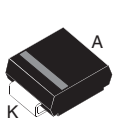
STTH4R02-Y

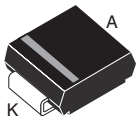
Automotive ultrafast recovery diode

Features

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



SMB
STTH4R02UY



SMC
STTH4R02SY

Description

The STTH4R02 uses ST's new 200 V planar Pt doping technology, and it is specially suited for switching mode base drive and transistor circuits.

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

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	4 A
V_{RRM}	200 V
T_j (max)	175 °C
V_F (typ)	0.76 V
t_{rr} (typ)	16 ns

1 Characteristics

Table 2. Absolute ratings (limiting values at T_j = 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		200	V
$I_{F(RMS)}$	Forward rms current		70	A
$I_{F(AV)}$	Average forward current, δ = 0.5	T_c = 95 °C	4	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	70	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	20	°C/W

Table 4. 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 = 12 A		1.15	1.25	V
		T_j = 25 °C	I_F = 4 A		0.95	1.05	
		T_j = 150 °C			0.76	0.83	

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:
$P = 0.67 \times I_{F(AV)} + 0.04\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic characteristics

Symbol	Parameter	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, T_j = 25 °C		24	30	ns
		I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V, T_j = 25 °C		16	20	
I_{RM}	Reverse recovery current	I_F = 4 A, dI_F/dt = -200 A/µs, V_R = 160 V, T_j = 125 °C		4.4	5.5	A
t_{fr}	Forward recovery time	I_F = 4 A, dI_F/dt = 50 A/µs $V_{FR} = 1.1 \times V_{Fmax}$, T_j = 25 °C		80		ns
V_{FP}	Forward recovery voltage	I_F = 4 A, dI_F/dt = 50 A/µs, T_j = 25 °C		1.6		V

Figure 1. Peak current versus duty cycle

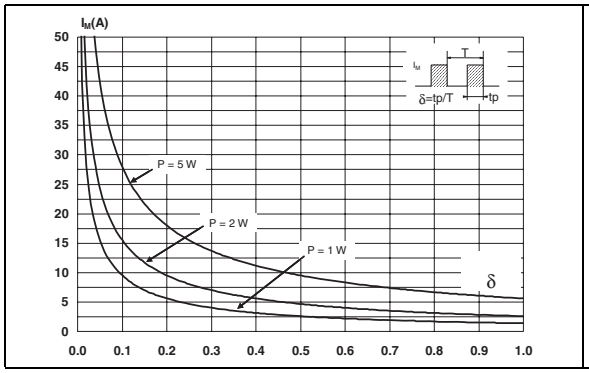


Figure 2. Forward voltage drop versus forward current (typical values)

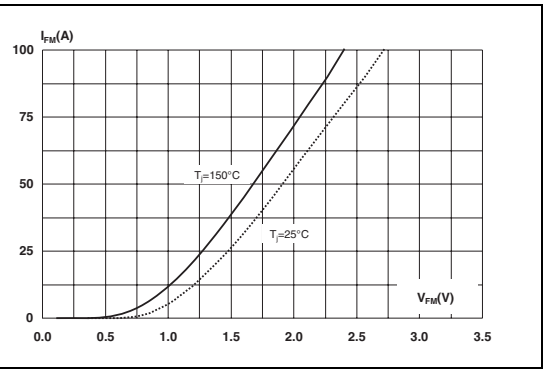


Figure 3. Forward voltage drop versus forward current (maximum values)

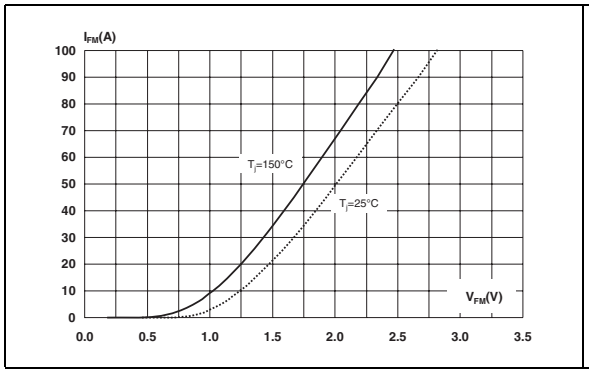


Figure 4. Relative variation of thermal impedance, junction to ambient, versus pulse duration (SMB)

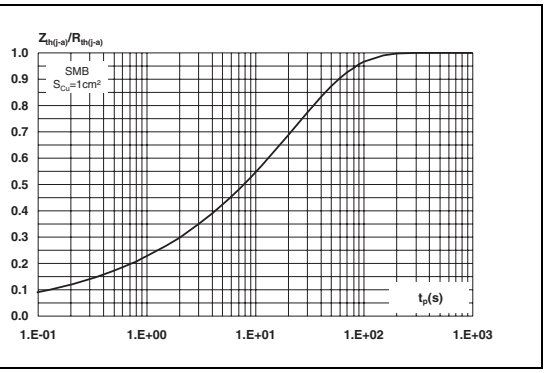


Figure 5. Relative variation of thermal impedance, junction to ambient, versus pulse duration (SMC)

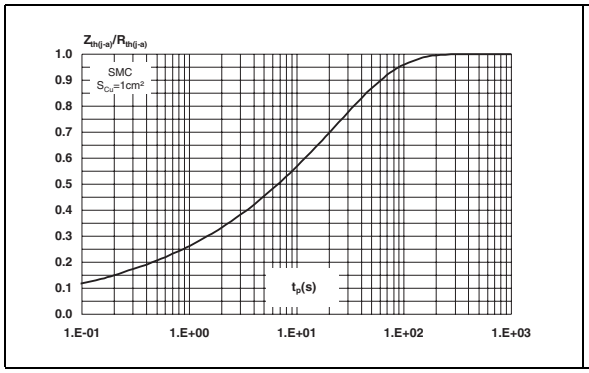


Figure 6. Junction capacitance versus reverse applied voltage (typical values)

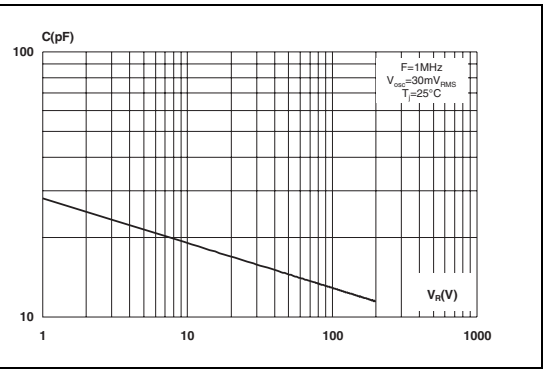


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

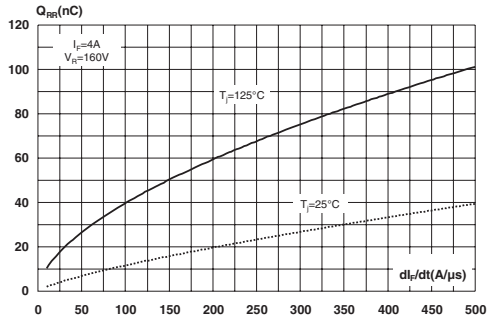


Figure 8. Reverse recovery time versus dI_F/dt (typical values)

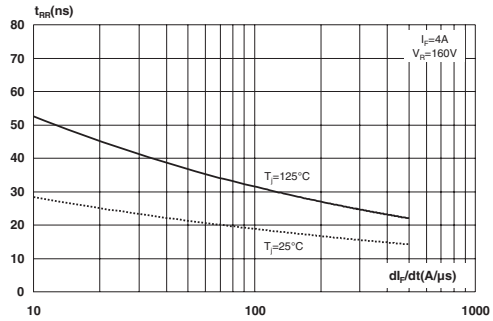


Figure 9. Peak reverse recovery current versus dI_F/dt (typical values)

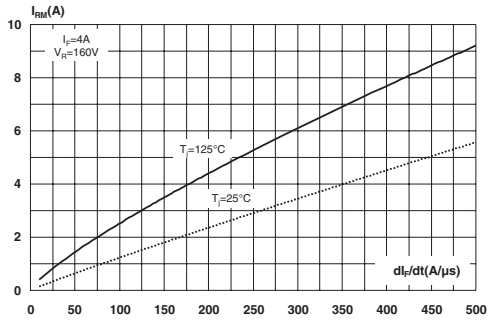


Figure 10. Dynamic parameters versus junction temperature

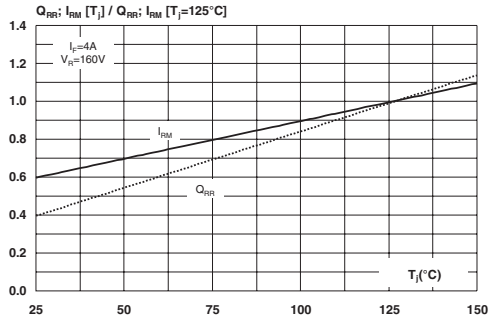


Figure 11. Thermal resistance, junction to ambient, versus copper surface under tab - SMB

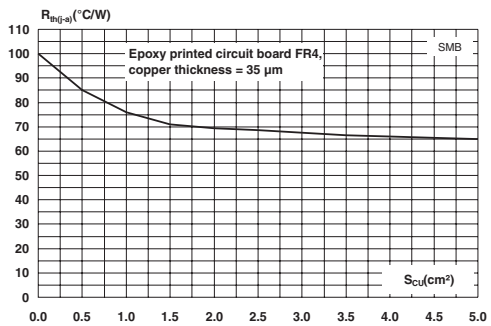
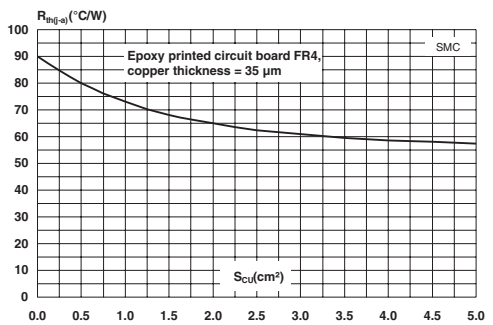
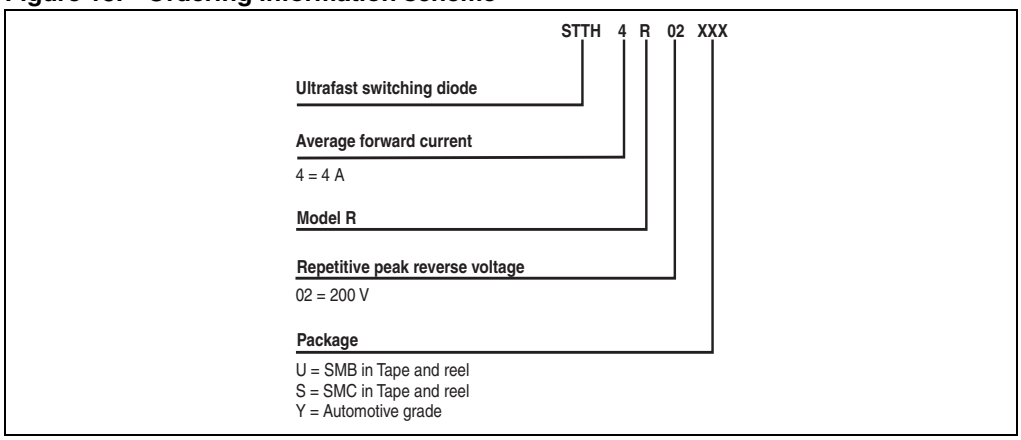


Figure 12. Thermal resistance, junction to ambient, versus copper surface under tab - SMC



2 Ordering information scheme

Figure 13. Ordering information scheme

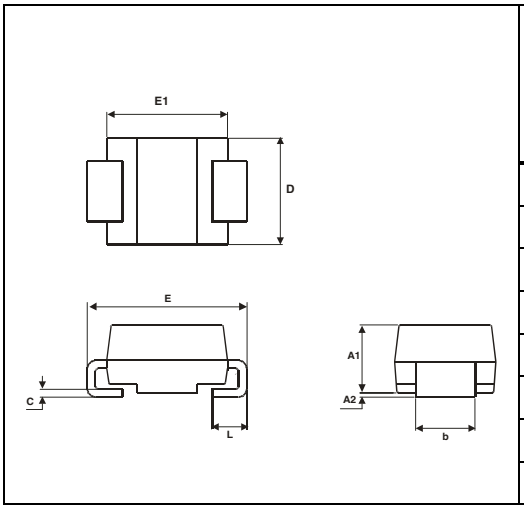


3 Package information

- Epoxy meets UL94, V0
- Band indicates cathode on SMB and SMC

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.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 14. Footprint, dimensions in mm (inches)

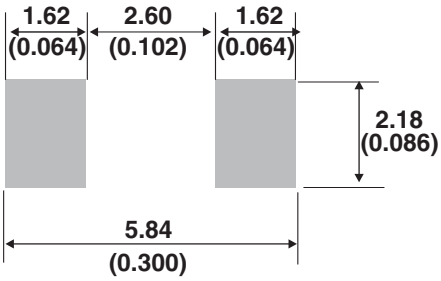
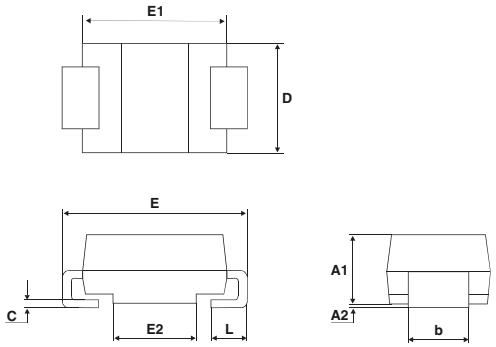


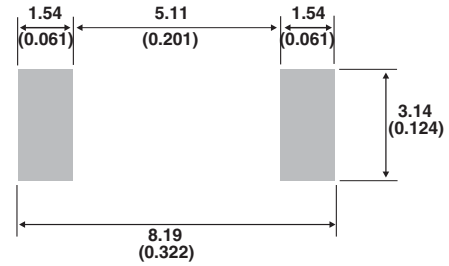
Table 7. SMC dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b(1)	2.90	3.20	0.114	0.126
c(1)	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

1. Dimensions b and c apply to plated leads

Figure 15. Footprint, dimensions in mm (inches)



4 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH4R02UY	4R2UY	SMB	0.107 g	2500	Tape and reel
STTH4R02SY	4R2SY	SMC	0.243 g		

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
03-Dec-2010	1	First issue.

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