



# TURBOSWITCH ULTRA-FAST HIGH VOLTAGE DIODE

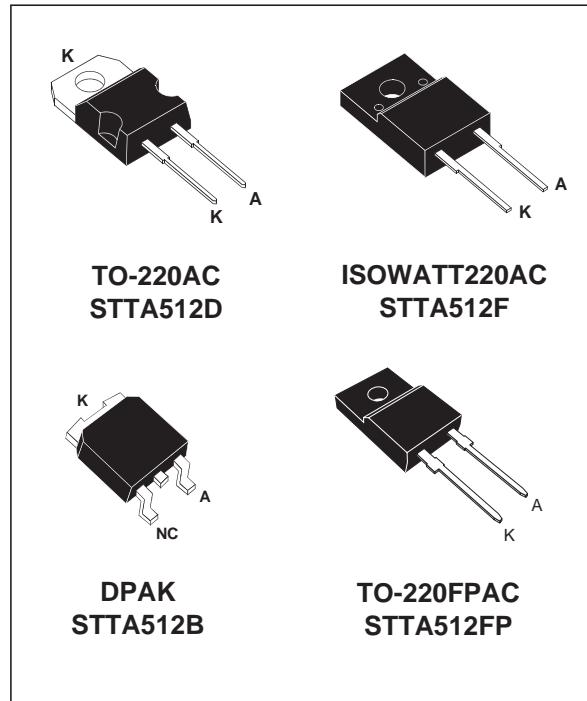
## STTA512D/F/B/FP

### MAIN PRODUCT CHARACTERISTICS

I <sub>F(AV)</sub>	5A
V <sub>RRM</sub>	1200V
t <sub>rr (typ)</sub>	45ns
V <sub>F (max)</sub>	2.0V

### FEATURES AND BENEFITS

- SPECIFIC TO THE FOLLOWING OPERATIONS:  
SNUBBING OR CLAMPING,  
DEMAGNETIZATION AND RECTIFICATION
- ULTRA-FAST, SOFT RECOVERY.
- VERY LOW OVERALL POWER LOSSES IN  
BOTH THE DIODE AND THE COMPANION  
TRANSISTOR.
- HIGH FREQUENCY AND/OR HIGH PULSED  
CURRENT OPERATION.
- HIGH REVERSE VOLTAGE CAPABILITY
- INSULATED PACKAGES:  
ISOWATT220AC, TO-220FPAC
- Electrical insulation : 2000V DC  
Capacitance : 12pF.



### DESCRIPTION

TURBOSWITCH 1200V drastically cuts losses in all high voltage operations which require extremely fast, soft and noise-free power diodes. Due to their optimized switching performances they also highly decrease power losses in any associated switching IGBT or MOSFET in all "freewheel mode" operations.

### ABSOLUTE RATINGS (limiting values)

They are particularly suitable in motor control circuitries, or in the primary of SMPS as snubber, clamping or demagnetizing diodes. They are also suitable for secondary of SMPS as high voltage rectifier diodes.

Symbol	Parameter	Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage	1200	V
V <sub>RSM</sub>	Non repetitive peak reverse voltage	1200	V
I <sub>F(RMS)</sub>	RMS forward current	20	A
		10	A
I <sub>FRM</sub>	Repetitive peak forward current tp = 5 µs F = 5kHz square	70	A
I <sub>FSM</sub>	Surge non repetitive forward current tp = 10ms sinusoidal	45	A
T <sub>stg</sub>	Storage temperature range	- 65 to + 150	°C
T <sub>j</sub>	Maximum operating junction temperature	150	°C

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### THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	TO-220AC / DPAK ISOWATT220AC / TO-220FPAC	4.0	°C/W
			5.5	
$P_1$	Conduction power dissipation $I_F(AV) = 5A \quad \delta = 0.5$	TO-220AC / DPAK ISOWATT220AC / TO-220FPAC	Tc= 102°C Tc= 84°C	12 W
		TO-220AC / DPAK ISOWATT220AC / TO-220FPAC	Tc= 98°C Tc= 78°C	
$P_{max}$	Total power dissipation $P_{max} = P_1 + P_3 \quad (P_3 = 10\% P_1)$	TO-220AC / DPAK ISOWATT220AC / TO-220FPAC	Tc= 98°C Tc= 78°C	13 W

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
$V_F$ *	Forward voltage drop	$I_F = 5A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$		1.35	2.2 2.0	V V
$I_R$ **	Reverse leakage current	$V_R = 0.8 \times V_{RRM}$	$T_j = 25^\circ C$ $T_j = 125^\circ C$		0.3	100 2.0	$\mu A$ mA
$V_{to}$	Threshold voltage	$I_p < 3.I_{AV}$	$T_j = 125^\circ C$			1.57	V
$R_d$	Dynamic resistance					86	$m\Omega$

Pulse test: \*  $t_p = 380 \mu s, \delta < 2\%$

\*\*  $t_p = 5 ms, \delta < 2\%$

To evaluate the maximum conduction losses use the following equation :  
 $P = V_{to} \times I_F(AV) + r_d \times I_F^2(RMS)$

### DYNAMIC ELECTRICAL CHARACTERISTICS

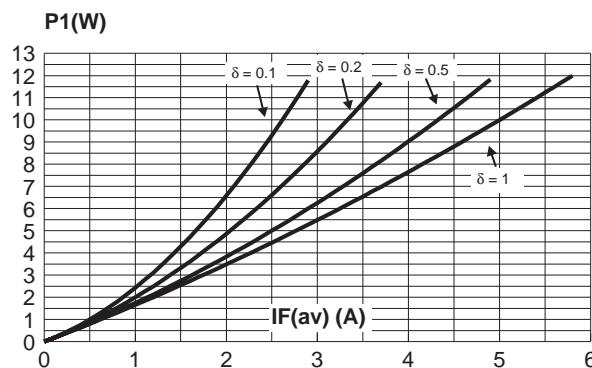
#### TURN-OFF SWITCHING

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ C$ $I_F = 0.5 A \quad I_R = 1A \quad Irr = 0.25A$ $I_F = 1 A \quad dI_F/dt = -50A/\mu s \quad V_R = 30V$		45	95	ns
$I_{RM}$	Maximum reverse recovery current	$T_j = 125^\circ C \quad V_R = 600V \quad I_F = 5A$ $dI_F/dt = -40 A/\mu s$ $dI_F/dt = -500 A/\mu s$		20	7.5	A
$S_{factor}$	Softness factor	$T_j = 125^\circ C \quad V_R = 600V \quad I_F = 5A$ $dI_F/dt = -500 A/\mu s$		1.2		/

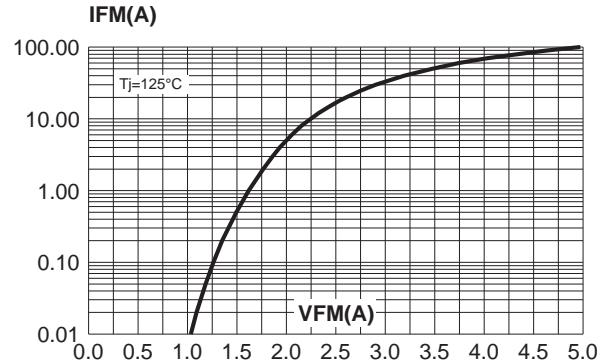
#### TURN-ON SWITCHING

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{fr}$	Forward recovery time	$T_j = 25^\circ C$ $I_F = 5 A, dI_F/dt = 40 A/\mu s$ measured at $1.1 \times V_{Fmax}$			900	ns
$V_{Fp}$	Peak forward voltage	$T_j = 25^\circ C$ $I_F = 5A, dI_F/dt = 40 A/\mu s$ $I_F = 40A, dI_F/dt = 500 A/\mu s$		50	35	V

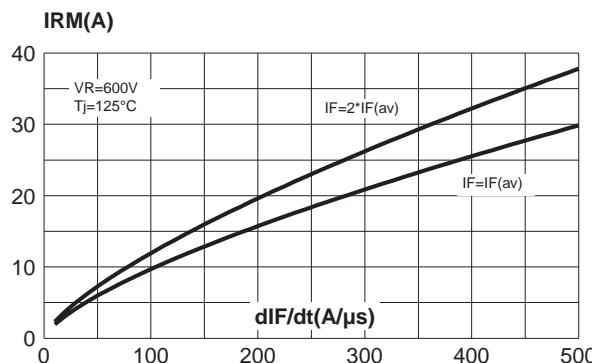
**Fig. 1:** Conduction losses versus average current.



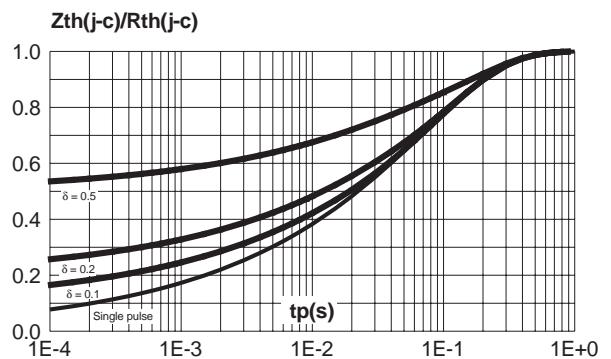
**Fig. 2:** Forward voltage drop versus forward current (maximum values).



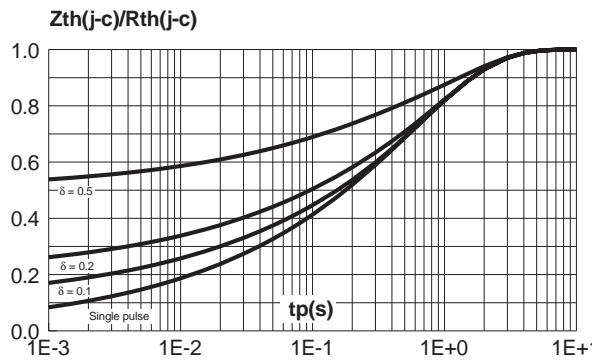
**Fig. 3:** Peak reverse recovery current versus  $dI_F/dt$  (90% confidence).



**Fig. 4:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC and DPAK).



**Fig. 5:** Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AC and TO-220FPAC).



**Fig. 6:** Reverse recovery time versus  $dI_F/dt$  (90% confidence).

