



600 V tandem extra fast diode

Datasheet - production data

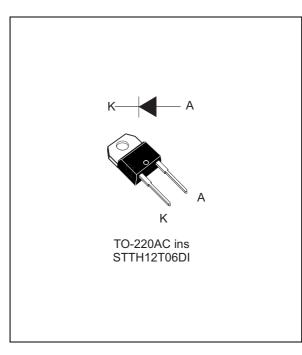


Table 1. Device summary

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.

Characteristics STTH12T06

Characteristics

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

Symbol	Parameter	Value	Unit	
V	Repetitive peak reverse voltage	T _j from 25 to 150 °C	600	V
V _{RRM}	Repetitive peak reverse voltage	T _j = -40 °C	550	V
I _{F(RMS)}	Forward rms current	22	Α	
I _{F(AV)}	Average forward current, $\delta = 0.5$	T _C = 75 °C	12	Α
I _{FSM}	Surge non repetitive forward current	90	Α	
I _{FRM}	Repetitive peak forward current	65	Α	
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.	Тур.	Max.	Unit
I _R ⁽¹⁾	Reverse leakage current	T _j = 25 °C	\/_ - \/			20	μA
IR Reverse leakage current	T _j = 125 °C	$V_R = V_{RRM}$		40	400	μΛ	
V _F ⁽²⁾ Forward voltage drop		T _j = 25 °C	I _F = 12A		2.95		V
VF`	Polward voltage drop	T _j = 150 °C	1F = 12A		2.05	2.55	V

^{1.} Pulse test: t_p = 5 ms, δ < 2%

To evaluate the conduction losses use the following equation: P = 1.75 x $I_{F(AV)}$ + 0.0667 x $I_{F}^{2}_{(RMS)}$

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

^{2.} Pulse test: t_p = 380 μ s, δ < 2%

STTH12T06 Characteristics

Table 5. Dynamic characteristics

Symbol	Parameter	Те	st conditions	Min.	Тур.	Max.	Unit
		$I_F = 1 \text{ A}, V_R = 30 \text{ V},$ $dI_F/dt = -50 \text{ A}/\mu\text{s}$		25	33		
t _{rr}	t _{rr} Reverse recovery time	T _j = 25 °C	$I_F = 12 \text{ A}, V_R = 400 \text{ V},$ $dI_F/dt = -200 \text{ A/}\mu\text{s}$		15	20	ns
		T _j = 125 °C	$I_F = 12 \text{ A}, V_R = 400 \text{ V},$ $dI_F/dt = -200 \text{ A/}\mu\text{s}$		23	30	
1	I _{RM} Reverse recovery current	T _j = 25 °C			0.83	1.1	A
'RM		T _j = 125 °C			2.3	3	
S	Softness factor	T _j = 25 °C	I _F = 12 A, V _R = 400 V,		1.4		
3	Solitiess factor	T _j = 125 °C	$dI_F/dt = -200 A/\mu s$		0.7		
0	Poverse recovery charge	T _j = 25 °C			6.5		nC
Q _{RR}	Reverse recovery charge	T _j = 125 °C			30		110

Figure 1. Average forward power dissipation versus average forward current

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

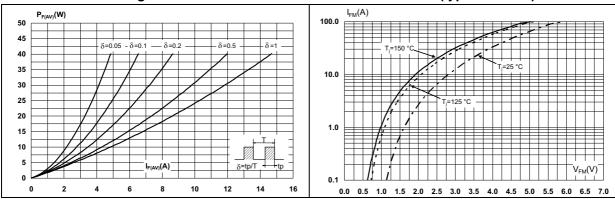
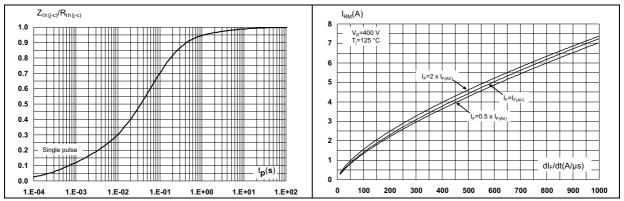


Figure 3. Relative variation of thermal impedance, junction to case, versus pulse duration

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



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

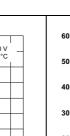
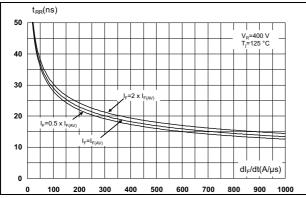


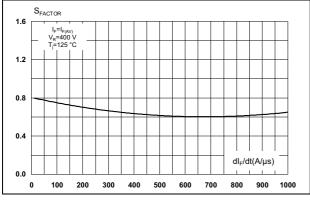
Figure 6. Reverse recovery charges versus dl_F/dt (typical values)



Q_{RR}(nC) V_R=400 V T_i=125 °C 20 10 dI_E/dt(A/µs)

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

Figure 8. Relative variations of dynamic parameters versus junction temperature



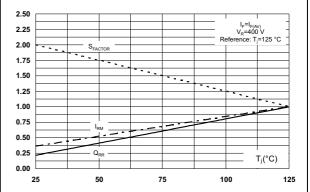
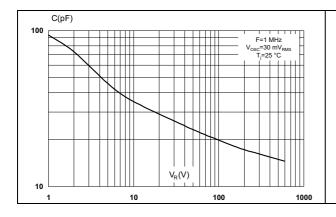
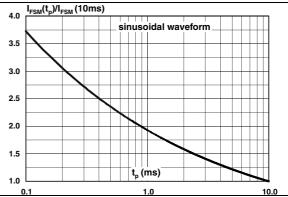


Figure 9. Junction capacitance versus reverse voltage applied (typical values)

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

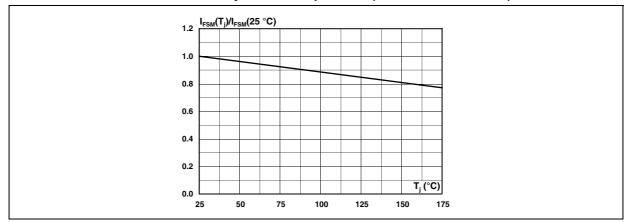




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Figure 11. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



Package information STTH12T06

2 Package information

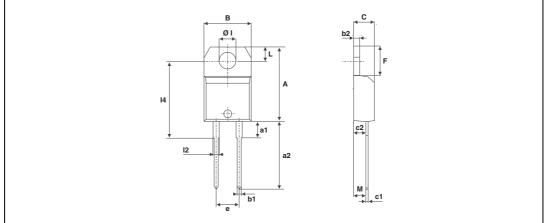
• Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque: 0.4 to 0.6 N·m

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Figure 12. T0-220AC ins dimension definitions



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Table 6. T0-220AC ins dimension values

			Dime	ensions		
Ref.		Millimeters			Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
В	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
С	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
е	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
14	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
12	1.14		1.70	0.044		0.066
М		2.60			0.102	

Ordering information STTH12T06

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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