SGS-THOMSON MICROELECTRONICS

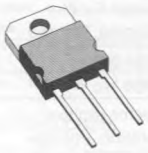
BUW48
BUW49

NPN HIGH CURRENT SWITCHING TRANSISTORS

- HIGH CURRENT CAPABILITY
- VERY LOW SATURATION VOLTAGE AT I_C = 20A
- FAST TURN-ON AND TURN-OFF

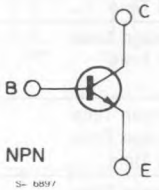
APPLICATIONS

- HIGH FREQUENCY AND EFFICENCY CONVERTERS
- SWITCHING REGULATORS
- MOTOR CONTROLS



TO-218

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BUW48	BUW49	
V_{CBO}	Collector-base Voltage (I_E = 0)	120	160	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	60	80	V
V_{EBO}	Emitter-base Voltage (I_C = 0)	7	7	V
I_C	Collector Current	30	30	A
I_{CM}	Collector Peak Current (t_p < 10ms)	45	40	A
I_B	Base Current	8	6	A
I_{BM}	Base Peak Current (t_p < 10ms)	12	10	A
P_{tot}	Total Dissipation at T_c < 25°C	150		W
T_{stg}	Storage Temperature	– 65 to 175		°C
T_j	Max. Operating Junction Temperature	175		°C

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1	°C/W

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

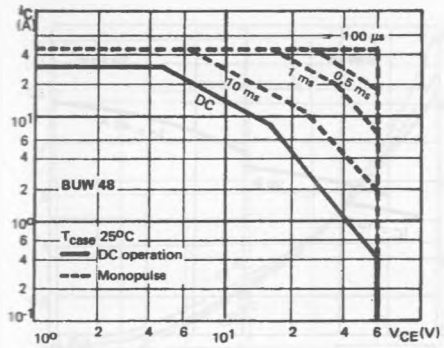
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEX}	Collector Cutoff Current	$V_{CE} = V_{CEX}$ $V_{BE} = -1.5V$			1	mA
		$V_{CE} = V_{CEX}$ $V_{BE} = -1.5V$ $T_c = 125°C$			3	mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 5V			1	mA
$V_{CEO(sus)}$*	Collector Emitter Sustaining Voltage	I_C = 0.2A L = 25mH for **BUW48**	60			V
		for **BUW49**	80			V
V_{EBO}	Emitter-base Voltage (I_C = 0)	I_E = 50mA	7			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = 20A I_B = 2A for **BUW48**			0.6	V
		I_C = 40A I_B = 4A for **BUW48**			1.4	V
		I_C = 15A I_B = 1.5A for **BUW49**			0.5	V
		I_C = 30A I_B = 3A for **BUW49**			1.2	V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 40A I_B = 4A for **BUW48**			2.1	V
		I_C = 30A I_B = 3A for **BUW49**			2	V
f_T	Transition Frequency	I_C = 1A V_{CE} = 15V f = 1MHz		8		MHz

RESISTIVE LOAD

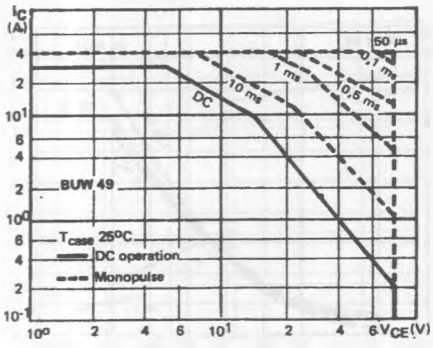
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{on}	Turn-on Time	for **BUW48**		1.2	1.5	µs
t_s	Storage Time	V_{CC} = 60V I_C = 40A		0.6	1.1	µs
t_f	Fall Time	$I_{B1} = -I_{B2}$ = 4A		0.17	0.25	µs
t_s	Storage Time	for **BUW48**				
t_f	Fall Time	V_{CC} = 60V I_C = 40A			1.65	µs
		$I_{B1} = -I_{B2}$ = 4A			0.5	µs
t_{on}	Turn-on Time	for **BUW49**		0.8	1.2	µs
t_s	Storage Time	V_{CC} = 80V I_C = 30A		0.6	1.1	µs
t_f	Fall Time	$I_{B1} = -I_{B2}$ = 3A		0.15	0.25	µs
t_s	Storage Time	for **BUW49**				
t_f	Fall Time	V_{CC} = 80V I_C = 30A			1.65	µs
		$I_{B1} = -I_{B2}$ = 3A			0.5	µs

* Pulsed : Pulse duration = 300µs, duty cycle = 1.5%.

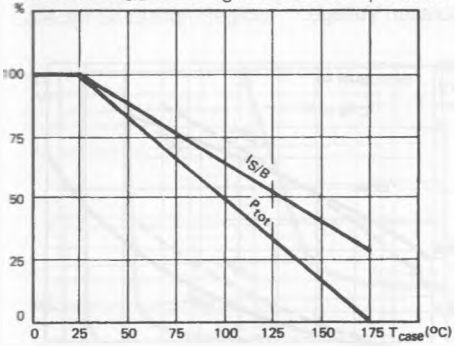
DC and Pulse Area.



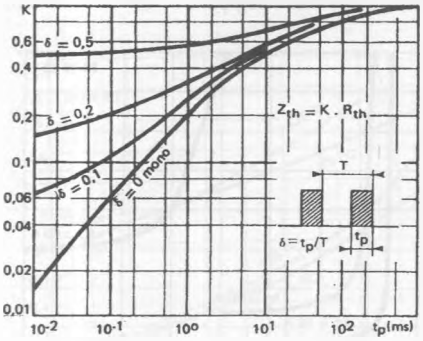
DC and Pulse Area.



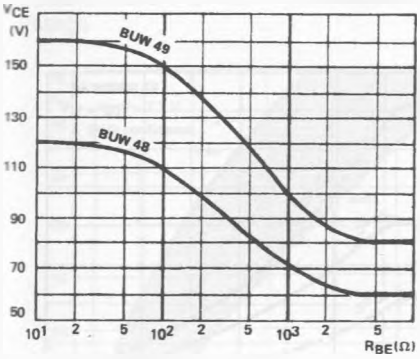
Power and $I_{S/B}$ Derating vs. Case Temperature.



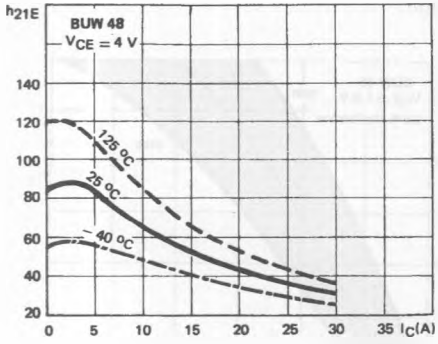
Transient Thermal Response.



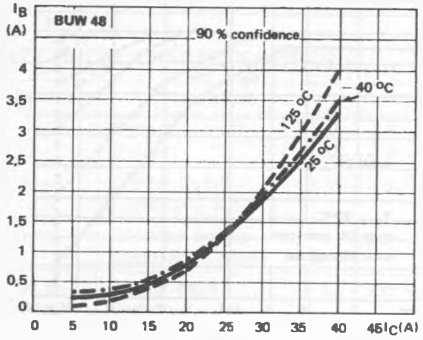
Collector-emitter Voltage vs. Base-emitter Resistance.



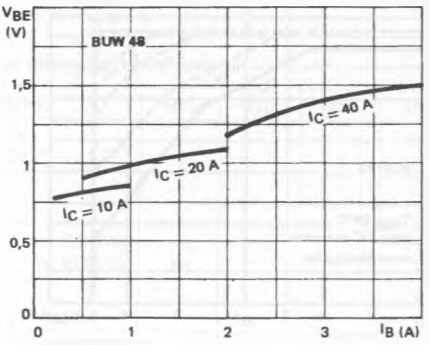
DC Current Gain.



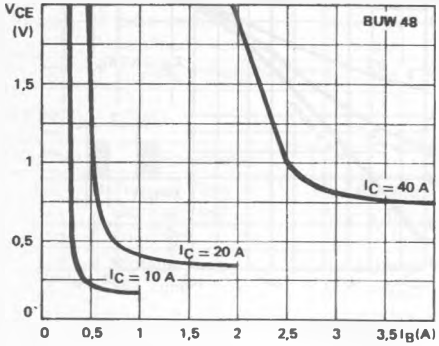
Minimum Base Current to Saturate theTransistor.



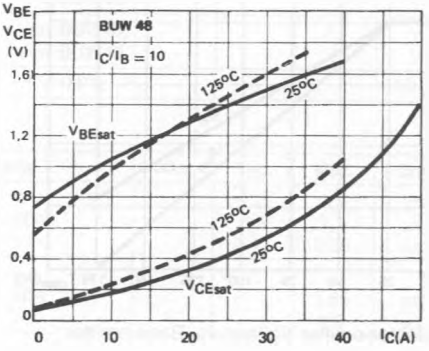
Base Characteristics.



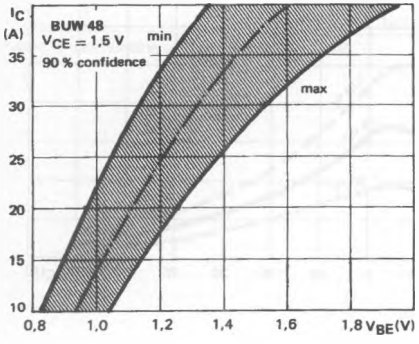
Collector Saturation Region.



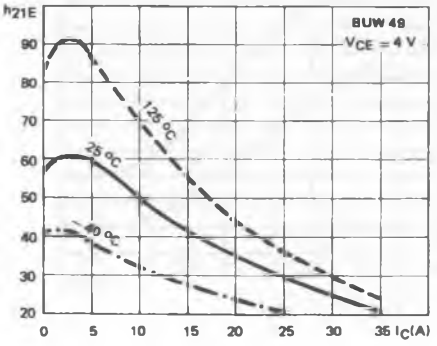
Saturation Voltage.



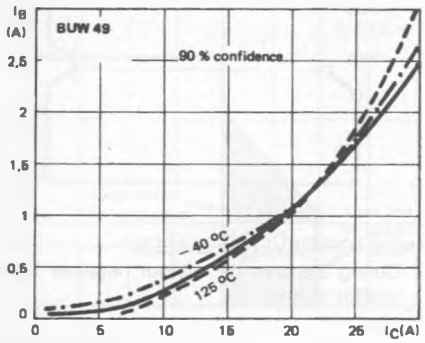
Collector Current Spread vs. Base Emitter Voltage.



DC Current Gain.



Minimum Base Current to saturate the Transistor.



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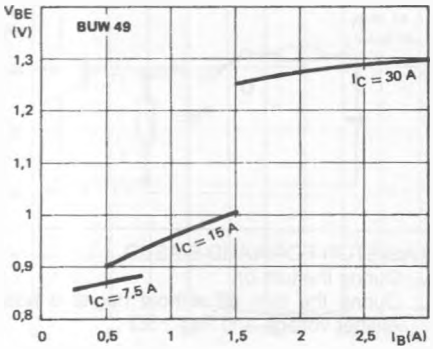
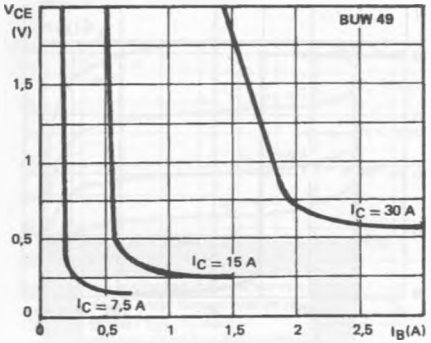
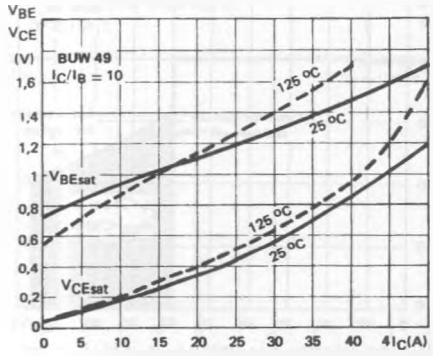


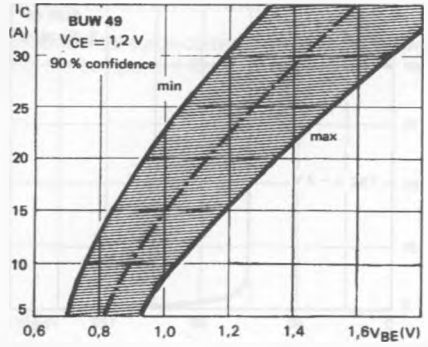
Collector Saturation Region.



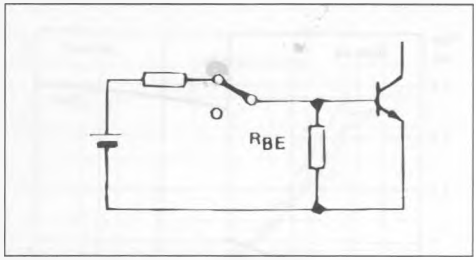
Saturation Voltage.



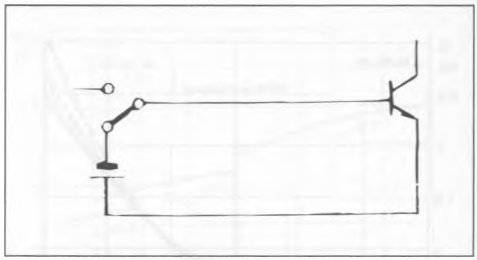
Collector Current Spread vs. Base Emitter Voltage.



SWITCHING OPERATING AND OVERLOAD AREAS

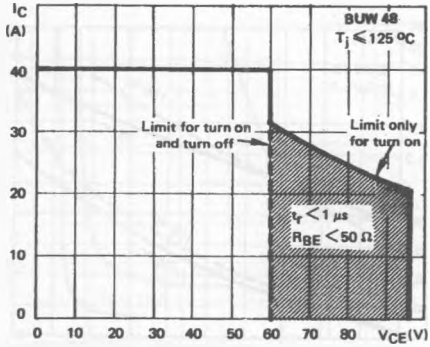


TRANSISTOR FORWARD BIASED
- During the turn on
- During the turn off without negative base-emitter voltage and $R_{BE} \geq 5\Omega$



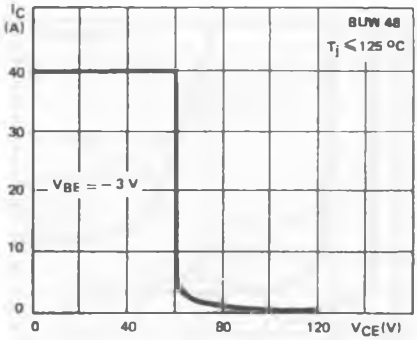
TRANSISTOR REVERSE BIASED
- During the turn off without negative base-emitter voltge

Forward Biased Safe Operating Area (FBSOA).

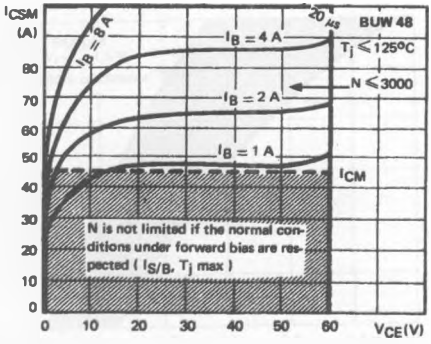


The hatched zone can only be used for turn on.

Reverse Biased Safe Operating Area (RBSOA).

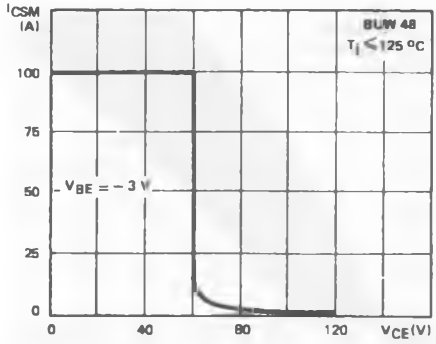


Forward Biased Accidental Overload Area (FBAOA).



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

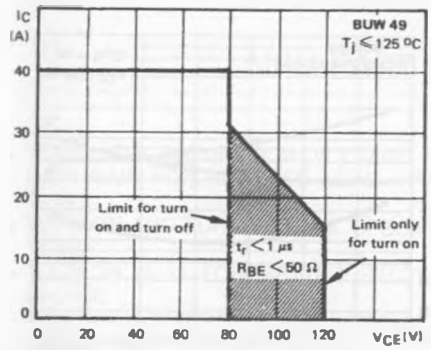
Reverse Biased Accidental Overload Area (RBAOA).



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.

Forward Biased Safe Operating Area (FBSOA).



The hatched zone can only be used for turn on.

Figure 25 : Forward Biased Accidental Overload Area (FBAOA).

Reverse Biased Safe Operating Area (RBSOA).

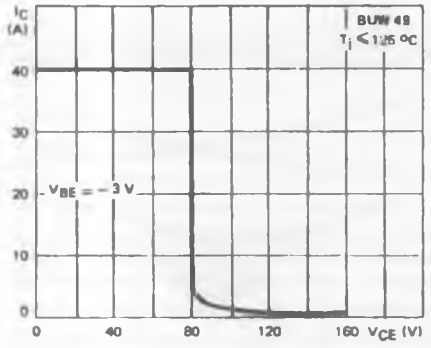
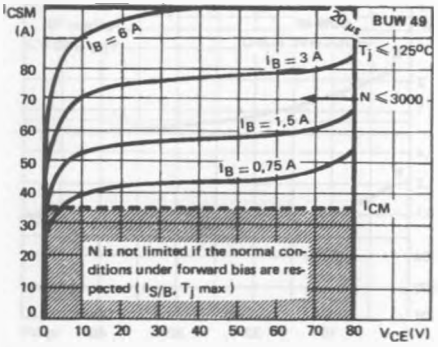


Figure 26 : Reverse Biased Accidental Overload Area (RBAOA).



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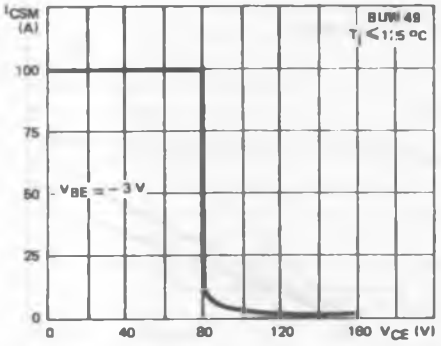
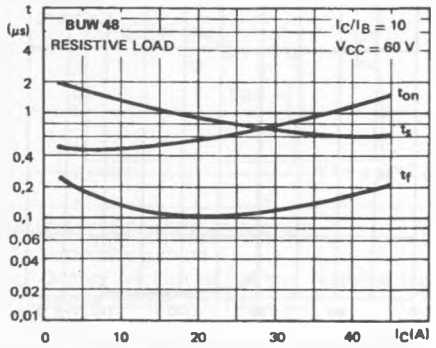


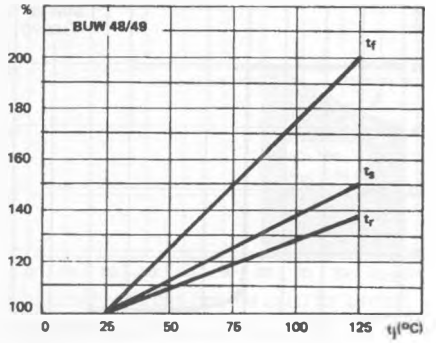
After the accidental overload current, the RBAOA has to be used for the turn off.

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

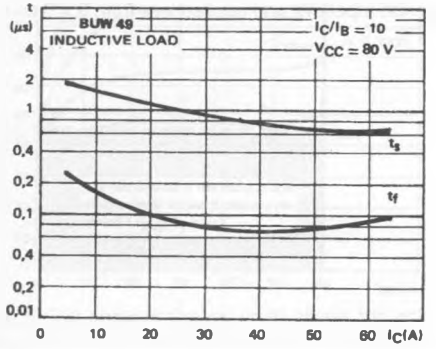
Switching Times vs. Collector Current (resistive load).



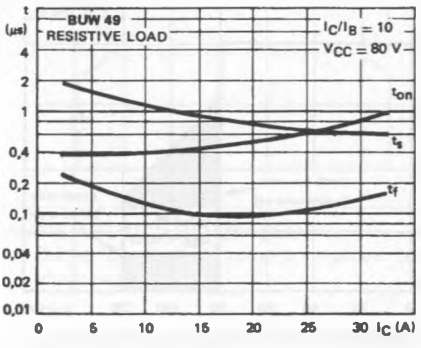
Switching Times vs. Junction Temperature.



Switching Times vs. Collector Current (inductive load).



Switching Times vs. Collector Current (resistive load).



Switching Times vs. Collector Current (inductive load).