



# PMEG040V030EPE-Q

40 V, 3 A low VF Schottky barrier rectifier

15 July 2024

Product data sheet

## 1. General description

Planar Low  $V_F$  Schottky barrier rectifier encapsulated in a CFP15B (SOT1289B) power and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Very low forward voltage
- High power capability due to clip-bond technology
- Small and thin SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- High efficiency DC-to-DC conversion
- Low voltage rectification
- Switch mode power supply
- Freewheeling application
- Reverse polarity protection
- OR-ing

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_R$	reverse voltage	$T_j = 25\text{ °C}$	-	-	40	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 173\text{ °C}$	-	-	3	A
$V_F$	forward voltage	$I_F = 3\text{ A}$ ; pulsed; $T_j = 25\text{ °C}$	[1]	425	490	mV
$I_R$	reverse current	$V_R = 40\text{ V}$ ; pulsed; $T_j = 25\text{ °C}$	[1]	30	120	$\mu\text{A}$

[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	A	anode	 CFP15B (SOT1289B)	 aaa-009063
2	A	anode		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG040V030EPE-Q	CFP15B	plastic, thermal enhanced ultra thin SMD package; 3 leads; 2.13 mm pitch; 5.8 x 4.3 x 0.95 mm body	<a href="#">SOT1289B</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG040V030EPE-Q	040V U03E

## 8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V <sub>R</sub>	reverse voltage	T <sub>j</sub> = 25 °C		-	40	V
I <sub>F</sub>	forward current	δ = 1; T <sub>sp</sub> ≤ 172 °C		-	4.2	A
I <sub>F(AV)</sub>	average forward current	square-wave pulse; δ = 0.5; f = 20 kHz; T <sub>sp</sub> ≤ 173 °C		-	3	A
I <sub>FSM</sub>	non-repetitive peak forward current	half sine-wave pulse; t <sub>p</sub> = 8.3 ms; T <sub>j(init)</sub> = 25 °C		-	120	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	<a href="#">[1]</a>	-	1.66	W
			<a href="#">[2]</a>	-	2.15	W
T <sub>j</sub>	junction temperature			-	175	°C
T <sub>amb</sub>	ambient temperature			-55	175	°C
T <sub>stg</sub>	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<sup>2</sup>.

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]	-	-	90	K/W
			[1] [3]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	3	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<sup>2</sup>.
- [4] Soldering point of cathode tab.

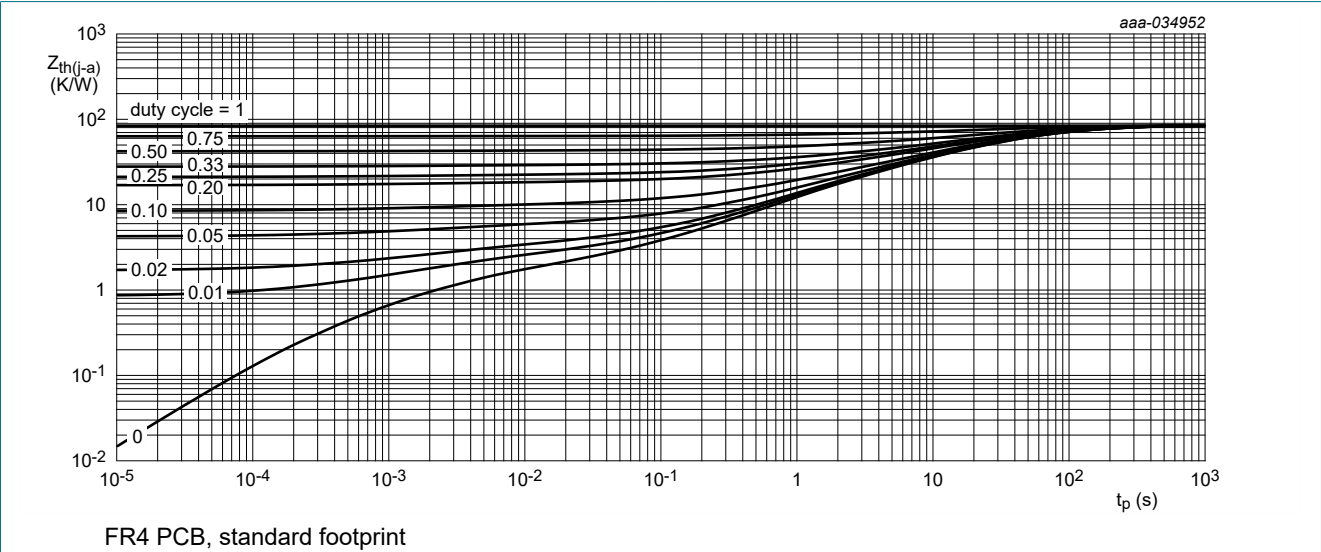


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

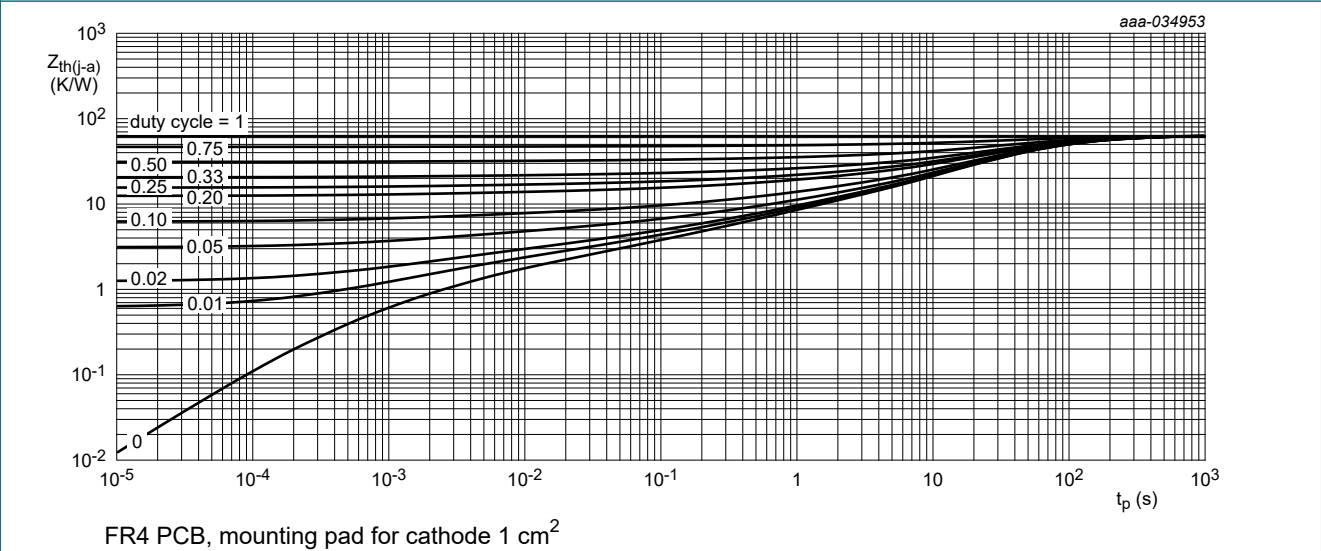


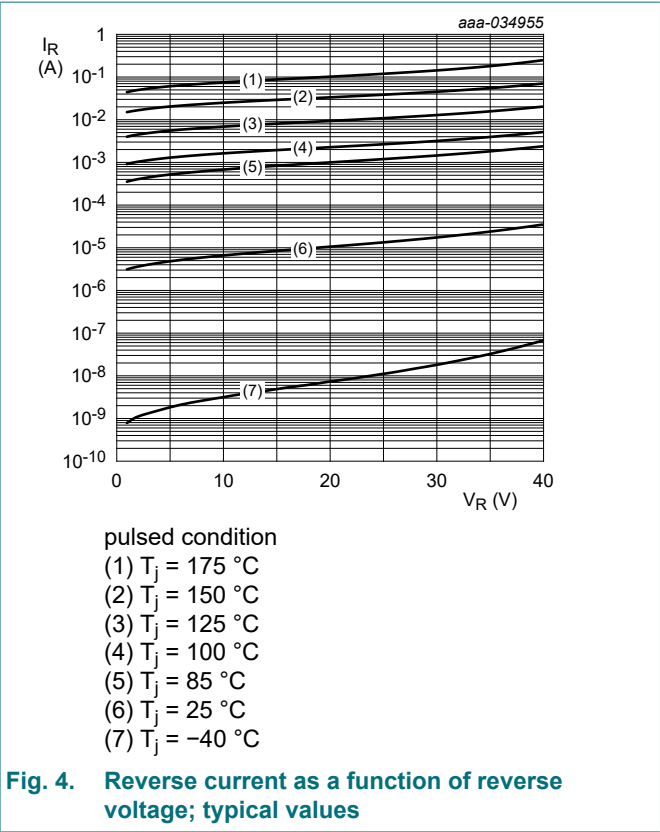
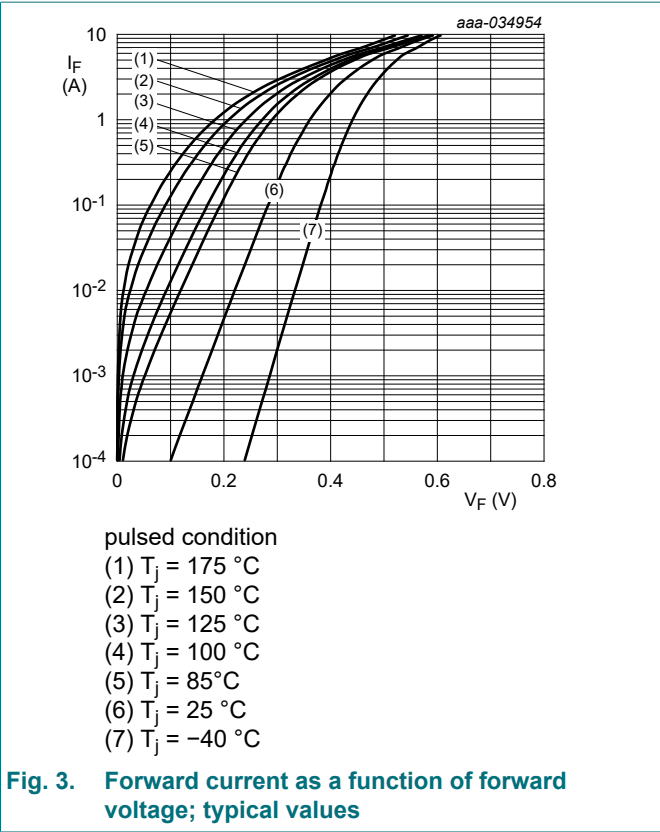
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 3\text{ mA}$ ; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	40	-	-	V
$V_F$	forward voltage	$I_F = 1\text{ A}$ ; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	360	420	mV
		$I_F = 3\text{ A}$ ; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	425	490	mV
		$I_F = 3\text{ A}$ ; pulsed; $T_j = -40\text{ }^{\circ}\text{C}$	[1]	-	490	580	mV
		$I_F = 3\text{ A}$ ; pulsed; $T_j = 125\text{ }^{\circ}\text{C}$	[1]	-	340	420	mV
$I_R$	reverse current	$V_R = 40\text{ V}$ ; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	30	120	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^{\circ}\text{C}$		-	370	-	pF
		$V_R = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^{\circ}\text{C}$		-	125	-	pF
$t_{rr}$	reverse recovery time step recovery	$I_F = 0.5\text{ A}$ ; $I_R = 0.5\text{ A}$ ; $I_{R(\text{meas})} = 0.1\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$		-	12	-	ns
	reverse recovery time ramp recovery	$dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $I_F = 3\text{ A}$ ; $V_R = 30\text{ V}$ ; $T_j = 25\text{ }^{\circ}\text{C}$		-	11	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 0.5\text{ A}$ ; $dI_F/dt = 20\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^{\circ}\text{C}$		-	340	-	mV

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



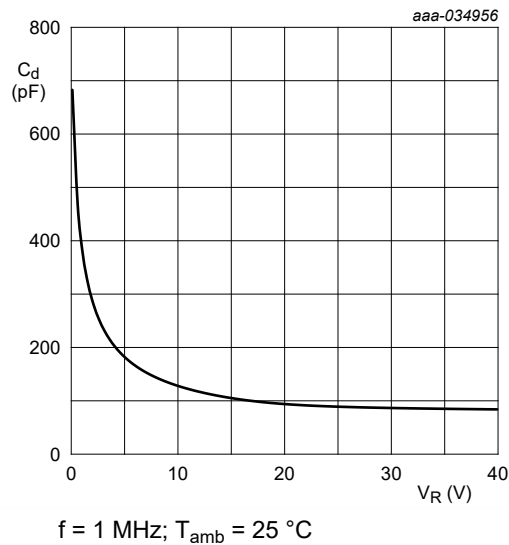


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

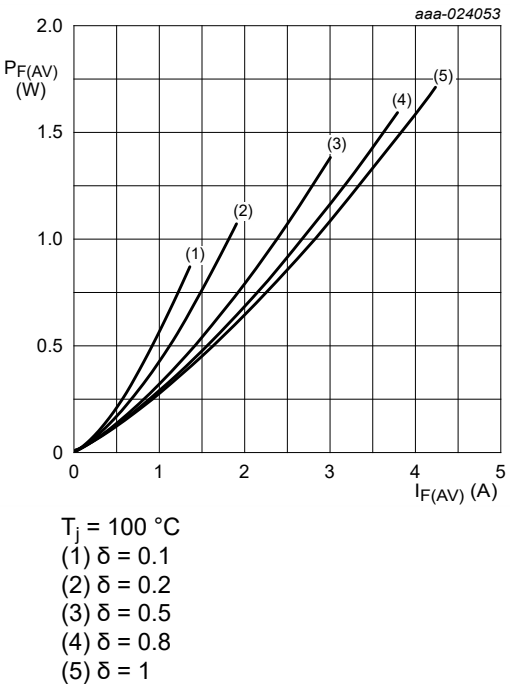


Fig. 6. Average forward power dissipation as a function of average forward current; typical values

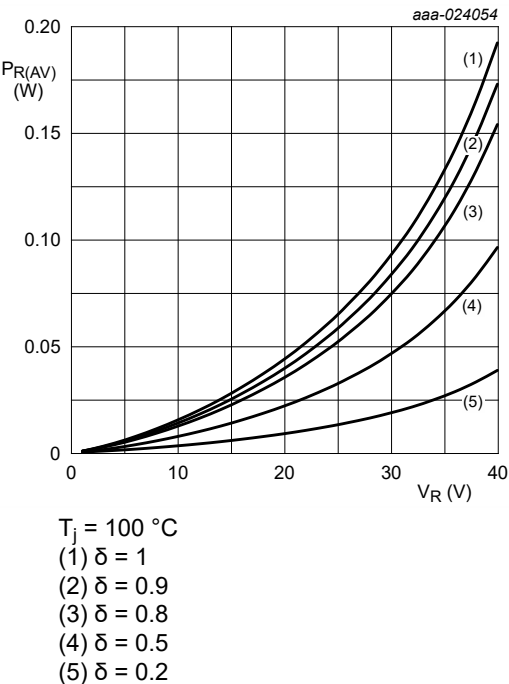


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

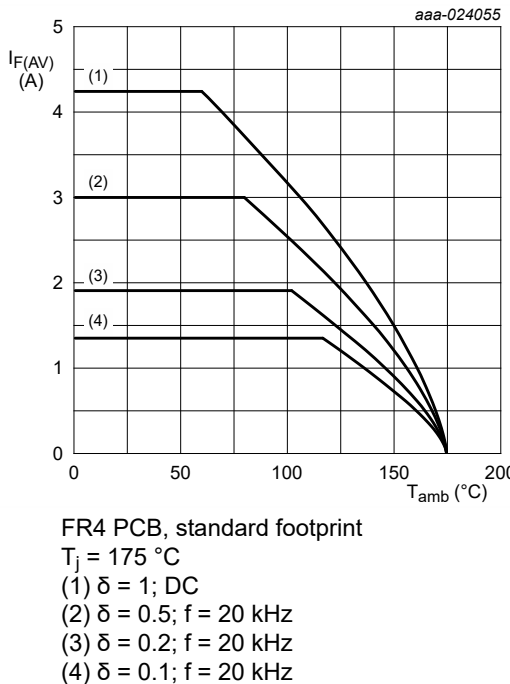
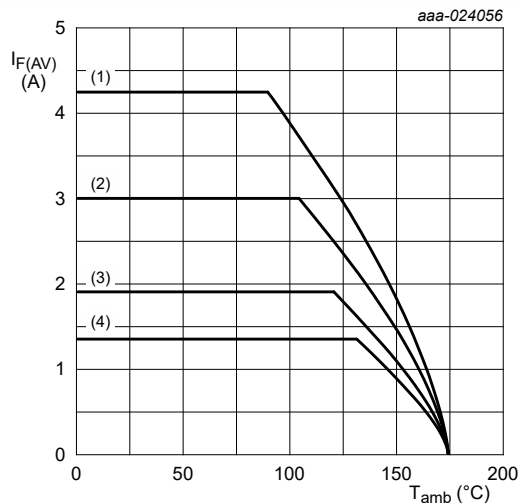
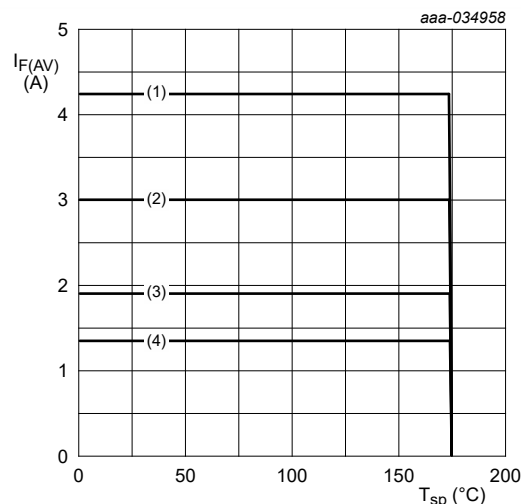


Fig. 8. Average forward current as a function of ambient temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 175$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

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



$T_j = 175$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

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

11. Test information

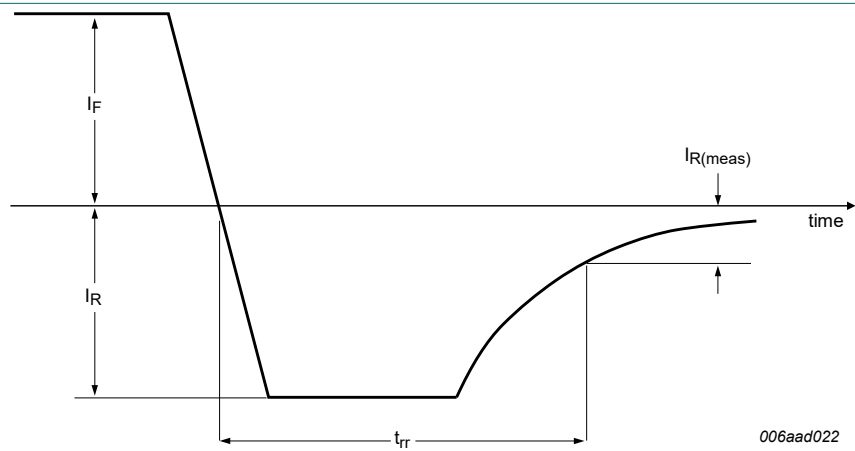


Fig. 11. Reverse recovery definition; step recovery

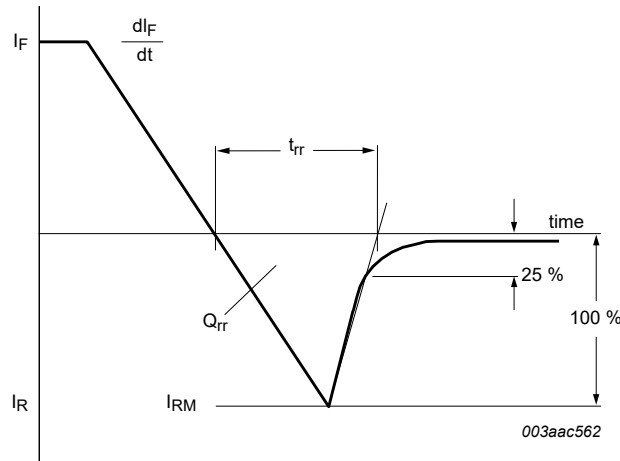


Fig. 12. Reverse recovery definition; ramp recovery

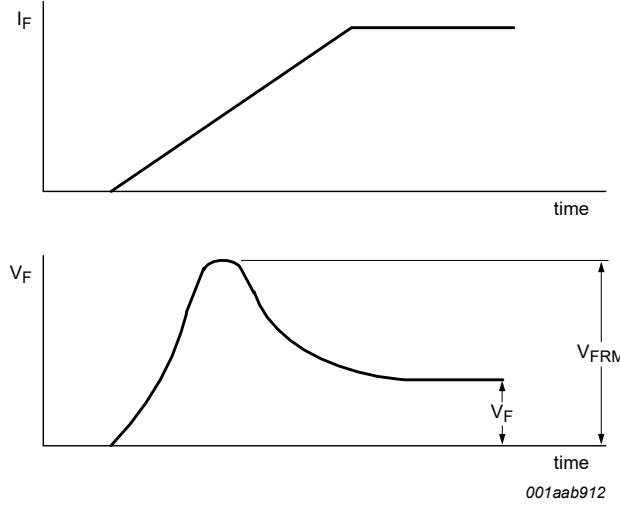


Fig. 13. Forward recovery definition

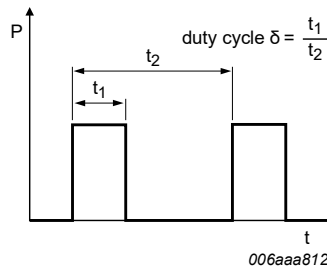


Fig. 14. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

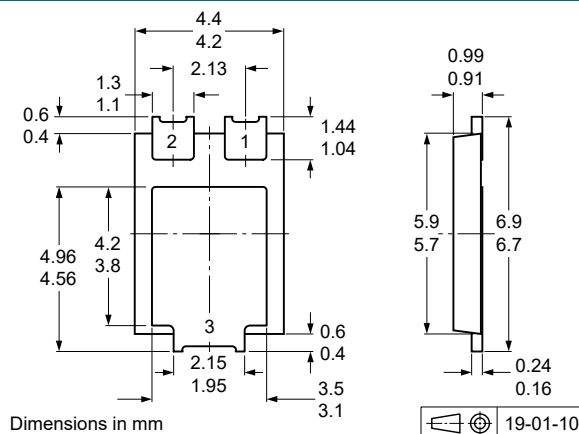
$$I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta}$$

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.

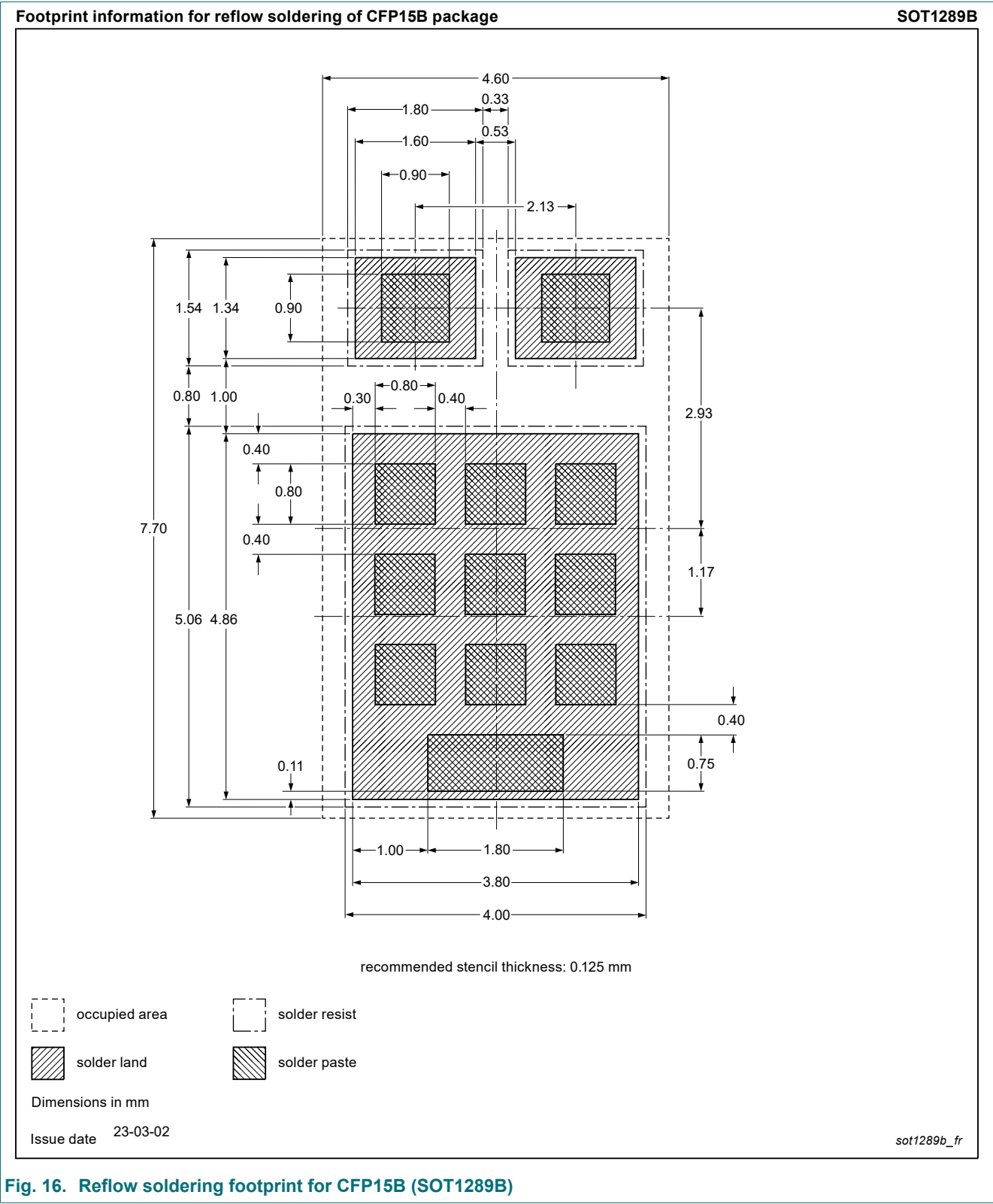
## 12. Package outline



**Fig. 15. Package outline CFP15B (SOT1289B)**



13. Soldering



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG040V030EPE-Q v.4	20240715	Product data sheet	-	PMEG040V030EPE-Q v.3
Modifications:	• Reflow soldering footprint: Stencil design for solder paste printing changed.			
PMEG040V030EPE-Q v.3	20221024	Product data sheet	-	PMEG040V030EPE-Q v.2
PMEG040V030EPE-Q v.2	20220715	Product data sheet	-	PMEG040V030EPE-Q v.1
PMEG040V030EPE-Q v.1	20220425	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information..... 1

6. Ordering information..... 2

7. Marking..... 2

8. Limiting values..... 2

9. Thermal characteristics..... 3

10. Characteristics..... 4

11. Test information..... 6

12. Package outline..... 8

13. Soldering..... 9

14. Revision history..... 10

15. Legal information..... 11

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