DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MJ10004-MJ10005

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	MJ10004	MJ10005	Unit
Collector emitter voltage	V_{CEV}	450	500	V
Collector emitter voltage	$V_{CEX(sus)}$	400	450	V
Collector emitter voltage	$V_{CEO(sus)}$	350	400	V
Emitter base voltage	V_{EBO}	8.0		V
Collector current-Continuous **-Peak**	I_C I_{CM}	20 30		A
Base current	I_B	2.5		A
Total power dissipation @ T_C = 25°C **Total power dissipation @ T_C = 100°C** **Derate above 25°C**	P_D	175 100 1.0		W W W/°C
Operating and storage temperature range	T_J, T_{stg}	-65 to +200		°C
Thermal resistance, junction to case	$R_{\Theta JC}$	1.0		°C/W

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector emitter sustaining voltage (I_C = 250mA, I_B = 0, V_{clamp} = Rated V_{CEO})	MJ10004 MJ10005	$V_{CEO(sus)}$	350 400	- -	Vdc
Collector cutoff current (V_{CE} = Rated V_{CEV}, R_{BE} = 50Ω, T_C = 100°C)		I_{CER}	-	5.0	mA
Collector cutoff current (V_{CEV} = Rated V_{CEV}, $V_{BE(off)}$ = 1.5V) (V_{CEV} = Rated V_{CEV}, $V_{BE(off)}$ = 1.5V, T_C = 150°C)		I_{CEV}	- -	0.25 5.0	mA
Emitter cutoff current (V_{EB} = 2.0V, I_C = 0)		I_{EBO}	-	175	mA
ON CHARACTERISTICS (1)					
DC current gain (I_C = 5.0A, V_{CE} = 5.0V) (I_C = 10A, V_{CE} = 5.0V)		h_{FE}	50 40	600 400	-
Collector emitter saturation voltage (I_C = 10A, I_B = 400mA) (I_C = 20A, I_B = 2.0A) (I_C = 10A, I_B = 400mA, T_C = 100°C)		$V_{CE(sat)}$	- - -	1.9 3.0 2.0	V
Base-emitter saturation voltage (I_C = 10A, I_B = 400mA) (I_C = 10A, I_B = 400mA, T_C = 100°C)		$V_{BE(sat)}$	- -	2.5 2.5	V

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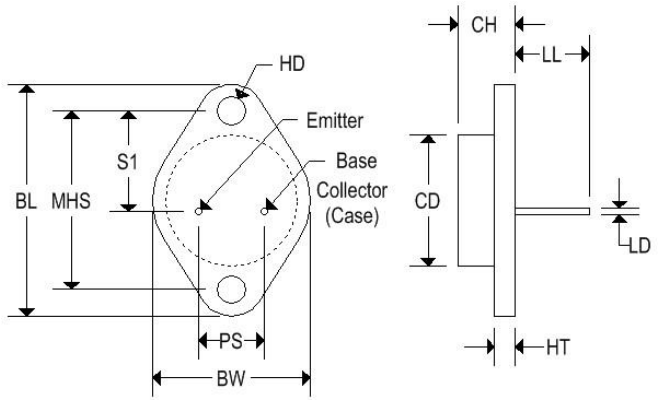
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Characteristic		Symbol	Min	Max	Unit
Diode forward voltage (I_F = 10A)		V_f	-	5.0	V
DYNAMIC CHARACTERISTICS					
Small signal current gain(2) (I_C = 1.0A, V_{CE} = 10V, f_{test} = 1MHz)		$\|h_{fe}\|$	10	-	-
Output capacitance (V_{CB} = 10V, I_E = 0, f_{test} = 100kHz)		C_{ob}	100	-	pF
SWITCHING CHARACTERISTICS					
Delay time	(V_{CC} = 250V, I_C = 10A, I_{B1} = 400mA, $V_{BE(off)}$ = 5.0V, t_p = 50µs, duty cycle ≤ 2%)	t_d	-	0.2	µs
Rise time		t_r	-	0.6	
Storage time		t_s	-	1.5	
Fall time		t_f	-	0.5	

Note 1: Pulse test: pulse width = 5ms, duty cycle ≤ 2%.
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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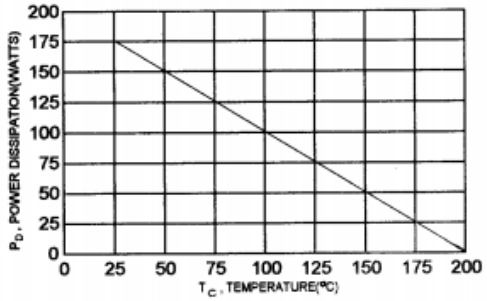
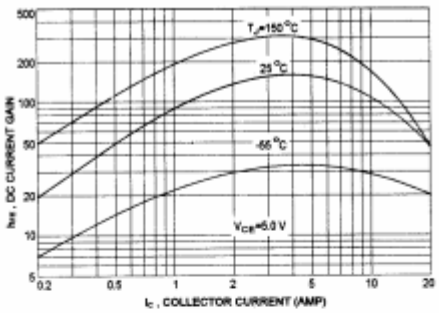
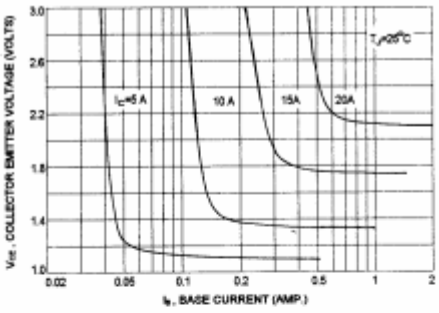
FIGURE -1 POWER DERATING



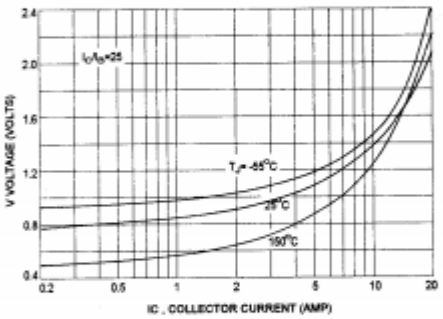
DC CURRENT GAIN



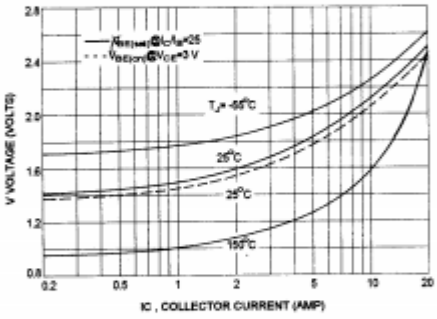
COLLECTOR SATURATION REGION



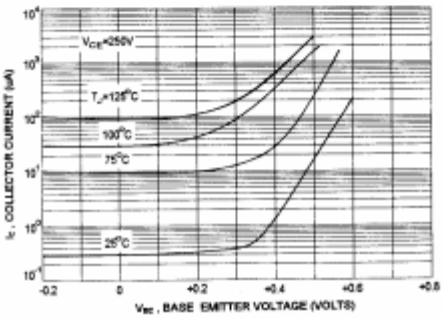
COLLECTOR EMITTER SATURATION VOLTAGE



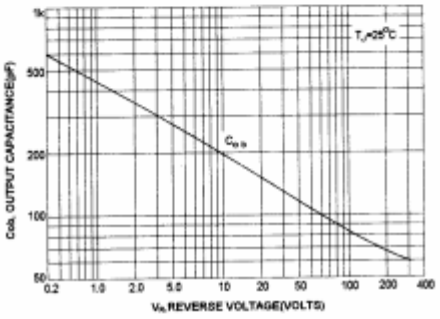
BASE EMITTER VOLTAGE



COLLECTOR CUT-OFF REGION



OUTPUT CAPACITANCES



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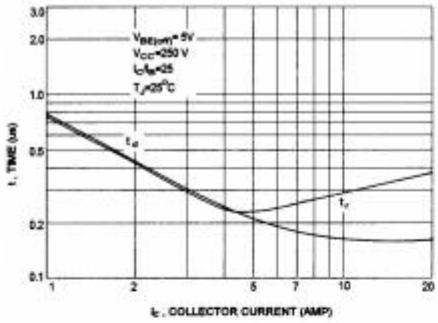
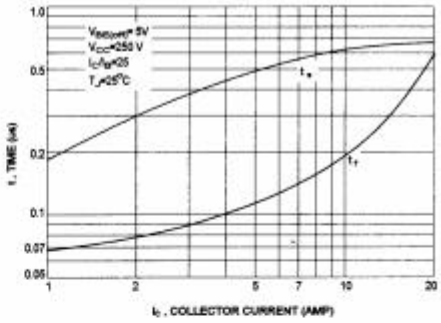
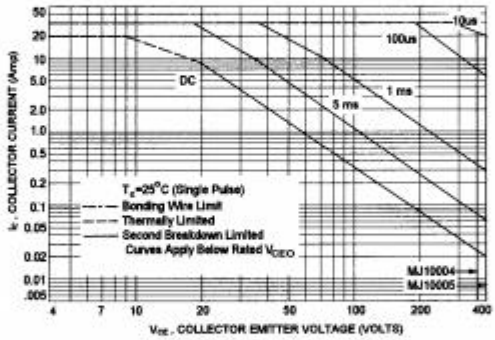
TURN-ON TIME



TURN-OFF TIME



ACTIVE REGION SAFE OPERATING AREA



REVERSE BIAS SWITCHING SAFE OPERATING AREA