New Jersey Semi-Conductor Products, Inc.

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MJE1090 thru MJE1093 PNP (SILICON)
MJE2090 thru MJE2093
MJE1100 thru MJE1103 NPN
MJE2100 thru MJE2103

PLASTIC MEDIUM-POWER COMPLEMENTARY SILICON TRANSISTORS

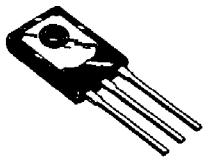
Designed for use in driver and output stages in complementary audio amplifier applications.

- High DC Current Gain – h_{FE} = 750 (Min) @ I_C = 3.0 and 4.0 Adc
- True Three Lead Monolithic Construction – Emitter-Base Resistors to Prevent Leakage Multiplication are Built in.
- Available in Two Packages – Case 90 or Case 199

5.0 AMPERE DARLINGTON POWER TRANSISTORS COMPLEMENTARY SILICON

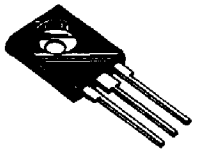
60-80 VOLTS 70 WATTS

MJE1090
MJE1091
MJE1092
MJE1093
MJE1100
MJE1101
MJE1102
MJE1103



CASE 90-05

MJE2090
MJE2091
MJE2092
MJE2093
MJE2100
MJE2101
MJE2102
MJE2103



CASE 199-04

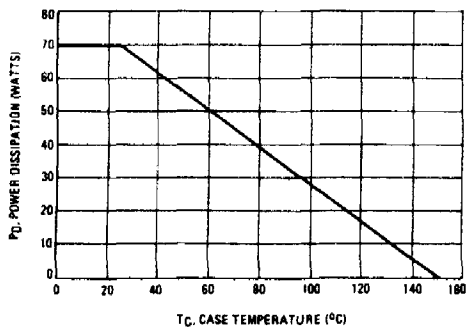
MAXIMUM RATINGS

Rating	Symbol	MJE1090 MJE1091 MJE1100 MJE1101 MJE2090 MJE2091 MJE2100 MJE2101	MJE1092 MJE1093 MJE1102 MJE1103 MJE2092 MJE2093 MJE2102 MJE2103	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Collector-Base Voltage	V_{CB}	60	80	Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current	I_C	5.0		Adc
Base Current	I_B	0.1		Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	70 0.56		Watts W/°C
Operating and Storage Junction Temperating Range	T_J, T_{stg}	-55 to +150		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	1.8	°C/W

FIGURE 1 – POWER DERATING



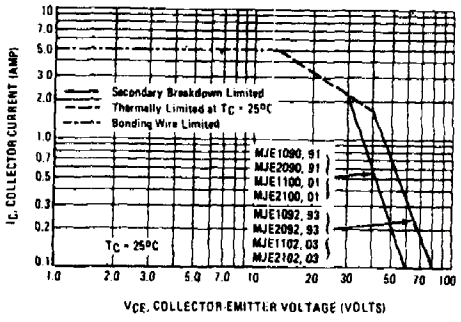
MJE1090 thru MJE1093 PNP/MJE1100 thru MJE1103 NPN (continued)
MJE2090 thru MJE2093 PNP/MJE2100 thru MJE2103 NPN

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage[1] (I_C = 100 mAdc, I_B = 0)	MJE1090, MJE1091, MJE1100, MJE1101	BV_{CEO}	60	–	Vdc
	MJE2090, MJE2091, MJE2100, MJE2101		60	–	
	MJE1092, MJE1093, MJE1102, MJE1103		80	–	
	MJE2092, MJE2093, MJE2102, MJE2103		80	–	
Collector Cutoff Current (V_{CE} = 30 Vdc, I_B = 0)	MJE1090, MJE1091, MJE1100, MJE1101	I_{CEO}	–	500	μAdc
	MJE2090, MJE2091, MJE2100, MJE2101		–	500	
(V_{CE} = 40 Vdc, I_B = 0)	MJE1092, MJE1093, MJE1102, MJE1103		–	500	
	MJE2092, MJE2093, MJE2102, MJE2103		–	500	
Collector Cutoff Current (V_{CB} = Rated BV_{CEO}, I_E = 0)		I_{CBO}	–	0.2	mAdc
(V_{CB} = Rated BV_{CEO}, I_E = 0, T_C = 100°C)			–	2.0	
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	2.0	mAdc
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 3.0 Adc, V_{CE} = 3.0 Vdc)	MJE1090, MJE1092, MJE1100, MJE1102	h_{FE}	750	–	–
	MJE2090, MJE2092, MJE2100, MJE2102		750	–	
(I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)	MJE1091, MJE1093, MJE1101, MJE1103		750	–	
	MJE2091, MJE2093, MJE2101, MJE2103		750	–	
Collector-Emitter Saturation Voltage (I_C = 3.0 Adc, I_B = 12 mAdc)	MJE1090, MJE1092, MJE1100, MJE1102	$V_{CE(sat)}$	–	2.5	Vdc
	MJE2090, MJE2092, MJE2100, MJE2102		–	2.5	
(I_C = 4.0 Adc, I_B = 16 mAdc)	MJE1091, MJE1093, MJE1101, MJE1103		–	2.8	
	MJE2091, MJE2093, MJE2101, MJE2103		–	2.8	
Base-Emitter On Voltage (I_C = 3.0 Adc, V_{CE} = 3.0 Vdc)	MJE1090, MJE1092, MJE1100, MJE1102	$V_{BE(on)}$	–	2.5	Vdc
	MJE2090, MJE2092, MJE2100, MJE2102		–	2.5	
(I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)	MJE1091, MJE1093, MJE1101, MJE1103		–	2.5	
	MJE2091, MJE2093, MJE2101, MJE2103		–	2.5	
DYNAMIC CHARACTERISTICS					
Small-Signal Current Gain (I_C = 3.0 Adc, V_{CE} = 3.0 Vdc, f = 1.0 MHz)		h_{fe}	1.0	–	–

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

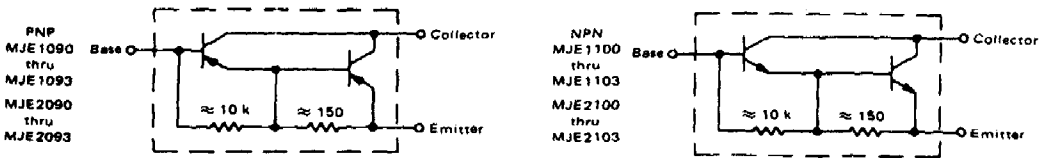
FIGURE 2 – DC SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: junction temperature and secondary breakdown. Safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation; e.g., the transistor must not be subjected to greater dissipation than the curves indicate.

At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown. (See AN-415)

FIGURE 3 – DARLINGTON CIRCUIT SCHEMATIC



MJE1090 thru MJE1093 PNP/MJE1100 thru MJE1103 NPN (continued)
MJE2090 thru MJE2093 PNP/MJE2100 thru MJE2103 NPN

MJE1090
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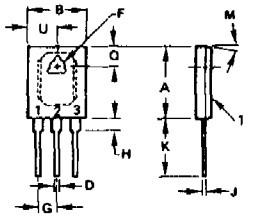
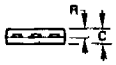


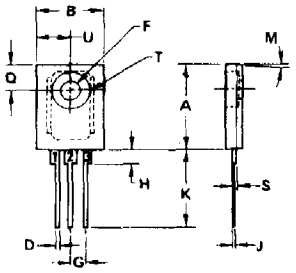


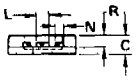
STYLE 2:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	16.13	16.38	0.635	0.645
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	1.09	1.24	0.043	0.049
F	3.51	3.76	0.138	0.148
G	4.22 BSC		0.166 BSC	
H	2.67	2.92	0.105	0.115
J	0.813	0.864	0.032	0.034
K	15.11	16.38	0.595	0.645
M	9° TYP		9° TYP	
Q	4.70	4.95	0.185	0.195
R	1.91	2.16	0.075	0.085
U	6.22	6.48	0.245	0.255

NOTE
1. LEADS WITHIN .005" RAD OF TRUE POSITION (TP) AT MMC

MJE2090
MJE2091
MJE2092
MJE2093
MJE2100
MJE2101
MJE2102
MJE2103





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

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	16.08	16.33	0.633	0.643
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	0.51	0.76	0.020	0.030
F	3.61	3.86	0.142	0.152
G	2.54 BSC		0.100 BSC	
H	2.67	2.92	0.105	0.115
J	0.43	0.69	0.017	0.027
K	14.73	14.99	0.580	0.590
L	2.16	2.41	0.085	0.095
M	3° TYP		3° TYP	
N	1.47	1.73	0.058	0.068
Q	4.76	5.03	0.188	0.198
R	1.91	2.16	0.075	0.085
S	0.81	0.86	0.032	0.034
T	6.99	7.24	0.275	0.285
U	6.22	6.48	0.245	0.255

1. DIM "G" IS TO CENTER LINE OF LEADS.