

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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

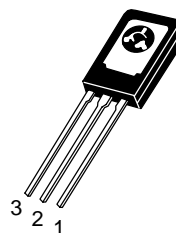
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

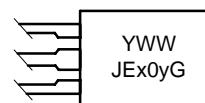
<http://onsemi.com>

**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.

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

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

| Characteristic | Symbol | Min | Max | Unit | |
|--|--|----------------------|----------|------------|------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage (Note 1) (I _C = 50 mA _{dc} , I _B = 0) | MJE700, MJE800 MJE702, MJE703, MJE802, MJE803 | V _{(BR)CEO} | 60 80 | – – | V _{dc} |
| Collector Cutoff Current (V _{CE} = 60 V _{dc} , I _B = 0) (V _{CE} = 80 V _{dc} , I _B = 0) | MJE700, MJE800 MJE702, MJE703, MJE802, MJE803 | I _{CEO} | – – | 100 100 | μA _{dc} |
| Collector Cutoff Current (V _{CB} = Rated BV _{CEO} , I _E = 0) (V _{CB} = Rated BV _{CEO} , I _E = 0, T _C = 100°C) | | I _{CBO} | – – | 100 500 | μA _{dc} |
| Emitter Cutoff Current (V _{BE} = 5.0 V _{dc} , I _C = 0) | | I _{EBO} | – | 2.0 | mA _{dc} |

ON CHARACTERISTICS

| | | | | | |
|---|---|----------------------|-------------------|-------------------|-----------------|
| DC Current Gain (Note 1) (I _C = 1.5 A _{dc} , V _{CE} = 3.0 V _{dc}) (I _C = 2.0 A _{dc} , V _{CE} = 3.0 V _{dc}) (I _C = 4.0 A _{dc} , V _{CE} = 3.0 V _{dc}) | MJE700, MJE702, MJE800, MJE802 MJE703, MJE803 All devices | h _{FE} | 750 750 100 | – – – | – |
| Collector–Emitter Saturation Voltage (Note 1) (I _C = 1.5 A _{dc} , I _B = 30 mA _{dc}) (I _C = 2.0 A _{dc} , I _B = 40 mA _{dc}) (I _C = 4.0 A _{dc} , I _B = 40 mA _{dc}) | MJE700, MJE702, MJE800, MJE802 MJE703, MJE803 All devices | V _{CE(sat)} | – – – | 2.5 2.8 3.0 | V _{dc} |
| Base–Emitter On Voltage (Note 1) (I _C = 1.5 A _{dc} , V _{CE} = 3.0 V _{dc}) (I _C = 2.0 A _{dc} , V _{CE} = 3.0 V _{dc}) (I _C = 4.0 A _{dc} , V _{CE} = 3.0 V _{dc}) | MJE700, MJE702, MJE800, MJE802 MJE703, MJE803 All devices | V _{BE(on)} | – – – | 2.5 2.5 3.0 | V _{dc} |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|--|-----------------|-----|---|---|
| Small–Signal Current Gain (I _C = 1.5 A _{dc} , V _{CE} = 3.0 V _{dc} , f = 1.0 MHz) | | h _{fe} | 1.0 | – | – |
|---|--|-----------------|-----|---|---|

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

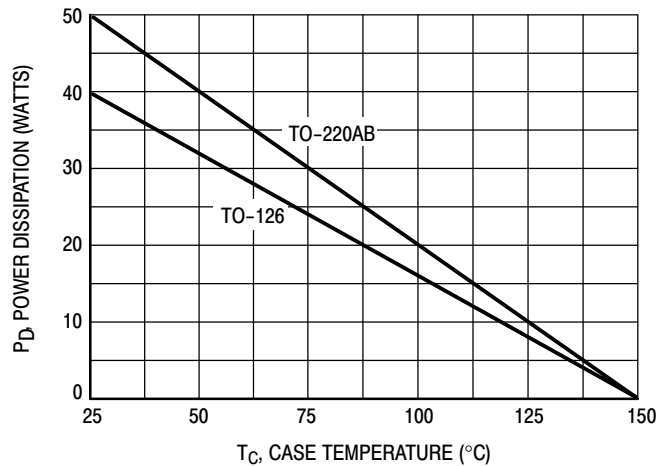


Figure 1. Power Derating

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

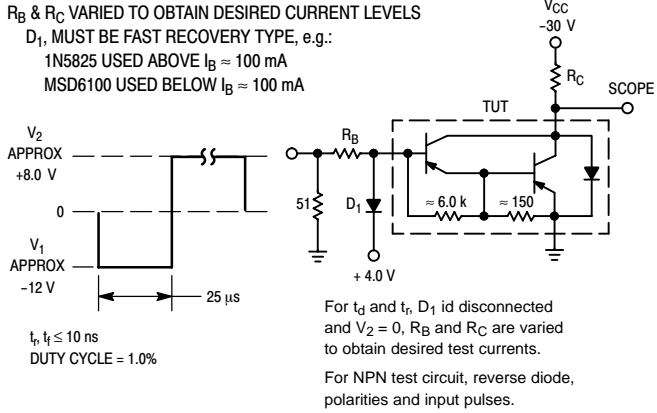


Figure 2. Switching Times Test Circuit

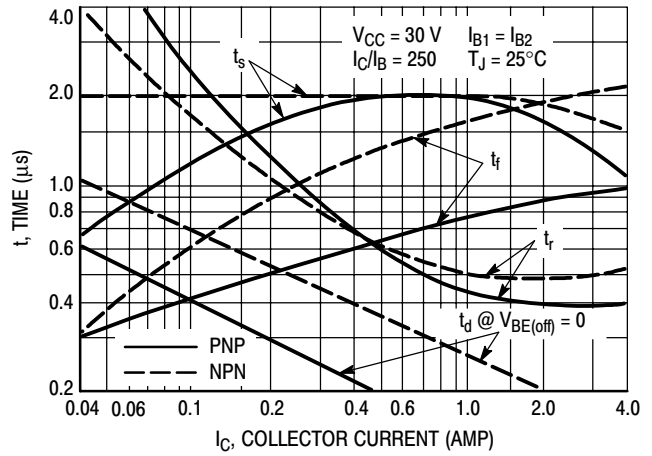


Figure 3. Switching Times

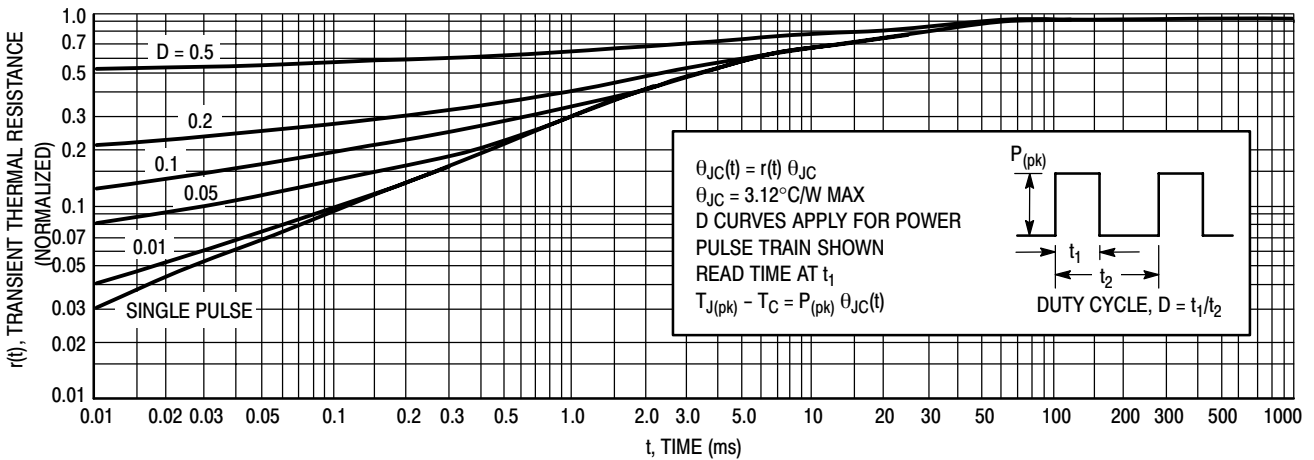


Figure 4. Thermal Response (MJE700, 800 Series)

ACTIVE-REGION SAFE-OPERATING AREA

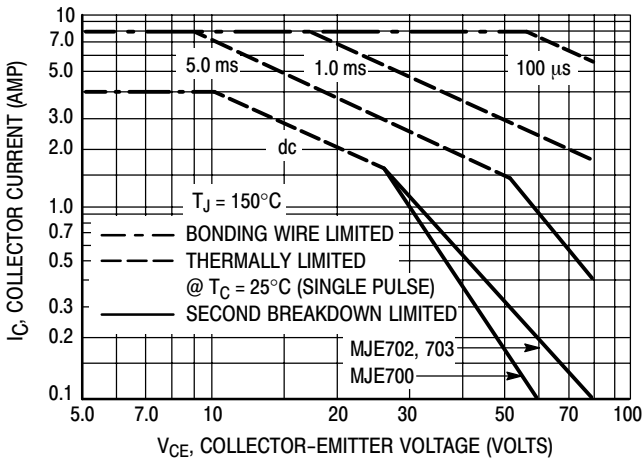


Figure 5. MJE700 Series

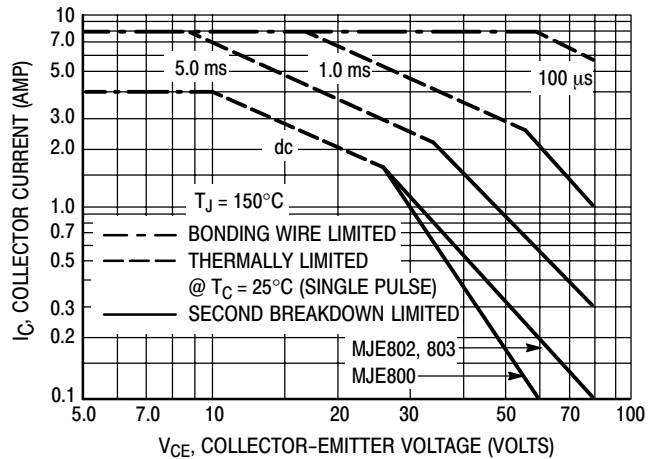


Figure 6. MJE800 Series

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.

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)

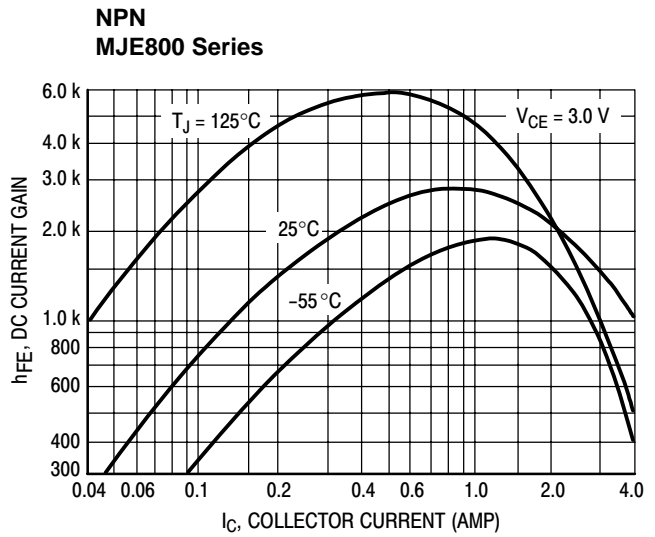
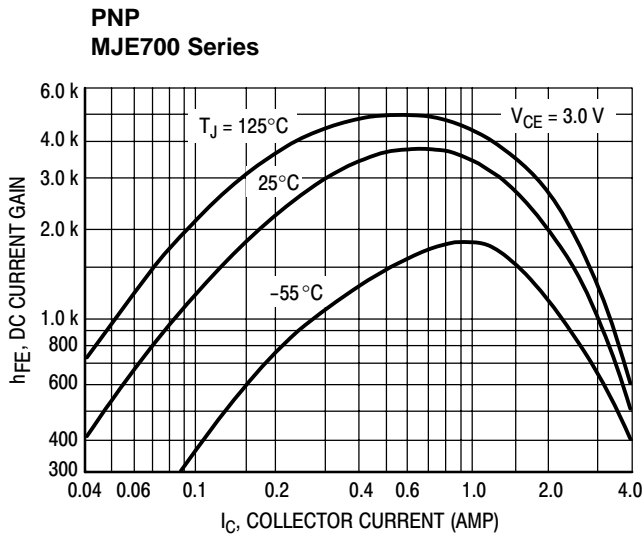


Figure 7. DC Current Gain

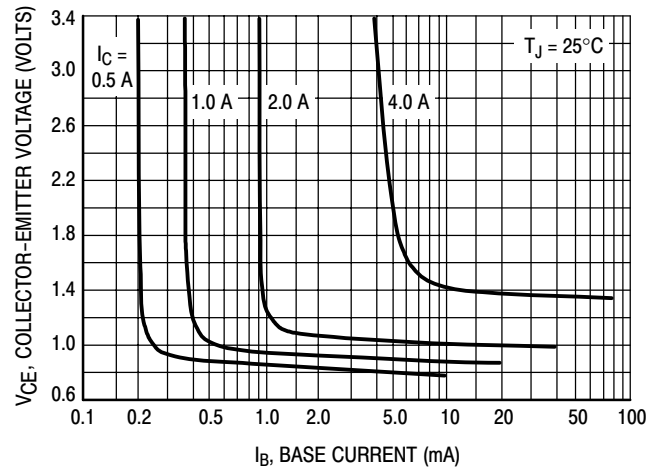
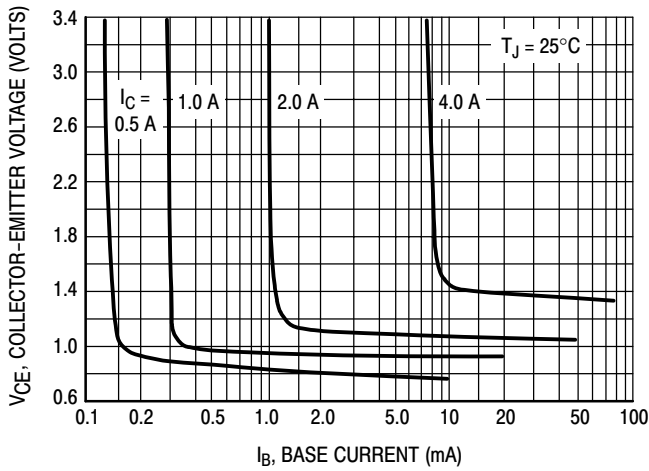


Figure 8. Collector Saturation Region

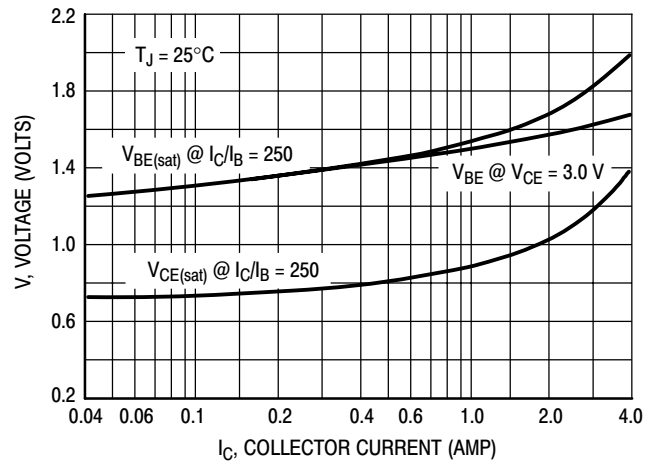
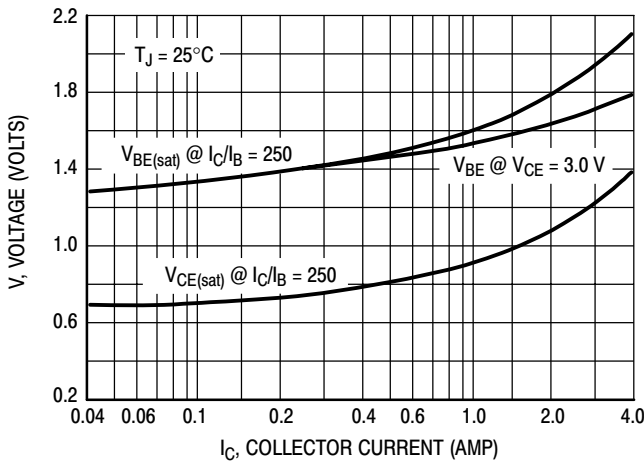


Figure 9. "On" Voltages

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

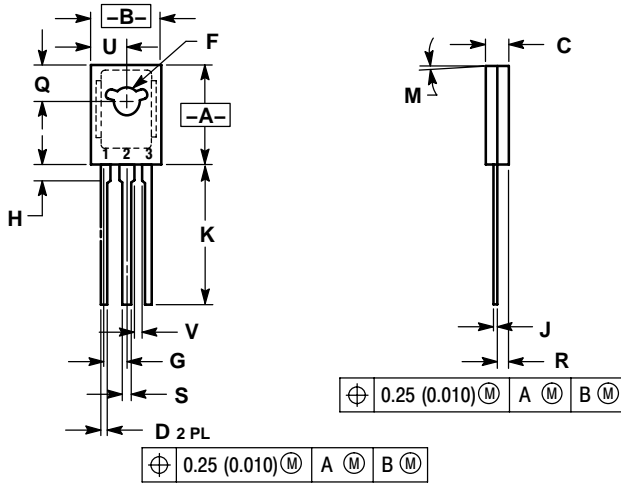
ORDERING INFORMATION

| 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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