
# PMEG100T30ELP-Q

## 100 V, 3 A low leakage current Trench Schottky barrier rectifier

19 July 2024 Product data sheet

## 1. General description

Trench Schottky barrier rectifier encapsulated in a CFP5 (SOD128) small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Low forward voltage
- Low $Q_{rr}$ and low $I_{RM}$
- Low leakage current
- High power capability due to clip-bonding technology
- Small and flat lead SMD power plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- High efficiency DC-to-DC conversion
- Automotive LED lighting
- Switch mode power supply
- Freewheeling applications
- Reverse polarity protection
- OR-ing

## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | average forward current | δ = 0.5; f = 20 kHz; square wave; $T_{sp}$ ≤ 160 °C | | - | - | 3 | A |
| $V_R$ | reverse voltage | $T_j$ = 25 °C | | - | - | 100 | V |
| $V_F$ | forward voltage | $I_F$ = 3 A; pulsed; $T_j$ = 25 °C | [1] | - | 705 | 800 | mV |
| $I_R$ | reverse current | $V_R$ = 100 V; pulsed; $T_j$ = 25 °C | [1] | - | 0.25 | 1.75 | µA |
| | | $V_R$ = 100 V; pulsed; $T_j$ = 125 °C | [1] | - | 0.42 | 2.2 | mA |

[1] Very short pulse, in order to maintain a stable junction temperature.

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | K | cathode[1] |  CFP5 (SOD128) |  sym001 |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMEG100T30ELP-Q | CFP5 | plastic, surface mounted package; 2 terminals; 4 mm pitch; 3.8 mm x 2.6 mm x 1 mm body | SOD128 |

## 7. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|---|---|
| PMEG100T30ELP-Q | E5 |

## 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 | | - | 100 | V |
| $I_F$ | forward current | δ = 1; $T_{sp}$ ≤ 156 °C | | - | 4.2 | A |
| $I_{F(AV)}$ | average forward current | δ = 0.5; f = 20 kHz; square wave; $T_{sp}$ ≤ 160 °C | | - | 3 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 8.3 ms; half sine wave; $T_{j(init)}$ = 25 °C | | - | 90 | A |
| $P_{tot}$ | total power dissipation | $T_{amb}$ ≤ 25 °C | [1] | - | 0.75 | W |
| | | | [2] | - | 1.2 | W |
| $T_j$ | junction temperature | | | - | 175 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 175 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 175 | °C |

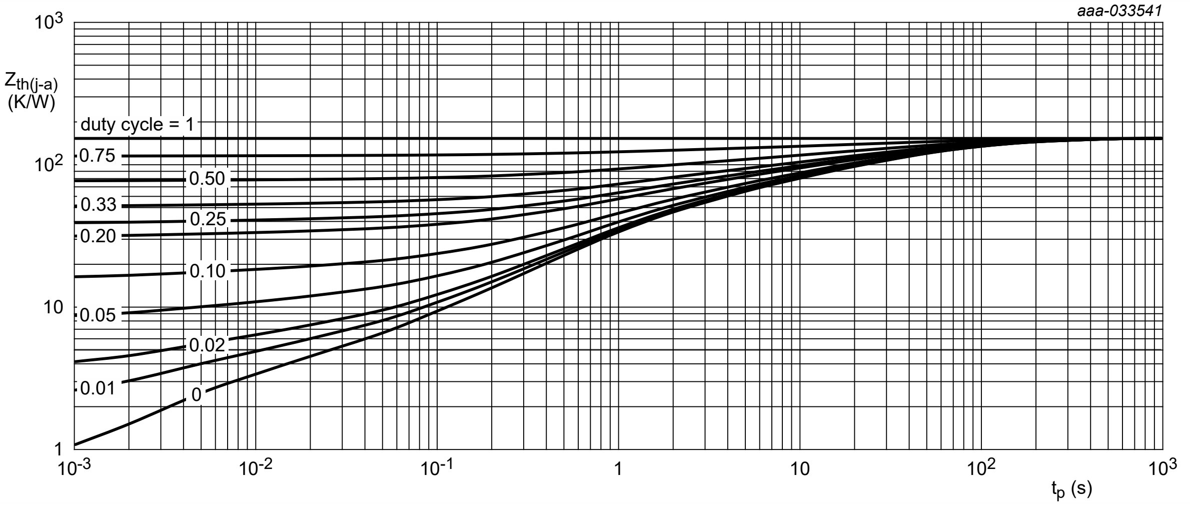
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.

# 9. Thermal characteristics

**Table 6. Thermal characteristics**

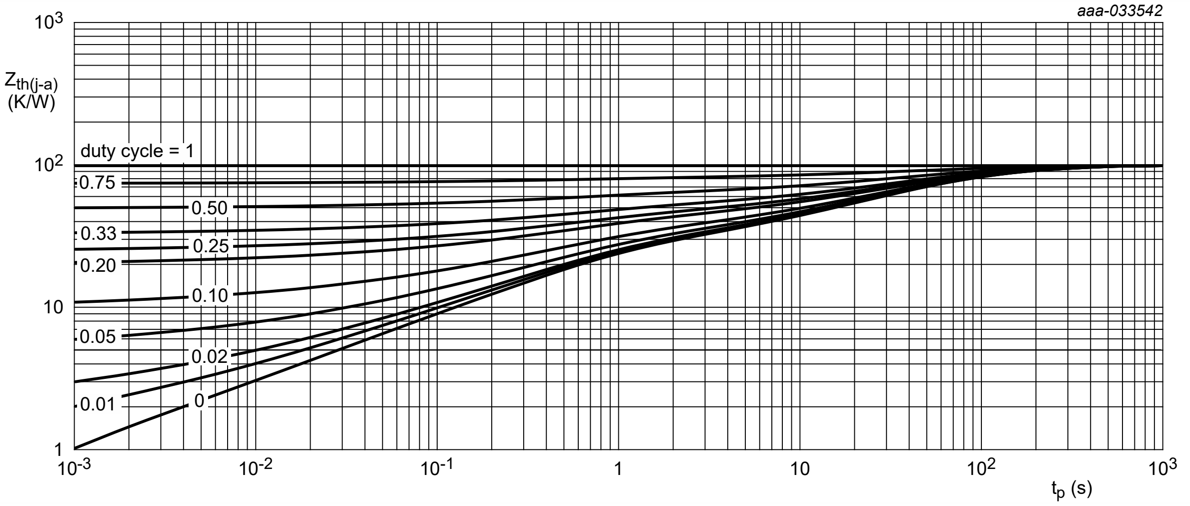
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] [2] | - | - | 200 | K/W |
| | | | [1] [3] | - | - | 120 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [4] | - | - | 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] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm$^2$.
[4] Soldering point of cathode tab.




FR4 PCB, single-sided copper, tin-plated and standard footprint

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




FR4 PCB, single-sided copper, tin-plated and mounting pad for cathode 1 cm$^2$

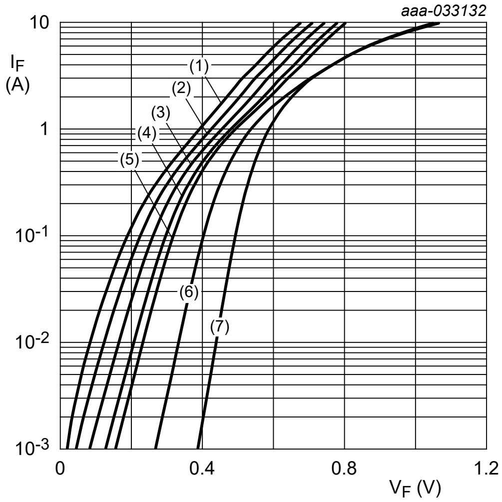
**Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

# 10. Characteristics

**Table 7. Characteristics**

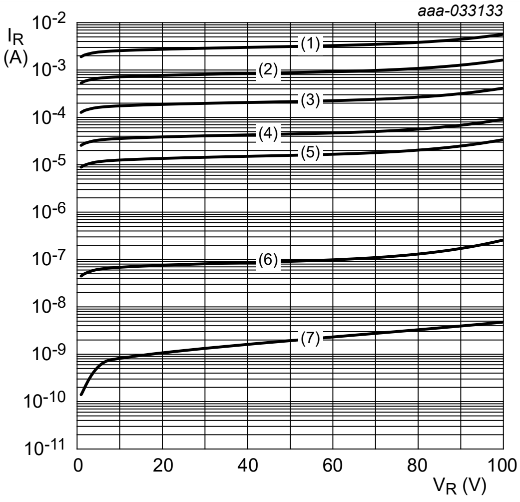
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R$ = 1 mA; pulsed; $T_j$ = 25 °C | [1] | 100 | - | - | V |
| $V_F$ | forward voltage | $I_F$ = 0.5 A; pulsed; $T_j$ = 25 °C | [1] | - | 480 | 550 | mV |
| | | $I_F$ = 1 A; pulsed; $T_j$ = 25 °C | [1] | - | 540 | 610 | mV |
| | | $I_F$ = 2 A; pulsed; $T_j$ = 25 °C | [1] | - | 630 | 710 | mV |
| | | $I_F$ = 3 A; pulsed; $T_j$ = 25 °C | [1] | - | 705 | 800 | mV |
| | | $I_F$ = 3 A; pulsed; $T_j$ = -40 °C | [1] | - | 705 | 800 | mV |
| | | $I_F$ = 3 A; pulsed; $T_j$ = 125 °C | [1] | - | 580 | 650 | mV |
| | | $I_F$ = 3 A; pulsed; $T_j$ = 150 °C | [1] | - | 545 | 620 | mV |
| $I_R$ | reverse current | $V_R$ = 60 V; pulsed; $T_j$ = 25 °C | [1] | - | 0.1 | 0.8 | µA |
| | | $V_R$ = 100 V; pulsed; $T_j$ = 25 °C | [1] | - | 0.25 | 1.75 | µA |
| | | $V_R$ = 100 V; pulsed; $T_j$ = 125 °C | [1] | - | 0.42 | 2.2 | mA |
| | | $V_R$ = 100 V; pulsed; $T_j$ = 150 °C | [1] | - | 1.65 | 8 | mA |
| $C_d$ | diode capacitance | $V_R$ = 1 V; f = 1 MHz; $T_j$ = 25 °C | | - | 300 | - | pF |
| | | $V_R$ = 10 V; f = 1 MHz; $T_j$ = 25 °C | | - | 85 | - | 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 | | - | 9 | - | ns |
| | reverse recovery time ramp recovery | $dI_F/dt$ = 200 A/µs; $I_F$ = 6 A; $V_R$ = 26 V; $T_j$ = 25 °C | | - | 12.5 | - | ns |
| $I_{RM}$ | peak reverse recovery current | | | - | 1.3 | - | A |
| $Q_{rr}$ | reverse recovery charge | | | - | 10 | - | nC |
| $V_{FRM}$ | peak forward recovery voltage | $I_F$ = 0.5 A; $dI_F/dt$ = 20 A/µs; $T_j$ = 25 °C | | - | 480 | - | mV |

[1] Very short pulse, in order to maintain a stable junction temperature.



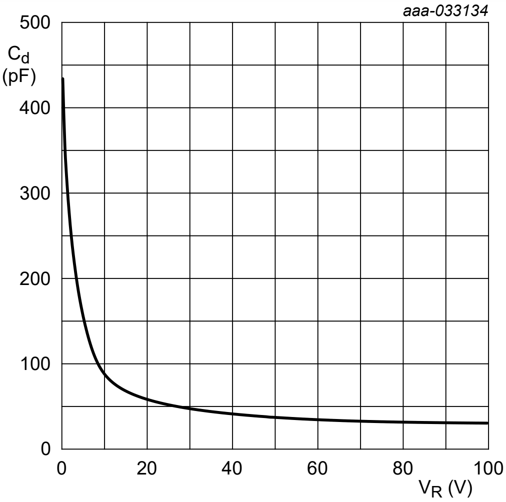

pulsed condition
(1) Tj = 175 °C
(2) Tj = 150 °C
(3) Tj = 125 °C
(4) Tj = 100 °C
(5) Tj = 85 °C
(6) Tj = 25 °C
(7) Tj = -40 °C

**Fig. 3. Forward current as a function of forward voltage; typical values**



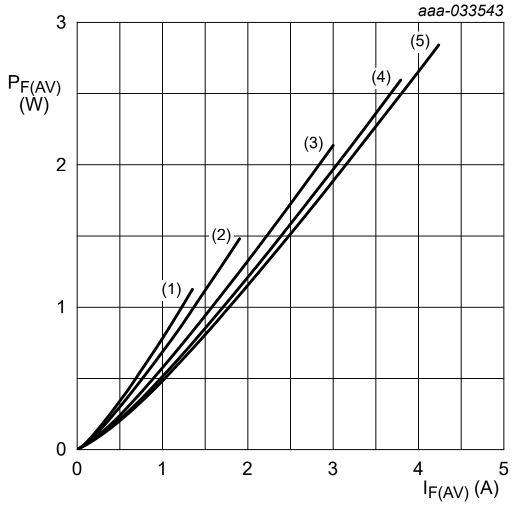

pulsed condition
(1) $T_j$ = 175 °C
(2) $T_j$ = 150 °C
(3) $T_j$ = 125 °C
(4) $T_j$ = 100 °C
(5) $T_j$ = 85 °C
(6) $T_j$ = 25 °C
(7) $T_j$ = -40 °C

**Fig. 4. Reverse current as a function of reverse voltage; typical values**



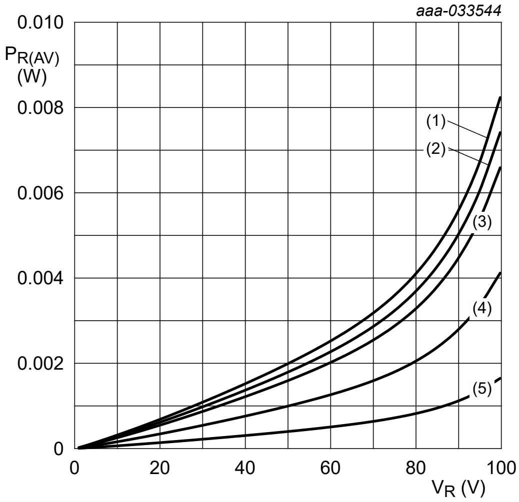

f = 1 MHz; $T_{amb}$ = 25 °C

**Fig. 5. Diode capacitance as a function of reverse voltage; typical values**



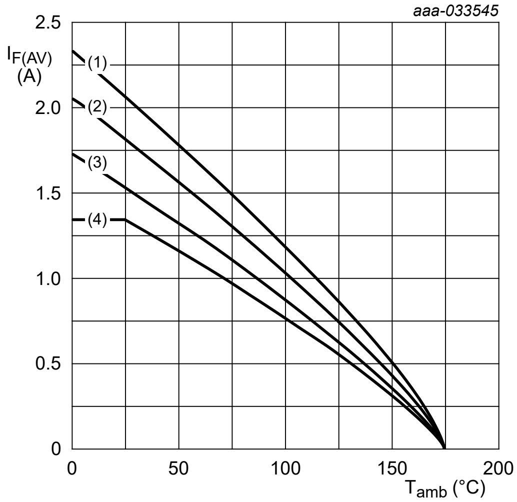

$T_j$ = 100 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 0.8
(5) δ = 1; DC

**Fig. 6. Average forward power dissipation as a function of average forward current; typical values**



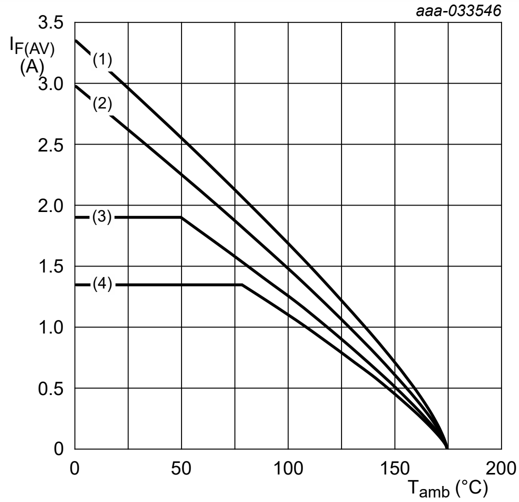

$T_j$ = 100 °C
(1) δ = 1; DC
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5
(5) δ = 0.2

**Fig. 7.** **Average reverse power dissipation as a function of reverse voltage; typical values**



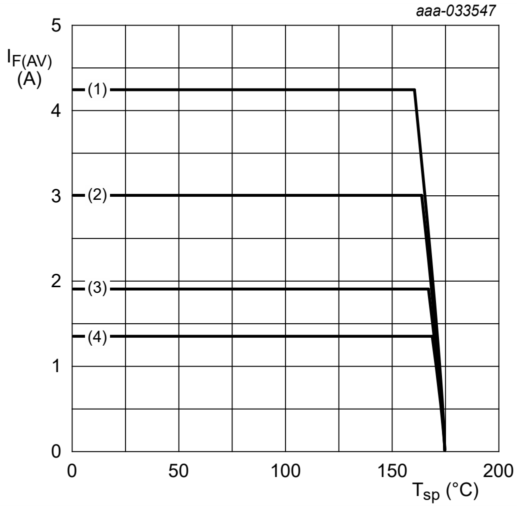

FR4 PCB, standard footprint
$T_j$ = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

**Fig. 8.** **Average forward current as a function of ambient temperature; typical values**



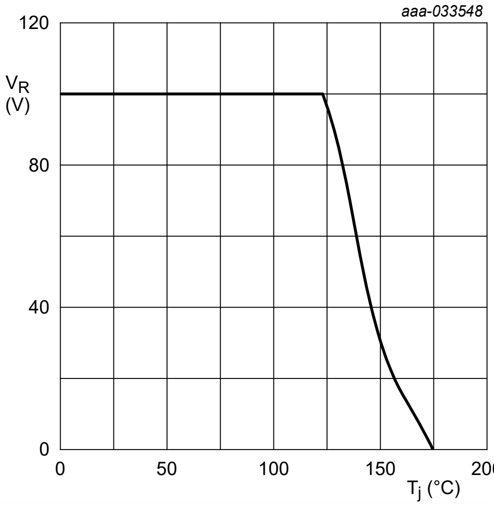

FR4 PCB, mounting pad for cathode 1 $cm^2$
$T_j$ = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

**Fig. 9.** **Average forward current as a function of ambient temperature; typical values**



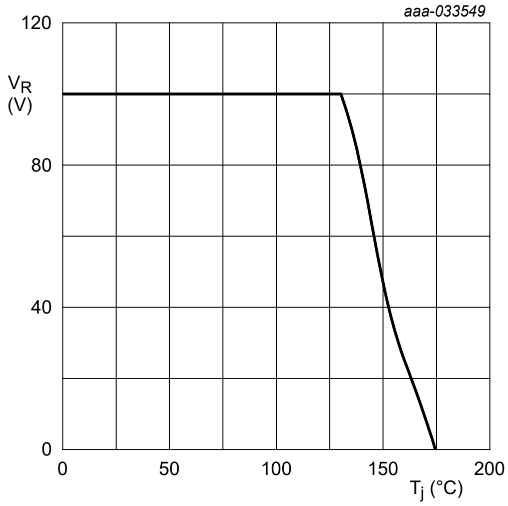

Tj = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



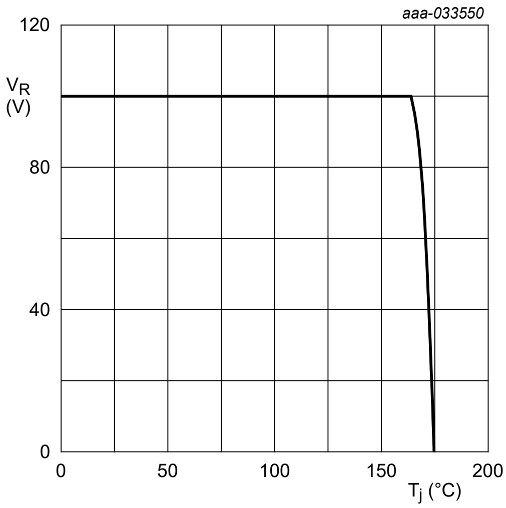

FR4 PCB, standard footprint
$R_{th}$ = 200 K/W

**Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values**




FR4 PCB, mounting pad for cathode 1 $cm^2$
$R_{th}$ = 120 K/W

**Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values**




Soldering point of cathode tab
$R_{th}$ = 12 K/W

**Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values**

# 11. Test information

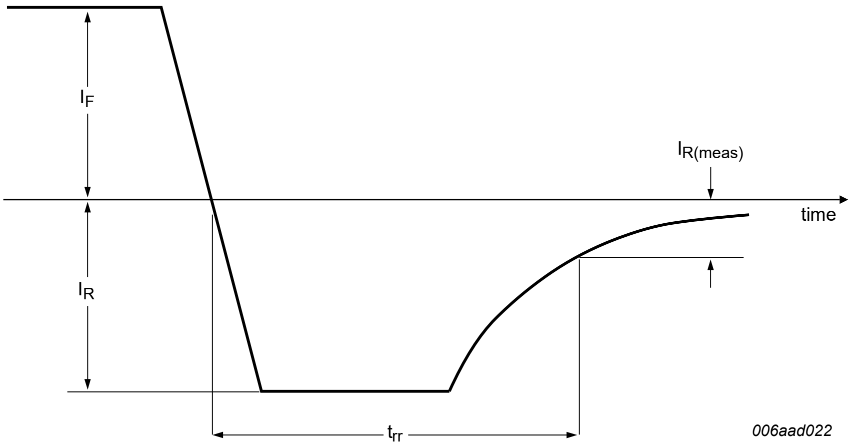



**Fig. 14. Reverse recovery definition; step recovery**

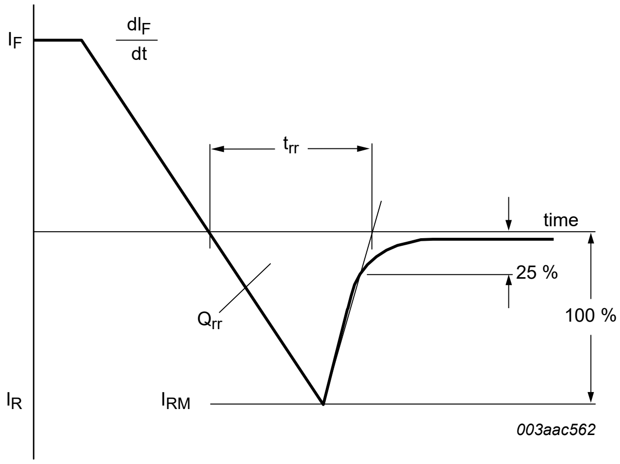



**Fig. 15. Reverse recovery definition; ramp recovery**

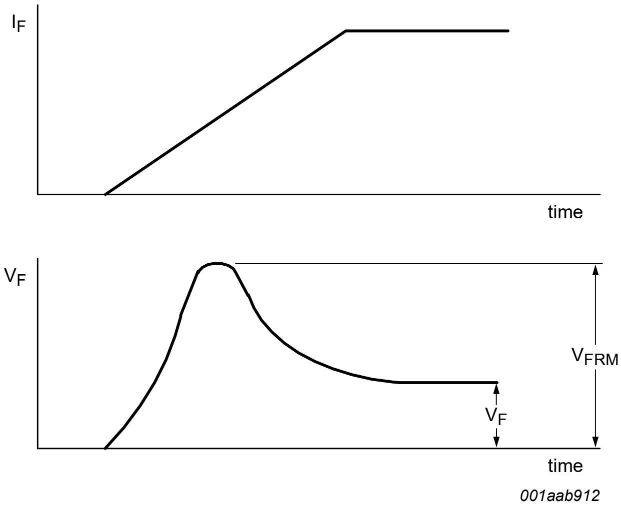



**Fig. 16. Forward recovery definition**

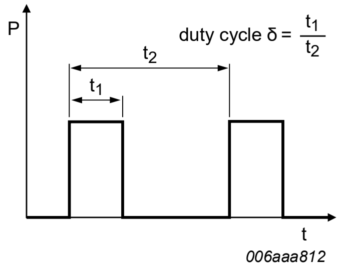



**Fig. 17. Duty cycle definition**

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.

### 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

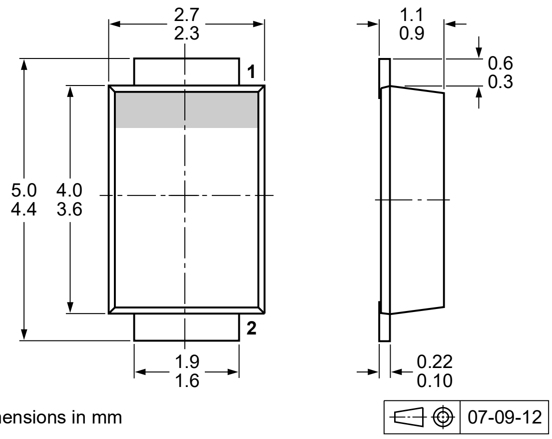



**Fig. 18. Package outline CFP5 (SOD128)**

## 13. Soldering

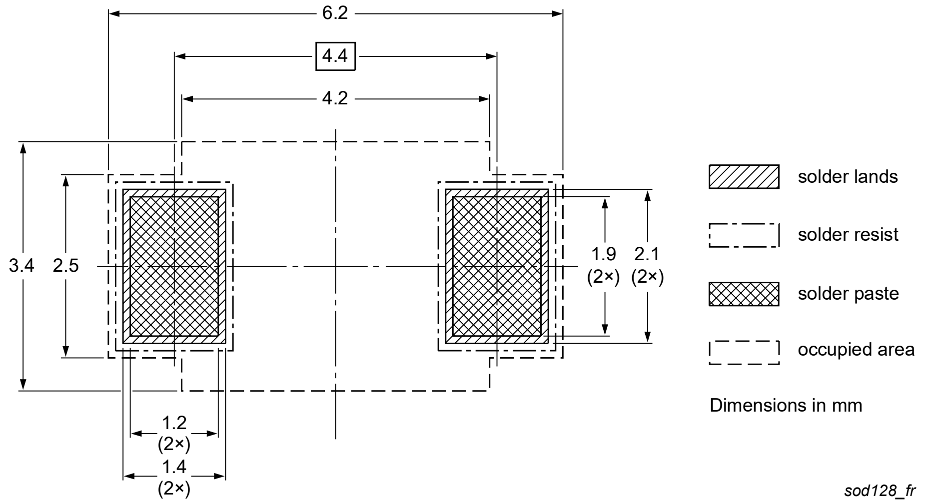



**Fig. 19. Reflow soldering footprint for CFP5 (SOD128)**

**Wave soldering footprint information** SOD128

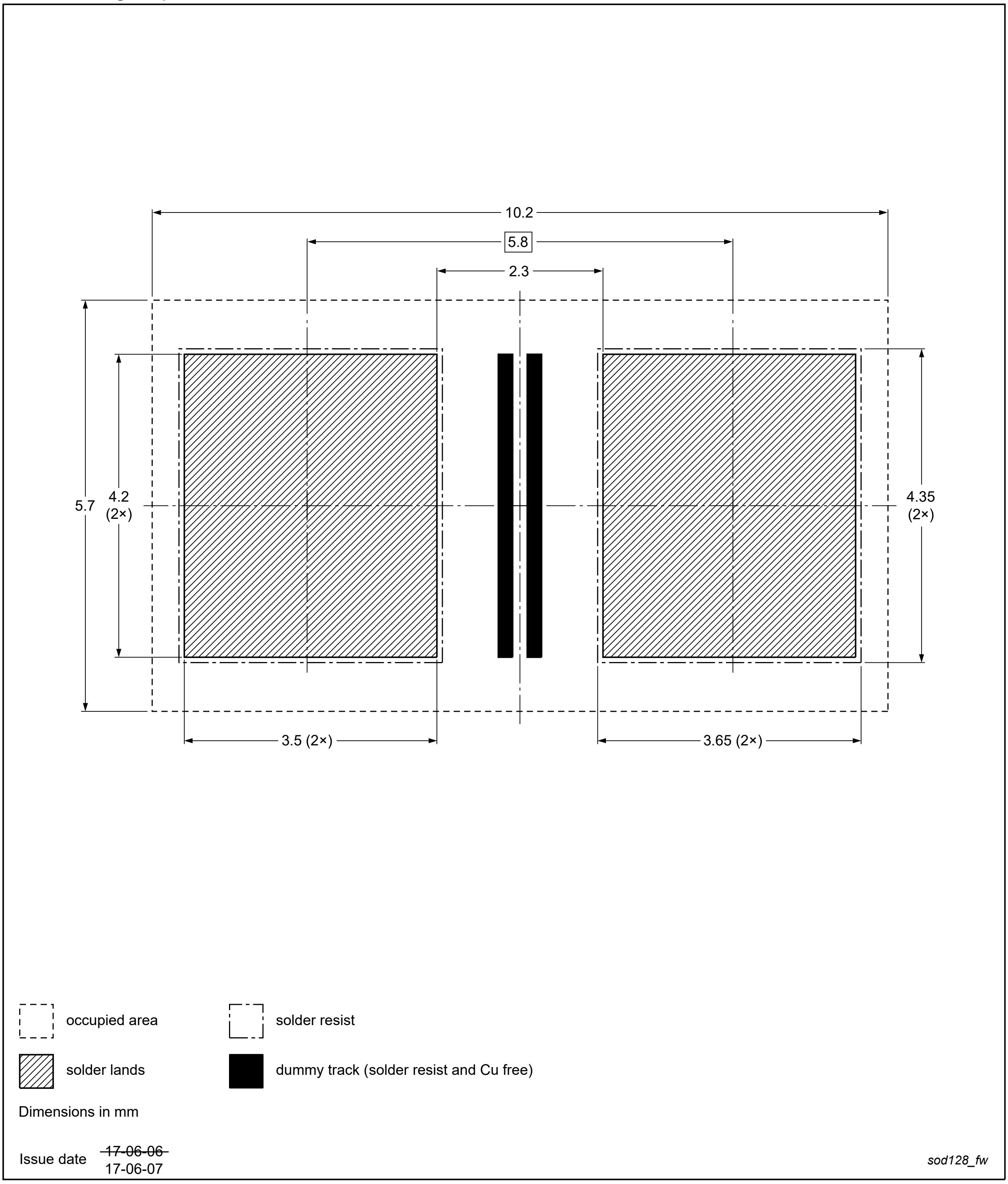



**Fig. 20. Wave soldering footprint for CFP5 (SOD128)**

# 14. Revision history

**Table 8. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PMEG100T30ELP-Q v.3 | 20240719 | Product data sheet | - | PMEG100T30ELP-Q v.2 |
| Modifications: | • Characteristics: $I_{RM}$ and $Q_{rr}$ conditions changed | | | |
| PMEG100T30ELP-Q v.2 | 20210707 | Product data sheet | - | PMEG100T30ELP-Q v.1 |
| PMEG100T30ELP-Q v.1 | 20210608 | Preliminary data sheet | - | - |

# 15. Legal information

## 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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