

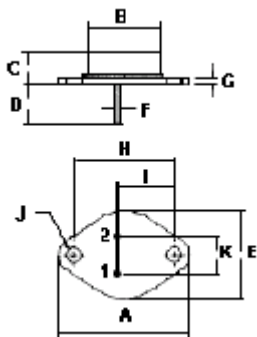
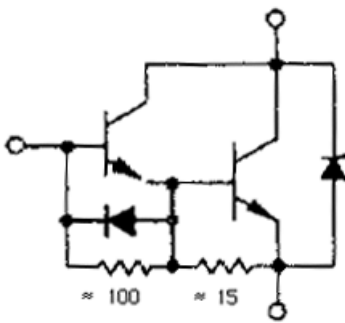
Darlington Power Transistor



Switchmode series NPN Silicon Power Darlington Transistors with Base-Emitter speedup diode are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line operated switch-mode applications.

Features:

- Continuous collector current - $I_C = 20A$.
- Switching regulators.
- Inverters.
- Solenoid and relay drivers.
- Motor controls.



Pin 1. Base
2. Emitter
Collector(Case)

Dimensions	Minimum	Maximum
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

Dimensions : Millimetres

NPN
MJ10004

20 Ampere
Power Darlington
Transistor
350 Volts
175 Watts



TO-3

MJ10004

Darlington Power Transistor



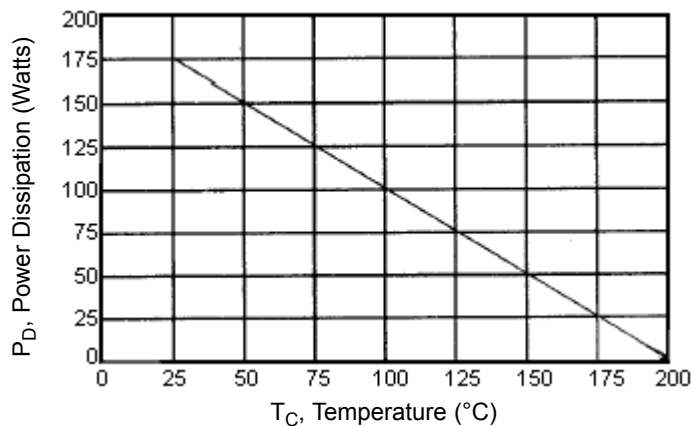
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CEV}	450	V
Collector-Emitter Voltage	$V_{CEX(sus)}$	400	
Collector-Emitter Voltage	$V_{CEO(sus)}$	350	
Emitter-Base Voltage	V_{EBO}	8.0	
Collector Current-Continuous -Peak	I_C I_{CM}	20 30	A
Base Current	I_B	2.5	
Total Power Dissipation at $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$ 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	Maximum	Unit
Thermal Resistance Junction to case	$R_{\theta jc}$	1.0	°C/W

Figure - 1 Power Derating



Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Minimum	Maximum	Unit
OFF Characteristics				
Collector - Emitter Sustaining Voltage (I _C = 250mA, I _B = 0, V _{clamp} = Rated V _{CEO})	V _{CEO(sus)}	350	-	V
Collector Cut off Current (V _{CEV} = Rated V _{CEV} , R _{BE} = 50Ω, T _C = 100°C)	I _{CER}	-	5.0	mA
Collector Cut off Current (V _{CEV} = Rated Value, V _{BE(OFF)} = 1.5V) (V _{CEV} = Rated Value, V _{BE(OFF)} = 1.5V, T _C = 100°C)	I _{CEV}	-	0.25 5.0	
Emitter Cut off Current (V _{EB} = 2.0V, I _C = 0)	I _{EBO}	-	175	
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	
Diode Forward Voltage (I _F = 10A)	V _F	-	5.0	
Dynamic Characteristics				
Small-Signal Current Gain (2) (I _C = 1.0A, V _{CE} = 10V, f = 1.0MHz)	h _{fe}	10	-	-
Output Capacitance (V _{CB} = 10V, I _E = 0, f = 100KHz)	C _{ob}	100	-	pF

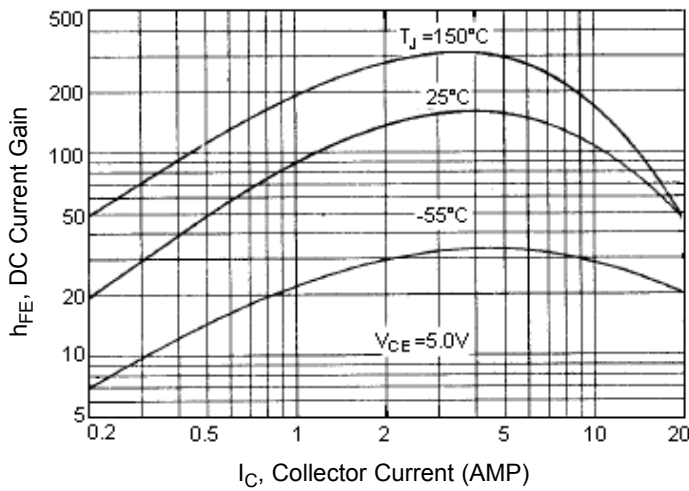
Switching Characteristics

Delay Time	$V_{\text{CC}} = 250\text{V}$, $I_C = 10\text{A}$ $I_{\text{B1}} = 400\text{mA}$, $V_{\text{BE(OFF)}} = 5.0\text{V}$ $t_p = 50\mu\text{s}$, Duty Cycle $\leq 2\%$	t_d	-	0.2	μs
Rise Time		t_r	-	0.6	
Storage Time		t_f	-	1.5	
Fall Time		t_f	-	0.5	

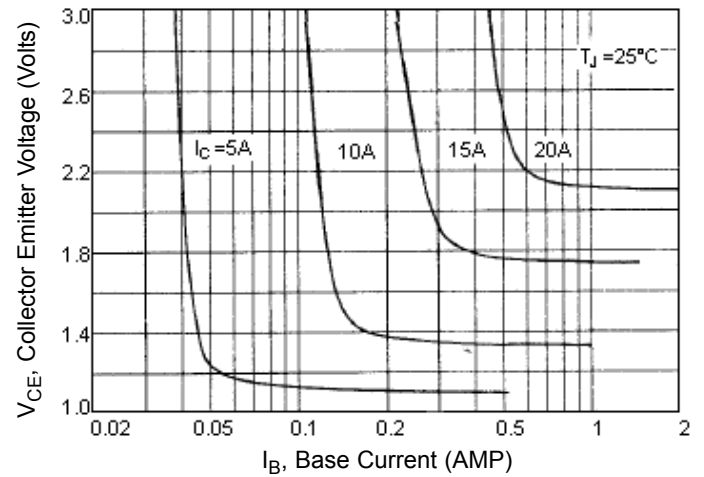
(1) Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

(2) $f_T = |h_{\text{fe}}| \cdot f_{\text{test}}$

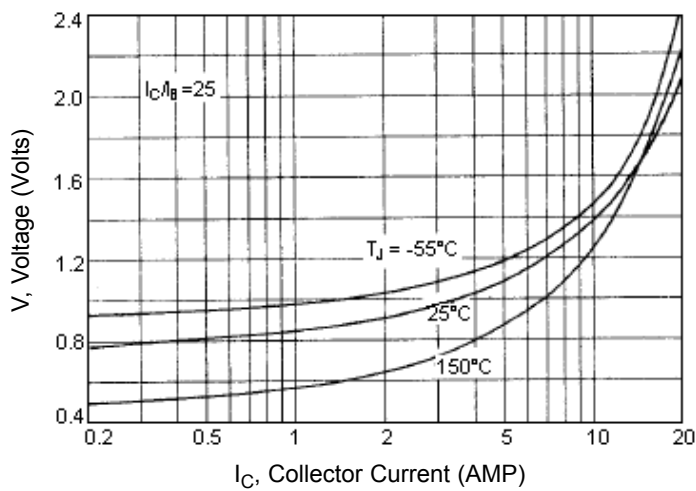
DC Current Gain



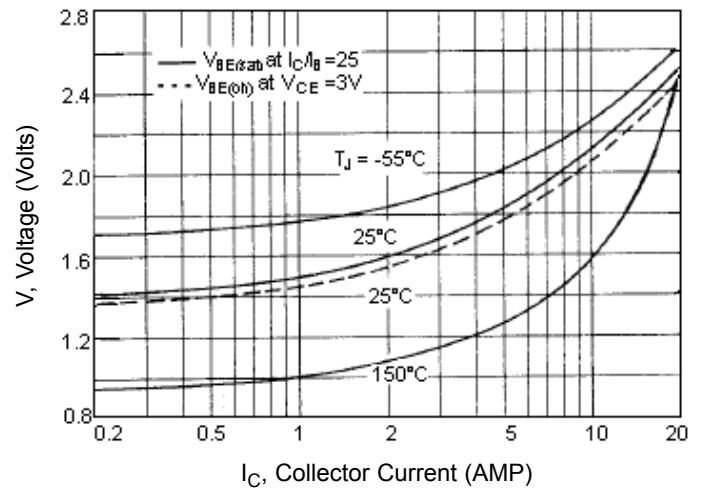
Collector Saturation Region



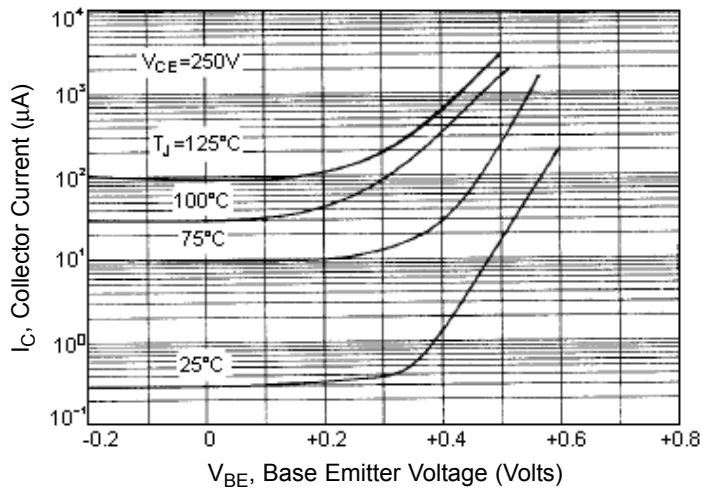
Collector Emitter Saturation Region



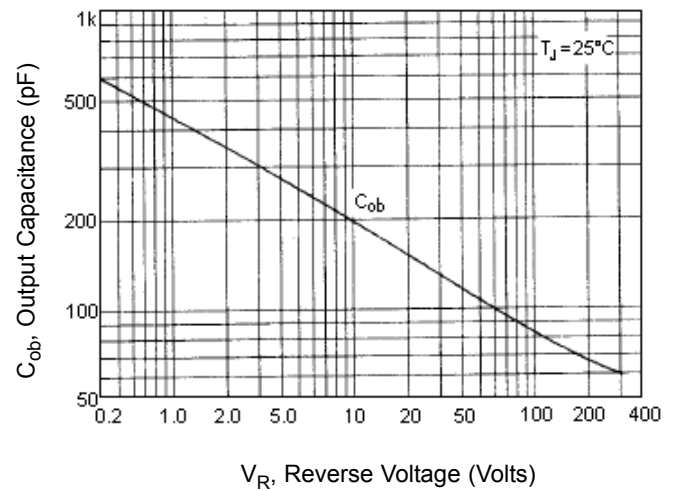
Base Emitter Voltage



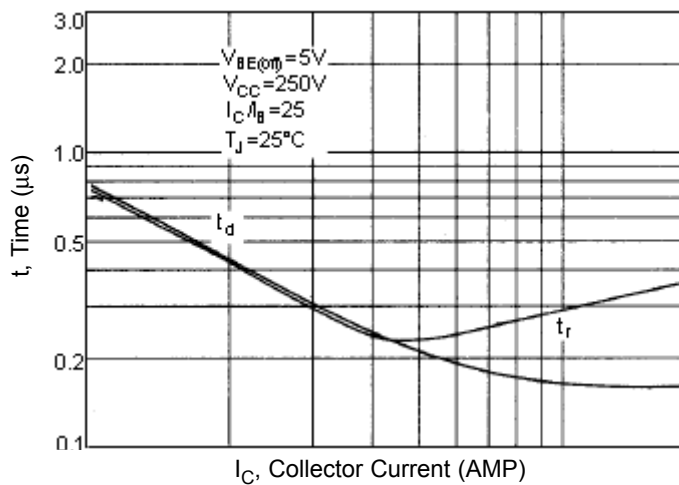
Collector Cut-Off Region



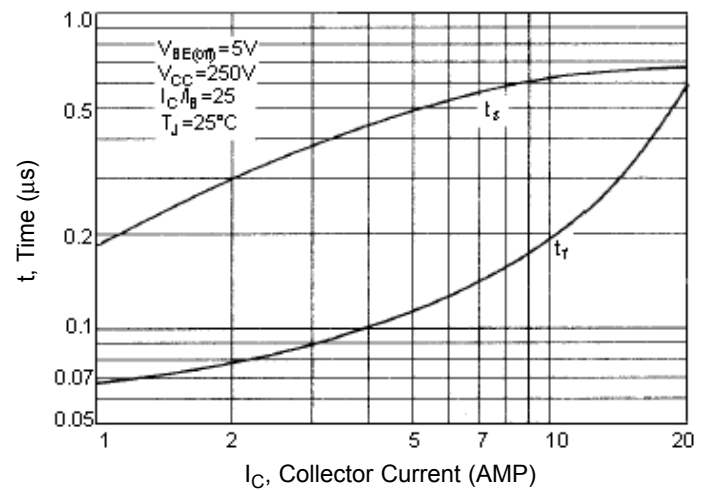
Output Capacitances



Turn-On Time

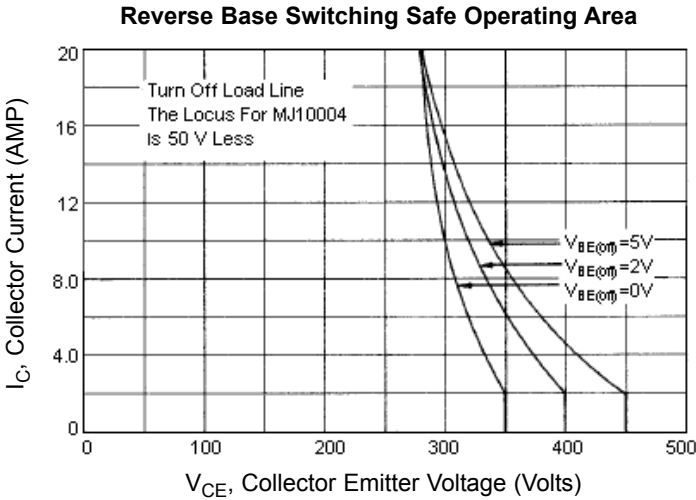
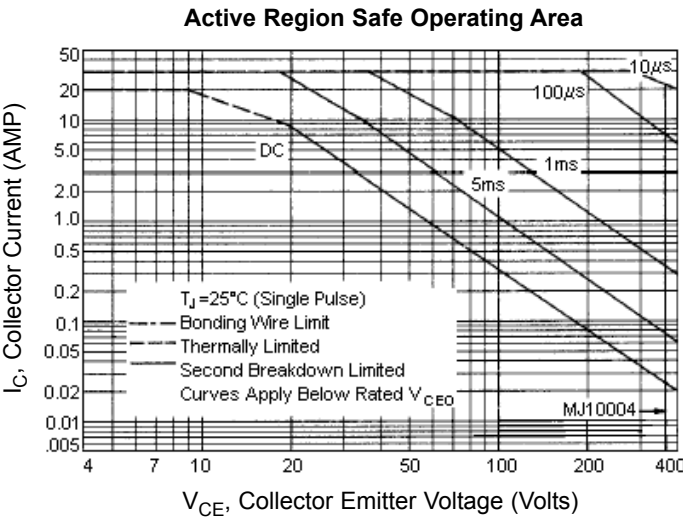


Turn-Off Time



MJ10004

Darlington Power Transistor



Specifications

I _{C(av)} maximum (A)	V _{CEO} maximum (V)	h _{FE} minimum at I _c = 10A	P _{tot} at 25°C (W)	Package	Type	Part Number
20	350	40	175	TO-3	NPN	MJ10004



MJ10004

Darlington Power Transistor



Notes:

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