

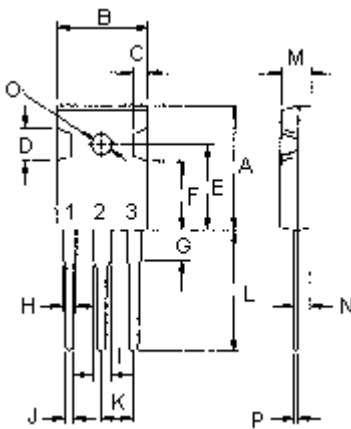
# Darlington Power Transistor



NPN Silicon Power Darlington Transistors are designed for use in automotive ignition, switching and motor control applications

## Features:

- Collector-Emitter Sustaining Voltage -  $V_{CEO(sus)} = 380\text{ V}$  (Minimum)
- Collector-Emitter Saturation Voltage  $V_{CE(sat)} = 2.9\text{ V}$  (Maximum) at  $I_C = 10\text{ A}$
- 10 A Rated continuous collector current

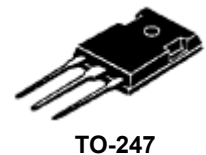


**Pin** 1. Base  
2. Collector  
3. Emitter

Dimensions	Minimum	Maximum
A	20.63	22.38
B	15.38	16.2
C	1.9	2.7
D	5.1	6.1
E	14.81	15.22
F	11.72	12.84
G	4.2	4.5
H	1.82	2.46
I	2.92	3.23
J	0.89	1.53
K	5.26	5.66
L	18.5	21.5
M	4.68	5.36
N	2.4	2.8
O	3.25	3.65
P	0.55	0.7

Dimensions : Millimetres

**NPN  
TIP162**  
  
10 A  
Darlington  
Power Transistor  
380 V  
125 W



## Maximum Ratings

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CEO}$	380	V
Collector-Base Voltage	$V_{CBO}$		
Emitter-Base Voltage	$V_{EBO}$	5	
Collector Current -Continuous -Peak	$I_C$ $I_{CM}$	10 15	A
Base Current	$I_B$	1	
Total Power Dissipation at $T_C = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	125 1	W W / $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150	$^\circ\text{C}$

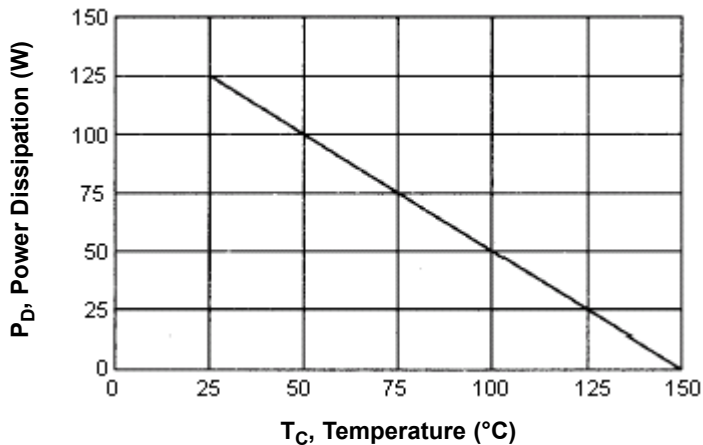
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## Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1	$^{\circ}\text{C} / \text{W}$

Figure - 1 Power Derating



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

Characteristic	Symbol	Minimum	Maximum	Unit	
<b>Off Characteristics</b>					
Collector Cut off Current ( $V_{CE} = 380 \text{ V}$ , $I_B = 0$ )	$I_{CEO}$	-	1	mA	
Emitter Cut off Current ( $V_{EB} = 5 \text{ V}$ , $I_C = 0$ )	$I_{EBO}$	-	100		
<b>On Characteristics (1)</b>					
DC Current Gain ( $I_C = 4 \text{ A}$ , $V_{CE} = 2.2 \text{ V}$ )	$h_{FE}$	200	-	-	
Collector-Emitter Saturation Voltage ( $I_C = 6.5 \text{ A}$ , $I_B = 0.1 \text{ A}$ ) ( $I_C = 10 \text{ A}$ , $I_B = 1 \text{ A}$ )	$V_{CE(sat)}$	-	2.8 2.9	V	
Base-Emitter Saturation Voltage ( $I_C = 6.5 \text{ A}$ , $I_B = 0.1 \text{ A}$ )	$V_{BE(sat)}$	-	2.2		
Diode Forward Voltage ( $I_F = 10 \text{ A}$ )	$V_F$	-	3.5		
<b>Switching Characteristics</b>					
Delay Time	$V_{CC} = 33 \text{ V}$ , $I_C = 6.5 \text{ A}$ $I_{B1} = -I_{B2} = 100 \text{ mA}$ , $t_p = 20 \mu\text{s}$ , duty cycle 2%	$t_d$	0.3 (Typical)	-	$\mu\text{s}$
Rise Time		$t_r$	1.5 (Typical)	-	
Storage Time		$t_s$	2.3 (Typical)	-	
Fall Time		$t_f$	2.8 (Typical)	-	

(1) Pulse Test : Pulse width = 300  $\mu\text{s}$ , duty cycle  $\leq 2\%$

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Figure - 2 DC Current Gain

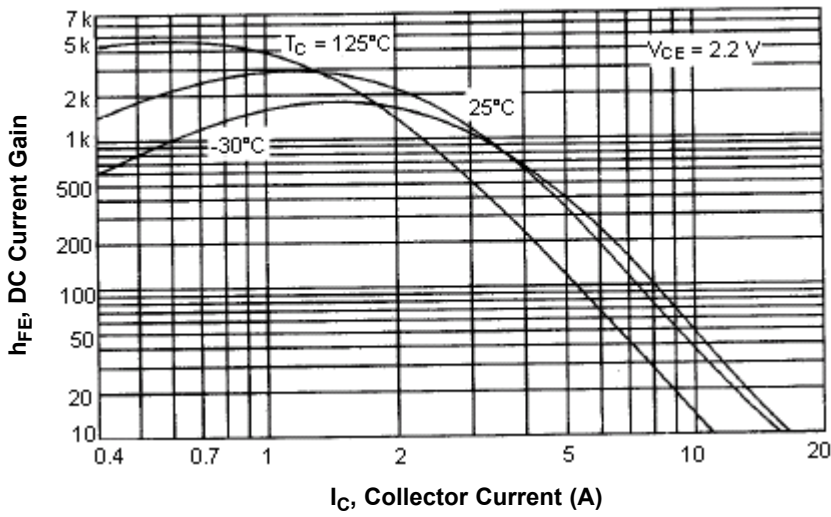


Figure - 3 Base-Emitter Voltage

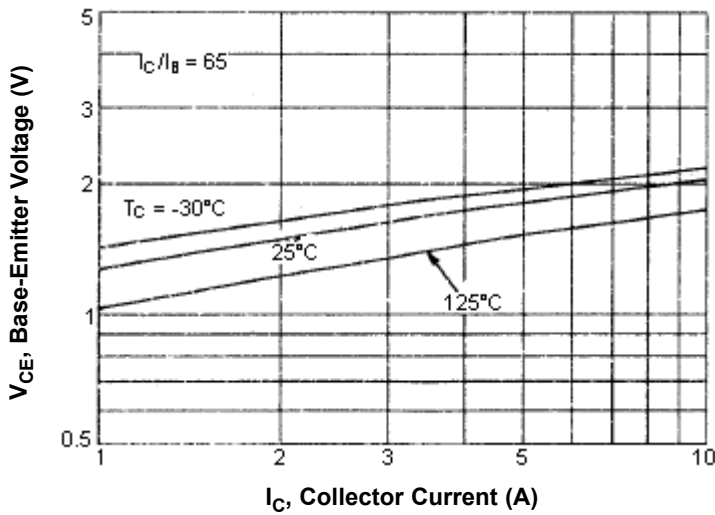
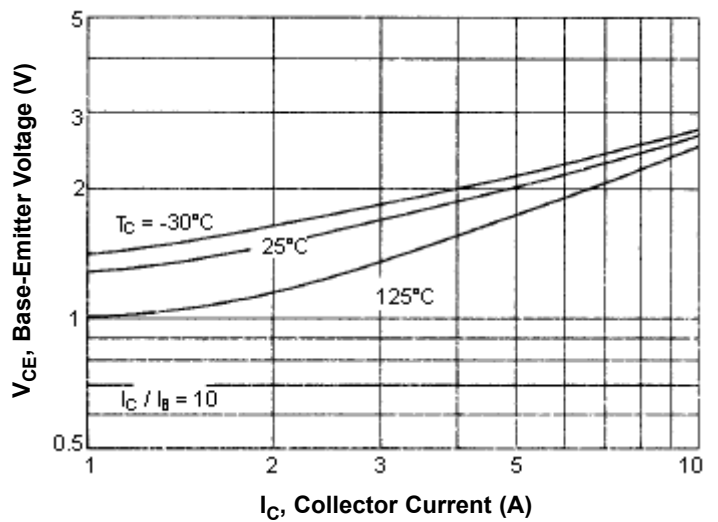


Figure - 4 Base-Emitter Voltage



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Figure - 5 Collector-Emitter Saturation Voltage

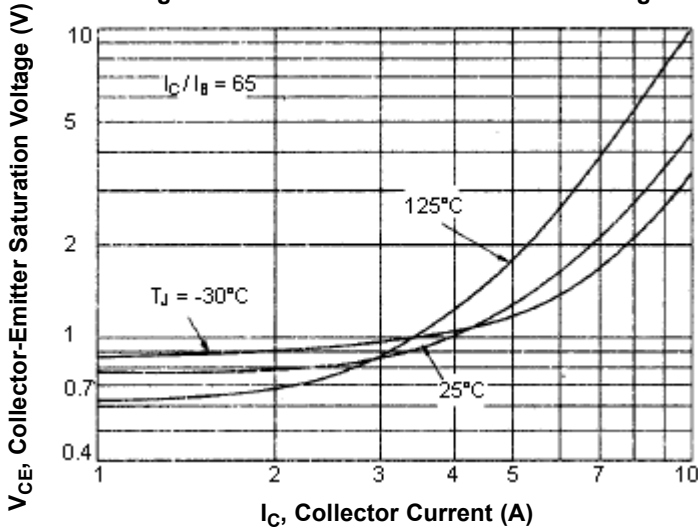


Figure - 6 Collector-Emitter Saturation Voltage

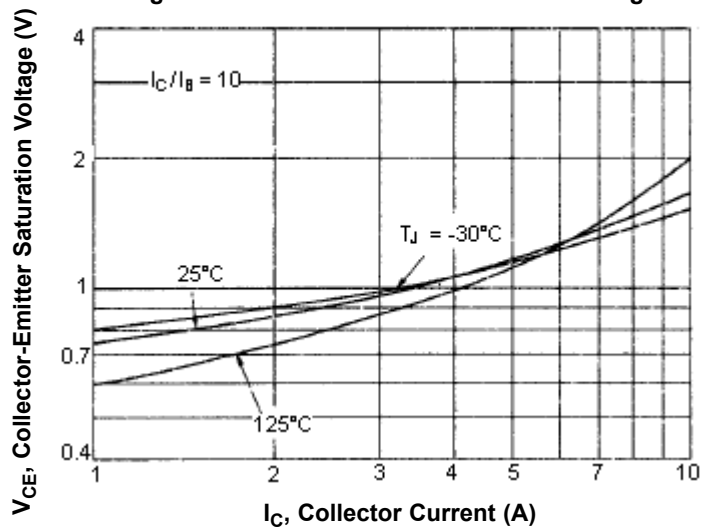
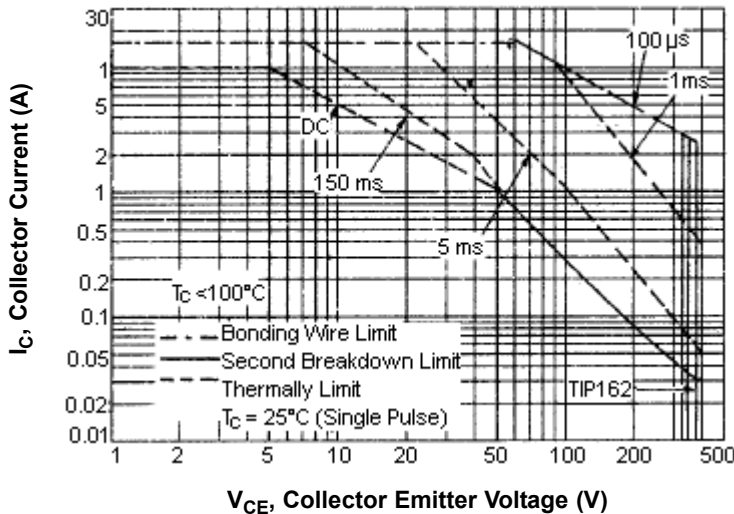


Figure - 7 Active Region Safe Operating Area



There are two limitations on the power handling ability of a transistor : average junction temperature and second breakdown safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than the curves indicate

The data of Figure - 7 is based on  $T_{J(PK)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 150^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown

## Specification Table

$I_C$ (av) Maximum (A)	$V_{CE0}$ Maximum (V)	$h_{FE}$ Minimum	$I_C$ (A)	$P_{tot}$ at $25^\circ\text{C}$ (W)	Package	Type	Part Number
10	380	200	4	125	TO-247	NPN	TIP162

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