

# 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  
 $V_{CEO(sus)} = 160 \text{ Vdc} \text{ — MJE4343 MJE4353}$
- High DC Current Gain — @  $I_C = 8.0 \text{ Adc}$   
 $h_{FE} = 35 \text{ (Typ)}$
- Low Collector–Emitter Saturation Voltage —  
 $V_{CE(sat)} = 2.0 \text{ Vdc (Max) @ } I_C = 8.0 \text{ Adc}$

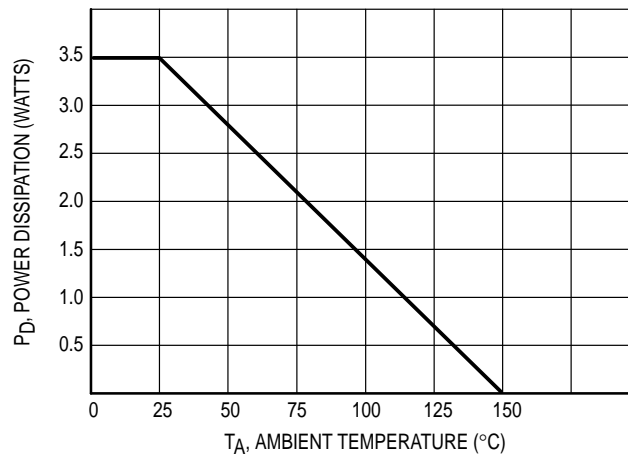
## MAXIMUM RATINGS

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

## THERMAL CHARACTERISTICS

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

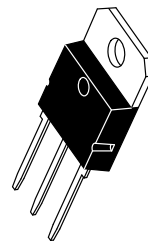
(1) Pulse Test: Pulse Width  $\leq 5.0 \mu\text{s}$ , Duty Cycle  $\geq 10\%$ .



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

**NPN**  
**MJE4343**  
**PNP**  
**MJE4353**

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



**CASE 340D-02**  
**TO-218 TYPE**

# MJE4343 MJE4353

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

| Characteristic   | Symbol        | Min | Max        | Unit             |
|--|---------------|-----|------------|------------------|
| <b>OFF CHARACTERISTICS</b>   |               |     |            |                  |
| Collector–Emitter Sustaining Voltage (1)<br>( $I_C = 200\text{ mA}$ , $I_B = 0$ )  | $V_{CE(sus)}$ | 160 | —          | Vdc              |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = 80\text{ Vdc}$ , $I_B = 0$ )   | $I_{CEO}$     | —   | 750        | $\mu\text{A}$ dc |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = \text{Rated } V_{CB}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ )<br>( $V_{CE} = \text{Rated } V_{CB}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) | $I_{CEX}$     | —   | 1.0<br>5.0 | $\text{mA}$ dc   |
| Collector–Base Cutoff Current<br>( $V_{CB} = \text{Rated } V_{CB}$ , $I_E = 0$ )   | $I_{CBO}$     | —   | 750        | $\mu\text{A}$ dc |
| Emitter–Base Cutoff Current<br>( $V_{BE} = 7.0\text{ Vdc}$ , $I_C = 0$ )   | $I_{EBO}$     | —   | 1.0        | $\text{mA}$ dc   |

## ON CHARACTERISTICS (1)

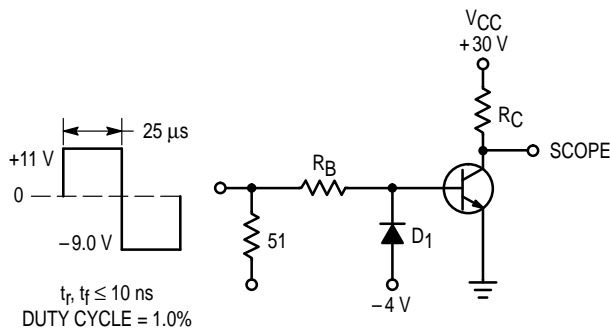
|  |               |           |                      |     |
|--|---------------|-----------|----------------------|-----|
| DC Current Gain<br>( $I_C = 8.0\text{ Adc}$ , $V_{CE} = 2.0\text{ Vdc}$ )<br>( $I_C = 16\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )               | $h_{FE}$      | 15<br>8.0 | 35 (Typ)<br>15 (Typ) | —   |
| Collector–Emitter Saturation Voltage<br>( $I_C = 8.0\text{ Adc}$ , $I_B = 800\text{ mA}$ )<br>( $I_C = 16\text{ Adc}$ , $I_B = 2.0\text{ Adc}$ ) | $V_{CE(sat)}$ | —<br>—    | 2.0<br>3.5           | Vdc |
| Base–Emitter Saturation Voltage<br>( $I_C = 16\text{ Adc}$ , $I_B = 2.0\text{ Adc}$ )  | $V_{BE(sat)}$ | —         | 3.9                  | Vdc |
| Base–Emitter On Voltage<br>( $I_C = 16\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )   | $V_{BE(on)}$  | —         | 3.9                  | Vdc |

## DYNAMIC CHARACTERISTICS

|   |          |     |     |     |
|---|----------|-----|-----|-----|
| Current–Gain — Bandwidth Product (2)<br>( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 20\text{ Vdc}$ , $f_{test} = 0.5\text{ MHz}$ ) | $f_T$    | 1.0 | —   | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ )                                       | $C_{ob}$ | —   | 800 | pF  |

(1) Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\geq 2.0\%$ .

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



$R_B$  and  $R_C$  VARIED TO OBTAIN DESIRED CURRENT LEVELS

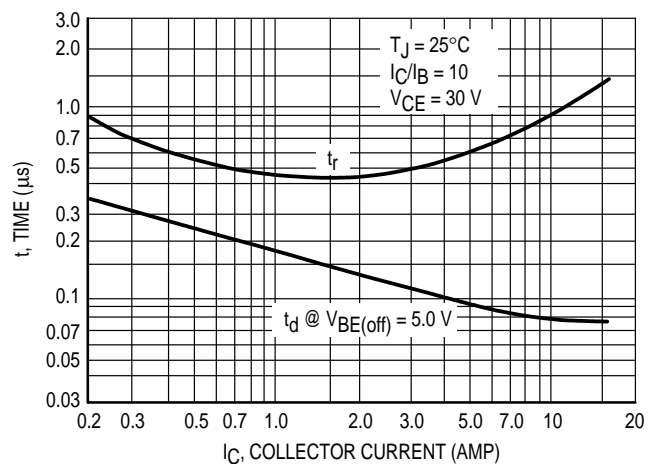
$D_1$  MUST BE FAST RECOVERY TYPE, e.g.:

1N5825 USED ABOVE  $I_B \approx 100\text{ mA}$

MSD6100 USED BELOW  $I_B \approx 100\text{ mA}$

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

**Figure 2. Switching Times Test Circuit**



**Figure 3. Typical Turn–On Time**

TYPICAL CHARACTERISTICS

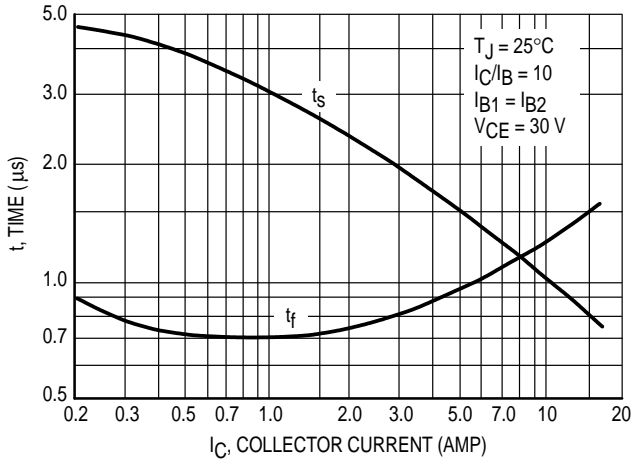


Figure 4. Turn-Off Time

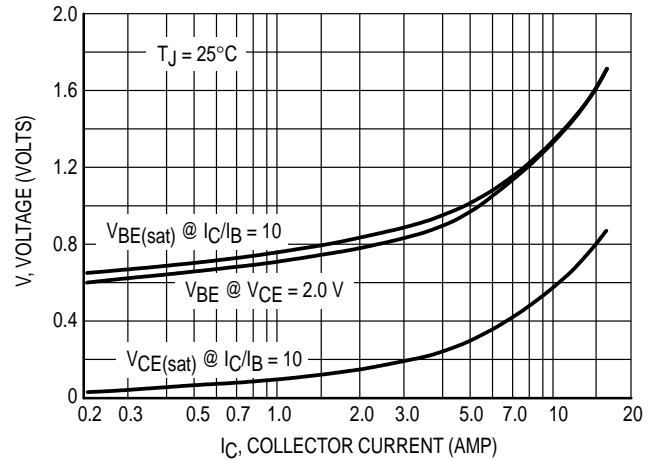


Figure 5. On Voltages

DC CURRENT GAIN

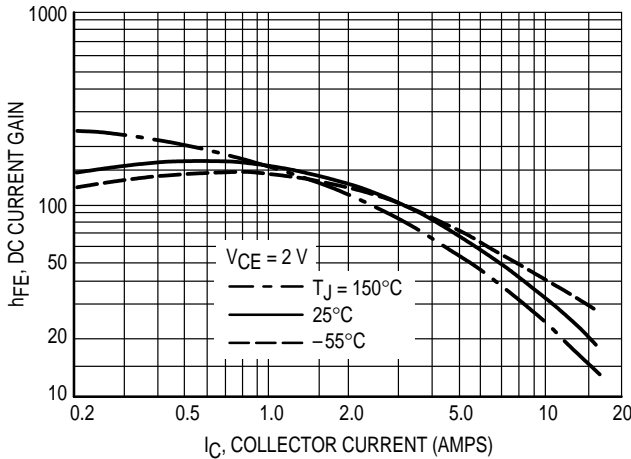


Figure 6. MJE4340 Series (NPN)

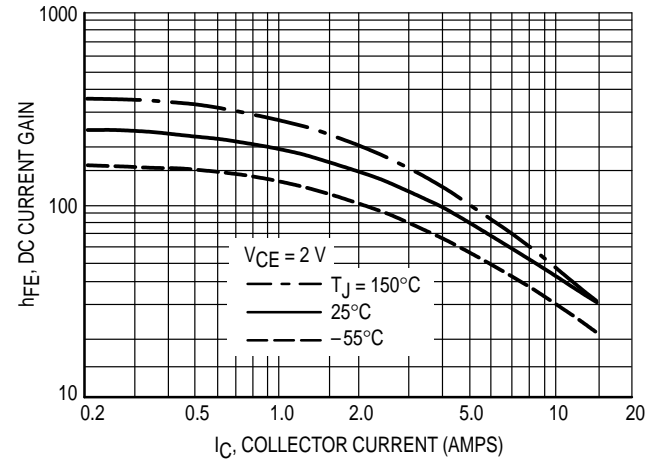


Figure 7. MJE4350 Series (PNP)

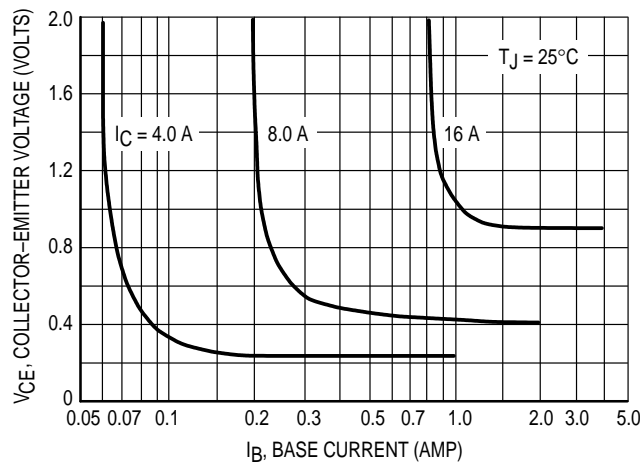


Figure 8. Collector Saturation Region

# MJE4343 MJE4353

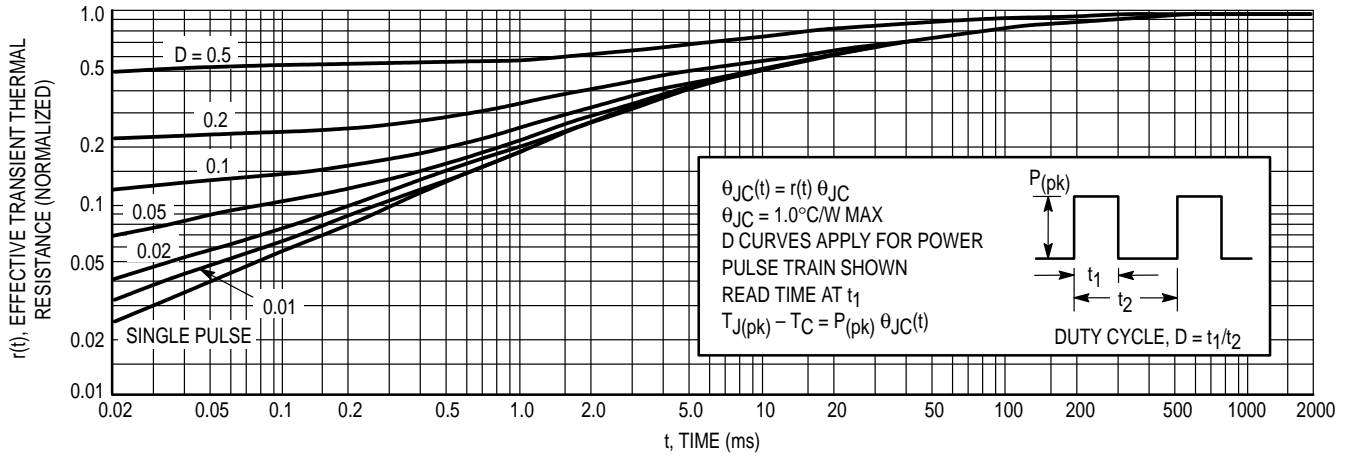


Figure 9. Thermal Response

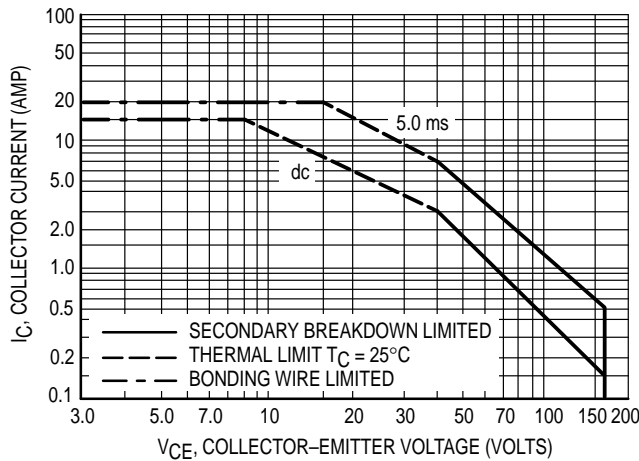


Figure 10. Maximum Forward Bias Safe Operating Area

## 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.

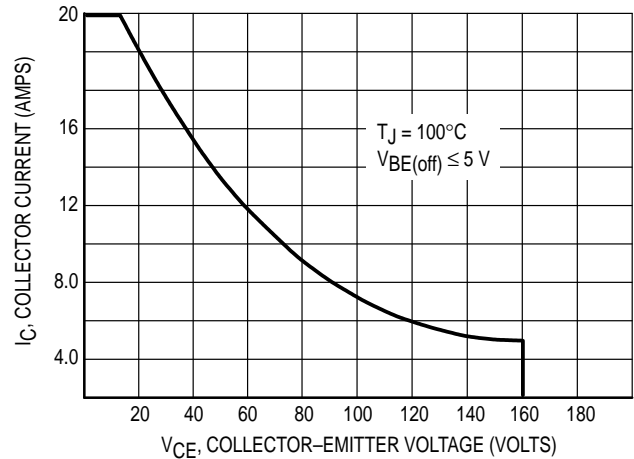
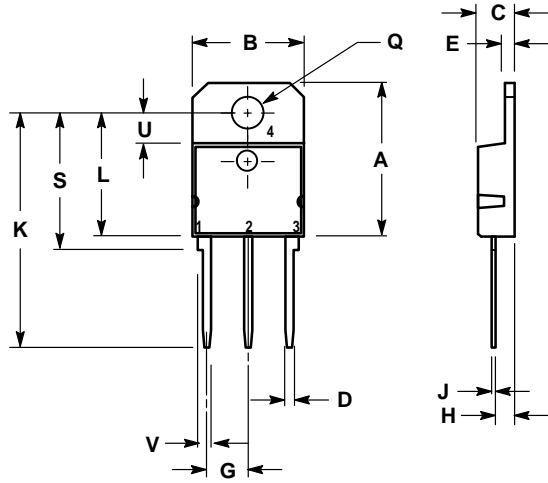


Figure 11. Maximum Reverse Bias Safe Operating Area

PACKAGE DIMENSIONS




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

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | —           | 20.35 | —         | 0.801 |
| B   | 14.70       | 15.20 | 0.579     | 0.598 |
| C   | 4.70        | 4.90  | 0.185     | 0.193 |
| D   | 1.10        | 1.30  | 0.043     | 0.051 |
| E   | 1.17        | 1.37  | 0.046     | 0.054 |
| G   | 5.40        | 5.55  | 0.213     | 0.219 |
| H   | 2.00        | 3.00  | 0.079     | 0.118 |
| J   | 0.50        | 0.78  | 0.020     | 0.031 |
| K   | 31.00 REF   |       | 1.220 REF |       |
| L   | —           | 16.20 | —         | 0.638 |
| Q   | 4.00        | 4.10  | 0.158     | 0.161 |
| S   | 17.80       | 18.20 | 0.701     | 0.717 |
| U   | 4.00 REF    |       | 0.157 REF |       |
| V   | 1.75 REF    |       | 0.069     |       |

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

CASE 340D-02  
 ISSUE B

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