

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

Complementary Silicon Plastic Power Transistors

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 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | $^\circ\text{C}/\text{W}$ |

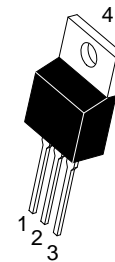
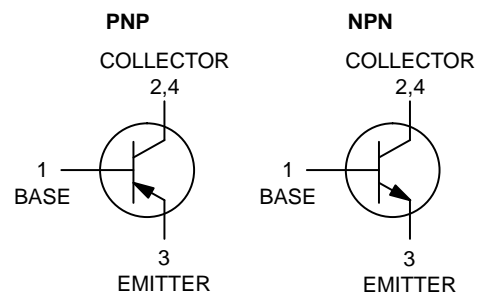
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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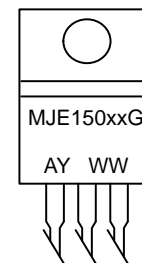
<http://onsemi.com>

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.

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

| Characteristic | Symbol | Min | Max | Unit |
|--|---------------|------------|------------|---------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (Note 1) ($I_C = 10\text{ mA}$, $I_B = 0$) MJE15028, MJE15029 MJE15030, MJE15031 | $V_{CE(sus)}$ | 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 | mA |
| 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 | μA |
| Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | – | 10 | μA |

ON CHARACTERISTICS (Note 1)

| | | | | |
|---|---------------|----------------------|------------------|-----|
| DC Current Gain ($I_C = 0.1\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 2.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 4.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) | 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 ($I_C = 1.0\text{ A}$, $I_B = 0.1\text{ A}$) | $V_{CE(sat)}$ | – | 0.5 | Vdc |
| Base–Emitter On Voltage ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) | $V_{BE(on)}$ | – | 1.0 | Vdc |

DYNAMIC CHARACTERISTICS

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

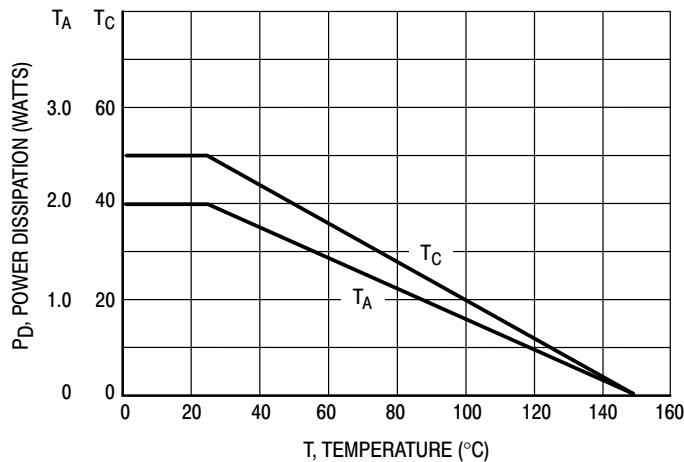


Figure 1. Power Derating

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

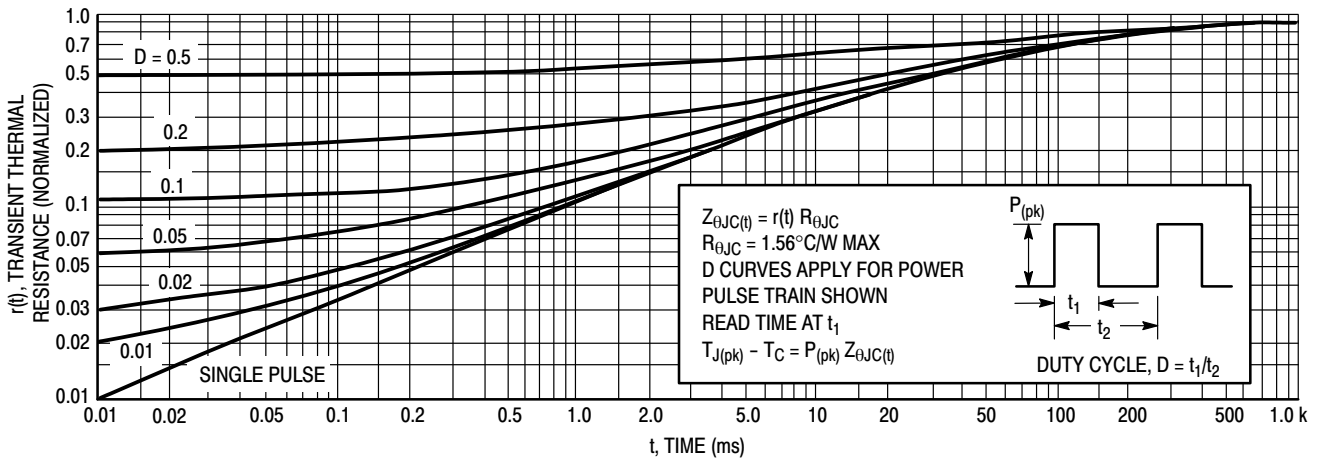


Figure 2. Thermal Response

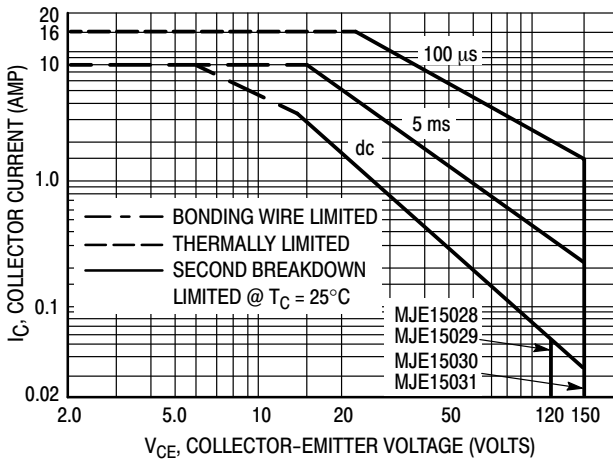


Figure 3. Forward Bias Safe Operating Area

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.

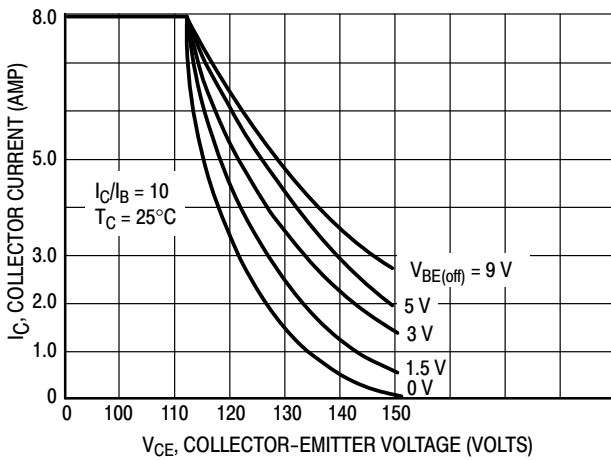


Figure 4. Reverse-Bias Switching Safe Operating Area

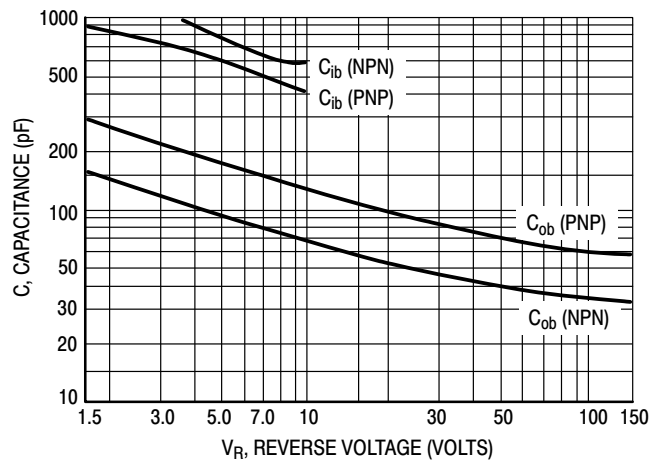


Figure 5. Capacitances

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

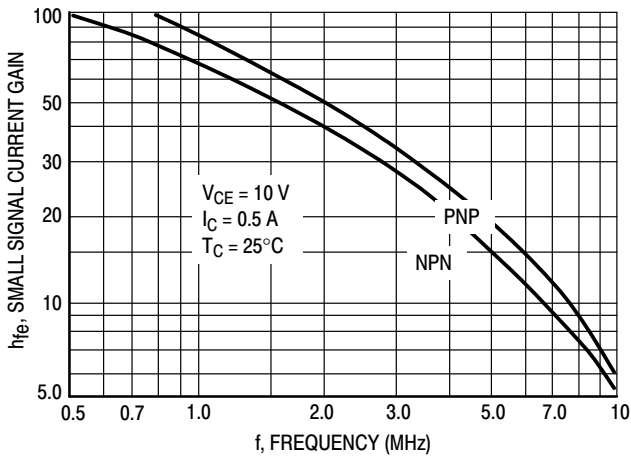


Figure 6. Small-Signal Current Gain

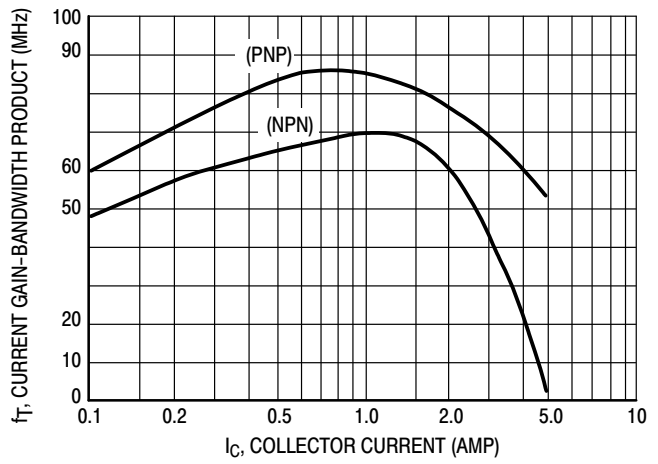
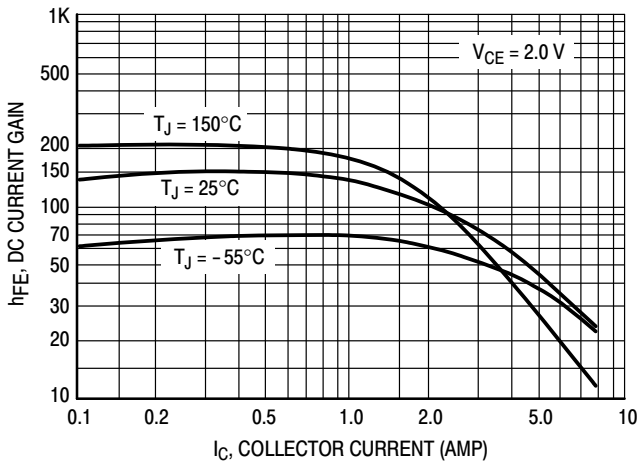


Figure 7. Current Gain-Bandwidth Product

NPN — MJE15028 MJE15030



PNP — MJE15029 MJE15031

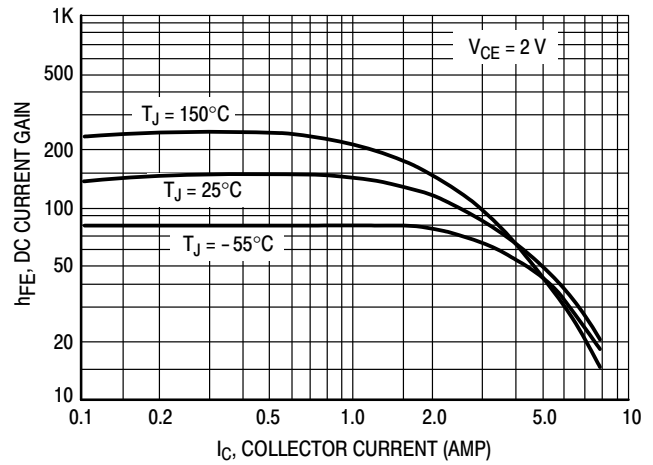
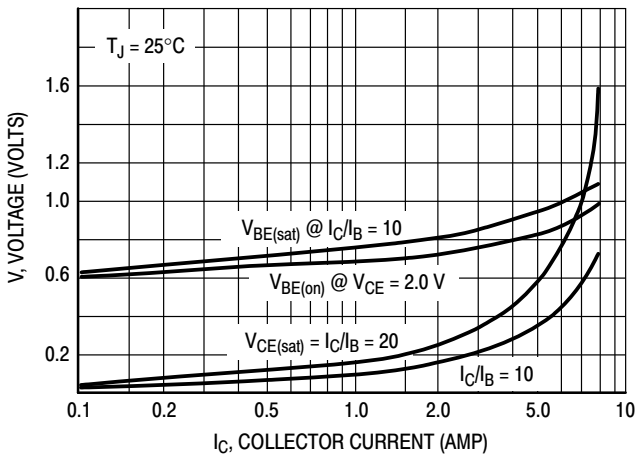


Figure 8. DC Current Gain

NPN



PNP

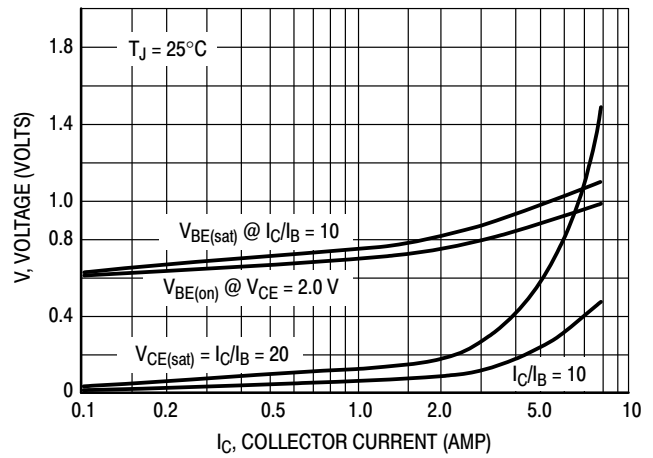


Figure 9. "On" Voltage

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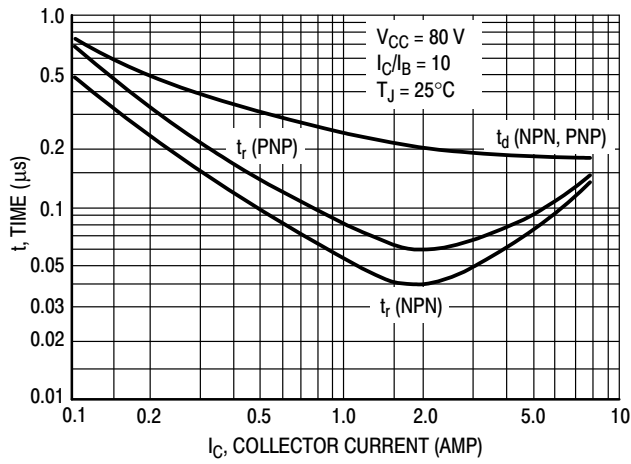


Figure 10. Turn-On Times

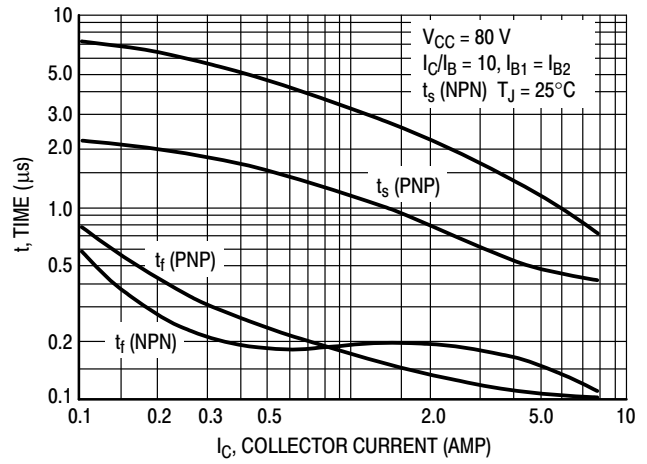


Figure 11. Turn-Off Times

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 |

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