



RB520S30-Q

200 mA low VF Schottky barrier rectifier

17 April 2024

Product data sheet

1. General description

Planar 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: $I_R \leq 1$ μ A
- Ultra small and flat lead SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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; $T_{amb} \leq 105$ °C	-	-	200	mA
		$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 135$ °C	-	-	200	mA
I_R	reverse current	$V_R = 10$ V; $T_j = 25$ °C	-	-	1	μ A
V_R	reverse voltage	$T_j = 25$ °C	-	-	30	V
V_F	forward voltage	$I_F = 200$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C	-	520	600	mV

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

5. Pinning information

Table 2. Pinning information

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

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
RB520S30-Q	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
RB520S30-Q	ZA

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; $T_{amb} \leq 105\text{ °C}$	[1]	-	200	mA
		$\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{sp} \leq 135\text{ °C}$		-	200	mA
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$; half sine wave; $T_{j(init)} = 25\text{ °C}$		-	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2]	-	275	mW
			[1]	-	420	mW
			[3]	-	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 cm².

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

[3] Device mounted on a ceramic PCB, Al₂O₃, 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]	-	-	455	K/W
			[1] [3]	-	-	300	K/W
			[1] [4]	-	-	250	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[1] [5]	-	-	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .
- [4] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.
- [5] Soldering point of cathode tab.

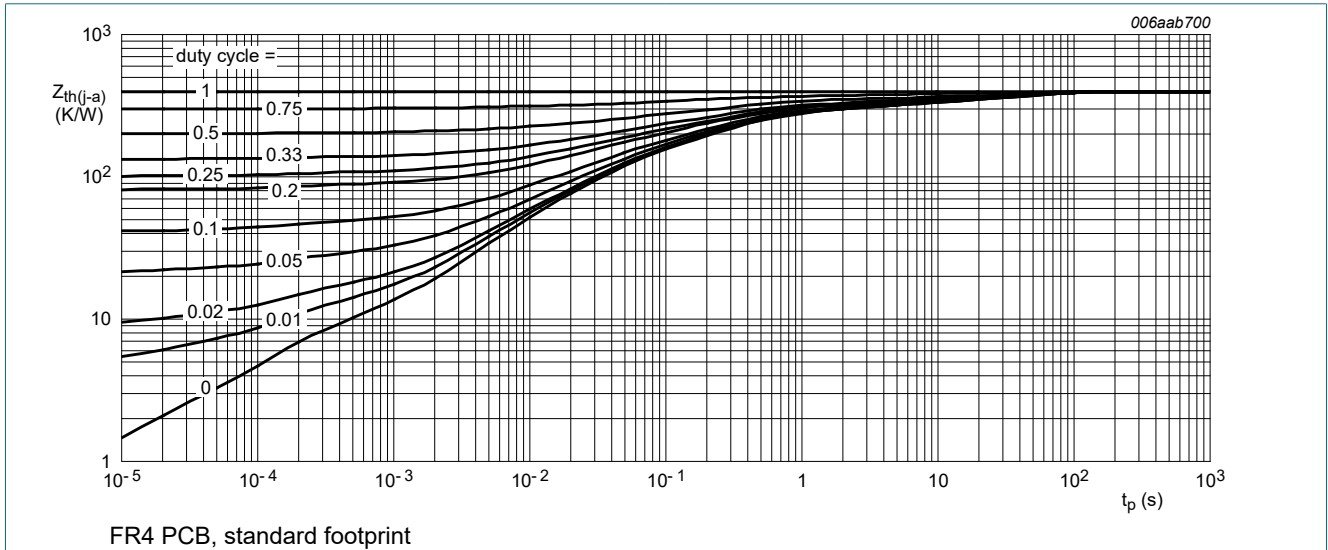


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

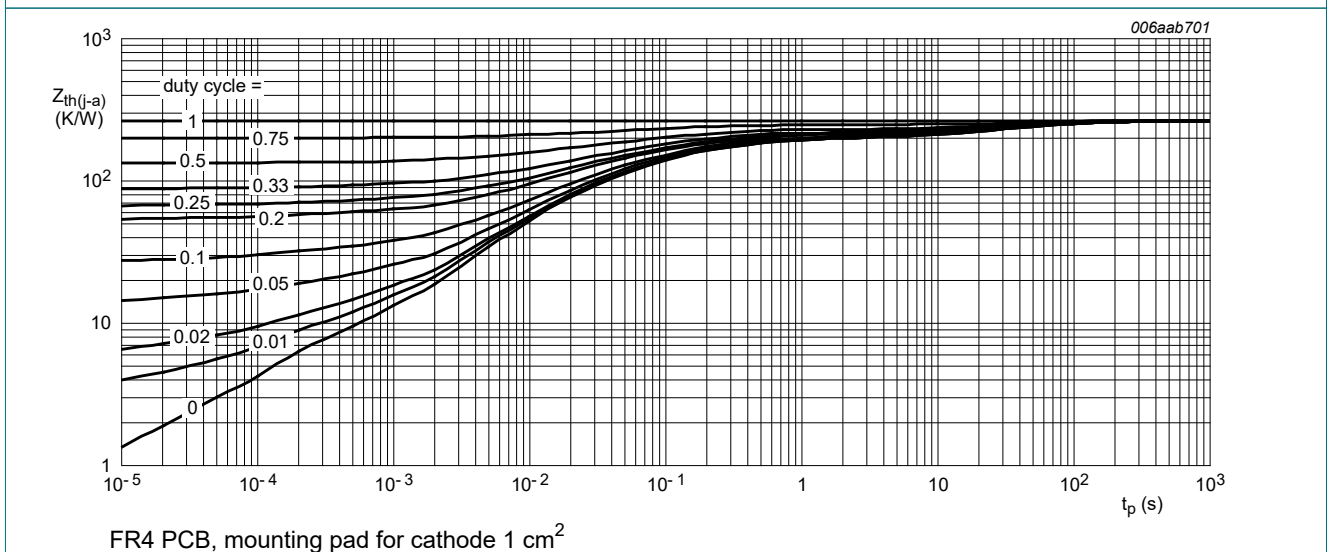
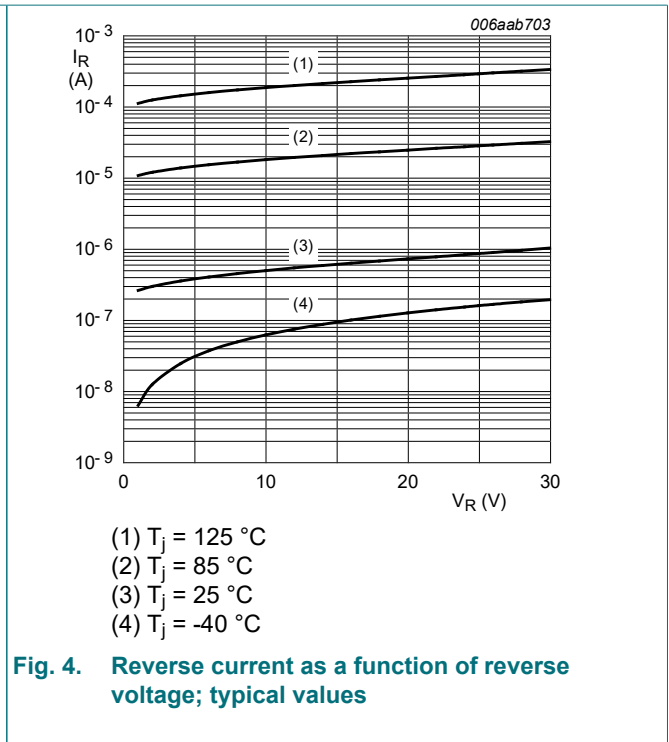
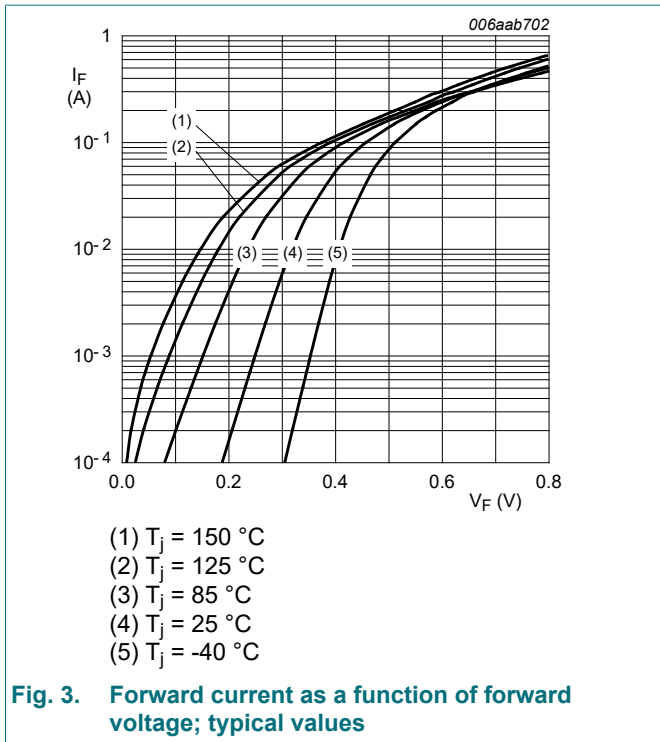


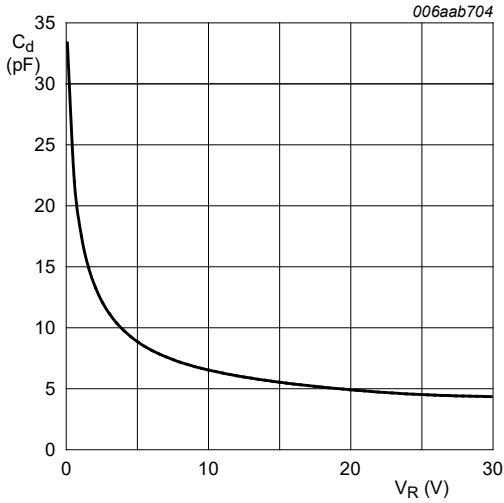
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

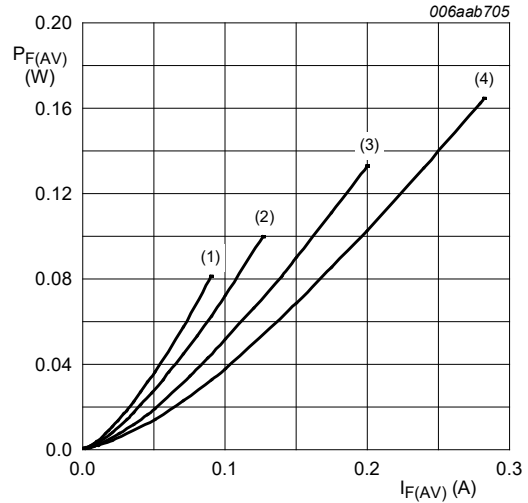
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _F	forward voltage	I _F = 0.1 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C	-	190	220	mV
		I _F = 1 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C	-	250	290	mV
		I _F = 10 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C	-	320	360	mV
		I _F = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C	-	440	500	mV
		I _F = 200 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C	-	520	600	mV
I _R	reverse current	V _R = 10 V; T _j = 25 °C	-	-	1	μA
C _d	diode capacitance	V _R = 1 V; f = 1 MHz; T _j = 25 °C	-	-	20	pF





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

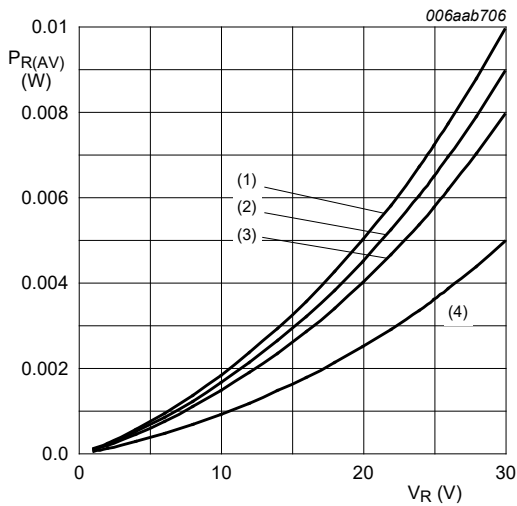
Fig. 5. Diode capacitance as a function of reverse voltage; typical values



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

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

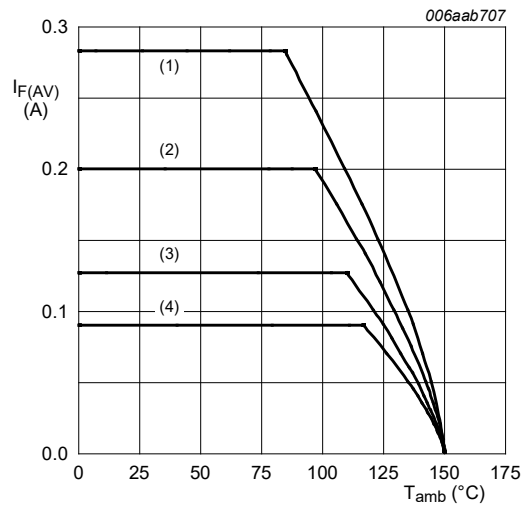
Fig. 6. Average forward power dissipation as a function of average forward current; typical values



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

- (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

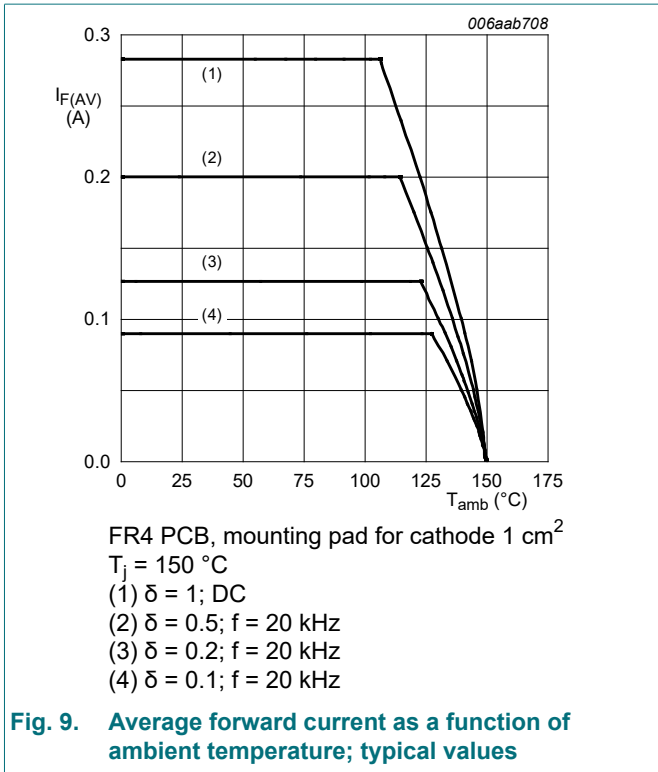


Fig. 9. Average forward current as a function of ambient temperature; typical values

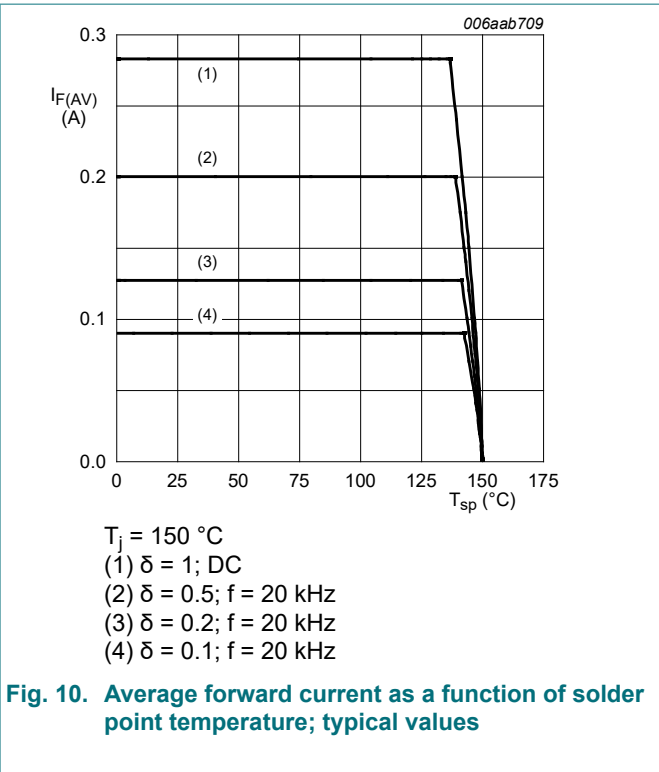
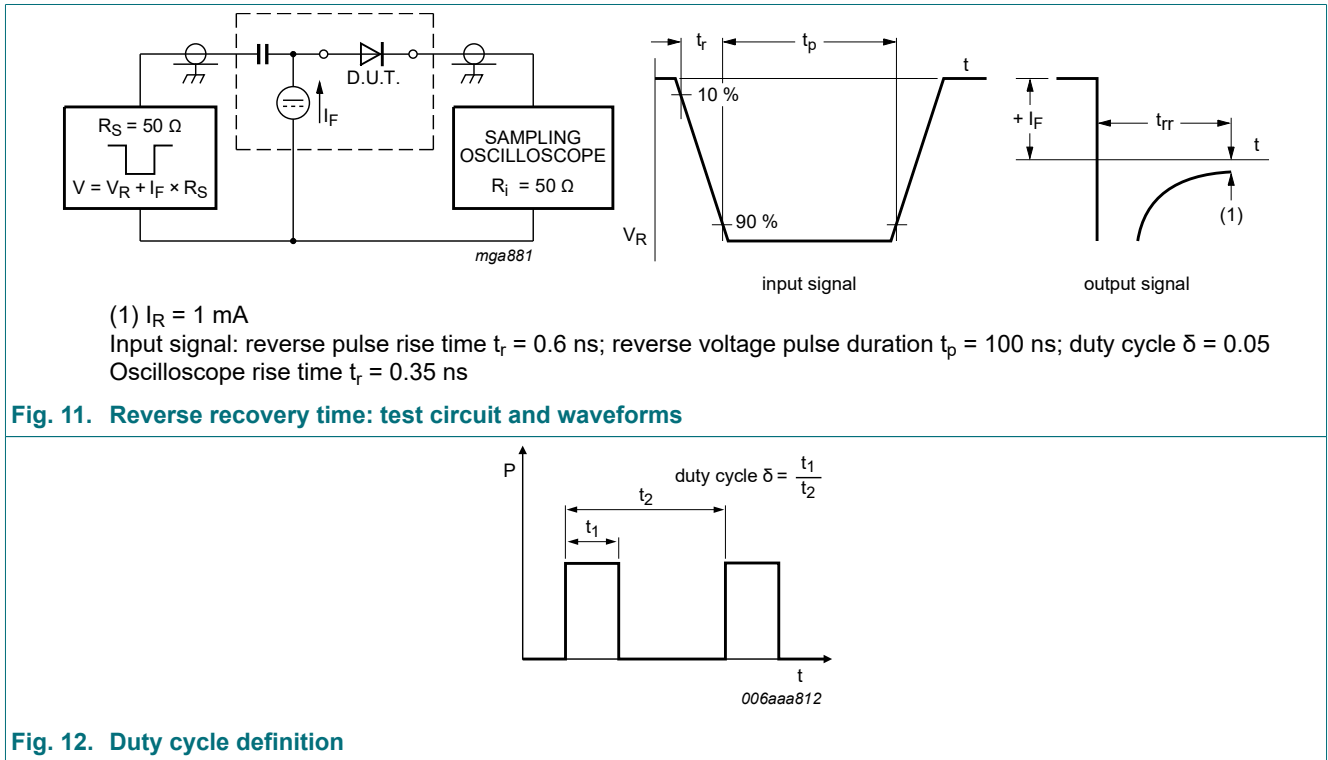


Fig. 10. Average forward current as a function of solder point temperature; typical values

11. Test information



The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

$$I_{RMS} = I_{F(AV)} \text{ at DC}$$

$$I_{RMS} = I_M \times \sqrt{\delta} \text{ with } I_{RMS} \text{ defined as RMS current}$$

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

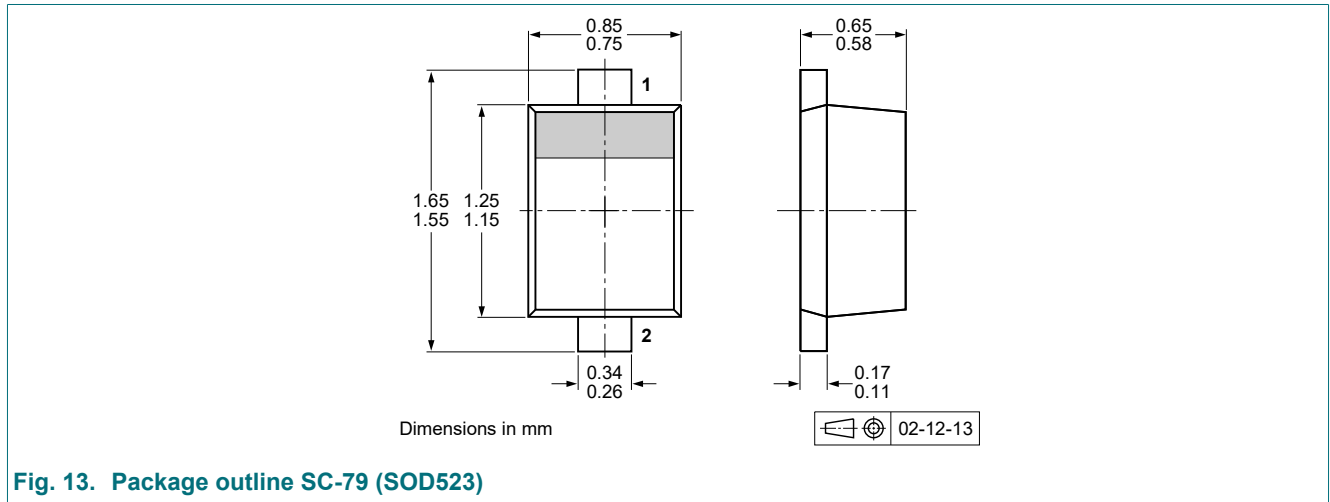


Fig. 13. Package outline SC-79 (SOD523)

13. Soldering

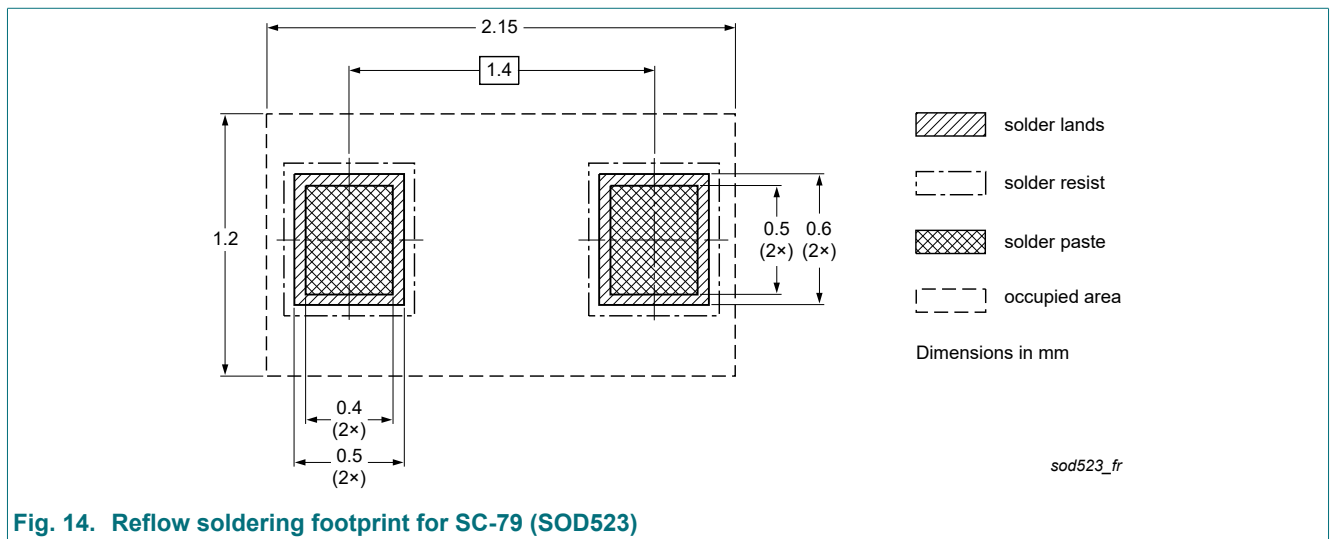


Fig. 14. Reflow soldering footprint for SC-79 (SOD523)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
RB520S30-Q v.1	20240417	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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