

RB521CS30L

100 mA low V_F MEGA Schottky barrier rectifier

Rev. 1 — 24 January 2011

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 SOD882 leadless ultra small Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Average forward current: $I_{F(AV)} \leq 100$ mA
- Reverse voltage: $V_R \leq 30$ V
- Low forward voltage: $V_F \leq 350$ mV
- Low reverse current: $I_R \leq 10$ μ A
- AEC-Q101 qualified
- Leadless ultra small SMD plastic package

1.3 Applications

- Low voltage 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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------|-------------------------|---|-----|-----|-----|---------|----|
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20$ kHz | | | | | |
| | | $T_{amb} \leq 135$ °C | [1] | - | - | 100 | mA |
| | | $T_{sp} \leq 145$ °C | - | - | - | 100 | mA |
| I_R | reverse current | $V_R = 10$ V | - | 2 | 10 | μ A | |
| V_R | reverse voltage | | - | - | 30 | V | |
| V_F | forward voltage | $I_F = 10$ mA | [2] | - | 280 | 350 | mV |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, 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] |  sym001 |
| 2 | anode |  Transparent top view | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| RB521CS30L | - | leadless ultra small plastic package; 2 terminal; body 1.0 × 0.6 × 0.5 mm | SOD882 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| RB521CS30L | AR |

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 | | - | 30 | V | |
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20$ kHz | | | | |
| | | $T_{amb} \leq 135$ °C | [1] | - | 100 | mA |
| | | $T_{sp} \leq 145$ °C | - | - | 100 | mA |
| I_{FSM} | non-repetitive peak forward current | half sine wave; $t_p \leq 8.3$ ms | [2] | - | 3 | A |

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

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-----------|-------------------------|-----------------------------|--------|------|------|----|
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [4][3] | - | 315 | mW |
| | | | [4][1] | - | 565 | mW |
| T_j | junction temperature | | - | 150 | °C | |
| T_{amb} | ambient temperature | | -65 | +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] $T_j = 25\text{ °C}$ 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.

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] | - | - | 395 | K/W |
| | | | [4] | - | - | 220 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [5] | - | - | 70 | K/W |

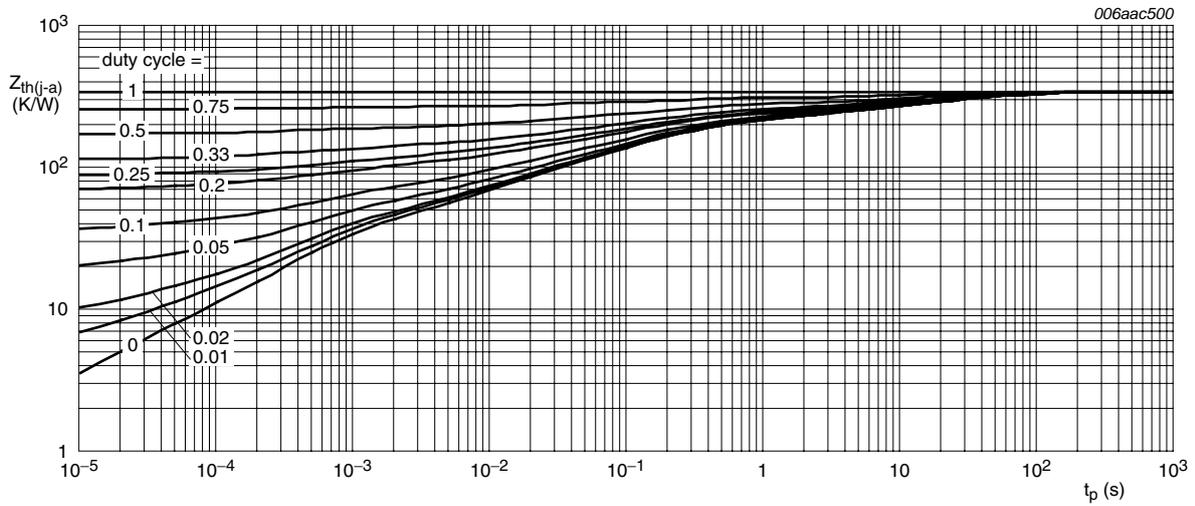
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

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

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

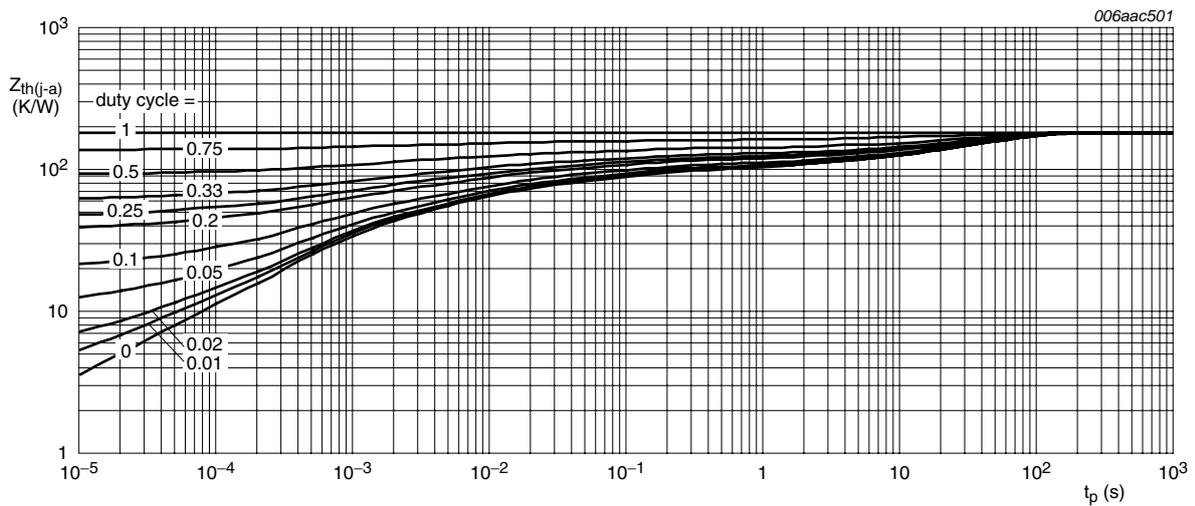
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

[5] 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

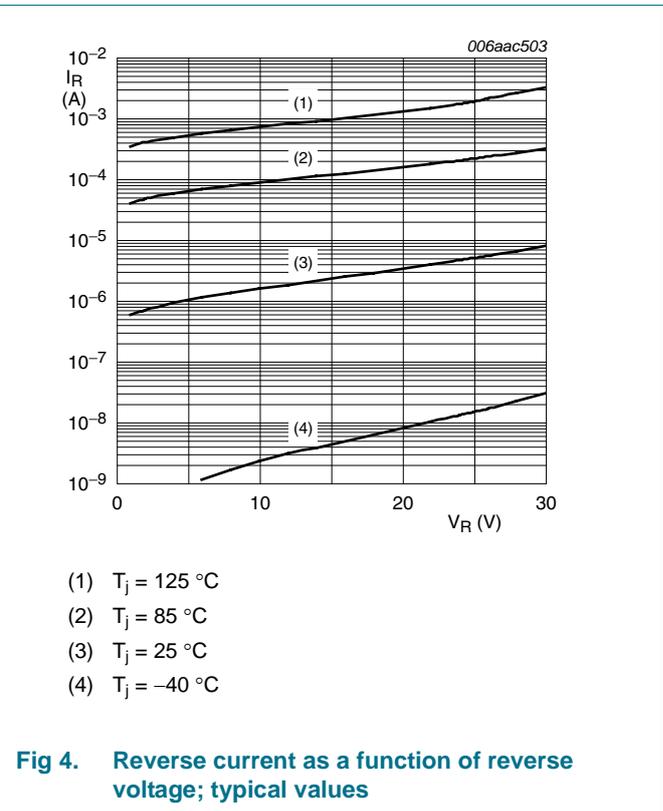
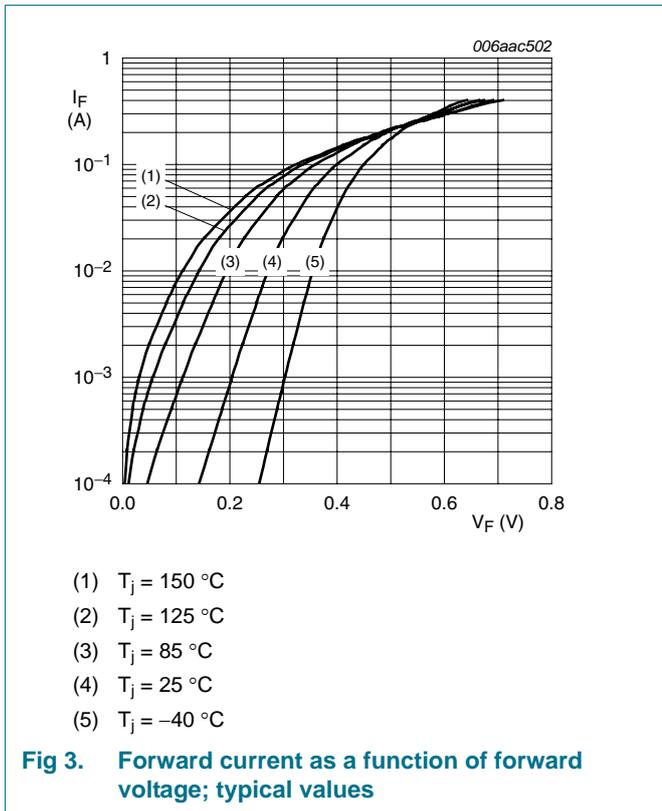
7. Characteristics

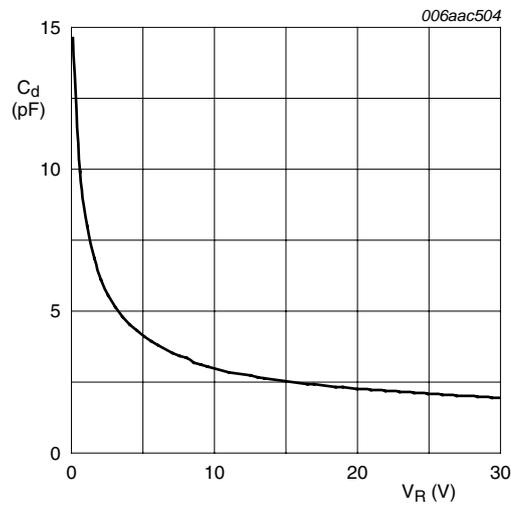
Table 7. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-------------------|--------------------------------------|-----|-----|-----|---------------|
| V_F | forward voltage | | [1] | | | |
| | | $I_F = 0.1\text{ mA}$ | - | 145 | - | mV |
| | | $I_F = 1\text{ mA}$ | - | 210 | - | mV |
| | | $I_F = 10\text{ mA}$ | - | 280 | 350 | mV |
| | | $I_F = 100\text{ mA}$ | - | 405 | - | mV |
| I_R | reverse current | $V_R = 10\text{ V}$ | - | 2 | 10 | μA |
| C_d | diode capacitance | $V_R = 1\text{ V}; f = 1\text{ MHz}$ | - | 8 | - | pF |

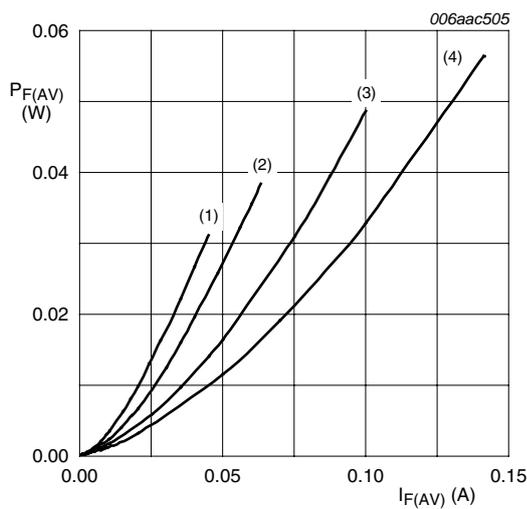
[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$.





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

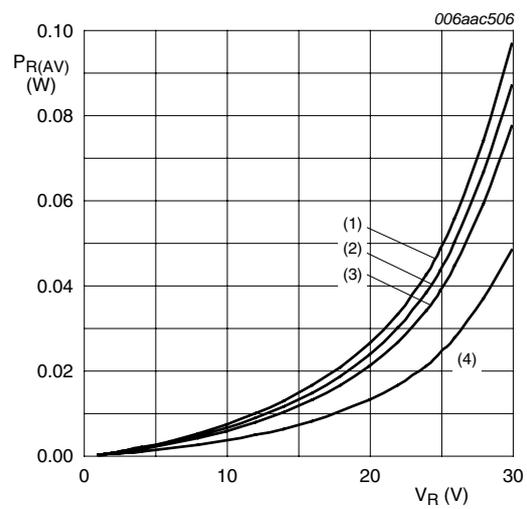
Fig 5. Diode capacitance as a function of reverse voltage; typical values



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

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

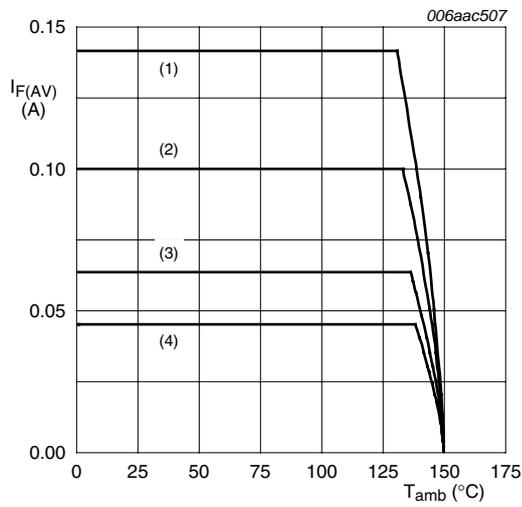
Fig 6. Average forward power dissipation as a function of average forward current; typical values



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

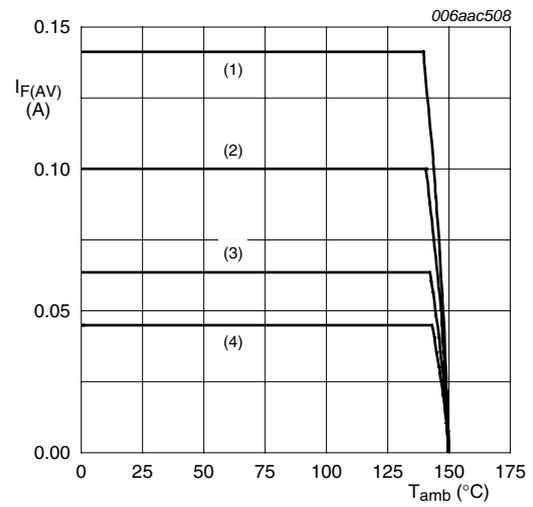
- (1) $\delta = 1; \text{DC}$
- (2) $\delta = 0.9; f = 20 \text{ kHz}$
- (3) $\delta = 0.8; f = 20 \text{ kHz}$
- (4) $\delta = 0.5; f = 20 \text{ kHz}$

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



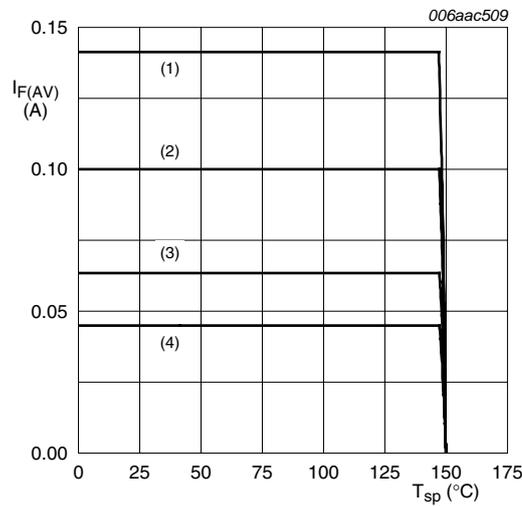
FR4 PCB, standard footprint
 $T_j = 150\text{ °C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 150\text{ °C}$
 (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

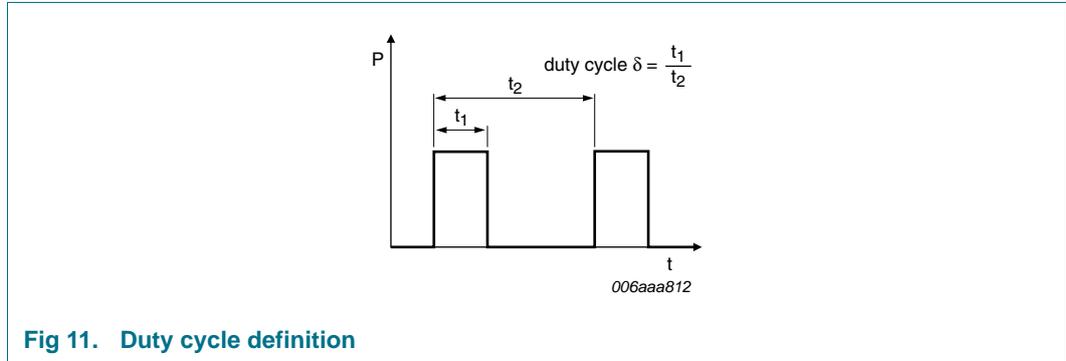


Fig 11. Duty cycle definition

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

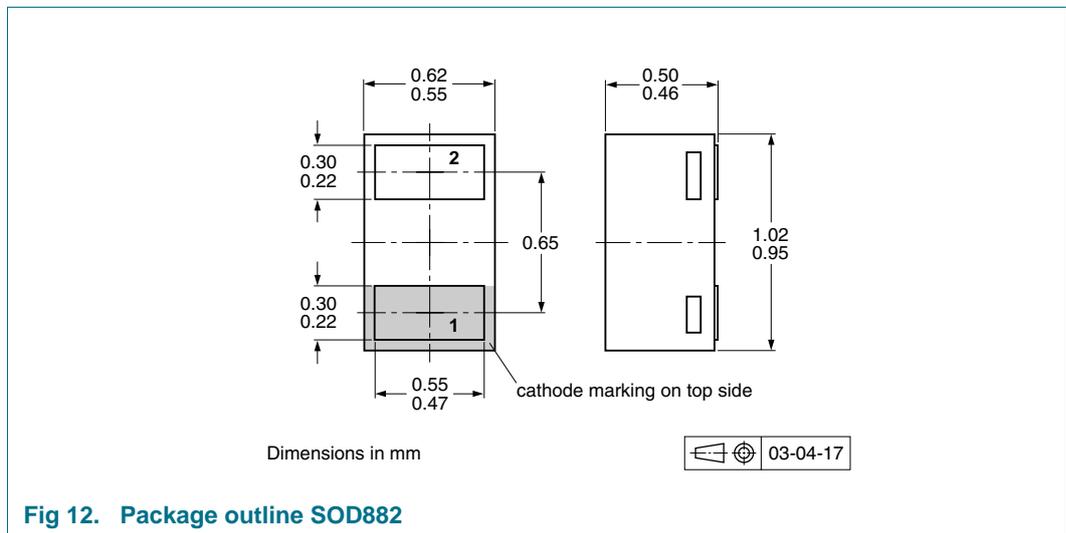


Fig 12. Package outline SOD882

10. Packing information

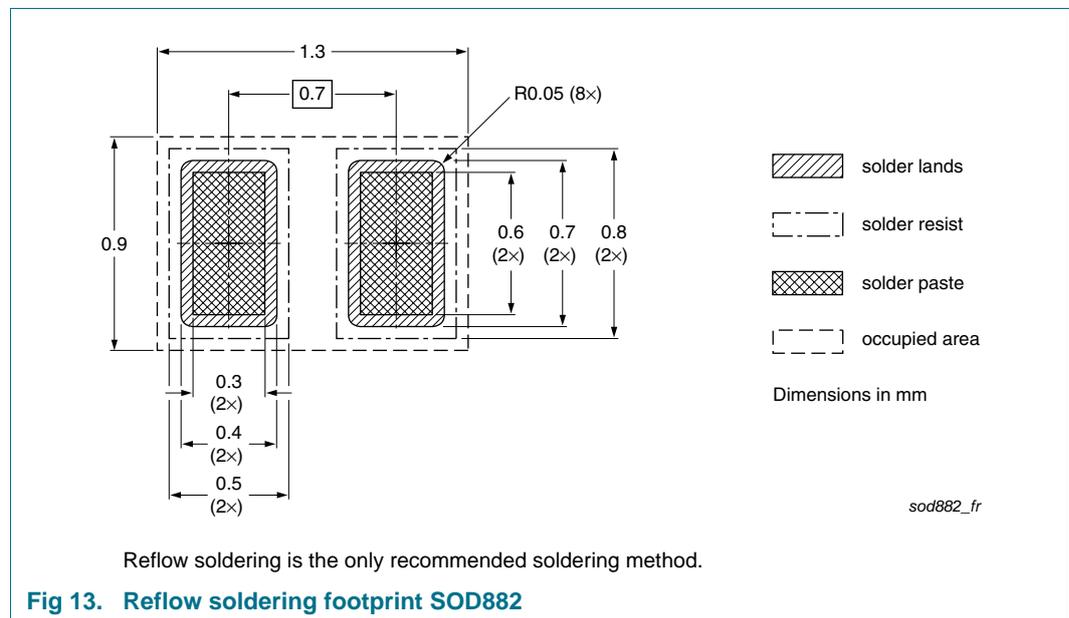
Table 8. Packing methods

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

| Type number | Package | Description | Packing quantity |
|-------------|---------|--------------------------------|------------------|
| RB521CS30L | SOD882 | 2 mm pitch, 8 mm tape and reel | 10000 |
| | | | -315 |

[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 |
|----------------|--------------|--------------------|---------------|------------|
| RB521CS30L v.1 | 20110124 | 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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Date of release: 24 January 2011

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