

Complementary power Darlingtons transistors

**Features**

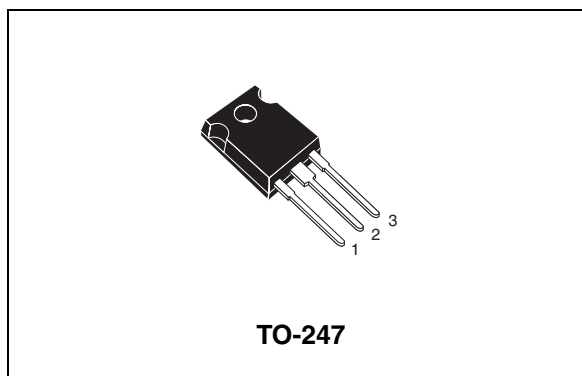
- Monolithic Darlingtons configuration
- Integrated antiparallel collector-emitter diode

**Applications**

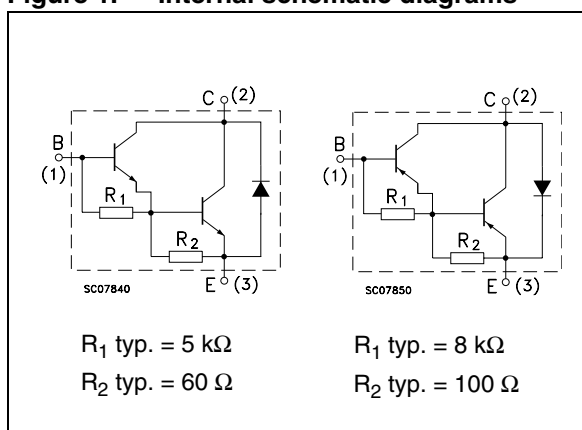
- Linear and switching industrial equipment

**Description**

The devices are manufactured in planar technology with “base island” layout and monolithic Darlingtons configuration. The resulting transistors show exceptional high gain performance coupled with very low saturation voltage.



**Figure 1. Internal schematic diagrams**



**Table 1. Device summary**

Part number	Marking	Polarity	Package	Packaging
TIP142	TIP142	NPN	TO-247	Tube
TIP147	TIP147	PNP		

# 1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CBO}$	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 $T_{case} = 25\text{ °C}$	125	W
$T_{STG}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

*Note:* For PNP type voltage and current are negative.

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance junction-case max	1	°C/W

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

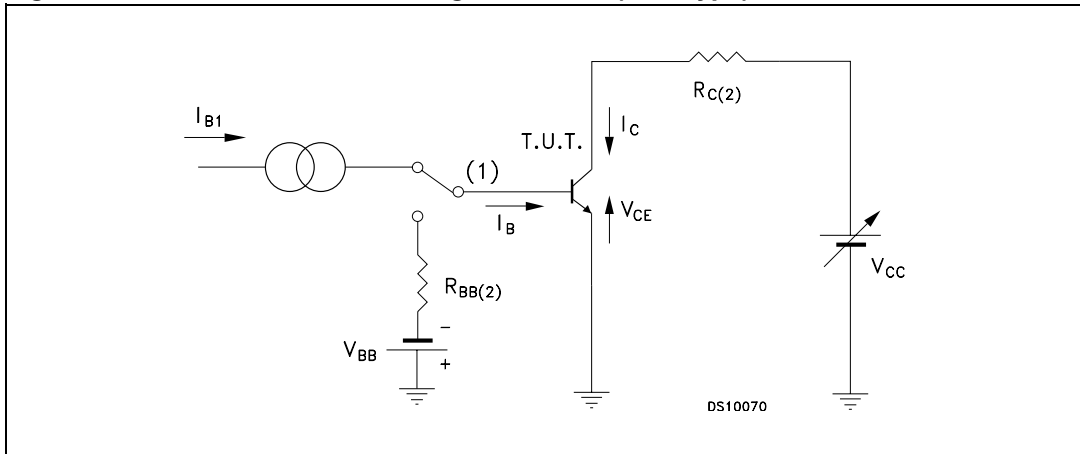
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 100\text{ V}$			1	mA
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 50\text{ V}$			2	mA
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5\text{ V}$			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	$I_{\text{C}} = 5\text{ A}$ $I_{\text{B}} = 10\text{ mA}$ $I_{\text{C}} = 10\text{ A}$ $I_{\text{B}} = 40\text{ mA}$			2 3	V 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	$I_{\text{C}} = 5\text{ A}$ $V_{\text{CE}} = 4\text{ V}$ $I_{\text{C}} = 10\text{ A}$ $V_{\text{CE}} = 4\text{ V}$	1000 500			
$t_{\text{on}}$ $t_{\text{off}}$	Resistive load Turn-on time Turn-off time	$I_{\text{C}} = 10\text{ A}$ $R_{\text{L}} = 3\text{ }\Omega$ $I_{\text{B1}} = -I_{\text{B2}} = 40\text{ mA}$		0.9 4		$\mu\text{s}$ $\mu\text{s}$

1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

*Note:* For PNP type voltage and current are negative.

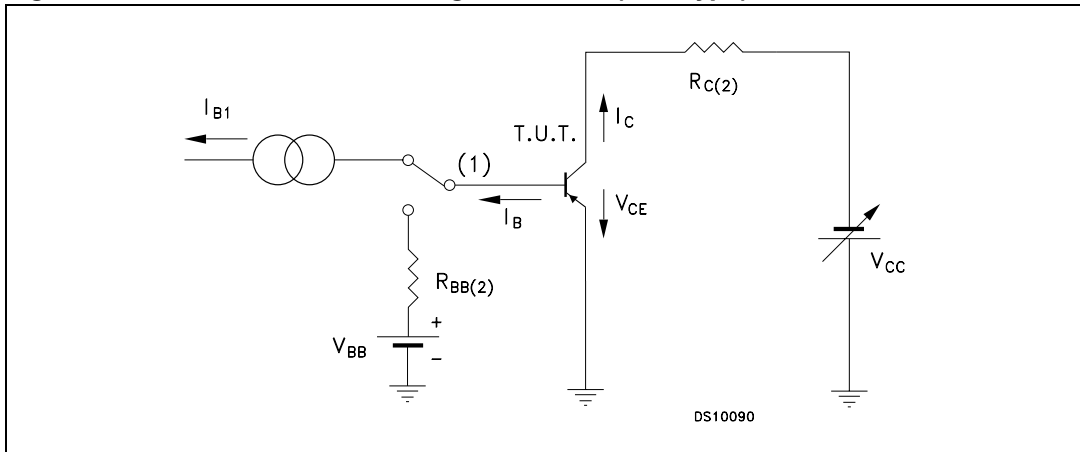
## 2.1 Test circuits

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



- 1. Fast electronic switch
- 2. Non-inductive resistor

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



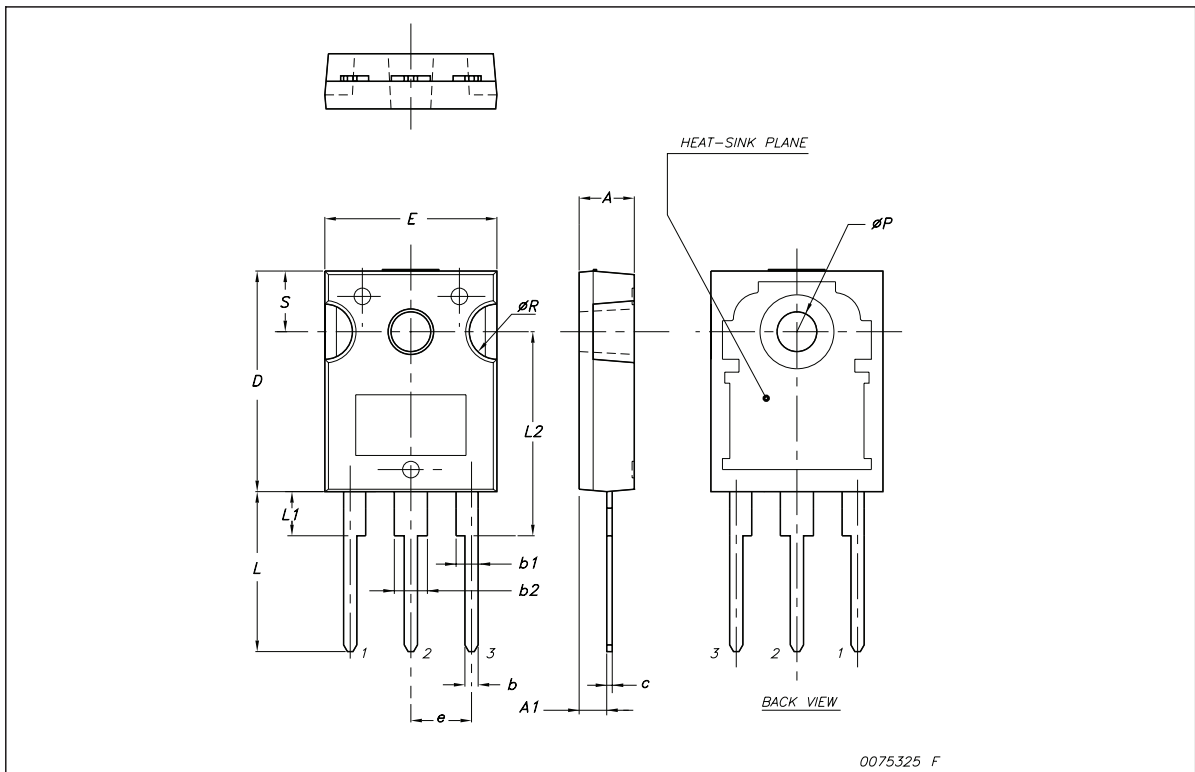
- 1. Fast electronic switch
- 2. Non-inductive resistor

### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**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**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
15-Oct-2007	6	Package change from SOT-93 to TO-247.
12-May-2010	7	Technology change from epitaxial base to planar base island.

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