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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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Team Nexperia



RB520CS30L

100 mA low V_F MEGA Schottky barrier rectifier

Rev. 1 — 10 March 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: $V_F \leq 450$ mV
- Low reverse current: $I_R \leq 0.5$ μ A
- AEC-Q101 qualified
- Leadless ultra small 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

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	-	0.14	0.5	μ A	
V_R	reverse voltage		-	-	30	V	
V_F	forward voltage	$I_F = 10$ mA	[2]	-	330	450	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
RB520CS30L	-	leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm	SOD882

4. Marking

Table 4. Marking codes

Type number	Marking code
RB520CS30L	AP

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
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[4][3]	-	315	mW
			[4][1]	-	565	mW
			[4][5]	-	865	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		-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] $T_j = 25$ °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, 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]	-	-	395	K/W
			[4]	-	-	220	K/W
			[5]	-	-	145	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	70	K/W

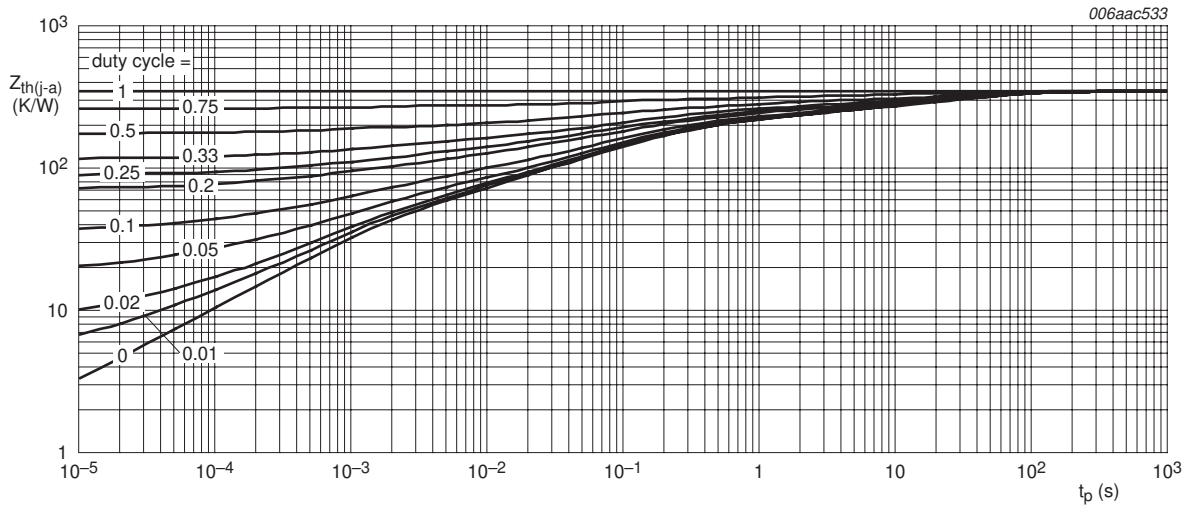
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

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

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

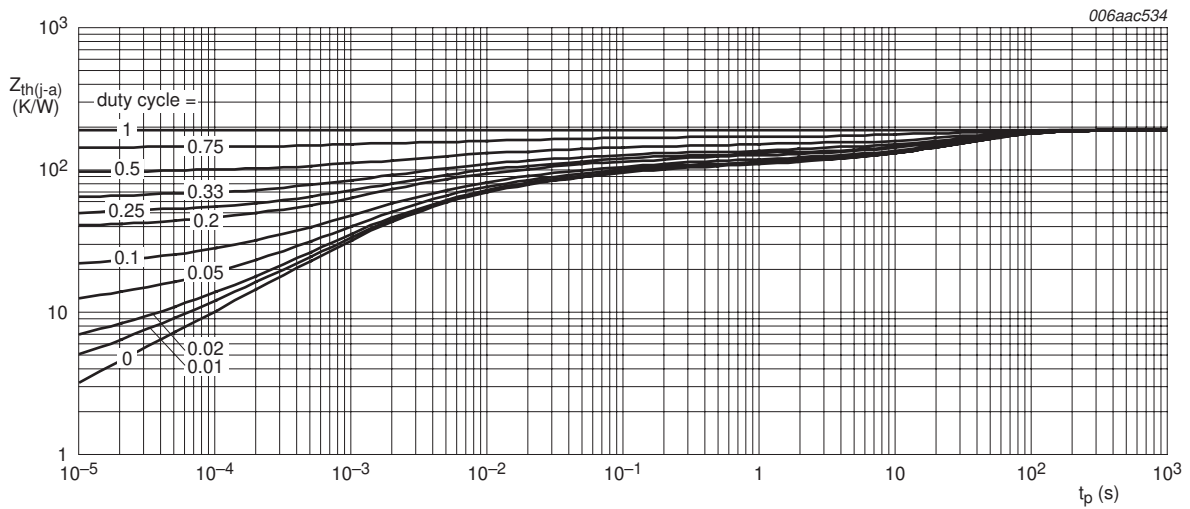
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².[5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.

[6] Soldering point of cathode tab.



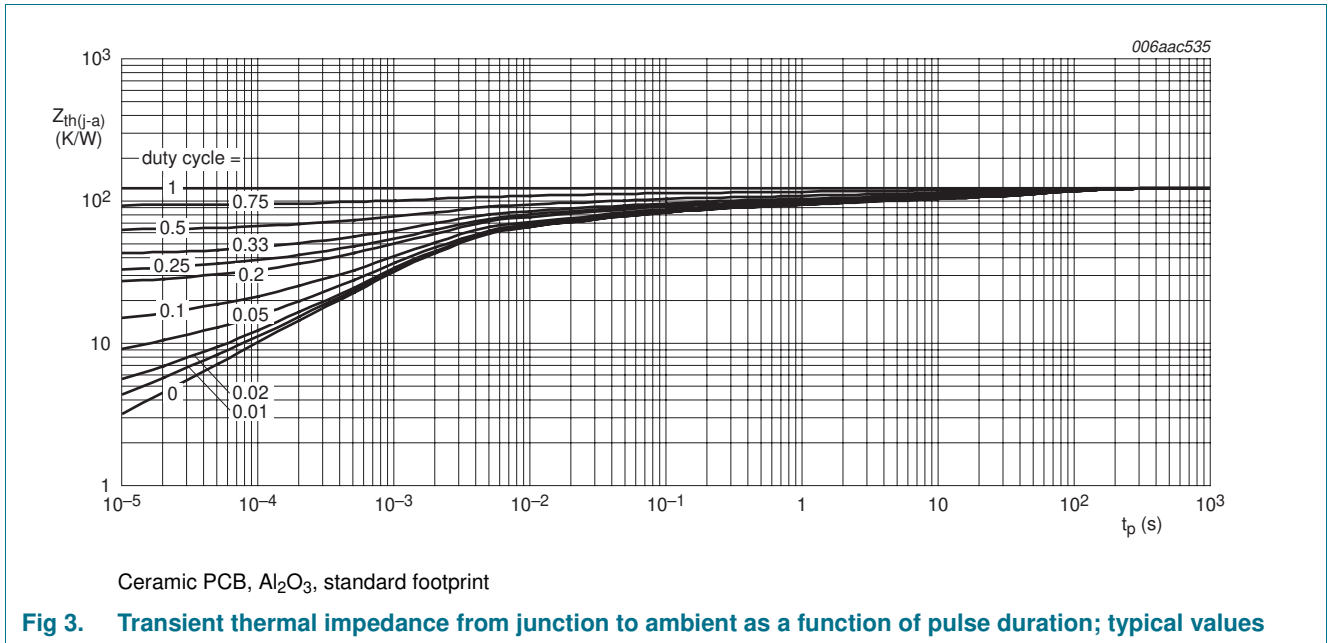
FR4 PCB, standard footprint

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



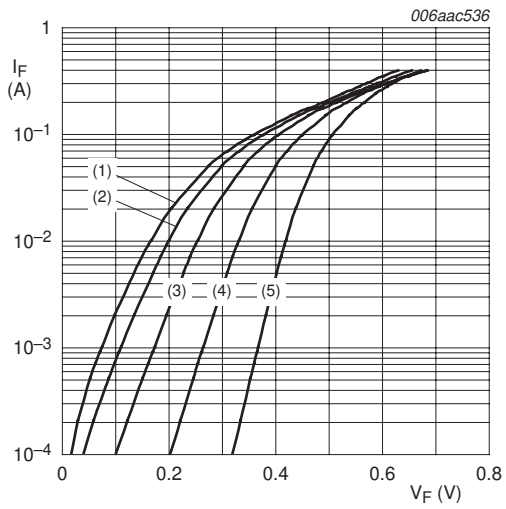
7. Characteristics

Table 7. Characteristics

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

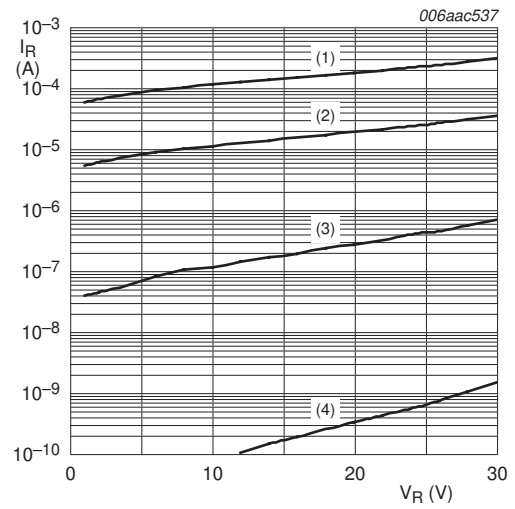
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage		[1]			
		$I_F = 0.1\text{ mA}$	-	210	-	mV
		$I_F = 1\text{ mA}$	-	270	-	mV
		$I_F = 10\text{ mA}$	-	330	450	mV
		$I_F = 100\text{ mA}$	-	450	-	mV
I_R	reverse current	$V_R = 10\text{ V}$	-	0.14	0.5	μA
C_d	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}$	-	10	-	pF

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



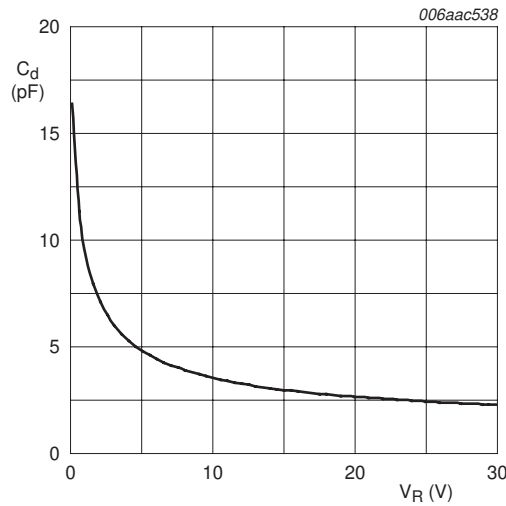
- (1) $T_j = 150\text{ °C}$
- (2) $T_j = 125\text{ °C}$
- (3) $T_j = 85\text{ °C}$
- (4) $T_j = 25\text{ °C}$
- (5) $T_j = -40\text{ °C}$

Fig 4. Forward current as a function of forward voltage; typical values



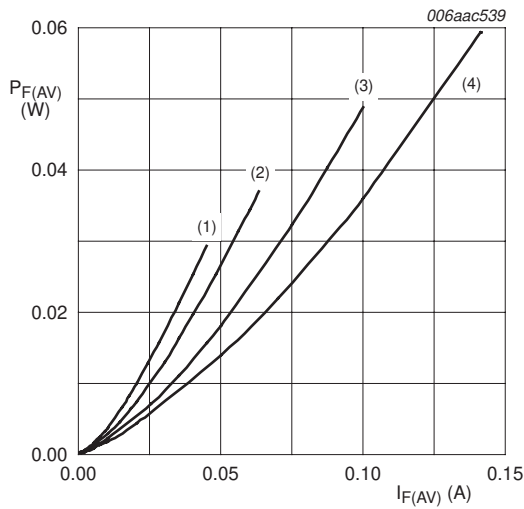
- (1) $T_j = 125\text{ °C}$
- (2) $T_j = 85\text{ °C}$
- (3) $T_j = 25\text{ °C}$
- (4) $T_j = -40\text{ °C}$

Fig 5. Reverse current as a function of reverse voltage; typical values



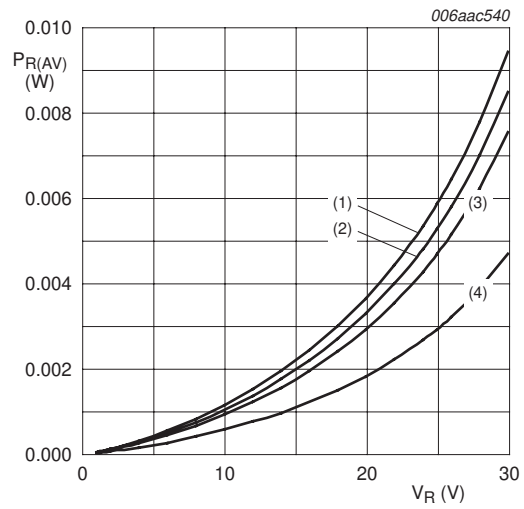
$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

Fig 6. Diode capacitance as a function of reverse voltage; typical values



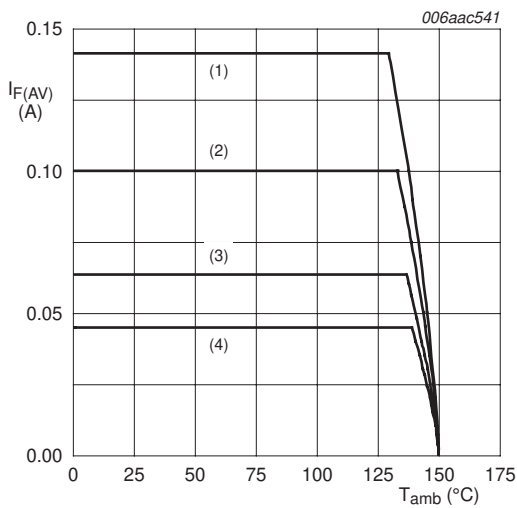
- $T_j = 150\text{ °C}$
- (1) $\delta = 0.1$
 - (2) $\delta = 0.2$
 - (3) $\delta = 0.5$
 - (4) $\delta = 1$

Fig 7. Average forward power dissipation as a function of average forward current; typical values



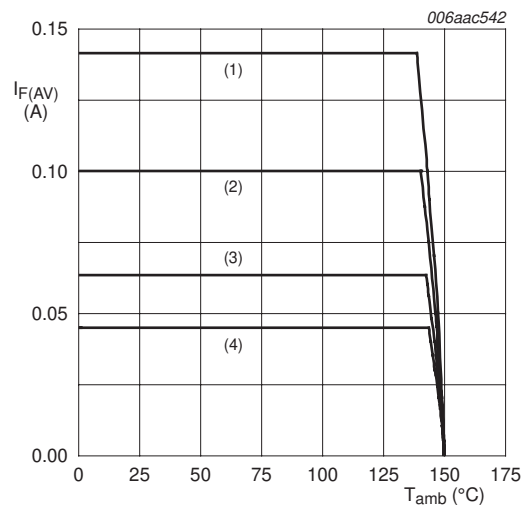
- $T_j = 125\text{ °C}$
- (1) $\delta = 1$; DC
 - (2) $\delta = 0.9$; $f = 20\text{ kHz}$
 - (3) $\delta = 0.8$; $f = 20\text{ kHz}$
 - (4) $\delta = 0.5$; $f = 20\text{ kHz}$

Fig 8. Average reverse power dissipation as a function of reverse voltage; typical values



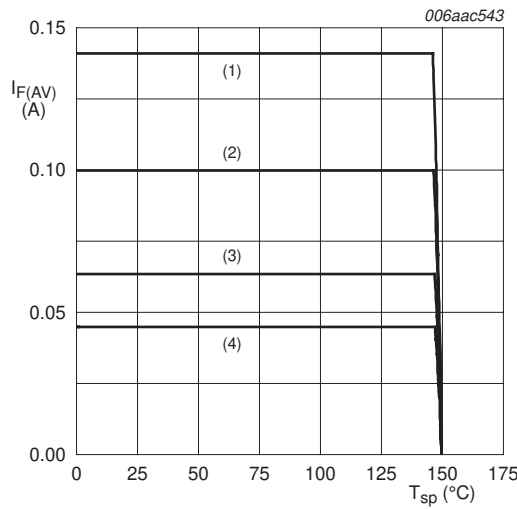
- FR4 PCB, standard footprint
 $T_j = 150\text{ °C}$
- (1) $\delta = 1$; DC
 - (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 - (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 - (4) $\delta = 0.1$; $f = 20\text{ kHz}$

Fig 9. 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 10. 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 11. Average forward current as a function of solder point temperature; typical values

8. Test information

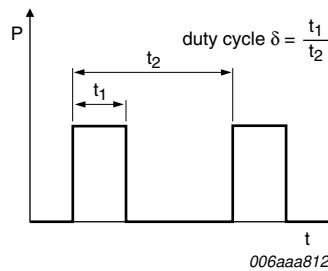


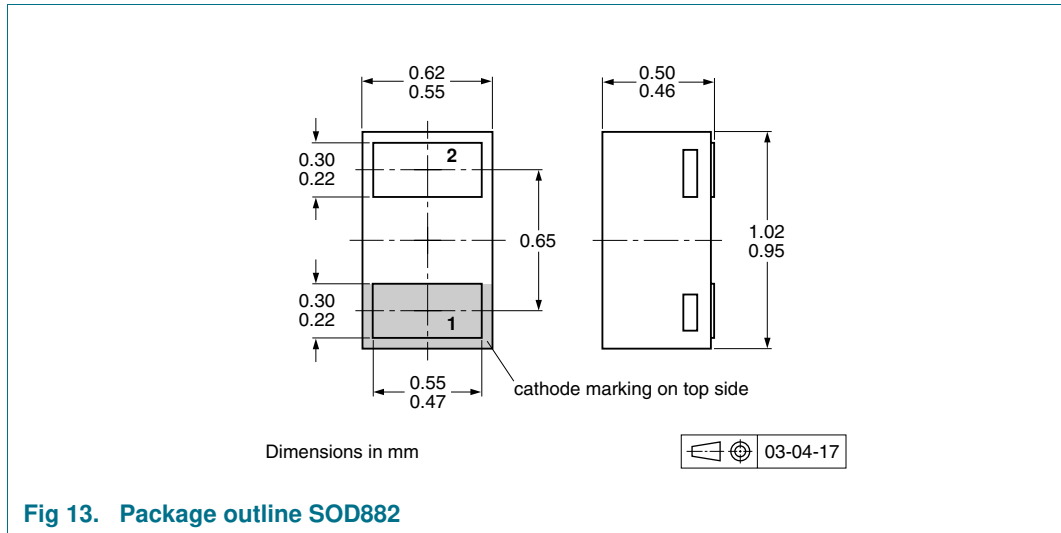
Fig 12. Duty cycle definition

The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#) and [11](#) 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

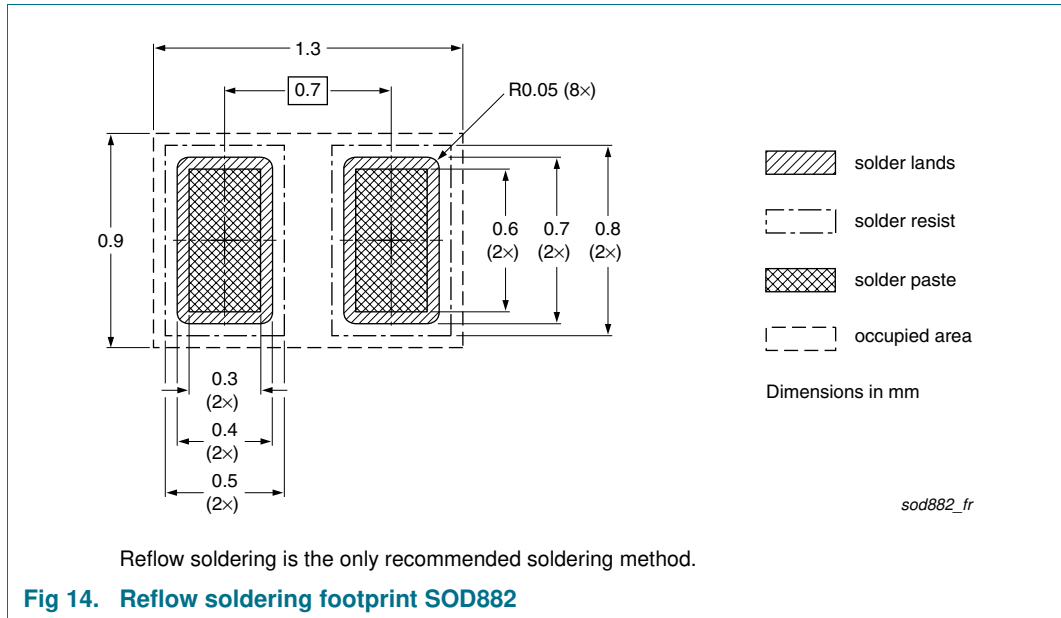
Table 8. Packing methods

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

Type number	Package	Description	Packing quantity
RB520CS30L	SOD882	2 mm pitch, 8 mm tape and reel	10 000
			-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
RB520CS30L v.1	20110310	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.
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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