



# RB521S30

200 mA low Vf MEGA Schottky barrier rectifier

7 April 2021

Product data sheet

## 1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD523 (SC-79) ultra small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 0.2$  A
- Reverse voltage:  $V_R \leq 30$  V
- Low reverse current:  $I_R \leq 30$   $\mu$ A
- AEC-Q101 qualified
- Ultra small and flat lead SMD plastic package

## 3. Applications

- Low current rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications

## 4. Quick reference data

Table 1. Quick reference data



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20$ kHz; square wave; $T_{amb} \leq 120$ °C [1]	-	-	0.2	A
		$\delta = 0.5$ ; $f = 20$ kHz; square wave; $T_{sp} \leq 140$ °C	-	-	0.2	A
$I_R$	reverse current	$V_R = 10$ V	-	2.5	30	$\mu$ A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	30	V
$V_F$	forward voltage	$I_F = 200$ mA [2]	-	420	500	mV

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[2] Pulsed test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 <p>SC-79 (SOD523)</p>	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
RB521S30	SC-79	plastic, surface-mounted package; 2 leads; 1.2 mm x 0.8 mm x 0.6 mm body	SOD523

## 7. Marking

Table 4. Marking codes

Type number	Marking code
RB521S30	ZB

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_R$	reverse voltage	$T_j = 25\text{ °C}$		-	30	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{amb} \leq 120\text{ °C}$	[1]	-	0.2	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{sp} \leq 140\text{ °C}$		-	0.2	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$ ; half sine wave; JEDEC method; $T_{j(init)} = 25\text{ °C}$	[2]	-	1	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[3] [4]	-	275	mW
			[1] [4]	-	420	mW
			[5] [4]	-	500	mW
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[2]  $T_j = 25\text{ °C}$  Prior to surge

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[4] Reflow soldering is the only recommended soldering method.

[5] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2] [3]	-	-	455	K/W
			[1] [4] [3]	-	-	300	K/W
			[1] [5] [3]	-	-	250	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	90	K/W

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Reflow soldering is the only recommended soldering method.

[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[5] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

[6] Soldering point of cathode tab.

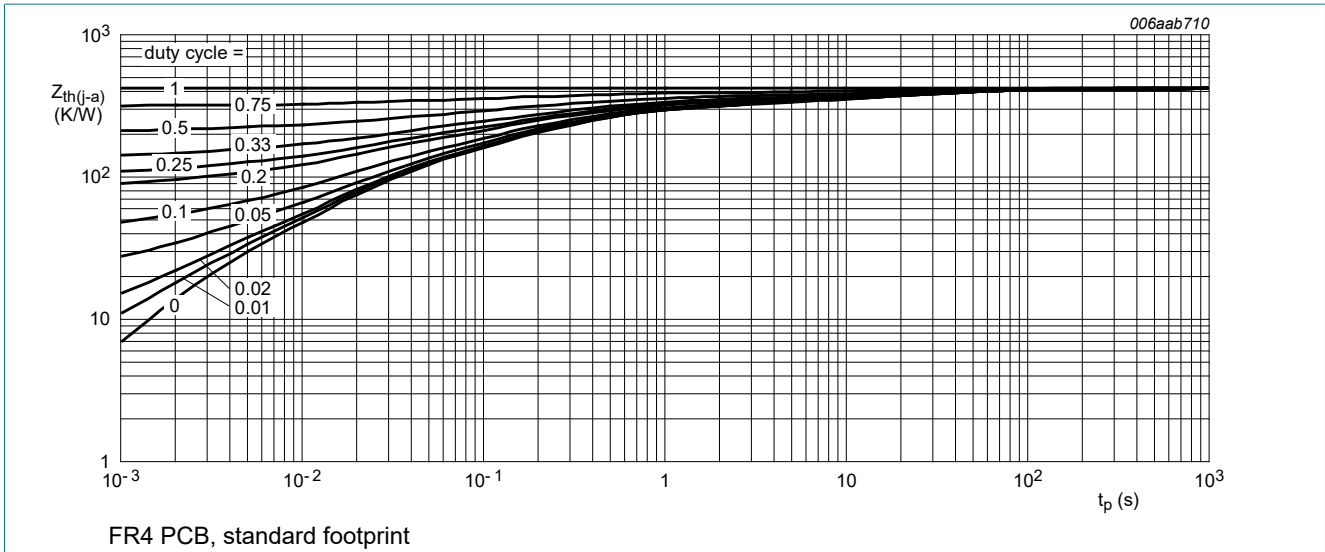


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

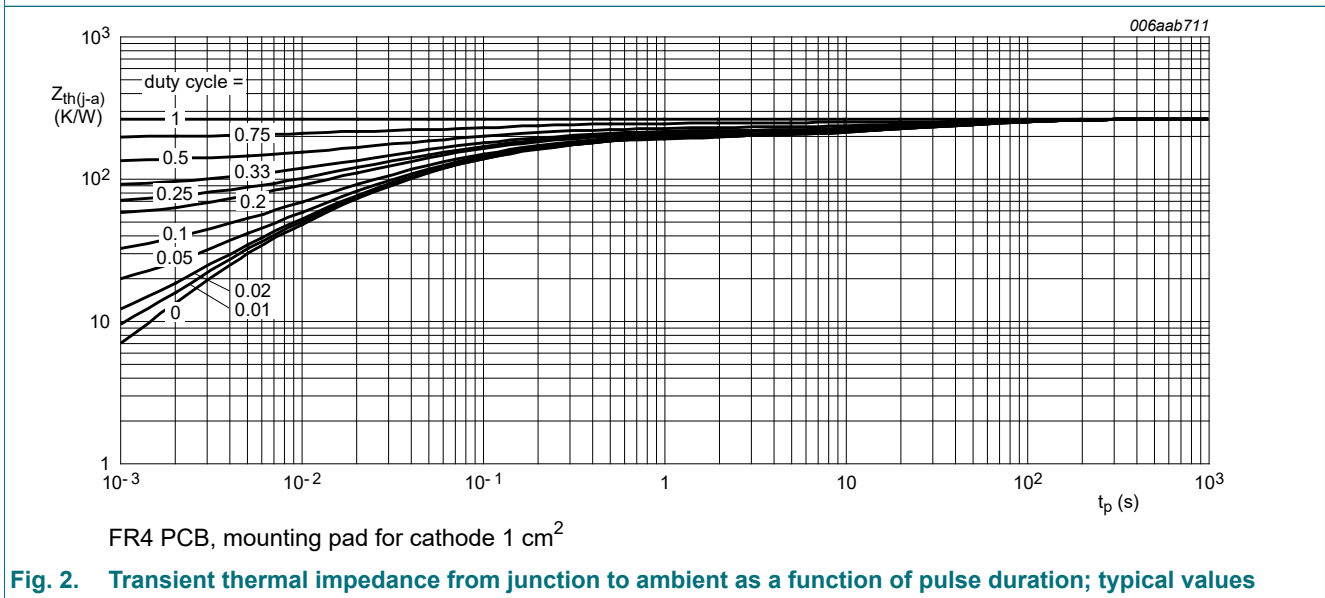


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

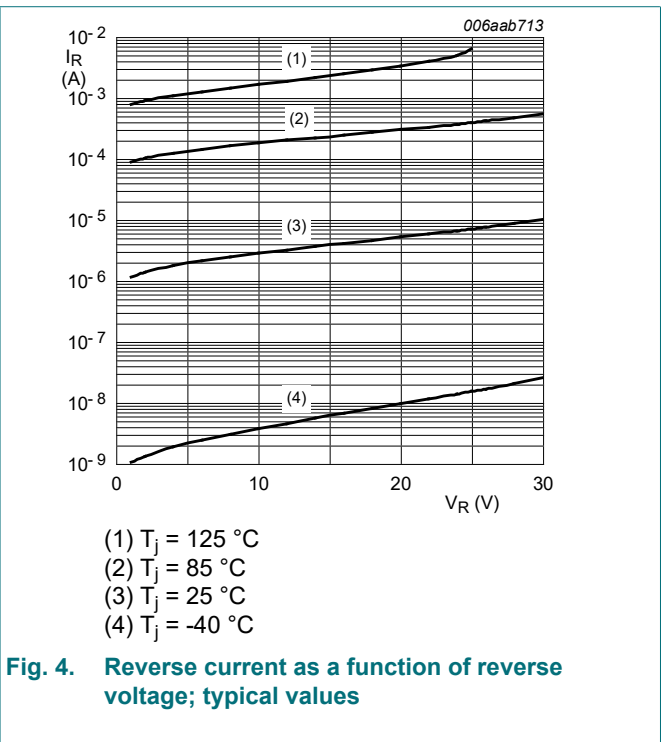
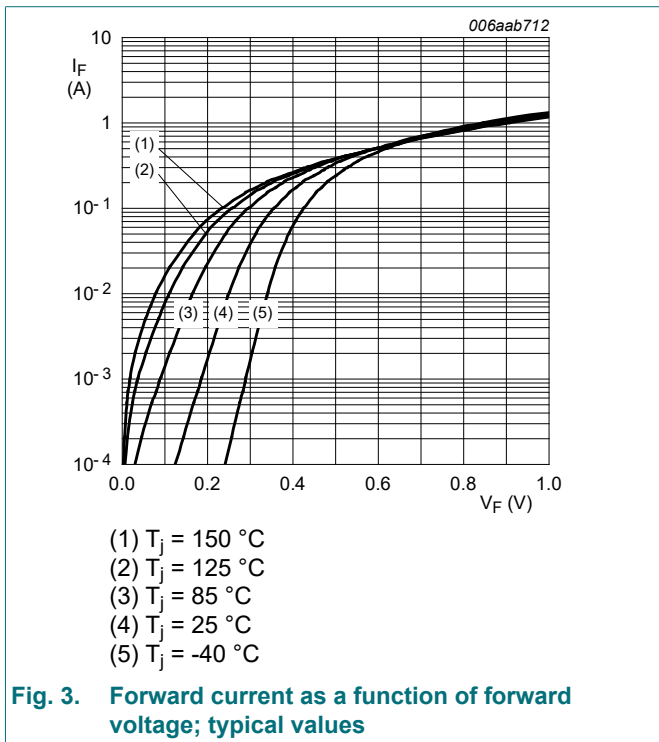
## 10. Characteristics

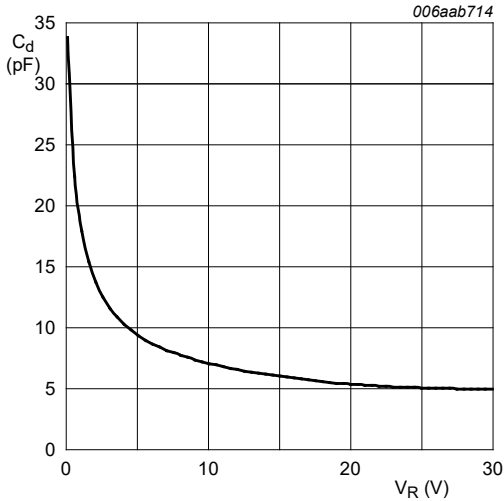
**Table 7. Characteristics**

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 0.1\text{ mA}$	[1]	-	130	190	mV
		$I_F = 1\text{ mA}$	[1]	-	190	250	mV
		$I_F = 10\text{ mA}$	[1]	-	255	300	mV
		$I_F = 100\text{ mA}$	[1]	-	355	410	mV
		$I_F = 200\text{ mA}$	[1]	-	420	500	mV
$I_R$	reverse current	$V_R = 10\text{ V}$		-	2.5	30	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}$		-	20	25	pF

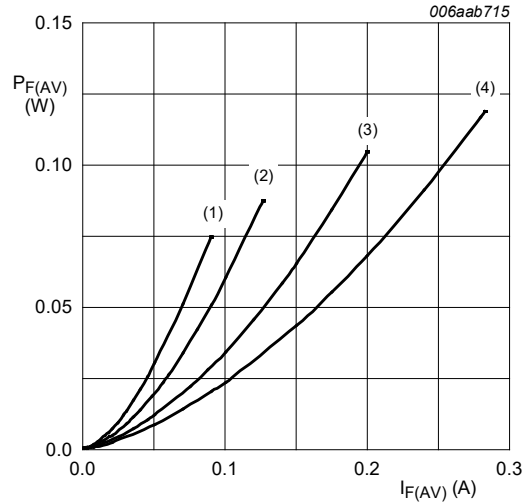
[1] Pulsed test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$





$f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$

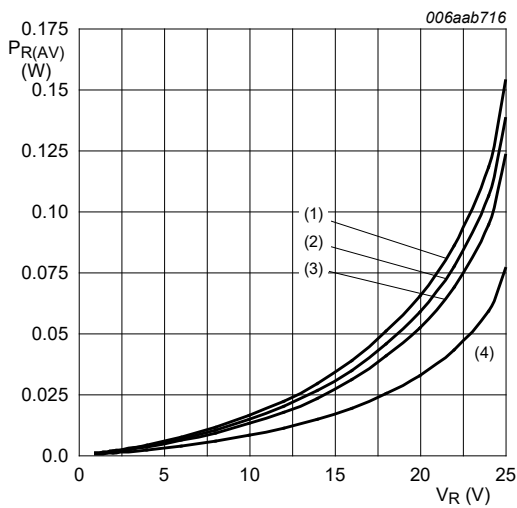
**Fig. 5. Diode capacitance as a function of reverse voltage; typical values**



$T_j = 150 \text{ }^\circ\text{C}$

- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

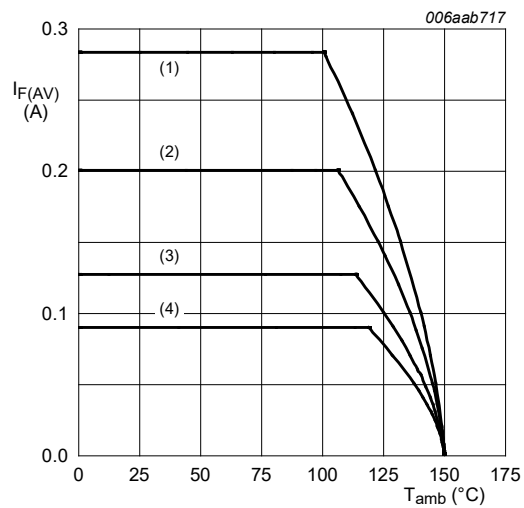
**Fig. 6. Average forward power dissipation as a function of average forward current; typical values**



$T_j = 125 \text{ }^\circ\text{C}$

- (1)  $\delta = 1$
- (2)  $\delta = 0.9$
- (3)  $\delta = 0.8$
- (4)  $\delta = 0.5$

**Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values**



FR4 PCB, standard footprint

$T_j = 150 \text{ }^\circ\text{C}$

- (1)  $\delta = 1; \text{DC}$
- (2)  $\delta = 0.5; f = 20 \text{ kHz}$
- (3)  $\delta = 0.2; f = 20 \text{ kHz}$
- (4)  $\delta = 0.1; f = 20 \text{ kHz}$

**Fig. 8. Average forward current as a function of ambient temperature; typical values**

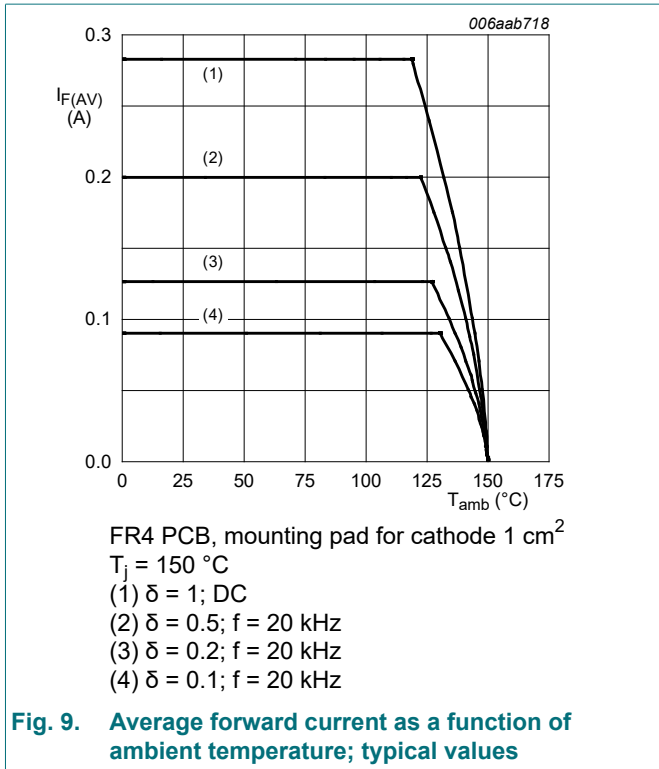


Fig. 9. Average forward current as a function of ambient temperature; typical values

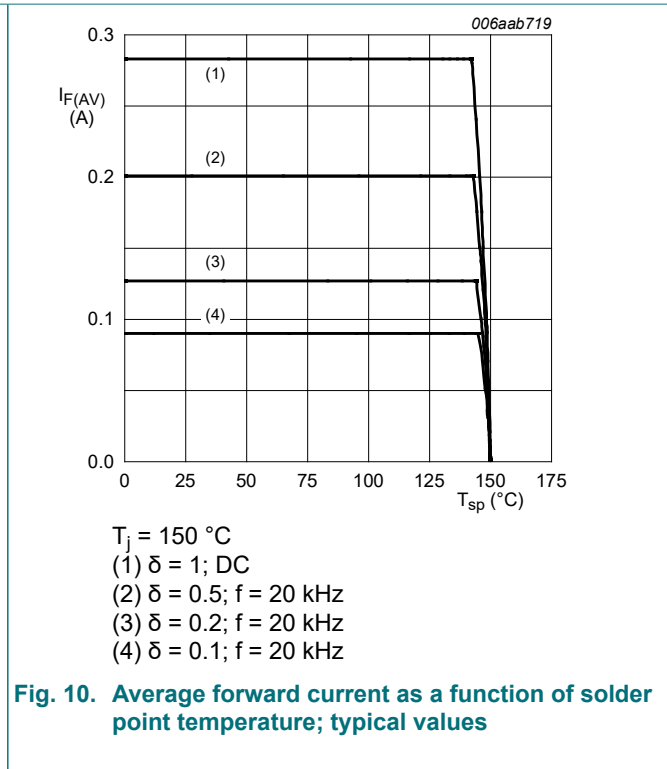


Fig. 10. Average forward current as a function of solder point temperature; typical values

## 11. Test information

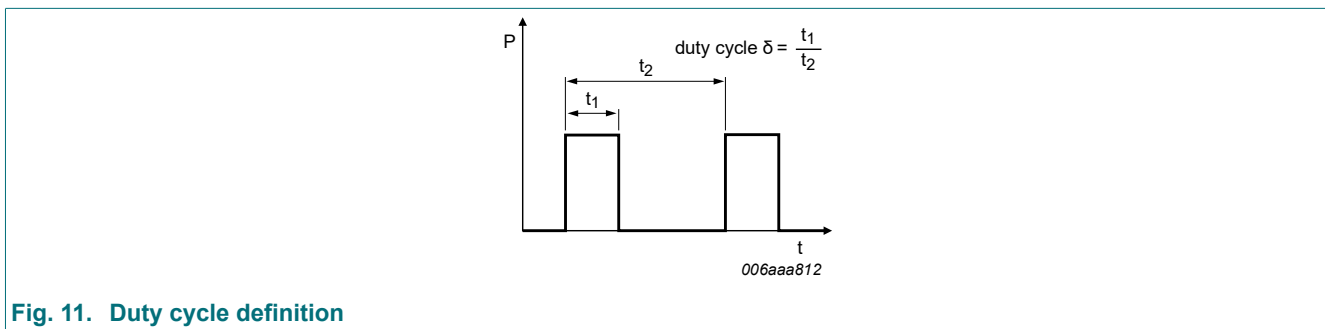


Fig. 11. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,  $I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  defined as RMS current.

### Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 12. Package outline

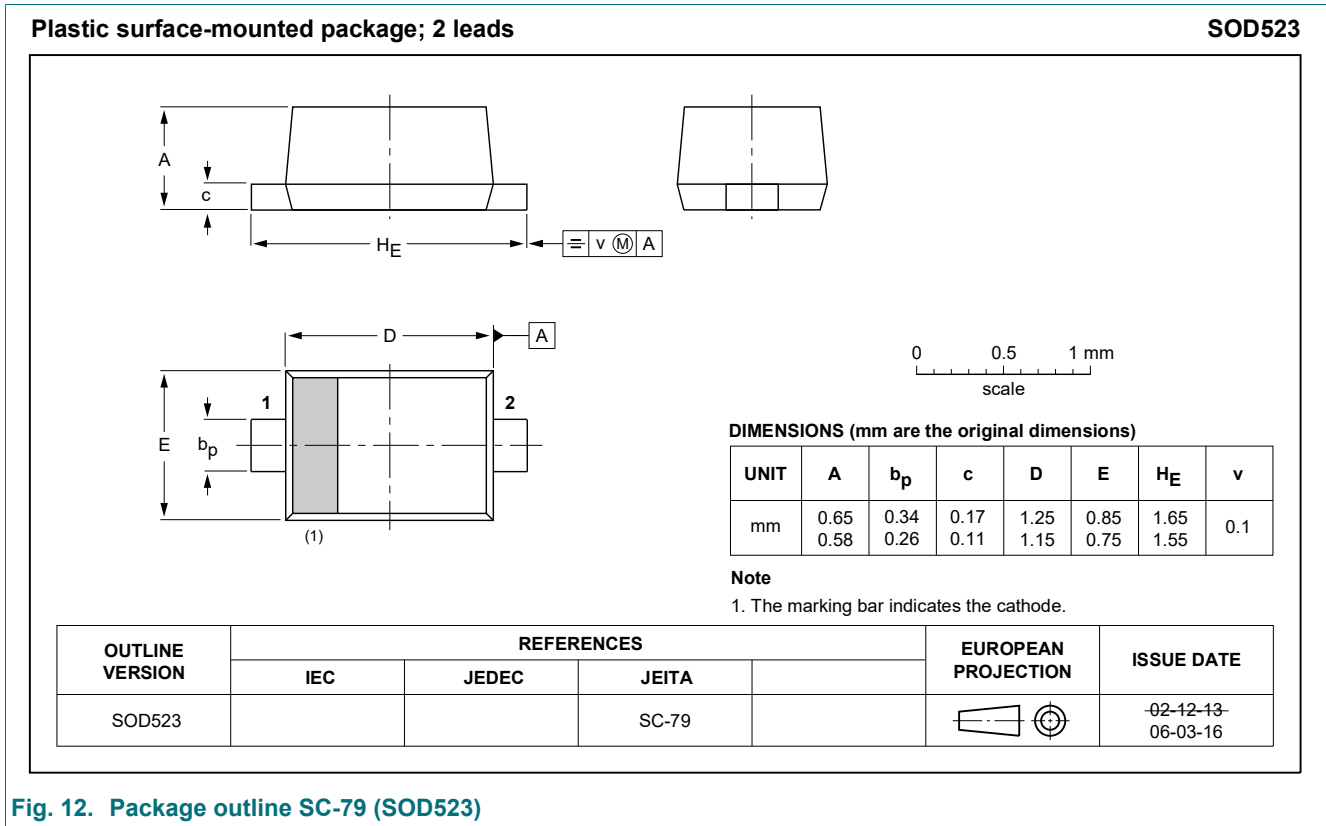


Fig. 12. Package outline SC-79 (SOD523)

## 13. Soldering

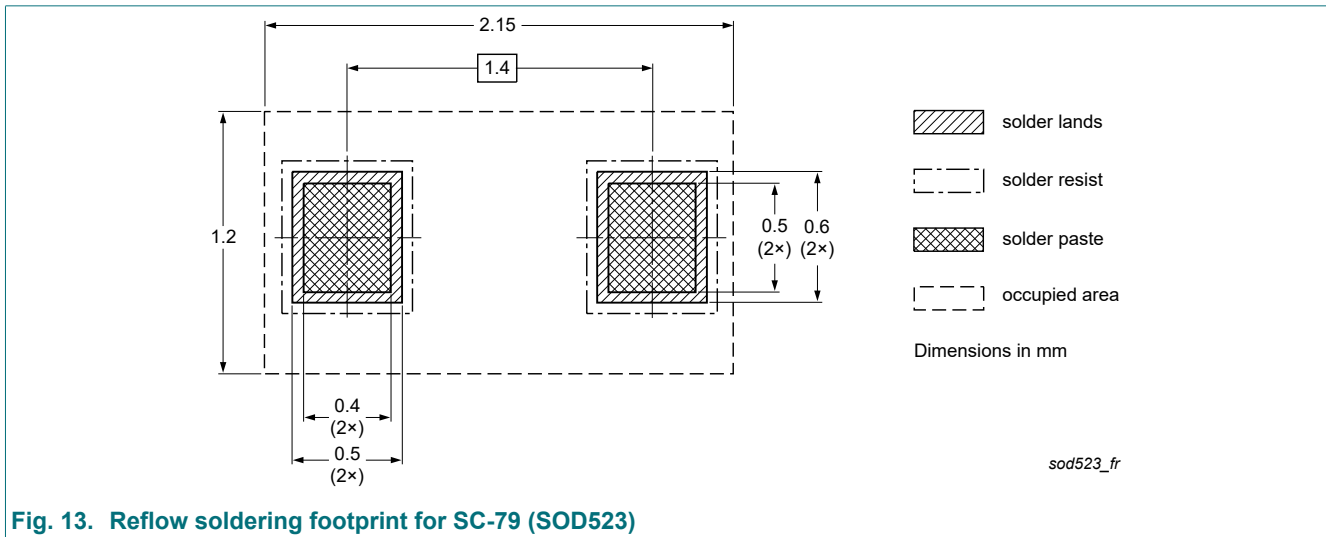


Fig. 13. Reflow soldering footprint for SC-79 (SOD523)



## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
RB521S30 v.2	20210407	Product data sheet	-	RB521S30 v.1
Modifications:	<ul style="list-style-type: none"><li>• Test information: Figure 11 removed</li><li>• Soldering: Figure 14: "Reflow soldering footprint for SOD523" updated</li><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li></ul>			
RB521S30 v.1	20091006	Product data sheet	-	-

## 15. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	3
10. Characteristics.....	5
11. Test information.....	7
12. Package outline.....	8
13. Soldering.....	8
14. Revision history.....	9
15. Legal information.....	10

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Date of release: 7 April 2021

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