STTH6010-Y

Automotive ultrafast recovery - high voltage diode

Features

- AEC-Q101 qualified
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- ECOPACK®2 compliant component

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.

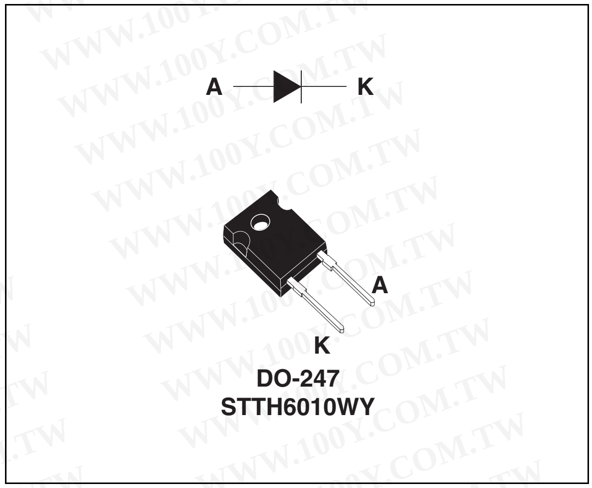


Table 1. Device summary

$I_{F(AV)}$	60 A
V_{RRM}	1000 V
T_j	175 °C
V_F (typ)	1.3 V
t_{rr} (typ)	49 ns

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
$I_{F(RMS)}$	Forward rms current		80	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 75$ °C	60	A
I_{FRM}	Repetitive peak forward current	$t_p = 5$ µs, F = 5 kHz square	450	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	400	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range		-40 to +175	°C

Table 3. Thermal parameters

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	0.78	°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			20	200	
V_F (2)	Forward voltage drop	$T_j = 25$ °C	$I_F = 60$ A			2.0	V
		$T_j = 100$ °C			1.4	1.8	
		$T_j = 150$ °C			1.3	1.7	

1. Pulse test: $t_p = 5$ ms, $\delta < 2$ %
2. Pulse test: $t_p = 380$ µs, $\delta < 2$ %

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

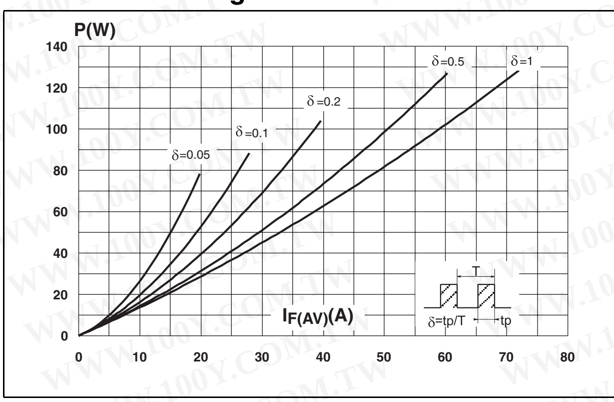


Figure 2. Forward voltage drop versus forward current

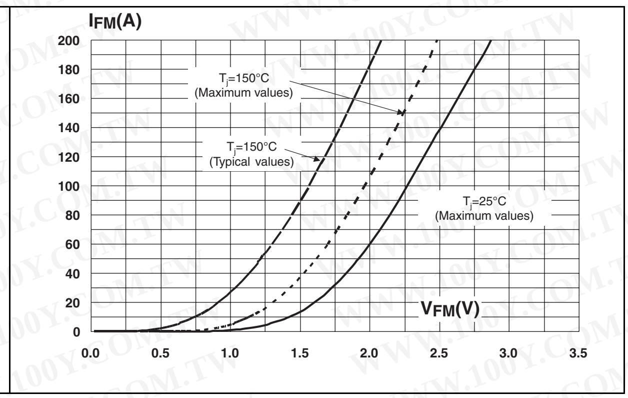


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

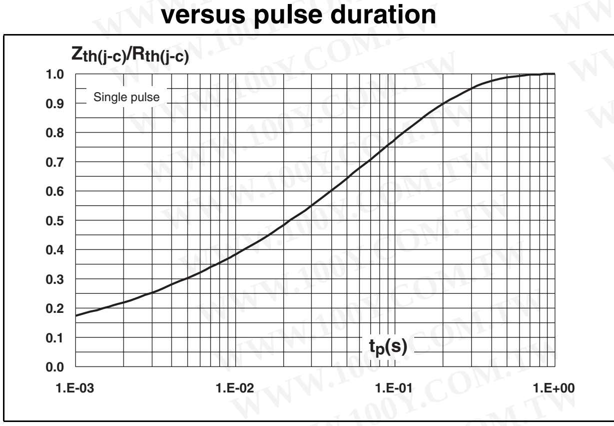


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

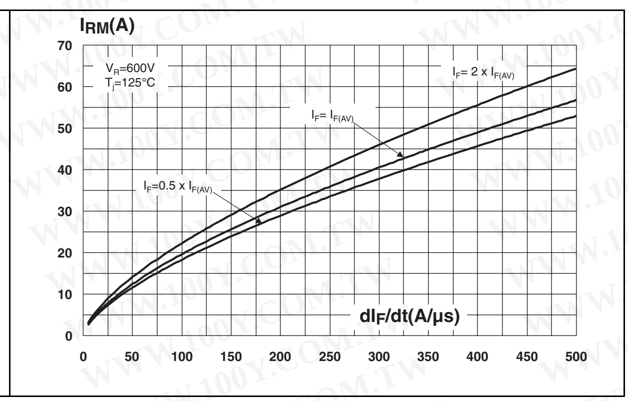


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

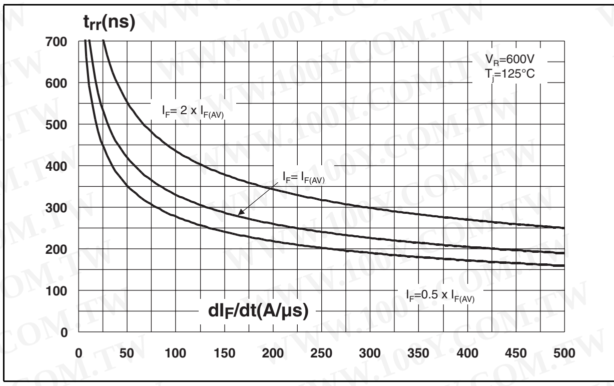


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

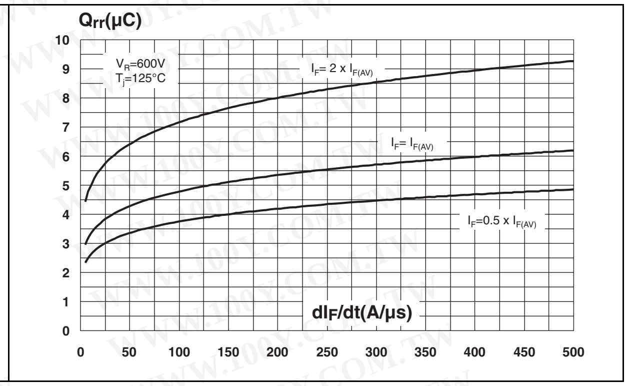


Figure 7. Softness factor versus dI_F/dt (typical values)

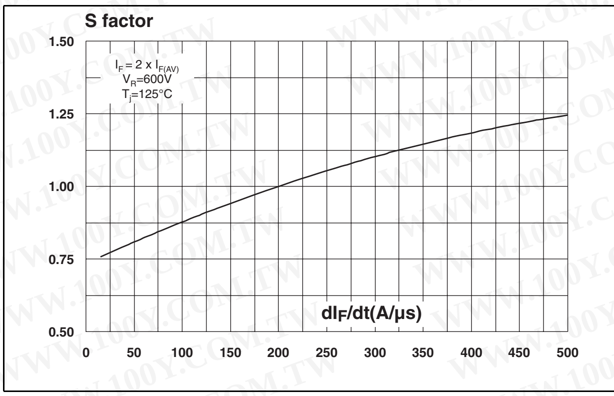


Figure 8. Relative variations of dynamic parameters versus junction temperature

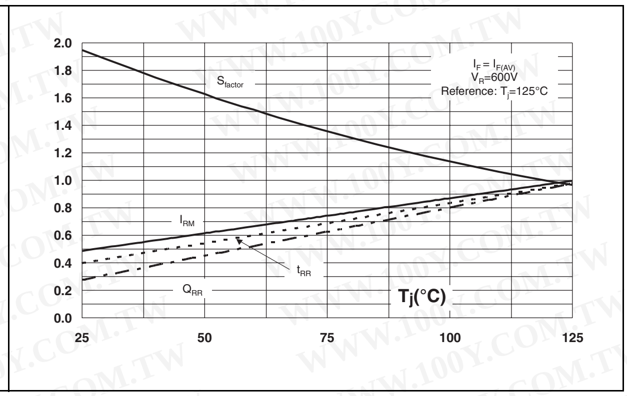


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

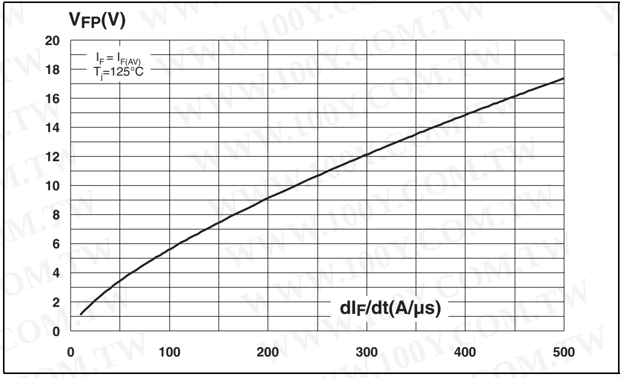


Figure 10. Forward recovery time versus dI_F/dt (typical values)

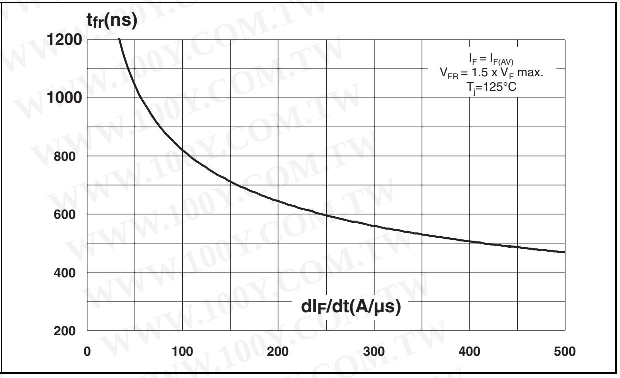
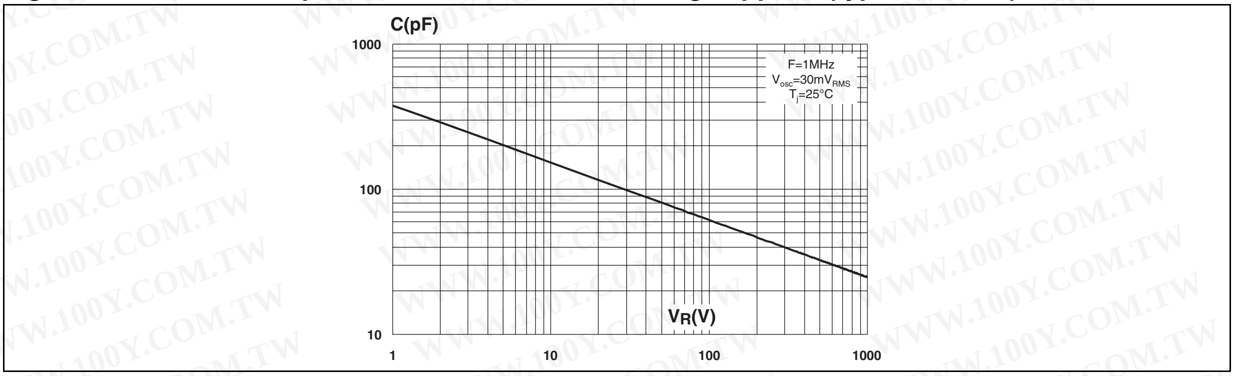


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

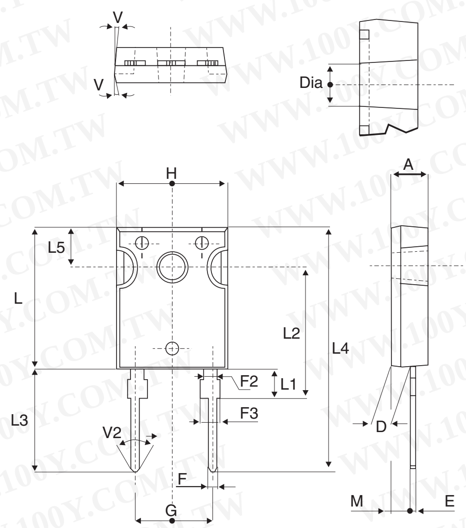


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.80 N·m
- Maximum torque value: 1.0 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.

Table 6. DO-247 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.		Max	Min.		Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH6010WY	STTH6010WY	DO-247	4.4 g	30	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
04-Nov-2011	1	Initial release.

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