

MJE700, MJE702, MJE703 (PNP) - MJE800, MJE802, MJE803 (NPN)

Plastic Darlington Complementary Silicon Power Transistors

These devices are designed for general-purpose amplifier and low-speed switching applications.

Features

- High DC Current Gain – $h_{FE} = 2000$ (Typ) @ $I_C = 2.0$ Adc
- Monolithic Construction with Built-in Base-Emitter Resistors to Limit Leakage – Multiplication
- Choice of Packages – MJE700 and MJE800 Series
- Pb-Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------------|-------------|---------------------------|
| Collector-Emitter Voltage MJE700, MJE800 MJE702, MJE703, MJE802, MJE803 | V_{CEO} | 60 80 | Vdc |
| Collector-Base Voltage MJE700, MJE800 MJE702, MJE703, MJE802, MJE803 | V_{CB} | 60 80 | Vdc |
| Emitter-Base Voltage | V_{EB} | 5.0 | Vdc |
| Collector Current | I_C | 4.0 | Adc |
| Base Current | I_B | 0.1 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 40 0.32 | W mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|---------------|------|--------------------|
| Thermal Resistance, Junction-to-Case | θ_{JC} | 6.25 | $^\circ\text{C/W}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

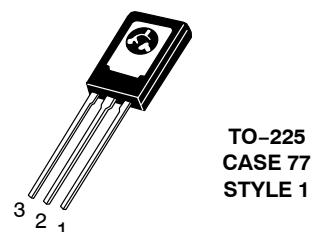
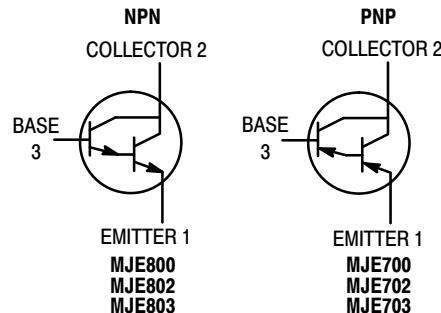
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

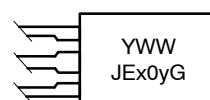
<http://onsemi.com>

4.0 AMPERE DARLINGTON POWER TRANSISTORS COMPLEMENTARY SILICON 40 WATT 50 WATT



TO-225
CASE 77
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
JEx0y = Device Code
x = 7 or 8
y = 0, 2, or 3
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 Breakdown Voltage (Note 1) ($I_C = 50 \text{ mA}_\text{dc}$, $I_B = 0$) | $V_{(\text{BR})\text{CEO}}$ | 60 80 | – – | Vdc |
| Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$, $I_B = 0$) ($V_{CE} = 80 \text{ Vdc}$, $I_B = 0$) | I_{CEO} | – – | 100 100 | μA_dc |
| Collector Cutoff Current ($V_{CB} = \text{Rated } BV_{\text{CEO}}$, $I_E = 0$) ($V_{CB} = \text{Rated } BV_{\text{CEO}}$, $I_E = 0$, $T_C = 100^\circ\text{C}$) | I_{CBO} | – – | 100 500 | μA_dc |
| Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}$, $I_C = 0$) | I_{EBO} | – | 2.0 | mA_dc |

ON CHARACTERISTICS

| | | | | | |
|--|---|----------------------|-------------------|-------------------|-----|
| DC Current Gain (Note 1) ($I_C = 1.5 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 2.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 4.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) | MJE700, MJE702, MJE800, MJE802 MJE703, MJE803 All devices | h_{FE} | 750 750 100 | – – – | – |
| Collector-Emitter Saturation Voltage (Note 1) ($I_C = 1.5 \text{ Adc}$, $I_B = 30 \text{ mA}_\text{dc}$) ($I_C = 2.0 \text{ Adc}$, $I_B = 40 \text{ mA}_\text{dc}$) ($I_C = 4.0 \text{ Adc}$, $I_B = 40 \text{ mA}_\text{dc}$) | MJE700, MJE702, MJE800, MJE802 MJE703, MJE803 All devices | $V_{CE(\text{sat})}$ | – – – | 2.5 2.8 3.0 | Vdc |
| Base-Emitter On Voltage (Note 1) ($I_C = 1.5 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 2.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 4.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) | MJE700, MJE702, MJE800, MJE802 MJE703, MJE803 All devices | $V_{BE(\text{on})}$ | – – – | 2.5 2.5 3.0 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|---|----------|-----|---|---|
| Small-Signal Current Gain ($I_C = 1.5 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$, $f = 1.0 \text{ MHz}$) | h_{fe} | 1.0 | – | – |
|---|----------|-----|---|---|

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

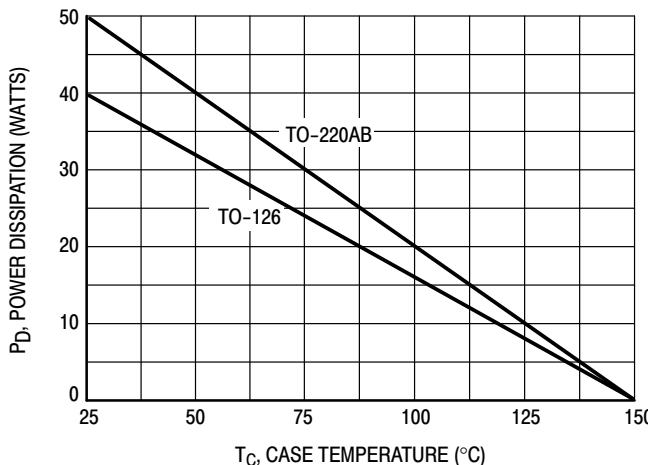


Figure 1. Power Derating

MJE700, MJE702, MJE703 (PNP) – MJE800, MJE802, MJE803 (NPN)

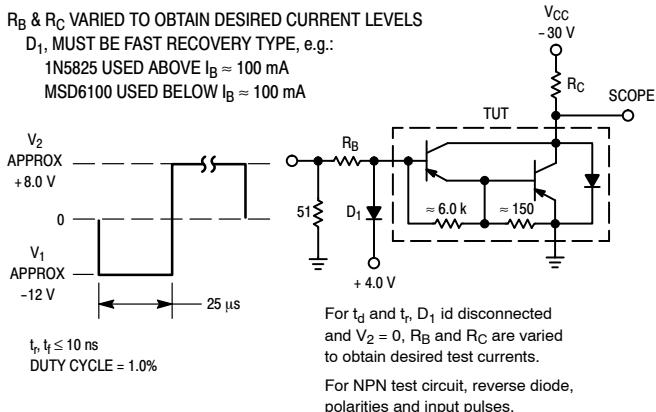


Figure 2. Switching Times Test Circuit

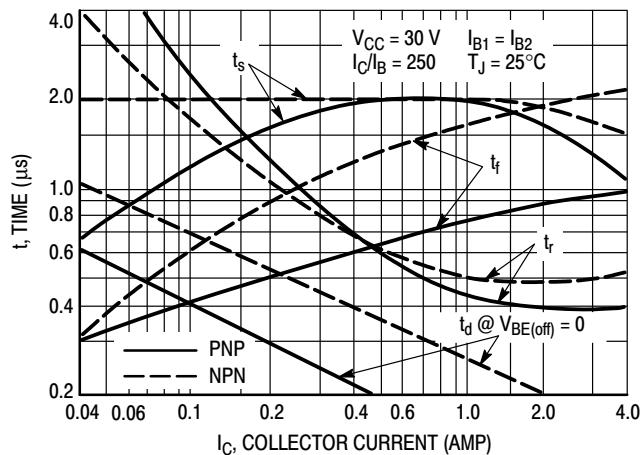


Figure 3. Switching Times

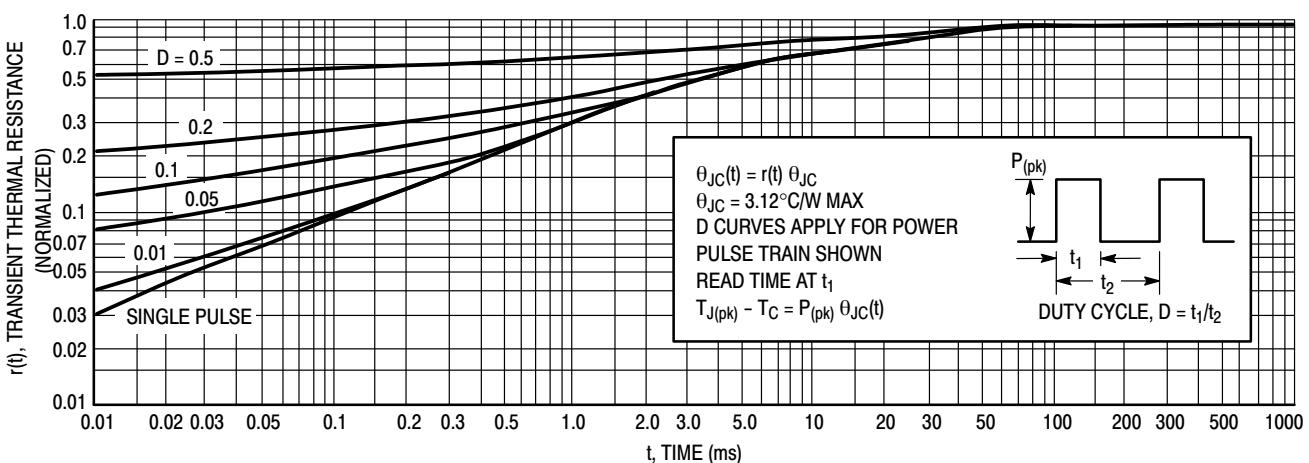


Figure 4. Thermal Response (MJE700, 800 Series)

ACTIVE-REGION SAFE-OPERATING AREA

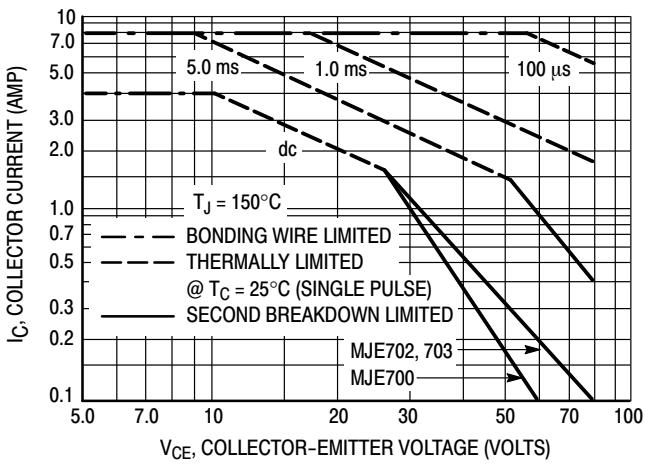


Figure 5. MJE700 Series

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.

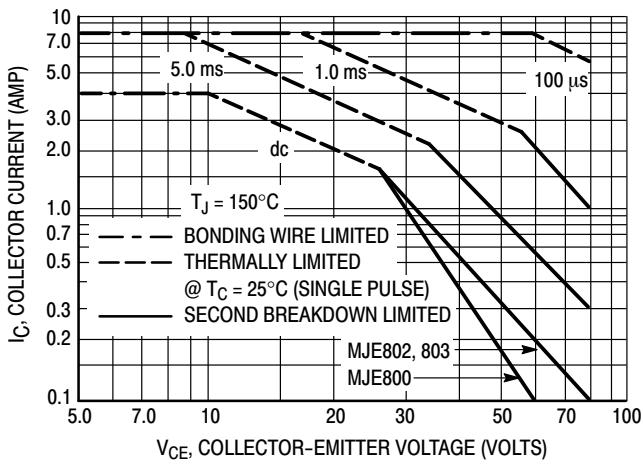


Figure 6. MJE800 Series

The data of Figures 5 and 6 are 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 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

MJE700, MJE702, MJE703 (PNP) – MJE800, MJE802, MJE803 (NPN)

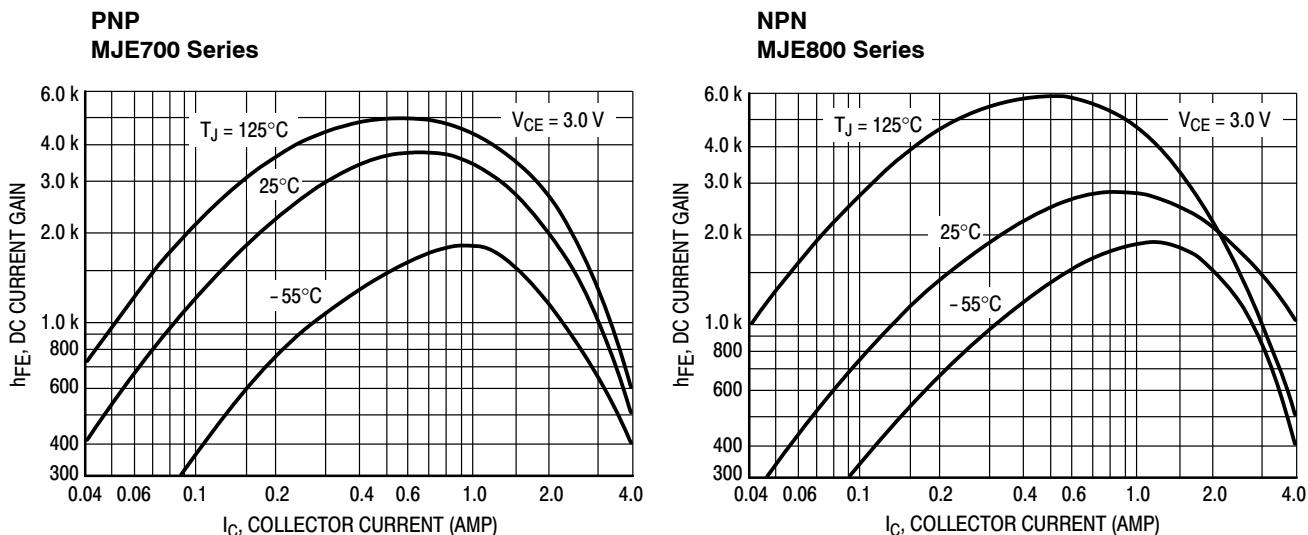
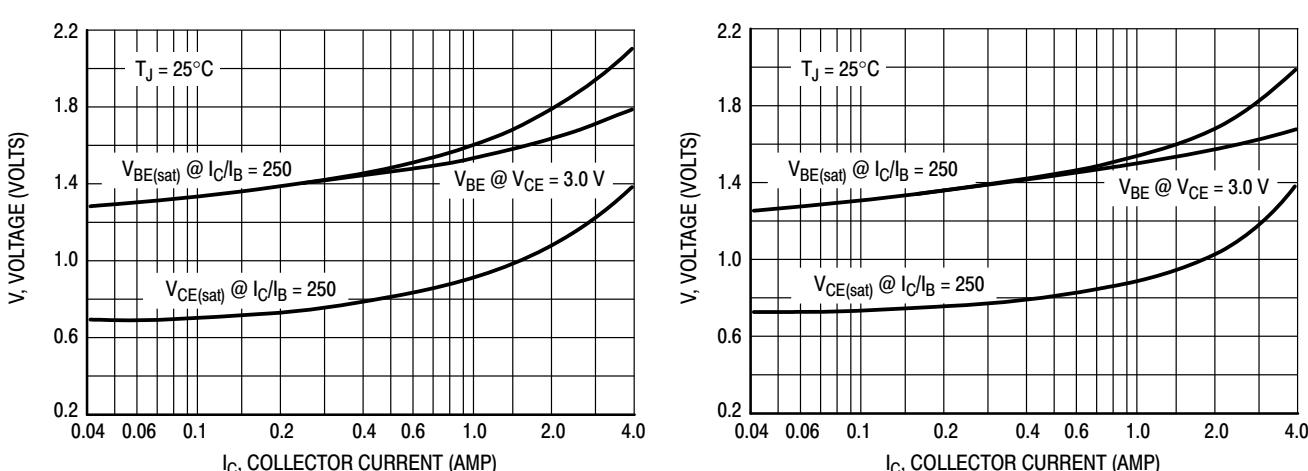
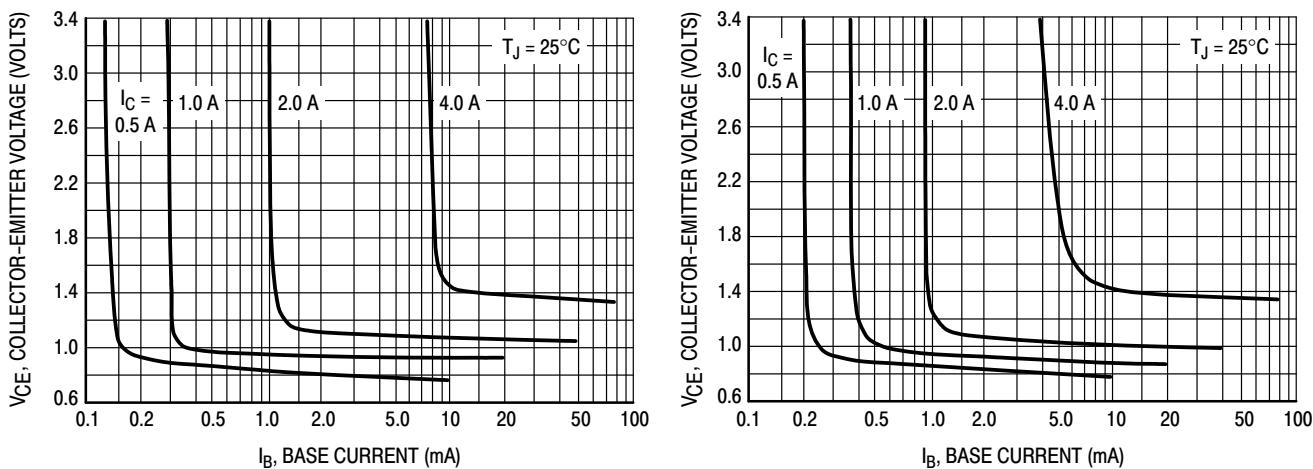


Figure 7. DC Current Gain



MJE700, MJE702, MJE703 (PNP) – MJE800, MJE802, MJE803 (NPN)

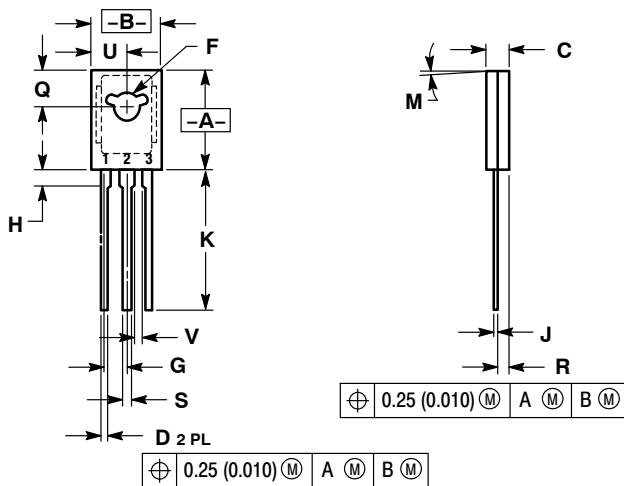
ORDERING INFORMATION

| Device | Package | Shipping |
|---------|---------------------|-----------------|
| MJE700 | TO-225 | 50 Units / Bulk |
| MJE700G | TO-225 (Pb-Free) | |
| MJE702 | TO-225 | |
| MJE702G | TO-225 (Pb-Free) | |
| MJE703 | TO-225 | |
| MJE703G | TO-225 (Pb-Free) | |
| MJE800 | TO-225 | |
| MJE800G | TO-225 (Pb-Free) | |
| MJE802 | TO-225 | |
| MJE802G | TO-225 (Pb-Free) | |
| MJE803 | TO-225 | |
| MJE803G | TO-225 (Pb-Free) | |

MJE700, MJE702, MJE703 (PNP) – MJE800, MJE802, MJE803 (NPN)

PACKAGE DIMENSIONS

TO-225
CASE 77-09
ISSUE Z



NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 077-01 THRU -08 OBSOLETE, NEW STANDARD 077-09.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.425 | 0.435 | 10.80 | 11.04 |
| B | 0.295 | 0.305 | 7.50 | 7.74 |
| C | 0.095 | 0.105 | 2.42 | 2.66 |
| D | 0.020 | 0.026 | 0.51 | 0.66 |
| F | 0.115 | 0.130 | 2.93 | 3.30 |
| G | 0.094 | BSC | 2.39 | BSC |
| H | 0.050 | 0.095 | 1.27 | 2.41 |
| J | 0.015 | 0.025 | 0.39 | 0.63 |
| K | 0.575 | 0.655 | 14.61 | 16.63 |
| M | 5° TYP | | 5° TYP | |
| Q | 0.148 | 0.158 | 3.76 | 4.01 |
| R | 0.045 | 0.065 | 1.15 | 1.65 |
| S | 0.025 | 0.035 | 0.64 | 0.88 |
| U | 0.145 | 0.155 | 3.69 | 3.93 |
| V | 0.040 | --- | 1.02 | --- |

STYLE 1:
 1. Emitter
 2. Collector
 3. Base

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