# PMEG045T150EPD

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

2 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: $I_{F(AV)} \leq 15$ A
- Reverse voltage: $V_R \leq 45$ 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
- AEC-Q101 qualified

## 3. Applications

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

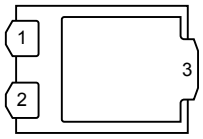
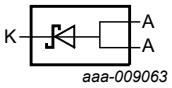
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 145$ °C; square wave | | - | - | 15 | A |
| $V_R$ | reverse voltage | $T_j = 25$ °C | | - | - | 45 | V |
| $V_F$ | forward voltage | $I_F = 15$ A; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C; pulsed | | - | 480 | 550 | mV |
| $I_R$ | reverse current | $V_R = 10$ V; $t_p \leq 3$ ms; $\delta \leq 0.03$; $T_j = 25$ °C; pulsed | | - | 16 | 50 | µA |
| | | $V_R = 45$ V; $t_p \leq 3$ ms; $\delta \leq 0.03$; $T_j = 25$ °C; pulsed | | - | 30 | 100 | µA |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | A | anode |   CFP15 (SOT1289) |   |
| 2 | A | anode | | |
| 3 | K | cathode | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMEG045T150EPD | 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 |
|---|---|
| PMEG045T150EPD | 045T 150E |

# 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 °C | | - | 45 | V |
| $I_F$ | forward current | $T_{sp}$ = 140 °C; δ = 1 | | - | 21 | A |
| $I_{F(AV)}$ | average forward current | δ = 0.5; f = 20 kHz; $T_{sp}$ ≤ 145 °C; square wave | | - | 15 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 8 ms; $T_{j(init)}$ = 25 °C; square wave | | - | 210 | A |
| $P_{tot}$ | total power dissipation | $T_{amb}$ ≤ 25 °C | [1] | - | 1.66 | W |
| | | | [2] | - | 2.15 | W |
| | | | [3] | - | 3.5 | W |
| $T_j$ | junction temperature | | | - | 175 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 175 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 175 | °C |

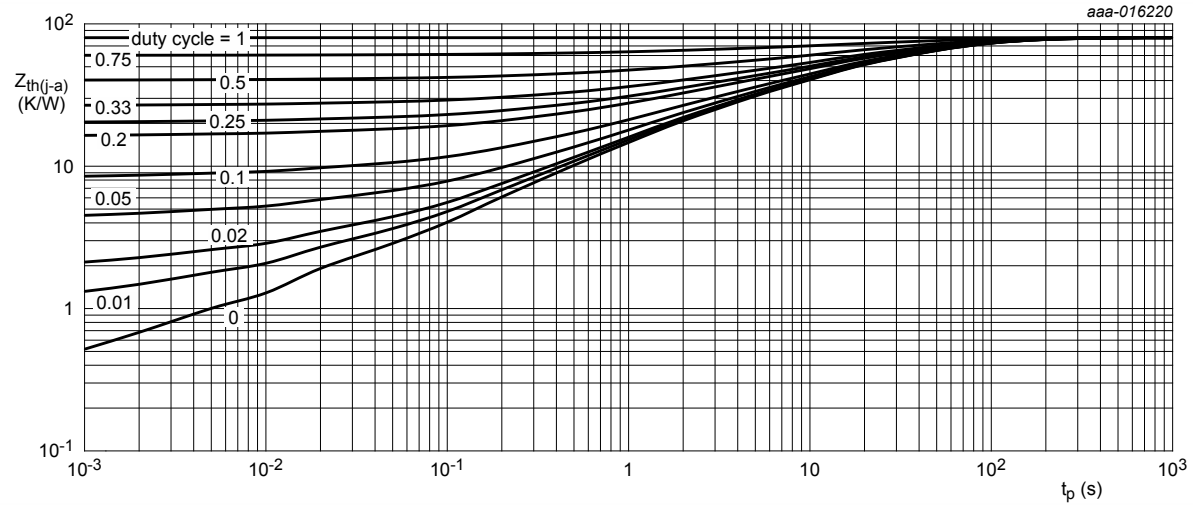
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.
[3] Device mounted on a ceramic Printed-Circuit Board (PCB), $Al_2O_3$, standard footprint.

# 9. Thermal characteristics

**Table 6. Thermal characteristics**

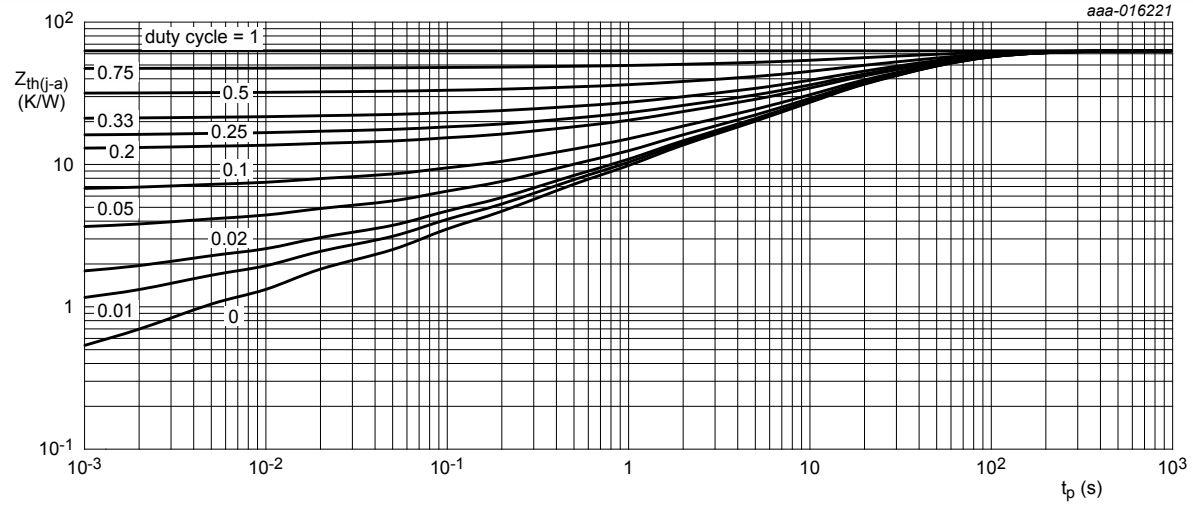
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1][2] | - | - | 90 | K/W |
| | | | [1][3] | - | - | 70 | K/W |
| | | | [1][4] | - | - | 42 | K/W |
| $R_{th(j-sp)}$ | thermal 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.



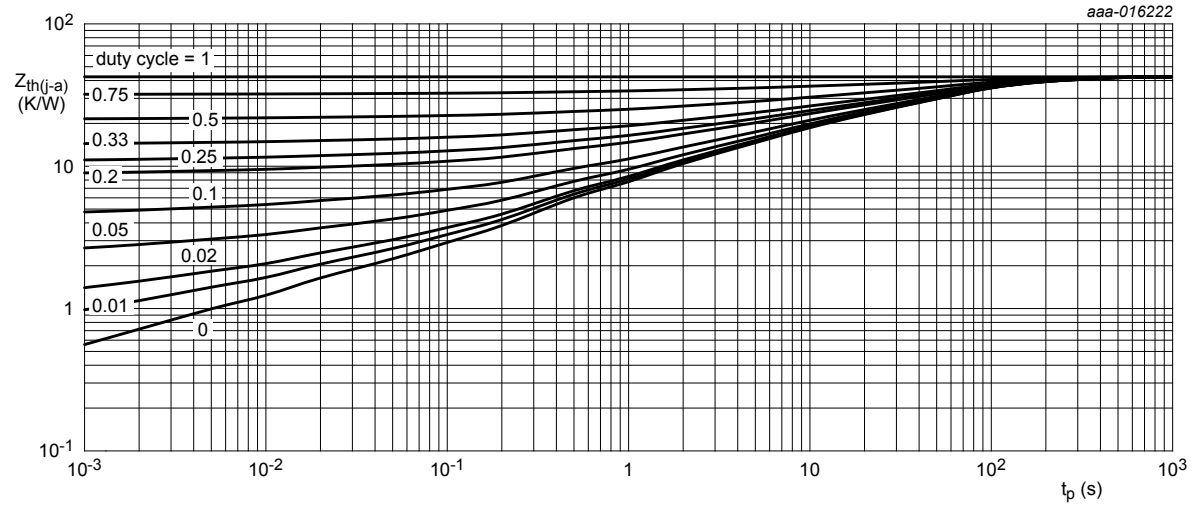

FR4 PCB, standard footprint

**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**



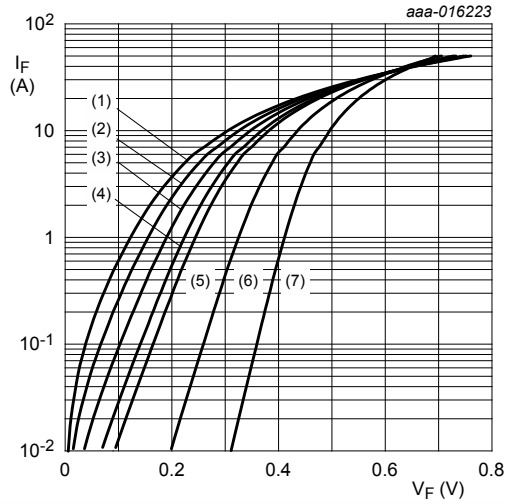

Ceramic PCB, $Al_2O_3$, standard footprint

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

## 10. Characteristics

**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R$ = 5 mA; $T_j$ = 25 °C; $t_p \leq$ 1.2 ms; $\delta \leq$ 0.12; pulsed | | 45 | - | - | V |
| $V_F$ | forward voltage | $I_F$ = 1 A; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; $T_j$ = 25 °C; pulsed | | - | 320 | 380 | mV |
| | | $I_F$ = 5 A; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; $T_j$ = 25 °C; pulsed | | - | 390 | 460 | mV |
| | | $I_F$ = 10 A; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; $T_j$ = 25 °C; pulsed | | - | 440 | - | mV |
| | | $I_F$ = 15 A; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; $T_j$ = 25 °C; pulsed | | - | 480 | 550 | mV |
| | | $I_F$ = 15 A; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; $T_j$ = 125 °C; pulsed | | - | 405 | - | mV |
| $I_R$ | reverse current | $V_R$ = 5 V; $t_p \leq$ 3 ms; $\delta \leq$ 0.03; $T_j$ = 25 °C; pulsed | | - | 12 | - | µA |
| | | $V_R$ = 10 V; $t_p \leq$ 3 ms; $\delta \leq$ 0.03; $T_j$ = 25 °C; pulsed | | - | 16 | 50 | µA |
| | | $V_R$ = 45 V; $t_p \leq$ 3 ms; $\delta \leq$ 0.03; $T_j$ = 25 °C; pulsed | | - | 30 | 100 | µA |
| | | $V_R$ = 45 V; $t_p \leq$ 3 ms; $\delta \leq$ 0.03; $T_j$ = 125 °C; pulsed | | - | 22 | - | mA |
| $C_d$ | diode capacitance | $V_R$ = 1 V; f = 1 MHz; $T_j$ = 25 °C | | - | 2200 | - | pF |
| | | $V_R$ = 10 V; f = 1 MHz; $T_j$ = 25 °C | | - | 800 | - | pF |
| $t_{rr}$ | reverse recovery time step recovery | $I_F$ = 0.5 A; $I_R$ = 0.5 A; $I_{R(meas)}$ = 0.1 A; $T_j$ = 25 °C | | - | 60 | - | ns |
| $t_{rr}$ | reverse recovery time ramp recovery | $dI_F/dt$ = 200 A/µs; $T_j$ = 25 °C; $I_F$ = 6 A; $V_R$ = 26 V | | - | 20 | - | ns |
| $V_{FRM}$ | peak forward recovery voltage | $I_F$ = 0.5 A; $dI_F/dt$ = 20 A/µs; $T_j$ = 25 °C | | - | 305 | - | mV |




pulsed condition

(1) $T_j$ = 175 °C

(2) $T_j$ = 150 °C

(3) $T_j$ = 125 °C

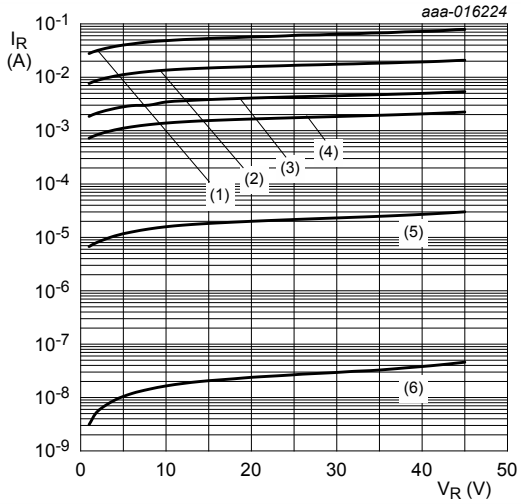
(4) $T_j$ = 100 °C

(5) $T_j$ = 85 °C

(6) $T_j$ = 25 °C

(7) $T_j$ = −40 °C

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




pulsed condition

(1) $T_j$ = 150 °C

(2) $T_j$ = 125 °C

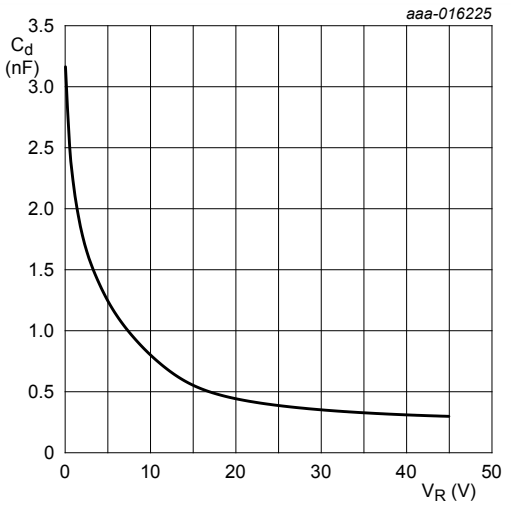
(3) $T_j$ = 100 °C

(4) $T_j$ = 85 °C

(5) $T_j$ = 25 °C

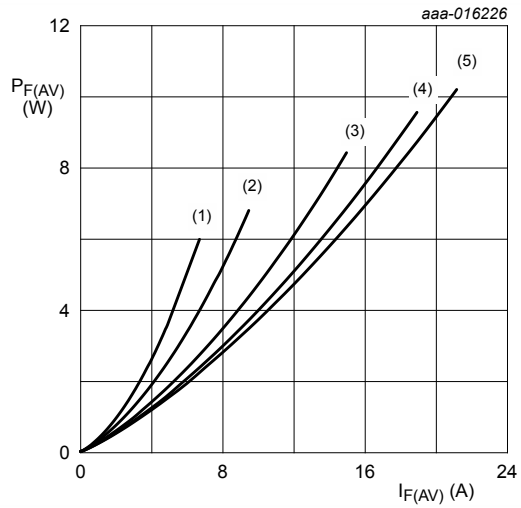
(6) $T_j$ = −40 °C

**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**




$T_j$ = 100 °C

(1) δ = 0.1

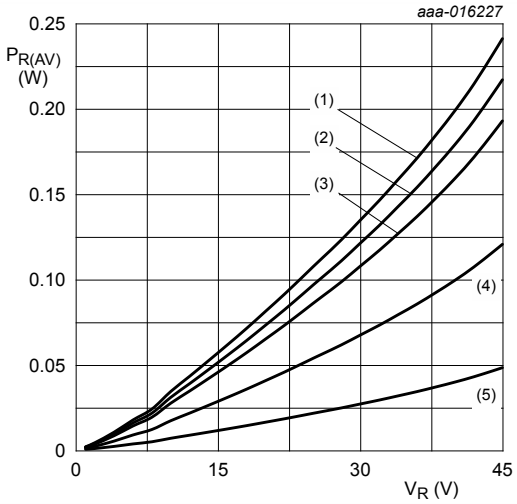
(2) δ = 0.2

(3) δ = 0.5

(4) δ = 0.8

(5) δ = 1

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




$T_j$ = 100 °C

(1) δ = 1

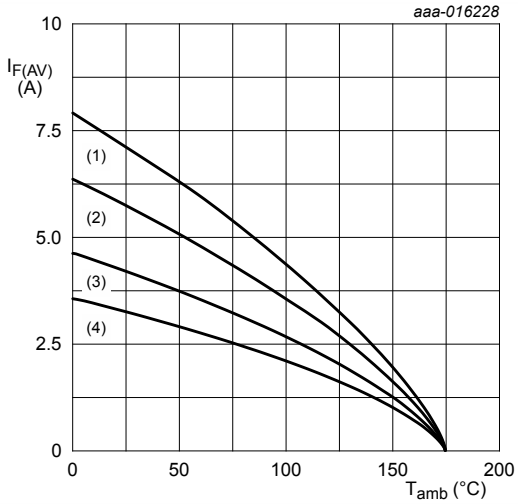
(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

(5) δ = 0.2

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




FR4 PCB, standard footprint

$T_j$ = 175 °C

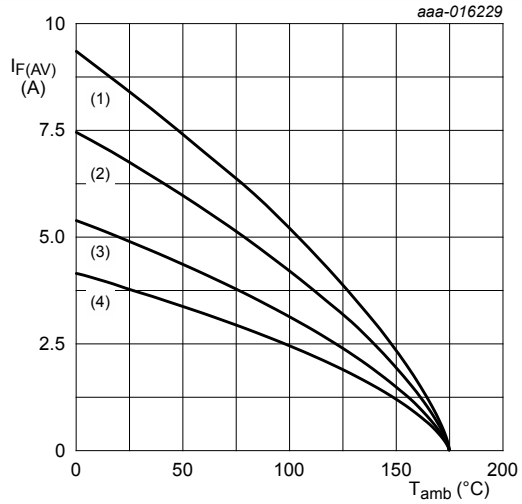
(1) δ = 1; DC

(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

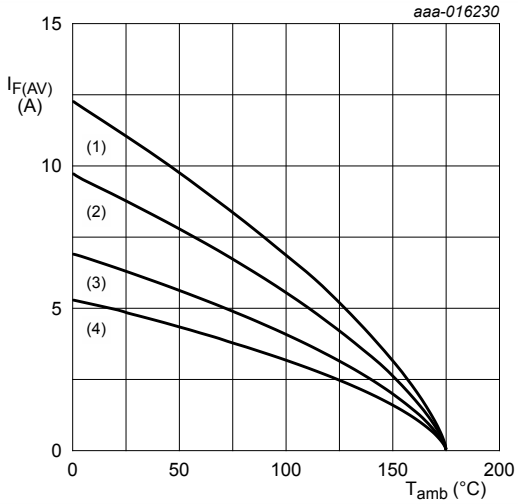
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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




Ceramic PCB, $Al_2O_3$, standard footprint

$T_j$ = 175 °C

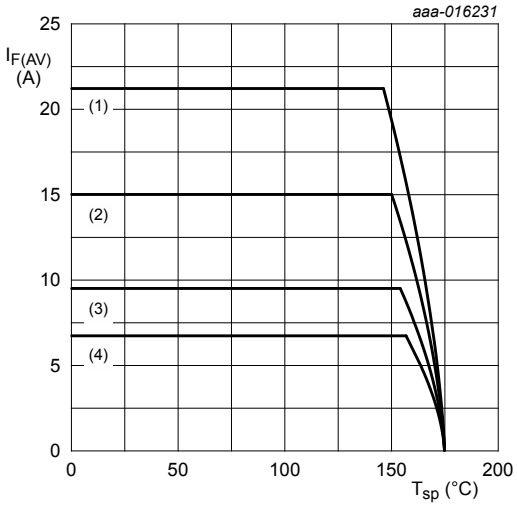
(1) δ = 1; DC

(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; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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

## 11. Test information

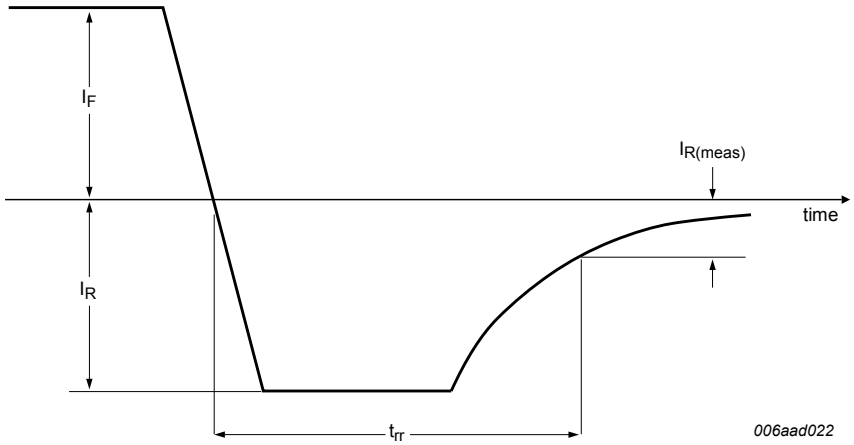



**Fig. 13. Reverse recovery definition; step recovery**

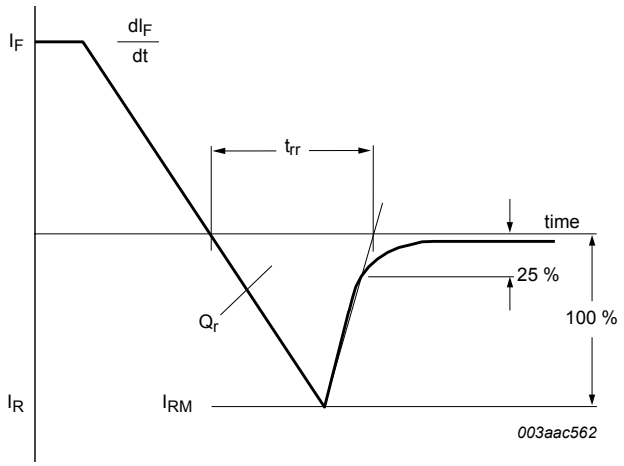



**Fig. 14. Reverse recovery definition; ramp recovery**

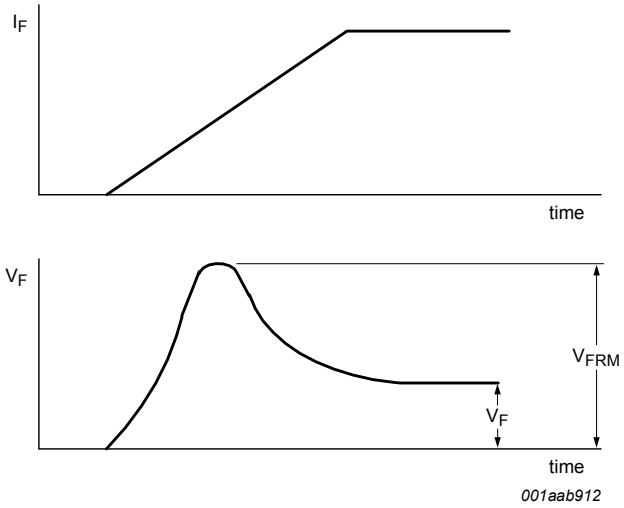



**Fig. 15. Forward recovery definition**

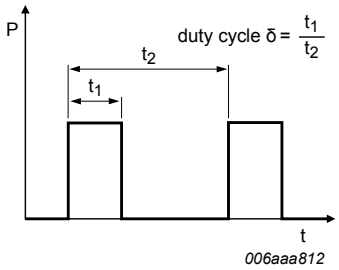



**Fig. 16. Duty cycle definition**

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.

### 11.1 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.

## 12. Package outline

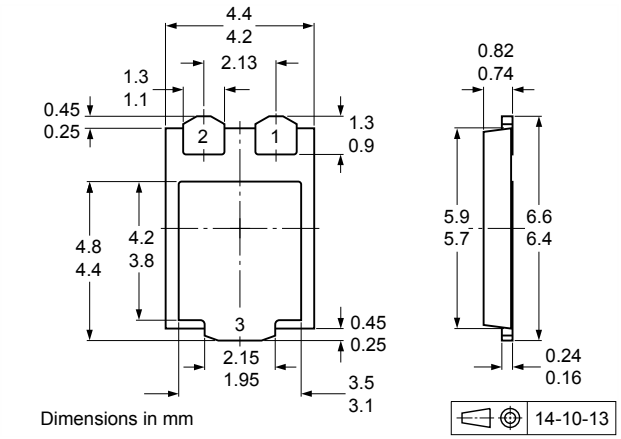



**Fig. 17. Package outline CFP15 (SOT1289)**

## 13. Soldering

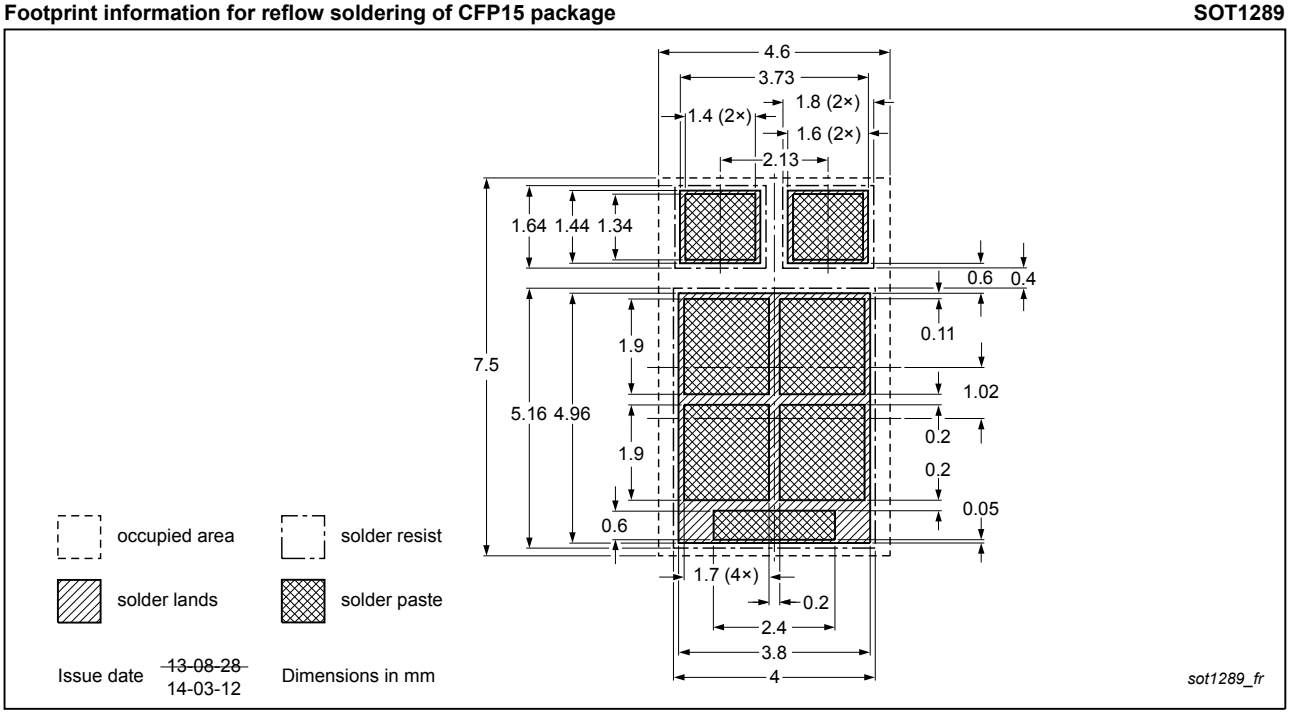



**Fig. 18. Reflow soldering footprint for CFP15 (SOT1289)**

# 14. Revision history

**Table 8. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PMEG045T150EPD v.1 | 20150902 | Product 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. |

[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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For sales office addresses, please send an email to: salesaddresses@nexperia.com
**Date of release: 02 September 2015**

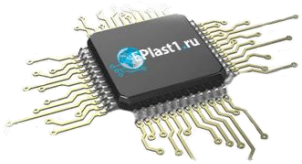
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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