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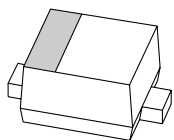
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Kind regards,

Team Nexperia



# 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:  $I_R \leq 1$   $\mu$ 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**  
 $T_j = 25^\circ\text{C}$  unless otherwise specified.

| Symbol      | Parameter               | Conditions                                       | Min | Typ | Max | Unit    |
|-------------|-------------------------|--------------------------------------------------|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | square wave;<br>$\delta = 0.5$ ;<br>$f = 20$ kHz |     |     |     |         |
|             |                         | $T_{amb} \leq 105^\circ\text{C}$                 | [1] | -   | 0.2 | A       |
|             |                         | $T_{sp} \leq 135^\circ\text{C}$                  | -   | -   | 0.2 | A       |
| $I_R$       | reverse current         | $V_R = 10$ V                                     | -   | -   | 1   | $\mu$ 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 cm<sup>2</sup>.

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

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline                                                                  | Graphic symbol                                                                                |
|-----|-------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1   | cathode     |  | <br>sym001 |
| 2   | anode       |                                                                                     |                                                                                               |

[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                     | $T_j = 25\text{ }^{\circ}\text{C}$                       | -        | 30  | V    |
| $I_{F(AV)}$ | average forward current             | square wave;<br>$\delta = 0.5$ ;<br>$f = 20\text{ kHz}$  |          |     |      |
|             |                                     | $T_{amb} \leq 105\text{ }^{\circ}\text{C}$               | [1] -    | 0.2 | A    |
|             |                                     | $T_{sp} \leq 135\text{ }^{\circ}\text{C}$                | -        | 0.2 | A    |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8.3\text{ ms}$<br>half sine wave;<br>JEDEC method | [2] -    | 1   | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$                | [3][4] - | 275 | mW   |
|             |                                     |                                                          | [3][4] - | 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 cm<sup>2</sup>.[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, Al<sub>2</sub>O<sub>3</sub>, 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  |

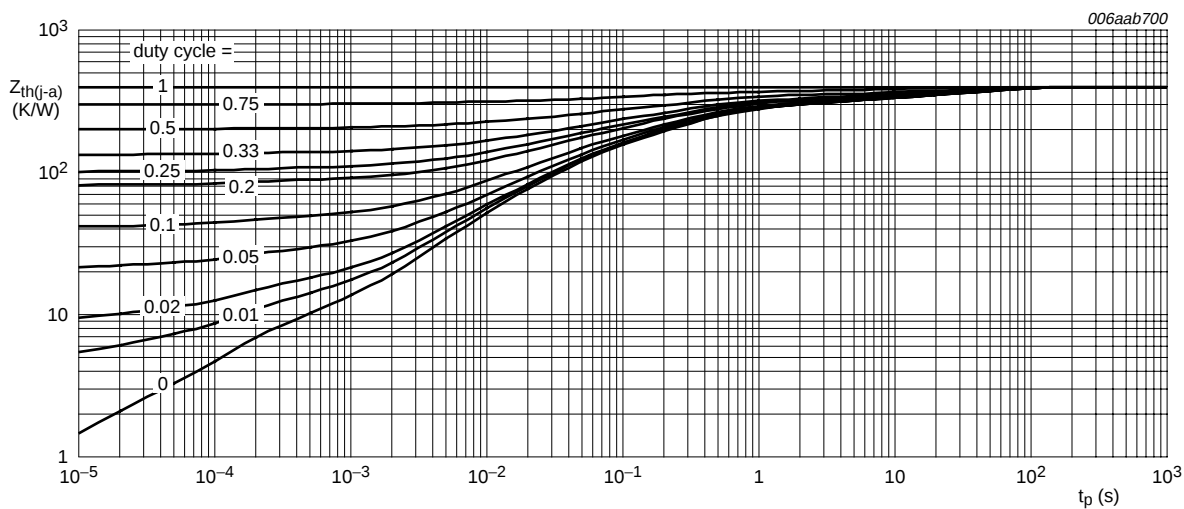
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

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

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

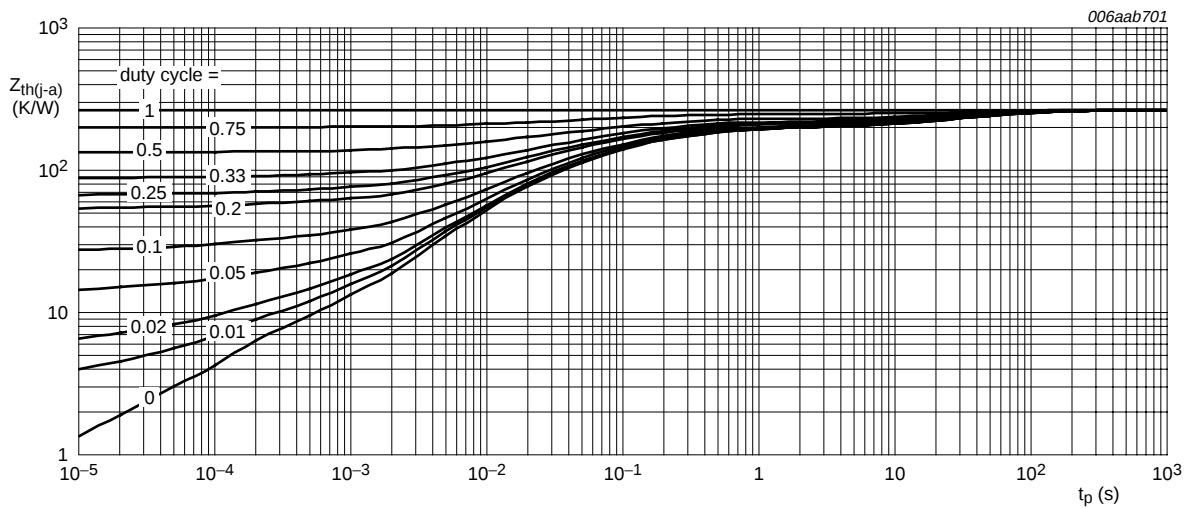
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.[5] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

[6] Soldering point of cathode tab.



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

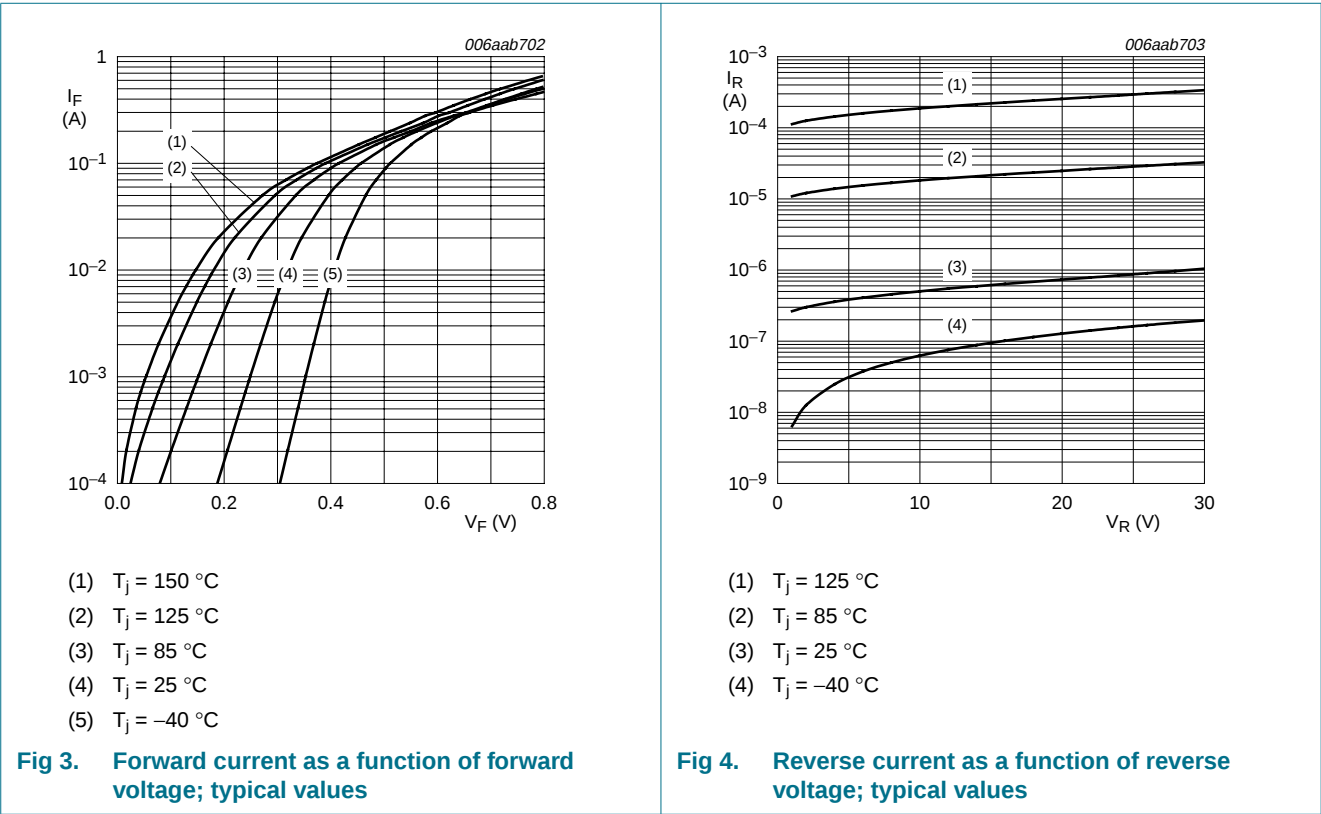
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics  
*T<sub>j</sub> = 25 °C unless otherwise specified.*

| Symbol         | Parameter         | Conditions                      | Min | Typ | Max | Unit |
|----------------|-------------------|---------------------------------|-----|-----|-----|------|
| V <sub>F</sub> | forward voltage   |                                 | [1] |     |     |      |
|                |                   | I <sub>F</sub> = 0.1 mA         | -   | 190 | 220 | mV   |
|                |                   | I <sub>F</sub> = 1 mA           | -   | 250 | 290 | mV   |
|                |                   | I <sub>F</sub> = 10 mA          | -   | 320 | 360 | mV   |
|                |                   | I <sub>F</sub> = 100 mA         | -   | 440 | 500 | mV   |
|                |                   | I <sub>F</sub> = 200 mA         | -   | 520 | 600 | mV   |
| I <sub>R</sub> | reverse current   | V <sub>R</sub> = 10 V           | -   | -   | 1   | μA   |
| C <sub>d</sub> | diode capacitance | f = 1 MHz; V <sub>R</sub> = 1 V | -   | -   | 20  | pF   |

[1] Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.



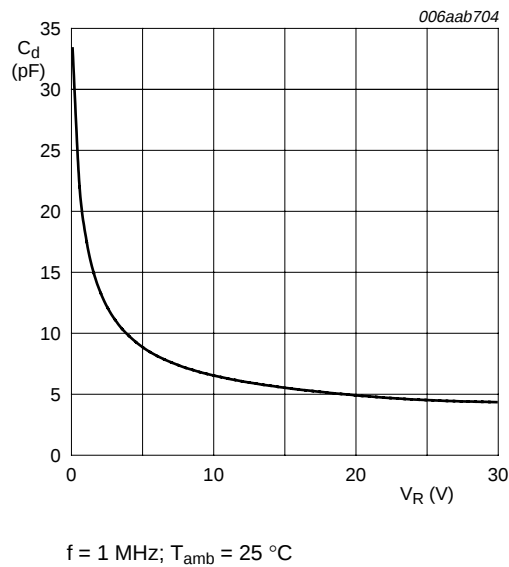


Fig 5. Diode capacitance as a function of reverse voltage; typical values

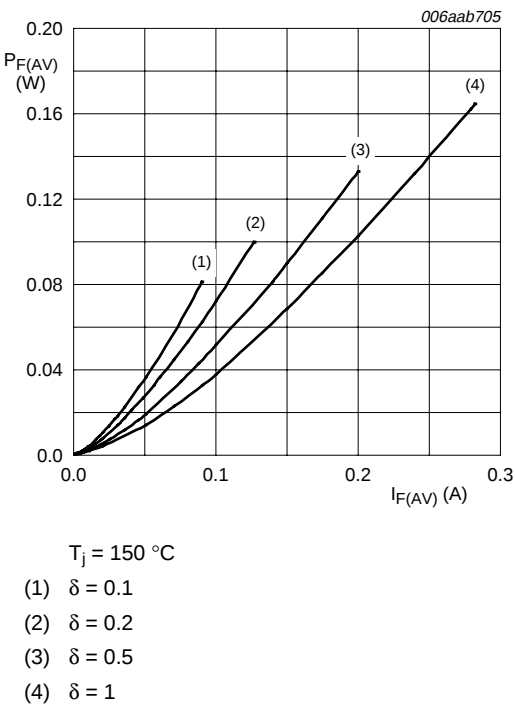


Fig 6. Average forward power dissipation as a function of average forward current; typical values

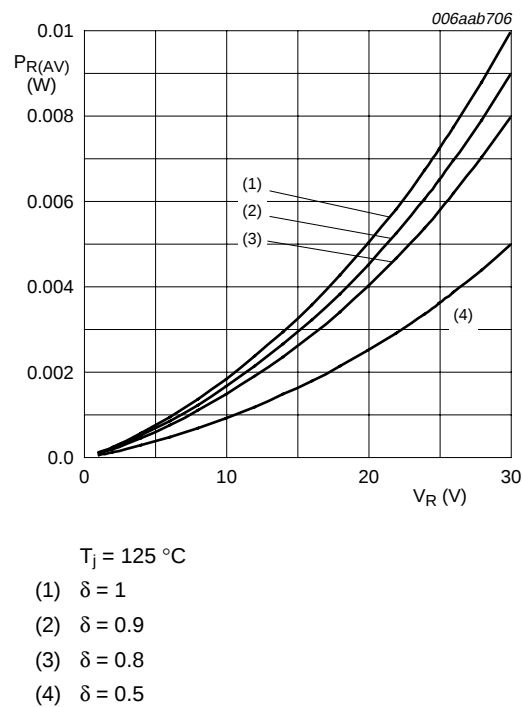


Fig 7. Average reverse power dissipation as a function of reverse voltage; typical values

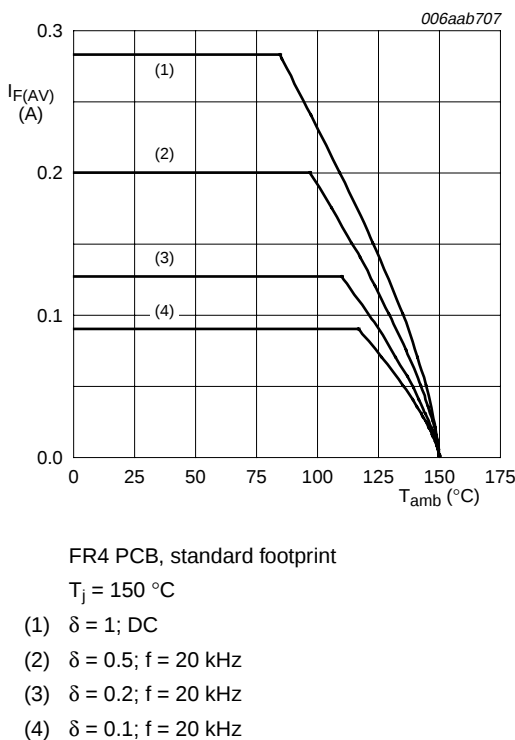
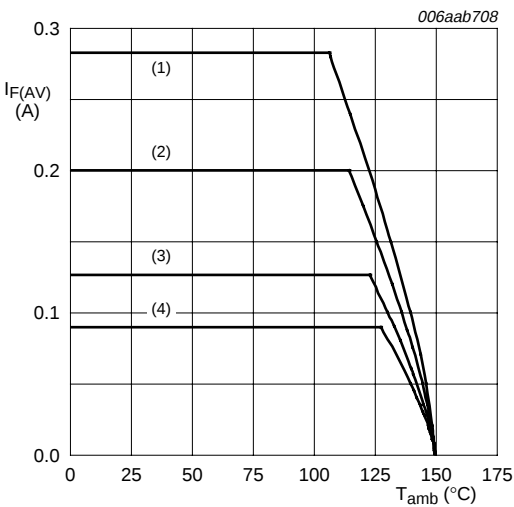
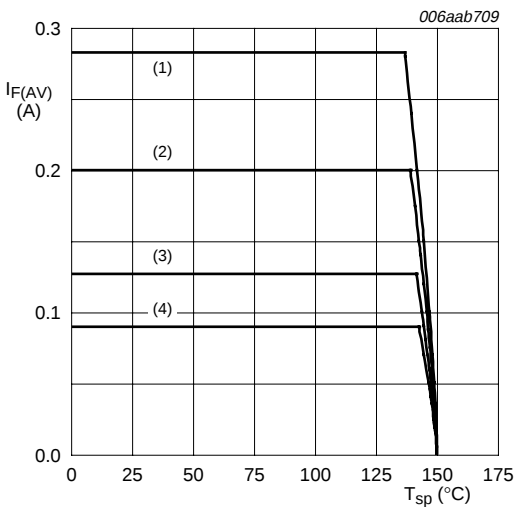


Fig 8. Average forward current as a function of ambient temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

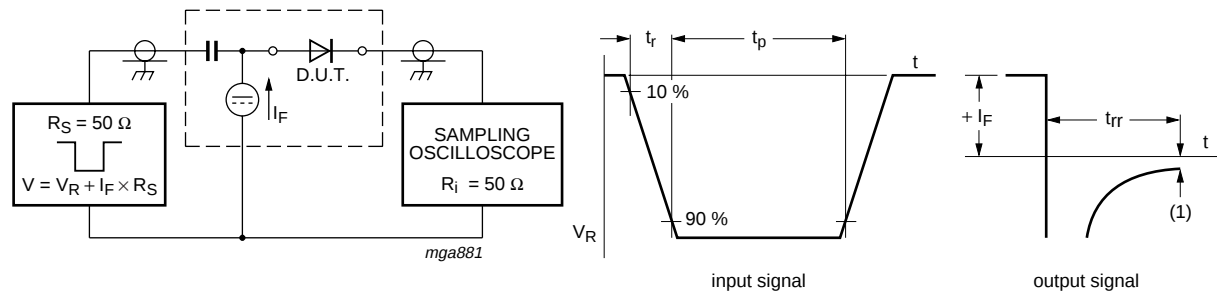
Fig 9. Average forward current as a function of ambient temperature; typical values



$T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

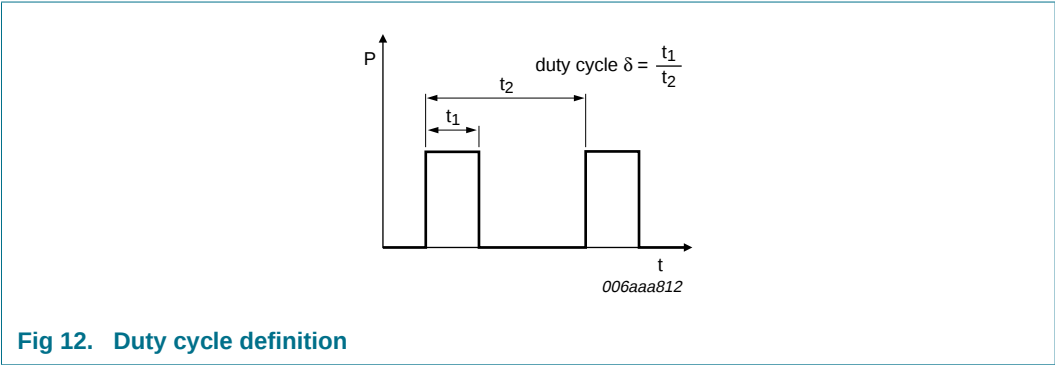
Fig 10. Average forward current as a function of solder point temperature; typical values

8. Test information



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

Fig 11. Reverse recovery time test circuit and waveforms

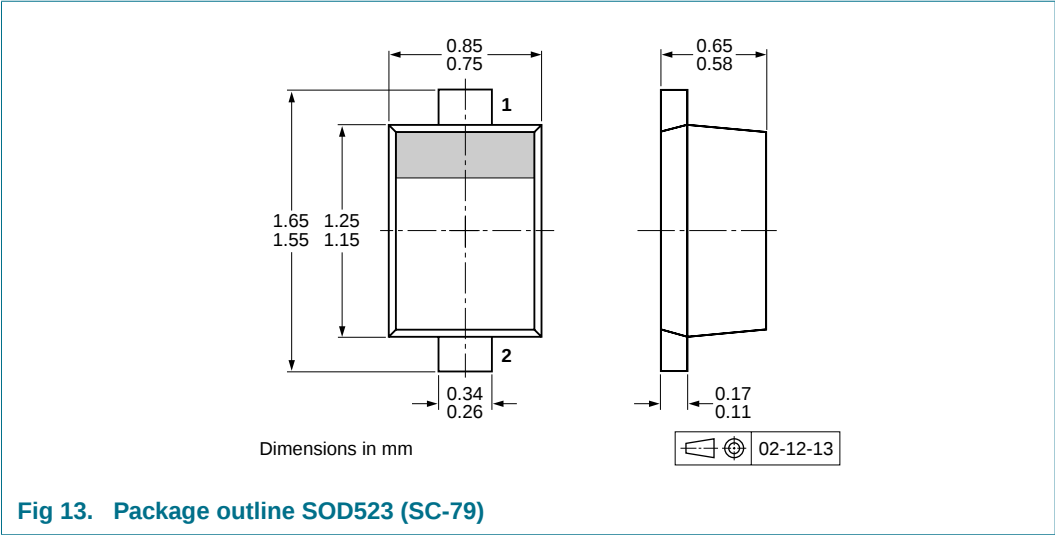


The current ratings for the typical waveforms as shown in [Figure 8](#), [9](#) and [10](#) are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,  $I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  defined 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



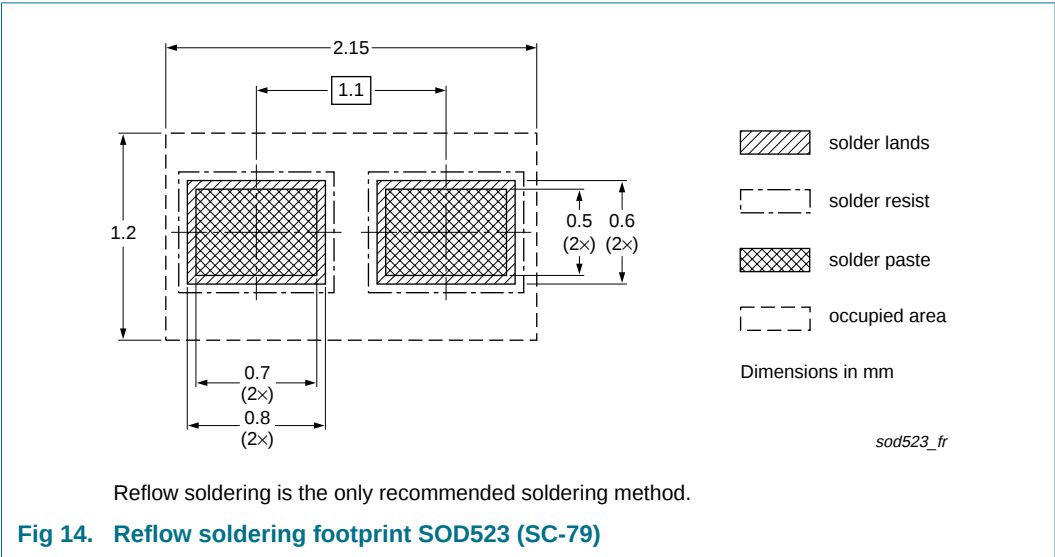
10. Packing information

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 <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

[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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Date of release: 6 October 2009

Document identifier: RB520S30\_1

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