



# PMEG4005CT

500 mA low VF dual MEGA Schottky barrier rectifier

24 September 2019

Product data sheet

## 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.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 0.5$  A
- Reverse voltage:  $V_R \leq 40$  V
- Small SMD plastic package
- Low forward voltage
- AEC-Q101 qualified

## 3. Applications

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

## 4. Quick reference data

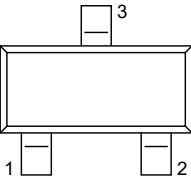
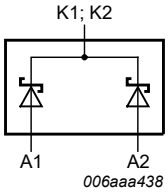
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 85$ °C	[1]	-	0.5	A
		square-wave pulse; $\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 130$ °C		-	0.5	A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	40	V
$V_F$	forward voltage	$I_F = 500$ mA; $T_j = 25$ °C	-	410	470	mV
$I_R$	reverse current	$V_R = 40$ V; $T_j = 25$ °C	-	27	100	$\mu$ A

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

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode (diode 1)	 <p style="text-align: center;"><b>SOT23</b></p>	 <p style="text-align: center;">006aaa438</p>
2	A	anode (diode 2)		
3	K1, K2	common cathode (diode 1 and diode 2)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4005CT	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

## 7. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
PMEG4005CT	PA%

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per diode</b>						
$V_R$	reverse voltage	$T_j = 25\text{ °C}$		-	40	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 85\text{ °C}$	[1]	-	0.5	A
		square-wave pulse; $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 130\text{ °C}$		-	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 pulse; $t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$		-	10	A
<b>Per device; one diode loaded</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2]	-	330	mW
			[3]	-	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] 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  $1\text{ cm}^2$ .

## 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]	-	-	375	K/W
			[1] [3]	-	-	310	K/W
			[1] [4]	-	-	270	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[1] [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  $1\text{ cm}^2$ .

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

[5] Soldering point of cathode tab.

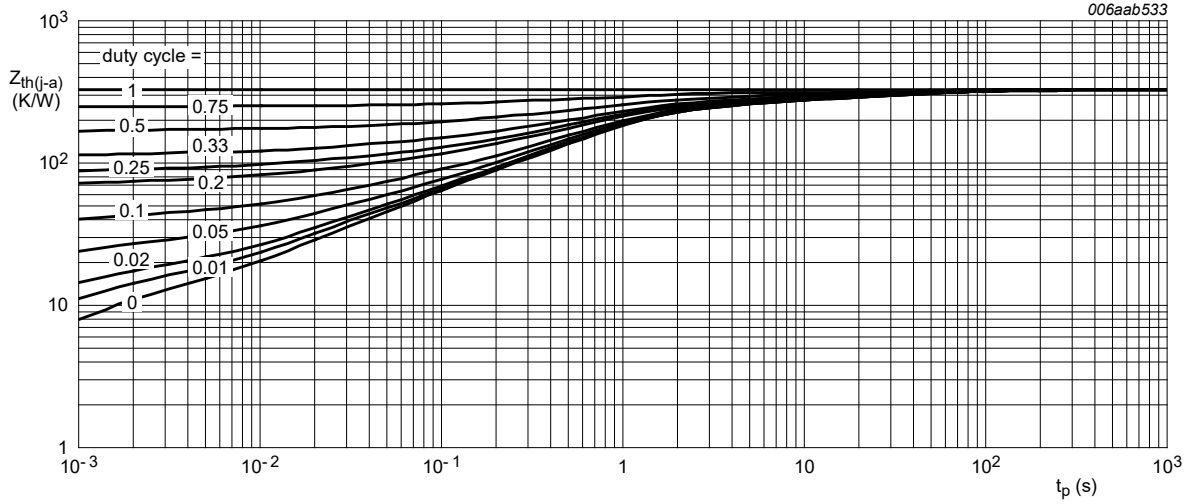


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

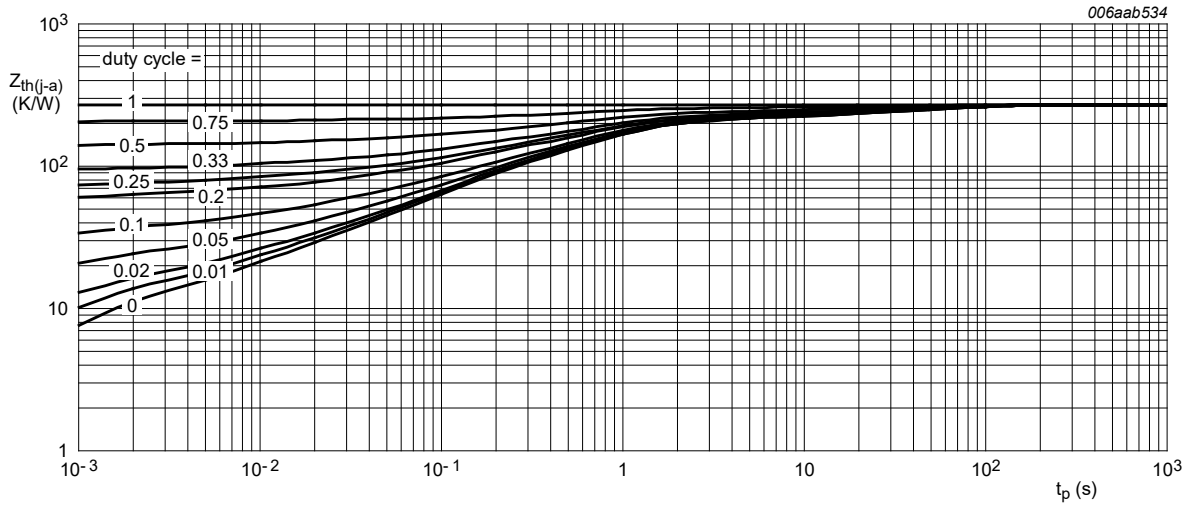


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

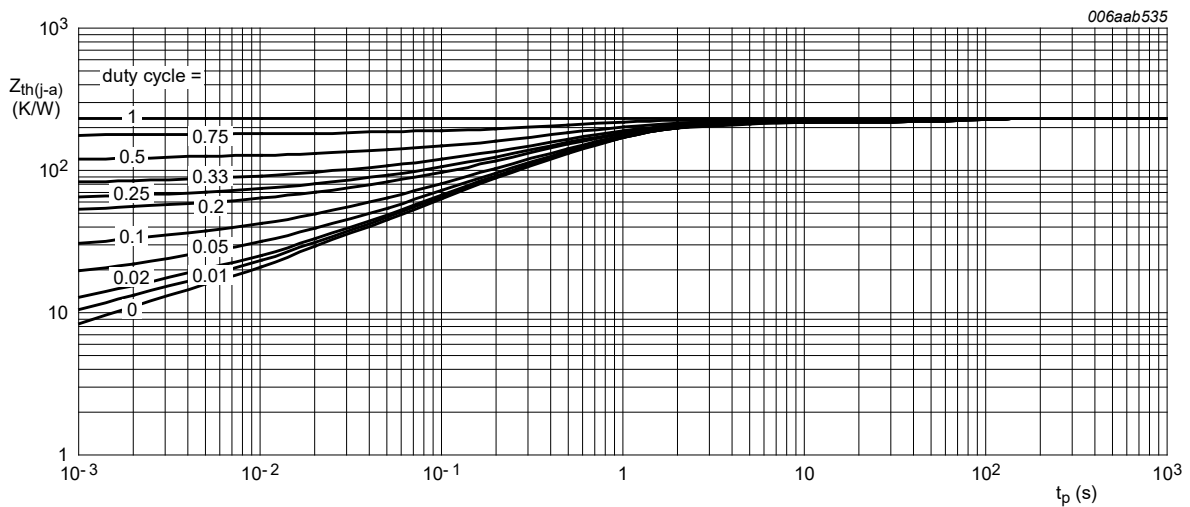


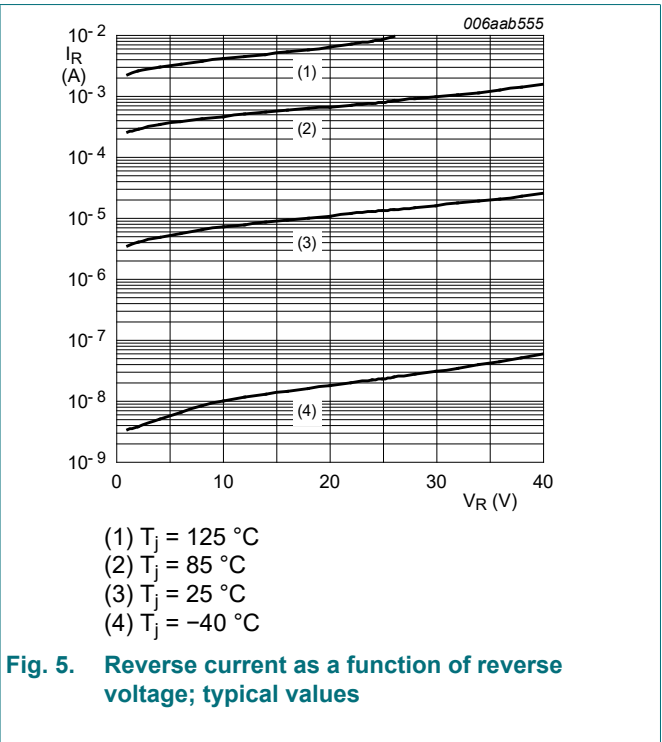
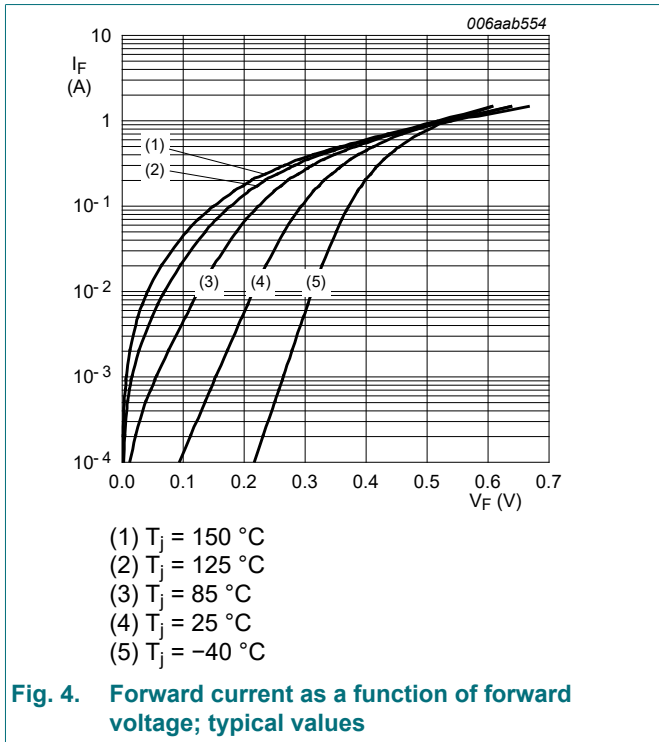
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

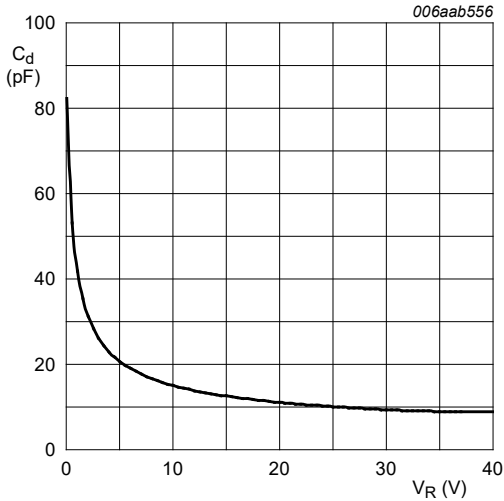
## 10. Characteristics

**Table 7. Characteristics**

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

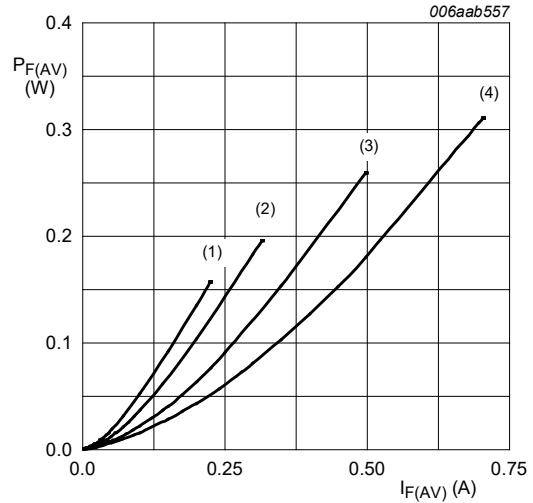
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_F$	forward voltage	$I_F = 0.1\text{ mA}; T_j = 25\text{ °C}$	-	95	130	mV
		$I_F = 1\text{ mA}; T_j = 25\text{ °C}$	-	155	210	mV
		$I_F = 10\text{ mA}; T_j = 25\text{ °C}$	-	220	270	mV
		$I_F = 100\text{ mA}; T_j = 25\text{ °C}$	-	295	350	mV
		$I_F = 500\text{ mA}; T_j = 25\text{ °C}$	-	410	470	mV
$I_R$	reverse current	$V_R = 10\text{ V}; T_j = 25\text{ °C}$	-	7	20	$\mu\text{A}$
		$V_R = 40\text{ V}; T_j = 25\text{ °C}$	-	27	100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ °C}$	-	43	50	pF
$t_{rr}$	reverse recovery time	$I_F = 10\text{ mA}; I_R = 10\text{ mA}; I_{R(\text{meas})} = 1\text{ mA}; R_L = 100\ \Omega; T_j = 25\text{ °C}$	-	13	-	ns





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

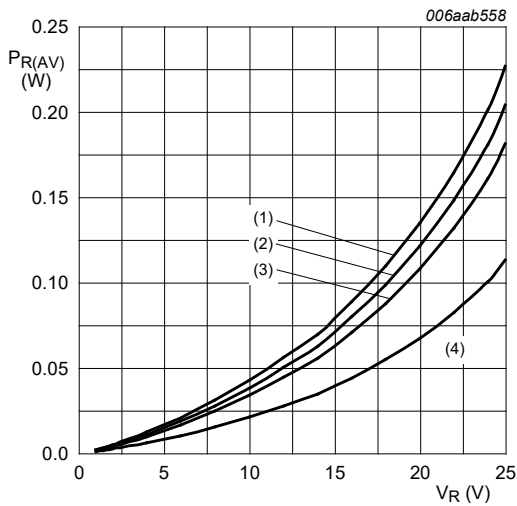
**Fig. 6. Diode capacitance as a function of reverse voltage; typical values**



$T_j = 150 \text{ }^\circ\text{C}$

- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

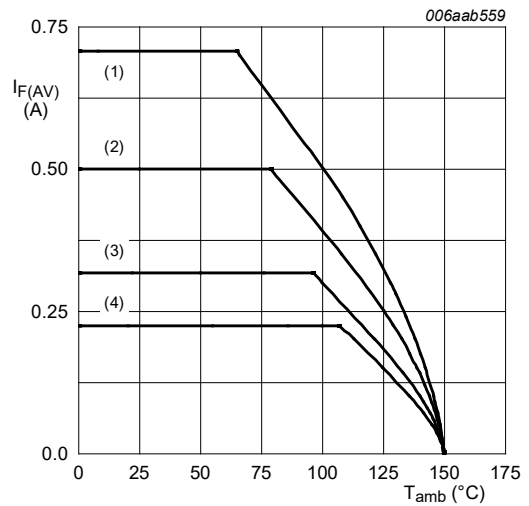
**Fig. 7. Average forward power dissipation as a function of average forward current; typical values**



$T_j = 125 \text{ }^\circ\text{C}$

- (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**

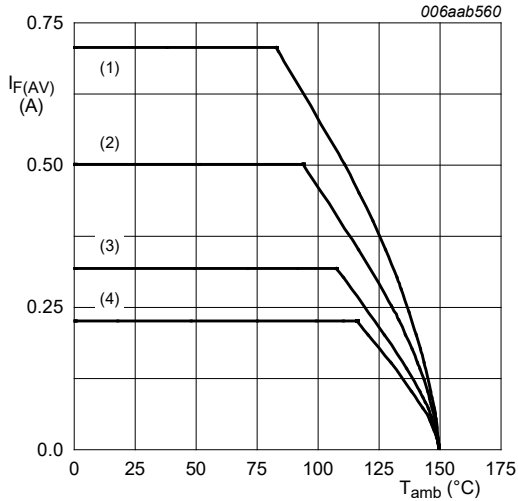


FR4 PCB, standard footprint

$T_j = 150 \text{ }^\circ\text{C}$

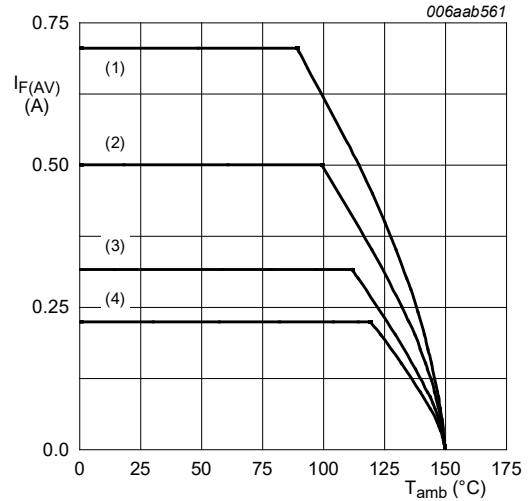
- (1)  $\delta = 1$ ; DC
- (2)  $\delta = 0.5$ ;  $f = 20 \text{ kHz}$
- (3)  $\delta = 0.2$ ;  $f = 20 \text{ kHz}$
- (4)  $\delta = 0.1$ ;  $f = 20 \text{ kHz}$

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



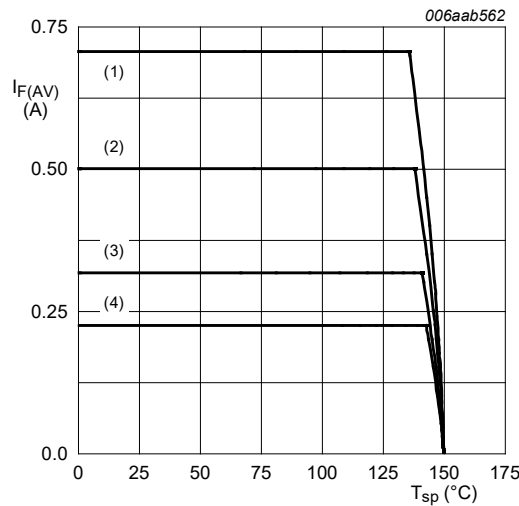
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 T<sub>j</sub> = 150 °C  
 (1) δ = 1; DC  
 (2) δ = 0.5; f = 20 kHz  
 (3) δ = 0.2; f = 20 kHz  
 (4) δ = 0.1; f = 20 kHz

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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint  
 T<sub>j</sub> = 150 °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<sub>j</sub> = 150 °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

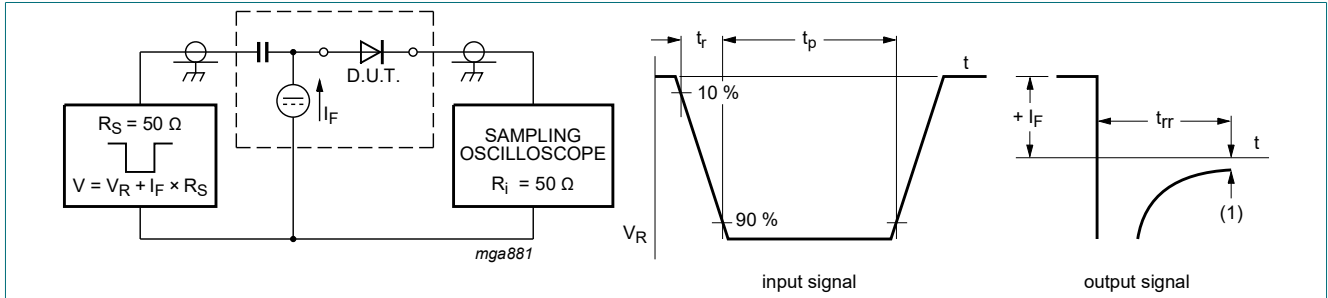


Fig. 13. Reverse recovery time: test circuit and waveforms

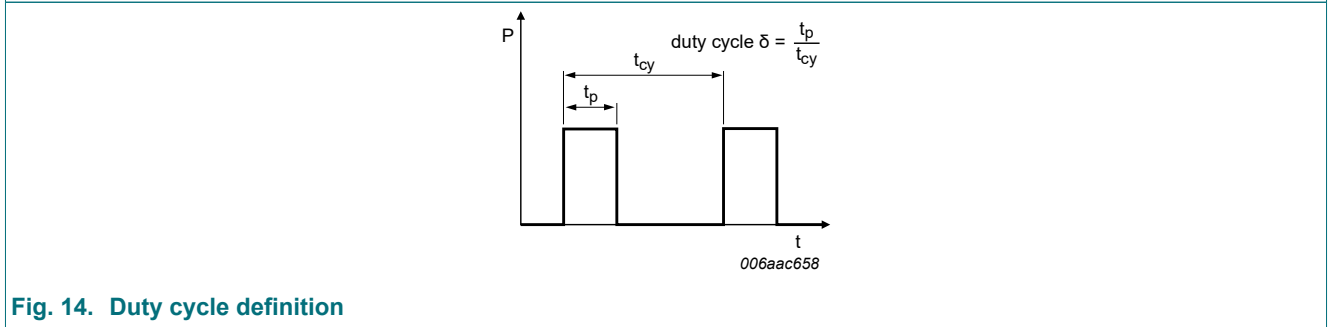


Fig. 14. Duty cycle definition

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

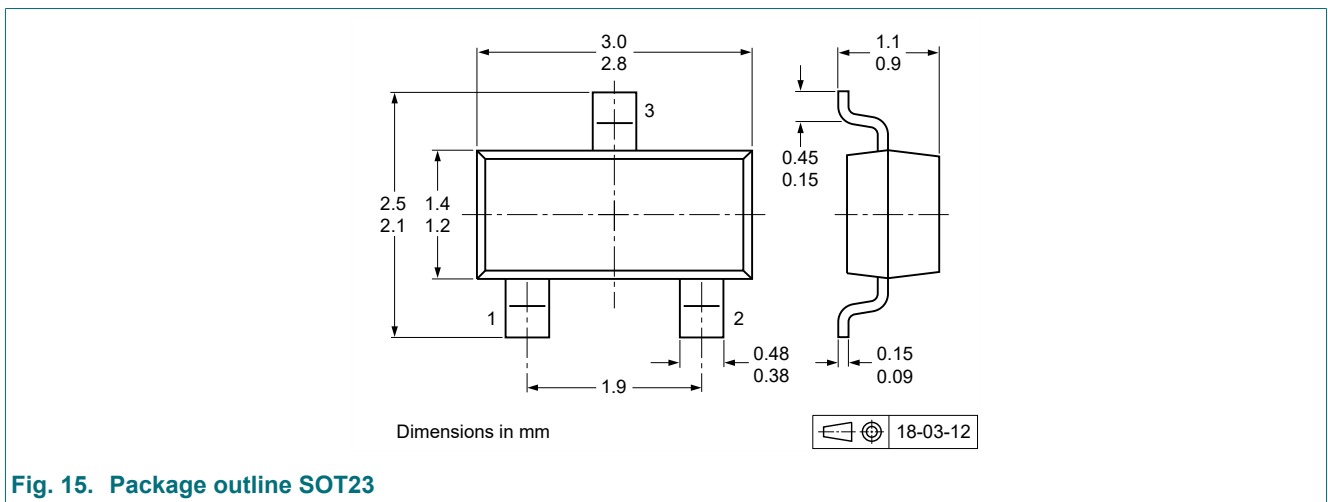


Fig. 15. Package outline SOT23



### 13. Soldering

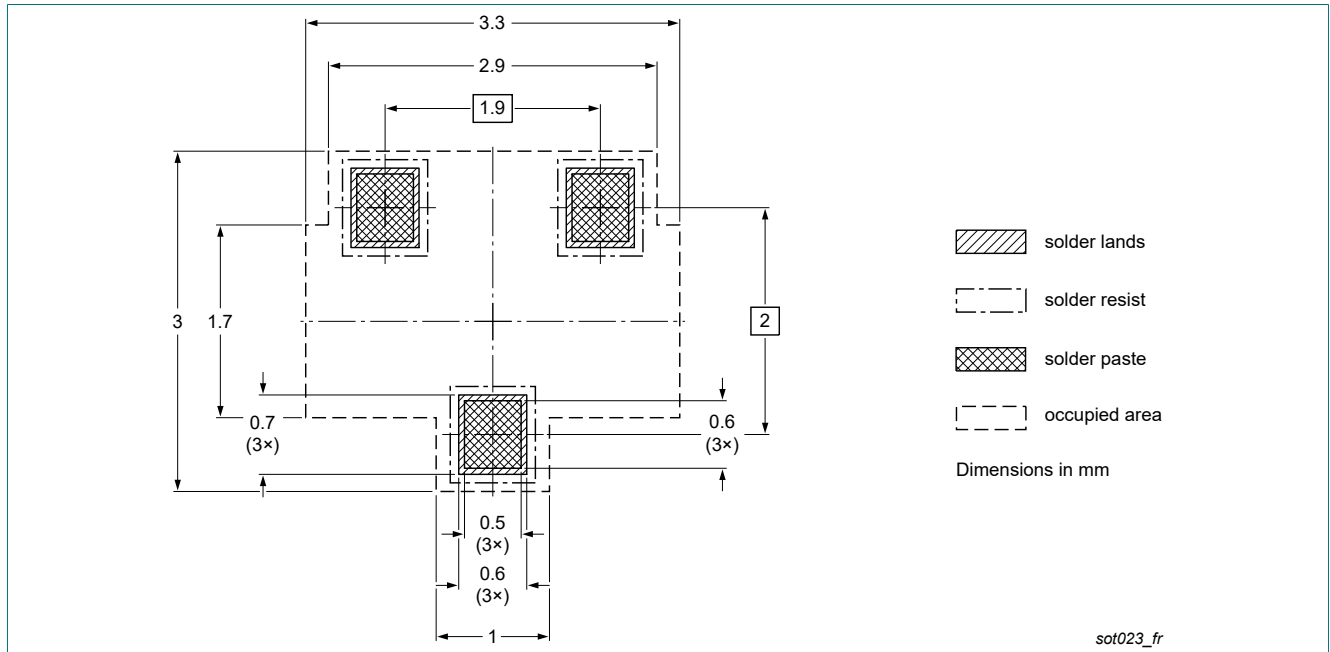


Fig. 16. Reflow soldering footprint for SOT23

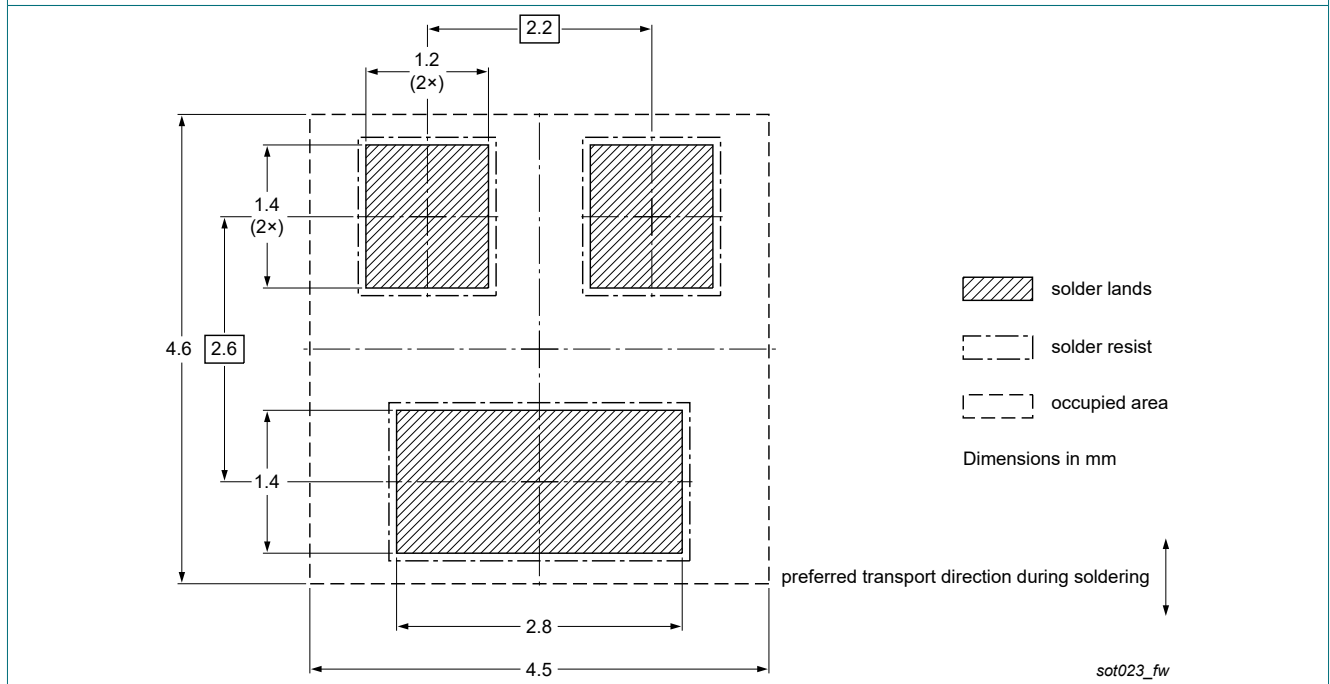


Fig. 17. Wave soldering footprint for SOT23

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4005CT v.3	20190924	Product data sheet	-	PMEG4005CT v.2
Modifications:	<ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul>			
PMEG4005CT v.2	20100920	Product data sheet	-	PMEG4005CT v.1
PMEG4005CT v.1	20090605	Product 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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