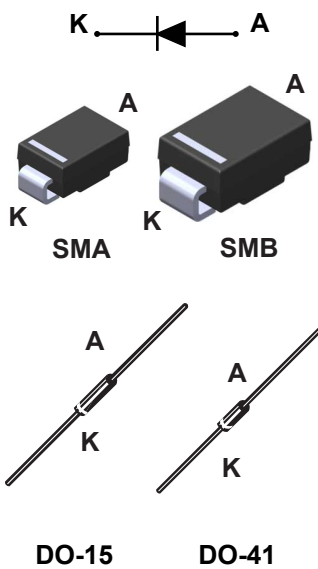


## 200 V - 1.5 A ultrafast recovery diode



### Features

- Very low conduction losses
- Negligible switching losses
- Low forward voltage drop
- High junction temperature
- ECOPACK<sup>®2</sup>

### Applications

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

### Description

The **STTH1R02** 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, SMB, DO-41 and DO-15, the **STTH1R02** is ideal for use low voltage, high frequency inverters, free wheeling and polarity protection

Product status	
STTH1R02	
Product summary	
Symbol	Value
$I_{F(AV)}$	1.5 A
$V_{RRM}$	200 V
$T_{j(max.)}$	175 °C
$V_F(typ.)$	0.7 V
$t_{rr}(typ.)$	15 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 $\delta = 0.5$ , square wave	SMA, SMB	$T_L = 150\text{ °C}$	1.5	A
		DO-41, DO-15	$T_L = 135\text{ °C}$		
$I_{FSM}$	Surge non repetitive forward current		$t_p = 10\text{ ms}$ sinusoidal	60	A
$T_{stg}$	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, SMB	30	°C/W
$R_{th(j-l)}$	Junction to lead	Lead length = 10 mm on infinite heatsink	DO-15, DO-41	45	

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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		3	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	2	20	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 1.5\text{ A}$	-	0.89	1.00	V
		$T_j = 100\text{ °C}$		-	0.76	0.85	
		$T_j = 150\text{ °C}$		-	0.70	0.80	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.68 \times I_{F(AV)} + 0.08 \times I_{F(RMS)}^2$$

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 ( $T_j = 25\text{ °C}$  unless otherwise stated)**

Symbol	Parameters	Test conditions	Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1\text{ A}$ , $di_F/dt = -50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	23	30	ns
		$I_F = 1\text{ A}$ , $di_F/dt = -100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	15	20	
$I_{RM}$	Reverse recovery current	$I_F = 1.5\text{ A}$ , $di_F/dt = -200\text{ A}/\mu\text{s}$ , $V_R = 160\text{ V}$ , $T_j = 125\text{ °C}$	-	3	4	A
$t_{fr}$	Forward recovery time	$I_F = 1.5\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_{FR} = 1.1 V_{F(max.)}$	-	50		ns
$V_{FP}$	Forward recovery voltage	$I_F = 1.5\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	-	2.1		V

## 1.1 Characteristics (curves)

Figure 1. Peak current versus duty cycle

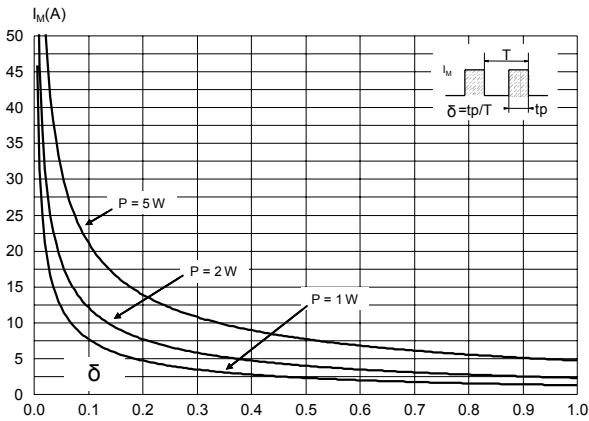


Figure 2. Forward voltage drop versus forward current (typical values)

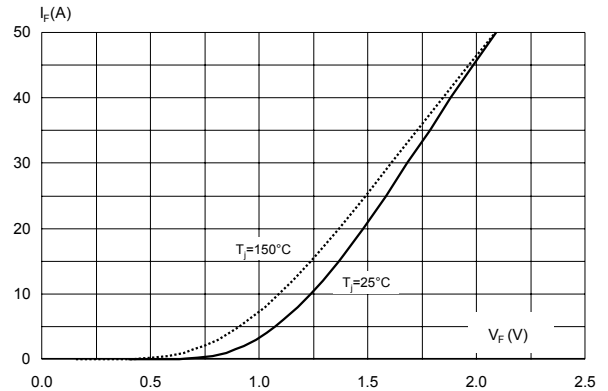


Figure 3. Forward voltage drop versus forward current (maximum values)

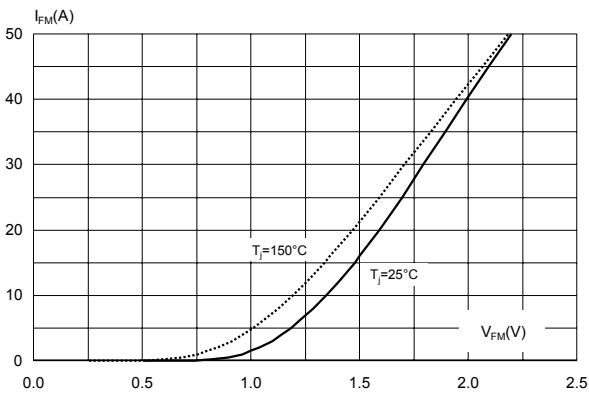
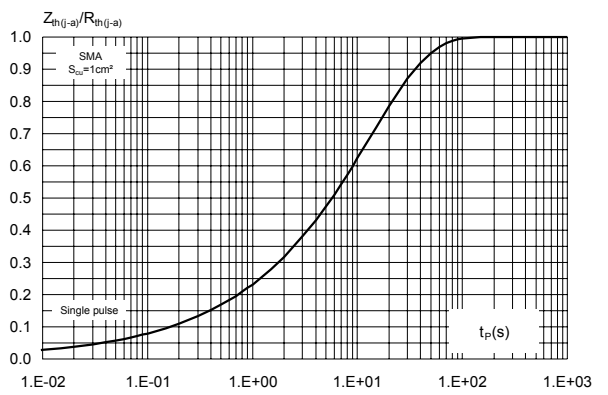
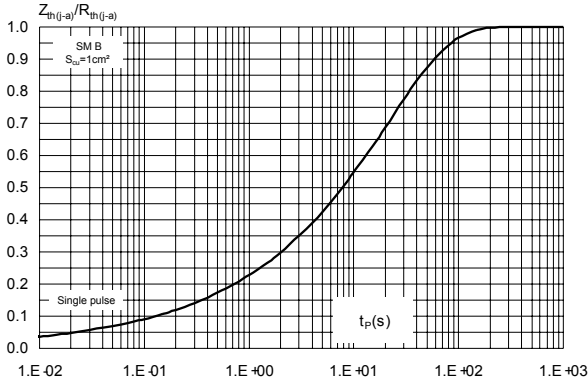


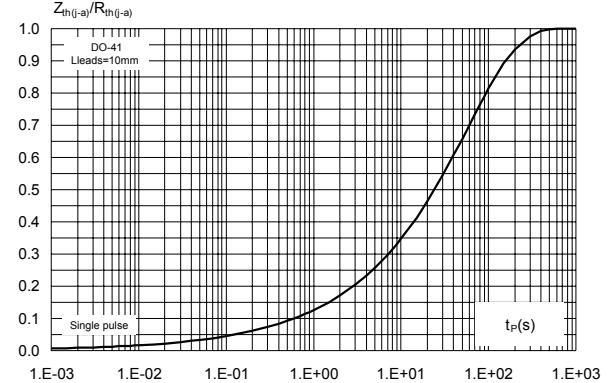
Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration (SMA)



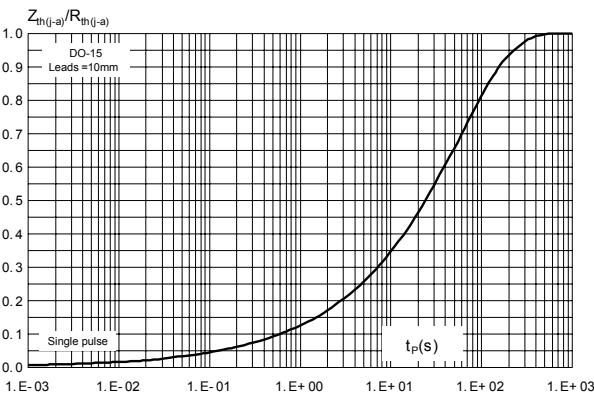
**Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration (SMB)**



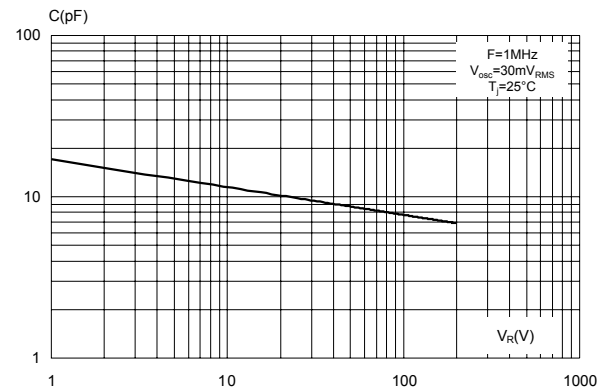
**Figure 6. Relative variation of thermal impedance junction to lead versus pulse duration (DO-41)**



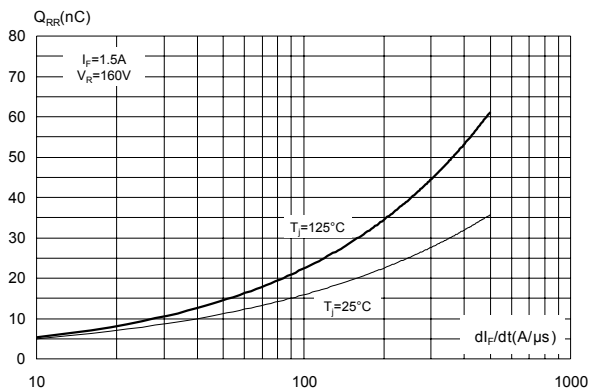
**Figure 7. Relative variation of thermal impedance junction to lead versus pulse duration (DO-15)**



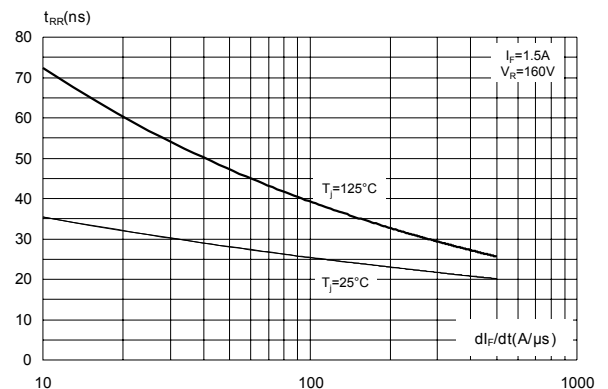
**Figure 8. Junction capacitance versus reverse voltage applied (typical values)**



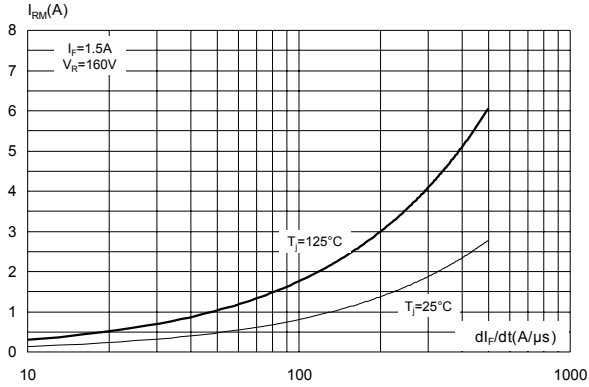
**Figure 9. Reverse recovery charges versus  $di_F/dt$  (typical values)**



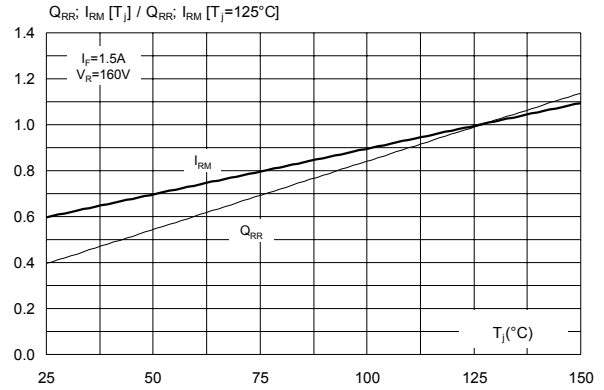
**Figure 10. Reverse recovery time versus  $di_F/dt$  (typical values)**



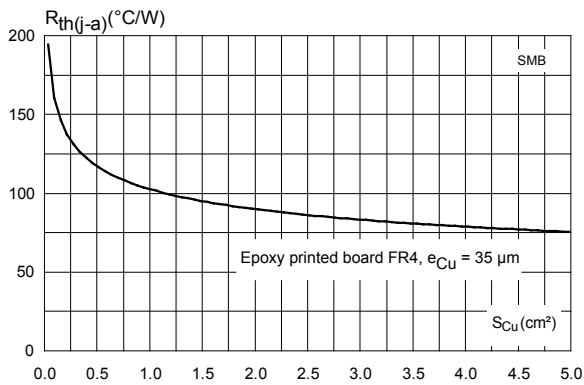
**Figure 11. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



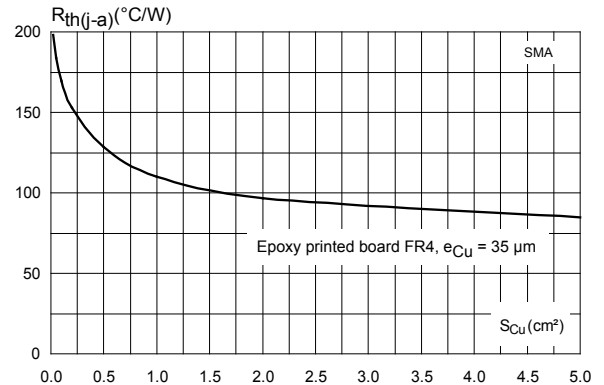
**Figure 12. Relative variations of dynamic parameters versus junction temperature**



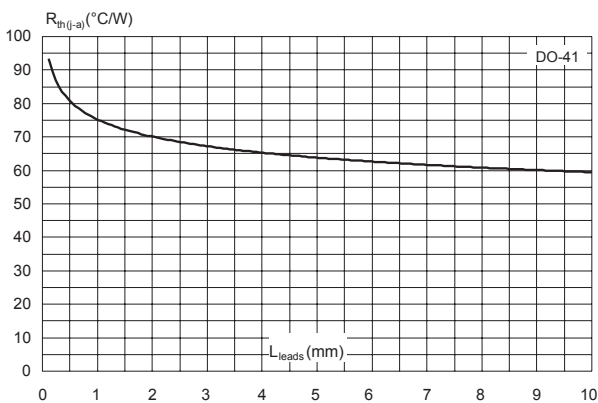
**Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (typical values)**



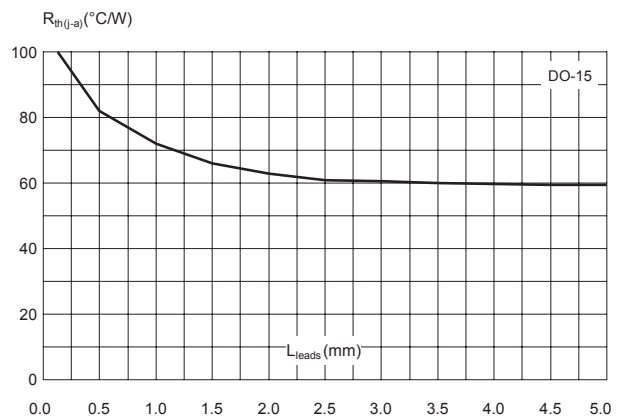
**Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (typical values)**



**Figure 15. Thermal resistance junction to ambient versus lead length (DO-41)**



**Figure 16. Thermal resistance junction to ambient versus lead length (DO-15)**



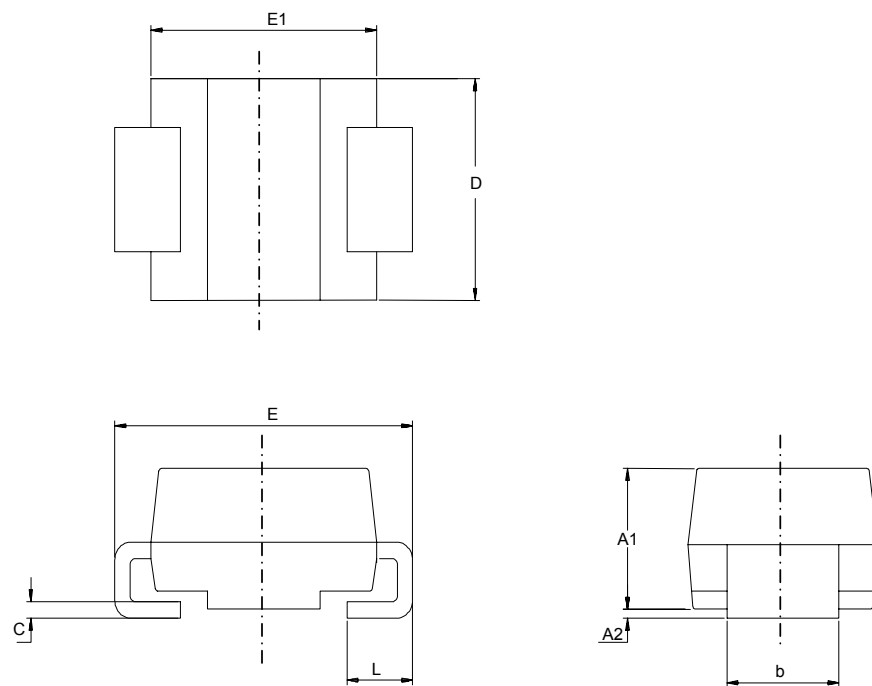
## 2 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

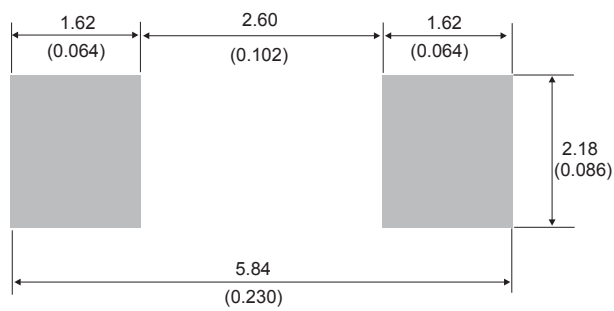
Figure 17. SMB package outline



**Table 5. SMB 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	1.95	2.20	0.076	0.087
c	0.15	0.40	0.005	0.016
D	3.30	3.95	0.129	0.156
E	5.10	5.60	0.200	0.221
E1	4.05	4.60	0.159	0.182
L	0.75	1.50	0.029	0.060

**Figure 18. SMB recommended footprint**





## 2.2 SMA package information

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

Figure 19. SMA package outline

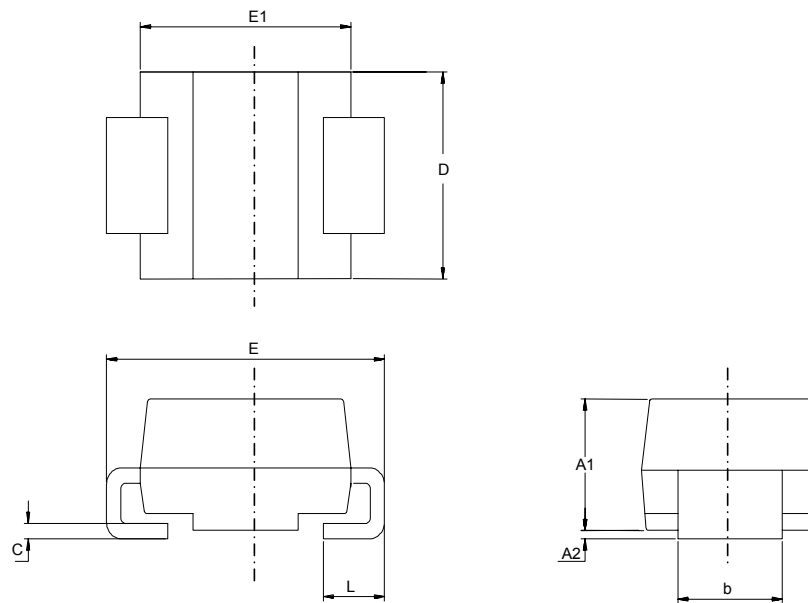
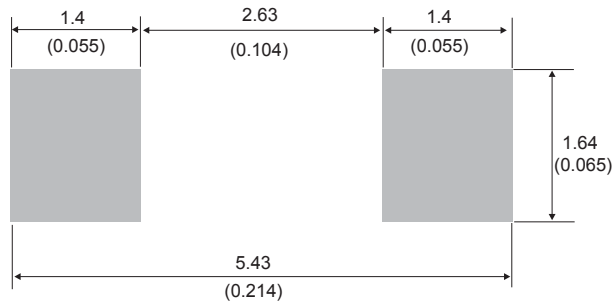


Table 6. SMA package mechanical data

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



### 2.3 DO-41 package information

- Epoxy meets UL 94, V0

Figure 21. DO-41 package outline

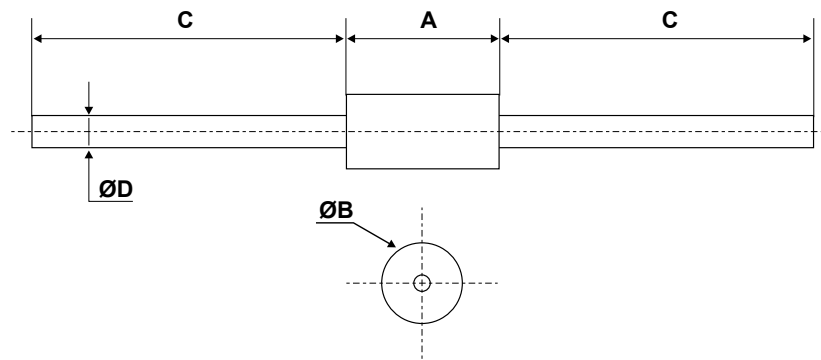


Table 7. DO-41 package mechanical data

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

## 2.4 DO-15 package information

- Epoxy meets UL 94, V0

Figure 22. DO-15 package outline

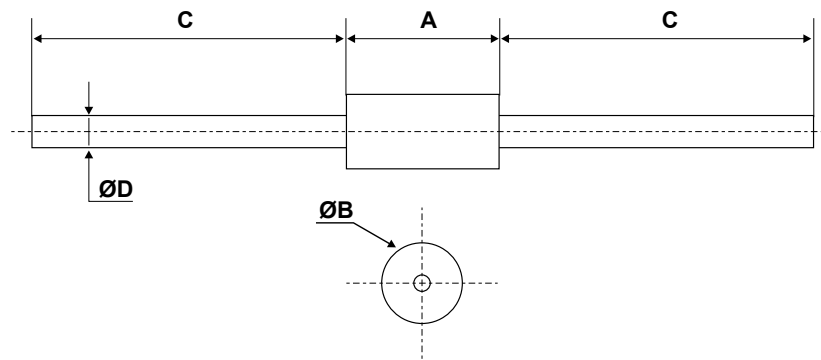


Table 8. DO-15 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.05	-	6.75	0.238	-	0.266
B	2.95	-	3.53	0.116	-	0.139
C	26.00	-	31.00	1.024	-	1.220
D	0.71	-	0.88	0.028	-	0.0035

### 3 Ordering information

**Table 9. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH1R02A	R1A	SMA	0.068 g	5000	Tape and reel
STTH1R02U	1R2S	SMB	0.107 g	2500	Tape and reel
STTH1R02	STTH1R02	DO-41	0.34 g	2000	Ammopack
STTH1R02RL	STTH1R02	DO-41	0.34 g	5000	Tape and reel
STTH1R02Q	STTH1R02Q	DO-15	0.40 g	1000	Ammopack
STTH1R02QRL	STTH1R02Q	DO-15	0.40 g	6000	Tape and reel

## Revision history

**Table 10. Document revision history**

Date	Revision	Changes
03-May-2006	1	First issue.
13-Oct-2006	2	Added DO-15 and SMB packages.
08-Mar-2007	3	Replaced Figure 8. Replaced ecu with copper thickness.
05-Dec-2018	4	Updated <a href="#">Section Applications</a> . Minor text changes.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9