

PMEG2005CT

500 mA low V_F dual MEGA Schottky barrier rectifier

Rev. 2 — 22 June 2010

Product data sheet

1. Product profile

1.1 General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier in common cathode configuration with an integrated guard ring for stress protection, encapsulated in a SOT23 (TO-236AB) small Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Average forward current: $I_{F(AV)} \leq 0.5$ A
- Reverse voltage: $V_R \leq 20$ V
- Low forward voltage
- AEC-Q101 qualified
- Small SMD plastic package

1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- High-speed switching
- Low power consumption applications

1.4 Quick reference data

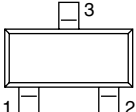
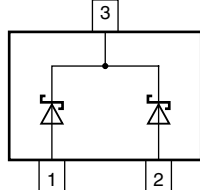
Table 1. Quick reference data
 $T_j = 25$ °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------|--|-----|-----|-----|---------|
| Per diode | | | | | | |
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20$ kHz | | | | |
| | | $T_{amb} \leq 100$ °C | [1] | - | - | 0.5 |
| | | $T_{sp} \leq 130$ °C | - | - | 0.5 | A |
| V_R | reverse voltage | | - | - | 20 | V |
| V_F | forward voltage | $I_F = 0.5$ A | - | 360 | 390 | mV |
| I_R | reverse current | $V_R = 20$ V | - | 30 | 200 | μ A |

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

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-----------------|---|---|
| 1 | anode (diode 1) |  |  |
| 2 | anode (diode 2) | | |
| 3 | common cathode | | |

006aaa438

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMEG2005CT | - | plastic surface-mounted package; 3 leads | SOT23 |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PMEG2005CT | P8* |

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|------------------|-------------------------------------|---|-----|-----|------|---|
| Per diode | | | | | | |
| V_R | reverse voltage | $T_j = 25\text{ °C}$ | - | 20 | V | |
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20\text{ kHz}$ | | | | |
| | | $T_{amb} \leq 100\text{ °C}$ | [1] | - | 0.5 | A |
| | | $T_{sp} \leq 130\text{ °C}$ | - | - | 0.5 | A |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ ms}$; $\delta \leq 0.25$ | - | 3.9 | A | |
| I_{FSM} | non-repetitive peak forward current | square wave; $t_p = 8\text{ ms}$ | [2] | - | 10 | A |

Table 5. Limiting values ...continued
 In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-------------------------------------|-------------------------|-----------------------------|-----|------|------|----|
| Per device; one diode loaded | | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [3] | - | 330 | mW |
| | | | [4] | - | 400 | mW |
| | | | [1] | - | 460 | mW |
| T_j | junction temperature | | - | 150 | °C | |
| T_{amb} | ambient temperature | | -55 | +150 | °C | |
| T_{stg} | storage temperature | | -65 | +150 | °C | |

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

[2] $T_j = 25\text{ °C}$ prior to surge.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------------------------------|--|-------------|-----|-----|-----|------|-----|
| Per device; one diode loaded | | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | | | | |
| | | | [2] | - | - | 375 | K/W |
| | | | [3] | - | - | 310 | K/W |
| | | | [4] | - | - | 270 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [5] | - | 60 | K/W | |

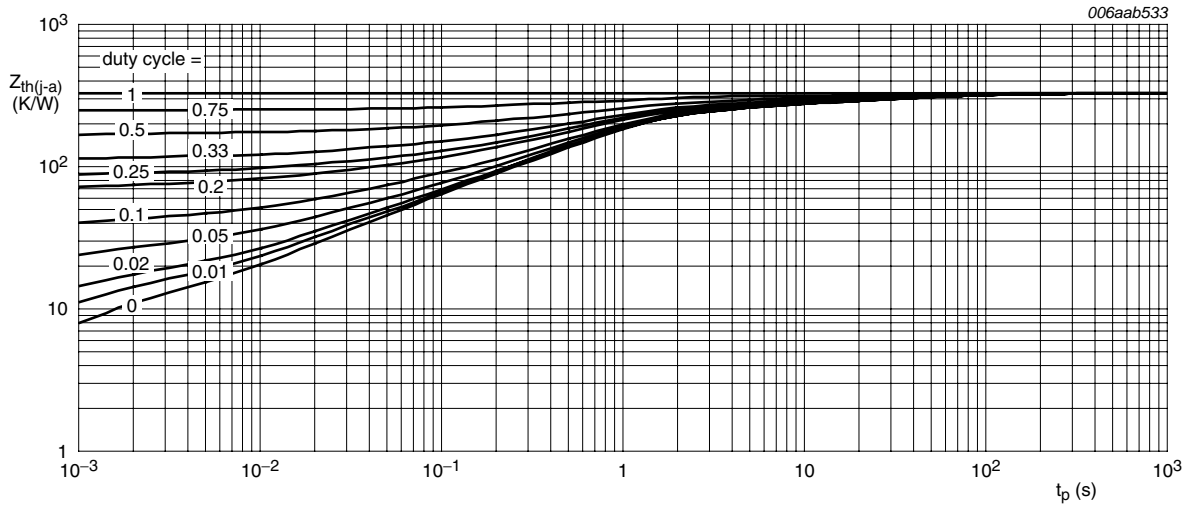
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

[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.

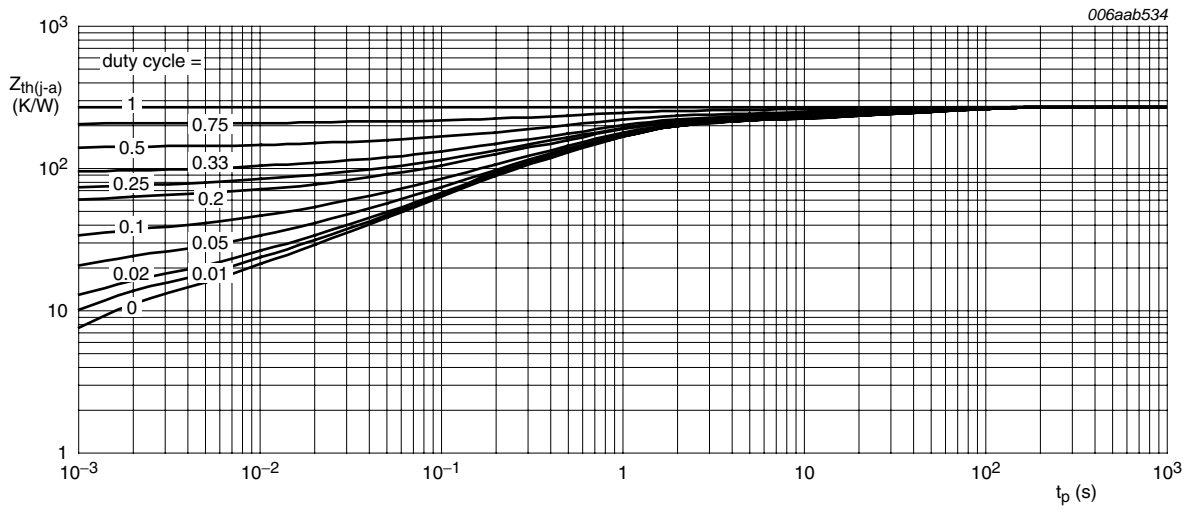
[4] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.

[5] Soldering point of cathode tab.



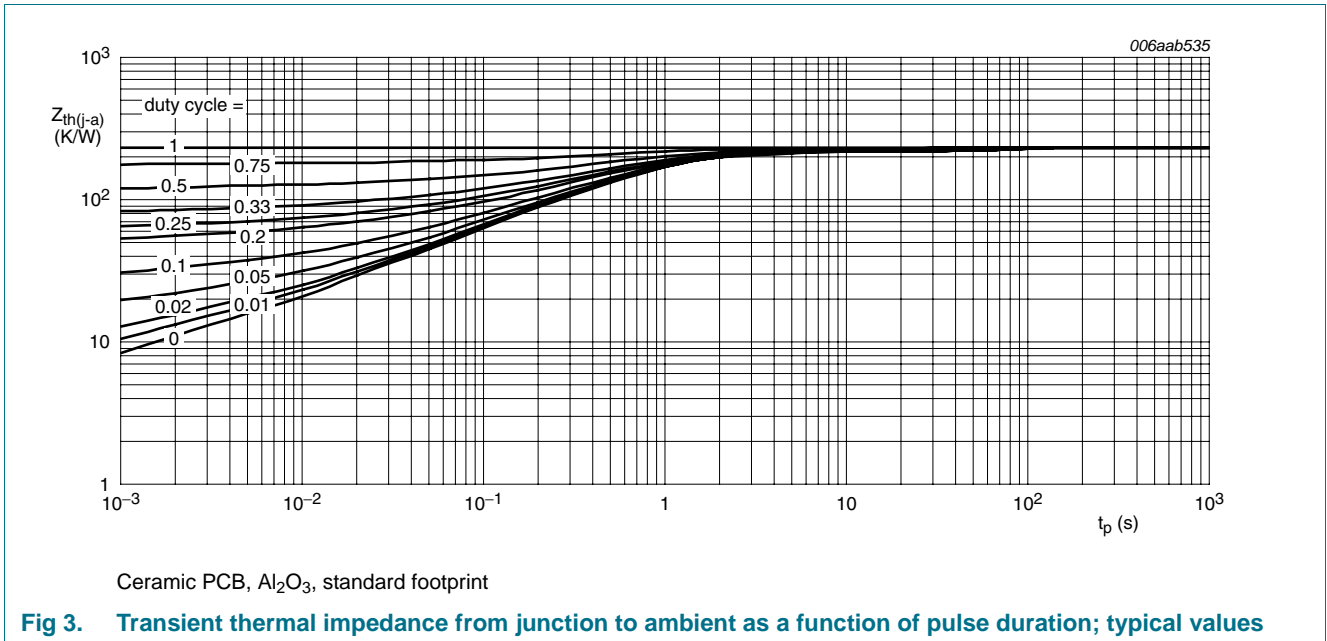
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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



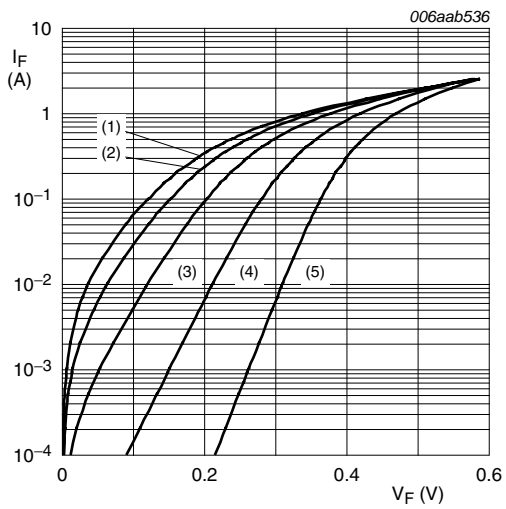
7. Characteristics

Table 7. Characteristics

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

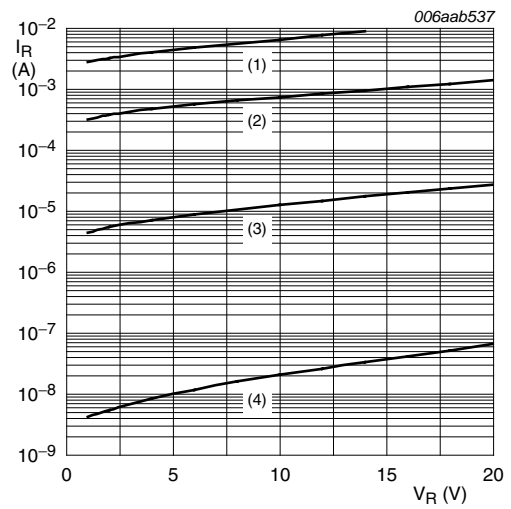
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------|-----------------------|--------------------------------------|-----|-----|-----|---------------|
| Per device | | | | | | |
| V_F | forward voltage | $I_F = 0.1\text{ mA}$ | - | 95 | 130 | mV |
| | | $I_F = 1\text{ mA}$ | - | 155 | 190 | mV |
| | | $I_F = 10\text{ mA}$ | - | 215 | 240 | mV |
| | | $I_F = 100\text{ mA}$ | - | 285 | 330 | mV |
| | | $I_F = 500\text{ mA}$ | - | 360 | 390 | mV |
| I_R | reverse current | $V_R = 10\text{ V}$ | - | 11 | 40 | μA |
| | | $V_R = 20\text{ V}$ | - | 30 | 200 | μA |
| C_d | diode capacitance | $V_R = 1\text{ V}; f = 1\text{ MHz}$ | - | 66 | 80 | pF |
| t_{rr} | reverse recovery time | | [1] | 22 | - | ns |

[1] When switched from $I_F = 10\text{ mA}$ to $I_R = 10\text{ mA}$; $R_L = 100\ \Omega$; measured at $I_R = 1\text{ mA}$.



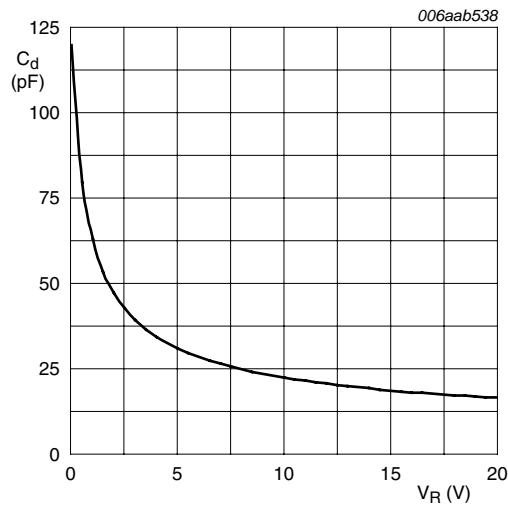
- (1) $T_j = 150\text{ °C}$
- (2) $T_j = 125\text{ °C}$
- (3) $T_j = 85\text{ °C}$
- (4) $T_j = 25\text{ °C}$
- (5) $T_j = -40\text{ °C}$

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



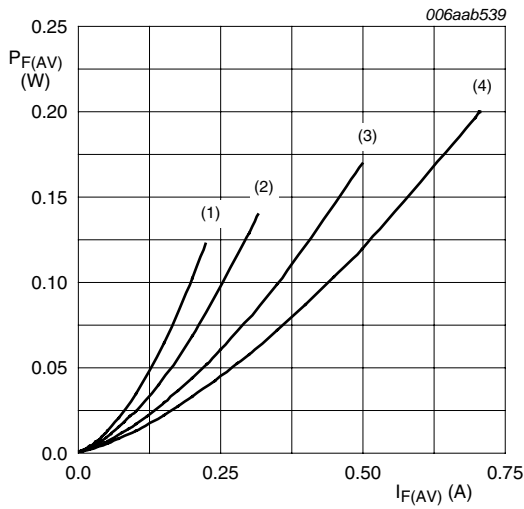
- (1) $T_j = 125\text{ °C}$
- (2) $T_j = 85\text{ °C}$
- (3) $T_j = 25\text{ °C}$
- (4) $T_j = -40\text{ °C}$

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



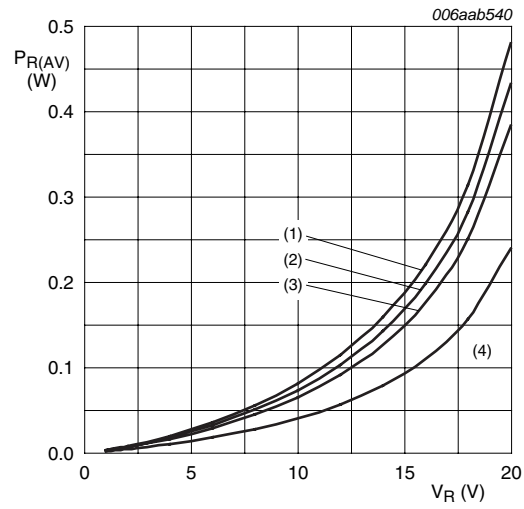
$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

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



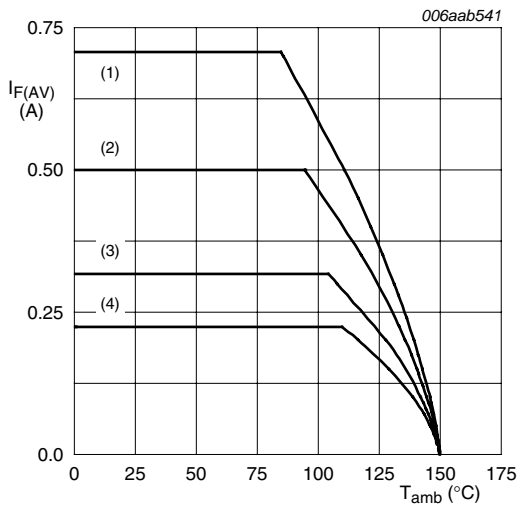
- $T_j = 150\text{ °C}$
- (1) $\delta = 0.1$
 - (2) $\delta = 0.2$
 - (3) $\delta = 0.5$
 - (4) $\delta = 1$

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



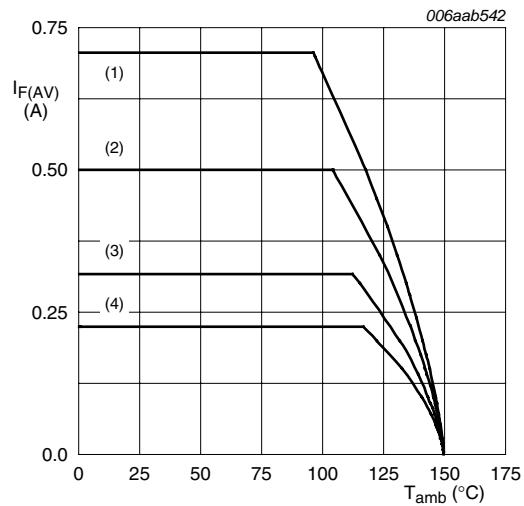
- $T_j = 125\text{ °C}$
- (1) $\delta = 1$
 - (2) $\delta = 0.9$
 - (3) $\delta = 0.8$
 - (4) $\delta = 0.5$

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



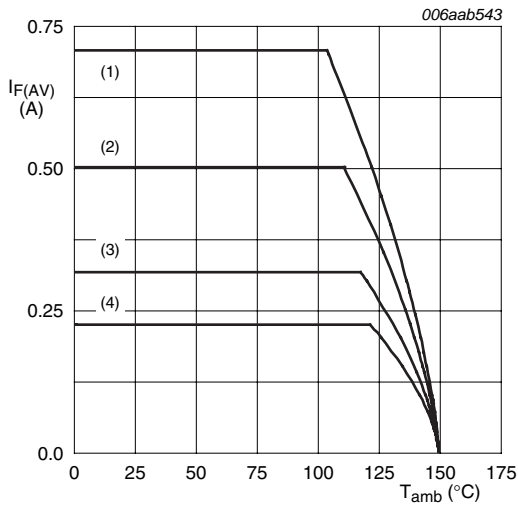
- FR4 PCB, standard footprint
 $T_j = 150\text{ °C}$
- (1) $\delta = 1$; DC
 - (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 - (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 - (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



- FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 150\text{ °C}$
- (1) $\delta = 1$; DC
 - (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 - (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 - (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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

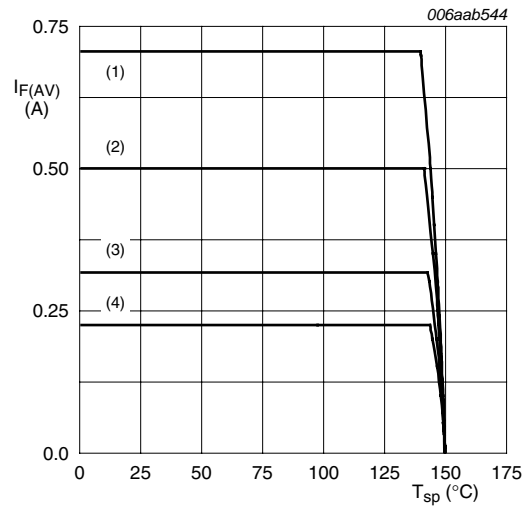


Ceramic PCB, Al_2O_3 , standard footprint

$T_j = 150\text{ °C}$

- (1) $\delta = 1$; DC
- (2) $\delta = 0.5$; $f = 20\text{ kHz}$
- (3) $\delta = 0.2$; $f = 20\text{ kHz}$
- (4) $\delta = 0.1$; $f = 20\text{ kHz}$

Fig 11. Average forward current as a function of ambient temperature; typical values

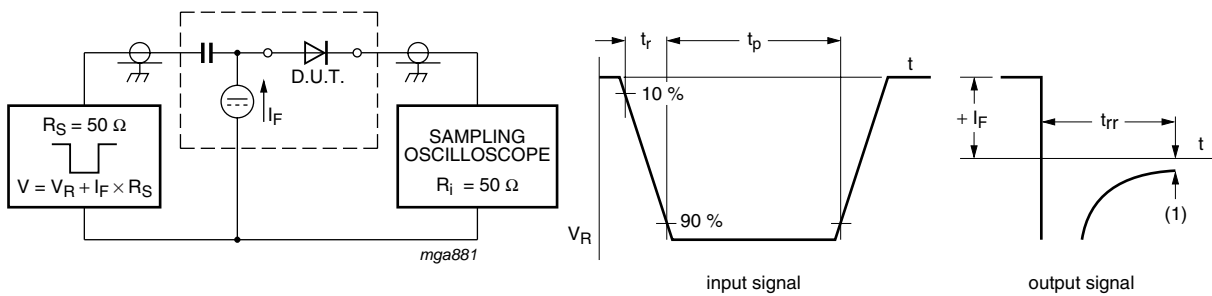


$T_j = 150\text{ °C}$

- (1) $\delta = 1$; DC
- (2) $\delta = 0.5$; $f = 20\text{ kHz}$
- (3) $\delta = 0.2$; $f = 20\text{ kHz}$
- (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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

8. Test information

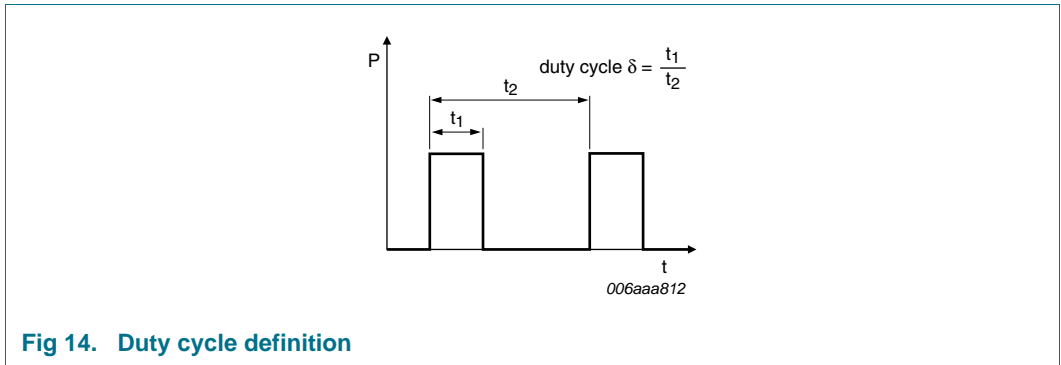


(1) $I_R = 1\text{ mA}$

Input signal: reverse pulse rise time $t_r = 0.6\text{ ns}$; reverse voltage pulse duration $t_p = 100\text{ ns}$; duty cycle $\delta = 0.05$

Oscilloscope: rise time $t_r = 0.35\text{ ns}$

Fig 13. Reverse recovery time test circuit and waveforms

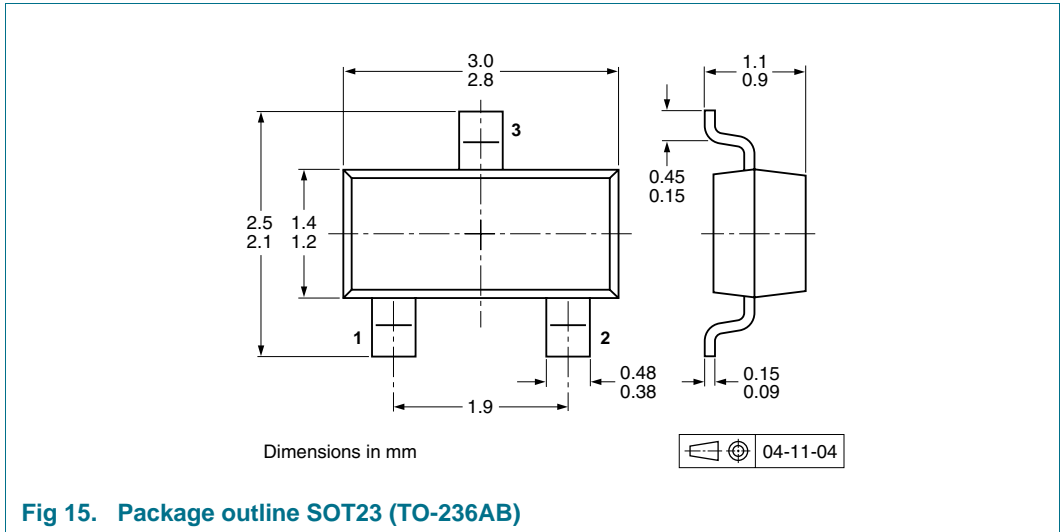


The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#), [11](#) and [12](#) are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

8.1 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.

9. Package outline



10. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | |
|-------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| PMEG2005CT | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | -235 |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

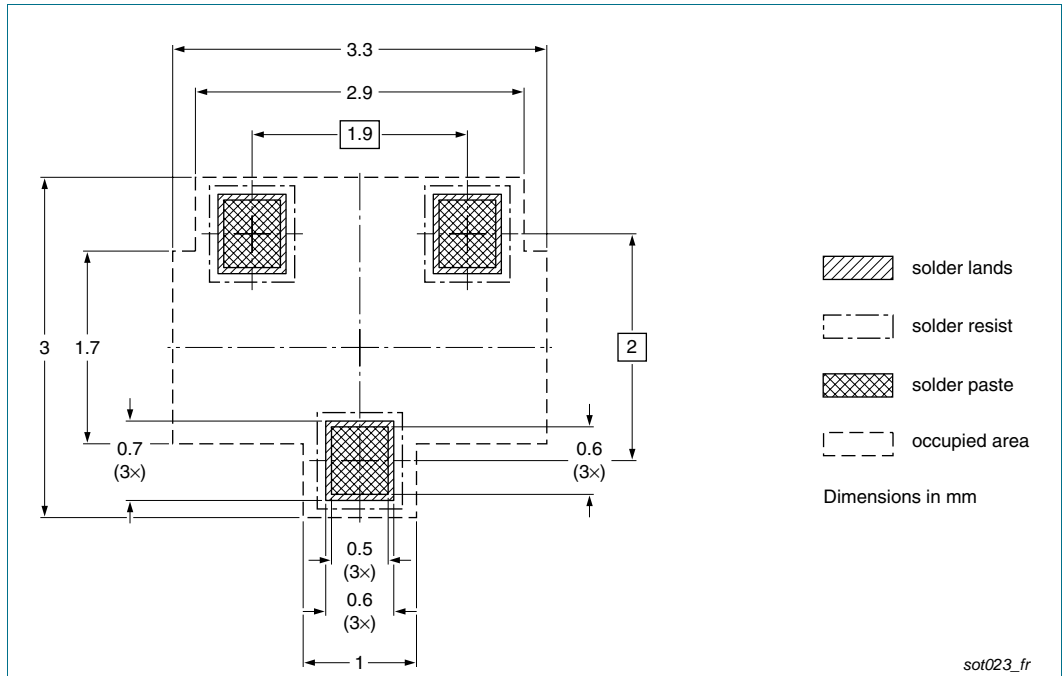


Fig 16. Reflow soldering footprint SOT23 (TO-236AB)

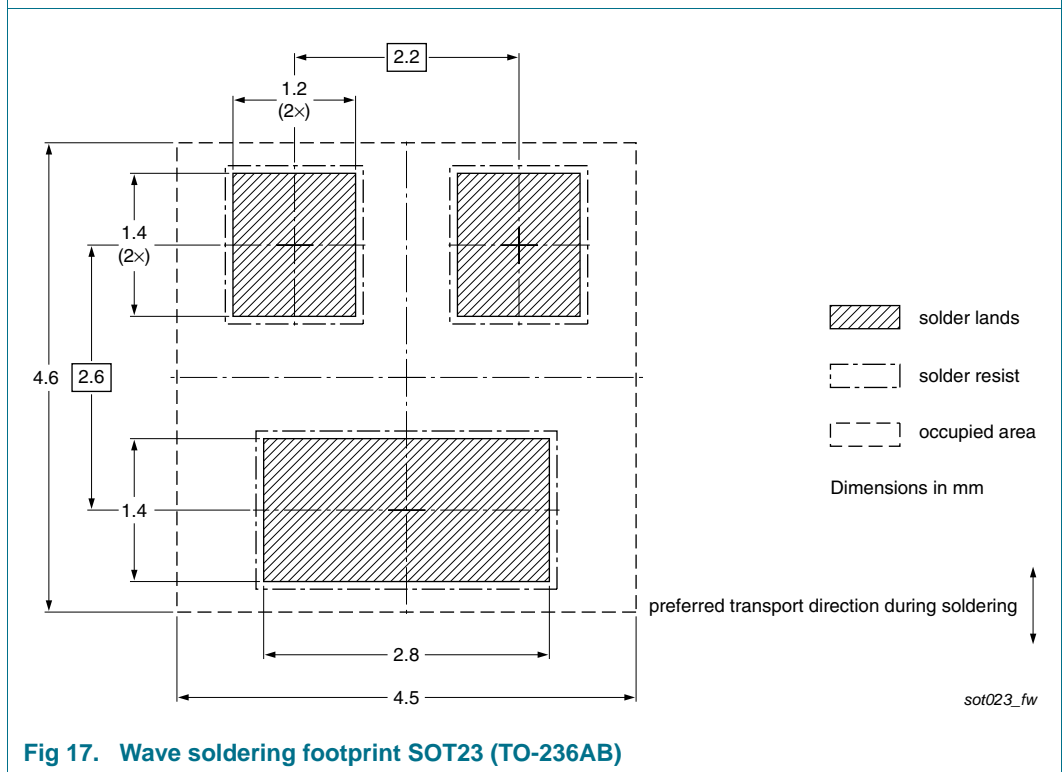


Fig 17. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|---|---------------|--------------|
| PMEG2005CT v.2 | 20100622 | Product data sheet | - | PMEG2005CT_1 |
| Modifications: | | <ul style="list-style-type: none">• Table 2 "Pinning": Graphic symbol amended• Section 13 "Legal information": updated | | |
| PMEG2005CT_1 | 20090604 | Product data sheet | - | - |

13. Legal information

13.1 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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15. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features and benefits | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| 2 | Pinning information | 2 |
| 3 | Ordering information | 2 |
| 4 | Marking | 2 |
| 5 | Limiting values | 2 |
| 6 | Thermal characteristics | 3 |
| 7 | Characteristics | 5 |
| 8 | Test information | 8 |
| 8.1 | Quality information | 9 |
| 9 | Package outline | 9 |
| 10 | Packing information | 9 |
| 11 | Soldering | 10 |
| 12 | Revision history | 11 |
| 13 | Legal information | 12 |
| 13.1 | Data sheet status | 12 |
| 13.2 | Definitions | 12 |
| 13.3 | Disclaimers | 12 |
| 13.4 | Trademarks | 13 |
| 14 | Contact information | 13 |
| 15 | Contents | 14 |

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