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°C Derate above 25°C	P_D	40 0.32	W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	θ_{JC}	6.25	°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.

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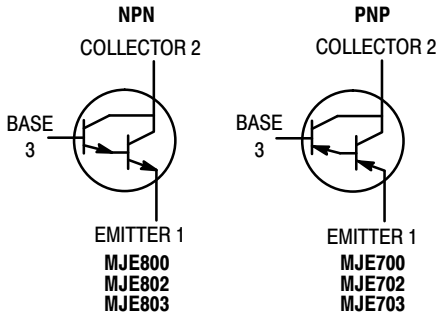
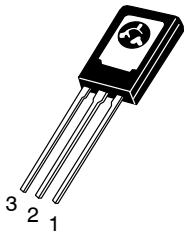
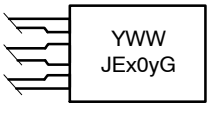
4.0 AMPERE
DARLINGTON POWER TRANSISTORS
COMPLEMENTARY SILICON
40 WATT
50 WATT





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°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (Note 1)	MJE700, MJE800	$V_{(BR)CEO}$	60	–	Vdc
(I_C = 50 mAdc, I_B = 0)	MJE702, MJE703, MJE802, MJE803		80	–	
Collector Cutoff Current		I_{CEO}			μAdc
(V_{CE} = 60 Vdc, I_B = 0)	MJE700, MJE800		–	100	
(V_{CE} = 80 Vdc, I_B = 0)	MJE702, MJE703, MJE802, MJE803		–	100	
Collector Cutoff Current		I_{CBO}			μAdc
(V_{CB} = Rated BV_{CEO}, I_E = 0)			–	100	
(V_{CB} = Rated BV_{CEO}, I_E = 0, T_C = 100°C)			–	500	
Emitter Cutoff Current		I_{EBO}	–	2.0	mAdc
(V_{BE} = 5.0 Vdc, I_C = 0)					
ON CHARACTERISTICS					
DC Current Gain (Note 1)		h_{FE}			–
(I_C = 1.5 Adc, V_{CE} = 3.0 Vdc)	MJE700, MJE702, MJE800, MJE802		750	–	
(I_C = 2.0 Adc, V_{CE} = 3.0 Vdc)	MJE703, MJE803		750	–	
(I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)	All devices		100	–	
Collector–Emitter Saturation Voltage (Note 1)		$V_{CE(sat)}$			Vdc
(I_C = 1.5 Adc, I_B = 30 mAdc)	MJE700, MJE702, MJE800, MJE802		–	2.5	
(I_C = 2.0 Adc, I_B = 40 mAdc)	MJE703, MJE803		–	2.8	
(I_C = 4.0 Adc, I_B = 40 mAdc)	All devices		–	3.0	
Base–Emitter On Voltage (Note 1)		$V_{BE(on)}$			Vdc
(I_C = 1.5 Adc, V_{CE} = 3.0 Vdc)	MJE700, MJE702, MJE800, MJE802		–	2.5	
(I_C = 2.0 Adc, V_{CE} = 3.0 Vdc)	MJE703, MJE803		–	2.5	
(I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)	All devices		–	3.0	
DYNAMIC CHARACTERISTICS					
Small–Signal Current Gain		h_{fe}	1.0	–	–
(I_C = 1.5 Adc, V_{CE} = 3.0 Vdc, f = 1.0 MHz)					

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

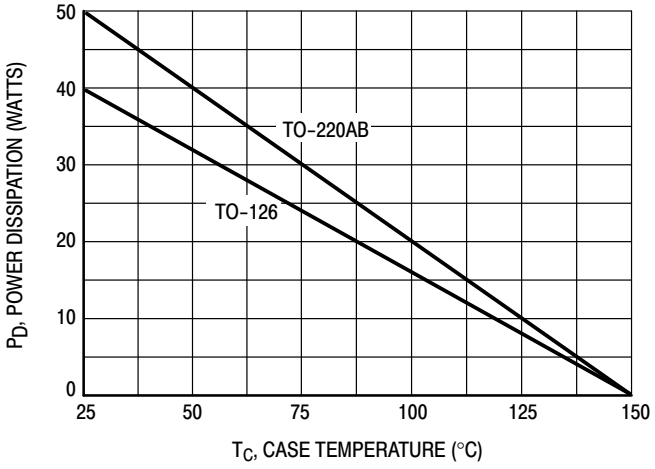


Figure 1. Power Derating

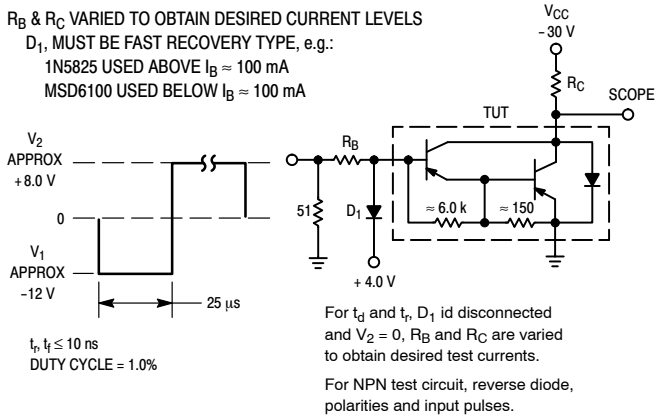


Figure 2. Switching Times Test Circuit

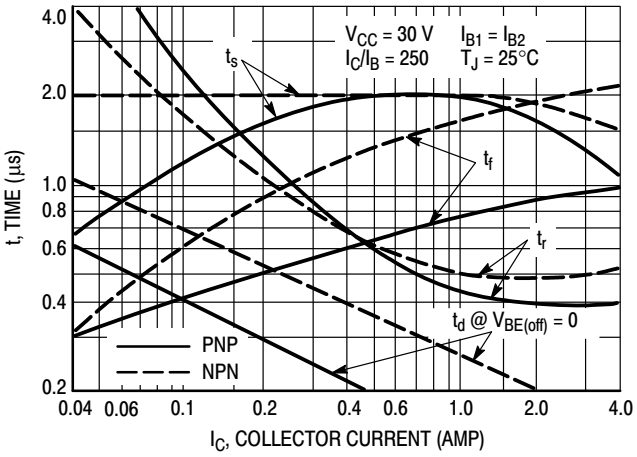


Figure 3. Switching Times

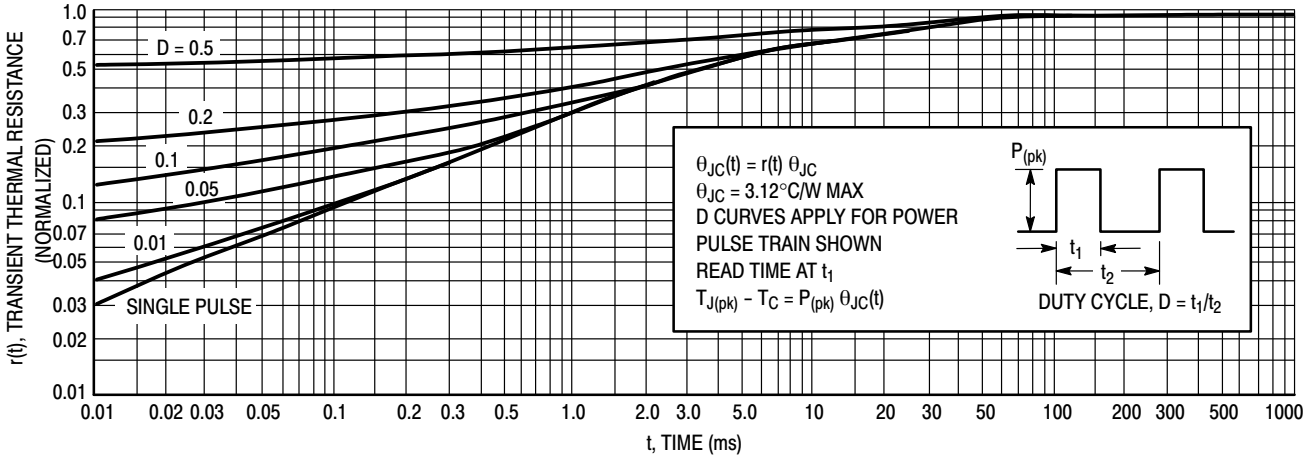


Figure 4. Thermal Response (MJE700, 800 Series)

ACTIVE−REGION SAFE−OPERATING AREA

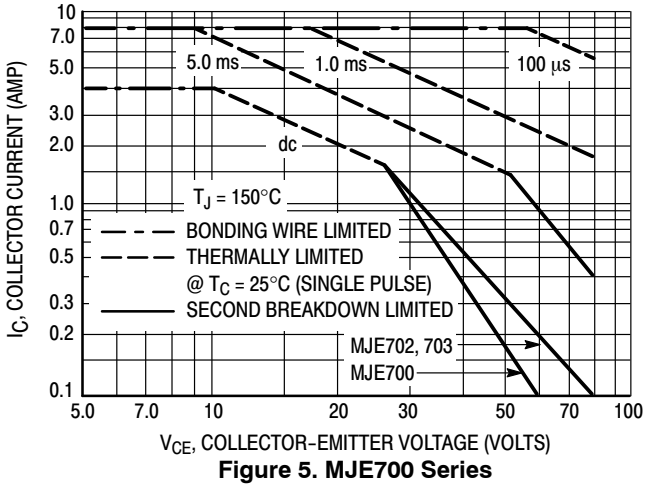


Figure 5. MJE700 Series

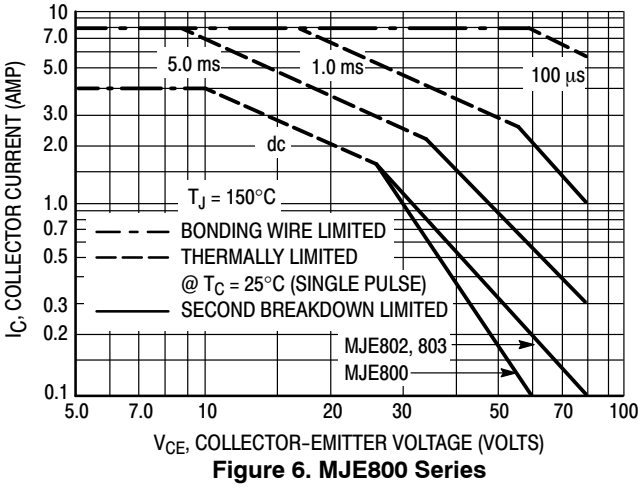
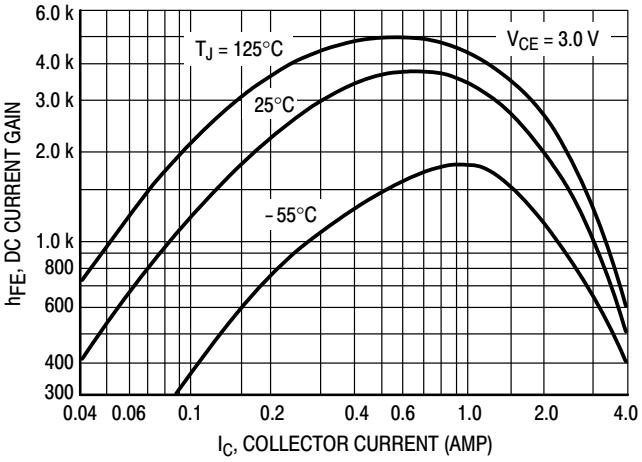


Figure 6. MJE800 Series

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 $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 150°C$. $T_{J(pk)}$ 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.

PNP
MJE700 Series



NPN
MJE800 Series

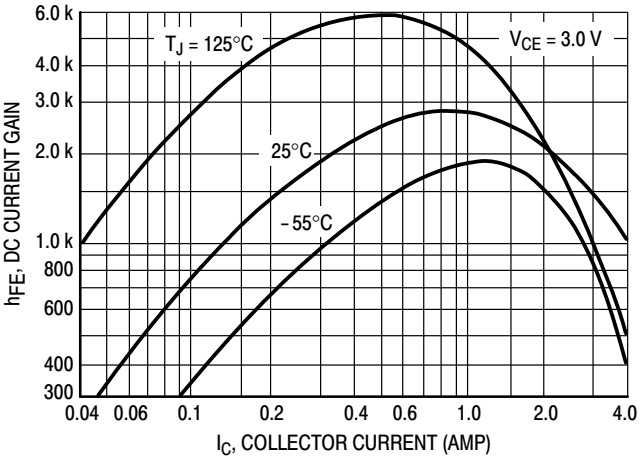
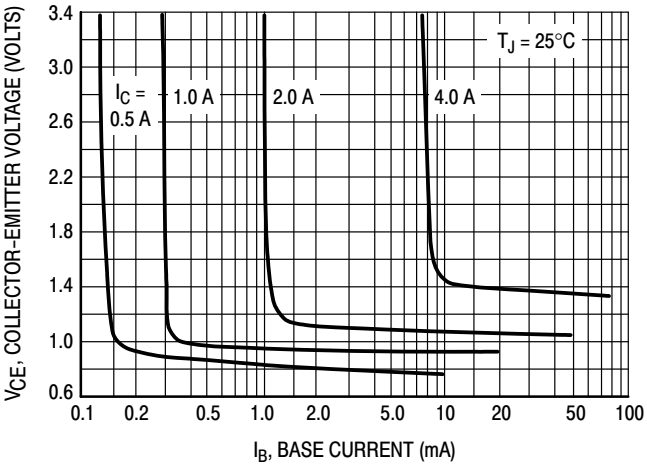


Figure 7. DC Current Gain



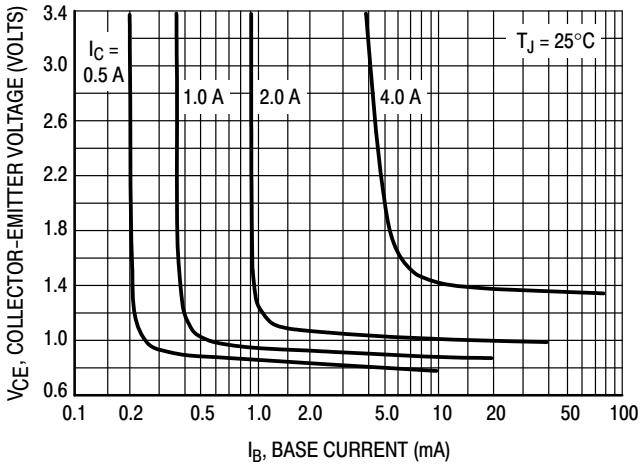
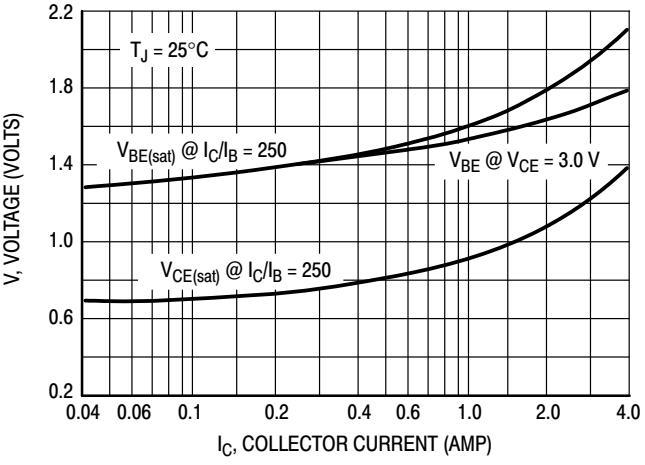


Figure 8. Collector Saturation Region



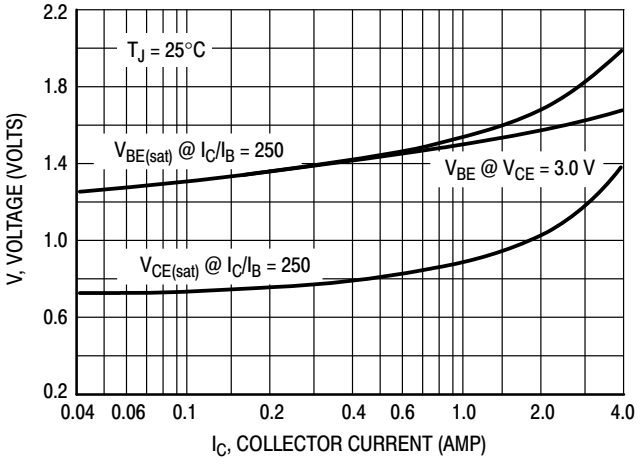


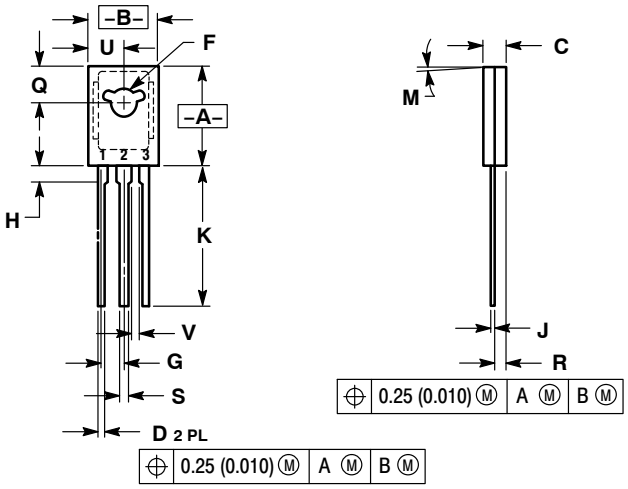
Figure 9. “On” Voltages

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)	

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.

	INCHES		MILLIMETERS	
DIM	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:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

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MJE700/D

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