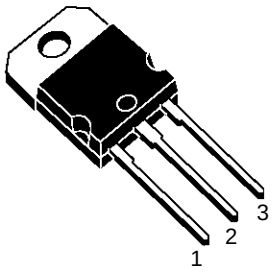
SGS-THOMSON MICROELECTRONICS

BUW90

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

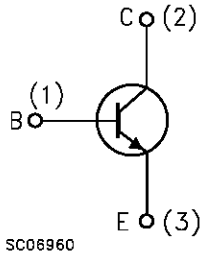
- SWITCHING REGULATORS
- MOTOR CONTROL
- HIGH FREQUENCY AND EFFICENCY CONVERTERS

DESCRIPTION

The BUW90 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)	250	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	125	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	7	V
I_C	Collector Current	20	A
I_{CM}	Collector Peak Current	30	A
I_B	Base Current	4	A
I_{BM}	Base Peak Current	6	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	$^oC/W$

ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^oC 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^{o}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^{o}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	125			V
V_{EBO}	Emitter-base Voltage (I_c = 0)	I_E = 50 mA	7			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 5.5 A I_B = 0.35 A I_C = 11 A I_B = 1.1 A I_C = 5.5 I_B = 0.35 A T_j = 100^{o}C I_C = 11 A I_B = 1.1 A T_j = 100^{o}C		0.5 0.65 0.5 0.8	0.8 0.9 0.9 1.2	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 11 A I_B = 1.1 A I_C = 11 A I_B = 1.1 A T_j = 100^{o}C		1.3 1.35	1.6 1.7	V V
di_c/dt*	Rated of Rise of on-state Collector Current	V_{CC} = 100 V R_C = 0 I_{B1} = 1.65 A T_j = 25^{o}C T_j = 100^{o}C	 35 30	 45 40	 	 A/µs A/µs
$V_{CE(2\mu s)}$	Collector Emitter Dynamic Voltage	V_{CC} = 100 V R_C = 9 Ω I_{B1} = 1.1 A T_j = 25^{o}C T_j = 100^{o}C		 2 2.6	 2.5 4	 V V
$V_{CE(4\mu s)}$	Collector Emitter Dynamic Voltage	V_{CC} = 100 V R_C = 9 Ω I_{B1} = 1.1 A T_j = 25^{o}C T_j = 100^{o}C		 1.1 1.6	 2 2.5	 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} = 100 V I_C = 15 A		0.4	1	µs
t_s	Storage Time	V_{BB} = -5 V I_{B1} = 1.8 A		0.6	1	µs
t_f	Fall Time	R_{B2} = 1.3 Ω t_p = 30µs		0.14	0.3	µs

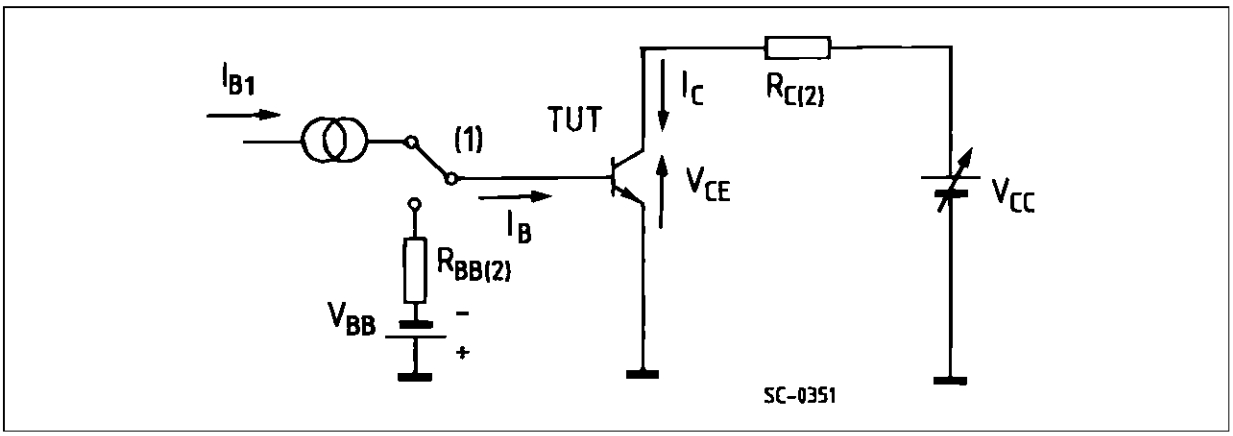
ELECTRICAL CHARACTERISTICS (continued)

INDUCTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_s	Storage Time	V_{CC} = 100 V I_C = 11 A I_B = 1.1 A		0.75	1.4	µs
t_f	Fall Time	V_{BB} = -5 V V_{clamp} = 125 V		0.08	0.2	µs
t_t	Tail Time in Turn-on	R_B = 2.3 Ω L_C = 0.25 mH		0.02	0.05	µs
t_c	Crossover Time			0.15	0.3	µs
t_s	Storage Time	VCC = 100 V I_C = 11 A I_B = 1.1		0.95	1.7	µs
t_f	Fall Time	A		0.14	0.3	µs
t_t	Tail Time in Turn-on	V_{BB} = -5 V V_{clamp} = 125 V		0.04	0.1	µs
t_c	Crossover Time	R_B = 2.3 Ω L_C = 0.25 mH		0.3	0.5	µs
		T_j =100°C				
t_s	Storage Time	V_{CC} = 100 V I_C = 11 A I_B = 1.1 A		1.8		µs
t_f	Fall Time	V_{BB} = 0 V_{clamp} = 125 V		0.7		µs
t_t	Tail Time in Turn-on	R_B = 4.7 Ω L_C = 0.25 mH		0.2		µs
t_s	Storage Time	V_{CC} = 100 V I_C = 11 A I_B = 1.1 A		2.5		µs
t_f	Fall Time	V_{BB} = 0 V_{clamp} = 125 V		1		µs
t_t	Tail Time in Turn-on	R_B = 4.7 Ω L_C = 0.25 mH		0.4		µs
		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