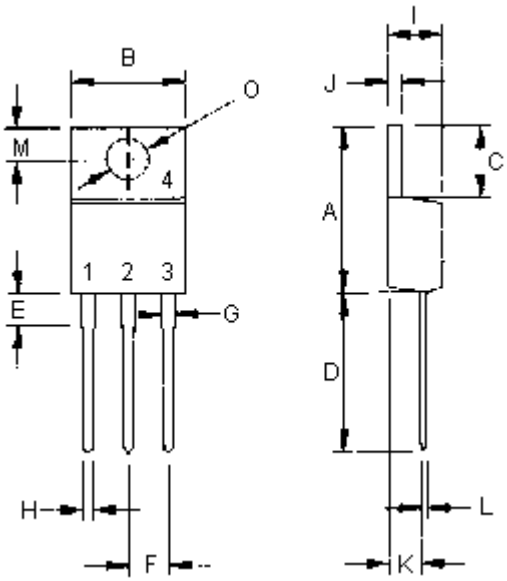
Darlingtion Transistor

NPN Silicon power darlington transistors are designed for use in automotive ignition. Switching and motor control applications

Features:

- Collector - emitter sustaining voltage
  $V_{CEO\ (SUS)}$ = 400 V (minimum)
  Collector - emitter saturation voltage
  $V_{CE\ (sat)}$ = 2 V (maximum) at I_C = 5 A
- Reverse-base SOA at 300 V to 400 V at 7 A



Pin
1. Base
2. Collector
3. Emitter
4. Collector (Case)

Dimensions	Minimum	Maximum
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.2	2.97
L	0.33	0.55
M	2.48	2.98
O	3.7	3.9

Dimensions : Millimetres

NPN
TIP152

7 Amperes
Darlington
Power Transistors
300 to 400 V
80 W

TO-220

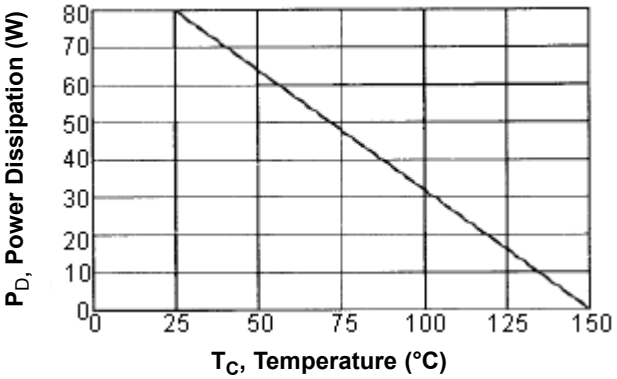
Maximum Ratings

Parameter	Symbol	TIP152	Unit
Collector - Emitter Voltage	V_{CEO}	400	V
Collector - Base Voltage	V_{CBO}		
Emitter - Base Voltage	V_{EBO}	8	
Collector Current Continuous -Peak	I_C I_{CM}	7 1	A
Base Current	I_B	1.5	
Total Power Dissipation at T_C = 25°C Derate above 25°C	P_D	80 0.64	W W / °C
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150	°C

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	Rθjc	1.56	°C / W

Power Derating



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

Parameter	Symbol	Minimum	Maximum	Unit
Off Characteristics				
Collector - Emitter Breakdown Voltage (1) (I_C = 10 mA, I_B = 0)	$V_{(BR)\ CEO}$	400	-	V
Collector - Base Breakdown Voltage (1) (I_C = 1 mA, I_B = 0)	$V_{(BR)\ CBO}$		-	
Collector Cut off Current (V_{CE} = 400 V, I_B = 0)	I_{CEO}	-	250	µA
Emitter Cut off Current (V_{EB} = 8 V, I_C = 0)	I_{EBO}	-	15	mA
On Characteristics (1)				
DC Current Gain (I_C = 2.5 A, V_{CE} = 5 V) (I_C = 5 A, V_{CE} = 5 V) (I_C = 7 A, V_{CE} = 5 V)	h_{FE}	150 50 15	-	-
Collector - Emitter Saturation Voltage (IC = 1 A, I_B = 10 mA) (IC = 2 A, I_B = 100 mA) (IC = 5 A, I_B = 250 mA)	$V_{CE\ (sat)}$	-	1.5 1.5 2	V
Base - Emitter Saturation Voltage V (I_C = 2 A, IB = 100 mA) (I_C = 5 A, IB = 250 mA)	$V_{BE\ (sat)}$	-	2.2 2.3	
Diode Forward Voltage (I_F = 7 A)	V_F	-	3.5	

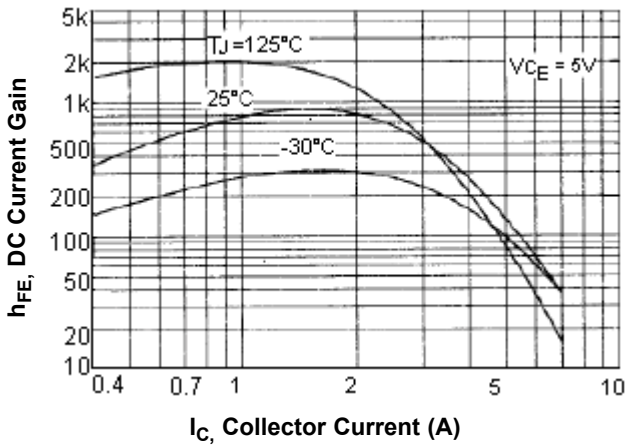
Parameter	Symbol	Minimum	Maximum	Unit
Dynamic Characteristics				
Small - Signal Current Gain (I_C = 0.5 A, V_{CE} = 5 V, f = 1 KHz)	h_{fe}	200	-	-
Output Capacitance (V_{CB} = 10 V, I_E = 0, f = 1MHz)	C_{ob}	-	150	pF

Switching Characteristics

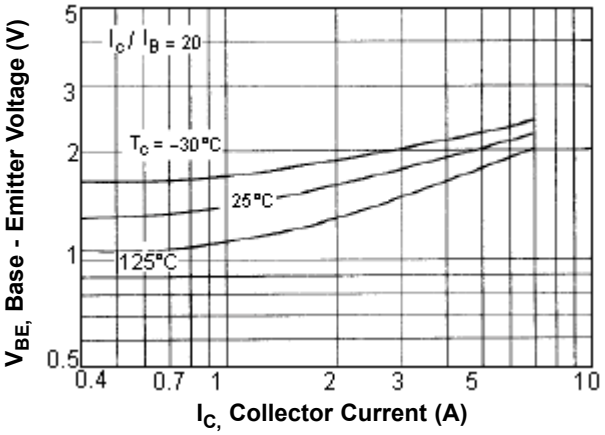
Delay Time	V_{CC} = 250 V, I_C = 5 A I_{B1} = -I_{B2} = 250 mA, tp = 200 µs, Duty Cycle ≤2%	t_d	30 (Typical)	-	ns
Rise Time		t_r	180 (Typical)	-	
Storage Time		t_s	3.5 (Typical)	-	µs
Fall Time		t_f	1.6 (Typical)	-	

1) Pulse Test : Pulse width: ≤300 µs, Duty Cycle ≤2%

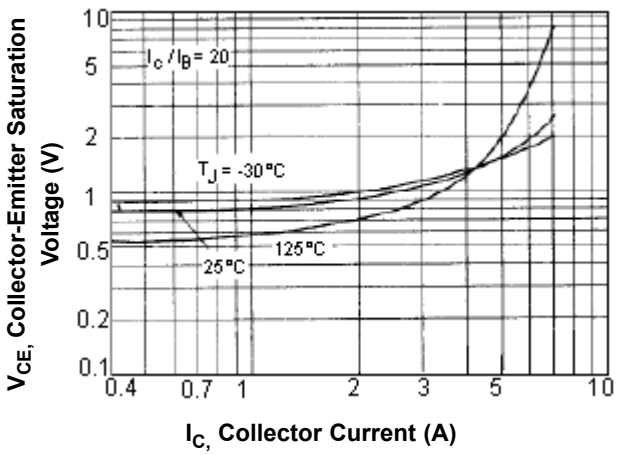
DC Current Gain



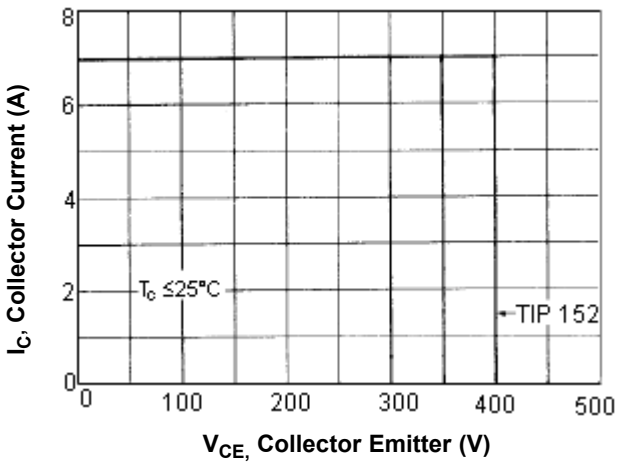
Base - Emitter Voltage



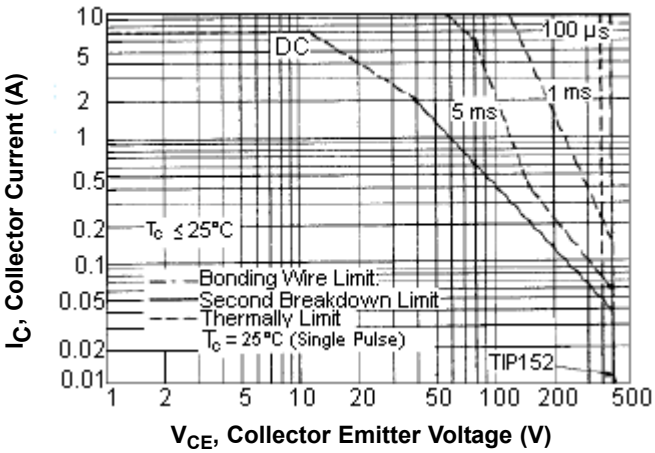
Collector - Emitter Saturation Voltage



Reverse Bias Safe Operating Area



Active Region Safe Operating Area



There are two limitation 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 curves indicate

The data of curve is base on $T_{J\ (PK)}$ = 150°C; T_C is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J\ (PK)}$ = 150°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

Part Number Table

Description	Part Number
Darlington Transistor, TO-220	TIP152