NPN Darlington Power Transistors
Vceo 350V, Ic 40A and Vceo 400V, Ic 40A, 250W

TO-03

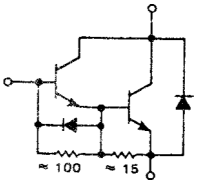
Description

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.

RoHS Compliant

Features

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

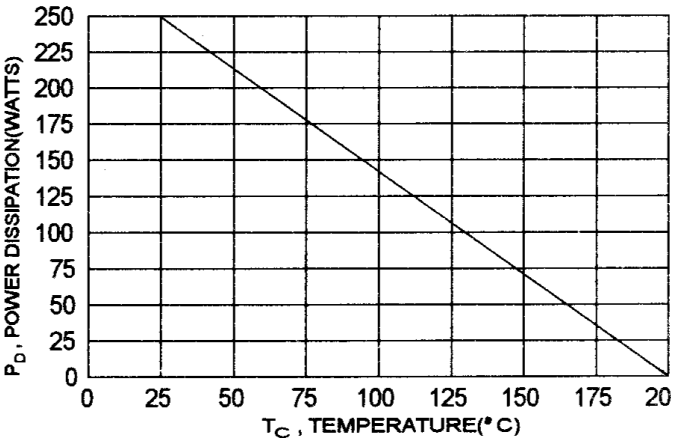


Maximum Ratings and Thermal Characteristics

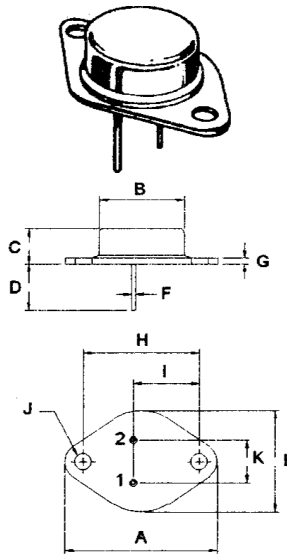
Characteristics	Symbol	MJ10022	MJ10023	Unit
Collector-Emitter Voltage	V_{CEV}	450	600	V
Collector-Emitter Voltage	$V_{CEO(SUS)}$	350	400	V
Emitter-Base Voltage	V_{EBO}	8	1.46	V
Collector Current-Continuous Peak	I_C I_{CM}	40 80		A A
Base Current	I_B	20		A
Total Power Dissipation @ T_C = 25°C @ T_C = 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

Thermal Characteristics

FIGURE -1 POWER DERATING



TO-03



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

Pin **1. Base**
2. Emitter
Collector (case)

Electrical Characteristics (Tc = 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, Tc=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), Tc=100°C)	V_{BE}(sat)	-	2.5 2.5	
Diode Forward Voltage (I_F =20 A)	V_F	-	5	

Dynamic Characteristics

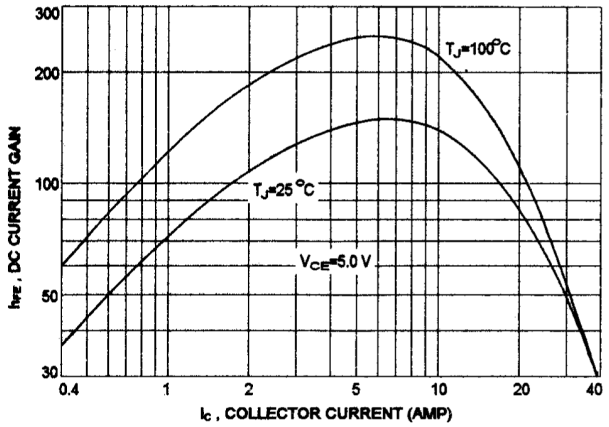
Characteristics	Symbol	Min	Max	Unit
Output Capacitance (V_{CB} = 10 V, I_E = 0, f = 1 KHz	Cob	150	600	pF

Switching Characteristics

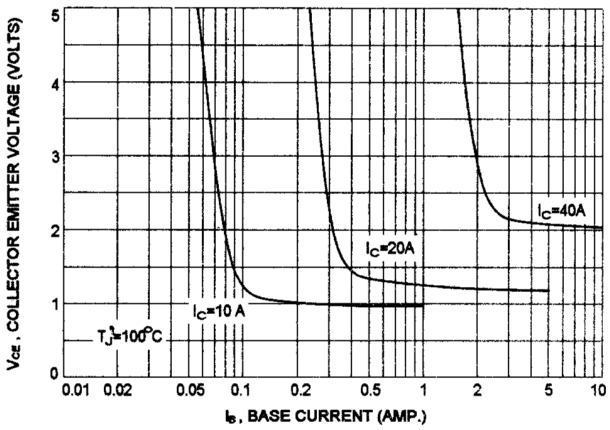
Delay time	V_{CC} = 250 V,I_C = 20A I_{B1} = 1 A, V_{BE}(off) = 5 V tp = 50us, Duty Cycle ≦ 2%	t_d	-	0.2	µs
Rise time		t_r	-	1.5	
Strong time		t_s	-	2.5	
Fall time		t_f	-	1.1	

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

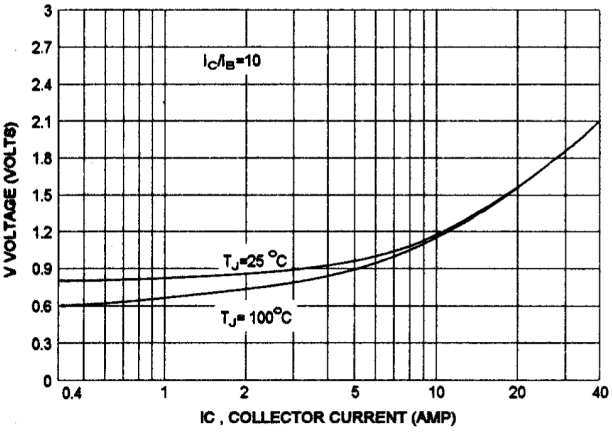
DC CURRENT GAIN



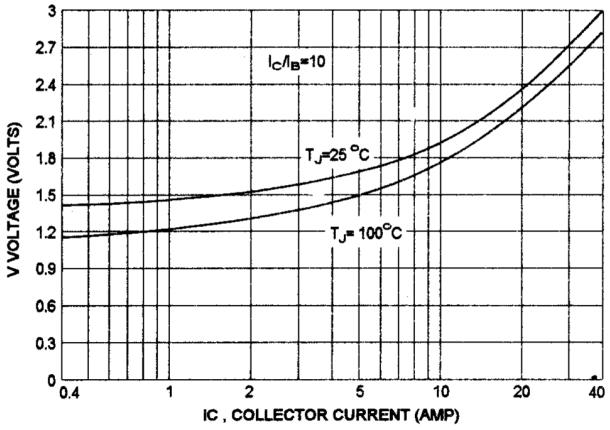
COLLECTOR SATURATION REGION



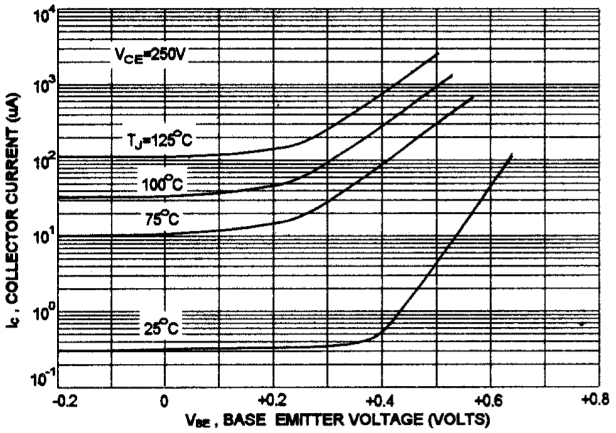
COLLECTOR EMITTER SATURATION VOLTAGE



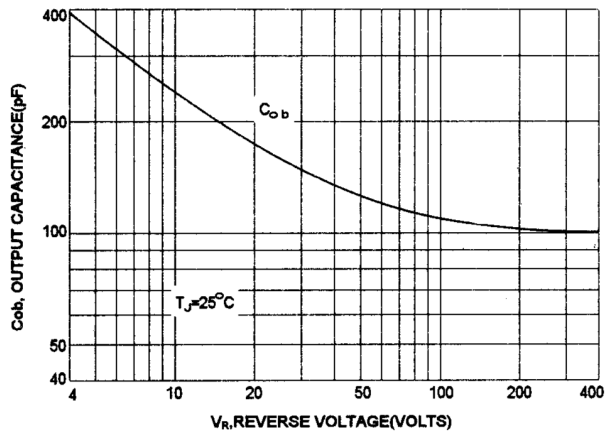
BASE - EMITTER SATURATION VOLTAGE



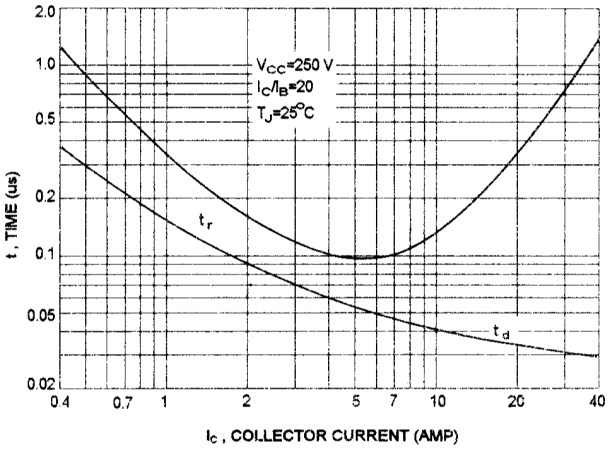
COLLECTOR CUT-OFF REGION



OUTPUT CAPACITANCES



TURN-ON TIME



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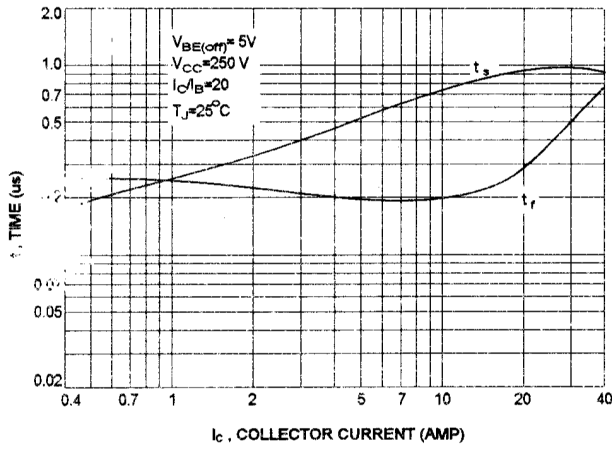
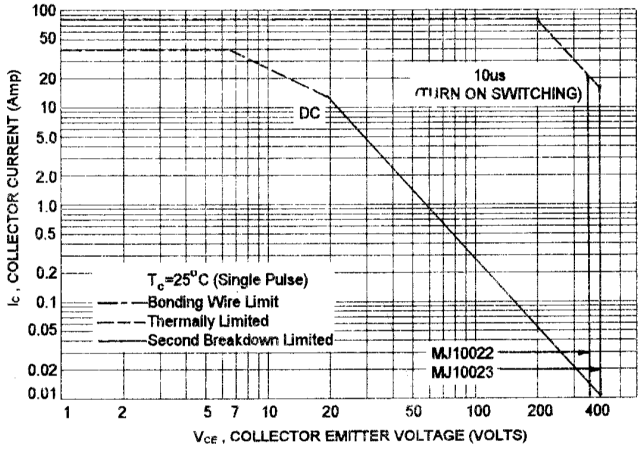
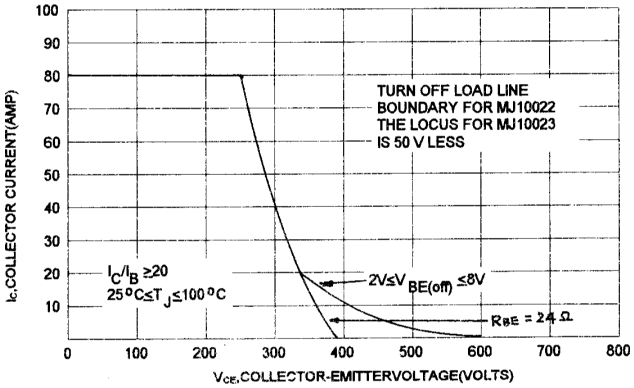


ACTIVE REGION SAFE OPERATING AREA



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