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PMEG45T15EPD

45 V, 15 A low VF Trench MEGA Schottky barrier rectifier

4 September 2015

Product data sheet

1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier, encapsulated in a CFP15 (SOT1289) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 15 \text{ A}$
- Reverse voltage: $V_R \leq 45 \text{ V}$
- Low forward voltage
- Low leakage current due to Trench MEGA Schottky technology
- 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

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

4. Quick reference data

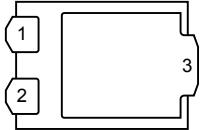
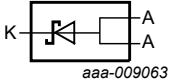
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20 \text{ kHz}$; $T_{sp} \leq 120 \text{ }^\circ\text{C}$; square wave	-	-	15	A
V_R	reverse voltage	$T_j = 25 \text{ }^\circ\text{C}$	-	-	45	V
V_F	forward voltage	$I_F = 15 \text{ A}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	480	580	mV
I_R	reverse current	$V_R = 10 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta \leq 0.03$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	16	50	μA
		$V_R = 45 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta \leq 0.03$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	30	100	μA



5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG45T15EPD	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
PMEG45T15EPD	4515 TTTT

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	$T_{sp} = 115\text{ °C}; \delta = 1$		-	21	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20\text{ kHz}; T_{sp} \leq 120\text{ °C};$ square wave		-	15	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8\text{ ms}; T_{j(\text{init})} = 25\text{ °C};$ square wave		-	210	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
T_{stg}	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^2 .

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

9. 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]	-	-	90	K/W
			[1][3]	-	-	70	K/W
			[1][4]	-	-	40	K/W
$R_{th(j-sp)}$	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_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] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

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

[5] Soldering point of cathode tab.

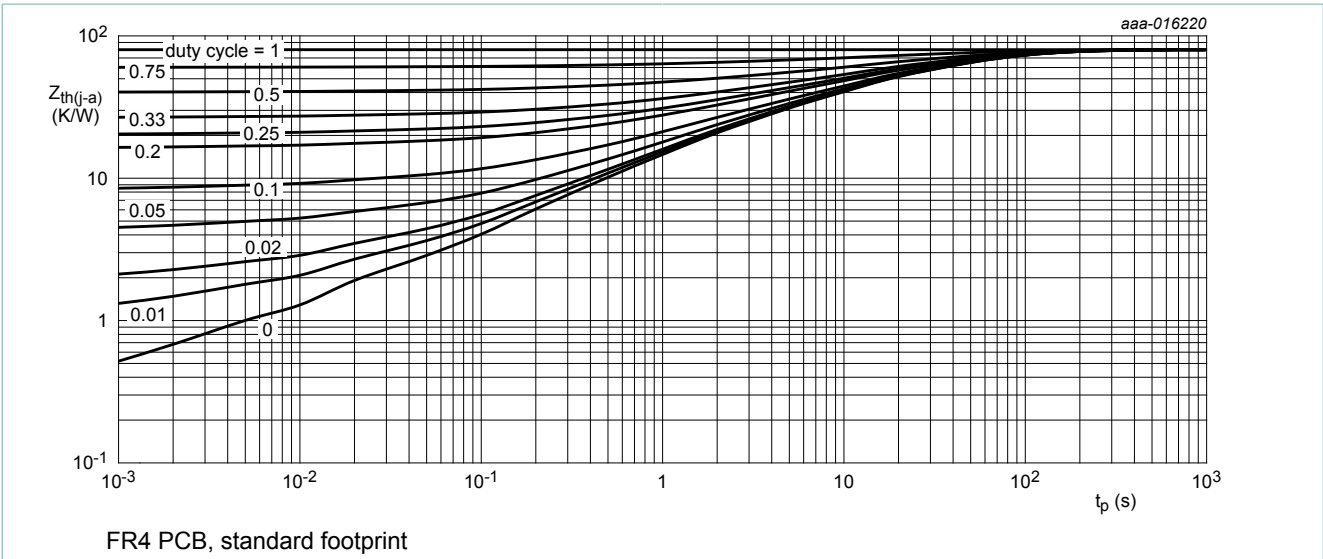


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

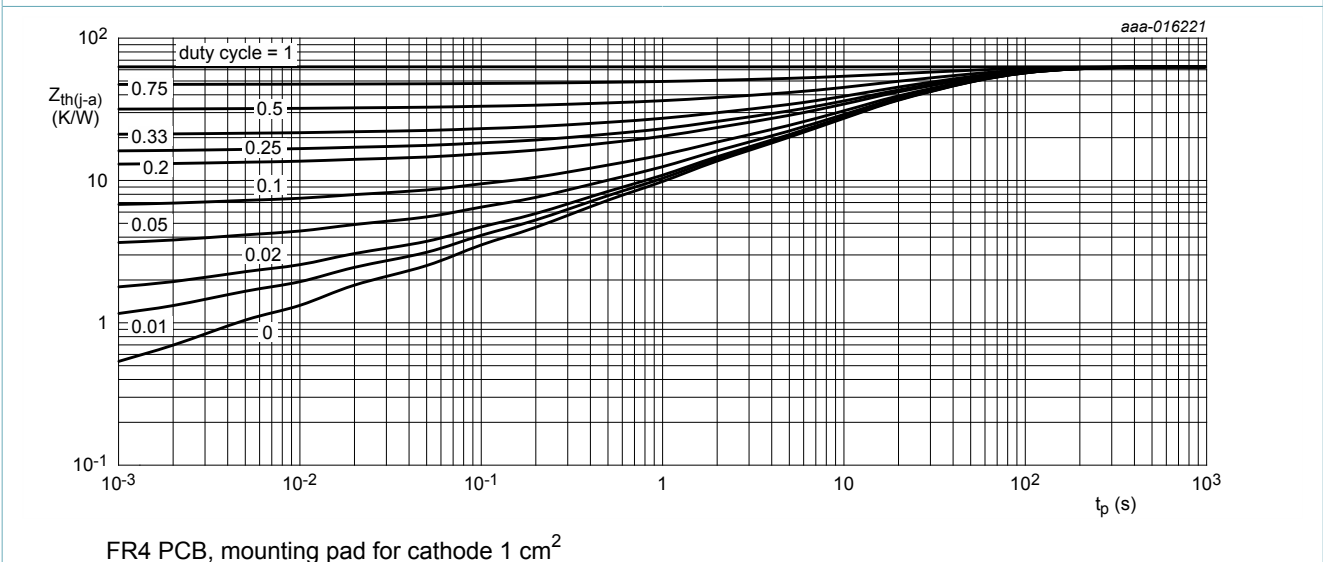
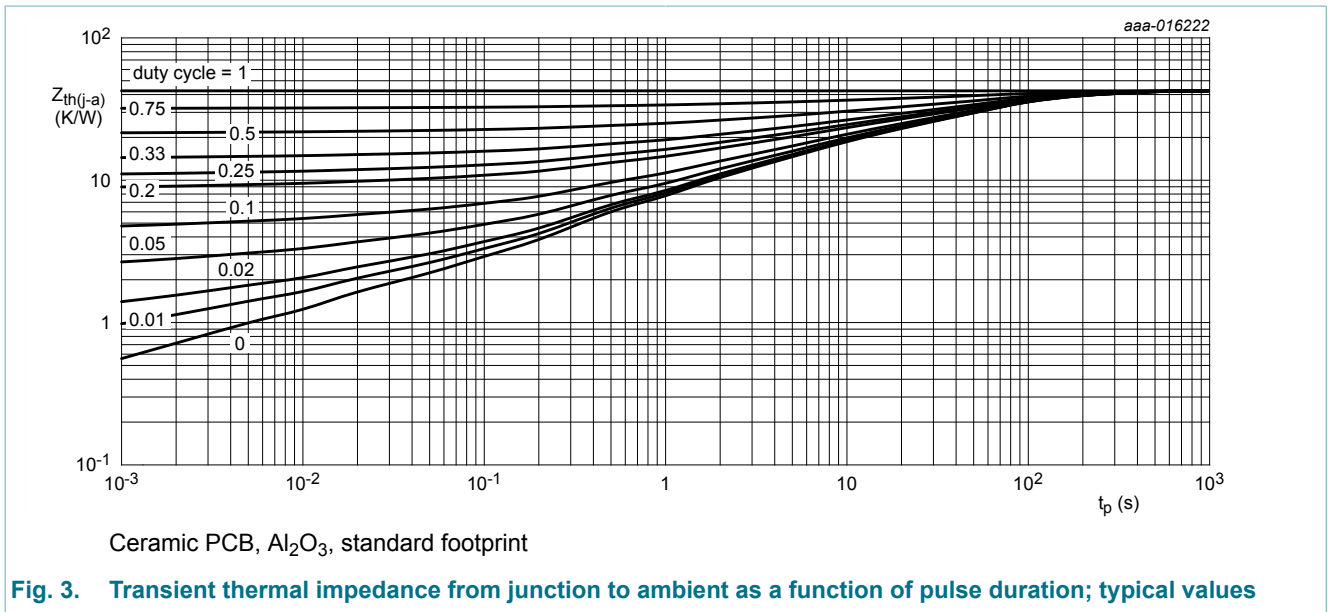


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

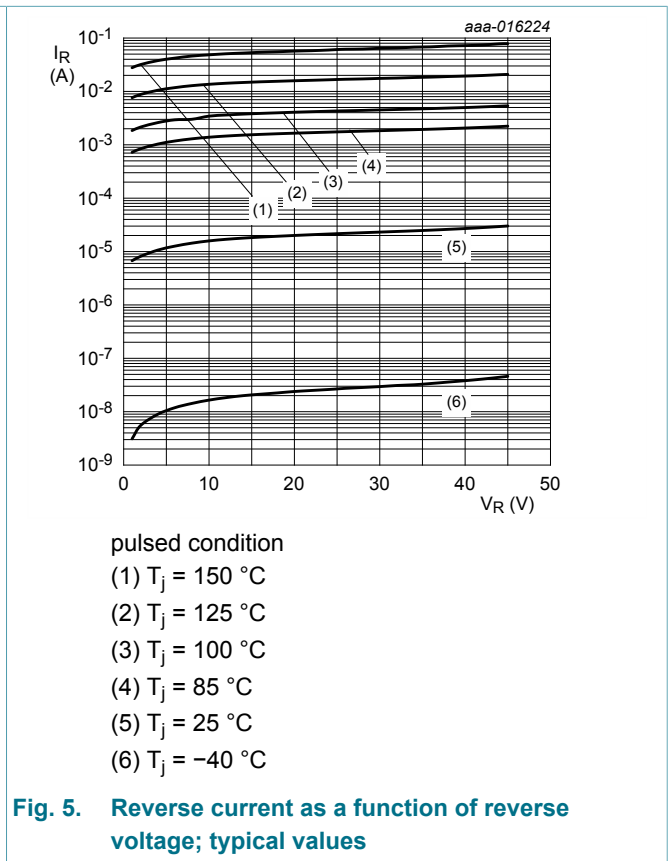
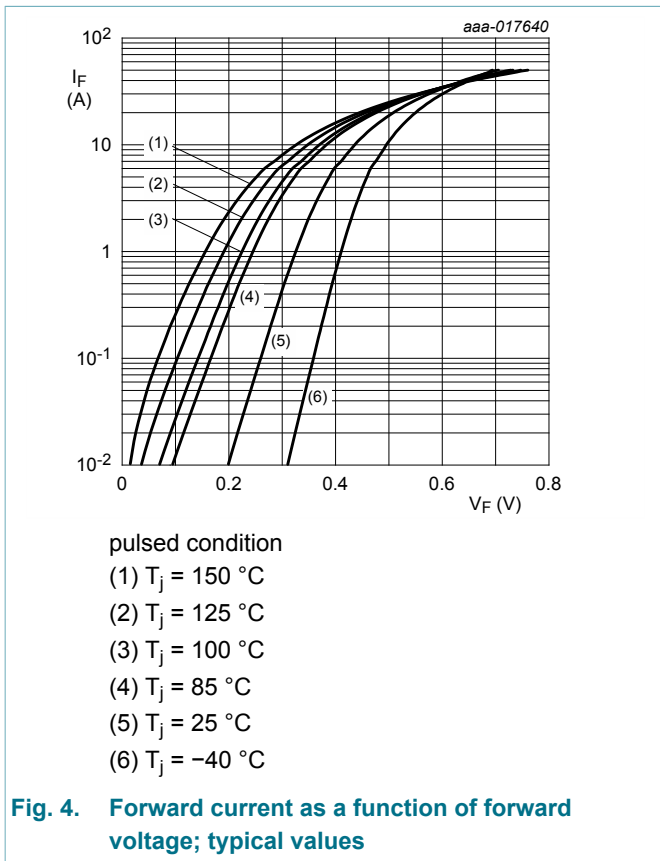


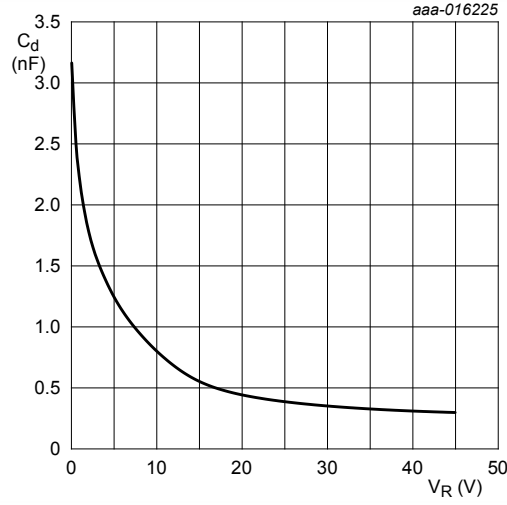
10. Characteristics

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	-	320	380	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	-	390	460	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	-	440	-	mV
		$I_F = 15 \text{ A}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	480	580	mV
		$I_F = 15 \text{ A}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 125 \text{ }^\circ\text{C}$; pulsed	-	405	-	mV
I_R	reverse current	$V_R = 5 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta \leq 0.03$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	12	-	μA
		$V_R = 10 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta \leq 0.03$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	16	50	μA
		$V_R = 45 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta \leq 0.03$; $T_j = 25 \text{ }^\circ\text{C}$; pulsed	-	30	100	μA
		$V_R = 45 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta \leq 0.03$; $T_j = 125 \text{ }^\circ\text{C}$; pulsed	-	22	-	mA
C_d	diode capacitance	$V_R = 1 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$	-	2200	-	pF

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	800	-	pF
t_{rr}	reverse recovery time step recovery	$I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_{R(\text{meas})} = 0.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	60	-	ns
t_{rr}	reverse recovery time ramp recovery	$dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; I_F = 6 \text{ A}; V_R = 26 \text{ V}$	-	20	-	ns
V_{FRM}	peak forward recovery voltage	$I_F = 0.5 \text{ A}; dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$	-	305	-	mV





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

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

11. Test information

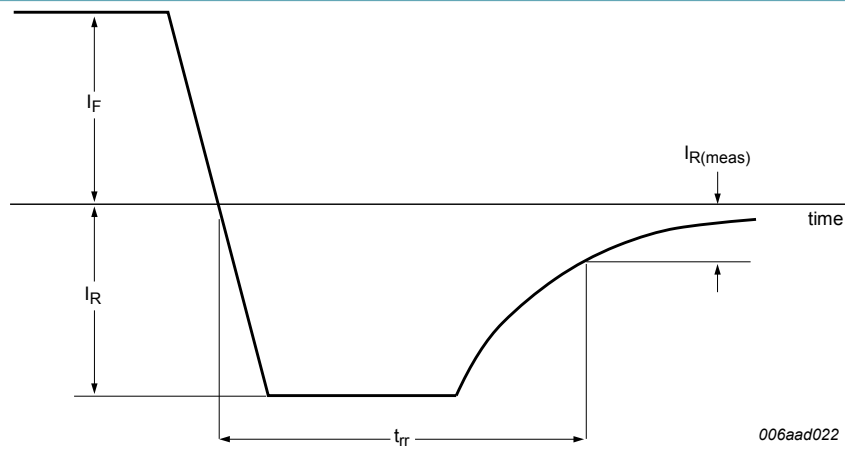


Fig. 7. Reverse recovery definition; step recovery

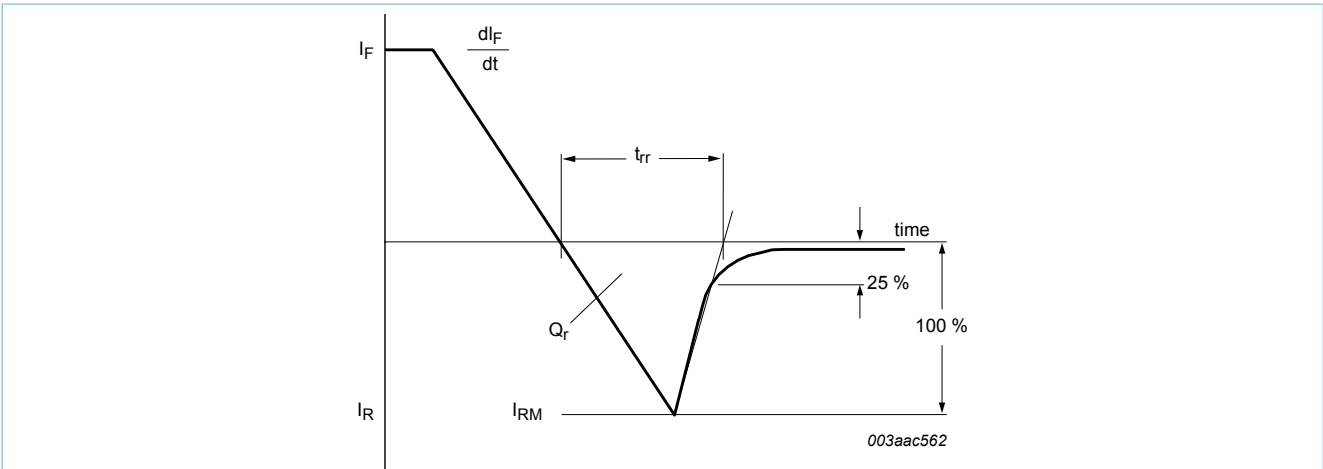


Fig. 8. Reverse recovery definition; ramp recovery

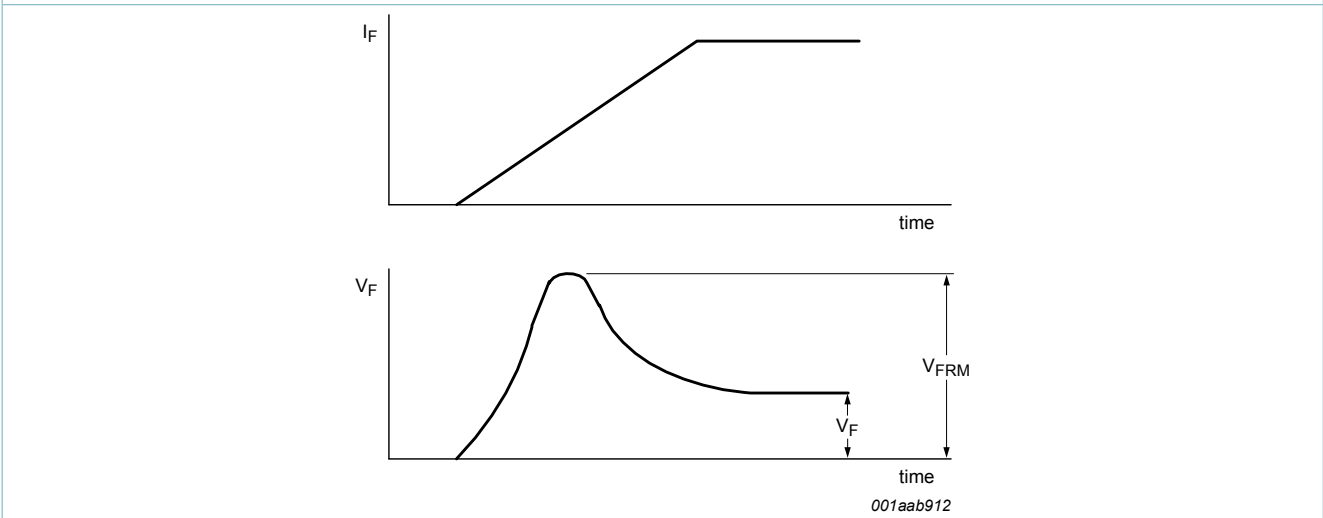


Fig. 9. Forward recovery definition

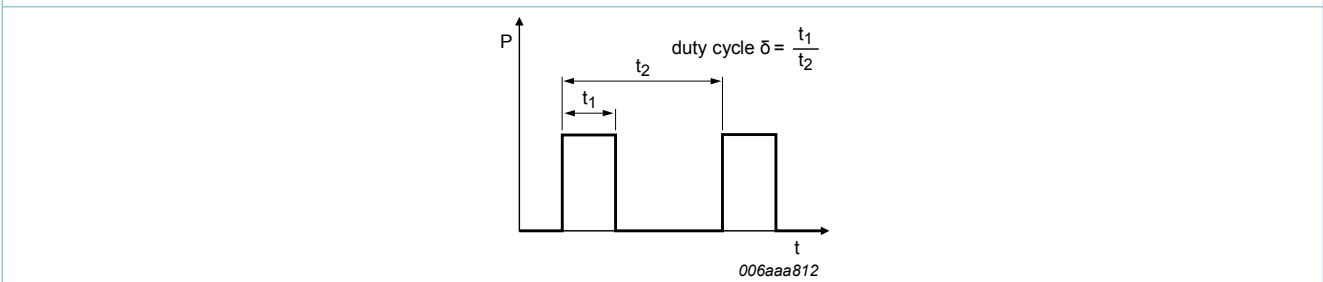


Fig. 10. Duty cycle definition

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

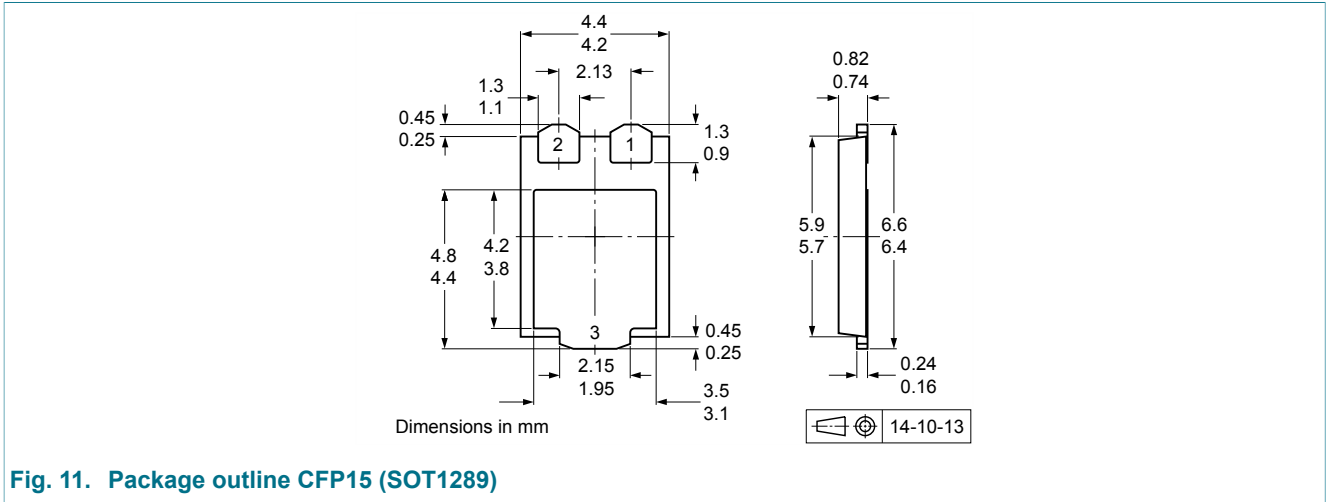


Fig. 11. Package outline CFP15 (SOT1289)

13. Soldering

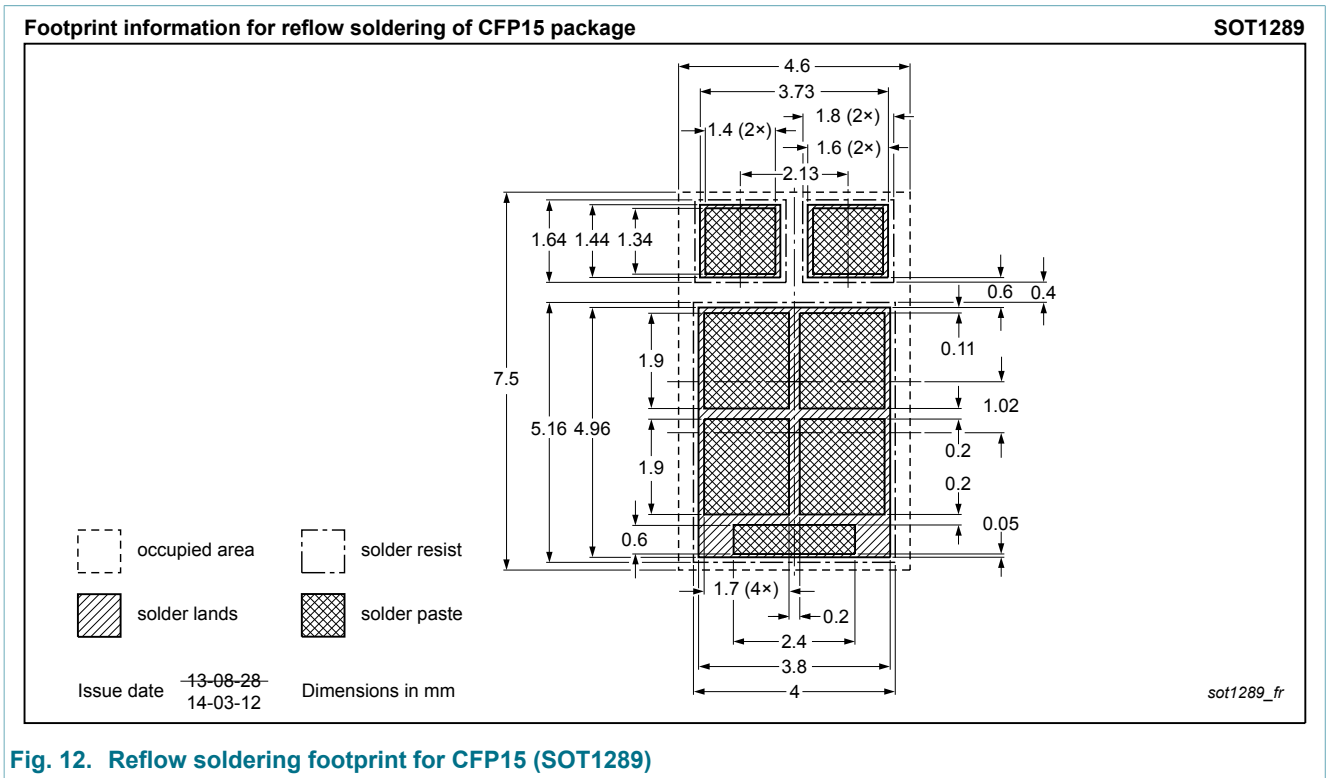


Fig. 12. Reflow soldering footprint for CFP15 (SOT1289)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG45T15EPD v.3	20150904	Product data sheet	-	PMEG45T15EPD v.2
Modifications:	<ul style="list-style-type: none">Editorial edit in conditions of V_F			
PMEG45T15EPD v.2	20150629	Product data sheet	-	PMEG45T15EPD v.1
PMEG45T15EPD v.1	20150330	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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16. Contents

1	General description	1
2	Features and benefits	1
3	Applications	1
4	Quick reference data	1
5	Pinning information	2
6	Ordering information	2
7	Marking	2
8	Limiting values	3
9	Thermal characteristics	3
10	Characteristics	5
11	Test information	7
12	Package outline	9
13	Soldering	9
14	Revision history	10
15	Legal information	11
15.1	Data sheet status	11
15.2	Definitions	11
15.3	Disclaimers	11
15.4	Trademarks	12

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