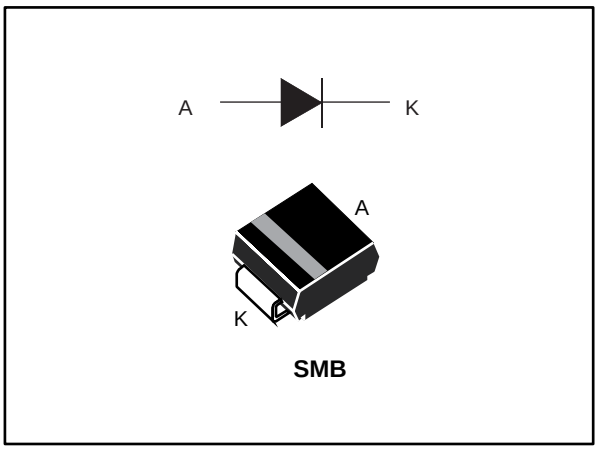
STTH2R02-Y

Automotive ultrafast recovery diode

Datasheet - production data



SMB

Features

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

Description

This device uses ST's new 200 V planar Pt doping technology, and is specially suited for switching mode base drive and transistor circuits.

Packaged in SMB, it is intended for use in low voltage, high frequency inverters, freewheeling and polarity protection in automotive applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 A
V_{RRM}	200 V
T_j (max.)	175 °C
V_F (typ.)	0.7 V
t_{rr} (typ.)	15 ns

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		200	V
I_{FRM}	Repetitive peak forward current	t_p = 5 µs, f = 5 kHz	60	A
$I_{F(RMS)}$	Forward rms current		60	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_{lead} = 90 °C	2	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	75	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature(1)		-40 to +175	°C

Notes:

(1)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal parameters

Symbol	Parameter	Maximum	Unit
$R_{th(j-l)}$	Junction to lead	30	°C/W

Table 4: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		3	µA
		T_j = 125 °C		-	2	20	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 6 A	-		1.20	V
		T_j = 25 °C	I_F = 2 A	-	0.89	1.0	
		T_j = 100 °C		-	0.76	0.85	
		T_j = 150 °C		-	0.70	0.80	

Notes:

(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:

$P = 0.68 \times I_{F(AV)} + 0.06 \times I_{F^2(RMS)}$

Table 5: Dynamic characteristics

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	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	
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 2 A; dI_F/dt = 100 A/µs; V_{FR} = 1.1 x V_{Fmax}	-	40		
V_{FP}	Forward recovery voltage		I_F = 2 A; dI_F/dt = 100 A/µs	-	2.0		V
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 2 A; dI_F/dt = -200 A/µs; V_R = 160 V	-	3	4	A

1.1 Characteristics (curves)

Figure 1: Peak current versus duty cycle

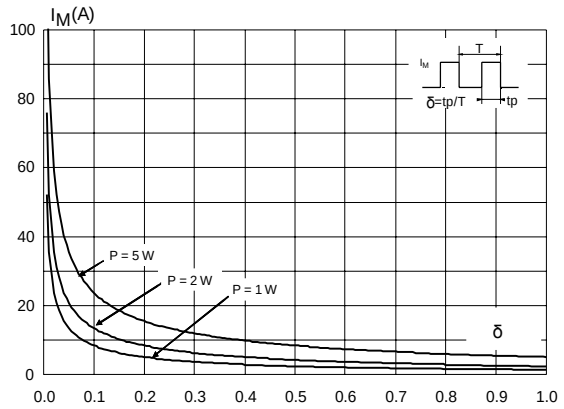


Figure 2: Forward voltage drop versus forward current (typical values)

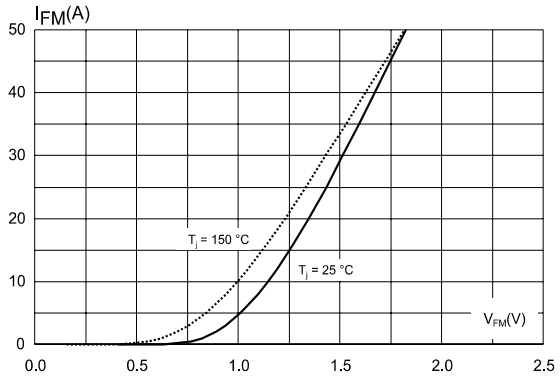


Figure 3: Forward voltage drop versus forward current (maximum values)

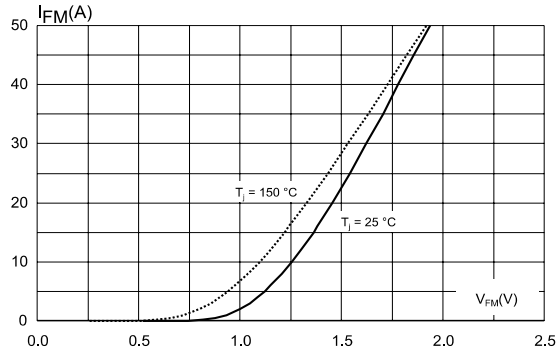


Figure 4: Relative variation of thermal impedance junction to ambient versus pulse duration

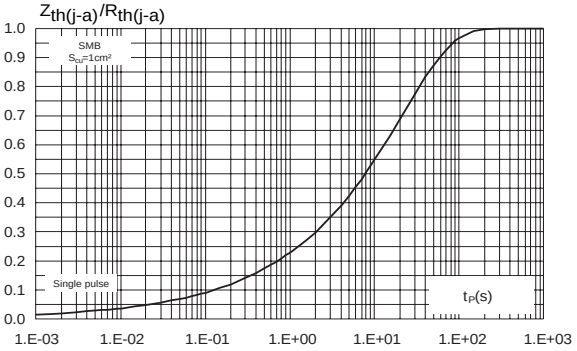


Figure 5: Junction capacitance versus reverse applied voltage (typical values)

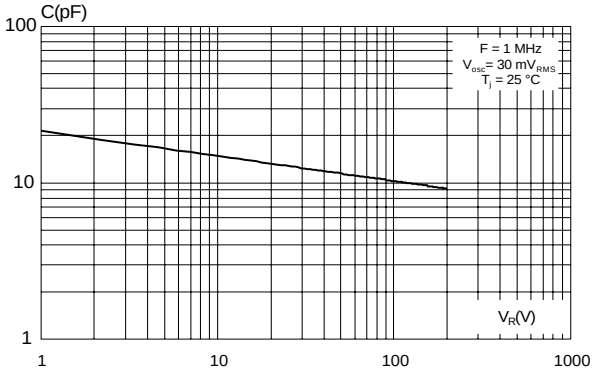


Figure 6: Reverse recovery charges versus dIF/dt (typical values)

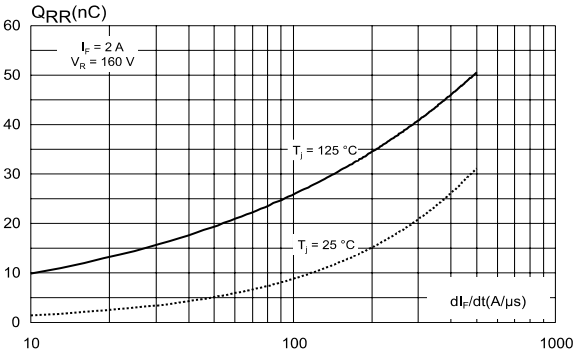


Figure 7: Reverse recovery time versus dI_F/dt (typical values)

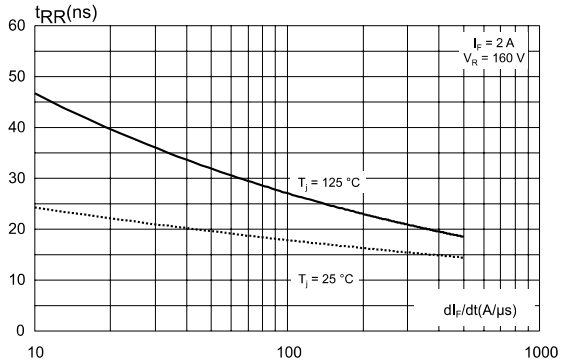


Figure 8: Peak reverse recovery current versus dI_F/dt (typical values)

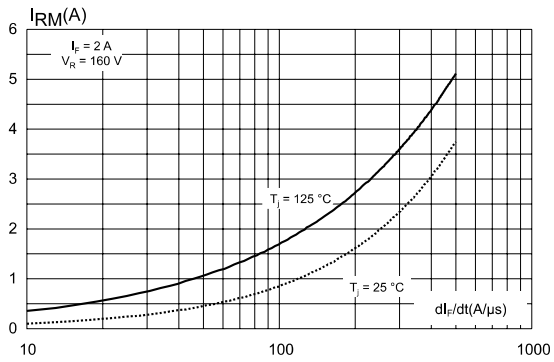


Figure 9: Dynamic parameters versus junction temperature

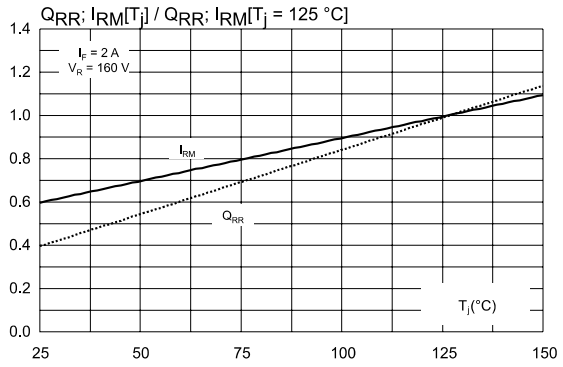
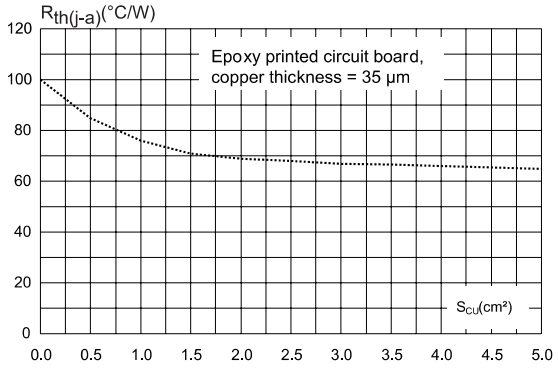


Figure 10: Thermal resistance, junction to ambient, versus copper surface under each lead



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.

- Epoxy meets UL94, V0
- Lead-free package

2.1 SMB package information

Figure 11: SMB package outline

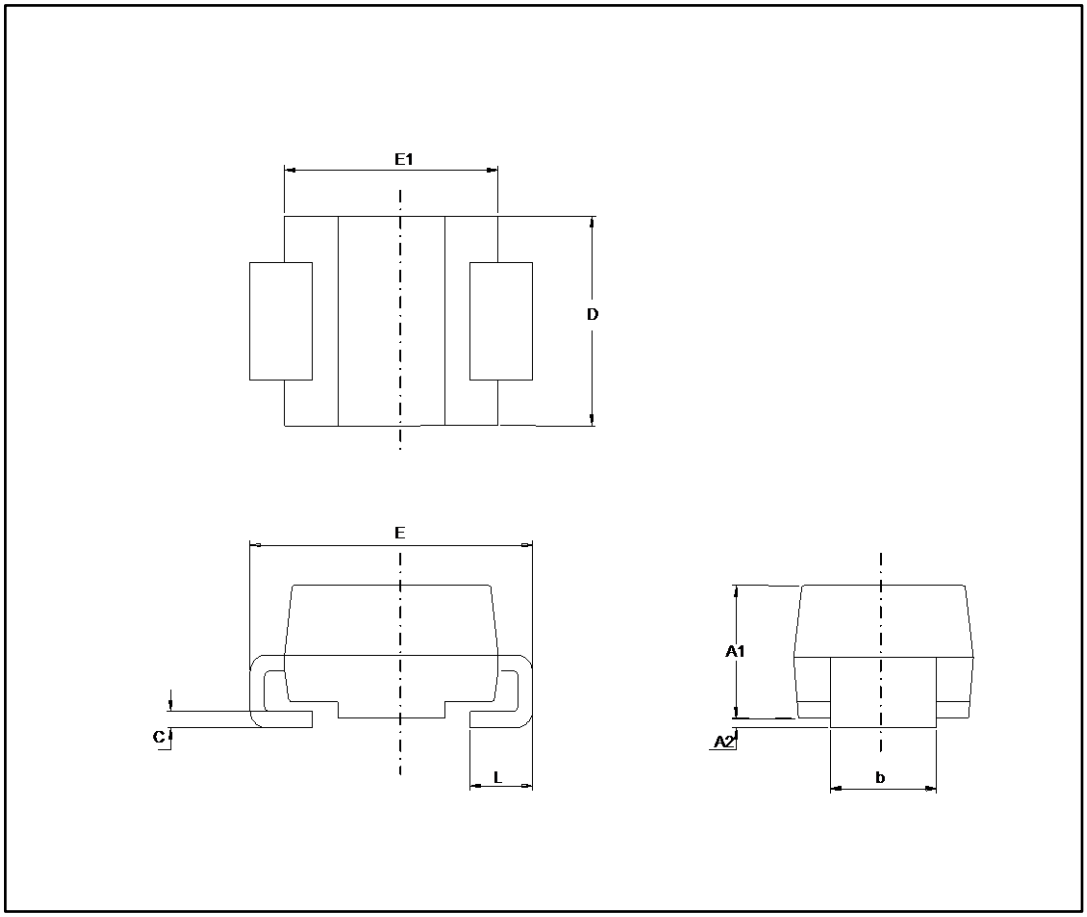
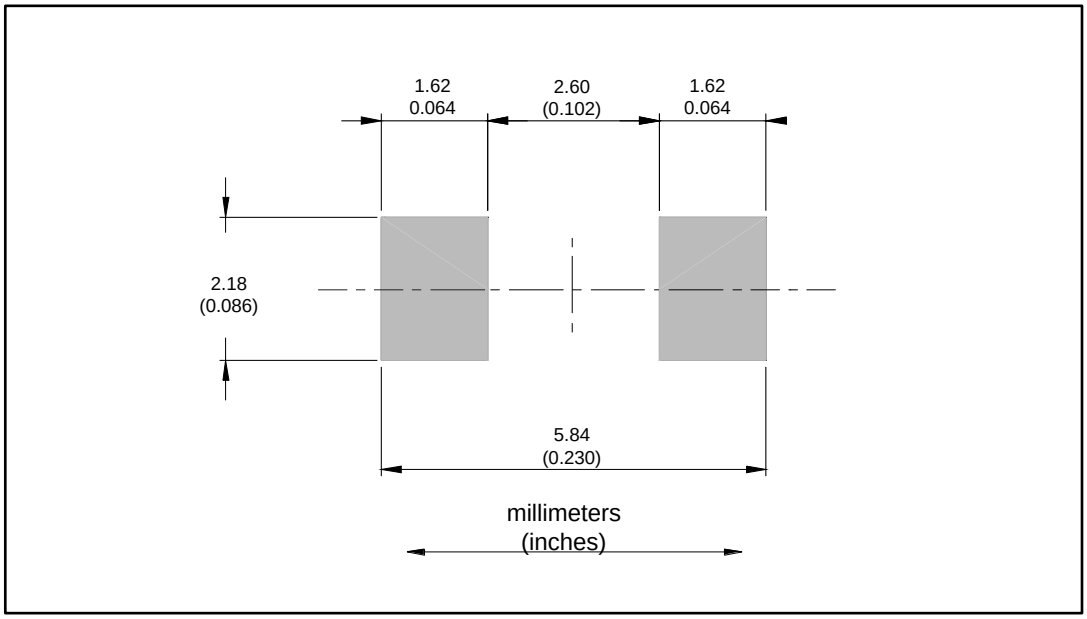


Table 6: SMB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0965
A2	0.05	0.20	0.0020	0.0079
b	1.95	2.20	0.0768	0.0867
c	0.15	0.40	0.0059	0.0157
D	3.30	3.95	0.1299	0.1556
E	5.10	5.60	0.2008	0.2205
E1	4.05	4.60	0.1594	0.1811
L	0.75	1.50	0.0295	0.0591

Figure 12: SMB recommended Footprint



3 Ordering information

Figure 13: Ordering information scheme

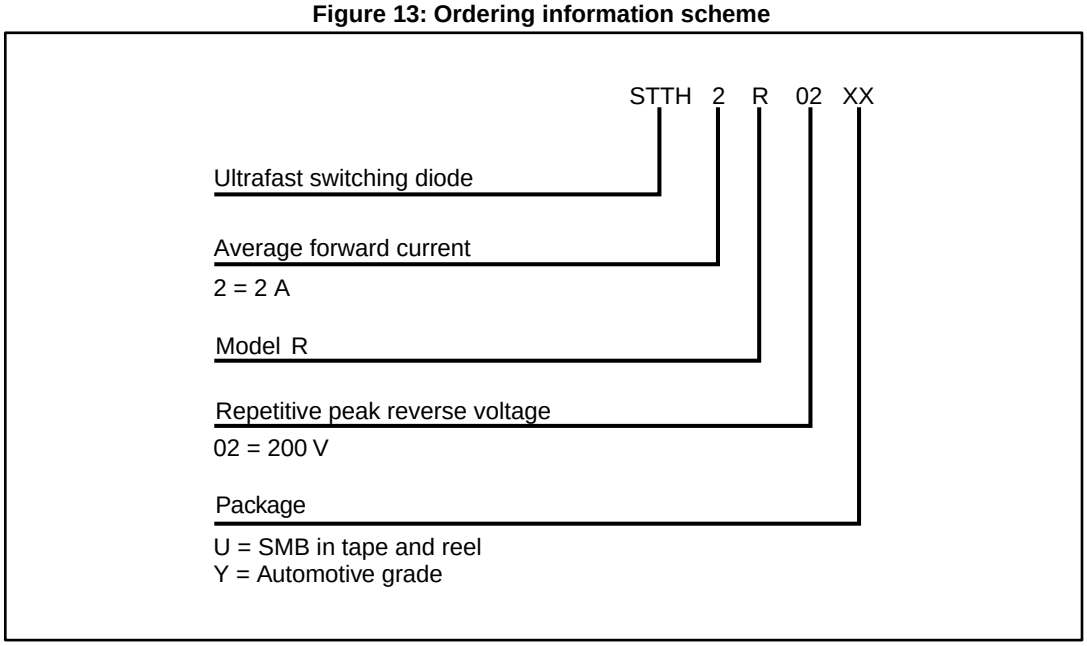


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH2R02UY	R2UY	SMB	0.110 g	2500	Tape and reel

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
20-Oct-2010	1	Initial release.
02-Feb-2017	2	Updated *Figure 4: "Relative variation of thermal impedance junction to case versus pulse duration"*.

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