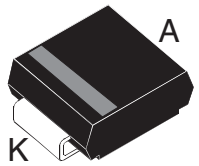
STTH102

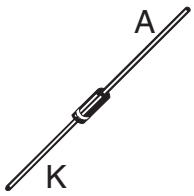
High efficiency ultrafast diode

Main product characteristics

$I_{F(AV)}$	1 A
V_{RRM}	200 V
T_j (max)	175° C
V_F(max)	0.78 V
t_{rr} (max)	20 ns



SMA
(JEDEC DO-214AC)
STTH102A



DO-41

STTH102

Features and benefits

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

Description

The STTH102, which is using ST's new 200 V planar technology, is specially suited for switching mode base drive and transistor circuits. The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

Order codes

Part Number	Marking
STTH102A	U12
STTH102	STTH102
STTH102RL	STTH102

Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(AV)}$	Average forward current	SMA	T_L = 148° C δ = 0.5	1	A
		DO-41	T_L = 130° C δ = 0.5		
I_{FSM}	Surge non repetitive forward current	SMA	tp = 10 ms Sinusoidal	40	A
		DO-41		50	
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C
dV/dt	Critical rate of rise of reverse voltage			10000	V/µs

1 Characteristics

Table 2. Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-l)}$	Junction to lead		SMA	30	°C/W
		Lead length = 10 mm	DO-41	50	

Table 3. Static Electrical Characteristics

Symbol	Parameter	Tests conditions		Min.	Typ	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			1	µA
		T_j = 125° C			1	25	
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 700 mA (SMA)			0.90	V
			I_F = 1 A			0.97	
		T_j = 125° C	I_F = 1 A		0.68	0.78	

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:
$P = 0.65 \times I_{F(AV)} + 0.130\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic electrical characteristics

Symbol	Parameter	Tests conditions		Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	T_j = 25° C	I_F = 0.5 A I_{rr} = 0.25 A I_R = 1 A		12	20	ns
t_{fr}	Forward recovery time	T_j = 25° C	I_F = 1 A dI_F/dt = 50 A/ms V_{FR} = 1.1 x $V_F$max		50		ns
V_{FP}	Forward recovery voltage	T_j = 25° C	I_F = 1 A dI_F/dt = 50 A/ms		1.8		V

Figure 1. Average forward power dissipation versus average forward current (SMA)

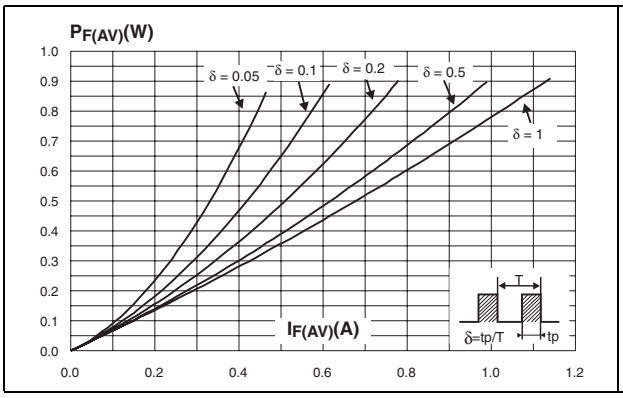


Figure 2. Average forward power dissipation versus average forward current (DO-41)

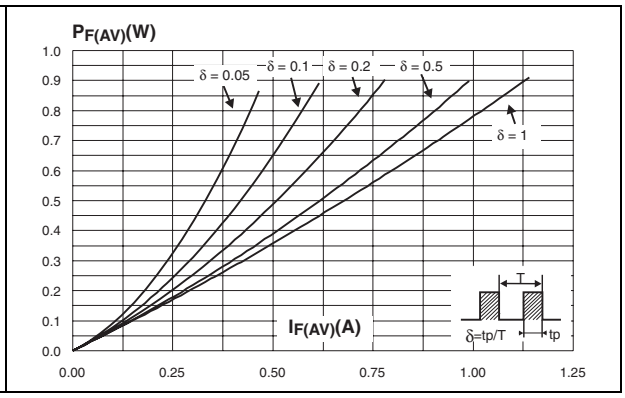


Figure 3. Average forward current versus ambient temperature (δ = 0.5) (SMA)

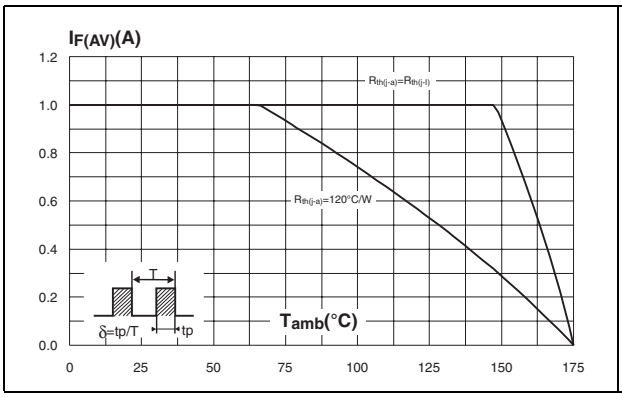


Figure 4. Average forward current versus ambient temperature (δ = 0.5) (DO-41)

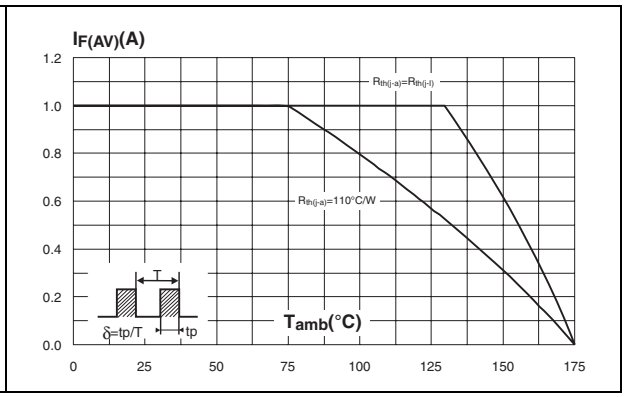


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board, $e_{(Cu)}$ = 35 µm, recommended pad layout) (SMA)

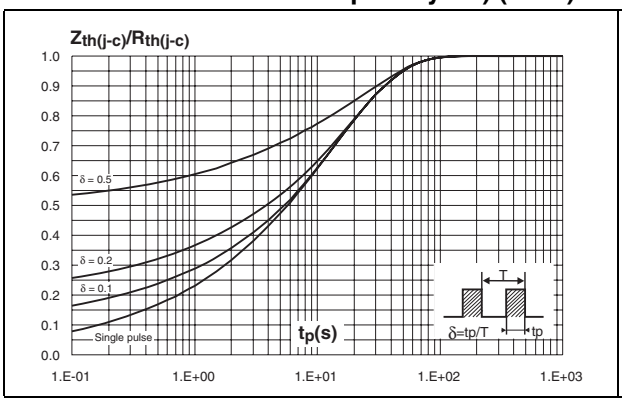


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-41)

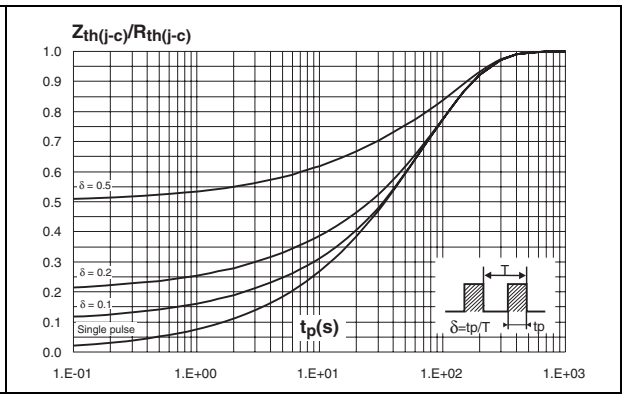


Figure 7. Forward voltage drop versus forward current

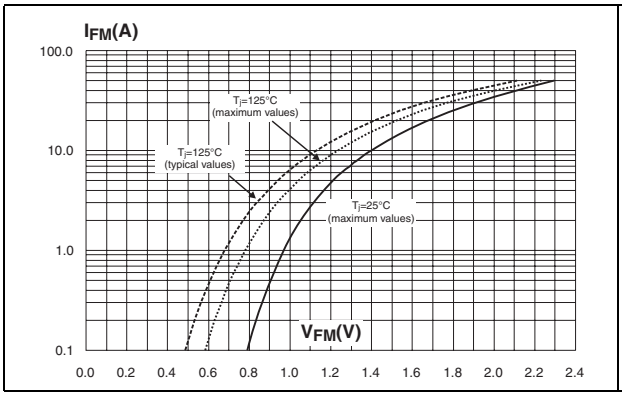


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

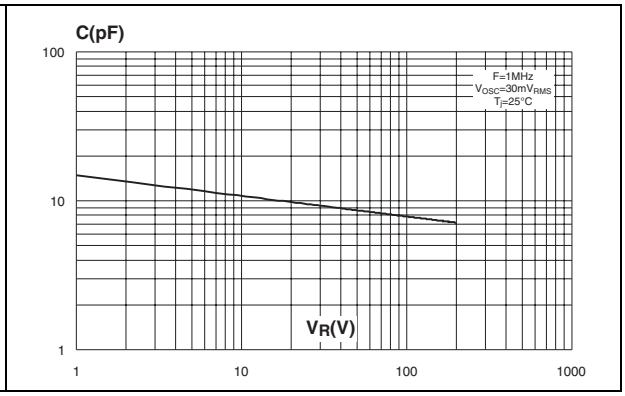


Figure 9. Reverse recovery time versus dI_F/dt (90% confidence)

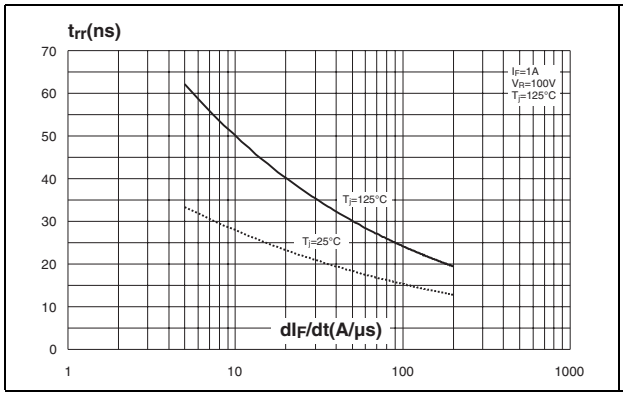


Figure 10. Peak recovery current versus dI_F/dt (90% confidence)

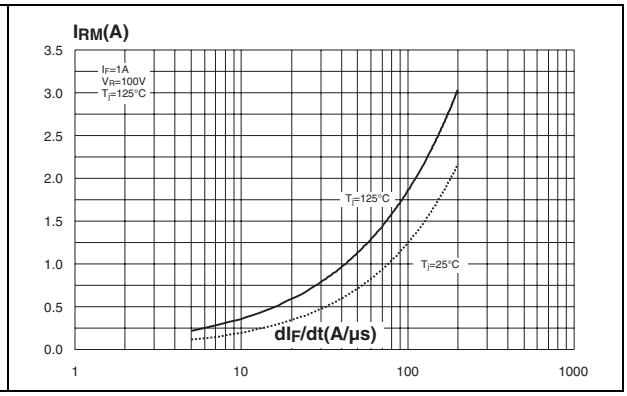


Figure 11. Reverse recovery charges versus dI_F/dt (90% confidence)

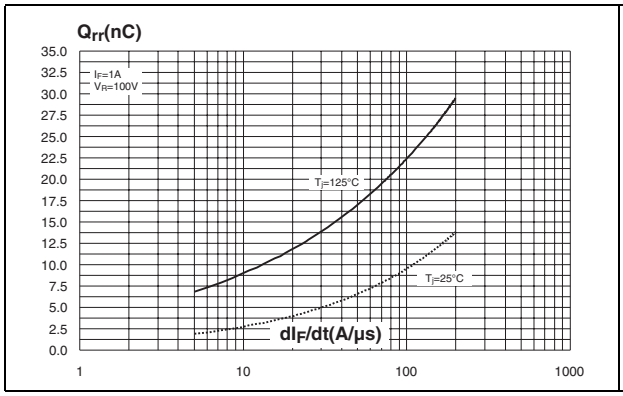


Figure 12. Relative variations of dynamic parameters versus junction temperature

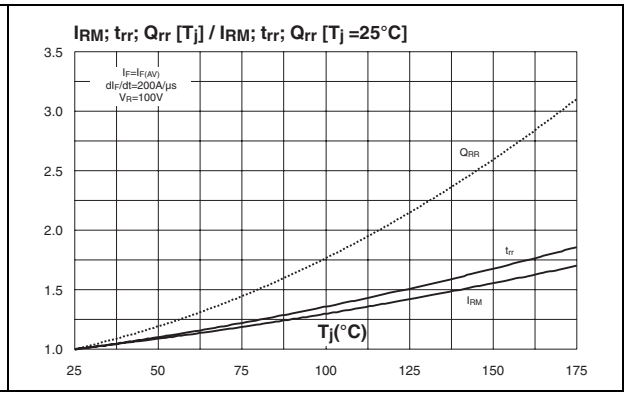


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 µm) (SMA)

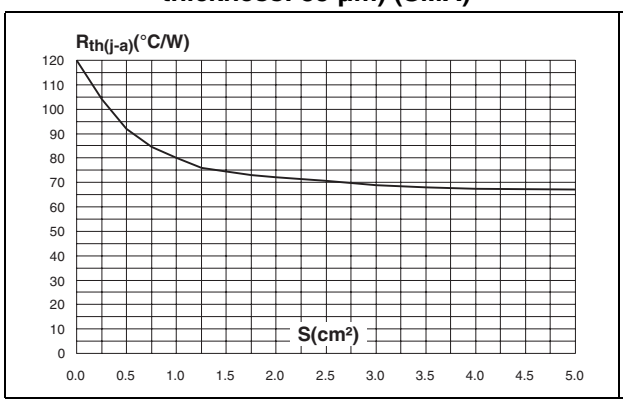
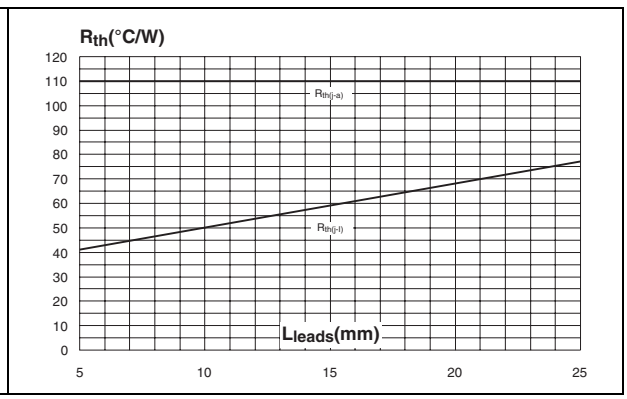


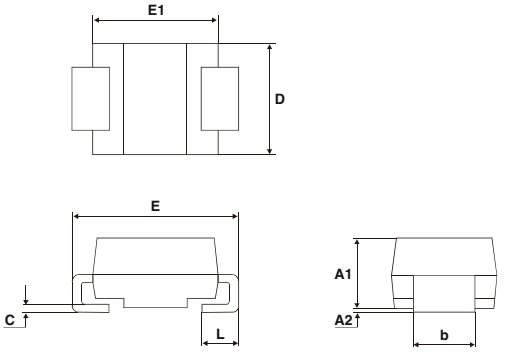
Figure 14. Thermal resistance versus lead length (DO-41)



2 Package information

- Epoxy meets UL94 V0

Table 5. SMA Dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 15. Footprint (dimensions in mm)

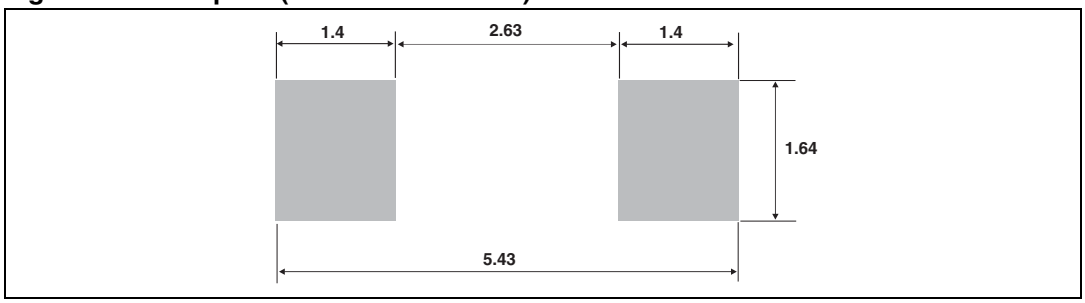
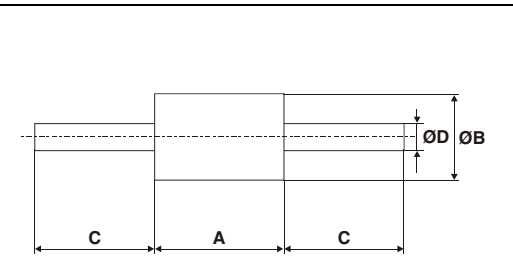


Table 6. DO-41 (Plastic) Package dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.1	5.20	0.160	0.205
B	2	2.71	0.080	0.107
C	25.4		1	
D	0.712	0.863	0.028	0.034

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.

3 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH102A	U12	SMA	0.068 g	5000	Tape and reel
STTH102	STTH102	DO-41	0.34 g	2000	Ammopack
STTH102RL	STTH102	DO-41	0.34 g	5000	Tape and reel

4 Revision history

Date	Revision	Description of Changes
Jul-2003	2A	Last update.
Aug-2004	3	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106inc.) to 2.03mm (0.080). SMA and DO-41 datasheets merged
27-Jun-2005	4	Corrected error in title.
21-Nov-2006	5	Reformatted to current standards. Added Table 4. Dynamic electrical characteristics. Updated dimensions table for DO-41 Plastic package. Added cathode bands to package illustrations.

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