



STC04IE170HP

Emitter switched bipolar transistor
ESBT® 1700V - 4A - 0.17 Ω

General features

Table 1. General features

$V_{CS(ON)}$	I_C	$R_{CS(ON)}$
0.7V	4A	0.17 Ω

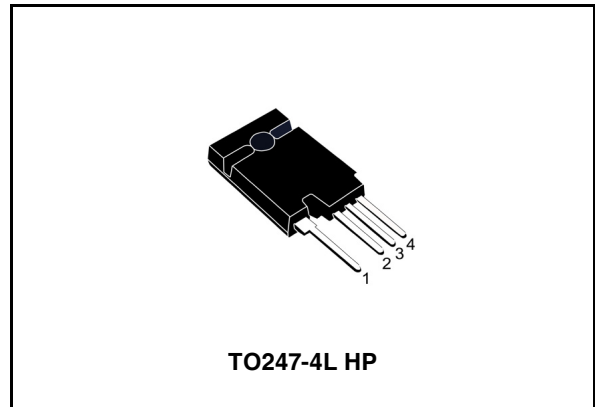
- High voltage / high current cascode configuration
- Low equivalent on resistance
- Very fast-switch, up to 150 kHz
- Squared RBSOA, up to 1700 V
- Very low C_{ISS} driven by $R_G = 47 \Omega$
- Very low turn-off cross over time
- In compliance with the 2002/93/EC European Directive

Applications

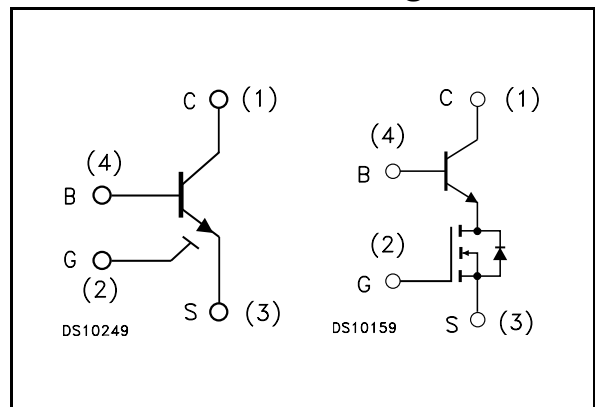
- Aux SMPS for three phase mains

Description

The STC04IE170HP is manufactured in Monolithic ESBT technology, aimed to provide the best performance in High Frequency / High voltage applications. It is designed for use in Gate Driven based topologies.



Internal schematic diagrams



Order codes

Part Number	Marking	Package	Packing
STC04IE170HP	C04IE170HP	TO247-4LHP	Tube

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{CS(SS)}$	Collector-source voltage ($V_{BS}=V_{GS}=0V$)	1700	V
$V_{BS(OS)}$	Base-source voltage ($I_C=0$, $V_{GS}=0V$)	30	V
$V_{SB(OS)}$	Source-base voltage ($I_C=0$, $V_{GS}=0V$)	17	V
V_{GS}	Gate-source voltage	± 17	V
I_C	Collector current	4	A
I_{CM}	Collector peak current ($t_P < 5ms$)	15	A
I_B	Base current	2	A
I_{BM}	Base peak current ($t_P < 1ms$)	4	A
P_{tot}	Total dissipation at $T_C \leq 25^\circ C$	50	W
T_{stg}	Storage temperature	-40 to 150	$^\circ C$
T_J	Max. operating junction temperature	150	$^\circ C$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	2.5	$^\circ C/W$

2 Electrical characteristics

($T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{\text{CS(SS)}}$	Collector-source current ($V_{\text{BS}} = V_{\text{GS}} = 0\text{V}$)	$V_{\text{CS(SS)}} = 1700\text{V}$			100	μA
$I_{\text{BS(OS)}}$	Base-source current ($I_{\text{C}} = 0, V_{\text{GS}} = 0\text{V}$)	$V_{\text{BS(OS)}} = 30\text{V}$			10	μA
$I_{\text{SB(OS)}}$	Source-base current ($I_{\text{C}} = 0, V_{\text{GS}} = 0\text{V}$)	$V_{\text{SB(OS)}} = 17\text{V}$			100	μA
$I_{\text{GS(OS)}}$	Gate-source leakage ($V_{\text{BS}} = 0\text{V}$)	$V_{\text{GS}} = \pm 17\text{V}$			100	nA
$V_{\text{CS(ON)}}$	Collector-source ON voltage	$V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 4\text{A}$ $I_{\text{B}} = 0.8\text{A}$ $V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 1.5\text{A}$ $I_{\text{B}} = 0.15\text{A}$		0.7 0.6	1.5 1.4	V V
h_{FE}	DC current gain	$V_{\text{CS}} = 1\text{V}$ $V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 4\text{A}$ $V_{\text{CS}} = 1\text{V}$ $V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 1.5\text{A}$	4 7	5.5 11		
$V_{\text{BS(ON)}}$	Base-source ON voltage	$V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 4\text{A}$ $I_{\text{B}} = 0.8\text{A}$ $V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 1.5\text{A}$ $I_{\text{B}} = 0.15\text{A}$		1.3 0.9	1.5 1.1	V V
$V_{\text{GS(th)}}$	Gate threshold voltage	$V_{\text{BS}} = V_{\text{GS}}$ $I_{\text{B}} = 250\mu\text{A}$	2	3	4	V
C_{iss}	Input capacitance	$V_{\text{CS}} = 25\text{V}$ $f = 1\text{MHz}$ $V_{\text{GS}} = 0\text{V}$		510		pF
$Q_{\text{GS(tot)}}$	Gate-source Charge	$V_{\text{GS}} = 10\text{V}$		3.9		nC
t_{s} t_{f}	INDUCTIVE LOAD Storage time Fall time	$V_{\text{GS}} = 10\text{V}$ $R_{\text{G}} = 47\Omega$ $V_{\text{Clamp}} = 1360\text{V}$ $t_{\text{p}} = 4\mu\text{s}$ $I_{\text{C}} = 2\text{A}$ $I_{\text{B}} = 0.4\text{A}$		770 10		ns ns
t_{s} t_{f}	INDUCTIVE LOAD Storage time Fall time	$V_{\text{GS}} = 10\text{V}$ $R_{\text{G}} = 47\Omega$ $V_{\text{Clamp}} = 1360\text{V}$ $t_{\text{p}} = 4\mu\text{s}$ $I_{\text{C}} = 2\text{A}$ $I_{\text{B}} = 0.2\text{A}$		410 10		ns ns
$V_{\text{CS(dyn)}}$	Collector-source dynamic voltage (500ns)	$V_{\text{CC}} = V_{\text{Clamp}} = 400\text{V}$ $V_{\text{GS}} = 10\text{V}$ $I_{\text{C}} = 1.5\text{A}$ $I_{\text{B}} = 0.3\text{A}$ $t_{\text{peak}} = 500\text{ns}$ $R_{\text{G}} = 47\Omega$ $I_{\text{Bpeak}} = 3\text{A}$ ($2I_{\text{C}}$)		5.36		V

Table 4. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CS(dyn)}$	Collector-source dynamic voltage (1 μ s)	$V_{CC} = V_{Clamp} = 400V$ $V_{GS} = 10V$ $I_C = 1.5A$ $I_B = 0.3A$ $t_{peak} = 500ns$ $R_G = 47\Omega$ $I_{Bpeak} = 3A (2I_C)$		4.32		V
V_{CSW}	Maximum collector-source voltage switched without snubber	$R_G = 47\Omega$ $h_{FE} = 5$ $I_C = 4A$	1700			V

Note (1) Pulsed duration = 300 μ s, duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 1. Output characteristics

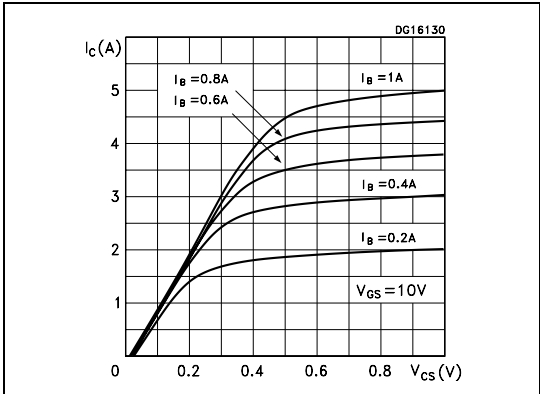


Figure 2. Dynamic collector-source saturation voltage

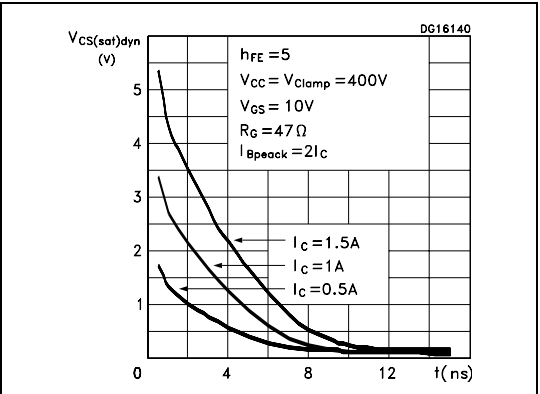


Figure 3. DC current gain

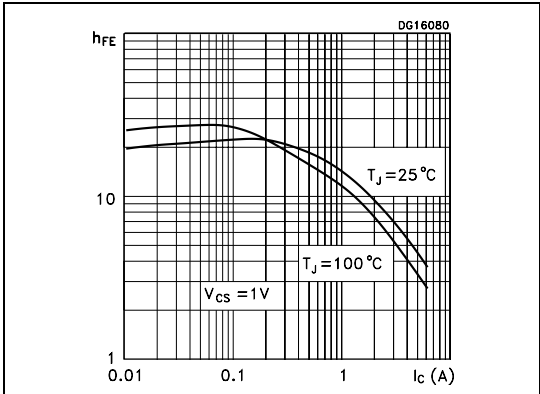


Figure 4. Gate threshold voltage vs temperature

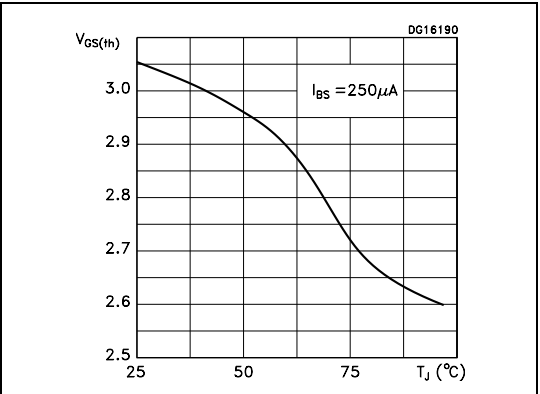


Figure 5. Collector-source On voltage Figure 6. Collector-source On voltage

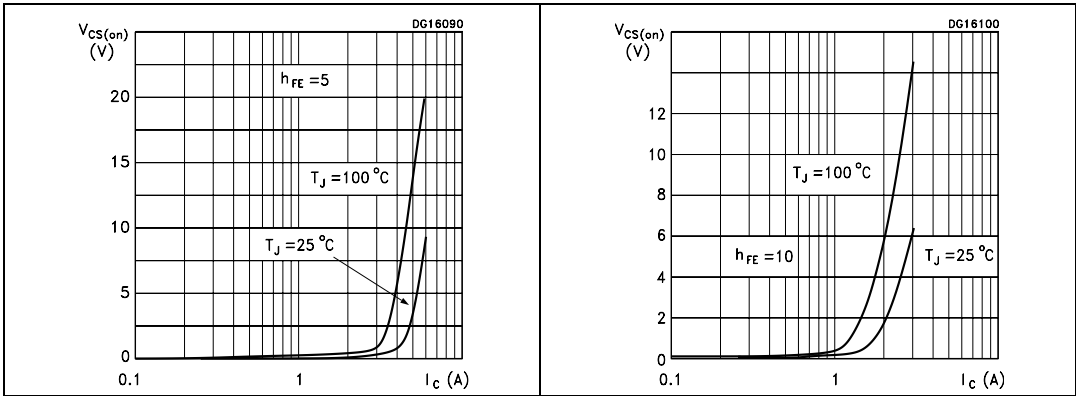


Figure 7. Base-source On voltage Figure 8. Base-source On voltage

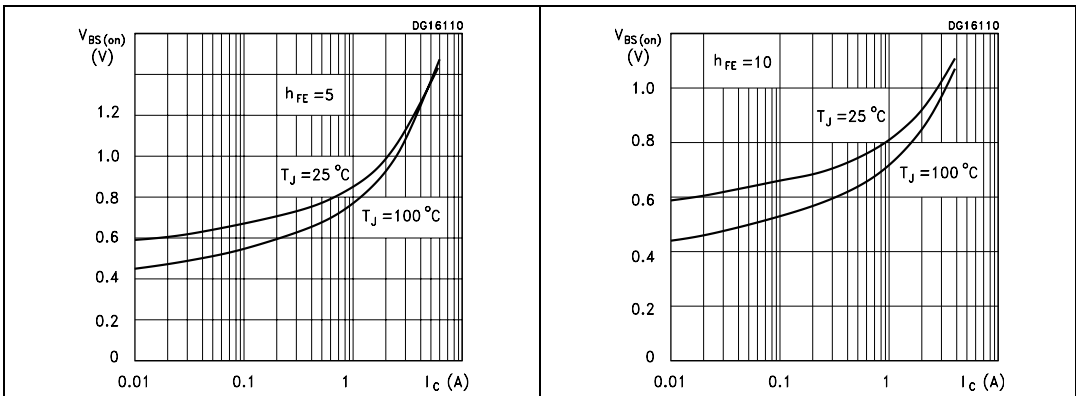
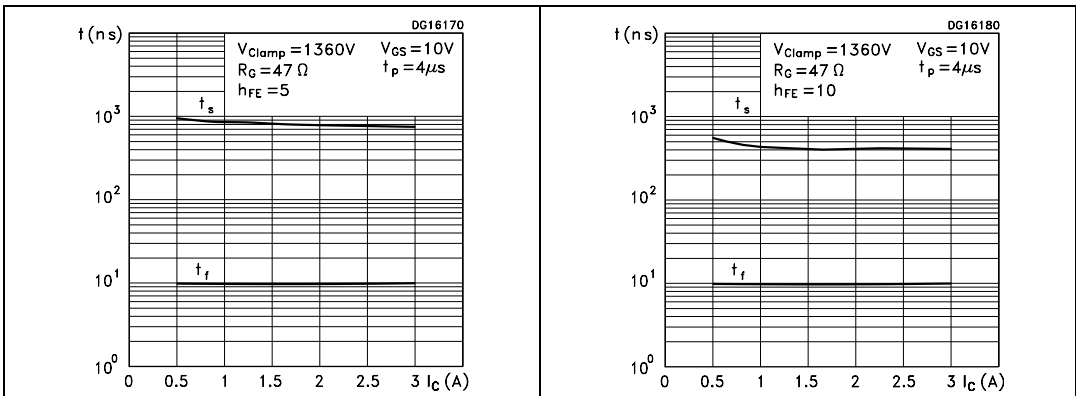
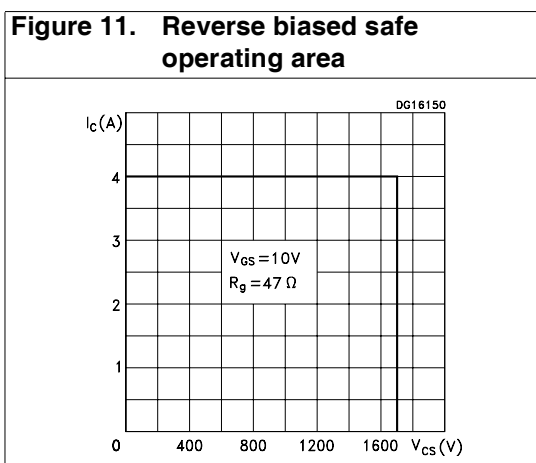


Figure 9. Inductive load switching time Figure 10. Inductive load switching time



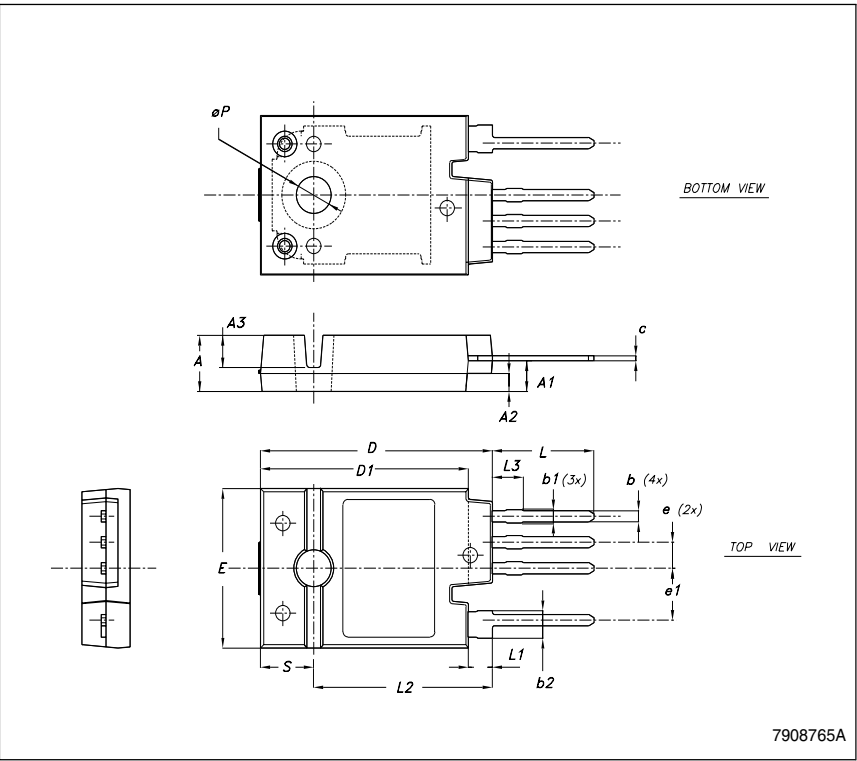


3 Package mechanical data

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

TO247-4LHP MECHANICAL DATA

DIM.	mm.		
	MIN.	TYP	MAX.
A	5.50	5.65	5.80
A1	2.85	3.15	3.25
A2		1.92	
A3		3.18	
b	0.95	1.10	1.30
b1	1.10		1.50
b2	2.50		2.90
c	0.40		0.80
D	23.85	24	24.15
D1		21.50	
E	15.45	15.60	15.75
e	2.54		
e1		5.08	
L	10.20		10.80
L1	2.20	2.50	2.80
L2		18.50	
L3		3	
øP	3.55		3.65
S		5.50	



4 Revision history

Table 5. Revision history

Date	Revision	Changes
27-Sep-2006	1	First release.
21-Nov-2006	2	Improved application target.

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