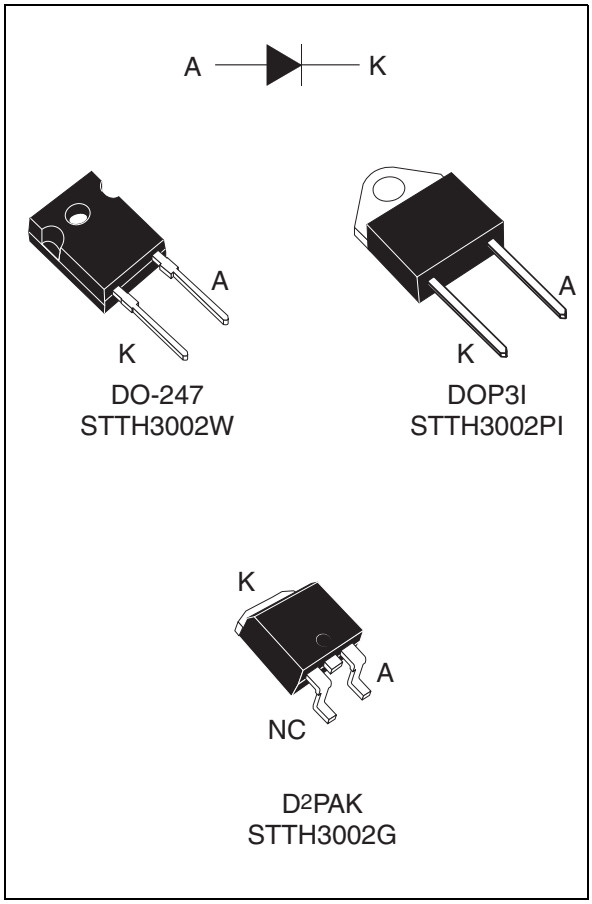
STTH3002

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



DO-247
STTH3002W

DOP3I
STTH3002PI

D²PAK
STTH3002G

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

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		200	V
$I_{F(RMS)}$	RMS forward current		50	A
$I_{F(AV)}$	Average forward current, δ = 0.5	DO-247 T_c = 135° C	30	A
		DOP3I T_c = 115° C		
		D^2PAK T_c = 135° C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal	300	A
T_{stg}	Storage temperature range		-65 to + 175	° C
T_j	Maximum operating junction temperature		175	° C

Table 2. Thermal parameters

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

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			20	µA
		T_j = 150° C			20	200	
V_F (2)	Forward voltage drop	T_j = 125° C	I_F = 25 A		0.77	0.85	V
		T_j = 25° C	I_F = 30 A			1.05	
		T_j = 150° C			0.8	0.88	

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:
$P = 0.67 \times I_{F(AV)} + 0.007\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A, dI_F/dt = -200 A/µs, V_R = 30 V, T_j = 25 °C		22	27	ns
		I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25 °C		40	50	
I_{RM}	Reverse recovery current	I_F = 30 A, dI_F/dt = 200 A/µs, V_R = 160 V, T_j = 125 °C		7.6	9.5	A
t_{fr}	Forward recovery time	I_F = 30 A, dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25 °C		140		ns
V_{FP}	Forward recovery voltage	I_F = 30 A, dI_F/dt = 200 A/µs, V_{FR} = 1.1 x V_{Fmax}, T_j = 25 °C		2.5		V

Figure 1. Peak current versus duty cycle

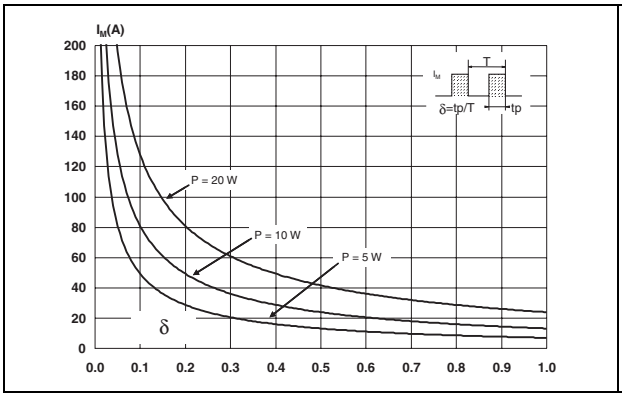


Figure 2. Forward voltage drop versus forward current (typical values)

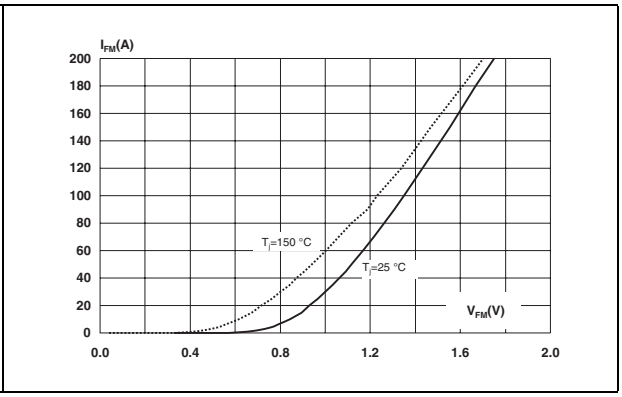


Figure 3. Forward voltage drop versus forward current (maximum values)

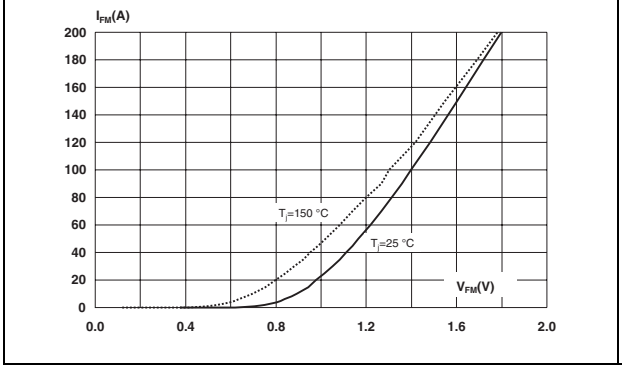


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

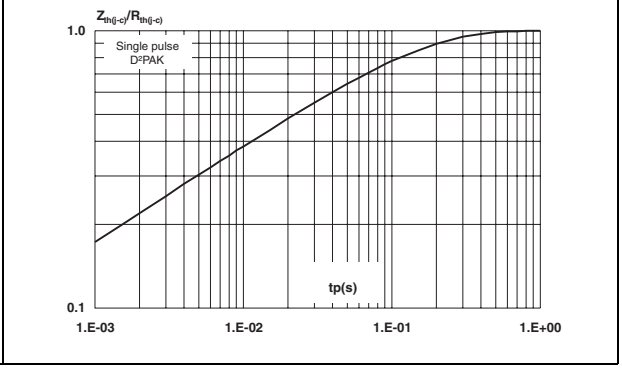


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

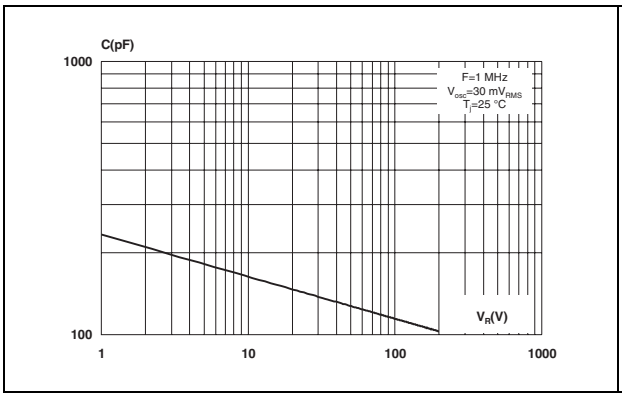


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

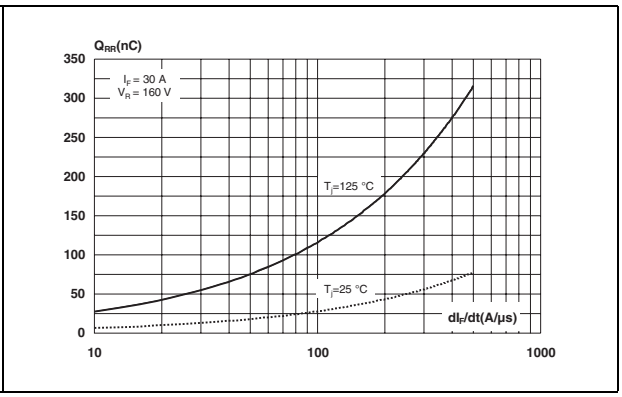


Figure 7. Reverse recovery time versus dI_F/dt (typical values)

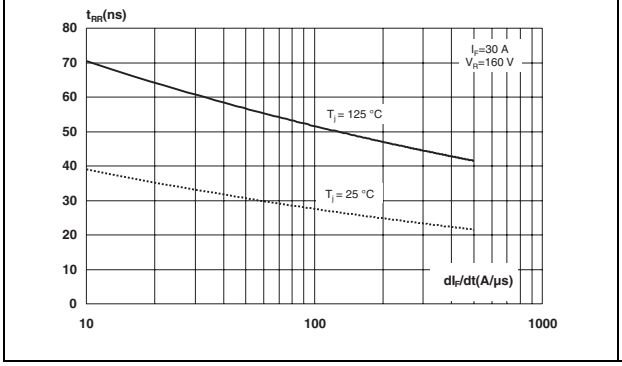


Figure 8. Peak reverse recovery current versus dI_F/dt (typical values)

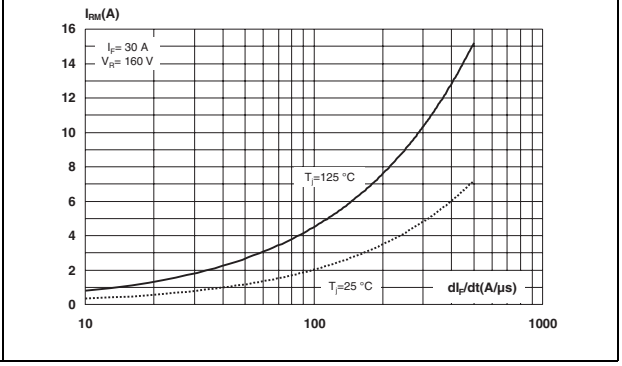


Figure 9. Dynamic parameters versus junction temperature

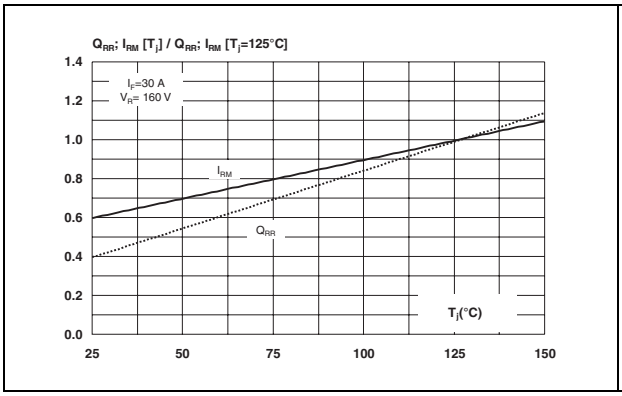
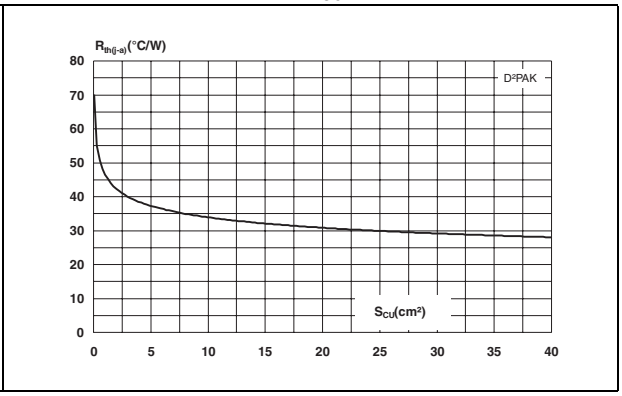
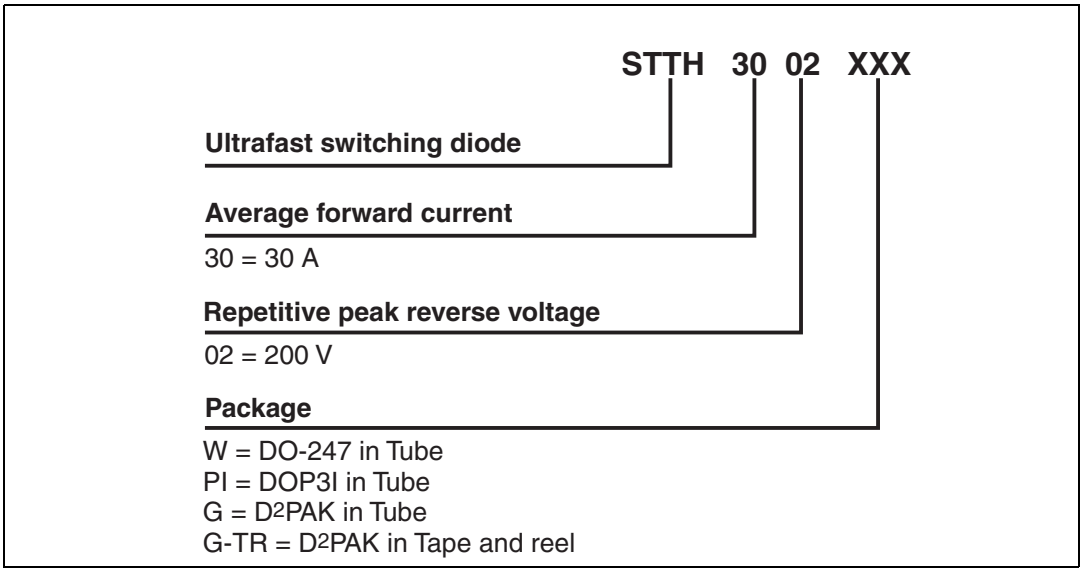


Figure 10. Thermal resistance, junction to ambient, versus copper surface under tab (Epoxy printed circuit board FR4, e_{cu} = 35 µm)



2 Ordering information scheme



3 Package information

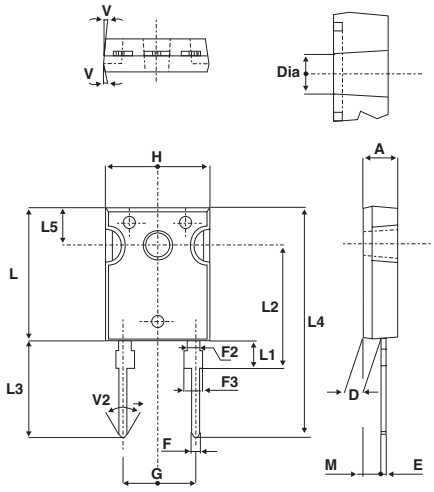
Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.8 Nm

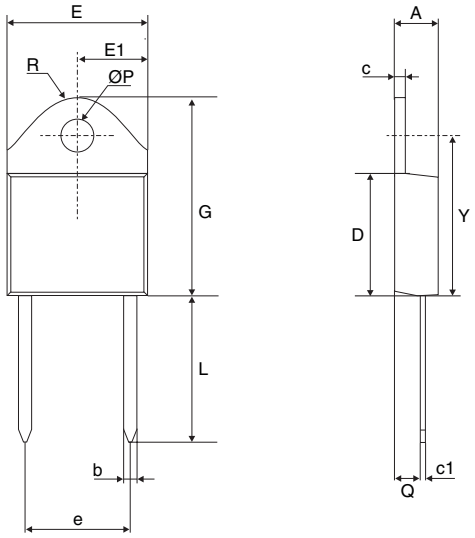
Maximum torque value: 1.0 Nm

Table 5. DO-247 dimensions



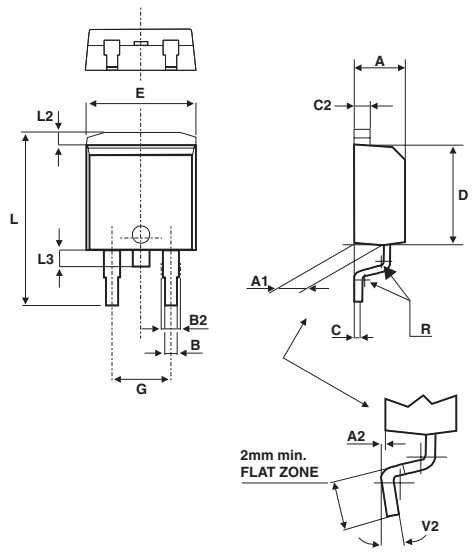
REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	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	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

Table 6. DOP3I dimensions



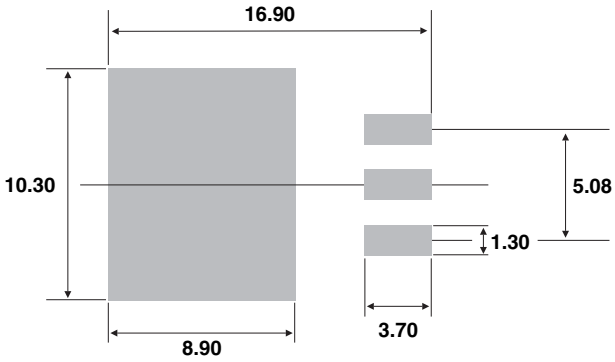
REF	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	1.20	1.40	0.047	0.055
c	1.45	1.55	0.057	0.061
c1	0.50	0.70	0.020	0.028
D	12.15	13.10	0.474	0.516
E	15.10	15.50	0.594	0.610
E1	7.55	7.75	0.297	0.305
e	10.80	11.30	0.425	0.445
G	20.4	21.10	0.815	0.831
L	14.35	15.60	0.565	0.614
P	4.08	4.17	0.161	0.164
Q	2.70	2.90	0.106	0.114
R	4.60 typ.		0.181 typ.	
Y	15.80	16.50	0.622	0.650

Table 7. D²PAK dimensions



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	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
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	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
E	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
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 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^2PAK	1.48 g	50	Tube
STTH3002G-TR	STTH3002	D^2PAK	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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