SGS-THOMSON MICROELECTRONICS

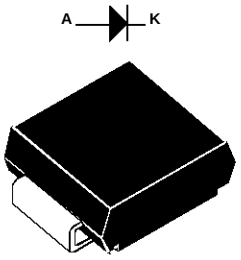
STTB106U

TURBOSWITCH ™ "B". ULTRA-FAST HIGH VOLTAGE DIODE

PRELIMINARY DATASHEET

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	**1A**
V_{RRM}	**600V**
t_{rr} (typ)	**45ns**
V_F (max)	**1.3V**



SOD6
(Plastic)

FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS : SNUBBING OR CLAMPING, DEMAGNETIZATION AND RECTIFICATION
- ULTRA-FAST, VERY SOFT AND NOISE-FREE RECOVERY
- VERY LOW OVERALL POWER LOSSES AND PARTICULARY LOW FORWARD VOLTAGE
- DESIGNED FOR HIGH PULSED CURRENT OPERATIONS
- SURFACE MOUNT DEVICE

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.
TURBOSWITCH "B" family drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes.
They are particularly suitable in the primary circuit of an SMPS as snubber, clamping or demagnetizer diodes, and also in most power converters as high performance Rectifier diodes.

Packaged in SOD6 surface mount envelope, these 600V devices are particularly intended for use on 240V domestic mains.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	600	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	600	V
$I_{F(RMS)}$	RMS Forward Current	3.5	A
I_{FRM}	Repetitive Peak Forward Current (tp = 5 µs, f = 5kHz)	49	A
T_j	Max. Operating Junction Temperature	125	°C
T_{stg}	Storage Temperature range	- 65 to + 150	°C

TM : TURBOSWITCH is a trademark of SGS-THOMSON Microelectronics

THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-l)}$	Junction to Lead Thermal Resistance		23	°C/W
P_1	Conduction Power Dissipation (see fig. 5)	$I_{F(AV)}$ = 0.8A δ = 0.5 Tlead= 97°C	1.2	W
P_{max}	Total Power Dissipation Pmax = P1 + P3 (P3 = 10% P1)	Tlead= 95°C (Square waveform)	1.3	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig. 5)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward Voltage Drop	I_F = 1A	Tj = 25°C Tj = 125°C		 0.9	1.35 1.2	V
I_R **	Reverse Leakage Current	V_R = 0.8 x V_{RRM}	Tj = 25°C Tj = 125°C		 90	10 300	µA

Test pulses widths : * tp = 380 µs, duty cycle < 2%
** tp = 5 ms , duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig. 6)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse Recovery Time	Tj = 25°C I_F = 0.5 A I_R = 1A Irr = 0.25A I_F = 1 A dI_F/dt =-50A/µs V_R = 30V		45	 95	ns
I_{RM}	Maximum Recovery Current	Tj = 125°C VR = 400V I_F = 1A dI_F/dt = -8 A/µs dI_F/dt = -50 A/µs		 2.8	1.2	A
S factor	Softness factor	Tj = 125°C V_R = 400V I_F =1A dI_F/dt = -50 A/µs		TBD		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward Recovery Time	Tj = 25°C I_F = 1 A, dI_F/dt = 8 A/µs measured at, 1.1 × V_F max			500	ns
V_{Fp}	Peak Forward Voltage	Tj = 25°C I_F = 1A, dI_F/dt = 8 A/µs			8	V
		Tj = 25°C I_F = 5A, dI_F/dt = 50 A/µs		7.5		

APPLICATION DATA

The TURBOSWITCH™ "B" is especially designed to provide the lowest overall power losses in any application such as snubbing, clamping, demagnetization and rectification.

In such application (fig. 1 to 4), the way of calculating the power losses is given below :

TOTAL LOSSES
in the diode
P = P1+ P2+ P3+ P4+ P5 Watts

CONDUCTION LOSSES	REVERSE LOSSES	SWITCHING LOSSES
P1 Watts (Fig. 5)	P2 Watts (Fig. 5)	OFF : P3 Watts ON : P4 Watts (Fig. 6 & 7)

Fig. 1 : SNUBBER DIODE.

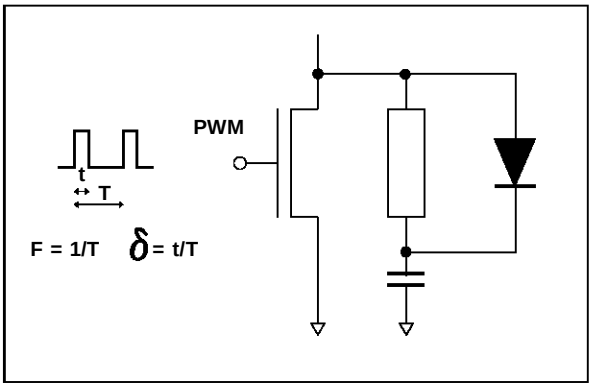


Fig. 2 : CLAMPING DIODE.

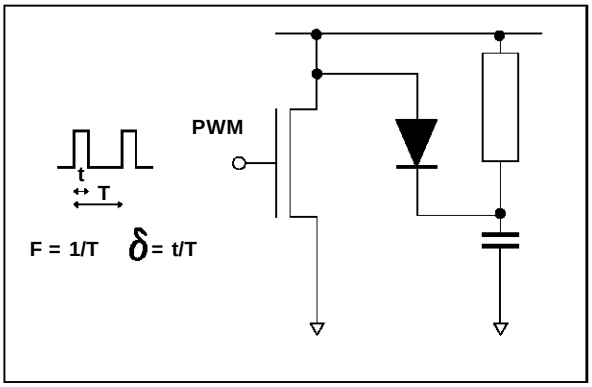


Fig. 3 : DEMAGNETIZING DIODE.

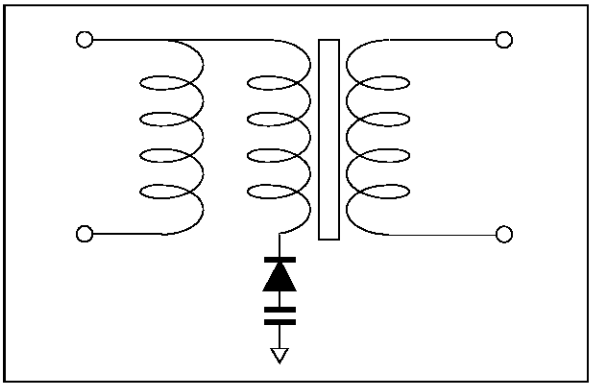
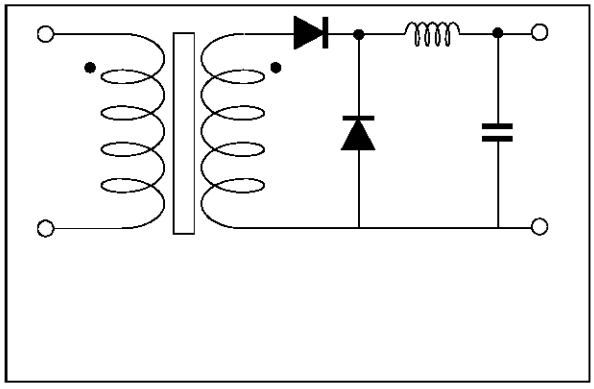
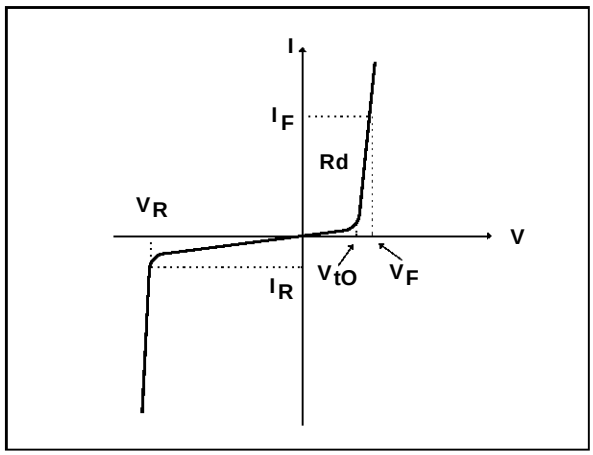


Fig. 4 : RECTIFIER DIODE.



APPLICATION DATA (Cont'd)

Fig. 5: STATIC CHARACTERISTICS



Conduction losses :

$P1 = V_{t0} \times I_{F(AV)} + R_d \times I_F^2{}_{(RMS)}$

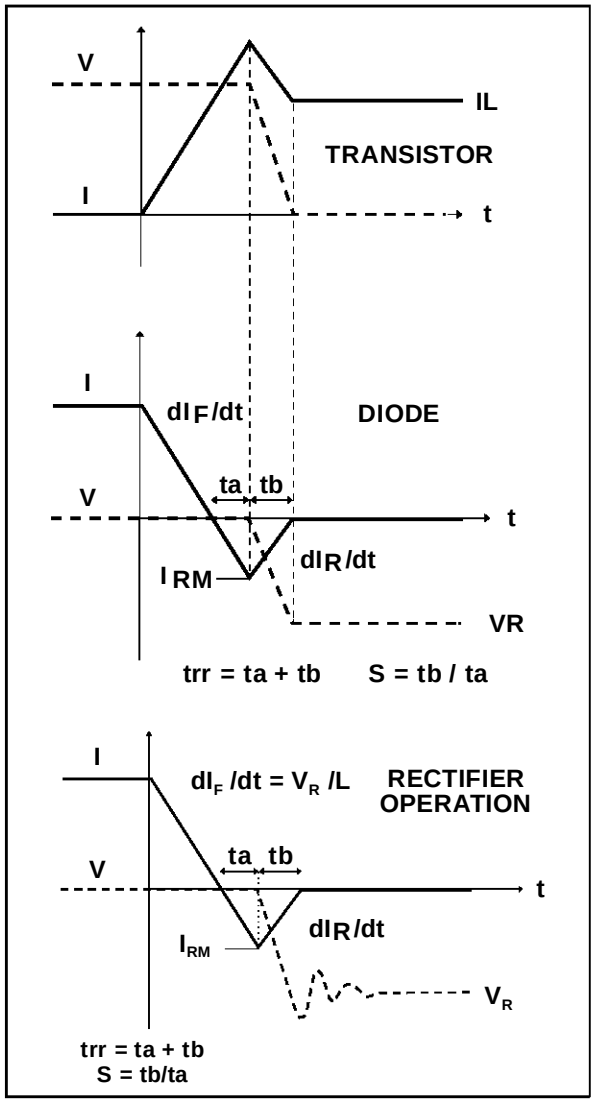
with

$V_{t0} = 1.05$ V
$R_d = 0.250$ Ohm
(Max values at 125°C)

Reverse losses :

$P2 = V_R \times I_{R\,x\,(1 - \delta)}$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-on losses :
(in the transistor, due to the diode)

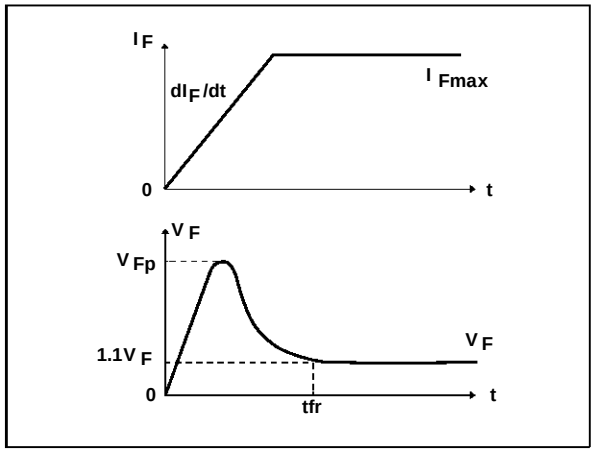
$$P3 = \frac{V_R \times I_{RM}{}^2 \times F}{6\ x\ dI_F/dt}$$

Turn-off losses :
with non negligible serial inductance

$$P3' = \frac{V_R \times I_{RM}{}^2 \times S \times F}{6\ x\ dI_F/dt} + \frac{L \times I_{RM}{}^2 \times F}{2}$$

APPLICATION DATA (Cont'd)

Fig. 7: TURN-ON CHARACTERISTICS



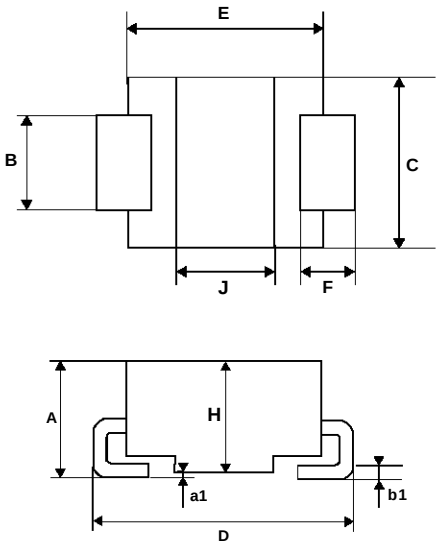
Ratings and characteristics curves are ON GOING.

Turn-on losses :

$P4 = 0.4\ (V_{FP} - V_F) \times I_{Fmax} \times t_{fr} \times F$

PACKAGE MECHANICAL DATA

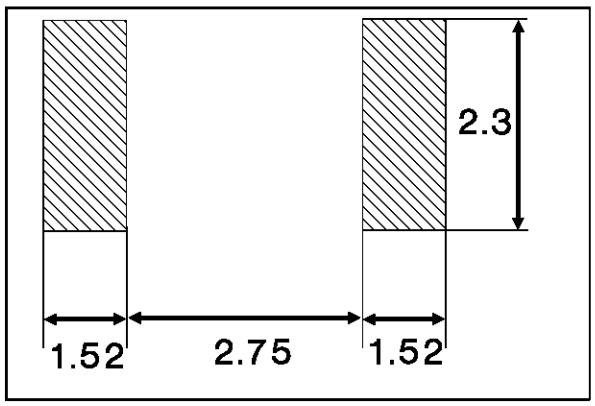
SOD6 Plastic (JEDEC outline)



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.44	2.62	0.096	0.103
a1	0.10	0.20	0.004	0.008
B	1.96	2.11	0.077	0.083
b1	0.25	0.35	0.010	0.014
C	3.65	3.93	0.143	0.155
D	5.39	5.59	0.212	0.220
E	4.15	4.30	0.163	0.170
F	1.00	1.27	0.039	0.050
H	2.33	2.41	0.092	0.095
J	2.05	2.13	0.080	0.084

FOOTPRINT DIMENSIONS

SOD6 Plastic



Marking : T11

Laser marking

Logo indicates cathode