



PMEG4020EXE

40 V, 2 A Schottky barrier rectifier

5 January 2024

Product data sheet

1. General description

Planar Schottky barrier rectifier encapsulated in a CFP3-HP (SOD123HP) power flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- Low leakage current
- High surge current robustness
- High power capability due to clip bond package
- Power flat lead plastic package with exposed heatsink for optimal thermal connection

3. Applications

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

4. Quick reference data

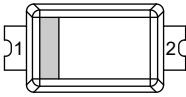
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 168$ °C		-	-	2	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	40	V
V_F	forward voltage	$I_F = 2$ A; pulsed; $T_j = 25$ °C	[1]	-	500	570	mV
I_R	reverse current	$V_R = 40$ V; pulsed; $T_j = 25$ °C	[1]	-	10	50	µA
		$V_R = 40$ V; pulsed; $T_j = 125$ °C	[1]	-	6	25	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]	 CFP3-HP (SOD123HP)	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4020EXE	CFP3-HP	Power plastic surface mounted package; 2 terminals; 2.80 mm × 1.80 mm × 0.90 mm body	SOD123HP

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020EXE	AE

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		-	40	V
I _F	forward current	δ = 1; T _{sp} ≤ 166 °C		-	2.8	A
I _{F(AV)}	average forward current	δ = 0.5; f = 20 kHz; square wave; T _{sp} ≤ 168 °C		-	2	A
I _{FSM}	non-repetitive peak forward current	t _p = 8.3 ms; half sine wave; T _{j(init)} = 25 °C		-	50	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	0.75	W
			[2]	-	1.3	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 Printed-Circuit Board (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 cm².

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
			[3] [2]	-	-	115	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	6	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] 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.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [4] Soldering point of cathode tab.

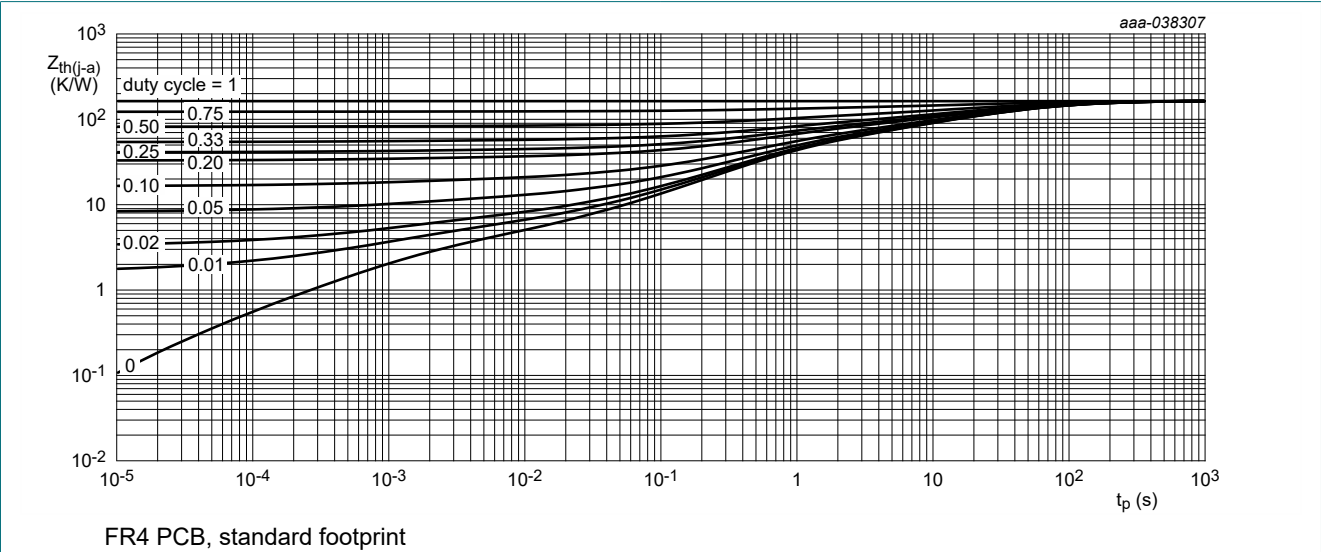


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

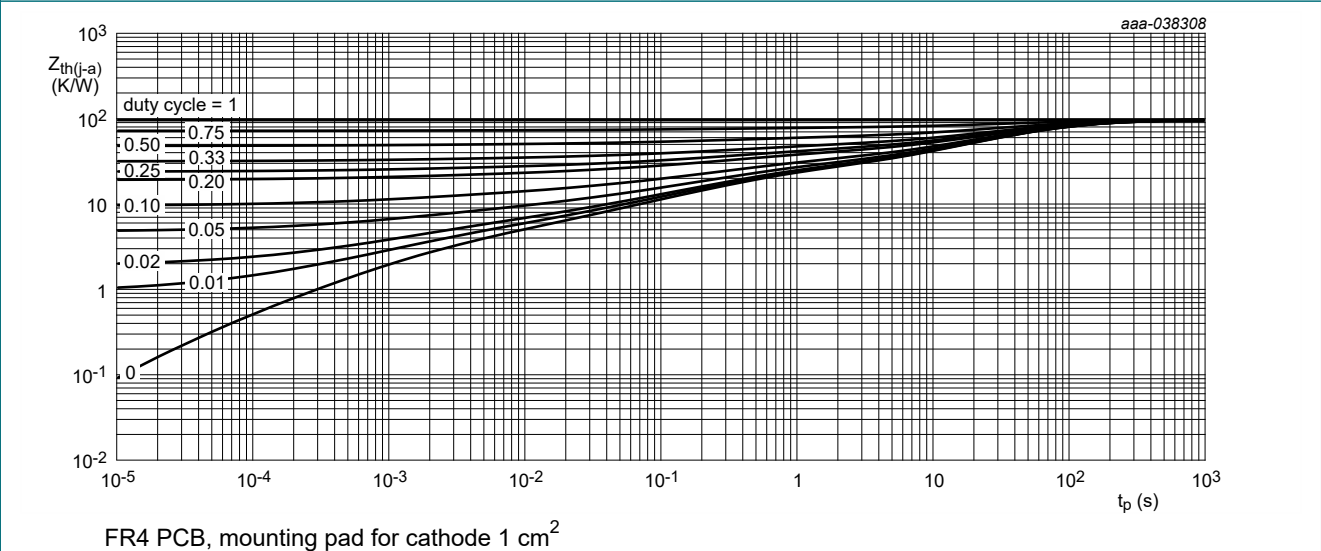


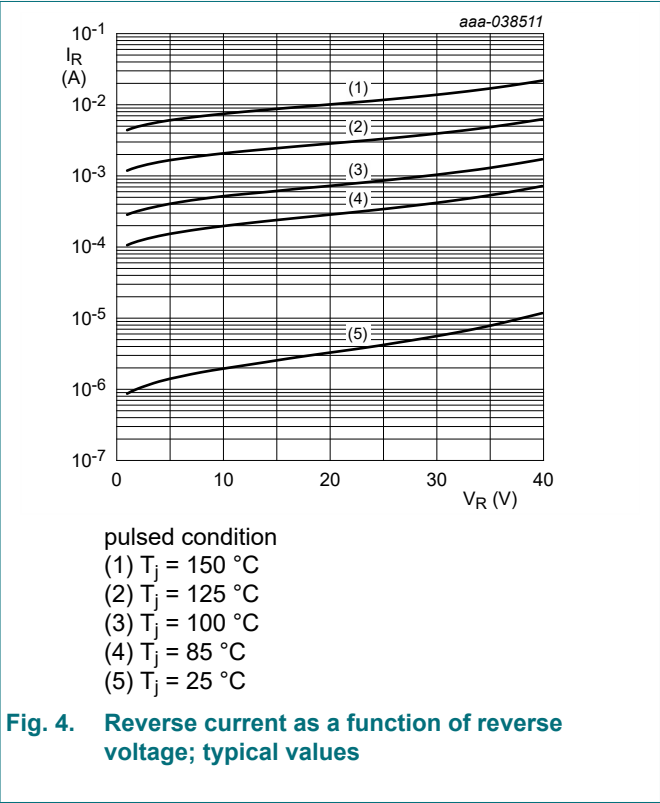
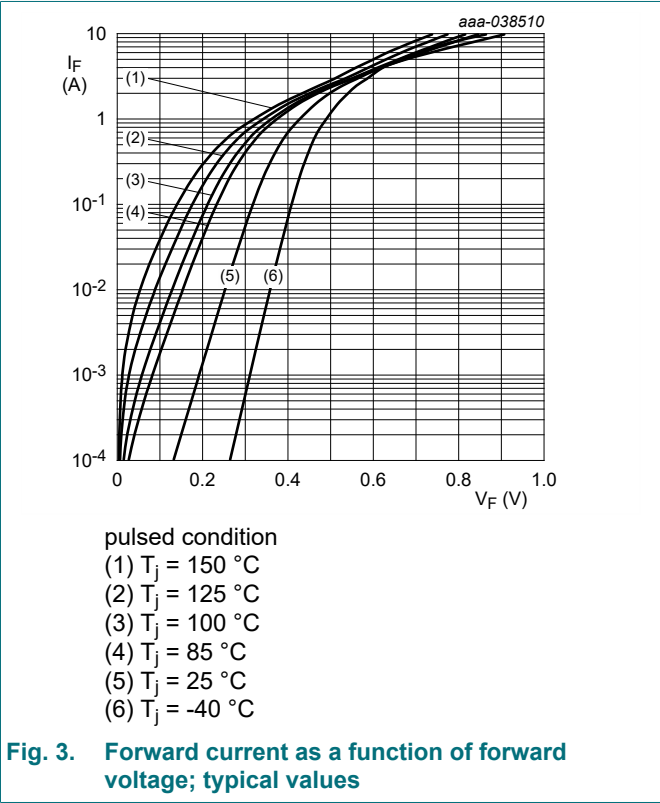
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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]	-	430	490	mV
		$I_F = 2\text{ A}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	500	570	mV
		$I_F = 2\text{ A}$; pulsed; $T_j = -40\text{ }^{\circ}\text{C}$	[1]	-	540	610	mV
		$I_F = 2\text{ A}$; pulsed; $T_j = 125\text{ }^{\circ}\text{C}$	[1]	-	450	540	mV
I_R	reverse current	$V_R = 40\text{ V}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	10	50	μA
		$V_R = 40\text{ V}$; pulsed; $T_j = 125\text{ }^{\circ}\text{C}$	[1]	-	6	25	mA
C_d	diode capacitance	$V_R = 1\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	115	-	pF
		$V_R = 10\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	40	-	pF
t_{rr}	reverse recovery time ; step recovery	$I_F = 0.5\text{ A}$; $I_R = 0.5\text{ A}$; $I_{R(meas)} = 0.1\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	4	-	ns
	reverse recovery time ; ramp recovery	$dI_F/dt = 200\text{ A}/\mu\text{s}$; $I_F = 6\text{ A}$; $V_R = 26\text{ V}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	6	-	ns
I_{RM}	peak reverse recovery current			-	0.6	-	A
Q_{rr}	reverse recovery charge			-	2.5	-	nC
V_{FRM}	peak forward recovery voltage	$I_F = 0.5\text{ A}$; $dI_F/dt = 20\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	390	-	mV

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



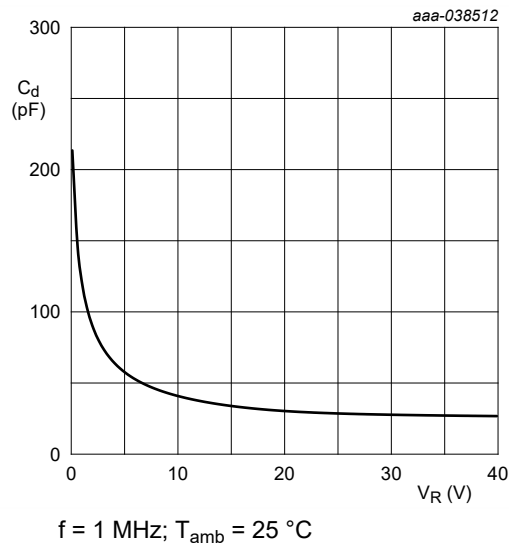


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

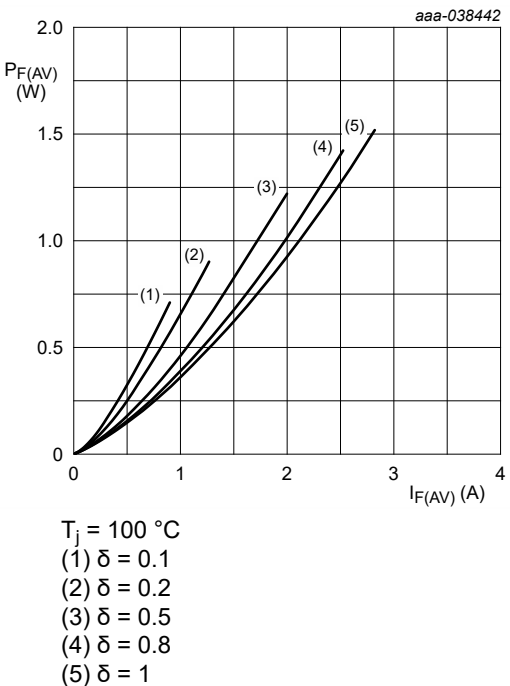


Fig. 6. Average forward power dissipation as a function of average forward current; typical values

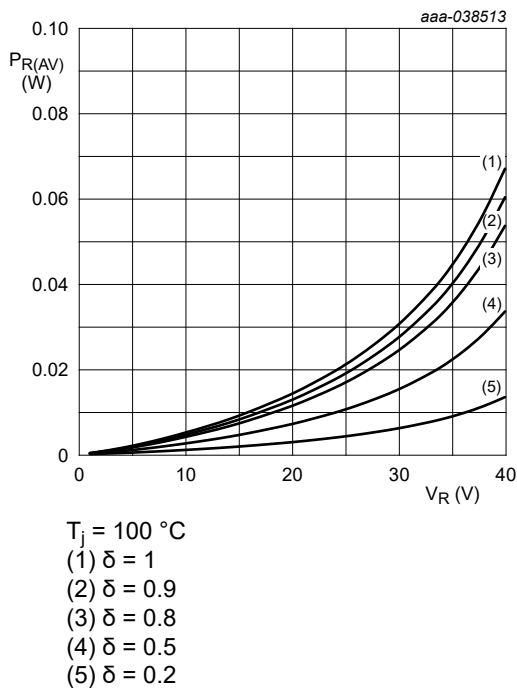


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

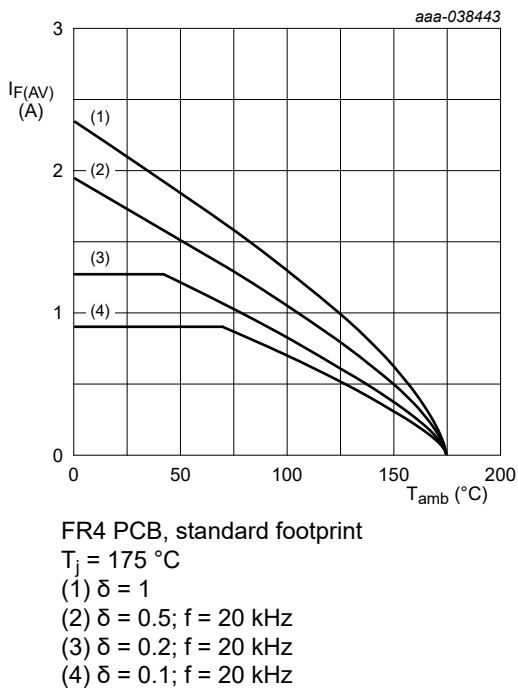
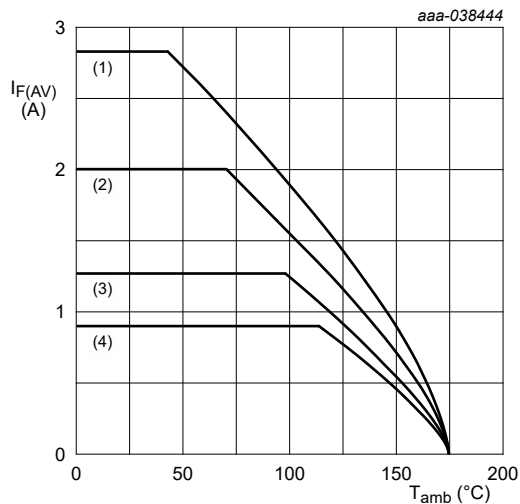
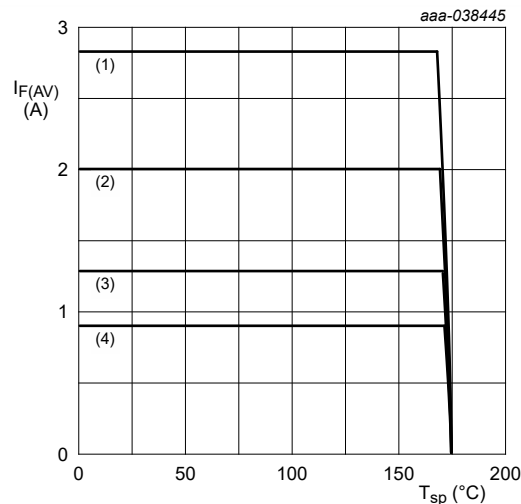


Fig. 8. Average forward current as a function of ambient temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 175^\circ\text{C}$
(1) $\delta = 1$
(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



$T_j = 175^\circ\text{C}$
(1) $\delta = 1$
(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 solder point temperature; typical values

11. Test information

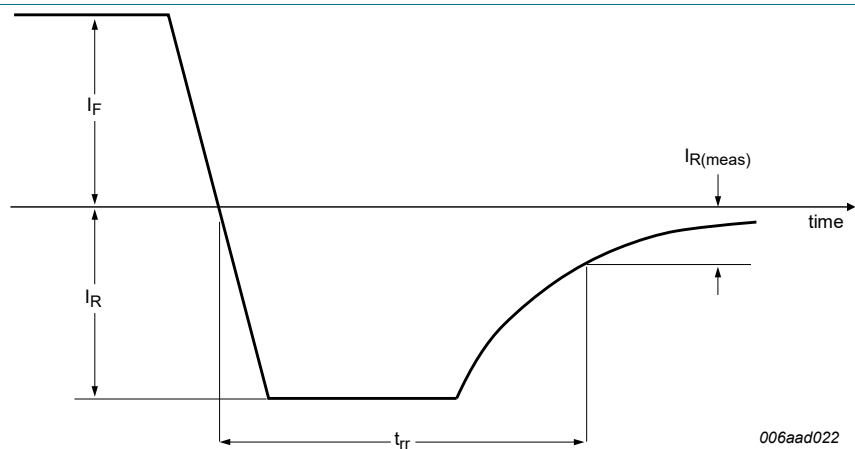


Fig. 11. Reverse recovery definition; step recovery

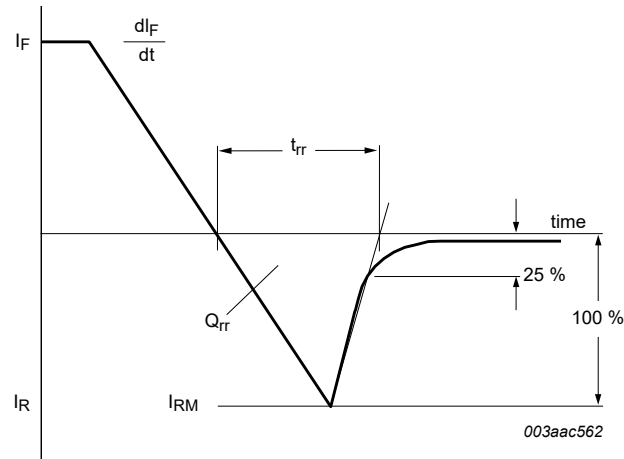


Fig. 12. Reverse recovery definition; ramp recovery

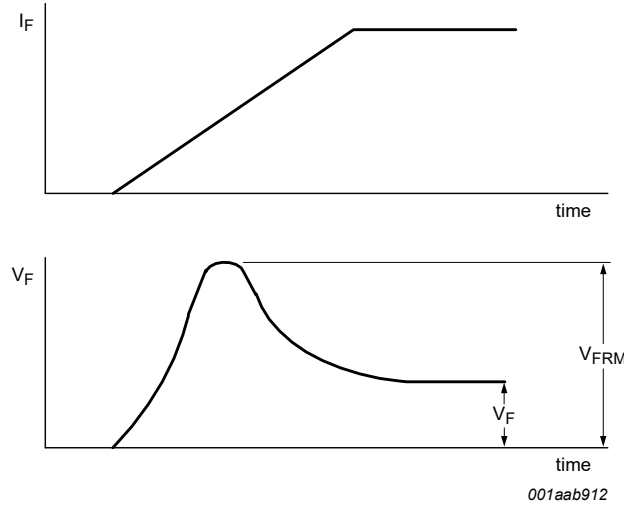


Fig. 13. Forward recovery definition

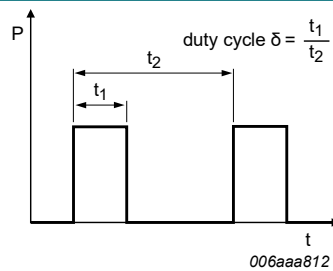


Fig. 14. Duty cycle definition

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.

12. Package outline

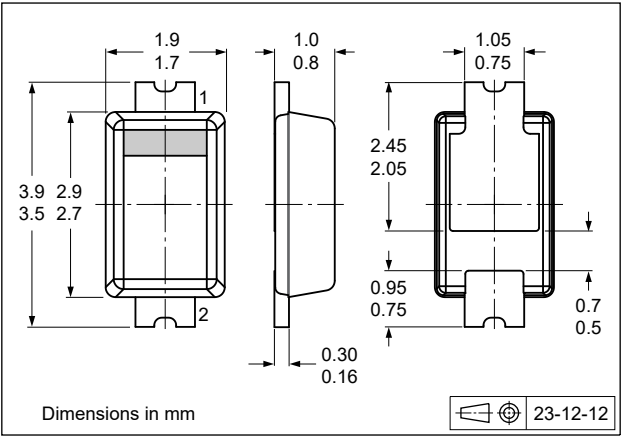


Fig. 15. Package outline CFP3-HP (SOD123HP)

13. Soldering

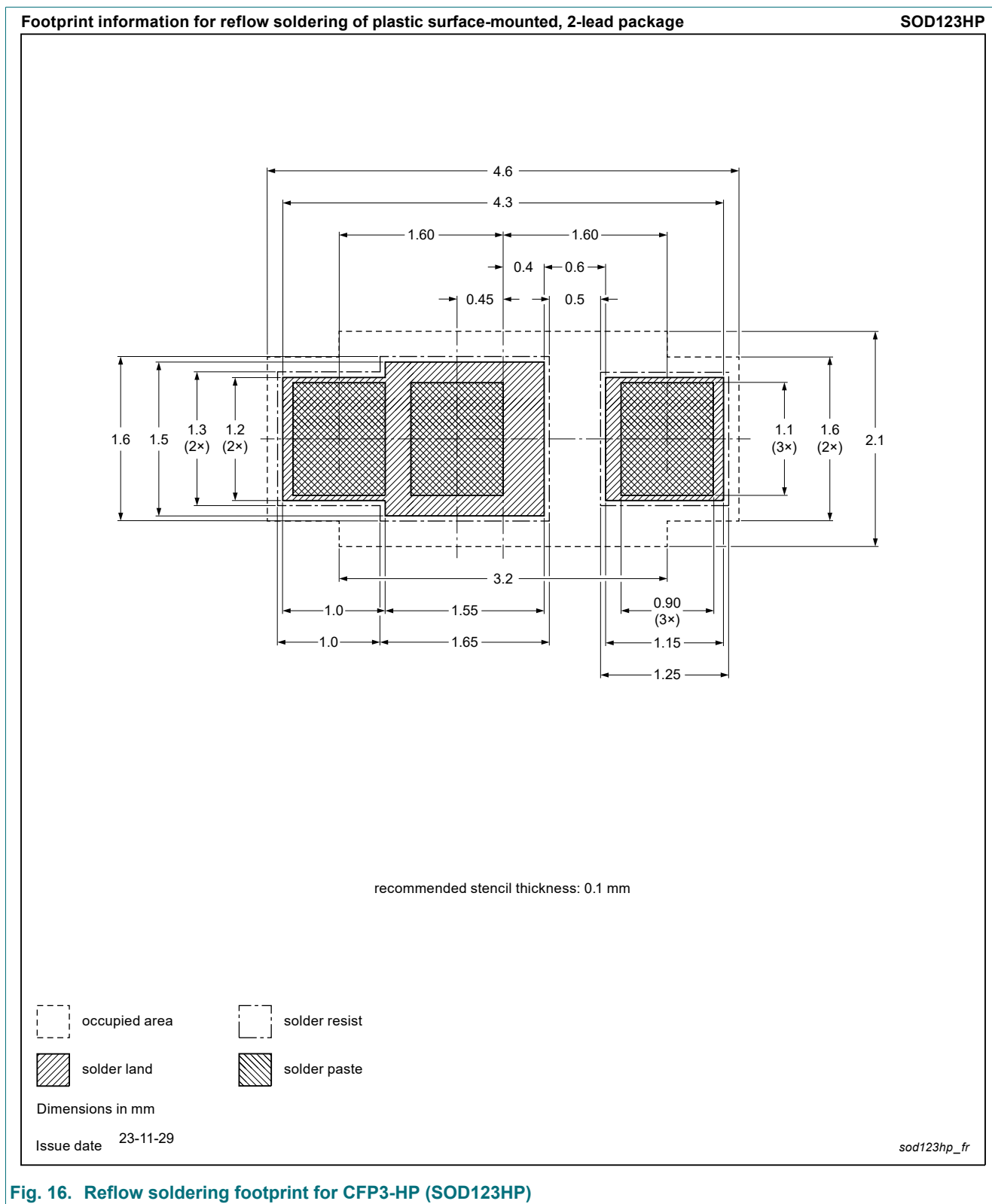


Fig. 16. Reflow soldering footprint for CFP3-HP (SOD123HP)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4020EXE v.1	20240105	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.

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