

PMEG3005CT

500 mA low V_F dual MEGA Schottky barrier rectifier

Rev. 2 — 20 September 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: $V_R \leq 30$ 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

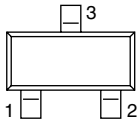
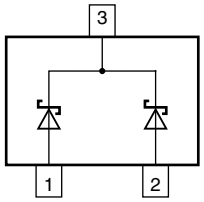
T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; f = 20 kHz					
		$T_{amb} \leq 95$ °C	[1]	-	-	0.5	A
		$T_{sp} \leq 130$ °C		-	-	0.5	A
V_R	reverse voltage			-	-	30	V
V_F	forward voltage	$I_F = 0.5$ A		-	375	430	mV
I_R	reverse current	$V_R = 30$ V		-	40	150	µA

[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
PMEG3005CT	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMEG3005CT	P9*

[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 °C		-	30	V
$I_{F(AV)}$	average forward current	square wave; δ = 0.5; f = 20 kHz				
		$T_{amb} \leq$ 95 °C	[1]	-	0.5	A
		$T_{sp} \leq$ 130 °C		-	0.5	A
I_{FRM}	repetitive peak forward current	$t_p \leq$ 1 ms; $\delta \leq$ 0.25		-	3.9	A
I_{FSM}	non-repetitive peak forward current	square wave; t_p = 8 ms	[2]	-	10	A

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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	$T_{amb} \leq 25$ °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 °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 cm^2.

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode; 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.

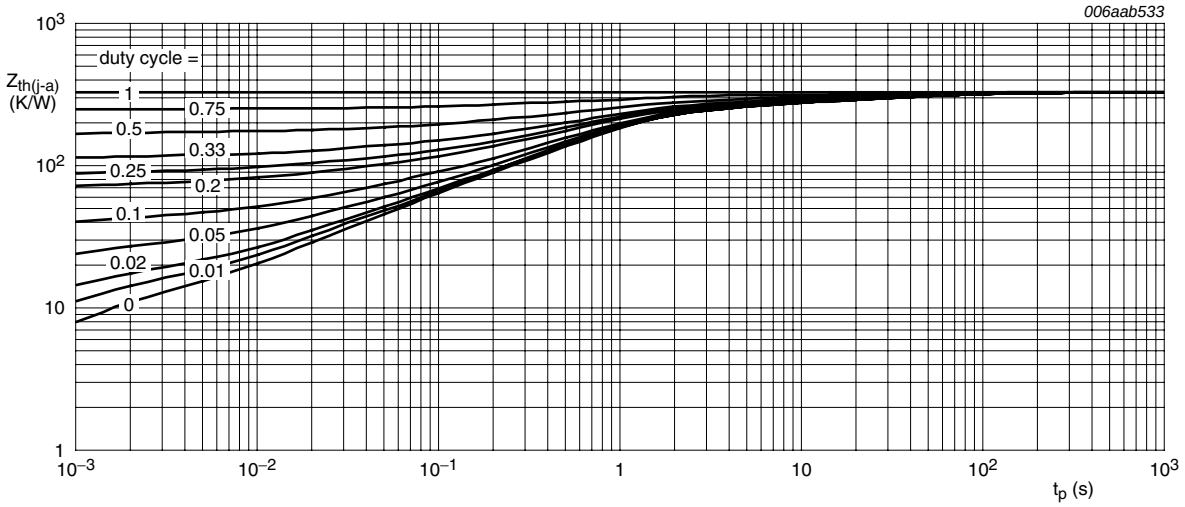
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

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

[5] Soldering point of cathode tab.

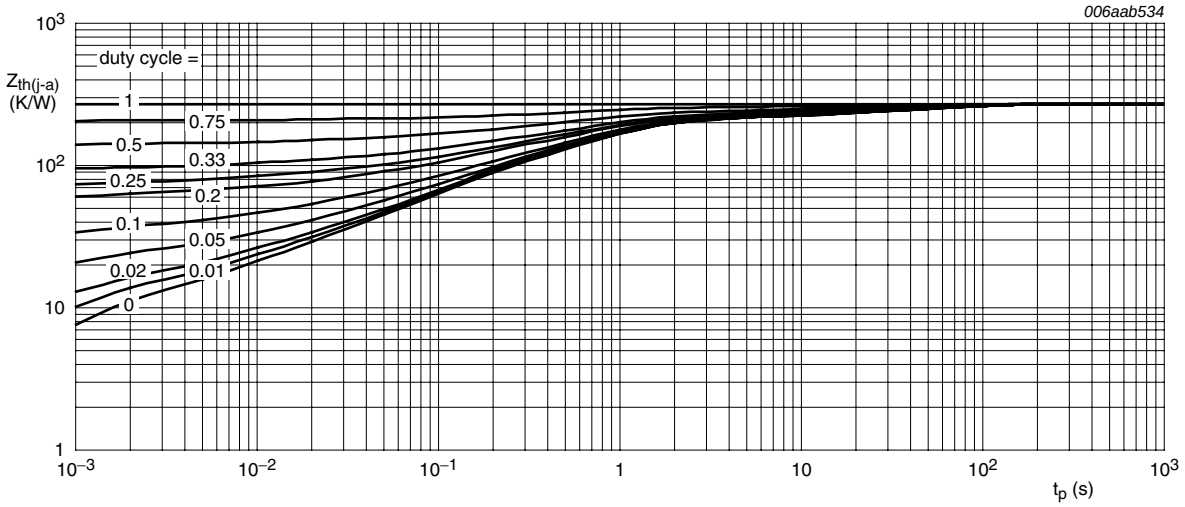
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FR4 PCB, standard footprint

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

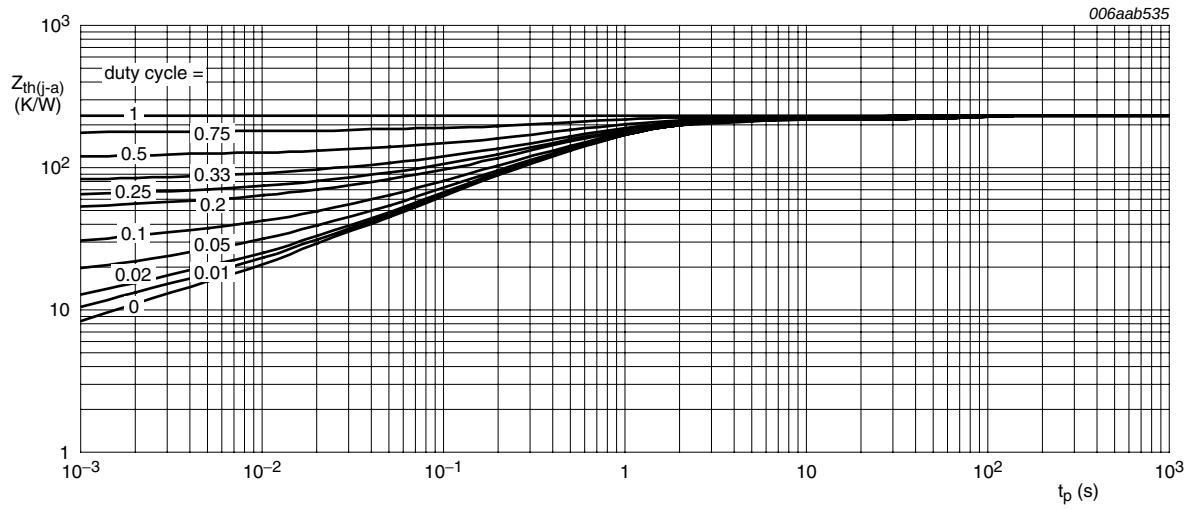


FR4 PCB, mounting pad for cathode 1 cm^2

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

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Ceramic PCB, Al_2O_3, standard footprint

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

7. Characteristics

Table 7. Characteristics

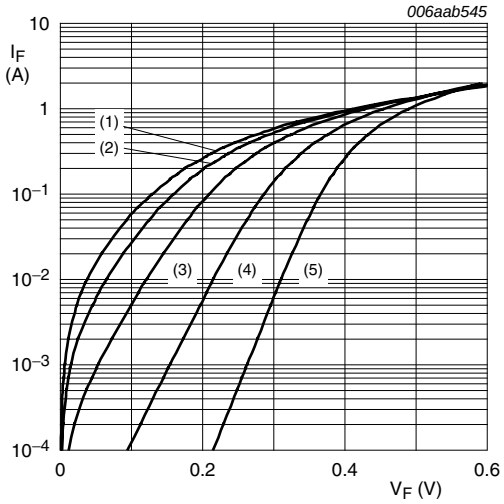
T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_F	forward voltage	I_F = 0.1 mA	-	95	130	mV
		I_F = 1 mA	-	155	200	mV
		I_F = 10 mA	-	215	250	mV
		I_F = 100 mA	-	290	340	mV
		I_F = 500 mA	-	375	430	mV
I_R	reverse current	V_R = 10 V	-	10	30	µA
		V_R = 30 V	-	40	150	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz	-	55	70	pF
t_{rr}	reverse recovery time	[1]	-	17	-	ns

[1] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA.

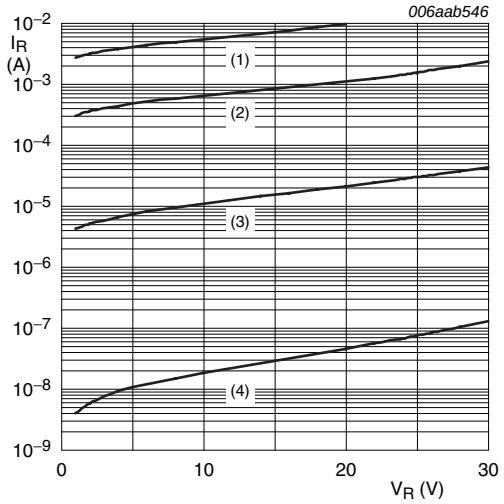
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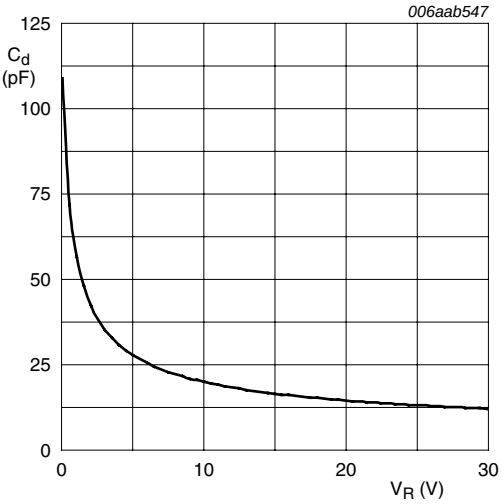
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

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



(1) T_j = 125 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

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

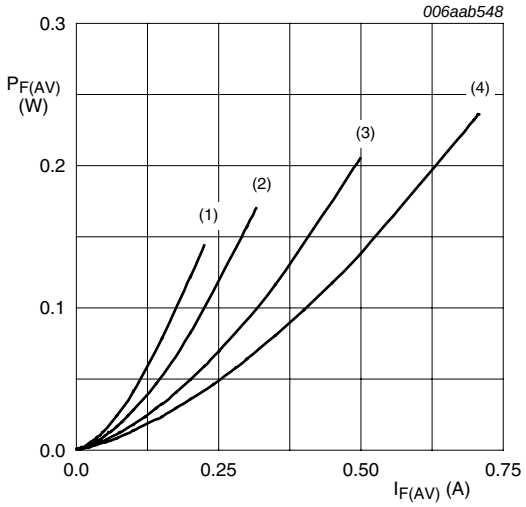


f = 1 MHz; T_{amb} = 25 °C

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

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T_j = 150 °C

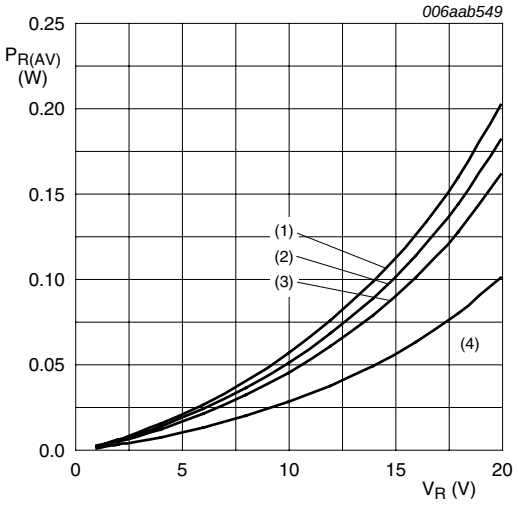
(1) δ = 0.1

(2) δ = 0.2

(3) δ = 0.5

(4) δ = 1

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



T_j = 125 °C

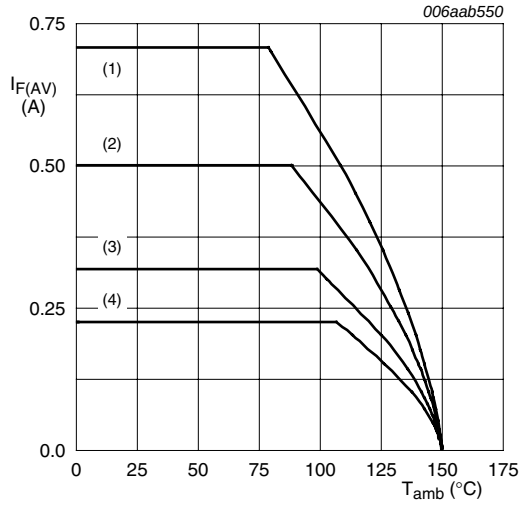
(1) δ = 1

(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

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



FR4 PCB, standard footprint

T_j = 150 °C

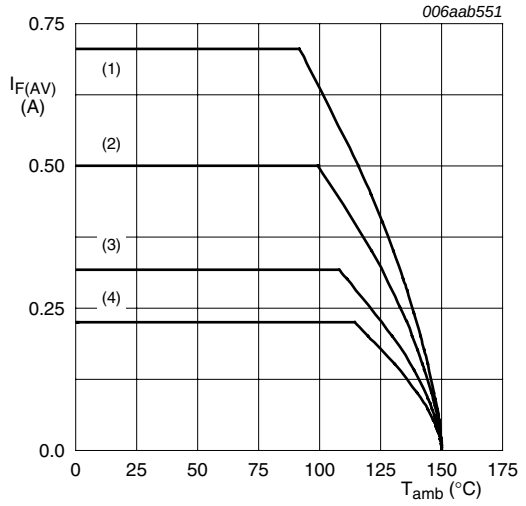
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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



FR4 PCB, mounting pad for cathode 1 cm^2

T_j = 150 °C

(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

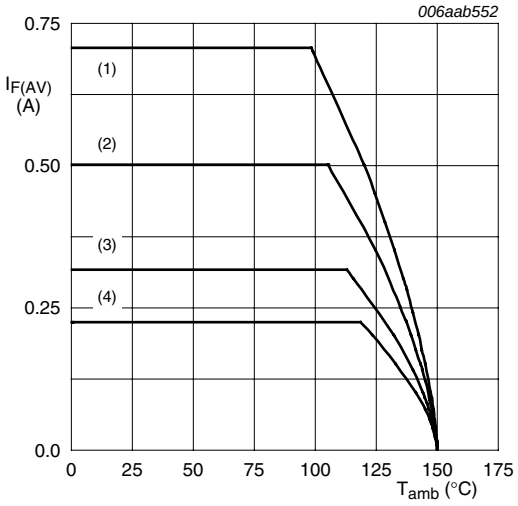
(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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

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Ceramic PCB, Al_2O_3, standard footprint

T_j = 150 °C

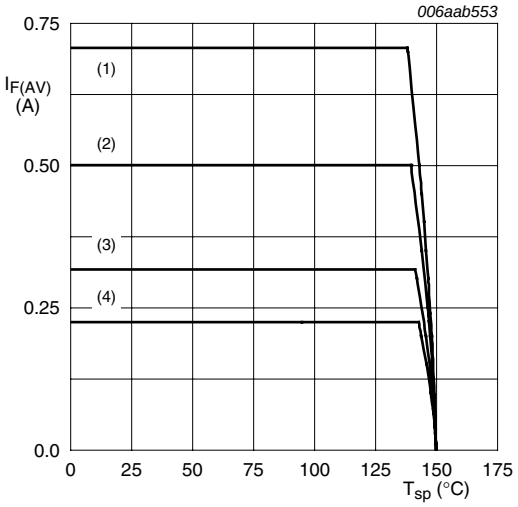
(1) δ = 1; DC

(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_j = 150 °C

(1) δ = 1; DC

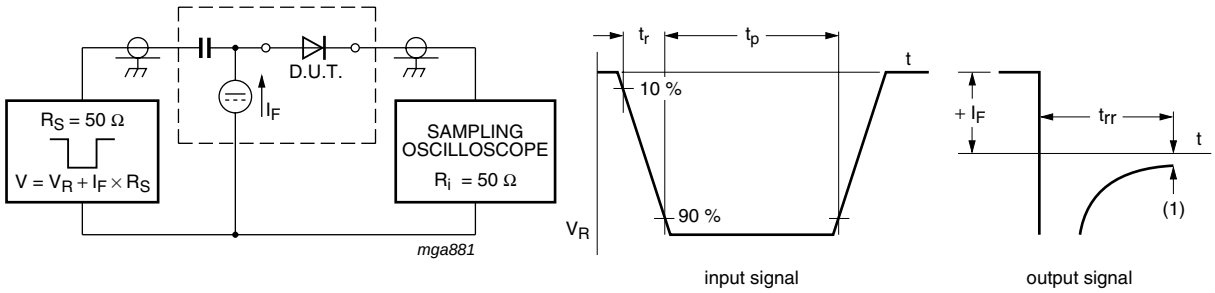
(2) δ = 0.5; f = 20 kHz

(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

8. Test information



(1) I_R = 1 mA

Input signal: reverse pulse rise time t_r = 0.6 ns; reverse voltage pulse duration t_p = 100 ns; duty cycle δ = 0.05

Oscilloscope: rise time t_r = 0.35 ns

Fig 13. Reverse recovery time test circuit and waveforms

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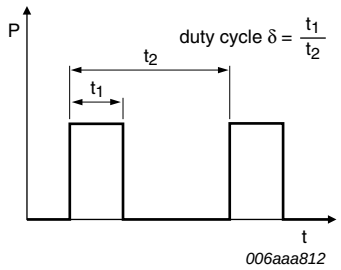


Fig 14. Duty cycle definition

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

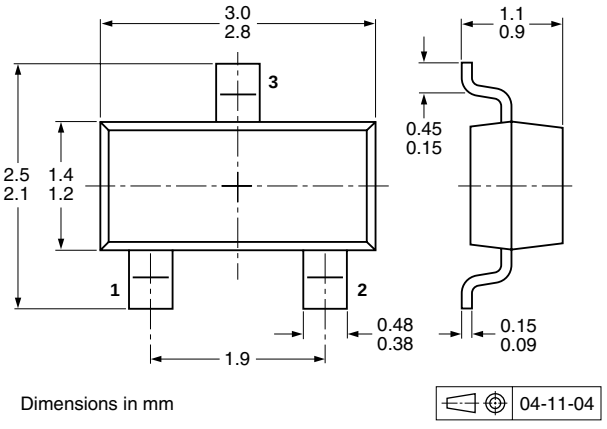


Fig 15. Package outline SOT23 (TO-236AB)

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
PMEG3005CT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

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

11. Soldering

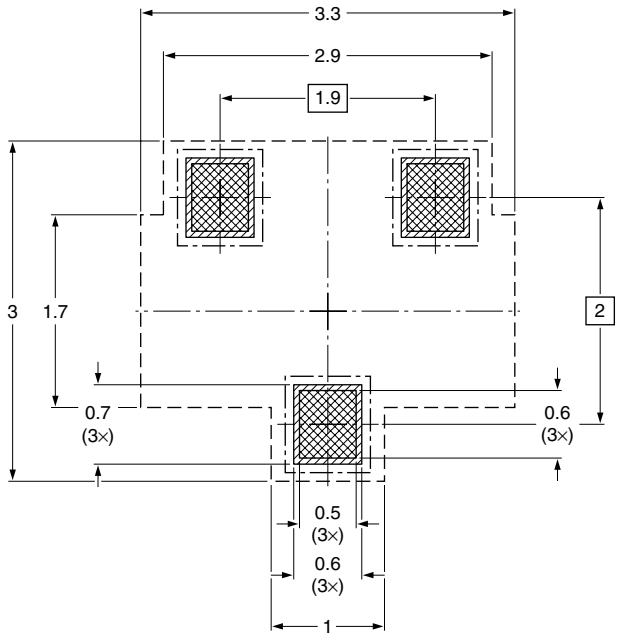


Fig 16. Reflow soldering footprint SOT23 (TO-236AB)

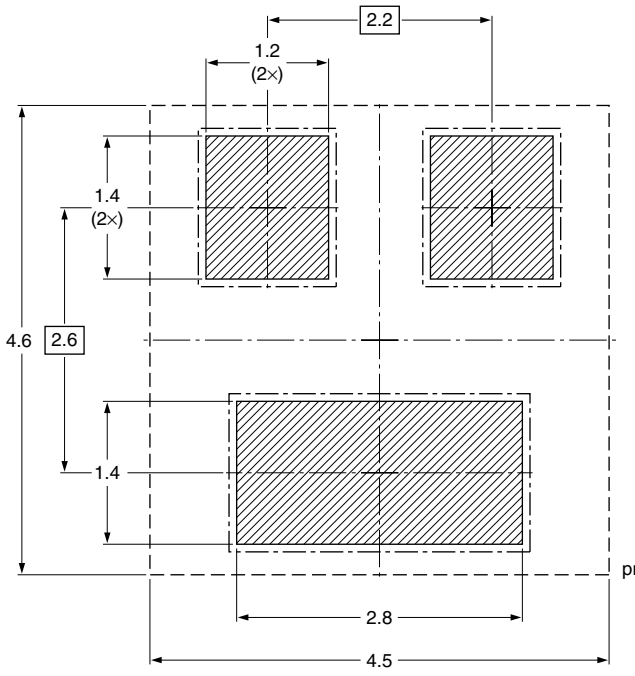


Fig 17. Wave soldering footprint SOT23 (TO-236AB)

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12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG3005CT v.2	20100920	Product data sheet	-	PMEG3005CT_1
Modifications:	• Table 2 “Pinning”: Graphic symbol amended • Section 13 “Legal information”: updated			
PMEG3005CT_1	20090605	Product data sheet	-	-

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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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