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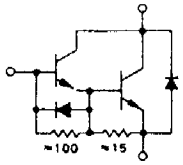
SWITCHMODE SERIES
NPN SILICON POWER DARLINGTON TRANSISTORS
WITH BASE-EMITTER SPEEDUP DIODE

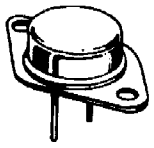
The MJ10004 and MJ10005 darlington transistors are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line oper -ated switch-mode applications such as:

FEATURES:
*Continuous Collector Current - I_C = 20 A
*Switching Regulators
*Inverters
*Solenoid and Relay Drivers
*Motor Controls

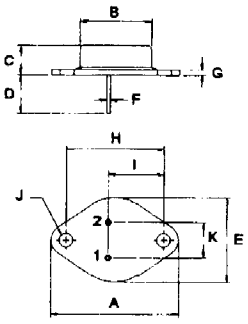


NPN
MJ10004
MJ10005

20 AMPERE
POWER DARLINGTON
TRANSISTORS
350-400 VOLTS
175 WATTS



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

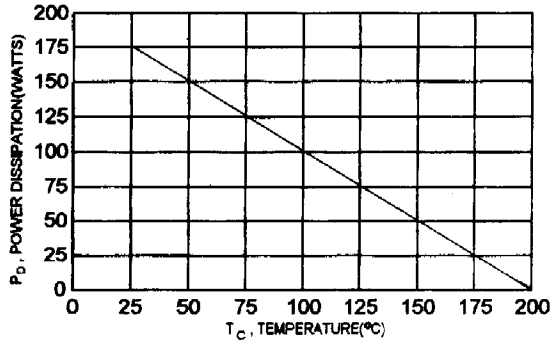
MAXIMUM RATINGS

Characteristic	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 @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	Rejc	1.0	°C/W

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 = 250 mA, I_B = 0, V_{clamp}=Rate V_{CEO}) MJ10004 / MJ10005	$V_{CEO(SUS)}$	350 / 400		V
Collector Cutoff Current (V_{CE}= Rated V_{CEV}, R_{BE}=50 ohm, T_C=100°C)	I_{CER}		5.0	mA
Collector Cutoff Current (V_{CEV}= Rated Value, $V_{BE(OFF)}$=1.5 V) (V_{CEV}= Rated Value, $V_{BE(OFF)}$=1.5 V, T_C=100°C)	I_{CEV}		0.25 / 5.0	mA
Emitter Cutoff Current (V_{EB} = 2.0 V , I_C = 0)	I_{EBO}		175	mA
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 5.0 A , V_{CE} = 5.0 V) (I_C = 10 A, V_{CE} = 5.0 V)	hFE	50 / 40	600 / 400	
Collector - Emitter Saturation Voltage (I_C = 10 A , I_B = 400mA) (I_C = 20 A, I_B = 2.0 A) (I_C = 10 A, I_B = 400 mA, T_C=100°C)	$V_{CE(sat)}$		1.9 / 3.0 / 2.0	V
Base - Emitter Saturation Voltage (I_C = 10 A, I_B = 400 mA) (I_C = 10 A, I_B =400 mA, T_C=100°C)	$V_{BE(sat)}$		2.5 / 2.5	V
Diode Forward Voltage (I_F = 10 A)	V_F		5.0	V
DYNAMIC CHARACTERISTICS				
Small-Signal Current Gain(2) (I_C = 1.0 A, V_{CE} = 10 V, f = 1.0 MHz)	$\lvert h_{fe} \rvert$	10		
Output Capacitance (V_{CB}=10 V, I_E=0, f =100 kHz)	C_{ob}	100		pF
SWITCHING CHARACTERISTICS				
Delay Time	t_d		0.2	us
Rise Time	t_r		0.6	us
Storage Time	t_s		1.5	us
Fall Time	t_f		0.5	us

V_{CC} = 250 V, I_C = 10 A
I_{B1} = 400 mA, $V_{BE(off)}$=5.0V
tp = 50 us, Duty Cycle ≤ 2%

(1) Pulse Test: Pulse width = 300 us , Duty Cycle ≤ 2.0%
(2) $f_T = \lvert h_{fe} \rvert \cdot f_{test}$