NPN SILICON POWER DARLINGTON TRANSISTORS

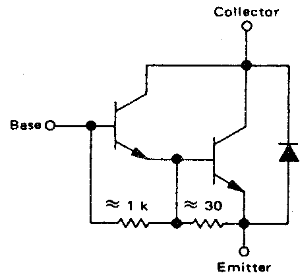
The MJ10012 is a high voltage, high-current darlington transistor designed for automotive ignition,switching regulator and motor control applications.

NPN
MJ10012

10 AMPERE
POWER DARLINGTON
TRANSISTORS
400 VOLTS
175 WATTS

FEATURES:

*Continuous Collector Current - I_C = 10 A
*Collector-Emitter Sustaining Voltage-
$V_{CEO(sus)}$=400V (Min)
*Automotive Function Tests

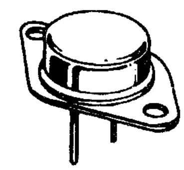


MAXIMUM RATINGS

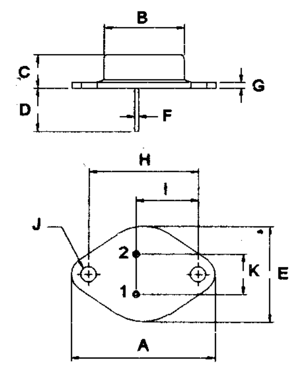
Characteristic	Symbol	MJ10012	Unit
Collector-Base Voltage	V_{CBO}	600	V
Collector-Emitter Voltage(R_{BE}=27Ω)	V_{CER}	550	V
Collector-Emitter Voltage	$V_{CEO(SUS)}$	400	V
Emitter-Base Voltage	V_{EBO}	8.0	V
Collector Current-Continuous -Peak	I_C I_{CM}	10 15	A
Base current	I_B	2	A
Total Power Dissipation @T_C=25°C @T_C= 100°C Derate above 25°C	P_D	175 100 1.0	W W W/°C
Operating and Storage Junction Temperature Range	T_J ,T_{STG}	- 65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	Rθjc	1.0	°C/W



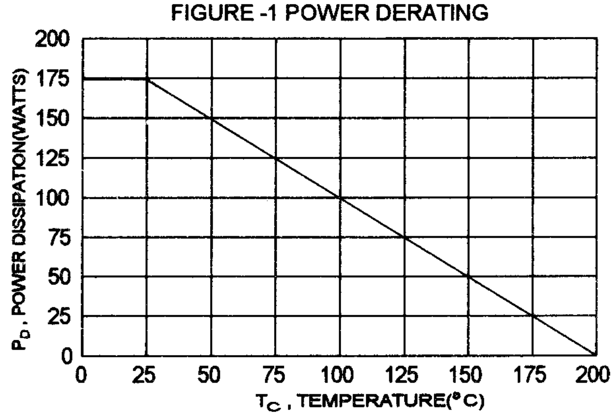
TO-3



PIN 1.BASE
2.EMITTER
COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

FIGURE -1 POWER DERATING



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

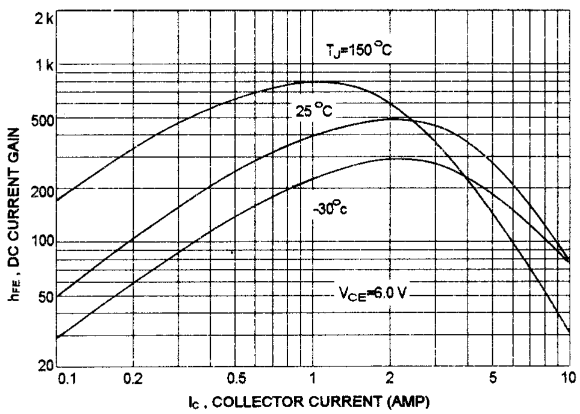
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector - Emitter Sustaining Voltage (I_C = 200 mA, I_B = 0, V_{clamp}=Rate V_{CEO})	$V_{CEO(SUS)}$	400		V
Collector - Emitter Sustaining Voltage (I_C = 200 mA, I_B = 0, R_{BE}=27 ohm, V_{clamp}=Rate V_{CER})	$V_{CER(SUS)}$	425		V
Collector Cutoff Current (Rated V_{CER}, R_{BE}=27 ohm)	I_{CER}		1.0	mA
Collector Cutoff Current (Rated V_{CBO}, I_E=0)	I_{CBO}		1.0	mA
Emitter Cutoff Current (V_{EB} = 6.0 V , I_C = 0)	I_{EBO}		40	mA
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 3.0 A , V_{CE} = 6.0 V) (I_C = 6.0 A, V_{CE} = 6.0 V) (I_C = 10 A, V_{CE} = 6.0 V)	hFE	300 100 20	2000	
Collector - Emitter Saturation Voltage (I_C = 3.0 A , I_B = 300 mA) (I_C = 6.0 A, I_B = 600 mA) (I_C = 10 A, I_B = 2.0 A)	$V_{CE(sat)}$		1.5 2.0 2.5	V
Base - Emitter Saturation Voltage (I_C = 6.0A, I_B = 600 mA) (I_C = 10A, I_B =2.0 A)	$V_{BE(sat)}$		2.5 3.0	V
Base - Emitter On Voltage (I_C = 10 A, V_{CE} = 6.0 V)	$V_{BE(on)}$		2.8	V
Diode Forward Voltage (I_F = 10 A)	V_F		3.5	V
DYNAMIC CHARACTERISTICS				
Output Capacitance (V_{CB}=10 V, I_E=0, f =100 kHz)	C_{ob}		350	pF

SWITCHING CHARACTERISTICS

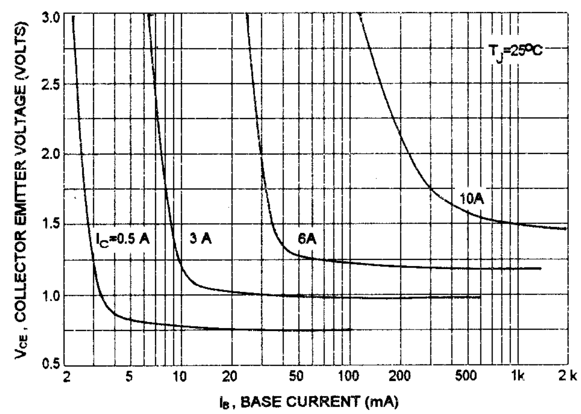
Characteristic	Conditions	Symbol	Min	Max	Unit
Storage Time	V_{CC} = 12 V, I_C = 6.0 A, I_{B1} = $-I_{B2}$=0.3A, tp = 25us, Duty Cycle ≦ 2%	t_s		15	us
Fall Time		t_f		15	us

(1) Pulse Test: Pulse width = 300 us , Duty Cycle ≦ 2.0%

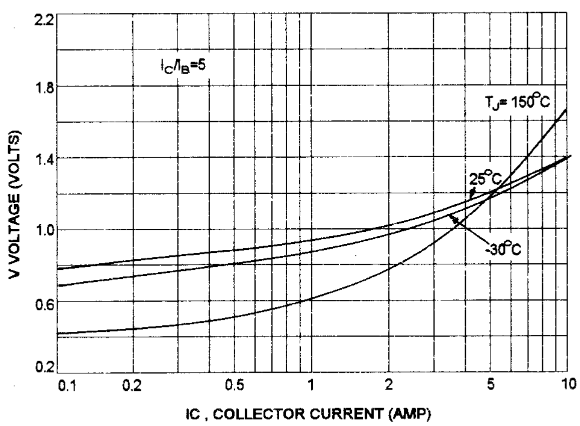
DC CURRENT GAIN



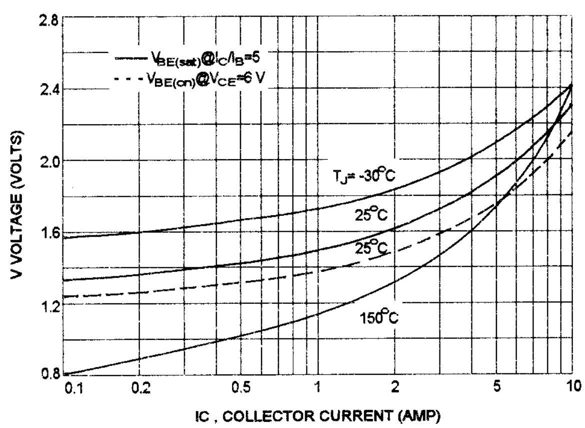
COLLECTOR SATURATION REGION



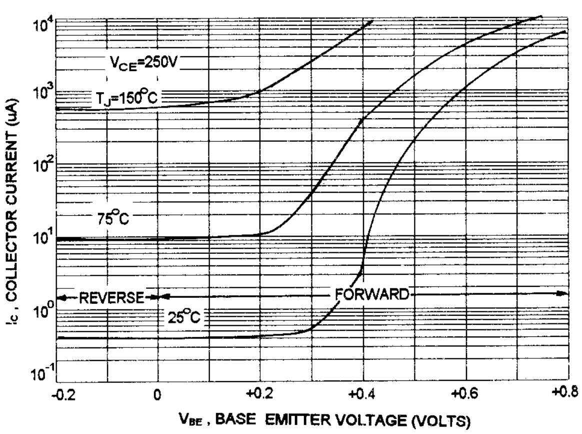
COLLECTOR EMITTER SATURATION VOLTAGE



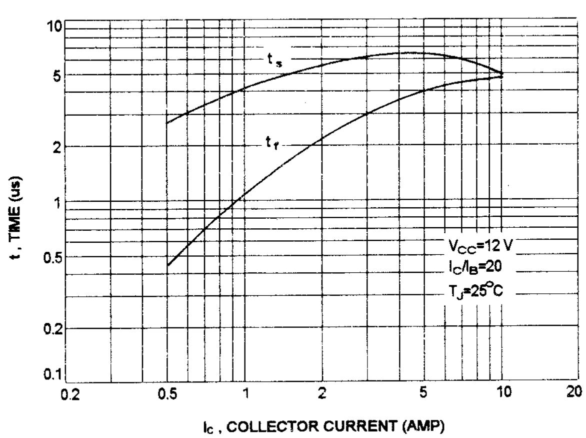
BASE EMITTER VOLTAGE



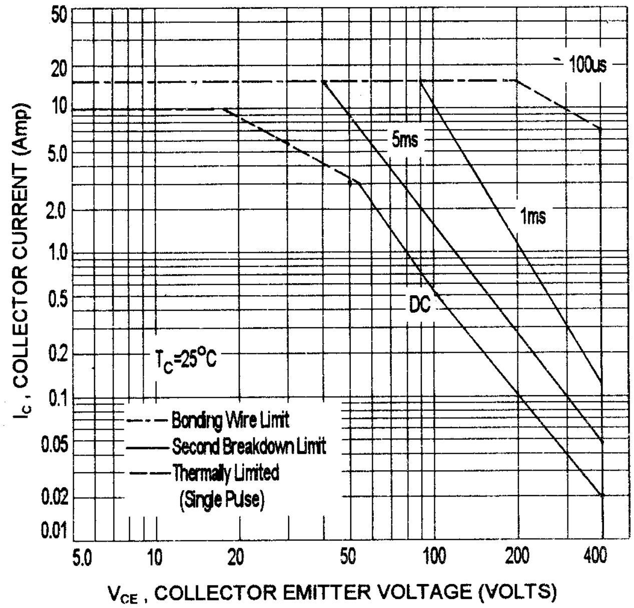
COLLECTOR CUT-OFF REGION



TURN-OFF TIME



ACTIVE-REGION SAFE OPERATING AREA
(SOA)



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 SOA curves is base on $T_{J(PK)}$=200 °C;T_C is variable depending on conditions.At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.