NPN
**MJE4342**
**MJE4343**
PNP
**MJE4352**
**MJE4353**

# High-Voltage — High Power Transistors

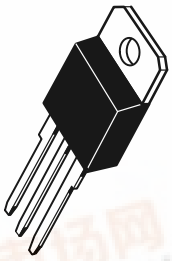
. . . designed for use in high power audio amplifier applications and high voltage switching regulator circuits.

- High Collector–Emitter Sustaining Voltage —

| | NPN | PNP |
|---|---|---|
| $V_{CEO(sus)}$ = 140 Vdc — | MJE4342 | MJE4352 |
| = 160 Vdc — | MJE4343 | MJE4353 |

- High DC Current Gain — @ $I_C$ = 8.0 Adc
  $h_{FE}$ = 35 (Typ)
- Low Collector–Emitter Saturation Voltage —
  $V_{CE(sat)}$ = 2.0 Vdc (Max) @ $I_C$ = 8.0 Adc

**16 AMPERE**
**POWER TRANSISTORS**
**COMPLEMENTARY**
**SILICON**
**140–160 VOLTS**



**CASE 340D–01**
**TO–218 TYPE**

## MAXIMUM RATINGS

| Rating | Symbol | MJE4342 MJE4352 | MJE4343 MJE4353 | Unit |
|---|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | 140 | 160 | Vdc |
| Collector–Base Voltage | $V_{CB}$ | 140 | 160 | Vdc |
| Emitter–Base Voltage | $V_{EB}$ | 7.0 | | Vdc |
| Collector Current — Continuous<br>Peak (1) | $I_C$ | 16<br>20 | | Adc |
| Base Current — Continuous | $I_B$ | 5.0 | | Adc |
| Total Power Dissipation @ $T_C$ = 25°C | $P_D$ | 125 | | Watts |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –65 to +150 | | °C |

## THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.0 | °C/W |

(1) Pulse Test: Pulse Width ≤ 5.0 μs, Duty Cycle ≥ 10%.

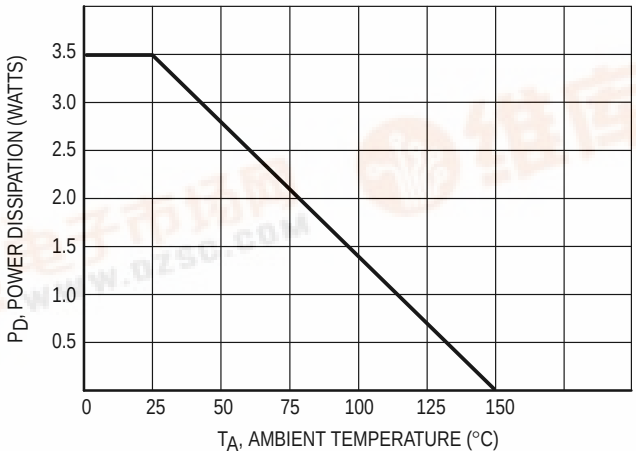


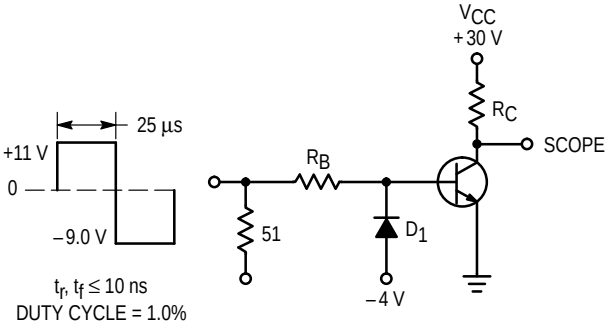

**Figure 1. Power Derating**
**Reference: Ambient Temperature**

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

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector–Emitter Sustaining Voltage (1)<br>($I_C$ = 200 mAdc, $I_B$ = 0) | <br>MJE4342, MJE4352<br>MJE4343, MJE4353 | $V_{CEO(sus)}$ | 140<br>160 | —<br>— | Vdc |
| Collector–Emitter Cutoff Current<br>($V_{CE}$ = 70 Vdc, $I_B$ = 0)<br>($V_{CE}$ = 80 Vdc, $I_B$ = 0 | <br>MJE4342, MJE4352<br>MJE4343, MJE4353 | $I_{CEO}$ | —<br>— | 750<br>750 | μAdc |
| Collector–Emitter Cutoff Current<br>($V_{CE}$ = Rated $V_{CB}$, $V_{EB(off)}$ = 1.5 Vdc)<br>($V_{CE}$ = Rated $V_{CB}$, $V_{EB(off)}$ = 1.5 Vdc, $T_C$ = 150°C) | | $I_{CEX}$ | —<br>— | 1.0<br>5.0 | mAdc |
| Collector–Base Cutoff Current<br>($V_{CB}$ = Rated $V_{CB}$, $I_E$ = 0) | | $I_{CBO}$ | — | 750 | μAdc |
| Emitter–Base Cutoff Current<br>($V_{BE}$ = 7.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | — | 1.0 | mAdc |
| **ON CHARACTERISTICS (1)** | | | | | |
| DC Current Gain<br>($I_C$ = 8.0 Adc, $V_{CE}$ = 2.0 Vdc)<br>($I_C$ = 16 Adc, $V_{CE}$ = 4.0 Vdc) | | $h_{FE}$ | <br>15<br>8.0 | <br>35 (Typ)<br>15 (Typ) | — |
| Collector–Emitter Saturation Voltage<br>($I_C$ = 8.0 Adc, $I_B$ = 800 mA)<br>($I_C$ = 16 Adc, $I_B$ = 2.0 Adc) | | $V_{CE(sat)}$ | <br>—<br>— | <br>2.0<br>3.5 | Vdc |
| Base–Emitter Saturation Voltage<br>($I_C$ = 16 Adc, $I_B$ = 2.0 Adc) | | $V_{BE(sat)}$ | — | 3.9 | Vdc |
| Base–Emitter On Voltage<br>($I_C$ = 16 Adc, $V_{CE}$ = 4.0 Vdc) | | $V_{BE(on)}$ | — | 3.9 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Current–Gain — Bandwidth Product (2)<br>($I_C$ = 1.0 Adc, $V_{CE}$ = 20 Vdc, $f_{test}$ = 0.5 MHz) | | $f_T$ | 1.0 | — | MHz |
| Output Capacitance<br>($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 0.1 MHz) | | $C_{ob}$ | — | 800 | pF |

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≥ 2.0%.

(2) $f_T = |h_{fe}| \bullet f_{test}$.




$R_B$ and $R_C$ VARIED TO OBTAIN DESIRED CURRENT LEVELS
$D_1$ MUST BE FAST RECOVERY TYPE, e.g.:
1N5825 USED ABOVE $I_B \approx$ 100 mA
MSD6100 USED BELOW $I_B \approx$ 100 mA

**Note:** Reverse polarities to test PNP devices.

**Figure 2. Switching Times Test Circuit**

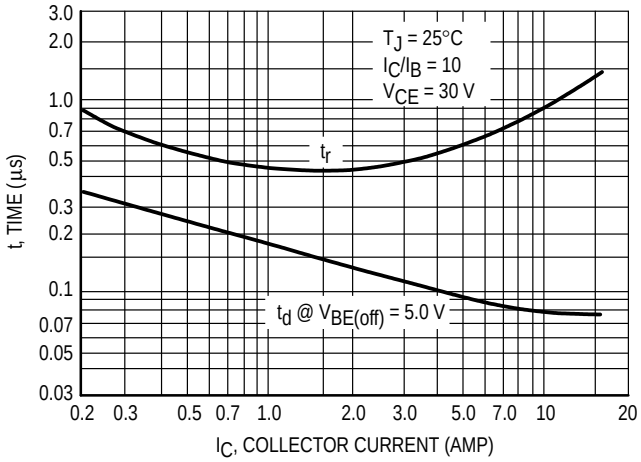



**Figure 3. Typical Turn–On Time**

## TYPICAL CHARACTERISTICS

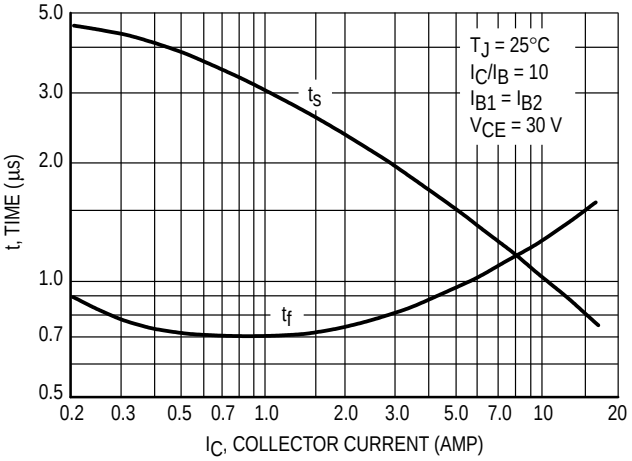



**Figure 4. Turn–Off Time**

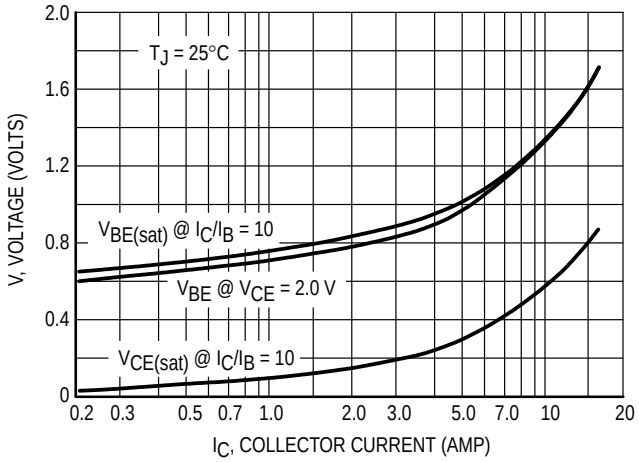



**Figure 5. On Voltages**

## DC CURRENT GAIN

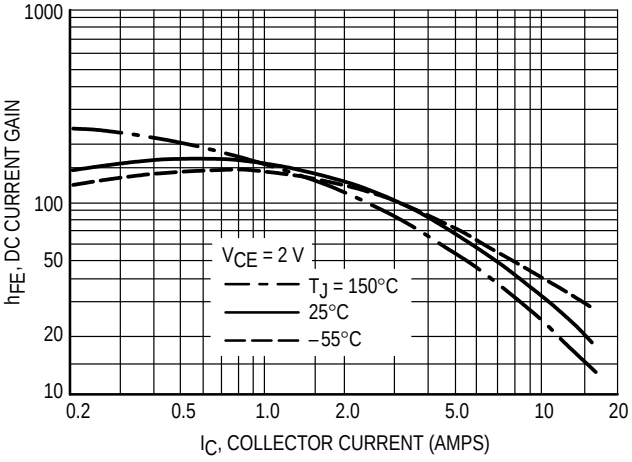



**Figure 6. MJE4340 Series (NPN)**

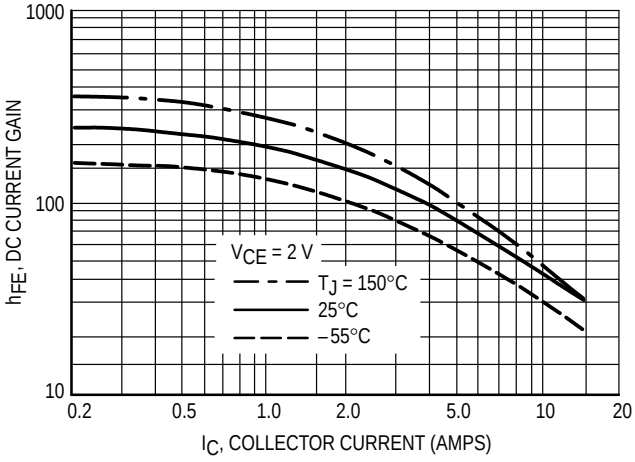



**Figure 7. MJE4350 Series (PNP)**

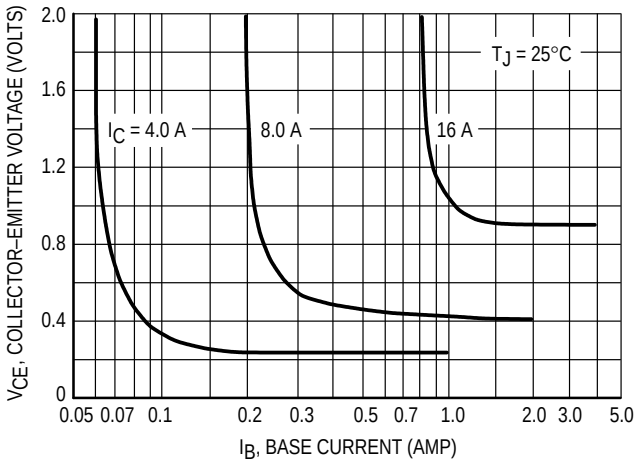



**Figure 8. Collector Saturation Region**

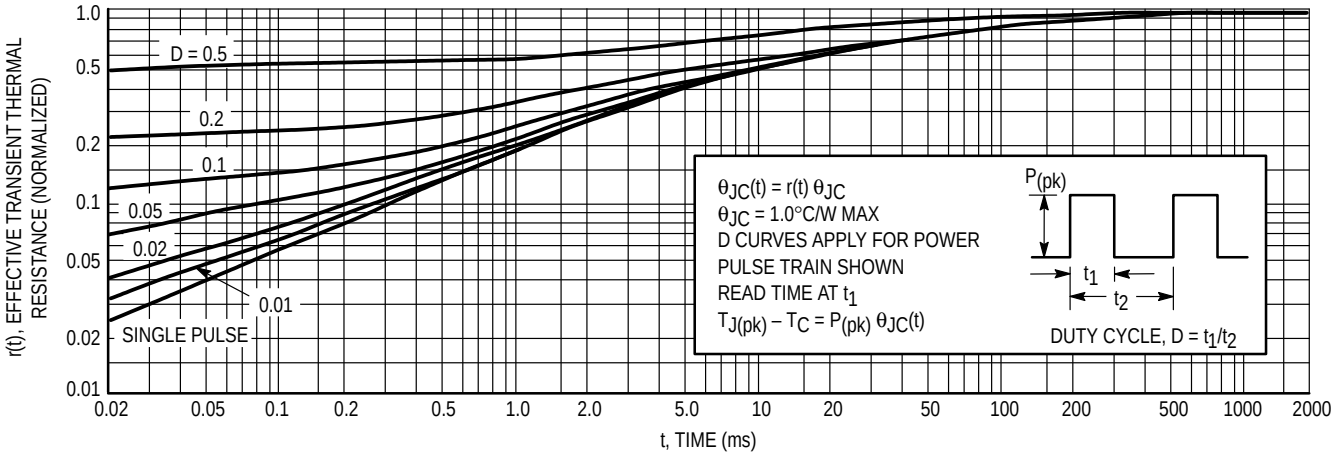



**Figure 9. Thermal Response**

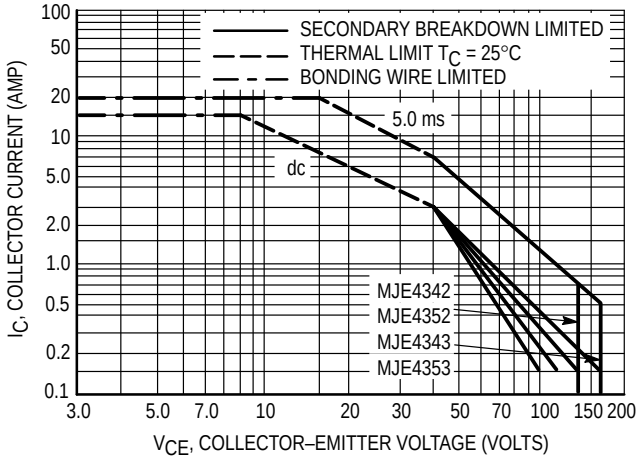



**Figure 10. Maximum Forward Bias Safe Operating Area**

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 Figure 10 is based on $T_C = 25°C$; $T_{J(pk)}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% but must be derated when $T_C \geq 25°C$. Second breakdown limitations do not derate the same as thermal limitations. Allowable current at the voltages shown on Figure 10 may be found at any case temperature by using the appropriate curve on Figure 9.

## REVERSE BIAS

For inductive loads, high voltage and high current must be sustained simultaneously during turn–off, in most cases, with the base to emitter junction reverse biased. Under these conditions the collector voltage must be held to a safe level at or below a specific value of collector current. This can be accomplished by several means such as active clamping, RC snubbing, load line shaping, etc. The safe level for these devices is specified as Reverse Bias Safe Operating Area and represents the voltage–current conditions during reverse biased turn–off. This rating is verified under clamped conditions so that the device is never subjected to an avalanche mode. Figure 11 gives RBSOA characteristics.

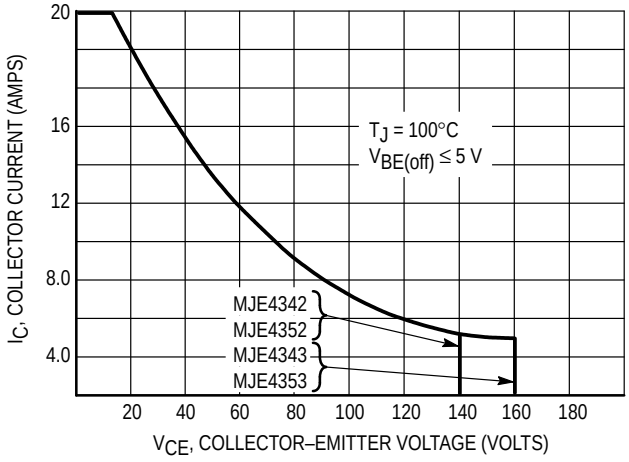
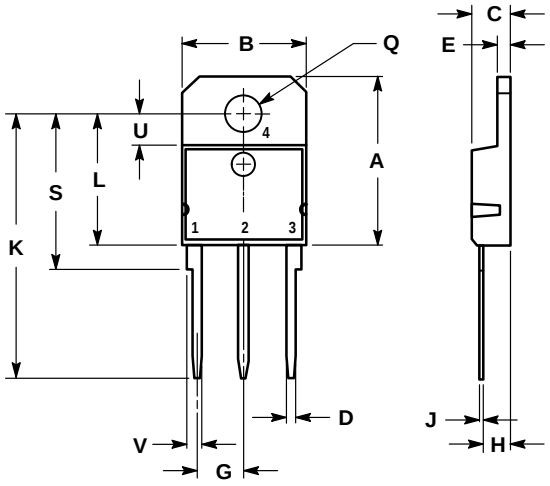



**Figure 11. Maximum Reverse Bias Safe Operating Area**

## PACKAGE DIMENSIONS




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 19.00 | 19.60 | 0.749 | 0.771 |
| B | 14.00 | 14.50 | 0.551 | 0.570 |
| C | 4.20 | 4.70 | 0.165 | 0.185 |
| D | 1.00 | 1.30 | 0.040 | 0.051 |
| E | 1.45 | 1.65 | 0.058 | 0.064 |
| G | 5.21 | 5.72 | 0.206 | 0.225 |
| H | 2.60 | 3.00 | 0.103 | 0.118 |
| J | 0.40 | 0.60 | 0.016 | 0.023 |
| K | 28.50 | 32.00 | 1.123 | 1.259 |
| L | 14.70 | 15.30 | 0.579 | 0.602 |
| Q | 4.00 | 4.25 | 0.158 | 0.167 |
| S | 17.50 | 18.10 | 0.689 | 0.712 |
| U | 3.40 | 3.80 | 0.134 | 0.149 |
| V | 1.50 | 2.00 | 0.060 | 0.078 |

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

**CASE 340D–01**
**TO–218 TYPE**
**ISSUE A**

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