

## Complementary power transistors

### Features

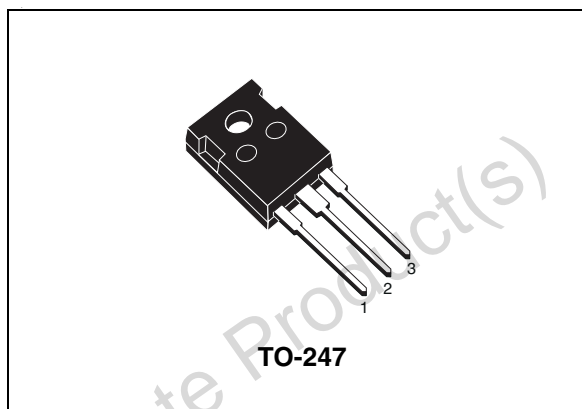
- Low collector-emitter saturation voltage
- Complementary NPN - PNP transistors

### Applications

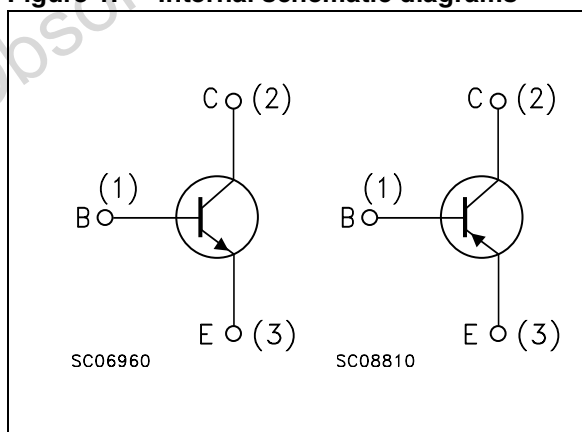
- General purpose

### Description

The devices are manufactured in epitaxial-base planar technology and are suitable for power linear and switching applications.



**Figure 1. Internal schematic diagrams**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
TIP33C	TIP33C	TO-247	Tube
TIP34C	TIP34C		

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter		Value	Unit
		NPN	TIP33C	
		PNP	TIP34C	
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )		140	V
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )		140	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 ( $t_P < 5$ ms)		15	A
$I_B$	Base current		3	A
$P_{TOT}$	Total dissipation at $T_{case} = 25$ °C		80	W
$T_{stg}$	Storage temperature		-65 to 150	°C
$T_J$	Max. operating junction temperature		150	°C

For PNP type voltage and current values are negative.

**Table 3. Thermal data**

Symbol	Parameter		Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	max	1.56	°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
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 140\text{ V}$			0.4	mA
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 60\text{ V}$			0.7	mA
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5\text{ V}$			1	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	$I_{\text{C}} = 3\text{ A}$ $I_{\text{C}} = 10\text{ A}$	$I_{\text{B}} = 0.3\text{ A}$ $I_{\text{B}} = 2.5\text{ A}$		1 4	V V
$V_{\text{BE(on)}}^{(1)}$	Base-emitter voltage	$I_{\text{C}} = 3\text{ A}$ $I_{\text{C}} = 10\text{ A}$	$V_{\text{CE}} = 4\text{ V}$ $V_{\text{CE}} = 4\text{ V}$		1.6 3	V V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 1\text{ A}$ $I_{\text{C}} = 3\text{ A}$	$V_{\text{CE}} = 4\text{ V}$ $V_{\text{CE}} = 4\text{ V}$	40 20		100
$h_{\text{fe}}$	Small signal current gain	$I_{\text{C}} = 0.5\text{ A}$ $f = 1\text{ kHz}$	$V_{\text{CE}} = 10\text{ V}$	3		
$f_{\text{T}}$	Transition frequency	$I_{\text{C}} = 0.5\text{ A}$ $f = 1\text{ MHz}$	$V_{\text{CE}} = 10\text{ V}$	3		MHz
$t_{\text{on}}$ $t_{\text{s}}$ $t_{\text{f}}$	Resistive load Turn-on time Storage time Fall time	$V_{\text{CC}} = 30\text{ V}$ $I_{\text{B1}} = -I_{\text{B2}} = 0.6\text{ A}$ $t_{\text{p}} = 20\text{ }\mu\text{s}$	$I_{\text{C}} = 6\text{ A}$ $V_{\text{BB}} = -6\text{ V}$		0.6 0.4 1	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$

1. Pulsed duration = 300 ms, duty cycle  $\geq 1.5\%$ .

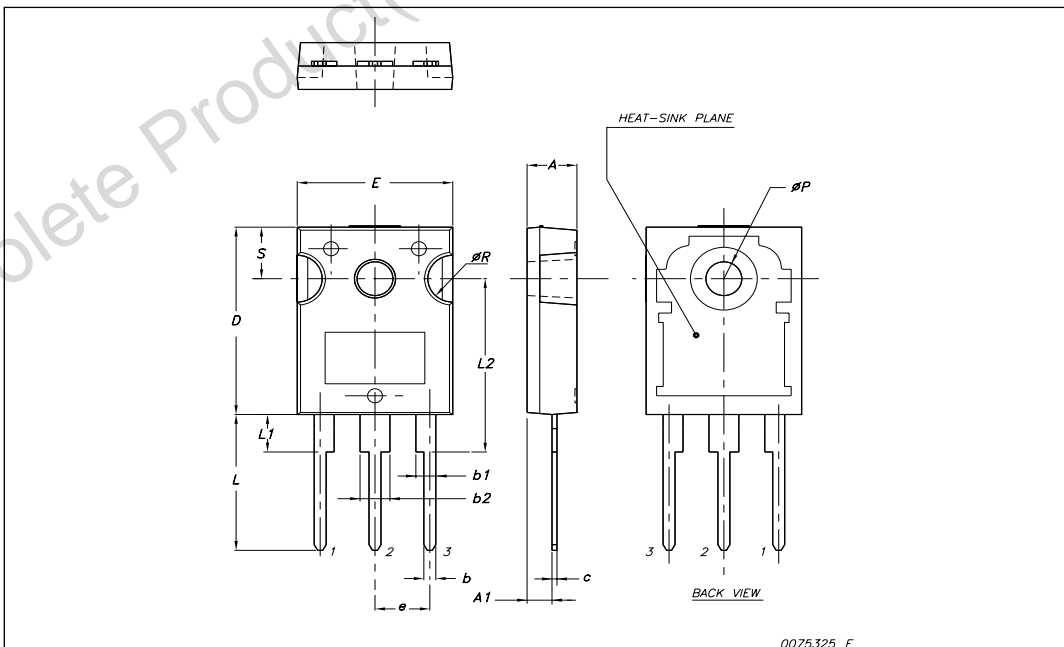
### 3 Package mechanical data

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](http://www.st.com)

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**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
01-Oct-1999	2	
20-Feb-2008	3	Package change from TO-218 to TO-247.

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