



PMEG4005ESF

40 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 $V_R \leq 40$ V
- Low forward voltage typ. $V_F = 315$ mV
- Low reverse current typ. $I_R = 0.24$ μ A
- 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; $T_{amb} \leq 95$ °C; square wave	[1]	-	-	0.5	A
		$\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 140$ °C; square wave		-	-	0.5	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	40	V
V_F	forward voltage	$I_F = 10$ mA; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C		-	315	390	mV
I_R	reverse current	$V_R = 10$ V; $T_j = 25$ °C; pulsed		-	0.24	2.5	μ A
t_{rr}	reverse recovery time	$I_F = 500$ mA; $I_R = 500$ mA; $I_{R(meas)} = 100$ mA; $T_j = 25$ °C		-	1.28	-	ns

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

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)	 <i>sym001</i>
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4005ESF	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
PMEG4005ESF	Y

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	$T_j = 25\text{ °C}$		-	40	V
I_F	forward current	$T_{sp} \leq 135\text{ °C}; \delta = 1$		-	0.71	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz}; T_{amb} \leq 95\text{ °C};$ square wave	[1]	-	0.5	A
		$\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 140\text{ °C};$ square wave		-	0.5	A
I_{FRM}	repetitive peak forward current	$t_p = 1\text{ ms}; \delta \leq 0.25$		-	1.2	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8\text{ ms}; T_{j(init)} = 25\text{ °C};$ square wave		-	3.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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

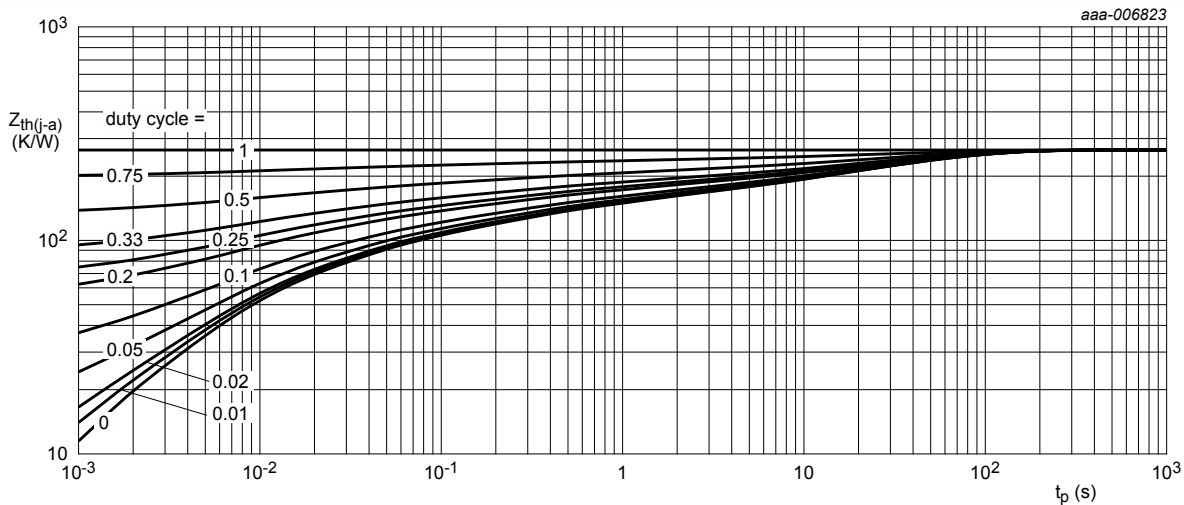
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

[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.

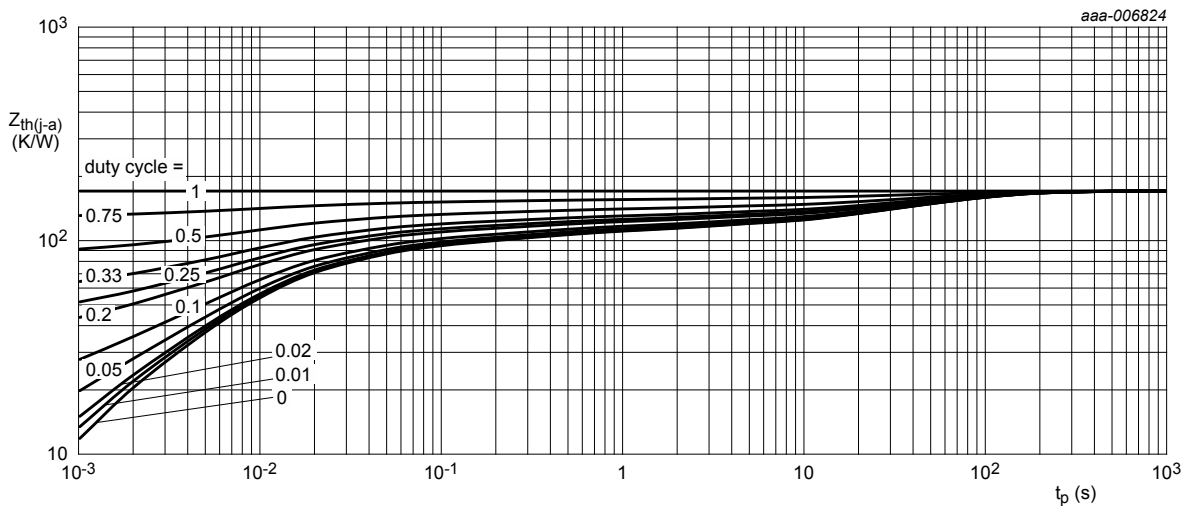
[4] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.

[5] Soldering point of anode tab.



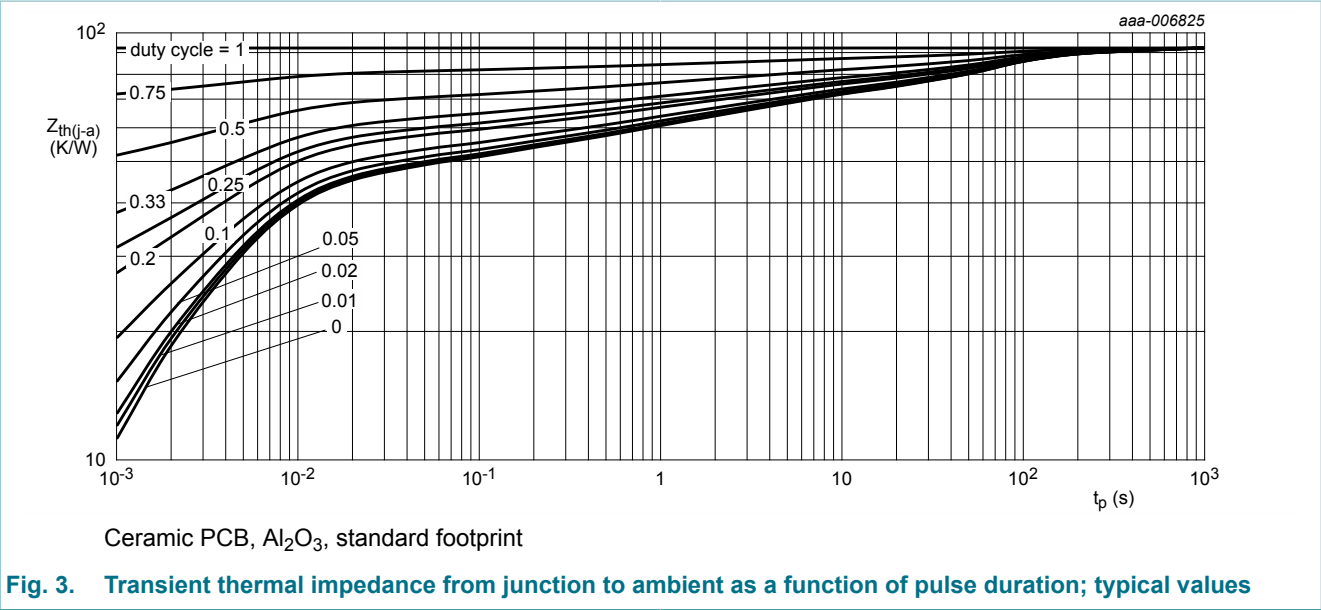
FR4 PCB, standard footprint

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 cm² each

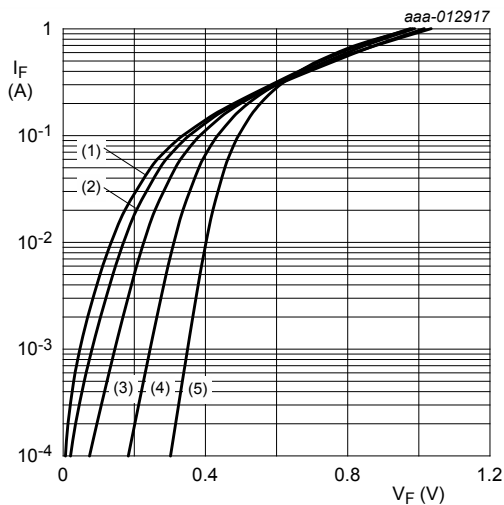
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



10. Characteristics

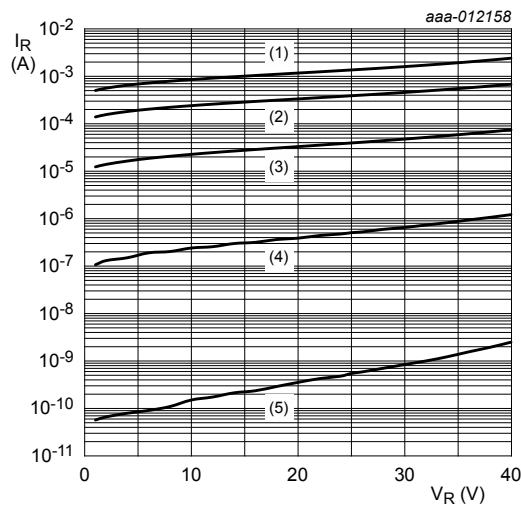
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 100\ \mu\text{A}$; $t_p = 300\ \mu\text{s}$; $\delta = 0.02$; $T_J = 25\ ^\circ\text{C}$	40	-	-	V
V_F	forward voltage	$I_F = 0.1\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	185	255	mV
		$I_F = 1\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	250	320	mV
		$I_F = 10\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	315	390	mV
		$I_F = 100\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	440	510	mV
		$I_F = 200\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	525	600	mV
		$I_F = 400\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	680	790	mV
		$I_F = 500\ \text{mA}$; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$; $T_J = 25\ ^\circ\text{C}$	-	750	880	mV
I_R	reverse current	$V_R = 10\ \text{V}$; $T_J = 25\ ^\circ\text{C}$; pulsed	-	0.24	2.5	μA
		$V_R = 40\ \text{V}$; $T_J = 25\ ^\circ\text{C}$; pulsed	-	1.2	6.5	μA
C_d	diode capacitance	$V_R = 1\ \text{V}$; $f = 1\ \text{MHz}$; $T_J = 25\ ^\circ\text{C}$	-	17	-	pF
		$V_R = 10\ \text{V}$; $f = 1\ \text{MHz}$; $T_J = 25\ ^\circ\text{C}$	-	7	-	pF
t_{rr}	reverse recovery time	$I_F = 500\ \text{mA}$; $I_R = 500\ \text{mA}$; $I_{R(\text{meas})} = 100\ \text{mA}$; $T_J = 25\ ^\circ\text{C}$	-	1.28	-	ns



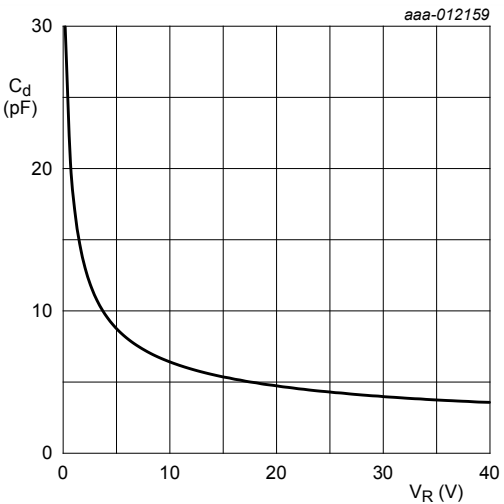
pulsed condition
(1) $T_j = 150^\circ\text{C}$
(2) $T_j = 125^\circ\text{C}$
(3) $T_j = 85^\circ\text{C}$
(4) $T_j = 25^\circ\text{C}$
(5) $T_j = -40^\circ\text{C}$

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



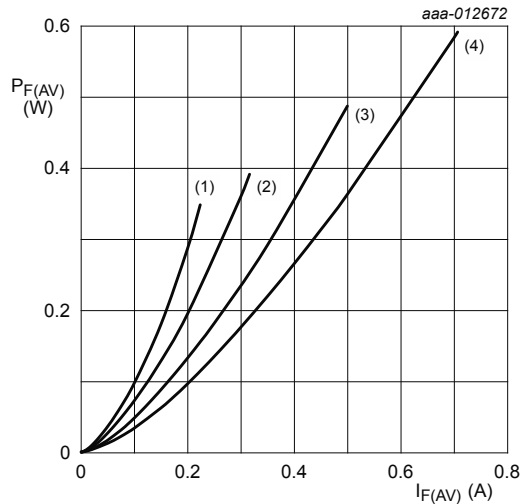
pulsed condition
(1) $T_j = 150^\circ\text{C}$
(2) $T_j = 125^\circ\text{C}$
(3) $T_j = 85^\circ\text{C}$
(4) $T_j = 25^\circ\text{C}$
(5) $T_j = -40^\circ\text{C}$

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



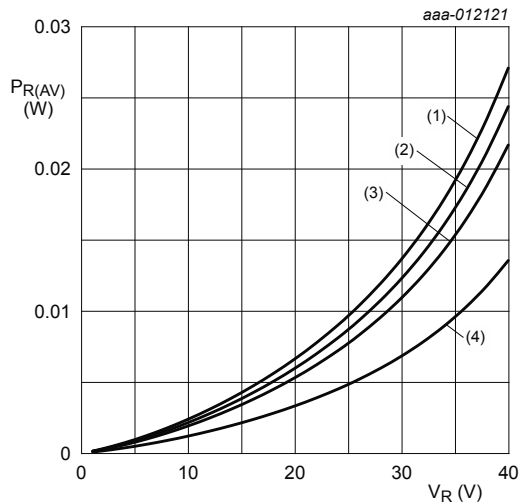
$f = 1\text{ MHz}$; $T_{\text{amb}} = 25^\circ\text{C}$

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



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

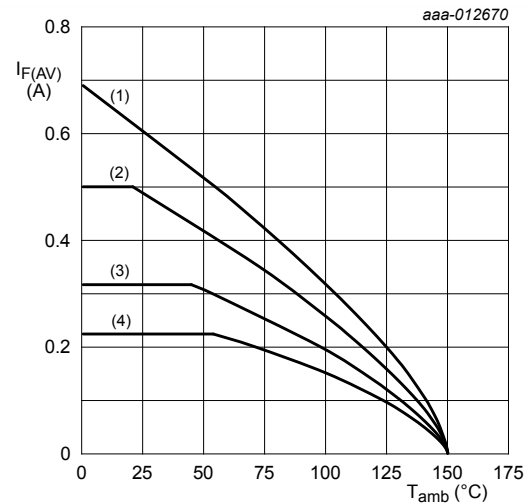
Fig. 7. Average forward power dissipation as a function of average forward current; typical values



$T_j = 125\text{ }^{\circ}\text{C}$

- (1) $\delta = 1$
- (2) $\delta = 0.9$
- (3) $\delta = 0.8$
- (4) $\delta = 0.5$

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

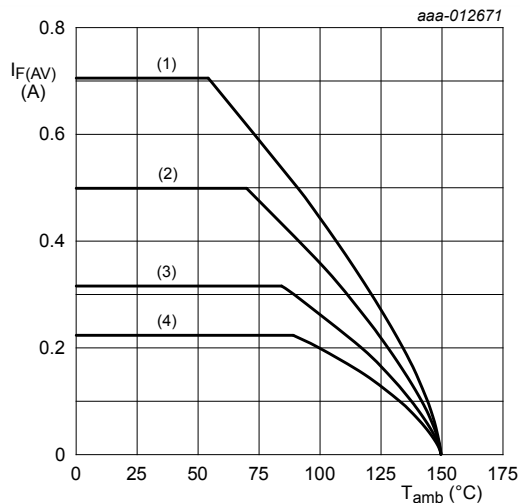


FR4 PCB, standard footprint

$T_j = 150\text{ }^{\circ}\text{C}$

- (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



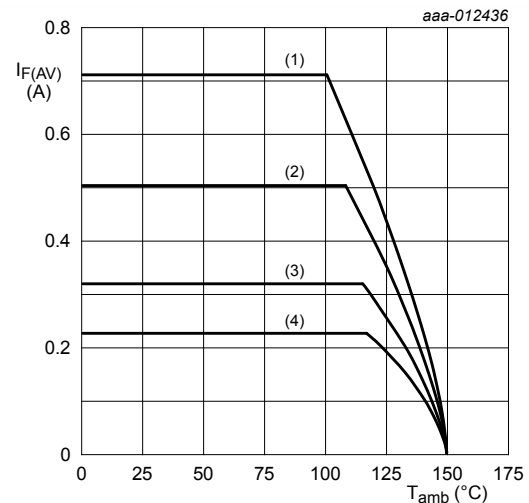
FR4 PCB, mounting pad for anode and cathode

1 cm^2 each

$T_j = 150\text{ }^{\circ}\text{C}$

- (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

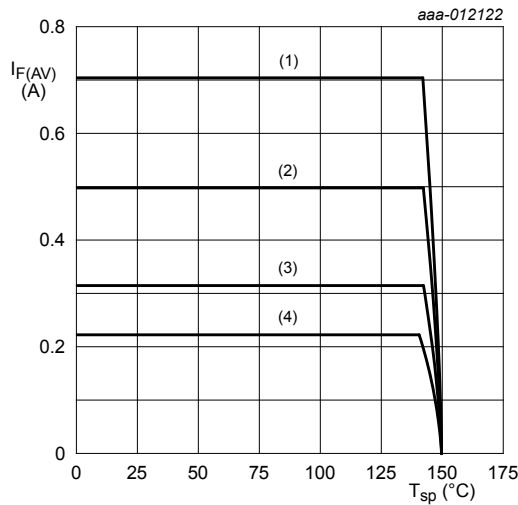


Ceramic PCB, Al_2O_3 , standard footprint

$T_j = 150\text{ }^{\circ}\text{C}$

- (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



$T_j = 150\text{ }^{\circ}\text{C}$
(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. 12. Average forward current as a function of solder point temperature; typical values

11. Test information

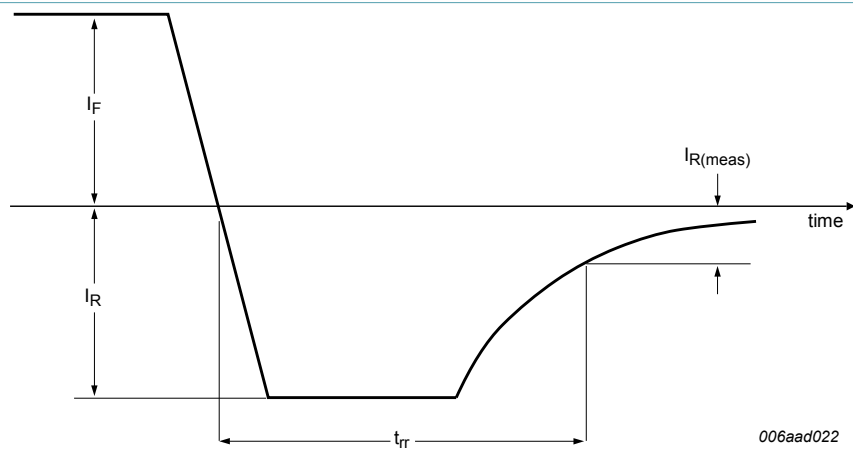


Fig. 13. Reverse recovery definition

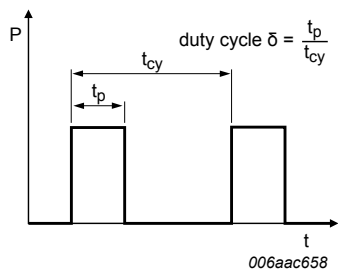


Fig. 14. Duty cycle definition

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

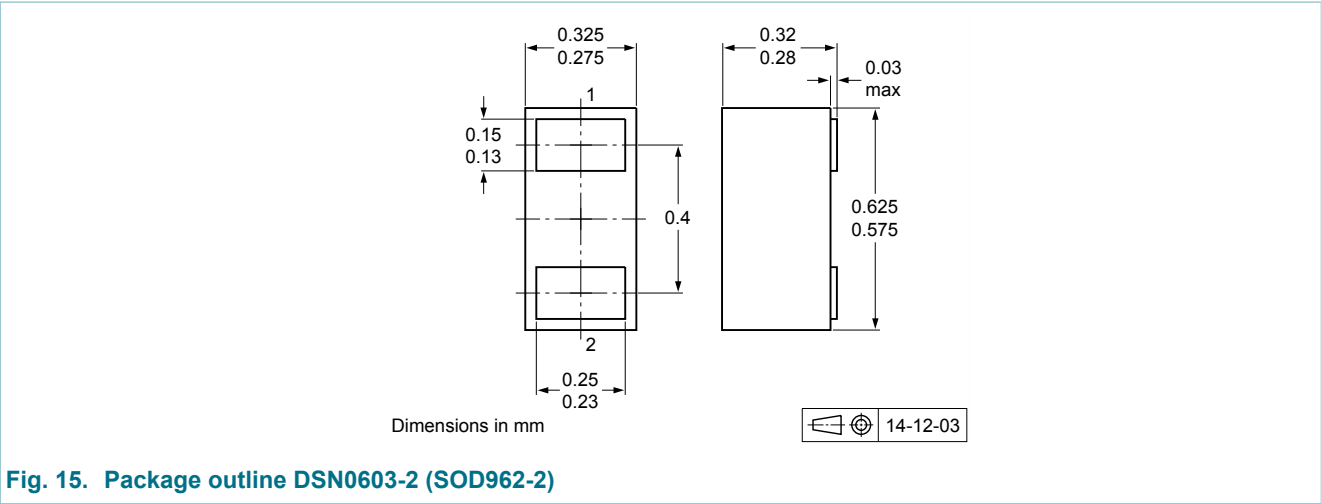


Fig. 15. Package outline DSN0603-2 (SOD962-2)

13. Soldering

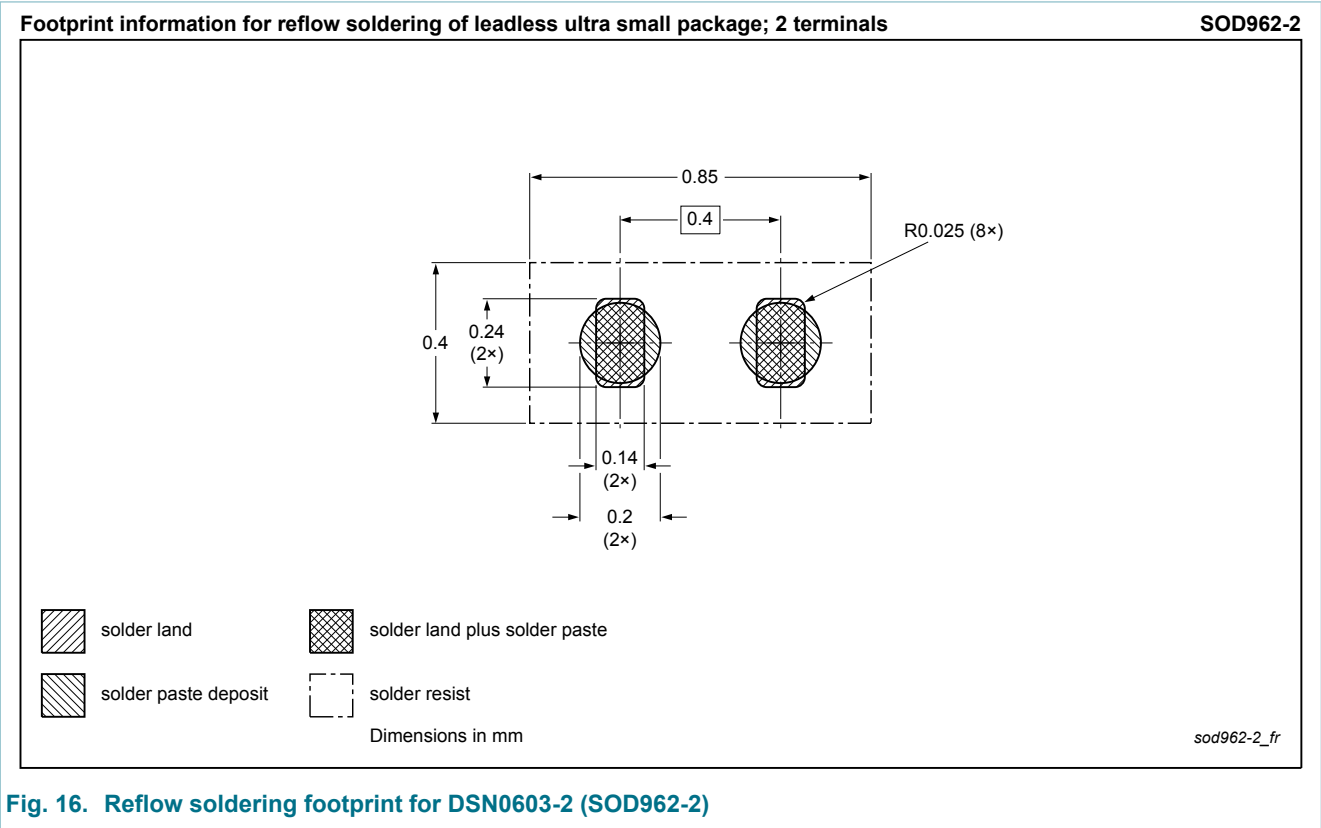


Fig. 16. Reflow soldering footprint for DSN0603-2 (SOD962-2)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4005ESF v.2	20150213	Product data sheet	-	PMEG4005ESF v.1
Modifications:	Product status changed			
PMEG4005ESF v.1	20140512	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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