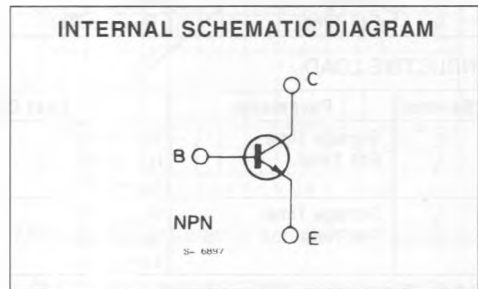
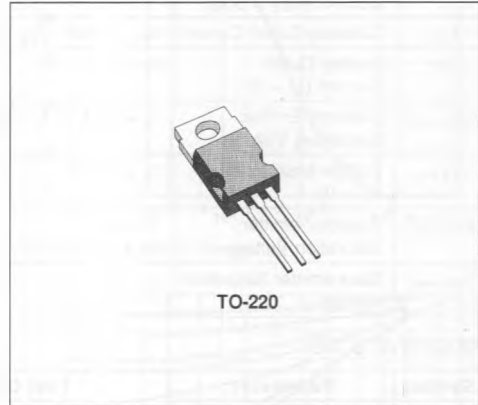


FAST NPN SWITCHING TRANSISTOR

- VERY LOW SATURATION VOLTAGE
- FAST TURN-OFF AND TURN-ON



DESCRIPTION

High speed transistor suited for low voltage applications.

High frequency and efficiency converters switching regulators motor control.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage ($I_E = 0$)	240	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	120	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	7	V
I_C	Collector Current	12	A
I_{CM}	Collector Peak Current	20	A
I_B	Base Current	4	A
I_{BM}	Base Peak Current	6	A
P_{Tot}	Total Dissipation at $T_c < 25^\circ\text{C}$	85	W
P_{Tot}	Total Dissipation at $T_c < 60^\circ\text{C}$	65	W
T_{stg}	Storage Temperature	- 65 to 175	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	175	$^\circ\text{C}$

THERMAL DATA

$R_{th(j-c)}$	Thermal Resistance Junction-case	max	1.76	°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_{CER}	Collector Cutoff Current ($R_{BE} = 50\Omega$)	$V_{CE} = 240V$ $T_c = 125^{\circ}C$			3	mA
I_{CEX}	Collector Cutoff Current	$V_{CE} = 240V$ $V_{BE} = -1.5V$ $T_c = 125^{\circ}C$			1	mA
I_{EBO}	Emitter Cutoff Current ($I_C = 0$)	$V_{EB} = 5V$			1	mA
$V_{CEO(sus)}^*$	Collector Emitter Sustaining Voltage	$I_C = 0.2A$ $L = 25mH$	120			V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	$I_E = 50mA$	7		30	V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 4A$ $I_B = 0.4A$ $I_C = 8A$ $I_B = 0.8A$			0.7 1.5	V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 8A$ $I_B = 0.8A$			2	V

RESISTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
t_{on}	Turn-on Time	$V_{CC} = 90V$ $I_C = 8A$		0.4	0.8	μs
t_s	Storage Time	$V_{BE} = -6V$ $I_{B1} = 0.8A$		0.5	1.2	μs
t_f	Fall Time	$R_{BB} = 3.75\Omega$		0.12	0.25	μs

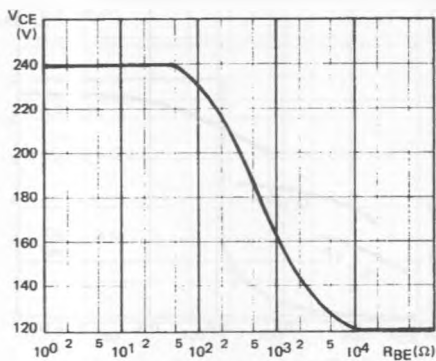
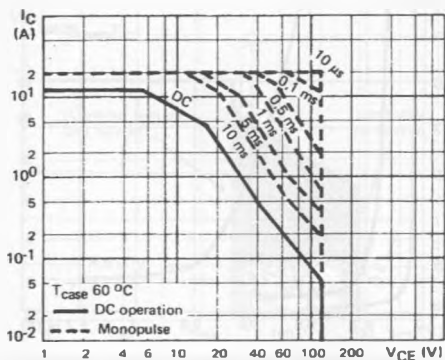
INDUCTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
t_s	Storage Time	$V_{CC} = 90V$ $I_C = 8A$ $I_{B1} = 0.8A$ $V_{BE} = -5V$		0.6 0.04		μs μs
t_f	Fall Time	$L_B = 1\mu H$				
t_s	Storage Time	$V_{CC} = 90V$ $I_C = 8A$ $I_{B1} = 0.8A$ $V_{BE} = -5V$			2	μs
t_f	Fall Time	$L_B = 1\mu H$ $T_j = 125^{\circ}C$			0.15	μs

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

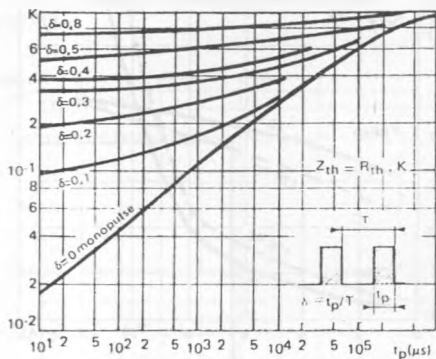
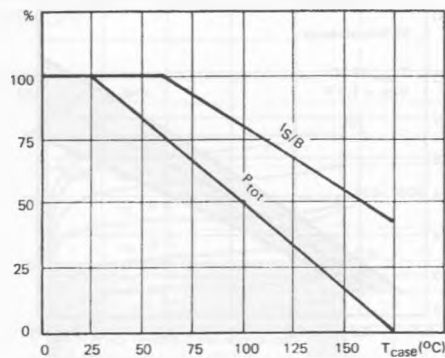
DC and Pulse Area.

Collector-emitter Voltage vs. Base-emitter Resistance.



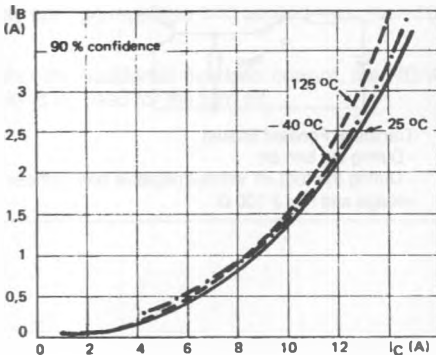
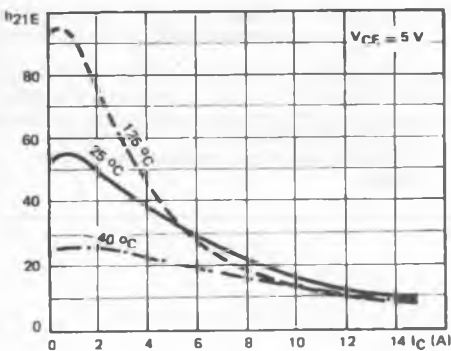
Power and $I_{S/B}$ Derating vs. Case Temperature.

Transient Thermal Response.

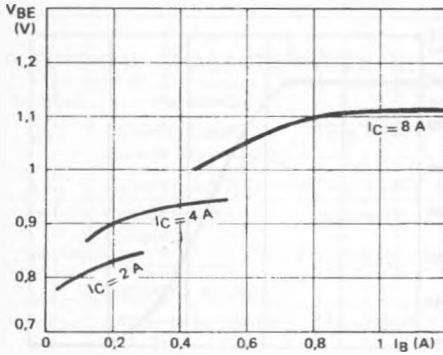


DC Current Gain.

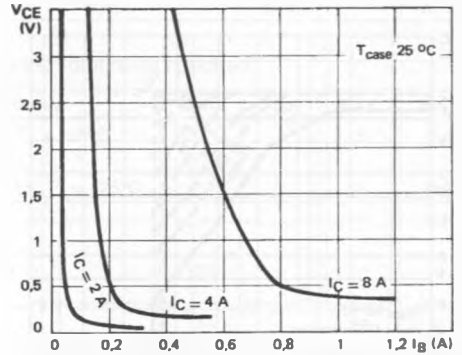
Minimum Base Current to saturate the Transistor.



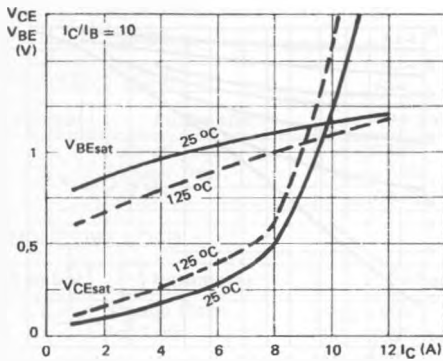
Base Characteristics.



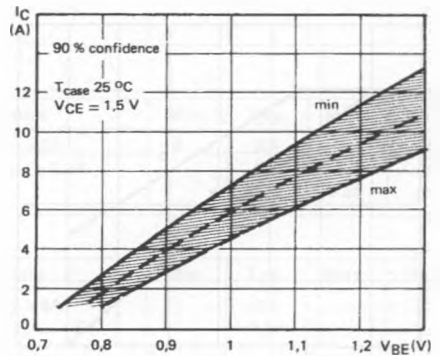
Collector Saturation Region.



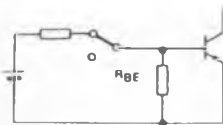
Saturation Voltage.



Collector Current Spread vs Base-emitter Voltage.



SWITCHING OPERATING AND OVERLOAD AREAS

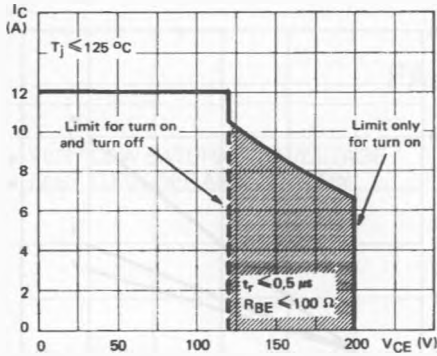


Transistor Forward Biased
 - During the turn on
 - During the turn off without negative base-emitter voltage and $R_{BE} \geq 100\ \Omega$



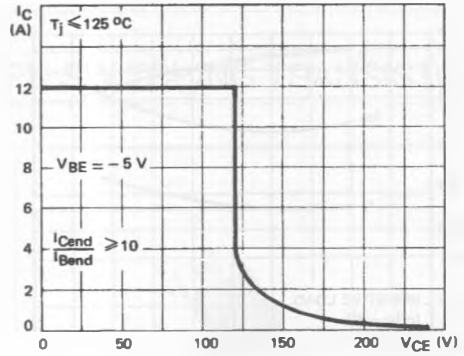
Transistor Reverse Biased
 - During the turn off with negative base-emitter voltage

Forward Biased Safe Operating Area (FBSOA).



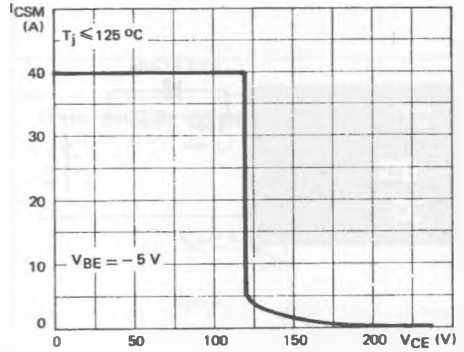
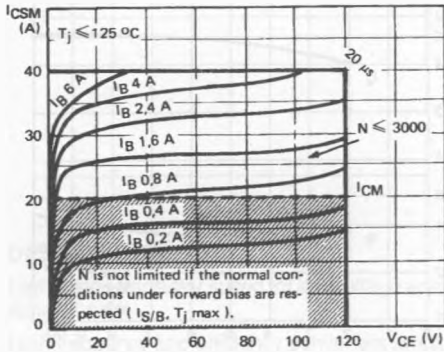
The hatched zone can only be used for turn on.

Reverse Biased Safe Operating Area (RBSOA).



Forward Biased Accidental Overload Area (FBAOA).

Reverse Biased Accidental Overload Area (RBAOA).

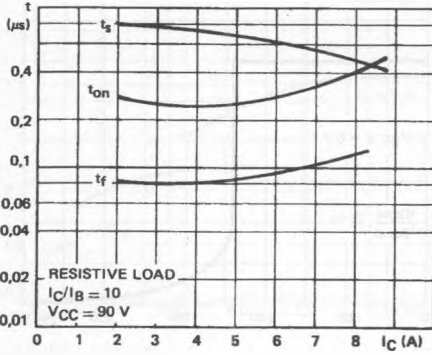


High accidental surge currents ($I > I_{CM}$) are allowed if they are non repetitive and applied less than 3000 times during the component life.

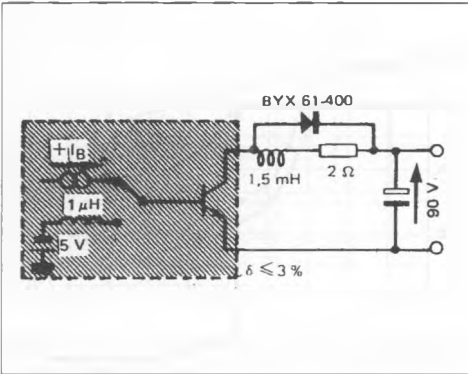
The Kellogg network (heavy point) allows the calculation of the maximum value of the short-circuit current for a given base current I_B (90 % confidence).

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

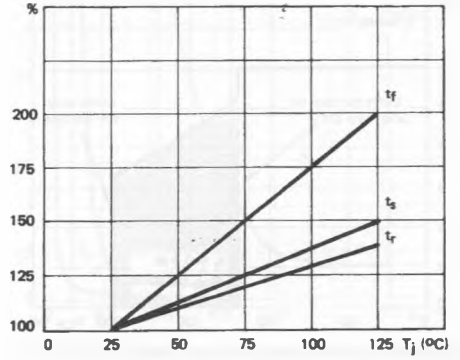
Switching Times vs Collector Current (resistive load).



Switching Times Test Circuit on Inductive Load.



Switching Times vs Junction Temperature.



Switching Times vs Junction Temperature (inductive load).

