PMEG3002ESF

30 V, 0.2 A low VF MEGA Schottky barrier rectifier

17 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 $I_{F(AV)} \leq 0.2$ A
- Reverse voltage $V_R \leq 30$ V
- Low forward voltage typ. $V_F = 310$ mV
- Low reverse current typ. $I_R = 0.33$ µA
- Package height typ. 0.3mm

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; $T_{amb} \leq 140$ °C; square wave	[1]	-	-	0.2	A
		$\delta = 0.5$; f = 20 kHz; $T_{sp} \leq 148$ °C; square wave		-	-	0.2	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	30	V
V_F	forward voltage	$I_F = 10$ mA; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C		-	310	390	mV
I_R	reverse current	$V_R = 10$ V; $T_j = 25$ °C; pulsed		-	0.33	2	µA
t_{rr}	reverse recovery time	$I_F = 500$ mA; $I_R = 500$ mA; $I_{R(meas)} = 100$ mA; $T_j = 25$ °C		-	1.42	-	ns

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

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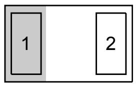
5. Pinning information

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
PMEG3002ESF	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
PMEG3002ESF	K

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		-	30	V
I_F	forward current	T_{sp} ≤ 145 °C; δ = 1		-	0.28	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; T_{amb} ≤ 140 °C; square wave	[1]	-	0.2	A
		δ = 0.5; f = 20 kHz; T_{sp} ≤ 148 °C; square wave		-	0.2	A
I_{FRM}	repetitive peak forward current	t_p = 1 ms; δ ≤ 0.25		-	1.5	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	3.5	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

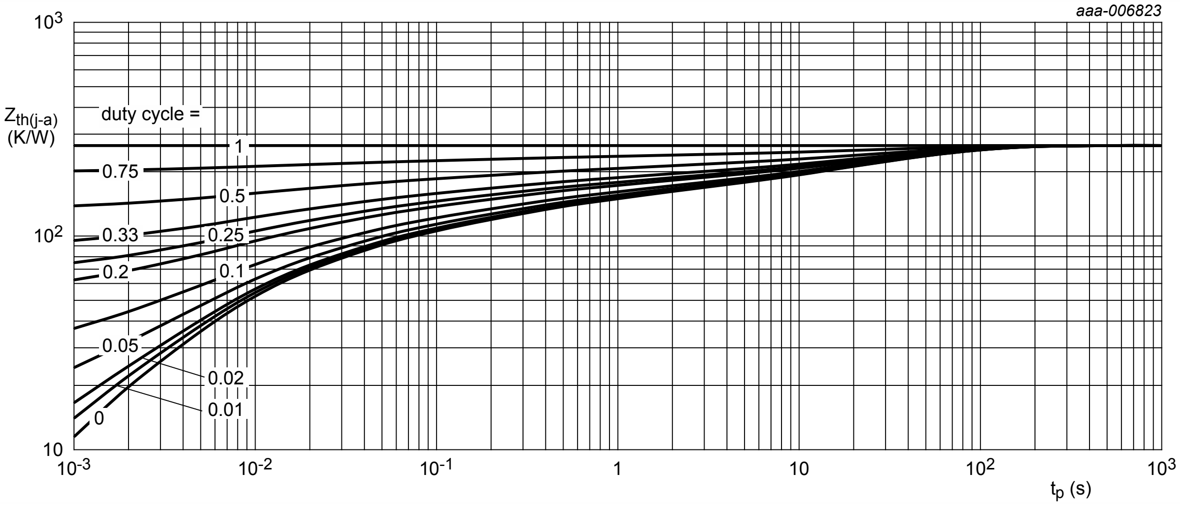
[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for anode and cathode 1 cm^2 each.

9. Thermal characteristics

Table 6. Thermal characteristics

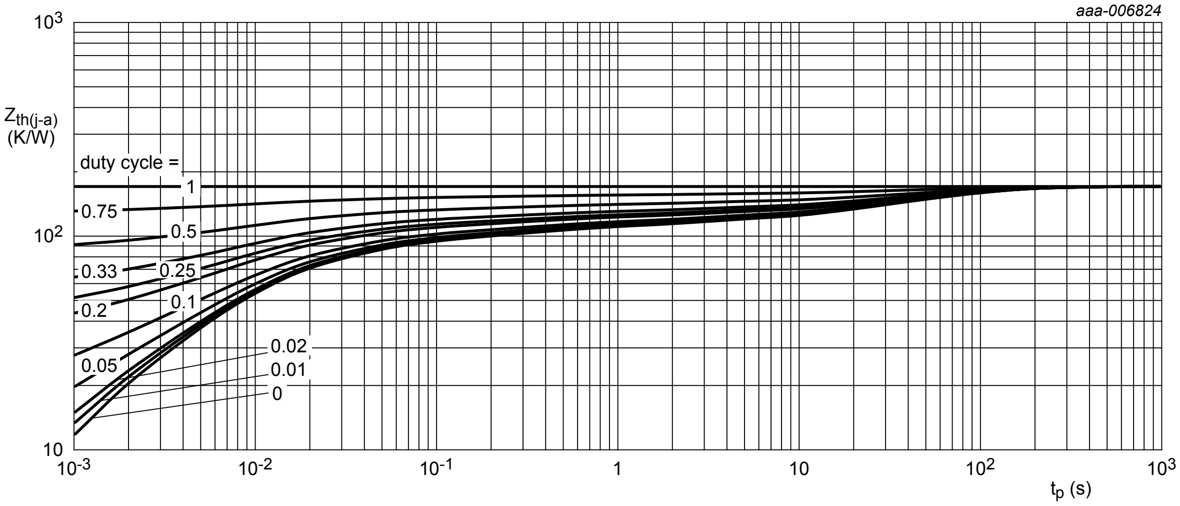
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	310	K/W
			[1][3]	-	-	190	K/W
			[1][4]	-	-	105	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	40	K/W

[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.



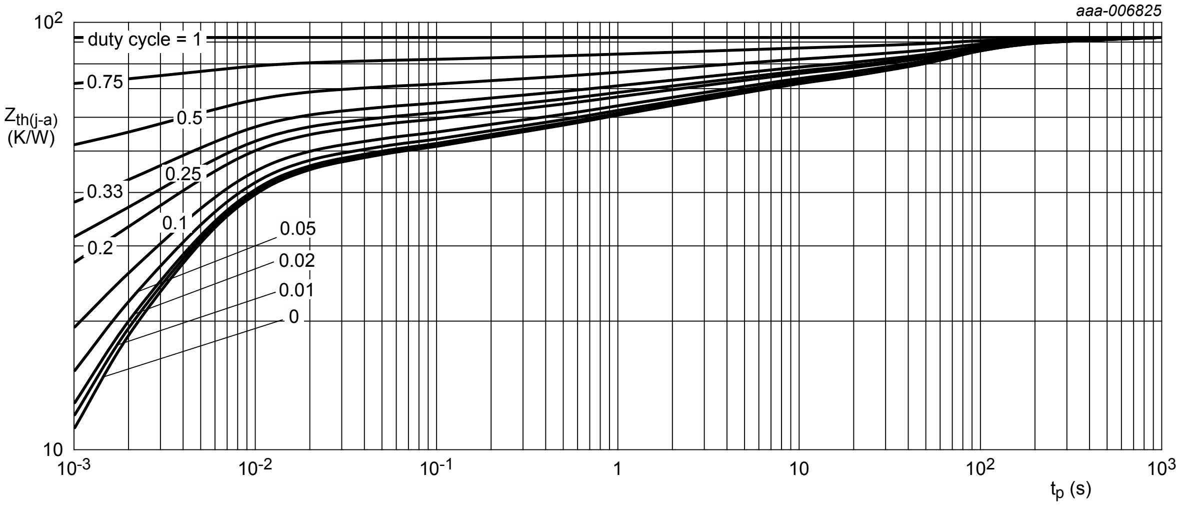
FR4 PCB, standard footprint

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



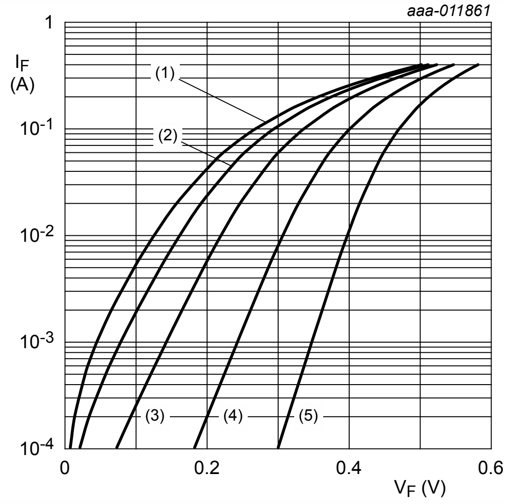
Ceramic PCB, Al_2O_3, standard footprint

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		30	-	-	V
V_F	forward voltage	I_F = 0.1 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	185	255	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	390	mV
		I_F = 100 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	405	480	mV
		I_F = 200 mA; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	460	535	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C; pulsed		-	0.33	2	μA
		V_R = 30 V; T_j = 25 °C; pulsed		-	1.8	9	μA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	21	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	8	-	pF
t_{rr}	reverse recovery time	I_F = 500 mA; I_R = 500 mA; $I_{R(meas)}$ = 100 mA; T_j = 25 °C		-	1.42	-	ns



pulsed condition

(1) T_j = 150 °C

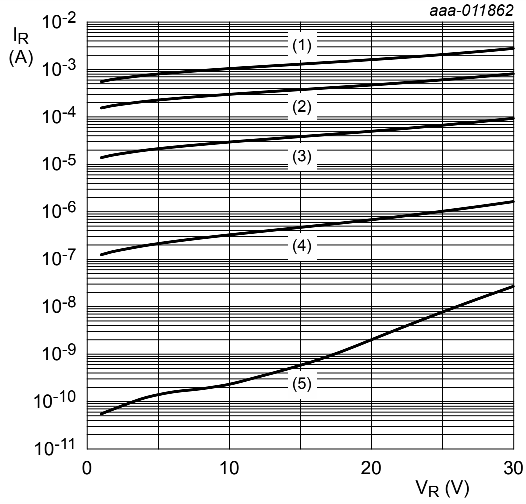
(2) T_j = 125 °C

(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

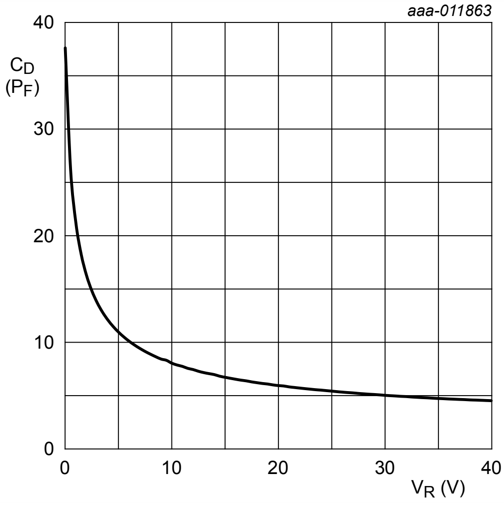
(2) T_j = 125 °C

(3) T_j = 85 °C

(4) T_j = 25 °C

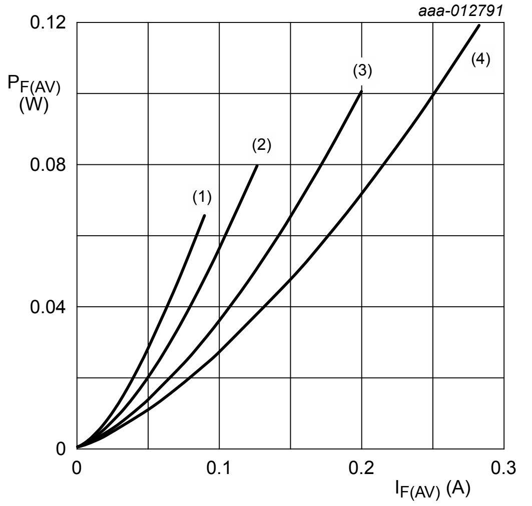
(5) T_j = −40 °C

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

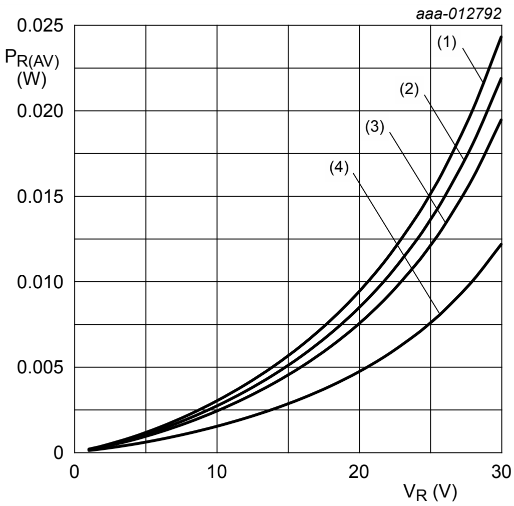
(1) δ = 0.1

(2) δ = 0.2

(3) δ = 0.5

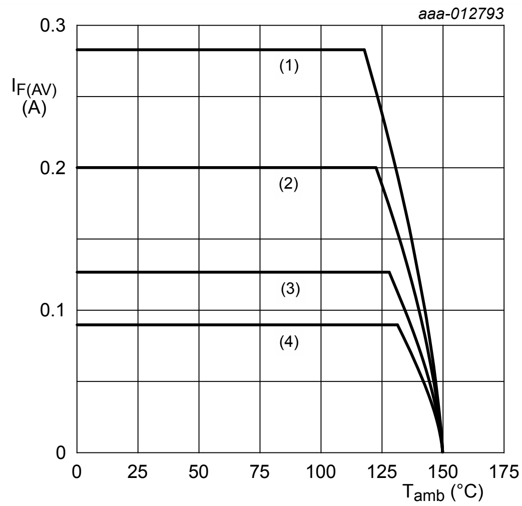
(4) δ = 1

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



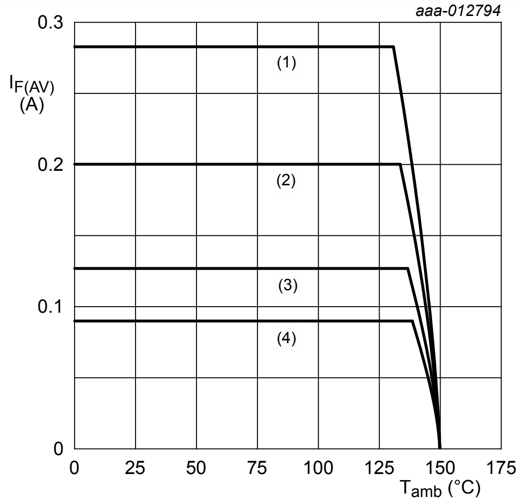
T_j = 125 °C
(1) δ = 1
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5

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



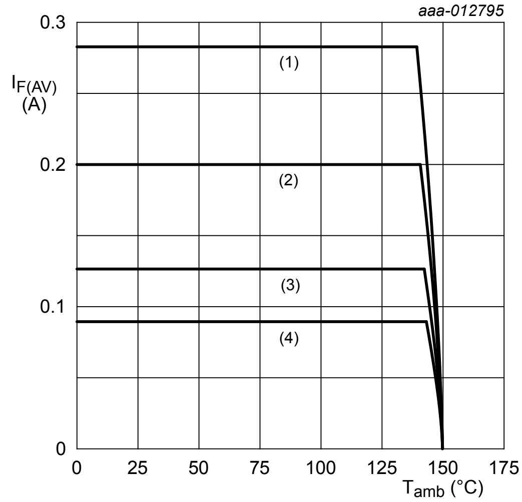
FR4 PCB, standard footprint
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



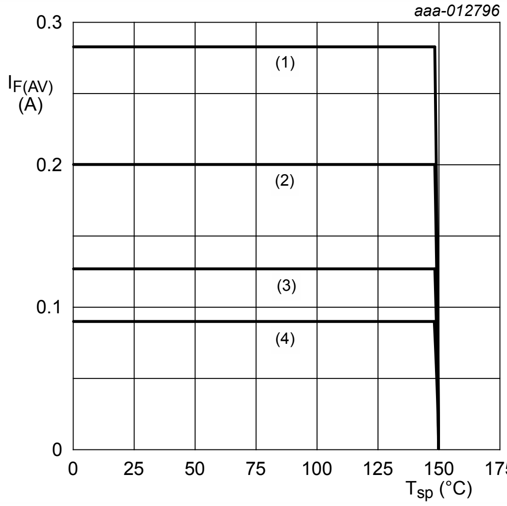
FR4 PCB, mounting pad for anode and cathode 1 cm^2 each
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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

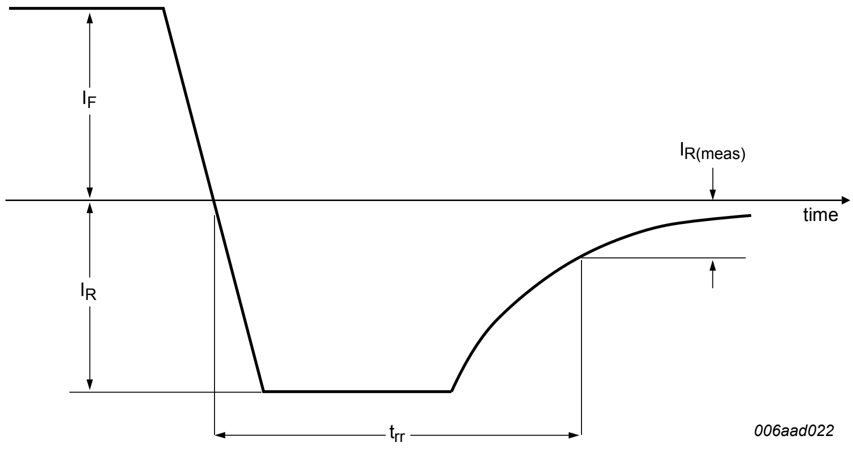


Fig. 13. Reverse recovery definition

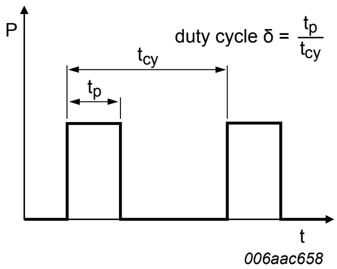


Fig. 14. Duty cycle definition

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

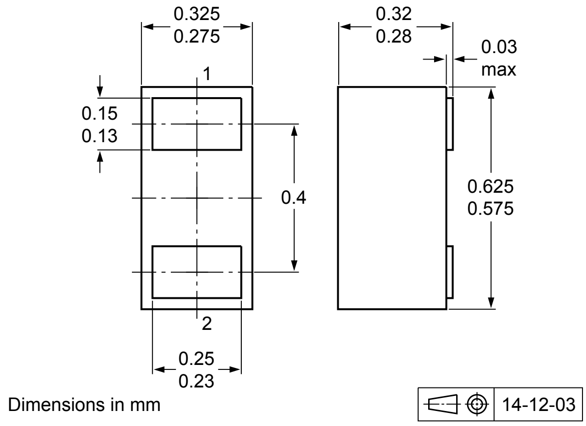


Fig. 15. Package outline DSN0603-2 (SOD962-2)

13. Soldering

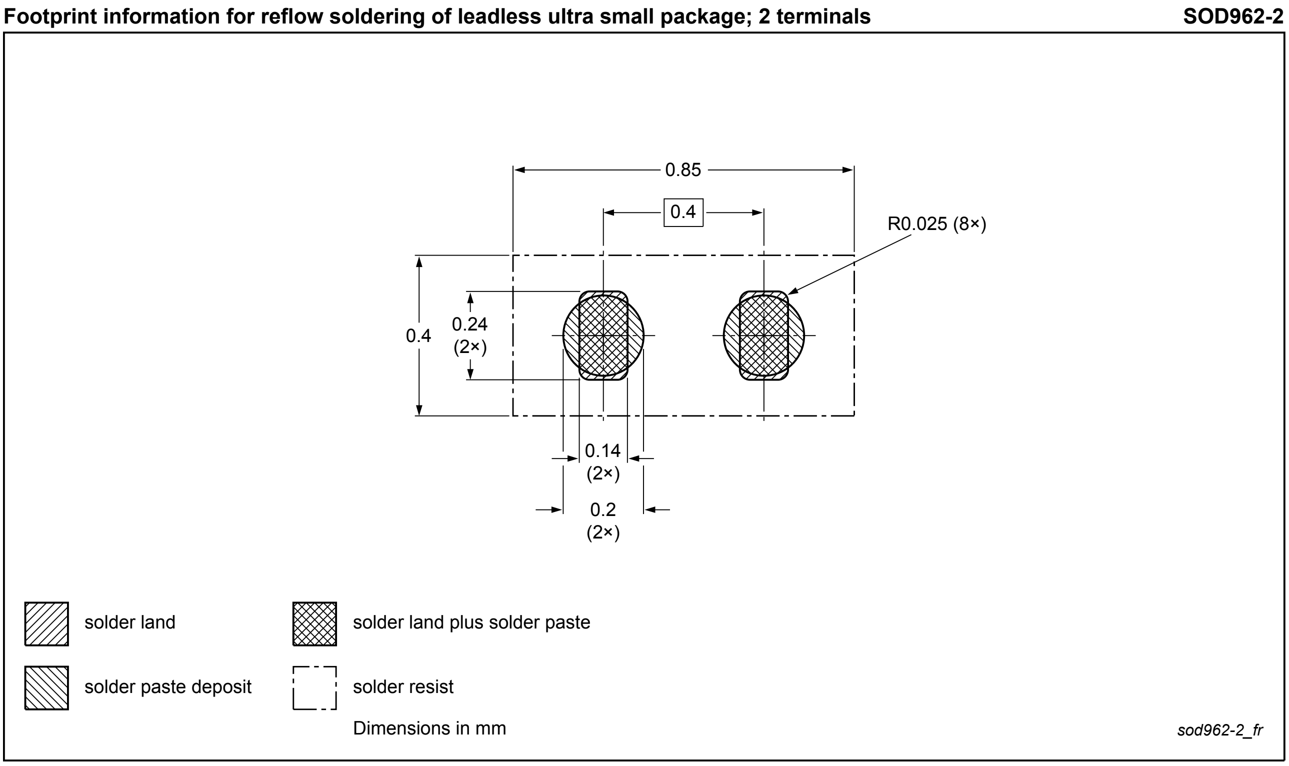


Fig. 16. Reflow soldering footprint for DSN0603-2 (SOD962-2)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG3002ESF v.2	20150217	Product data sheet	-	PMEG3002ESF v.1
Modifications:	• Product status changed			
PMEG3002ESF v.1	20140415	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.

[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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

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