

## HIGH POWER NPN SILICON TRANSISTOR

- SGS-THOMSON PREFERRED SALESTYPE
- NPN TRANSISTOR
- HIGH CURRENT CAPABILITY
- FAST SWITCHING SPEED
- VERY LOW SATURATION VOLTAGE AND HIGH GAIN

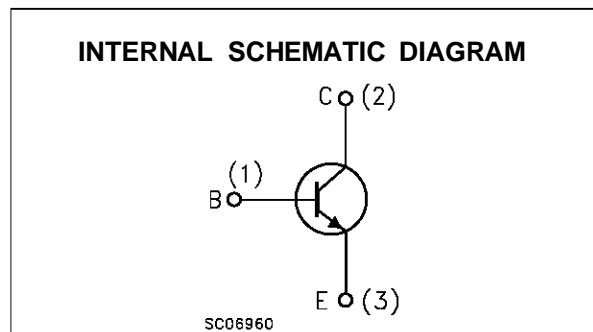
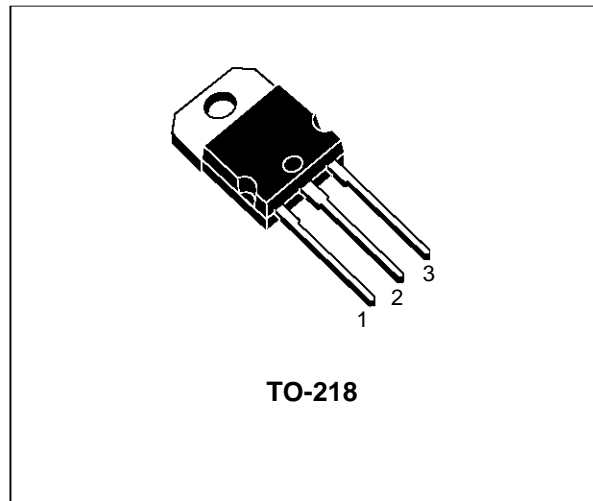
**APPLICATION**

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

**DESCRIPTION**

The BUW89 is a Multiepitaxial planar NPN transistor in TO-218 plastic package.

It's intended for use in high frequency and efficiency converters such as motor controllers and industrial equipment.


**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CEV}$	Collector-emitter Voltage ( $V_{BE} = -1.5V$ )	160	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )	90	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	7	V
$I_C$	Collector Current	25	A
$I_{CM}$	Collector Peak Current	45	A
$I_B$	Base Current	6	A
$I_{BM}$	Base Peak Current	9	A
$P_{Base}$	Reverse Bias Base Power Dissipation (B.E. junction in avalanche)	1	W
$P_{tot}$	Total Power Dissipation at $T_{case} < 25\text{ }^\circ\text{C}$	125	W
$T_{stg}$	Storage Temperature	-65 to 175	$^\circ\text{C}$
$T_j$	Max Operating Junction Temperature	175	$^\circ\text{C}$

**THERMAL DATA**

R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	1.2	°C/W
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**ELECTRICAL CHARACTERISTICS** (T<sub>case</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CER</sub>	Collector Cut-off Current (R <sub>BE</sub> = 10Ω)	V <sub>CE</sub> = V <sub>CEV</sub> V <sub>CE</sub> = V <sub>CEV</sub> T <sub>c</sub> = 100°C			1 5	mA mA
I <sub>CEV</sub>	Collector Cut-off Current	V <sub>CE</sub> = V <sub>CEV</sub> V <sub>BE</sub> = -1.5V V <sub>CE</sub> = V <sub>CEV</sub> V <sub>BE</sub> = -1.5V T <sub>C</sub> =100°C			1 5	mA mA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 5 V			1	mA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage	I <sub>C</sub> = 0.2A L = 25 mH	90			V
V <sub>EBO</sub>	Emitter-base Voltage (I <sub>c</sub> = 0)	I <sub>E</sub> = 50 mA	7			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 7.5A I <sub>B</sub> = 0.375A I <sub>C</sub> = 15A I <sub>B</sub> = 1.5A I <sub>C</sub> = 7.5A I <sub>B</sub> = 0.375A T <sub>j</sub> = 100°C I <sub>C</sub> = 15A I <sub>B</sub> = 1.5A T <sub>j</sub> = 100°C		0.5 0.65 0.5 0.8	0.8 0.9 0.9 1.5	V V V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 15A I <sub>B</sub> = 1.5A I <sub>C</sub> = 15A I <sub>B</sub> = 1.5A T <sub>j</sub> = 100°C		1.4 1.45	1.7 1.8	V V
di <sub>c</sub> /dt*	Rated of Rise of on-state Collector Current	V <sub>CC</sub> = 72V R <sub>C</sub> = 0 I <sub>B1</sub> = 2.25A T <sub>j</sub> = 25°C T <sub>j</sub> = 100°C	35 30	50 45		A/μs A/μs
V <sub>CE(2μs)</sub>	Collector Emitter Dynamic Voltage	V <sub>CC</sub> = 72V R <sub>C</sub> = 4.8Ω I <sub>B1</sub> = 1.5A T <sub>j</sub> = 25°C T <sub>j</sub> = 100°C		1.7 2	2.5 4	V V
V <sub>CE(4μs)</sub>	Collector Emitter Dynamic Voltage	V <sub>CC</sub> = 72V R <sub>C</sub> = 4.8Ω I <sub>B1</sub> = 1.5A T <sub>j</sub> = 25°C T <sub>j</sub> = 100°C		1 1.5	2 3	V V

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

**RESISTIVE LOAD**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>r</sub>	Rise Time	V <sub>CC</sub> = 72V I <sub>C</sub> = 20A		0.55	1.1	μs
t <sub>s</sub>	Storage Time	V <sub>BB</sub> = -5V I <sub>B1</sub> = 2.5A		0.55	1	μs
t <sub>f</sub>	Fall Time	R <sub>B2</sub> = 1Ω T <sub>p</sub> = 30μs		0.12	0.25	μs

**INDUCTIVE LOAD**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>s</sub>	Storage Time	V <sub>CC</sub> = 72V V <sub>clamp</sub> = 90V		0.75	1.2	μs
t <sub>f</sub>	Fall Time	I <sub>C</sub> = 15A I <sub>B</sub> = 1.5A		0.09	0.2	μs
t <sub>t</sub>	Tail Time in Turn-on	V <sub>BB</sub> = -5V R <sub>B2</sub> = 1.7Ω		0.03	0.05	μs
t <sub>c</sub>	Crossover Time			0.14	0.3	μs
t <sub>s</sub>	Storage Time	V <sub>CC</sub> = 72V V <sub>clamp</sub> = 90V		0.95	1.7	μs
t <sub>f</sub>	Fall Time	I <sub>C</sub> = 15A I <sub>B</sub> = 1.5A		0.15	0.3	μs
t <sub>t</sub>	Tail Time in Turn-on	V <sub>BB</sub> = -5V R <sub>B2</sub> = 1.7Ω		0.06	0.1	μs
t <sub>c</sub>	Crossover Time	L <sub>C</sub> = 0.25mH T <sub>j</sub> = 100°C		0.3	0.5	μs

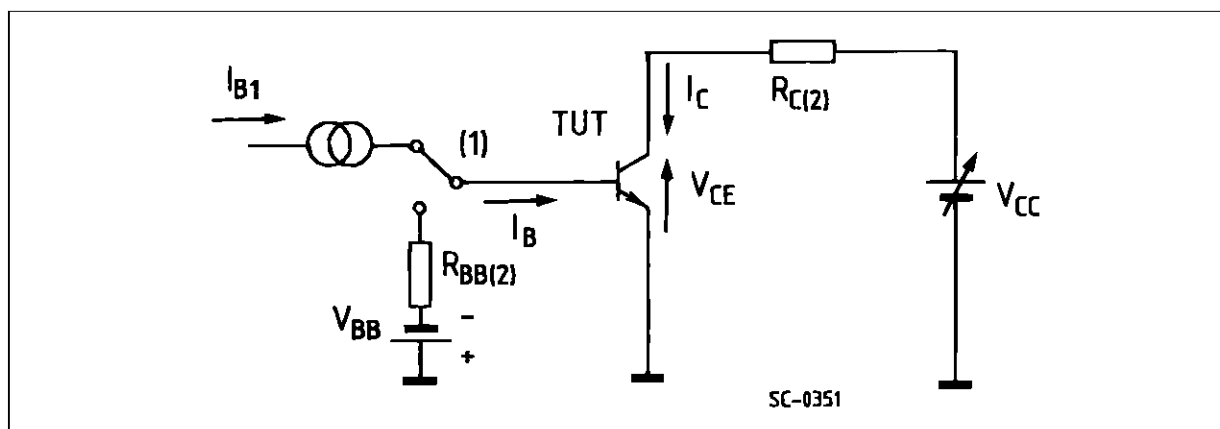
**ELECTRICAL CHARACTERISTICS** (continued)

INDUCTIVE LOAD

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$t_s$	Storage Time	$V_{CC} = 72V$	$V_{clamp} = 90V$		1.4		$\mu s$
$t_f$	Fall Time	$I_C = 15A$	$I_B = 1.5A$		0.7		$\mu s$
$t_t$	Tail Time in Turn-on	$V_{BB} = 0$	$R_{B2} = 3.9\Omega$		0.22		$\mu s$
		$L_C = 0.25mH$					
$t_s$	Storage Time	$V_{CC} = 72V$	$V_{clamp} = 90V$		1.85		$\mu s$
$t_f$	Fall Time	$I_C = 15A$	$I_B = 1.5A$		1		$\mu s$
$t_t$	Tail Time in Turn-on	$V_{BB} = 0$	$R_{B2} = 3.9\Omega$		0.44		$\mu s$
		$L_C = 0.25mH$	$T_j = 100^\circ C$				

\* Pulsed test  $t_p < 300 \mu s$  duty cycle  $< 2\%$

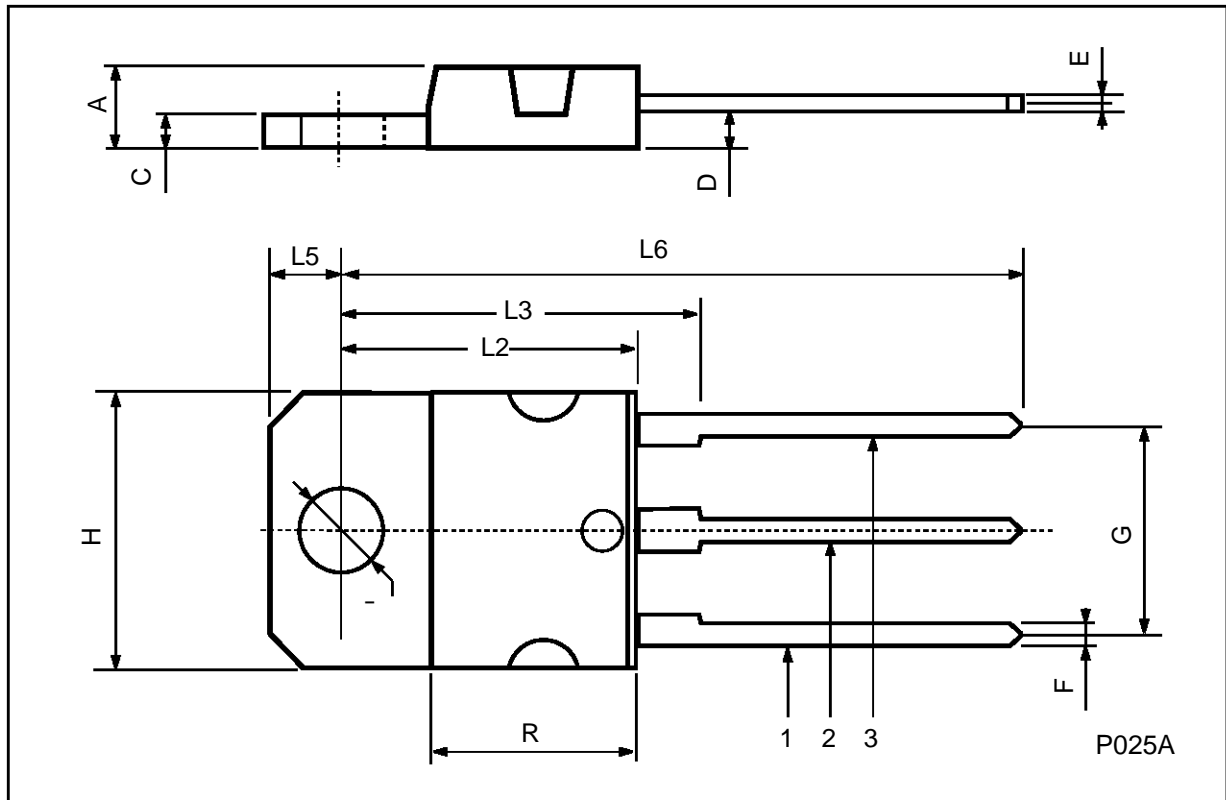
**Figure 1** : Switching Times Test Circuit (resistive load).



1 Fast electronic switch 2 Non-inductive Resistor

**TO-218 (SOT-93) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		4.9	0.185		0.193
C	1.17		1.37	0.046		0.054
D		2.5			0.098	
E	0.5		0.78	0.019		0.030
F	1.1		1.3	0.043		0.051
G	10.8		11.1	0.425		0.437
H	14.7		15.2	0.578		0.598
L2	-		16.2	-		0.637
L3		18			0.708	
L5	3.95		4.15	0.155		0.163
L6		31			1.220	
R	-		12.2	-		0.480
Ø	4		4.1	0.157		0.161



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