



# RB520CS3002L

200 mA low VF MEGA Schottky barrier rectifier

25 June 2013

Product data sheet

## 1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in DFN1006-2 (SOD882) leadless ultra small Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 200$  mA
- Reverse voltage:  $V_R \leq 30$  V
- Low forward voltage:  $V_F \leq 450$  mV
- Low reverse current:  $I_R \leq 0.5$   $\mu$ A
- AEC-Q101 qualified
- Leadless ultra small SMD plastic package

## 3. Applications

- Low current rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- 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; $T_{amb} \leq 115$ °C; square wave	[1]	-	-	200	mA
		$\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 135$ °C; square wave		-	-	200	mA
$V_R$	reverse voltage			-	-	30	V
$V_F$	forward voltage	$I_F = 10$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C; pulsed		-	330	450	mV
$I_R$	reverse current	$V_R = 10$ V; $T_j = 25$ °C		-	0.14	0.5	$\mu$ A

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 <p>Transparent top view</p> <p><b>DFN1006-2 (SOD882)</b></p>	 <p><i>sym001</i></p>
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
RB520CS3002L	DFN1006-2	leadless ultra small plastic package; 2 terminals	SOD882

## 7. Marking

Table 4. Marking codes

Type number	Marking code
RB520CS3002L	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			-	30	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 115$ °C; square wave	[1]	-	200	mA
		$\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 135$ °C; square wave		-	200	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; half sine wave		-	3	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	315	mW
			[1]	-	565	mW
			[3]	-	865	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.  
 [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.  
 [3] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, 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]	-	-	395	K/W
			[1][3]	-	-	220	K/W
			[1][4]	-	-	145	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] Device mounted on an FR4 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<sup>2</sup>.  
 [4] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.  
 [5] Soldering point of cathode tab.

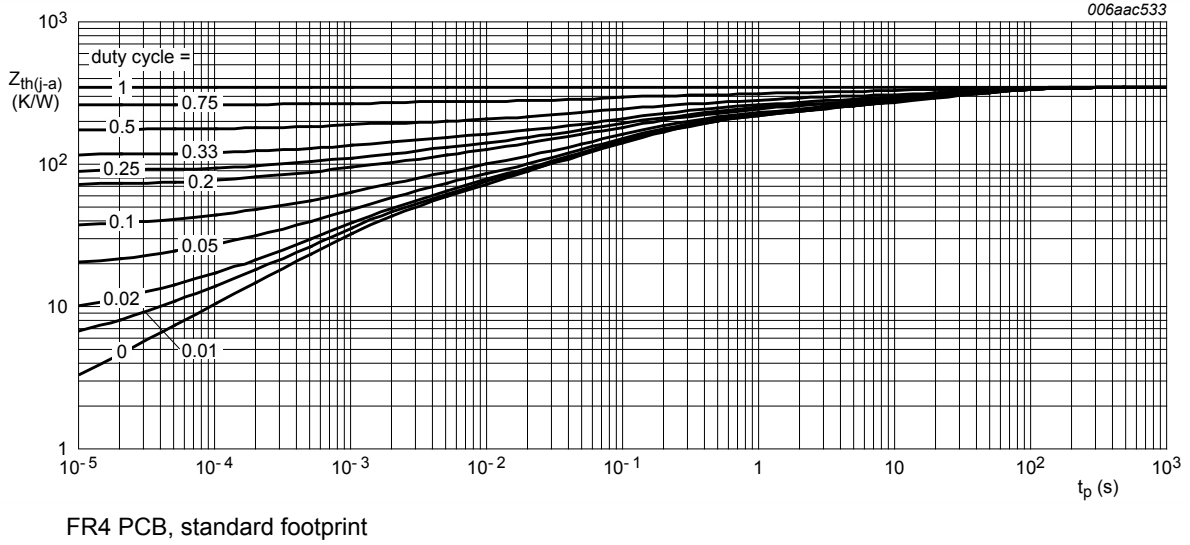


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

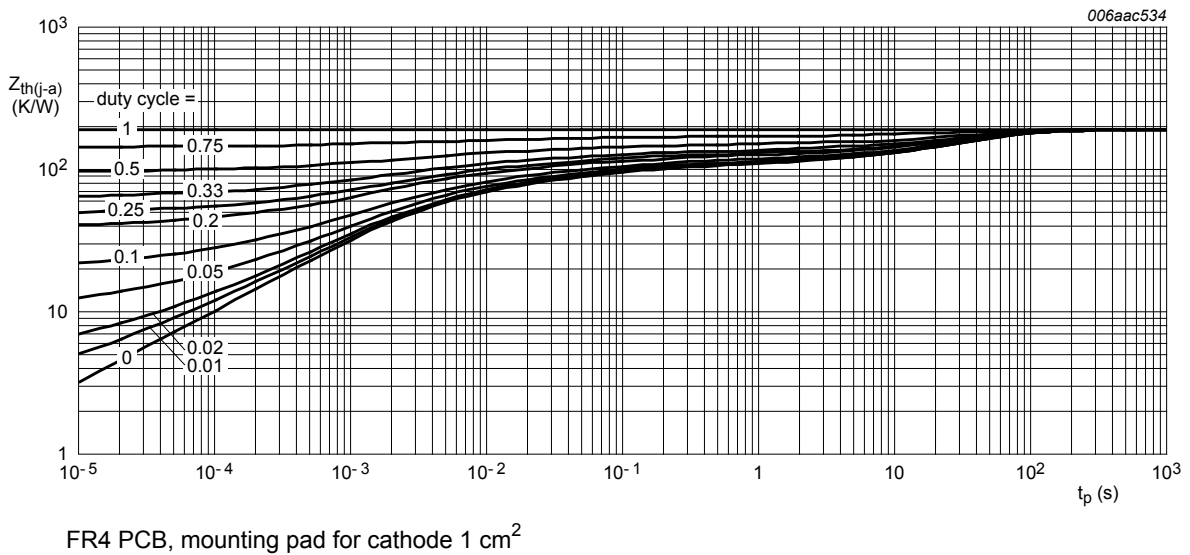
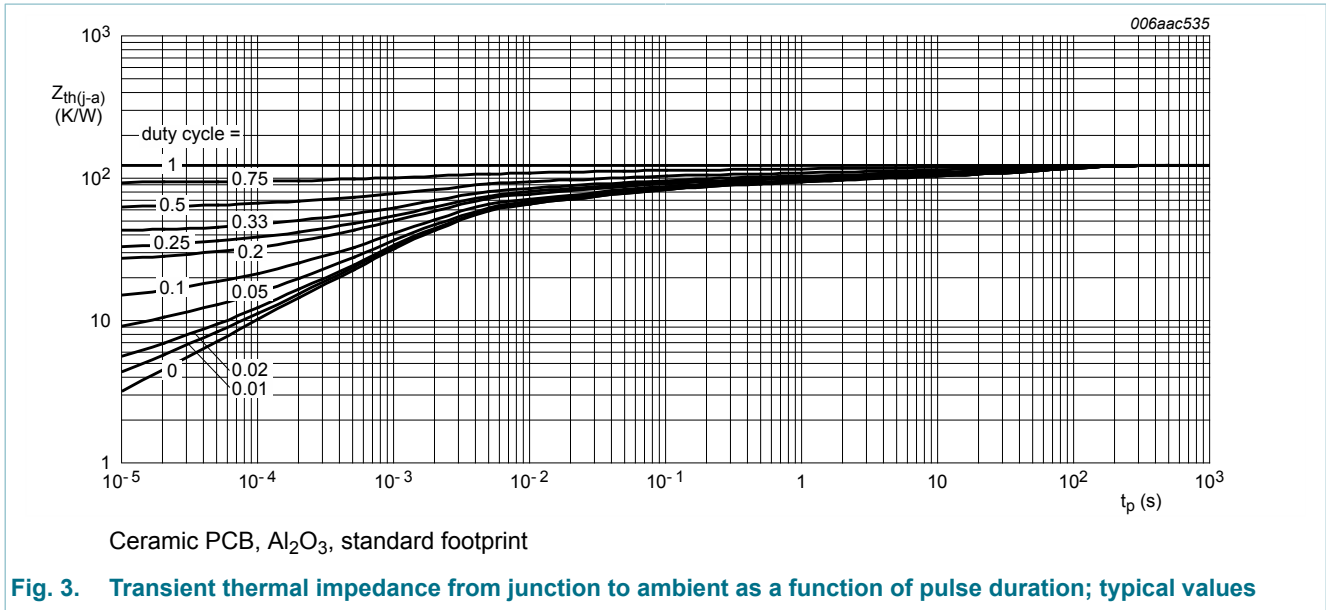


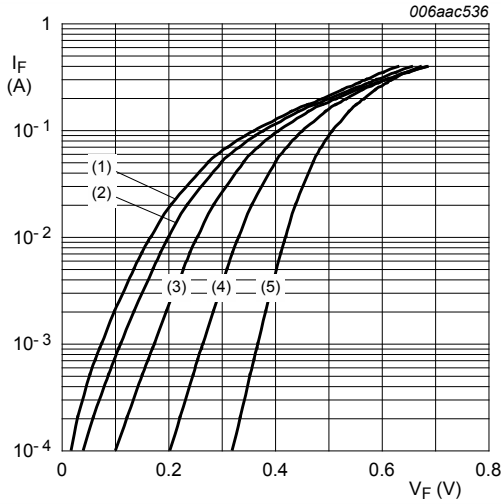
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



## 10. Characteristics

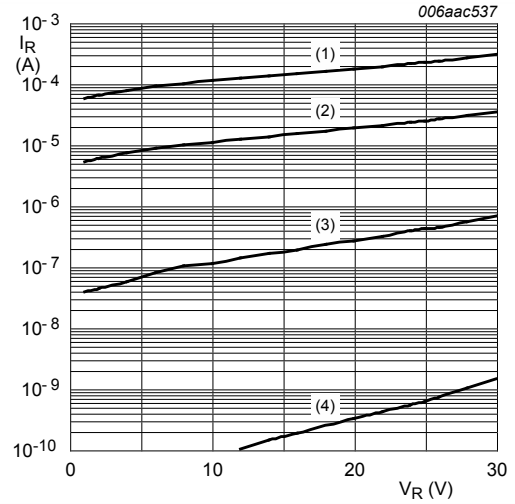
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 0.1 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>J</sub> = 25 °C; pulsed	-	210	-	mV
		I <sub>F</sub> = 1 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>J</sub> = 25 °C; pulsed	-	270	-	mV
		I <sub>F</sub> = 10 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>J</sub> = 25 °C; pulsed	-	330	450	mV
		I <sub>F</sub> = 100 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>J</sub> = 25 °C; pulsed	-	450	-	mV
		I <sub>F</sub> = 200 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>J</sub> = 25 °C; pulsed	-	540	640	mV
I <sub>R</sub>	reverse current	V <sub>R</sub> = 10 V; T <sub>J</sub> = 25 °C	-	0.14	0.5	μA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 1 V; f = 1 MHz; T <sub>J</sub> = 25 °C	-	10	-	pF



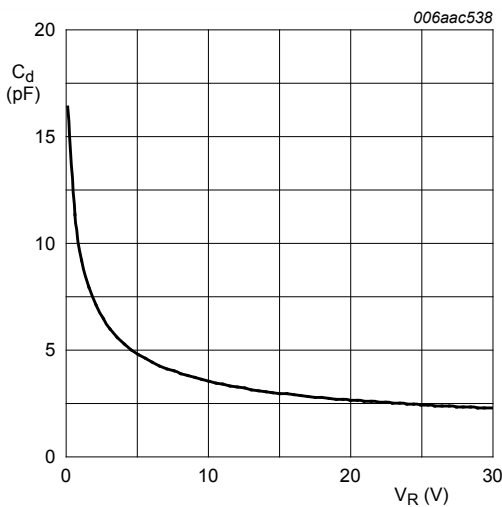
- (1)  $T_j = 150\text{ }^\circ\text{C}$
- (2)  $T_j = 125\text{ }^\circ\text{C}$
- (3)  $T_j = 85\text{ }^\circ\text{C}$
- (4)  $T_j = 25\text{ }^\circ\text{C}$
- (5)  $T_j = -40\text{ }^\circ\text{C}$

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



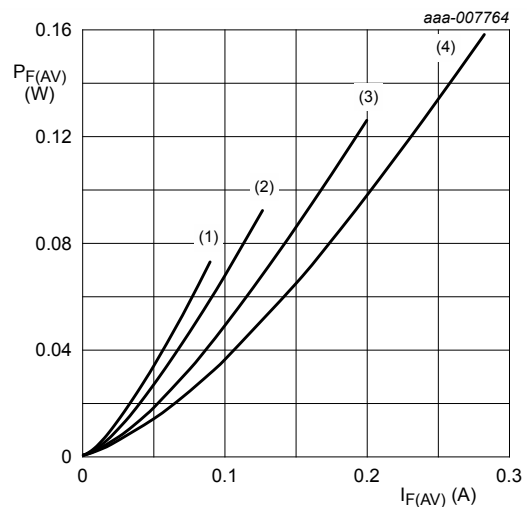
- (1)  $T_j = 125\text{ }^\circ\text{C}$
- (2)  $T_j = 85\text{ }^\circ\text{C}$
- (3)  $T_j = 25\text{ }^\circ\text{C}$
- (4)  $T_j = -40\text{ }^\circ\text{C}$

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



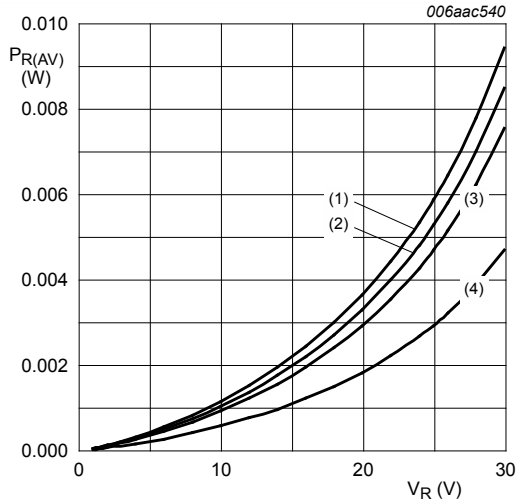
$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

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



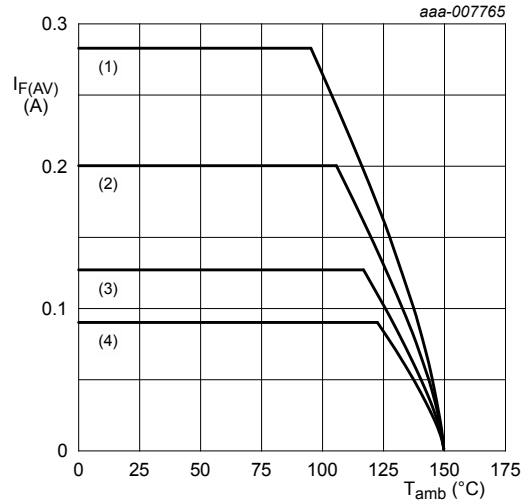
- $T_j = 150\text{ }^\circ\text{C}$
- (1)  $\delta = 0.1; f = 20\text{ kHz}$
- (2)  $\delta = 0.2; f = 20\text{ kHz}$
- (3)  $\delta = 0.5; f = 20\text{ kHz}$
- (4)  $\delta = 1; \text{DC}$

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



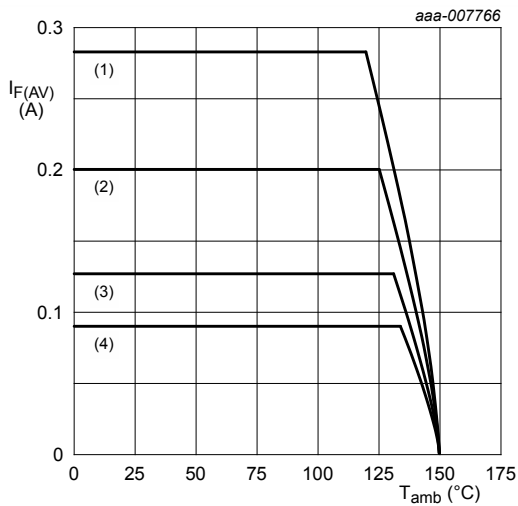
$T_j = 125\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.9$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.8$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$

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



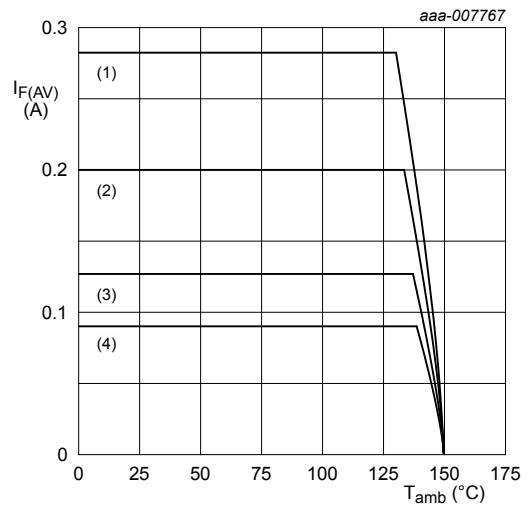
FR4 PCB, standard footprint  
 $T_j = 150\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



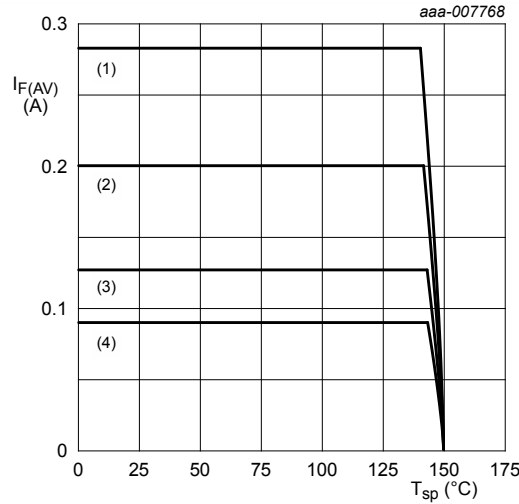
FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 150\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



Ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint  
 $T_j = 150\text{ }^\circ\text{C}$   
 (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 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. 12. Average forward current as a function of solder point temperature; typical values

## 11. Test information

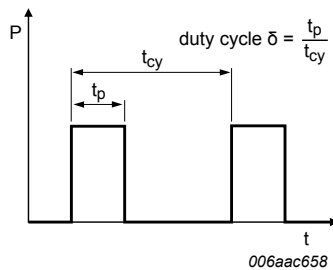


Fig. 13. Duty cycle definition

The current ratings for the typical waveforms 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.

### 11.1 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.



## 12. Package outline

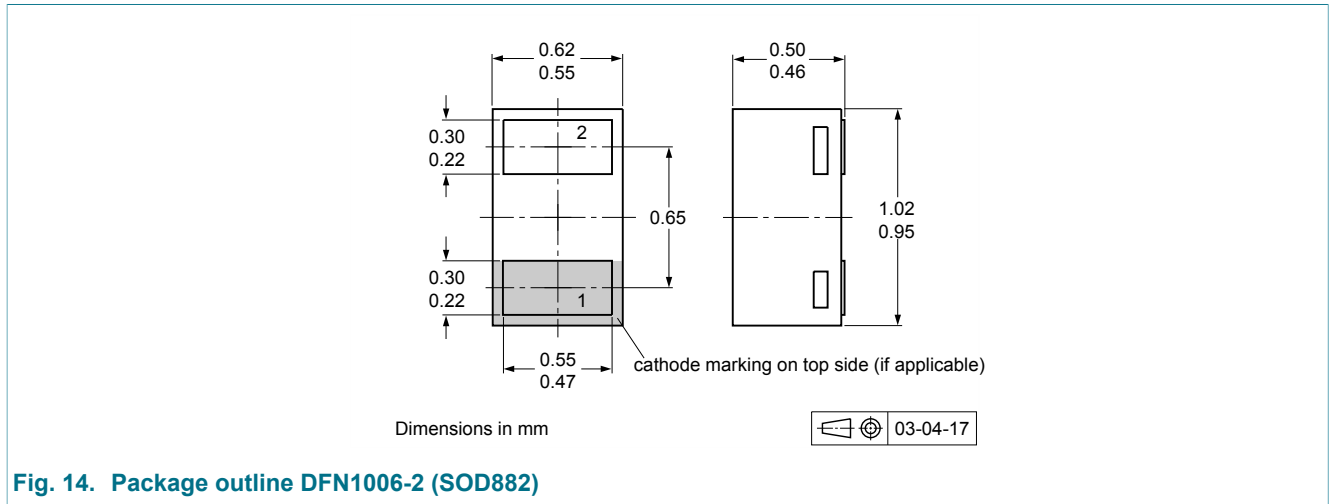


Fig. 14. Package outline DFN1006-2 (SOD882)

## 13. Soldering

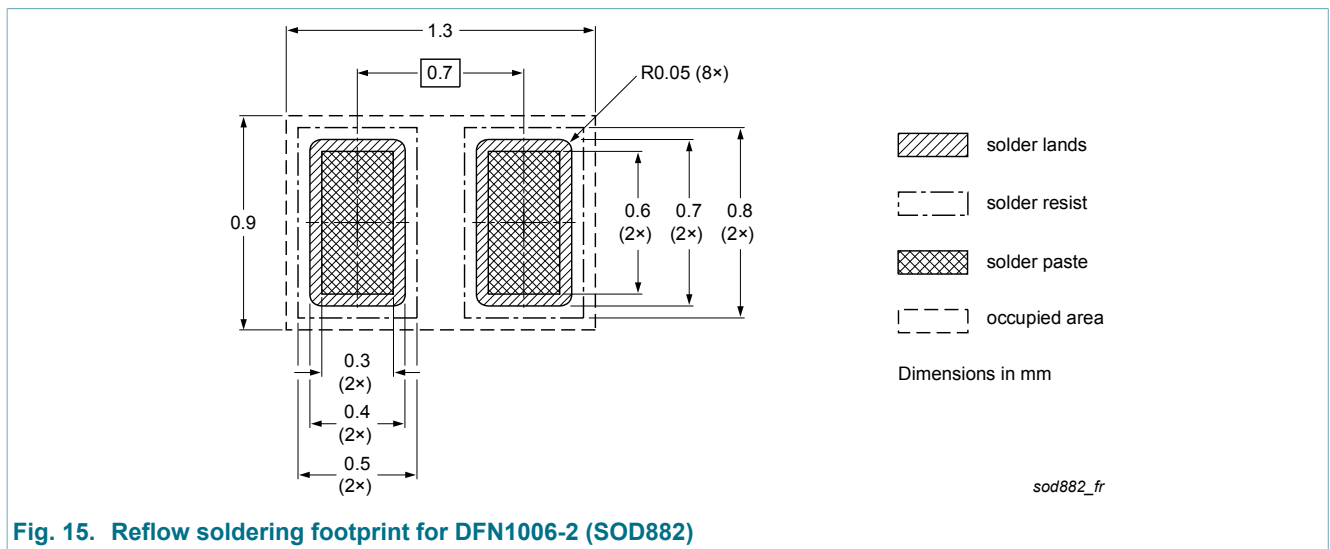


Fig. 15. Reflow soldering footprint for DFN1006-2 (SOD882)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
RB520CS3002L v.1	20130625	Product data sheet	-	-

## 15. Legal information

### 15.1 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.

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