

NPN Darlington Power Transistors

V_{ceo} 350V, I_c 40A and V_{ceo} 400V, I_c 40A, 250W

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**RoHS
Compliant**



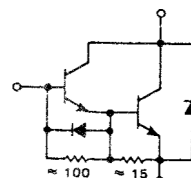
TO-3

Description

Switch Mode Series NPN Silicon Power Darlington Transistors With Base-Emitter Speedup Diode. These 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 operated switch-mode applications.

Features

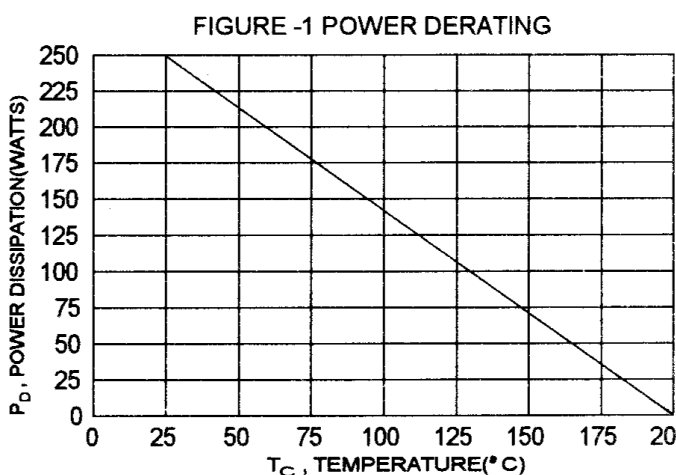
- Continuous collector Current - I_c = 40 A
- Switching Regulators
- Solenoid and Relay drivers
- AC and DC Motor Controls



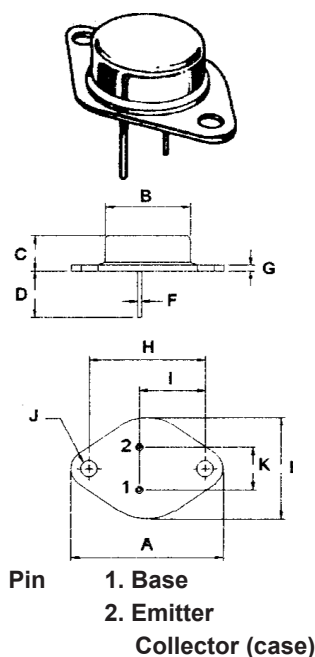
Maximum Ratings and Thermal Characteristics

Characteristics	Symbol	MJ10022	MJ10023	Unit
Collector-Emitter Voltage	V _{CEV}	450	600	V
Collector-Emitter Voltage	V _{CEO(SUS)}	350	400	
Emitter-Base Voltage	V _{EB0}	8	1.46	
Collector Current-Continuous	I _c	40		A
Peak	I _{CM}	80		
Base Current	I _B	20		
Total Power Dissipation @ T _c = 25°C	P _D	250		W
@ T _c = 100°C		143		W
Derate above 25°C		1.43		W/°C
Operating and Storage Junction Temperature Range	T _J , T _{STG}	-65 to +200		°C
Thermal Resistance Junction to Case	R _{θjc}	0.7		°C/W

Thermal Characteristics



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DIM	MILLIMETRES	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.2	26.67
F	1.46	1.55
G	1.38	1.62
H	29.9	30.4
I	16.64	17.3
J	3.88	4.36
K	10.67	11.18

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Electrical Characteristics (T_c = 25°C Unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
Off Characteristics				
Collector - Emitter Sustaining Voltage (I _C = 100 mA, I _B = 0) MJ10022 MJ10023	V _{CEO(SUS)}	350 400	-	V
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 = 150°C)	I _{CEV}	-	0.25 5	mA
Collector Cutoff Current (V _{CEV} = Rated V _{CEV} , R _{BE} = 50 Ω, T _C =100°C	I _{CER}	-	5	
Emitter Cutoff Current V _{EB} =2 V, I _C = 0)	I _{EBO}	-	175	
On Characteristics (1)				
DC Current Gain (I _C = 10A, V _{CE} = 5V)	hFE	60	600	-
Collector - Emitter Saturation Voltage (I _C = 20A, I _B = 1A) (I _C = 40A, I _B = 5A) (I _C = 20A, I _B = 1A, T _C =100°C)	V _{CE(sat)}	-	2.2 5 2.5	V
Base - Emitter Saturation Voltage (I _C = 20A, I _B =1.2 A) (I _C = 20A, I _B =1.2 A), T _C =100°C)	V _{BE(sat)}	-	2.5 2.5	
Diode Forward Voltage (I _F =20 A)	V _F	-	5	

Dynamic Characteristics

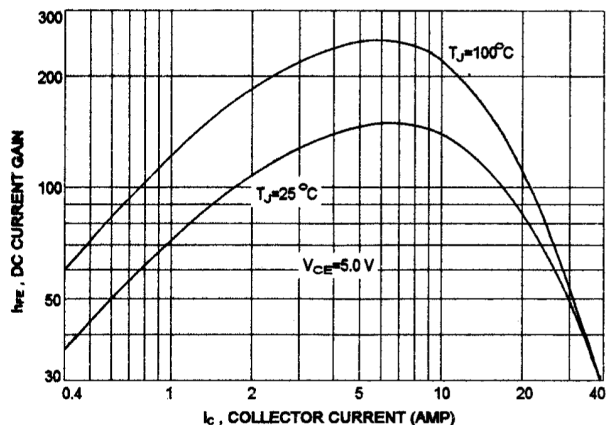
Characteristics	Symbol	Min	Max	Unit
Output Capacitance (V _{CB} = 10 V, I _E = 0, f = 1 KHz)	C _{ob}	150	600	pF

Switching Characteristics

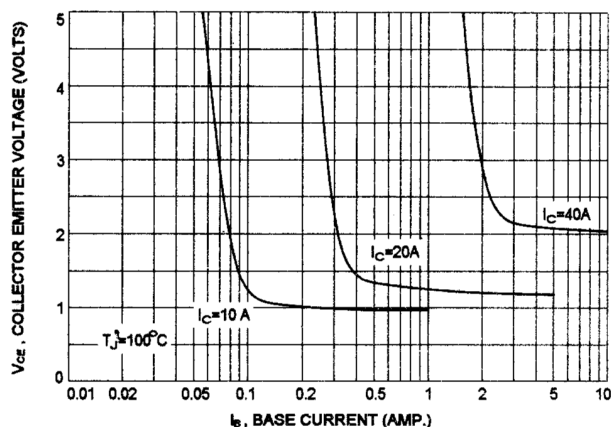
Delay time	V _{CC} = 250 V, I _c = 20A I _{B1} = 1 A, V _{BE(off)} = 5 V tp = 50us, Duty Cycle ≤ 2%	t _d	-	0.2	μs
Rise time		t _r	-	1.5	
Strong time		t _s	-	2.5	
Fall time		t _f	-	1.1	

(1) Pulse Test - Pulse width = 300 μs, Duty Cycle ≤ 2%

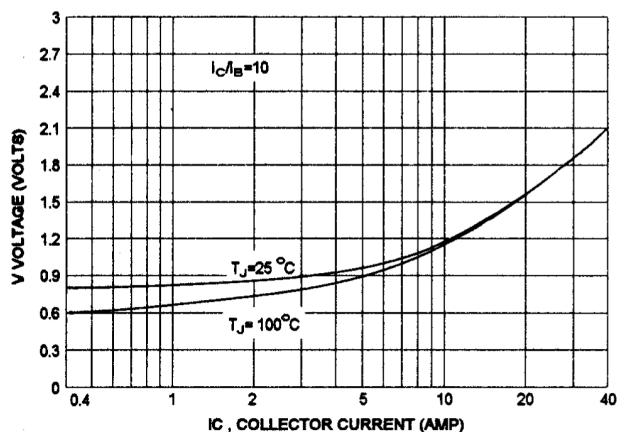
DC CURRENT GAIN



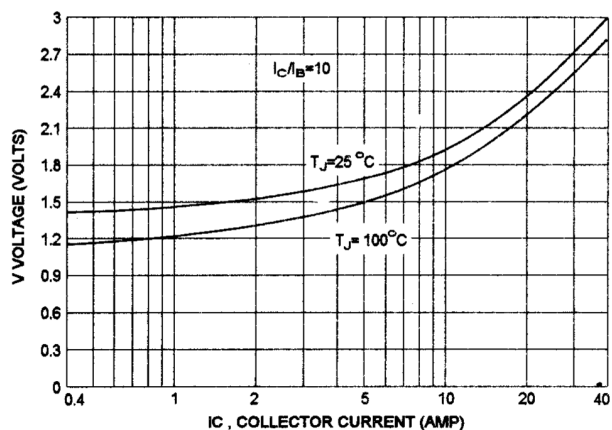
COLLECTOR SATURATION REGION



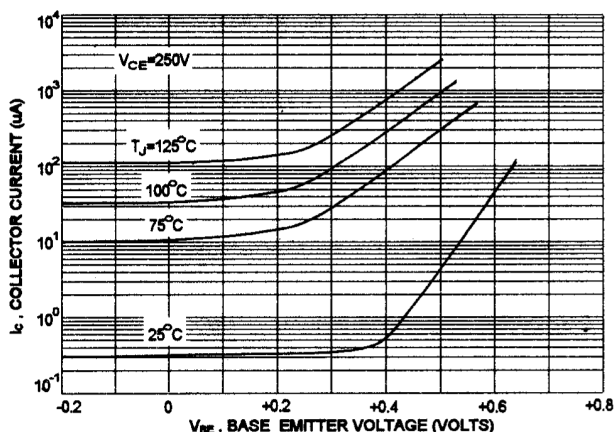
COLLECTOR-EMITTER SATURATION VOLTAGE



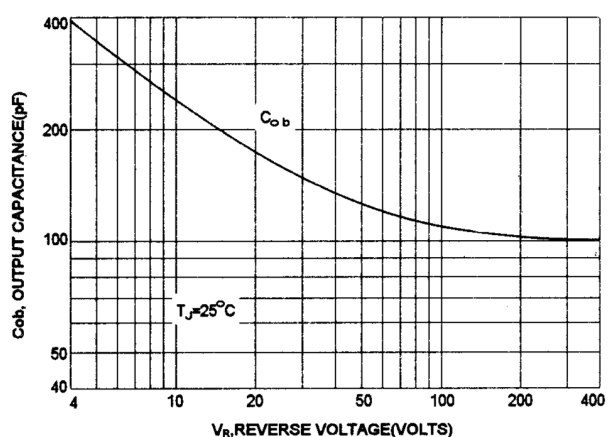
BASE-EMITTER SATURATION VOLTAGE



COLLECTOR CUT-OFF REGION



OUTPUT CAPACITANCES

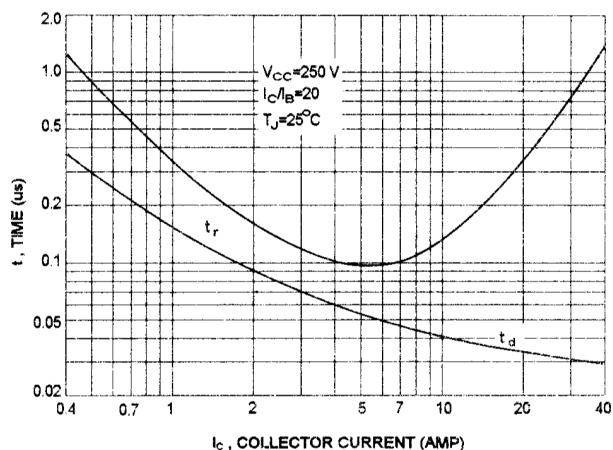


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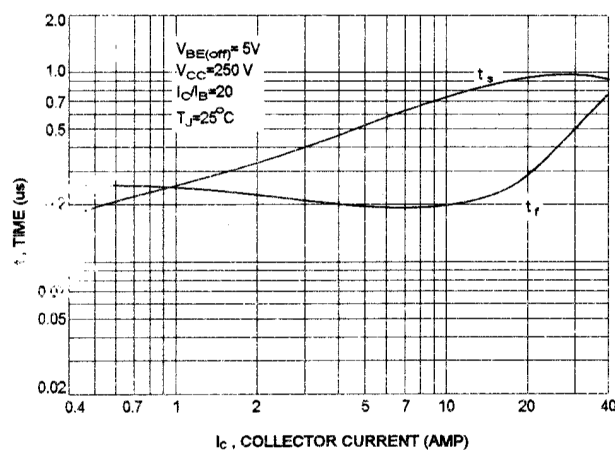
Vceo 350V, Ic 40A and Vceo 400V, Ic 40A, 250W

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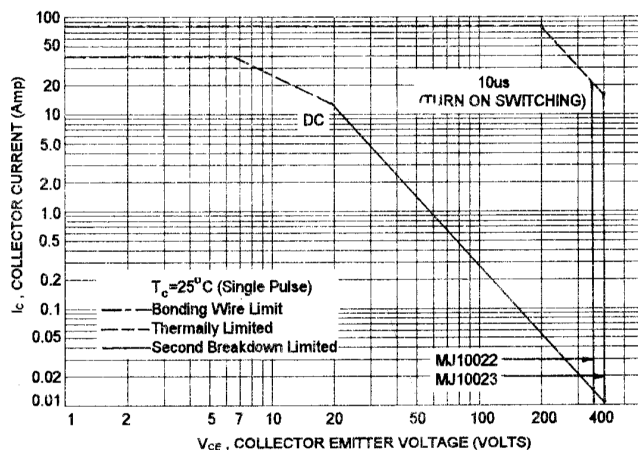
TURN-ON TIME



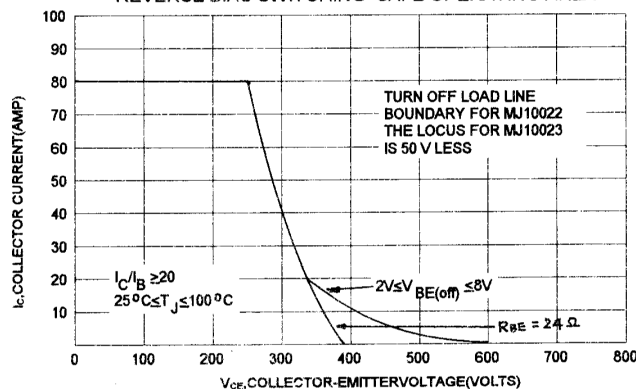
TURN-OFF TIME



ACTIVE REGION SAFE OPERATING AREA



REVERSE BIAS SWITCHING SAFE OPERATING AREA



Part Number Table

Description	Part Number
NPN Darlington Transistor, 350V, 40A, 250W, TO-3	MJ10022
NPN Darlington Transistor, 400V, 40A, 250W, TO-3	MJ10023

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