

Complementary power Darlington transistors

Features

- Monolithic Darlington configuration
- Integrated antiparallel collector-emitter diode

Applications

- Linear and switching industrial equipment

Description

The TIP142 is an Epitaxial-base NPN power transistor in monolithic Darlington configuration, mounted in TO-247 plastic package. It is intended for use in power linear and switching applications. The PNP complementary type is TIP147.

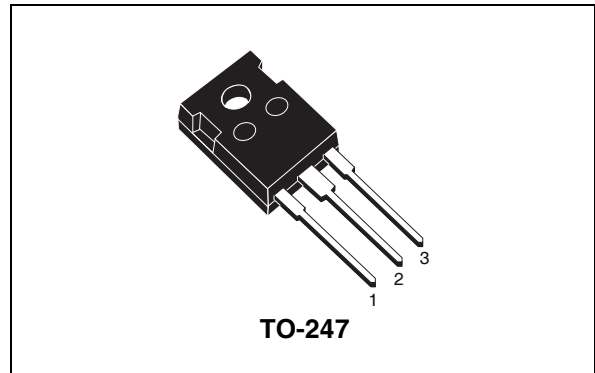


Figure 1. Internal schematic diagrams

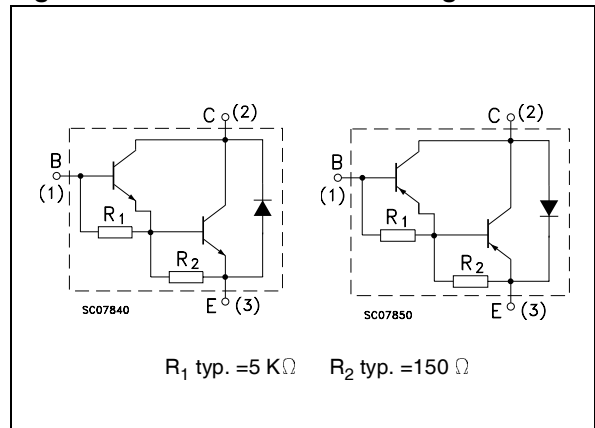


Table 1. Device summary

Part number	Marking	Package	Packaging
TIP142	TIP142	TO-247	Tube
TIP147	TIP147		

1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter		Value	Unit
		NPN	TIP142	
		PNP	TIP147	
V_{CBO}	Collector-base voltage ($I_E = 0$)		100	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)		100	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)		5	V
I_C	Collector current		10	A
I_{CM}	Collector peak current		20	A
I_B	Base current		0.5	A
P_{TOT}	Total dissipation at $T_{case} = 25^\circ\text{C}$		125	W
T_{stg}	Storage temperature		-65 to 150	$^\circ\text{C}$
T_J	Max. operating junction temperature		150	$^\circ\text{C}$

For PNP type voltage and current are negative.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	1	$^\circ\text{C/W}$

2 Electrical characteristics

($T_{\text{case}} = 25^{\circ}\text{C}$; unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = 100 \text{ V}$			1	mA
I_{CEO}	Collector cut-off current ($I_{\text{B}} = 0$)	$V_{\text{CE}} = 50 \text{ V}$			2	mA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5 \text{ V}$			2	mA
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 30 \text{ mA}$	100			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 5 \text{ A}$ $I_{\text{B}} = 10 \text{ mA}$			2	V
		$I_{\text{C}} = 10 \text{ A}$ $I_{\text{B}} = 40 \text{ mA}$			3	V
$V_{\text{BE(on)}}^{(1)}$	Base-emitter on voltage	$I_{\text{C}} = 10 \text{ A}$ $V_{\text{CE}} = 4 \text{ V}$			3	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 5 \text{ A}$ $V_{\text{CE}} = 4 \text{ V}$	1000			
		$I_{\text{C}} = 10 \text{ A}$ $V_{\text{CE}} = 4 \text{ V}$	500			
t_{on}	Resistive load Turn-on time	$I_{\text{C}} = 10 \text{ A}$ $R_{\text{L}} = 3 \Omega$		0.9		μs
t_{off}	Turn-off time	$I_{\text{B1}} = -I_{\text{B2}} = 40 \text{ mA}$		4		μs

1. Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$.

For PNP type voltage and current are negative.

2.1 Test circuits

Figure 2. Resistive load switching test circuit (NPN type)

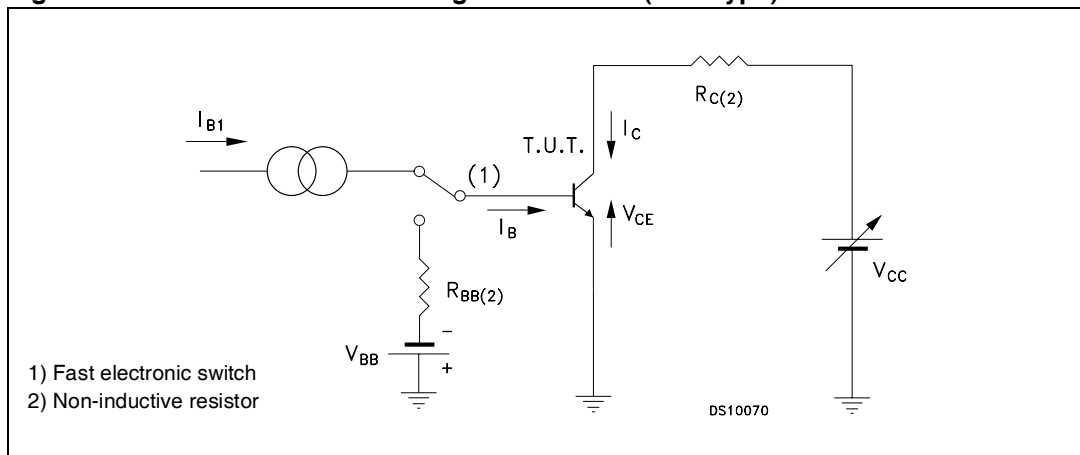
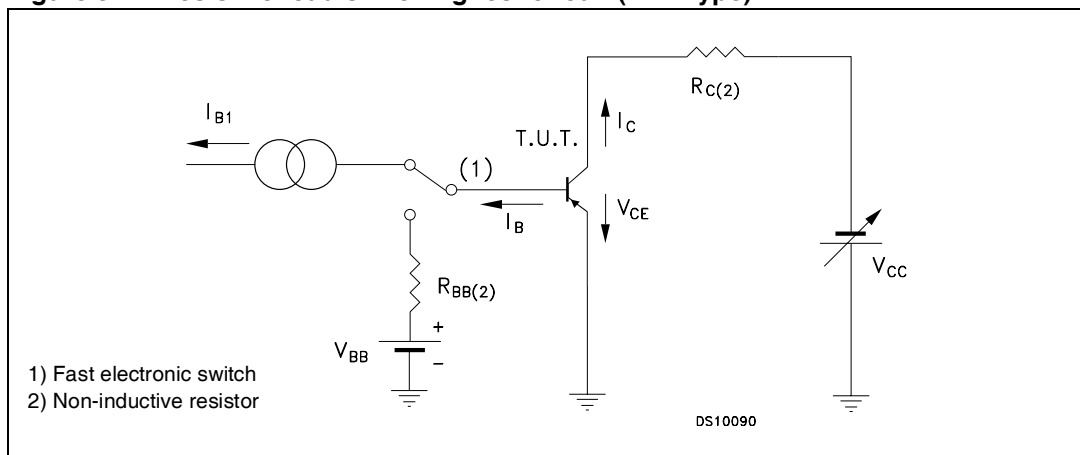


Figure 3. Resistive load switching test circuit (PNP type)

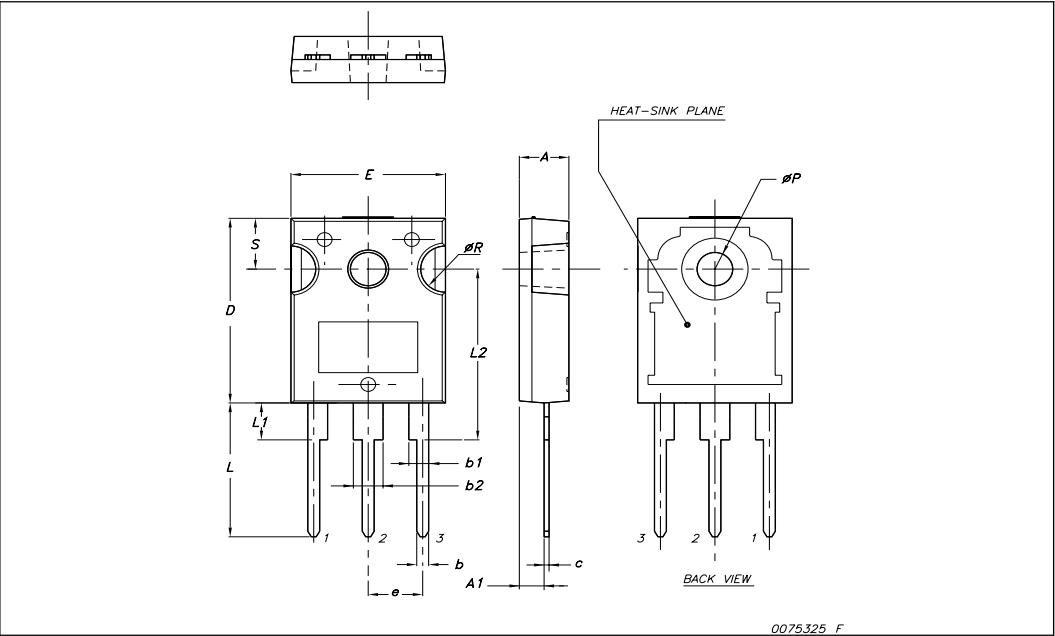


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

TO-247 Mechanical data

Dim.	mm.		
	Min.	Typ	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		5.45	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
øP	3.55		3.65
øR	4.50		5.50
S		5.50	



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
04-Mar-2000	5	
15-Oct-2007	6	Package change from SOT-93 to TO-247.

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