### STTH1210-Y



## Automotive ultrafast recovery - high voltage diode

Datasheet - production data

#### **Features**

- AEC-Q101 qualified
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and 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, like automotive applications.

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.

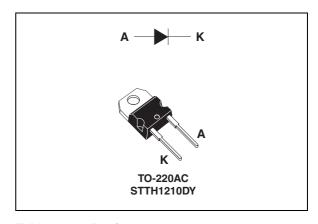


Table 1. Device summary

I <sub>F(AV)</sub>	12 A
$V_{RRM}$	1000 V
T <sub>j</sub>	175 °C
V <sub>F</sub> (typ)	1.30 V
t <sub>rr</sub> (typ)	48 ns

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### 1 Characteristics

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

Symbol	Parameter			Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage			1000	V
I <sub>F(RMS)</sub>	Forward rms current	Forward rms current			
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$	12	Α		
I <sub>FRM</sub>	Repetitive peak forward current $t_p = 5 \mu s$ , $F = 5 kHz square$		120	Α	
I <sub>FSM</sub>	Surge non repetitive forward current	80	Α		
T <sub>stg</sub>	Storage temperature range			-65 to +175	°C
T <sub>j</sub>	Operating junction temperature range			-40 to +175	°C

#### Table 3. Thermal parameters

Symbol	Parameter	Value	Unit
R <sub>th(j-c)</sub>	Junction to case	1.9	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Poverse leekage ourrant	T <sub>j</sub> = 25 °C	V -V			10	
'R` ′	I <sub>R</sub> <sup>(1)</sup> Reverse leakage current	T <sub>j</sub> = 125 °C	$V_R = V_{RRM}$		3	30	μA
		T <sub>j</sub> = 25 °C				2.0	
V <sub>F</sub> <sup>(2)</sup> Fo	Forward voltage drop	T <sub>j</sub> = 100 °C	I <sub>F</sub> = 12 A		1.40	1.8	V
		T <sub>j</sub> = 150 °C			1.30	1.7	

<sup>1.</sup> Pulse test:  $t_p = 5 \text{ ms}, \delta < 2\%$ 

To evaluate the conduction losses use the following equation:

$$P = 1.3 \text{ x } I_{F(AV)} + 0.033 I_{F}^{2}_{(RMS)}$$

<sup>2.</sup> Pulse test:  $t_p$  = 380  $\mu$ s,  $\delta$  < 2%

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Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
	Daviera versioni timo	$I_F$ = 1 A, $dI_F/dt$ = -50 A/ $\mu$ s, $V_R$ = 30 V, $T_j$ = 25 °C		67	90	ns
t <sub>rr</sub>	Reverse recovery time	$I_F$ = 1 A, $dI_F/dt$ = -100 A/ $\mu$ s, $V_R$ = 30 V, $T_j$ = 25 °C		48	65	115
I <sub>RM</sub>	Reverse recovery current	$I_F = 12 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 600 \text{ V}, T_j = 125 \text{ °C}$		15	20	Α
S	Softness factor	$I_F = 12 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 600 \text{ V}, T_j = 125 \text{ °C}$		2		
t <sub>fr</sub>	Forward recovery time	$I_F = 12 \text{ A}$ $dI_F/dt = 50 \text{ A/}\mu\text{s}$ $V_{FR} = 1.5 \text{ x } V_{Fmax}, T_j = 25 \text{ °C}$			400	ns
V <sub>FP</sub>	Forward recovery voltage	$I_F = 12 \text{ A, } dI_F/dt = 50 \text{ A/}\mu\text{s,}$ $T_j = 25 \text{ °C}$		5		V

Figure 1. Conduction losses versus average current

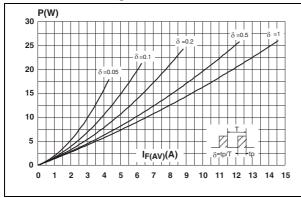


Figure 2. Forward voltage drop versus forward current

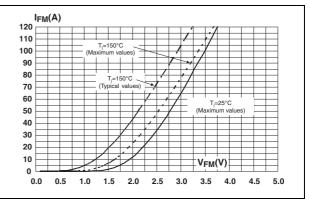


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

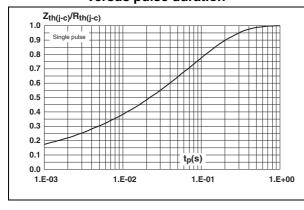
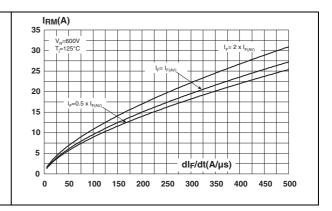
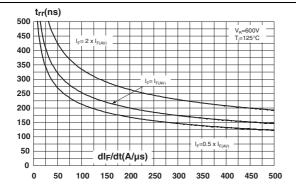


Figure 4. Peak reverse recovery current versus dl<sub>F</sub>/dt (typical values)



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Figure 5. Reverse recovery time versus dI<sub>F</sub>/dt Figure 6. Reverse recovery charges (typical values) versus dI<sub>F</sub>/dt (typical values)



Q<sub>rr</sub>(μC)
3.5

V<sub>p=600V</sub>
3.0

T<sub>p=125°C</sub>
2.5

2.0

1.5

1.0

0.5

0.0

0.50

100

150

200

250

300

350

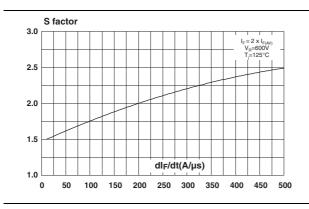
400

450

500

Figure 7. Softness factor versus dl<sub>F</sub>/dt (typical values)

Figure 8. Relative variations of dynamic parameters versus junction temperature



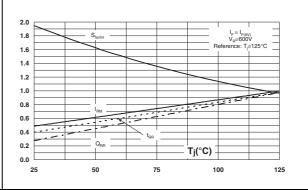
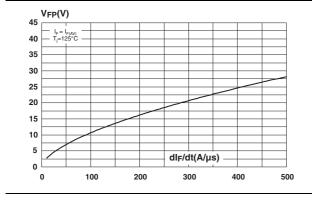
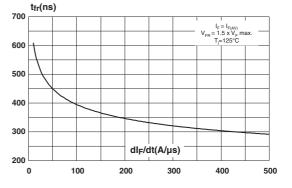


Figure 9. Transient peak forward voltage versus dl<sub>F</sub>/dt (typical values)

Figure 10. Forward recovery time versus dl<sub>F</sub>/dt (typical values)





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100 C(pF)
100 F=1MHz
Vos=30mVraus
T<sub>1</sub>=25°C

10 VR(V)
1 1 10 100 1000

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

Package information STTH1210-Y

### 2 Package information

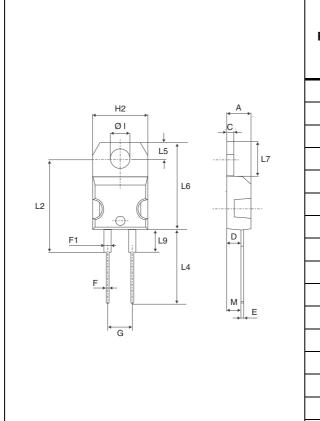
Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.4 to 0.6 N⋅m

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

Table 6. T0-220AC dimensions



	DIMENSIONS			
Ref.	Millimeters Min. Max.		Inc	hes
			Min.	Max.
Α	4.40	4.60	0.173	0.181
С	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
Е	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40	0 typ.	0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
М	2.6 typ.		0.102 typ	
Diam. I	3.75	3.85	0.147	0.151

# **3** Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1210DY	STTH1210DY	TO-220AC	1.86 g	50	Tube

## 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
24-Oct-2012	1	First issue.

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