

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 @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 50 0.40 | W W/ $^\circ\text{C}$ |
| Total Power 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 | $^\circ\text{C}$ |
| 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 | $^\circ\text{C}/\text{W}$ |
| 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.

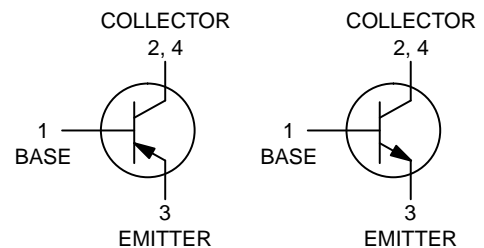


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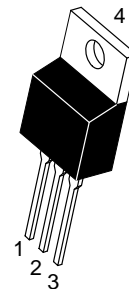
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8.0 AMPERES POWER TRANSISTORS COMPLEMENTARY SILICON 250 VOLTS, 50 WATTS

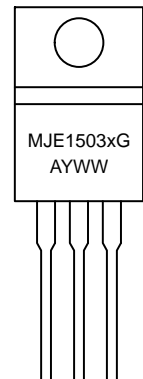
COMPLEMENTARY



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

| Characteristic | Symbol | Min | Max | Unit |
|---|----------------|----------------|-------------|-----------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (Note 1) ($I_C = 10\text{ mA}$, $I_B = 0$) | $V_{CEO(sus)}$ | 250 | – | Vdc |
| Collector Cutoff Current ($V_{CB} = 250\text{ Vdc}$, $I_E = 0$) | I_{CBO} | – | 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 ($I_C = 0.5\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$) ($I_C = 1.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$) | h_{FE} | 70 50 10 | – – – | – |
| 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 ($I_C = 1.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$) | $V_{BE(on)}$ | – | 1.0 | Vdc |
| DYNAMIC CHARACTERISTICS | | | | |
| Current Gain – Bandwidth Product (Note 2) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f_{test} = 1.0\text{ MHz}$) | 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. $f_T = |h_{fe}| \cdot f_{test}$.

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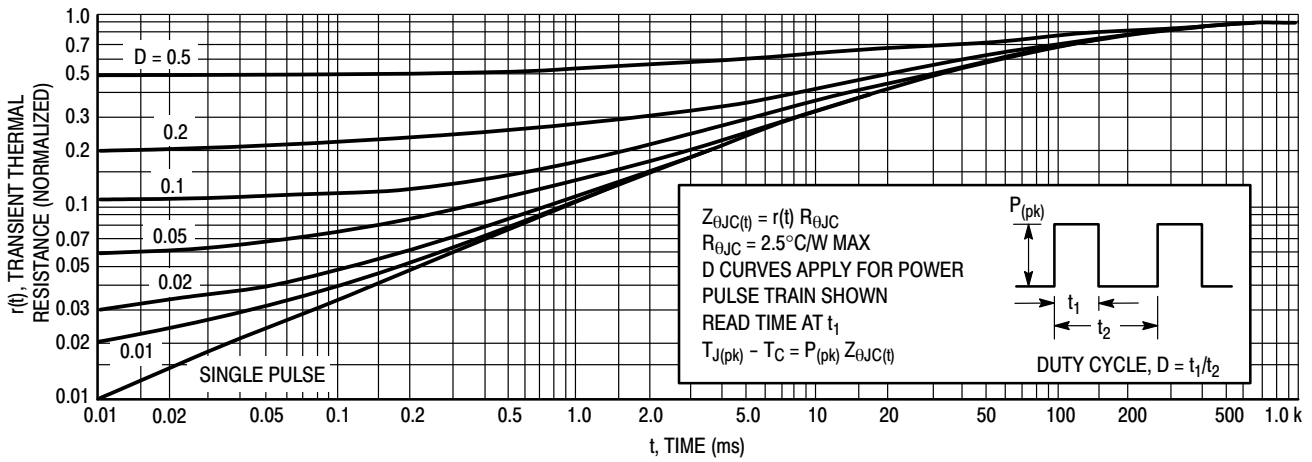


Figure 1. Thermal Response

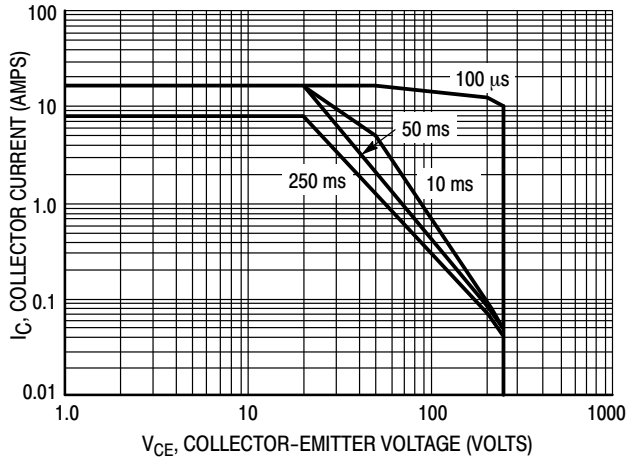


Figure 2. MJE15032 & MJE15033 Safe Operating Area

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 than the curves indicate.

The data of Figures 2 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 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.

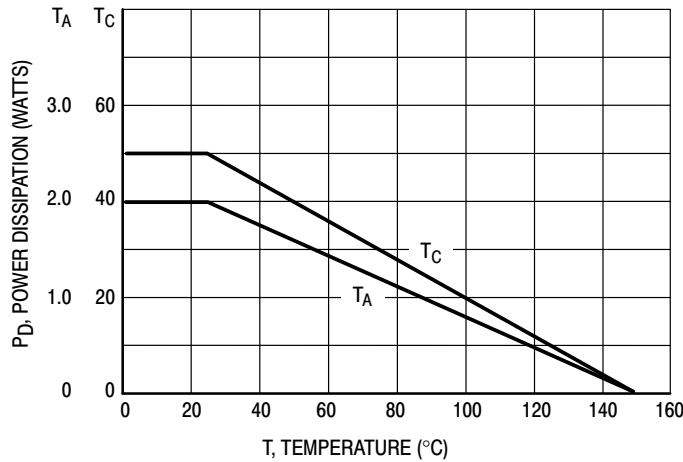


Figure 3. Power Derating

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NPN – MJE15032

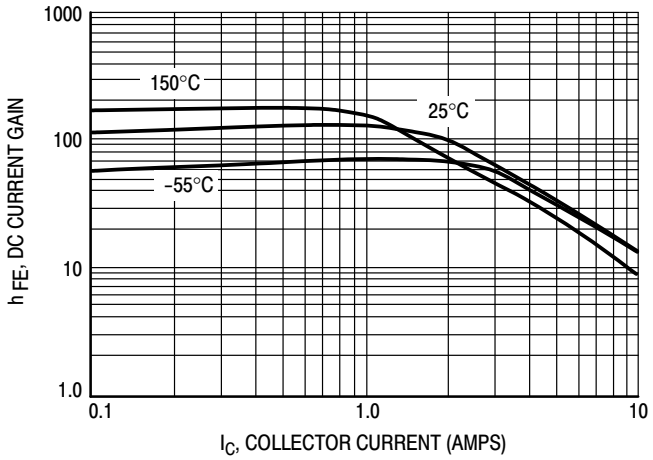


Figure 4. NPN – MJE15032
 $V_{CE} = 5$ V DC Current Gain

PNP – MJE15033

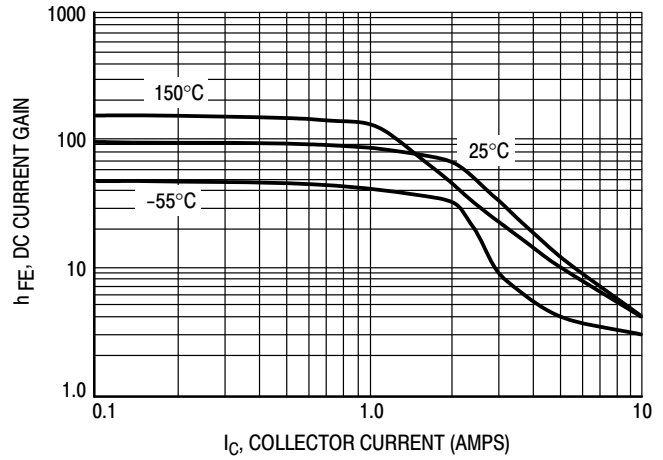


Figure 5. PNP – MJE15033
 $V_{CE} = 5$ V DC Current Gain

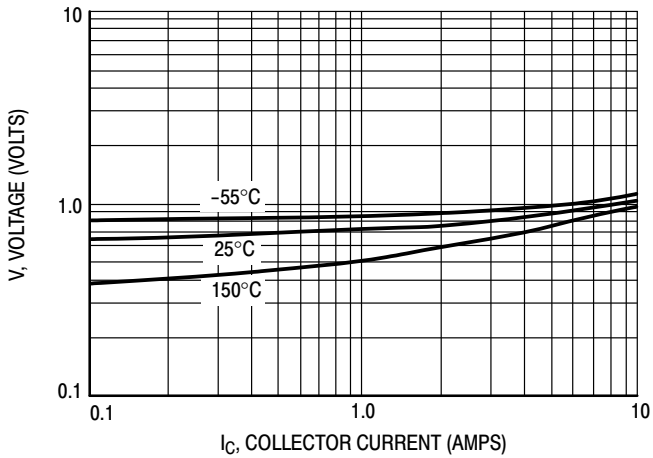


Figure 6. NPN – MJE15032
 $V_{CE} = 5$ V $V_{BE(on)}$ Curve

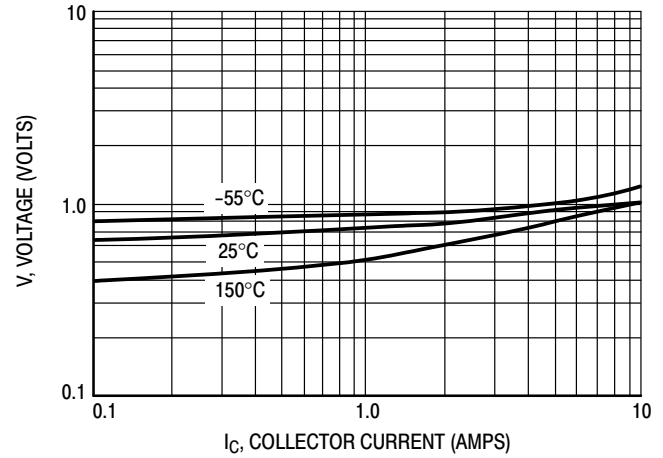


Figure 7. PNP – MJE15033
 $V_{CE} = 5$ V $V_{BE(on)}$ Curve

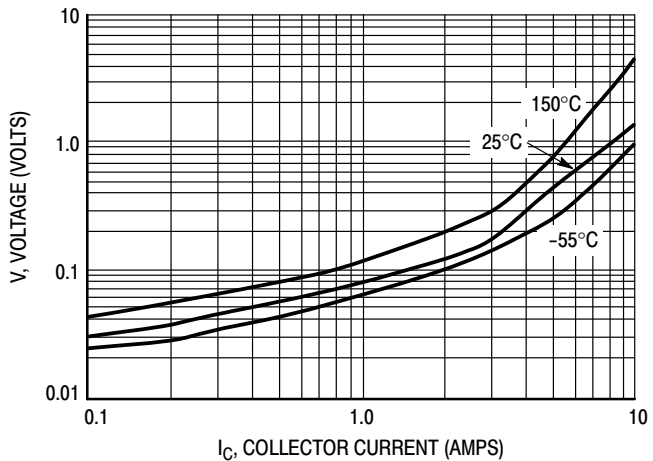


Figure 8. NPN – MJE15032
 $V_{CE(sat)}$ $I_C/I_B = 10$

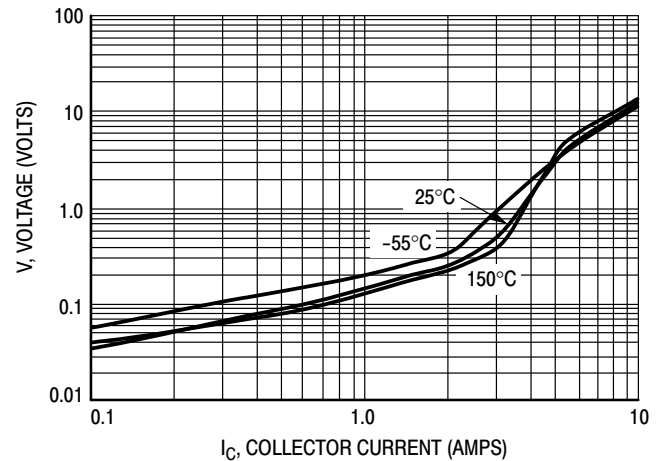


Figure 9. PNP – MJE15033
 $V_{CE(sat)}$ $I_C/I_B = 10$

MJE15032 (NPN), MJE15033 (PNP)

NPN – MJE15032

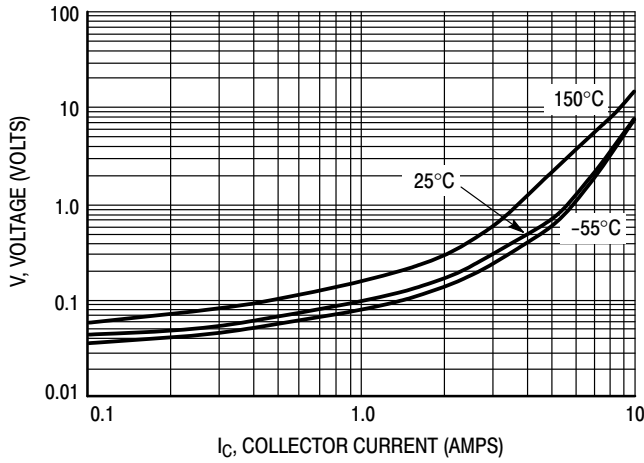


Figure 10. NPN – MJE15032
 $V_{CE(sat)} I_C/I_B = 20$

PNP – MJE15033

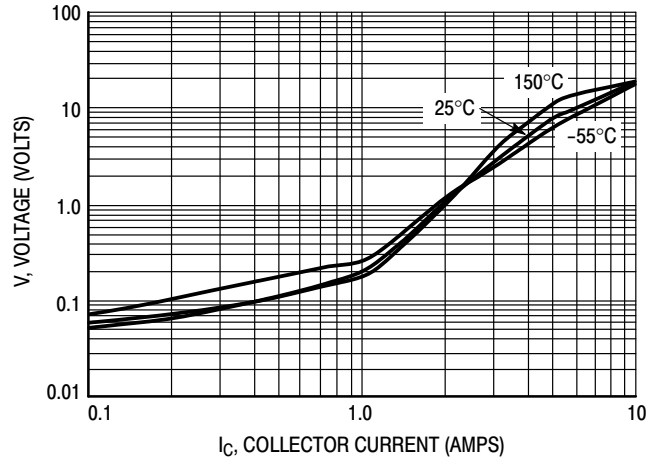


Figure 11. PNP – MJE15033
 $V_{CE(sat)} I_C/I_B = 20$

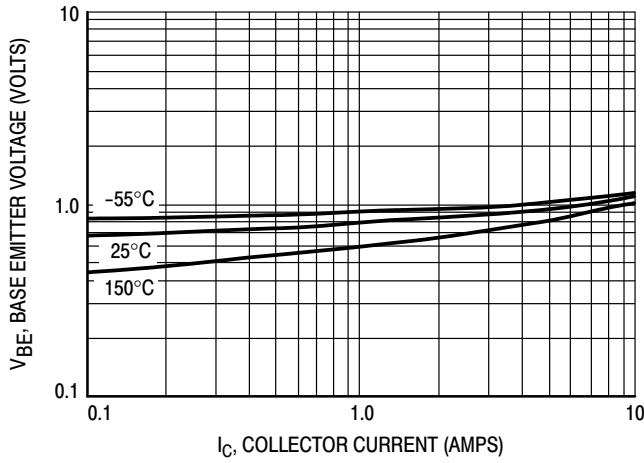


Figure 12. NPN – MJE15032
 $V_{BE(sat)} I_C/I_B = 10$

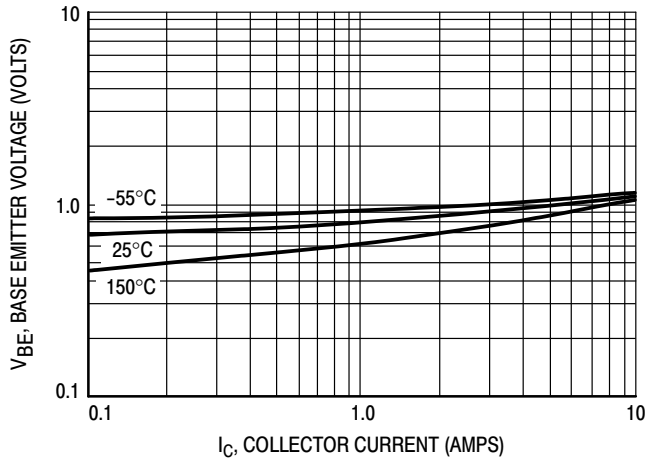


Figure 13. PNP – MJE15033
 $V_{BE(sat)} I_C/I_B = 10$

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