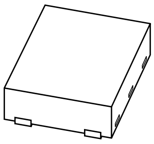


PMEG6020EPA

2 A low V_F MEGA Schottky barrier rectifier

Rev. 2 — 17 June 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. PMEG6020EPA is encapsulated in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package with medium power capability.

1.2 Features and benefits

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 60$ 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

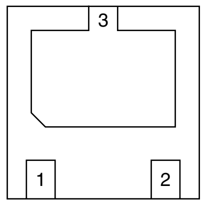
T_j = 25 °C unless otherwise specified.

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			-	-	60	V
V_F	forward voltage	I_F = 2 A		-	505	575	mV
I_R	reverse current	V_R = 60 V		-	55	250	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	 Transparent top view	 006aab624
2	anode		
3	cathode		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG6020EPA	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
PMEG6020EPA	A4

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		-	60	V
$I_{F(AV)}$	average forward current	square wave; δ = 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]	-	18	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[4][5]	-	520	mW
			[4][6]	-	1050	mW
			[4][1]	-	1900	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]	-	-	240	K/W
			[4]	-	-	120	K/W
			[5]	-	-	65	K/W
$R_{th(j-sp)}$	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_R are a significant part of the total power losses.

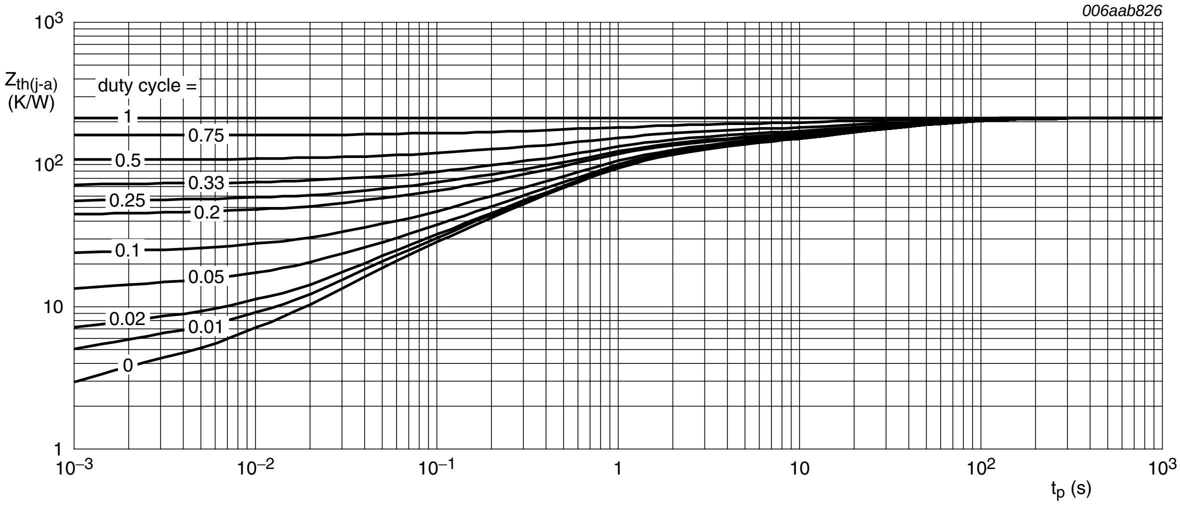
[2] Reflow soldering is the only recommended soldering method.

[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.

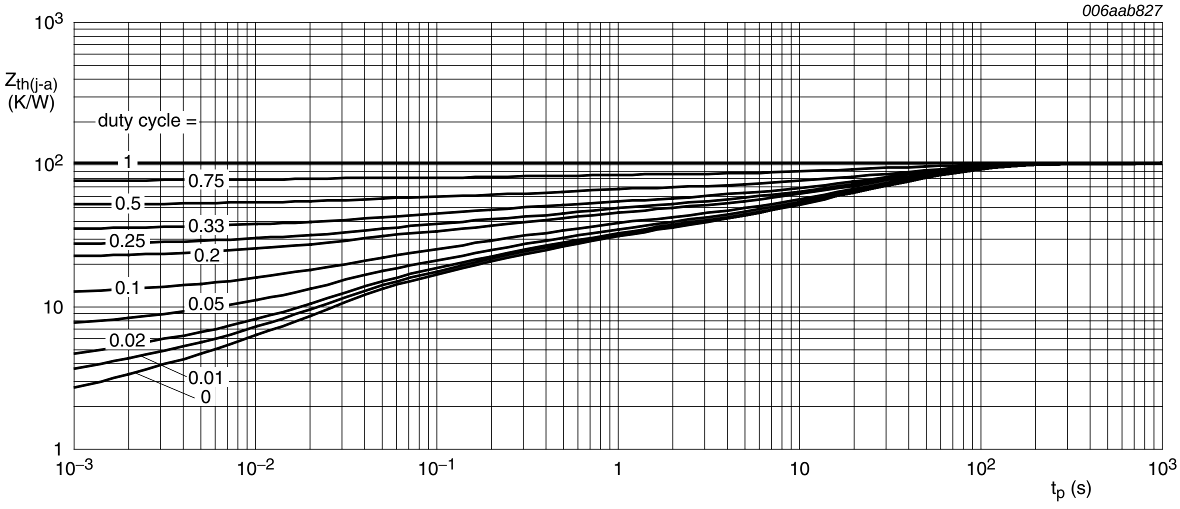
[5] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

[6] Soldering point of cathode tab.



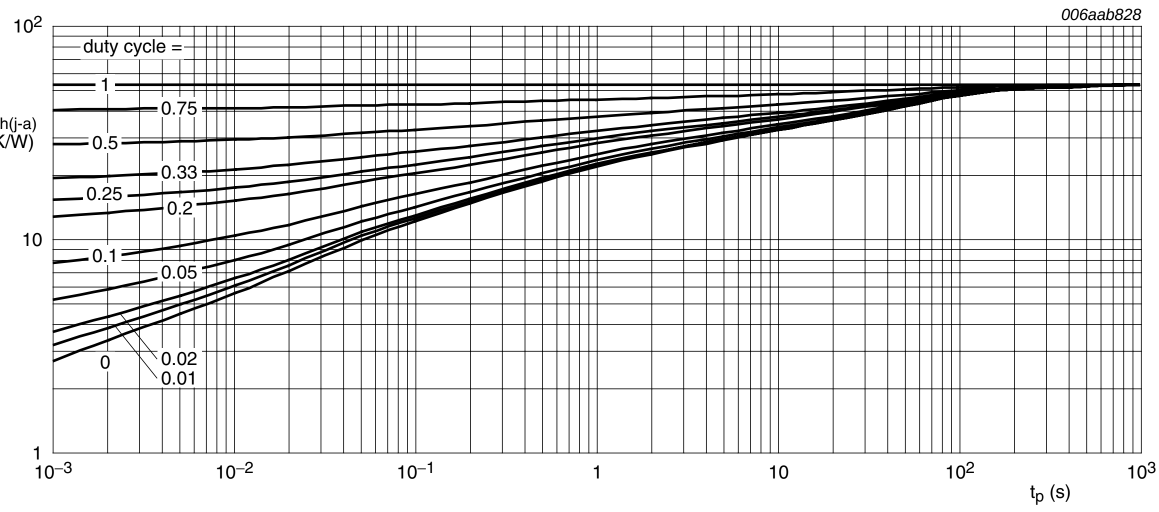
FR4 PCB, standard footprint

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

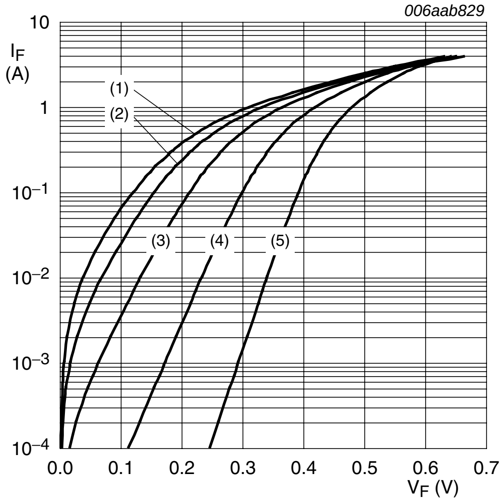
7. Characteristics

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	-	370	-	mV
		I_F = 1 A	-	420	-	mV
		I_F = 2 A	-	505	575	mV
I_R	reverse current	V_R = 10 V	-	5	-	µA
		V_R = 60 V	-	55	250	µA
C_d	diode capacitance	f = 1 MHz				
		V_R = 1 V	-	250	-	pF
		V_R = 10 V	-	90	-	pF
t_{rr}	reverse recovery time	[1]	-	78	-	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

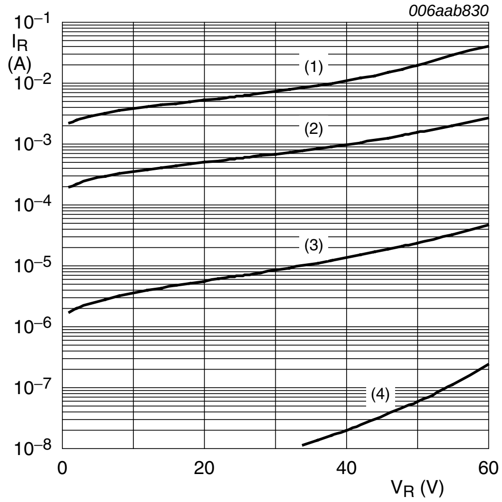
(2) T_j = 125 °C

(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



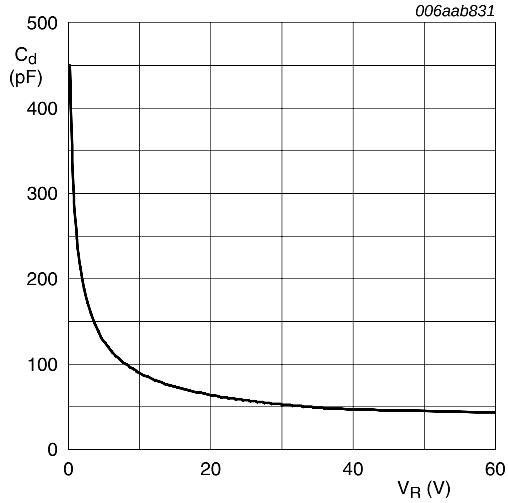
(1) T_j = 125 °C

(2) T_j = 85 °C

(3) T_j = 25 °C

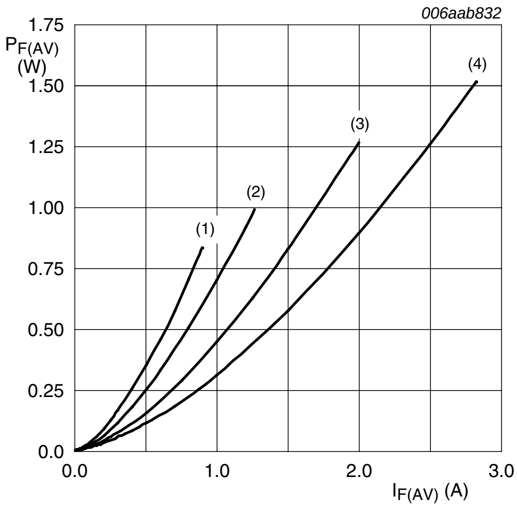
(4) T_j = −40 °C

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

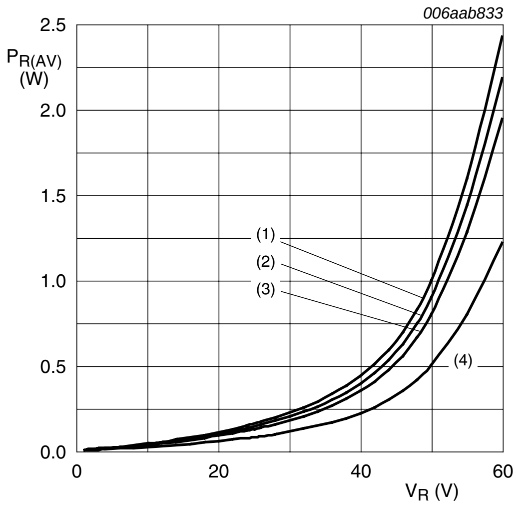
(1) δ = 0.1

(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

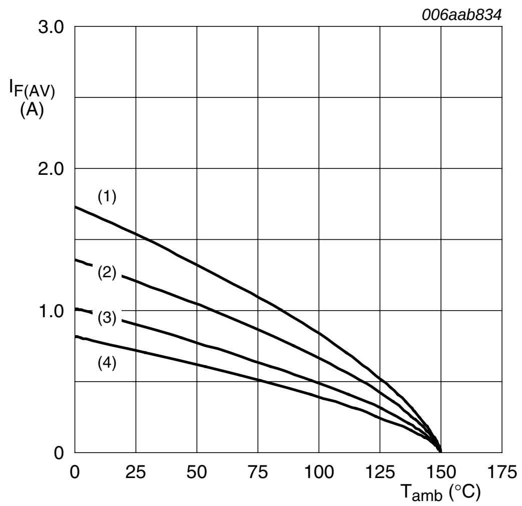
(1) δ = 1

(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

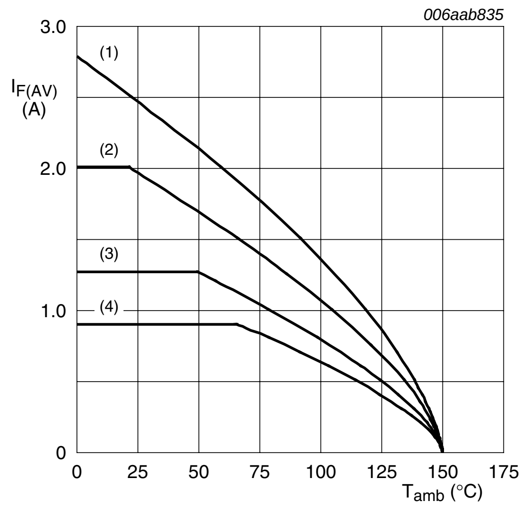
(1) δ = 1; DC

(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

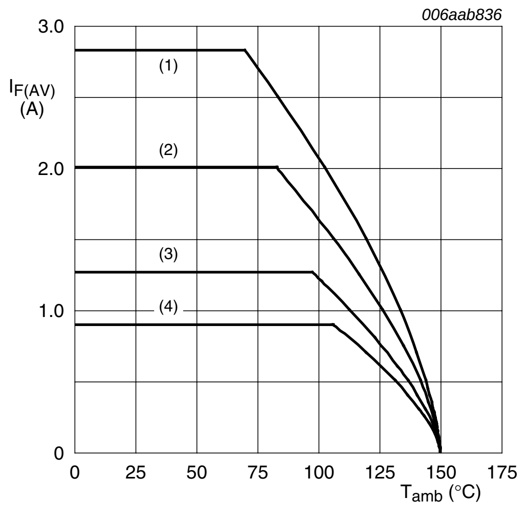
(1) δ = 1; DC

(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

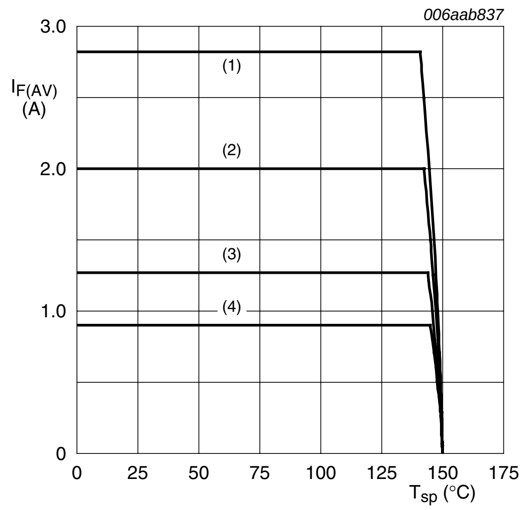
(1) δ = 1; DC

(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

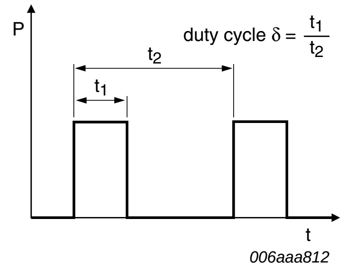


Fig 13. Duty cycle definition

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

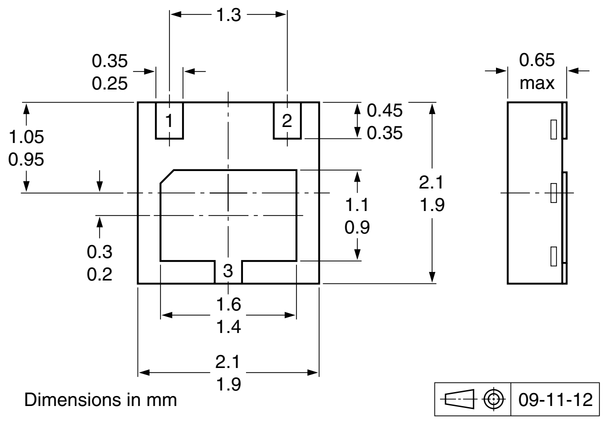


Fig 14. Package outline SOT1061

10. Packing information

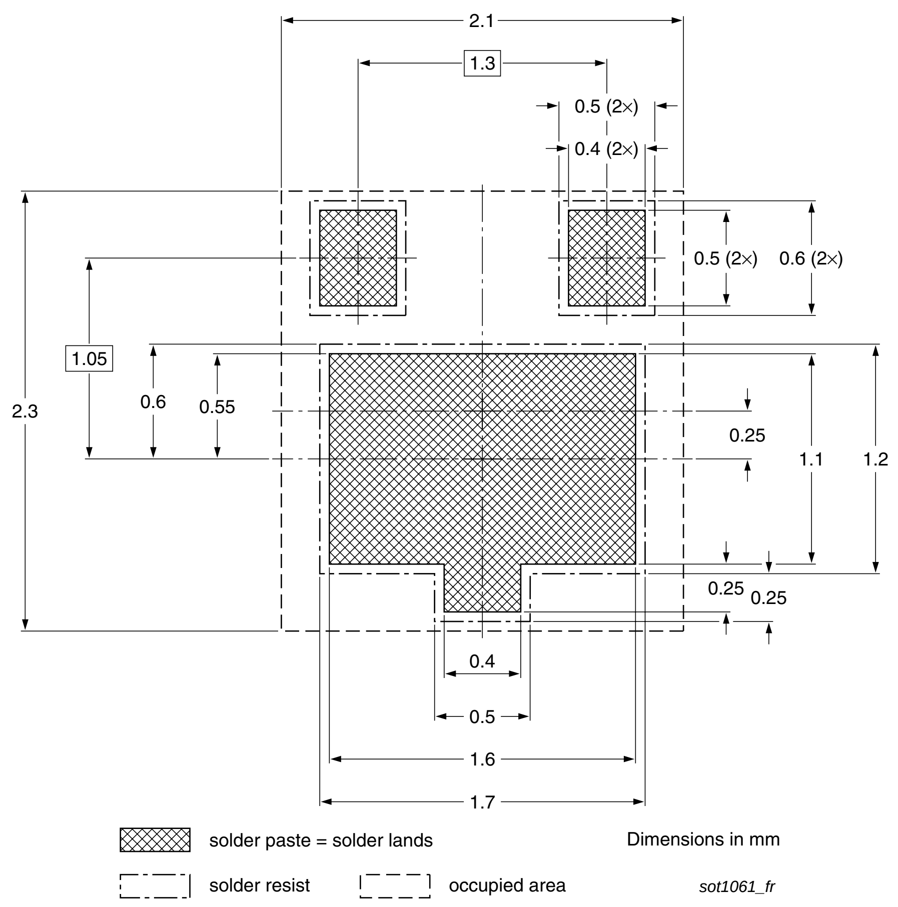
Table 8. Packing methods

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

Type number	Package	Description	Packing quantity
			3000
PMEG6020EPA	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
PMEG6020EPA v.2	20100617	Product data sheet	-	PMEG6020EPA_1
Modifications:	• Table 1 “Quick reference data”: typo in I_R condition amended • Section 13 “Legal information”: updated			
PMEG6020EPA_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.
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: PMEG6020EPA