

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

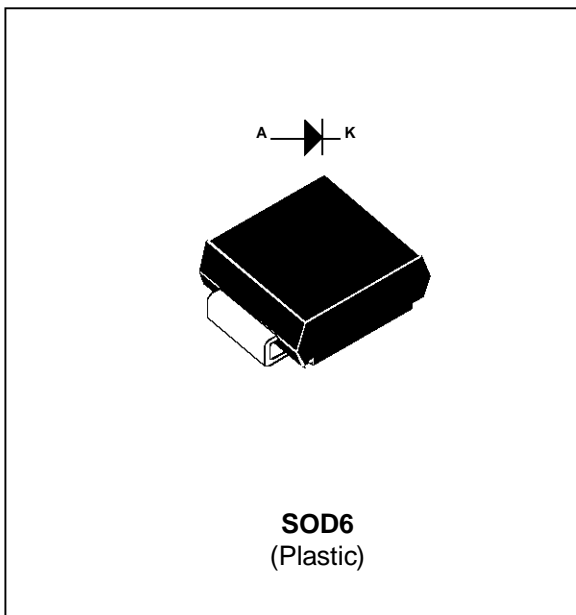
MAIN PRODUCTS CHARACTERISTICS

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

PRELIMINARY DATASHEET

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
PARTICULARLY 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 μ s, f = 5kHz)	49	A
T_j	Max. Operating Junction Temperature	125	°C
T_{stg}	Storage Temperature range	- 65 to + 150	°C

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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)	$I_{F(AV)} = 0.8A$ $\delta = 0.5$ $T_{lead} = 97^\circ C$	1.2	W
P_{max}	Total Power Dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_{lead} = 95^\circ C$ (Square waveform)	1.3	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig. 5)

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

Test pulses widths : * $t_p = 380 \mu s$, duty cycle < 2%

** $t_p = 5 ms$, 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	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		45	95	ns
I_{RM}	Maximum Recovery Current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 1A$ $di_F/dt = -8 A/\mu s$ $di_F/dt = -50 A/\mu s$		2.8	1.2	A
S factor	Softness factor	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 1A$ $di_F/dt = -50 A/\mu s$		TBD		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{fr}	Forward Recovery Time	$T_j = 25^\circ C$ $I_F = 1 A$, $di_F/dt = 8 A/\mu s$ measured at, $1.1 \times V_F$ max			500	ns
V_{Fp}	Peak Forward Voltage	$T_j = 25^\circ C$ $I_F = 1A$, $di_F/dt = 8 A/\mu s$			8	V
		$T_j = 25^\circ C$ $I_F = 5A$, $di_F/dt = 50 A/\mu s$		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 :

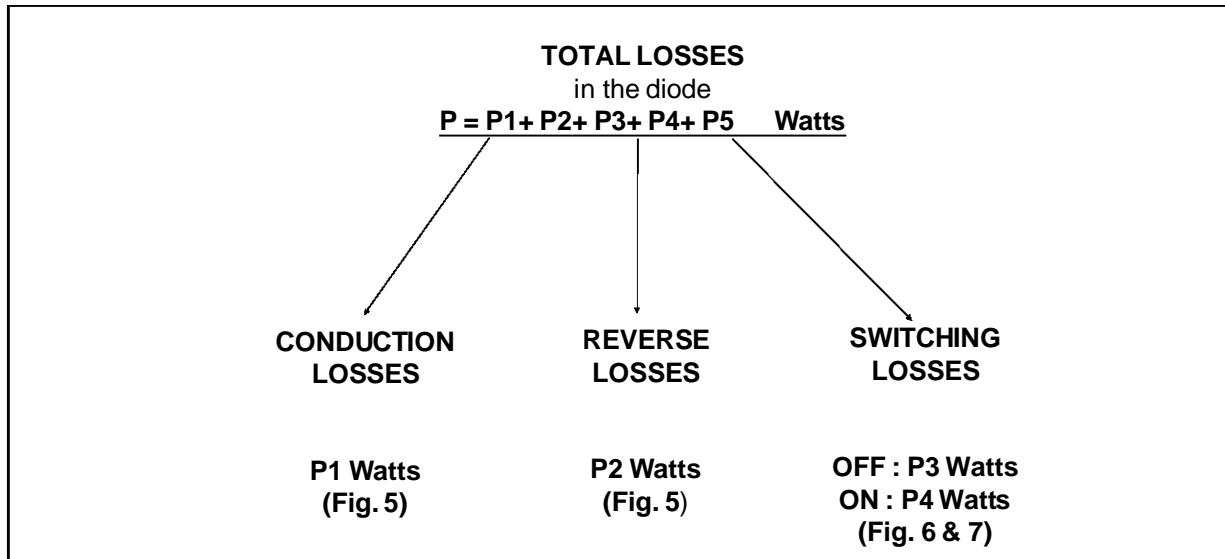


Fig. 1 : SNUBBER DIODE.

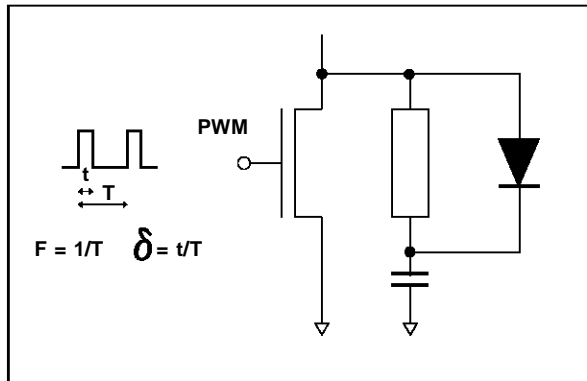


Fig. 2 : CLAMPING DIODE.

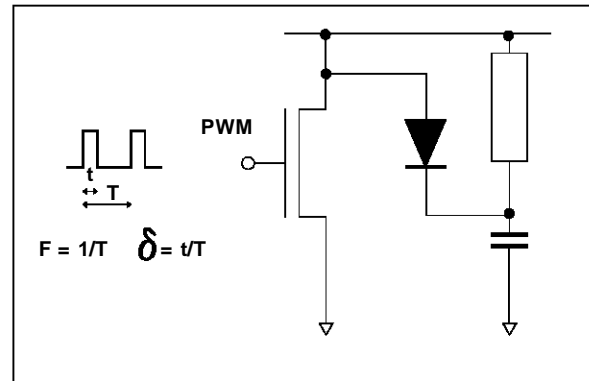


Fig. 3 : DEMAGNETIZING DIODE.

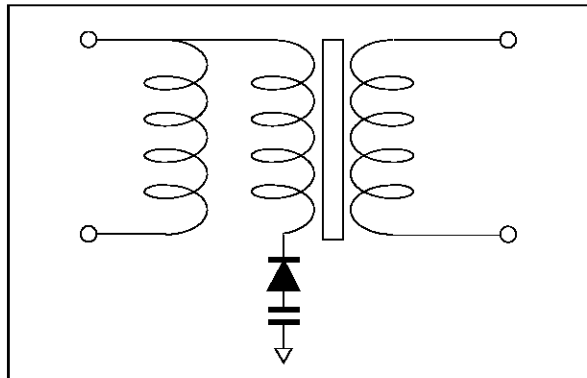
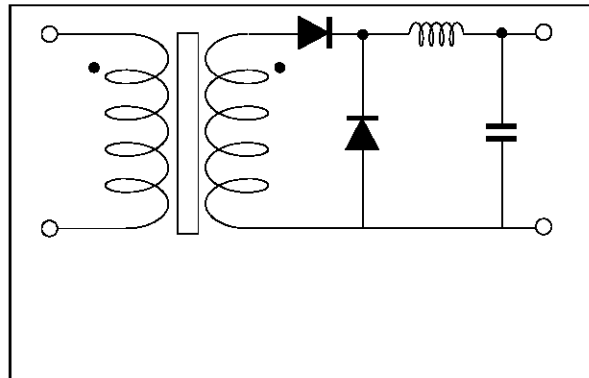
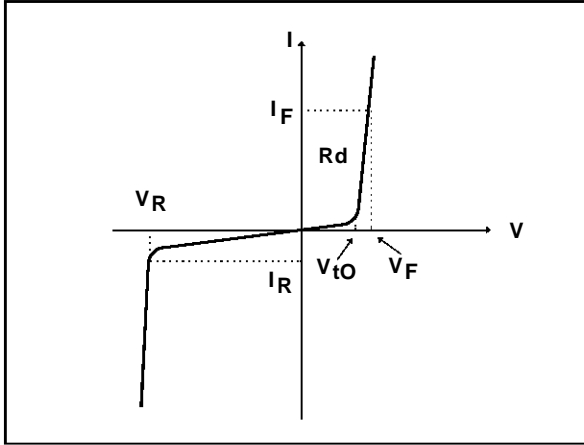


Fig. 4 : RECTIFIER DIODE.



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

$$V_{t0} = 1.05 \text{ V}$$

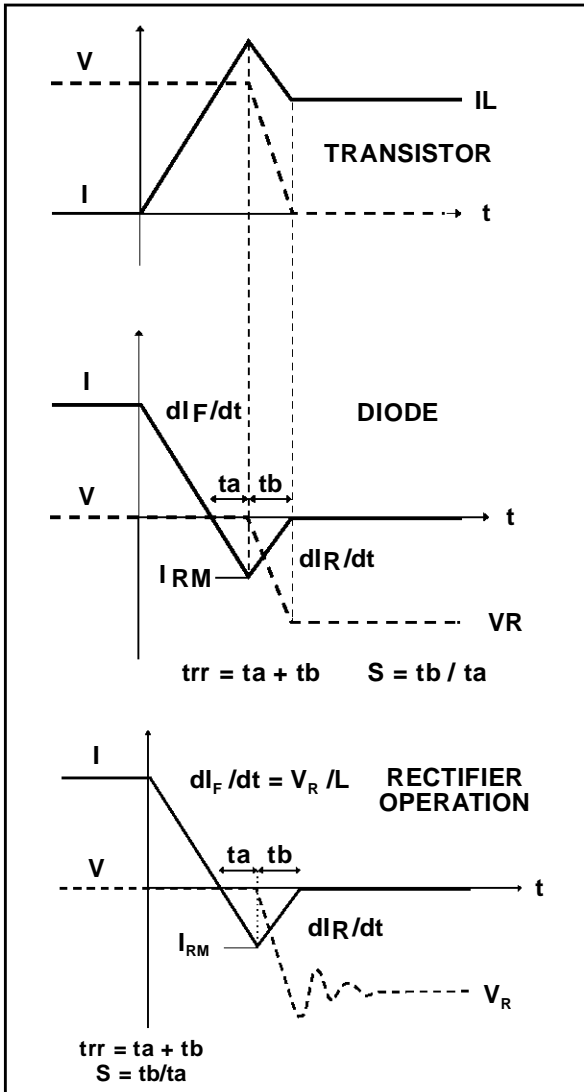
$$R_d = 0.250 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

$$P2 = V_R \times I_R \times (1 - \delta)$$

Fig. 6: TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

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

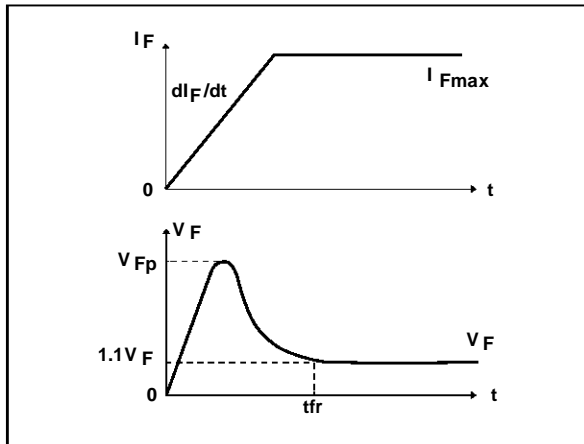
Turn-off losses :

with non negligible serial inductance

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

APPLICATION DATA (Cont'd)

Fig. 7: TURN-ON CHARACTERISTICS



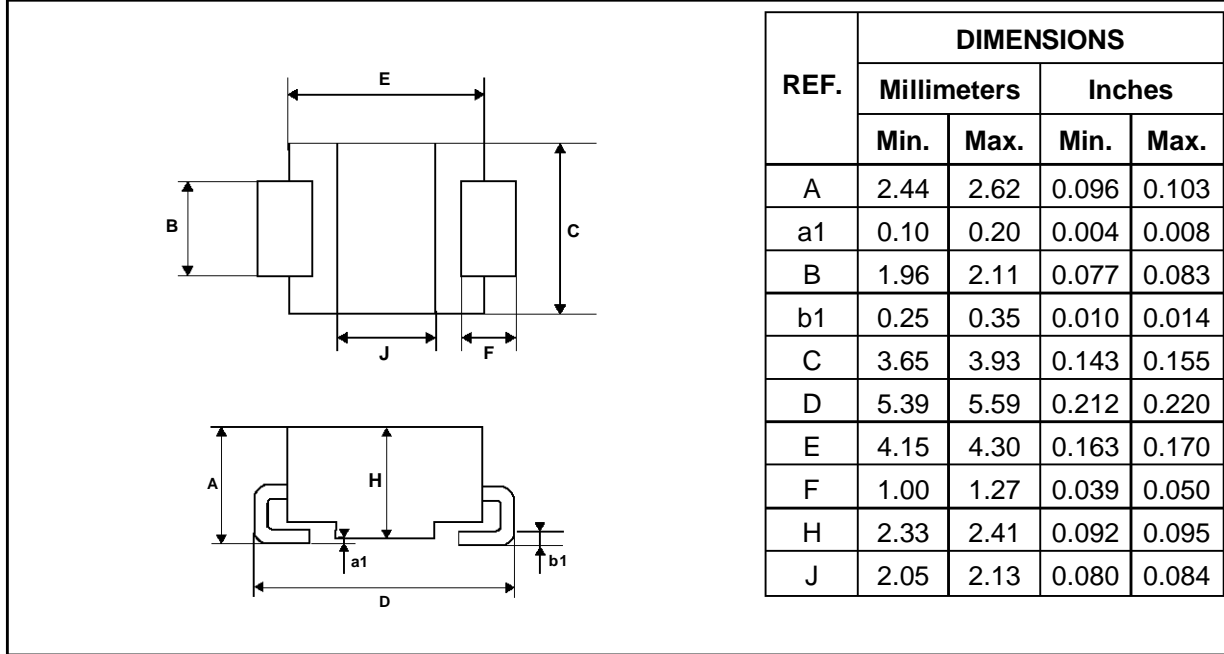
Ratings and characteristics curves are ON GOING.

Turn-on losses :

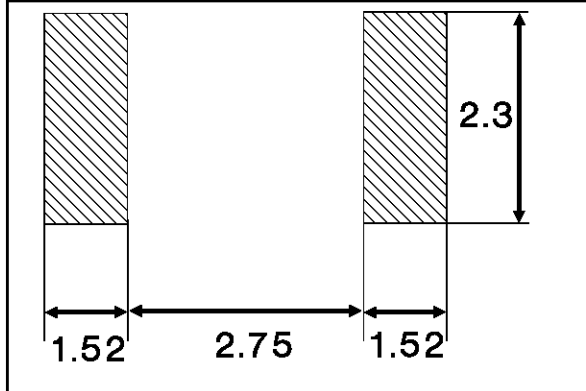
$$P_4 = 0.4 (V_{FP} - V_F) \times I_{Fmax} \times t_{fr} \times F$$

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PACKAGE MECHANICAL DATA SOD6 Plastic (JEDEC outline)



FOOTPRINT DIMENSIONS SOD6 Plastic



Marking : T11
Laser marking
Logo indicates cathode

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