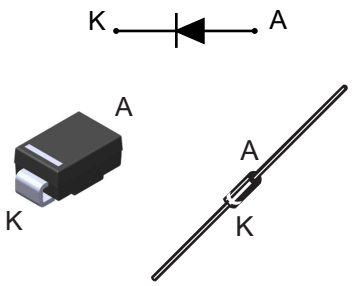
STTH102

Datasheet

200 V - 1 A high efficiency ultrafast diode



SMA DO-41

Features

- Very low conduction losses
- Negligible switching losses
- Low forward voltage drop
- High junction temperature
- ECOPACK®2 compliant

Applications

- Switching diode
- LED Lighting
- Auxiliary power supply
- Flyback diode

Description

The STTH102 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 SMA and DO-41, the STTH102 is ideal for use as a free wheeling diode in power supplies and other power switching applications.

Product status
STTH102

Product summary	
Symbol	**Value**
$I_{F(AV)}$	1 A
V_{RRM}	200 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.68 V
$t_{rr(typ.)}$	12 ns

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	SMA	T_L = 145 °C	1	A
		DO-41	T_L = 130 °C		
I_{FSM}	Surge non repetitive forward current	SMA	t_p = 10 ms sinusoidal	40	A
		DO-41		50	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Operating junction temperature			+175	°C

Table 2. Thermal resistance parameter

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

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		1	µA
		T_j = 125 °C		-	1	25	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-		0.97	V
		T_j = 125 °C		-	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:

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

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

Table 4. Dynamic characteristics (T_j = 25 °C unless otherwise stated)

Symbol	Parameters	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A	-	12	20	ns
t_{fr}	Forward recovery time	I_F = 1 A, dI_F/dt = 50 A/ms, V_{FR} = 1.1 $V_{F(max.)}$	-	50		ns
V_{FP}	Forward recovery voltage	I_F = 1 A, dI_F/dt = 50 A/µs	-	1.8		V

1.1 Characteristics (curves)

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

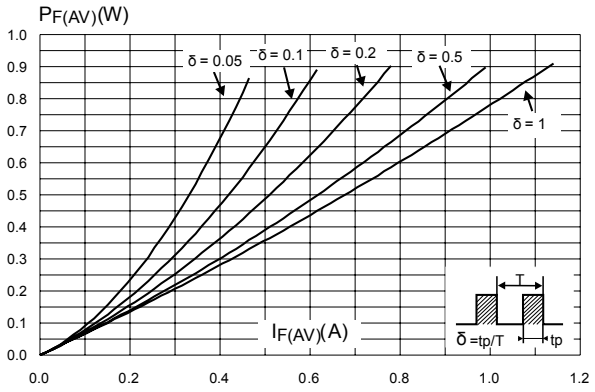


Figure 2. Average forward power dissipation versus average forward current (DO-41)

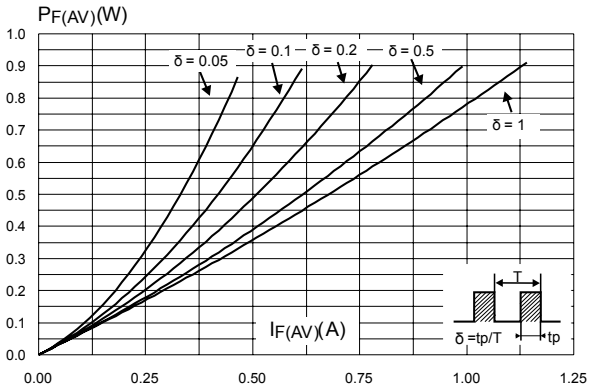


Figure 3. Average forward current versus ambient temperature (δ = 0.5) (SMA)

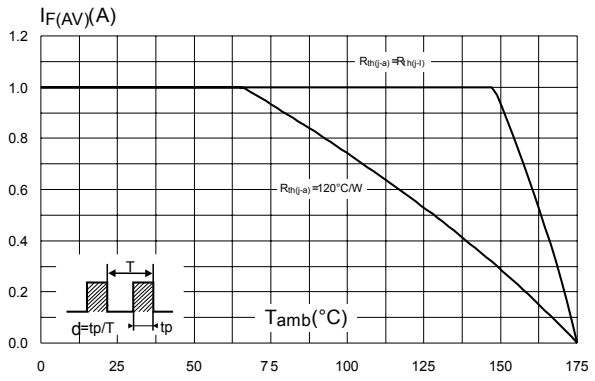


Figure 4. (DO-41)Average forward current versus ambient temperature (δ = 0.5) (DO-41)

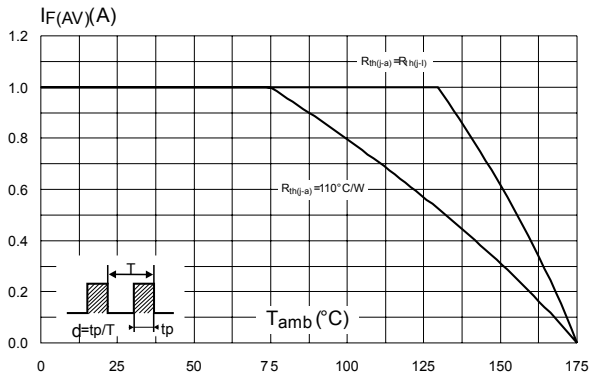


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board, e(Cu) = 35 µm,recommended pad layout) (SMA)

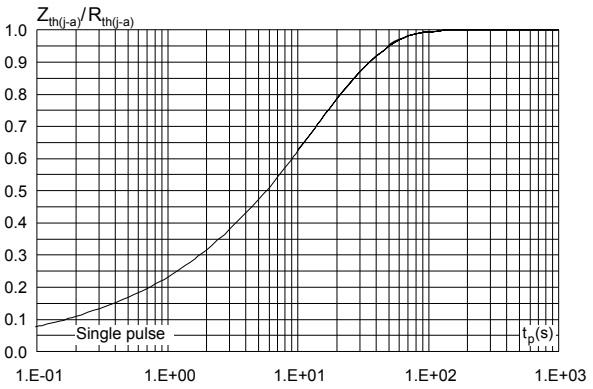


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-41)

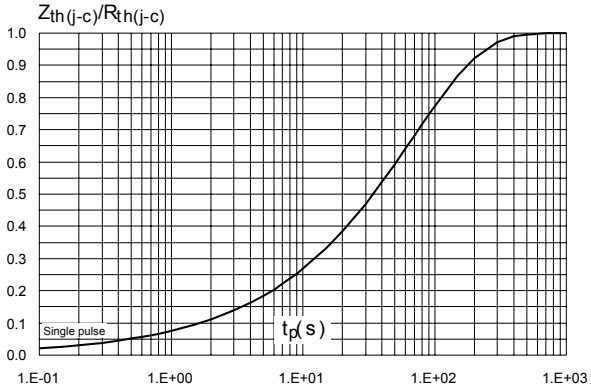


Figure 7. Forward voltage drop versus forward current

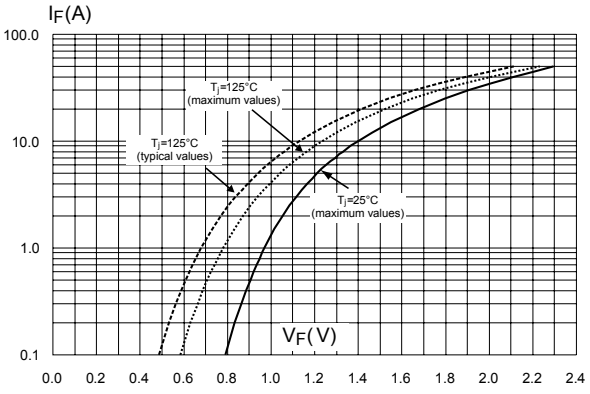


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

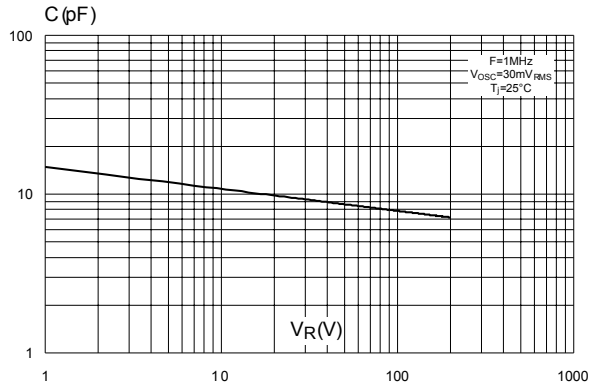


Figure 9. Relative variations of dynamic parameters versus junction temperature

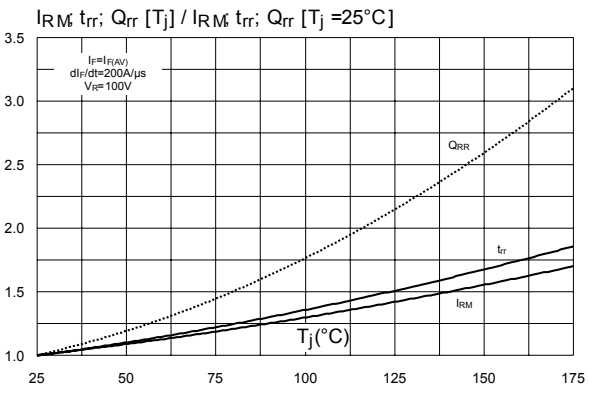


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (typical values)

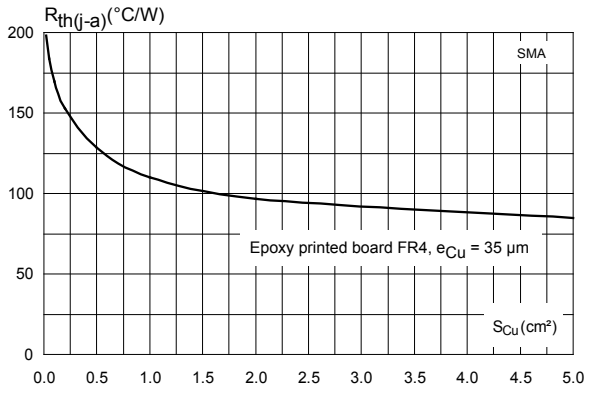
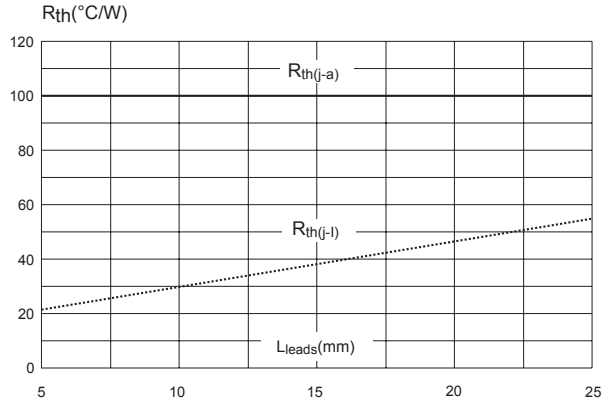


Figure 11. Thermal resistance versus lead length (DO-41)



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

2.1 DO-41 package information

- Epoxy meets UL 94, V0

Figure 12. DO-41 package outline

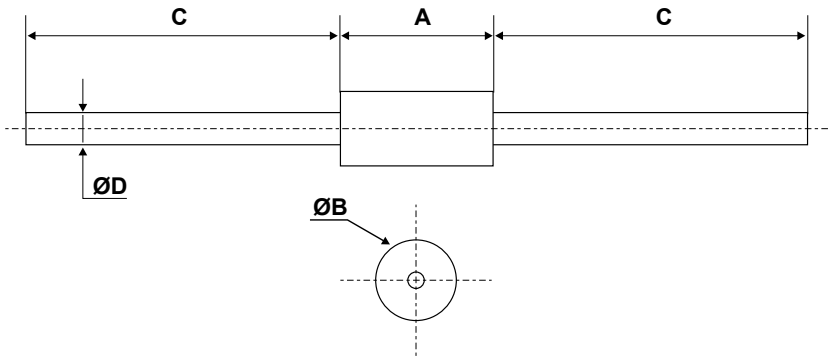


Table 5. DO-41 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.07	-	5.20	0.160	-	0.205
B	2.04	-	2.71	0.080	-	0.107
C	25.40	-		1.000	-	
D	0.71	-	0.86	0.028	-	0.0034

2.2 SMA package information

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

Figure 13. SMA package outline

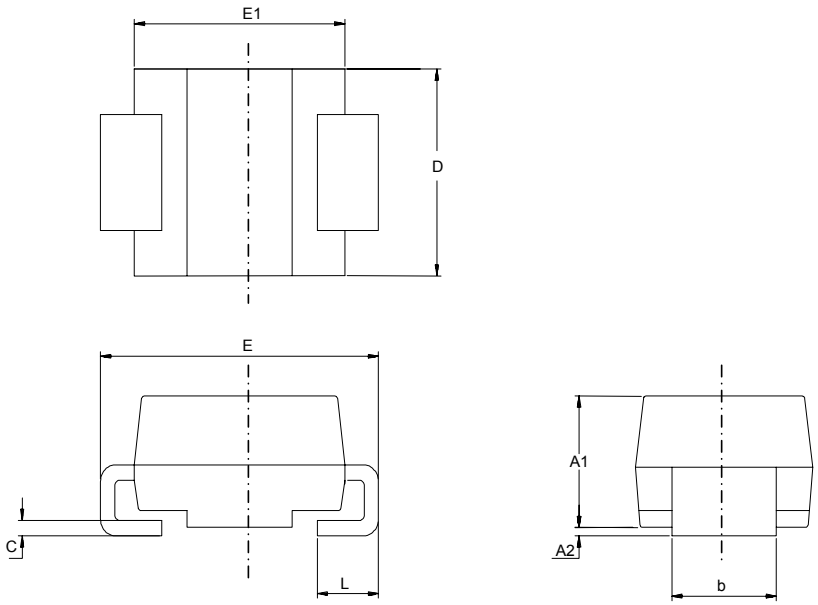
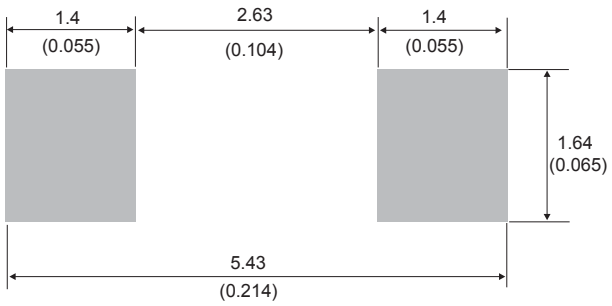


Table 6. SMA package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.074	0.097
A2	0.05	0.20	0.001	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.005	0.016
D	2.25	2.90	0.088	0.115
E	4.80	5.35	0.188	0.211
E1	3.95	4.60	0.155	0.182
L	0.75	1.50	0.029	0.060

Figure 14. **SMA recommended footprint in mm (inches)**



3 Ordering information

Table 7. **Ordering information**

Order code	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

Revision history

Table 8. **Document revision history**

Date	Revision	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.
05-Dec-2018	6	Add electrical schematics of single diode and ECOPACK®2 compliant.

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