Darlington Power Transistors

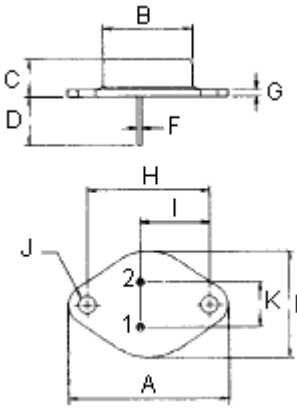
NPN Silicon

TO-3

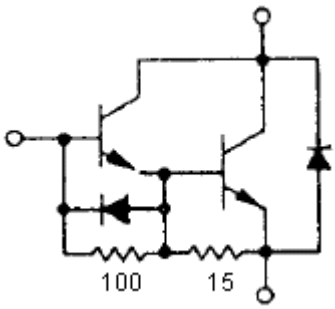
The Darlington transistors are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line operated switch-mode applications such as:

Features:

- Continuous Collector Current - I_c = 20 A
- 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	25.2	26.67
F	0.92	1.09
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

Dimensions : Millimetres

Maximum Ratings

Characteristic	Symbol	MJ10005	Unit
Collector - Emitter Voltage	V_{CEV}	500	V
	$V_{CEX\ (SUS)}$	450	
	$V_{CEO\ (SUS)}$	400	
Emitter - Base Voltage	V_{EBO}	8	
Collector Current - Continuous - Peak	I_C I_{CM}	20 30	A
Base Current	I_B	2.5	
Total Power Dissipation at T_C = 25°C at T_C = 100°C Derate above 25°C	P_D	175 100 1	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	Rθjc	1	°C / W

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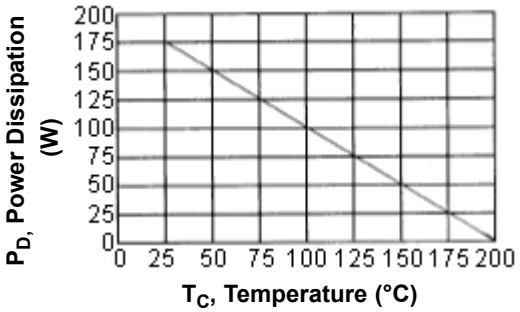
Figure - 1 Power Derating



Electrical Characteristics (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Minimum	Maximum	Unit
OFF Characteristics					
Collector - Emitter Sustaining Voltage (I_C = 250 mA, I_B = 0, V_{Clamp} = Rate V_{CEO}) MJ10005		$V_{CEO\ (sus)}$	400	-	V
Collector Cut off Current (V_{CE} = Rated V_{CEV}, R_{BE} = 50 Ω, T_C = 100°C)		I_{CER}	-	5	mA
Collector Cut off 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	
Emitter Cut off Current (V_{EB} = 2 V, I_C = 0)		I_{EBO}	-	175	
ON Characteristics (1)					
DC Current Gain (I_C = 5 A, V_{CE} = 5 V) (I_C = 10 A, V_{CE} = 5 V)		h_{FE}	50 40	600 400	-
Collector - Emitter Saturation Voltage (I_C = 10 A, I_B = 400 mA) (I_C = 20 A, I_B = 2 A) (I_C = 10 A, I_B = 400 mA, T_C = 100°C)		$V_{CE\ (sat)}$	-	1.9 3 2	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	
Diode Forward Voltage (I_F = 10 A)		V_F		5	
Dynamic Characteristics					
Small - Signal Current Gain (2) (I_C = 1 A, V_{CE} = 10 V, f = 1 MHz)		$\lvert h_{fe} \rvert$	10	-	-
Output Capacitance (V_{CB} = 10 V, I_E = 0 V, f = 100 kHz)		C_{ob}	100	-	pF
Switching Characteristics					
Delay Time	V_{CC} = 250 V, I_C = 10 A I_{B1} = 400 mA, $V_{BE\ (o(f)}$ = 5 V tp = 50 µs, Duty Cycle ≤ 2%	t_d	-	0.2	µs
Rise Time		t_r	-	0.6	
Storage Time		t_s	-	1.5	
Fall Time		t_f	-	0.5	

(1) Pulse Test: Pulse Width = 300 µs, Duty Cycle ≤ 2%
(2) $f_T = |h_{fe}| \circ f_{test}$

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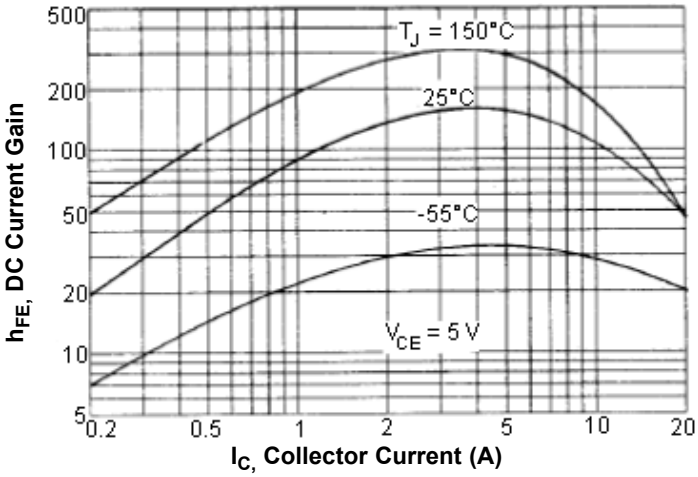
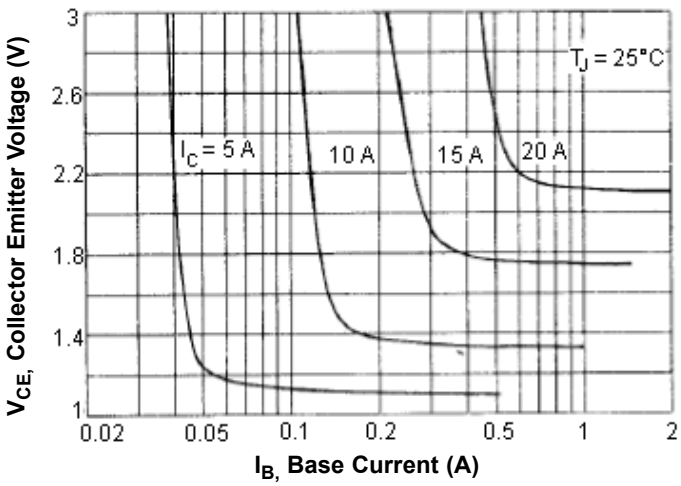
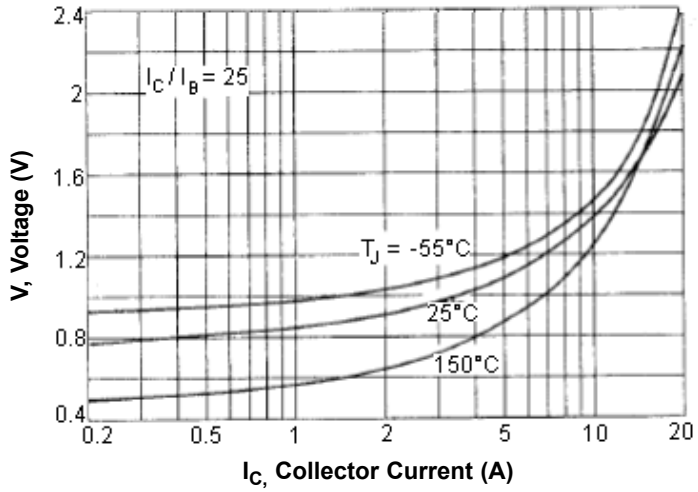
DC Current Gain



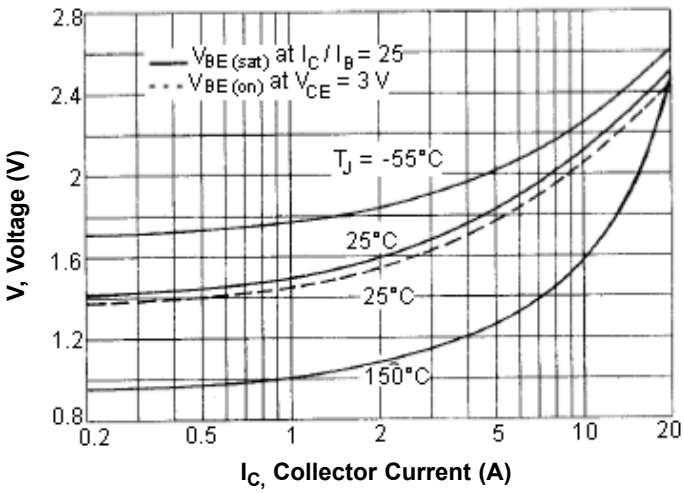
Collector Saturation Region



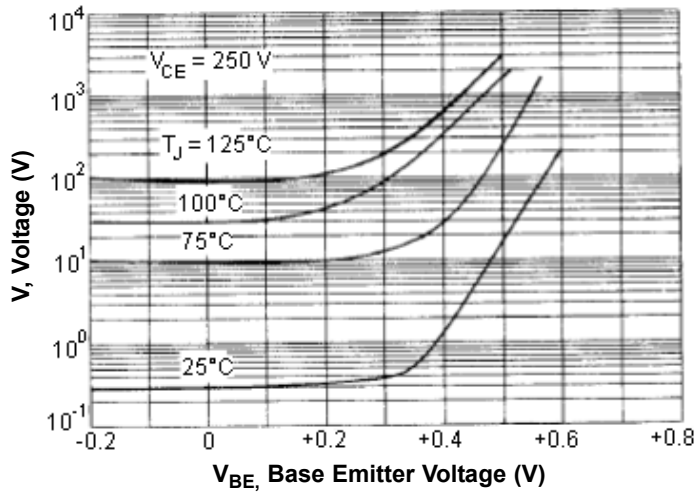
Collector Emitter Saturation Voltage



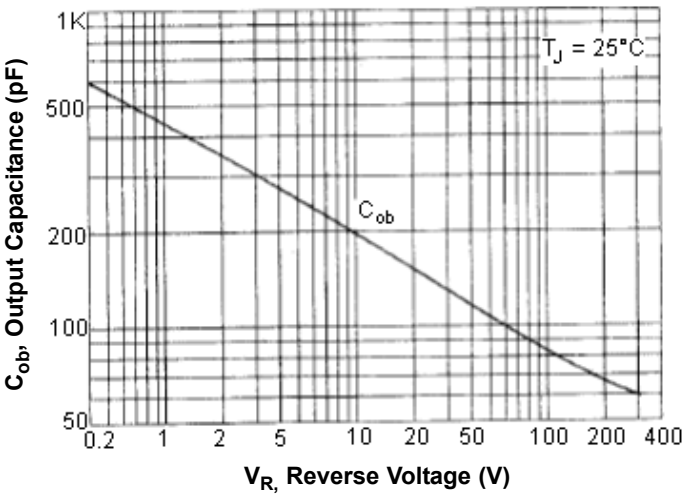
Base Emitter Voltage



Collector Cut -off Region



Output Capacitances



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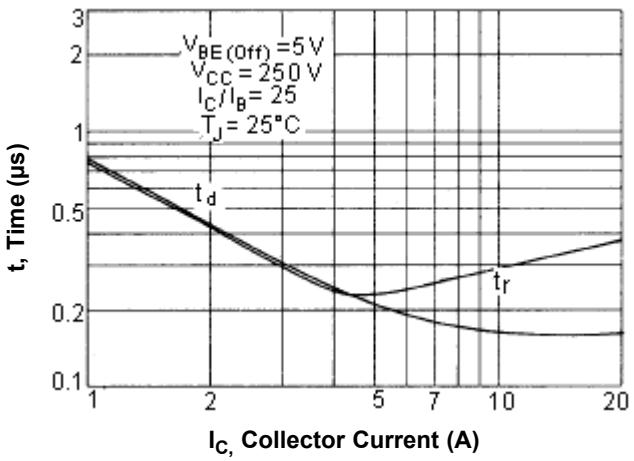
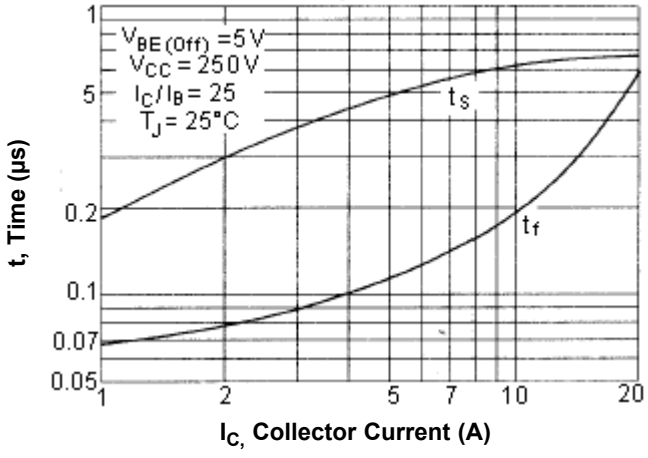
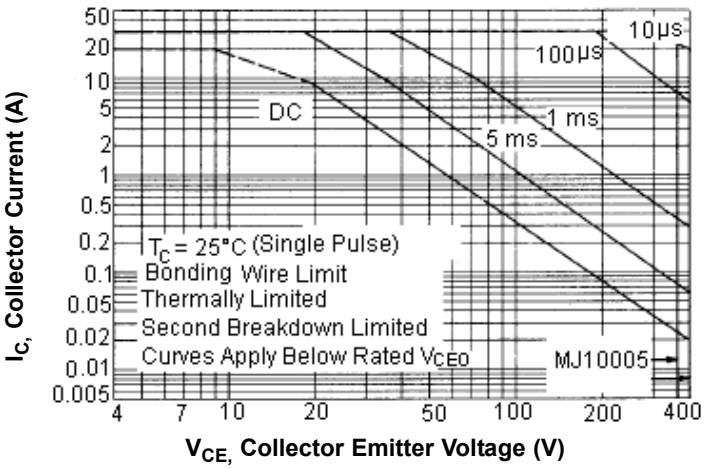
Turn - on Time



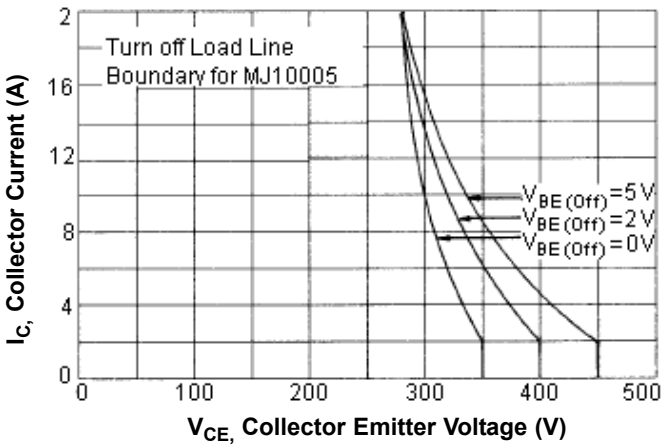
Turn - off Time



Active Region Safe Operating Area



Reverse Bias Switching Safe Operating Area



Part Number Table

Description	Part Number
Darlington Transistor, TO-3	MJ10005