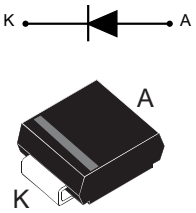
STTH2R02AY

Datasheet

Automotive 200 V, 2 A ultrafast diode



SMA

Features

- AEC-Q101 qualified
- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature
- PPAP capable
- ECOPACK2 compliant

Applications

- DC/DC converter
- Reverse polarity protection
- LED Lighting
- Injection system

Description

The STTH2R02AY is based on ST´s 200 V planar Pt doping technology.

This is leading to best in class V_F/Q_{RR} performances, especially in high temperature environment.

Packaged in SMA package, this device is particularly suitable for high frequency operations in automotive applications.

Product status
STTH2R02AY

Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 A
V_{RRM}	200 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.71 V
$t_{rr}(typ.)$	15 ns

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage (T_j = -40 °C to +175 °C)		200	V
$I_{F(RMS)}$	Forward rms current		60	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_L = 119 °C	2	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	62	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature		+175	°C

Table 2. Thermal resistance parameter

Symbol	Parameter	Max. value	Unit
$R_{th(j-l)}$	Junction to lead	28	°C/W

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		2.5	µA
		T_j = 125 °C		-	2.5	25	
V_F	Forward voltage drop	T_j = 25 °C	I_F = 2 A	-	0.90	1.04	V
		T_j = 150 °C		-	0.71	0.82	
		T_j = 25 °C	I_F = 6 A	-		1.25	

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:

$P = 0.64 \times I_{F(AV)} + 0.09 \times I_F{}^2{}_{(RMS)}$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

Table 4. Dynamic characteristics (T_j = 25 °C unless otherwise specified)

Symbol	Parameters	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	-	23	30	ns
		I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V	-	15	20	
I_{RM}	Reverse recovery current	I_F = 2 A, dI_F/dt = -200 A/µs, V_R = 160 V, T_j = 125 °C	-	3.5		A

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

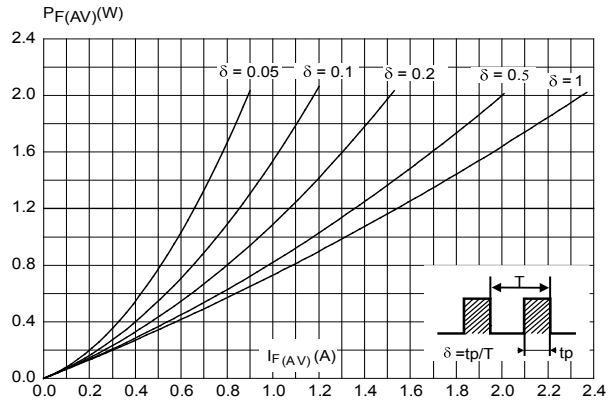


Figure 2. Forward voltage drop versus forward current (typical values)

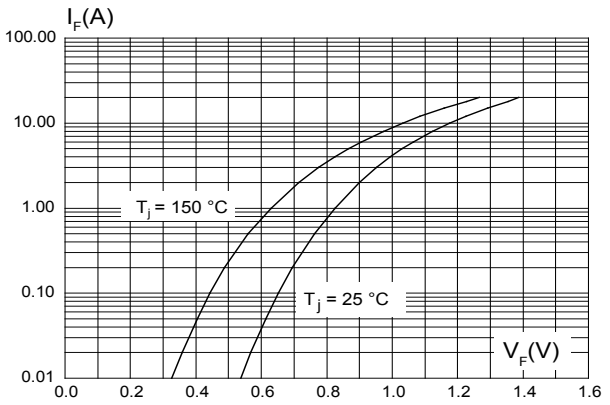


Figure 3. Forward voltage drop versus forward current (maximum values)

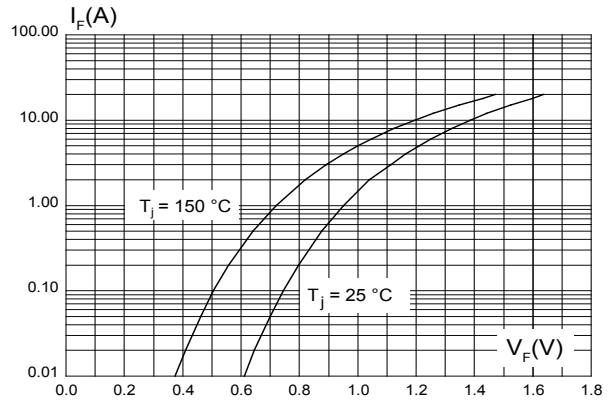


Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration

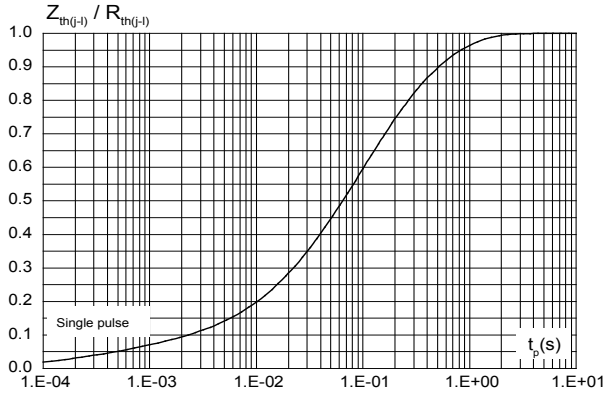


Figure 5. Reverse recovery charges versus dI_F/dt (typical values)

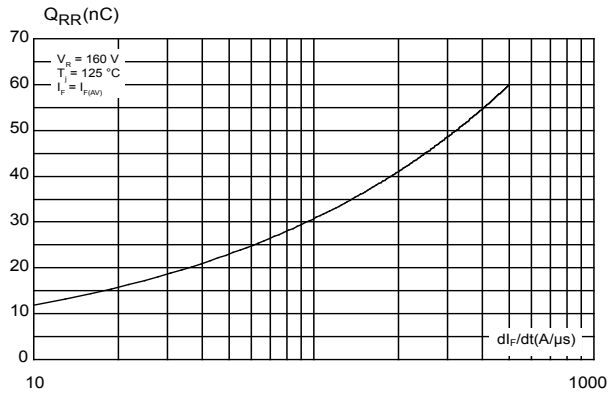


Figure 6. Reverse recovery time versus dI_F/dt (typical values)

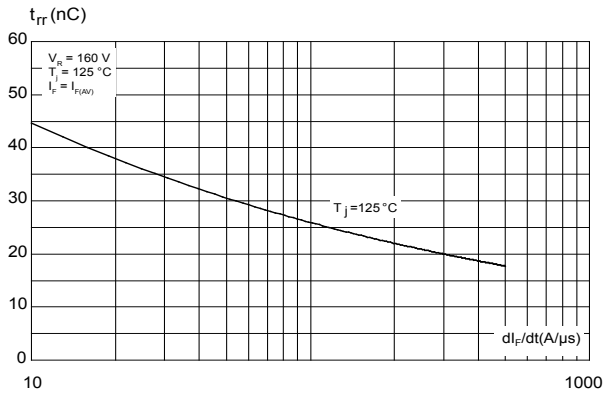


Figure 7. Peak reverse recovery current versus dI_F/dt (typical values)

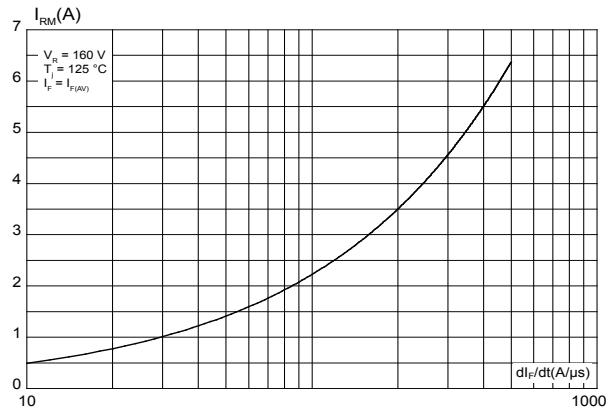


Figure 8. Relative variations of dynamic parameters versus junction temperature

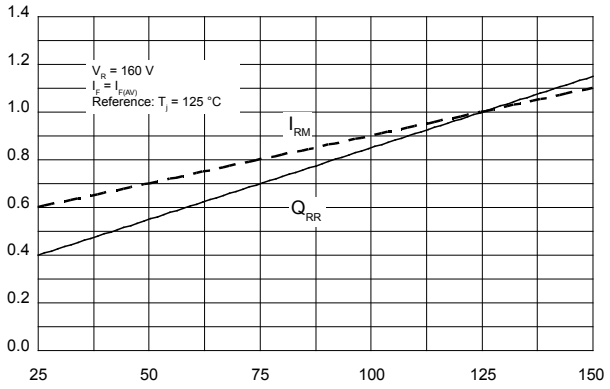


Figure 9. Junction capacitance versus reverse voltage applied (typical values)

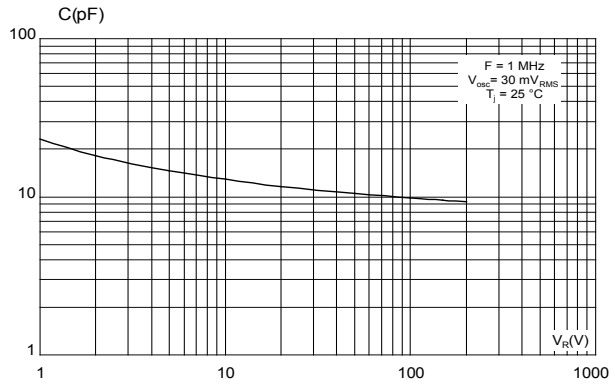
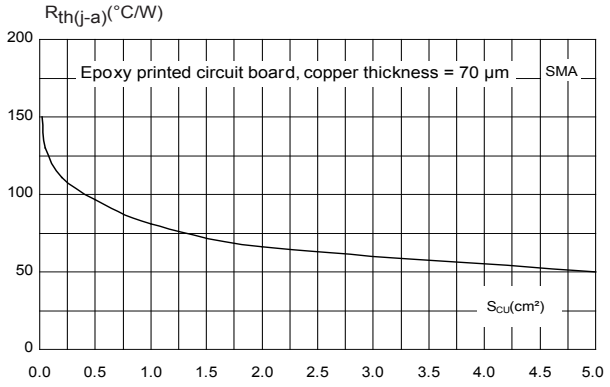


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (typical values)



2 Package information

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 SMA package information

- Epoxy meets UL94, V0
- Cooling method : by conduction (C)

Figure 11. SMA package outline

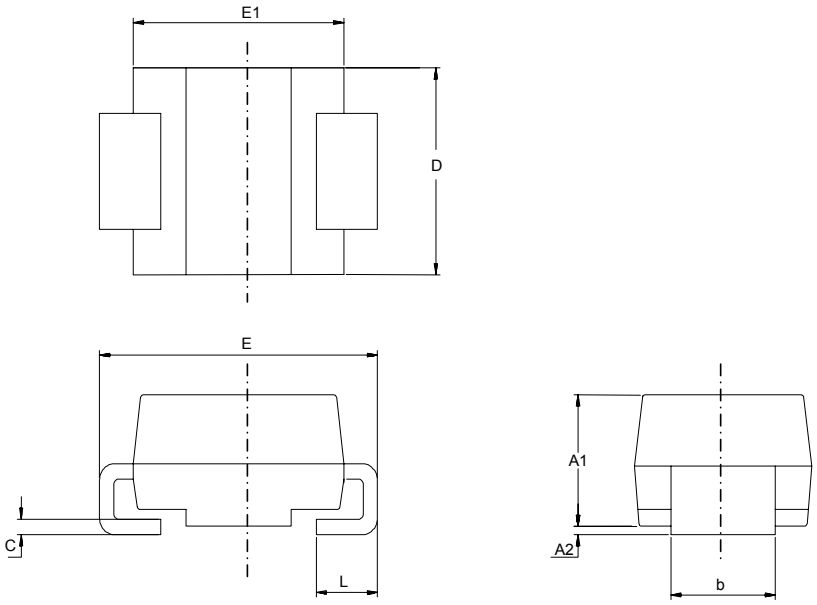
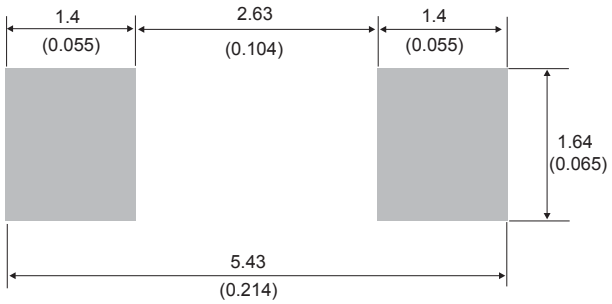


Table 5. SMA package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.074	0.097
A2	0.05	0.20	0.001	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.005	0.016
D	2.25	2.90	0.088	0.115
E	4.80	5.35	0.188	0.211
E1	3.95	4.60	0.155	0.182
L	0.75	1.50	0.029	0.060

Figure 12. **SMA recommended footprint in mm (inches)**



3 Ordering information

Figure 13. **Ordering information scheme**

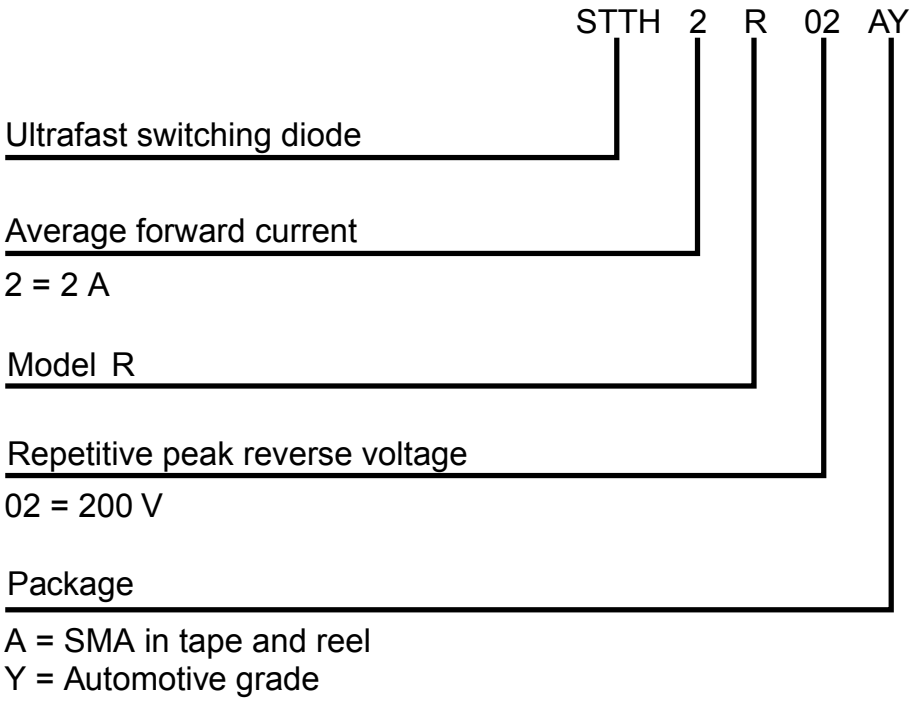


Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH2R02AY	2R2AY	SMA	68 mg	5000	Tape and reel

Revision history

Table 7. **Document revision history**

Date	Revision	Changes
16-Feb-2021	1	First issue.