

## High power PNP epitaxial planar bipolar transistor

### Features

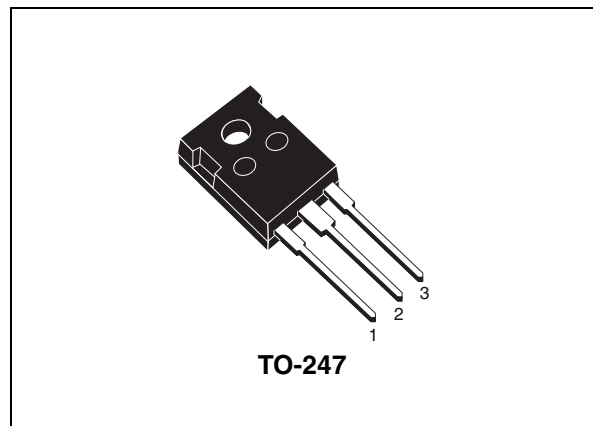
- High breakdown voltage  $V_{CEO} = -80\text{ V}$
- Complementary to 2STW4466
- Typical  $f_t = 20\text{ MHz}$
- Fully characterized at  $125\text{ }^{\circ}\text{C}$

### Applications

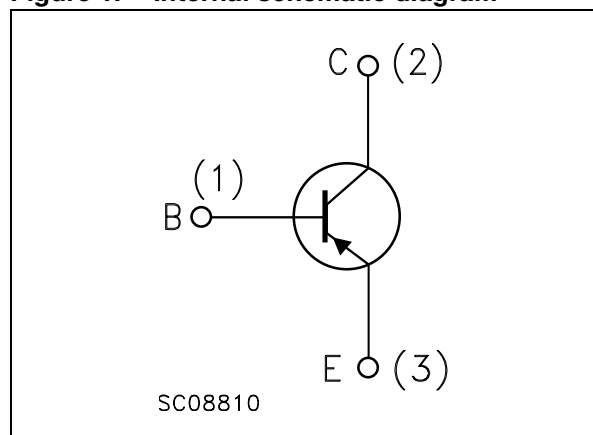
- Audio power amplifier

### Description

The device is a PNP transistor manufactured in low voltage planar technology using base island layout. The resulting transistor shows good gain linearity coupled with low  $V_{CE(sat)}$  behaviour. Recommended for 40W to 70W high fidelity audio frequency amplifier output stage.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
2STW1693	2STW1693	TO-247	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	-100	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	-80	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	-6	V
$I_C$	Collector current	-6	A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	-12	A
$P_{TOT}$	Total dissipation at $T_c = 25$ °C	60	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	2.08	°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 ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = -100\text{ V}$			-0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = -6\text{ V}$			-0.1	$\mu\text{A}$
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = -1\text{ mA}$	-6			V
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = -100\text{ }\mu\text{A}$	-100			V
$V_{(\text{BR})\text{CEO}}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = -50\text{ mA}$	-80			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = -2\text{ A}$ $I_{\text{B}} = -200\text{ mA}$			-0.6	V
		$I_{\text{C}} = -6\text{ A}$ $I_{\text{B}} = -600\text{ mA}$			-1.5	V
$V_{\text{BE}}^{(1)}$	Base-emitter voltage	$V_{\text{CE}} = -4\text{ V}$ $I_{\text{C}} = -6\text{ A}$			-1.5	V
$h_{\text{FE}}$	DC current gain	$I_{\text{C}} = -2\text{ A}$ $V_{\text{CE}} = -4\text{ V}$	50		120	
$f_{\text{T}}$	Transition frequency	$I_{\text{C}} = -0.5\text{ A}$ $V_{\text{CE}} = -12\text{ V}$		20		MHz
$C_{\text{CBO}}$	Collector-base capacitance ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = -10\text{ V}$ $f = 1\text{ MHz}$		80		pF
$t_{\text{on}}$ $t_{\text{stg}}$ $t_{\text{f}}$	Resistive load					
	Turn-on time	$I_{\text{C}} = -3\text{ A}$ $V_{\text{CC}} = -30\text{ V}$		0.18		ns
	Storage time	$I_{\text{B1}} = -I_{\text{B2}} = -0.3\text{ A}$		0.6		ns
	Fall time			0.09		ns

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

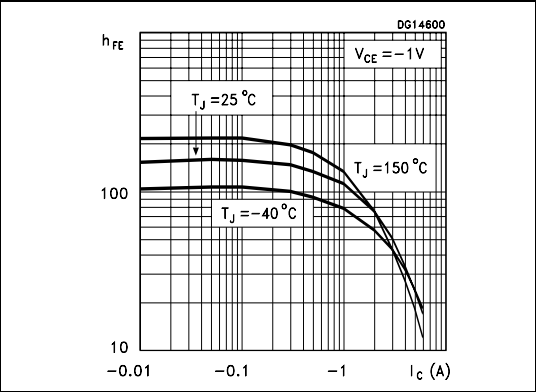


Figure 3. DC current gain

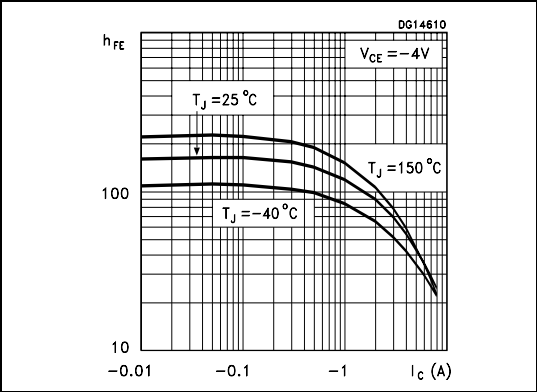


Figure 4. Collector-emitter saturation voltage

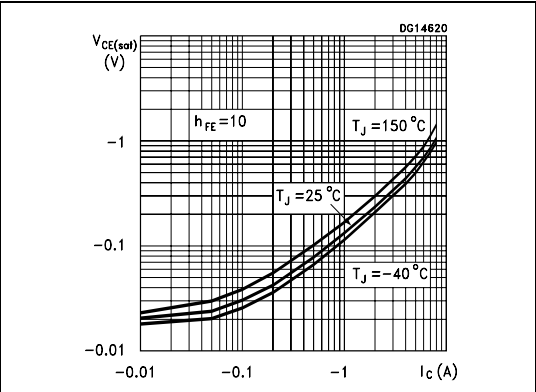


Figure 5. Base-emitter saturation voltage

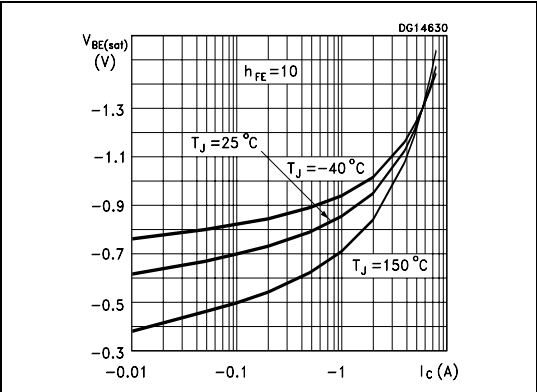


Figure 6. Base-emitter voltage

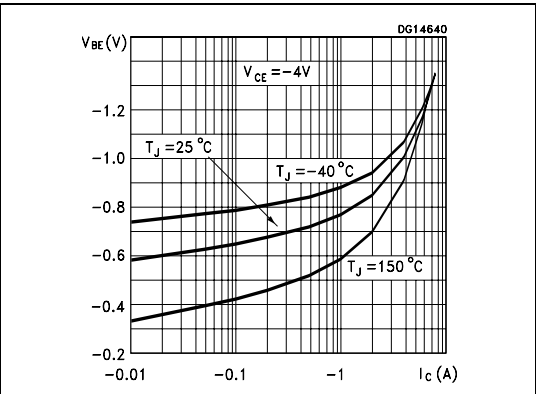
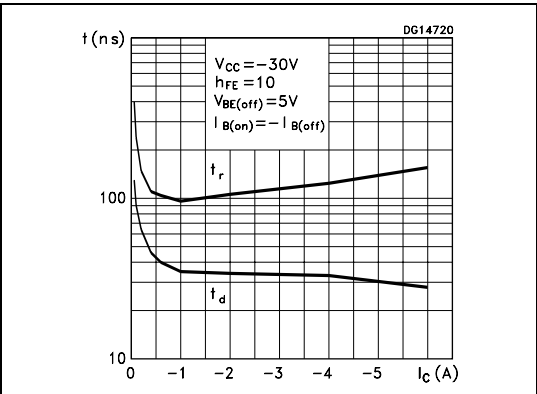
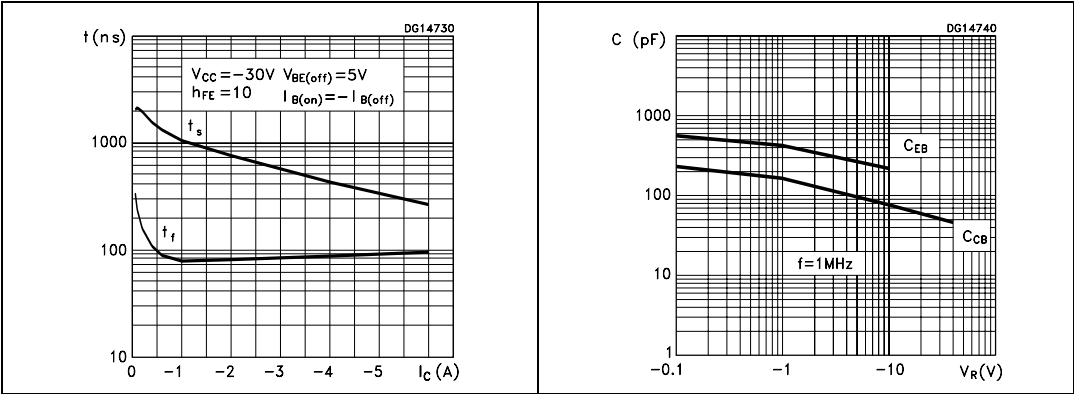


Figure 7. Resistive load switching time (on)



**Figure 8. Resistive load switching time (off)** **Figure 9. Collector-base and emitter-base capacitance**

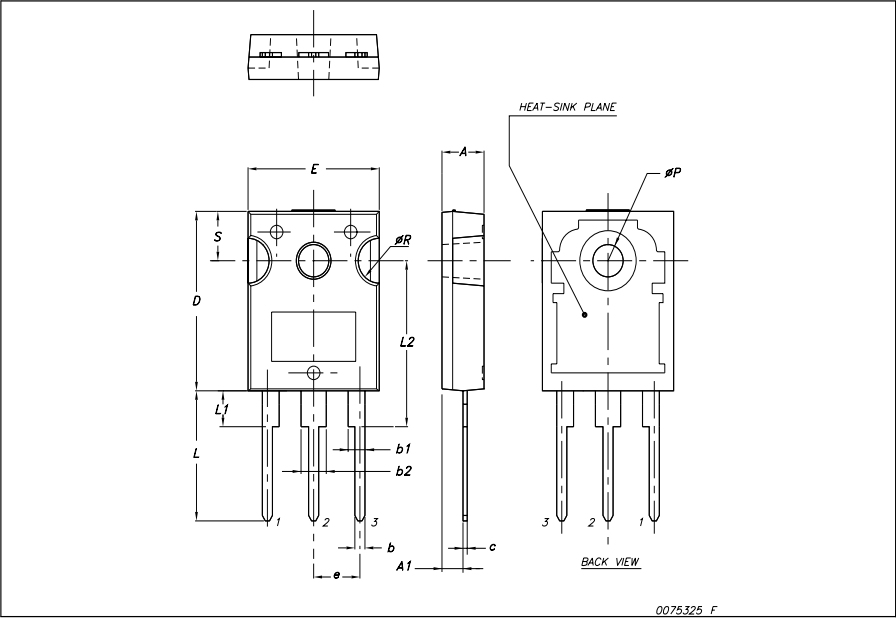


### 3 Package mechanical data

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)

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
10-Oct-2007	1	Initial release
02-Oct-2008	2	Content reworked to improve readability, no technical changes.

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