STC03DE170

HYBRID EMITTER SWITCHED BIPOLAR TRANSISTOR ESBT™ 1700 V - 3 A - 0.55 Ω

Table 1: General Features

$V_{CS(ON)}$	I_C	$R_{CS(ON)}$
1 V	1.8 A	0.55 Ω

- LOW EQUIVALENT ON RESISTANCE
- VERY FAST-SWITCH, UP TO 150 kHz
- SQUARED RBSOA, UP TO 1700 V
- VERY LOW C_{ISS} DRIVEN BY RG = 4.7 Ω

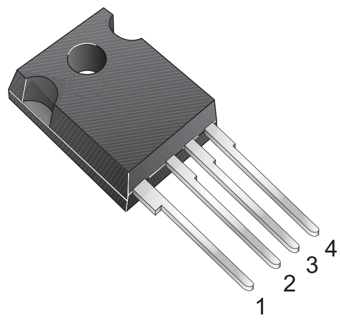
APPLICATION

- AUX SMPS FOR THREE PHASE MAINS

DESCRIPTION

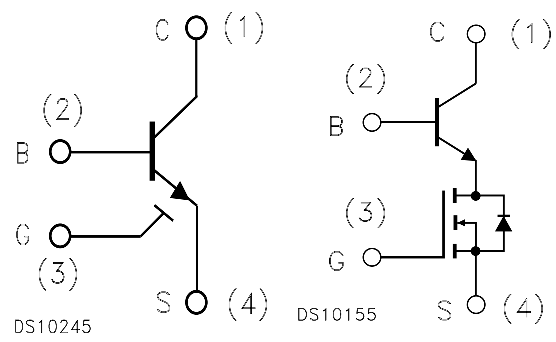
The STC03DE170 is manufactured in a hybrid structure, using dedicated high voltage Bipolar and low voltage MOSFET technologies, aimed to providing the best performance in ESBT topology. The STC03DE170 is designed for use in aux flyback smps for any three phase application.

Figure 1: Package



TO247-4L

Figure 2: Internal Schematic Diagram



Electrical Symbol Device Structure

Table 2: Order Code

Part Number	Marking	Package	Packaging
STC03DE170	STC03DE170	TO247-4L	TUBE

Table 3: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{CS(SS)}$	Collector-Source Voltage ($V_{BS} = V_{GS} = 0$ V)	1700	V
$V_{BS(OS)}$	Base-Source Voltage ($I_C = 0$, $V_{GS} = 0$ V)	30	V
$V_{SB(OS)}$	Source-Base Voltage ($I_C = 0$, $V_{GS} = 0$ V)	9	V
V_{GS}	Gate-Source Voltage	± 20	V
I_C	Collector Current	3	A
I_{CM}	Collector Peak Current (t_p < 5ms)	6	A
I_B	Base Current	2	A
I_{BM}	Base Peak Current (t_p < 1ms)	4	A
P_{tot}	Total Dissipation at $T_C = 25\ ^oC$	100	W
T_{stg}	Storage Temperature	-65 to 125	°C
T_J	Max. Operating Junction Temperature	125	°C

Table 4: Thermal Data

Symbol	Parameter		Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-Case Max	1	^{o}C/W

Table 5: Electrical Characteristics ($T_{case} = 25\ ^oC$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CS(SS)}$	Collector-Source Current ($V_{BS} = V_{GS} = 0$ V)	$V_{CS(SS)} = 1700$ V			100	μA
$I_{BS(OS)}$	Base-Source Current ($I_C = 0$, $V_{GS} = 0$ V)	$V_{BS(OS)} = 30$ V			10	μA
$I_{SB(OS)}$	Source-Base Current ($I_C = 0$, $V_{GS} = 0$ V)	$V_{SB(OS)} = 9$ V			100	μA
$I_{GS(OS)}$	Gate-Source Leakage	$V_{GS} = \pm 20$ V			500	nA
$V_{CS(ON)}$	Collector-Source ON Voltage	$V_{GS} = 10$ V $I_C = 1.8$ A $I_B = 0.36$ A $V_{GS} = 10$ V $I_C = 0.7$ A $I_B = 70$ mA		1 1	1.5 1.3	V V
h_{FE}	DC Current Gain	$I_C = 1.8$ A $V_{CS} = 1$ V $V_{GS} = 10$ V $I_C = 0.7$ A $V_{CS} = 1$ V $V_{GS} = 10$ V	3.5 6	5 10		
$V_{BS(ON)}$	Base-Source ON Voltage	$V_{GS} = 10$ V $I_C = 1.8$ A $I_B = 0.36$ A $V_{GS} = 10$ V $I_C = 0.7$ A $I_B = 70$ mA		1 0.8	1.2 1	V V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{BS} = V_{GS}$ $I_B = 250\ \mu$A	1.5	2.2	3	V
C_{iss}	Input Capacitance	$V_{CS} = 25$ V f = 1MHZ $V_{GS} = V_{CB} = 0$		750		pF
$Q_{GS(tot)}$	Gate-Source Charge	$V_{CS} = 15$ V $V_{GS} = 10$ V $V_{CB} = 0$ $I_C = 1.8$ A		12.5		nC
 t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	$V_{GS} = 10$ V $R_G = 47\ \Omega$ $V_{Clamp} = 1200$ V $t_p = 4\ \mu$s $I_C = 1.8$ A $I_B = 0.36$ A		 760 14		 ns ns

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
 t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	V_{GS} = 10 V R_G = 47 Ω V_{Clamp} = 1200 V t_p = 4 µs I_C = 0.7 A I_B = 70 mA		 690 32		 ns ns
V_{CSW}	Maximum Collector-Source Voltage without Snubber	R_G = 47 Ω h_{FE} = 5 A I_C = 3 A	1500			V
$V_{CS(dyn)}$	Collector-Source Dynamic Voltage (500 ns)	V_{CC} = V_{Clamp} = 400 V V_{GS} = 10 V R_G = 47 Ω I_C = 0.5 A I_B = 0.1 A I_{Bpeak} = 1 A t_{peak} = 500 ns		3.9		V
$V_{CS(dyn)}$	Collector-Source Dynamic Voltage (1µs)	V_{CC} = V_{Clamp} = 400 V V_{GS} = 10 V R_G = 47 Ω I_C = 0.5 A I_B = 0.1 A I_{Bpeak} = 1 A t_{peak} = 500 ns		2.2		V

Figure 3: Safe Operating Area

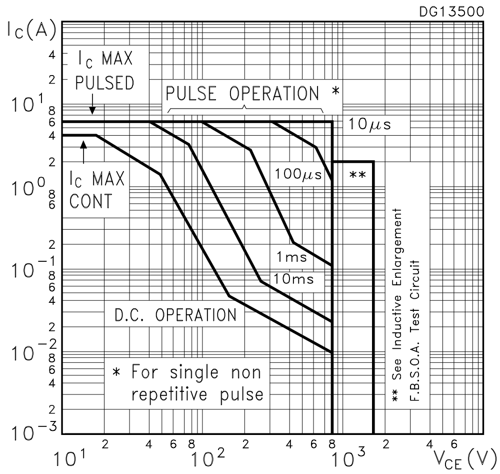


Figure 6: Output Characteristics

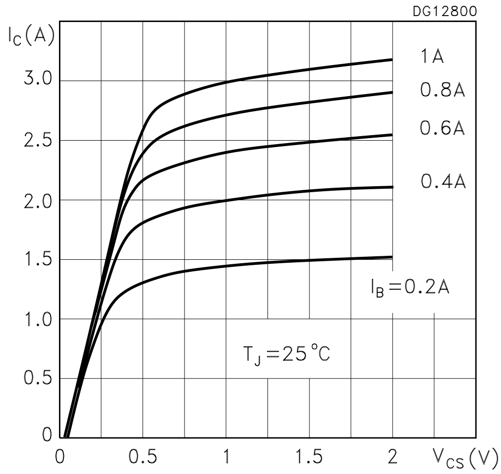


Figure 4: Reverse Biased Safe Operating Area

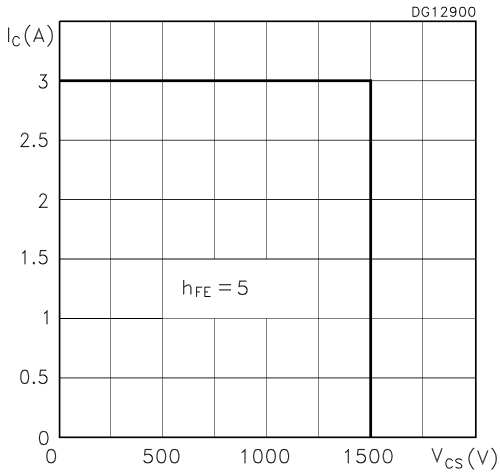


Figure 7: Gate Threshold Voltage vs Temperature

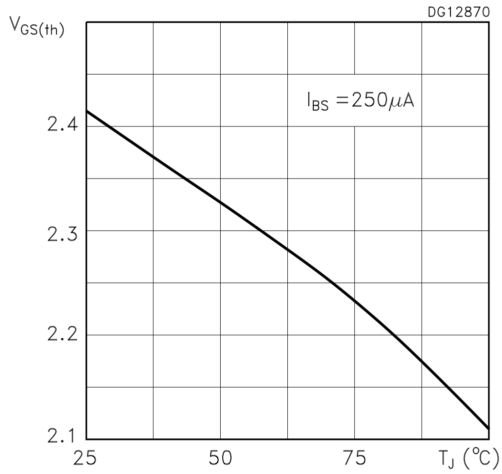


Figure 5: DC Current Gain

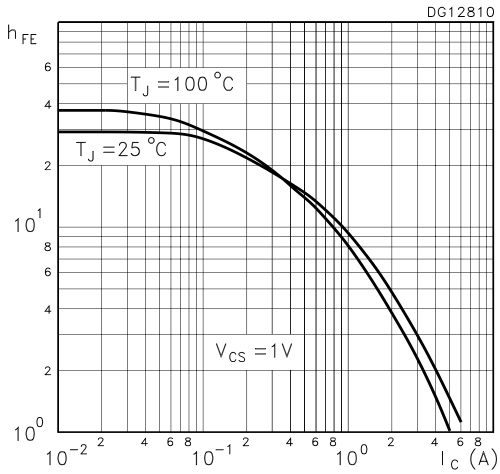


Figure 8: DC Current Gain

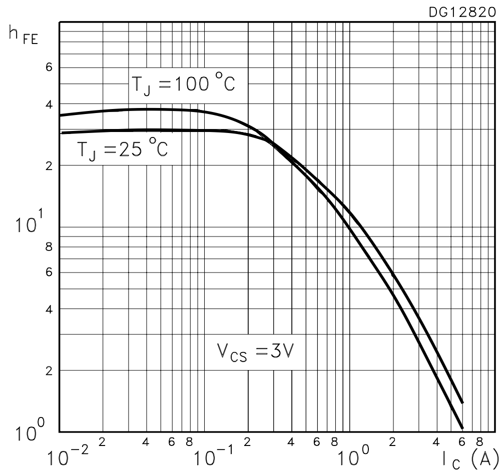


Figure 9: Collector-Source On Voltage

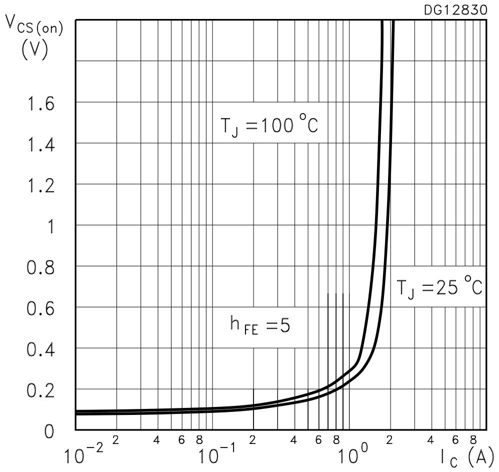


Figure 10: Base-Source On Voltage

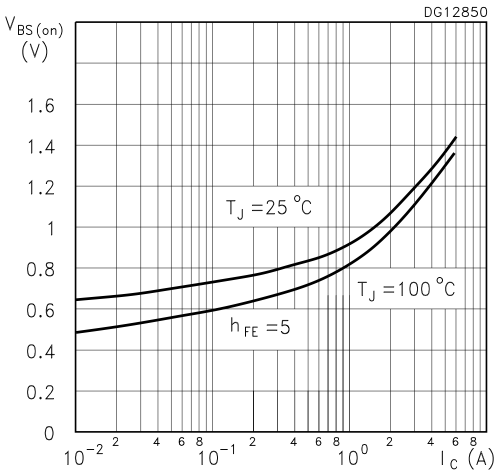


Figure 11: Inductive Load Switching Time

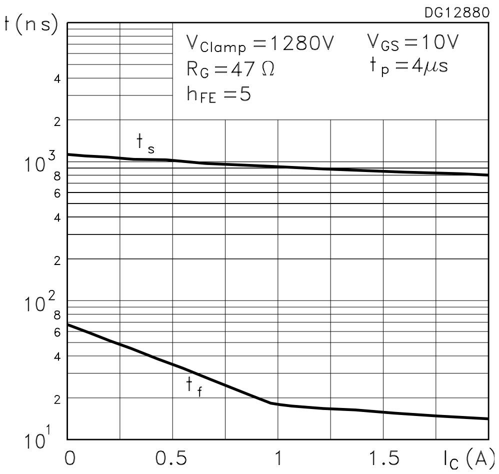


Figure 12: Collector-Source On Voltage

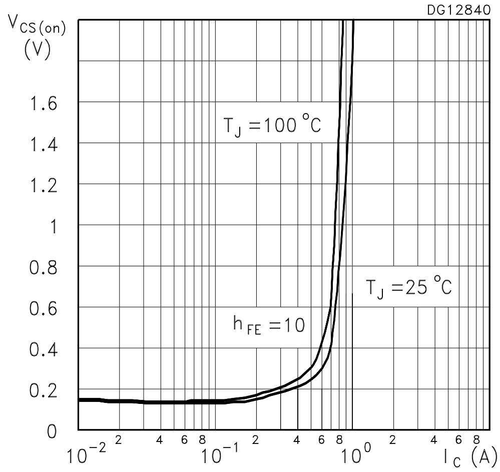


Figure 13: Base-Source On Voltage

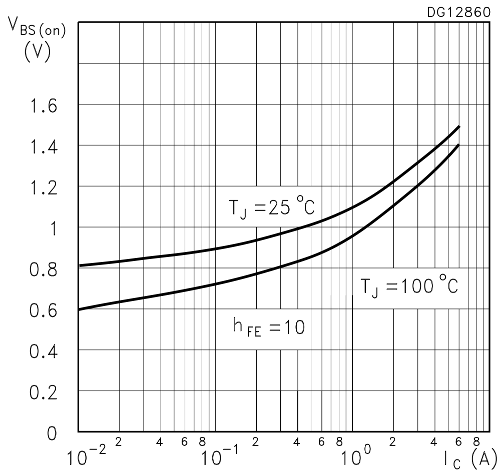


Figure 14: Inductive Load Switching Time

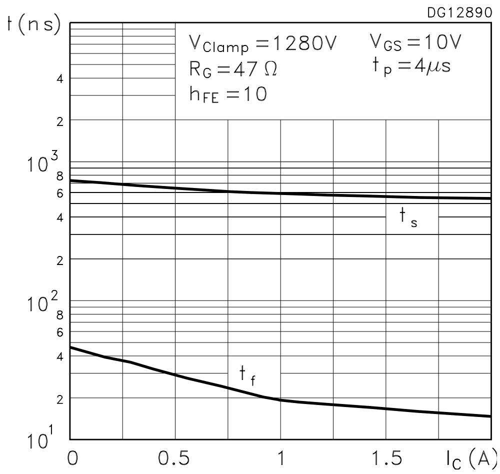


Figure 15: Dynamic Collector-Emitter Saturation Voltage

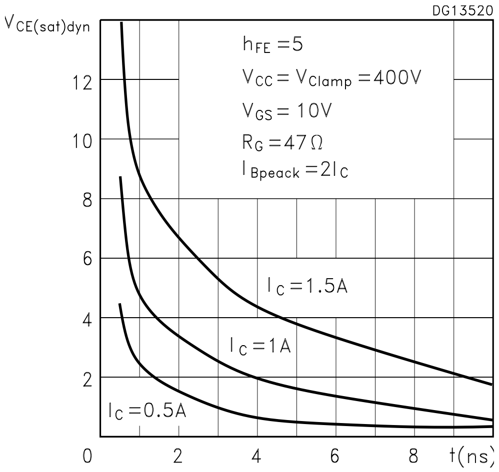


Figure 16: Inductive Load Enlargement FBSOA Circuit

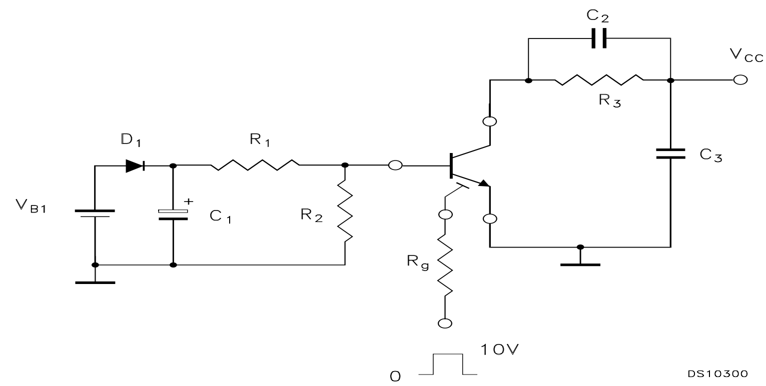


Table 6: Components, Values

V_{B1} = 4.16 V D_1 = BA157 R_1 = 1 Ω R_2 = 100 Ω $R_3 = V_{CC} / I_{Cn}$ R_g = 47 Ω	C_1 = 220 nF $C_2 \leq$ 70 pF C_3 = 50 nF V_g = 10 V Pulse Time = 5 μs

TO247-4L MECHANICAL DATA

DIM.	mm		
	MIN.	TYP.	MAX.
A	4.85		5.15
A1	2.20		2.60
b	0.95	1.10	1.30
b1	1.30		1.70
b2	2.50		2.90
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		2.54	
e1		5.08	
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	

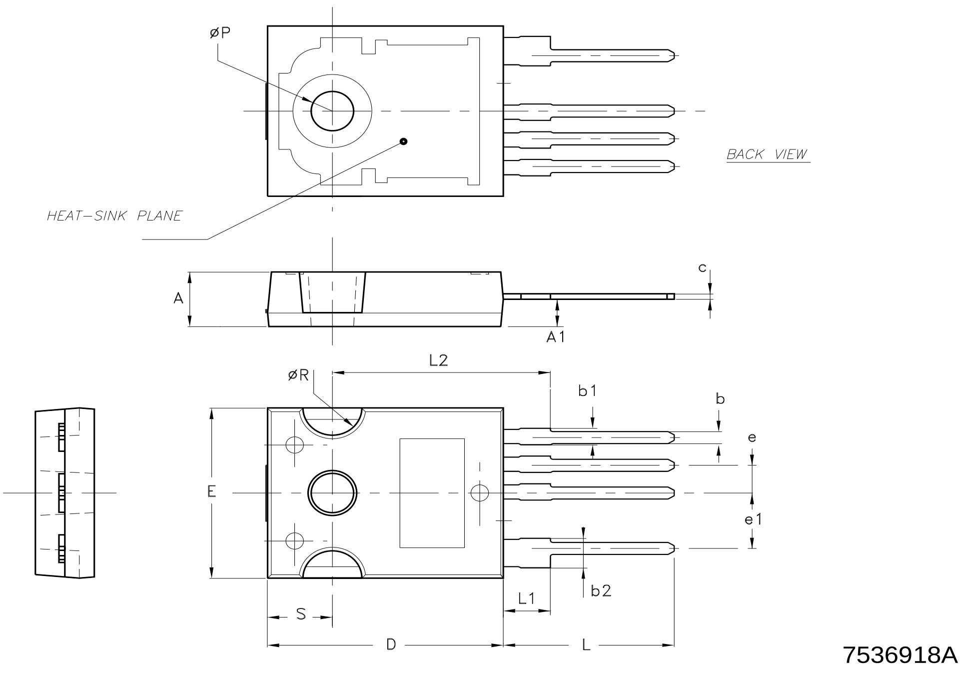


Table 7: Revision History

Version	Release Date	Change Designator
13-Sep-2004	1	First Release.