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# TIP142, TIP147

## Complementary power Darlingtons transistors

Datasheet — production data

### Features

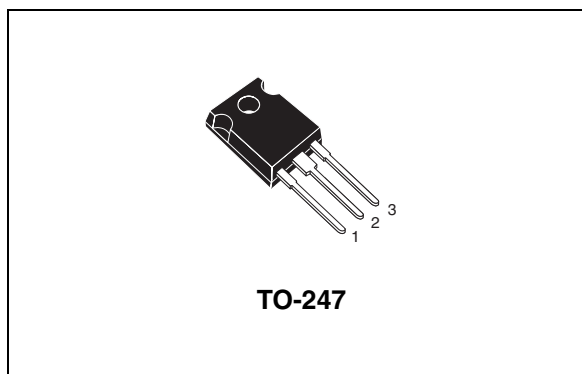
- Monolithic Darlingtons configuration
- Integrated antiparallel collector-emitter diode

### Applications

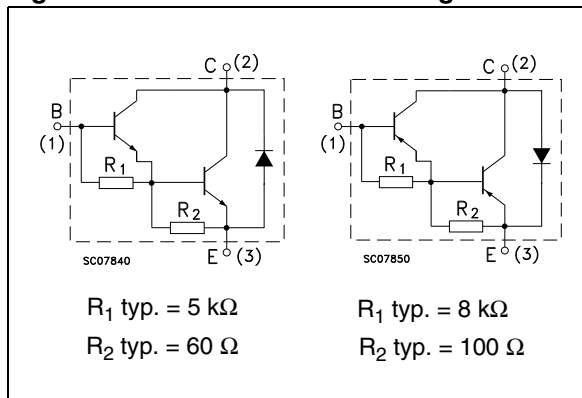
- Linear and switching industrial equipment

### 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		

**Absolute maximum ratings**

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# 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

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

**Table 4. Electrical characteristics**

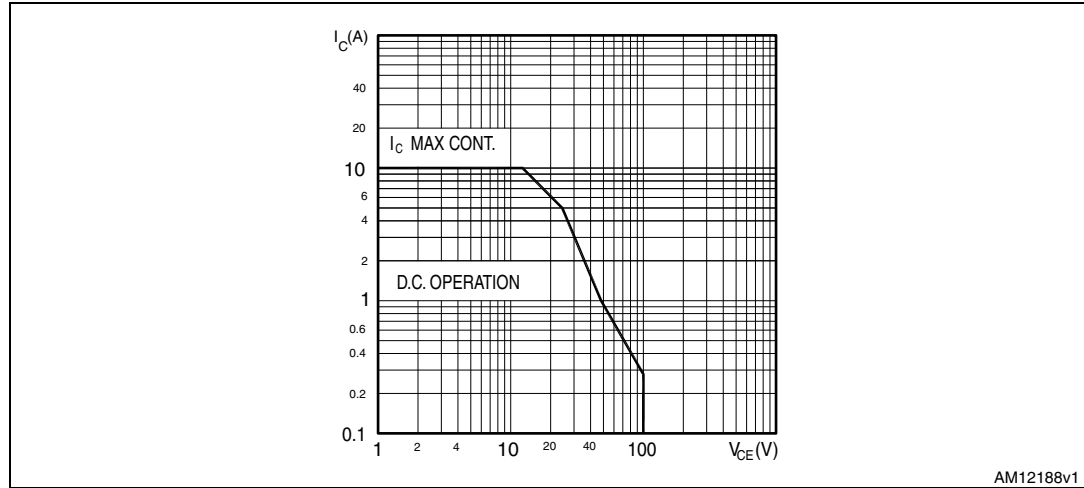
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector cut-off current ( $I_E = 0$ )	$V_{CB} = 100\text{ V}$			1	mA
$I_{CEO}$	Collector cut-off current ( $I_B = 0$ )	$V_{CE} = 50\text{ V}$			2	mA
$I_{EBO}$	Emitter cut-off current ( $I_C = 0$ )	$V_{EB} = 5\text{ V}$			2	mA
$V_{CEO(sus)}^{(1)}$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

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

For PNP type voltage and current are negative.

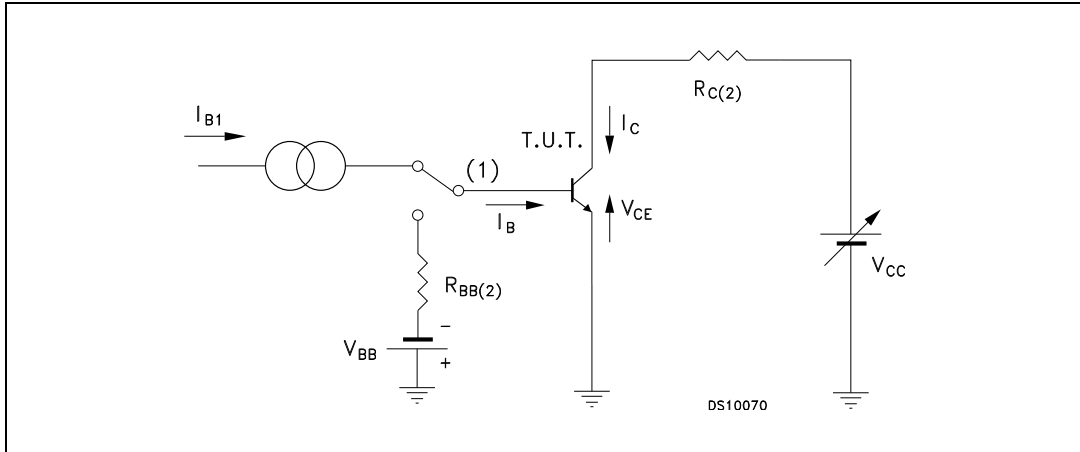
### 3 Electrical characteristics (curve)

Figure 2. Safe operating area



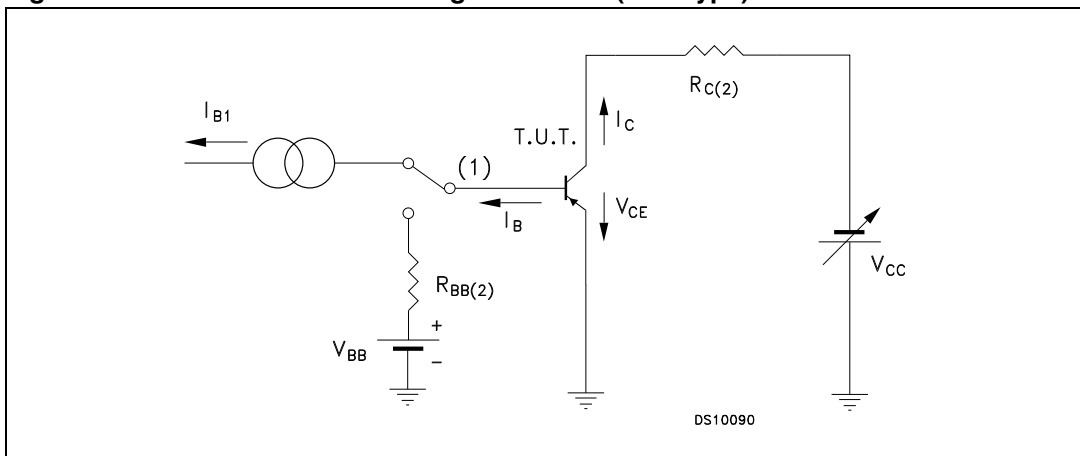
## 4 Test circuits

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



1. Fast electronic switch
2. Non-inductive resistor

**Figure 4. Resistive load switching test circuit (PNP type)**



1. Fast electronic switch
2. Non-inductive resistor

## 5 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.

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Package mechanical data

**Table 5. TO-247 mechanical data**

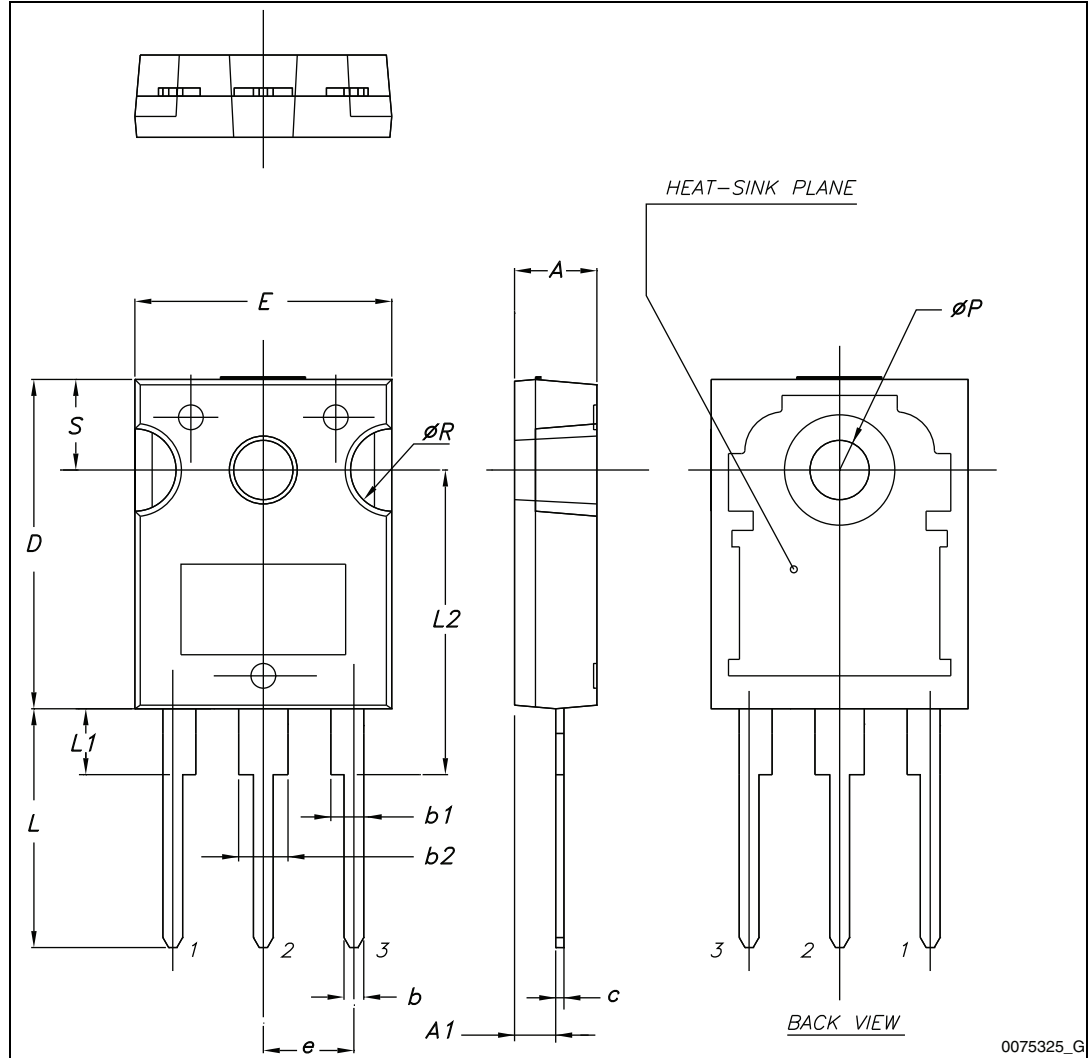
Dim.	mm.		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e	5.30	5.45	5.60
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
ØP	3.55		3.65
ØR	4.50		5.50
S	5.30	5.50	5.70



**Package mechanical data**

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**Figure 5. TO-247 drawing**



## 6 Revision history

Table 6. Document revision history

Date	Revision	Changes
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.
19-Apr-2012	8	Added: <a href="#">Figure 2: Safe operating area</a> Updated: mechanical data

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