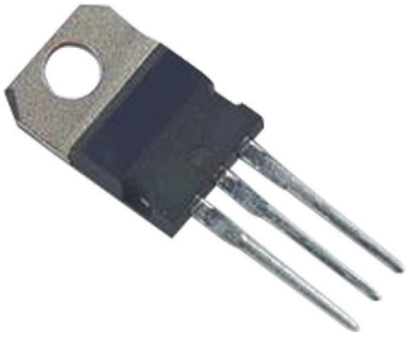
Power Transistor



Description:

Designed for use in general purpose power amplifier and switching applications.

Features:

- Collector-emitter sustaining voltage-$V_{CEO\ (sus)}$ = 60V (Min.)
- Collector-emitter saturation voltage-$V_{CE\ (sat)}$ = 1.5V (Max.) at I_C = 6A
- Current gain-bandwidth product f_T = 3MHz (Min.) at I_C = 500mA

Maximum Ratings

Characteristic	Symbol	TIP41A TIP42A	Unit
Collector-Emitter Voltage	V_{CEO}	60	V
Collector-Base Voltage	V_{CBO}		
Emitter-Base Voltage	V_{EBO}	5	
Collector Current-Continuous -Peak	I_C	6 10	A
Base Current	I_B	2	
Total Power Dissipation at T_C = 25°C Derate above 25°C	P_D	65 0.52	W W/°C
Operation and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150	°C

Thermal Characteristics

Characteristic	Symbol	Max.	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.92	°C/W

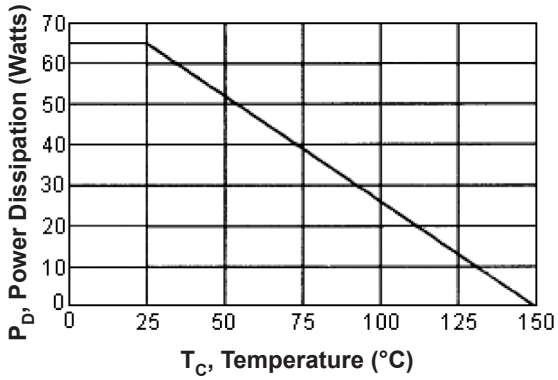
Electrical Characteristics (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min.	Max.	Unit
OFF Characteristics				
Collector-Emitter Sustaining Voltage (1) I_C = 30mA, I_B = 0 TIP41A TIP42A	$V_{CEO(sus)}$	60	-	V
Collector Cut off Current V_{CE} = 30V, I_B = 0 TIP41A TIP42A	I_{CEO}	-	0.7	mA
Collector Cut off Current V_{CE} = 60V, V_{EB} = 0 TIP41A TIP42A	I_{CES}	-	0.4	
Emitter Cut off Current V_{EB} = 5V, I_C = 0	I_{EBO}	-	1	
ON Characteristics (1)				
DC Current Gain I_C = 0.3A, V_{CE} = 4V I_C = 0.3A, V_{CE} = 4V	h_{FE}	30 15	75	-
Collector-Emitter Saturation Voltage I_C = 6A, I_B = 600mA	$V_{CE(sat)}$	-	1.5	V
Base-Emitter On Voltage I_C = 6A, V_{CE} = 4V	$V_{BE(on)}$	-	2	
Dynamic Characteristics				
Current Gain-Bandwidth Product (2) I_C = 500mA, V_{CE} = 10V, f_{TEST} = 1MHz	f_T	3	-	MHz
Small Signal Current Gain I_C = 500mA, V_{CE} = 10V, f = 1kHz	h_{FE}	20	-	-

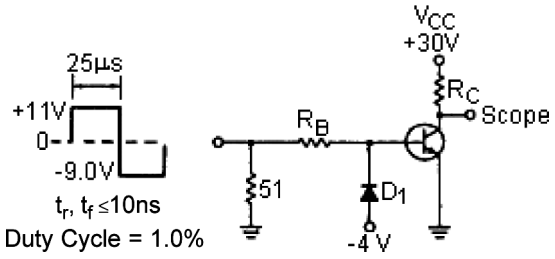
(1) Pulse Test: Pulse width ≤300μs, Duty Cycle ≤2%

(2) $f_T = h_{FE} \bullet f_{TEST}$

Power Derating

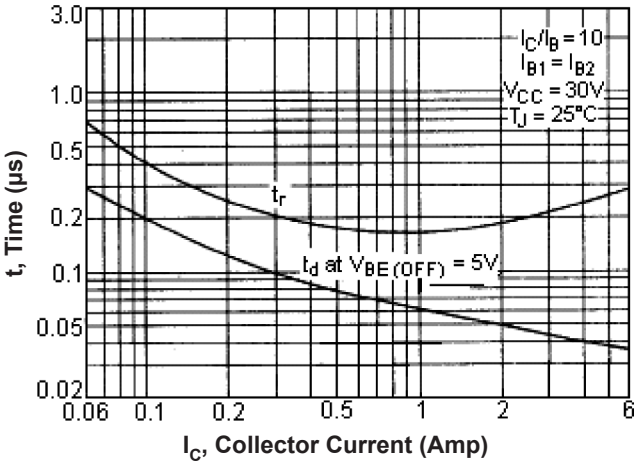


Switching Time Test Circuit

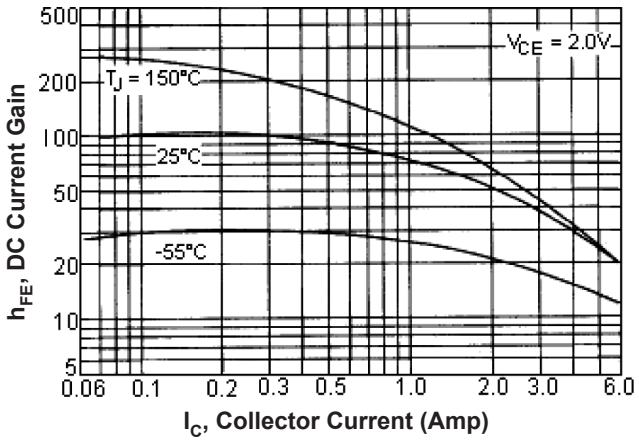


R_B and R_C Varied to Obtain Desired Current Levels
D_1 Must be Fast Recovery Type. eg:
M8D5000 Used Above I_B to 100mA
MSD6100 Used Below I_B to 100mA

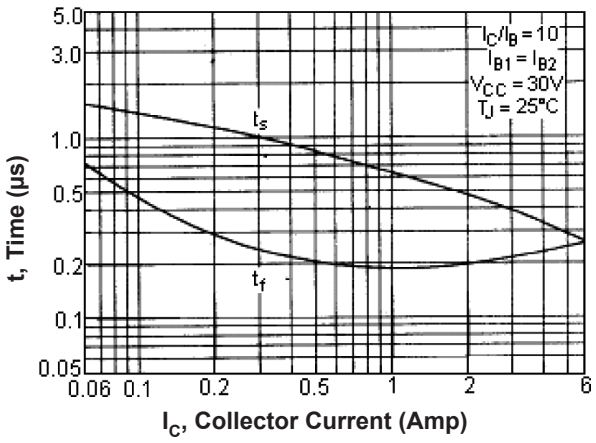
Figure - 3 Turn-On Time



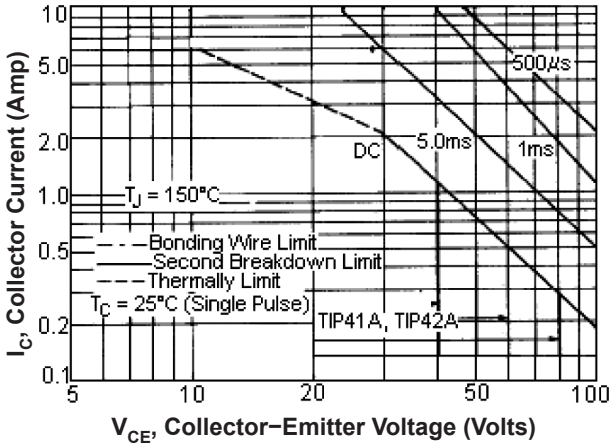
DC Current Gain



Turn-off Time



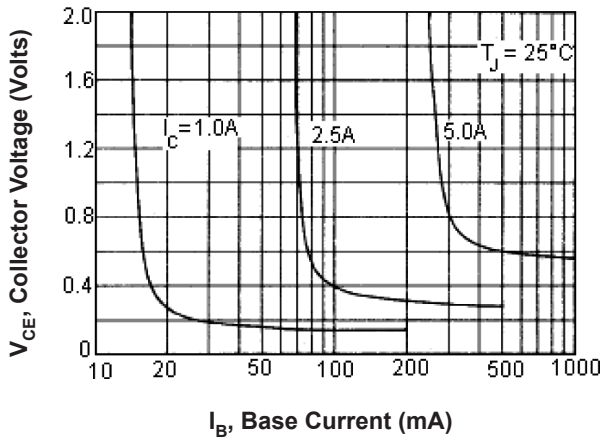
Active Region Safe Operating Area



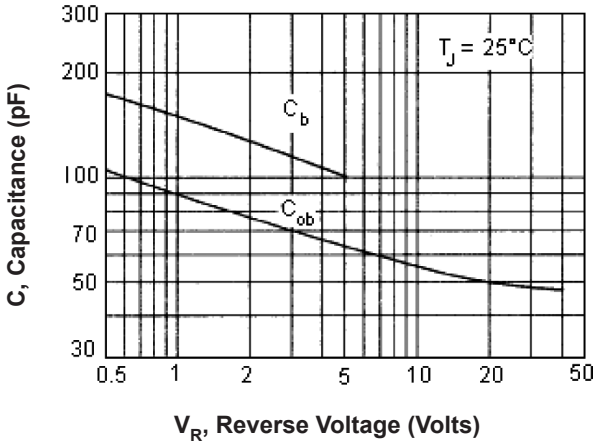
There are two limitation on the power ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than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

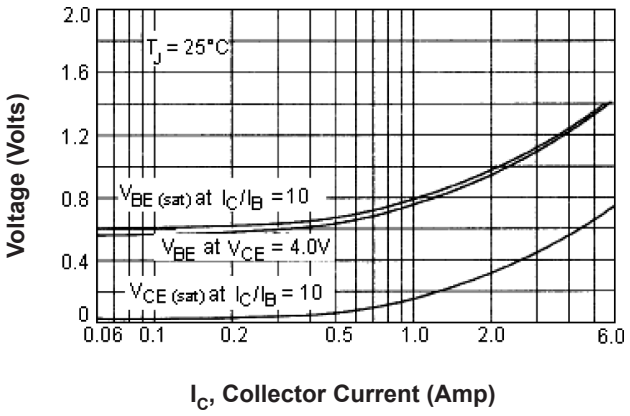
Collector Saturation Region



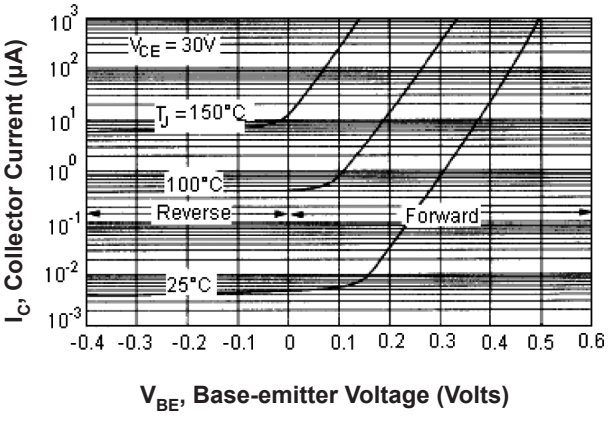
Capacitances



"ON" Voltage



Collector Cut off Region



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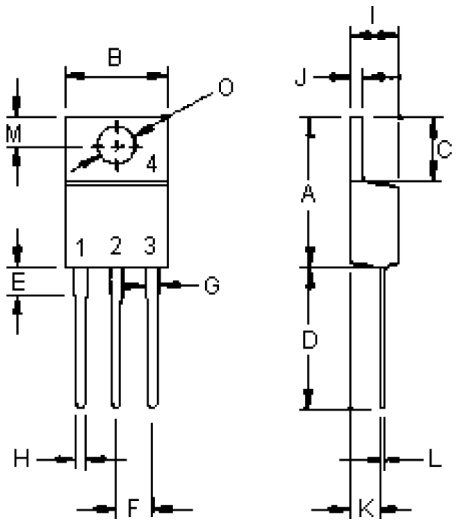

Pin Configuration:

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

Dimensions	Min.	Max.
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

Part Number Table

Description	Part Number
Transistor, NPN, TO-220	TIP41A
Transistor, PNP, TO-220	TIP42A