PMEG4010ETP

40 V, 1 A low VF MEGA Schottky barrier rectifier

Rev. 1 — 5 October 2011 | 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 SOD128 small and flat lead Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Average forward current: $I_{F(AV)} \leq 1$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- AEC-Q101 qualified
- High temperature $T_j \leq 175$ °C

1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- High temperature applications

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	square wave; δ = 0.5; f = 20 kHz; $T_{amb} \leq 145$ °C	[1]	-	-	1	A
		square wave; δ = 0.5; f = 20 kHz; $T_{sp} \leq 165$ °C		-	-	1	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	40	V
V_F	forward voltage	$I_F = 1$ A; $T_j = 25$ °C		-	430	490	mV
I_R	reverse current	$V_R = 40$ V; $T_j = 25$ °C		-	10	50	µA

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

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 SOD128	
2	A	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4010ETP	-	plastic surface-mounted package; 2 leads	SOD128

4. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4010ETP	C1

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} ≤ 145 °C	[1]	-	1	A
		square wave; δ = 0.5; f = 20 kHz; T_{sp} ≤ 165 °C		-	1	A
I_{FSM}	non-repetitive peak forward current	square wave; t_p = 8 ms; $T_{j(init)}$ = 25 °C		-	50	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2][3]	-	750	mW
			[4][3]	-	1250	mW
			[1][3]	-	2500	mW
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	storage temperature			-65	175	°C

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

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

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

[4] 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]	-	-	200	K/W
			[1][4][3]	-	-	120	K/W
			[1][5][3]	-	-	60	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.

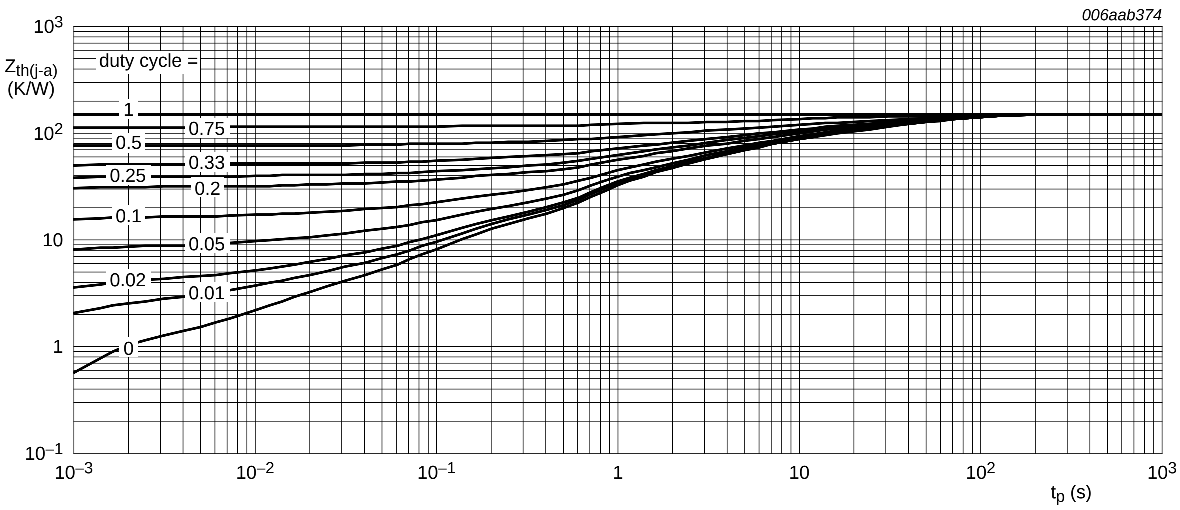
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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

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

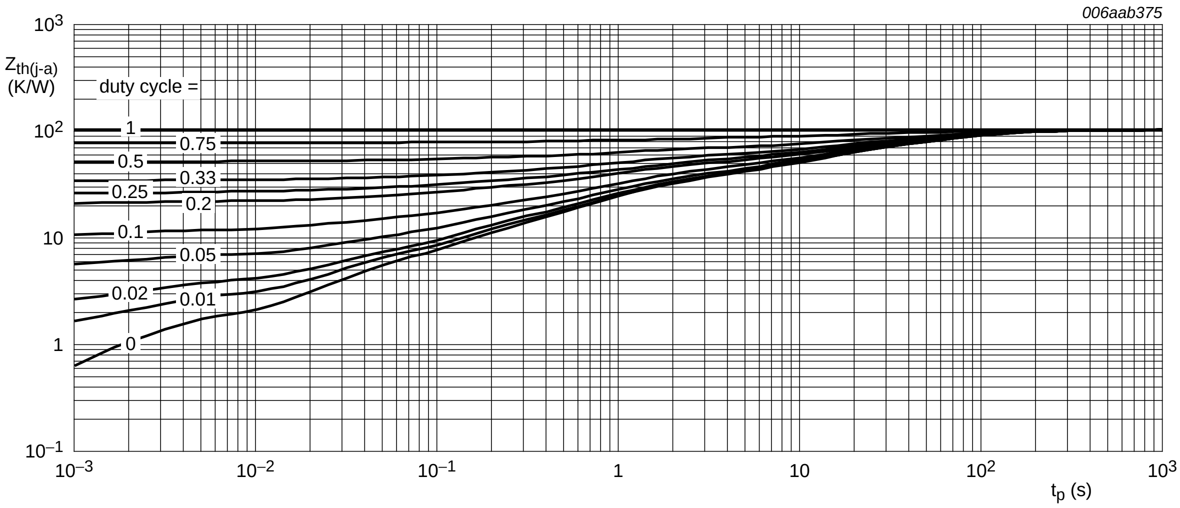
[5] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

[6] Soldering point of cathode tab.



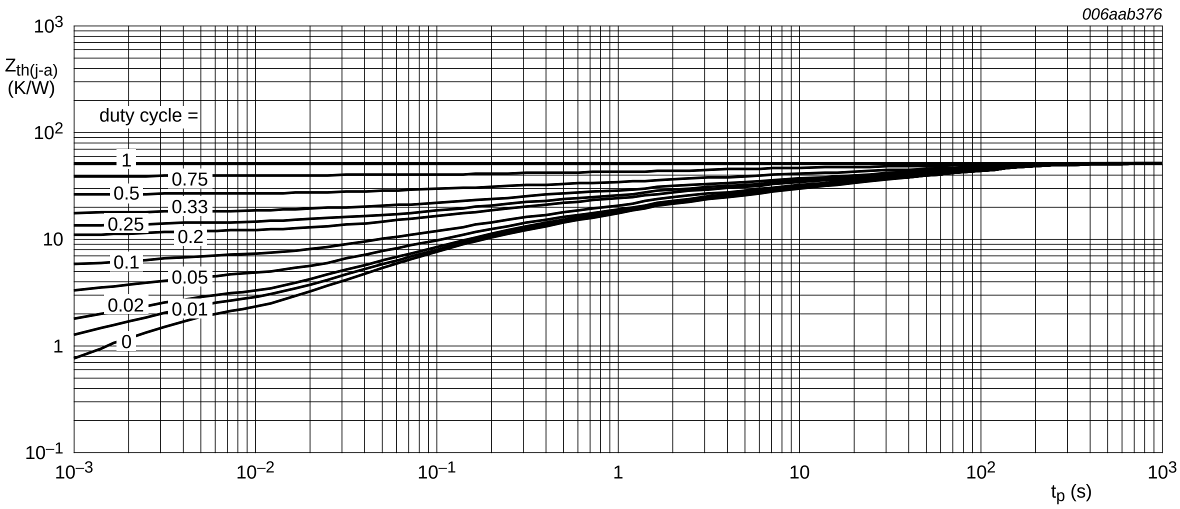
FR4 PCB, standard footprint

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



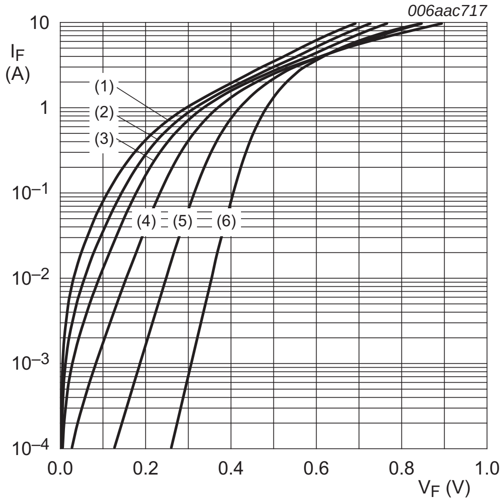
Ceramic PCB, Al_2O_3, standard footprint

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	I_F = 0.1 A; T_j = 25 °C	-	310	360	mV
		I_F = 1 A; T_j = 25 °C	-	430	490	mV
		I_F = 1 A; T_j = 125 °C	-	330	380	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C	-	3	13	µA
		V_R = 40 V; T_j = 25 °C	-	10	50	µA
		V_R = 10 V; T_j = 125 °C	-	2	-	mA
		V_R = 40 V; T_j = 125 °C	-	6	-	mA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C	-	130	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C	-	50	-	pF



(1) T_j = 175 °C

(2) T_j = 150 °C

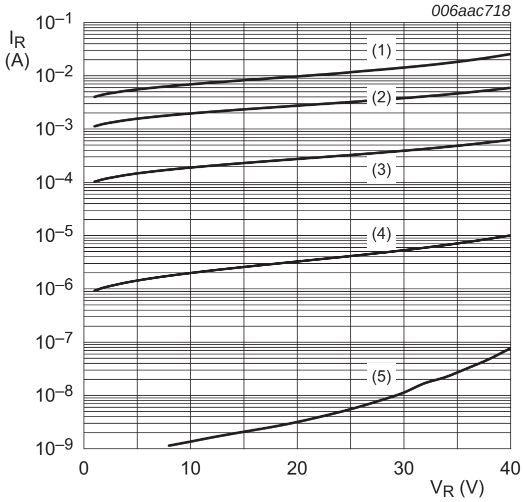
(3) T_j = 125 °C

(4) T_j = 85 °C

(5) T_j = 25 °C

(6) T_j = −40 °C

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



(1) T_j = 150 °C

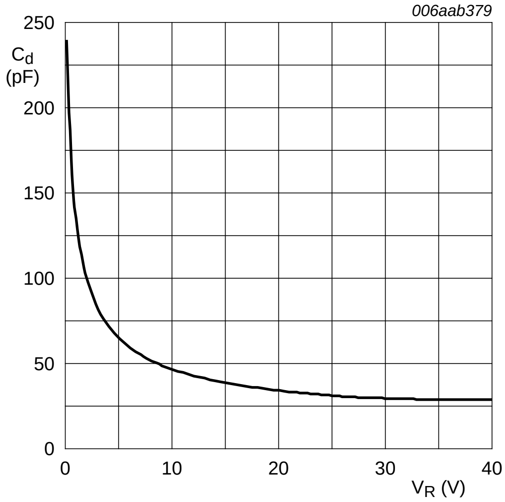
(2) T_j = 125 °C

(3) T_j = 85 °C

(4) T_j = 25 °C

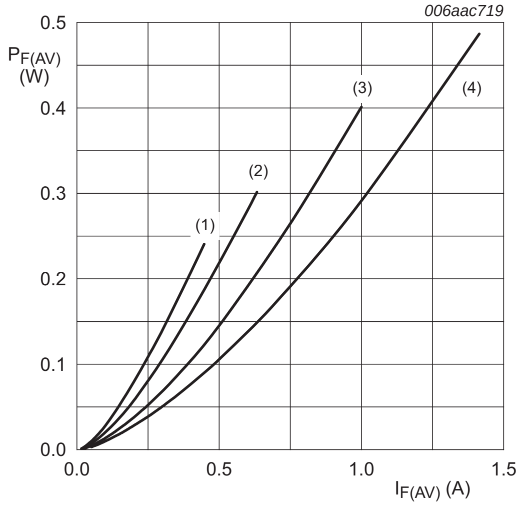
(5) T_j = −40 °C

Fig 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 = 175 °C

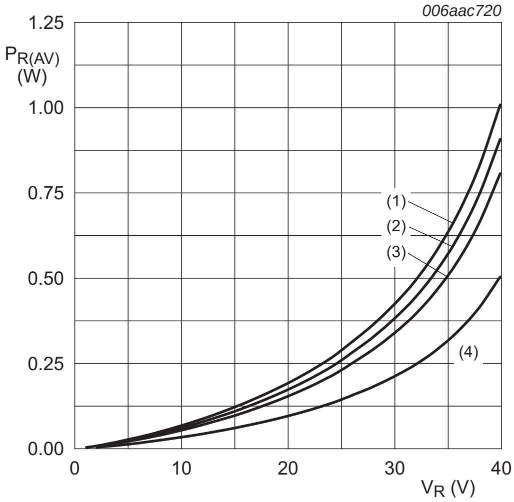
(1) δ = 0.1

(2) δ = 0.2

(3) δ = 0.5

(4) δ = 1.0

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



T_j = 150 °C

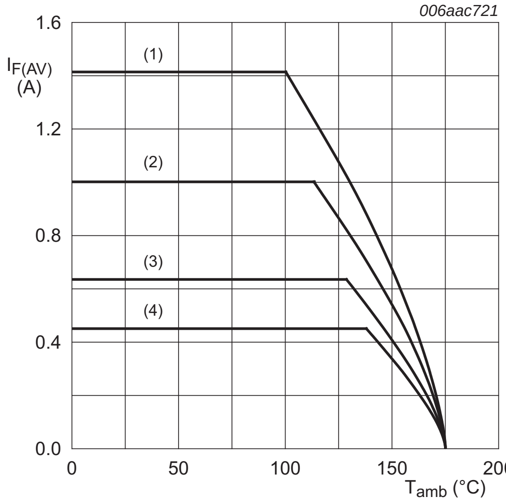
(1) δ = 1.0

(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 = 175 °C

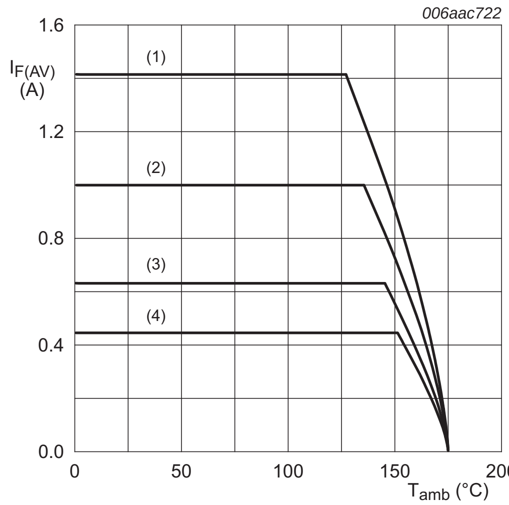
(1) δ = 1.0 (DC)

(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 = 175 °C

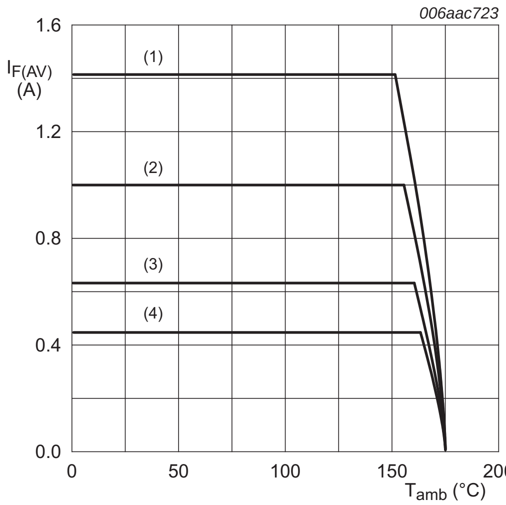
(1) δ = 1.0

(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

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



Ceramic PCB, Al_2O_3, standard footprint

T_j = 175 °C

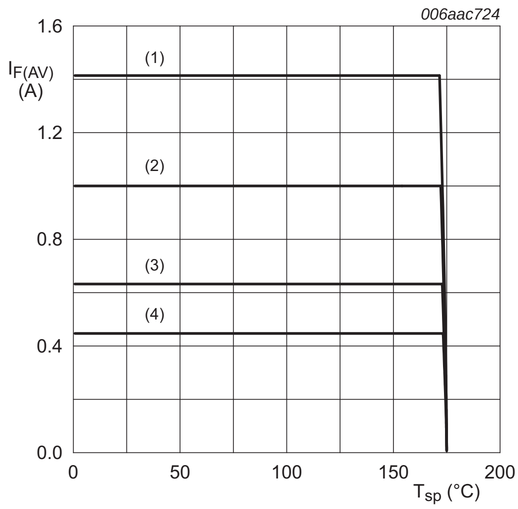
(1) δ = 1.0 (DC)

(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 = 175 °C

(1) δ = 1.0

(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

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

8. Test information

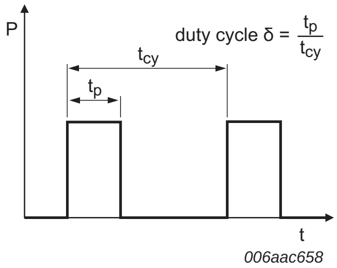


Fig 13. Duty cycle definition

The current ratings for the typical waveforms as shown in figures 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

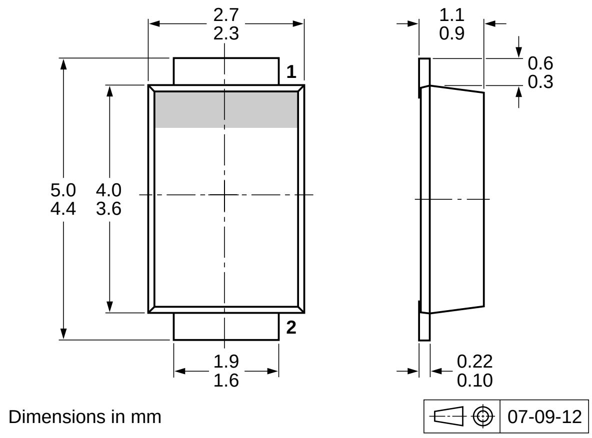


Fig 14. Package outline SOD128

10. Packing information

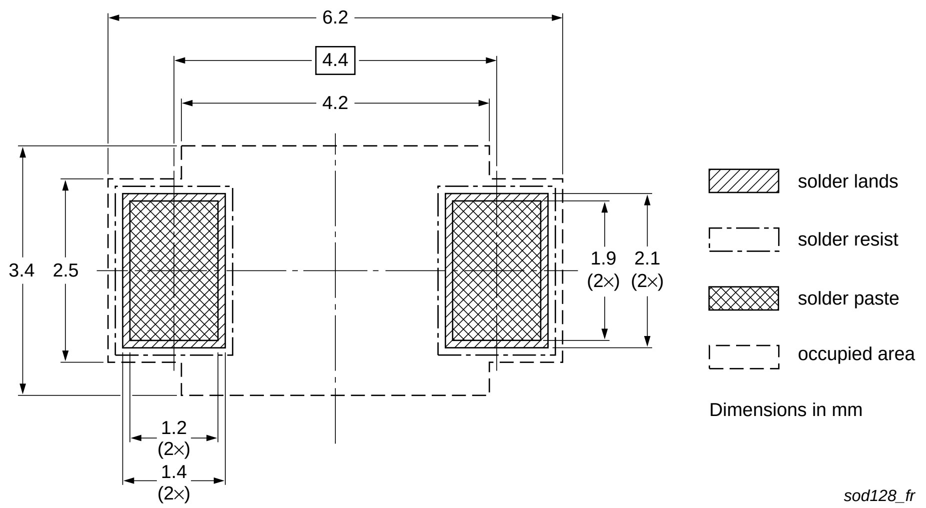
Table 8. Ordering information

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

Type number	Package	Description	Packing quantity
			3000
PMEG4010ETP	SOD128	4 mm pitch, 12 mm tape and reel	-115

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

11. Soldering



Reflow soldering is the only recommended soldering method.

Fig 15. Reflow soldering footprint for SOD128

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4010ETP v.1	20111005	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".

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15. Contents

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Date of release: 5 October 2011
Document identifier: PMEG4010ETP