

## PLASTIC DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS

... designed for general-purpose and low-speed switching application.

### FEATURES

- \* High DC Current Gain-  
hFE = 2000 (Typ) @  $I_C = 2.0$  A
- \* Monolithic Construction with Built-in Base-Emitter  
Resistors Limit Leakage Multiplication

### MAXIMUM RATINGS

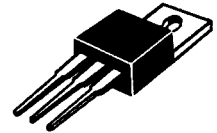
| Characteristic  | Symbol         | MJE700T<br>MJE701T<br>MJE800T<br>MJE801T | MJE702T<br>MJE703T<br>MJE802T<br>MJE803T | Unit                     |
|---|----------------|--|--|--------------------------|
| Collector-Emitter Voltage   | $V_{CEO}$      | 60                                       | 80                                       | V                        |
| Collector-Base Voltage  | $V_{CBO}$      | 60                                       | 80                                       | V                        |
| Emitter-Base Voltage  | $V_{EBO}$      | 5.0                                      |  | V                        |
| Collector current   | $I_C$          | 4.0                                      |  | A                        |
| Base current  | $I_B$          | 0.1                                      |  | A                        |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 50<br>0.4                                |  | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{STG}$ | - 55 to +150                             |  | $^\circ\text{C}$         |

### THERMAL CHARACTERISTICS

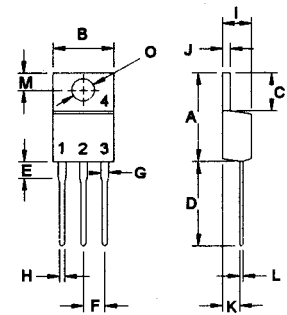
| Characteristic                      | Symbol          | Max  | Unit                      |
|-------------------------------------|-----------------|------|---------------------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 2.50 | $^\circ\text{C}/\text{W}$ |

| PNP     | NPN     |
|---------|---------|
| MJE700T | MJE800T |
| MJE701T | MJE801T |
| MJE702T | MJE802T |
| MJE703T | MJE803T |

4.0 AMPERE  
DARLINGTON  
POWER TRANSISTORS  
COMPLEMENTARY SILICON  
60-80 VOLTS  
40 WATTS



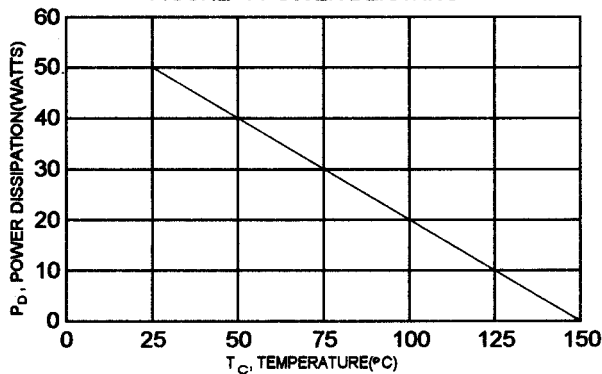
TO-220



PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 14.68       | 15.31 |
| B   | 9.78        | 10.42 |
| C   | 5.01        | 6.52  |
| D   | 13.06       | 14.62 |
| E   | 3.57        | 4.07  |
| F   | 2.42        | 3.66  |
| G   | 1.12        | 1.36  |
| H   | 0.72        | 0.96  |
| I   | 4.22        | 4.98  |
| J   | 1.14        | 1.38  |
| K   | 2.20        | 2.97  |
| L   | 0.33        | 0.55  |
| M   | 2.48        | 2.98  |
| O   | 3.70        | 3.90  |

FIGURE -1 POWER DERATING



**MJE700T thru MJE703T PNP / MJE800T thru MJE803T NPN**

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

**OFF CHARACTERISTICS**

|  |           |          |            |               |
|--|-----------|----------|------------|---------------|
| Collector - Emitter Breakdown Voltage<br>( $I_c = 50\text{ mA}$ , $I_B = 0$ ) MJE700T,MJE701T MJE800T,MJE801T<br>MJE702T,MJE703T MJE802T,MJE803T                             | $V_{CEO}$ | 60<br>80 |            | V             |
| Collector Cutoff Current<br>( $V_{CE} = 60\text{ V}$ , $I_B = 0$ ) MJE700T,MJE701T MJE800T,MJE801T<br>( $V_{CE} = 80\text{ V}$ , $I_B = 0$ ) MJE702T,MJE703T MJE802T,MJE803T | $I_{CEO}$ |          | 100<br>100 | $\mu\text{A}$ |
| Collector Cutoff Current<br>( $V_{CB} = \text{Rated } V_{CBO}$ , $I_E = 0$ )<br>( $V_{CB} = \text{Rated } V_{CBO}$ , $I_E = 0$ , $T_c = 100^\circ\text{C}$ )                 | $I_{CBO}$ |          | 100<br>500 | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{BE} = 5.0\text{ V}$ , $I_c = 0$ )  | $I_{EBO}$ |          | 2.0        | mA            |

**ON CHARACTERISTICS (1)**

|   |               |                   |                   |   |
|---|---------------|-------------------|-------------------|---|
| DC Current Gain<br>( $I_c = 1.5\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) MJE700T,MJE702T MJE800T,MJE802T<br>( $I_c = 2.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) MJE701T,MJE703T MJE801T,MJE803T<br>( $I_c = 4.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) All devices             | hFE           | 750<br>750<br>100 |                   |   |
| Collector-Emitter Saturation Voltage<br>( $I_c = 1.5\text{ A}$ , $I_B = 30\text{ mA}$ ) MJE700T,MJE702T MJE800T,MJE802T<br>( $I_c = 2.0\text{ A}$ , $I_B = 40\text{ mA}$ ) MJE701T,MJE703T MJE801T,MJE803T<br>( $I_c = 4.0\text{ A}$ , $I_B = 40\text{ mA}$ ) All devices | $V_{CE(sat)}$ |                   | 2.5<br>2.8<br>3.0 | V |
| Base-Emitter On Voltage<br>( $I_c = 1.5\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) MJE700T,MJE702T MJE800T,MJE802T<br>( $I_c = 2.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) MJE701T,MJE703T MJE801T,MJE803T<br>( $I_c = 4.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) All devices     | $V_{BE(on)}$  |                   | 2.5<br>2.5<br>3.0 | V |

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

FIGURE 2 - SWITCHING TIMES TEST CIRCUIT

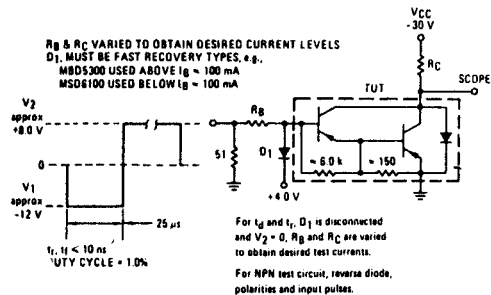


FIG-3 TURN-ON TIME

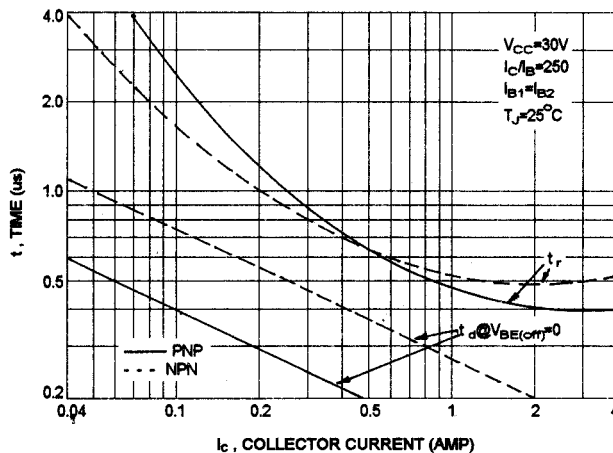


FIG-4 TURN-OFF TIME

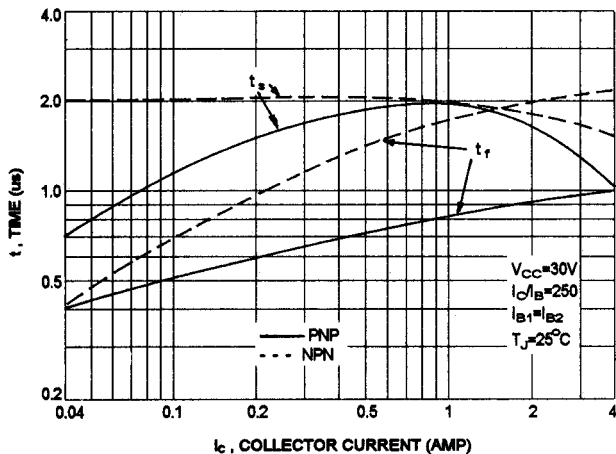


FIG-5 ACTIVE REGION SAFE OPERATING AREA

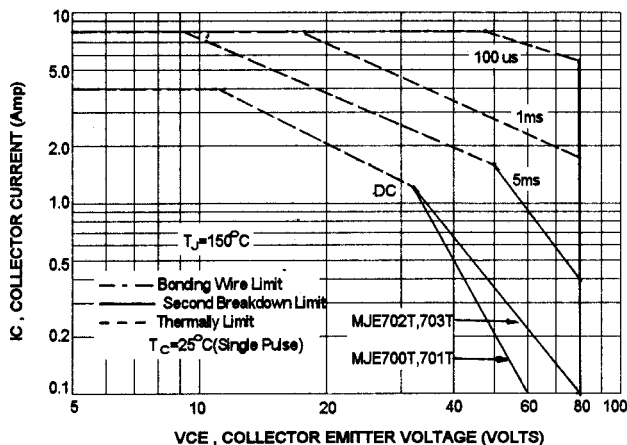
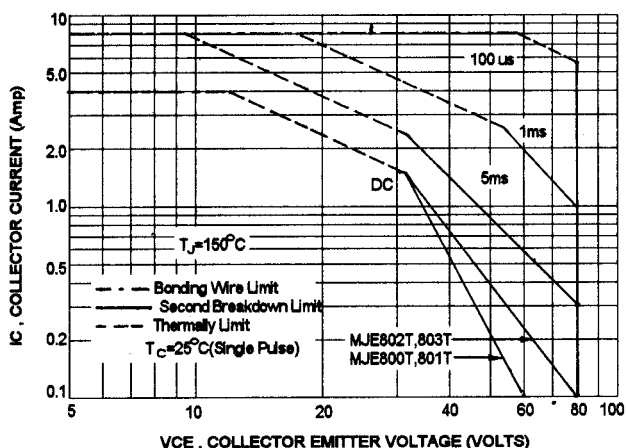


FIG-6 ACTIVE REGION SAFE OPERATING AREA



There are two limitation 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 curves indicate.

The data of Fig-5 and Fig-6 is base on  $T_{J(PK)}=150^{\circ}C$ ,  $T_C$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 150^{\circ}C$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

MJE700T thru MJE703T PNP / MJE800T thru MJE803T NPN

FIG-7 DC CURRENT GAIN

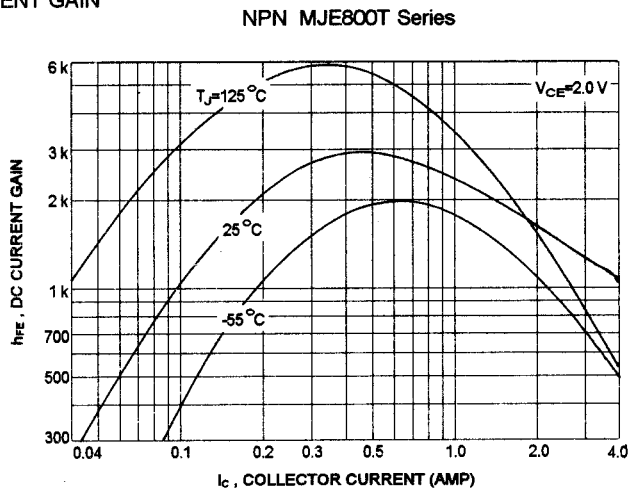
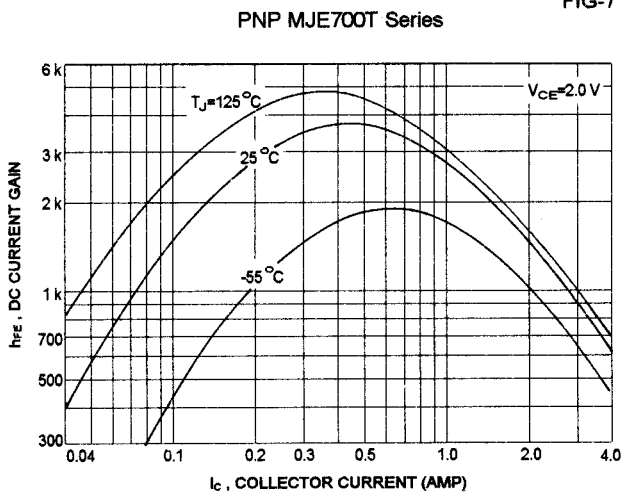


FIG-8 "ON" VOLTAGE

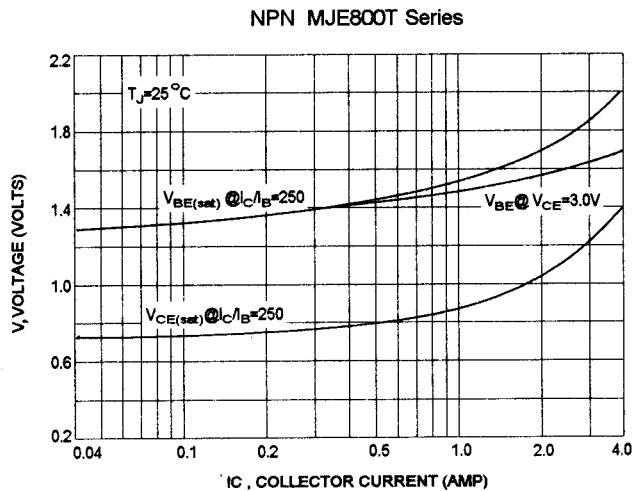
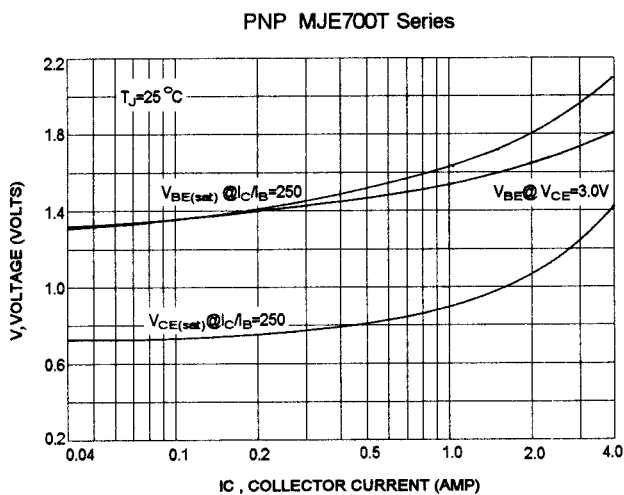


FIG-9 COLLECTOR SATURATION REGION

