MOSPEC

PLASTIC MEDIUM-POWER COPLEMENTARY SILICON TRANSISTORS

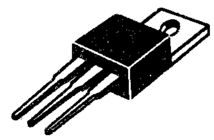
...designed for general-purpose amplifier and low speed switching applications

NPN	PNP
TIP110	TIP115
TIP111	TIP116
TIP112	TIP117

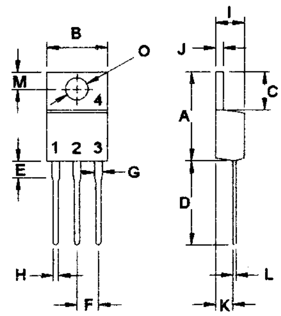
2.0 AMPERE
DARLINGTON
COMPLEMENTARY SILICON
POWER TRANSISTORS
60-100 VOLTS
50 WATTS

FEATURES:

* Collector-Emitter Sustaining Voltage-
  $V_{CEO(SUS)}$ = 60 V (Min) - TIP110,TIP115
  = 80 V (Min) - TIP111,TIP116
  = 100 V (Min) - TIP112,TIP117
* Collector-Emitter Saturation Voltage
  $V_{CE(sat)}$ = 2.5 V (Max.) @ I_C = 2.0 A
* Monolithic Construction with Built-in Base-Emitter Shunt Resistor



TO-220



PIN 1.BASE
2.COLLECTOR
3.EMITTER
4.COLLECTOR(CASE)

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

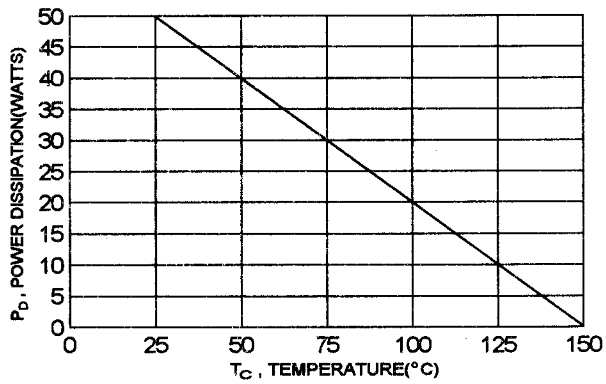
MAXIMUM RATINGS

Characteristic	Symbol	TIP110 TIP115	TIP111 TIP116	TIP112 TIP117	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	100	V
COllector-Base Voltage	V_{CBO}	60	80	100	V
Emitter-Base Voltage	V_{EBO}	5.0			V
Collector Current-Continuous -Peak	I_C I_{CM}	2.0 4.0			A
Base Current	I_B	50			mA
Total Power Dissipation @T_C= 25°C Derate above 25°C	P_D	50 0.4			W W/°C
Operating and Storage Junction Temperature Range	T_J ,T_{STG}	- 65 to +150			°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	Rθjc	2.5	°C/W

FIGURE -1 POWER DERATING



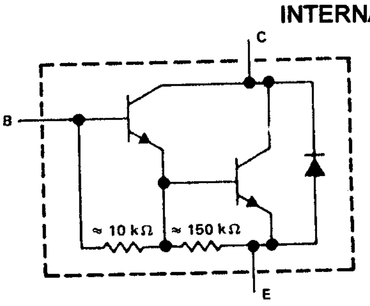
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector - Emitter Sustaining Voltage (1) (I_C = 30 mA, I_B = 0)	TIP110,TIP115 TIP111,TIP116 TIP112,TIP117	$V_{CEO(sus)}$	60 80 100		V
Collector Cutoff Current (V_{CE} = 30 V, I_B = 0) (V_{CE} = 40 V, I_B = 0) (V_{CE} = 50 V, I_B = 0)	TIP110,TIP115 TIP111,TIP116 TIP112,TIP117	I_{CEO}		2.0 2.0 2.0	mA
Collector Cutoff Current (V_{CB} = 60 V, I_E = 0) (V_{CB} = 80 V, I_E = 0) (V_{CB} = 100 V, I_E = 0)	TIP110,TIP115 TIP111,TIP116 TIP112,TIP117	I_{CBO}		1.0 1.0 1.0	mA
Emitter Cutoff Current (V_{EB} = 5.0 V, I_C = 0)		I_{EBO}		2.0	mA
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 1.0 A, V_{CE} = 4.0 V) (I_C = 2.0 A, V_{CE} = 4.0 V)		hFE	1000 500		
Collector-Emitter Saturation Voltage (I_C = 2.0 A, I_B = 8.0 mA)		$V_{CE(sat)}$		2.5	V
Base-Emitter On Voltage (I_C = 2.0 A, V_{CE} = 4.0 V)		$V_{BE(on)}$		2.8	V
DYNAMIC CHARACTERISTICS					
Small-Signal Current Gain (I_C = 0.75 A, V_{CE} = 10 V, f = 1.0 MHz)		h_{fe}	25		
Output Capacitance (V_{CB} ≐ 10 V, I_E = 0 , f = 0.1 MHz)	TIP110,TIP111,TIP112 TIP115,TIP116,TIP117	C_{ob}		250 150	pF

(1) Pulse Test: Pulse width = 300 us , Duty Cycle ≦ 2.0%

INTERNAL SCHEMATIC DIAGRAM

NPN
TIP110
TIP111
TIP112



PNP
TIP115
TIP116
TIP117

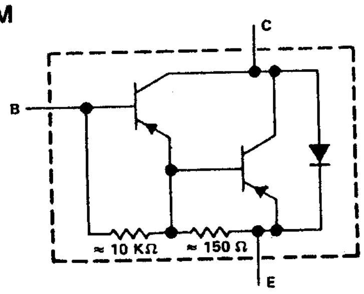


FIG-2 SWITCHING TIME

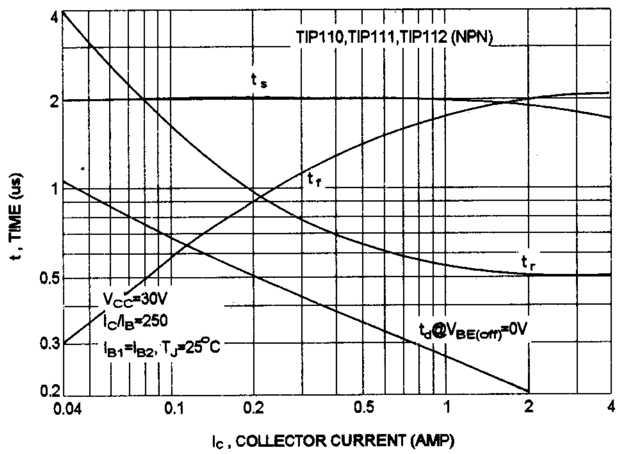


FIG-3 SWITCHING TIME

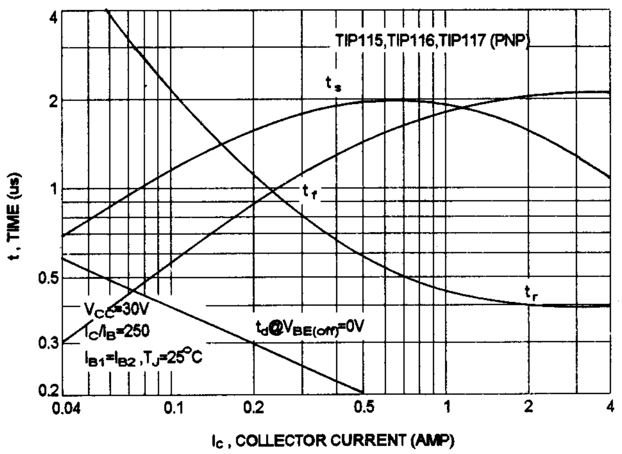


FIG-4 CAPACITANCES

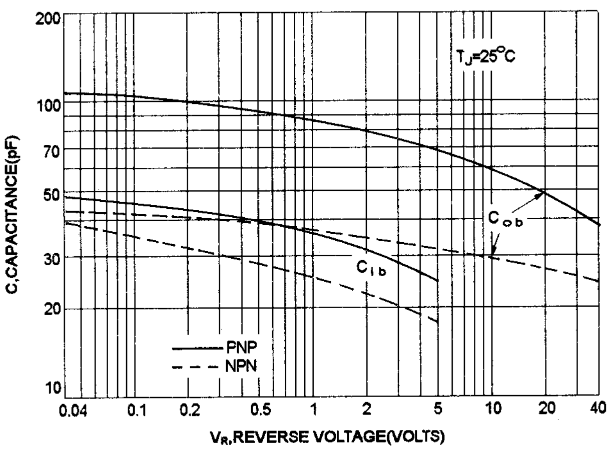


FIG-5 ACTIVE REGION SAFE OPERATING AREA

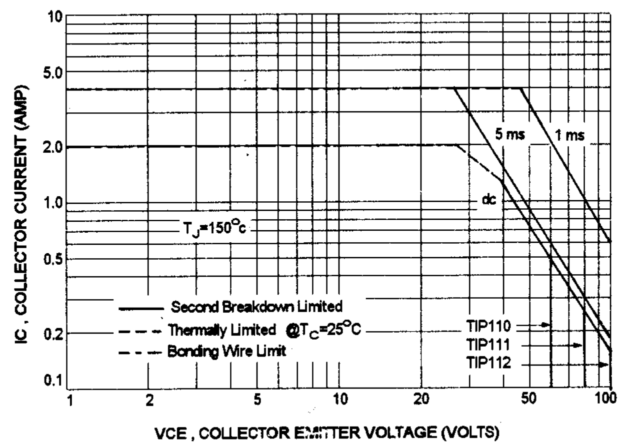
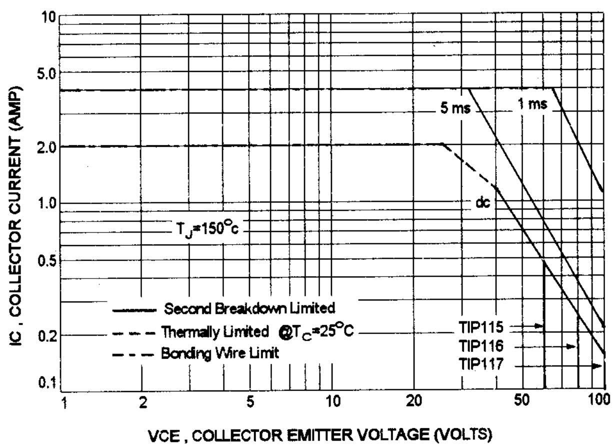


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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-5 and 6 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 $T_{J(PK)} \leq 150°C$,At high case temperatures,thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.