



PMEG2020EPA-Q

20 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 a SOT1061 leadless small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 20$ V
- Low forward voltage
- Exposed heat sink (cathode pad) for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with medium power capability
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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

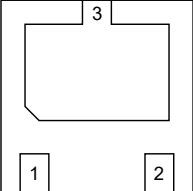
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $f = 20$ kHz; $T_{amb} \leq 80$ °C	[1]	-	-	2	A
		square-wave pulse; $\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 140$ °C		-	-	2	A
V_R	reverse voltage	$T_j \leq 25$ °C		-	-	20	V
V_F	forward voltage	$I_F = 2$ A; $T_j = 25$ °C		-	385	420	mV
I_R	reverse current	$V_R = 20$ V; $T_j = 25$ °C		-	335	1900	µA

[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	A1	anode (diode 1)	 Transparent top view DFN2020-3 (SOT1061)	 006aab624
2	A2	anode (diode 2)		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG2020EPA-Q	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	SOT1061

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2020EPA-Q	AK

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(AV)}	average forward current	square-wave pulse; δ = 0.5; f = 20 kHz; T _{amb} ≤ 80 °C	[1]	-	2	A
		square-wave pulse; δ = 0.5; f = 20 kHz; T _{sp} ≤ 140 °C		-	2	A
I _{FRM}	repetitive peak forward current	t _p ≤ 1 ms; δ ≤ 0.25	[2]	-	7	A
I _{FSM}	non-repetitive peak forward current	square-wave pulse; t _p = 8 ms; T _{j(init)} = 25 °C	[2]	-	17	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[3] [4]	-	500	mW
			[5] [4]	-	960	mW
			[4] [1]	-	1.8	W
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C

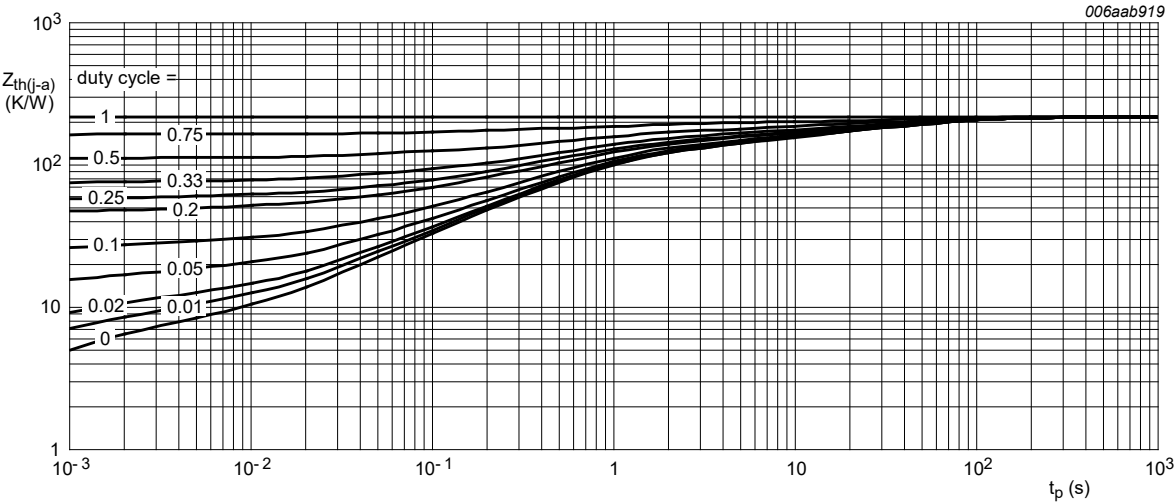
- [1] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
[2] Both anode pins connected.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[4] Reflow soldering is the only recommended soldering method.
[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

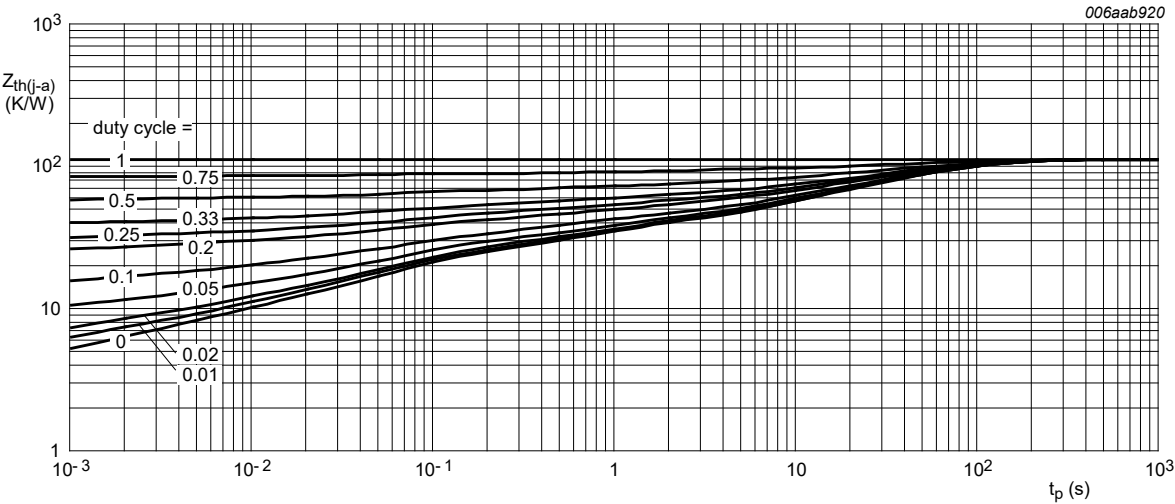
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1] [2] [3]	-	-	250	K/W
			[1] [2] [4]	-	-	130	K/W
			[1] [2] [5]	-	-	70	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point		[6]	-	-	12	K/W

- [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] 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 cm².
[5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
[6] Soldering point of cathode tab.



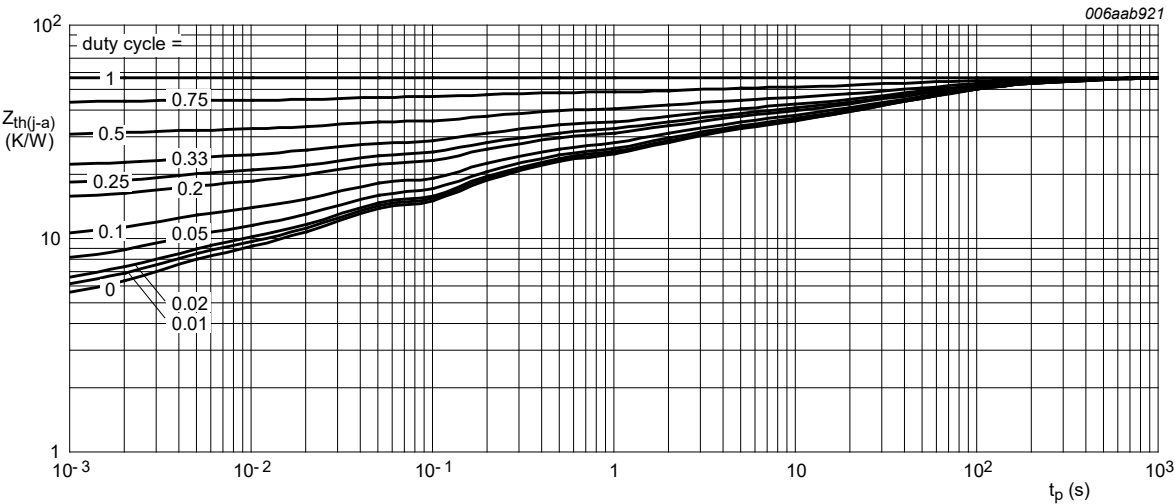
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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



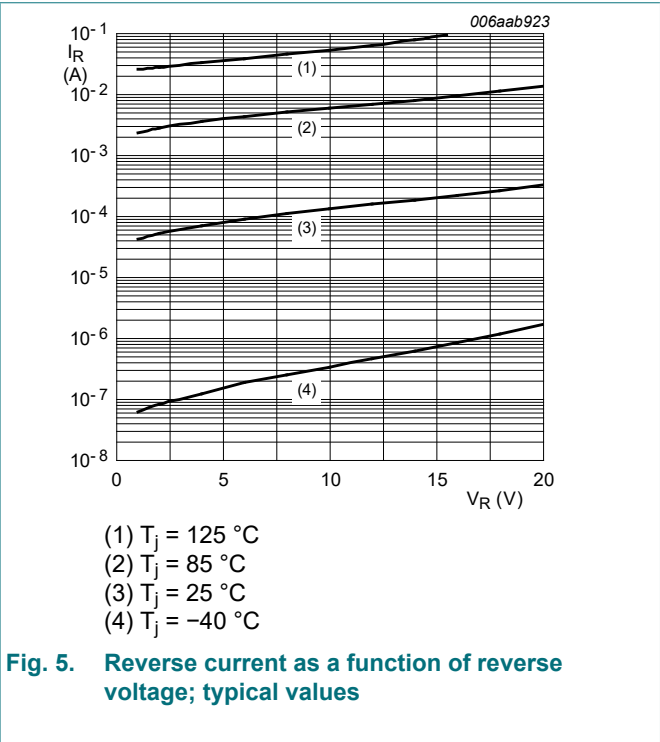
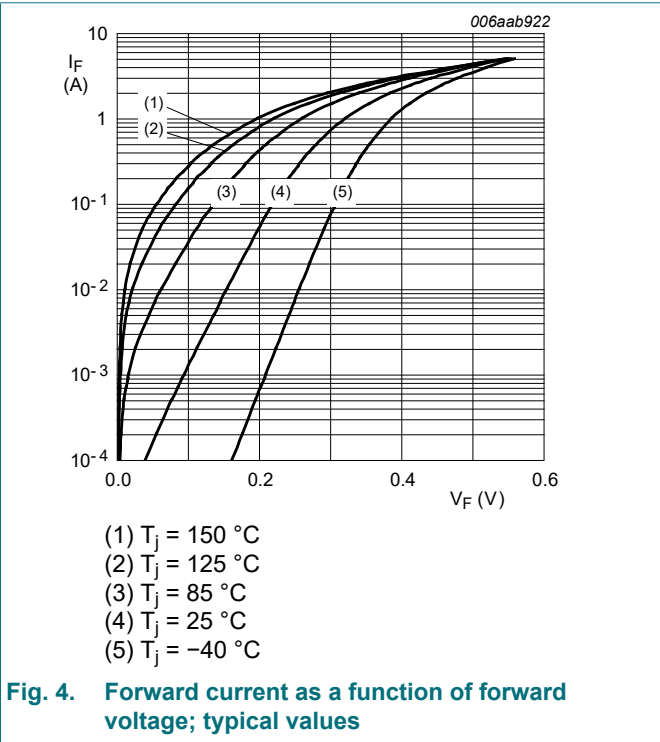
Ceramic PCB, Al₂O₃, standard footprint

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	$I_F = 0.5\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	280	-	mV
		$I_F = 2\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	385	420	mV
I_R	reverse current	$V_R = 10\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	135	-	μA
		$V_R = 20\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	335	1900	μA
C_d	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$	-	175	-	pF
		$V_R = 10\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$	-	65	-	pF
t_{rr}	reverse recovery time	$I_F = 10\text{ mA}; I_R = 10\text{ mA}; I_{R(\text{meas})} = 1\text{ mA}; R_L = 100\text{ }\Omega; T_j = 25\text{ }^{\circ}\text{C}$	-	50	-	ns



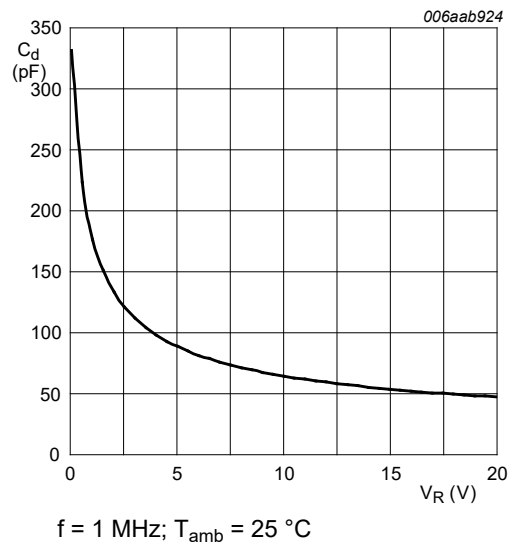


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

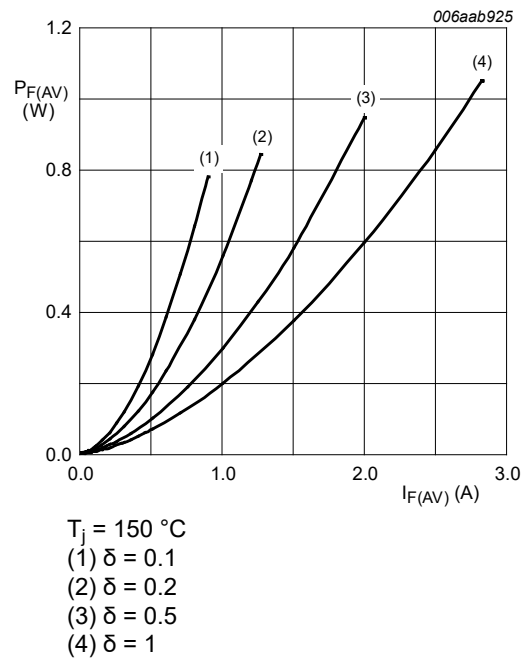


Fig. 7. Average forward power dissipation as a function of average forward current; typical values

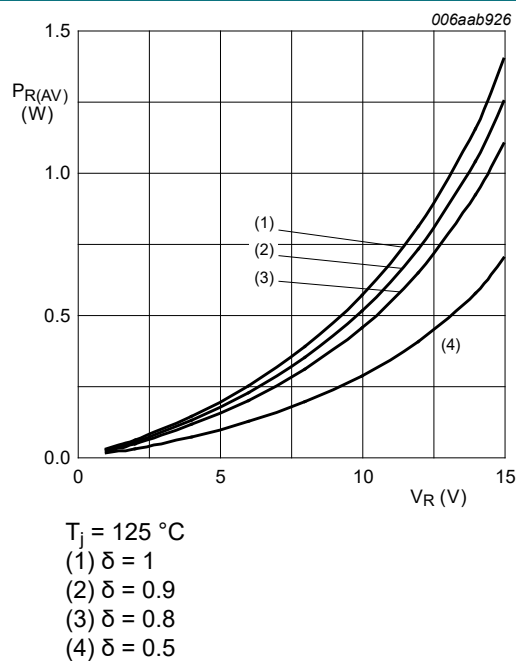


Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values

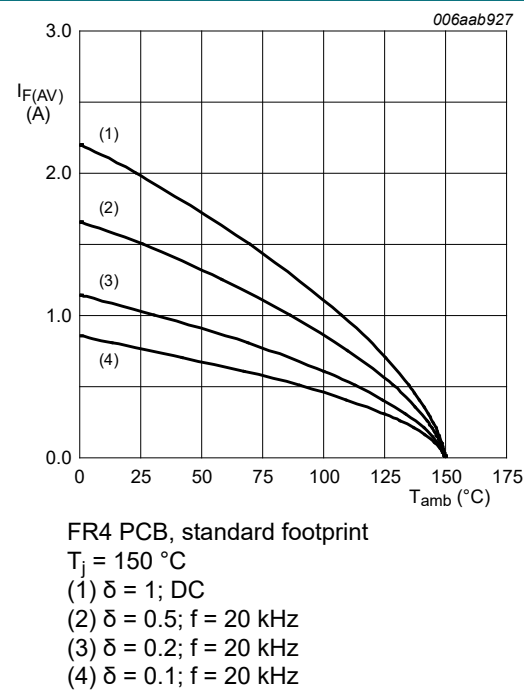
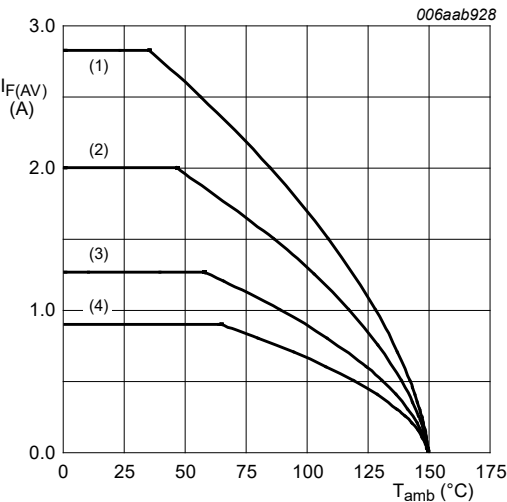
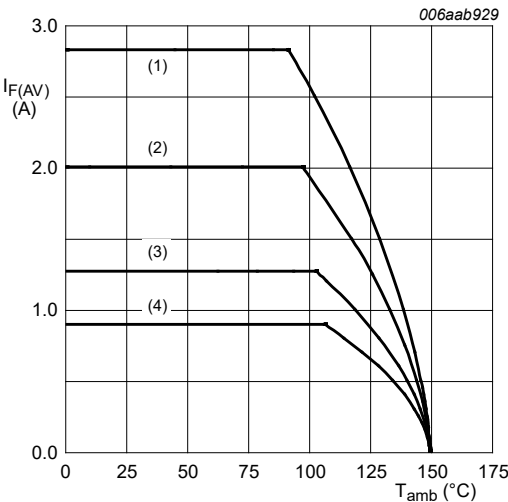


Fig. 9. Average forward current as a function of ambient temperature; typical values



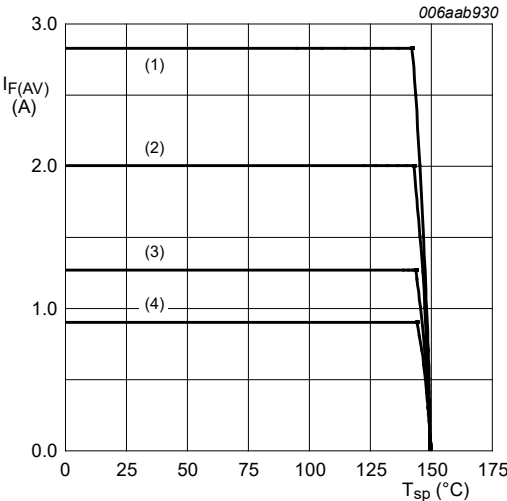
FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 150$ °C
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20$ kHz
(3) $\delta = 0.2$; $f = 20$ kHz
(4) $\delta = 0.1$; $f = 20$ kHz

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



Ceramic PCB, Al₂O₃, 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

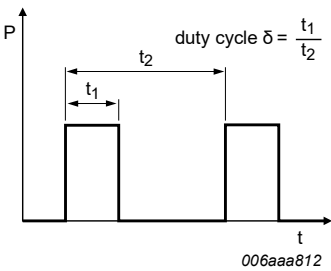


Fig. 13. Duty cycle definition

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

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

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

$I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} 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

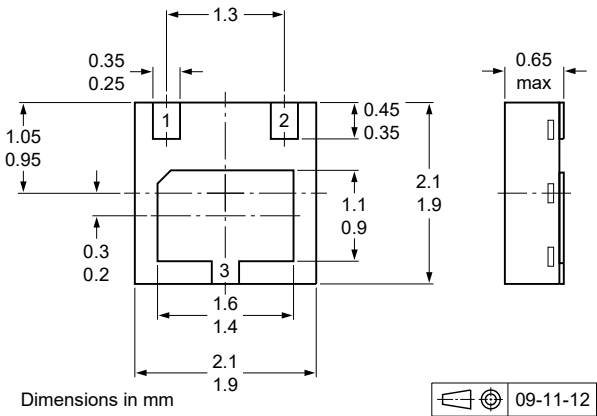


Fig. 14. Package outline DFN2020-3 (SOT1061)

13. Soldering

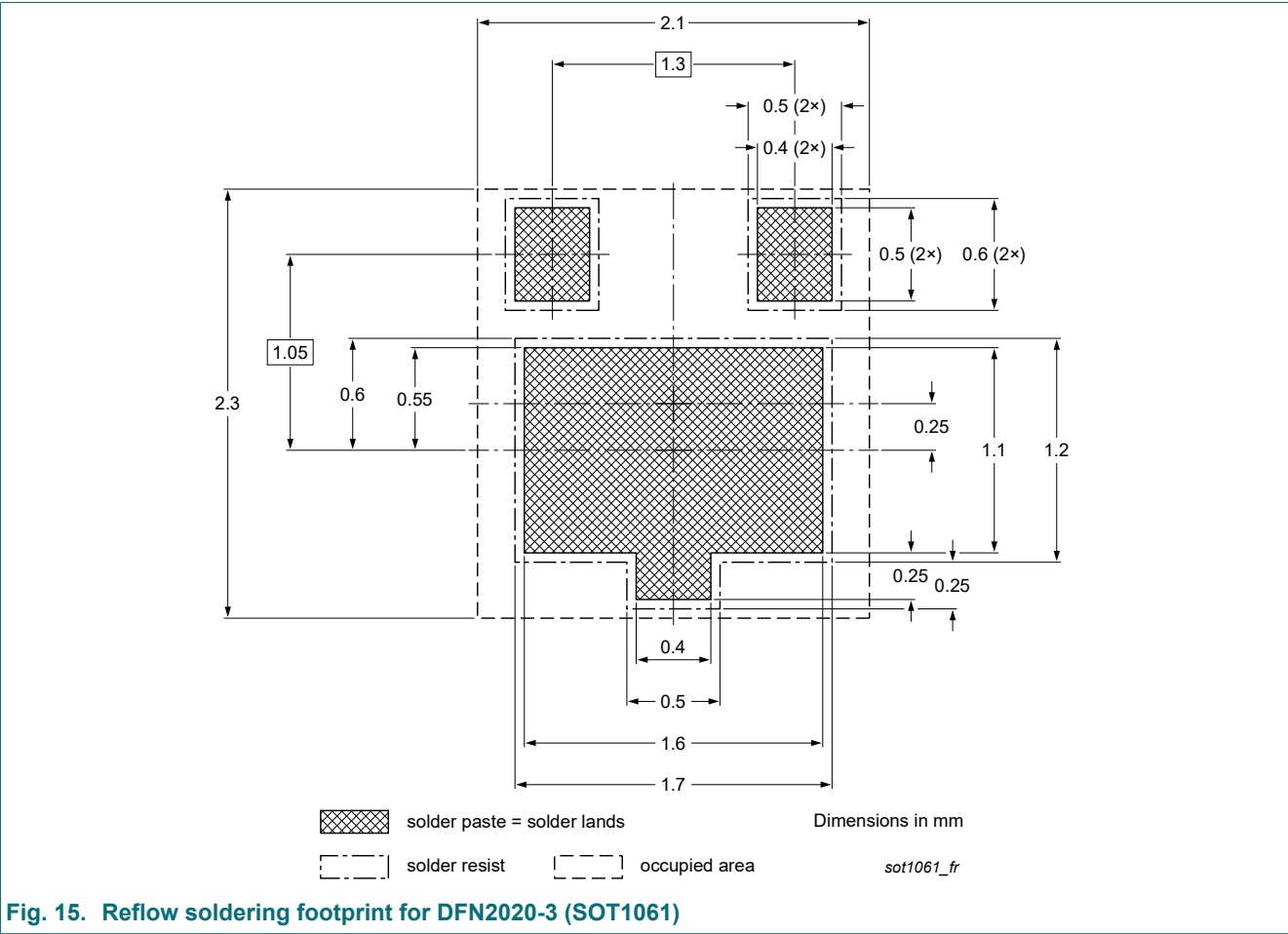


Fig. 15. Reflow soldering footprint for DFN2020-3 (SOT1061)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2020EPA-Q v.1	20240910	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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