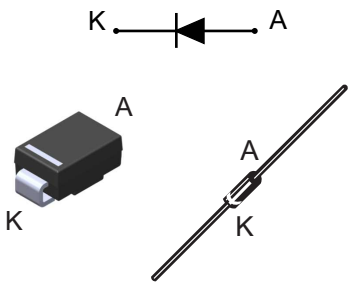
1000 V - 1 A high efficiency ultrafast diode



SMA DO-41

Features

- Low forwarded voltage drop
- High reliability
- High surge current capability
- Soft switching for reduced EMI disturbances
- Planar technology
- ECOPACK2 compliant

Applications

- Switching diode
- Auxiliary power supply

Description

The STTH110, which is using ST ultrafast high voltage planar technology, is especially suited for free-wheeling, clamping, snubbering, demagnetization in power supplies and other power switching applications.

Product status
STTH110

Product summary	
Symbol	**Value**
$I_{F(AV)}$	1 A
V_{RRM}	1000 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	1.42 V

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			1000	V
V_{RMS}	Voltage rms			700	V
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	SMA	T_L = 125 °C	1	A
		DO-41	T_L = 100 °C		
I_{FSM}	Surge non repetitive forward current	SMA	t_p = 8.3 ms sinusoidal	18	A
		DO-41		20	
T_{stg}	Storage temperature range			-50 to +175	°C
T_j	Maximum 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	45	
$R_{th(j-a)}$	Junction to ambient			110	

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 = 1000 V	-		10	µA
		T_j = 125 °C		-		50	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-		1.7	V
		T_j = 150 °C		-	0.98	1.42	

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:

$P = 1.20 \times I_{F(AV)} + 0.225 \times I_F{}^2{}_{(RMS)}$

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	-	-	75	ns
t_{fr}	Forward recovery time	I_F = 1 A, dI_F/dt = 50 A/µs, V_{FR} = 1.1 $V_{F(max.)}$	-	-	300	ns
V_{FP}	Forward recovery voltage		-	-	18	V

1.1 Characteristics (curves)

Figure 1. Conduction losses versus average current

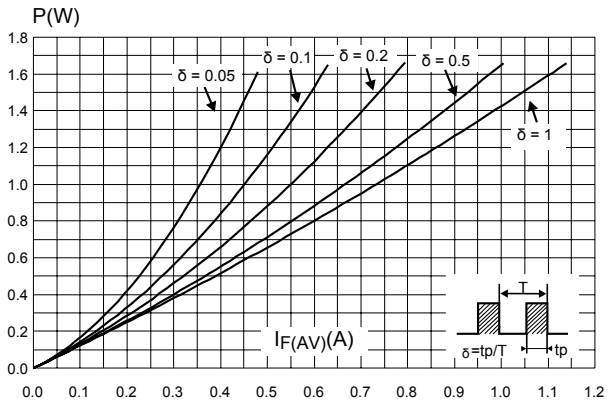


Figure 2. Forward voltage drop versus forward current (typical values)

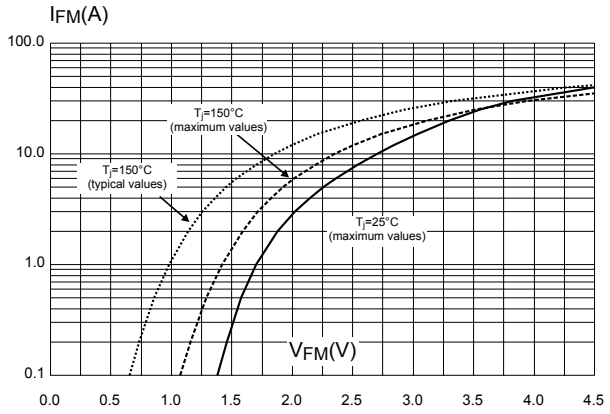


Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-41)

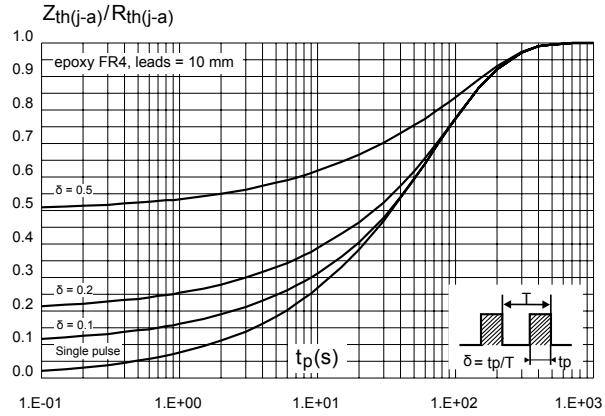


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration(SMA)

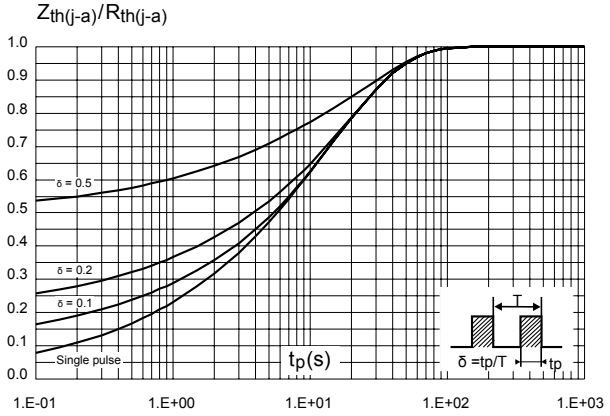


Figure 5. Thermal resistance junction to ambient versus copper surface under each lead (DO-41)

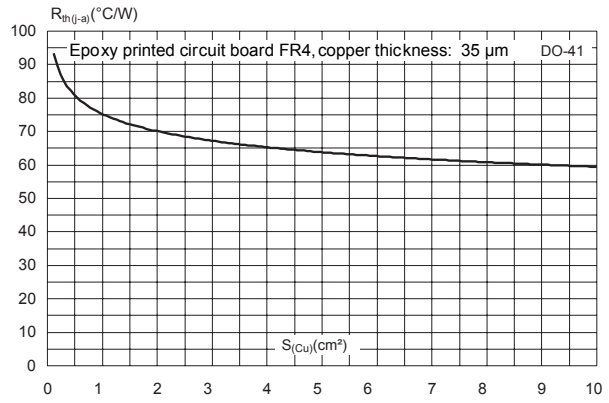
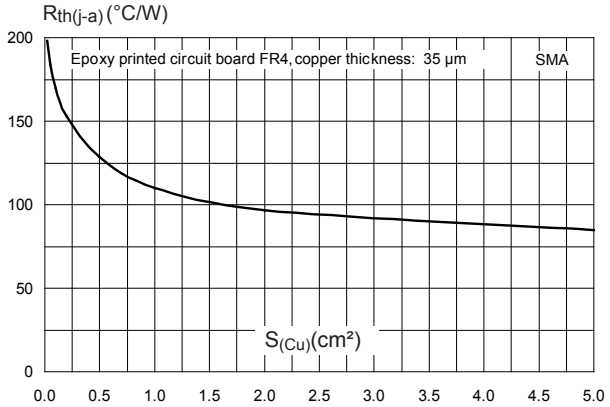


Figure 6. Thermal resistance junction to ambient versus copper surface under each lead (typical values) (SMA)



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
- Band indicates cathode
- Bending method (DO-41): see Application note AN1471

Figure 7. DO-41 package outline

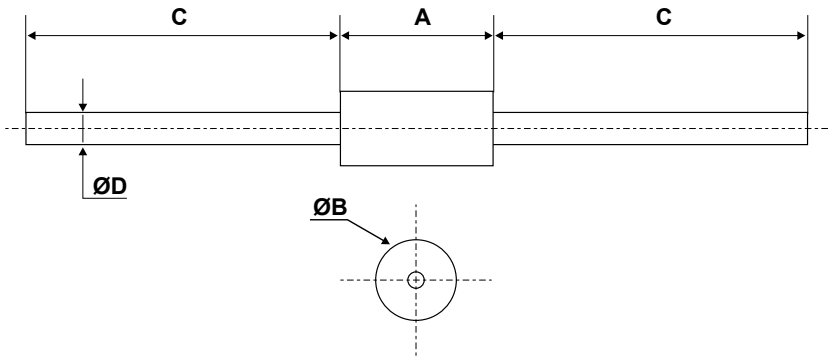


Table 5. DO-41 package mechanical data

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 8. SMA package outline

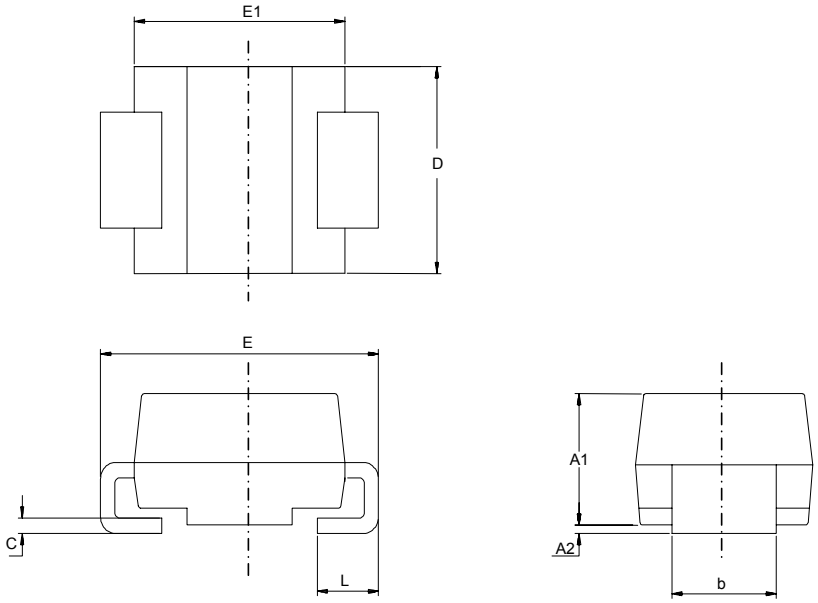
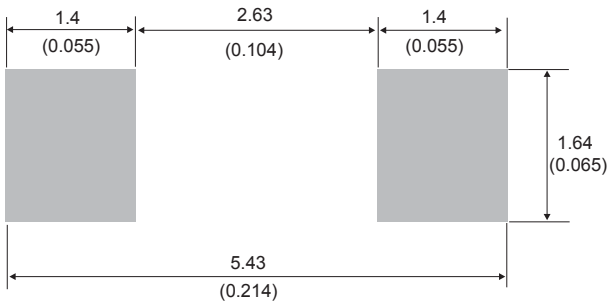


Table 6. SMA package mechanical data

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 9. **SMA recommended footprint in mm (inches)**



3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH110	STTH110	DO-41	0.34 g	2000	Ammopack
STTH110A	H10	SMA	0.068 g	5000	Tape and reel 13"
STTH110RL	STTH110	DO-41	0.34 g	5000	Tape and reel 13"

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
Jan-2003	1	Initial release.
30-Sept-2009	2	Updated Table 8.
20-Dec-2013	3	Updated Table 4.
11-Dec-2019	4	Updated Table 3.