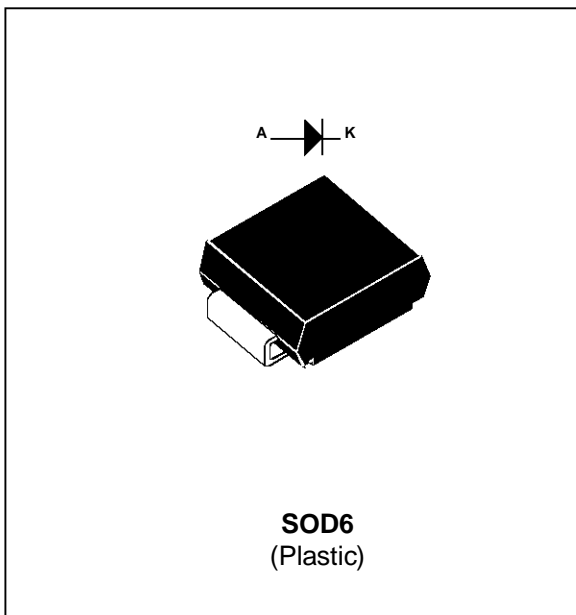


TURBOSWITCH™ "A". ULTRA-FAST HIGH VOLTAGE DIODE
MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	1A
V_{RRM}	600V
t_{rr} (typ)	20ns
V_F (max)	1.5V

PRELIMINARY DATASHEET
FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERATIONS: FREEWHEEL OR BOOSTER DIODE
- ULTRA-FAST AND SOFT RECOVERY
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR
- HIGH FREQUENCY 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 "A" family drastically cuts losses in both the diode and the associated switching IGBT and MOSFET in all "Freewheel Mode" operations and is particularly suitable and efficient

in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries.

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)	22	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. 2)	$I_{F(AV)} = 0.8A$ $\delta = 0.5$ $T_{lead} = 93^\circ C$	1.4	W
P_{max}	Total Power Dissipation $P_{max} = P_1 + P_3$ ($P_3 = 10\% P_1$)	$T_{lead} = 90^\circ C$	1.5	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig. 2)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_F *	Forward Voltage Drop	$I_F = 1A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$		1.1	1.75 1.5	V
I_R **	Reverse Leakage Current	$V_R = 0.8$ $\times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$		250	10 750	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. 3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse Recovery Time	$T_j = 25^\circ C$ $I_F = 0.5 A$ $I_R = 1A$ $I_{rr} = 0.25A$ $I_F = 1 A$ $di_F/dt = -50A/\mu s$ $V_R = 30V$		20	50	ns
I_{RM}	Maximum Recovery Current	$T_j = 125^\circ C$ $V_R = 400V$ $I_F = 1A$ $di_F/dt = -8 A/\mu s$ $di_F/dt = -50 A/\mu s$		1.6	0.6	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. 4)

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				10	V

APPLICATION DATA

The TURBOSWITCH™ "A" is especially designed to provide the lowest overall power losses in any "Freewheel Mode" application (see fig. 1) considering both the diode and the companion transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below :

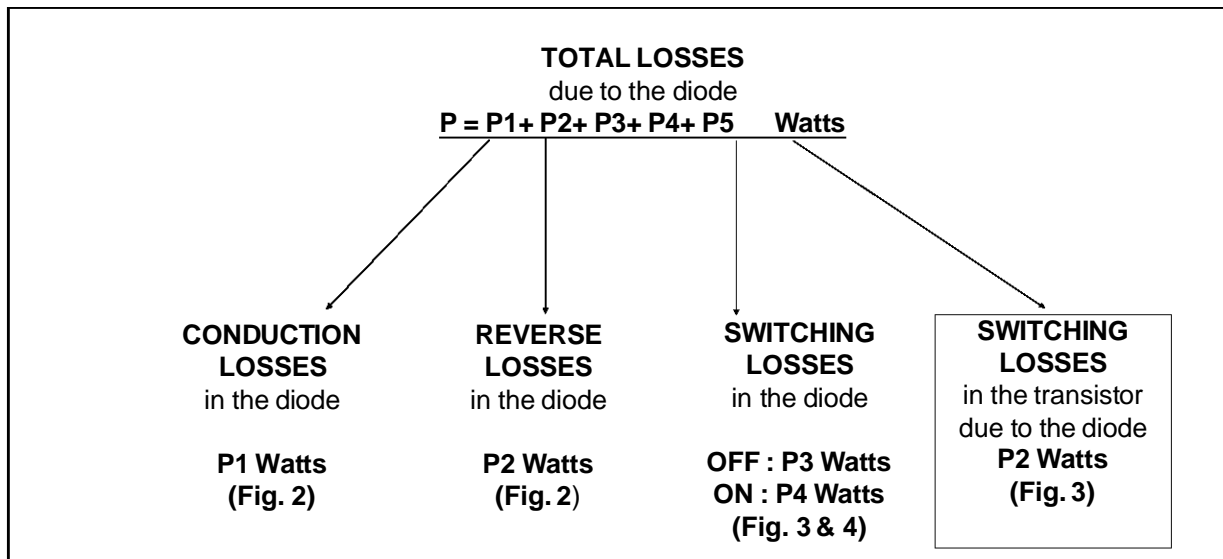
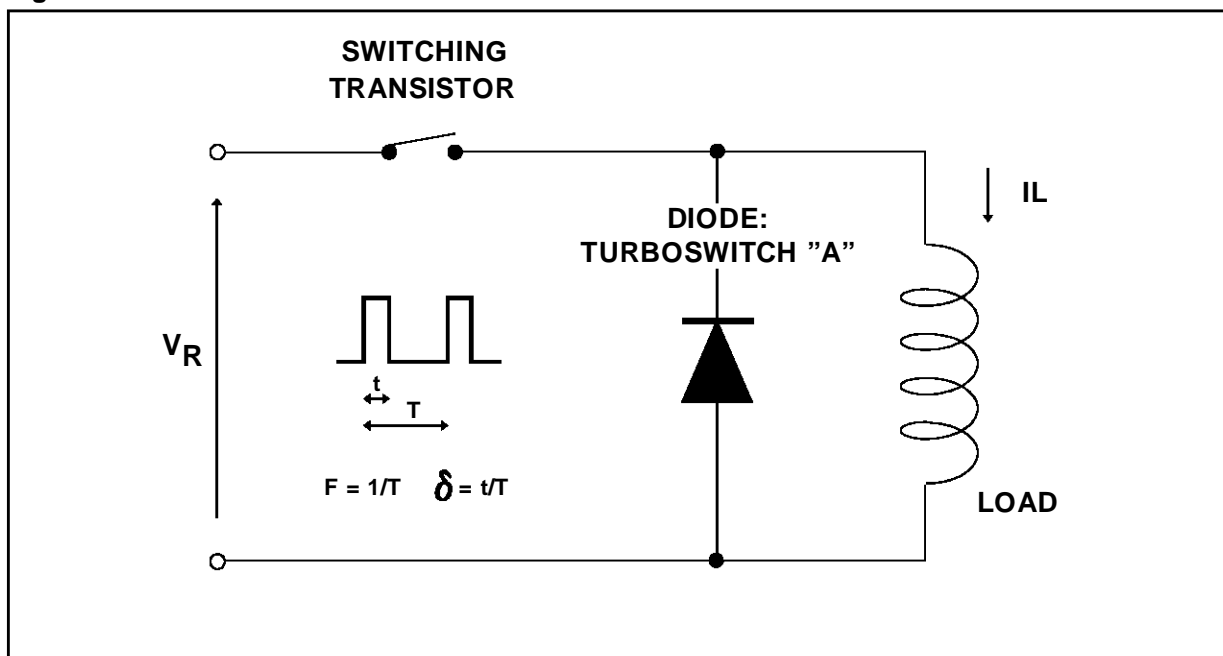
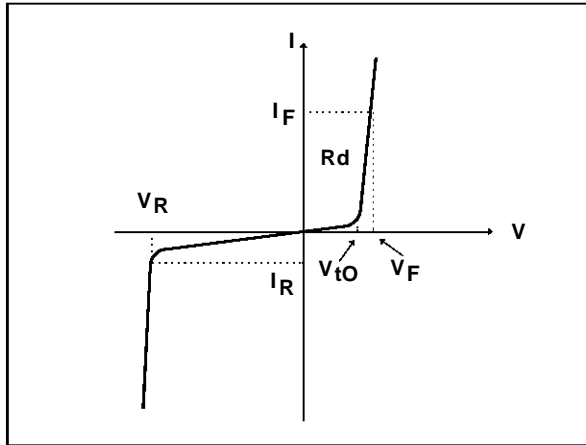


Fig. 1 : "FREEWHEEL" MODE



APPLICATION DATA (Cont'd)

Fig. 2 : STATIC CHARACTERISTICS



Conduction losses :

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

with

$$V_{t0} = 1.15 \text{ V}$$

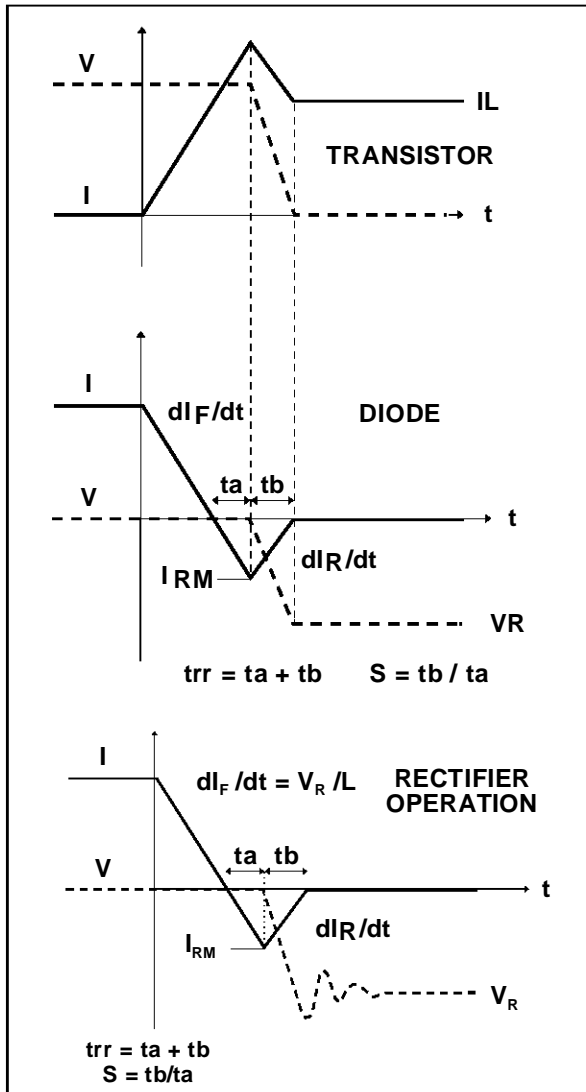
$$R_d = 0.350 \text{ Ohm}$$

(Max values at 125°C)

Reverse losses :

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

Fig. 3 : TURN-OFF CHARACTERISTICS



Turn-on losses :

(in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3+2 \times S) \times F}{6 \times dI_F/dt}$$

$$+ \frac{V_R \times I_{RM} \times I_L \times (S+2) \times F}{2 \times dI_F/dt}$$

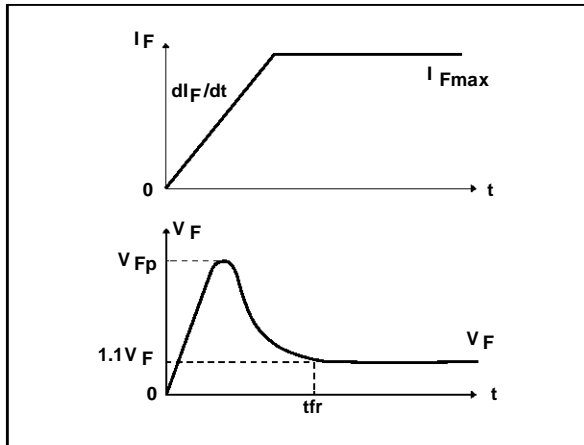
Turn-off losses (in the diode) :

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

P3 and P5 are suitable for power MOSFET and IGBT

APPLICATION DATA (Cont'd)

Fig. 4 : TURN-ON CHARACTERISTICS



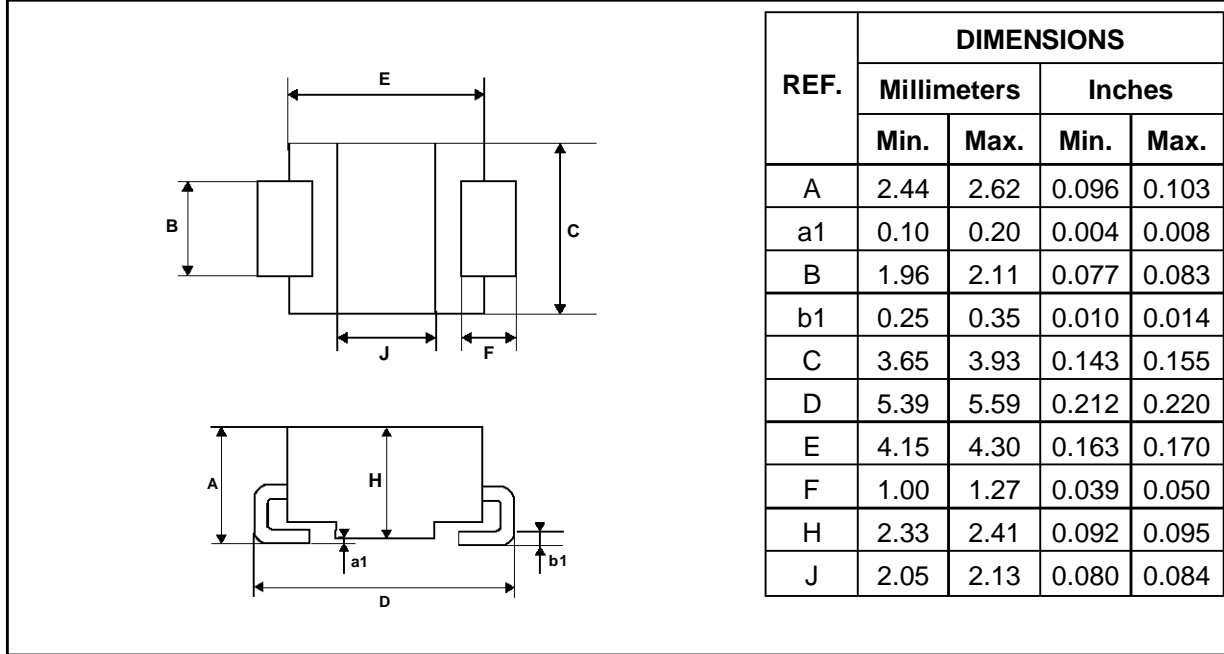
Ratings and characteristics curves are ON GOING.

Turn-on losses :

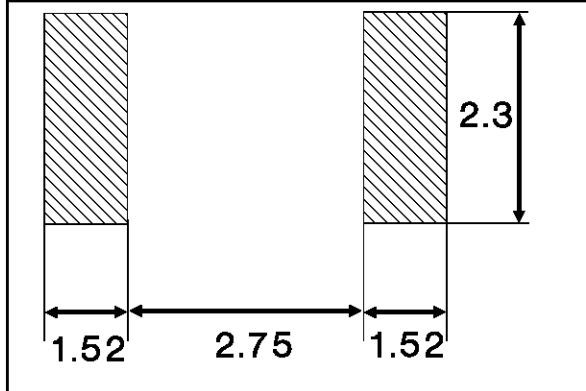
$$P_4 = 0.4 (V_{FP} - V_F) \times I_{Fmax} \times t_{fr} \times F$$

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PACKAGE MECHANICAL DATA SOD6 Plastic (JEDEC outline)



FOOTPRINT DIMENSIONS SOD6 Plastic



Marking : T01
Laser marking
Logo indicates cathode

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