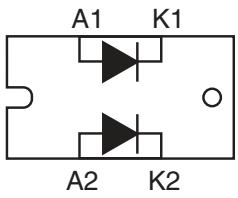
STTH12010TV

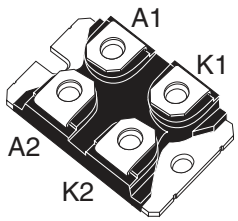
Ultrafast recovery - high voltage diode

Datasheet – production data

Features

- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and high pulsed current operation
- High reverse voltage capability
- High junction temperature
- Insulated package
  - Electrical insulation = 2500 V rms
  - Capacitance = 45 pF





ISOTOP
STTH12010TV1

Description

The compromise-free, high quality design of this diode has produced a device with low leakage current, regularly reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability.

These demanding applications include industrial power supplies, motor control, and similar industrial systems that require rectification and freewheeling. This diode also fits into auxiliary functions such as snubber, bootstrap, and demagnetization applications.

The improved performance in low leakage current, and therefore thermal runaway guard band, is an immediate advantage for reducing maintenance of equipment.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 60 A
V_{RRM}	1000 V
t_{rr} (typ)	49 ns
T_j	150 °C
V_F (typ)	1.30 V

1 Characteristics

Table 2. Absolute ratings (limiting values per diode at 25° C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			1000	V
$I_{F(RMS)}$	Forward rms current			150	A
$I_{F(AV)}$	Average forward current, δ = 0.5	per diode	T_c = 50° C	60	A
I_{FRM}	Repetitive peak forward current	t_p = 5 µs, F = 5 kHz square		750	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		400	A
T_{stg}	Storage temperature range			-65 to + 150	°C
T_j	Maximum operating junction temperature			150	°C

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.80	°C/W
		Total	0.45	
$R_{th(c)}$	Coupling thermal resistance		0.1	

When the diodes are used simultaneously:
$\Delta T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			20	µA
		T_j = 125° C			20	200	
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 60 A			2.0	V
		T_j = 100° C			1.40	1.80	
		T_j = 150° C			1.30	1.70	

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

To evaluate the conduction losses use the following equation:
$P = 1.3 \times I_{F(AV)} + 0.0067\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25° C			115	ns
		I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V, T_j = 25° C		61	80	
		I_F = 1 A, dI_F/dt = -200 A/µs, V_R = 30 V, T_j = 25° C		49	65	
I_{RM}	Reverse recovery current	I_F = 60 A, dI_F/dt = -200 A/µs, V_R = 600 V, T_j = 125° C		31	40	A
S	Softness factor	I_F = 60 A, dI_F/dt = -200 A/µs, V_R = 600 V, T_j = 125° C		1		
t_{fr}	Forward recovery time	I_F = 60 A dI_F/dt = 100 A/µs V_{FR} = 1.5 x V_{Fmax}, T_j = 25° C			750	ns
V_{FP}	Forward recovery voltage	I_F = 60 A, dI_F/dt = 100 A/µs, T_j = 25° C		4		V

Figure 1. Conduction losses versus average current

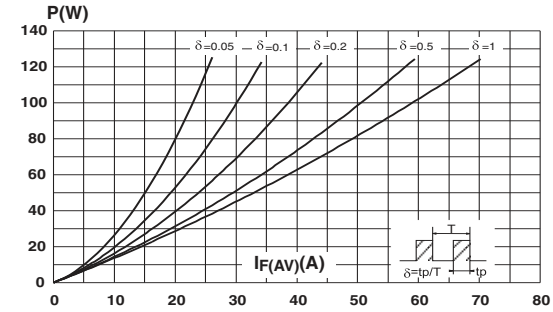


Figure 2. Forward voltage drop versus forward current

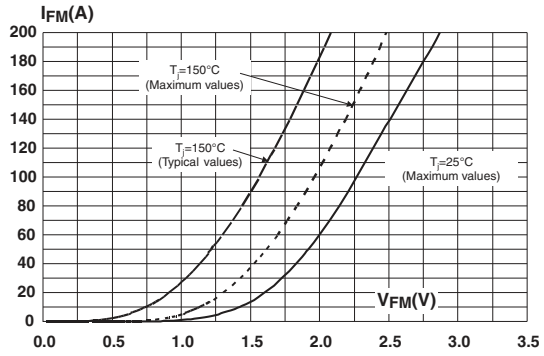


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

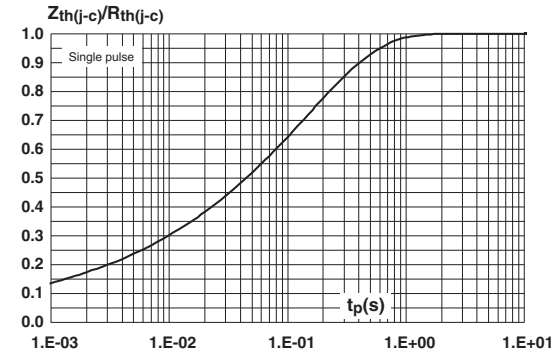


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

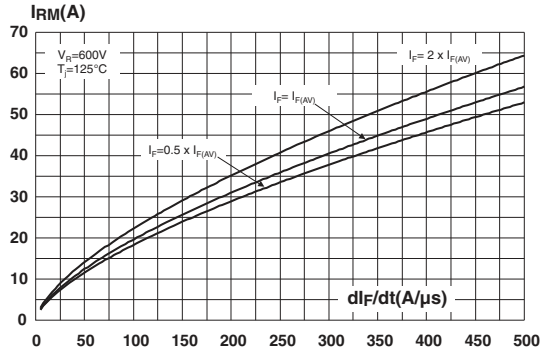


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

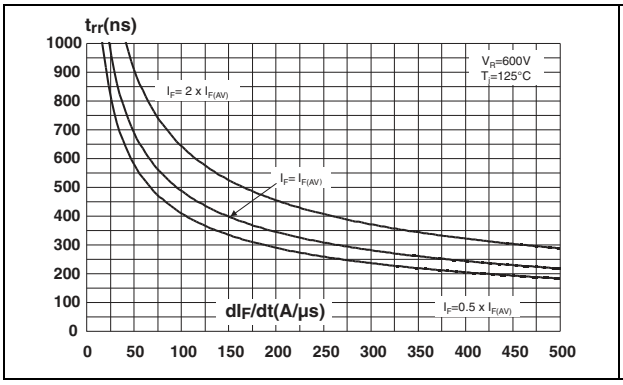


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

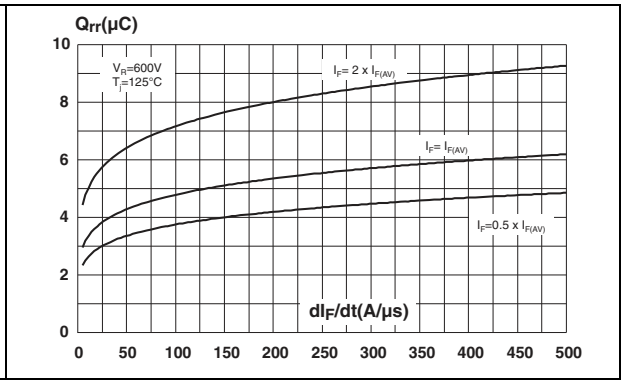


Figure 7. Softness factor versus dI_F/dt (typical values)

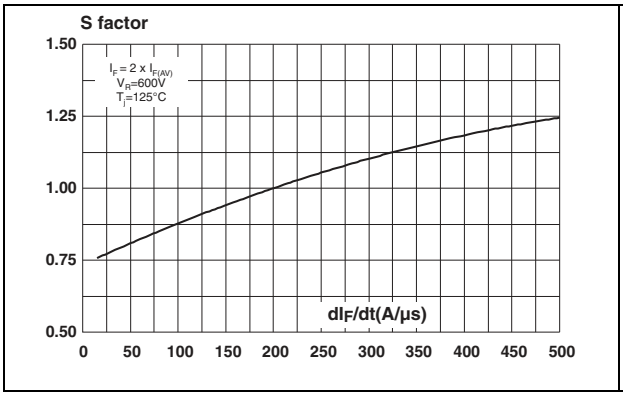


Figure 8. Relative variations of dynamic parameters versus junction temperature

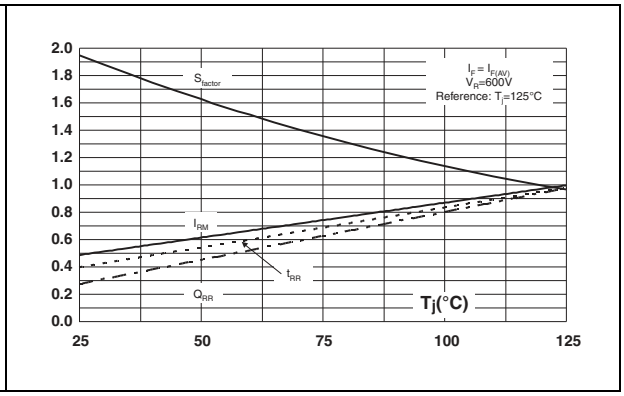


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

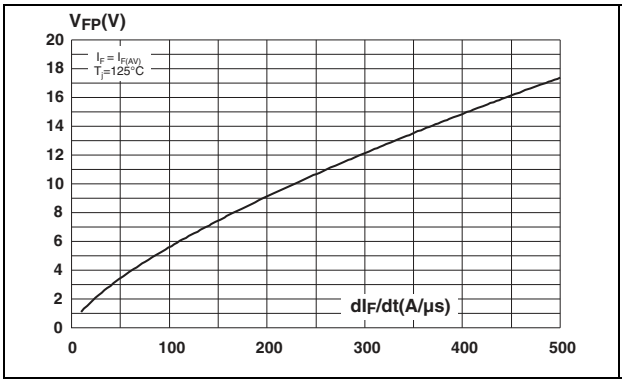


Figure 10. Forward recovery time versus dI_F/dt (typical values)

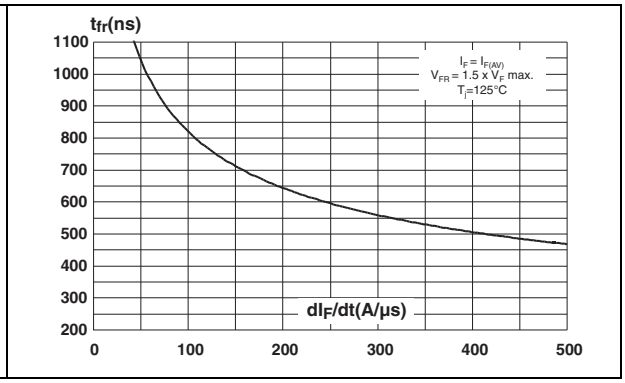
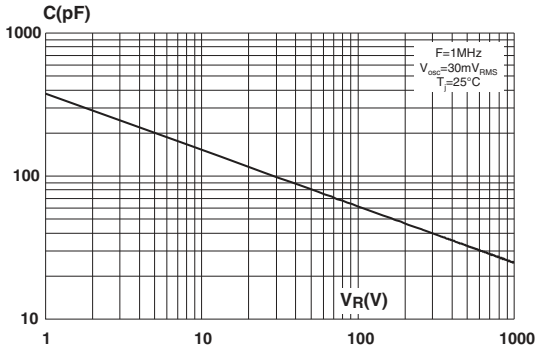


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

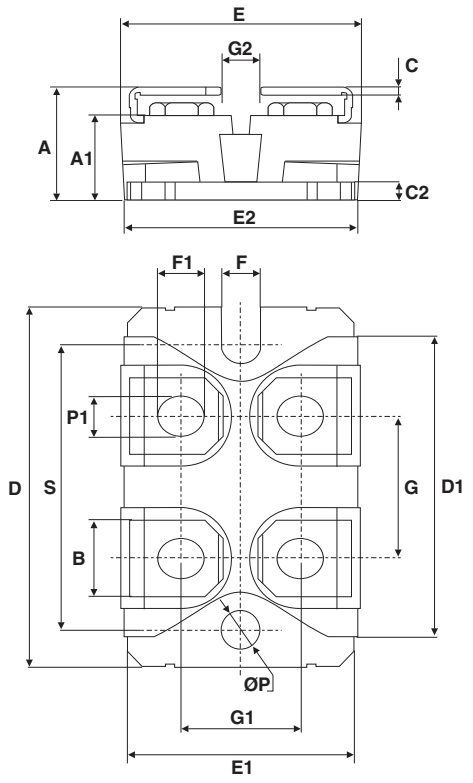


2 Package information

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

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 6. ISOTOP dimensions



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

3 Ordering information

Table 7. Ordering information

Part Number	Marking	Package	Weight	Base qty[1]	Delivery mode
STTH12010TV1	STTH12010TV1	ISOTOP	27 g	10 with screws	Tube

1. This product is supplied with 40 terminal screws and washers for each tube. The screws and washers are supplied in a separate pack with the order.

4 Revision history

Table 8. Document revision history

Date	Revision	Description of Changes
02-Mar-2006	1	First issue.
23-Oct-2012	2	Remove information related to TV2 product. Added footnote to *Table 7*.

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