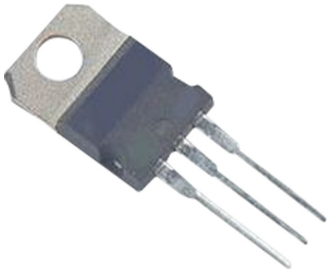
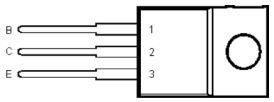
Darlington Transistor
TO-220



TO-220 Package (Top View)



Pin 2 is in electrical contact with the mounting base.

Features:

- 70W at 25°C case temperature
- 8A continuous collector current
- Min. hFE of 1,000 at 4V, 4A

Absolute Maximum Ratings
at 25°C Case Temperature (Unless Otherwise Noted)

Rating	Symbol	Value	Unit
Collector-base voltage (I_E = 0)	V_{CBO}	-100	V
Collector-emitter voltage (I_B = 0)	V_{CEO}		
Emitter-base voltage	V_{EBO}	-5	
Continuous collector current	I_C	-8	A
Peak collector current (note 1)	I_{CM}	-12	
Continuous base current	I_B	-0.3	
Continuous device dissipation at (or below) 25°C case temperature (note 2)	P_{tot}	70	W
Continuous device dissipation at (or below) 25°C free air temperature (note 3)		2	
Unclamped inductive load energy (note 4)	$1/2LI_C^2$	75	mJ
Operating junction temperature range	T_j	-65 to +150	°C
Storage temperature range	T_{stg}		
Lead temperature 3.2mm from case for 10 seconds	T_L	260	

Notes:

1. This value applies for tp ≤0.3ms, duty cycle ≤10%
2. Derate linearly to 150°C case temperature at the rate of 0.56W/°C
3. Derate linearly to 150°C free air temperature at the rate of 16mW/°C
4. This rating is based on the capability of the transistor to operate safely in a circuit of: L = 20mH, $I_{B(on)}$ = -5mA, R_{BE} = 100Ω, $V_{BE(off)}$ = 0, R_S = 0.1Ω, V_{CC} = -20V

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Electrical characteristics at 25°C case temperature

Parameter	Test Conditions	Min.	Symbol	Max.	Unit
Collector-emitter breakdown voltage	I_C = -30mA I_B = 0 (Note 5)	-100	$V_{(BR)CEO}$	-	V
Collector-emitter cut-off current	V_{CE} = -50V I_B = 0	-	I_{CEO}	-0.5	mA
Collector cut-off current	V_{CB} = -100V I_E = 0 V_{CB} = -100V I_E = 0 T_C = 100°C	-	I_{CBO}	-0.2 -1	mA
Emitter cut-off current	V_{EB} = -5V I_C = 0	-	I_{EBO}	-5	mA
Forward current transfer ratio	V_{CE} = -4V I_C = -1A V_{CE} = -4V I_C = -4A (Notes 5 and 6)	500 1,000	h_{FE}	15,000	-
Collector-emitter saturation voltage	I_B = -16mA I_C = -4A I_B = -30mA I_C = -6A (Notes 5 and 6)	-	$V_{CE\ (sat)}$	-2 -3	V
Base-emitter voltage	V_{CE} = -4V I_C = -4A (Notes 5 and 6)	-	V_{BE}	-2.5	V
Output capacitance	V_{CB} = -10V I_E = 0	-	C_{obo}	200	pF
Parallel diode forward voltage	I_E = -8A I_B = 0 (Notes 5 and 6)	-	V_{EC}	-3.5	V

Notes:

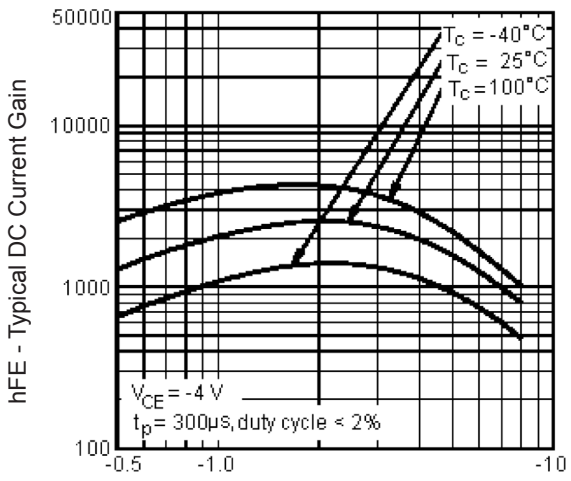
5. These parameters must be measured using pulse techniques, tp = 300µs, duty cycle ≤2%.
6. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts

Thermal Characteristics

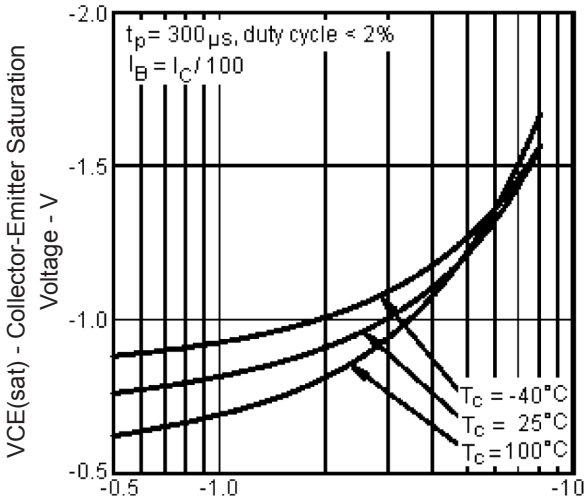
Parameter	Symbol	Min.	Typical	Max.	Unit
Junction to case thermal resistance	$R_{\theta JC}$	-	-	1.78	°C/W
Junction to free air thermal resistance	$R_{\theta JA}$	-	-	62.5	°C/W

Typical Characteristics

Typical DC Current Gain vs Collector Current



Collector-Emitter Saturation Voltage vs Collector Current



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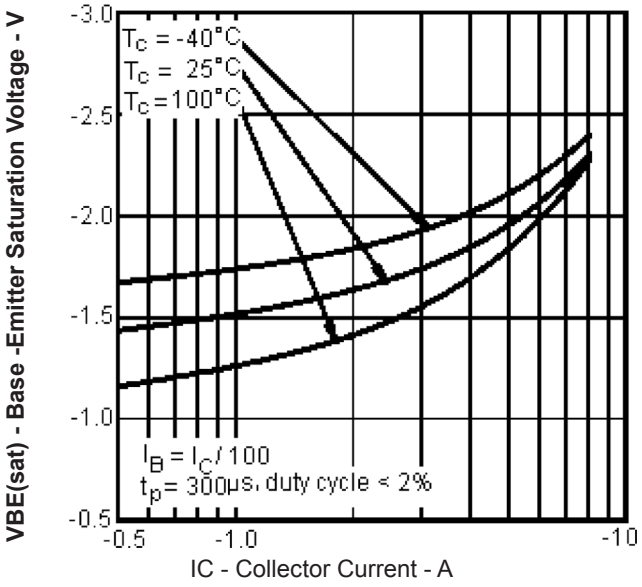
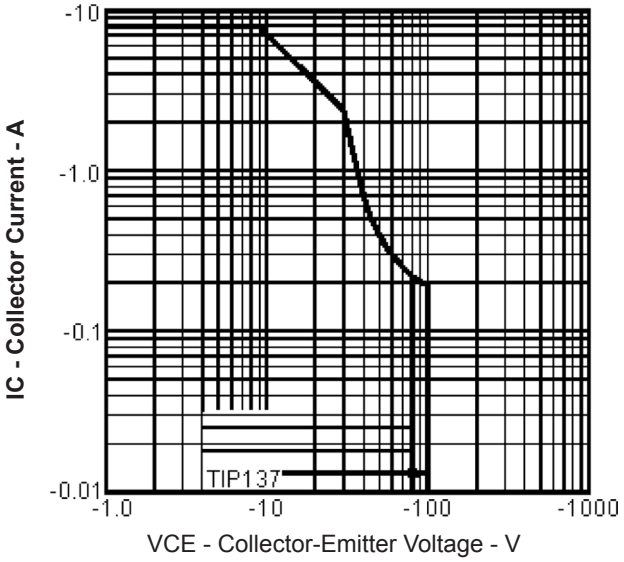
Base-Emitter Saturation Voltage vs Collector Current



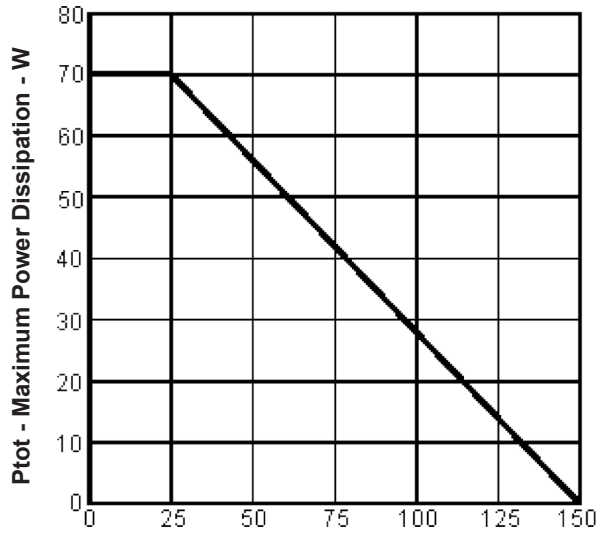
Maximum Safe Operating Regions

Maximum Forward-Bias Safe Operating Area



Thermal Information

Maximum Power Dissipation vs Case Temperature



Part Number Table

Description	Part Number
Darlington Transistor, TO-220	TIP137