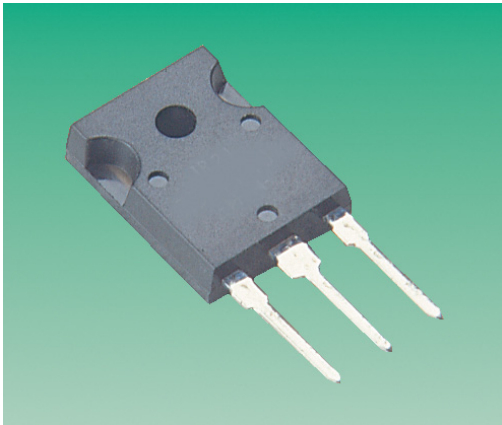


TIP140 to TIP142 & TIP145 to TIP147

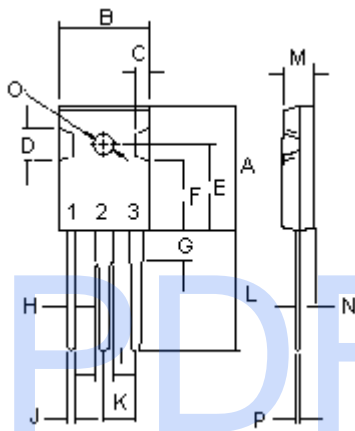
Darlington Transistors



Features:

Designed for general-purpose amplifier and low speed switching applications.

- Collector-Emitter sustaining voltage
 - $V_{CEO(sus)} = 60V$ (Minimum) - TIP140, TIP145
 - $= 80V$ (Minimum) - TIP141, TIP146
 - $= 100V$ (Minimum) - TIP142, TIP147
- Collector-Emitter saturation voltage
 - $V_{CE(sat)} = 2.0V$ (Maximum) at $I_C = 5.0A$
- Monolithic construction with Built-in Base-Emitter shunt resistor.



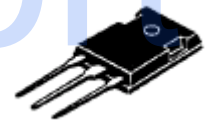
Pin 1. Base
2. Collector
3. Emitter

Dimensions	Minimum	Maximum
A	20.63	22.38
B	15.38	16.20
C	1.90	2.70
D	5.10	6.10
E	14.81	15.22
F	11.72	12.84
G	4.20	4.50
H	1.82	2.46
I	2.92	3.23
J	0.89	1.53
K	5.26	5.66
L	18.50	21.50
M	4.68	5.36
N	2.40	2.80
O	3.25	3.65
P	0.55	0.70

Dimensions : Millimetres

NPN	PNP
TIP140	TIP145
TIP141	TIP146
TIP142	TIP147

10 Ampere
Darlington
Complementary Silicon
Power Transistors
60 - 100 Volts
125 Watts



TO-247 (3P)

TIP140 to TIP142 & TIP145 to TIP147

Darlington Transistors

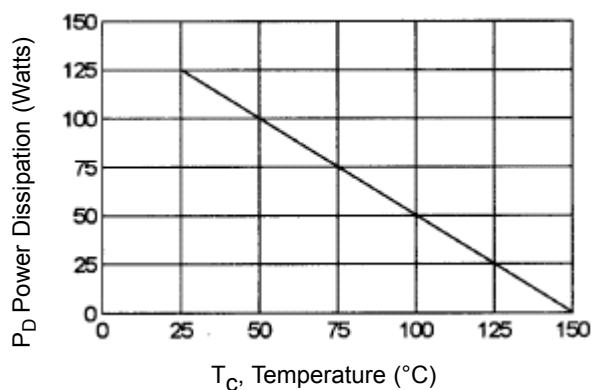


Maximum Ratings

Characteristic	Symbol	TIP140 TIP145	TIP141 TIP146	TIP142 TIP147	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	100	V
Collector-Base Voltage	V_{CBO}				
Emitter-Base Voltage	V_{EBO}				
Collector Current-Continuous -Peak	I_C I_{CM}	5.0			A
Base Current	I_B	10 15			
Total Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	0.5			W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	125 1.0			$^\circ\text{C}$
		-65 to +150			

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to case	$R_{\theta jc}$	1.0	$^\circ\text{C}/\text{W}$



TIP140 to TIP142 & TIP145 to TIP147

Darlington Transistors



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

Characteristic	Symbol	Minimum	Maximum	Unit
OFF Characteristics				
Collector-Emitter Sustaining Voltage (1) ($I_C = 30\text{mA}$, $I_B = 0$) TIP140, TIP145 TIP141, TIP146 TIP142, TIP147	$V_{CE(sus)}$	60 80 100	-	V
Collector Cut off Current ($V_{CE} = 30\text{V}$, $I_B = 0$) TIP140, TIP145 ($V_{CE} = 40\text{V}$, $I_B = 0$) TIP141, TIP146 ($V_{CE} = 50\text{V}$, $I_B = 0$) TIP142, TIP147	I_{CEO}	-	2.0 2.0 2.0	mA
Collector Cut off Current ($V_{CB} = 60\text{V}$, $I_E = 0$) TIP140, TIP145 ($V_{CB} = 80\text{V}$, $I_E = 0$) TIP141, TIP146 ($V_{CB} = 100\text{V}$, $I_E = 0$) TIP142, TIP147	I_{CBO}	-	1.0 1.0 1.0	
Emitter Cut off Current ($V_{EB} = 5.0\text{V}$, $I_C = 0$)	I_{EBO}	-	2.0	

ON Characteristics (1)				
DC Current Gain ($I_C = 5.0\text{A}$, $V_{CE} = 4.0\text{V}$) ($I_C = 10\text{A}$, $V_{CE} = 4.0\text{V}$)	h_{FE}	1000 500	-	-
Collector-Emitter Saturation Voltage ($I_C = 5.0\text{A}$, $I_B = 10\text{mA}$) ($I_C = 10\text{A}$, $I_B = 40\text{mA}$)	$V_{CE(sat)}$	-	2.0 3.0	V
Base-Emitter Saturation Voltage ($I_C = 10\text{A}$, $I_B = 40\text{mA}$)	$V_{BE(sat)}$	-	3.5	
Base-Emitter On Voltage ($I_C = 10\text{A}$, $V_{CE} = 4.0\text{V}$)	$V_{BE(on)}$	-	3.0	

Switching Characteristics					
Delay Time	$V_{CC} = 30\text{V}$, $I_C = 5.0\text{A}$ $I_{B1} = -I_{B2} = 20\text{mA}$ $t_p = 20\mu\text{s}$, Duty cycle $\leq 2.0\%$	t_d	0.15 (Typical)	-	μs
Rise Time		t_r	0.55 (Typical)	-	
Storage Time		t_s	2.5 (Typical)	-	
Fall Time		t_f	-	-	

1. Pulse Test: Pulse width = $30\mu\text{s}$, Duty cycle $\leq 2.0\%$

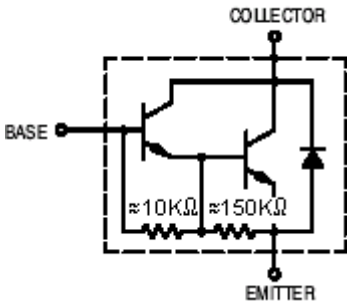
TIP140 to TIP142 & TIP145 to TIP147

Darlington Transistors

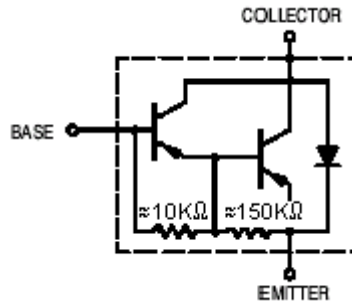


Internal Schematic Diagram

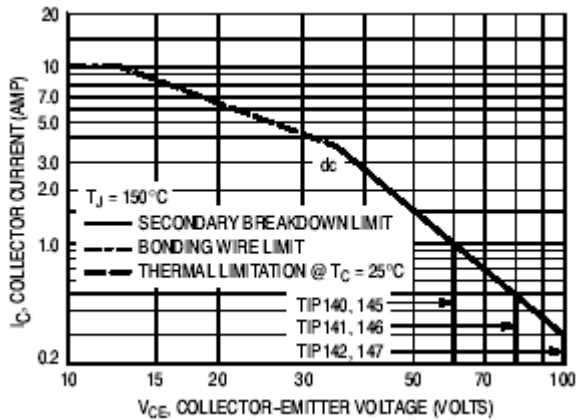
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PNP : TIP145, TIP146, TIP147



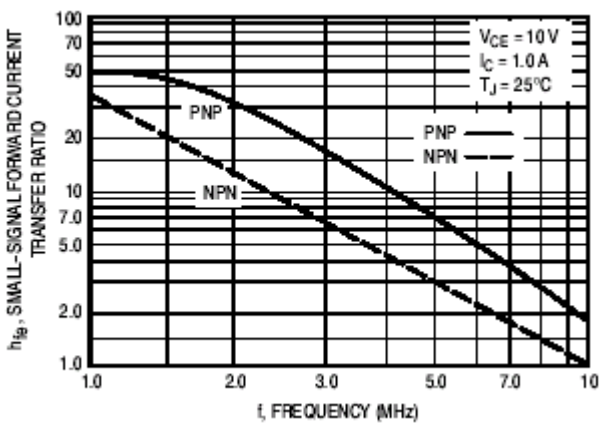
Active Region Safe Operating Area (SOA)



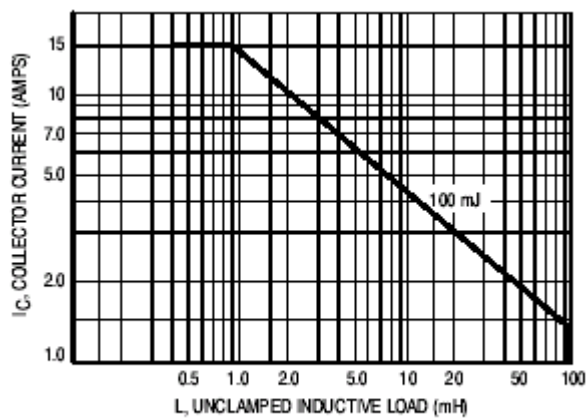
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation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

The data of SOA curve is based on $T_{J(PK)} = 150^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

Small-Signal Common-Emitter Forward Current Transfer Ratio



Unclamped Inductive Load



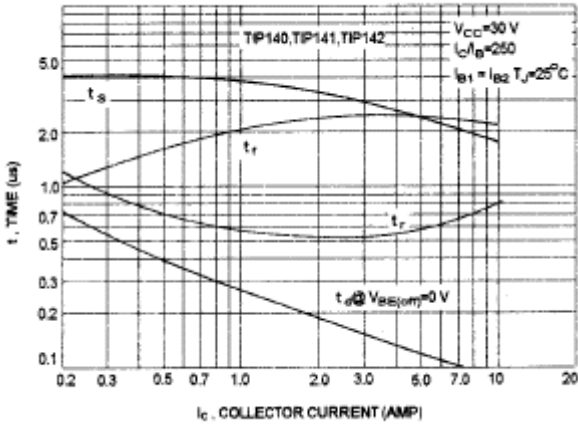
TIP140 to TIP142 & TIP145 to TIP147

Darlington Transistors



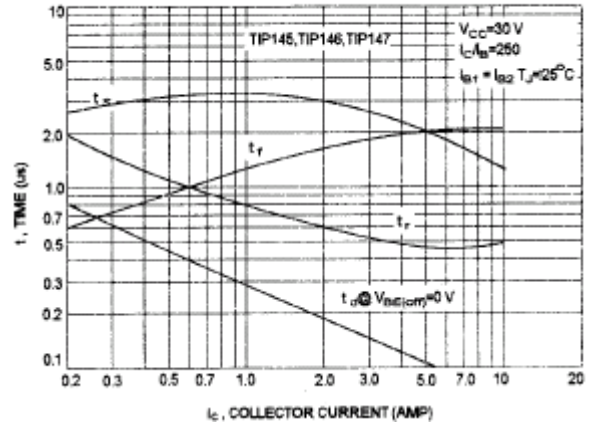
NPN : TIP140, TIP141, TIP142

SWITCHING TIME

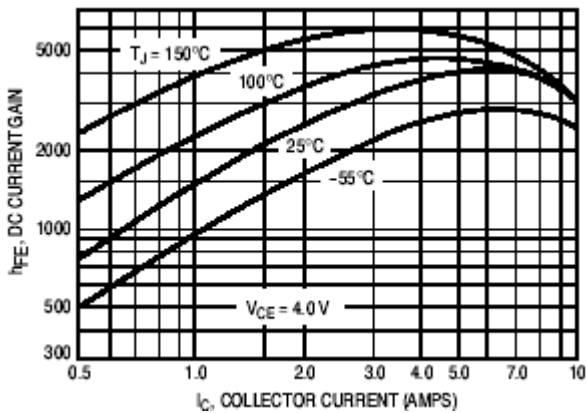


PNP : TIP145, TIP146, TIP147

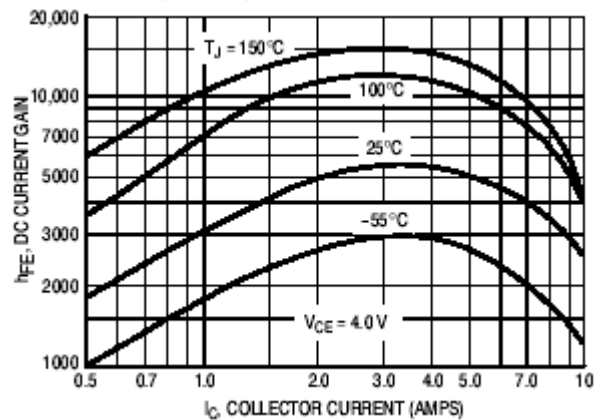
SWITCHING TIME



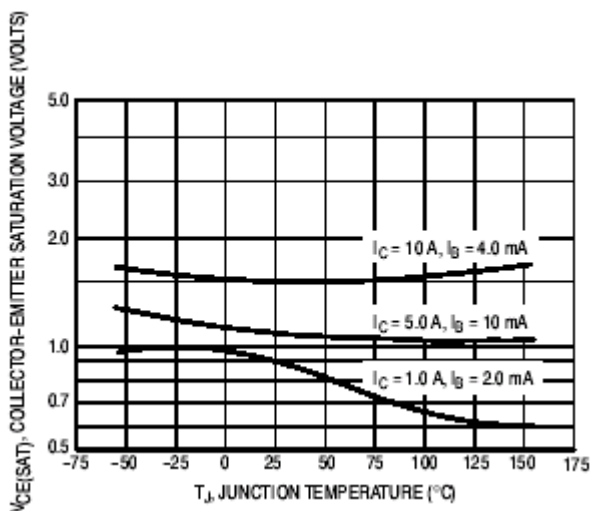
DC Current Gain



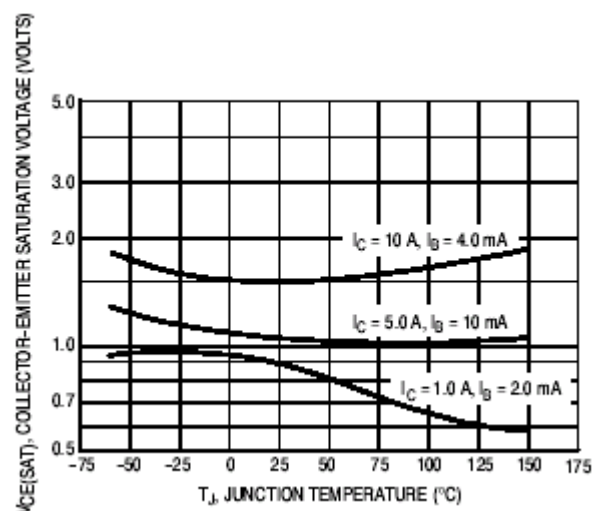
DC Current Gain



Collector-Emitter Saturation Voltage



Collector-Emitter Saturation Voltage



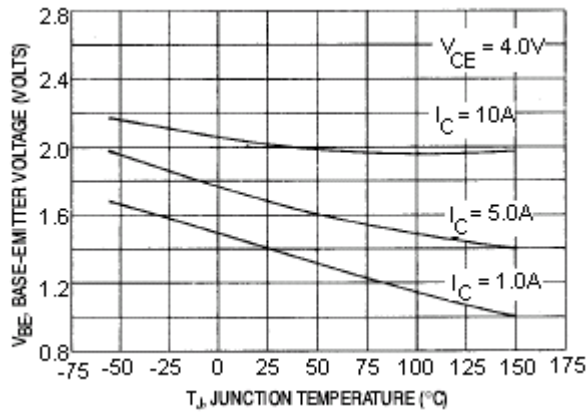
TIP140 to TIP142 & TIP145 to TIP147



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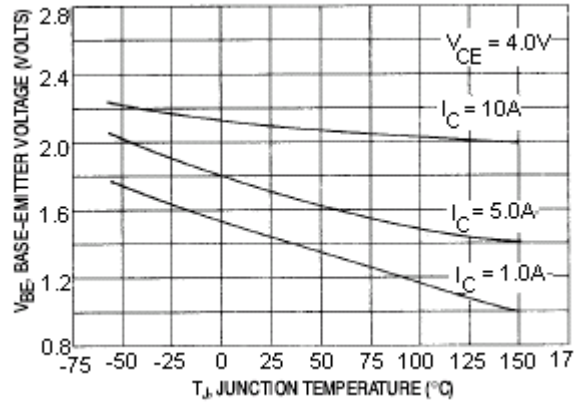
NPN : TIP140, TIP141, TIP142

Base-Emitter Voltage



PNP : TIP145, TIP146, TIP147

Base-Emitter Voltage



Specifications

I_C (A)	V_{CE0} maximum (V)	h_{FE} minimum at $I_C = 5A$	P_{tot} at 25°C (W)	Package	TYPE	Part Number
10	60	1000	125	TO-247 (3P)	NPN	TIP140
	80					TIP141
	100					TIP142
	60				PNP	TIP145
	80					TIP146
	100					TIP147



TIP140 to TIP142 & TIP145 to TIP147

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