

Automotive ultrafast recovery diode

Features

- very low conduction losses
- negligible switching losses
- low forward and reverse recovery times
- high junction temperature
- AEC-Q101 qualified

Description

The STTH2R02 uses ST's new 200 V planar Pt doping technology, and it is specially suited for switching mode base drive and transistor circuits.

Packaged in SMB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection for automotive applications.

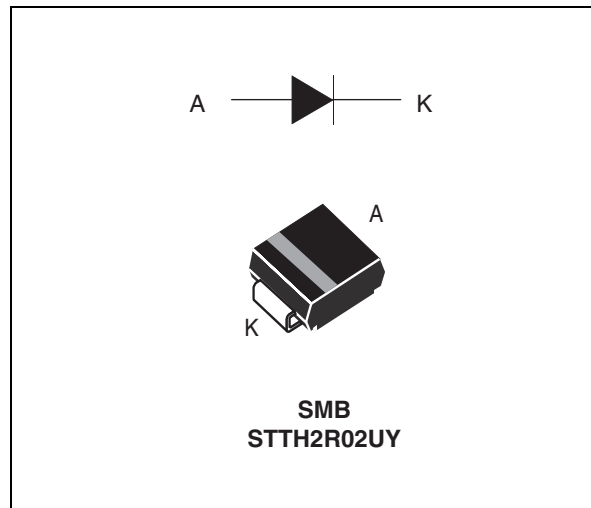


Table 1. Device summary

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 at $T_j = 25\text{ °C}$, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		200	V
I_{FRM}	Repetitive peak forward current	$t_p = 5\ \mu\text{s}$, $F = 5\ \text{kHz}$	60	A
$I_{F(RMS)}$	Forward rms current		60	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 90\text{ °C}$	2	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\ \text{ms}$ Sinusoidal	75	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	30	°C/W

Table 4. Static electrical characteristics

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

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

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

To evaluate the conduction losses use the following equation:

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

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	$I_F = 1\text{ A}$, $di_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$	-	23	30	ns
		$I_F = 1\text{ A}$, $di_F/dt = -100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$	-	15	20	
I_{RM}	Reverse recovery current	$I_F = 2\text{ A}$, $di_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 160\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$	-	3	4	A
t_{fr}	Forward recovery time	$I_F = 2\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$, $T_j = 25\text{ }^\circ\text{C}$	-	40	-	ns
V_{FP}	Forward recovery voltage	$I_F = 2\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $T_j = 25\text{ }^\circ\text{C}$	-	2.0	-	V

Figure 1. Peak current versus duty cycle

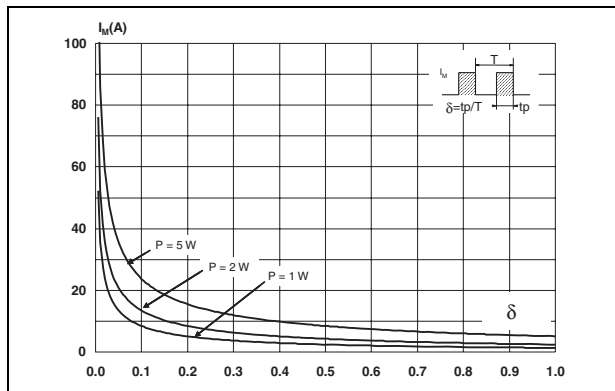


Figure 2. Forward voltage drop versus forward current (typical values)

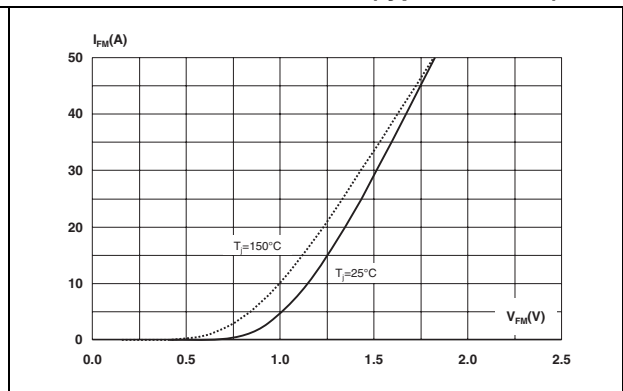


Figure 3. Forward voltage drop versus forward current (maximum values)

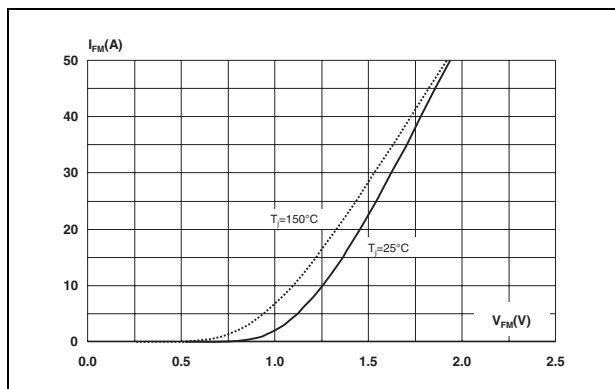


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

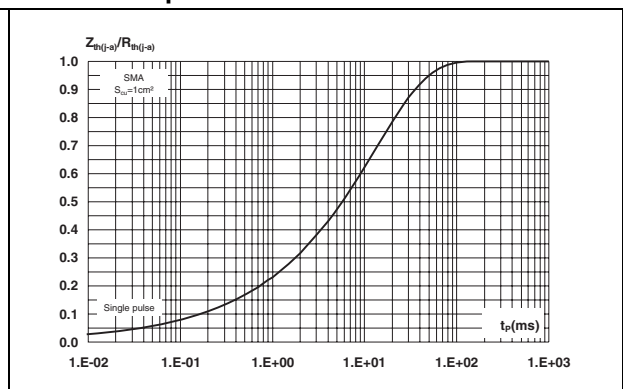


Figure 5. Junction capacitance versus reverse applied voltage (typical values)

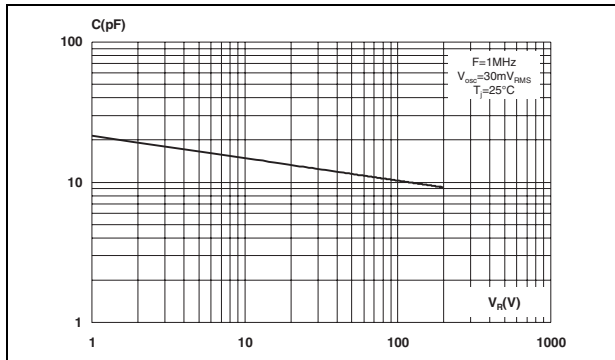


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

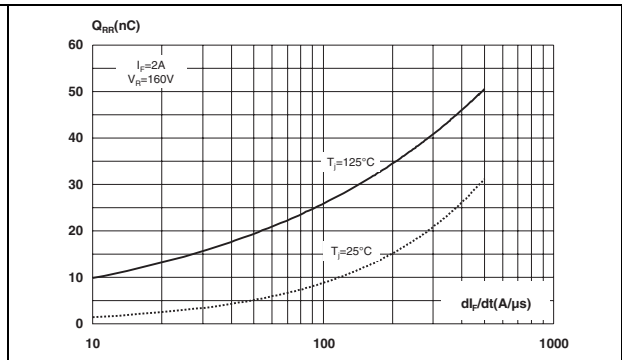


Figure 7. Reverse recovery time versus di_F/dt (typical values)

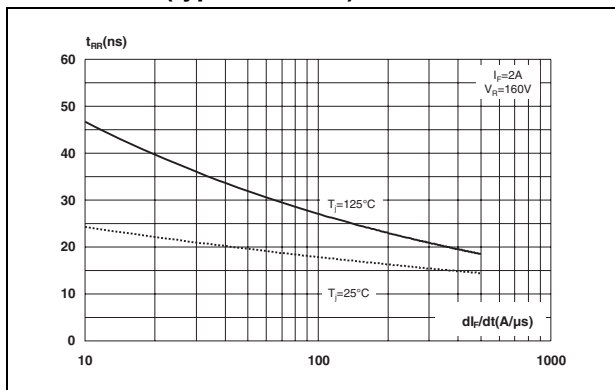


Figure 8. Peak reverse recovery current versus di_F/dt (typical values)

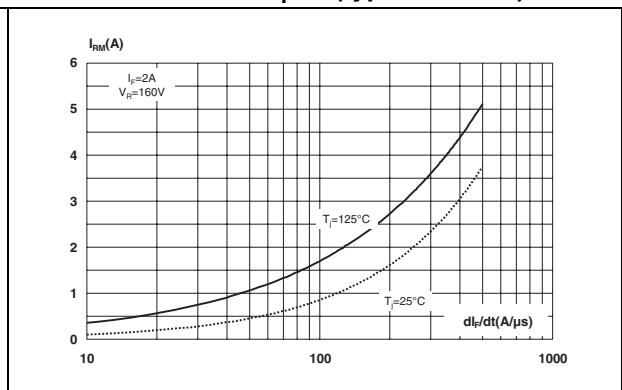


Figure 9. Dynamic parameters versus junction temperature

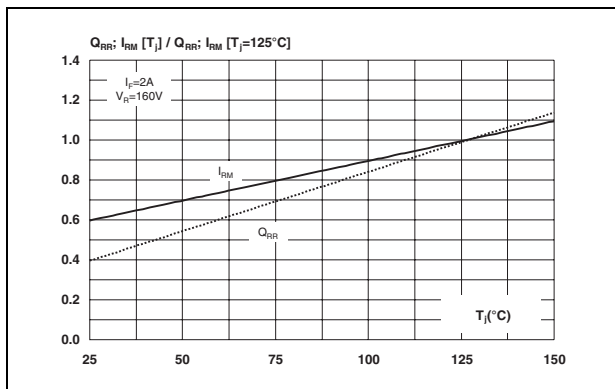
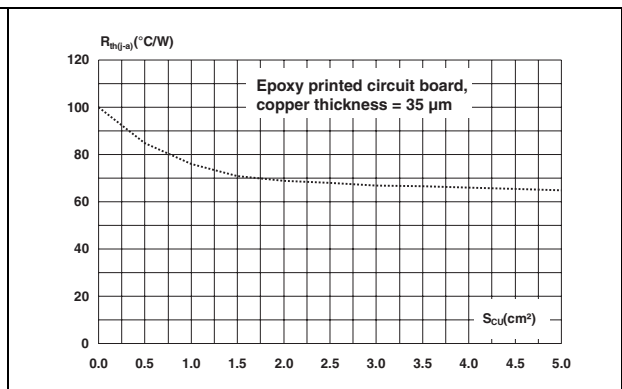
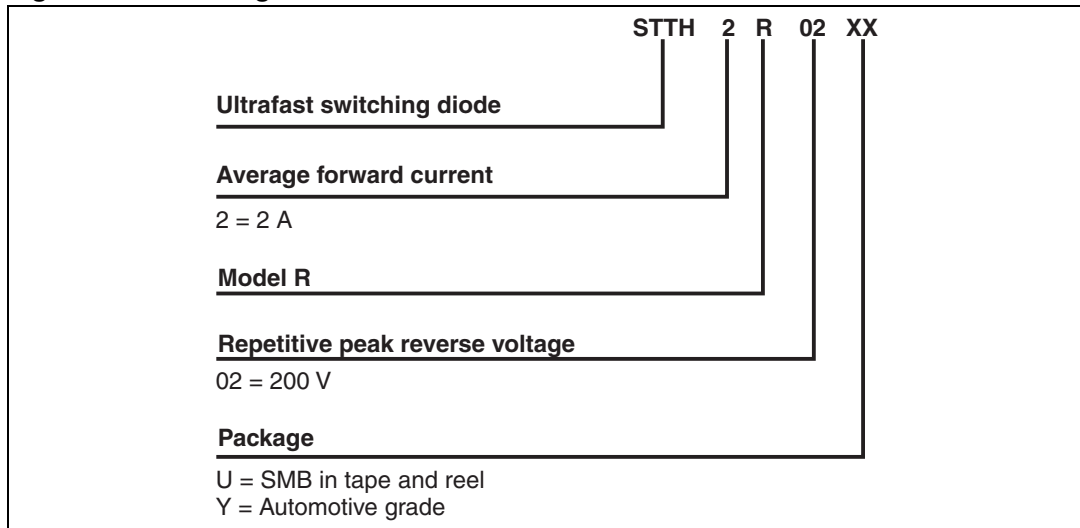


Figure 10. Thermal resistance, junction to ambient, versus copper surface under each lead



2 Ordering information scheme

Figure 11. Ordering information scheme



3 Package information

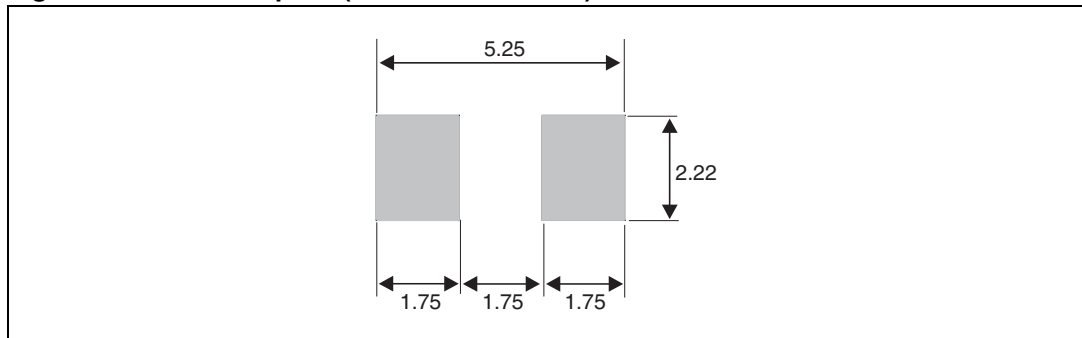
- Epoxy meets UL94, V0
- Lead-free package

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.

Table 6. SMB dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1	1.90	2.15	2.45	0.075	0.085	0.096
A2	0.05	0.15	0.20	0.002	0.006	0.008
b	1.95		2.20	0.077		0.087
c	0.15		0.41	0.006		0.016
E	5.10	5.40	5.60	0.201	0.213	0.220
E1	4.05	4.30	4.60	0.159	0.169	0.181
D	3.30	3.60	3.95	0.130	0.142	0.156
L	0.75	1.15	1.60	0.030	0.045	0.063

Figure 12. SMB footprint (dimensions in mm)



4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH2R02UY	R2UY	SMB	0.12 g	2500	Tape and reel

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
20-Oct-2010	1	Initial release.

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