TIP110, TIP115

Darlington Transistors

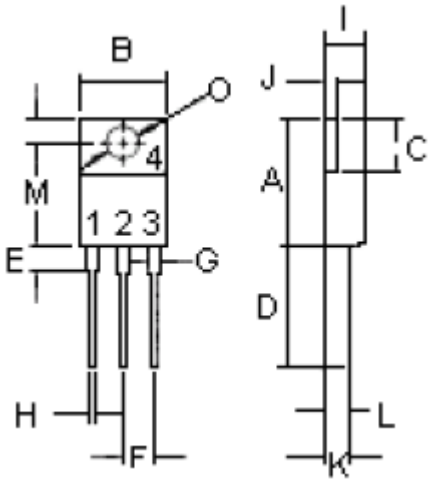
TO - 220

Features:

- Collector - emitter sustaining voltage - $V_{CEO\ (sus)}$ = 60 V (minimum)
- Collector - emitter saturation voltage - $V_{CE\ (sat)}$ = 2.5 V (maximum) at I_C = 2 A
- Monolithic construction with built-in-base-emitter shunt resistor

Application:

Designed for general-purpose amplifier and low speed 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

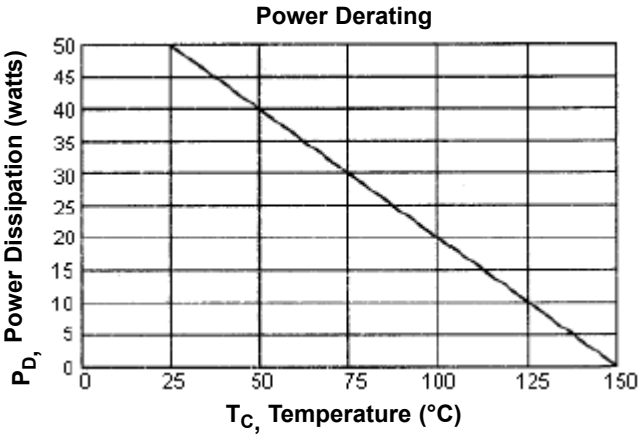
1. Base
2. Collector
3. Emitter
4. Collector (Case)

Maximum Ratings

Characteristic	Symbol	TIP110 TIP115	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 I_{CM}	2 4	A
Base current	I_B	50	mA
Total power dissipation at 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	Maximum	Unit
Thermal resistance junction to case	$R_{\theta jc}$	2.5	°C/W



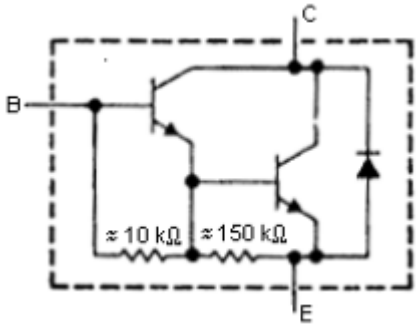
Electrical Characteristics (T_c = 25°C Unless Otherwise noted)

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} = 30 V, I_B = 0)	I_{CEO}	-	2	mA
Collector cut off current (V_{CB} = 60 V, I_E = 0)	I_{CBO}	-	1	mA
Emitter cut off current (V_{EB} = 5 V, I_C = 0)	I_{EBO}	-	2	mA
On Characteristics (1)				
DC current gain (I_C = 1 A; V_{CE} = 4 V) (I_C = 2 A; V_{CE} = 4 V)	h_{FE}	1,000 500	-	-
Collector - emitter saturation voltage (I_C = 2 A; I_B = 8 mA)	$V_{CE(sat)}$	-	2.5	V
Base-emitter on voltage (I_C = 2 A; V_{CE} = 4 V)	$V_{BE\ (on)}$	-	2.8	V
Dynamic characteristics				
Small signal current gain (I_C = 0.75 A; V_{CE} = 10 V, f = 1 MHz)	h_{fe}	25	-	-
Output capacitance (V_{CB} = 10 V; I_E = 0, f = 0.1 MHz)	C_{ob}	-	250 150	pF

(1) Pulse test: Pulse width = 300 µs, duty cycle ≤ 2%

Internal Schematic Diagram

NPN
TIP110



PNP
TIP115

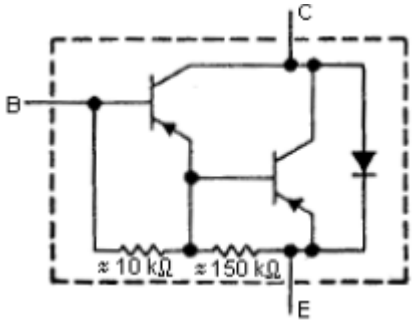


Figure-2 Switching Time

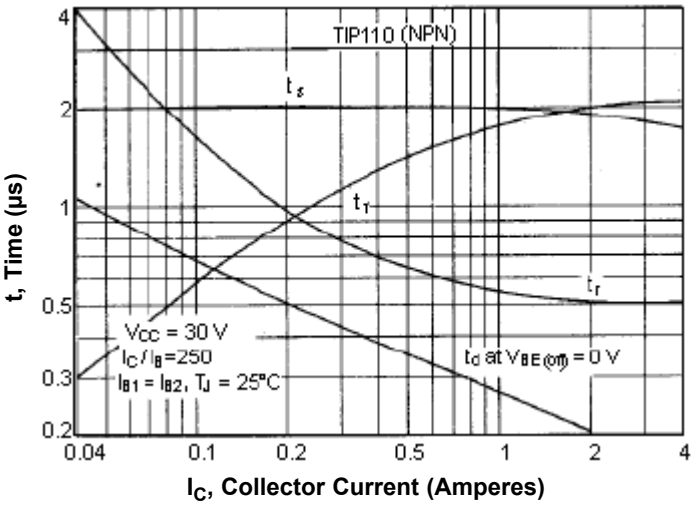


Figure-3 Switching Time

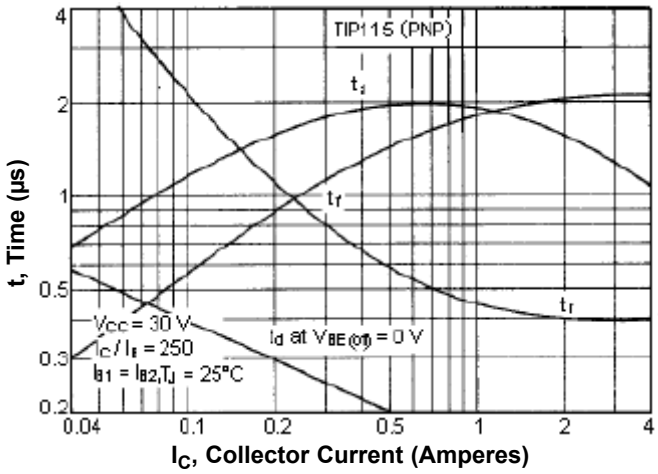


Figure-4 Capacitances

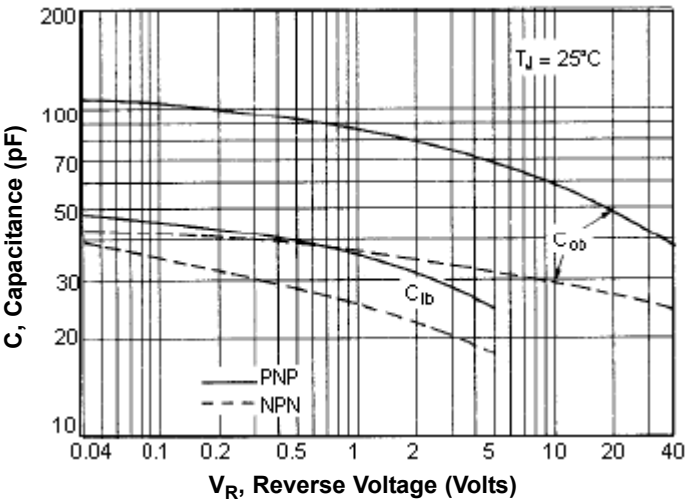


Figure-5 Active Region Safe Operating Area

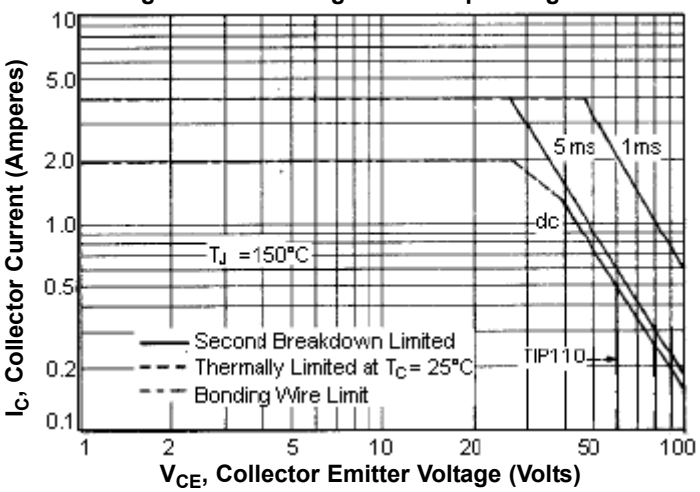
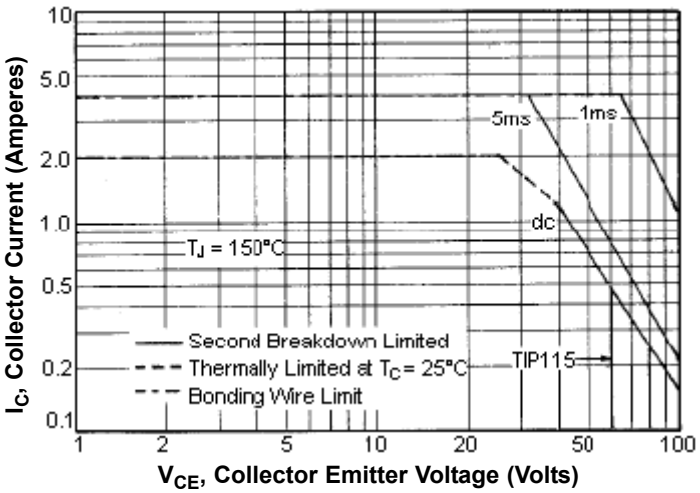


Figure-6 Active Region Safe Operating Area



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 the curves indicate

The data of Figure - 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

Specifications Table

Description	$I_{C\,(av)}$ maximum (A)	V_{CEO} maximum V	h_{FE} minimum at I_C = 1 A	P_{tot} at 25°C (W)	Type	Part Number
Darlington Transistors	2	60	1,000	50	**NPN**	TIP110
					PNP	TIP115

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