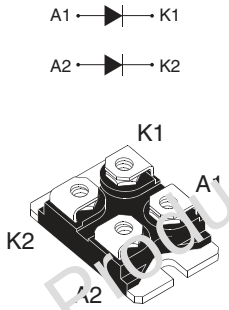
STTH12004TV1

Ultrafast high voltage rectifier

Table 1: Main product characteristics

$I_{F(AV)}$	2 x 60 A
V_{RRM}	400 V
T_j (max)	150 °C
V_F (typ)	0.83 V
t_{rr} (max)	50 ns



ISOTOP
STTH12004TV1

Features and benefits

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching & conduction losses

Description

The STTH12004TV1 uses ST 400V technology and is specially suited for use in switching power supplies, welding equipment, and industrial applications, as an output rectification diode.

Table 2: Order codes

Part number	Marking
STTH12004TV1	STTH12004TV1

Table 3: Absolute ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			400	V
$I_{F(RMS)}$	RMS forward current			120	A
$I_{F(AV)}$	Average forward current	T_c = 115 °C δ = 0.5	Per diode	60	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		600	A
T_{stg}	Storage temperature range			-55 to + 150	°C
T_j	Maximum operating junction temperature			150	°C

Table 4: Thermal resistance

Symbol	Parameter		Value (max).	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.5	°C/W
		Total	0.3	
$R_{th(c)}$	Coupling		0.1	°C/W

When diodes 1 and 2 are used simultaneously:
Δ Tj(diode 1) = P(diode 1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

Table 5: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R *	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			50	µA
		T_j = 125 °C			50	500	
V_F **	Forward voltage drop	T_j = 25 °C	I_F = 60 A			1.2	V
		T_j = 150 °C			0.83	1.0	

Pulse test: * t_p = 5 ms, δ < 2%
** t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation: P = 0.8 x $I_{F(AV)}$ + 0.008 I_F^2 (RMS)

Table 6: Dynamic characteristics (per diode)

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A dI_F/dt = 50 A/µs V_R = 30 V		66	90	ns
			I_F = 1 A dI_F/dt = 200 A/µs V_R = 30 V		36	50	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 60 A V_R = 200 V dI_F/dt = 100 A/µs			15	A
S_{factor}	Softness factor	T_j = 125 °C	I_F = 60 A V_R = 200 V dI_F/dt = 100 A/µs		0.4		
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 60 A dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}			600	ns
V_{FP}	Forward recovery voltage	T_j = 25 °C	I_F = 60 A dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}		2.6		V

Figure 1: Conduction losses versus average forward current (per diode)

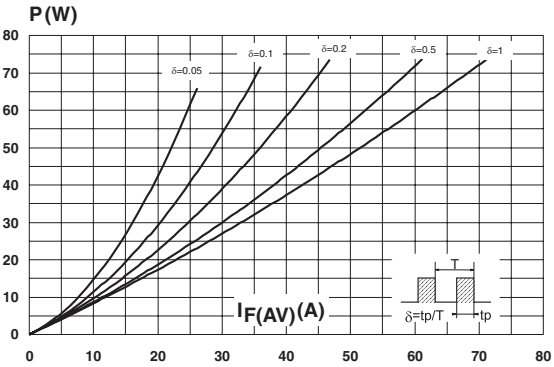


Figure 2: Forward voltage drop versus forward current (per diode)

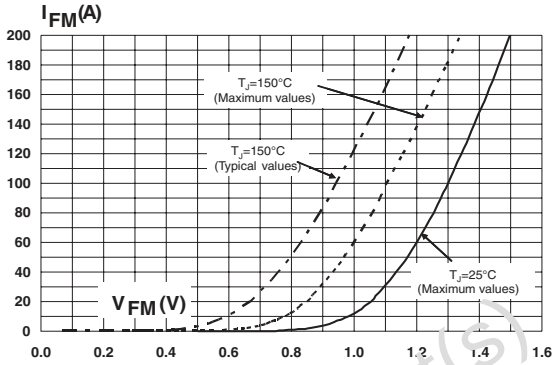


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

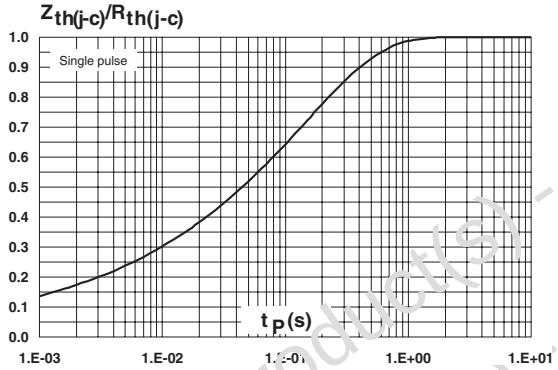


Figure 4: Peak reverse recovery current versus dI_F/dt (typical values, per diode)

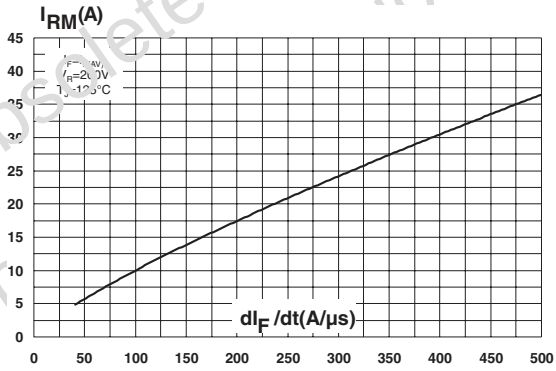


Figure 5: Reverse recovery time versus dI_F/dt (typical values, per diode)

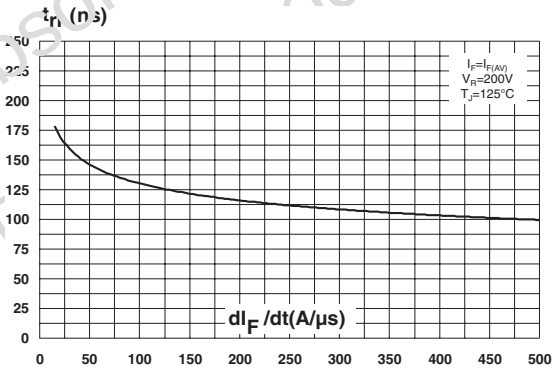


Figure 6: Reverse recovery charges versus dI_F/dt (typical values, per diode)

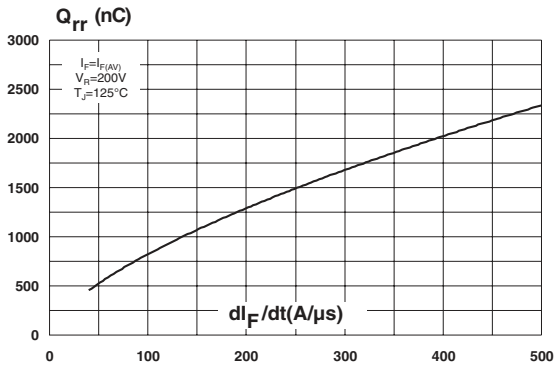


Figure 7: Reverse recovery softness factor versus dI_F/dt (typical values, per diode)

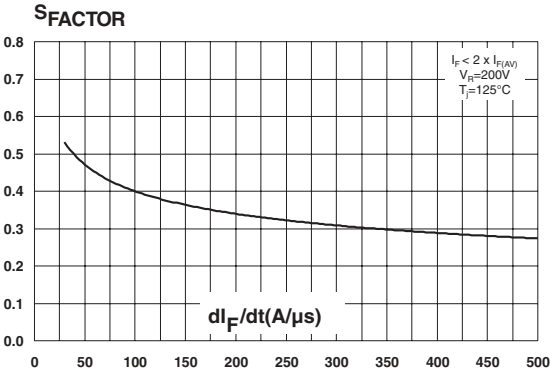


Figure 8: Relative variations of dynamic parameters versus junction temperature

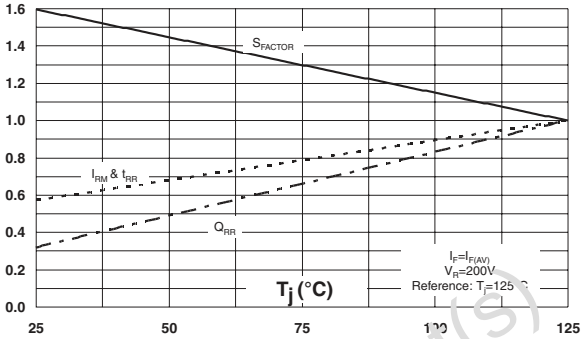


Figure 9: Transient peak forward voltage versus dI_F/dt (typical values, per diode)

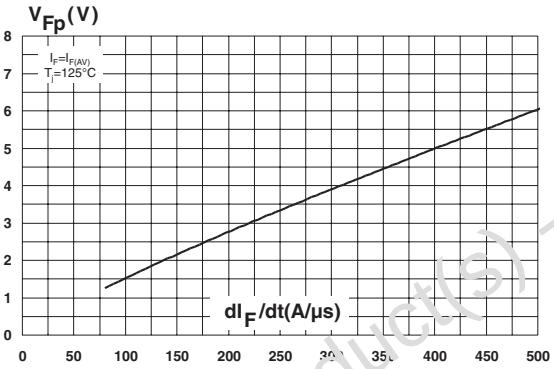


Figure 10: Forward recovery time versus dI_F/dt (typical values, per diode)

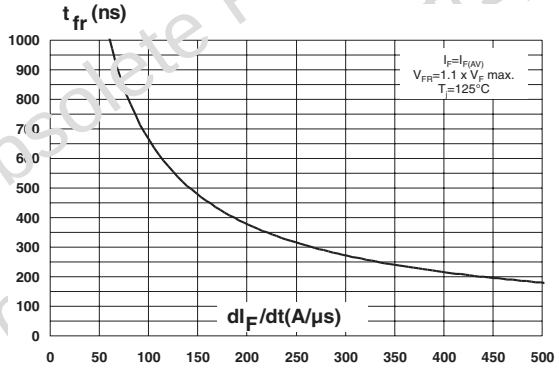


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)

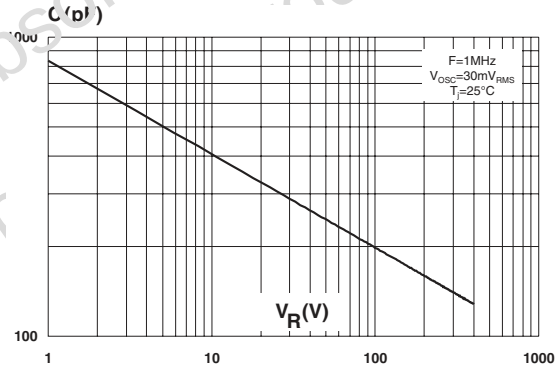
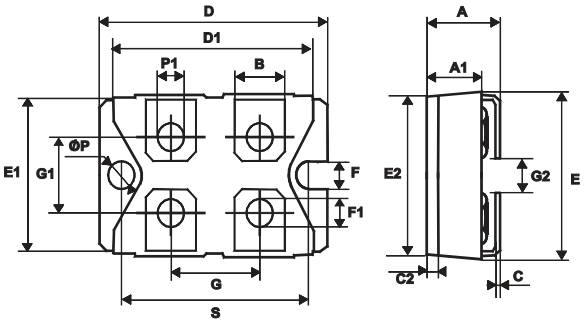


Figure 12: ISOTOP Package mechanical data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.465	0.480
A1	8.90	9.10	0.350	0.358
B	7.8	8.20	0.307	0.323
C	0.75	0.85	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.80	38.20	1.488	1.504
D1	31.50	31.70	1.240	1.248
E	25.15	25.50	0.990	1.004
E1	23.85	24.15	0.939	0.951
E2	24.80 typ.		0.976 typ.	
G	14.90	15.10	0.587	0.594
G1	12.60	12.80	0.496	0.504
G2	3.50	4.30	0.138	0.169
F	4.10	4.30	0.161	0.169
F1	4.60	5.00	0.181	0.197
P	4.00	4.30	0.157	0.69
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Table 7: Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH12004TV1	STTH12004TV1	ISOTOP	27 g (without screws)	10 (with screws)	Tube

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

Table 8: Revision history

Date	Revision	Description of Changes
18-Oct-2005	1	First issue