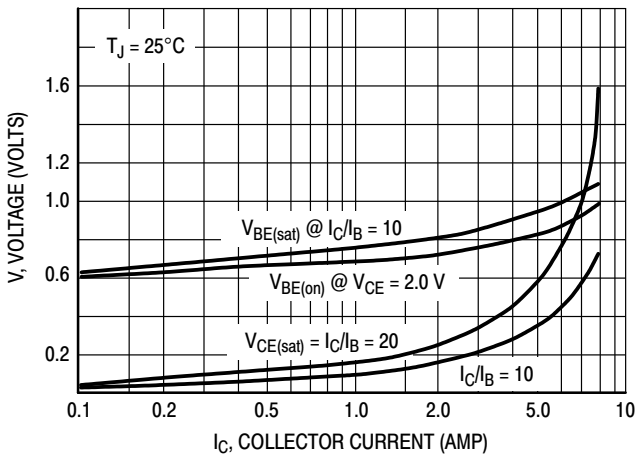


Figure 8. DC Current Gain

NPN



PNP

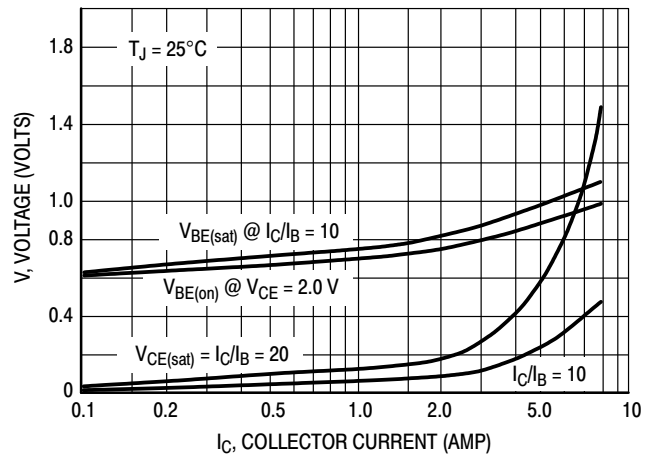


Figure 9. "On" Voltage

MJE15028, MJE15030 (NPN), MJE15029, MJE15031 (PNP)

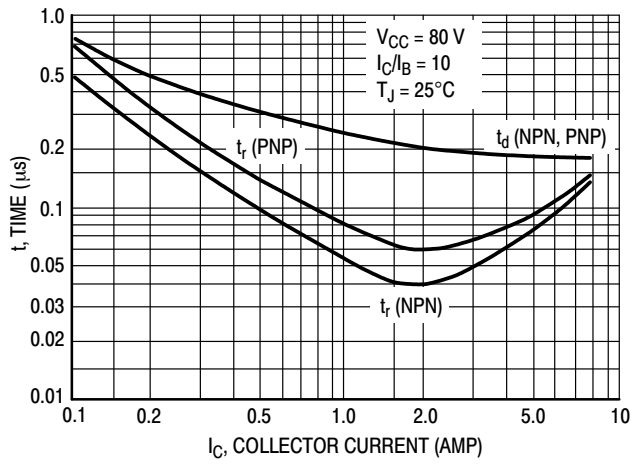


Figure 10. Turn-On Times

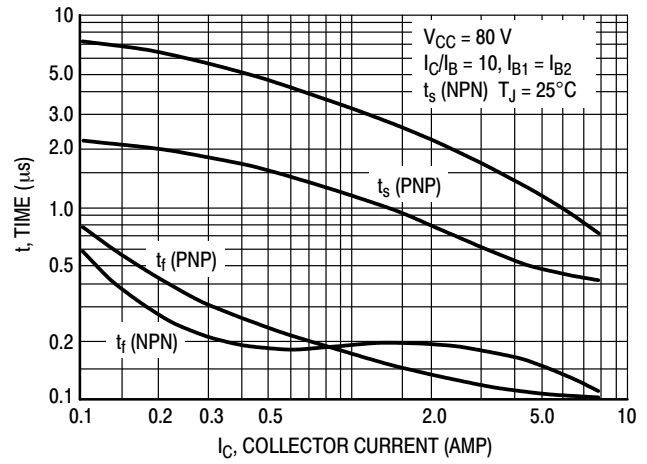
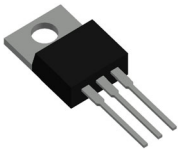


Figure 11. Turn-Off Times

ORDERING INFORMATION

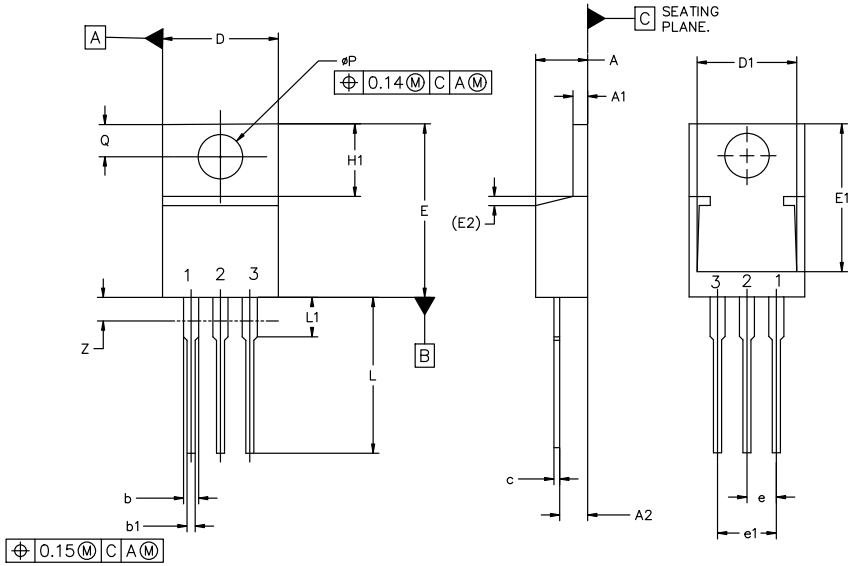
Device	Package	Shipping
MJE15028G	TO-220 (Pb-Free)	50 Units / Rail
MJE15029G	TO-220 (Pb-Free)	50 Units / Rail
MJE15030G	TO-220 (Pb-Free)	50 Units / Rail
MJE15031G	TO-220 (Pb-Free)	50 Units / Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).



TO-220-3 10.10x15.12x4.45, 2.54P
CASE 221A
ISSUE AL

DATE 05 FEB 2025



MILLIMETERS			
DIM	MIN	NOM	MAX
A	4.07	4.45	4.83
A1	1.15	1.28	1.41
A2	2.04	2.42	2.79
b	1.15	1.34	1.52
b1	0.64	0.80	0.96
c	0.36	0.49	0.61
D	9.66	10.10	10.53
D1	8.43	8.63	8.83
E	14.48	15.12	15.75
E1	12.58	12.78	12.98
E2	1.27 REF		

MILLIMETERS			
DIM	MIN	NOM	MAX
e	2.42	2.54	2.66
e1	4.83	5.08	5.33
H1	5.97	6.22	6.47
L	12.70	13.49	14.27
L1	2.80	3.45	4.10
Q	2.54	2.79	3.04
phi P	3.60	3.85	4.09
Z	---	---	3.48

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

STYLE 1: PIN 1. BASE 2. COLLECTOR 3. EMITTER 4. COLLECTOR	STYLE 2: PIN 1. BASE 2. EMITTER 3. COLLECTOR 4. EMITTER	STYLE 3: PIN 1. CATHODE 2. ANODE 3. GATE 4. ANODE	STYLE 4: PIN 1. MAIN TERMINAL 1 2. MAIN TERMINAL 2 3. GATE 4. MAIN TERMINAL 2
STYLE 5: PIN 1. GATE 2. DRAIN 3. SOURCE 4. DRAIN	STYLE 6: PIN 1. ANODE 2. CATHODE 3. ANODE 4. CATHODE	STYLE 7: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. ANODE	STYLE 8: PIN 1. CATHODE 2. ANODE 3. EXTERNAL TRIP/DELAY 4. ANODE
STYLE 9: PIN 1. GATE 2. COLLECTOR 3. EMITTER 4. COLLECTOR	STYLE 10: PIN 1. GATE 2. SOURCE 3. DRAIN 4. SOURCE	STYLE 11: PIN 1. DRAIN 2. SOURCE 3. GATE 4. SOURCE	STYLE 12: PIN 1. MAIN TERMINAL 1 2. MAIN TERMINAL 2 3. GATE 4. NOT CONNECTED

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