

NPN	PNP
TIP141	TIP145
TIP142	TIP146
-	TIP147
10 Amperes	
Darlington	
Complementary	
Silicon	
Power Transistors	
60V - 100V	
125W	

## Features

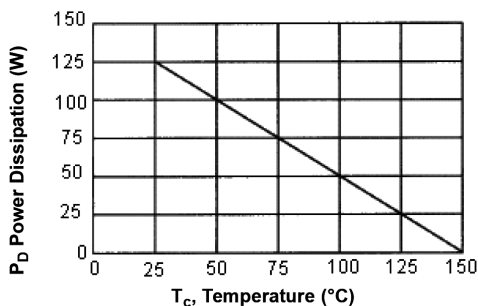
- Designed for general-purpose amplifier and low speed switching applications
- Collector-Emitter sustaining voltage  
 $V_{CE(sus)} = 60V$  (Minimum) - TIP145  
 $= 80V$  (Minimum) - TIP141, TIP146  
 $= 100V$  (Minimum) - TIP142, TIP147
- Collector-Emitter saturation voltage  
 $V_{CE(sat)} = 2V$  (Maximum) at  $I_C = 5A$
- Monolithic construction with Built-in Base-Emitter shunt resistor

## Maximum Ratings

Characteristic	Symbol	TIP145	TIP141 TIP146	TIP142 TIP147	Unit
Collector - Emitter Voltage	$V_{CEO}$	60	80	100	V
Collector - Base Voltage	$V_{CB0}$				
Emitter - Base Voltage	$V_{EB0}$	5			
Collector Current - Continuous	$I_C$	10			A
- Peak	$I_{CM}$	15			
Base Current	$I_B$	0.5			
Total Power Dissipation at $T_C = 25^\circ C$	$P_D$	125			W
Derate above $25^\circ C$		1			
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150			$^\circ C$

## Thermal Characteristics

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



## Electrical Characteristics (T<sub>c</sub> = 25°C unless otherwise specified)

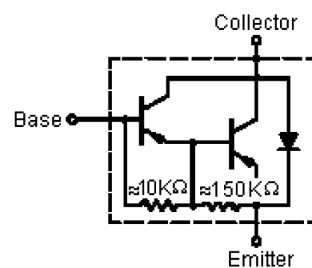
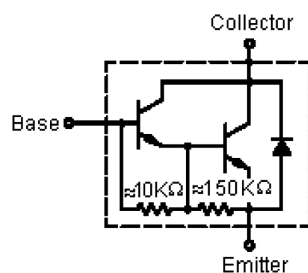
Characteristic	Symbol	Minimum	Maximum	Unit	
<b>OFF Characteristics</b>					
Collector - Emitter Sustaining Voltage (1) (I <sub>c</sub> = 30mA, I <sub>B</sub> = 0) TIP145 TIP141, TIP146 TIP142, TIP147	V <sub>CEO(sus)</sub>	60 80 100	-	V	
Collector Cut off Current (V <sub>CE</sub> = 30V, I <sub>B</sub> = 0) TIP145 (V <sub>CE</sub> = 40V, I <sub>B</sub> = 0) TIP141, TIP146 (V <sub>CE</sub> = 50V, I <sub>B</sub> = 0) TIP142, TIP147	I <sub>CEO</sub>	-	2 2 2	mA	
Collector Cut off Current (V <sub>CB</sub> = 60V, I <sub>E</sub> = 0) TIP145 (V <sub>CB</sub> = 80V, I <sub>E</sub> = 0) TIP141, TIP146 (V <sub>CB</sub> = 100V, I <sub>E</sub> = 0) TIP142, TIP147	I <sub>CBO</sub>	-	1 1 1		
Emitter Cut off Current (V <sub>EB</sub> = 5V, I <sub>C</sub> = 0)	I <sub>EBO</sub>	-	2		
<b>ON Characteristics (1)</b>					
DC Current Gain (I <sub>c</sub> = 5A, V <sub>CE</sub> = 4V) (I <sub>c</sub> = 10A, V <sub>CE</sub> = 4V)	h <sub>FE</sub>	1,000 500	-	-	
Collector - Emitter Saturation Voltage (I <sub>c</sub> = 5A, I <sub>B</sub> = 10mA) (I <sub>c</sub> = 10A, I <sub>B</sub> = 40mA)	V <sub>CE(sat)</sub>	-	2 3	V	
Base - Emitter Saturation Voltage (I <sub>c</sub> = 10A, I <sub>B</sub> = 40mA)	V <sub>BE(sat)</sub>	-	3.5		
Base - Emitter On Voltage (I <sub>c</sub> = 10A, V <sub>CE</sub> = 4V)	V <sub>BE(on)</sub>	-	3		
<b>Switching Characteristics</b>					
Delay Time	V <sub>CC</sub> = 30V, I <sub>c</sub> = 5A I <sub>B1</sub> = -I <sub>B2</sub> = 20mA t <sub>p</sub> = 20μs, Duty cycle ≤2%	t <sub>d</sub>	0.15 (Typical)	-	μs
Rise Time		t <sub>r</sub>	0.55 (Typical)	-	
Storage Time		t <sub>s</sub>	-	-	
Fall Time		t <sub>f</sub>	2.5 (Typical)	-	

1. Pulse Test : Pulse width = 30μs, Duty cycle = 2%

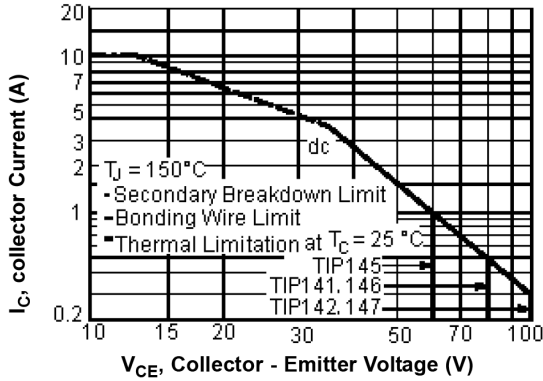
## Internal Schematic Diagram

NPN : TIP141, TIP142

PNP : TIP145, TIP146, TIP147



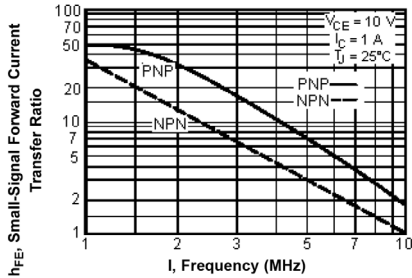
Active Region Safe Operating Area (SOA)



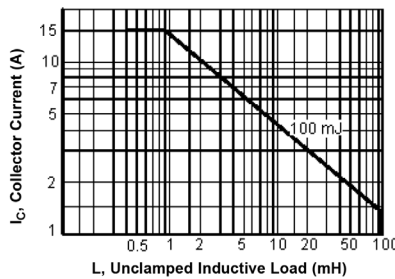
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation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

The data of SOA curve is base 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

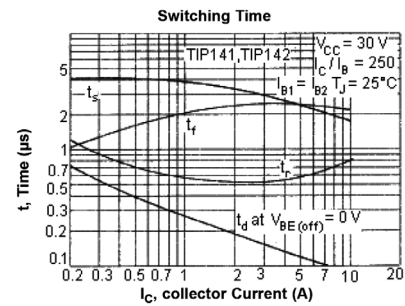
Small-Signal Common-Emitter Forward Current Transfer Ratio



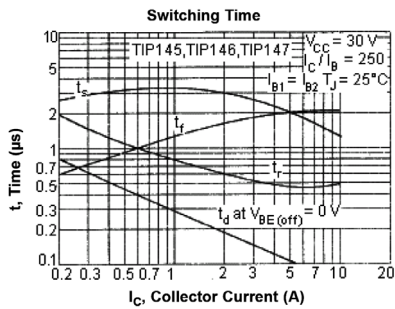
Unclamped Inductive Load



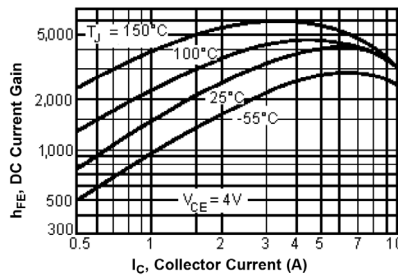
NPN : TIP141, TIP142



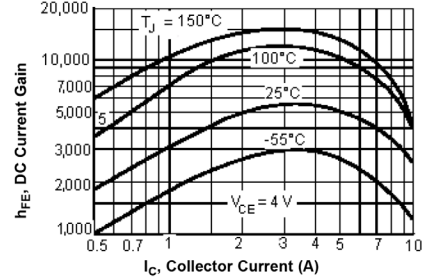
PNP : TIP145, TIP146, TIP147



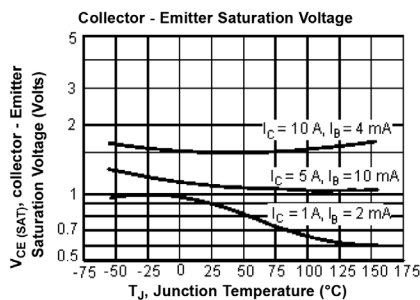
DC Current Gain



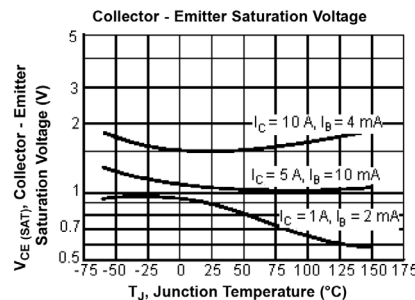
DC Current Gain



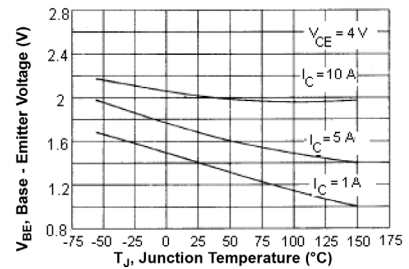
NPN : TIP141, TIP142

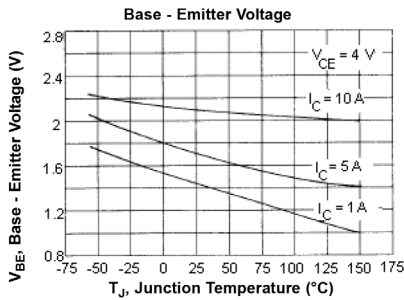


PNP : TIP145, TIP146, TIP147

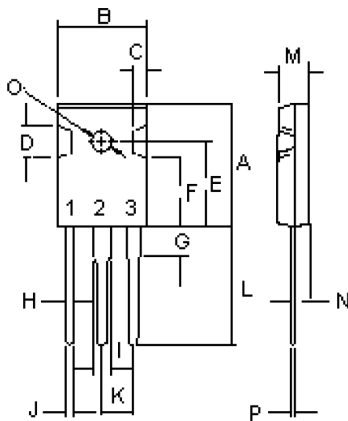


Base - Emitter Voltage





## Diagram



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

Dimensions	Minimum	Maximum
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

## Specification Table

$I_C$ (A)	$V_{CE0}$ Maximum (V)	$h_{FE}$ Minimum at $I_C = 5A$	$P_{tot}$ at 25°C (W)	Package	Type	Part Number
10	80	1,000	125	TO-247 (3P)	NPN	TIP141
	100					TIP142
	60				PNP	TIP145
	80					TIP146
	100					TIP147

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