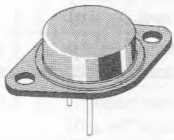
SGS-THOMSON MICROELECTRONICS

BUT92

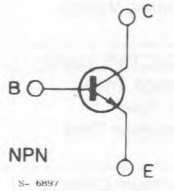
FAST SWITCHING POWER TRANSISTOR

- h_{FE} > 10 AT I_C = 35A
- HIGH EFFICIENCY SWITCHING
- VERY LOW SATURATION VOLTAGE
- RECTANGULAR SAFE OPERATING AREA
- WIDE ACCIDENTAL OVERLOAD AREA



TO-3

INTERNAL SCHEMATIC DIAGRAM



DESCRIPTION

Suitable for motor-drives, S.M.P.S. converters, uninterruptible power supply operating medium low voltage supply.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-emitter Voltage (V_{BE} = – 1.5V)	350	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	250	V
V_{EBO}	Emitter-base Voltage (I_C = 0)	7	V
I_E	Emitter Current	50	A
I_{EM}	Emitter Peak Current	75	A
I_B	Base Current	10	A
I_{BM}	Base Peak Current	15	A
P_{tot}	Total Dissipation at T_c < 25°C	250	W
T_{stg}	Storage Temperature	– 65 to 200	°C
T_j	Max. Operating Junction Temperature	200	°C

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	max	0.7	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cutoff Current (R_{BE} = 10Ω)	V_{CE} = V_{CEV} V_{CE} = V_{CEV} T_c = 100°C			0.4 4	mA mA
I_{CEV}	Collector Cutoff Current	V_{CE} = V_{CEV} V_{BE} = − 1.5V V_{CE} = V_{CEV} V_{BE} = − 1.5V T_c = 100°C			0.2 2	mA mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 7V			1	mA
$V_{CEO(sus)}$*	Collector Emitter Sustaining Voltage	I_C = 0.2A L = 25mH	250			V
V_{EBO}	Emitter-base Voltage (I_C = 0)	I_E = 50mA	7			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = 35A I_B = 3.5A I_C = 35A I_B = 3.5A T_j = 100°C		0.8 1.25	1.2 1.9	V V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 35A I_B = 3.5A I_C = 35A I_B = 3.5A T_j = 100°C		1.2 1.2	1.5 1.5	V V
di_C/dt	Rated of Rise of on-state Collector Current	V_{CC} = 200V R_C = 0 I_{B1} = 5.25A t_p = 3μs T_j = 100°C See fig. 1 and 2	125	200		A/μs
$V_{CE(3\mu s)}$	Collector Emitter Dynamic Voltage	V_{CC} = 200V I_{B1} = 5.25A R_C = 5.7Ω T_j = 100°C See fig. 1 and 2		3	6	V
$V_{CE(5\mu s)}$	Collector Emitter Dynamic Voltage	V_{CC} = 200V I_{B1} = 5.25A R_C = 5.7Ω T_j = 100°C See fig. 1 and 2		1.8	3	V
t_s t_f t_c	INDUCTIVE LOAD Storage Time Fall Time Crossover Time	V_{CC} = 200V V_{clamp} = 250V I_C = 35A I_{B1} = 3.5A V_{BB} = − 5V L_C = 0.28mH R_{B2} = 0.7Ω T_j = 100°C See fig. 3a and 3b		1.4 0.15 0.3	3 0.4 0.7	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage without Snubber	V_{CC} = 50V I_{CWoff} = 52A V_{BB} = − 5V I_{B1} = 3.5A L_C = 48μH R_{B2} = 0.7Ω T_j = 125°C See fig. 3a and 3b	250			V

* Pulsed : Pulse duration = 300 μs, duty cycle = 2%.

Figure 1 : Turn-on Switching Test Circuit.

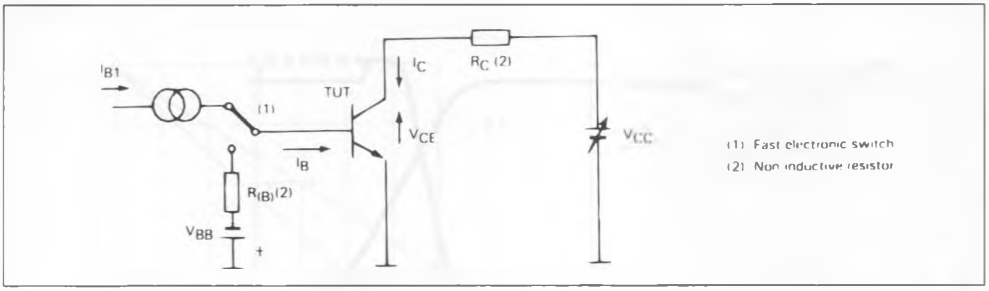


Figure 2 : Turn-off Switching Waveforms.

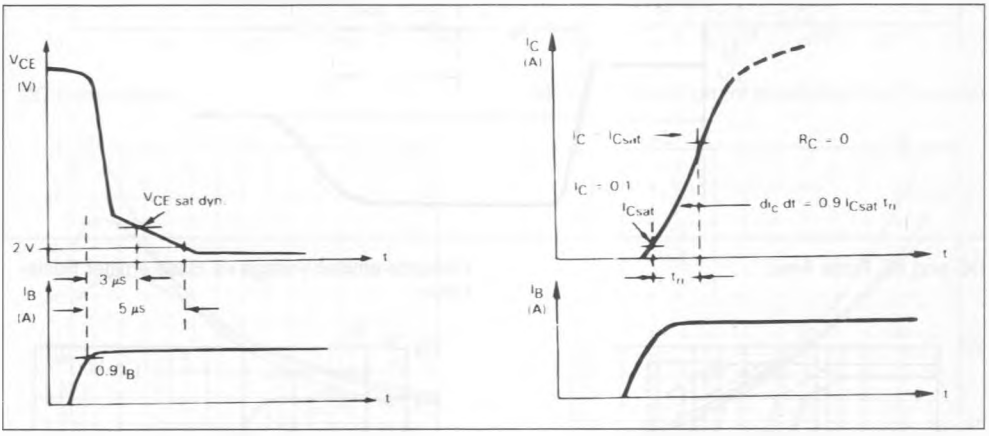


Figure 3a : Turn-off Switching Test Circuit.

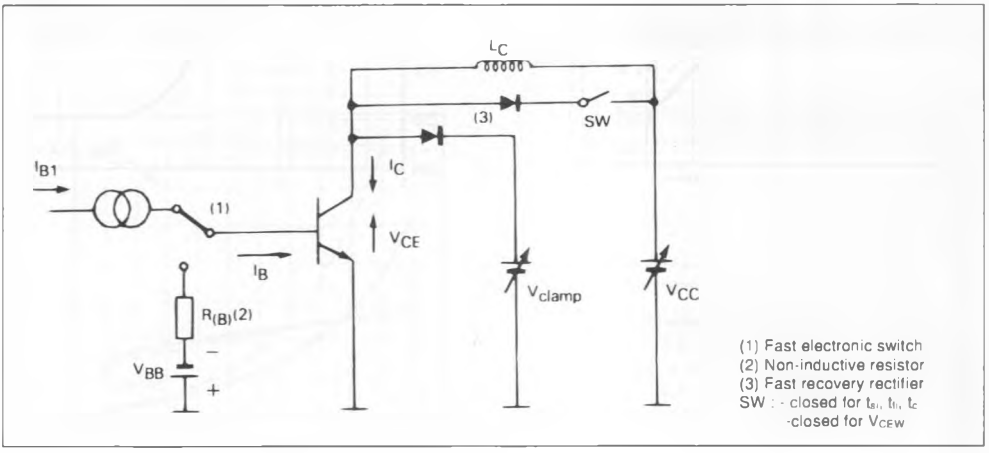
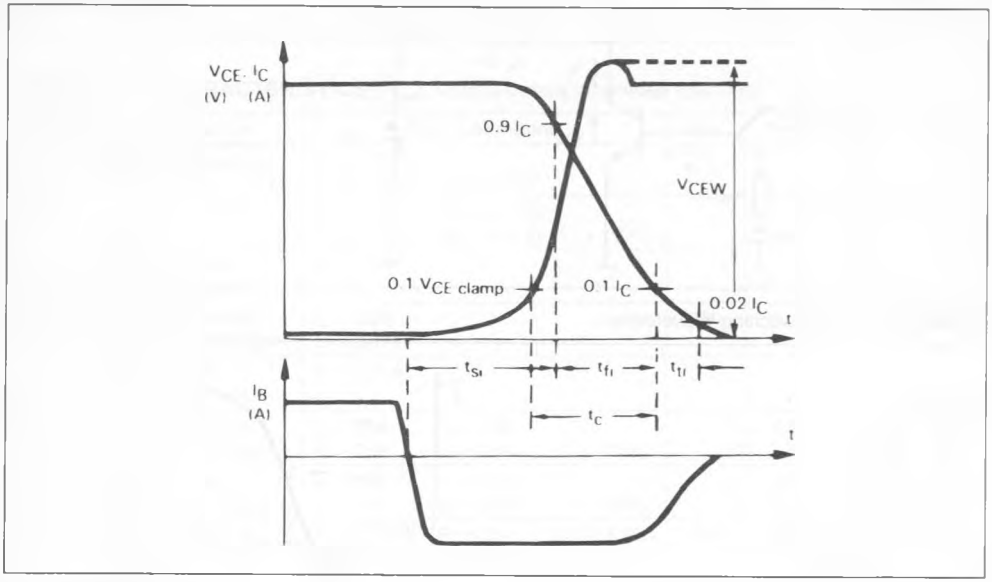
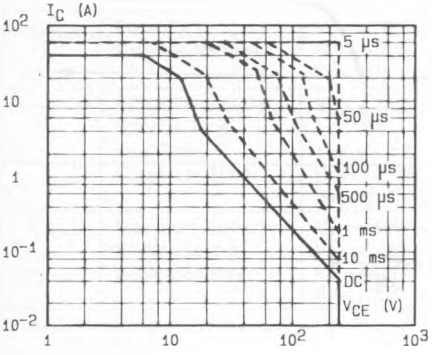


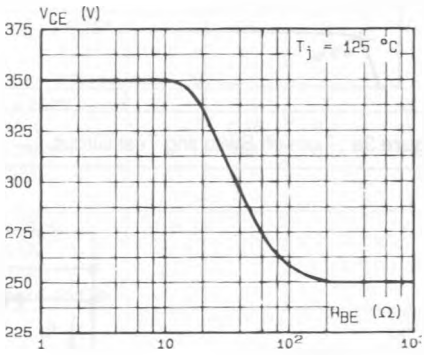
Figure 3b : Turn-off Switching Waveforms (inductive load).



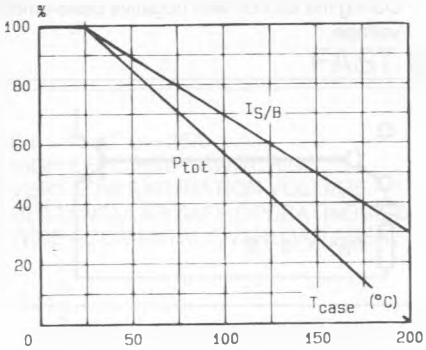
DC and AC Pulse Area.



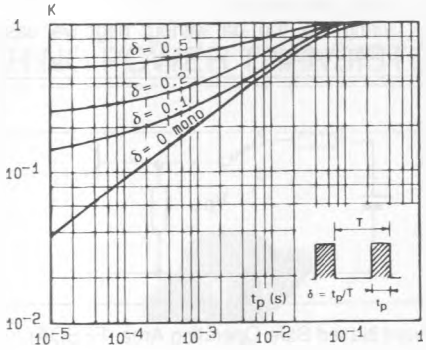
Collector-emitter Voltage vs. Base emitter Resistance.



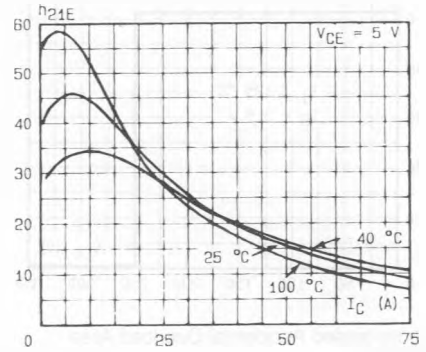
Power and $I_{S/B}$ Derating versus Case Temperature.



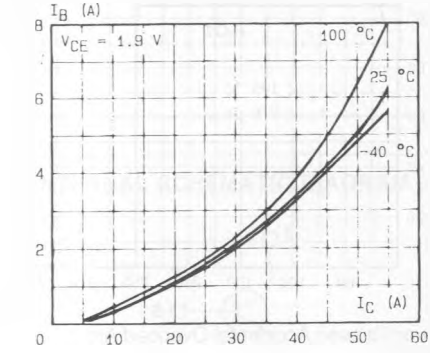
Transient Thermal Response.



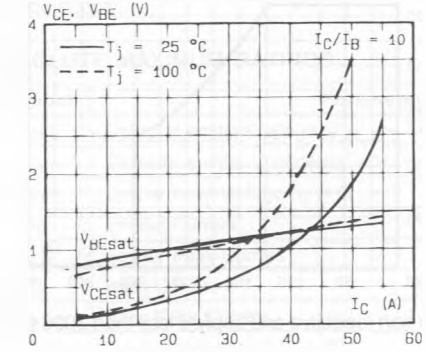
DC Current Gain.



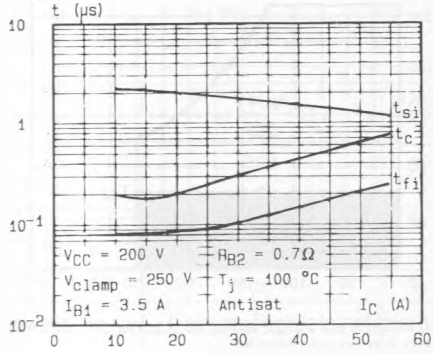
Minimum Base Current to saturate the Transistor.



Saturation Voltage.



Switching Times versus Collector Current (inductive load).



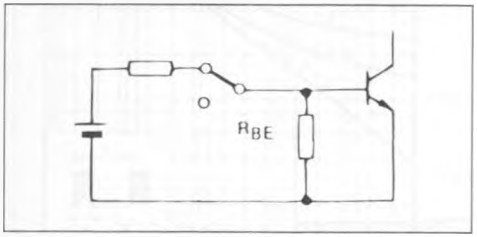
SWITCHING OPERATING AND OVERLOAD AREAS

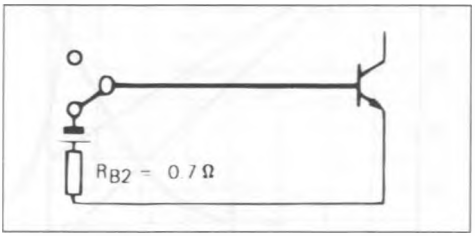
TRANSISTOR FORWARD BIASED

- During the turn-on
- During the turn-off without negative base-emitter voltage.

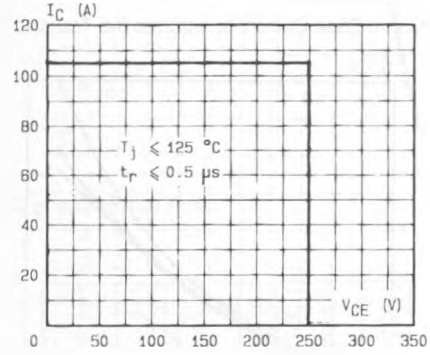
TRANSISTOR REVERSE BIASED

- During the turn-off with negative base-emitter voltage.

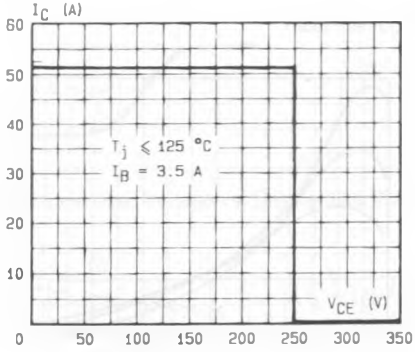




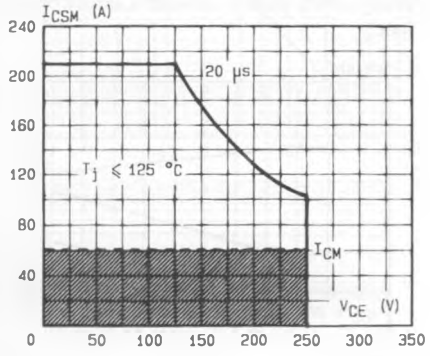
Forward biased Safe Operating Area (FBSOA).



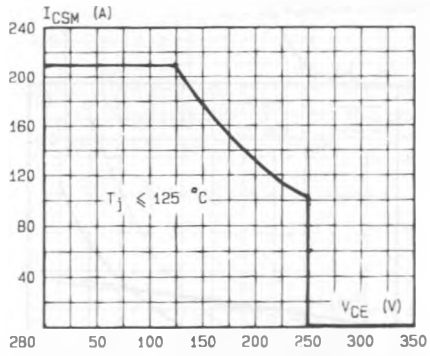
Reverse biased Safe Operating Area (RBSOA).



Forward biased Accidental Overload Area (FBAOA).



Reverse biased Accidental Overload Area (RBAOA).



High accidental surge currents ($I > I_{CM}$) are allowed if they are non repetitive and applied less than 3000 times during the component life.