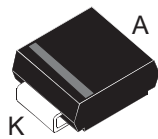



## Automotive 200 V, 2 A ultrafast diode



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 ( $T_j = -40\text{ °C}$ to $+175\text{ °C}$ )	200	V	
$I_{F(RMS)}$	Forward rms current	60	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$ , square wave	$T_L = 119\text{ °C}$	2	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ 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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		2.5	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	2.5	25	
$V_F$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$	-	0.90	1.04	V
		$T_j = 150\text{ °C}$		-	0.71	0.82	
		$T_j = 25\text{ °C}$	$I_F = 6\text{ A}$	-		1.25	

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

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

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

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

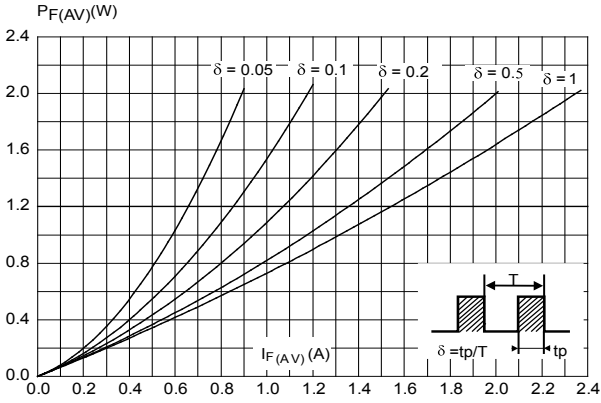
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

**Table 4. Dynamic characteristics ( $T_j = 25\text{ °C}$  unless otherwise specified)**

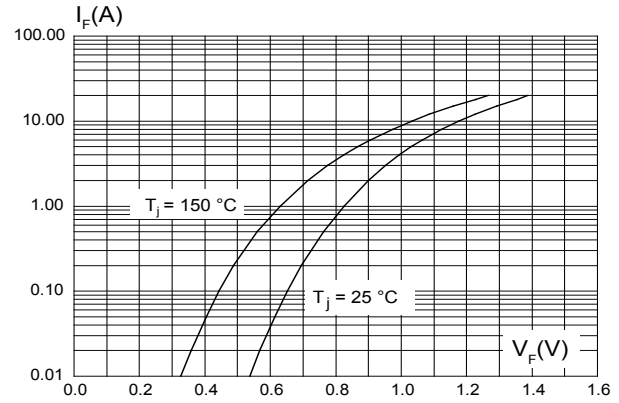
Symbol	Parameters	Test conditions	Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1\text{ A}$ , $di_F/dt = -50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	23	30	ns
		$I_F = 1\text{ A}$ , $di_F/dt = -100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	15	20	
$I_{RM}$	Reverse recovery current	$I_F = 2\text{ A}$ , $di_F/dt = -200\text{ A}/\mu\text{s}$ , $V_R = 160\text{ V}$ , $T_j = 125\text{ °C}$	-	3.5		A

### 1.1 Characteristics (curves)

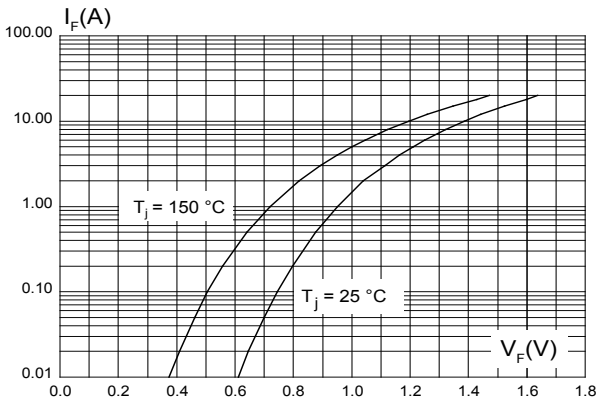
**Figure 1. Average forward power dissipation versus average forward current**



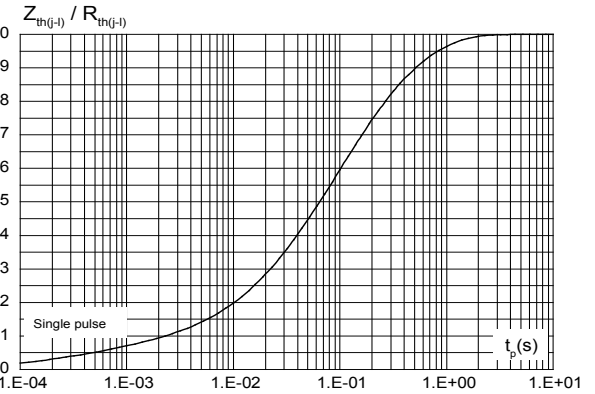
**Figure 2. Forward voltage drop versus forward current (typical values)**



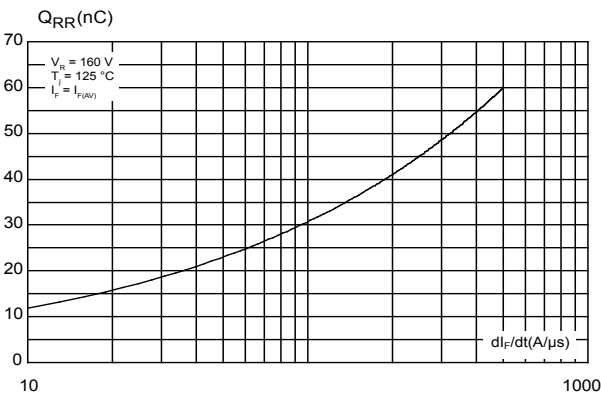
**Figure 3. Forward voltage drop versus forward current (maximum values)**



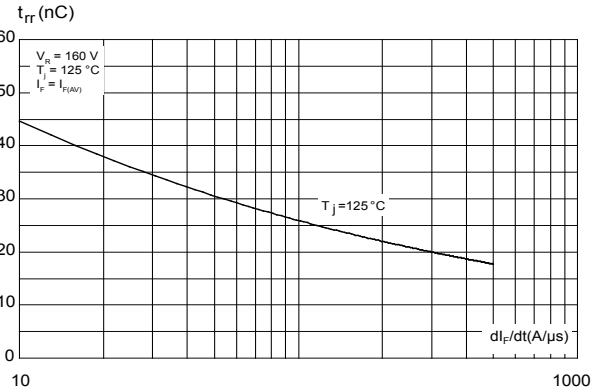
**Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration**



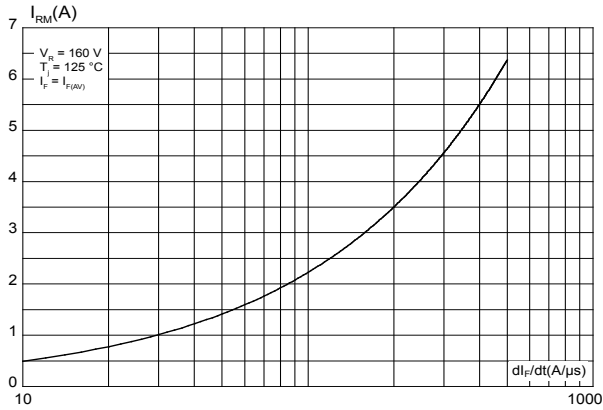
**Figure 5. Reverse recovery charges versus  $di_F/dt$  (typical values)**



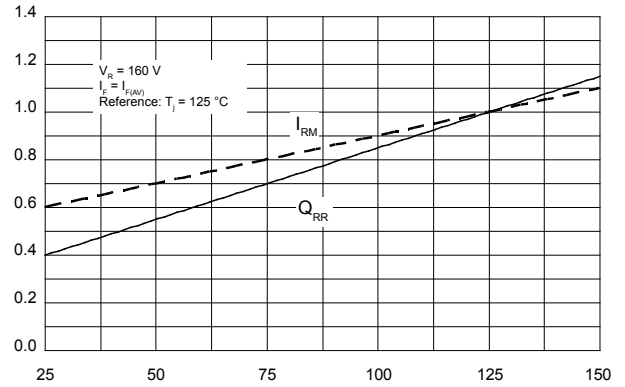
**Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)**



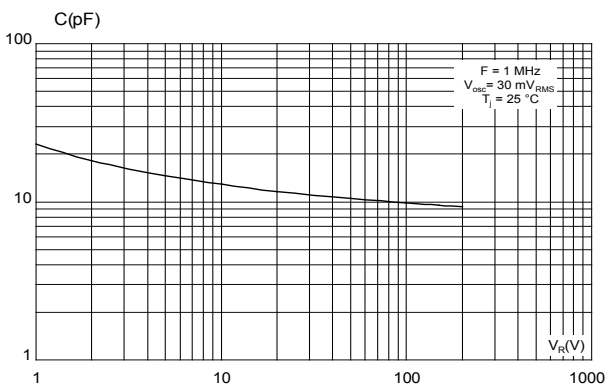
**Figure 7. Peak reverse recovery current versus  $di_f/dt$  (typical values)**



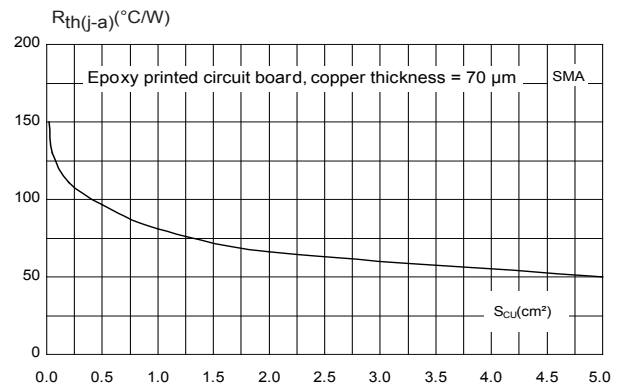
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



**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)**



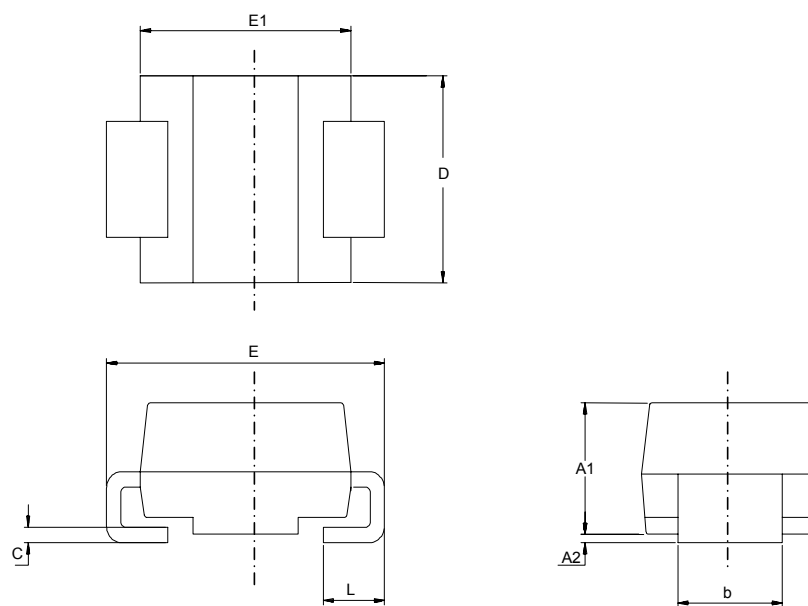
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 SMA package information

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

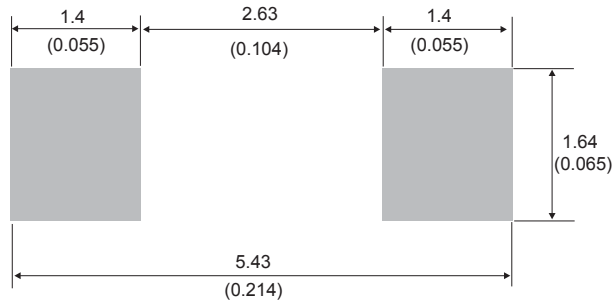
**Figure 11. SMA package outline**



**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

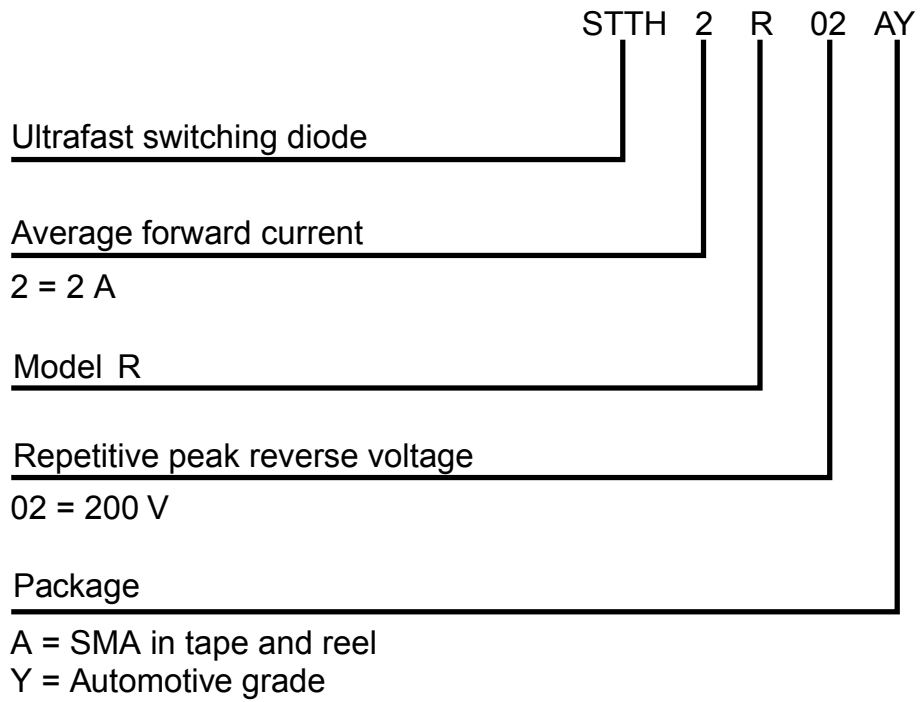


Table 6. Ordering information

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.



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