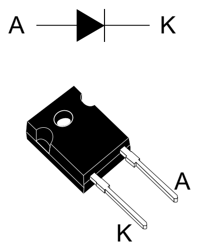
STTH6010-Y

Automotive ultrafast recovery - high voltage diode

Datasheet - production data



DO-247

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 (max.)	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	T_c = 75 °C, δ = 0.5, square wave	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, δ < 2%
2. Pulse test: t_p = 380 µs, δ < 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

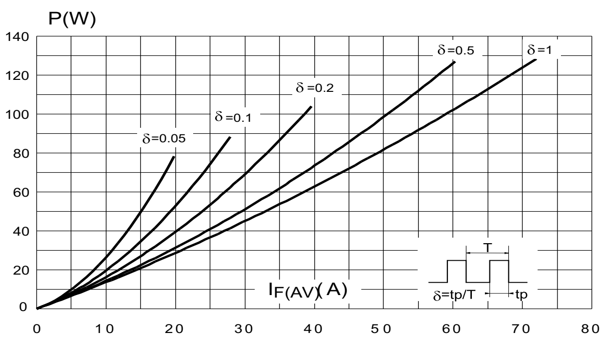


Figure 2. Forward voltage drop versus forward current

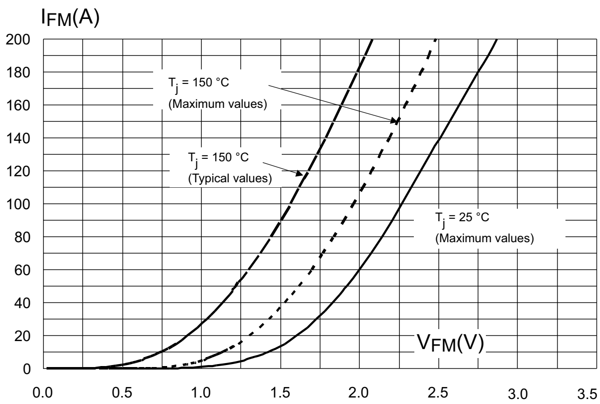


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

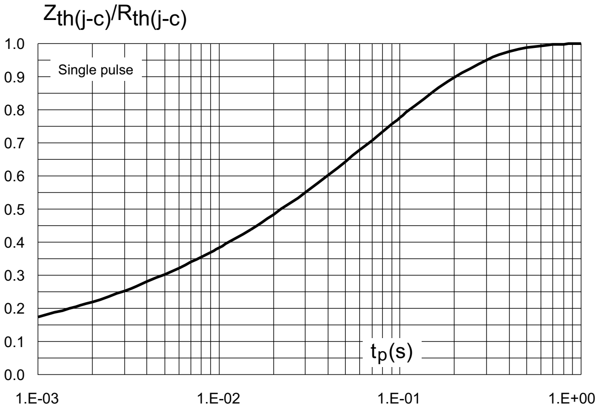


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

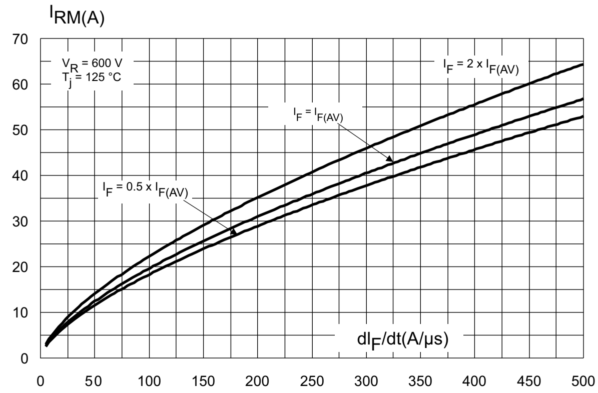


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

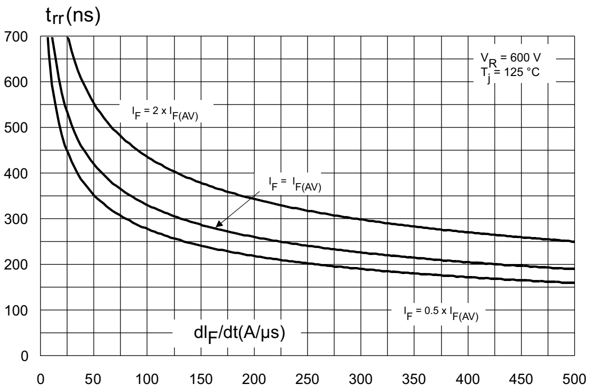


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

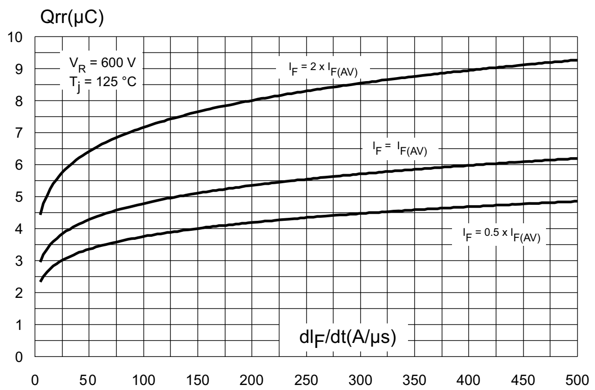


Figure 7. Softness factor versus dI_F/dt (typical values)

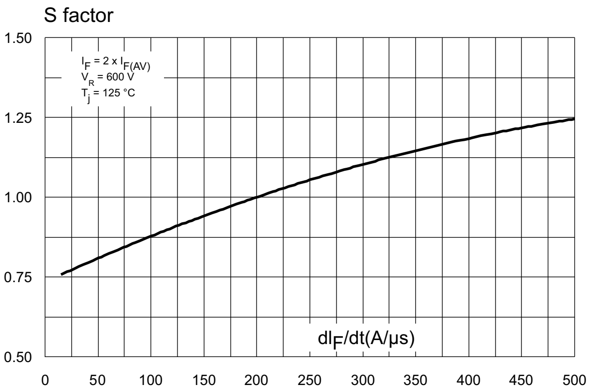


Figure 8. Relative variations of dynamic parameters versus junction temperature

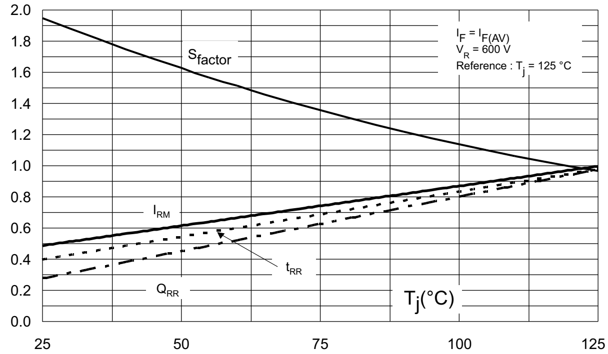


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

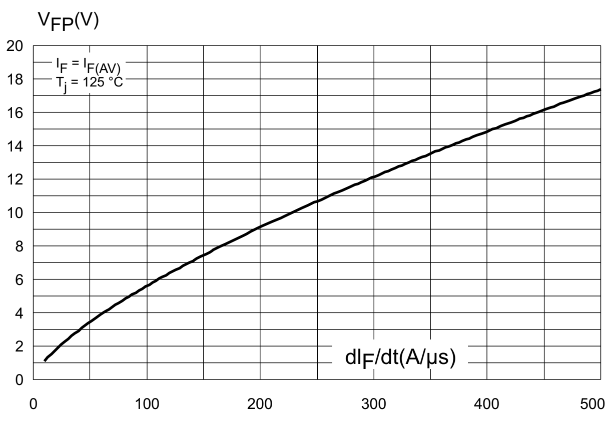


Figure 10. Forward recovery times versus dI_F/dt (typical values)

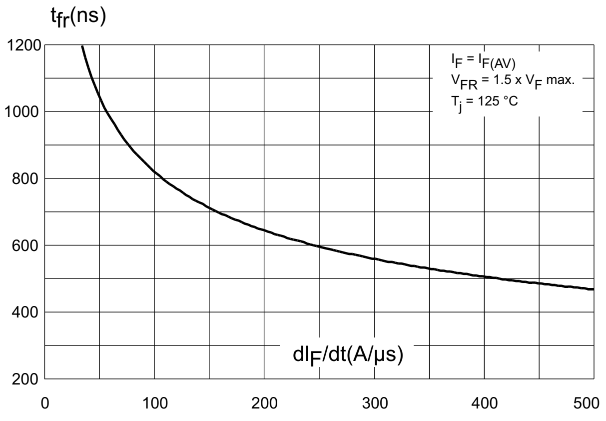


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

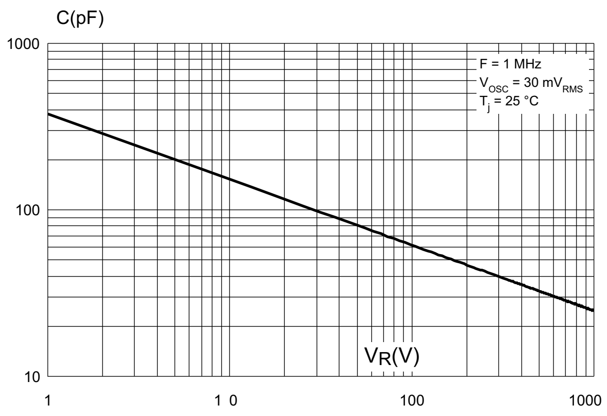


Figure 12. Threshold voltage versus junction temperature

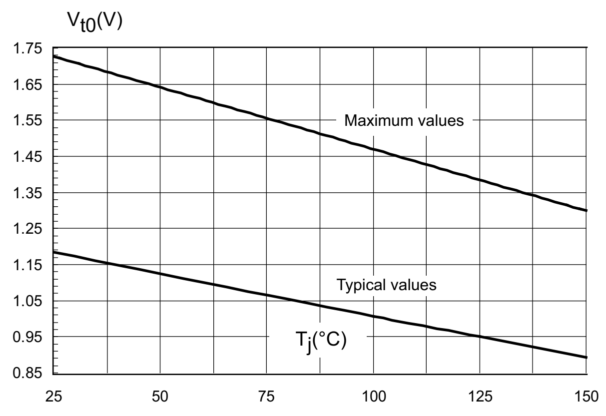
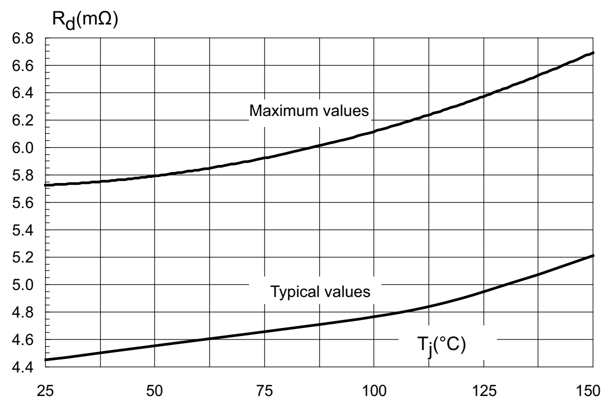


Figure 13. Dynamic resistance versus junction temperature



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.

2.1 DO-247 package information

Figure 14. DO-247 package outline

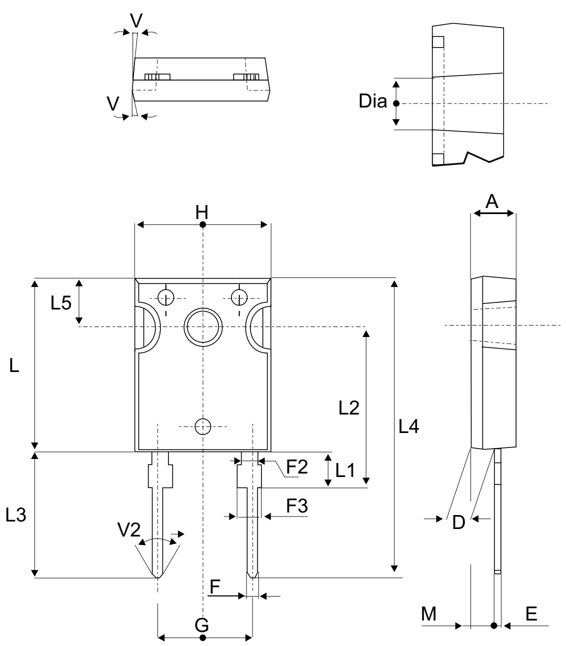


Table 6. DO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches(1)		
	Typ.	Min.	Max.	Typ.	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

1. Values in inches are converted from mm and rounded to 4 decimal digits.

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.
22-Apr-2015	2	Added *Figure 12* and *Figure 13*. Document updated to current standard.