



# PMEG45U10EPD

45 V, 10 A extremely low VF MEGA Schottky barrier rectifier

16 December 2014

Product data sheet

## 1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOT1289 (CFP15) power and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 10 \text{ A}$
- Reverse voltage:  $V_R \leq 45 \text{ V}$
- Extremely low forward voltage
- High power capability due to clip-bonding technology and heat sink
- Small and thin SMD power plastic package, typical height 0.78 mm

## 3. Applications

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

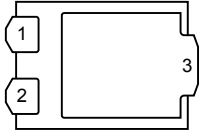
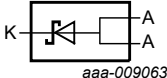
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20 \text{ kHz}$ ; $T_{sp} \leq 130 \text{ °C}$ ; square wave	-	-	10	A
$V_R$	reverse voltage	$T_j = 25 \text{ °C}$	-	-	45	V
$V_F$	forward voltage	$I_F = 10 \text{ A}$ ; $t_p \leq 300 \text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ °C}$ ; pulsed	-	430	490	mV
$I_R$	reverse current	$V_R = 10 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 25 \text{ °C}$ ; pulsed	-	20	50	$\mu\text{A}$
		$V_R = 45 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 25 \text{ °C}$ ; pulsed	-	230	600	$\mu\text{A}$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>CFP15 (SOT1289)</p>	 <p>aaa-009063</p>
2	A	anode		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG45U10EPD	CFP15	plastic, thermal enhanced ultra thin SMD package; 3 leads; body: 5.8 x 4.3 x 0.78 mm	SOT1289

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG45U10EPD	4510 UUUU

## 8. 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	$T_j = 25\text{ °C}$		-	45	V
$I_F$	forward current	$T_{sp} = 125\text{ °C}; \delta = 1$		-	14	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 130\text{ °C};$ square wave		-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}; T_{j(\text{init})} = 25\text{ °C};$ square wave		-	180	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	1.4	W
			[2]	-	1.8	W
			[3]	-	3.1	W
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C

Symbol	Parameter	Conditions	Min	Max	Unit
T <sub>stg</sub>	storage temperature		-65	150	°C

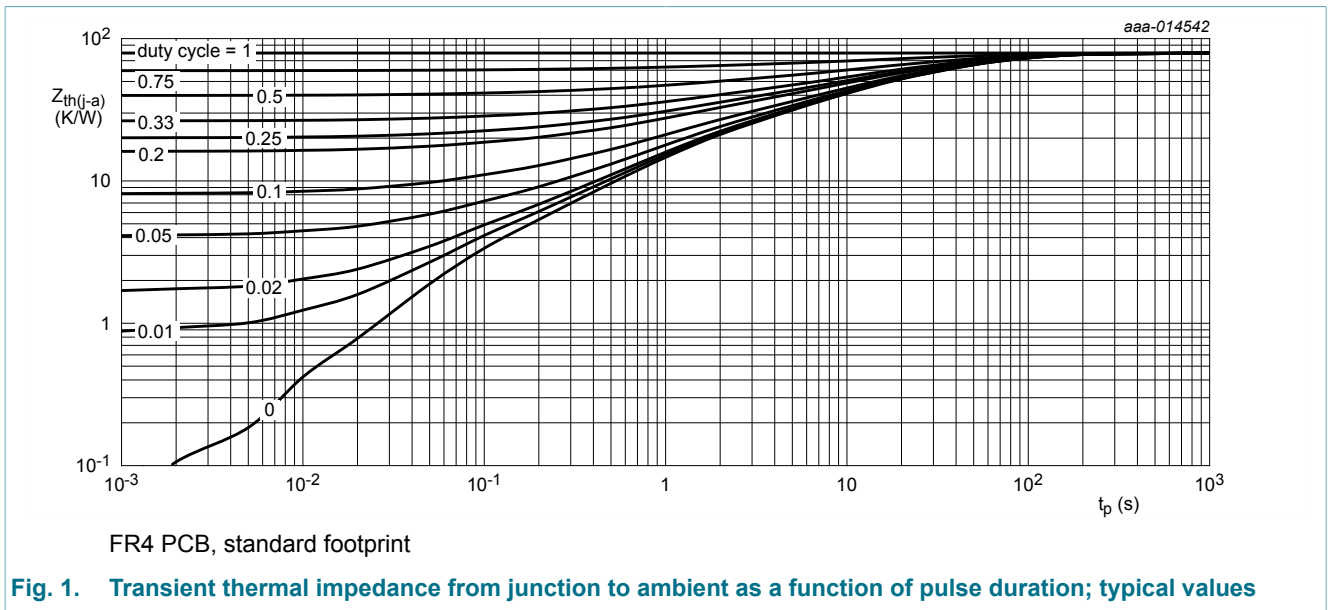
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.
- [3] Device mounted on a ceramic Printed-Circuit Board (PCB), Al<sub>2</sub>O<sub>3</sub>, standard footprint.

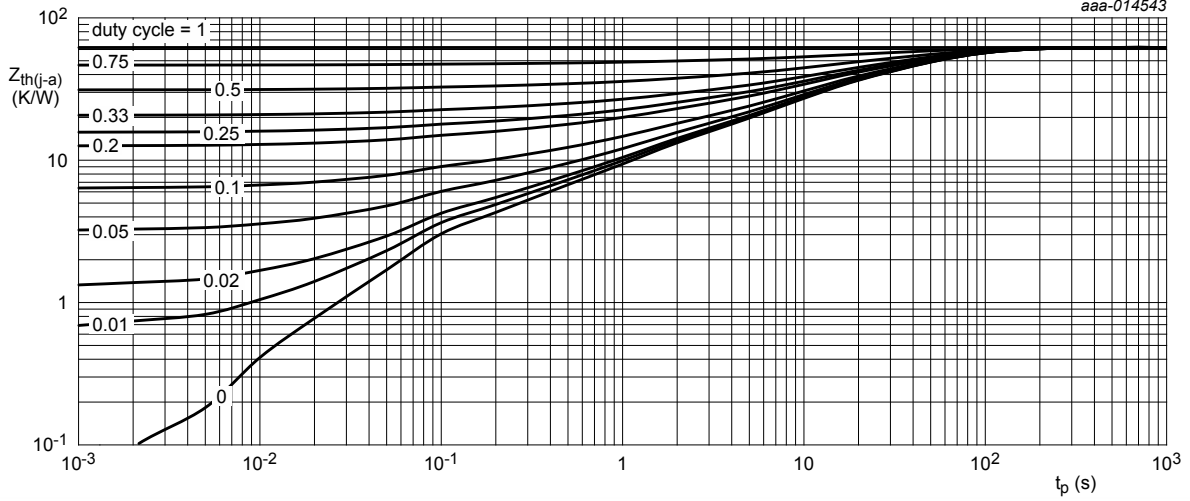
## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1][2]	-	-	90	K/W
			[1][3]	-	-	70	K/W
			[1][4]	-	-	40	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		[5]	-	-	3	K/W

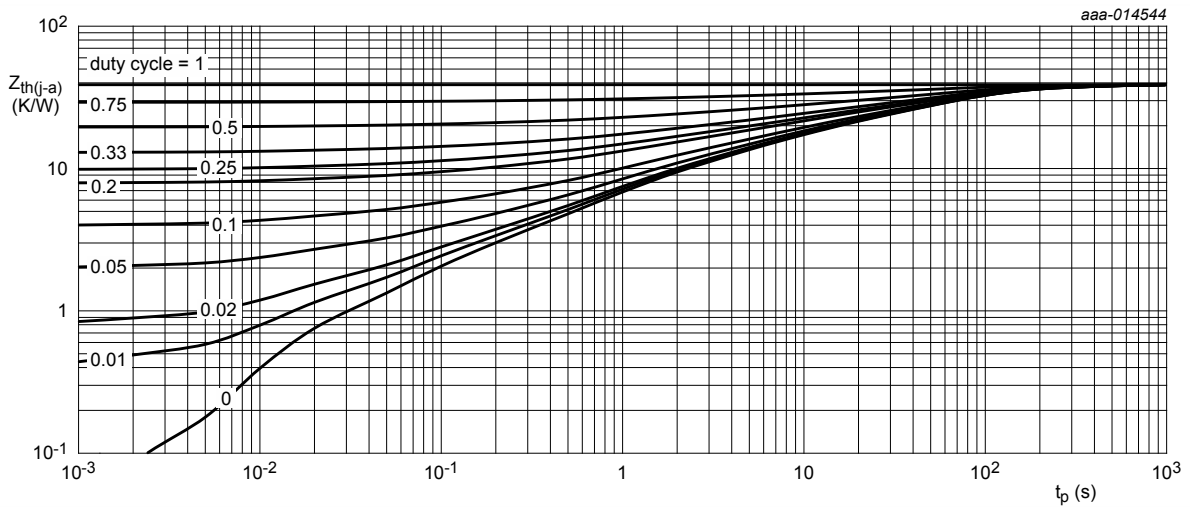
- [1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P<sub>R</sub> are a significant part of the total power losses.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.
- [4] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [5] Soldering point of cathode tab.





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

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



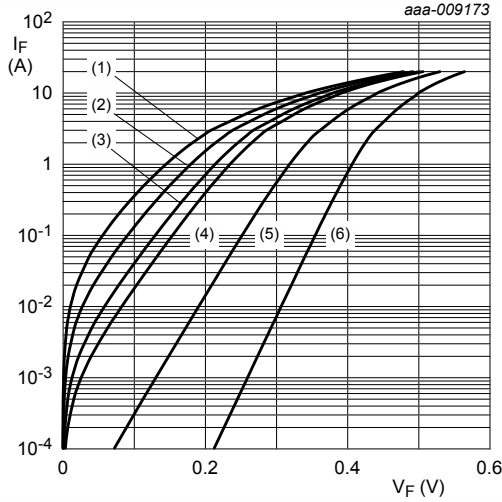
Ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint

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

## 10. Characteristics

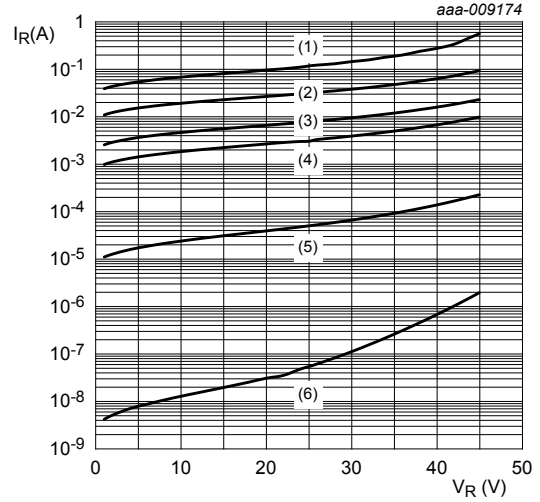
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 5 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; $t_p \leq 1.2 \text{ ms}$ ; $\delta \leq 0.12$ ; pulsed	45	-	-	V
$V_F$	forward voltage	$I_F = 1 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	314	360	mV
		$I_F = 2 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	338	-	mV
		$I_F = 3 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	355	-	mV
		$I_F = 5 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	380	430	mV
		$I_F = 10 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	430	490	mV
$I_R$	reverse current	$V_R = 5 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	15	-	$\mu\text{A}$
		$V_R = 10 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	20	50	$\mu\text{A}$
		$V_R = 30 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	65	-	$\mu\text{A}$
		$V_R = 45 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	230	600	$\mu\text{A}$
		$V_R = 10 \text{ V}$ ; $t_p \leq 3 \text{ ms}$ ; $\delta \leq 0.3$ ; $T_j = 125 \text{ }^\circ\text{C}$ ; pulsed	-	20	-	mA
$C_d$	diode capacitance	$V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	1170	-	pF
		$V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	390	-	pF
$t_{rr}$	reverse recovery time step recovery	$I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	34	-	ns
$t_{rr}$	reverse recovery time ramp recovery	$dI_F/dt = 200 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; $I_F = 6 \text{ A}$ ; $V_R = 26 \text{ V}$	-	16	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	300	-	mV



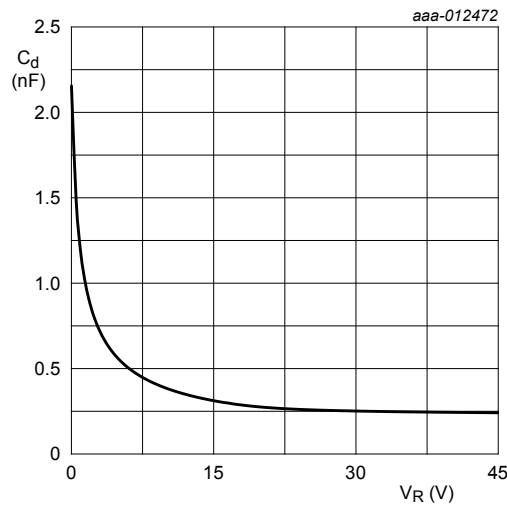
pulsed condition  
 (1)  $T_j = 150\text{ }^\circ\text{C}$   
 (2)  $T_j = 125\text{ }^\circ\text{C}$   
 (3)  $T_j = 100\text{ }^\circ\text{C}$   
 (4)  $T_j = 85\text{ }^\circ\text{C}$   
 (5)  $T_j = 25\text{ }^\circ\text{C}$   
 (6)  $T_j = -40\text{ }^\circ\text{C}$

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



pulsed conditions  
 (1)  $T_j = 150\text{ }^\circ\text{C}$   
 (2)  $T_j = 125\text{ }^\circ\text{C}$   
 (3)  $T_j = 100\text{ }^\circ\text{C}$   
 (4)  $T_j = 85\text{ }^\circ\text{C}$   
 (5)  $T_j = 25\text{ }^\circ\text{C}$   
 (6)  $T_j = -40\text{ }^\circ\text{C}$

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



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

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

### 11. Test information

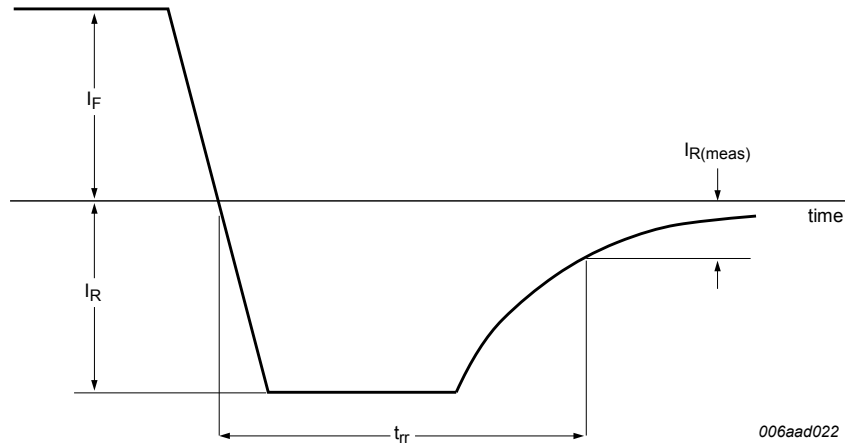


Fig. 7. Reverse recovery definition; step recovery

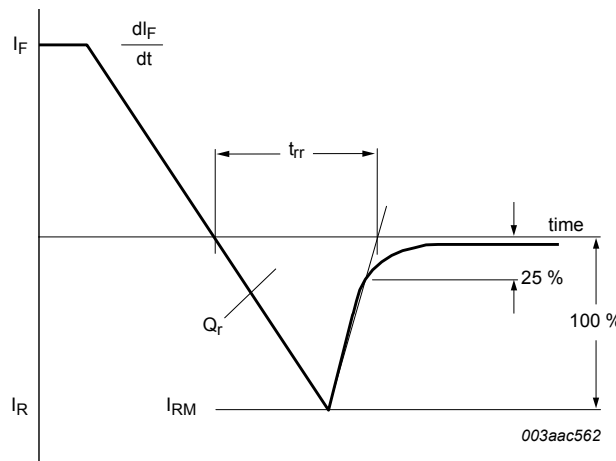


Fig. 8. Reverse recovery definition; ramp recovery

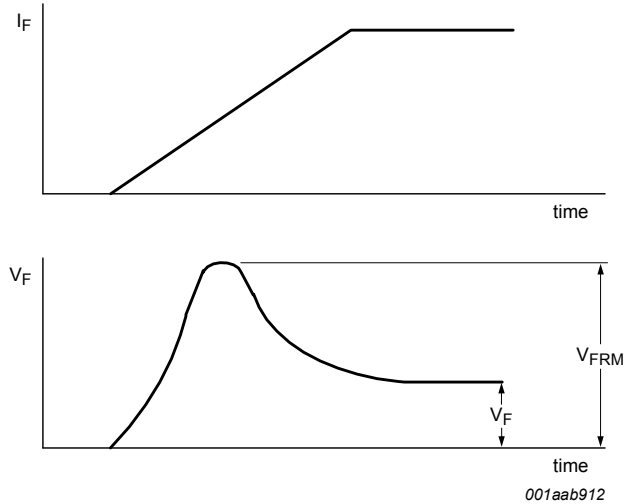


Fig. 9. Forward recovery definition

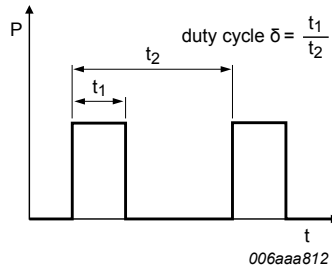


Fig. 10. Duty cycle definition

The current ratings for the typical waveforms 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.

## 12. Package outline

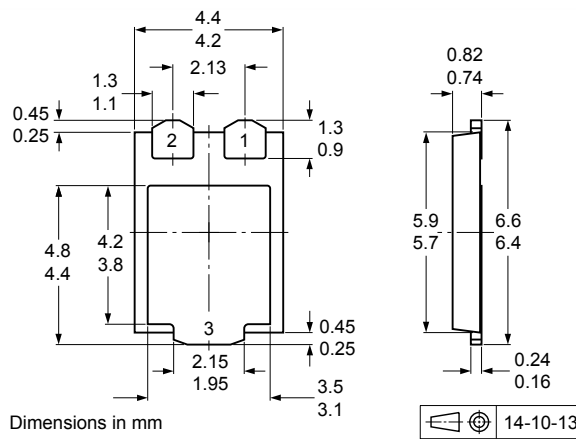


Fig. 11. Package outline CFP15 (SOT1289)



### 13. Soldering

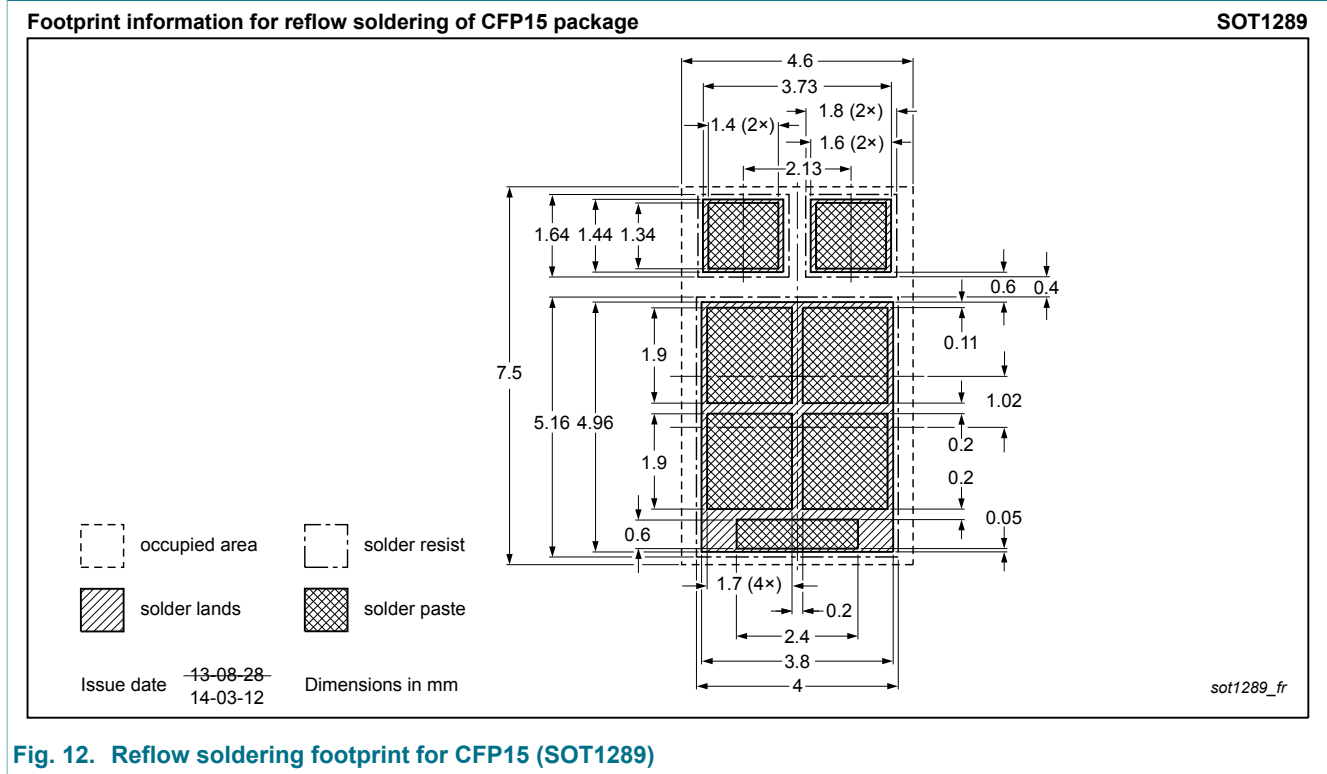


Fig. 12. Reflow soldering footprint for CFP15 (SOT1289)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG45U10EPD v.3	20141216	Product data sheet	-	PMEG45U10EPD v.2
Modifications:	<ul style="list-style-type: none"><li>Package outline drawing updated</li></ul>			
PMEG45U10EPD v.2	20140416	Product data sheet	-	PMEG45U10EPD v.1
PMEG45U10EPD v.1	20140217	Objective data sheet	-	-

## 15. Legal information

### 15.1 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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