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Kind regards,

Team Nexperia



PMEG4020EPA

2 A low V_F MEGA Schottky barrier rectifier Rev. 01 — 16 December 2009

Product data sheet

Product profile

1.1 General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection. PMEG4020EPA 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)} ≤ 2 A
- Reverse voltage: V_R ≤ 40 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

reverse current

Battery chargers for mobile equipment

1.4 Quick reference data

 I_R

Quick reference data Table 1. $T_i = 25 \, ^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
I _{F(AV)} average forward co	average forward current	square wave; $\delta = 0.5$; $f = 20 \text{ kHz}$				
		$T_{amb} \le 65 ^{\circ}C$	<u>[1]</u> _	-	2	Α
		$T_{sp} \le 140 ^{\circ}C$	-	-	2	Α
V_R	reverse voltage		-	-	40	V
V_{F}	forward voltage	I _F = 2 A	-	470	535	mV

 $V_{R} = 40 \ V$

^[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al₂O₃, standard footprint.



100

μΑ

20

2. Pinning information

Table 2. Pinning

	3		
Pin	Description	Simplified outline	Graphic symbol
1	anode		
2	anode	3	3
3	cathode		006aab624
		Transparent top view	

3. Ordering information

Table 3. Ordering information

Type number	Package	Package		
	Name	Description	Version	
PMEG4020EPA	HUSON3	plastic thermal enhanced ultra thin small outline package; no leads; three terminals; body $2\times2\times0.65$ mm	SOT1061	

4. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020EPA	A3

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	-	40	V
$I_{F(AV)}$	average forward current	square wave; δ = 0.5; f = 20 kHz			
		T _{amb} ≤ 65 °C	<u>[1]</u> -	2	Α
		T _{sp} ≤ 140 °C	-	2	Α
I _{FRM}	repetitive peak forward current	$\begin{array}{l} t_p \leq 1 \text{ ms;} \\ \delta \leq 0.25 \end{array}$	[2] _	7	Α
I _{FSM}	non-repetitive peak forward current	square wave; t _p = 8 ms	[2][3] _	18	Α
P _{tot}	total power dissipation	$T_{amb} \le 25 ^{\circ}C$	[4][5]	520	mW
			[4][6]	1050	mW
			[4][1]	1900	mW

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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, Al₂O₃, 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 cm².

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
R _{th(j-a)} thermal resistance from junction to ambient	thermal resistance from	in free air	[1][2]			
	junction to ambient		[3] _	-	240	K/W
			[4] _	-	120	K/W
			<u>[5]</u> _	-	65	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point		<u>[6]</u> _	-	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 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Soldering point of cathode tab.

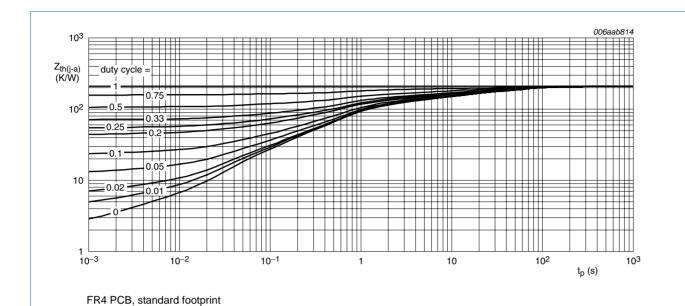
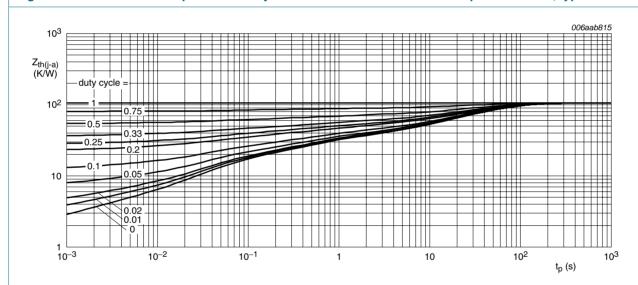
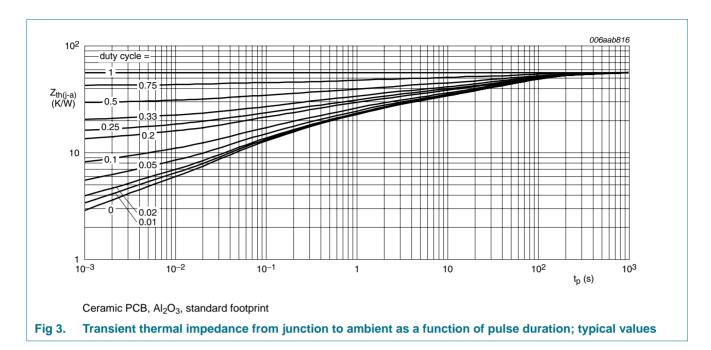


Fig 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



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



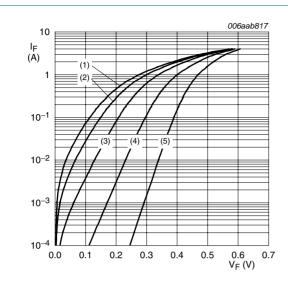
7. Characteristics

Table 7. Characteristics

 $T_i = 25$ °C unless otherwise specified.

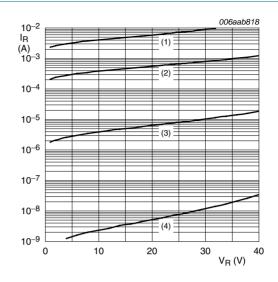
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V_{F}	forward voltage	$I_F = 0.5 A$	-	360	-	mV
		I _F = 1 A	-	400	-	mV
		I _F = 2 A	-	470	535	mV
I _R	reverse current	V _R = 10 V	-	5	-	μΑ
	V _R = 40 V	-	20	100	μΑ	
C _d	diode capacitance	f = 1 MHz				
		$V_R = 1 V$	-	270	-	pF
		V _R = 10 V	-	100	-	pF
t _{rr}	reverse recovery time		<u>[1]</u> -	85	-	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) $T_i = 150 \, ^{\circ}\text{C}$
- (2) T_j = 125 °C
- (3) $T_i = 85 \, ^{\circ}C$
- (4) $T_i = 25 \, ^{\circ}C$
- (5) $T_i = -40 \, ^{\circ}\text{C}$

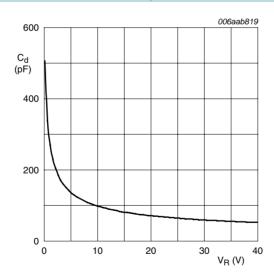
Forward current as a function of forward Fig 4. voltage; typical values



- (1) $T_i = 125 \, ^{\circ}C$
- (2) $T_i = 85 \, ^{\circ}C$
- (3) $T_j = 25 \, ^{\circ}C$
- (4) $T_i = -40 \, ^{\circ}\text{C}$

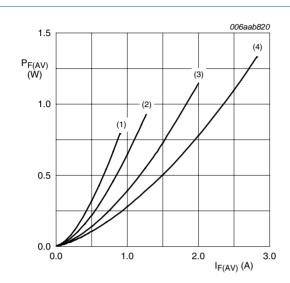
Reverse current as a function of reverse Fig 5. voltage; typical values

6 of 13



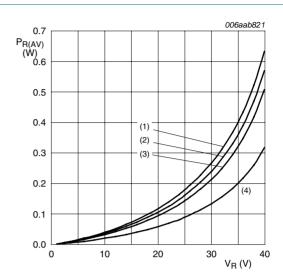
 $f = 1 \text{ MHz}; T_{amb} = 25 ^{\circ}\text{C}$

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



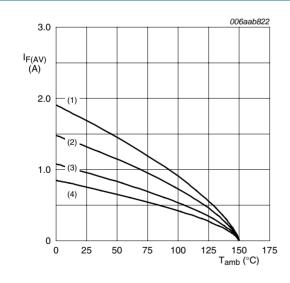
- (1) $\delta = 0.1$
- (2) $\delta = 0.2$
- (3) $\delta = 0.5$
- (4) $\delta = 1$

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



- (1) $\delta = 1$
- (2) $\delta = 0.9$
- (3) $\delta = 0.8$
- (4) $\delta = 0.5$

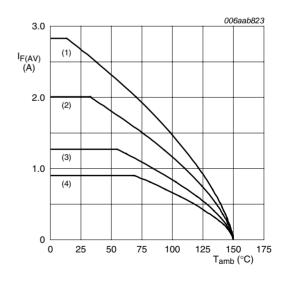
Fig 8. Average reverse power dissipation as a function of reverse voltage; typical values



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

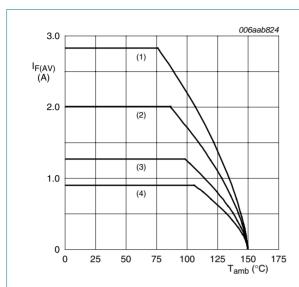
- (1) $\delta = 1$; DC
- (2) $\delta = 0.5$; f = 20 kHz
- (3) $\delta = 0.2$; f = 20 kHz
- (4) $\delta = 0.1$; f = 20 kHz

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

Product data sheet

PMEG4020EPA

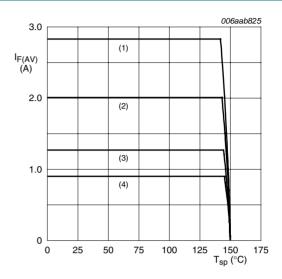
2 A low V_F MEGA Schottky barrier rectifier



Ceramic PCB, Al₂O₃, standard footprint

- (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

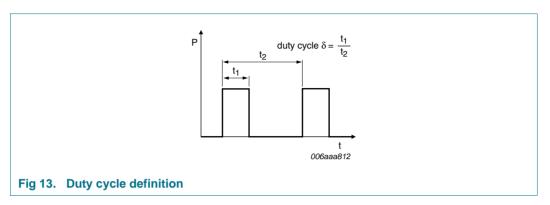
Fig 11. Average forward current as a function of ambient temperature; typical values



- (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

8. Test information

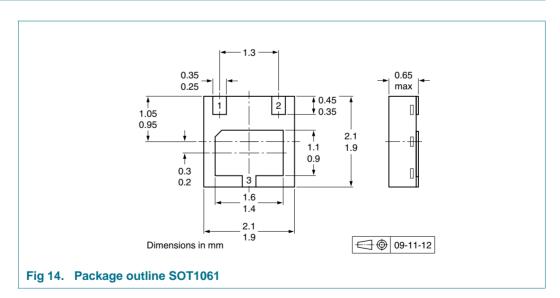


The current ratings for the typical waveforms as shown in Figure 9, 10, 11 and 12 are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

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

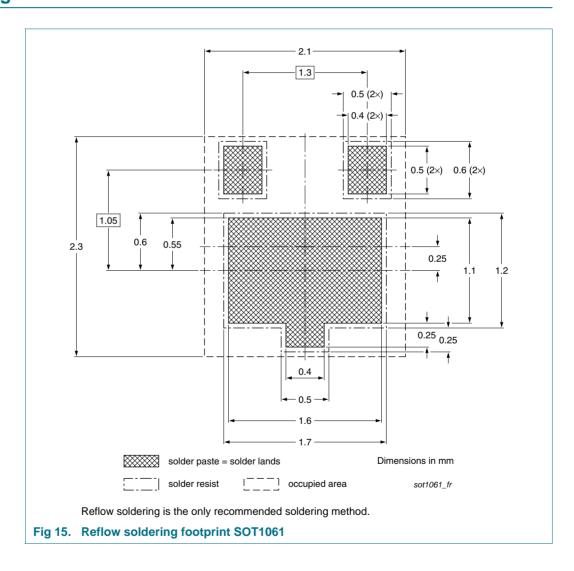
Table 8. Packing methods

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

Type number	Package	Description	Packing quantity
			3000
PMEG4020EPA	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





12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4020EPA_1	20091216	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.
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PMEG4020EPA

2 A low V_F MEGA Schottky barrier rectifier

15. Contents

1	Product profile
1.1	General description 1
1.2	Features
1.3	Applications
1.4	Quick reference data 1
2	Pinning information
3	Ordering information
4	Marking 2
5	Limiting values
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
13.2	Definitions
13.3	Disclaimers
13.4	Trademarks12
14	Contact information 12
15	Contents

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