

RB520S30

200 mA low V_F MEGA Schottky barrier rectifier

Rev. 01 — 6 October 2009

Product data sheet

1. Product profile

1.1 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.

1.2 Features

- Average forward current: $I_{F(AV)} \leq 0.2$ A
- Reverse voltage: $V_R \leq 30$ V
- Low reverse current: $I_R \leq 1$ μ A
- AEC-Q101 qualified
- Ultra small and flat lead SMD plastic package

1.3 Applications

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

1.4 Quick reference data

Table 1. Quick reference data
T_j = 25 °C unless otherwise specified.


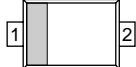
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $f = 20$ kHz					
		$T_{amb} \leq 105$ °C	[1]	-	-	0.2	A
		$T_{sp} \leq 135$ °C	-	-	-	0.2	A
I_R	reverse current	$V_R = 10$ V	-	-	1	μ A	
V_R	reverse voltage		-	-	30	V	
V_F	forward voltage	$I_F = 0.2$ A	[2]	-	520	600	mV

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, mounting pad for cathode 1 cm².

[2] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode	[1]	1  2
2	anode		sym001

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
RB520S30	SC-79	plastic surface-mounted package; 2 leads	SOD523

4. Marking

Table 4. Marking codes

Type number	Marking code
RB520S30	ZA

5. 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	square wave; $\delta = 0.5$; $f = 20\text{ kHz}$			
		$T_{amb} \leq 105\text{ °C}$	[1] -	0.2	A
		$T_{sp} \leq 135\text{ °C}$	-	0.2	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$ half sine wave; JEDEC method	[2] -	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[3][4] -	275	mW
			[3][1] -	420	mW
			[3][5] -	500	mW

Table 5. Limiting values ...continued
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	+150	°C
T_{stg}	storage temperature		-65	+150	°C

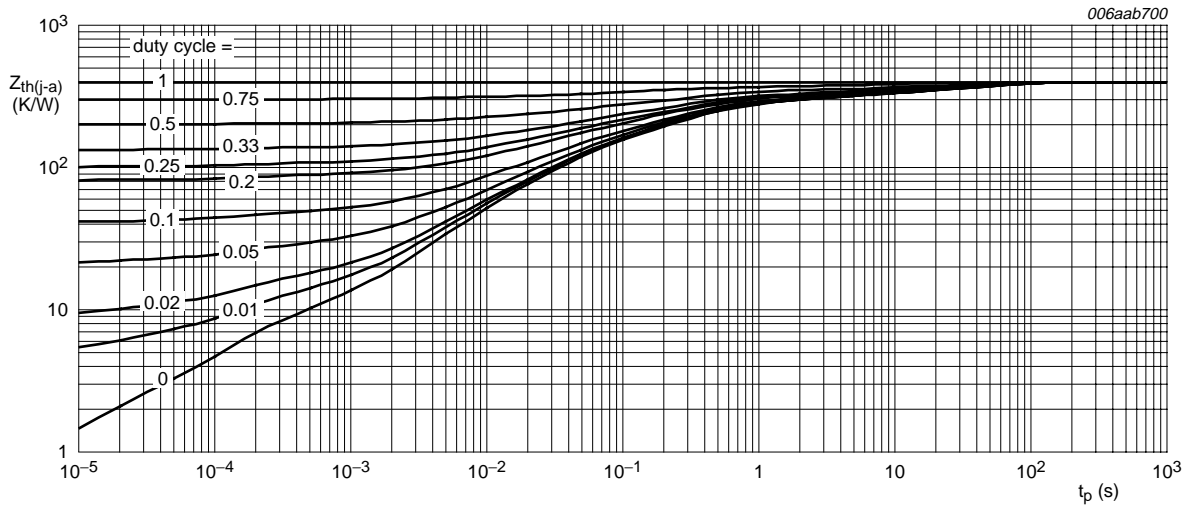
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [2] $T_j = 25$ °C prior to surge.
- [3] Reflow soldering is the only recommended soldering method.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.

6. Thermal characteristics

Table 6. Thermal characteristics

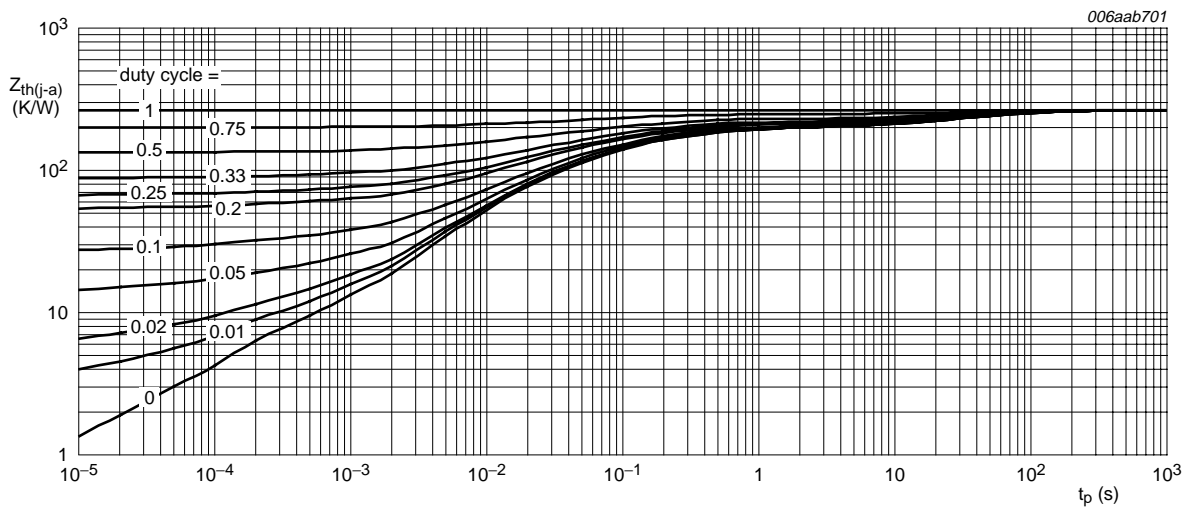
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]				
			[3]	-	-	455	K/W
			[4]	-	-	300	K/W
			[5]	-	-	250	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	90	K/W	

- [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] Reflow soldering is the only recommended soldering method.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

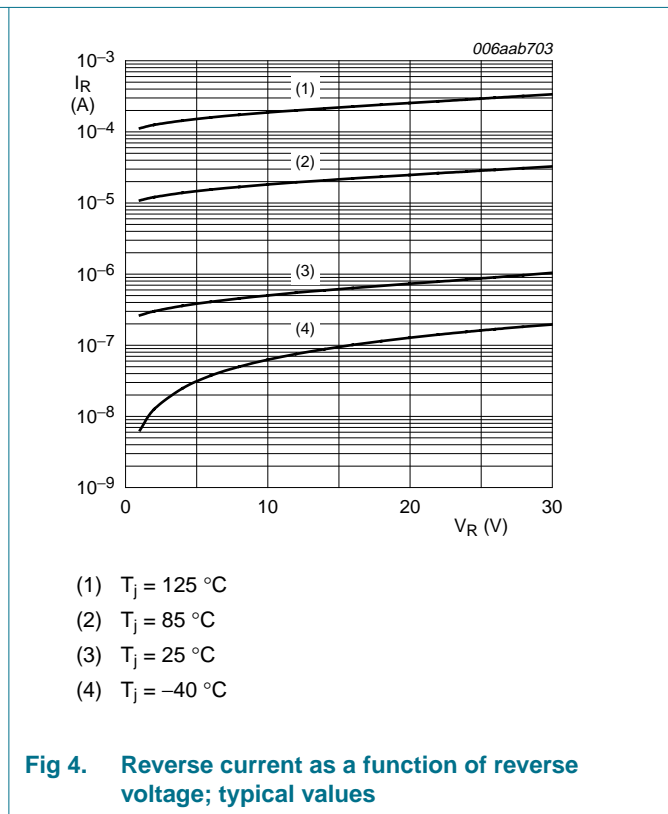
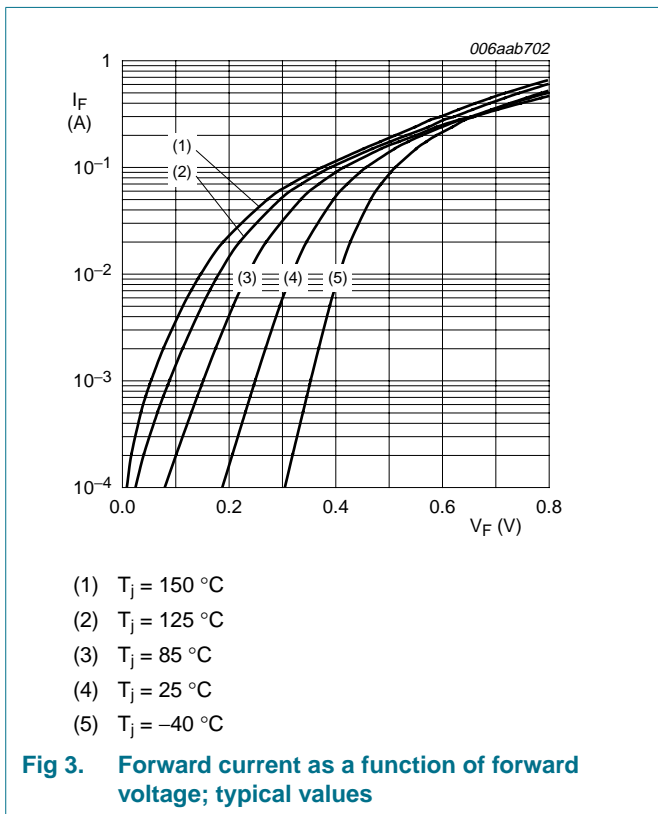
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

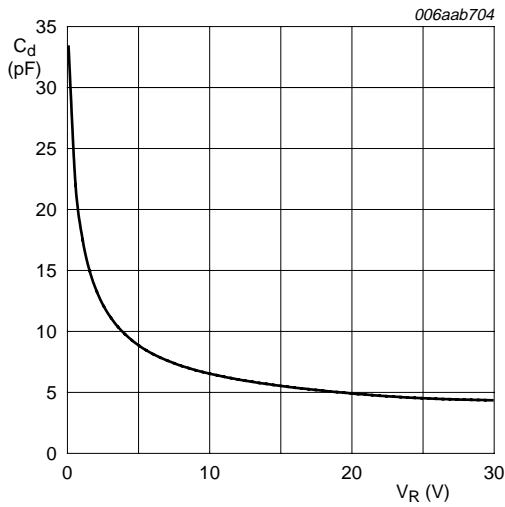
7. Characteristics

Table 7. Characteristics
 $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage		[1]			
		$I_F = 0.1\text{ mA}$	-	190	220	mV
		$I_F = 1\text{ mA}$	-	250	290	mV
		$I_F = 10\text{ mA}$	-	320	360	mV
		$I_F = 100\text{ mA}$	-	440	500	mV
$I_F = 200\text{ mA}$	-	520	600	mV		
I_R	reverse current	$V_R = 10\text{ V}$	-	-	1	μA
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}$	-	-	20	pF

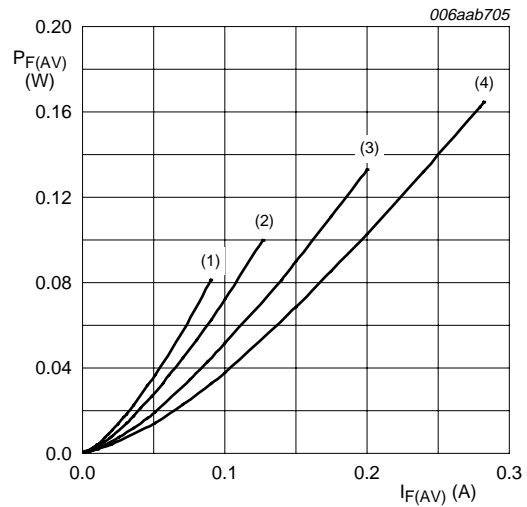
[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$.





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

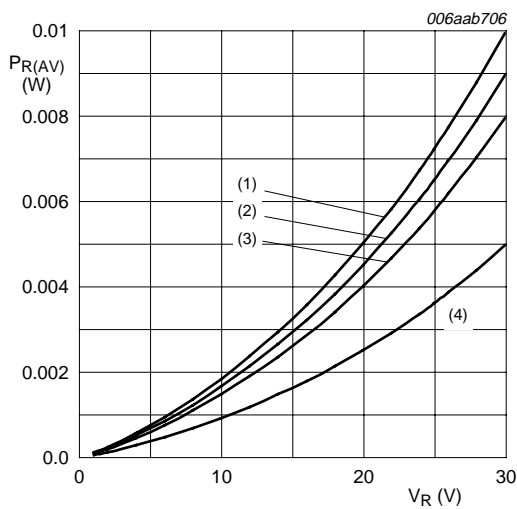
Fig 5. Diode capacitance as a function of reverse voltage; typical values



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

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

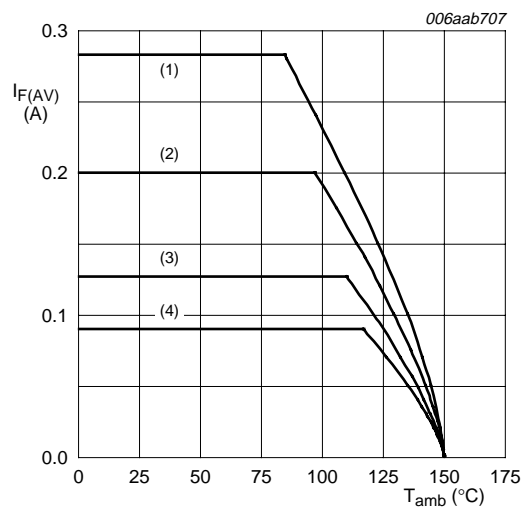
Fig 6. Average forward power dissipation as a function of average forward current; typical values



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

- (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

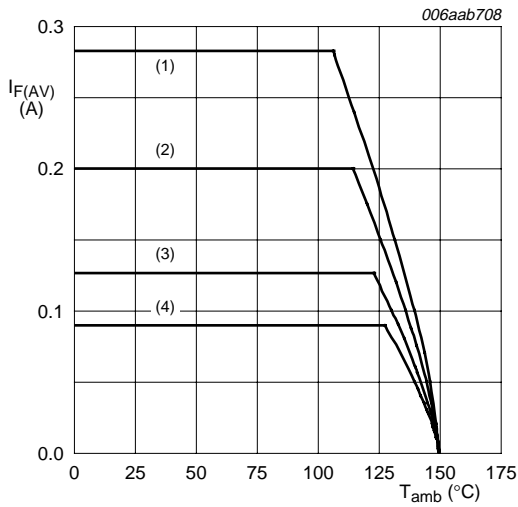


FR4 PCB, standard footprint

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

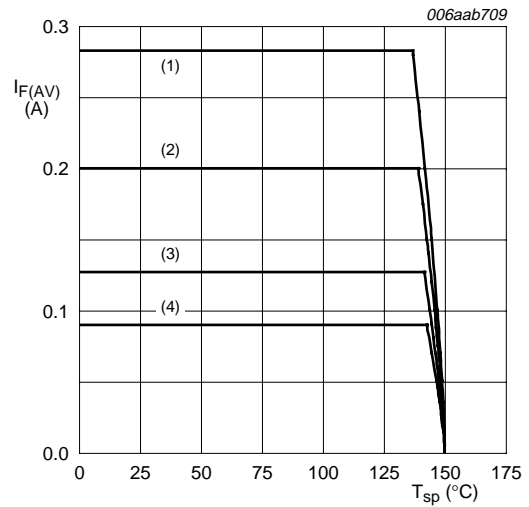
- (1) $\delta = 1; \text{DC}$
- (2) $\delta = 0.5; f = 20 \text{ kHz}$
- (3) $\delta = 0.2; f = 20 \text{ kHz}$
- (4) $\delta = 0.1; f = 20 \text{ kHz}$

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



FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 150\text{ °C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

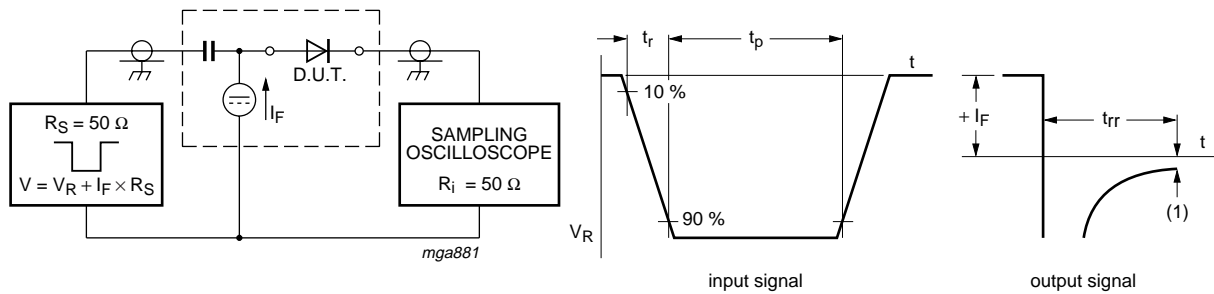
Fig 9. Average forward current as a function of ambient temperature; typical values



$T_j = 150\text{ °C}$
 (1) $\delta = 1$; 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 10. Average forward current as a function of solder point temperature; typical values

8. Test information



(1) $I_R = 1\text{ mA}$
 Input signal: reverse pulse rise time $t_r = 0.6\text{ ns}$; reverse voltage pulse duration $t_p = 100\text{ ns}$; duty cycle $\delta = 0.05$
 Oscilloscope: rise time $t_r = 0.35\text{ ns}$

Fig 11. Reverse recovery time test circuit and waveforms

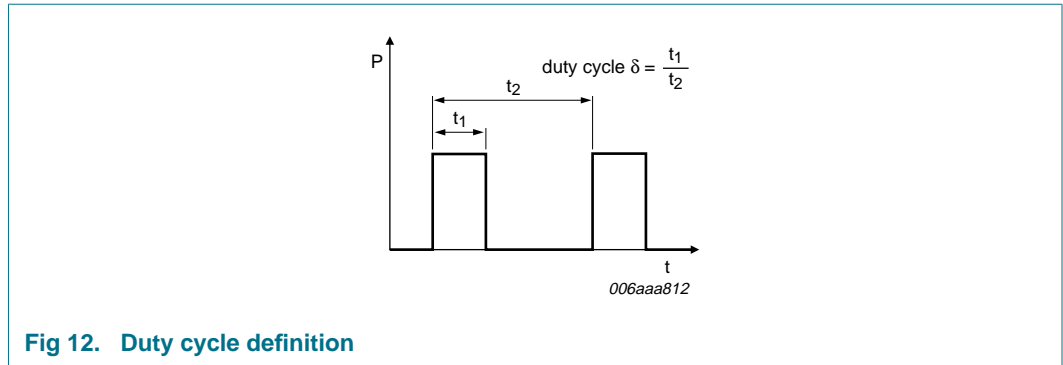


Fig 12. Duty cycle definition

The current ratings for the typical waveforms as shown in [Figure 8](#), [9](#) and [10](#) 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.

8.1 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.

9. Package outline

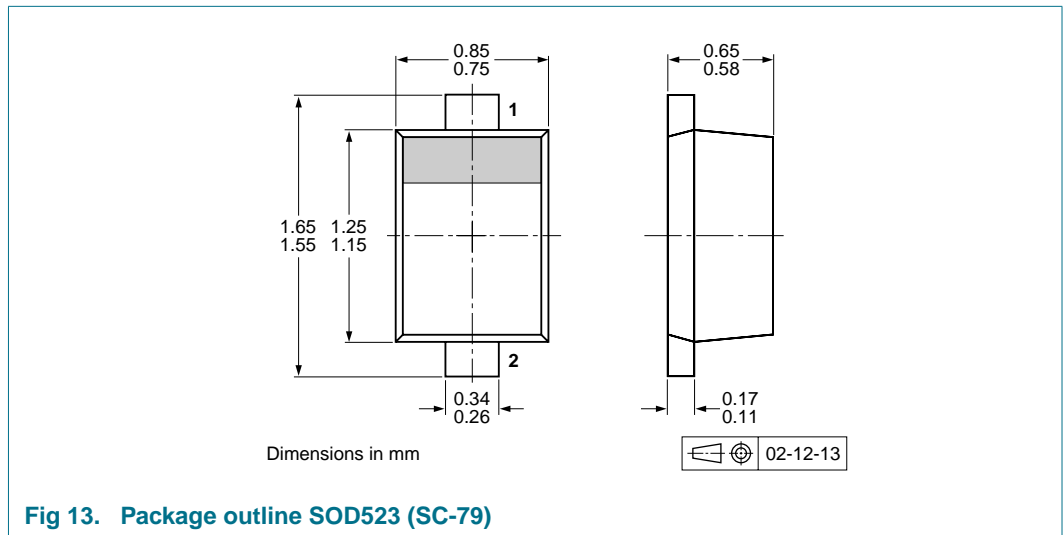


Fig 13. Package outline SOD523 (SC-79)

10. Packing information

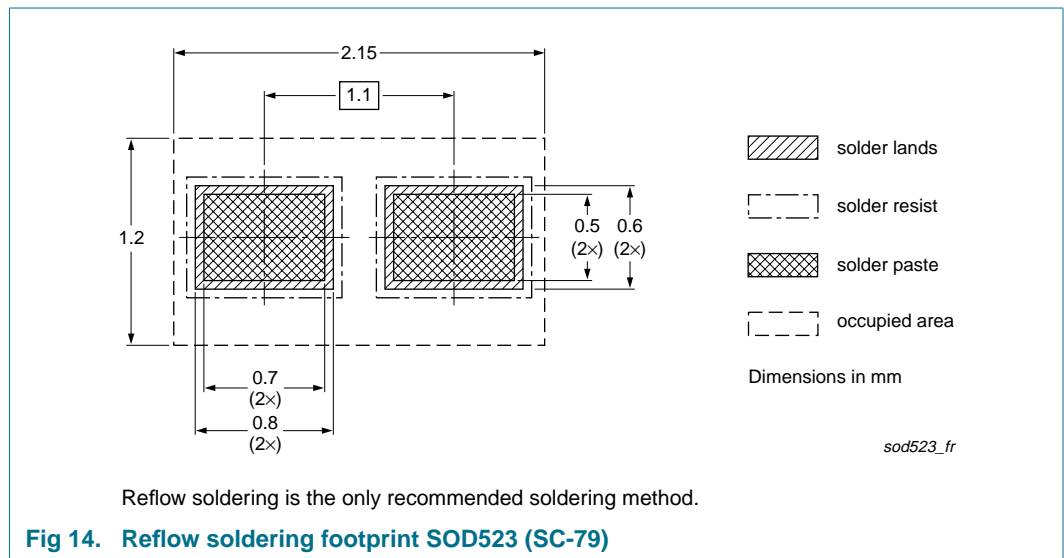
Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity		
			3000	8000	10000
RB520S30	SOD523	2 mm pitch, 8 mm tape and reel	-	-315	-
		4 mm pitch, 8 mm tape and reel	-115	-	-135

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering



12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
RB520S30_1	20091006	Product data sheet	-	-

13. Legal information

13.1 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.
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[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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