MJE15032 (NPN), MJE15033 (PNP)

Complementary Silicon Plastic Power Transistors

Designed for use as high−frequency drivers in audio amplifiers.

Features

- High DC Current Gain
- High Current Gain − Bandwidth Product
- TO−220 Compact Package
- Epoxy Meets UL 94 V−0 @ 0.125 in
- These Devices are Pb−Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	250	Vdc
Collector−Base Voltage	V_{CB}	250	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 Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	50 0.40	W W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	2.0 0.016	W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C
ESD − Human Body Model	HBM	3B	V
ESD − Machine Model	MM	C	V

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	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	62.5	°C/W

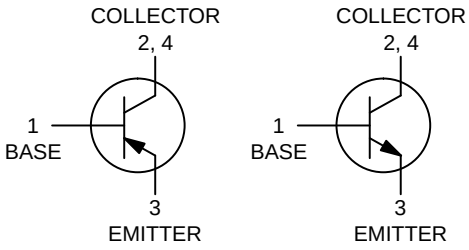
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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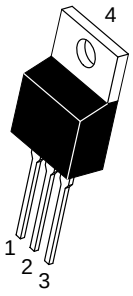
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8.0 AMPERES POWER TRANSISTORS COMPLEMENTARY SILICON 250 VOLTS, 50 WATTS

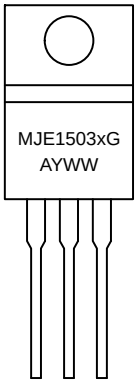
COMPLEMENTARY



MARKING DIAGRAM



TO−220
CASE 221A
STYLE 1



MJE1503x = Specific Device Code
x = 2 or 3
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping
MJE15032G	TO−220 (Pb−Free)	50 Units/Rail
MJE15033G	TO−220 (Pb−Free)	50 Units/Rail

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (Note 1) (I_C = 10 mAdc, I_B = 0)	$V_{CEO(sus)}$	250	−	Vdc
Collector Cutoff Current (V_{CB} = 250 Vdc, I_E = 0)	I_{CBO}	−	10	μAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	−	10	μAdc
ON CHARACTERISTICS (Note 1)				
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 5.0 Vdc) (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc) (I_C = 2.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	 70 50 10	 − − −	−
Collector−Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 0.1 Adc)	$V_{CE(sat)}$	−	0.5	Vdc
Base−Emitter On Voltage (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)	$V_{BE(on)}$	−	1.0	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain − Bandwidth Product (Note 2) (I_C = 500 mAdc, V_{CE} = 10 Vdc, f_{test} = 1.0 MHz)	f_T	30	−	MHz

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 ≤ 2.0%.
2. $f_T = |h_{fe}| \bullet f_{test}$.

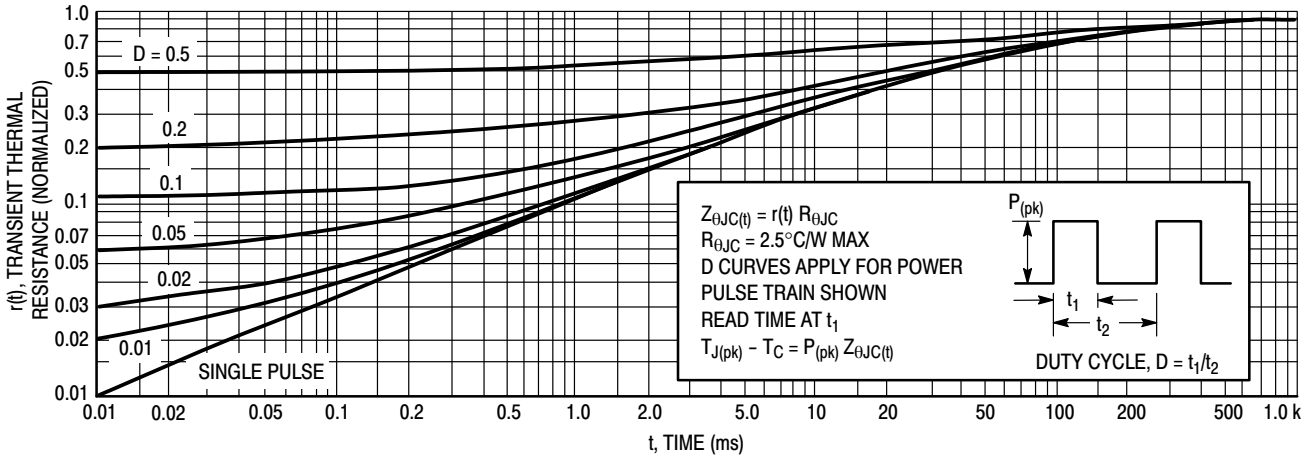


Figure 1. Thermal Response

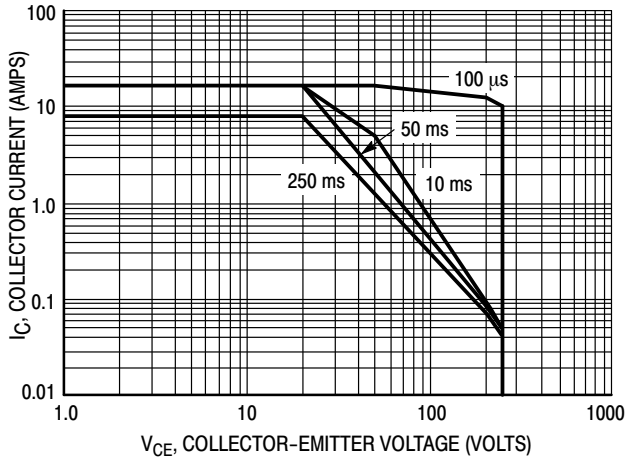


Figure 2. MJE15032 & MJE15033 Safe Operating Area

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 then the curves indicate.

The data of Figures 2 and 4 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)}$ < 150°C. $T_{J(pk)}$ may be calculated from the data in Figure 1. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

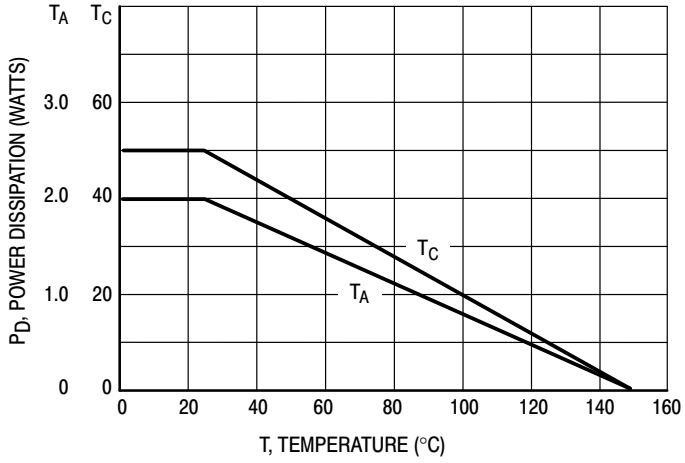


Figure 3. Power Derating

NPN − MJE15032

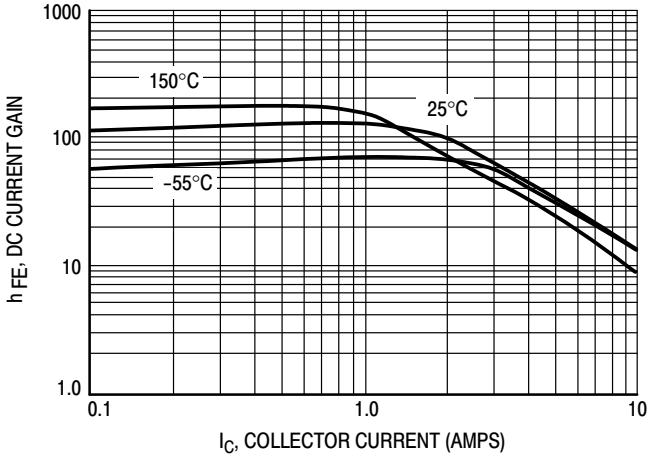


Figure 4. NPN − MJE15032
V_{CE} = 5 V DC Current Gain

PNP − MJE15033

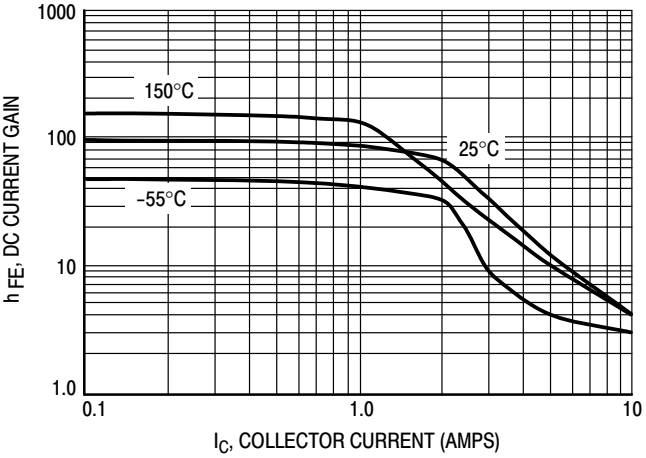


Figure 5. PNP − MJE15033
V_{CE} = 5 V DC Current Gain

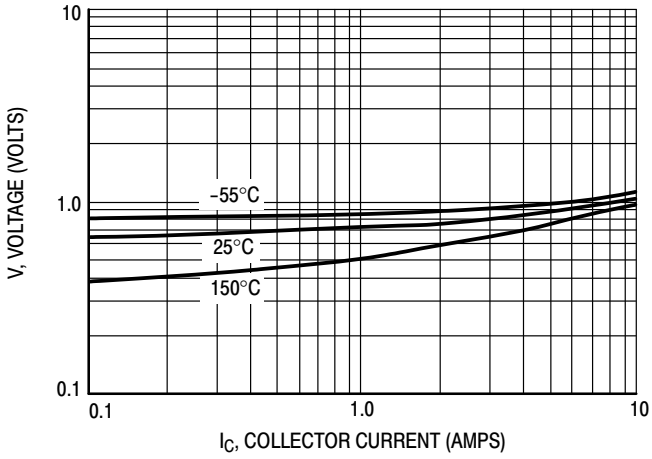


Figure 6. NPN − MJE15032
V_{CE} = 5 V $V_{BE(on)}$ Curve

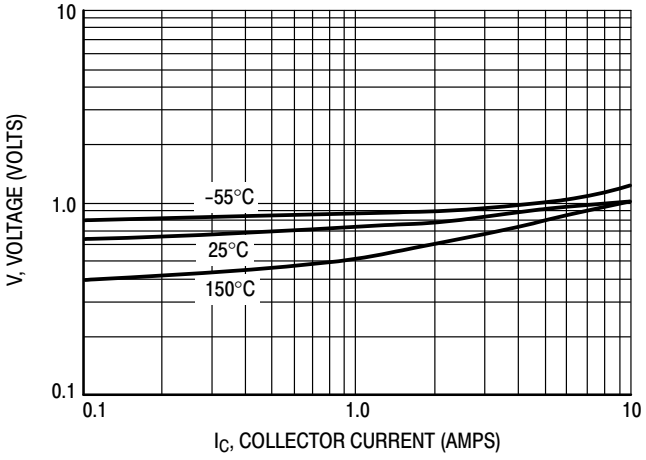


Figure 7. PNP − MJE15033
V_{CE} = 5 V $V_{BE(on)}$ Curve

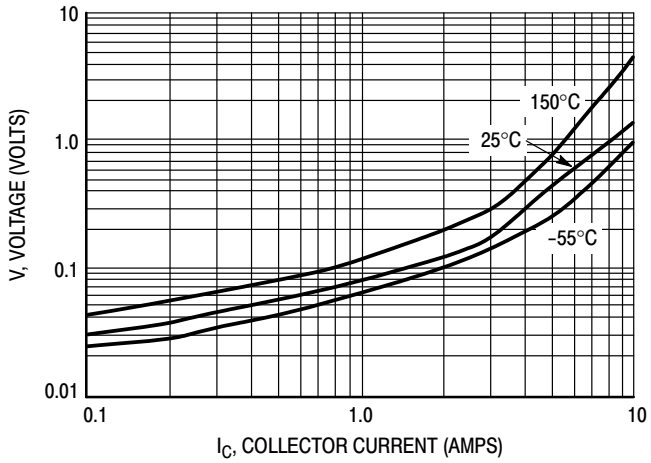


Figure 8. NPN − MJE15032
$V_{CE(sat)}$ I_C/I_B = 10

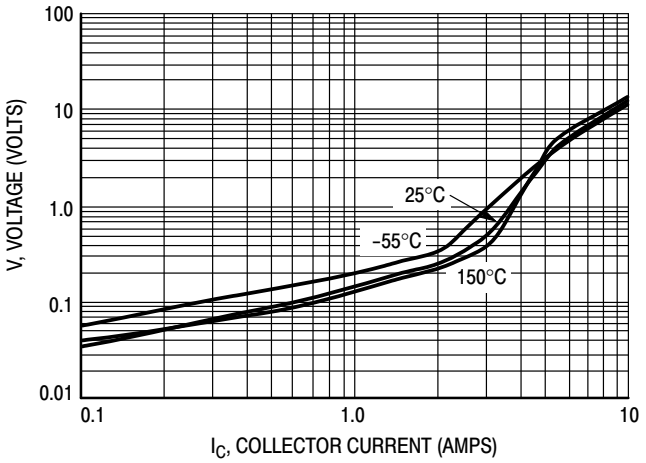


Figure 9. PNP − MJE15033
$V_{CE(sat)}$ I_C/I_B = 10

NPN − MJE15032

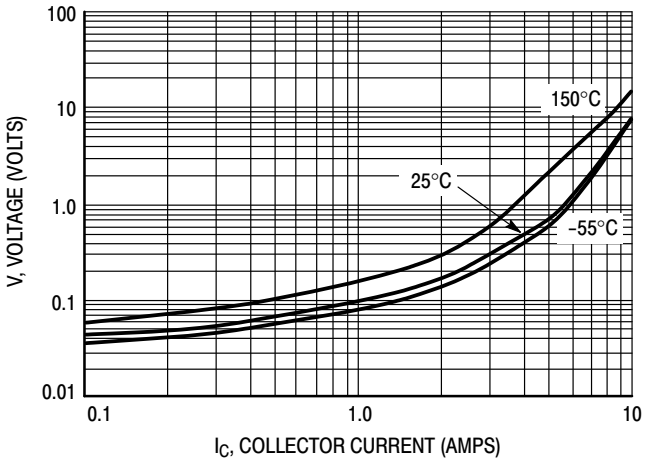


Figure 10. NPN − MJE15032
$V_{CE(sat)}$ I_C/I_B = 20

PNP − MJE15033

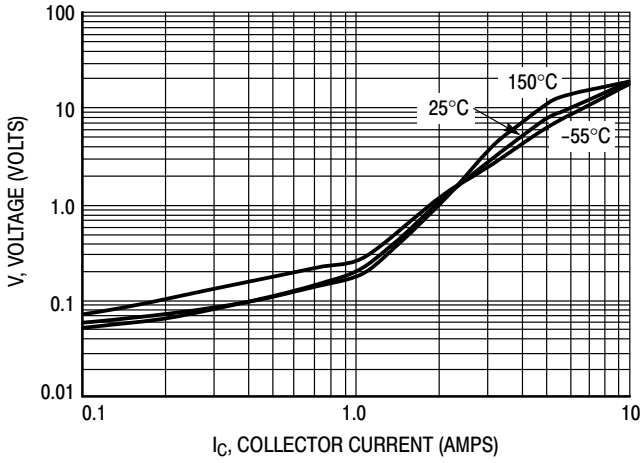


Figure 11. PNP − MJE15033
$V_{CE(sat)}$ I_C/I_B = 20

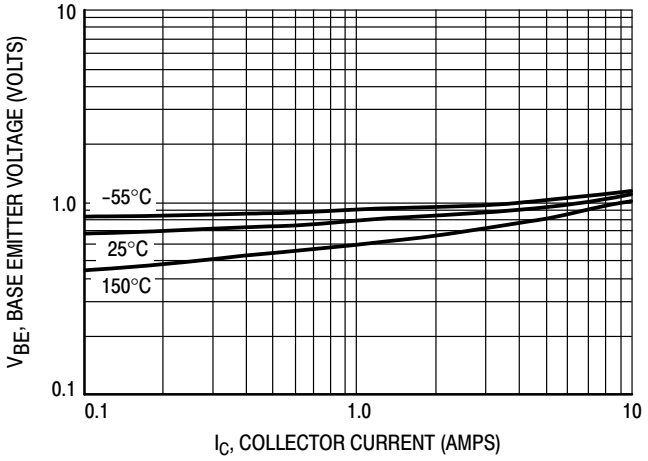


Figure 12. NPN − MJE15032
$V_{BE(sat)}$ I_C/I_B = 10

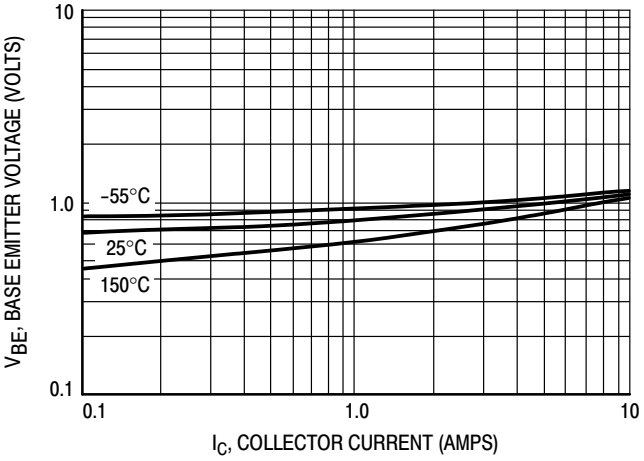
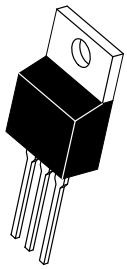


Figure 13. PNP − MJE15033
$V_{BE(sat)}$ I_C/I_B = 10

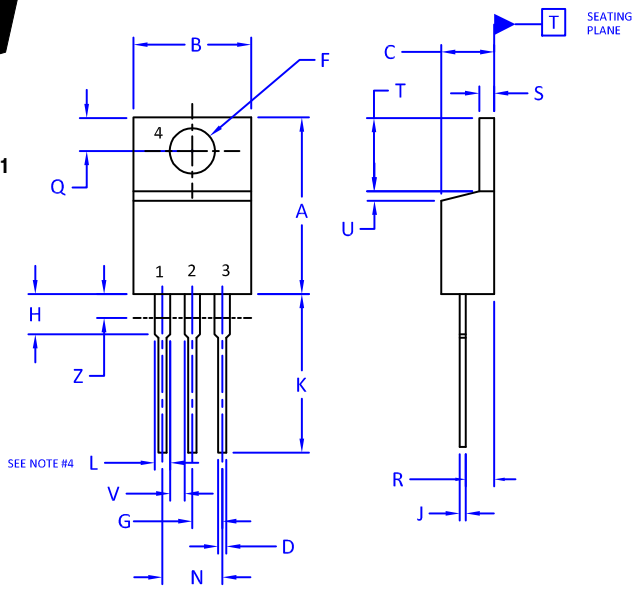
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TO−220
CASE 221A
ISSUE AK

DATE 13 JAN 2022



SCALE 1:1



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

	INCHES		MILLIMETERS	
DIM	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.41
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	----	1.15	---
Z	----	0.080	---	2.04

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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