

STTH3002

Ultrafast recovery diode

Main product characteristics

I _{F(AV)}	30 A
V _{RRM}	200 V
T _j (max)	175° C
V _F (typ)	0.77 V
t _{rr} (typ)	22 ns

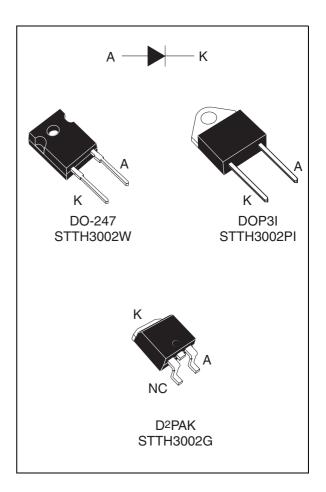
Features and benefits

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

Description

The STTH3002 uses ST's new 200 V planar Pt doping technology, and is specially suited for switching mode base drive and transistor circuits.

Packaged in DO-247, DOP3I, and D²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection.



Order codes

Part Number	Marking
STTH3002W	STTH3002
STTH3002PI	STTH3002
STTH3002G	STTH3002
STTH3002G-TR	STTH3002

Characteristics STTH3002

Characteristics 1

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

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Symbol	Paran	Value	Unit	
V _{RRM}	Repetitive peak reverse voltage	Repetitive peak reverse voltage		V
I _{F(RMS)}	RMS forward current		50	Α
		DO-247 T _c = 135° C		
I _{F(AV)}	Average forward current, $\delta = 0.5$	DOP3I T _c = 115° C	30	Α
		D^2 PAK $T_c = 135^{\circ}$ C		
I _{FSM}	Surge non repetitive forward current $t_p = 10 \text{ ms Sinusoidal}$		300	Α
T _{stg}	Storage temperature range		-65 to + 175	° C
Tj	Maximum operating junction temperature		175	° C

Table 2. Thermal parameters

Symbol	Parameter		Value	Unit
		DO-247	1.2	
R _{th(j-c)}	Junction to case	DOP3I	1.8	° C/W
		D ² PAK	1.2	

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			20	
'R`	Reverse leakage current $T_j = 150^{\circ} \text{ C}$ $V_R = V_{RI}$	$V_R = V_{RRM}$		20	200	μΑ	
		T _j = 125° C	I _F = 25 A		0.77	0.85	
V _F ⁽²⁾	V _F ⁽²⁾ Forward voltage drop	T _j = 25° C	I _F = 30 A			1.05	V
		T _j = 150° C	1F = 30 A		0.8	0.88	

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

To evaluate the conduction losses use the following equation: P = 0.67 x $I_{F(AV)}$ + 0.007 $I_{F}^{2}_{(RMS)}$

$$P = 0.67 \times I_{F(\Delta V)} + 0.007 I_{F^2(BMS)}$$

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

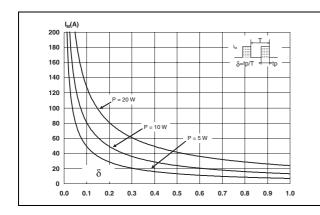
STTH3002 Characteristics

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
+	Reverse recovery time	I_F = 1 A, dI_F/dt = -200 A/ μ s, V_R = 30 V, T_j = 25 °C		22	27	ns
t _{rr}	Tieverse recovery time	I_F = 1 A, dI_F/dt = -50 A/ μ s, V_R = 30 V, T_j = 25 °C		40	50	113
I _{RM}	Reverse recovery current	$I_F = 30 \text{ A}, dI_F/dt = 200 \text{ A}/\mu\text{s}, \ V_R = 160 \text{ V}, T_j = 125 ^{\circ}\text{C}$		7.6	9.5	Α
t _{fr}	Forward recovery time	I_F = 30 A, dI_F/dt = 200 A/ μ s V_{FR} = 1.1 x V_{Fmax} , T_j = 25 °C		140		ns
V _{FP}	Forward recovery voltage	$I_F = 30 \text{ A}, \ dI_F/dt = 200 \text{ A}/\mu\text{s}, \ V_{FR} = 1.1 \text{ x } V_{Fmax}, \ T_j = 25 \ ^{\circ}\text{C}$		2.5		V

Figure 1. Peak current versus duty cycle

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



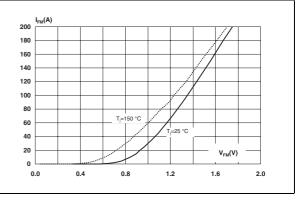
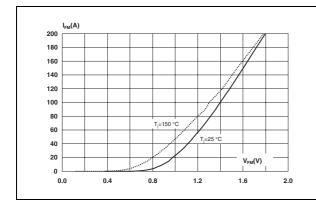
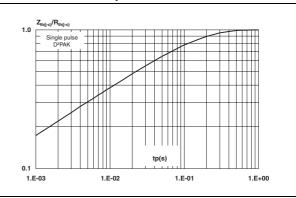


Figure 3. Forward voltage drop versus forward current (maximum values)

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

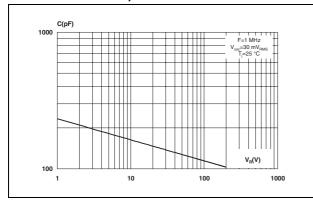




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Figure 5. Junction capacitance versus reverse voltage applied (typical values)

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



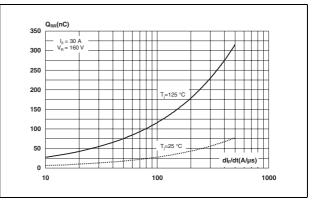
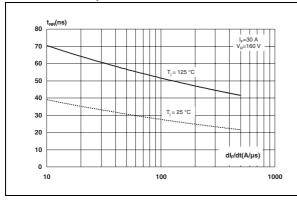


Figure 7. Reverse recovery time versus dl_F/dt (typical values)

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



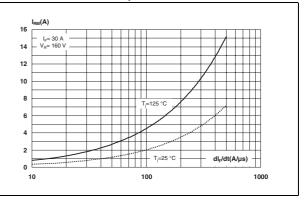
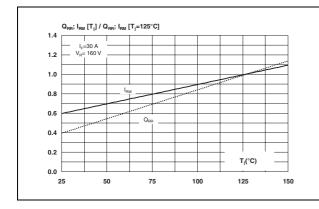
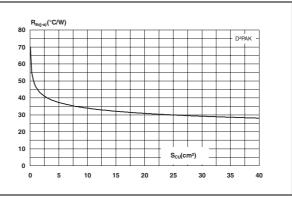


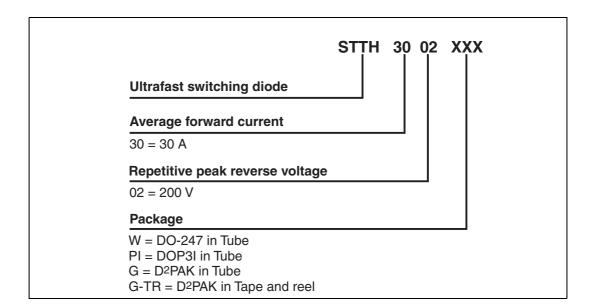
Figure 9. Dynamic parameters versus junction temperature

Figure 10. Thermal resistance, junction to ambient, versus copper surface under tab (Epoxy printed circuit board FR4, e_{cu} = 35 μ m)





2 Ordering information scheme



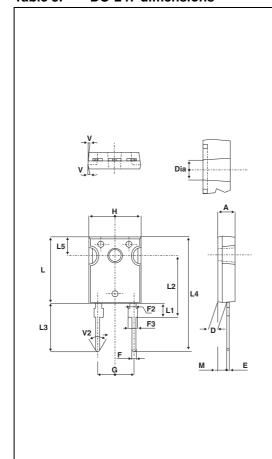
Package information STTH3002

3 Package information

Epoxy meets UL94, V0

Cooling method: by conduction (C)
Recommended torque value: 0.8 Nm
Maximum torque value: 1.0 Nm

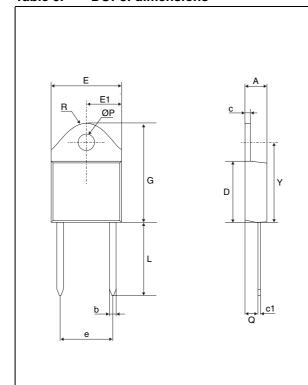
Table 5. DO-247 dimensions



	DIMENSIONS					
REF.	Millimeters				Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
Е	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
Н	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
М	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

STTH3002 Package information

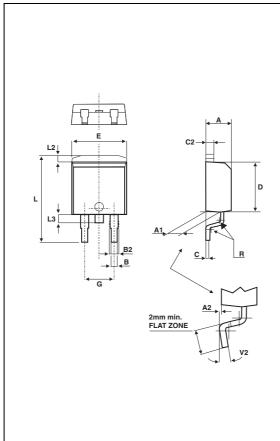
Table 6. DOP3I dimensions



REF	Millimeters		Inc	hes
	Min.	Max.	Min.	Max.
Α	4.40	4.60	0.173	0.181
b	1.20	1.40	0.047	0.055
С	1.45	1.55	0.057	0.061
c1	0.50	0.70	0.020	0.028
D	12.15	13.10	0.474	0.516
Е	15.10	15.50	0.594	0.610
E1	7.55	7.75	0.297	0.305
е	10.80	11.30	0.425	0.445
G	20.4	21.10	0.815	0.831
L	14.35	15.60	0.565	0.614
Р	4.08	4.17	0.161	0.164
Q	2.70	2.90	0.106	0.114
R	4.60	typ.	0.18	1 typ.
Υ	15.80	16.50	0.622	0.650

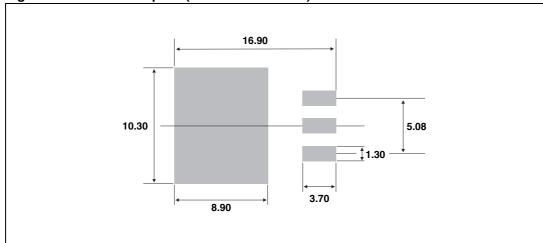
Package information STTH3002

Table 7. D²PAK dimensions



	DIMENSIONS				
REF.	Millimeters		Inc	hes	
	Min.	Max	Min.	Max.	
Α	4.40	4.60	0.173	0.181	
A1	2.49	2.69	0.098	0.106	
A2	0.03	0.23	0.001	0.009	
В	0.70	0.93	0.027	0.037	
B2	1.14	1.70	0.045	0.067	
С	0.45	0.60	0.017	0.024	
C2	1.23	1.36	0.048	0.054	
D	8.95	9.35	0.352	0.368	
Е	10.00	10.40	0.393	0.409	
G	4.88	5.28	0.192	0.208	
L	15.00	15.85	0.590	0.624	
L2	1.27	1.40	0.050	0.055	
L3	1.40	1.75	0.055	0.069	
М	2.40	3.20	0.094	0.126	
R	0.40	typ.	0.016	6 typ.	
V2	0°	8°	0°	8°	

Figure 11. D²PAK 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.

4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH3002W	STTH3002	DO-247	4.4 g	30	Tube
STTH3002PI	STTH3002	DOP3I	4.46 g	30	Tube
STTH3002G	STTH3002	D ² PAK	1.48 g	50	Tube
STTH3002G-TR	STTH3002	D ² PAK	1.48 g	1000	Tape and reel

5 Revision history

Date	Revision	Description of Changes
03-May-2006	1	First issue

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