

STTH3012

Ultrafast recovery - 1200 V diode

Main product characteristics

I _{F(AV)}	30 A
V _{RRM}	1200 V
Tj	175° C
V _F (typ)	1.30 V
t _{rr} (typ)	57 ns

Features and benefits

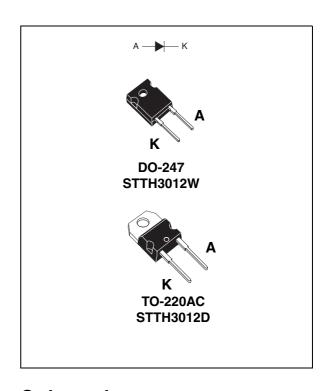
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature

Description

The 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.

Such demanding applications include industrial power supplies, motor control, and similar mission-critical systems that require rectification and freewheeling. These diodes also fit 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 competitive advantage for this device.



Order codes

Part Number	Marking
STTH3012D	STTH3012D
STTH3012W	STTH3012W

Characteristics STTH3012

Characteristics 1

Table 1. Absolute ratings (limiting values at 25° C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V _{RRM}	Repetitive peak reverse voltage			1200	V
I _{F(RMS)}	RMS forward current	RMS forward current			Α
I _{F(AV)}	Average forward current, $\delta = 0.5$ $T_c = 105^{\circ} C$		30	Α	
I _{FRM}	Repetitive peak forward current $t_p = 5 \mu s$, $F = 5 kHz square$		300	Α	
I _{FSM}	Surge non repetitive forward current t _p = 10 ms Sinusoidal		210	Α	
T _{stg}	Storage temperature range			-65 to + 175	°C
T _j	Maximum operating junction temperature			175	°C

Table 2. **Thermal parameters**

Symbol	Parameter	Value	Unit
R _{th(j-c)}	Junction to case	0.95	°C/W

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I _R ⁽¹⁾ Reverse leakage current	Povorco logizado gurrant	T _j = 25° C	V V			20	
	T _j = 125° C	$V_R = V_{RRM}$		15	150	μA	
V _F ⁽²⁾ Forward voltage drop	T _j = 25° C	I _F = 25 A			2.1		
	T _j = 125° C			1.25	1.9		
	T _j = 150° C			1.20	1.8	V	
VF`	V _F ⁽²⁾ Forward voltage drop	T _j = 25° C				2.25	V
	T _j = 125° C	I _F = 30 A		1.35	2.05		
	T _j = 150° C			1.30	1.95		

^{1.} Pulse test: $t_p = 5$ ms, $\delta < 2$ %

To evaluate the conduction losses use the following equation: P = 1.60 x $I_{F(AV)}$ + 0.012 $I_{F}^{2}_{(RMS)}$

$$P = 1.60 \times I_{F(AV)} + 0.012 I_{F^2(BMS)}$$

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

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Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
+	Reverse recovery time	$I_F = 1 \text{ A, } dI_F/dt = -50 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$			115	ns
t _{rr}	neverse recovery time	I_F = 1 A, dI_F/dt = -100 A/ μ s, V_R = 30 V, T_j = 25° C		57	80	115
I _{RM}	Reverse recovery current	$I_F = 30 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s}, \ V_R = 600 \text{ V}, T_j = 125^{\circ} \text{ C}$		25	35	Α
S	Softness factor	$I_F = 30 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 600 \text{ V}, T_j = 125^{\circ} \text{ C}$		1.5		
t _{fr}	Forward recovery time	$I_F = 30 \text{ A}$ $dI_F/dt = 100 \text{ A/}\mu\text{s}$ $V_{FR} = 1.5 \text{ x } V_{Fmax}, T_j = 25^{\circ} \text{ C}$			550	ns
V _{FP}	Forward recovery voltage	$I_F = 30 \text{ A, } dI_F/dt = 100 \text{ A/}\mu\text{s,}$ $T_j = 25^{\circ} \text{ C}$		6		٧

Figure 1. Conduction losses versus average current

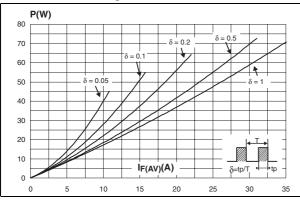
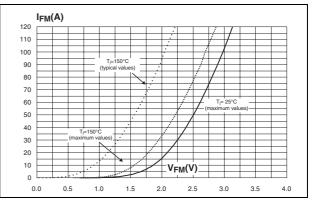


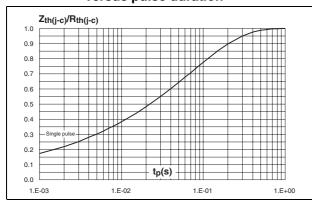
Figure 2. Forward voltage drop versus forward current



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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)



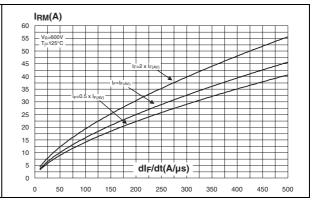
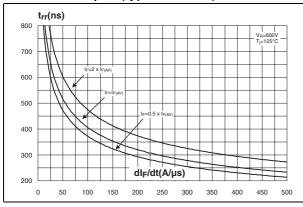


Figure 5. Reverse recovery time versus dl_E/dt (typical values)

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



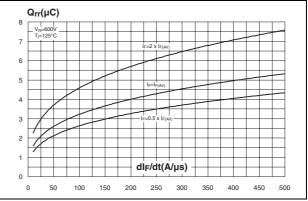
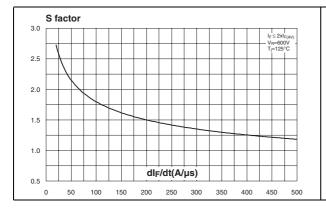
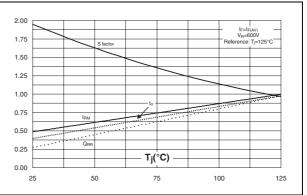


Figure 7. Softness factor versus dl_F/dt (typical values)

Figure 8. Relative variations of dynamic parameters versus junction temperature

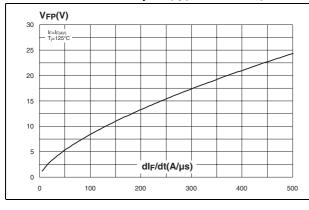




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Figure 9. Transient peak forward voltage versus dl_F/dt (typical values)

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



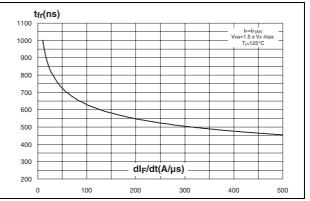
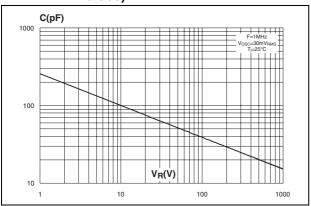


Figure 11. Junction capacitance versus reverse voltage applied (typical values)



Package information STTH3012

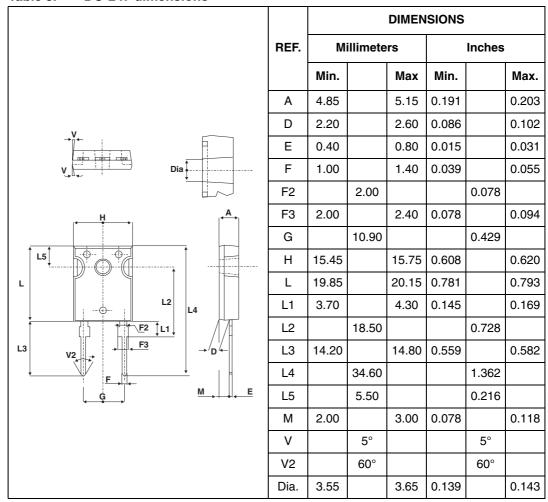
2 Package information

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.55 Nm (TO-220AC)
Recommended torque value: 0.80 Nm (DO-247)
Maximum torque value: 0.7 Nm (TO-220AC)
Maximum torque value: 1.0 Nm (DO-247)

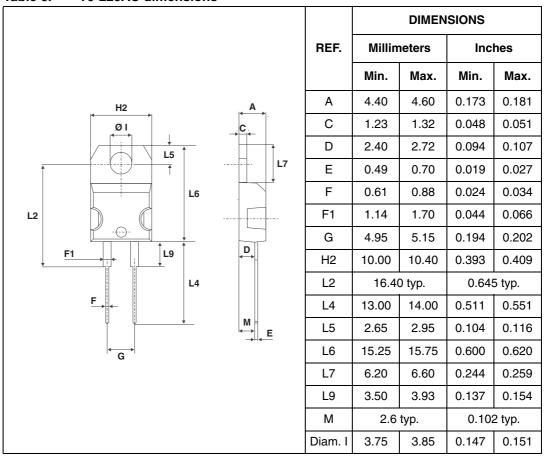
Table 5. DO-247 dimensions



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STTH3012 Package information

Table 6. T0-220AC dimensions



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.

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Ordering information STTH3012

3 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH3012D	STTH3012D	TO-220AC	1.86 g	50	Tube
STTH3012W	STTH3012W	DO-247	4.4 g	30	Tube

4 Revision history

Date	Revision	Description of Changes
02-Mar-2006	1	First issue.

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