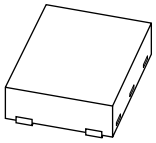


# PMEG2020EPA

## 2 A low $V_F$ MEGA Schottky barrier rectifier

Rev. 01 — 27 January 2010 Product data sheet

## 1. Product profile

### 1.1 General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOT1061 leadless small Surface-Mounted Device (SMD) plastic package.

### 1.2 Features

- 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
- AEC-Q101 qualified

### 1.3 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

### 1.4 Quick reference data

**Table 1. Quick reference data**

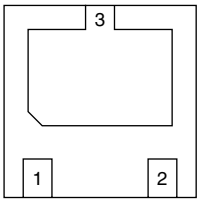
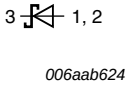
*$T_j$ = 25 °C unless otherwise specified.*

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

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

## 2. Pinning information

**Table 2. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| 1 | anode |  |  |
| 2 | anode | | |
| 3 | cathode | | |



Transparent top view



## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMEG2020EPA | HUSON3 | plastic thermal enhanced ultra thin small outline package; no leads; three terminals; body 2 × 2 × 0.65 mm | SOT1061 |

## 4. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|---|---|
| PMEG2020EPA | AK |

## 5. 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; $\delta$ = 0.5; f = 20 kHz | | | | |
| | | $T_{amb} \leq 80$ °C | [1] | - | 2 | A |
| | | $T_{sp} \leq 140$ °C | | - | 2 | A |
| $I_{FRM}$ | repetitive peak forward current | $t_p \leq 1$ ms; $\delta \leq 0.25$ | [2] | - | 7 | A |
| $I_{FSM}$ | non-repetitive peak forward current | square wave; $t_p$ = 8 ms | [2][3] | - | 17 | A |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [4][5] | - | 500 | mW |
| | | | [4][6] | - | 960 | mW |
| | | | [1][4] | - | 1800 | mW |

**Table 5. Limiting values** *...continued*

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $T_j$ | 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, $Al_2O_3$, standard footprint.

[2] Both anode pins connected.

[3] $T_j$ = 25 °C prior to surge.

[4] Reflow soldering is the only recommended soldering method.

[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[6] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.

## 6. 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 |
| | | | [4] | - | - | 130 | K/W |
| | | | [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.

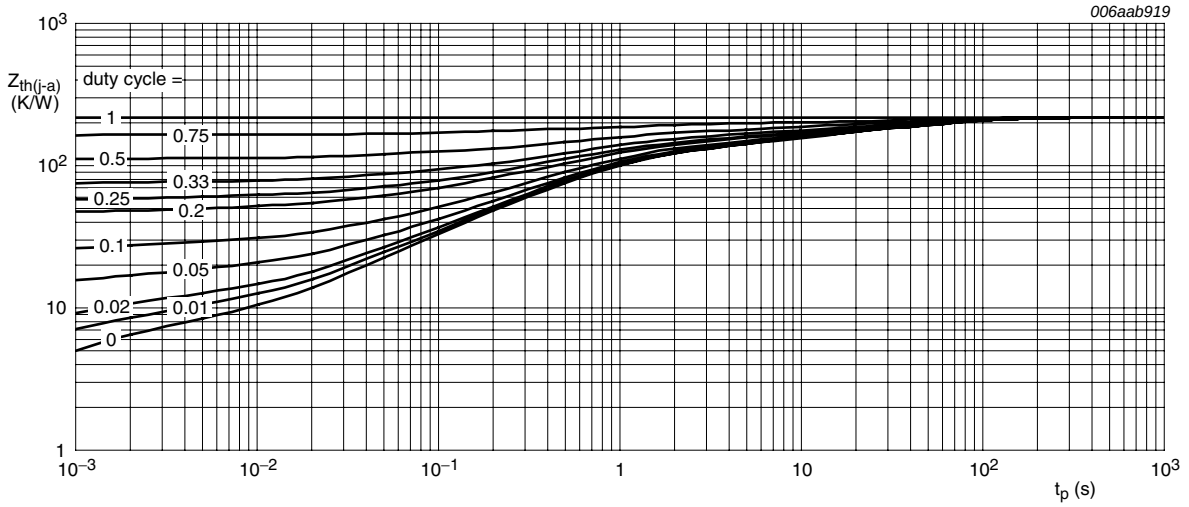
[2] Reflow soldering is the only recommended soldering method.

[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 $cm^2$.

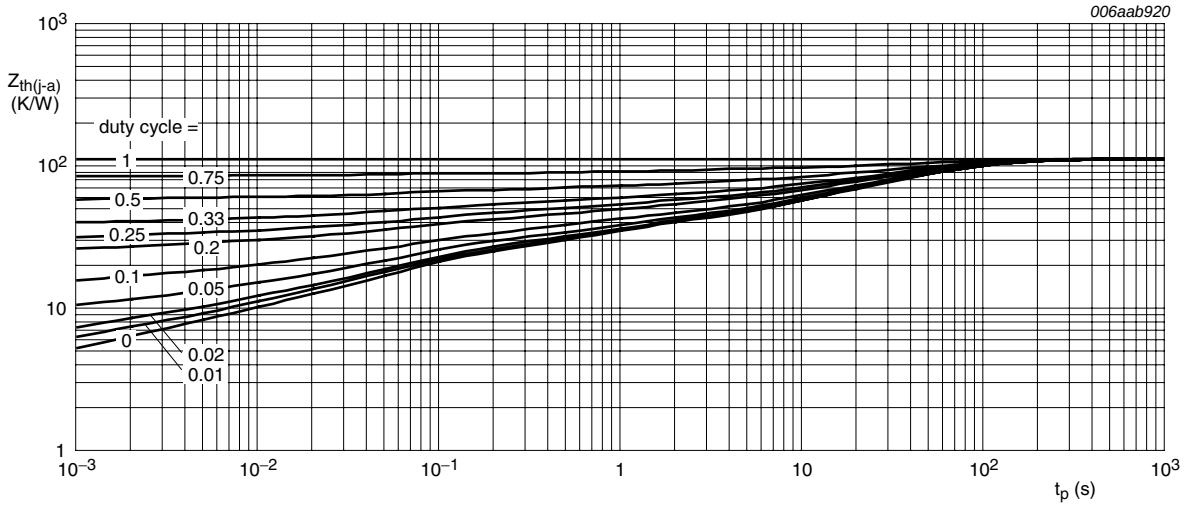
[5] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.

[6] Soldering point of cathode tab.



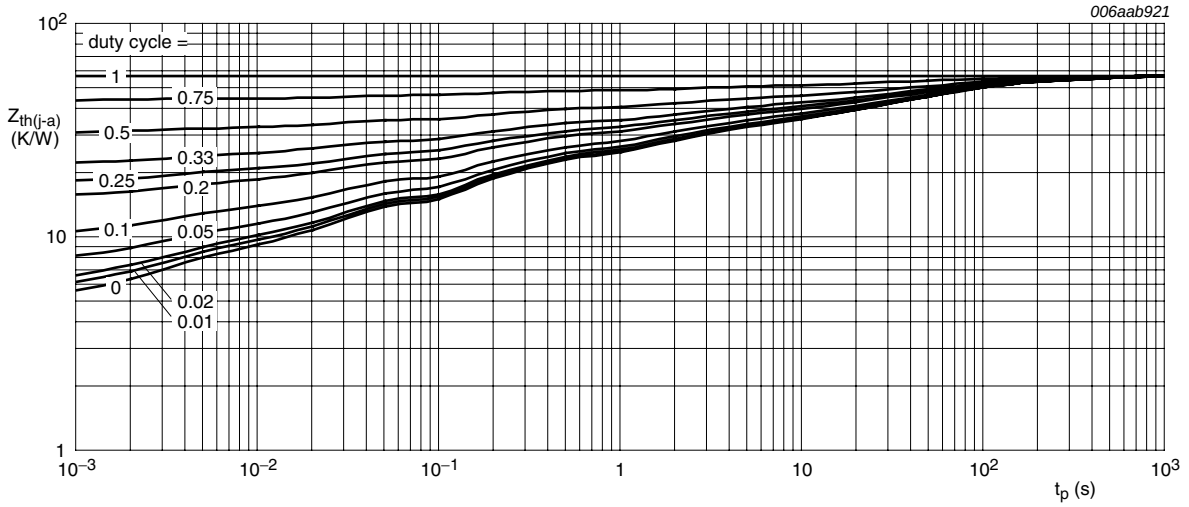

FR4 PCB, standard footprint

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




FR4 PCB, mounting pad for cathode 1 $cm^2$

**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**

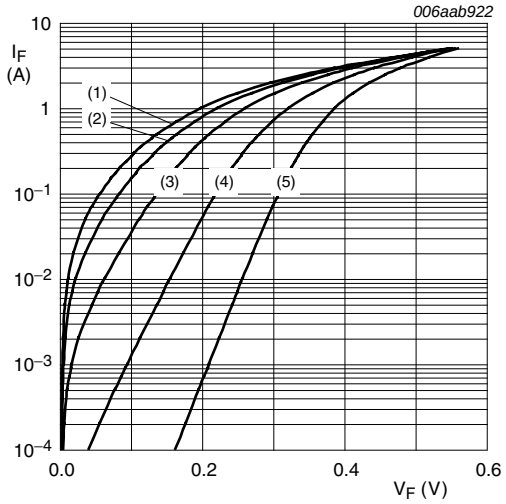
## 7. Characteristics

**Table 7. Characteristics**

*$T_j$ = 25 °C unless otherwise specified.*

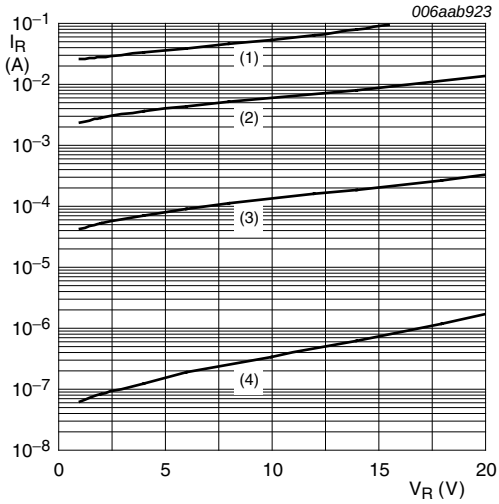
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 0.5 A | - | 280 | - | mV |
| | | $I_F$ = 2 A | - | 385 | 420 | mV |
| $I_R$ | reverse current | $V_R$ = 10 V | - | 135 | - | µA |
| | | $V_R$ = 20 V | - | 335 | 1900 | µA |
| $C_d$ | diode capacitance | f = 1 MHz | | | | |
| | | $V_R$ = 1 V | - | 175 | - | pF |
| | | $V_R$ = 10 V | - | 65 | - | pF |
| $t_{rr}$ | reverse recovery time | [1] | - | 50 | - | ns |

[1] When switched from $I_F$ = 10 mA to $I_R$ = 10 mA; $R_L$ = 100 Ω; measured at $I_R$ = 1 mA.



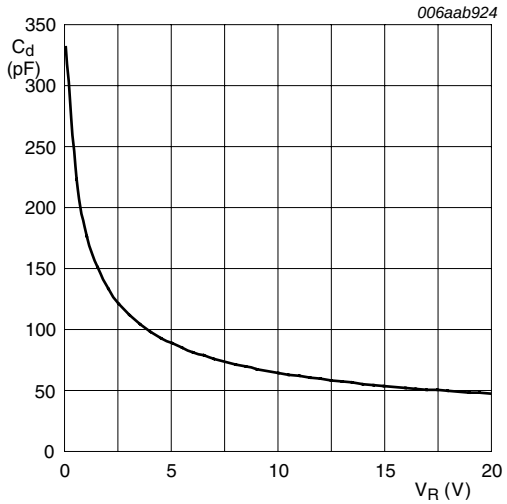

(1) $T_j$ = 150 °C
(2) $T_j$ = 125 °C
(3) $T_j$ = 85 °C
(4) $T_j$ = 25 °C
(5) $T_j$ = −40 °C

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



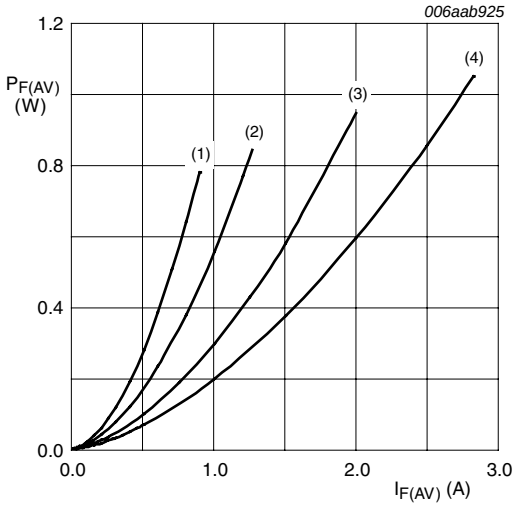

(1) $T_j$ = 125 °C
(2) $T_j$ = 85 °C
(3) $T_j$ = 25 °C
(4) $T_j$ = −40 °C

**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

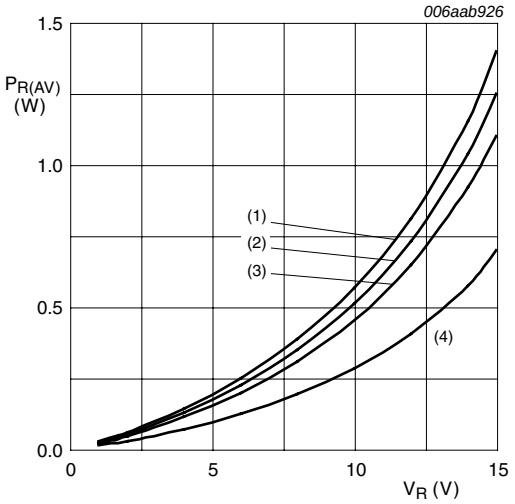
(1) δ = 0.1

(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

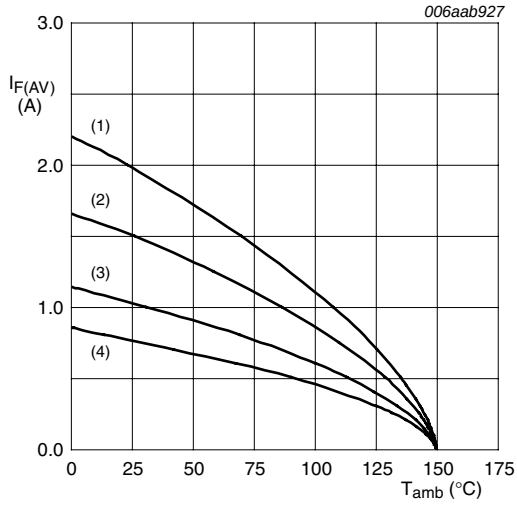
(1) δ = 1

(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

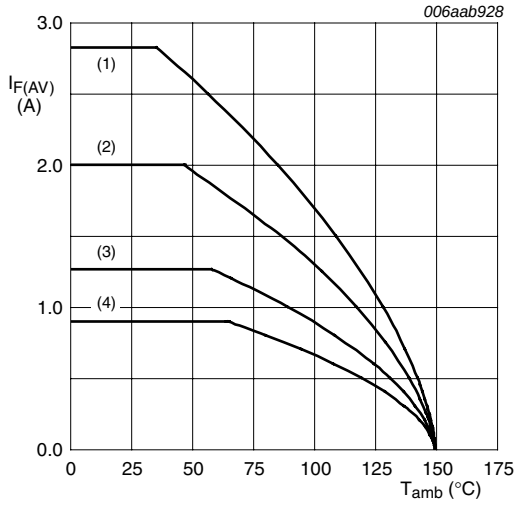
(1) δ = 1; DC

(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 cathode 1 $cm^2$

$T_j$ = 150 °C

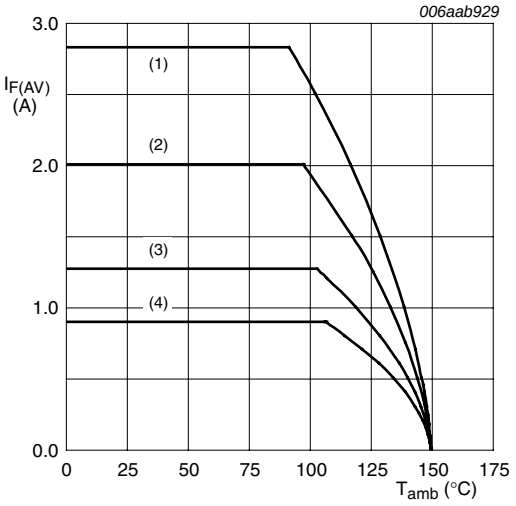
(1) δ = 1; DC

(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

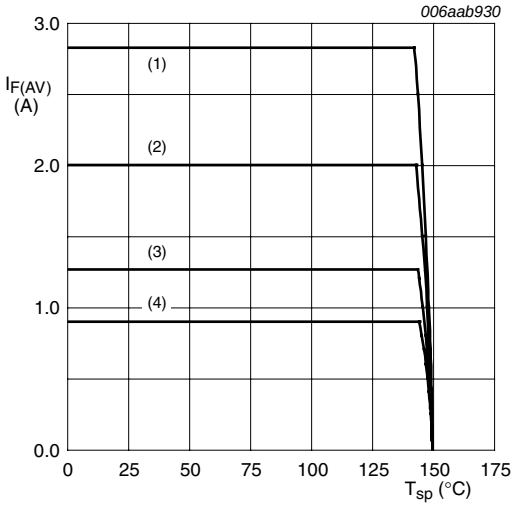
(1) δ = 1; DC

(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**

# 8. Test information

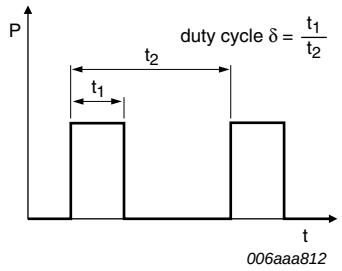



**Fig 13. Duty cycle definition**

The current ratings for the typical waveforms as shown in Figure 8, 9, 10 and 11 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.

## 8.1 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.

# 9. Package outline

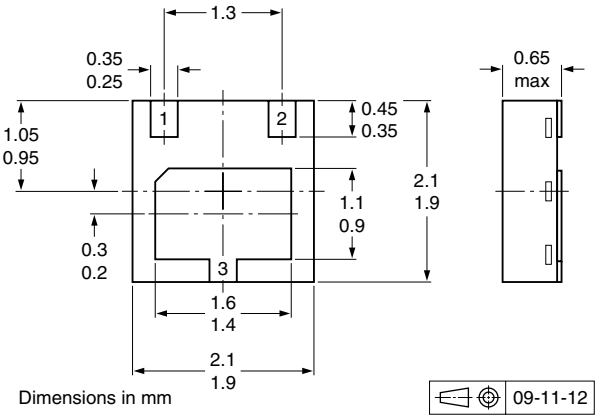



**Fig 14. Package outline SOT1061**

## 10. Packing information

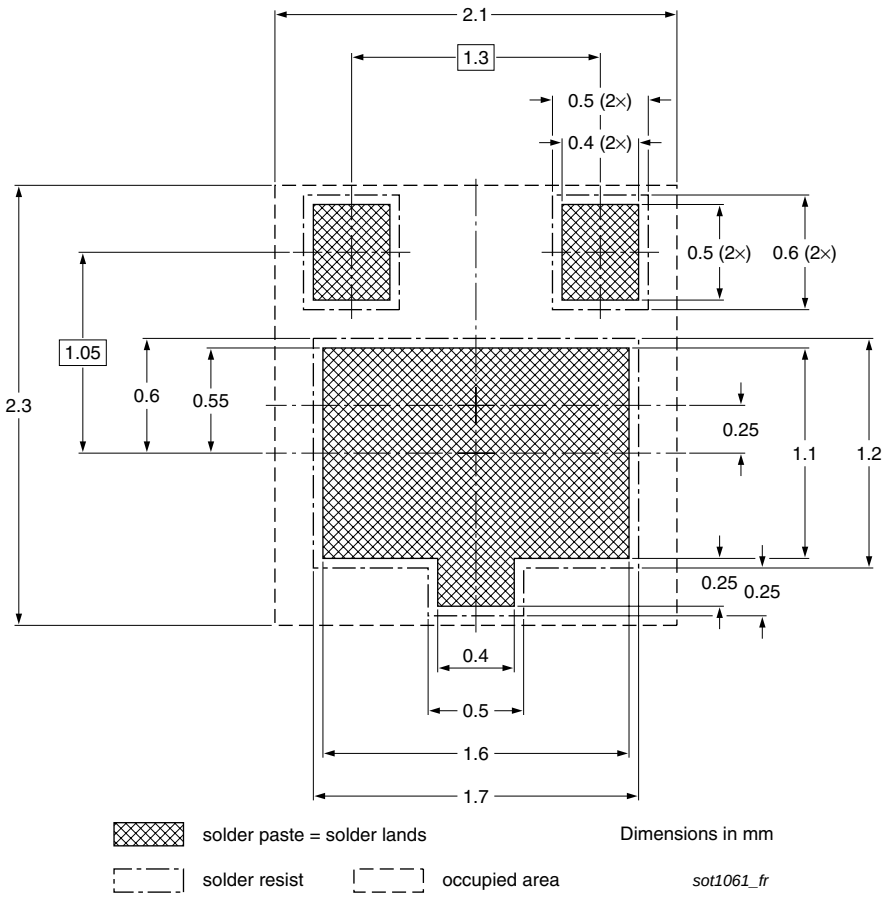
**Table 8. Packing methods**

*The indicated -xxx are the last three digits of the 12NC ordering code.*[1]

| Type number | Package | Description | Packing quantity |
|---|---|---|---|
| | | | 3000 |
| PMEG2020EPA | SOT1061 | 4 mm pitch, 8 mm tape and reel | -115 |

[1] For further information and the availability of packing methods, see Section 14.

## 11. Soldering




Reflow soldering is the only recommended soldering method.

**Fig 15. Reflow soldering footprint SOT1061**

## 12. Revision history

**Table 9. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PMEG2020EPA_1 | 20100127 | Product data sheet | - | - |

# 13. Legal information

## 13.1 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.nxp.com.

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## 15. Contents





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**Document identifier: PMEG2020EPA_1**