

Complementary power Darlington transistors

**Features**

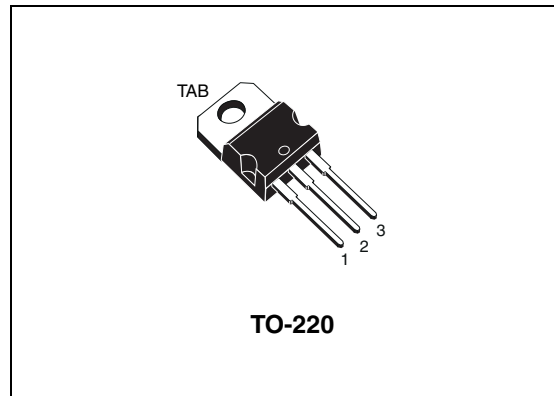
- Monolithic Darlington configuration
- Integrated antiparallel collector-emitter diode

**Application**

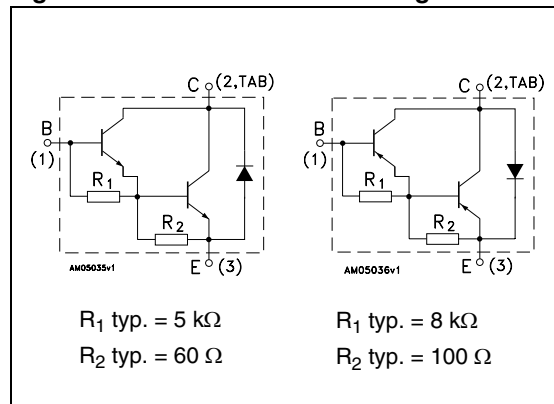
- Linear and switching industrial equipment

**Description**

The devices are manufactured in planar technology with “base island” layout and monolithic Darlington 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
TIP142T	TIP142T	NPN	TO-220	Tube
TIP147T	TIP147T	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 $T_{case} = 25\text{ °C}$	90	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	1.4	°C/W

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

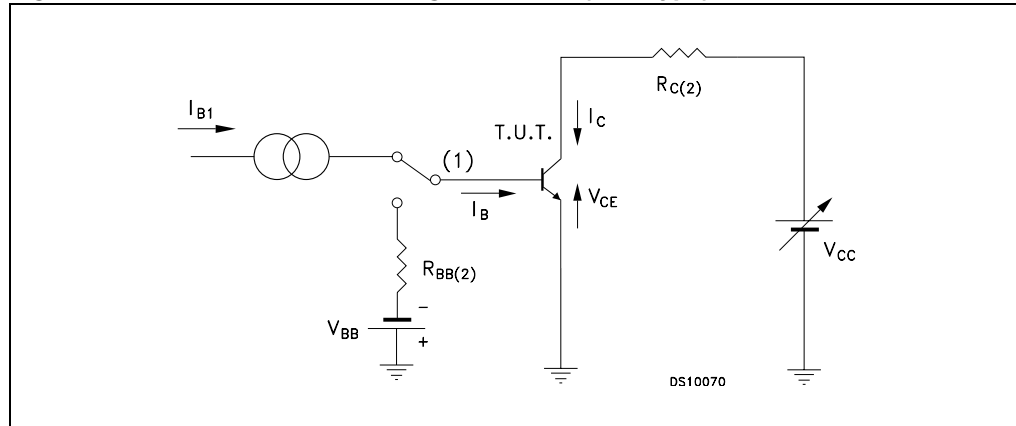
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 100\text{ V}$			1	mA
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 50\text{ V}$			2	mA
$I_{\text{EBO}}$	Emitter cut-off current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

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

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

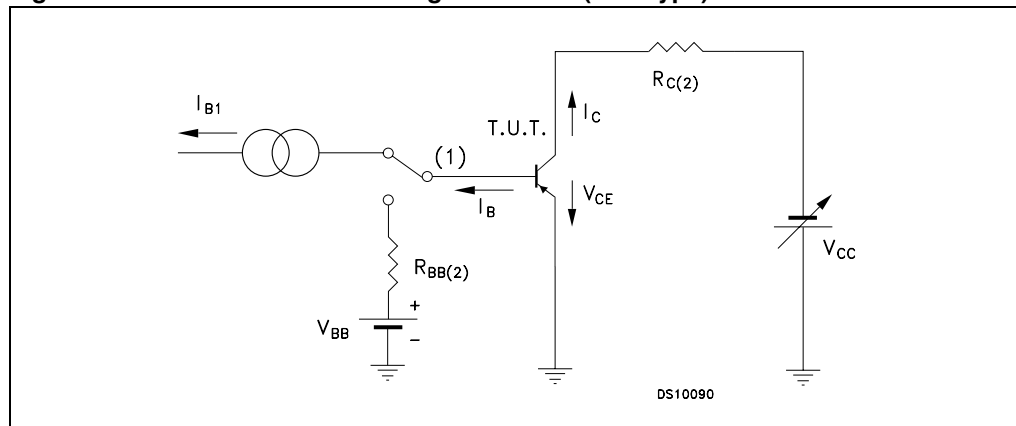
## 2.1 Test circuits

**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)**



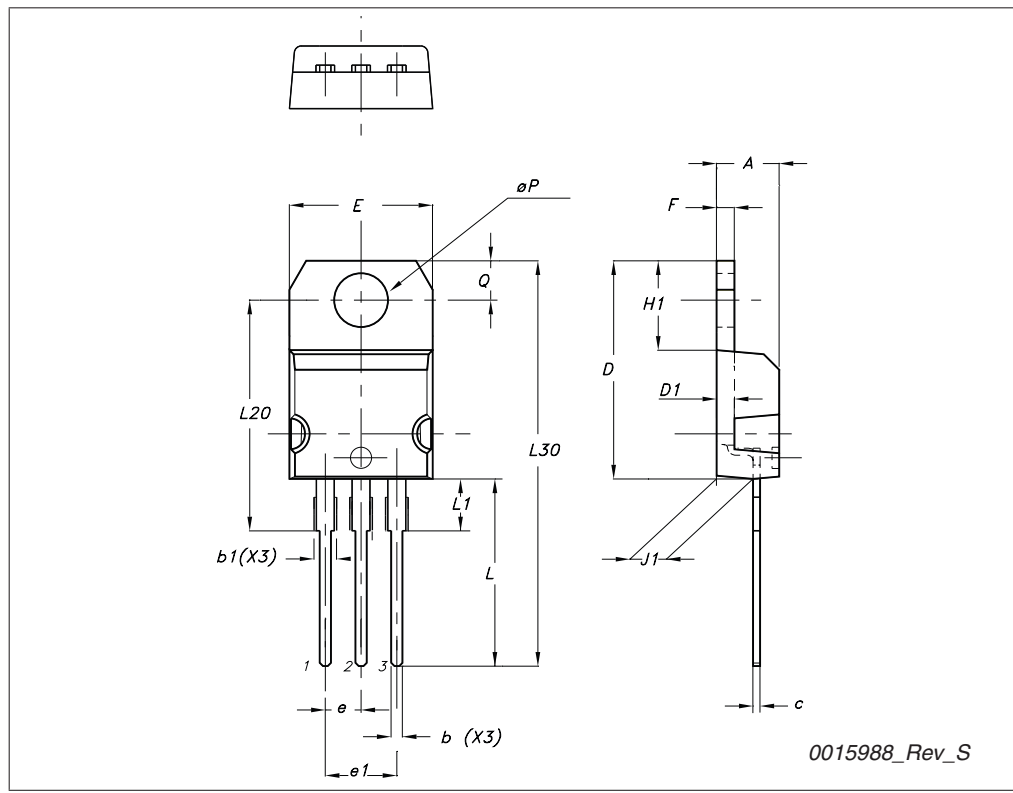
1. Fast electronic switch
2. Non-inductive resistor

### 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-220 type A mechanical data**

Dim	mm		
	Min	Typ	Max
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
∅P	3.75		3.85
Q	2.65		2.95



## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
21-Jun-2004	4	
20-May-2010	5	Technology change from epitaxial base to planar base island.

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