PMEG2005ESF

20 V, 0.5 A low VF MEGA Schottky barrier rectifier

13 February 2015 — Product data sheet

1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection in a DSN0603-2 (SOD962-2) leadless ultra small Chip-Scale Package (CSP).

2. Features and benefits

- Average forward current $I_{F(AV)} \leq 0.5$ A
- Reverse voltage $V_R \leq 20$ V
- Low forward voltage typ. $V_F = 310$ mV
- Low reverse current typ. $I_R = 0.37$ µA
- Package height typ. 0.3 mm

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Ultra high speed switching
- LED backlight for mobile application

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; $T_{amb} = 110$ °C; square wave	[1]	-	-	0.5	A
		$\delta = 0.5$; f = 20 kHz; $T_{sp} = 145$ °C; square wave		-	-	0.5	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	20	V
V_F	forward voltage	$I_F = 10$ mA; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C		-	310	380	mV
I_R	reverse current	$V_R = 10$ V; $T_j = 25$ °C; pulsed		-	0.37	2	µA
t_{rr}	reverse recovery time	$I_F = 500$ mA; $I_R = 500$ mA; $I_{R(meas)} = 100$ mA; $T_j = 25$ °C		-	1.9	-	ns

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.

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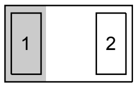
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **DSN0603-2 (SOD962-2)**	 *sym001*
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG2005ESF	DSN0603-2	Leadless ultra small package; 2 terminals; body 0.6 x 0.3 x 0.3 mm	SOD962-2

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2005ESF	5

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	T_j = 25 °C		-	20	V
I_F	forward current	T_{sp} ≤ 140 °C; δ = 1		-	0.71	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; T_{amb} = 110 °C; square wave	[1]	-	0.5	A
		δ = 0.5; f = 20 kHz; T_{sp} = 145 °C; square wave		-	0.5	A
I_{FRM}	repetitive peak forward current	t_p ≤ 1 ms; δ ≤ 0.25		-	1	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	4.5	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	405	mW
			[3]	-	660	mW
			[1]	-	1200	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 a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.

[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 anode and cathode 1 cm^2 each.

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]	-	-	310	K/W
			[1][3]	-	-	190	K/W
			[1][4]	-	-	105	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	40	K/W

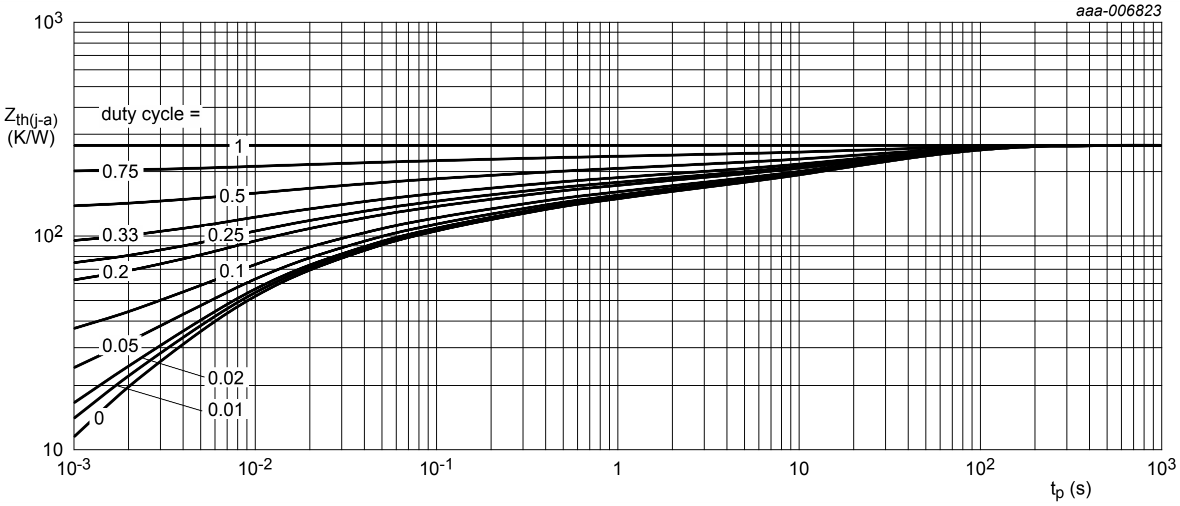
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

[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 anode and cathode 1 cm^2 each.

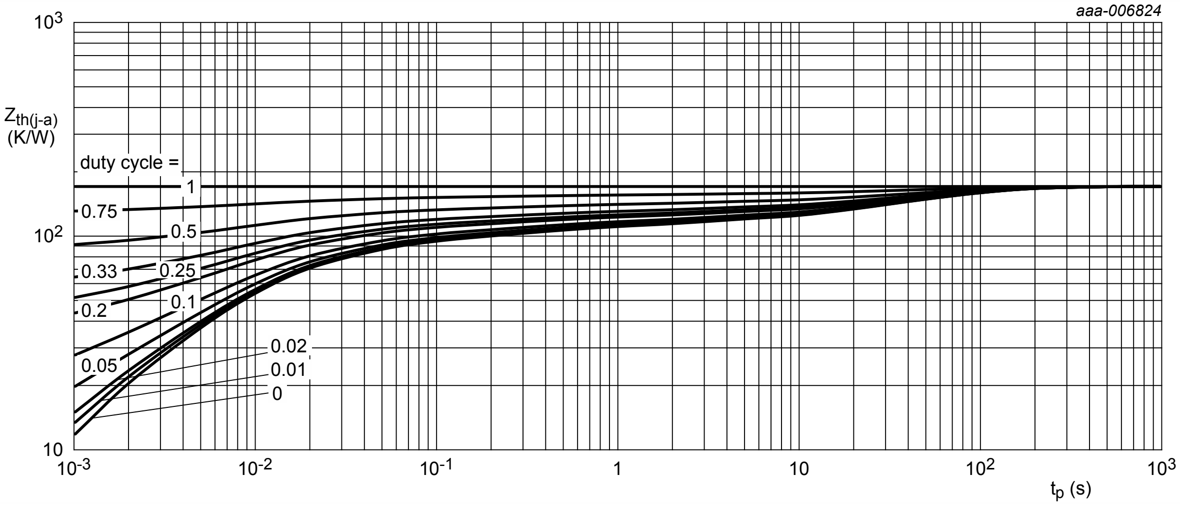
[4] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

[5] Soldering point of anode tab.



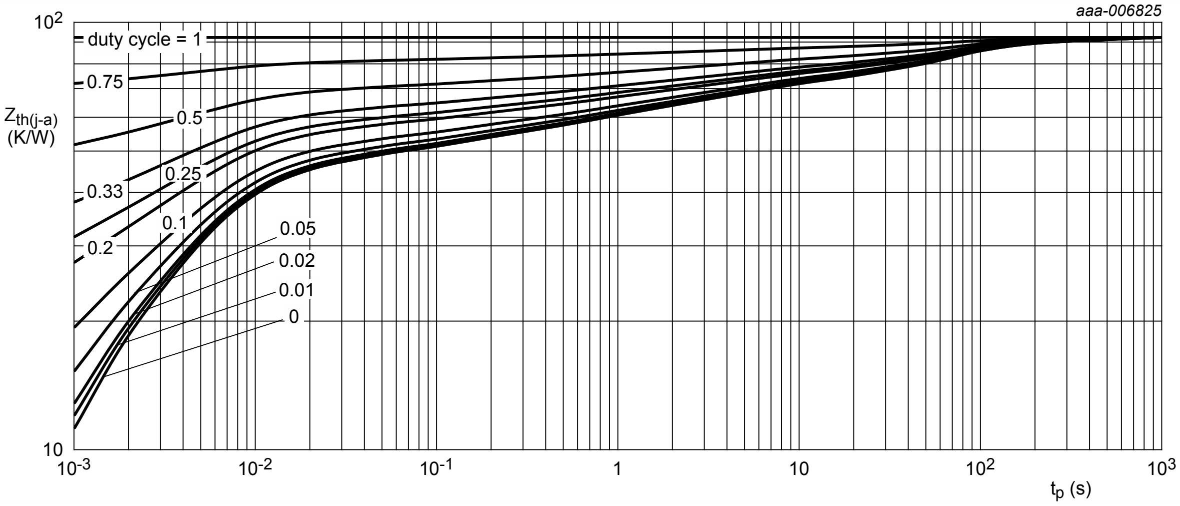
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for anode and cathode 1 cm^2 each

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



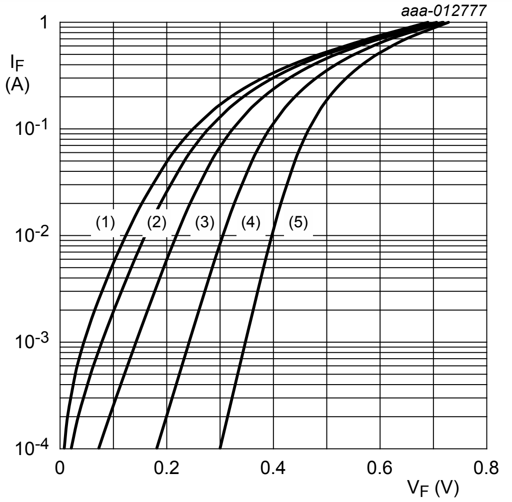
Ceramic PCB, Al_2O_3, standard footprint

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
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 μA; t_p = 300 μs; δ = 0.02; T_j = 25 °C		20	-	-	V
V_F	forward voltage	I_F = 0.1 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	185	250	mV
		I_F = 1 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	245	320	mV
		I_F = 10 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	310	380	mV
		I_F = 100 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	390	450	mV
		I_F = 200 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	435	490	mV
		I_F = 500 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	555	620	mV
I_R	reverse current	V_R = 6 V; T_j = 25 °C; pulsed		-	0.26	-	μA
		V_R = 10 V; T_j = 25 °C; pulsed		-	0.37	2	μA
		V_R = 20 V; T_j = 25 °C; pulsed		-	0.88	3.5	μA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	25	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	9	-	pF
t_{rr}	reverse recovery time	I_F = 500 mA; I_R = 500 mA; $I_{R(meas)}$ = 100 mA; T_j = 25 °C		-	1.9	-	ns



pulsed condition

(1) T_j = 150 °C

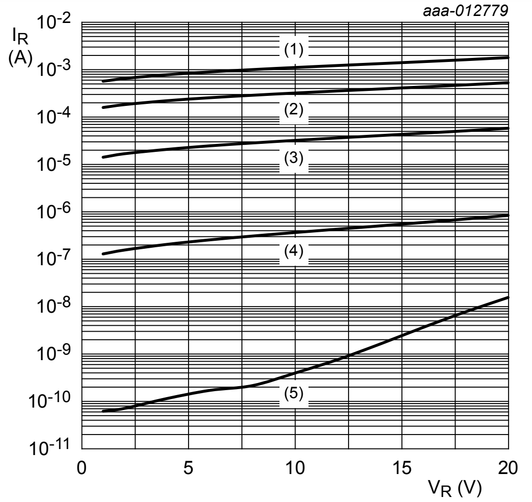
(2) T_j = 125 °C

(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



pulsed condition

(1) T_j = 150 °C

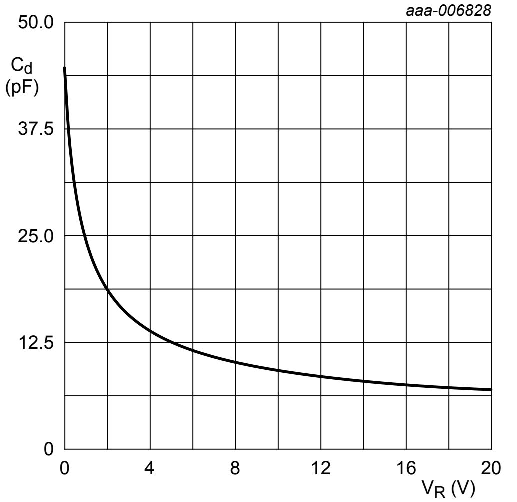
(2) T_j = 125 °C

(3) T_j = 85 °C

(4) T_j = 25 °C

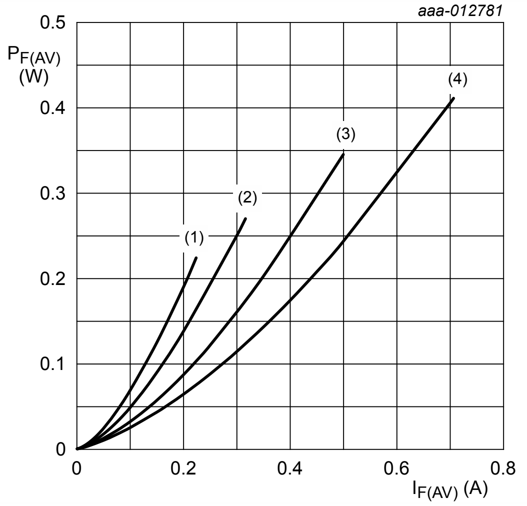
(5) T_j = −40 °C

Fig. 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

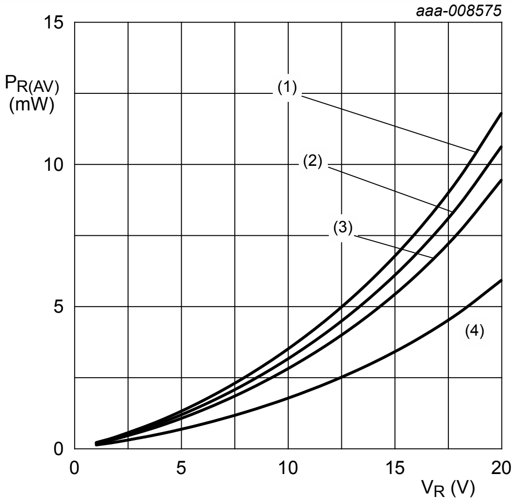
(1) δ = 0.1

(2) δ = 0.2

(3) δ = 0.5

(4) δ = 1

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



T_j = 125 °C

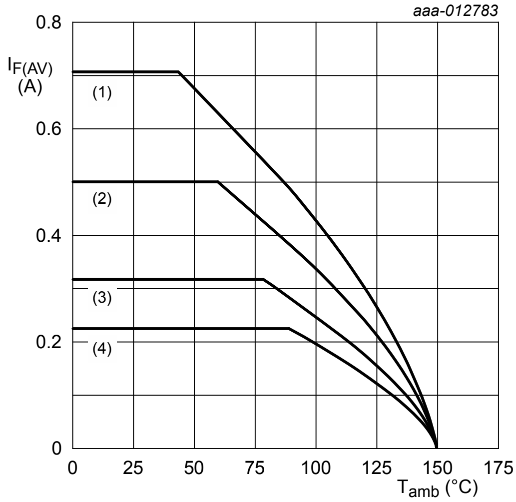
(1) δ = 1

(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

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



FR4 PCB, standard footprint

T_j = 150 °C

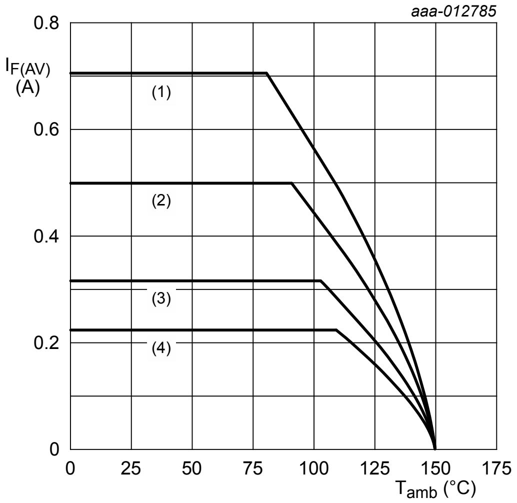
(1) δ = 1; DC

(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 anode and cathode

1 cm^2 each

T_j = 150 °C

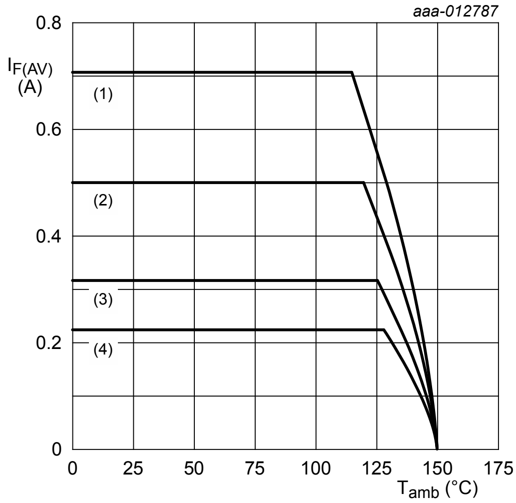
(1) δ = 1; DC

(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

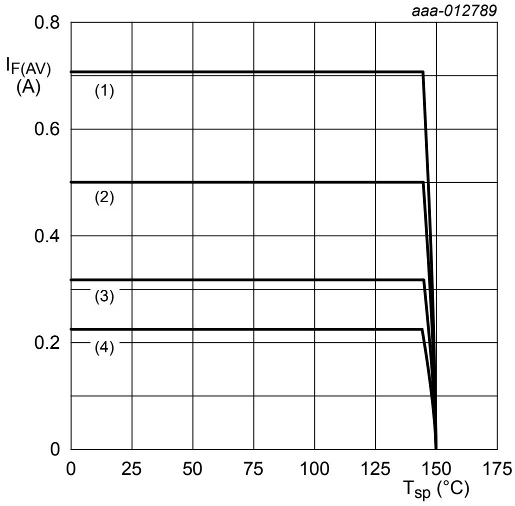
(1) δ = 1; DC

(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

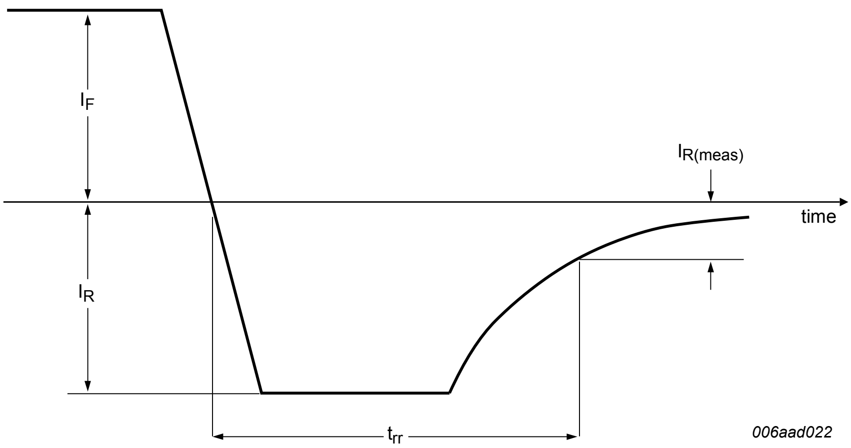


Fig. 13. Reverse recovery definition

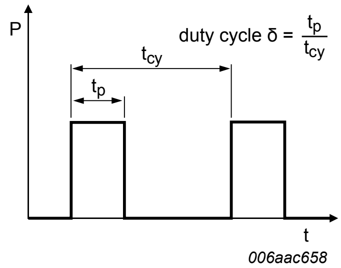


Fig. 14. Duty cycle definition

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.

12. Package outline

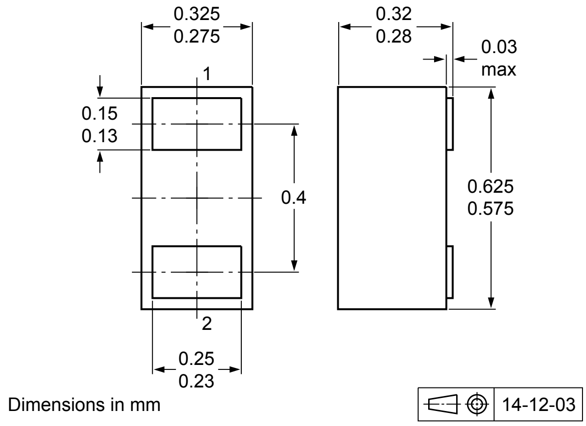


Fig. 15. Package outline DSN0603-2 (SOD962-2)

13. Soldering

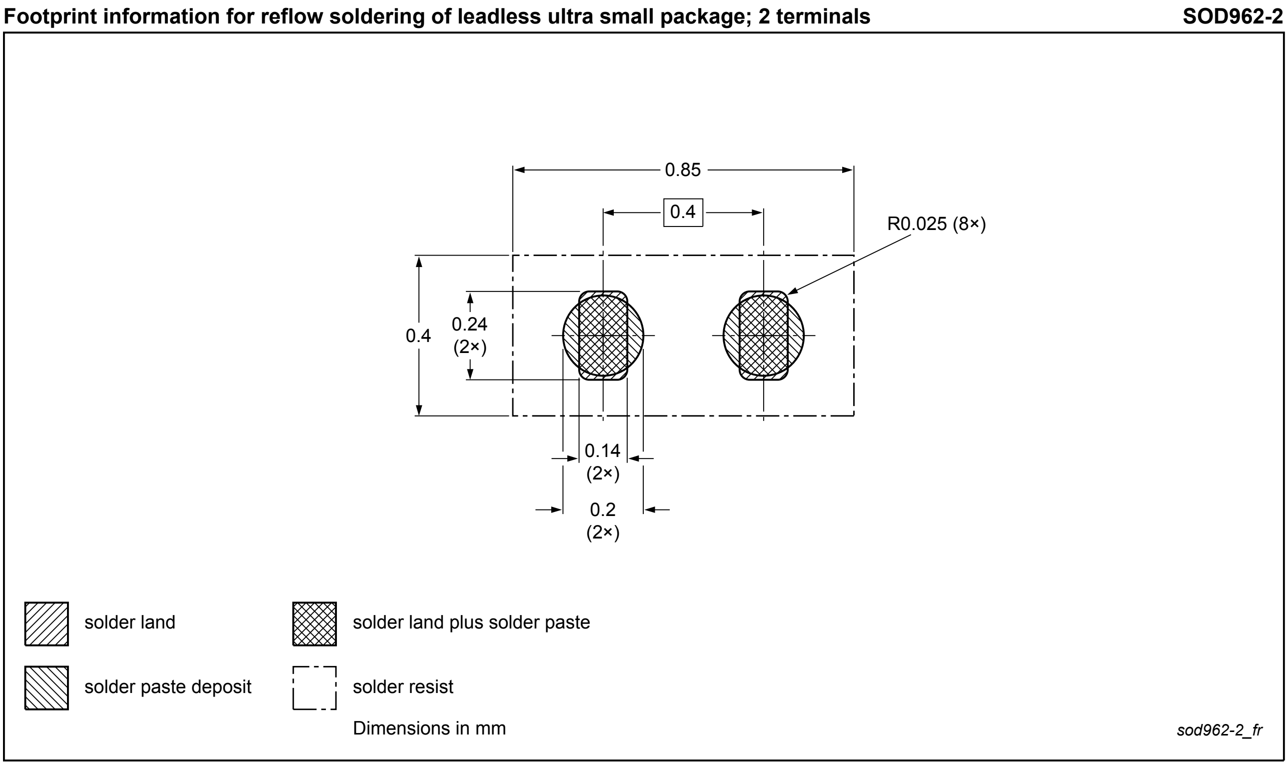


Fig. 16. Reflow soldering footprint for DSN0603-2 (SOD962-2)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2005ESF v.2	20150213	Product data sheet	-	PMEG2005ESF v.1
Modifications:	• Product status changed			
PMEG2005ESF v.1	20140506	Preliminary 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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