

MJE15032 (NPN), MJE15033 (PNP)

Preferred Devices

Complementary Silicon Plastic Power Transistors

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

- DC Current Gain Specified to 5.0 Amperes
 $h_{FE} = 70$ (Min) @ $I_C = 0.5$ Adc
 $= 10$ (Min) @ $I_C = 2.0$ Adc
- Collector-Emitter Sustaining Voltage –
 $V_{CEO(sus)} = 250$ Vdc (Min) – MJE15032, MJE15033
- High Current Gain – Bandwidth Product
 $f_T = 30$ MHz (Min) @ $I_C = 500$ mAdc
- TO-220AB Compact Package
- Epoxy Meets UL94, V0 @ 1/8"
- ESD Ratings: Machine Model C
 Human Body Model 3B

MAXIMUM RATINGS

| Rating | Symbol | MJE15032 MJE15033 | 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 – Peak | I_C | 8.0 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 | Watts W/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 2.0 0.016 | Watts W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | 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 | $^\circ\text{C/W}$ |

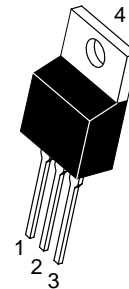


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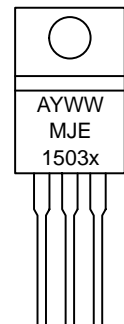
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**8.0 AMPERES
POWER TRANSISTORS
COMPLEMENTARY SILICON
250 VOLTS
50 WATTS**

MARKING DIAGRAM



TO-220
CASE 221A
STYLE 1



MJE1503x = Specific Device Code
 x = 2 or 3
 A = Assembly Location
 Y = Year
 WW = Work Week

ORDERING INFORMATION

| Device | Package | Shipping |
|----------|---------|---------------|
| MJE15032 | TO-220 | 50 Units/Rail |
| MJE15033 | TO-220 | 50 Units/Rail |

Preferred devices are recommended choices for future use and best overall value.

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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 | μA |
| Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | – | 10 | μA |

ON CHARACTERISTICS (Note 1)

| | | | | |
|---|---------------|----------------|-------------|-----|
| DC Current Gain ($I_C = 0.5\text{ A}$, $V_{CE} = 5.0\text{ Vdc}$) ($I_C = 1.0\text{ A}$, $V_{CE} = 5.0\text{ Vdc}$) ($I_C = 2.0\text{ A}$, $V_{CE} = 5.0\text{ Vdc}$) | h_{FE} | 70 50 10 | – – – | – |
| 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 ($I_C = 1.0\text{ A}$, $V_{CE} = 5.0\text{ Vdc}$) | $V_{BE(on)}$ | – | 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 |
|---|-------|----|---|-----|

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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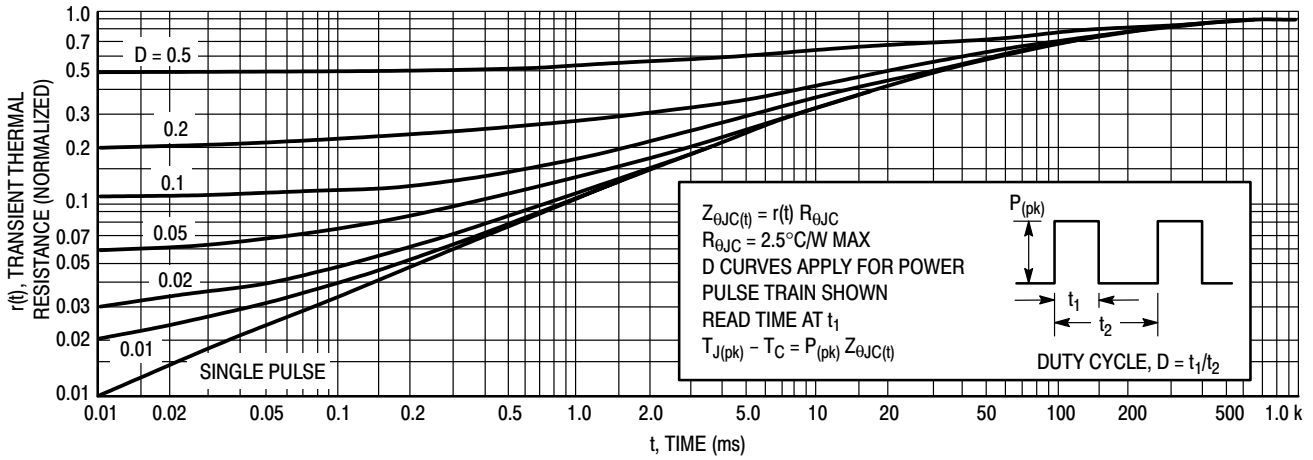


Figure 1. Thermal Response

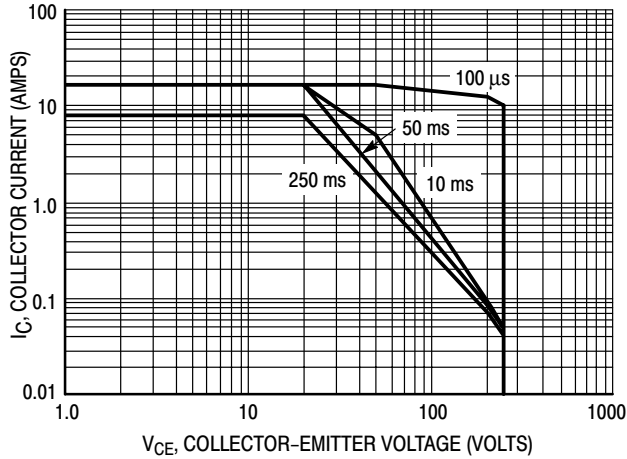


Figure 2. MJE15032 & MJE15033 Safe Operating Area

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.

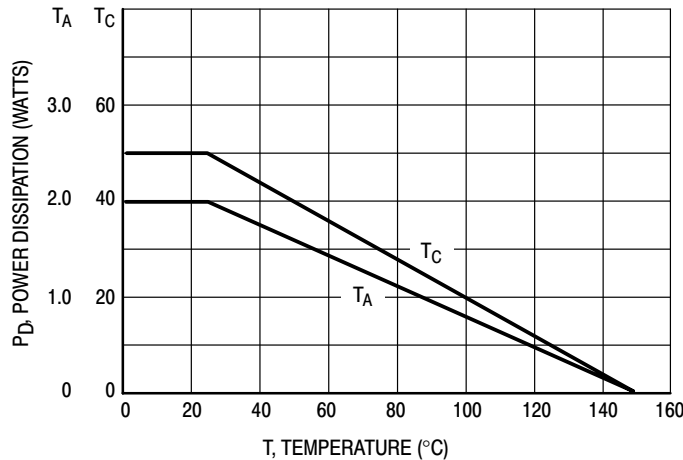


Figure 3. Power Derating

MJE15032 (NPN), MJE15033 (PNP)

NPN – MJE15032

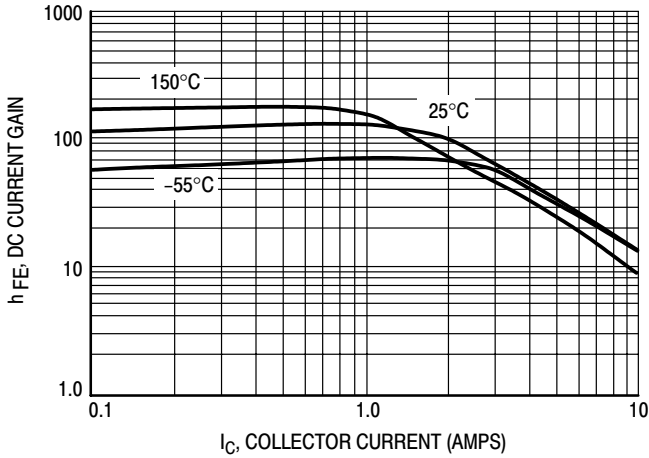


Figure 4. NPN – MJE15032
 $V_{CE} = 5$ V DC Current Gain

PNP – MJE15033

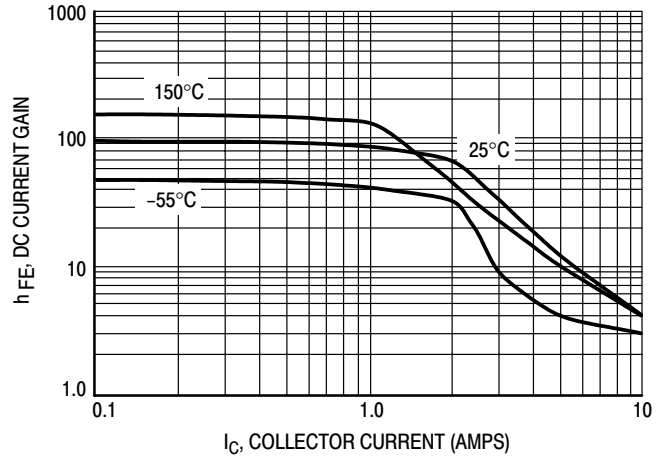


Figure 5. PNP – MJE15033
 $V_{CE} = 5$ V DC Current Gain

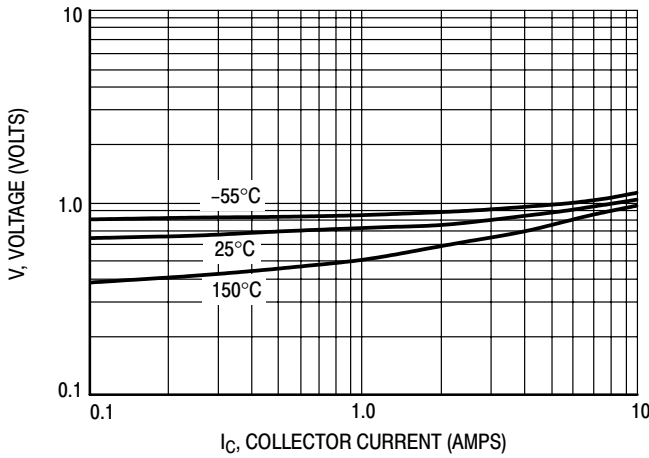


Figure 6. NPN – MJE15032
 $V_{CE} = 5$ V $V_{BE(on)}$ Curve

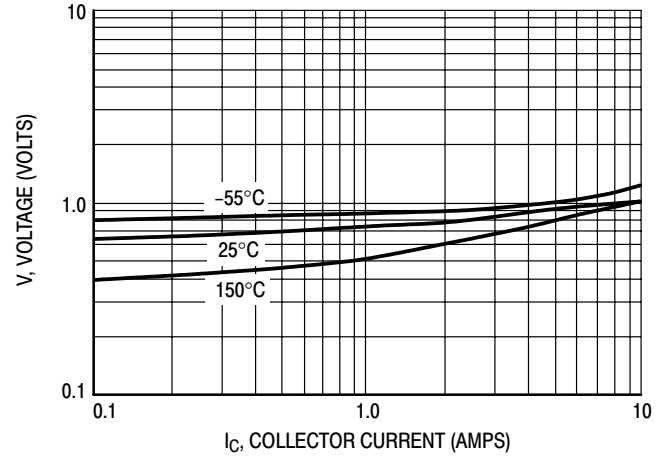


Figure 7. PNP – MJE15033
 $V_{CE} = 5$ V $V_{BE(on)}$ Curve

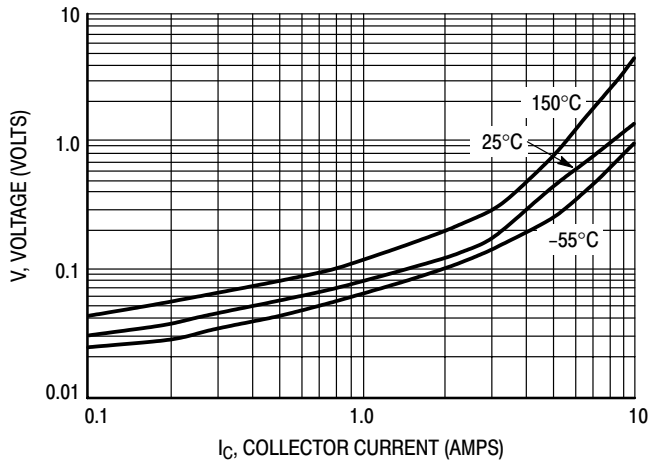


Figure 8. NPN – MJE15032
 $V_{CE(sat)}$ $I_C/I_B = 10$

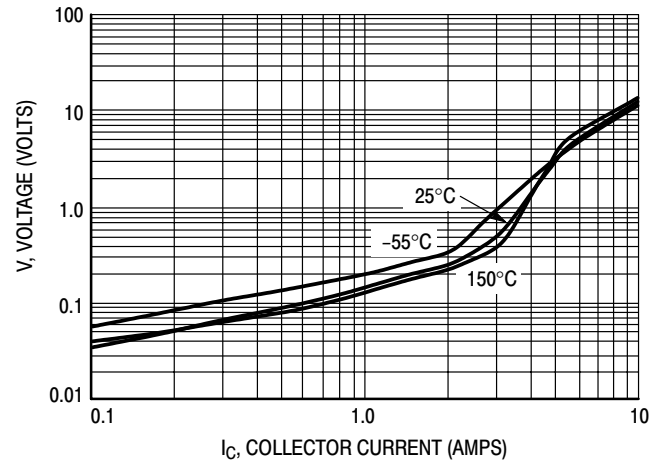


Figure 9. PNP – MJE15033
 $V_{CE(sat)}$ $I_C/I_B = 10$

MJE15032 (NPN), MJE15033 (PNP)

NPN – MJE15032

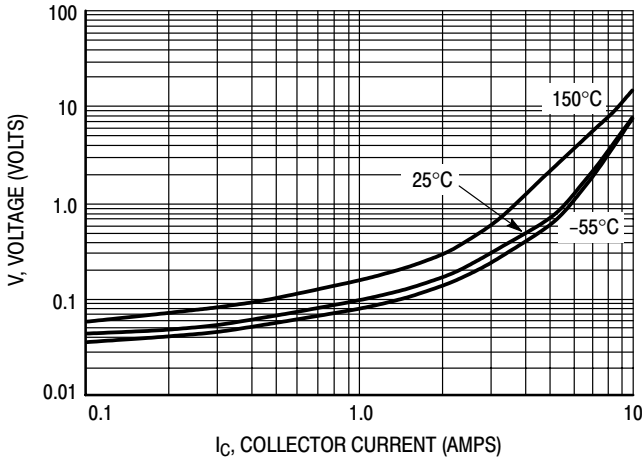


Figure 10. NPN – MJE15032
 $V_{CE(sat)} I_C/I_B = 20$

PNP – MJE15033

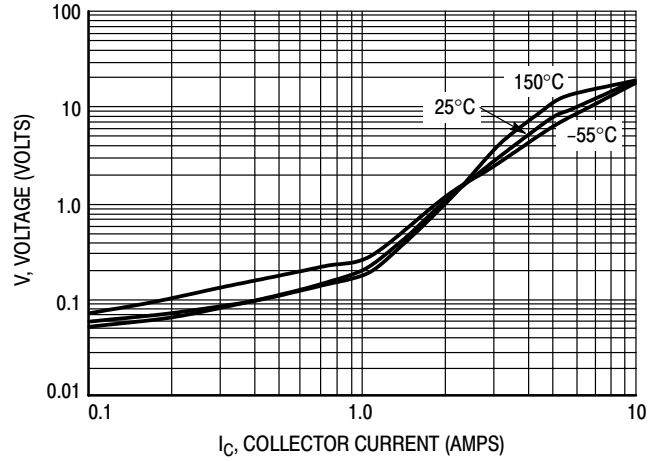


Figure 11. PNP – MJE15033
 $V_{CE(sat)} I_C/I_B = 20$

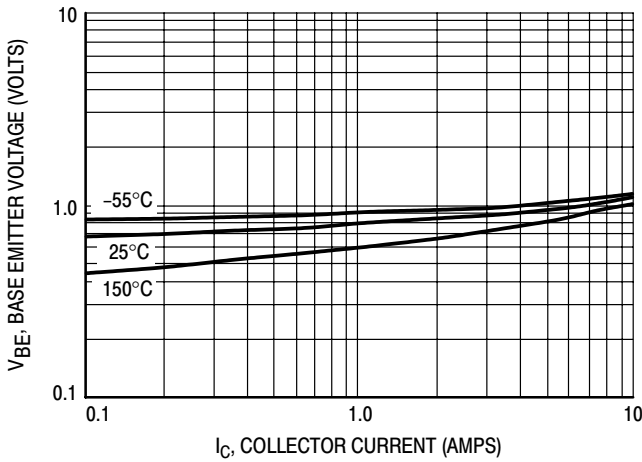


Figure 12. NPN – MJE15032
 $V_{BE(sat)} I_C/I_B = 10$

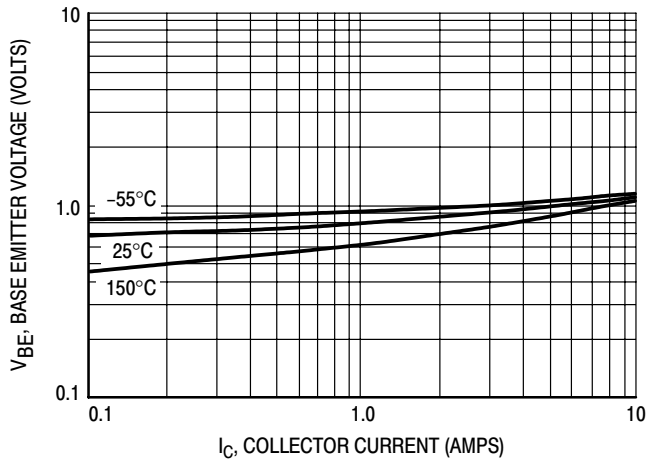
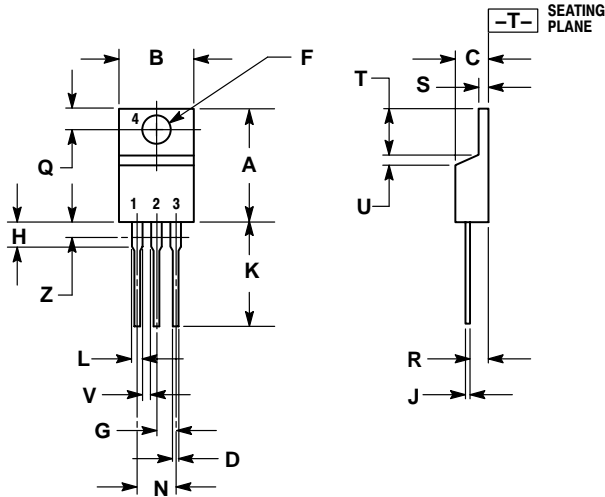


Figure 13. PNP – MJE15033
 $V_{BE(sat)} I_C/I_B = 10$

MJE15032 (NPN), MJE15033 (PNP)

PACKAGE DIMENSIONS

TO-220
CASE 221A-09
ISSUE AA




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.147 | 3.61 | 3.73 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| 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 | 1.39 |
| 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:

1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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