



PMEG45A10EPD

45 V, 10 A low VF MEGA Schottky barrier rectifier

16 April 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: $V_R \leq 45 \text{ V}$
- 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

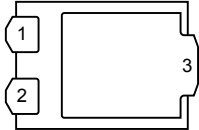
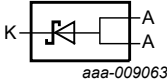
Table 1. Quick reference data

| 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 | - | 473 | 540 | mV |
| I_R | reverse current | $V_R = 10 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta = 0.3$; $T_j = 25 \text{ °C}$; pulsed | - | 13 | 30 | μA |
| | | $V_R = 45 \text{ V}$; $t_p \leq 3 \text{ ms}$; $\delta = 0.3$; $T_j = 25 \text{ °C}$; pulsed | - | 150 | 500 | μA |



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 |
| PMEG45A10EPD | 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 |
|--------------|--------------|
| PMEG45A10EPD | 4510 AAAA |

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 | $T_j = 25\text{ }^\circ\text{C}$ | | - | 45 | V |
| I_F | forward current | $T_{sp} = 125\text{ }^\circ\text{C}; \delta = 1$ | | - | 14 | A |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 130\text{ }^\circ\text{C};$ square wave | | - | 10 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8\text{ ms}; T_{j(\text{init})} = 25\text{ }^\circ\text{C};$ square wave | | - | 170 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ }^\circ\text{C}$ | [1] | - | 0.9 | W |
| | | | [2] | - | 1.2 | W |
| | | | [3] | - | 3 | W |
| T_j | junction temperature | | | - | 150 | $^\circ\text{C}$ |
| T_{amb} | ambient temperature | | | -55 | 150 | $^\circ\text{C}$ |

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|---------------------|------------|-----|-----|------|
| T _{stg} | storage temperature | | -65 | 150 | °C |

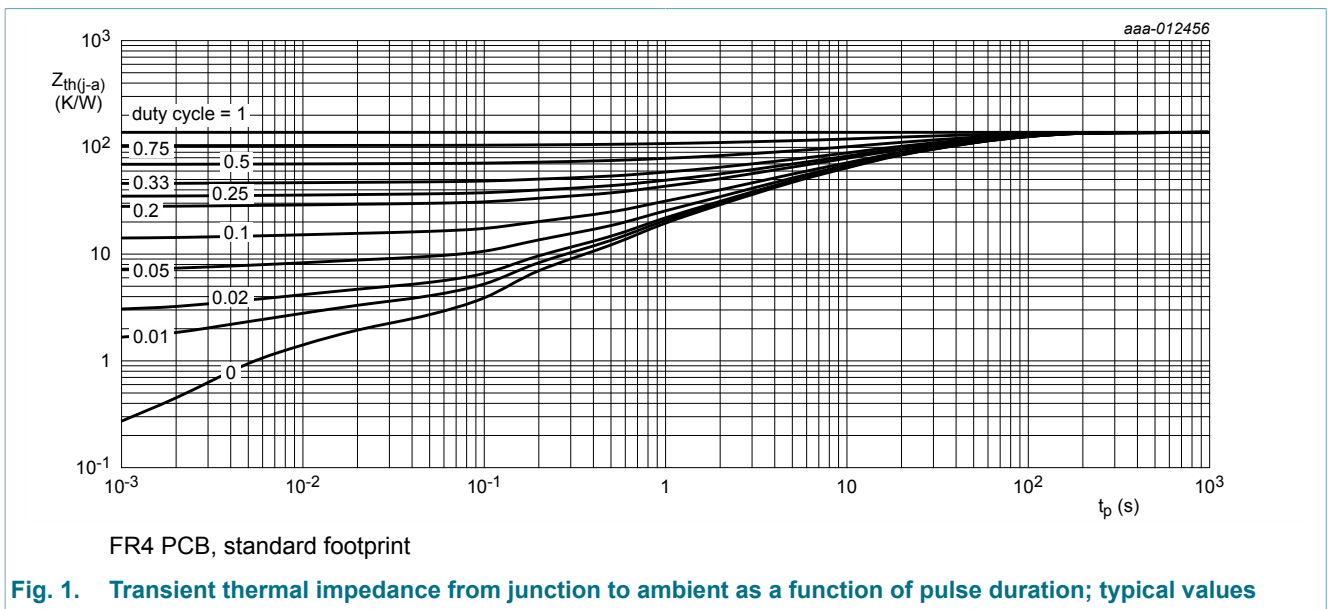
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [3] Device mounted on a ceramic Printed-Circuit Board (PCB), Al₂O₃, standard footprint.

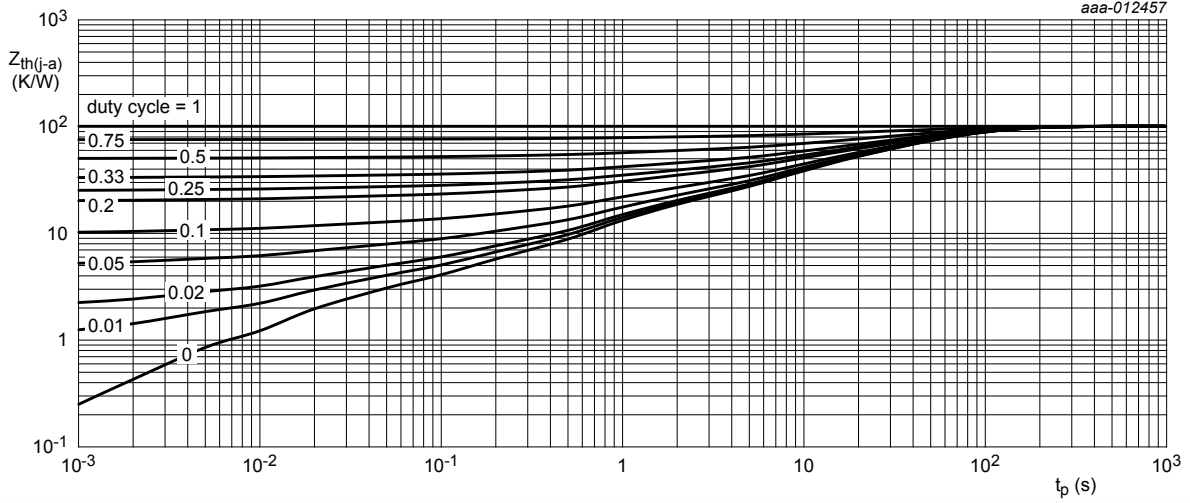
9. Thermal characteristics

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] | - | - | 165 | K/W |
| | | | [1][3] | - | - | 120 | K/W |
| | | | [1][4] | - | - | 50 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | [5] | - | - | 4 | K/W |

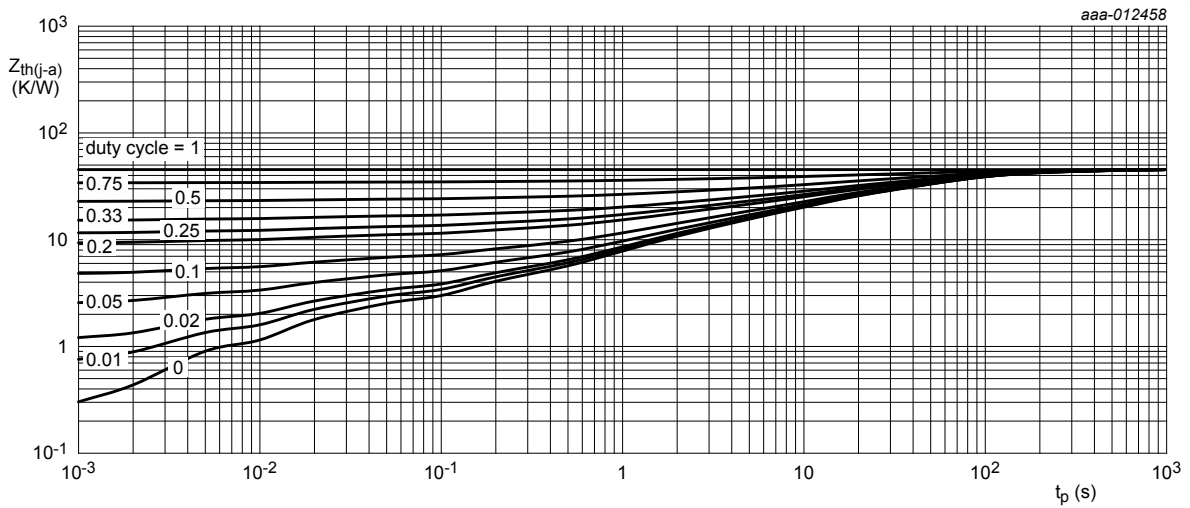
- [1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [4] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [5] Soldering point of cathode tab.





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



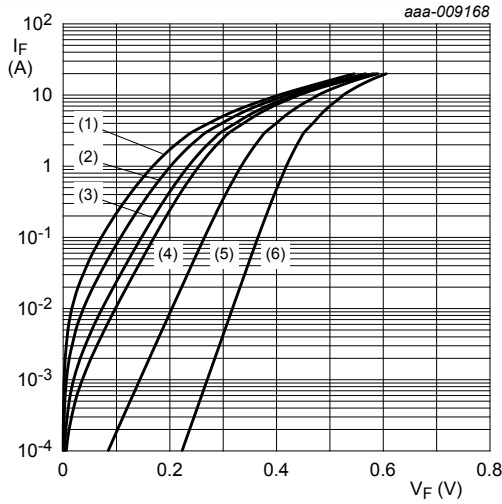
Ceramic PCB, Al₂O₃, standard footprint

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

10. Characteristics

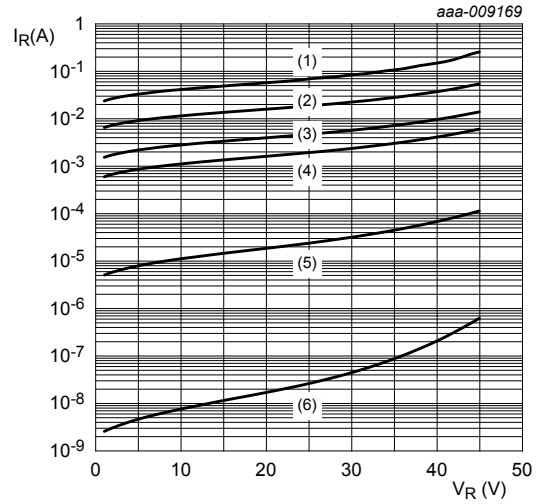
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| V _F | forward voltage | I _F = 1 A; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C; pulsed | - | 330 | 380 | mV |
| | | I _F = 2 A; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C; pulsed | - | 357 | - | mV |
| | | I _F = 3 A; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C; pulsed | - | 377 | - | mV |
| | | I _F = 5 A; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C; pulsed | - | 409 | 470 | mV |
| | | I _F = 10 A; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C; pulsed | - | 473 | 540 | mV |
| I _R | reverse current | V _R = 5 V; t _p ≤ 3 ms; δ = 0.3; T _j = 25 °C; pulsed | - | 10 | - | μA |
| | | V _R = 10 V; t _p ≤ 3 ms; δ = 0.3; T _j = 25 °C; pulsed | - | 13 | 30 | μA |
| | | V _R = 30 V; t _p ≤ 3 ms; δ = 0.3; T _j = 25 °C; pulsed | - | 36 | - | μA |
| | | V _R = 45 V; t _p ≤ 3 ms; δ = 0.3; T _j = 25 °C; pulsed | - | 150 | 500 | μA |
| | | V _R = 10 V; t _p ≤ 3 ms; δ = 0.3; T _j = 125 °C; pulsed | - | 11 | - | mA |
| C _d | diode capacitance | V _R = 1 V; f = 1 MHz; T _j = 25 °C | - | 715 | - | pF |
| | | V _R = 10 V; f = 1 MHz; T _j = 25 °C | - | 240 | - | 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 | - | 21 | - | 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 | - | 13 | - | ns |
| V _{(BR)R} | reverse breakdown voltage | I _R = 5 mA; T _j = 25 °C; t _p ≤ 1.2 ms; δ = 0.12; pulsed | 45 | - | - | V |
| V _{FRM} | peak forward recovery voltage | I _F = 0.5 A; dI _F /dt = 20 A/μs; T _j = 25 °C | - | 317 | - | mV |



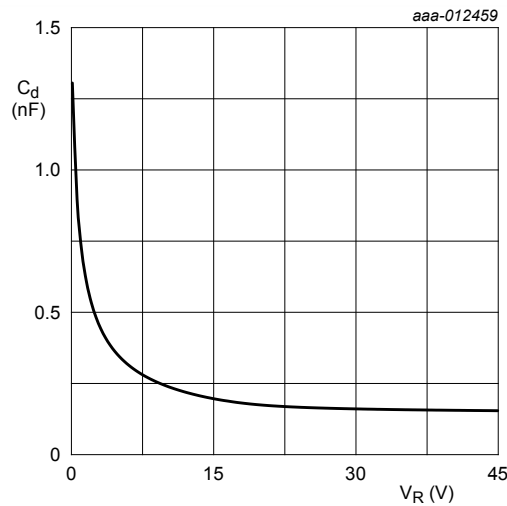
- (1) $T_j = 150\text{ }^\circ\text{C}$
- (2) $T_j = 125\text{ }^\circ\text{C}$
- (3) $T_j = 100\text{ }^\circ\text{C}$
- (4) $T_j = 85\text{ }^\circ\text{C}$
- (5) $T_j = 25\text{ }^\circ\text{C}$
- (6) $T_j = -40\text{ }^\circ\text{C}$

Fig. 4. Forward current as a function of forward voltage; typical values (pulsed 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. 5. Reverse current as a function of reverse voltage; typical values (pulsed condition)



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

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

11. Test information

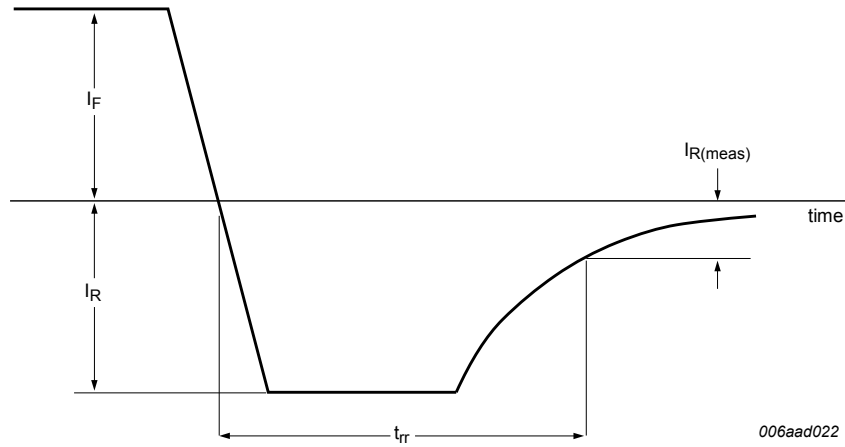


Fig. 7. Reverse recovery definition; step recovery

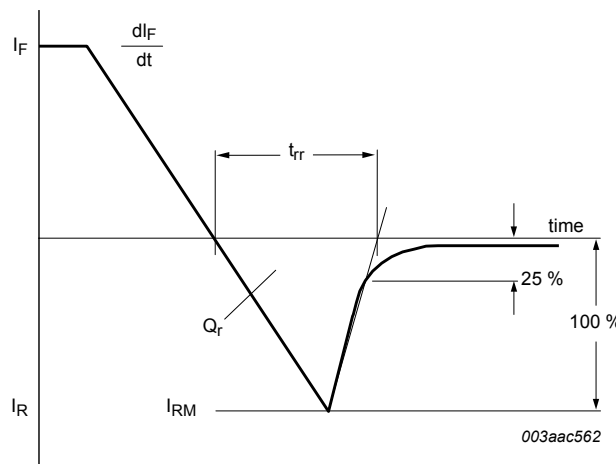


Fig. 8. Reverse recovery definition; ramp recovery

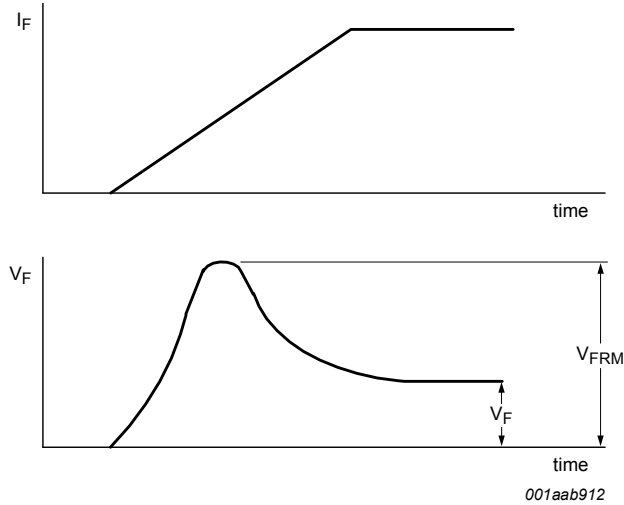


Fig. 9. Forward recovery definition

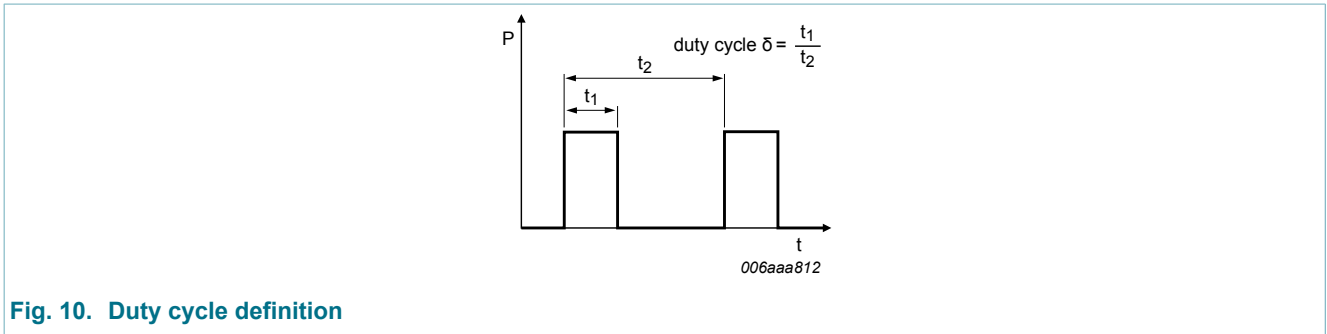


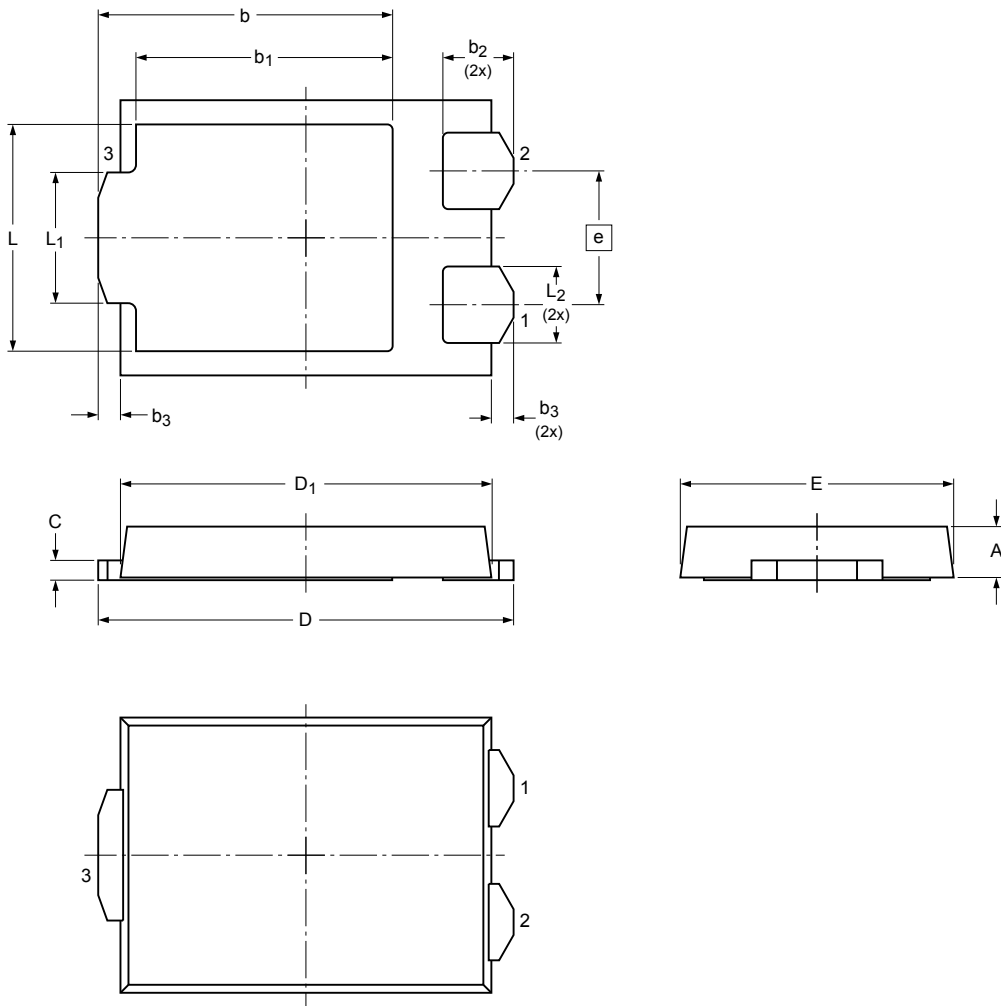
Fig. 10. Duty cycle definition

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

CFP15: plastic, thermal enhanced ultra thin SMD package; 3 leads; body: 5.8 x 4.3 x 0.78 mm

SOT1289



Dimensions (mm are the original dimensions)

| Unit | A | C | D | D ₁ | E | e | b | b ₁ | b ₂ | b ₃ | L | L ₁ | L ₂ |
|--------|------|-----|-----|----------------|-----|------|------|----------------|----------------|----------------|------|----------------|----------------|
| max | | | 6.6 | 5.9 | 4.4 | | 4.71 | 4.11 | 1.19 | | 3.41 | 2.15 | 1.3 |
| mm nom | 0.78 | 0.2 | 6.5 | 5.8 | 4.3 | 2.13 | 4.61 | 4.01 | 1.09 | | 3.31 | 2.05 | 1.2 |
| min | | | 6.4 | 5.7 | 4.2 | | 4.51 | 3.91 | 0.99 | 0.25 | 3.21 | 1.95 | 1.1 |

Note

1. Dimension A is excluding plating thickness.

sot1289_po

| Outline version | References | | | European projection | Issue date |
|-----------------|------------|-------|-------|---------------------|------------------------|
| | IEC | JEDEC | JEITA | | |
| SOT1289 | | | | | -13-07-12- 13-08-27 |

Fig. 11. Package outline CFP15 (SOT1289)

13. Soldering

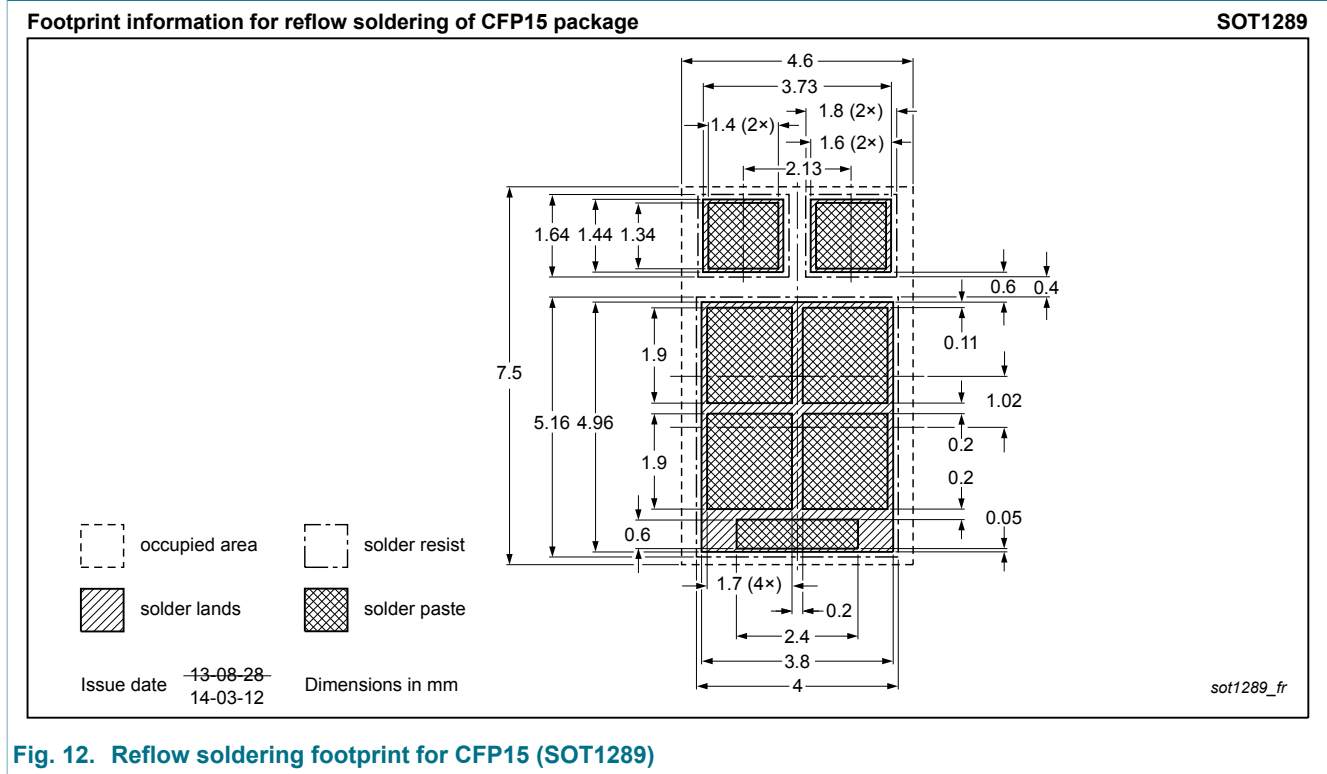


Fig. 12. Reflow soldering footprint for CFP15 (SOT1289)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|------------------------------------------------------------------------|----------------------|---------------|------------------|
| PMEG45A10EPD v.2 | 20140416 | Product data sheet | - | PMEG45A10EPD v.1 |
| Modifications: | <ul style="list-style-type: none">Product status changed | | | |
| PMEG45A10EPD 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. |
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| Product [short] data sheet | Production | This document contains the product specification. |

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