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: $I_R \leq 0.5$ µA
- 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	δ = 0.5 ; f = 20 kHz; $T_{amb} \leq 115$ °C; square wave	[1]	-	-	200	mA
		δ = 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; $t_p \leq 300$ µs; δ ≤ 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	µA

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

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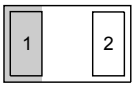
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **DFN1006-2 (SOD882)**	 *sym001*
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	δ = 0.5 ; f = 20 kHz; T_{amb} ≤ 115 °C; square wave	[1]	-	200	mA
		δ = 0.5 ; f = 20 kHz; T_{sp} ≤ 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} ≤ 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

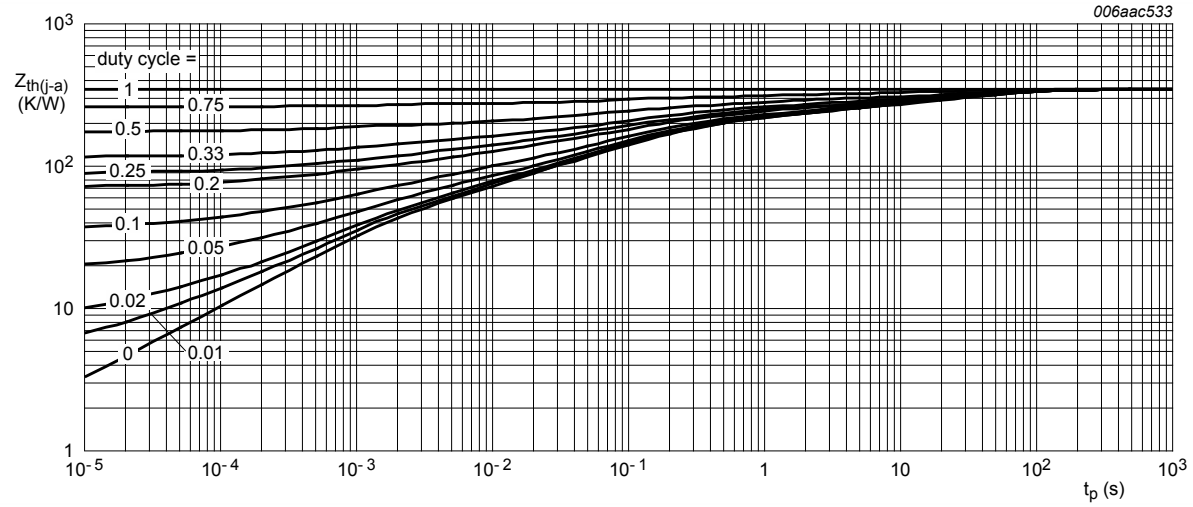
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

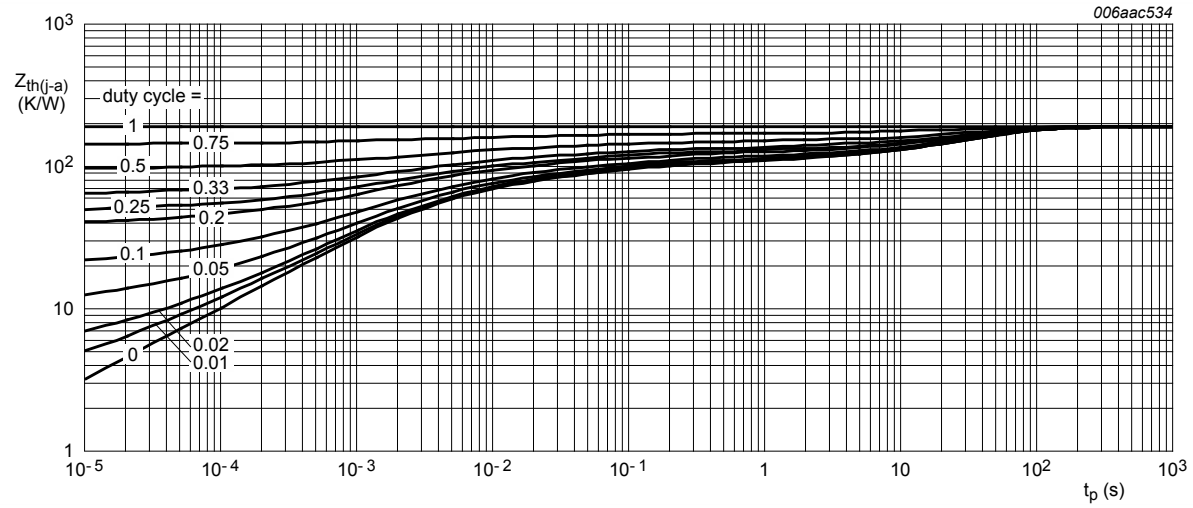
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	395	K/W
			[1][3]	-	-	220	K/W
			[1][4]	-	-	145	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	70	K/W

[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^2.
[4] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[5] Soldering point of cathode tab.



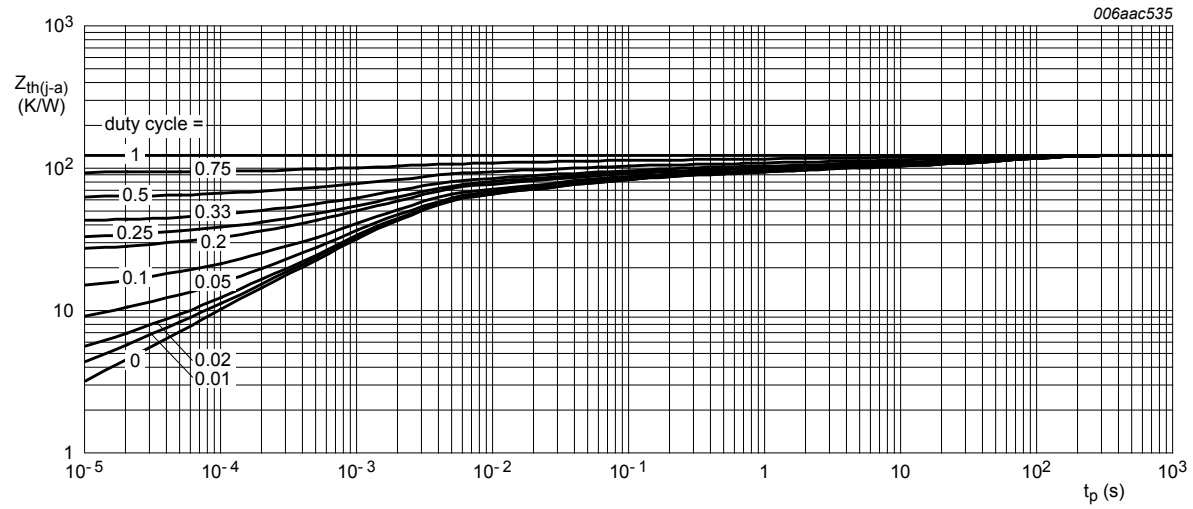
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm^2

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



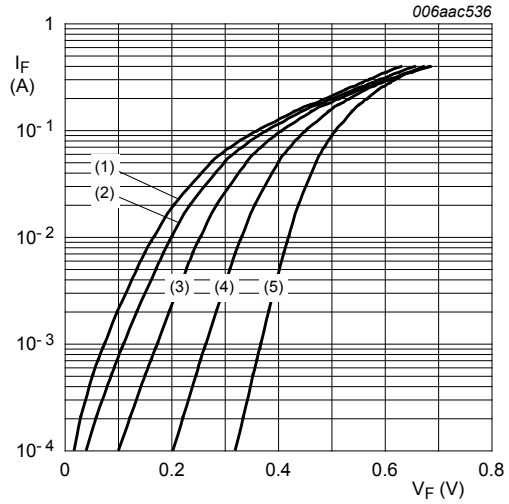
Ceramic PCB, Al_2O_3, standard footprint

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

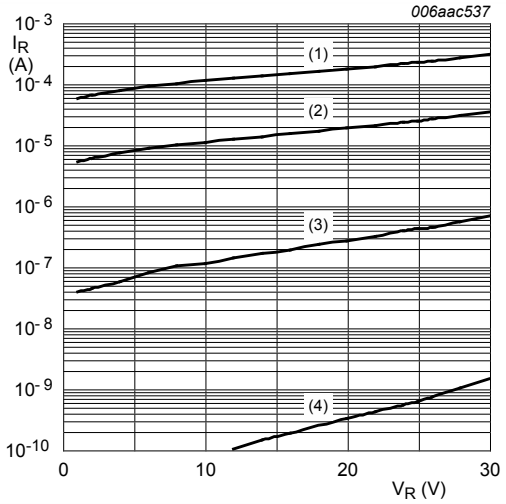
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 0.1 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C; pulsed		-	210	-	mV
		I_F = 1 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C; pulsed		-	270	-	mV
		I_F = 10 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C; pulsed		-	330	450	mV
		I_F = 100 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C; pulsed		-	450	-	mV
		I_F = 200 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C; pulsed		-	540	640	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C		-	0.14	0.5	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	10	-	pF



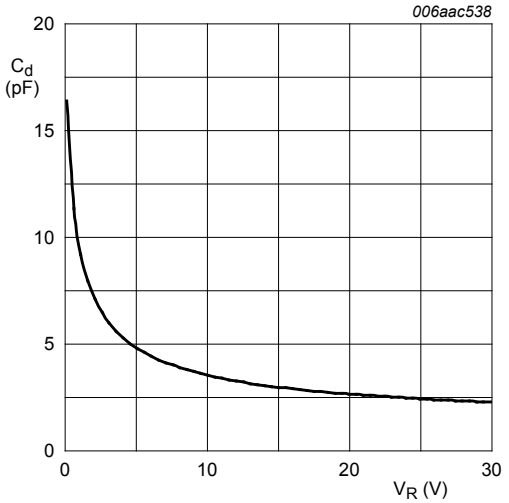
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

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



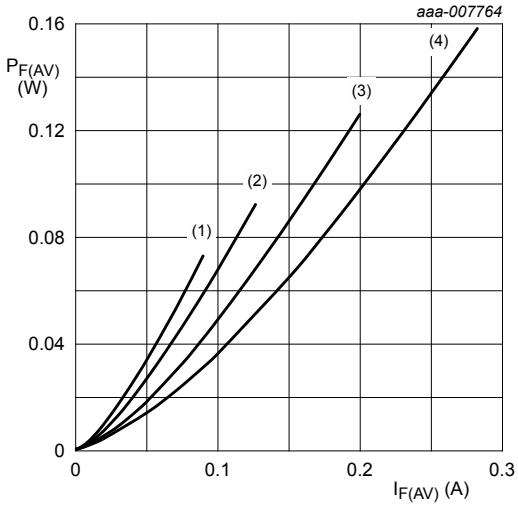
(1) T_j = 125 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

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



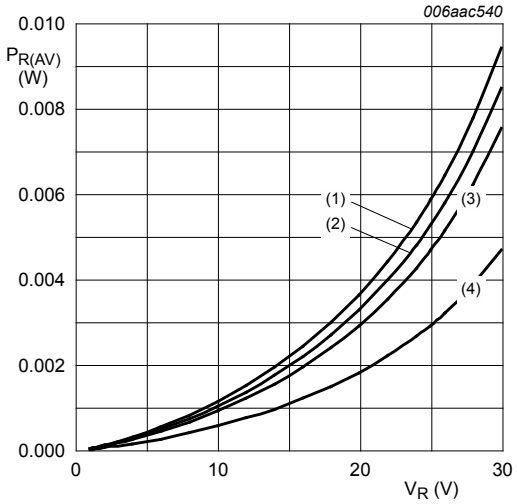
f = 1 MHz; T_{amb} = 25 °C

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



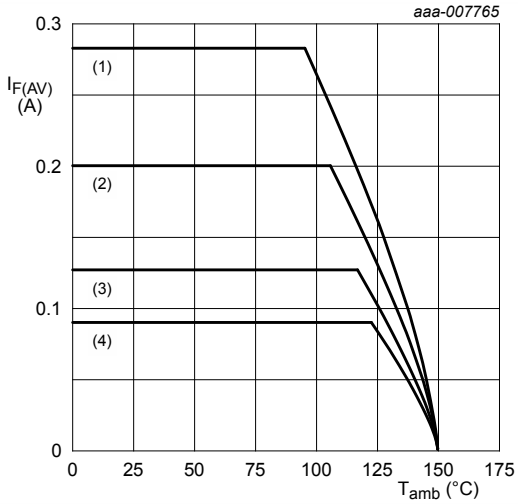
T_j = 150 °C
(1) δ = 0.1; f = 20 kHz
(2) δ = 0.2; f = 20 kHz
(3) δ = 0.5; f = 20 kHz
(4) δ = 1; DC

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



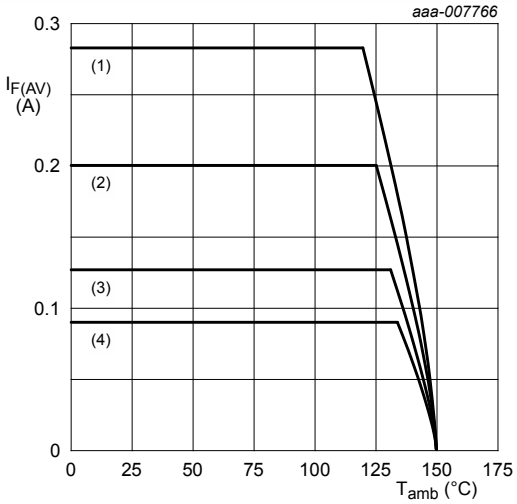
T_j = 125 °C
(1) δ = 1; DC
(2) δ = 0.9; f = 20 kHz
(3) δ = 0.8; f = 20 kHz
(4) δ = 0.5; f = 20 kHz

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



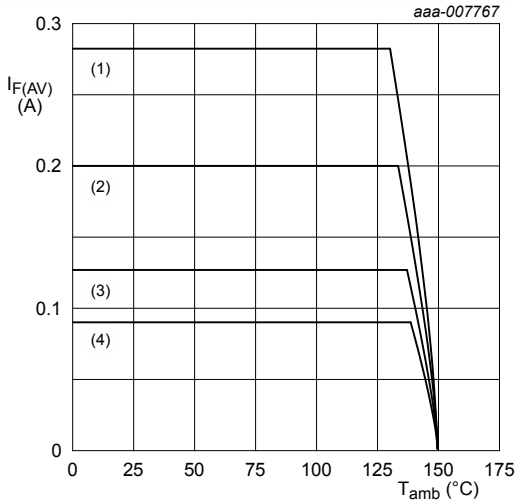
FR4 PCB, standard footprint
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



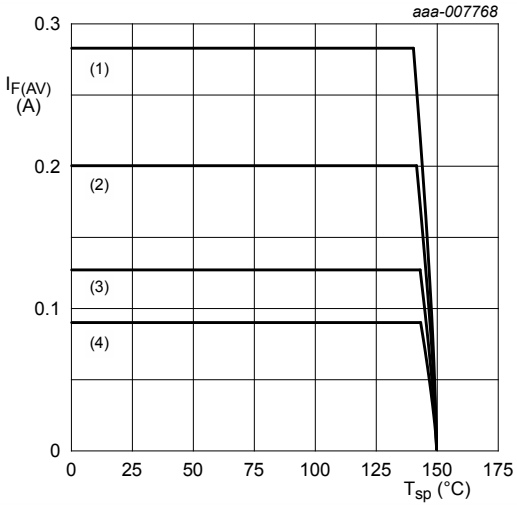
FR4 PCB, mounting pad for cathode 1 cm^2
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



Ceramic PCB, Al_2O_3, standard footprint
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 11. Average forward current as a function of ambient temperature; typical values



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

Fig. 12. Average forward current as a function of solder point temperature; typical values

11. Test information

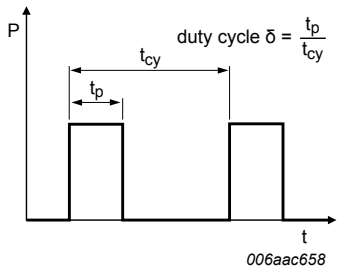


Fig. 13. Duty cycle definition

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

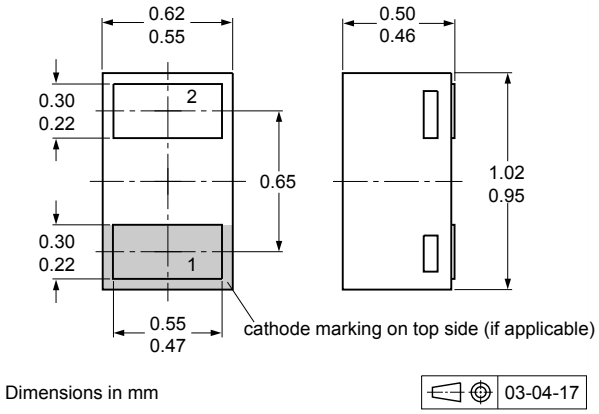


Fig. 14. Package outline DFN1006-2 (SOD882)

13. Soldering

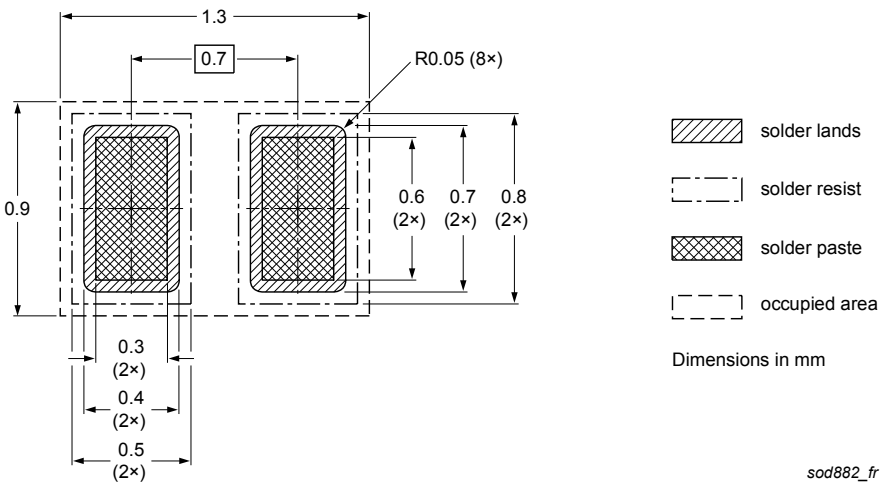


Fig. 15. Reflow soldering footprint for DFN1006-2 (SOD882)

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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16. Contents

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