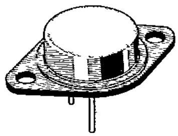
SGS-THOMSON
MICROELECTRONICS

BUV52

FAST SWITCHING POWER TRANSISTOR

- FAST SWITCHING TIMES
- LOW SWITCHING LOSSES
- VERY LOW SATURATION VOLTAGE AND HIGH GAIN FOR REDUCED LOAD OPERATION



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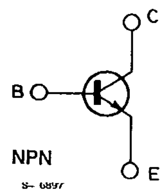
INTERNAL SCHEMATIC DIAGRAM



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_C	Collector Current	20	A
I_{CM}	Collector Peak Current	30	A
I_B	Base Current	4	A
I_{BM}	Base Peak Current	6	A
P_{base}	Reverse Bias Base Dissipation (B.E. junction in avalanche)	1	W
P_{tot}	Total Dissipation at T_c < 25°C	150	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	1.17	°C/W

ELECTRICAL CHARACTERISTIC (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			0.5 2.5	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			0.5 2	mA mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 5V			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 = 4A I_B = 0.27A I_C = 8A I_B = 0.8A I_C = 12A I_B = 1.5A I_C = 4A I_B = 0.27A T_j = 100°C I_C = 8A I_B = 0.8A T_j = 100°C I_C = 12A I_B = 1.5A T_j = 100°C		0.35 0.45 0.6 0.35 0.6 0.9	0.8 0.9 1.2 0.9 1.5 1.9	V V V V V V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 8A I_B = 0.8A I_C = 12A I_B = 1.5A I_C = 8A I_B = 0.8A T_j = 100°C I_C = 12A I_B = 1.5A T_j = 100°C		1 1.2 0.9 1.2	1.3 1.5 1.3 1.5	V V V V
di_C/dt	Rated of Rise of On-state Collector Current	V_{CC} = 200V R_C = 0 I_{B1} = 1.2A T_j = 25°C See fig. 2 T_j = 100°C	 30 25	 70 60		 A/µs A/µs
$V_{CE(2µs)}$	Collector Emitter Dynamic Voltage	V_{CC} = 200V I_{B1} = 0.8A R_C = 25Ω T_j = 25°C See fig. 2 T_j = 100°C		 1.8 2.8	 3 5	 V V
$V_{CE(4µs)}$	Collector Emitter Dynamic Voltage	V_{CC} = 200V I_{B1} = 0.8A R_C = 25Ω T_j = 25°C See fig. 2 T_j = 100°C		 1.1 1.5	 1.7 2.5	 V V

ELECTRICAL CHARACTERISTIC (continued)

RESISTIVE LOAD

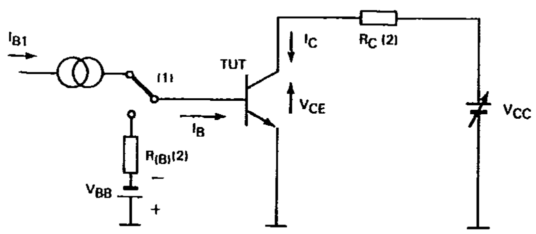
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_r t_s t_f	Rise Time Storage Time Fall Time	V_{CC} = 200V V_{BB} = – 5V R_{B2} = 1.7Ω See fig. 1	I_C = 12A I_{B2} = 1.5A t_p = 30μs		0.3 1 0.15	0.6 1.6 0.3	μs μs μs

INDUCTIVE LOAD

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
t_s t_f t_t t_c	Storage Time Fall Time Tail Time in Turn-on Crossover Time	V_{CC} = 200V I_C = 8A V_{BB} = – 5V L_C = 1.3mH	V_{clamp} = 250V I_B = 0.8A R_{B2} = 3.1Ω See fig. 3		1.2 0.08 0.03 0.15	1.8 0.2 0.12 0.35	μs μs μs μs
t_s t_f t_t t_c	Storage Time Fall Time Tail Time in Turn-on Crossover Time	V_{CC} = 200V I_C = 8A V_{BB} = – 5V L_C = 1.3mH See fig. 3	V_{clamp} = 250V I_B = 0.8A R_{B2} = 3.1Ω T_j = 100°C		1.8 0.2 0.08 0.35	2.4 0.4 0.2 0.7	μs μs μs μs
t_s t_f t_t	Storage Time Fall Time Tail Time in Turn-on	V_{CC} = 200V I_C = 8A V_{BB} = 0 L_C = 1.3mH	V_{clamp} = 250V I_B = 0.8A R_{B2} = 5.6Ω See fig. 3		2.8 0.5 0.15		μs μs μs
t_s t_f t_t	Storage Time Fall Time Tail Time in Turn-on	V_{CC} = 200V I_C = 8A V_{BB} = 0 L_C = 1.3mH See fig. 3	V_{clamp} = 250V I_B = 0.8A R_{B2} = 5.6Ω T_j = 100°C		4.5 0.8 0.4		μs μs μs

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

Figure 1 : Switching Times Test Circuit (resistive load).



(1) Fast switching
(2) Non-inductive resistor

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Figure 2 : Turn-on Switching Waveforms.

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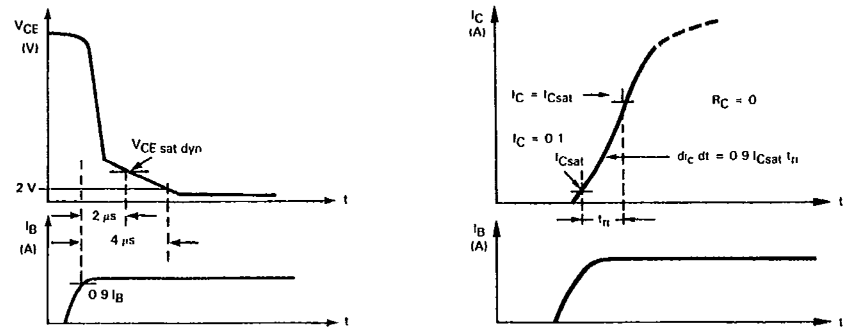
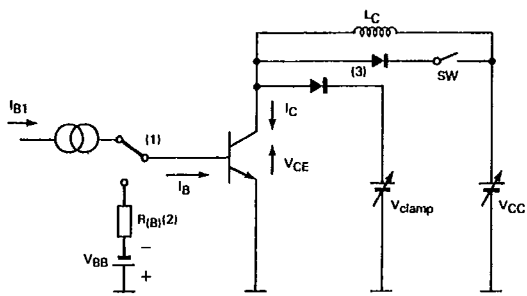
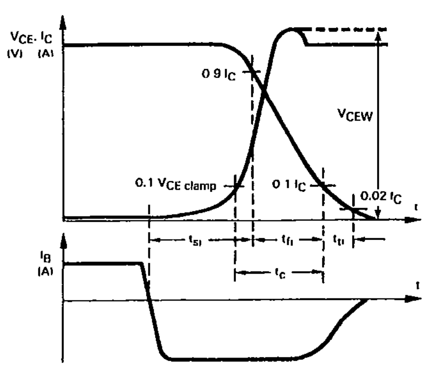


Figure 3a : Turn-on Switching Test Circuits.

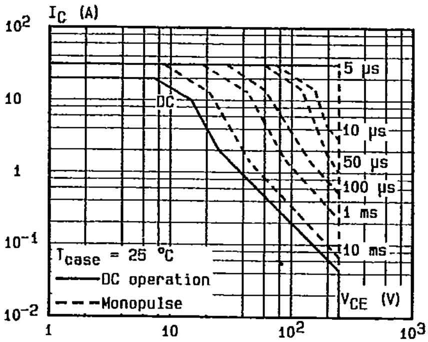


(1) Fast electronic switch
(2) Non-inductive resistor
(3) Fast recovery rectifier
SW : – closed for t_{si}, t_{fi}, t_c
– open for V_{CEW}

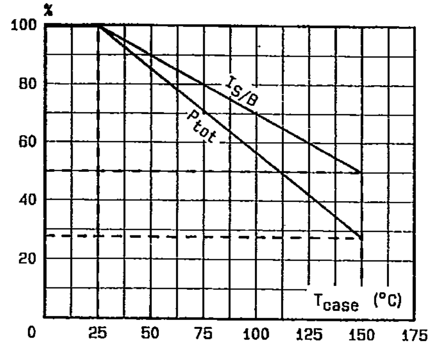
Figure 3b : Turn-on Switching Waveforms (inductive load).



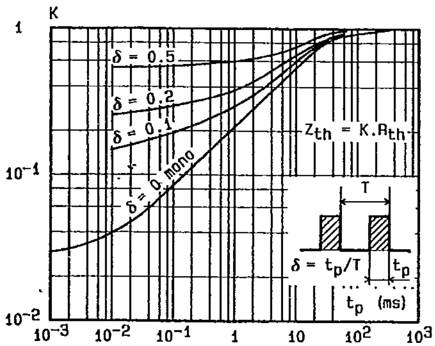
DCand AC Pulse Area.



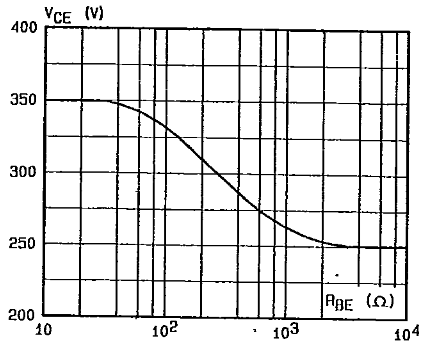
Power and $I_{S/B}$ Derating versus Case Temperature.



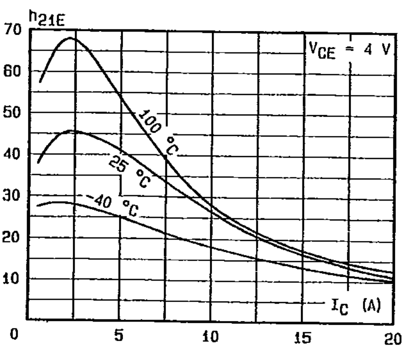
Transient Thermal Response.



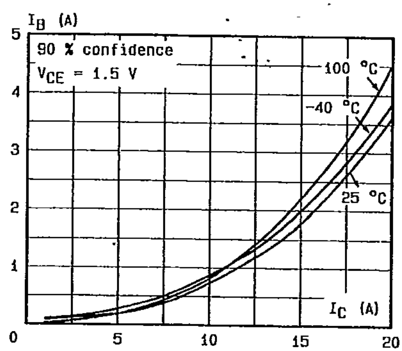
Collector-emitter Voltage versus Base-emitter Resistance.



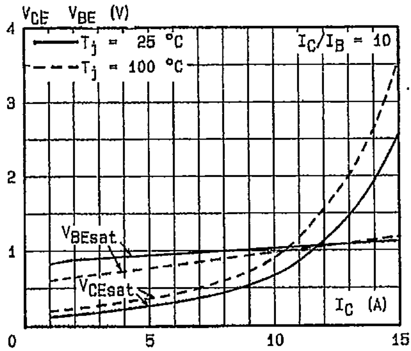
DC Current Gain.



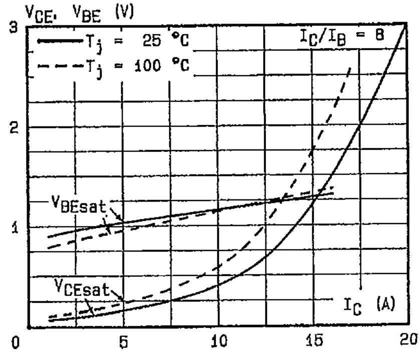
Minimum Base Current to Saturate the transistor.



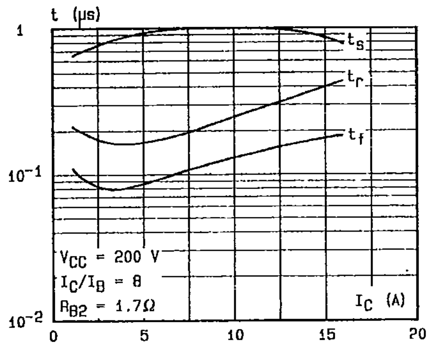
Saturation Voltage.



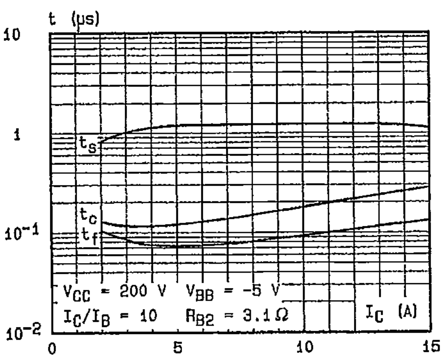
Saturation Voltage.



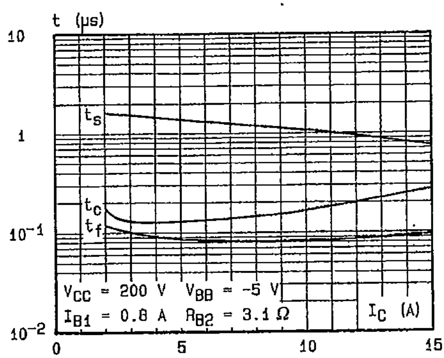
Switching Times versus Collector Current (resistive load).



Switching Times versus Collector Current (inductive load).



Switching Times versus Collector Current (inductive load).



SWITCHING OPERATING AND OVERLOAD AREAS

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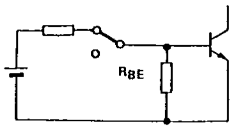
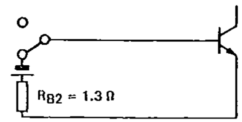
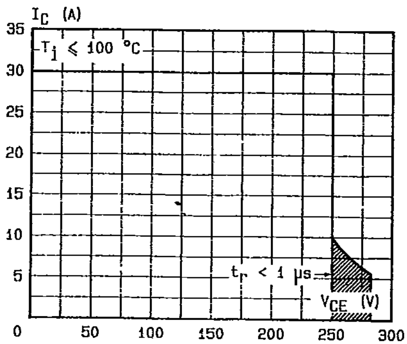


Transistor Forward Biased
- During the turn-on
- During the turn-off without negative base-emitter voltage and $5.6\Omega \leq R_{BE} \leq 50\ \Omega$



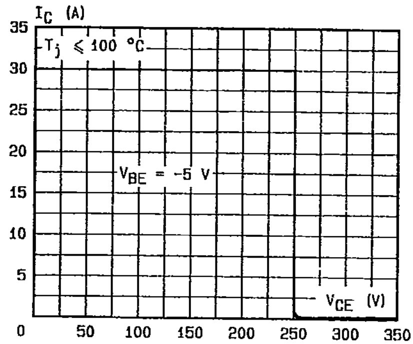
Transistor Reverse Biased
- During the turn-off with negative base emitter voltage

Forward Biased Safe Operating Area (FBSOA).

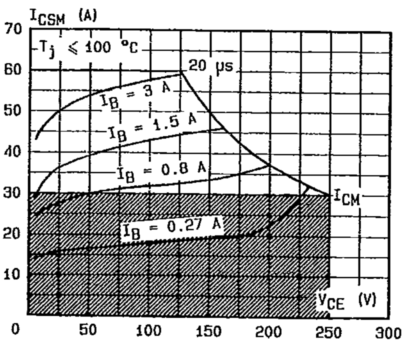


The hatched zone can only be used for turn-on.

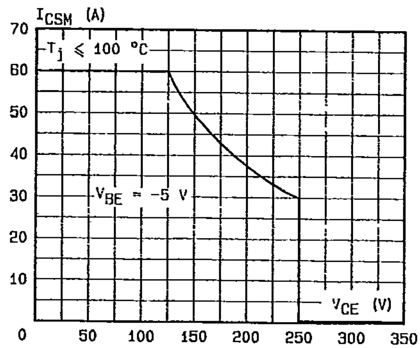
Reverse Biased Safe Operating Area (RBSOA).



Forward Biased Accidental Overload Area (FBAOA).



Reverse Biased Accidental Overload Area (RBAOA).



The Kellog network (heavy point) allows the calculation of the maximum value of the short-circuit for a given base current I_B (90 % confidence).

After the accidental overload current the RBAOA has to be used for the turn-off.

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