

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.

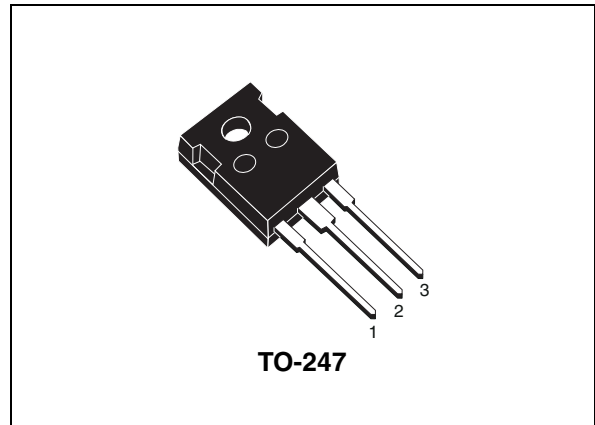


Figure 1. Internal schematic diagram

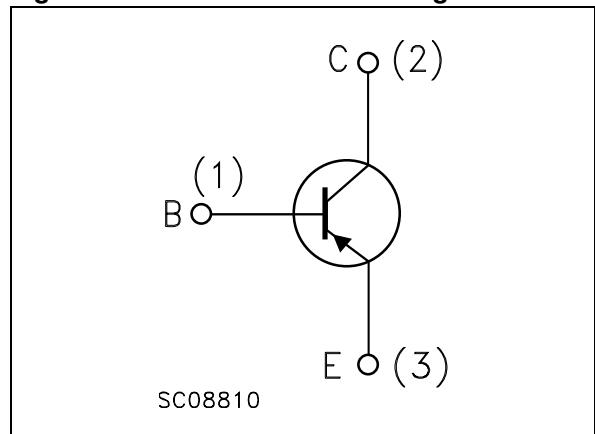


Table 1. Device summary

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_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = -100\text{ V}$			-0.1	μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = -6\text{ V}$			-0.1	μA
$V_{(\text{BR})\text{EBO}}$	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_{FE}	DC current gain	$I_{\text{C}} = -2\text{ A}$ $V_{\text{CE}} = -4\text{ V}$	50		120	
f_{T}	Transition frequency	$I_{\text{C}} = -0.5\text{ A}$ $V_{\text{CE}} = -12\text{ V}$		20		MHz
C_{CBO}	Collector-base capacitance ($I_{\text{E}} = 0$)	$V_{\text{CB}} = -10\text{ V}$ $f = 1\text{ MHz}$		80		pF
t_{on} t_{stg} t_{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 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

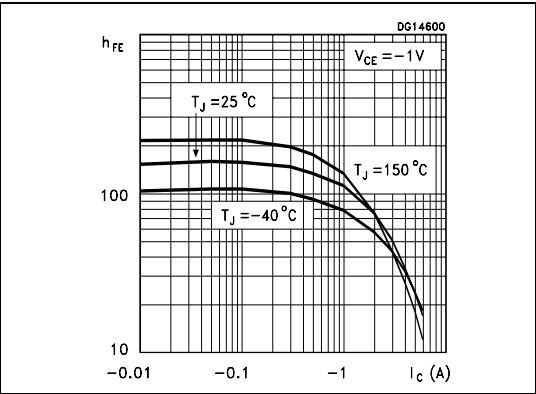


Figure 3. DC current gain

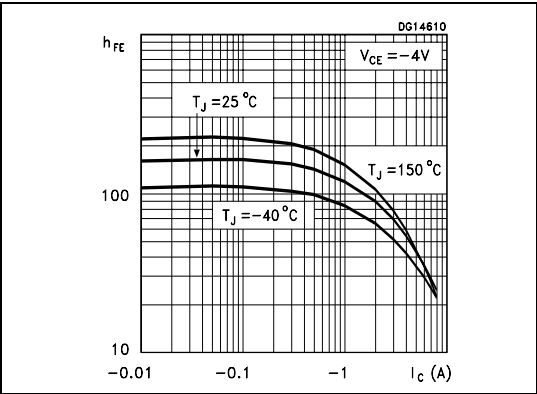


Figure 4. Collector-emitter saturation voltage

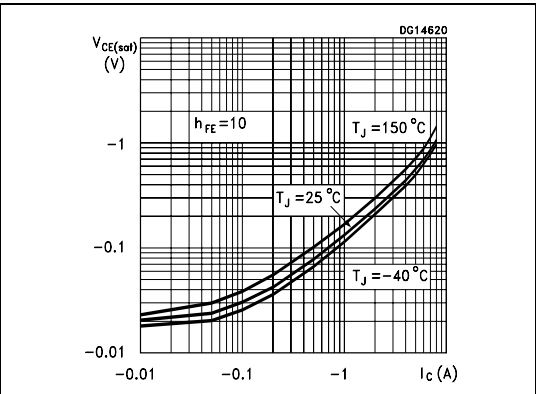


Figure 5. Base-emitter saturation voltage

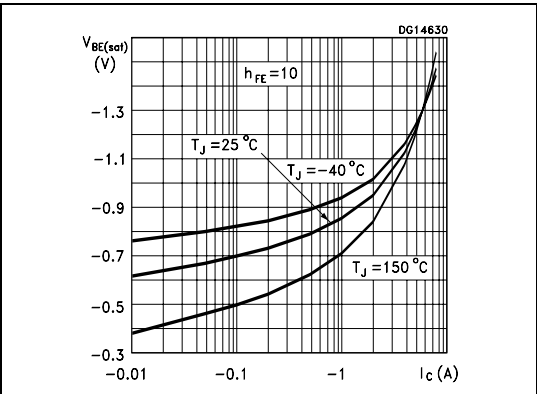


Figure 6. Base-emitter voltage

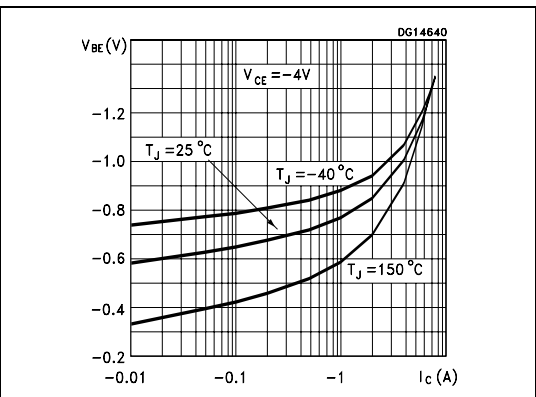


Figure 7. Resistive load switching time (on)

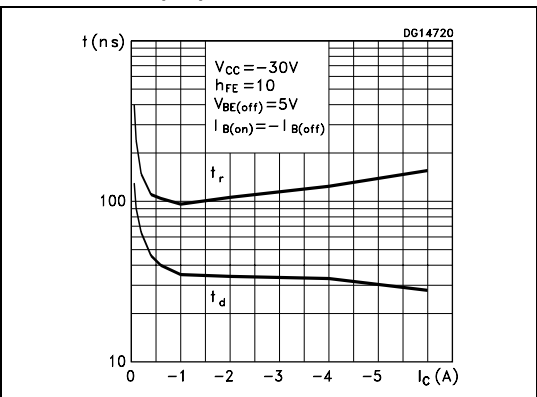
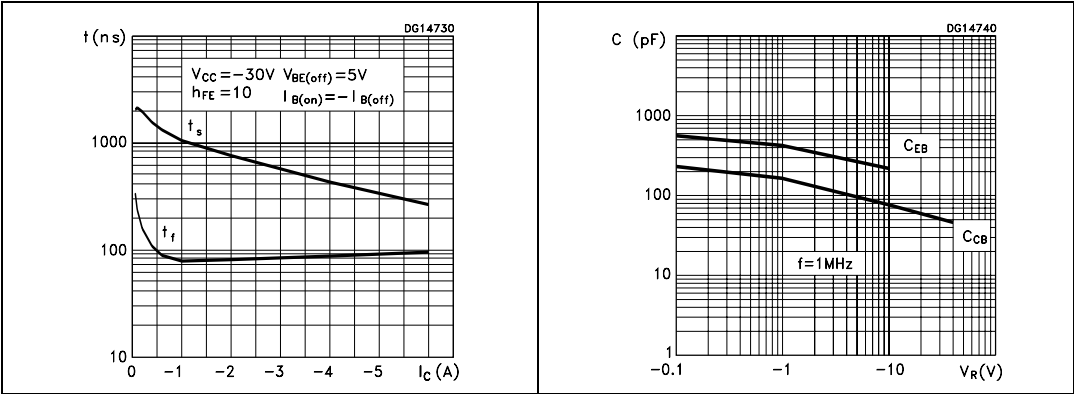


Figure 8. Resistive load switching time (off)

Figure 9. Collector-base and emitter-base capacitance

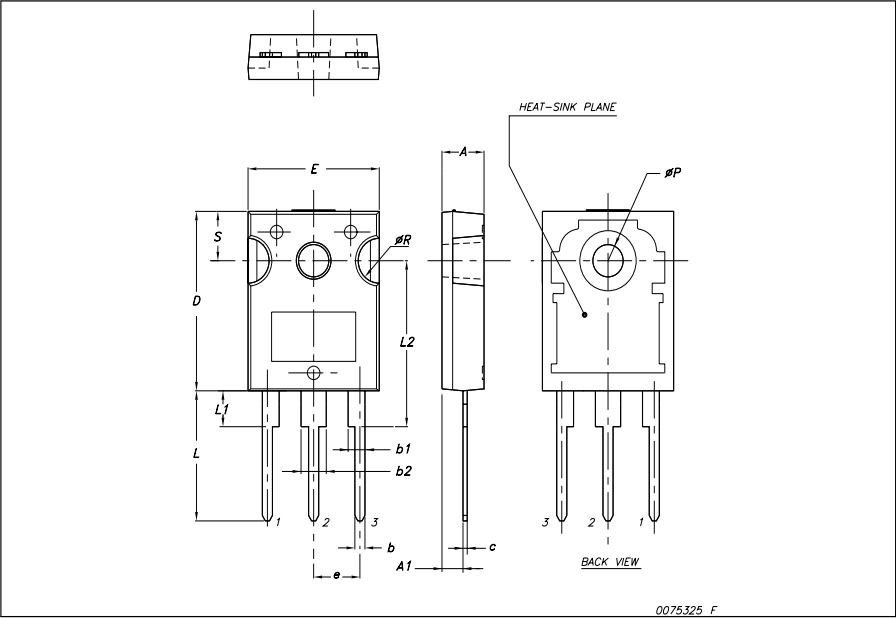


3 Package mechanical data

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

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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