DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MJ11028, MJ11030, MJ11032 – NPN
MJ11029, MJ11031, MJ11033 – PNP

COMPLEMENTARY SILICON DARLINGTON POWER 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

Ratings	Symbol	MJ11028 MJ11029	MJ11030 MJ11031	MJ11032 MJ11033	Unit
Collector-emitter voltage	V_{CEO}	60	90	120	V
Collector-base voltage	V_{CBO}	60	90	120	V
Emitter-base voltage	V_{EBO}	5			V
Continuous collector current **Peak collector current**	I_C I_{CM}	50 100			A
Continuous base current	I_B	2			A
Total device dissipation @ T_C = 25°C **Derate above 25°C @ T_C = 100°C**	P_D	300 1.71			W W/°C
Operating and storage temperature range	T_J, T_{stg}	-55 to +200			°C
Maximum lead temperature for soldering purposes ≤ 10s	T_L	275			°C
Thermal resistance, junction to case	$R_{\Theta JC}$	0.584			°C

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

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector- emitter breakdown voltage [1] **I_C = 100mA, I_B = 0**	MJ10028, MJ10029 MJ11030, MJ11031 MJ11032, MJ11033	$V_{(BR)CEO}$	60 90 120	- - -	V
Collector emitter leakage current **V_{CE} = 60V, R_{BE} = 1kΩ** **V_{CE} = 90V, R_{BE} = 1kΩ** **V_{CE} = 120V, R_{BE} = 1kΩ** **V_{CE} = 60V, R_{BE} = 1kΩ, T_C = 150°C** **V_{CE} = 90V, R_{BE} = 1kΩ, T_C = 150°C** **V_{CE} = 120V, R_{BE} = 1kΩ, T_C = 150°C**	 MJ11028, MJ11029 MJ11030, MJ11031 MJ11032, MJ11033 MJ11028, MJ11029 MJ11030, MJ11031 MJ11032, MJ11033	I_{CER}	 - - - - - -	 2 2 2 10 10 10	mA
Emitter cutoff current **V_{BE} = 5V, I_C = 0**		I_{EBO}	-	5	mA
Collector emitter leakage current **V_{CE} = 50V, I_B = 0**		I_{CEO}	-	2	mA
ON CHARACTERISTICS [1]					
DC current gain **I_C = 25A, V_{CE} = 5V** **I_C = 50A, V_{CE} = 5V**		hFE	 1000 400	 18000 -	-

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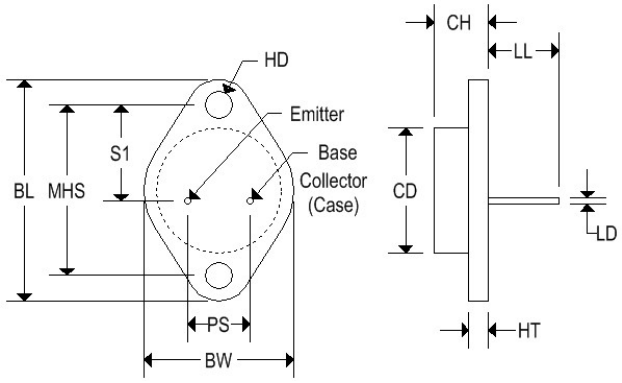
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Characteristics	Symbol	Min	Max	Unit
Collector emitter saturation voltage				
I_C = 25A, I_B = 250mA	$V_{CE(sat)}$	-	2.5	V
I_C = 50A, I_B = 300mA		-	4.5	
Base emitter saturation voltage				
I_C = 25A, I_B = 200mA	$V_{BE(sat)}$	-	3.0	V
I_C = 50A, I_B = 500mA		-	3.5	

Note 1: Pulse test: Pulse width ≤ 300µs, duty cycle ≤ 2.0%.

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 – DARLINGTON CIRCUIT SCHEMATIC

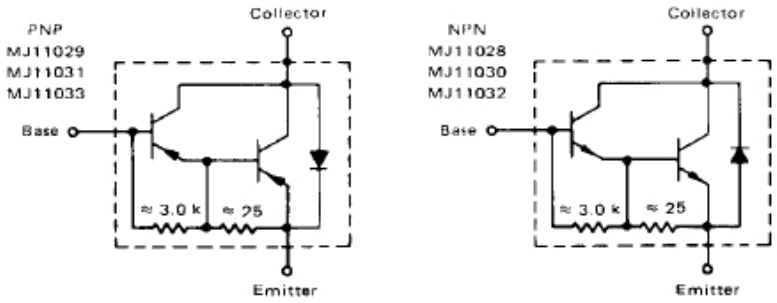


FIGURE 2 – DC SAFE OPERATING AREA

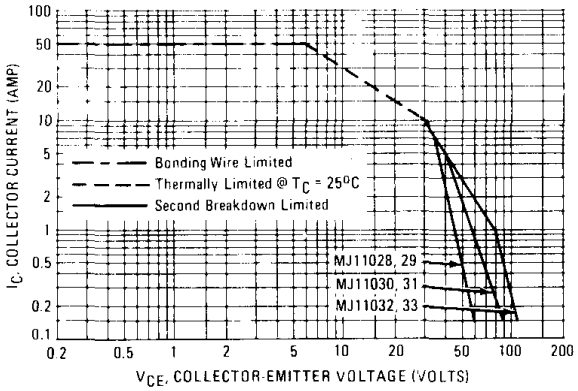


FIGURE 3 – DC CURRENT GAIN

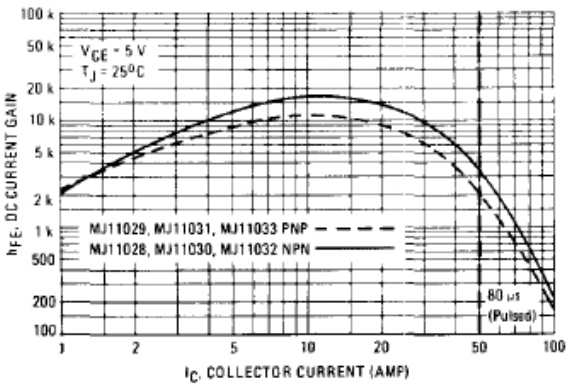
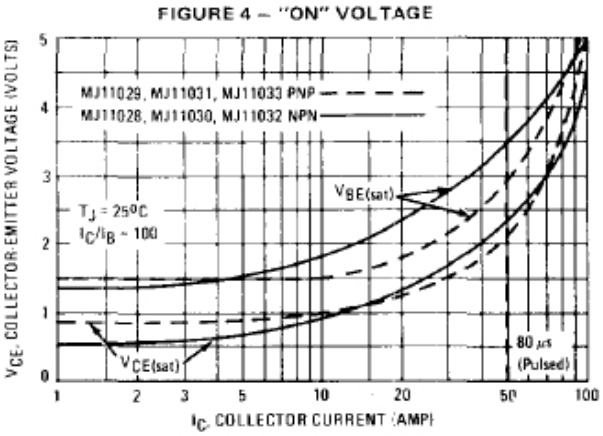


FIGURE 4 – "ON" VOLTAGE



There are two limitations on the power-handling ability of a transistor: average junction temperature and second breakdown. Safe operating are curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation, ie., the transistor must not be subjected to greater dissipation than the curves indicate. The data of Fig. 2 is based on $T_{J(pk)}$ = 200°C: T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.