



# PMEG4020EPA

40 V, 2 A low VF Schottky barrier rectifier

10 September 2024

Product data sheet

## 1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package with medium power capability.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 2$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage
- Exposed heat sink (cathode pad) for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with medium power capability
- AEC-Q101 qualified

## 3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications
- Battery chargers for mobile equipment

## 4. Quick reference data

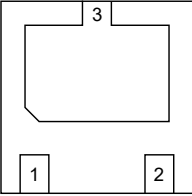
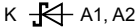
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 65$ °C	[1]	-	-	2	A
		square-wave pulse; $\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 140$ °C		-	-	2	A
$V_R$	reverse voltage	$T_j = 25$ °C		-	-	40	V
$V_F$	forward voltage	$I_F = 2$ A; $T_j = 25$ °C		-	470	535	mV
$I_R$	reverse current	$V_R = 40$ V; $T_j = 25$ °C		-	20	100	$\mu$ A

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>Transparent top view DFN2020-3 (SOT1061)</p>	 <p>006aab624</p>
2	A	anode		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PMEG4020EPA</a>	DFN2020-3	plastic, leadless thermal enhanced ultra thin small outline package; 3 terminals; 1.3 mm pitch; 2 mm x 2 mm x 0.65 mm body	<a href="#">SOT1061</a>

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020EPA	A3

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V <sub>R</sub>	reverse voltage	T <sub>j</sub> = 25 °C		-	40	V
I <sub>F(AV)</sub>	average forward current	square-wave pulse; δ = 0.5; f = 20 kHz; T <sub>amb</sub> ≤ 65 °C	[1]	-	2	A
		square-wave pulse; δ = 0.5; f = 20 kHz; T <sub>sp</sub> ≤ 140 °C		-	2	A
I <sub>FRM</sub>	repetitive peak forward current	t <sub>p</sub> ≤ 1 ms; δ ≤ 0.25	[2]	-	7	A
I <sub>FSM</sub>	non-repetitive peak forward current	square-wave pulse; t <sub>p</sub> = 8 ms; T <sub>j(init)</sub> = 25 °C	[2]	-	18	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[3] [4]	-	520	mW
			[3] [5]	-	1.05	W
			[3] [1]	-	1.9	W
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C

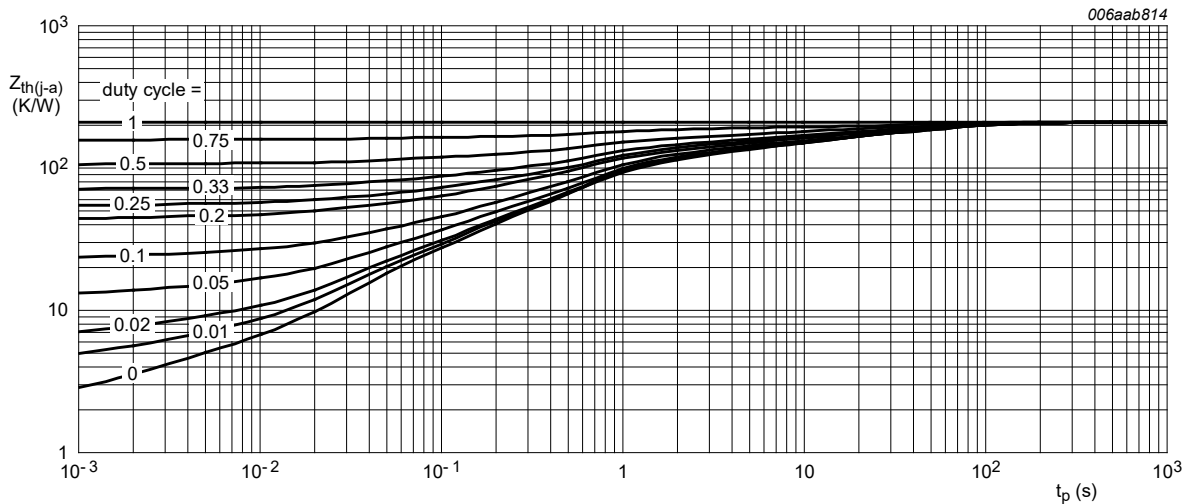
- [1] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [2] Both anode pins connected.
- [3] Reflow soldering is the only recommended soldering method.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

9. Thermal characteristics

Table 6. Thermal characteristics

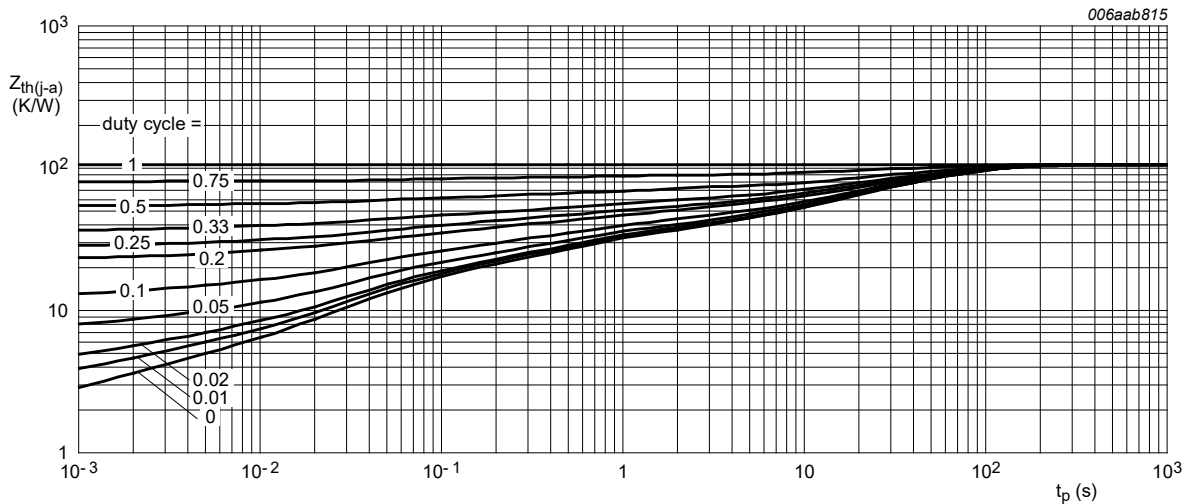
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1] [2] [3]	-	-	240	K/W
			[1] [2] [4]	-	-	120	K/W
			[1] [2] [5]	-	-	65	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		[6]	-	-	10	K/W

- [1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P<sub>R</sub> are a significant part of the total power losses.
- [2] Reflow soldering is the only recommended soldering method.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.
- [5] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [6] Soldering point of cathode tab.



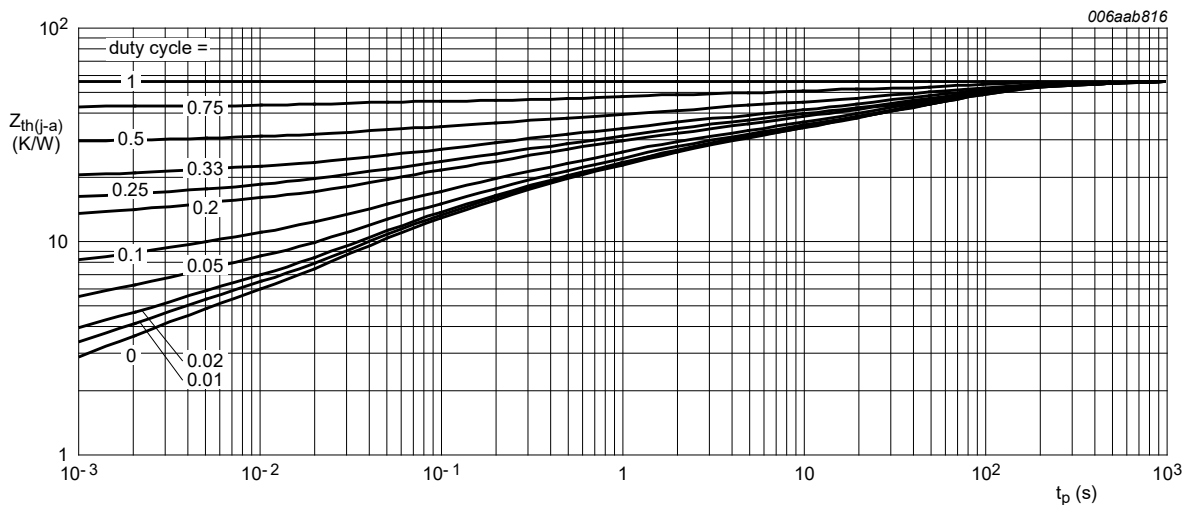
FR4 PCB, standard footprint

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<sup>2</sup>

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



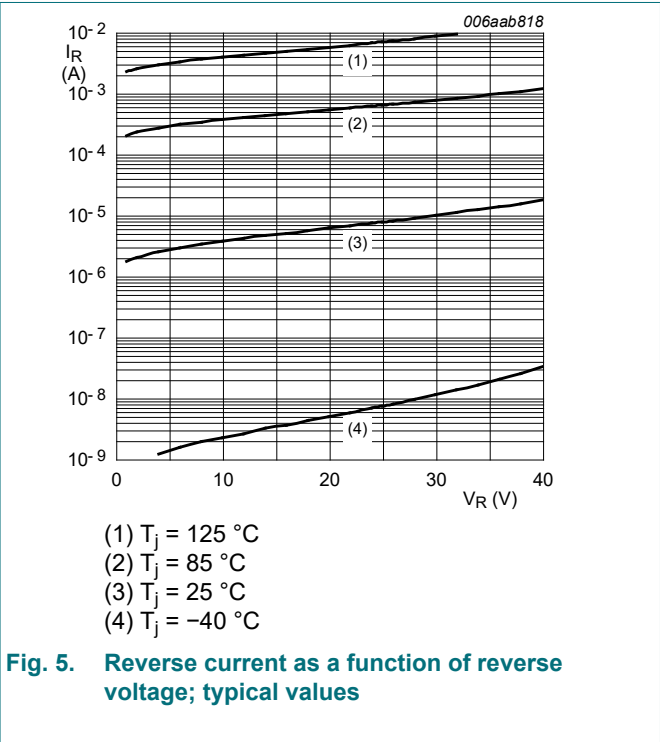
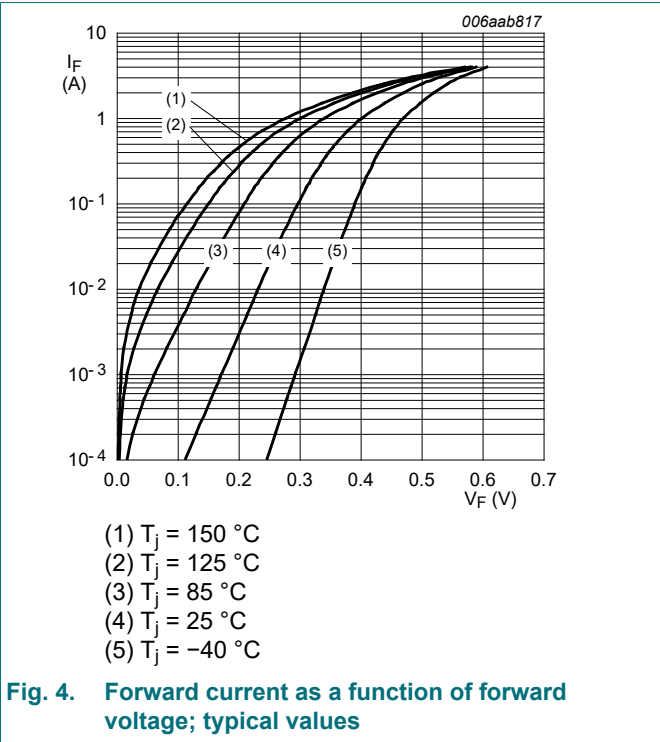
Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint

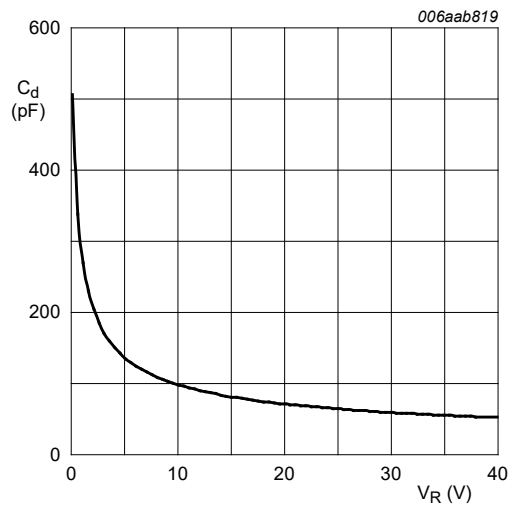
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

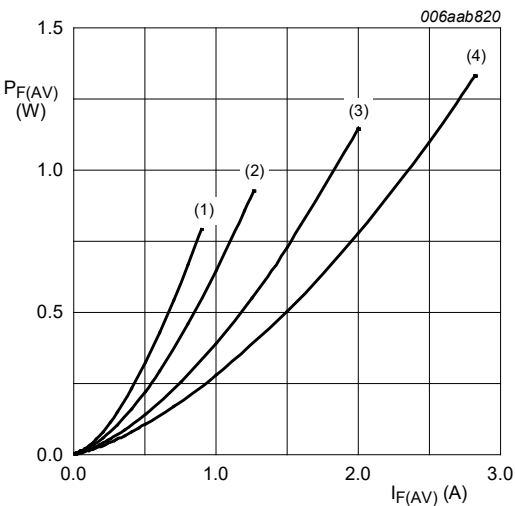
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 0.5\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	360	-	mV
		$I_F = 1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	400	-	mV
		$I_F = 2\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	470	535	mV
$I_R$	reverse current	$V_R = 10\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	5	-	$\mu\text{A}$
		$V_R = 40\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	20	100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$	-	270	-	pF
		$V_R = 10\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$	-	100	-	pF
$t_{rr}$	reverse recovery time	$I_F = 10\text{ mA}; I_R = 10\text{ mA}; I_{R(\text{meas})} = 1\text{ mA}; R_L = 100\text{ }\Omega; T_j = 25\text{ }^{\circ}\text{C}$	-	85	-	ns





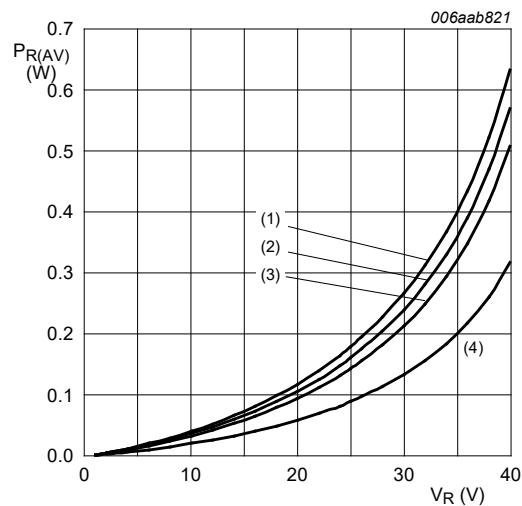
$f = 1\text{ MHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$

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



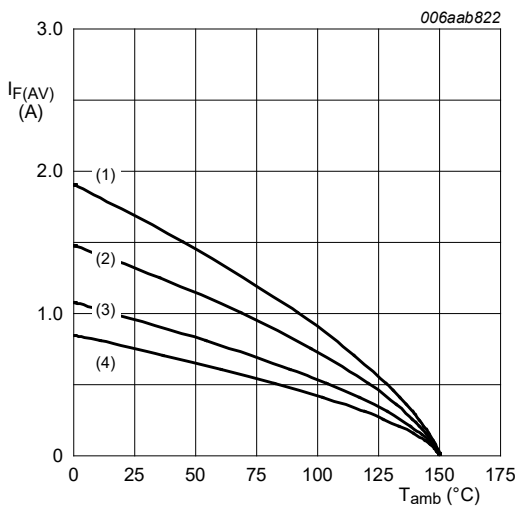
$T_j = 150\text{ }^{\circ}\text{C}$   
(1)  $\delta = 0.1$   
(2)  $\delta = 0.2$   
(3)  $\delta = 0.5$   
(4)  $\delta = 1$

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



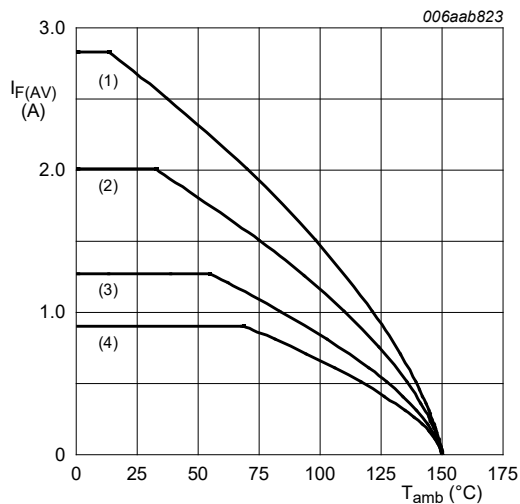
$T_j = 125\text{ }^{\circ}\text{C}$   
(1)  $\delta = 1$   
(2)  $\delta = 0.9$   
(3)  $\delta = 0.8$   
(4)  $\delta = 0.5$

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



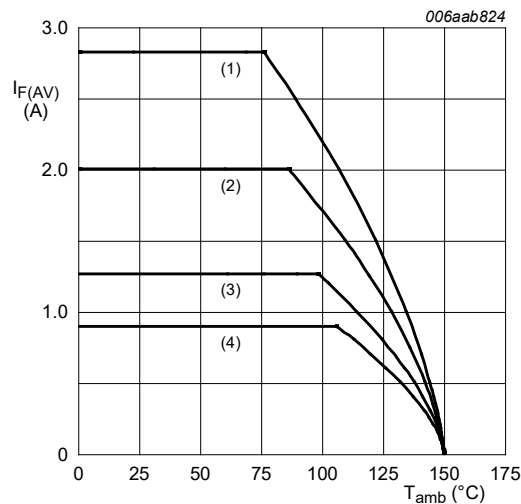
FR4 PCB, standard footprint  
 $T_j = 150\text{ }^{\circ}\text{C}$   
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
(3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
(4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



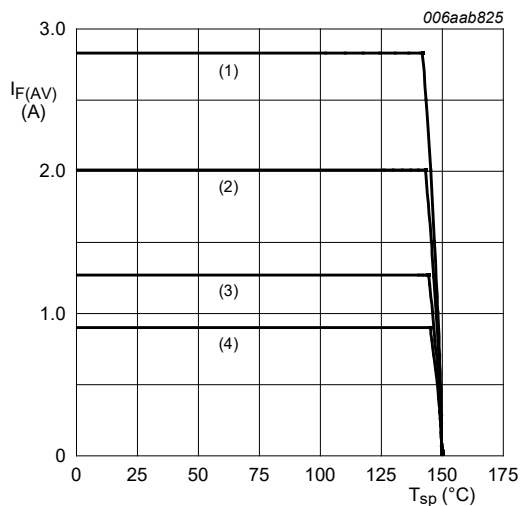
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint  
 $T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

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



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

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

## 11. Test information

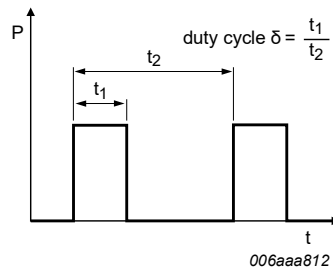


Fig. 13. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

$$I_{RMS} = I_{F(AV)} \text{ at DC}$$

$$I_{RMS} = I_M \times \sqrt{\delta} \text{ with } I_{RMS} \text{ defined as RMS current}$$

### 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

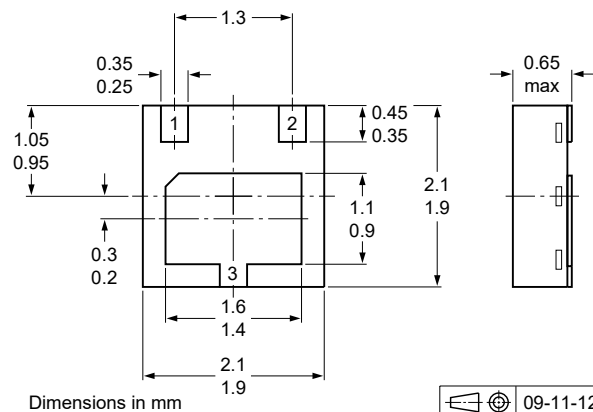


Fig. 14. Package outline DFN2020-3 (SOT1061)



13. Soldering

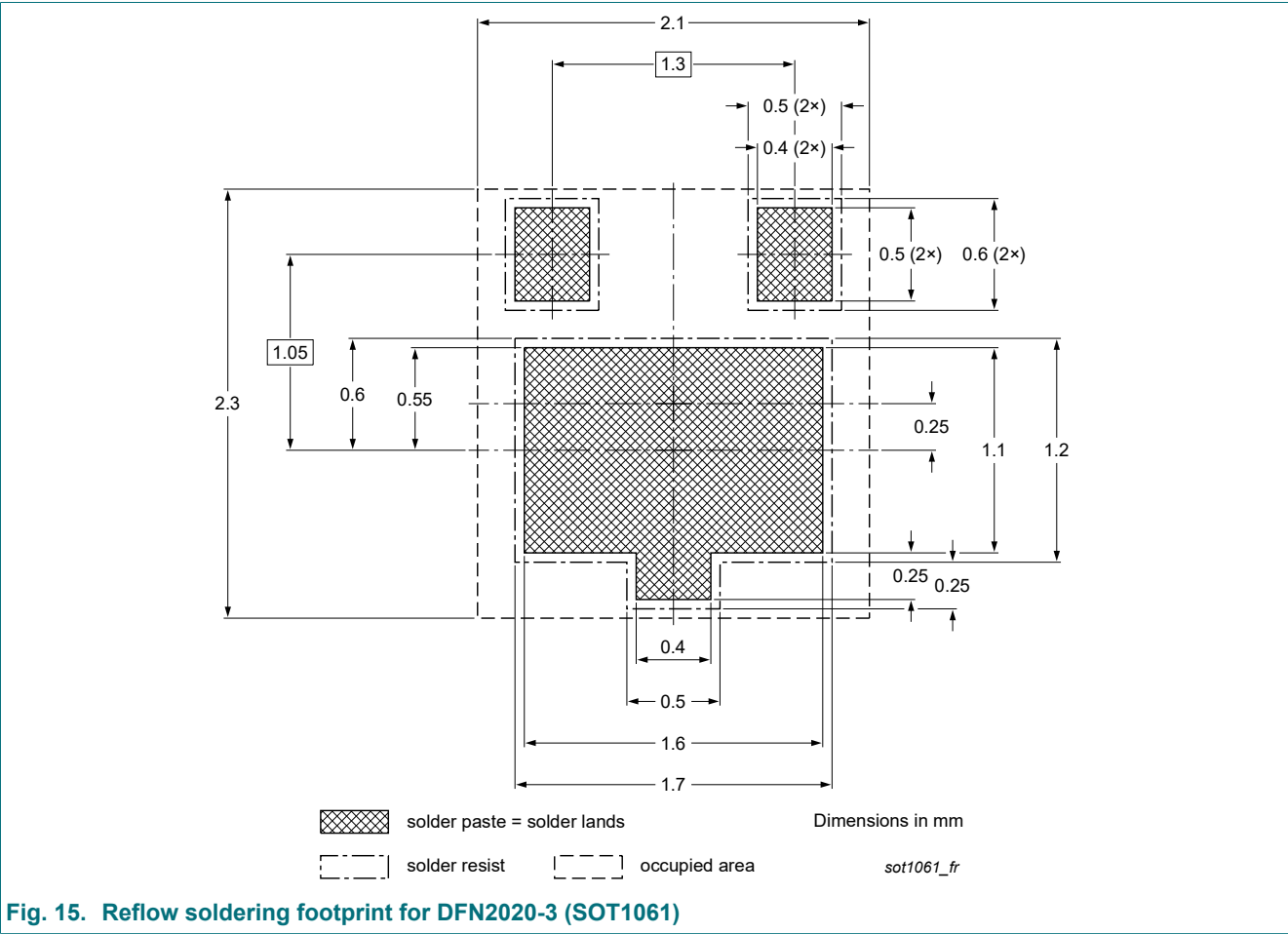


Fig. 15. Reflow soldering footprint for DFN2020-3 (SOT1061)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4020EPA v.2	20240910	Product data sheet	-	PMEG4020EPA_1
Modifications:	<ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li><li>Section "Packing information" removed.</li></ul>			
PMEG4020EPA_1	20091216	Product data sheet	-	-

15. Legal information

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 <https://www.nexperia.com>.

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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Thermal characteristics..... 3

10. Characteristics..... 5

11. Test information..... 8

12. Package outline..... 8

13. Soldering..... 9

14. Revision history..... 10

15. Legal information..... 11

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Date of release: 10 September 2024