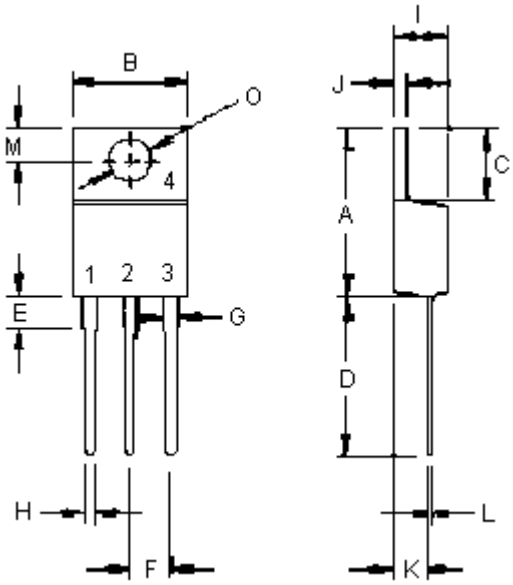
Power Transistors

TO - 220

Features:

- Complementary Silicon Plastic Power Transistors
- Collector - emitter sustaining voltage - $V_{CEO\ (sus)}$ = 60 V (minimum)
- Collector - emitter saturation voltage - $V_{CE\ (sat)}$ = 1.5 V (maximum) at I_C = 6 A
- Current gain - bandwidth product f_T = 3 MHz (minimum) at I_C = 500 mA

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



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

Pin

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

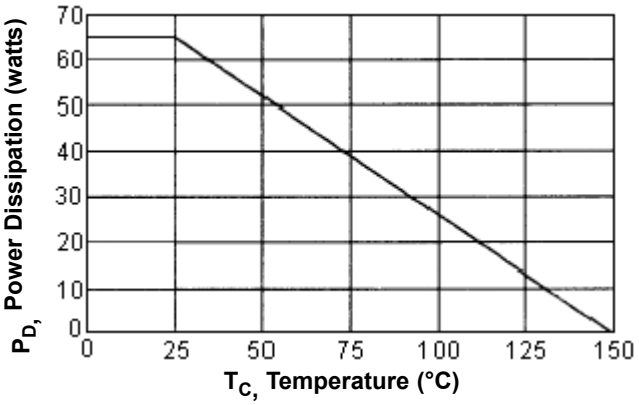
Maximum Ratings

Characteristics	Symbol	TIP41A TIP42A	Unit
Collector - emitter voltage	V_{CEO}	60	V
Collector - base voltage	V_{CBO}	60	V
Emitter - base voltage	V_{EBO}	5	V
Collector current - Continuous - Peak	I_C	6 10	A
Base current	I_B	2	A
Total power dissipation at T_c = 25°C derate above 25°C	P_D	65 0.52	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	$R_{\theta jc}$	1.92	°C/W

Power Derating

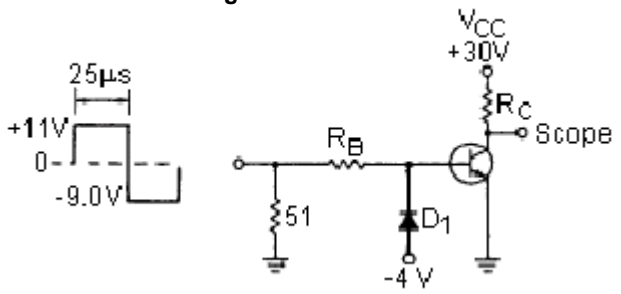


Electrical Characteristics (T_C = 25°C Unless Otherwise noted)

Characteristics	Symbol	Minimum	Maximum	Units
Off Characteristics				
Collector - emitter sustaining voltage (1) (I_C = 30 mA, I_B = 0)	$V_{CEO\ (SUS)}$	60	-	V
Collector cut off current (V_{CE} = 100 V, I_B = 0)	I_{CEO}	-	0.7	mA
Collector cut off current (V_{CE} = 60 V, V_{BE} = 0)	I_{CES}	-	0.4	mA
Emitter cut off current (V_{EB} = 5 V, I_C = 0)	I_{EBO}	-	1	mA
On Characteristics (1)				
DC current gain (I_C = 0.3 A; V_{CE} = 4 V) (I_C = 0.3 A; V_{CE} = 4 V)	h_{FE}	30 15	75	-
Collector - emitter saturation voltage (I_C = 6 A; I_B = 600 mA)	$V_{CE\ (sat)}$	-	1.5	V
Base-emitter on voltage (I_C = 6 A; V_{CE} = 4 V)	$V_{BE\ (on)}$	-	2	V
Dynamic characteristics				
Current gain-bandwidth Product (2) (I_C = 500 mA; V_{CE} = 10 V, f_{TEST} = 1 MHz)	f_T	3	-	MHz
Small signal current gain (I_C = 500 mA; V_{CE} = 10 V, f = 1 kHz)	h_{fe}	20	-	-

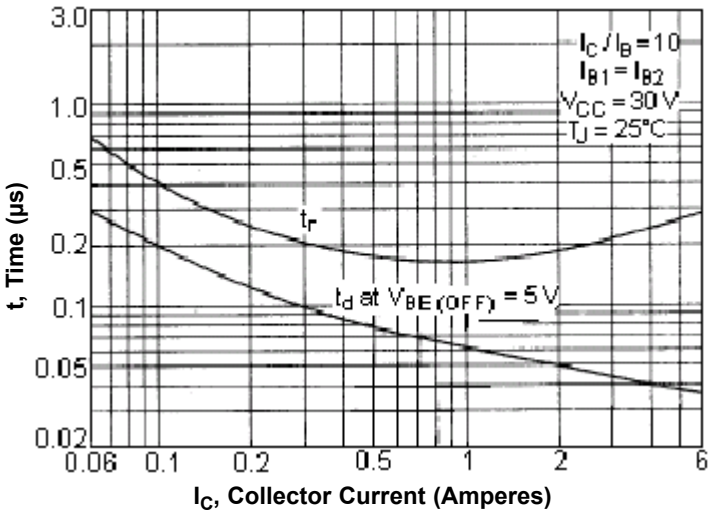
(1) Pulse test: Pulse width ≤ 300 µs, duty cycle ≤ 2%
(2) $f_T = |h_{fe}| \bullet f_{TEST}$

Switching Time Test Circuit

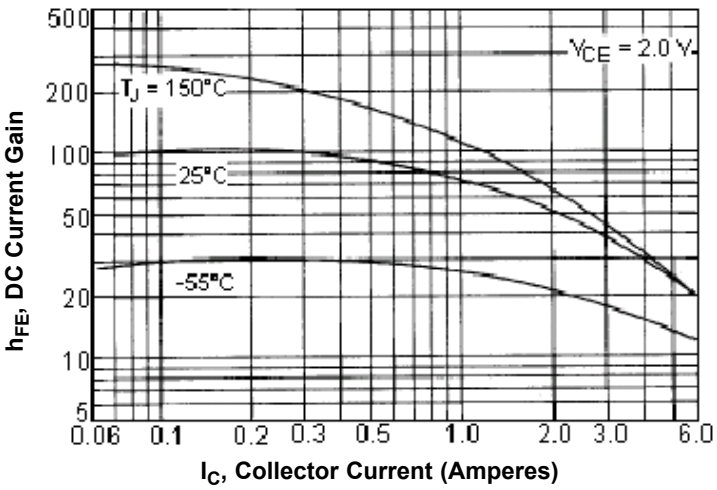


t_r, t_f ≤10 ns
Duty cycle = 1 %
R_B and R_C varied to obtain desired current levels
D_1 must be fast recovery type eg:
M8D5000 Used Above I_B to 100 mA
MSD6100 Used Below I_B to 100 mA

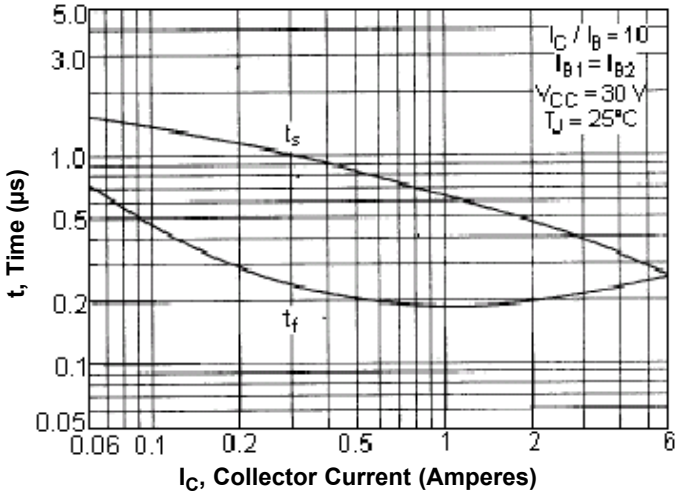
Turn-on Time



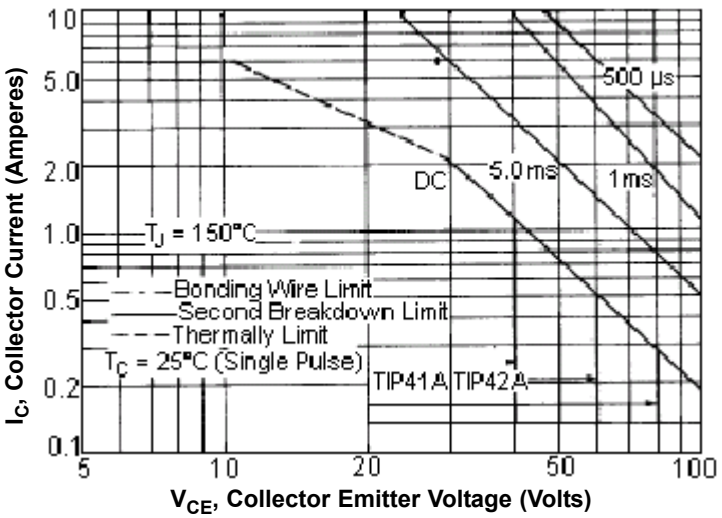
DC Current Gain



Turn-off Time

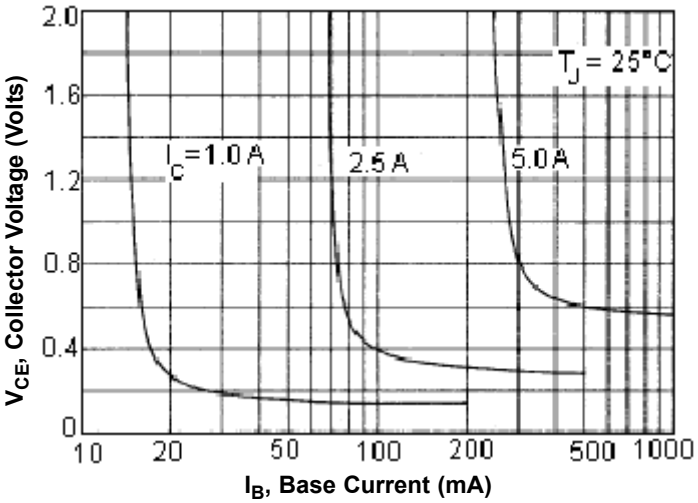


Active Region Safe Operating Area

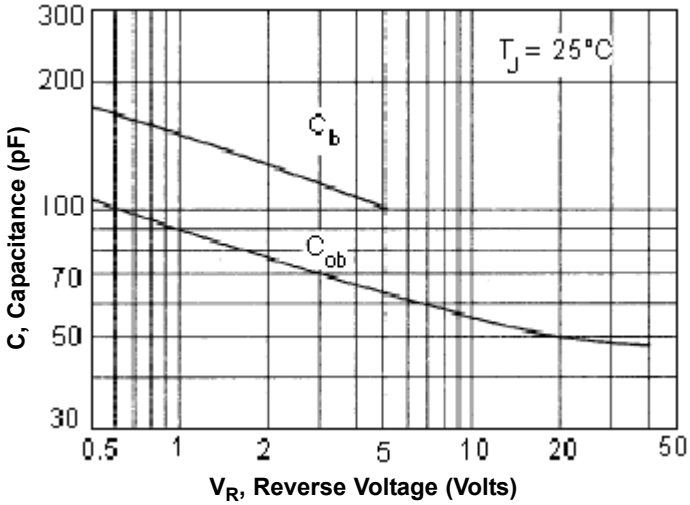


There are two limitation on the power ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than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

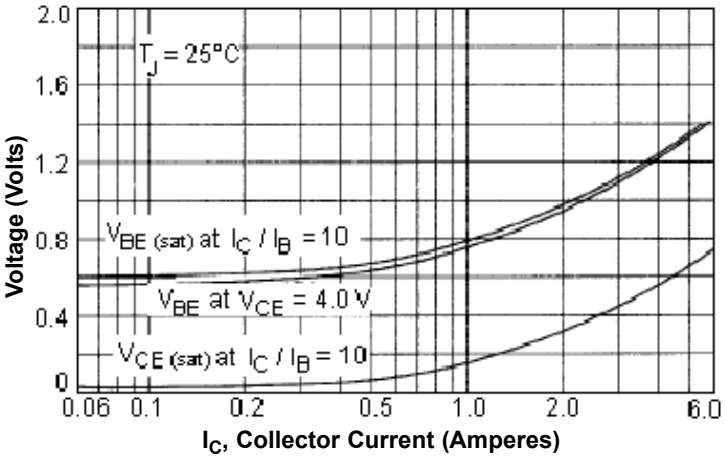
Collector Saturation Region



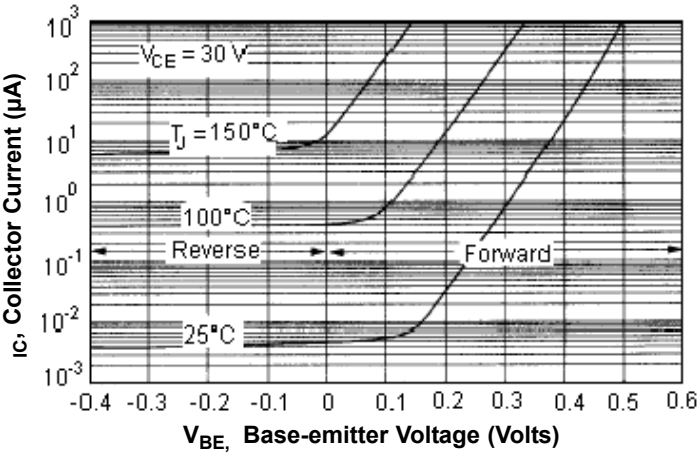
Capacitances



"ON" Voltage



Collector Cut off Region



Part Number Table

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