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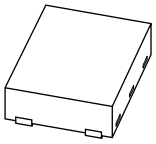


# PMEG3020EPA

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

Rev. 01 — 15 December 2009 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. PMEG3020EPA is encapsulated in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package with medium power capability.

### 1.2 Features

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 30$ 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**

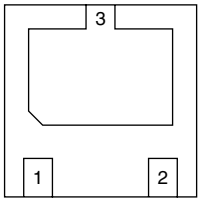
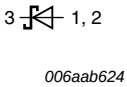
*$T_j$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | average forward current | square wave; $\delta$ = 0.5; f = 20 kHz | | | | | |
| | | $T_{amb} \leq 65$ °C | [1] | - | - | 2 | A |
| | | $T_{sp} \leq 140$ °C | | - | - | 2 | A |
| $V_R$ | reverse voltage | | | - | - | 30 | V |
| $V_F$ | forward voltage | $I_F$ = 2 A | | - | 410 | 470 | mV |
| $I_R$ | reverse current | $V_R$ = 30 V | | - | 435 | 2500 | 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 | | |



## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMEG3020EPA | 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 |
|---|---|
| PMEG3020EPA | A2 |

## 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 | | - | 30 | V |
| $I_{F(AV)}$ | average forward current | square wave; $\delta$ = 0.5; f = 20 kHz | | | | |
| | | $T_{amb} \leq$ 65 °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 |
| | | | [4][1] | - | 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.

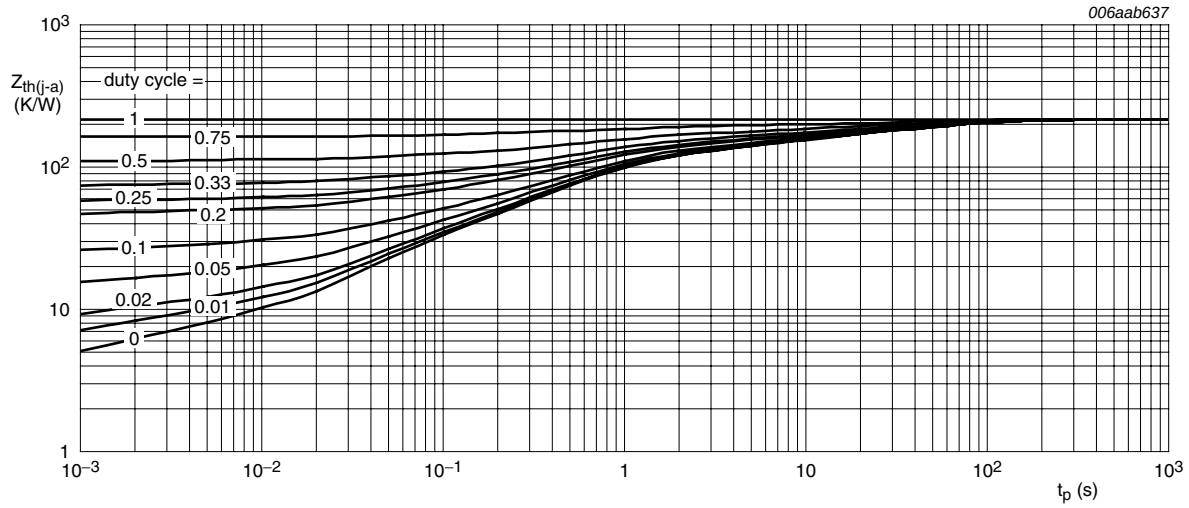
[2] Reflow soldering is the only recommended soldering method.

[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 $cm^2$.

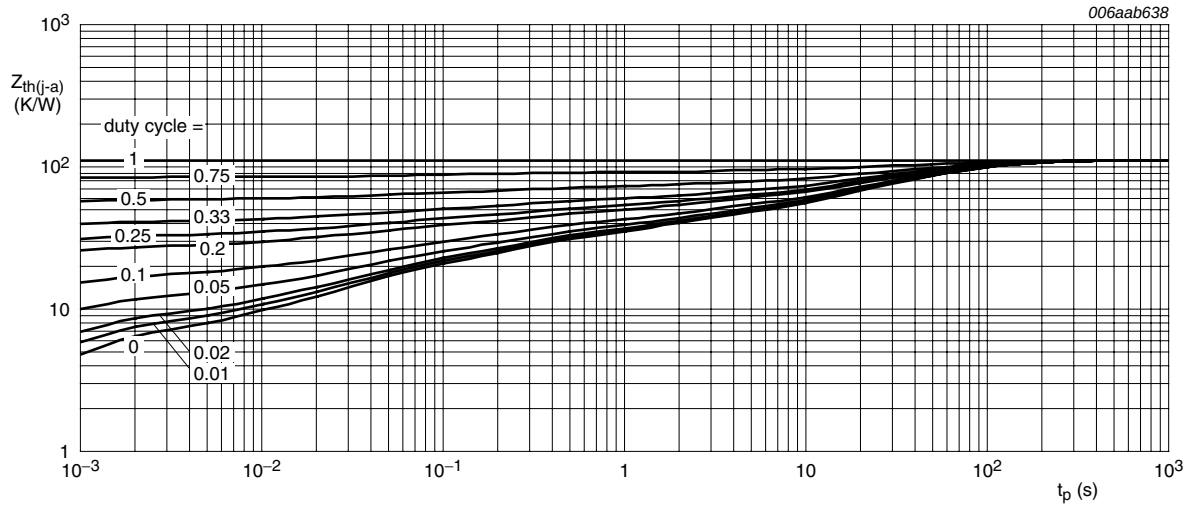
[5] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.

[6] Soldering point of cathode tab.



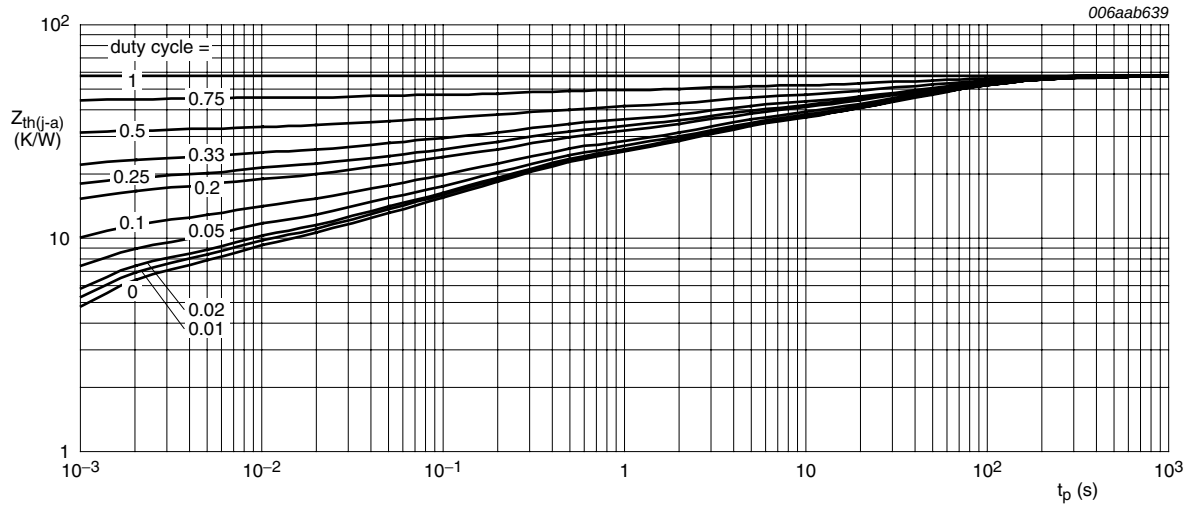

FR4 PCB, standard footprint

**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**

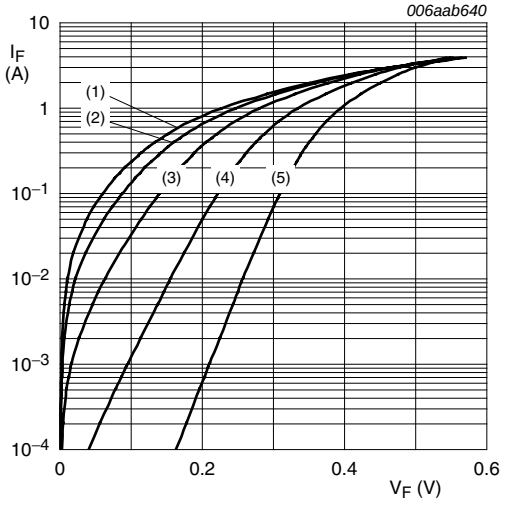
## 7. Characteristics

**Table 7. Characteristics**

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

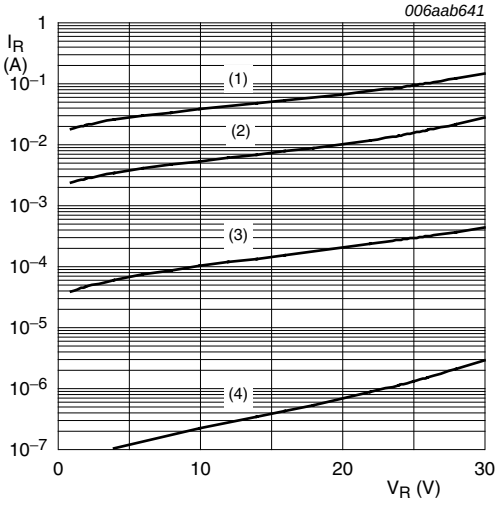
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 0.5 A | - | 290 | - | mV |
| | | $I_F$ = 1 A | - | 335 | - | mV |
| | | $I_F$ = 2 A | - | 410 | 470 | mV |
| $I_R$ | reverse current | $V_R$ = 10 V | - | 100 | - | µA |
| | | $V_R$ = 30 V | - | 435 | 2500 | µA |
| $C_d$ | diode capacitance | f = 1 MHz | | | | |
| | | $V_R$ = 1 V | - | 150 | - | pF |
| | | $V_R$ = 10 V | - | 55 | - | pF |
| $t_{rr}$ | reverse recovery time | [1] | - | 47 | - | ns |

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



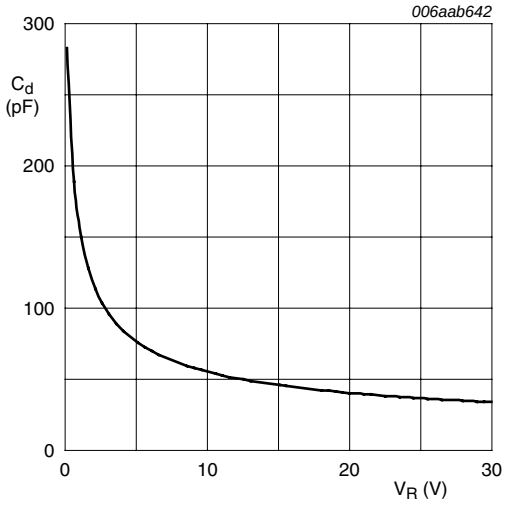

(1) $T_j$ = 150 °C
(2) $T_j$ = 125 °C
(3) $T_j$ = 85 °C
(4) $T_j$ = 25 °C
(5) $T_j$ = −40 °C

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



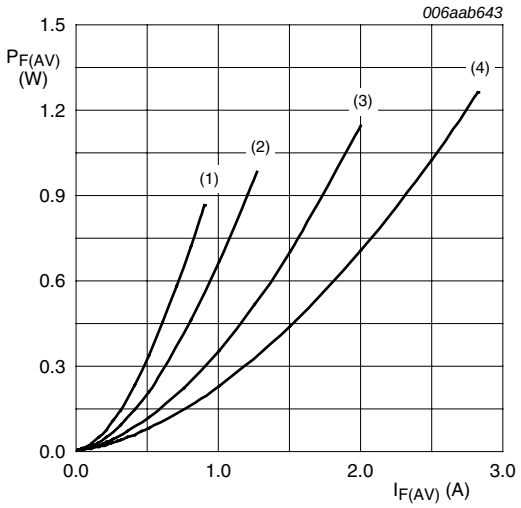

(1) $T_j$ = 125 °C
(2) $T_j$ = 85 °C
(3) $T_j$ = 25 °C
(4) $T_j$ = −40 °C

**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

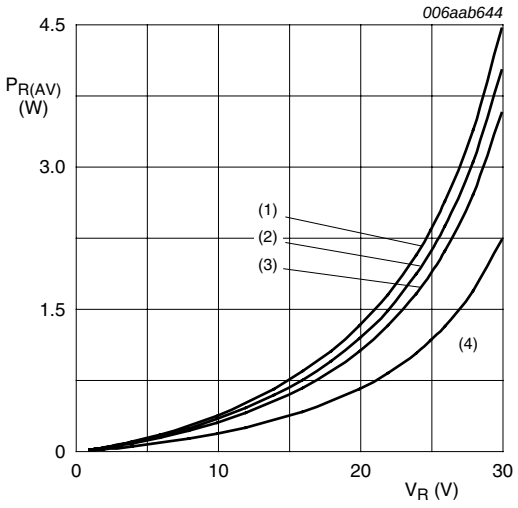
(1) δ = 0.1

(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

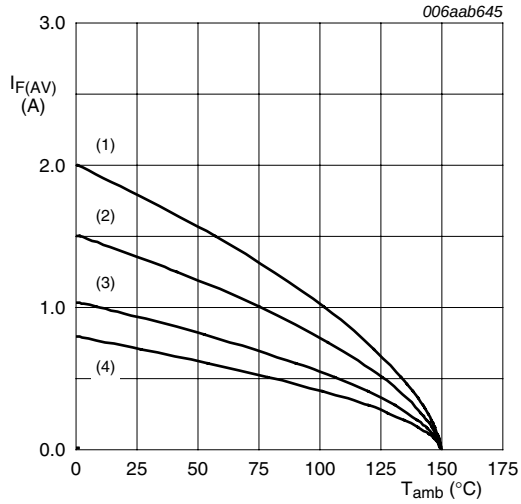
(1) δ = 1

(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

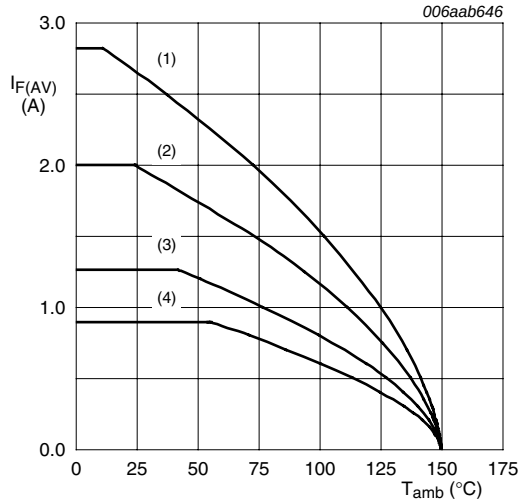
(1) δ = 1; DC

(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

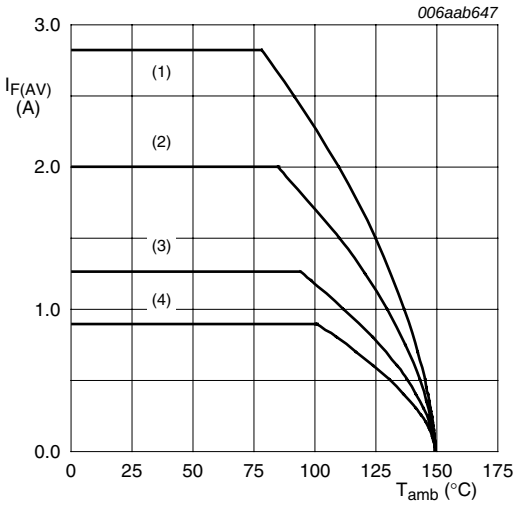
(1) δ = 1; DC

(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

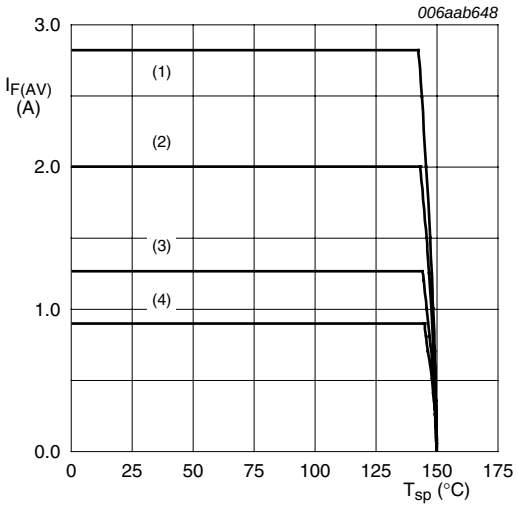
(1) δ = 1; DC

(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

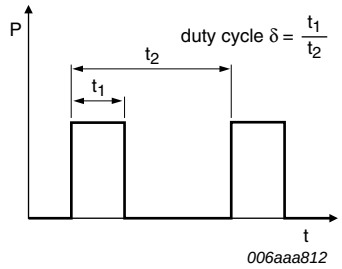



**Fig 13. Duty cycle definition**

The current ratings for the typical waveforms as shown in Figure 9, 10, 11 and 12 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

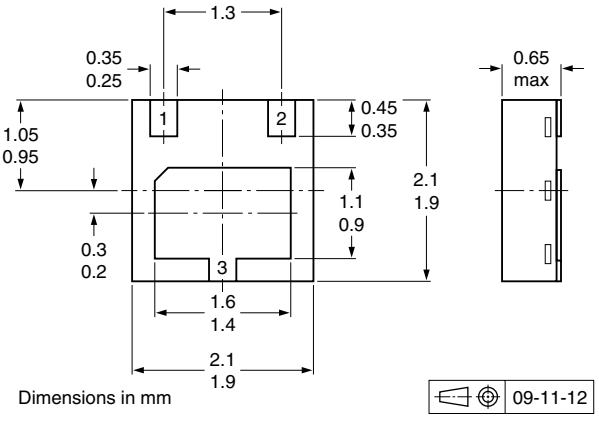



**Fig 14. Package outline SOT1061**

## 10. Packing information

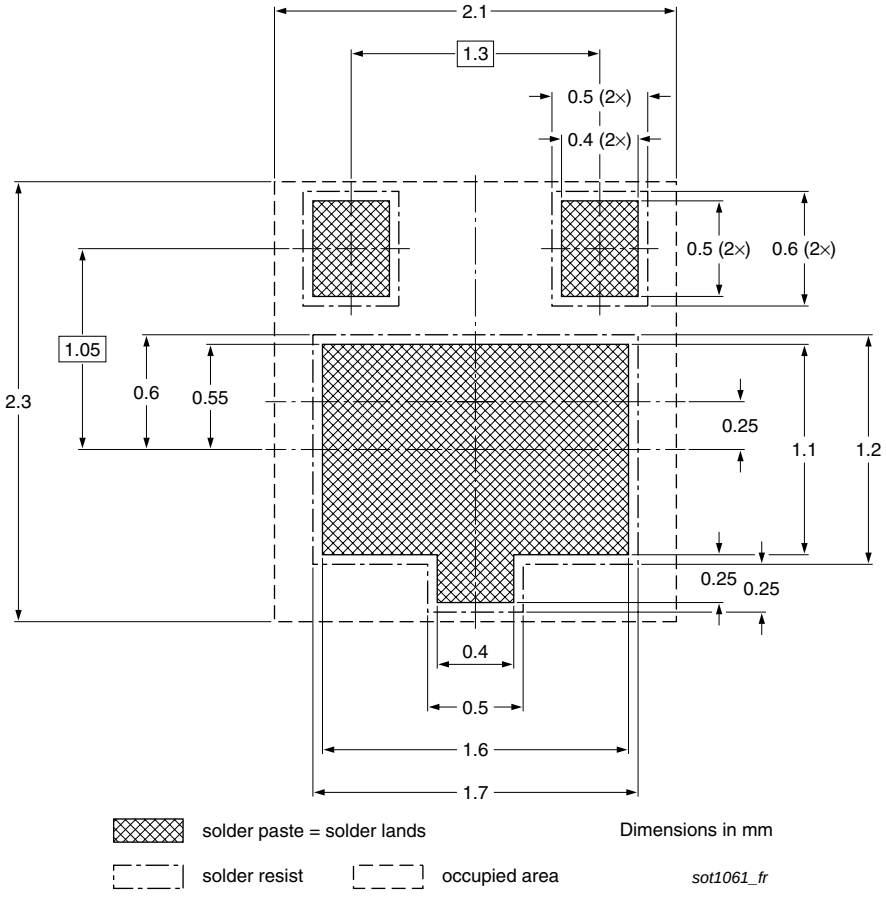
**Table 8. Packing methods**

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

| Type number | Package | Description | Packing quantity |
|---|---|---|---|
| | | | 3000 |
| PMEG3020EPA | 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 |
|---|---|---|---|---|
| PMEG3020EPA_1 | 20091215 | 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. |
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## 15. Contents


| | | |
|---|---|---|
| **1** | **Product profile** | **1** |
| 1.1 | General description | 1 |
| 1.2 | Features | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| **2** | **Pinning information** | **2** |
| **3** | **Ordering information** | **2** |
| **4** | **Marking** | **2** |
| **5** | **Limiting values** | **2** |
| **6** | **Thermal characteristics** | **3** |
| **7** | **Characteristics** | **5** |
| **8** | **Test information** | **9** |
| 8.1 | Quality information | 9 |
| **9** | **Package outline** | **9** |
| **10** | **Packing information** | **10** |
| **11** | **Soldering** | **10** |
| **12** | **Revision history** | **11** |
| **13** | **Legal information** | **12** |
| 13.1 | Data sheet status | 12 |
| 13.2 | Definitions | 12 |
| 13.3 | Disclaimers | 12 |
| 13.4 | Trademarks | 12 |
| **14** | **Contact information** | **12** |
| **15** | **Contents** | **13** |




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**Date of release: 15 December 2009**
**Document identifier: PMEG3020EPA_1**