

# PMEG2020CPA

2 A low  $V_F$  dual MEGA Schottky barrier rectifier

Rev. 1 — 5 August 2010

Product data sheet

## 1. Product profile

### 1.1 General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier in common cathode configuration with an integrated guard ring for stress protection, encapsulated in a 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:  $V_R \leq 20$  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<sub>j</sub> = 25 °C unless otherwise specified.*

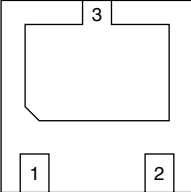
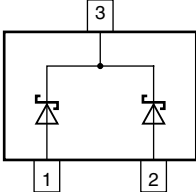
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$ ; $f = 20$ kHz				
		$T_{amb} \leq 80$ °C	[1]	-	2	A
		$T_{sp} \leq 140$ °C	-	-	2	A
$V_R$	reverse voltage		-	-	20	V
$V_F$	forward voltage	$I_F = 2$ A	-	385	420	mV
$I_R$	reverse current	$V_R = 20$ V	-	380	1000	μA

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al<sub>2</sub>O<sub>3</sub>, standard footprint.



## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	anode diode 1	 <p>Transparent top view</p>	 <p>006aaa438</p>
2	anode diode 2		
3	common cathode		

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PMEG2020CPA	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
PMEG2020CPA	AL

## 5. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit	
<b>Per diode</b>						
$V_R$	reverse voltage	$T_j \leq 25\text{ °C}$	-	20	V	
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$ ; $f = 20\text{ kHz}$				
		$T_{amb} \leq 80\text{ °C}$	[1]	-	2	A
		$T_{sp} \leq 140\text{ °C}$	-	-	2	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$	-	7	A	
$I_{FSM}$	non-repetitive peak forward current	square wave; $t_p = 8\text{ ms}$	[2]	-	9	A

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

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

Symbol	Parameter	Conditions	Min	Max	Unit	
<b>Per device, one diode loaded</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[3][4]	-	500	mW
			[3][5]	-	960	mW
			[1][3]	-	1800	mW
$T_j$	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]  $T_j = 25\text{ °C}$  prior to surge.

[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  $1\text{ cm}^2$ .

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>Per device, one diode loaded</b>							
$R_{th(j-a)}$	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

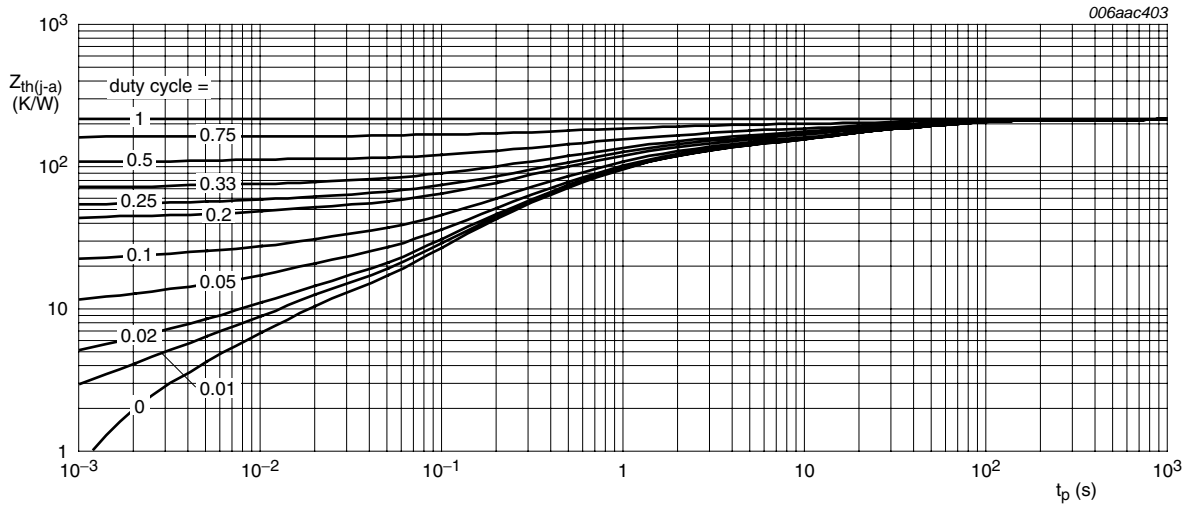
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

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

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

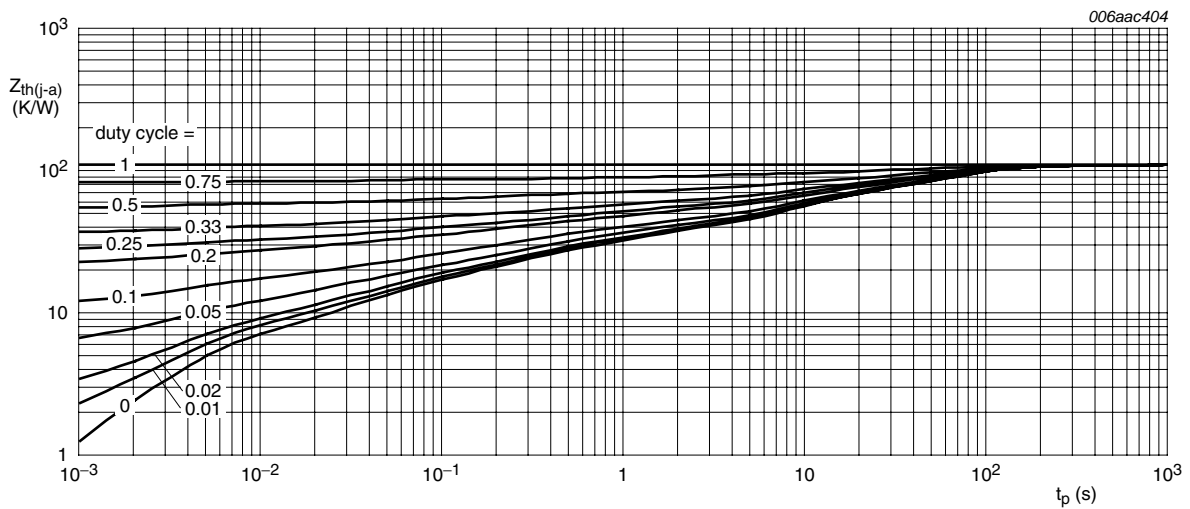
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .[5] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

[6] Soldering point of cathode tab.



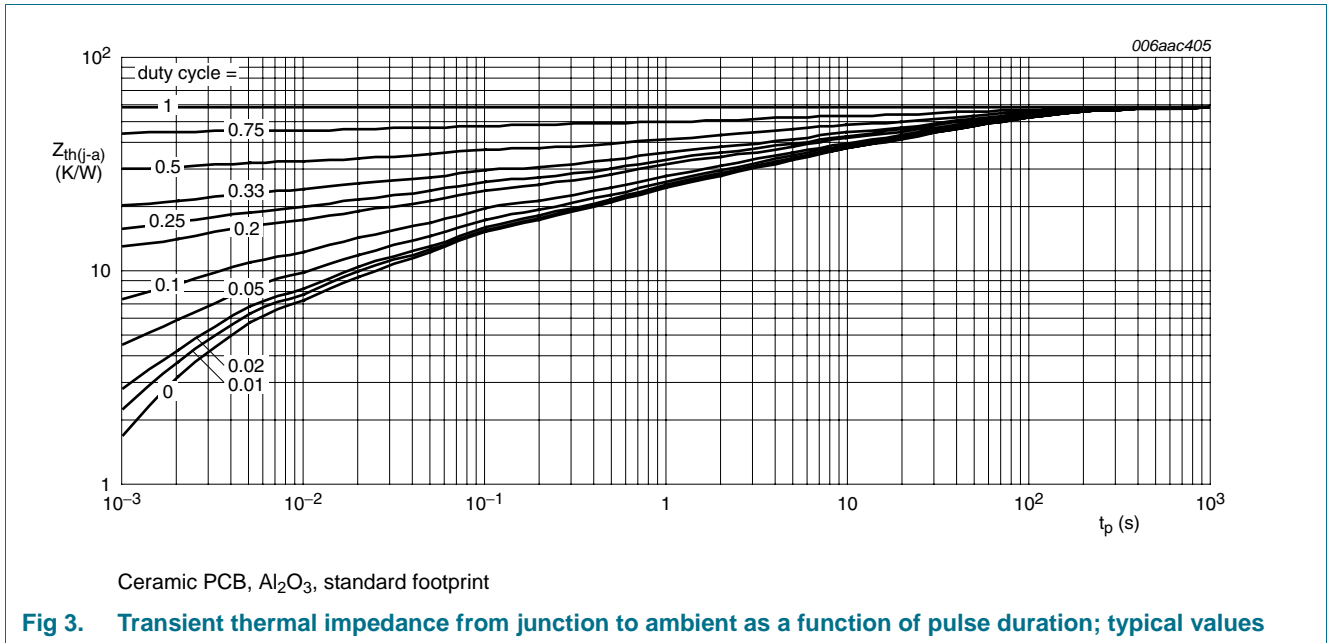
FR4 PCB, standard footprint

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<sup>2</sup>

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

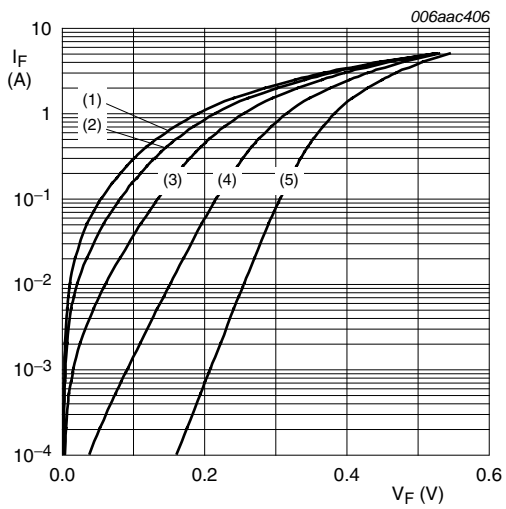


## 7. Characteristics

**Table 7. Characteristics**  
 $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

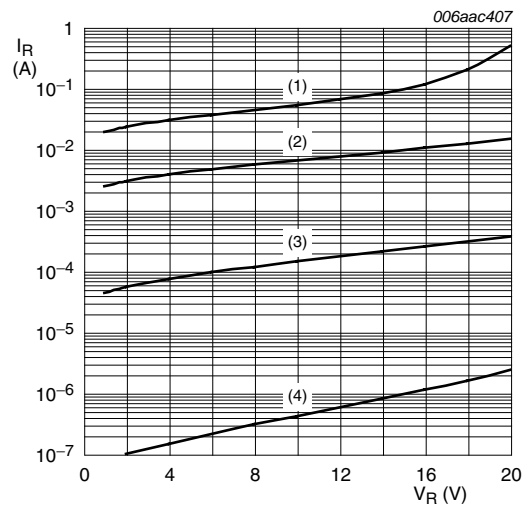
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_F$	forward voltage	$I_F = 100\text{ mA}$	-	220	-	mV
		$I_F = 1\text{ A}$	-	320	360	mV
		$I_F = 2\text{ A}$	-	385	420	mV
$I_R$	reverse current	$V_R = 10\text{ V}$	-	160	-	$\mu\text{A}$
		$V_R = 20\text{ V}$	-	380	1000	$\mu\text{A}$
$C_d$	diode capacitance	$f = 1\text{ MHz}$				
		$V_R = 1\text{ V}$	-	175	-	pF
		$V_R = 10\text{ V}$	-	65	-	pF
$t_{rr}$	reverse recovery time		[1]	55	-	ns

[1] When switched from  $I_F = 10\text{ mA}$  to  $I_R = 10\text{ mA}$ ;  $R_L = 100\ \Omega$ ; measured at  $I_R = 1\text{ mA}$ .



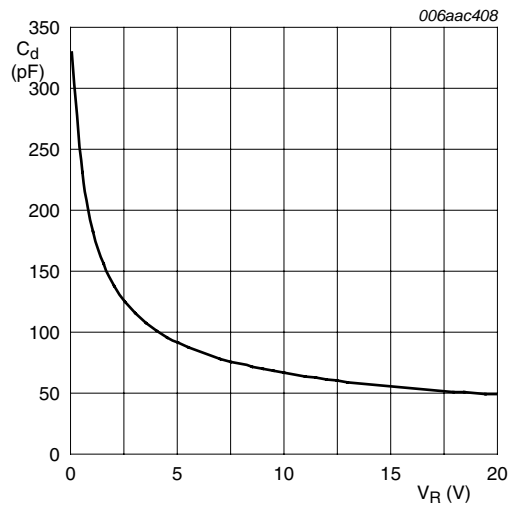
- (1)  $T_j = 150\text{ °C}$
- (2)  $T_j = 125\text{ °C}$
- (3)  $T_j = 85\text{ °C}$
- (4)  $T_j = 25\text{ °C}$
- (5)  $T_j = -40\text{ °C}$

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



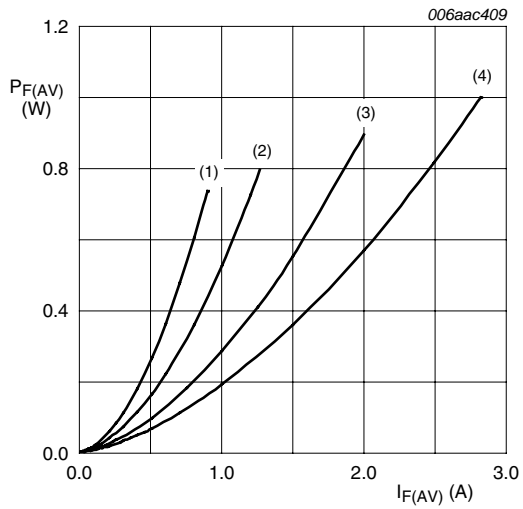
- (1)  $T_j = 125\text{ °C}$
- (2)  $T_j = 85\text{ °C}$
- (3)  $T_j = 25\text{ °C}$
- (4)  $T_j = -40\text{ °C}$

**Fig 5. Reverse current as a function of reverse voltage; typical values**



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

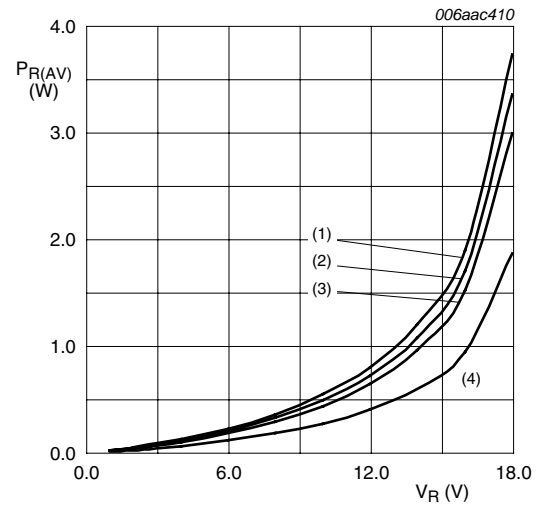
**Fig 6. Diode capacitance as a function of reverse voltage; typical values**



$T_j = 150\text{ }^\circ\text{C}$

- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

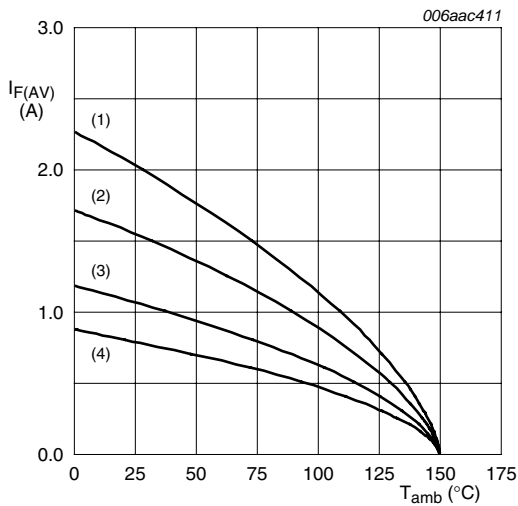
**Fig 7. Average forward power dissipation as a function of average forward current; typical values**



$T_j = 125\text{ }^\circ\text{C}$

- (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**

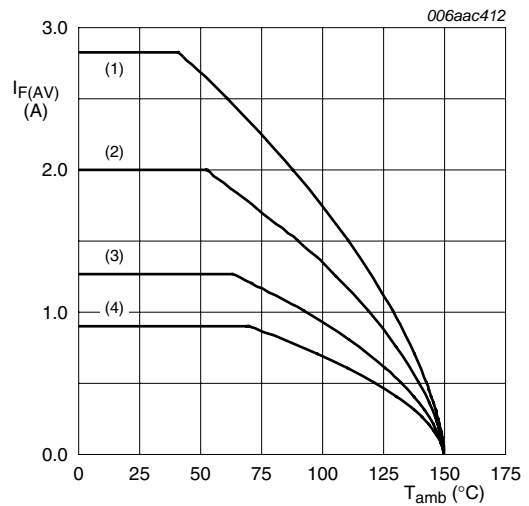


FR4 PCB, standard footprint

$T_j = 150\text{ }^\circ\text{C}$

- (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**

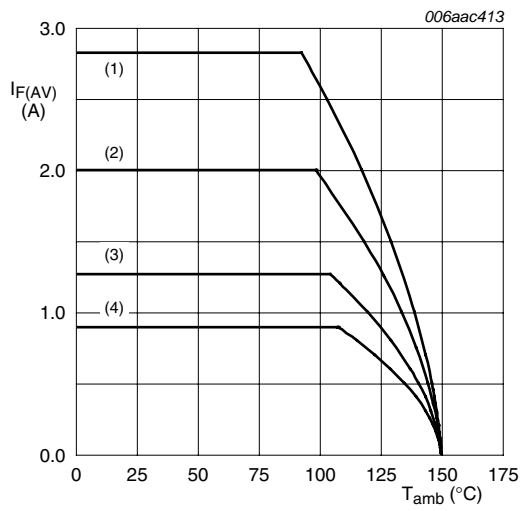


FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$

$T_j = 150\text{ }^\circ\text{C}$

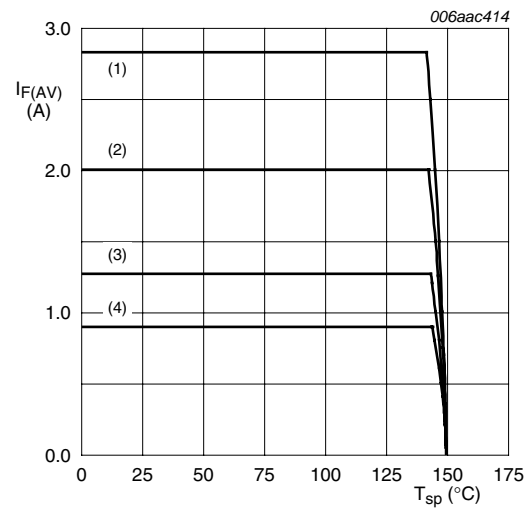
- (1)  $\delta = 1$ ; DC
- (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$
- (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$
- (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



Ceramic PCB,  $Al_2O_3$ , standard footprint  
 $T_j = 150\text{ °C}$   
 (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 11. Average forward current as a function of ambient temperature; typical values**

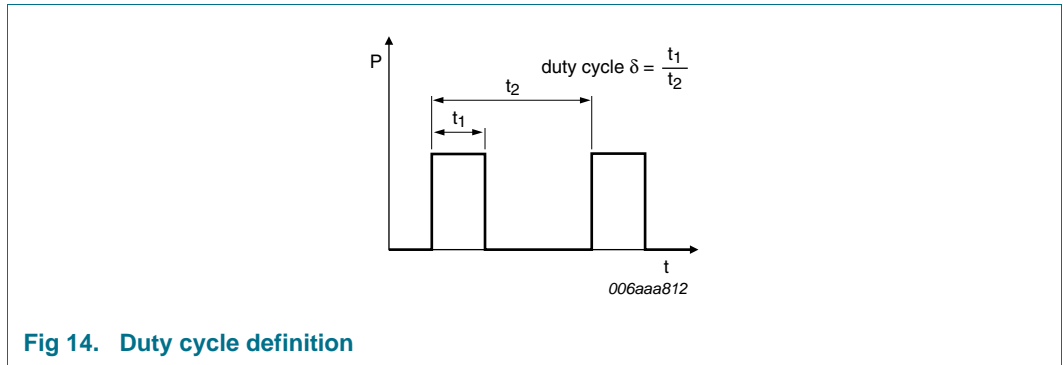
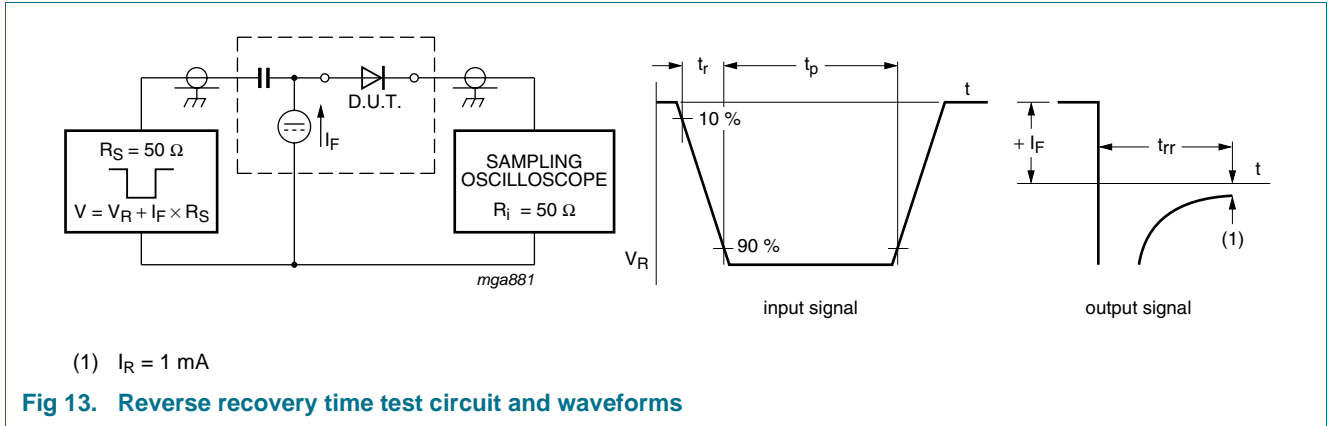


$T_j = 150\text{ °C}$   
 (1)  $\delta = 1; DC$   
 (2)  $\delta = 0.5; f = 20\text{ kHz}$   
 (3)  $\delta = 0.2; f = 20\text{ kHz}$   
 (4)  $\delta = 0.1; f = 20\text{ kHz}$

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



8. Test information

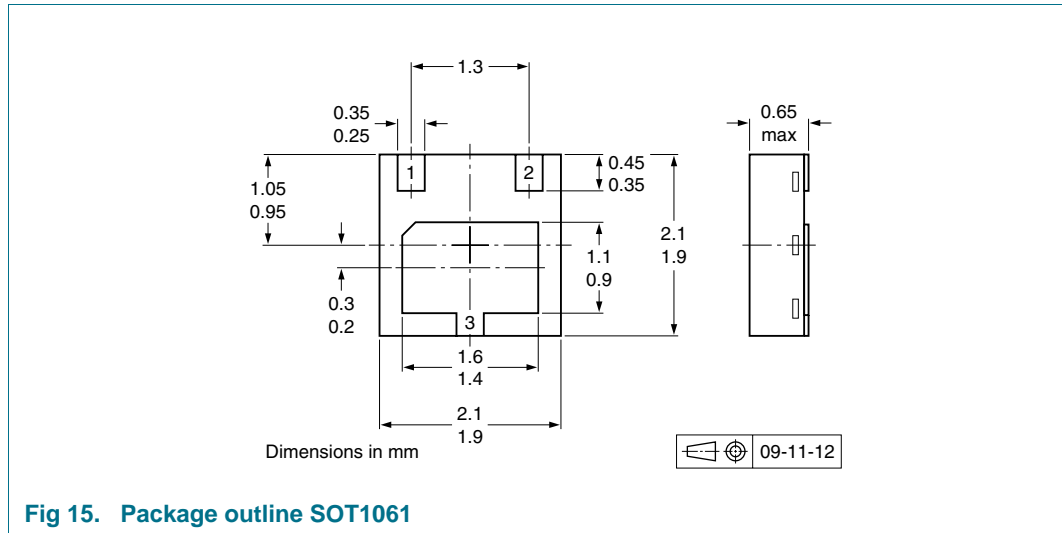


The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#), [11](#) and [12](#) are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,  $I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  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



## 10. Packing information

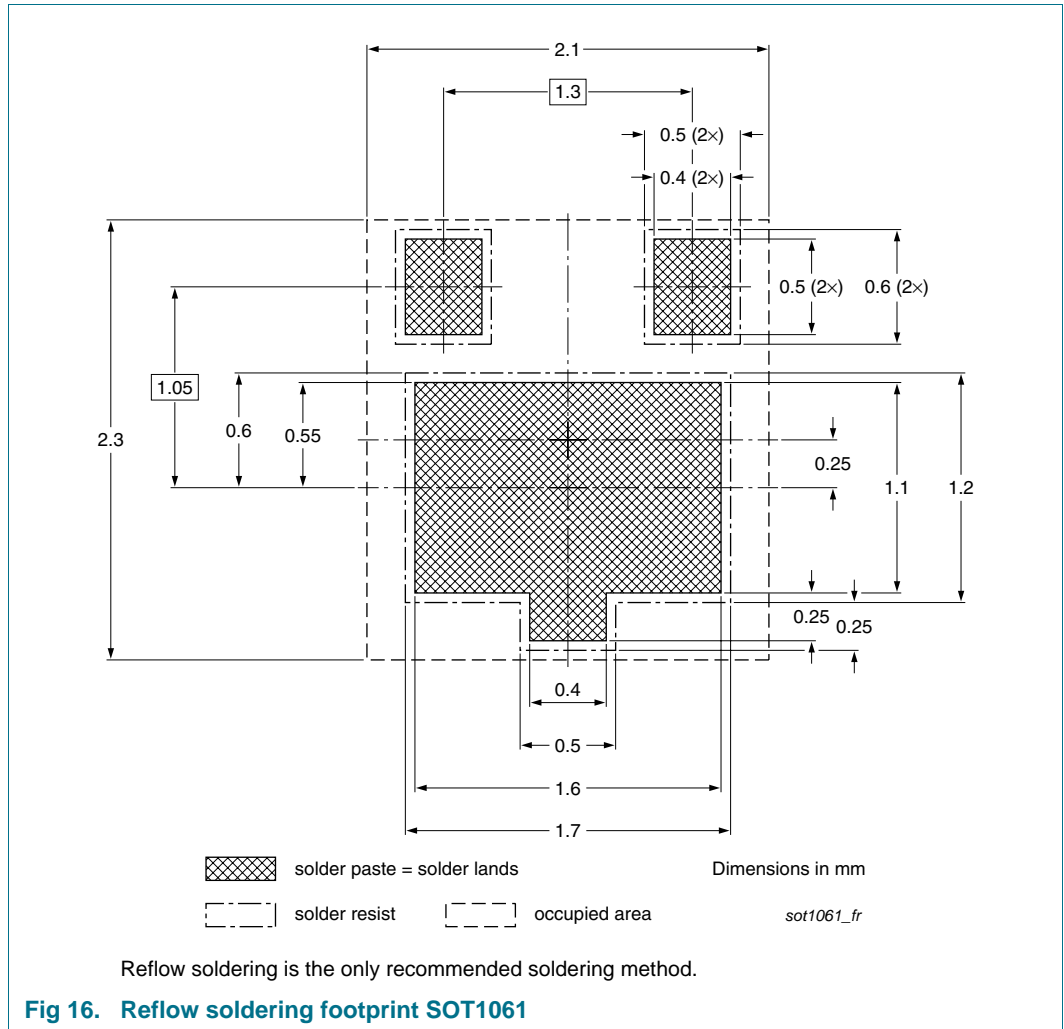
**Table 8. Packing methods**

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

Type number	Package	Description	Packing quantity
PMEG2020CPA	SOT1061	4 mm pitch, 8 mm tape and reel	3000 -115

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

**11. Soldering**



## 12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2020CPA v.1	20100805	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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