STTH3R02



Ultrafast recovery diode

Main product characteristics

I _{F(AV)}	3 A
V _{RRM}	200 V
T _j (max)	175° C
V _F (typ)	0.7 V
t _{rr} (typ)	16 ns

Features and benefits

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

Description

The STTH3R02 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-201AD, DO-15, and SMC, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection.



Order codes

Part Number	Marking
STTH3R02	STTH3R02
STTH3R02RL	STTH3R02
STTH3R02Q	STTH3R02
STTH3R02QRL	STTH3R02
STTH3R02S	3R2S

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1 Characteristics

Table 1.Absolute ratings (limiting values at $T_j = 25^{\circ}$ C, unless otherwise specified)

Symbol	Paramo	Value	Unit	
V _{RRM}	Repetitive peak reverse voltage	200	V	
I _{FRM}	Repetitive peak forward current ⁽¹⁾	$t_p = 5 \ \mu s, F = 5 \ kHz$	110	А
1	DMC forward ourrant	DO-201AD / DO-15	70	А
I _{F(RMS)} RMS forward current	SMC	70	A	
		DO-15 T _{lead} = 50° C		
I _{F(AV)}	Average forward current, $\delta = 0.5$	DO-201AD T _{lead} = 90° C	3	А
		SMC $T_c = 110^{\circ} C$		
I _{FSM}	Surge non repetitive forward current $t_p = 10 \text{ ms Sinusoidal}$		75	А
T _{stg}	Storage temperature range	-65 to + 175	°C	
Тj	Maximum operating junction temperature	175	°C	
TL	Maximum lead temperature for soldering during 10 s at 4 mm from case			°C

1. On infinite heatsink with 10 mm lead length

Table 2.Thermal parameters

Symbol		Parameter			
P	Junction to lead	Lead Length = 10 mm on infinite heatsink	DO-15	45	
R _{th(j-l)}	Junction to lead		DO-201AD	30	° C/W
R _{th(j-c)}	Junction to case		SMC	20	

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I _R ⁽¹⁾ Reverse leakage current		$T_j = 25^\circ C$	V _R = V _{RRM}			3	μA
I _R ⁽¹⁾ Reverse leakage current	$T_j = 125^\circ C$			3	30		
	V _F ⁽²⁾ Forward voltage drop	$T_j = 25^\circ C$	I _F = 9 A			1.20	
V _F ⁽²⁾		$T_j = 25^\circ C$			0.89	1.0	v
VF Poliward voltage drop	$T_j = 100^\circ C$	I _F = 3 A		0.76	0.85	v	
		$T_j = 150^\circ C$			0.70	0.80	

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

2. Pulse test: t_p = 380 µs, δ < 2 %

To evaluate the conduction losses use the following equation: P = 0.68 x $I_{F(AV)}$ + 0.04 ${I_F}^2_{(RMS)}$



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Table 4.	Dynamic characteristics
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Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit	
		$I_F = 1 \text{ A, } dI_F/dt = -50 \text{ A}/\mu\text{s},$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		24	30	- ns	
t _{rr} Reverse recovery time	$\label{eq:lf} \begin{array}{l} I_{F} = 1 \ A, \ dI_{F}/dt = \text{-100 } A/\mus, \\ V_{R} = 30 \ V, \ T_{j} = 25^{\circ} \ C \end{array}$		16	20			
I _{RM}	Reverse recovery current	$I_F = 3 \text{ A, } dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 160 \text{ V, } T_j = 125^{\circ} \text{ C}$		3.5	4.5	А	
t _{fr}	Forward recovery time	$I_F = 3 \text{ A, } dI_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \text{ x } V_{Fmax}, T_j = 25^\circ\text{ C}$		40		ns	
V_{FP}	Forward recovery voltage	$I_F = 3 \text{ A, } dI_F/dt = 100 \text{ A/}\mu\text{s,}$ $T_j = 25^{\circ} \text{ C}$		1.9		V	





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









- Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration - DO-15 (Epoxy printed circuit board FR4, e_{CU} = 35 μm)
- Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration SMC (Epoxy printed circuit board FR4, $e_{CU} = 35 \ \mu m$)



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





Figure 9.Reverse recovery time versus dl_F/dtFigure 10.Peak reverse re
versus dl_F/dt (typical values)

Peak reverse recovery current versus dl_F/dt (typical values)





Figure 11. Dynamic parameters versus junction temperature





Figure 13. Thermal resistance versus copper surface under each lead for SMC (Epoxy printed circuit board FR4, e_{CU} = 35µm)



Figure 14. Thermal resistance versus lead length for DO-201AD package



2 Ordering information scheme



3 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

Table 5. DO-201AD Dimensions



Table 6.DO-15 dimensions





			Dimensions				
	Ref.		Millimeters		Inches		
€1			Min.	Max.	Min.	Max.	
		A1	1.90	2.45	0.075	0.096	
D		A2	0.05	0.20	0.002	0.008	
		b	2.90	3.2	0.114	0.126	
		с	0.15	0.41	0.006	0.016	
	<u> </u>	E	7.75	8.15	0.305	0.321	
	A1	E1	6.60	7.15	0.260	0.281	
	A2	E2	4.40	4.70	0.173	0.185	
		D	5.55	6.25	0.218	0.246	
		L	0.75	1.60	0.030	0.063	

Table 7.SMC dimensions





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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4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode	
STTH3R02	STTH3R02	DO-201AD	1.16 g	600	Ammopack	
STTH3R02RL	STTH3R02	DO-201AD	1.16 g	1900	Tape and reel	
STTH3R02Q	STTH3R02	DO-15	0.4 g	1000	Ammopack	
STTH3R02QRL	STTH3R02	DO-15	0.4 g	6000	Tape and reel	
STTH3R02S	3R2S	SMC	0.243 g	2500	Tape and reel	

5 Revision history

Date	Revision	Description of Changes
03-May-2006	1	First issue
10-Oct-2006	2	Added SMC package



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