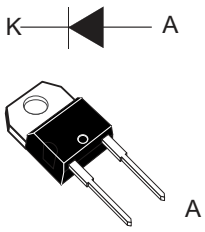
STTH12T06

600 V tandem extra fast diode

Datasheet – production data



TO-220AC ins
STTH12T06DI

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	12 A
V_{RRM}	600 V
t_{rr} (typ)	15 ns
I_{RM} (typ)	2.3 A
V_F (typ)	2.05 V
I_{FRM}	65 A
T_j (max)	175 °C

Features

- High voltage rectifier
- Tandem diodes in series
- Very low switching losses
- Insulated device with internal ceramic
- Equal thermal conditions for both 300 V diodes
- Static and dynamic equilibrium of internal diodes are warranted by design
- Insulated package:
  - Capacitance: 7 pF
  - Insulated voltage: 2500 V rms

Description

This device is part of ST's second generation of 600 V tandem diodes. It has ultralow switching-losses with a minimized Q_{RR} (6.5 nC) that makes it perfect for use in circuits working in hard-switching mode. In particular the V_F/Q_{RR} trade-off positions this device between standard ultrafast diodes and silicon-carbide Schottky rectifiers in terms of price/performance ratio.

The device offers a new positioning giving more flexibility to power-circuit designers looking for good performance while still respecting cost constraints.

Featuring ST's Turbo 2 600 V technology, the device is particularly suited as a boost diode in continuous conduction mode power factor correction circuits.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage	T_j from 25 to 150 °C	600	V
		T_j = -40 °C	550	
$I_{F(RMS)}$	Forward rms current		22	A
$I_{F(AV)}$	Average forward current, δ = 0.5	T_c = 75 °C	12	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	90	A
I_{FRM}	Repetitive peak forward current	T_c = 75 °C, $\delta = 0.1$	65	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature		-40 to +175	°C

Table 3. Thermal parameters

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	2.4	°C/W

Table 4. Static electrical characteristics

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			40	400	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 12A		2.95		V
		T_j = 150 °C			2.05	2.55	

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:
$P = 1.75 \times I_{F(AV)} + 0.0667 \times I_F{}^2{}_{(RMS)}$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, V_R = 30 V, dI_F/dt = -50 A/µs		25	33	ns
			I_F = 12 A, V_R = 400 V, dI_F/dt = -200 A/µs		15	20	
		T_j = 125 °C	I_F = 12 A, V_R = 400 V, dI_F/dt = -200 A/µs		23	30	
I_{RM}	Reverse recovery current	T_j = 25 °C	I_F = 12 A, V_R = 400 V, dI_F/dt = -200 A/µs		0.83	1.1	A
		T_j = 125 °C			2.3	3	
S	Softness factor	T_j = 25 °C			1.4		
		T_j = 125 °C			0.7		
Q_{RR}	Reverse recovery charge	T_j = 25 °C			6.5		nC
		T_j = 125 °C			30		

Figure 1. Average forward power dissipation versus average forward current

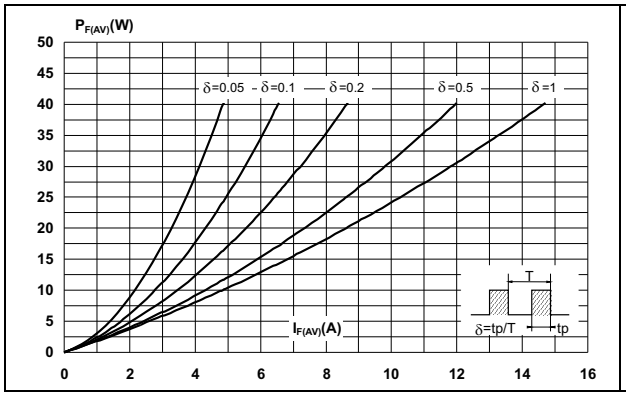


Figure 2. Forward voltage drop versus forward current (typical values)

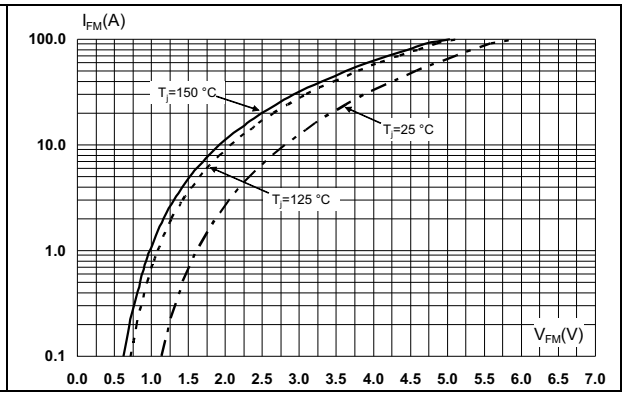


Figure 3. Relative variation of thermal impedance, junction to case, versus pulse duration

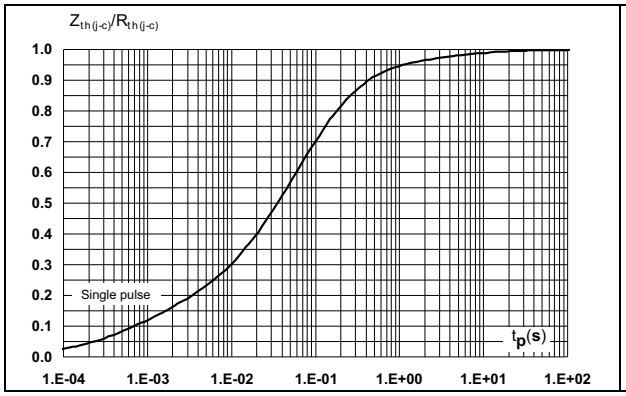


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

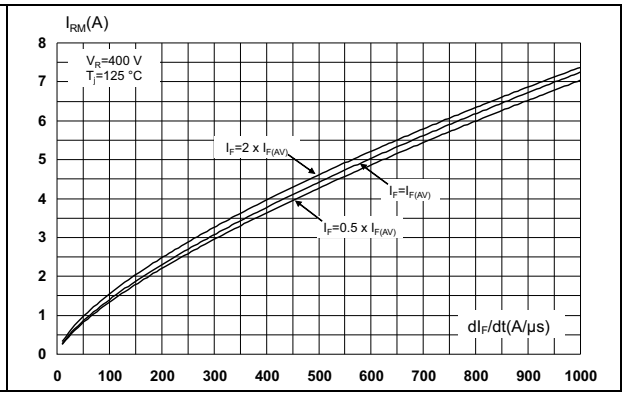


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

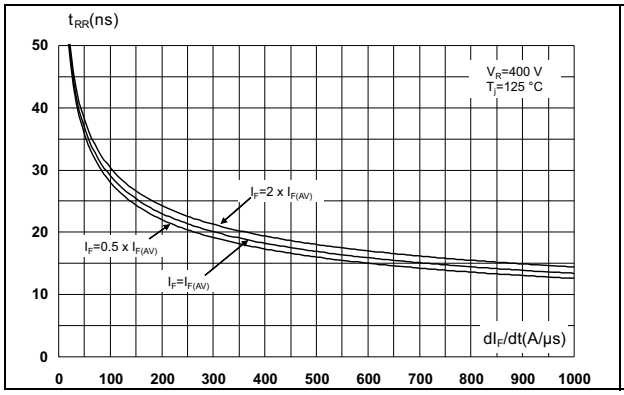


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

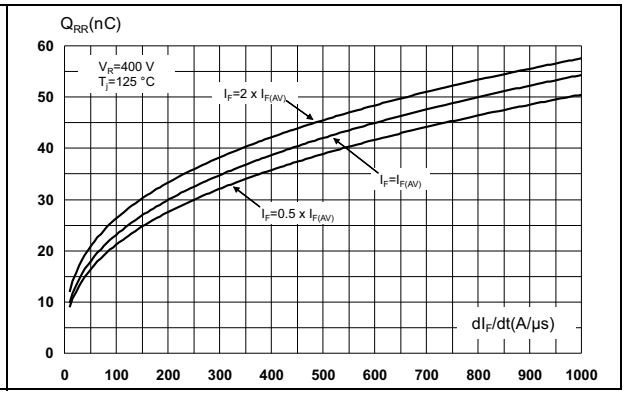


Figure 7. Reverse recovery softness factor versus dI_F/dt (typical values)

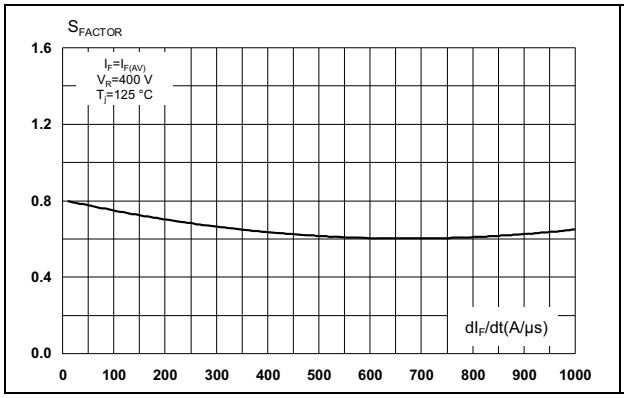


Figure 8. Relative variations of dynamic parameters versus junction temperature

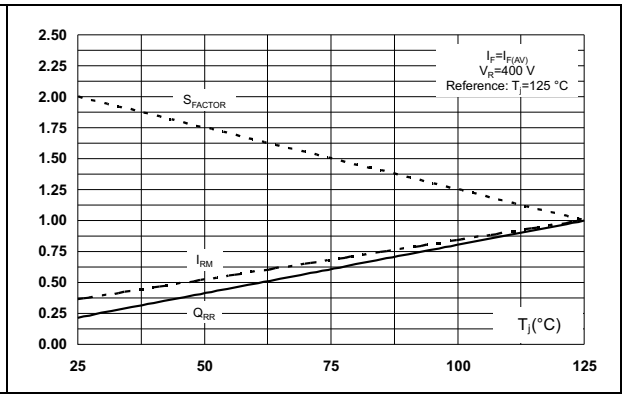


Figure 9. Junction capacitance versus reverse voltage applied (typical values)

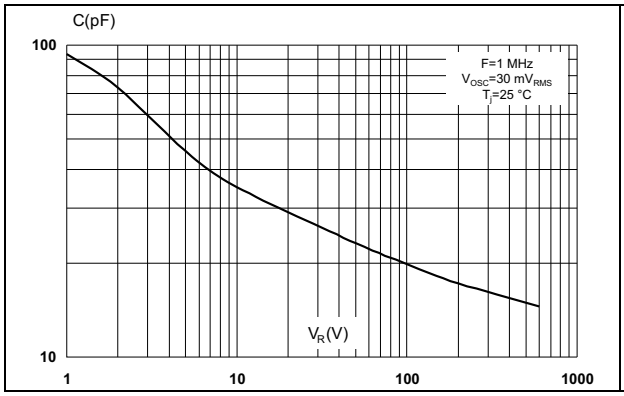


Figure 10. Relative variation of non-repetitive peak surge forward current versus pulse duration

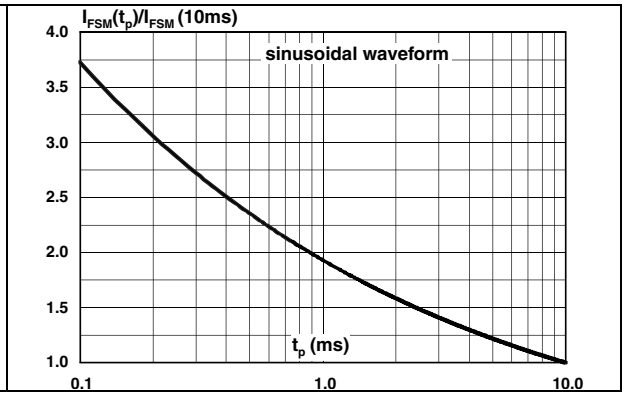
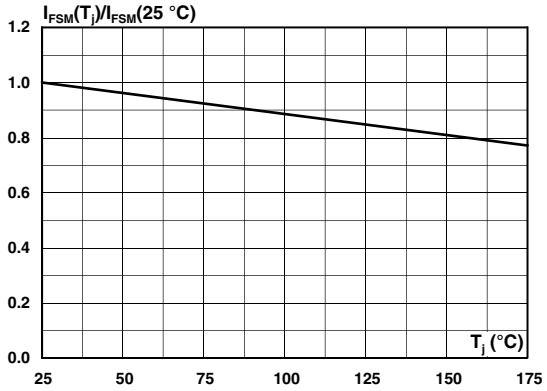


Figure 11. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque: 0.4 to 0.6 N·m

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.

Figure 12. T0-220AC ins dimension definitions

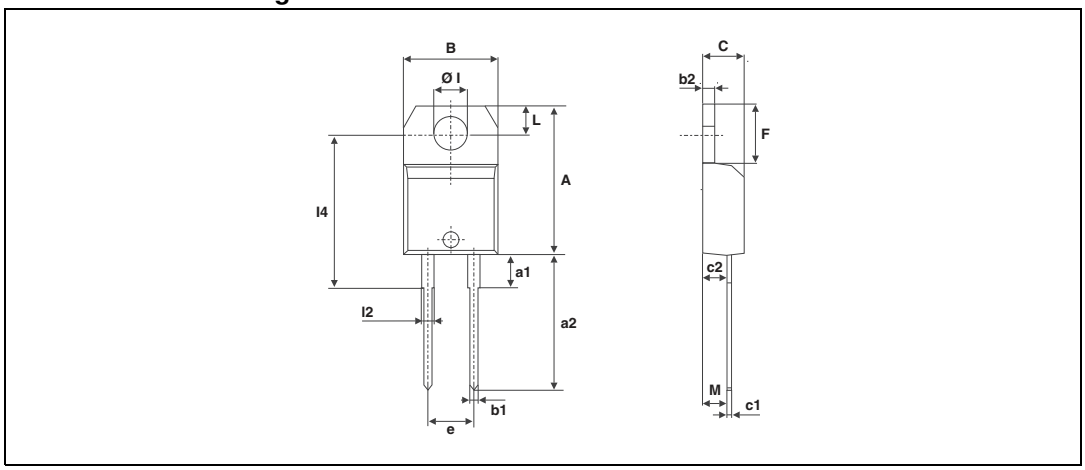


Table 6. T0-220AC ins dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	4.80		5.40	0.189		0.212
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
M		2.60			0.102	

3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH12T06DI	STTH12T06DI	TO-220AC ins	2.30 g	50	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
13-May-2013	1	Initial release

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