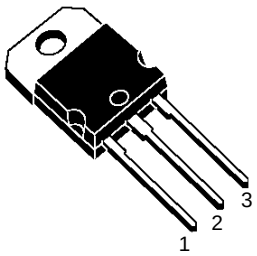
SGS-THOMSON MICROELECTRONICS

BUW89

HIGH POWER NPN SILICON TRANSISTOR

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



TO-218

APPLICATION

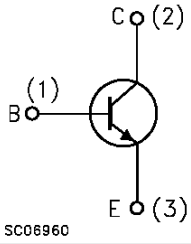
- SWITCHING REGULATORS
- MOTOR CONTROL
- HIGH FREQUENCY AND EFFICENCY CONVERTERS

DESCRIPTION

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

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

INTERNAL SCHEMATIC DIAGRAM



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 °C	125	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	1.2	°C/W

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector Cut-off Current (R_{BE} = 10Ω)	V_{CE} = V_{CEV} V_{CE} = V_{CEV} T_c = 100°C			1 5	mA mA
I_{CEV}	Collector Cut-off Current	V_{CE} = V_{CEV} V_{BE} = -1.5V V_{CE} = V_{CEV} V_{BE} = - 1.5V T_C=100°C			1 5	mA mA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 5 V			1	mA
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage	I_C = 0.2A L = 25 mH	90			V
V_{EB0}	Emitter-base Voltage (I_c = 0)	I_E = 50 mA	7			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 7.5A I_B = 0.375A I_C = 15A I_B = 1.5A I_C = 7.5A I_B = 0.375A T_j = 100°C I_C = 15A I_B = 1.5A T_j = 100°C		0.5 0.65 0.5 0.8	0.8 0.9 0.9 1.5	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 15A I_B = 1.5A I_C = 15A I_B = 1.5A T_j = 100°C		1.4 1.45	1.7 1.8	V V
di_c/dt*	Rated of Rise of on-state Collector Current	V_{CC} = 72V R_C =0 I_{B1} =2.25A T_j = 25°C T_j = 100°C	 35 30	 50 45		 A/µs A/µs
$V_{CE(2\mu s)}$	Collector Emitter Dynamic Voltage	V_{CC} = 72V R_C =4.8Ω I_{B1} =1.5A T_j = 25°C T_j = 100°C		 1.7 2	 2.5 4	 V V
$V_{CE(4\mu s)}$	Collector Emitter Dynamic Voltage	V_{CC} = 72V R_C =4.8Ω I_{B1} = 1.5A T_j = 25°C T_j = 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_r	Rise Time	V_{CC} = 72V I_C = 20A		0.55	1.1	µs
t_s	Storage Time	V_{BB} = -5V I_{B1} = 2.5A		0.55	1	µs
t_f	Fall Time	R_{B2} = 1Ω T_p = 30µs		0.12	0.25	µs

INDUCTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_s	Storage Time	V_{CC} = 72V V_{clamp} = 90V		0.75	1.2	µs
t_f	Fall Time	I_C = 15A I_B = 1.5A		0.09	0.2	µs
t_t	Tail Time in Turn-on	V_{BB} = -5V R_{B2} = 1.7Ω		0.03	0.05	µs
t_c	Crossover Time			0.14	0.3	µs
t_s	Storage Time	V_{CC} = 72V V_{clamp} = 90V		0.95	1.7	µs
t_f	Fall Time	I_C = 15A I_B = 1.5A		0.15	0.3	µs
t_t	Tail Time in Turn-on	V_{BB} = -5V R_{B2} = 1.7Ω		0.06	0.1	µs
t_c	Crossover Time	L_C = 0.25mH T_j =100°C		0.3	0.5	µs

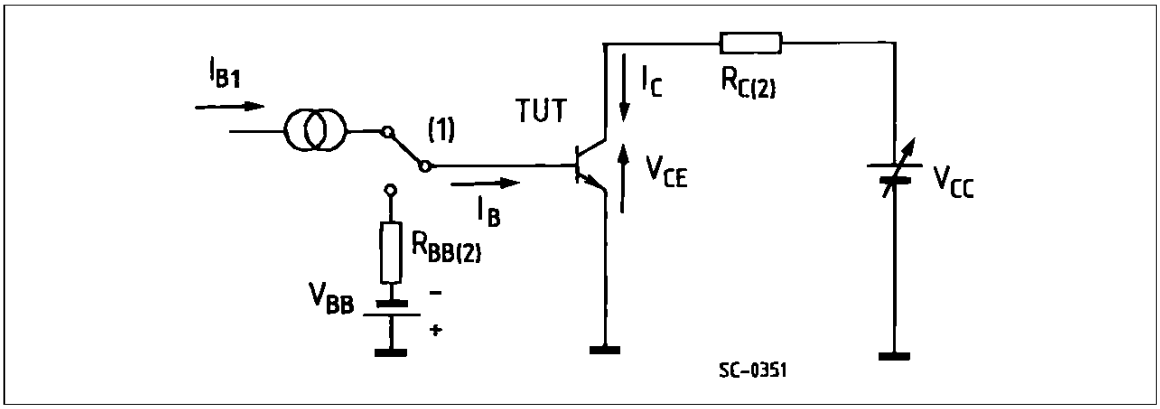
ELECTRICAL CHARACTERISTICS (continued)

INDUCTIVE LOAD

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

∗ Pulsed test t_p < 300 µs 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