MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

NPN
MJF102
PNP
MJF107

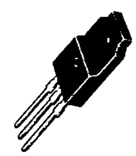
Full Pak Complementary Power Darlingtons

For Isolated Package Applications

COMPLEMENTARY SILICON POWER DARLINGTONS
8 AMPERES
100 VOLTS
35 WATTS

Designed for general-purpose amplifiers, low speed switching circuits, solenoid drivers and other switching applications, where the mounting surface of the device is required to be electrically isolated from the heatsink or chassis.

- Isolated Overmold Package (1500 Volts RMS Min)
- Electrically Similar to the Popular TIP
- 100 $V_{CEO(sus)}$
- 8 A Rated Collector Current
- No Isolating Washers Required
- Reduced System Cost
- High DC Current Gain 3000 (Min) @ I_C = 3 Adc



CASE 221C-02
TO-220 TYPE

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	100	Vdc
Collector-Base Voltage	V_{CB}	100	Vdc
Emitter-Base Voltage	V_{EB}	5	Vdc
Isolation Voltage (RMS for 1 Min)	V_{ISOL}	1500	Vrms
Collector Current — Continuous — Peak	I_C	8 15	Adc
Base Current	I_B	1	Adc
Total Power Dissipation* @ T_C = 25°C Derate above 25°C	P_D	35 0.28	Watts W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	2 0.016	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case*	$R_{\theta JC}$	3.6	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Lead Temperature for Soldering Purpose	T_L	260	°C

*Measurement made with thermocouple contacting the bottom insulated mounting surface (in a location beneath the die), the device mounted on a heatsink with thermal grease and a mounting torque of ≥ 6 in. lbs.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) (I_C = 30 mAdc, I_B = 0)	$V_{CEO(sus)}$	100	—	Vdc
Collector Cutoff Current (V_{CE} = 50 Vdc, I_B = 0)	I_{CEO}	—	10	μAdc
Collector Cutoff Current (V_{CB} = 100 Vdc, I_E = 0)	I_{CBO}	—	10	μAdc
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)	I_{EBO}	—	2	mAdc
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 3 Adc, V_{CE} = 4 Vdc) (I_C = 8 Adc, V_{CE} = 4 Vdc)	h_{FE}	3000 500	15000 —	—
Collector-Emitter Saturation Voltage (I_C = 8 Adc, I_B = 80 mAdc)	$V_{CE(sat)}$	—	2	Vdc
Base-Emitter On Voltage (I_C = 8 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	—	2.5	Vdc
DYNAMIC CHARACTERISTICS				
Small-Signal Current Gain (I_C = 3 Adc, V_{CE} = 4 Vdc, f = 1 MHz)	$\|h_{fe}\|$	4	—	—
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz) MJF107 MJF102	C_{ob}	— —	300 200	pF

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

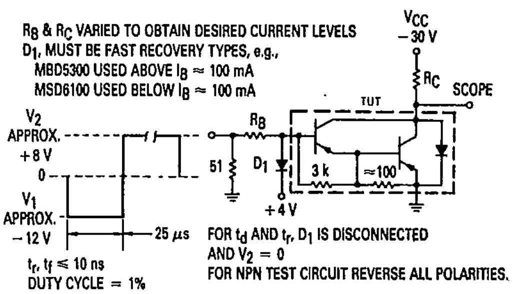

Figure 1. Switching Times Test Circuit

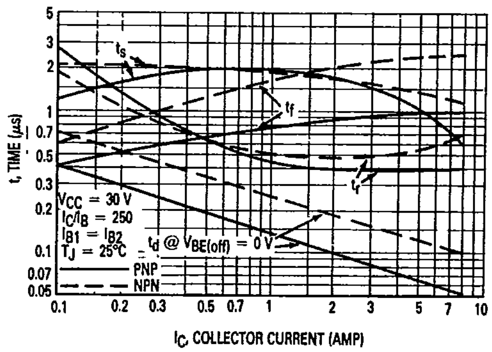

Figure 2. Switching Times

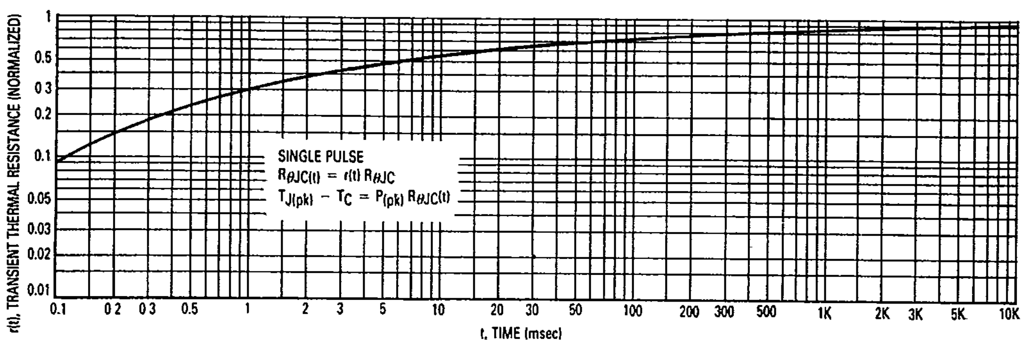

Figure 3. Thermal Response

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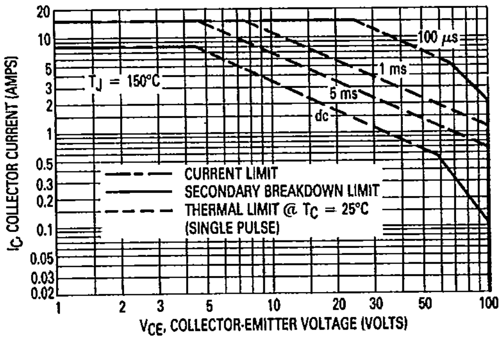

Figure 4. Maximum Forward Bias Safe Operating Area

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 Figure 4 is 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 $T_{J(pk)} \leq$ 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.

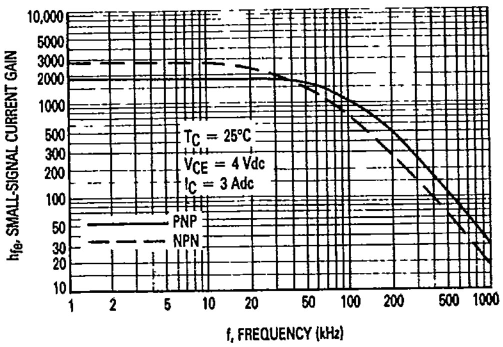

Figure 5. Small-Signal Current Gain

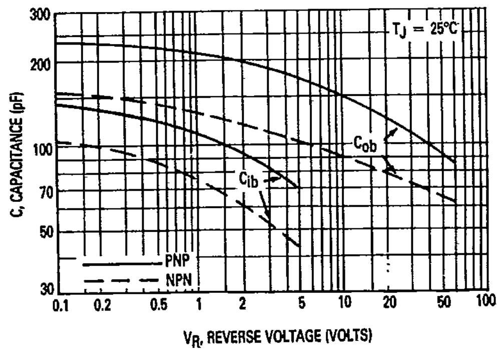

Figure 6. Capacitance

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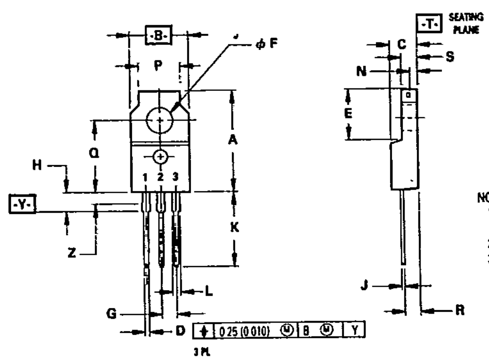
OUTLINE DIMENSIONS



STYLE 1:
PIN 1 BASE
2 COLLECTOR
3 EMITTER

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. CONTROLLING DIMENSION: INCH.
3. LEAD DIMENSION UNCONTROLLED WITHIN DIMENSION "Z".

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	17.28	17.78	0.680	0.700
B	9.86	10.36	0.388	0.408
C	4.45	4.95	0.175	0.195
D	0.64	1.01	0.025	0.040
E	8.64	9.01	0.340	0.355
F	3.56	3.81	0.140	0.150
G	2.54 BSC		0.100 BSC	
H	2.80	3.93	0.110	0.155
J	0.46	0.71	0.018	0.028
K	12.70	13.97	0.500	0.550
L	1.15	1.77	0.045	0.070
N	1.25	—	0.049	—
P	6.86	7.36	0.270	0.290
Q	12.20	12.70	0.480	0.500
R	2.29	3.04	0.090	0.120
S	2.67	2.92	0.105	0.115
Z	1.78	2.28	0.070	0.090

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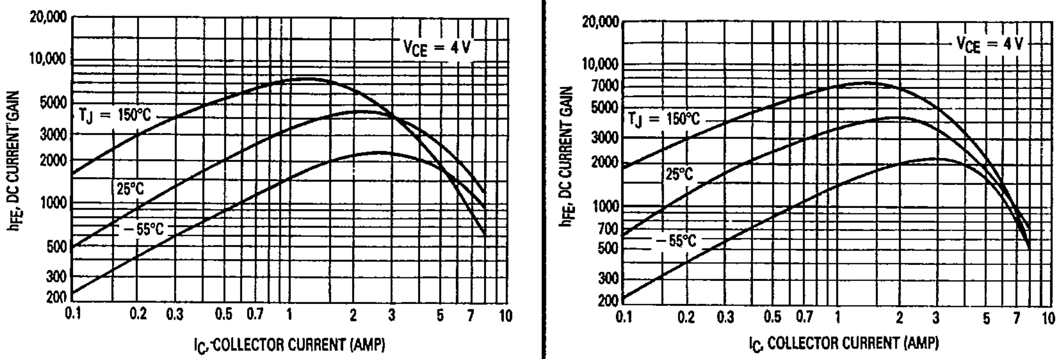

Figure 7. DC Current Gain

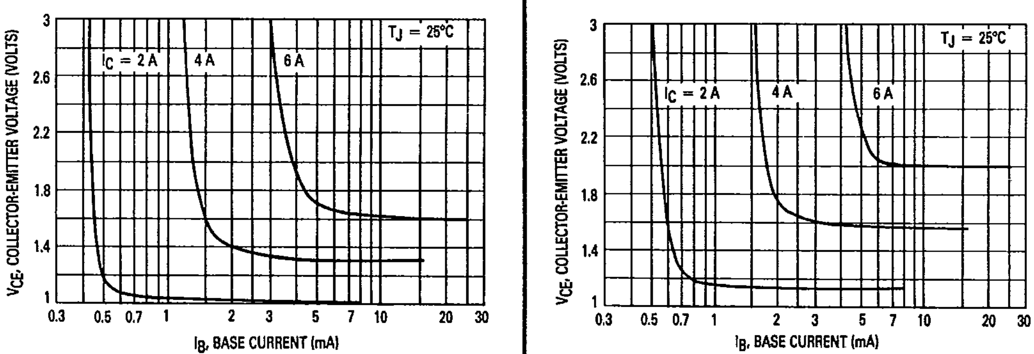

Figure 8. Collector Saturation Region

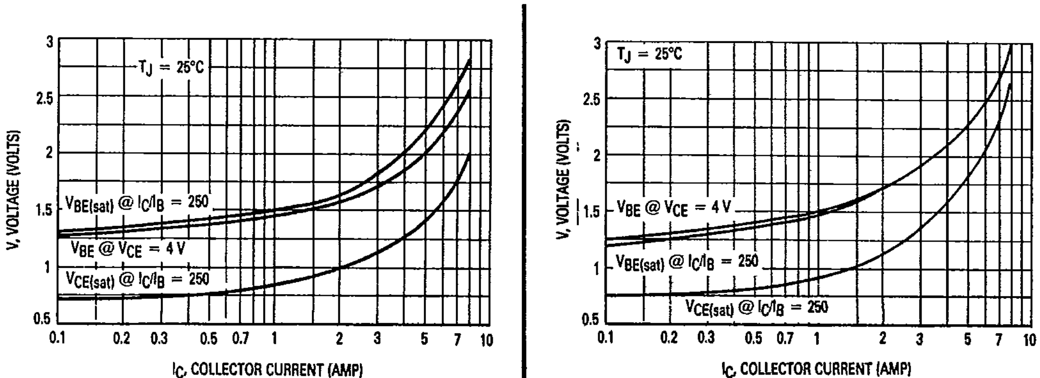

Figure 9. "On" Voltages

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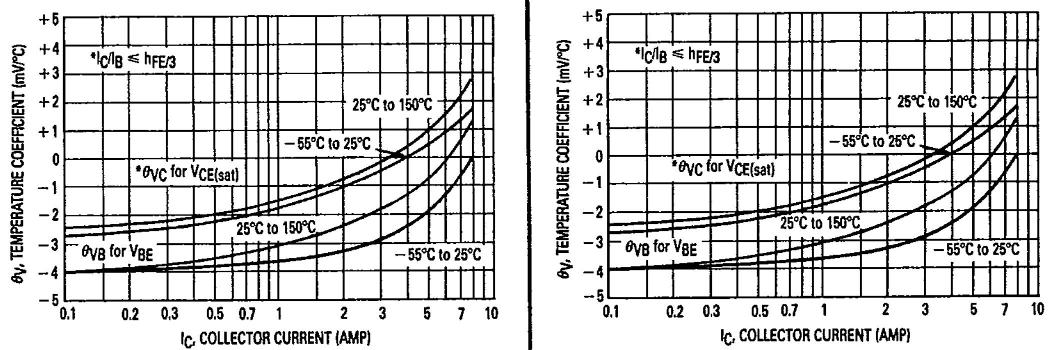

Figure 10. Temperature Coefficients

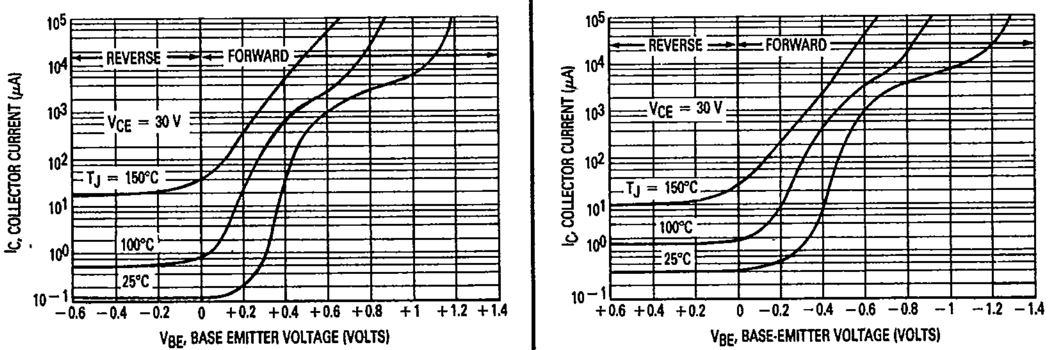

Figure 11. Collector Cut-Off Region

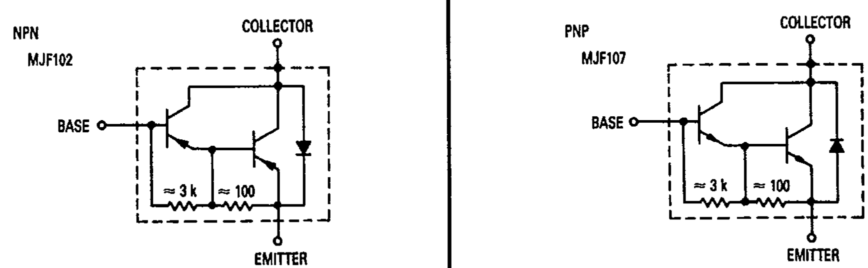

Figure 12. Darlington Schematic

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