

STTH2R02

Ultrafast recovery diode

Main product characteristics

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

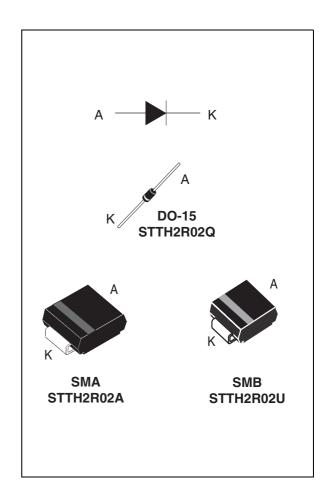
Features and benefits

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

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 DO-15, SMA, and SMB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection.



Order codes

Part Number	Marking
STTH2R02Q	STTH2R02
STTH2R02QRL	STTH2R02
STTH2R02A	R2A
STTH2R02U	R2U

Characteristics STTH2R02

Characteristics 1

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

Symbol	Parameter			Value	Unit
V _{RRM}	Repetitive peak reverse voltage	Repetitive peak reverse voltage			V
	Penetitive peak farward current	DO-15 ⁽¹⁾	$t_p = 5 \mu s$, $F = 5 kHz$	60	Α
IFRM	Repetitive peak forward current	SMA, SMB		60	A
1	DMC forward assessed		DO-15		Α
I _{F(RMS)}	F(RMS) RMS forward current	SMA, SMB		60	A
l=	Average forward current, $\delta = 0.5$	DO-15	T _{lead} = 90° C	2	Α
I _{F(AV)}	Average lorward current, 0 = 0.5	SMA, SMB	T _c = 90° C	۷	ζ.
I _{FSM}	Surge non repetitive forward current $t_p = 10 \text{ ms Sinusoidal}$			75	Α
T _{stg}	Storage temperature range				°C
T _j	Maximum operating junction temperature	·	·	175	° C

^{1.} On infinite heatsink with 10 mm lead length

Table 2. **Thermal parameters**

Symbol	Parameter			Value	Unit
В	Junction to lead	Lead Length = 10 mm on infinite heatsink	DO-15	45	° C/W
R _{th(j-c)}	Junction to case		SMA, SMB	30	C/VV

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I _R ⁽¹⁾	Povorco logizado gurrant	T _j = 25° C	V - V			3	
I _R ⁽¹⁾ Reverse leakage current	T _j = 125° C	$V_R = V_{RRM}$		2	20	μΑ	
	V _F ⁽²⁾ Forward voltage drop	T _j = 25° C	I _F = 6 A			1.20	
V (2)		T _j = 25° C			0.89	1.0	V
VF`		T _j = 100° C	I _F = 2 A		0.76	0.85	V
		T _j = 150° C			0.70	0.80	

^{1.} Pulse test: t_p = 5 ms, δ < 2 %

To evaluate the conduction losses use the following equation: P = 0.68 x $I_{F(AV)}$ + 0.06 $I_{F}^{2}_{(RMS)}$

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

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^{2.} Pulse test: t_p = 380 μ s, δ < 2 %

STTH2R02 Characteristics

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
+	Payarsa racayary tima	I_F = 1 A, dI_F/dt = -50 A/ μ s, V_R = 30 V, T_j = 25° C		23	30	ns
t _{rr} Reverse recovery time	I_F = 1 A, dI_F/dt = -100 A/ μ s, V_R = 30 V, T_j = 25° C		15	20	115	
I _{RM}	Reverse recovery current	$I_F = 2 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 160 \text{ V}, T_j = 125^{\circ} \text{ C}$		3	4	Α
t _{fr}	Forward recovery time	$I_F = 2 \text{ A, } dI_F/dt = 100 \text{ A/}\mu\text{s}$ $V_{FR} = 1.1 \text{ x } V_{Fmax}, T_j = 25^{\circ} \text{ C}$		40		ns
V _{FP}	Forward recovery voltage	$I_F = 2 \text{ A, } dI_F/dt = 100 \text{ A/}\mu\text{s,}$ $T_j = 25^{\circ} \text{ C}$		2.0		٧

Figure 1. Peak current versus duty cycle

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

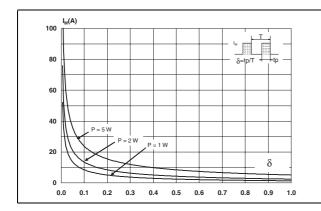
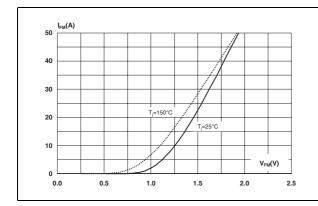
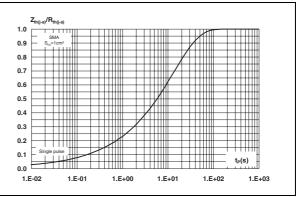


Figure 3. Forward voltage drop versus forward current (maximum values)

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





Characteristics STTH2R02

Figure 6.

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

1.0

0.9

0.7

0.6

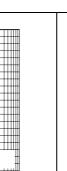
0.4

0.3

0.2

0.1

1.E-03



1.E+03

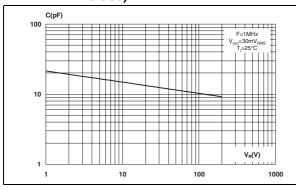
Relative variation of thermal impedance junction to case versus pulse duration (DO-15)

Figure 7. Junction capacitance versus reverse applied voltage (typical values)

1.E+00

1.E-01

Figure 8. Reverse recovery charges versus dl_F/dt (typical values)



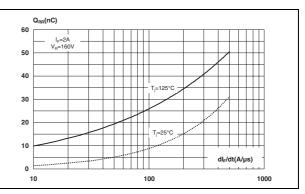
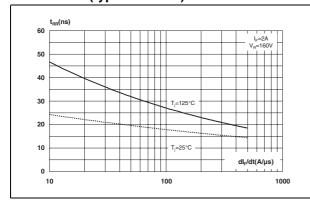


Figure 9. Reverse recovery time versus dI_F/dt Figure 10. Peak reverse recovery current (typical values)



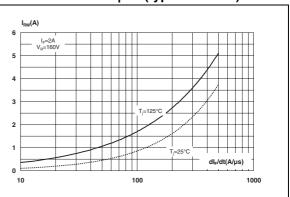
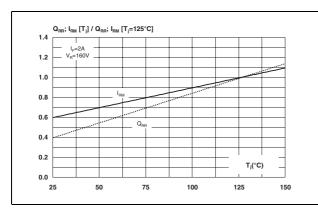


Figure 11. Dynamic parameters versus junction temperature

Figure 12. Thermal resistance, junction to ambient, versus copper surface under each lead - SMA/SMB (epoxy FR4, e_{cu} = 35 μ m)



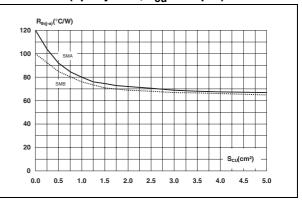
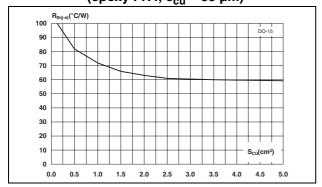
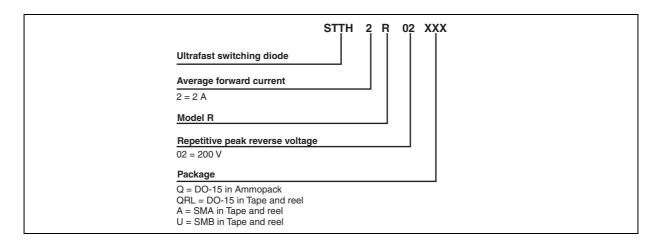


Figure 13. Thermal resistance, junction to ambient, versus copper surface under each lead DO-15 (epoxy FR4, e_{cu} = 35 μm)



2 Ordering information scheme



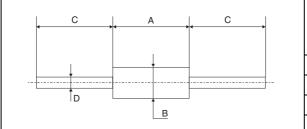
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Package information STTH2R02

3 Package information

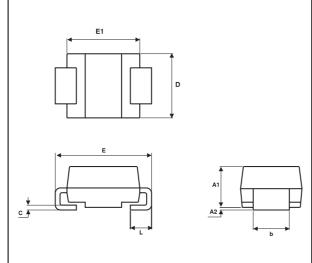
Epoxy meets UL94, V0

Table 5. DO-15 Dimensions



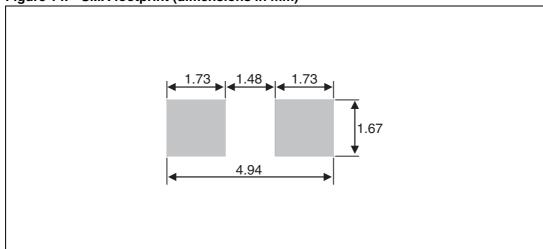
	DIMENSIONS				
REF.	Millimeters		Inc	Inches	
	Min.	Max.	Min.	Max.	
Α	6.05	6.75	0.238	0.266	
В	2.95	3.53	0.116	0.139	
С	26	31	1.024	1.220	
D	0.71	0.88	0.028	0.035	

Table 6. SMA dimensions



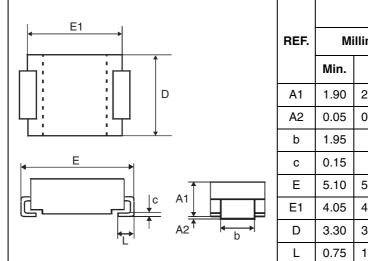
	DIMENSIONS				
REF.	Millim	neters	Inc	hes	
	Min.	Max.	Min.	Max.	
A1	1.90	2.03	0.075	0.080	
A2	0.05	0.20	0.002	0.008	
b	1.25	1.65	0.049	0.065	
С	0.15	0.41	0.006	0.016	
Е	4.80	5.60	0.189	0.220	
E1	3.95	4.60	0.156	0.181	
D	2.25	2.95	0.089	0.116	
L	0.75	1.60	0.030	0.063	

Figure 14. SMA footprint (dimensions in mm)



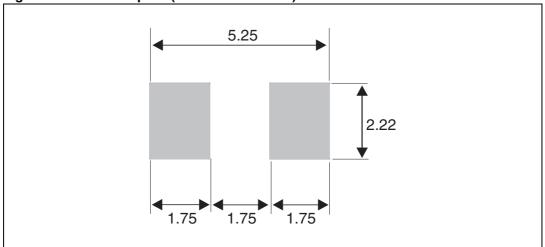
STTH2R02 Package information

Table 7. SMB dimensions



DIMENSIONS Millimeters Inches Max. Min. Max. 2.15 2.45 0.075 0.085 0.096 0.008 0.15 0.20 0.002 0.006 0.087 2.20 0.077 0.016 0.41 0.006 0.201 0.213 0.220 5.40 5.60 4.30 4.60 0.159 0.169 0.181 3.60 3.95 0.130 0.142 0.156 1.15 1.60 0.030 0.045 0.063

Figure 15. SMB footprint (dimensions in mm)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

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Ordering information STTH2R02

4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH2R02Q	STTH2R02	DO-15	0.4 g	1000	Ammopack
STTH2R02QRL	STTH2R02	DO-15	0.4 g	6000	Tape and reel
STTH2R02A	R2A	SMA	0.068 g	5000	Tape and reel
STTH2R02U	R2U	SMB	0.12 g	2500	Tape and reel

5 Revision history

Date	Revision	Description of Changes
03-May-2006	1	First issue
13-Oct-2006	2	Maximum T _j set to 175° C for all packages in Table 1.

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