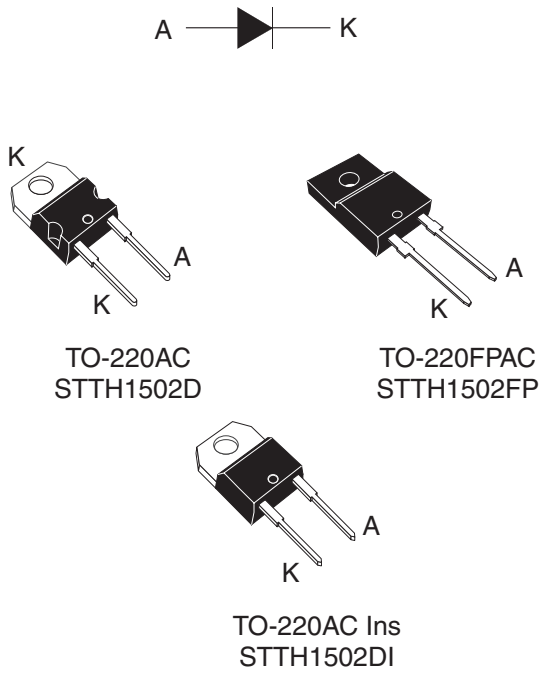
STTH1502

Ultrafast recovery diode

Main product characteristics

$I_{F(AV)}$	15 A
V_{RRM}	200 V
T_j (max)	175° C
V_F (typ)	0.85 V
t_{rr} (typ)	20 ns



Features and benefits

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery time
- High junction temperature
- Insulated packages
  - TO-220FPAC
    Electrical insulation 2000 V_{DC}
  - TO-220AC Ins
    Electrical insulation 2500 V_{RMS}

Description

The STTH1502 uses ST's new 200V planar Pt doping technology, and is specially suited for switching mode base drive and transistor circuits.

Packaged in TO-220AC, TO-220FPAC, and TO-220 Ins, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection.

Order codes

Part Number	Marking
STTH1502D	STTH1502
STTH1502FP	STTH1502
STTH1502DI	STTH1502DI

www.st.com

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			32	A
$I_{F(AV)}$	Average forward current, δ = 0.5	TO-220AC	T_c = 130° C	15	A
		TO-220AC Ins	T_c = 105° C		
		TO-220FPAC	T_c = 85° C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal		150	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	TO-220AC	2.5	° C/W
		TO-220AC Ins	3.8	
		TO-220FPAC	5	

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			10	µA
		T_j = 125° C			10	100	
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 15 A		1	1.1	V
		T_j = 150° C			0.85	0.95	
		T_j = 125° C	I_F = 30 A		1.05	1.20	
		T_j = 25° C	I_F = 30 A		1.15	1.3	
		T_j = 150° C			1	1.15	

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:
$P = 0.74 \times I_{F(AV)} + 0.014\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25° C		28	36	ns
		I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V, T_j = 25° C		20	25	
I_{RM}	Reverse recovery current	I_F = 15 A, dI_F/dt = -200 A/µs, V_R = 160 V, T_j = 125° C		5.7	7.2	A
t_{fr}	Forward recovery time	I_F = 15 A, dI_F/dt = 50 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25° C		200		ns
V_{FP}	Forward recovery voltage	I_F = 15 A, dI_F/dt = 50 A/µs, T_j = 25° C		1.3		V

Figure 1. Peak current versus duty cycle

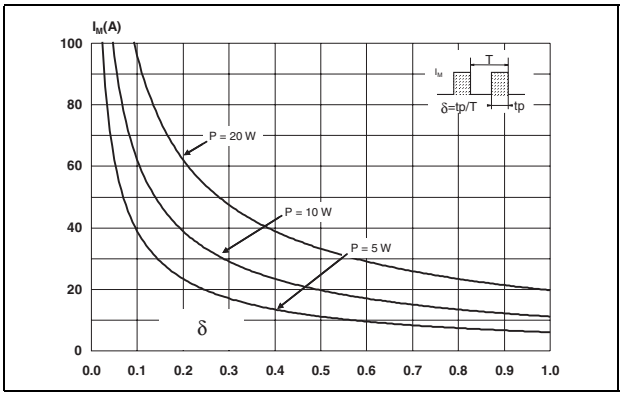


Figure 2. Forward voltage drop versus forward current (typical values)

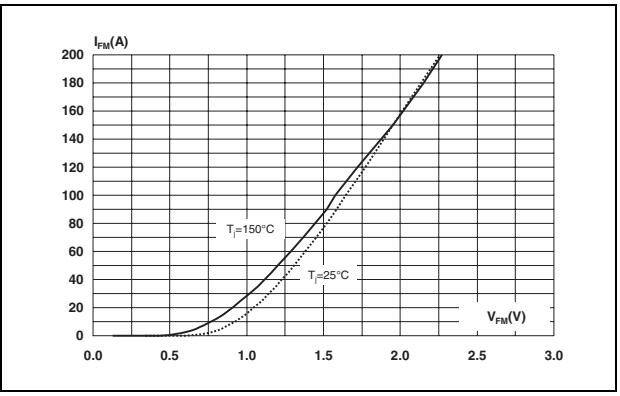


Figure 3. Forward voltage drop versus forward current (maximum values)

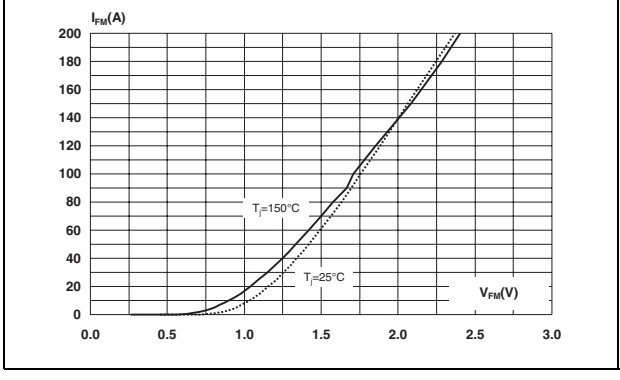


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-220AC)

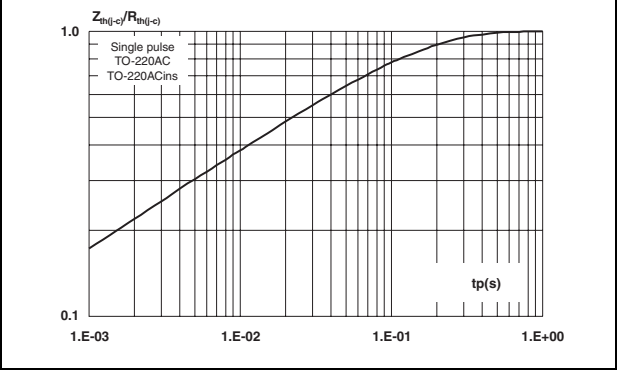


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-220FPAC)

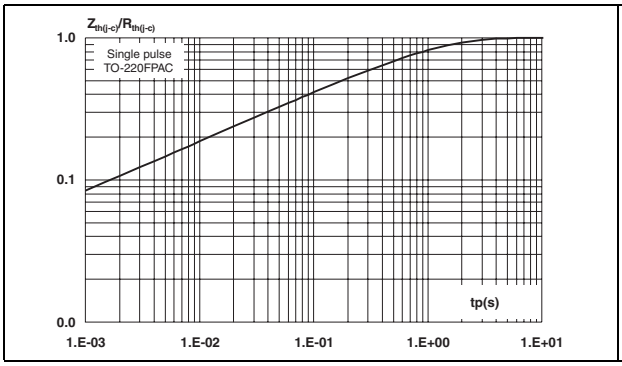


Figure 6. Junction capacitance versus reverse applied voltage (typical values)

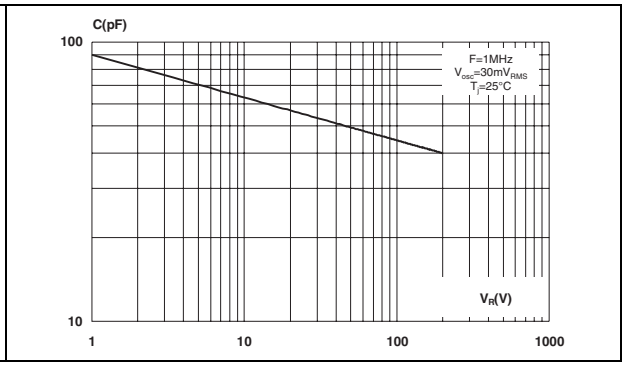


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

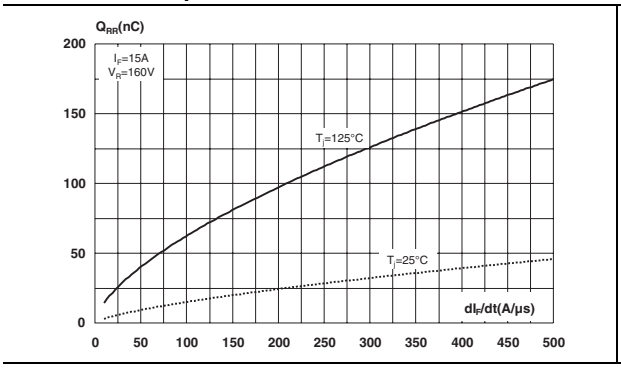


Figure 8. Reverse recovery time versus dI_F/dt (typical values)

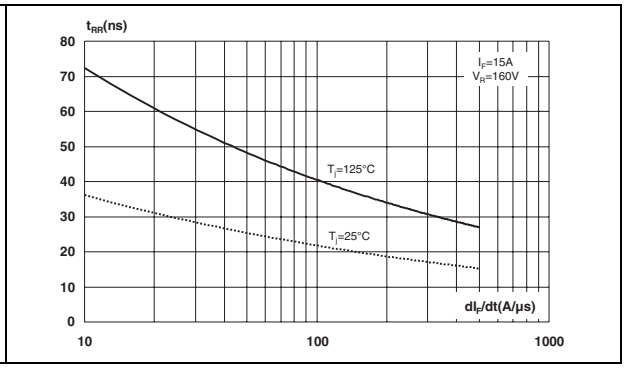


Figure 9. Peak reverse recovery current versus dI_F/dt (typical values)

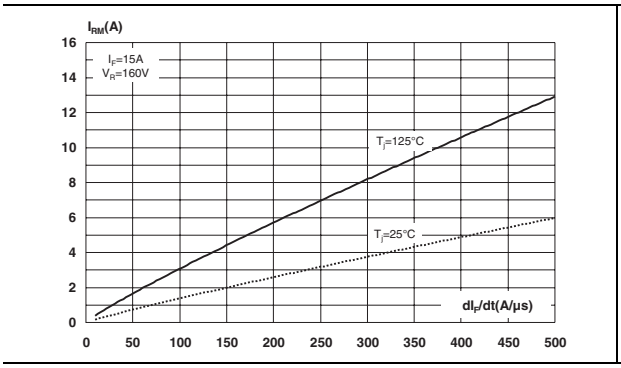
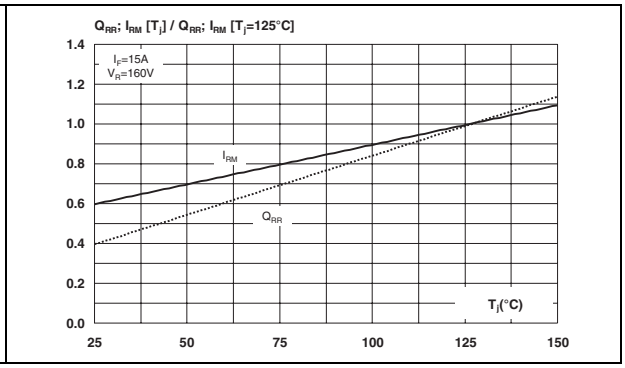
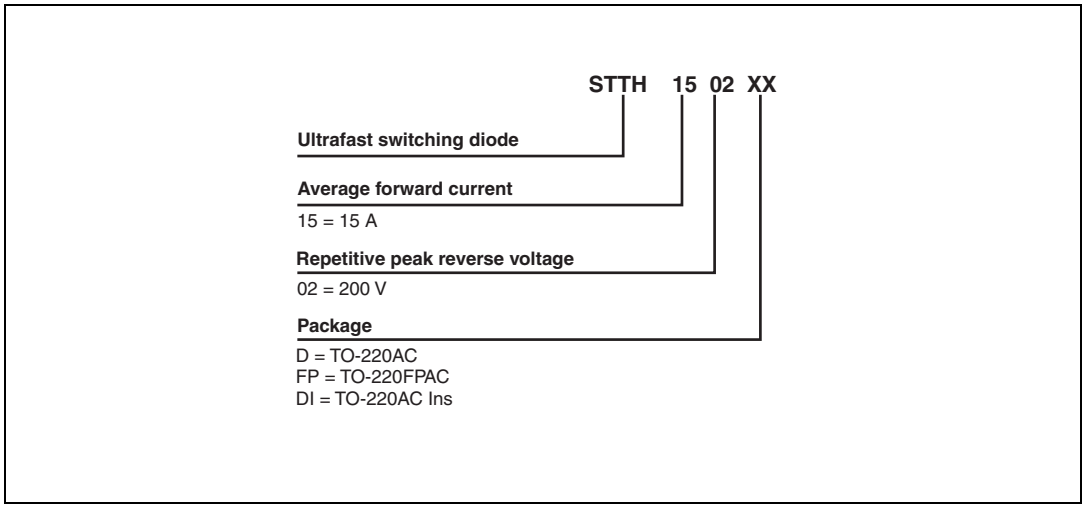


Figure 10. Dynamic parameters versus junction temperature



2 Ordering information scheme



3 Package information

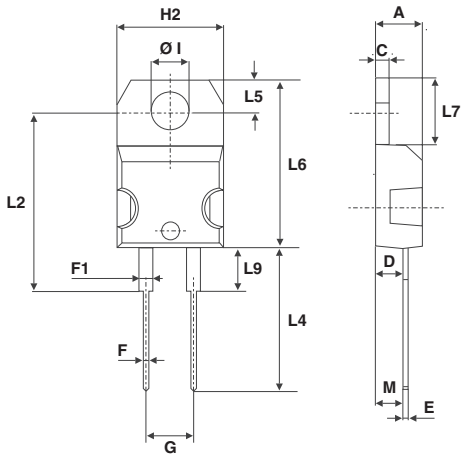
Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.8 Nm

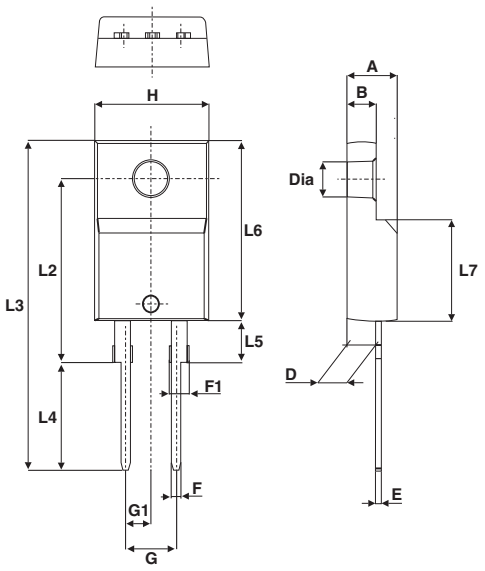
Maximum torque value: 1.0 Nm

Table 5. T0-220AC dimensions



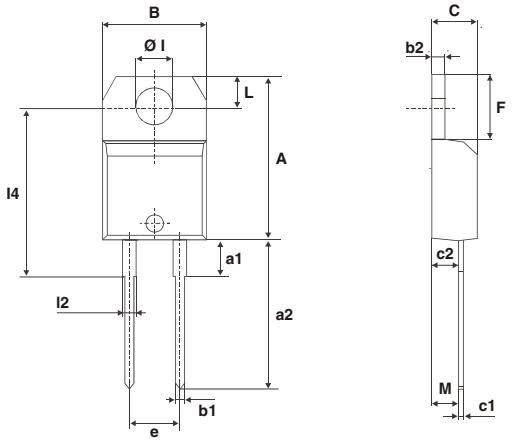
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

Table 6. T0-220FPAC dimensions



REF	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 7. TO-220AC Ins. dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	4.80		5.40	0.189		0.212
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
M		2.60			0.102	

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
STTH1502D	STTH1502	TO-220AC	1.86 g	50	Tube
STTH1502FP	STTH1502	TO-220FPAC	2.2 g	50	Tube
STTH1502DI	STTH1502DI	TO-220AC Ins	1.86	50	Tube

5 Revision history

Date	Revision	Description of Changes
05-Apr-2006	1	First issue
10-Oct-2006	2	Added TO-220AC Ins package

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