DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MJ11017, MJ11019, MJ11021 – PNP
MJ11018, MJ11020, MJ11022 - NPN

SILICON POWER DARLINGTON TRANSISTORS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

Rating	Symbol	MJ11017 MJ11018	MJ11019 MJ11020	MJ11021 MJ11022	Unit
Collector emitter voltage	V_{CEO}	150	200	250	V
Collector base voltage	V_{CBO}	150	200	250	V
Emitter base voltage	V_{EBO}	5			V
Collector current **Peak**	I_C I_{CM}	15 30			A
Base current	I_B	0.5			A
Total device dissipation @ T_C = 25°C **Derate above 25°C**	P_D	175 1.16			W W/°C
Operating and storage temperature range	T_J, T_{stg}	-65 to +175			°C
Thermal resistance, junction to case	$R_{\theta JC}$	0.86			°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector emitter sustaining voltage (1) I_C = 100mA, I_B = 0	MJ11017, MJ11018 MJ11019, MJ11020 MJ11021, MJ11022	$V_{CEO(sus)}$	150 200 250	- - 	V
Collector cutoff current V_{CE} = 75V, I_B = 0 V_{CE} = 100V, I_B = 0 V_{CE} = 125V, I_B = 0		I_{CEO}	 - - -	 1 1 1	mA
Collector cutoff current V_{CE} = Rated V_{CB} = $V_{BE(off)}$ = 1.5V V_{CE} = Rated V_{CB} = $V_{BE(off)}$ = 1.5V, T_J = 150°C		I_{CEV}	 - -	 0.5 5.0	mA
Emitter cutoff current V_{BE} = 5V, I_C = 0		I_{EBO}	-	2.0	mA
ON CHARACTERISTICS (1)					
DC current gain I_C = 10A, V_{CE} = 5V I_C = 15A, V_{CE} = 5V		h_{FE}	 400 100	 15000 -	-
Collector emitter saturation voltage I_C = 10A, I_B = 100mA I_C = 15A, I_B = 150mA		$V_{CE(sat)}$	 - -	 2.0 3.4	V
Base emitter saturation voltage I_C = 15A, I_B = 150mA		$V_{BE(sat)}$	-	3.8	V
Base emitter on voltage I_C = 10A, V_{CE} = 5.0V		$V_{BE(on)}$	-	2.8	V

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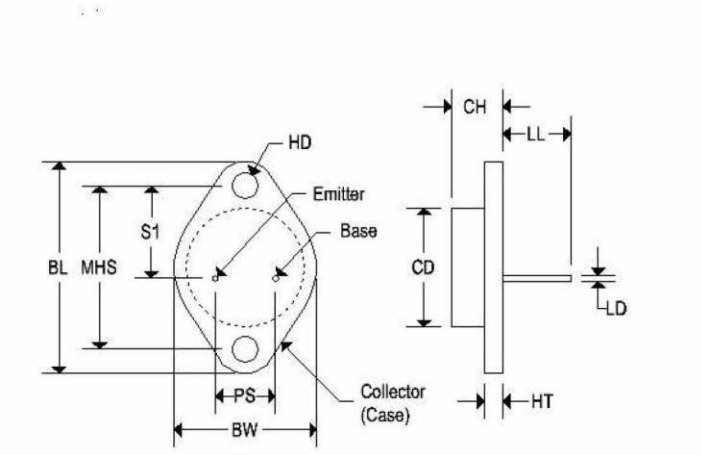
Characteristic		Symbol	Min	Max	Unit
DYNAMIC CHARACTERISTICS					
Small signal current gain I_C = 10A, V_{CE} = 3V, f = 1MHz		h_{fe}	3.0	-	-
SWITCHING CHARACTERISTICS			NPN (typical)	PNP (typical)	
Delay time	(V_{CC} = 100V, I_C = 10A, I_{B1} = 100mA, $V_{BE(off)}$ = 5.0V, t_p = 25µs, duty cycle ≤ 10%)	t_d	0.2	0.1	µs
Rise time		t_r	1.3	0.6	
Storage time		t_s	4.5	2.7	
Fall time		t_f	10	2.6	

Note 1: Pulse test: Pulse width = 300µs, duty cycle ≤ 2.0%.
Note 2: $f_T = |h_{fe}| * f_{test}$

MECHANICAL CHARACTERISTICS

Case	TO-3
Marking	Alpha-numeric
Polarity	See below



	TO-3			
	Inches		Millimeters	
	Min	Max	Min	Max
CD	-	0.875	-	22.220
CH	0.250	0.380	6.860	9.650
HT	0.060	0.135	1.520	3.430
BW	-	1.050	-	26.670
HD	0.131	0.188	3.330	4.780
LD	0.038	0.043	0.970	1.090
LL	0.312	0.500	7.920	12.700
BL	1.550 REF		39.370 REF	
MHS	1.177	1.197	29.900	30.400
PS	0.420	0.440	10.670	11.180
S1	0.655	0.675	16.640	17.150

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FIGURE -1 POWER DERATING

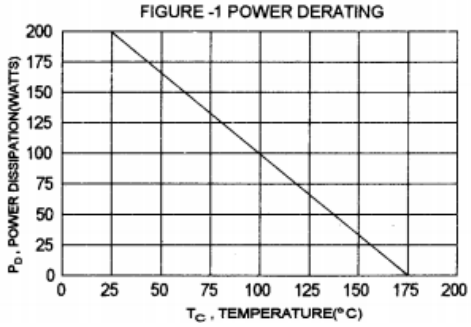
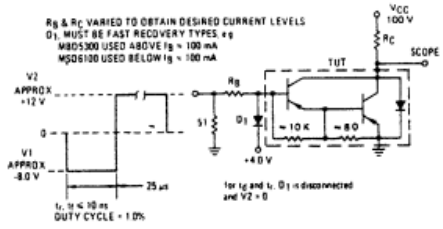


FIGURE 2 — SWITCHING TIMES TEST CIRCUIT



For NPN test circuit reverse diode and voltage polarities.

FIG-3 FORWARD BIAS SAFE OPERATING AREA

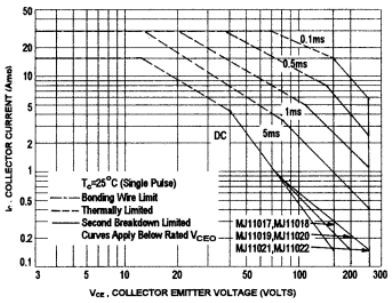


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FIG-5 DC CURRENT GAIN

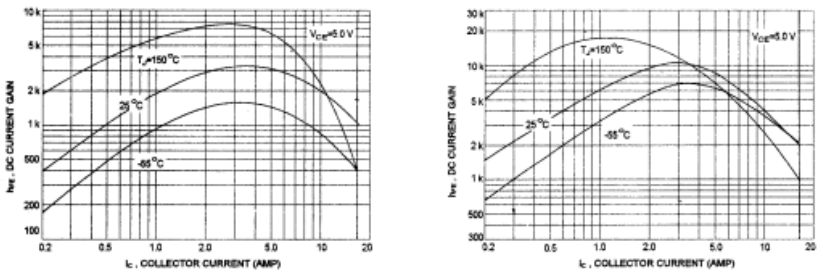

FIG-6 COLLECTOR SATURATION

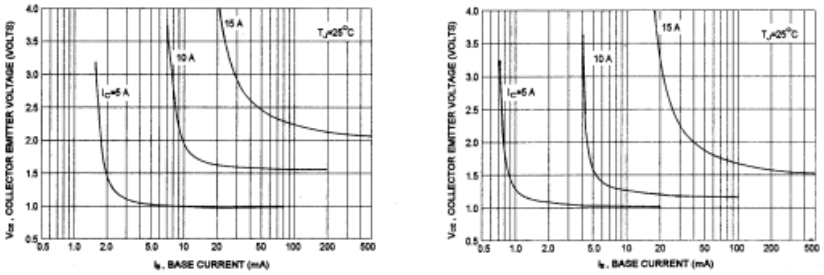

FIG-7 "ON" VOLTAGE

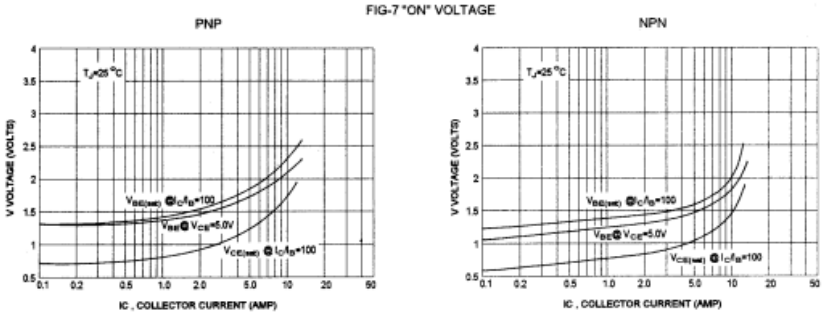

FIG-4 REVERSE BIAS SAFE OPERATING AREA