DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MJ10015-MJ10016

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

Characteristics	Symbol	MJ10015	MJ10016	Unit
Collector-emitter voltage	V_{CEV}	600	700	V
Collector-emitter voltage	$V_{CEO(sus)}$	400	500	V
Emitter-base voltage	V_{EBO}	8.0		V
Collector-current **-continuous** **-peak**	I_C	 50 75		A
Base current	I_B	10		A
Total power dissipation **@ T_C = 25°C** **@ T_C = 100°C** **Derate above 25°C**	P_D	 250 143 1.43		 W W W/°C
Operating and storage junction temperature range	T_J, T_{stg}	-65 to +200		°C
Thermal resistance, junction to case	$R_{\theta JC}$	0.7		°C/W

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

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-emitter sustaining voltage (I_C = 100mA, I_B = 0, V_{clamp} = Rate V_{CEO})	MJ10015 MJ10015	$V_{CEO(sus)}$	400 500		V
Collector-cutoff current (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5V)		I_{CEV}		0.25	mA
Emitter-cutoff current (V_{EB} = 2.0V, I_C = 0)		I_{EBO}		350	mA
ON CHARACTERISTICS					
DC current gain (I_C = 20A, V_{CE} = 5.0V) (I_C = 40A, V_{CE} = 5.0V)		h_{FE}	 25 10		
Collector-emitter saturation voltage (I_C = 20A, I_B = 1.0A) (I_C = 50A, I_B = 10A)		$V_{CE(sat)}$		 2.2 5.0	V
Base-emitter saturation voltage (I_C = 20A, I_B = 1.0A)		$V_{BE(sat)}$		2.75	V
Diode forward voltage (I_F = 20A)		V_F		5.0	V
DYNAMIC CHARACTERISTICS					
Output capacitance (V_{CE} = 10V, I_E = 0, f = 100kHz)		C_{ob}		750	pF

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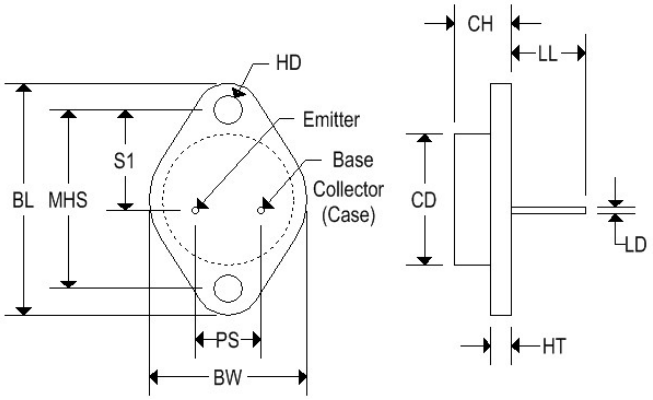
Characteristics		Symbol	Min	Max	Unit
SWITCHING CHARACTERISTICS					
Delay time	V_{CC} = 250V, I_C = 20A, I_{B1} = 1.0A, $V_{BE(off)}$ = 5.0V, t_p = 25µs, duty cycle ≤ 2%	t_d		0.3	µs
Rise time		t_r		1.0	
Storage time		t_s		2.5	
Fall time		t_f		1.0	

MECHANICAL CHARACTERISTICS

Case	TO-3
Marking	Alpha-numeric
Pin out	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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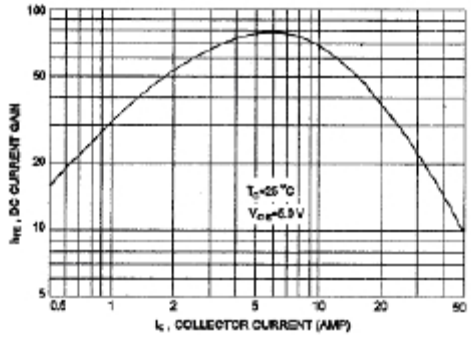
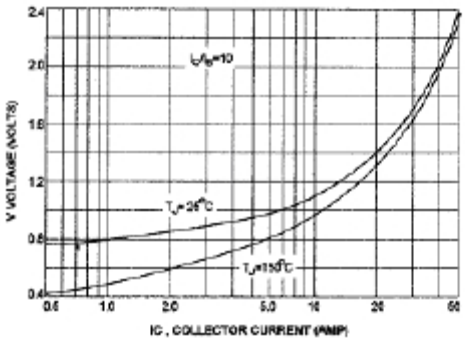
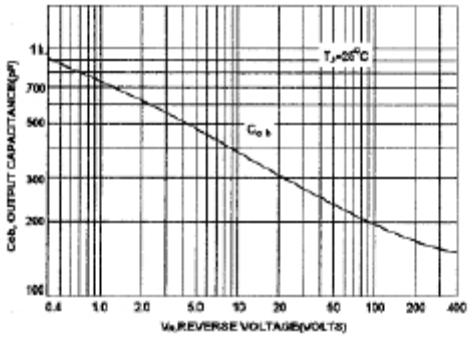
DC CURRENT GAIN



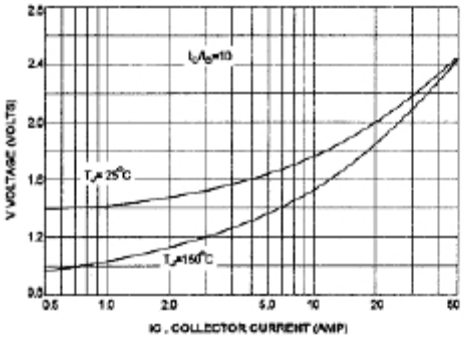
COLLECTOR EMITTER SATURATION VOLTAGE



OUTPUT CAPACITANCES



BASE- EMITTER SATURATION VOLTAGE



COLLECTOR CUT-OFF REGION

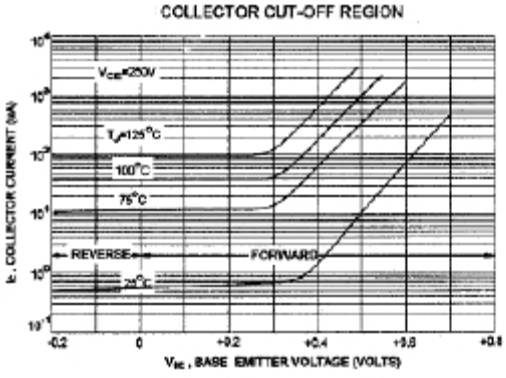


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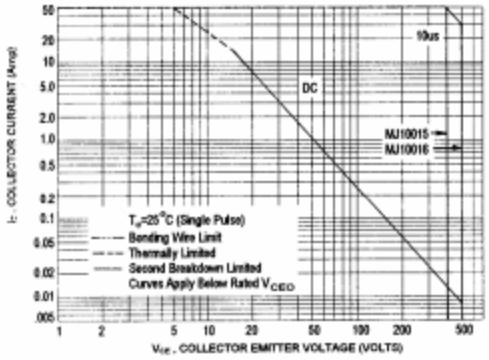
FIG-7 FORWARD BIAS SAFE OPERATING AREA

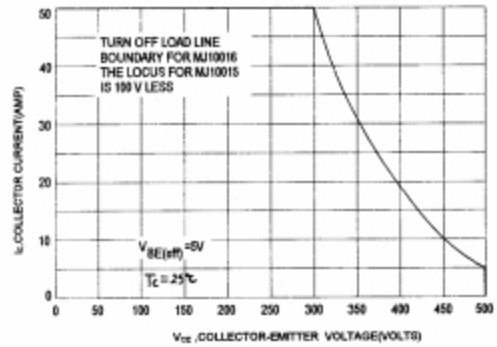


FORWARD BIAS

There are two limitation 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 curves indicate.

The data of FIG-7 is base on T_C=25 °C;$T_{J(PK)}$ isvariable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% must be derate when T_C ≥25°C, Second breakdown limitations do not derate the same as thermal limitations.

FIG-8 REVERSE BIAS SAFE OPERATING AREA



REVERSE BIAS

For inductive loads, high voltage and high current must be sustained simultaneously during turn-off, in most cases, with the base-to-emitter junction reverse biased Under these conditions the collector voltage must be held to a safe level at or below a specific value of collector current.This can be accomplished by several mean such as active clamping, RC snubbing, load line shaping, etc. the safe level for these devices is specified as Reverse Bias Safe Operating Area and represents the voltage-current condition allowable during reverse biased turn-off. This rating is verified under clamped conditions so that the device is never subjected to an avalanche mode. FIG-8 gives the RBSOA haracteristics.

POWER DERATING