

COMPLEMENTARY SILICON PLASTIC POWER TRANSISTORS

General Purpose-Amplifier and Switching Application..

FEATURES:

- * Collector-Emitter Sustaining Voltage -
 $V_{CE(sus)} = 120V$ (Min)- TIP41D, TIP42D
 $140V$ (Min)- TIP41E, TIP42E
 $160V$ (Min)- TIP41F, TIP42F
- * Current Gain-Bandwidth Product-
 $f_T = 3.0MHz$ (Min) @ $I_C = 0.5A$

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NPN	PNP
TIP41D	TIP42D
TIP41E	TIP42E
TIP41F	TIP42F

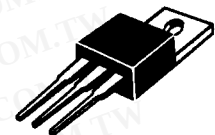
6 AMPERE
 COMPLEMENTARY SILICON
 POWER TRANSISTORS
 120-160 VOLTS
 65 WATTS

MAXIMUM RATINGS

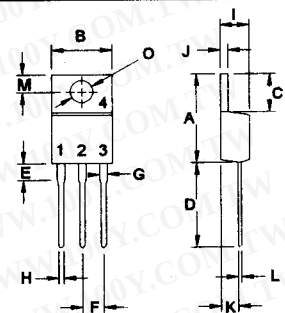
Characteristic	Symbol	TIP41D TIP42D	TIP41E TIP42E	TIP41F TIP42F	Unit
Collector-Emitter Voltage	V_{CEO}	120	140	160	V
Collector-Base Voltage	V_{CBO}	160	180	200	V
Emitter-Base Voltage	V_{EBO}	5			V
Collector Current - Continuous - Peak	I_C	6 10			A
Base Current	I_B	3			A
Total Power Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	P_D	65 0.52			W W/ $^\circ C$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150			$^\circ C$

THERMAL CHARACTERISTICS

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



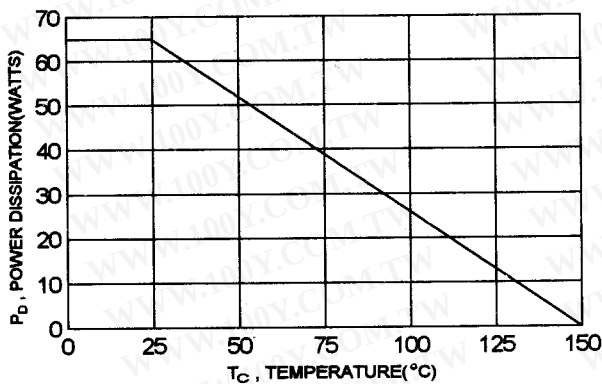
TO-220



PIN 1.BASE
 2.COLLECTOR
 3.EMITTER
 4.COLLECTOR

DIM	MILLIMETERS	
	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	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

FIGURE -1 POWER DERATING



TIP41D,TIP41E,TIP41F NPN / TIP42D,TIP42E,TIP42F PNP

ELECTRICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector -Emitter Sustaining Voltage (1) ($I_C = 30\text{ mA}$, $I_B = 0$)	TIP41D,TIP42D TIP41E,TIP42E TIP41F,TIP42F	V_{CEO}	120 140 160	V
Collector Cutoff Current ($V_{CE} = 90\text{ V}$, $I_B = 0$)		I_{CEO}	0.7	mA
Collector Cutoff Current ($V_{CE} = 160\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 180\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 200\text{ V}$, $V_{BE} = 0$)	TIP41D,TIP42D TIP41E,TIP42E TIP41F,TIP42F	I_{CES}	0.4 0.4 0.4	mA
Emitter-Base Cutoff Current ($V_{EB} = 5.0\text{ V}$, $I_C = 0$)		I_{EBO}	1.0	mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 0.3\text{ A}$, $V_{CE} = 4.0\text{ V}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 4.0\text{ V}$)	h_{FE}	30 15		
Collector-Emitter Saturation Voltage ($I_C = 6.0\text{ A}$, $I_B = 1.5\text{ A}$)	$V_{CE(sat)}$		1.5	V
Base-Emitter On Voltage ($I_C = 6.0\text{ A}$, $V_{CE} = 4.0\text{ V}$)	$V_{BE(on)}$		2.0	V

DYNAMIC CHARACTERISTICS

Current-Gain-Bandwidth Product ($I_C = 0.5\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ MHz}$)	f_T	3.0		MHz
Small-Signal Current Gain ($I_C = 0.5\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ KHz}$)	h_{fe}	15		

SWITCHING CHARACTERISTICS

Turn On Time	$I_C = 6.0\text{ A}$, $I_{B1} = -I_{B2} = 0.6\text{ A}$ $V_{BE(off)} = 4.0\text{ V}$, $R_L = 5\Omega$	t_{on}	0.6	us
Off Time		t_{off}	1.0	us

(1) Pulse Test: Pulse width $\leq 300\text{ us}$, Duty Cycle $\leq 2.0\%$

(2) $f_T = |h_{fe}| \cdot f_{TEST}$

FIGURE 2 - SWITCHING TIME TEST CIRCUIT

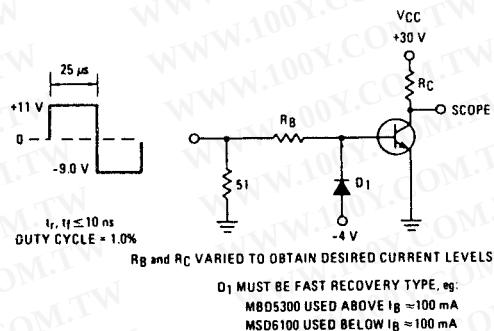


FIG-4 DC CURRENT GAIN

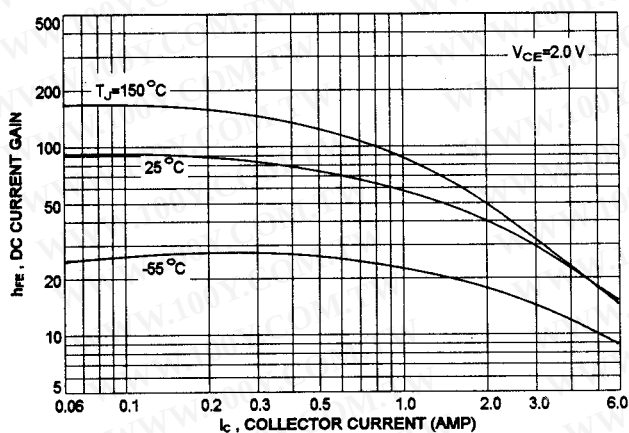


FIG-6 ACTIVE REGION SAFE OPERATING AREA

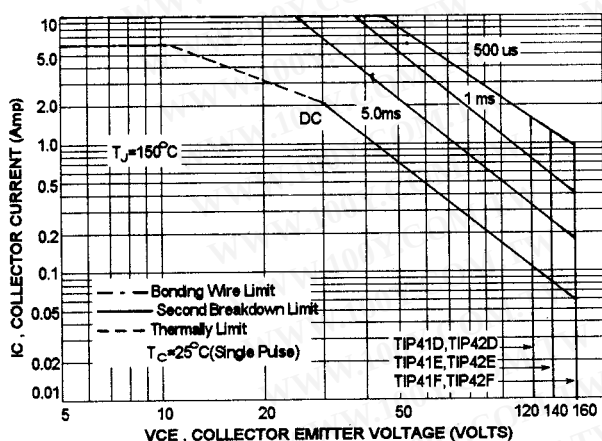


FIG-3 TURN-ON TIME

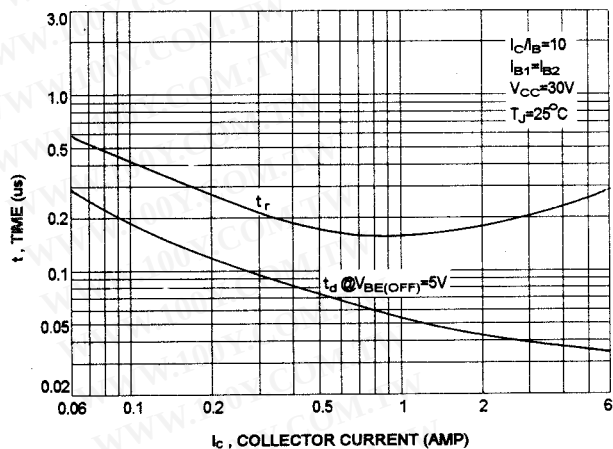
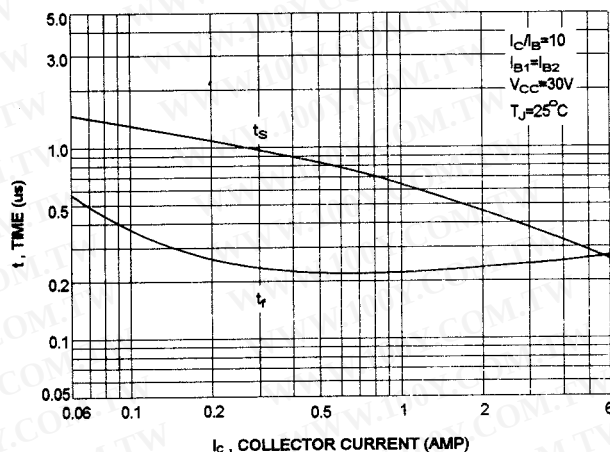


FIG-5 TURN-OFF TIME



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 FIG-6 curve is base on $T_{J(PK)} = 150^\circ C$; T_C is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)} \leq 150^\circ C$. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

FIG-7 COLLECTOR SATURATION REGION

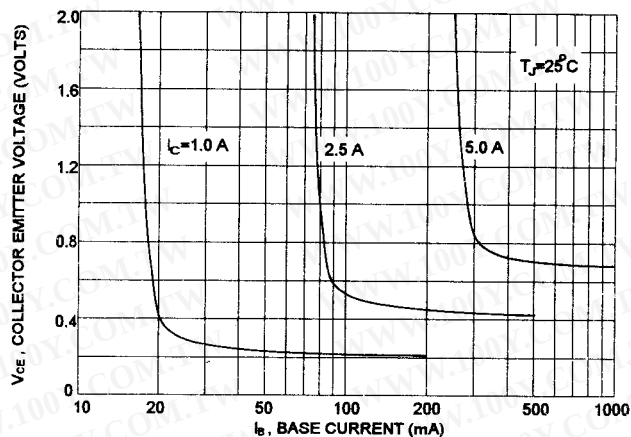


FIG-8 CAPACITANCES

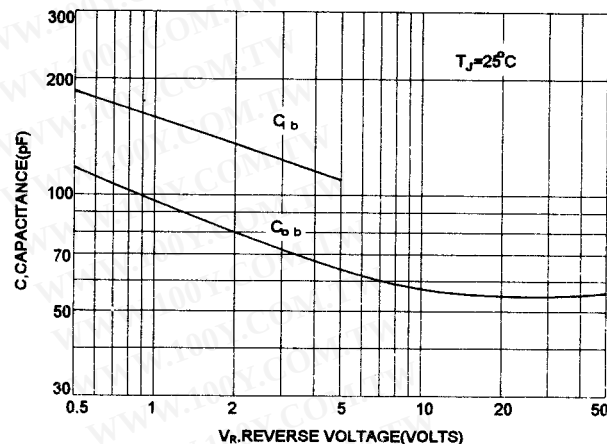


FIG-9 "ON" VOLTAGE

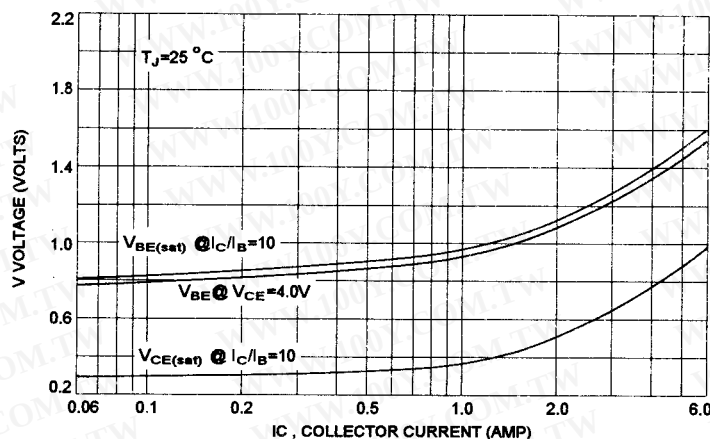


FIG-10 COLLECTOR CUT-OFF REGION

