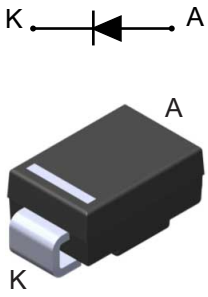
STTH2R02-Y

Datasheet

Automotive 200 V, 2 A ultrafast recovery diode



SMB

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

- High frequency inverters
- Freewheeling diode
- Polarity protection
- Reverse battery protection

Description

This 2 A, 200 V uses ST's 200 V planar Pt doping technology, and it is specially suited for switching mode base drive and transistor circuits.

Product status
STTH2R02-Y

Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 A
V_{RRM}	200 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.7 V
trr(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 (Tj = -40 °C to +175 °C)		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_L = 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	Operating junction temperature range (1)		-40 to +175	°C

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

Table 2. Thermal resistance parameter

Symbol	Parameter	Max. value	Unit
$R_{th(j-l)}$	Junction to lead	30	°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 (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	1.00	
		T_j = 100 °C		-	0.76	0.85	
		T_j = 150 °C		-	0.70	0.80	

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:

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

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	4	A
t_{fr}	Forward recovery time	I_F = 2 A, dI_F/dt = 100 A/µs, V_{FR} = 1.1 $V_{F(max.)}$	-	40		ns
V_{FP}	Forward recovery voltage	I_F = 2 A, dI_F/dt = 100 A/µs	-	2.0		V

1.1 Characteristics (curves)

Figure 1. Peak current versus duty cycle

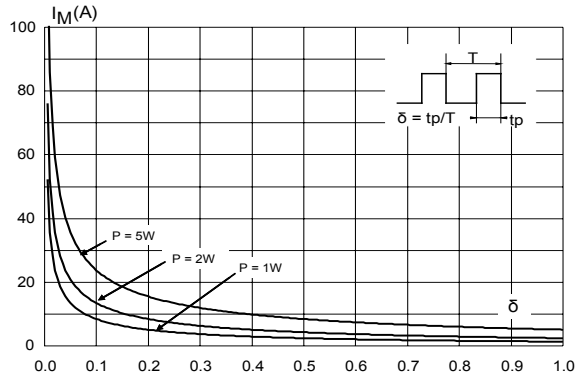


Figure 2. Average forward power dissipation versus average forward current

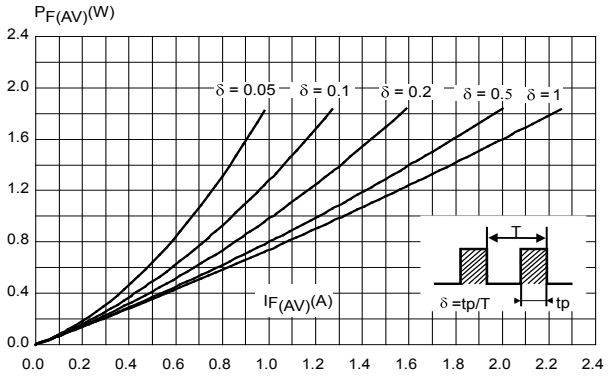


Figure 3. Forward voltage drop versus forward current (typical values)

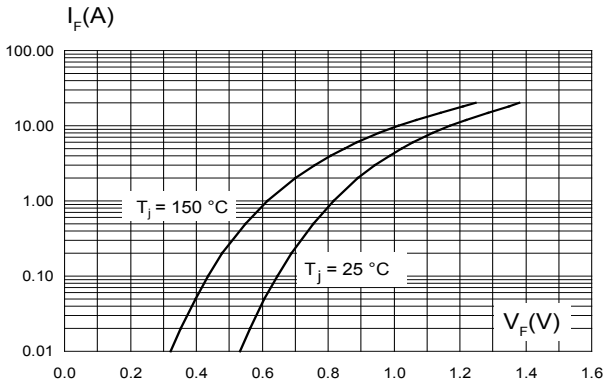


Figure 4. Forward voltage drop versus forward current (maximum values)

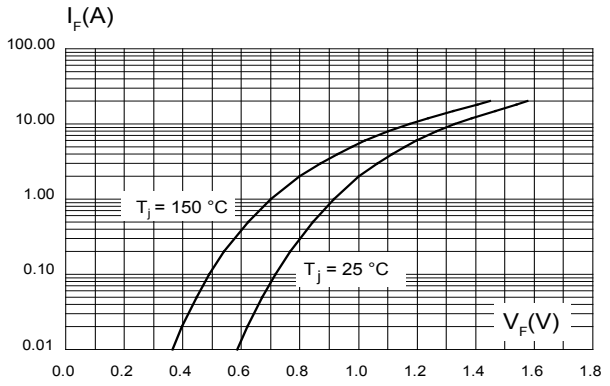


Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration (SMB)

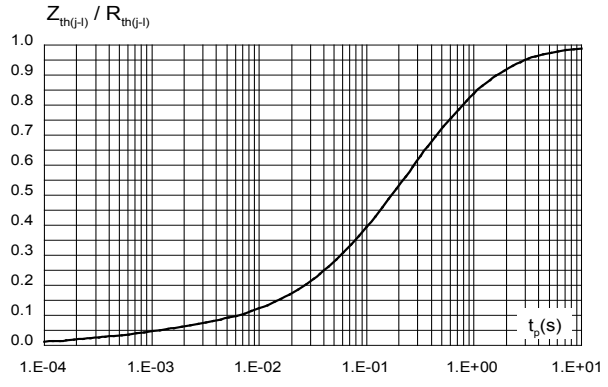


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

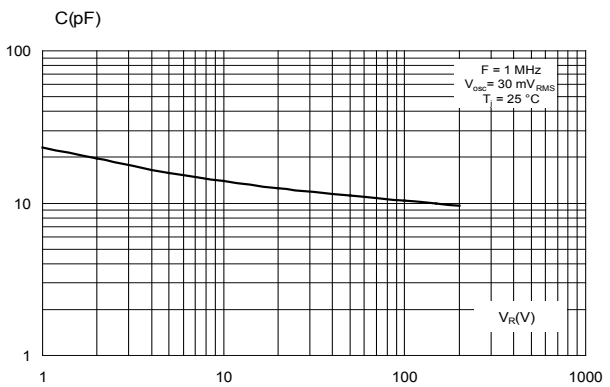


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

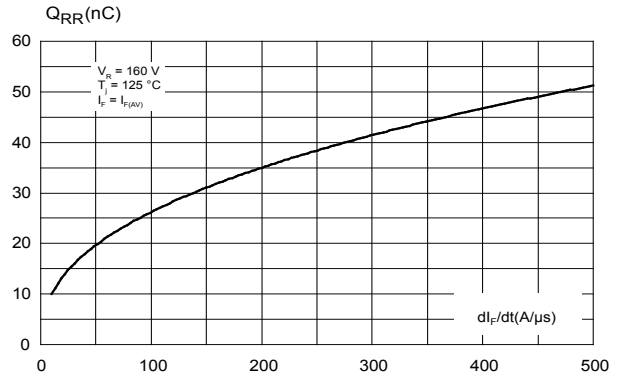


Figure 8. Reverse recovery time versus dI_F/dt (typical values)

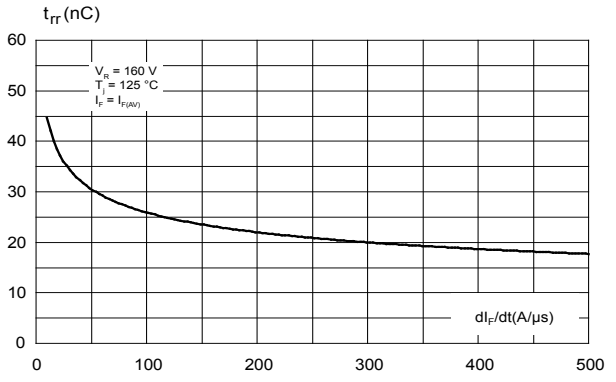


Figure 9. Peak reverse recovery current versus dI_F/dt (typical values)

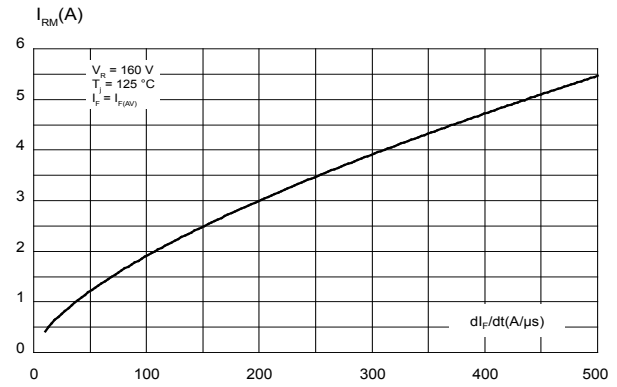


Figure 10. Relative variations of dynamic parameters versus junction temperature

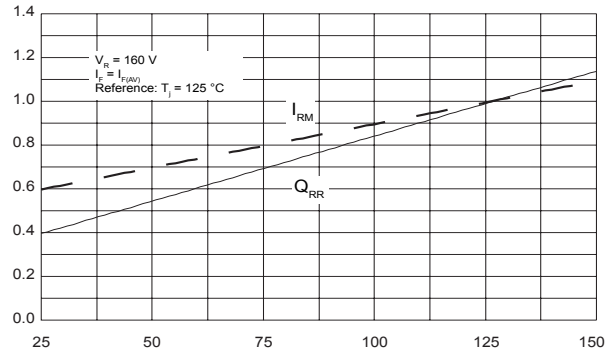
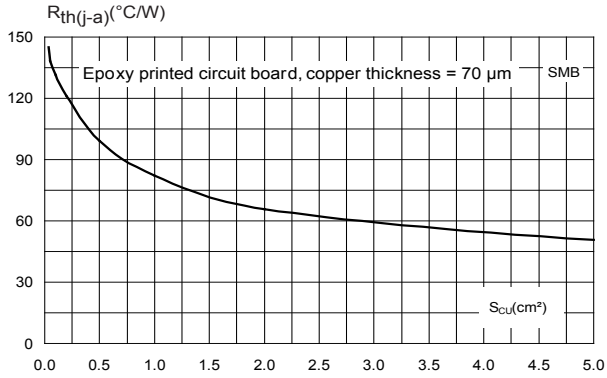


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead (typical values)



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 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 12. SMB package outline

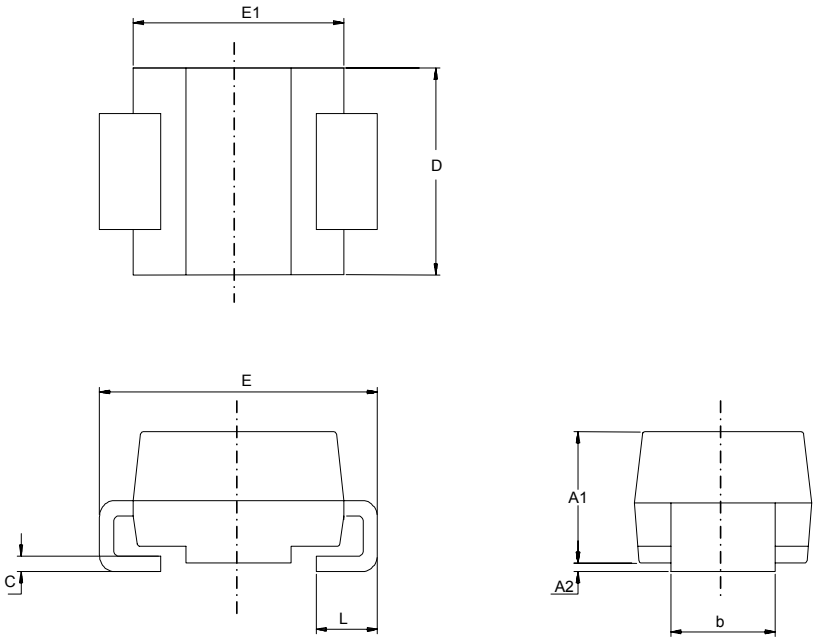
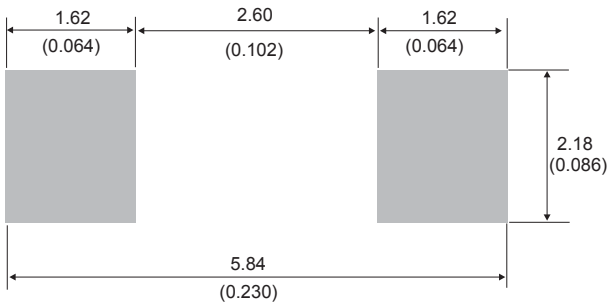


Table 5. **SMB package mechanical data**

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	1.95	2.20	0.076	0.087
c	0.15	0.40	0.005	0.016
D	3.30	3.95	0.129	0.156
E	5.10	5.60	0.200	0.221
E1	4.05	4.60	0.159	0.182
L	0.75	1.50	0.029	0.060

Figure 13. **SMB recommended footprint**



3 Ordering information

Figure 14. **Ordering information scheme**

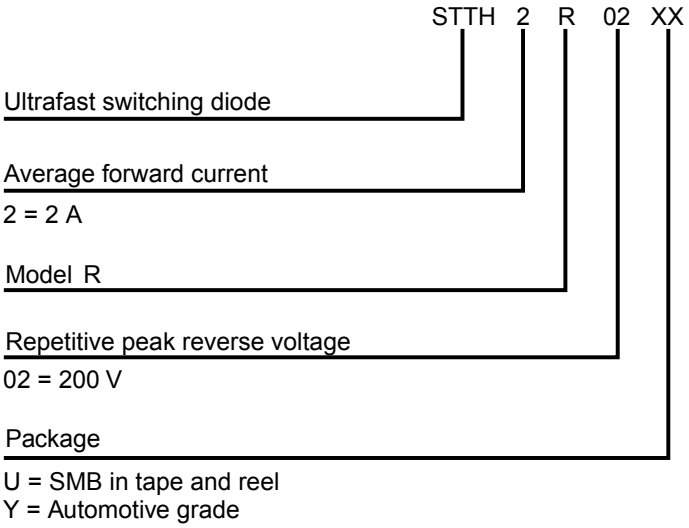


Table 6. **Ordering information**

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

Revision history

Table 7. **Document revision history**

Date	Revision	Changes
20-Oct-2010	1	First issue.
02-Feb-2017	2	Updated Figure 4: "Relative variation of thermal impedance junction to case versus pulse duration".
10-Jul-2020	3	Updated Section 1.1 Characteristics (curves) and added Section Applications. Minor text changes.

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