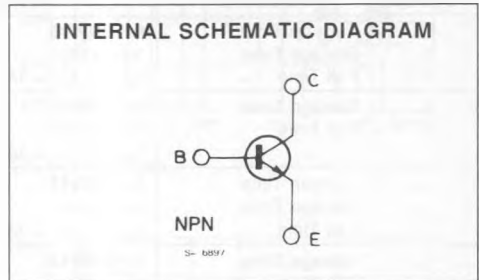
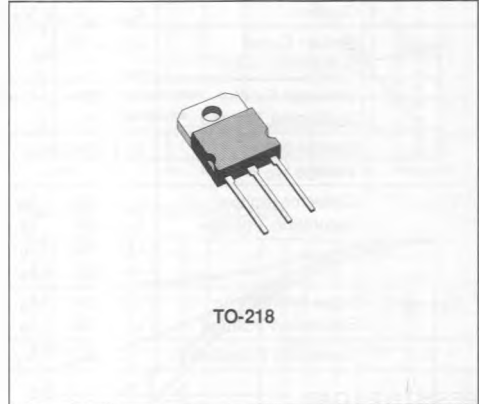


## NPN HIGH CURRENT SWITCHING TRANSISTORS

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

### APPLICATIONS

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



### 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 $T_c < 25^\circ C$	150		W
$T_{stg}$	Storage Temperature	- 65 to 175		$^\circ C$
$T_j$	Max. Operating Junction Temperature	175		$^\circ C$

**THERMAL DATA**

$R_{thj-case}$	Thermal Resistance Junction-case	Max	†	°C/W
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**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

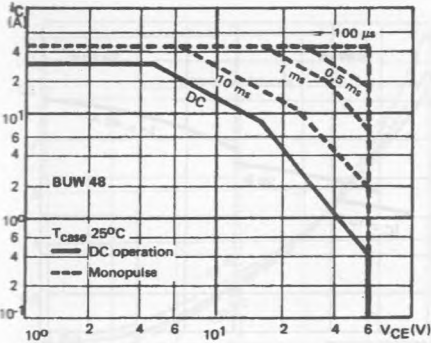
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEX}$	Collector Cutoff Current	$V_{CE} = V_{CEX}$ $V_{BE} = -1.5V$ $V_{CE} = V_{CEX}$ $V_{BE} = -1.5V$ $T_c = 125^{\circ}C$			1 3	mA mA
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5V$			1	mA
$V_{CEO(sus)}^*$	Collector Emitter Sustaining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

**RESISTIVE LOAD**

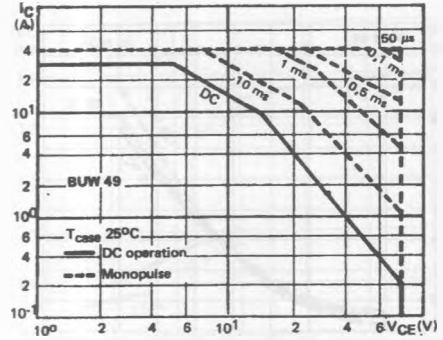
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{on}$ $t_s$ $t_f$	Turn-on Time Storage Time Fall Time	for <b>BUW48</b> $V_{CC} = 60V$ $I_C = 40A$ $I_{B1} = -I_{B2} = 4A$		1.2 0.6 0.17	1.5 1.1 0.25	$\mu s$ $\mu s$ $\mu s$
$t_s$ $t_f$	Storage Time Fall Time	for <b>BUW48</b> $V_{CC} = 60V$ $I_C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

\* Pulsed : Pulse duration = 300 $\mu s$ , duty cycle = 1.5%.

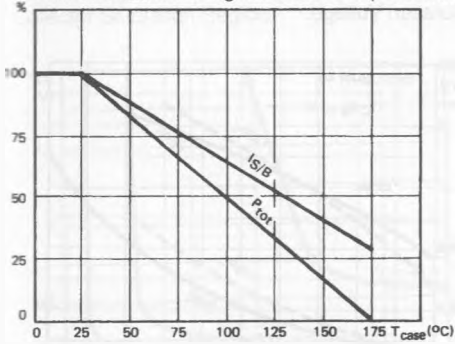
DC and Pulse Area.



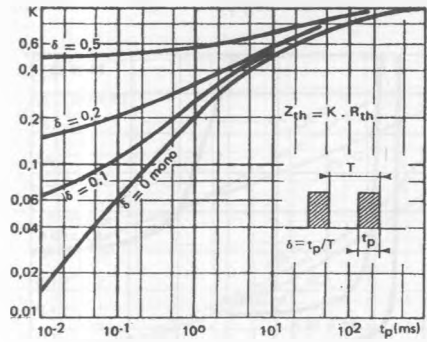
DC and Pulse Area.



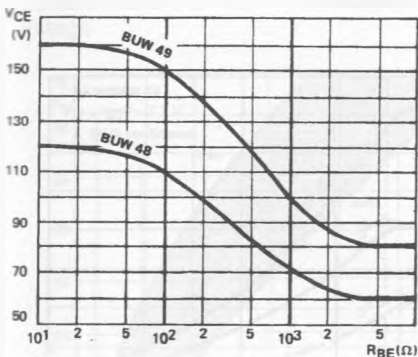
Power and  $I_{S/B}$  Derating vs. Case Temperature.



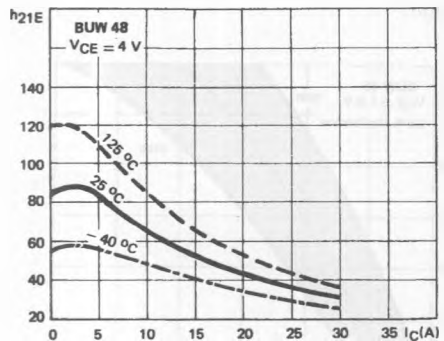
Transient Thermal Response.



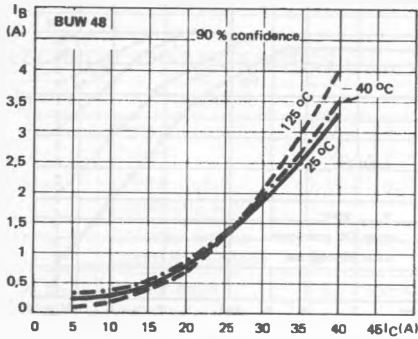
Collector-emitter Voltage vs. Base-emitter Resistance.



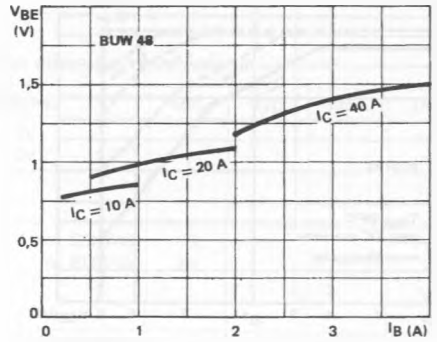
DC Current Gain.



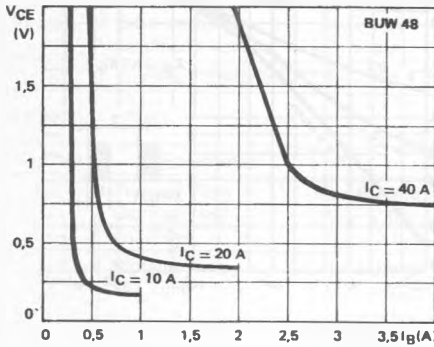
Minimum Base Current to Saturate the Transistor.



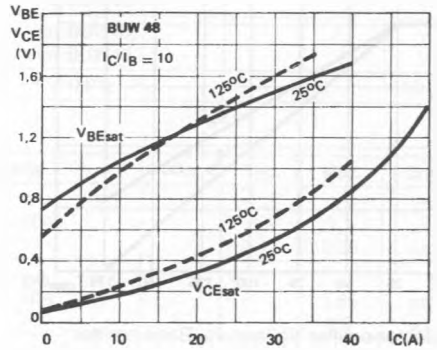
Base Characteristics.



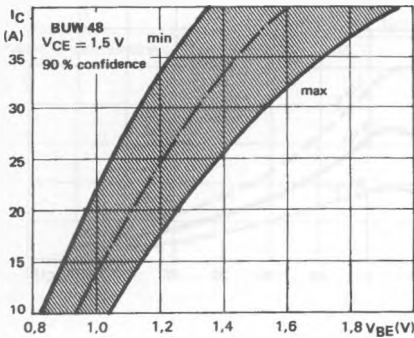
Collector Saturation Region.



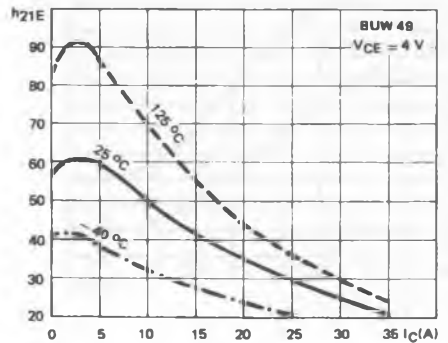
Saturation Voltage.



Collector Current Spread vs. Base Emitter Voltage.

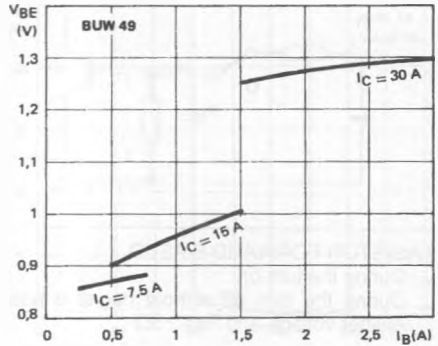
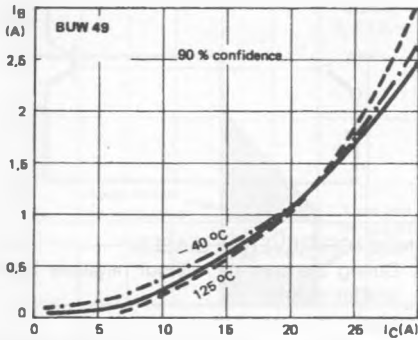


DC Current Gain.



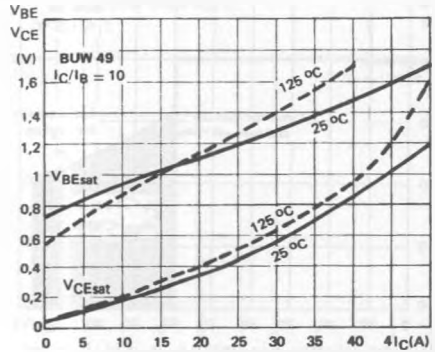
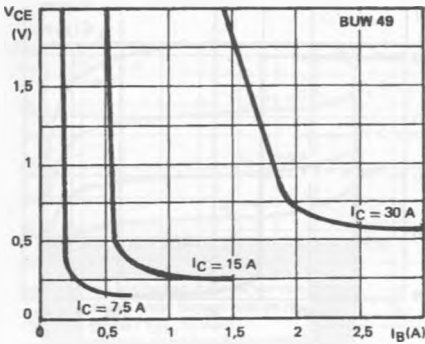
Minimum Base Current to saturate the Transistor.

Base Characteristics.

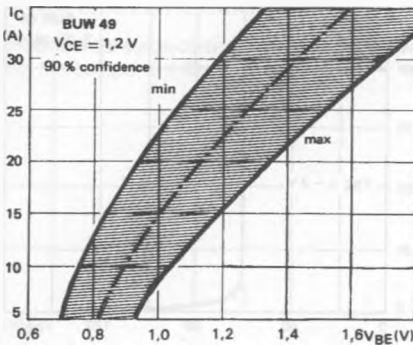


Collector Saturation Region.

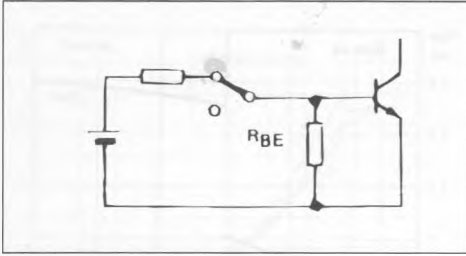
Saturation Voltage.



Collector Current Spread vs. Base Emitter Voltage.



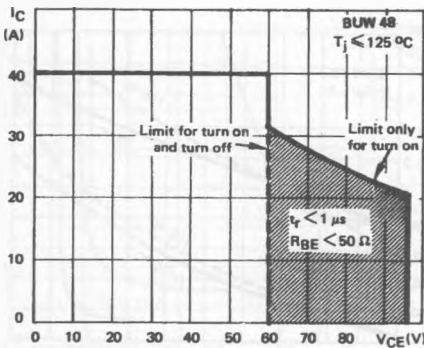
SWITCHING OPERATING AND OVERLOAD AREAS



TRANSISTOR FORWARD BIASED

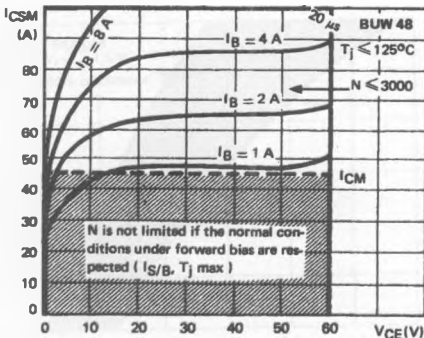
- During the turn on
- During the turn off without negative base-emitter voltage and  $R_{BE} \geq 5\Omega$

Forward Biased Safe Operating Area (FBSOA).



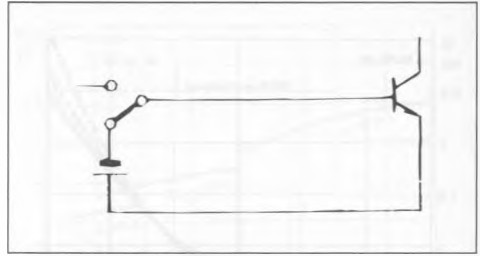
The hatched zone can only be used for turn on.

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).

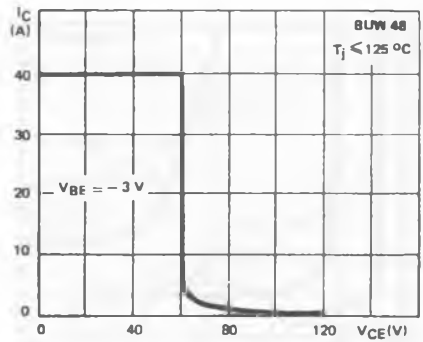
High accidental surge currents ( $I > I_{CM}$ ) are allowed if they are non repetitive and applied less than 3000 times during the component life.



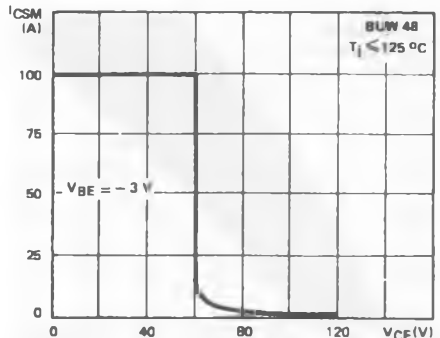
TRANSISTOR REVERSE BIASED

- During the turn off without negative base-emitter voltage

Reverse Biased Safe Operating Area (RBSOA).

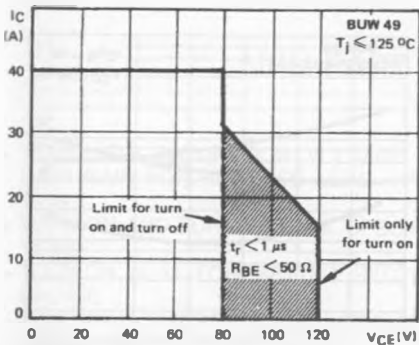


Reverse Biased Accidental Overload Area (RBAOA).



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

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).

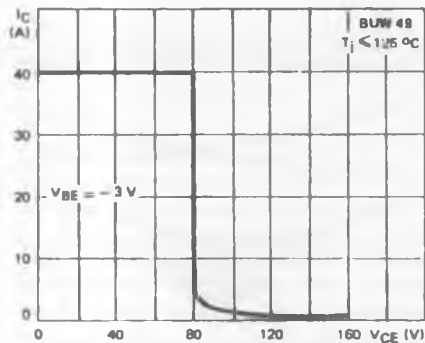
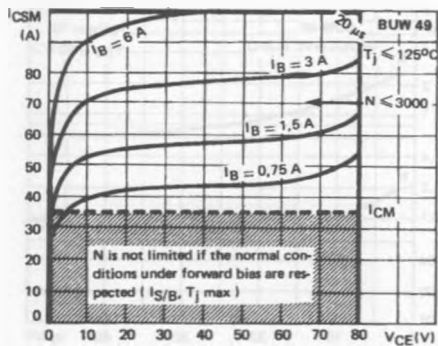
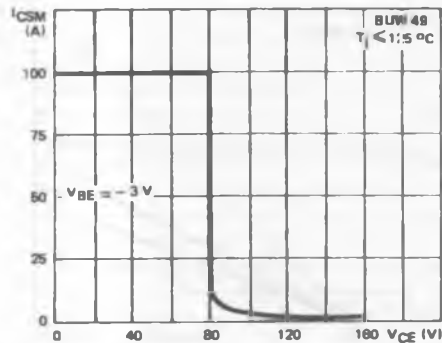


Figure 26 : Reverse Biased Accidental Overload Area (RBAOA).



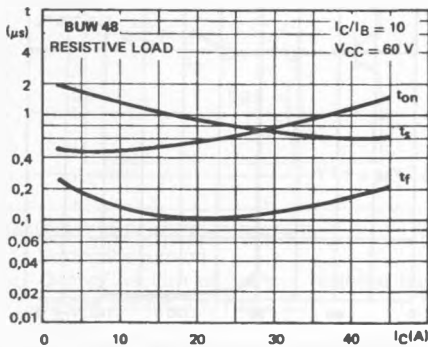
The Kellog network (heavy print) allows the calculation of the maximum value of the short-circuit current for a given base current  $I_B$  (90% confidence).

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

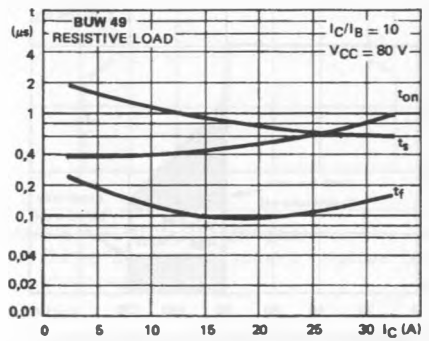


After the accidental overload current, the RBAOA has to be used for the turn off.

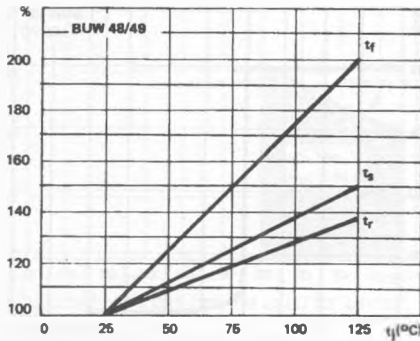
Switching Times vs. Collector Current (resistive load).



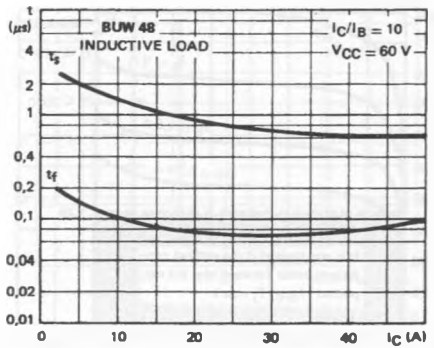
Switching Times vs. Collector Current (resistive load).



Switching Times vs. Junction Temperature.



Switching Times vs. Collector Current (inductive load).



Switching Times vs. Collector Current (inductive load).

