



PMEG10010ELXE

100 V, 1 A low leakage current 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
- Extremely 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

- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Freewheeling application
- Reverse polarity protection
- OR-ing

4. Quick reference data

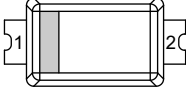

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 170$ °C		-	-	1	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	100	V
V_F	forward voltage	$I_F = 1$ A; pulsed; $T_j = 25$ °C	[1]	-	720	780	mV
I_R	reverse current	$V_R = 100$ V; pulsed; $T_j = 25$ °C	[1]	-	30	150	nA
		$V_R = 100$ V; pulsed; $T_j = 125$ °C	[1]	-	60	500	μ 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	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
PMEG10010ELXE	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
PMEG10010ELXE	H2

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	$T_j = 25\text{ °C}$	-	100	V
I_F	forward current	$\delta = 1; T_{sp} \leq 169\text{ °C}$	-	1.4	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz};$ square wave; $T_{sp} \leq 170\text{ °C}$	-	1	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms};$ half sine wave; $T_{j(\text{init})} = 25\text{ °C}$	-	50	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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 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]	-	-	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.

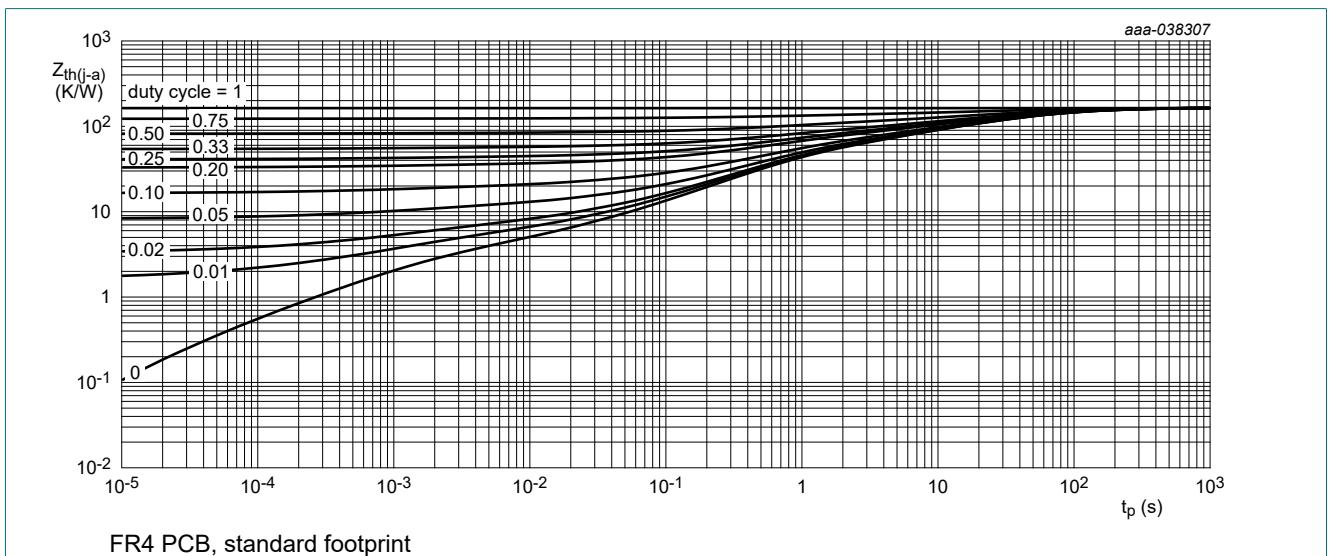


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

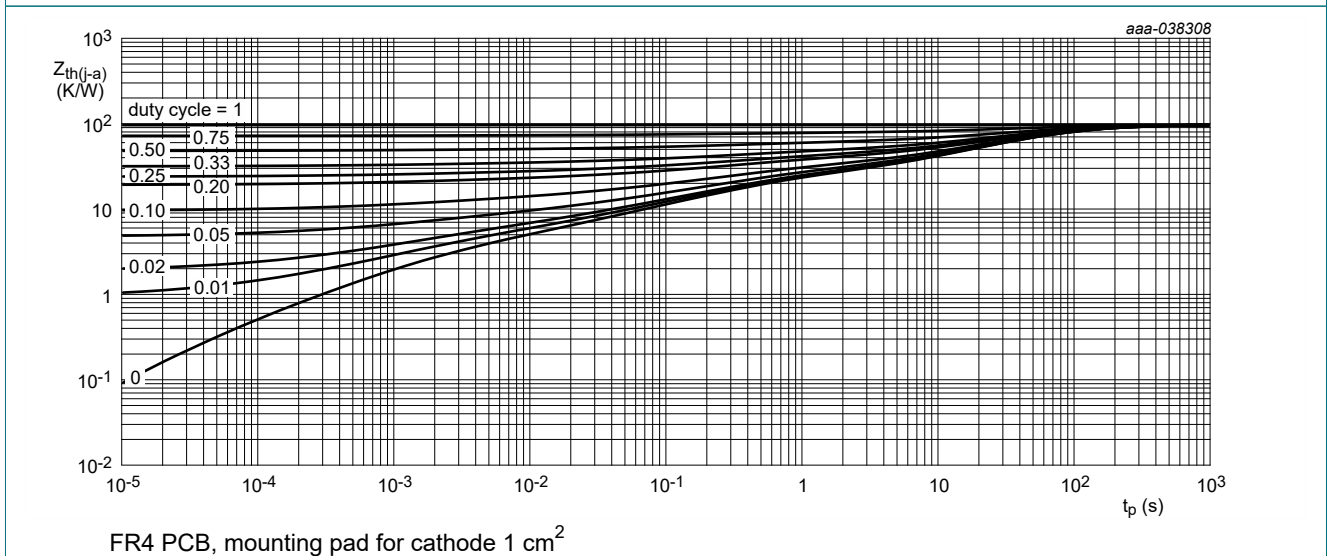


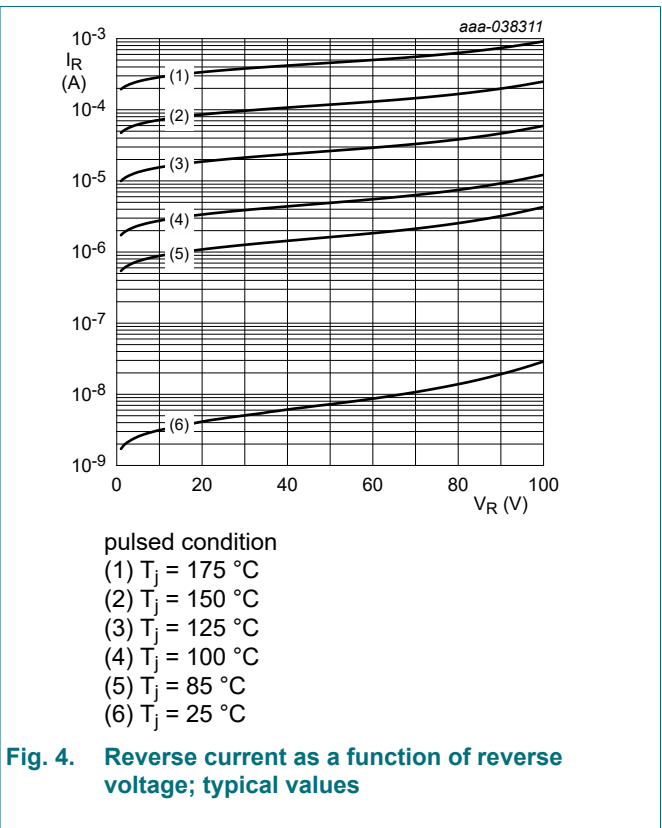
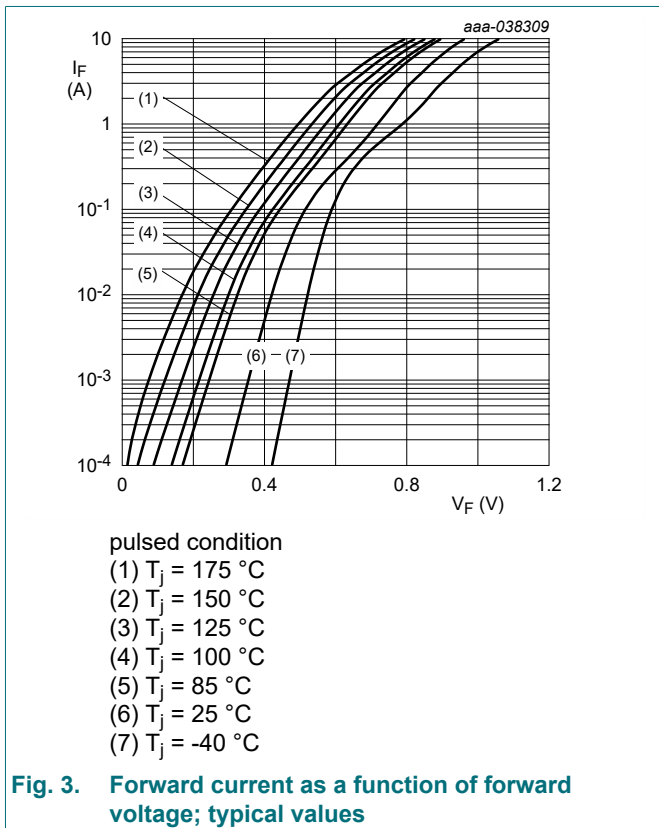
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

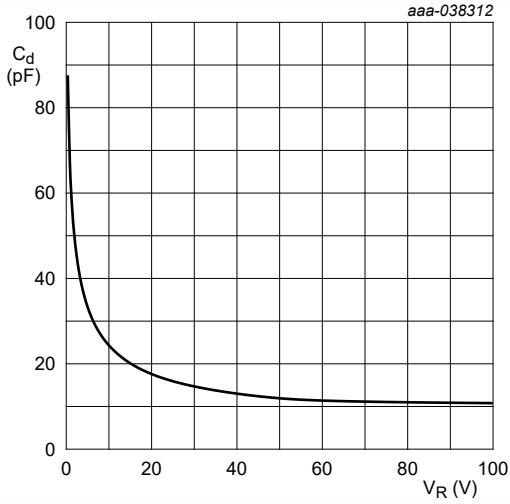
10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	[1]	100	-	V	
V_F	forward voltage	$I_F = 0.5 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	[1]	-	655	725	mV
		$I_F = 1 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	[1]	-	720	780	mV
		$I_F = 1 \text{ A}$; pulsed; $T_j = -40 \text{ }^\circ\text{C}$	[1]	-	790	860	mV
		$I_F = 1 \text{ A}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$	[1]	-	575	680	mV
I_R	reverse current	$V_R = 100 \text{ V}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	[1]	-	30	150	nA
		$V_R = 100 \text{ V}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$	[1]	-	60	500	μA
C_d	diode capacitance	$V_R = 1 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$		-	55	-	pF
		$V_R = 10 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$		-	25	-	pF
t_{rr}	reverse recovery time ; step recovery	$I_F = 0.5 \text{ A}$; $I_R = 0.5 \text{ A}$; $I_{R(\text{meas})} = 0.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$		-	4	-	ns
	reverse recovery time ; ramp recovery	$dI_F/dt = 200 \text{ A}/\mu\text{s}$; $I_F = 6 \text{ A}$; $V_R = 26 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$		-	14	-	ns
I_{RM}	peak reverse recovery current			-	1.6	A	
Q_{rr}	reverse recovery charge			-	13	nC	
V_{FRM}	peak forward recovery voltage	$I_F = 0.5 \text{ A}$; $dI_F/dt = 20 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$		-	680	mV	

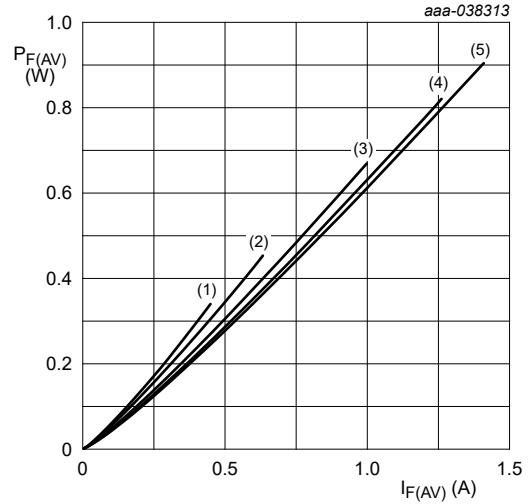
[1] Very short pulse, in order to maintain a stable junction temperature.





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

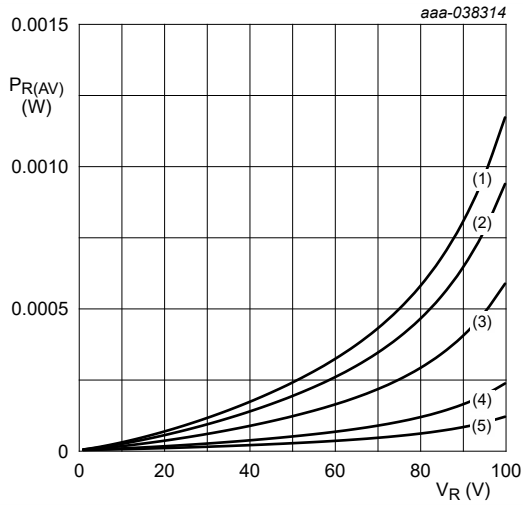
Fig. 5. Diode capacitance as a function of reverse voltage; typical values



$T_j = 100 \text{ }^\circ\text{C}$

- (1) $\delta = 0.1$
- (2) $\delta = 0.2$
- (3) $\delta = 0.5$
- (4) $\delta = 0.8$
- (5) $\delta = 1$

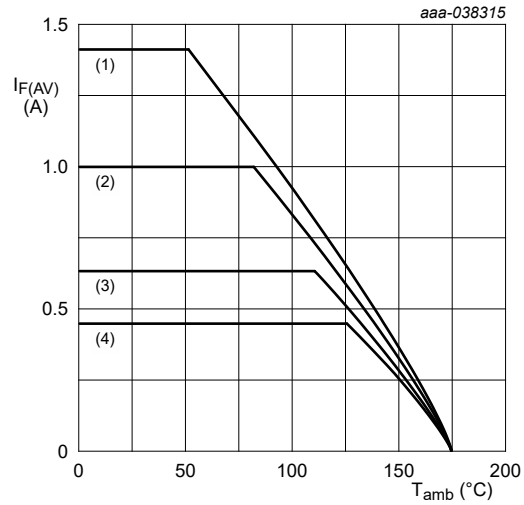
Fig. 6. Average forward power dissipation as a function of average forward current; typical values



$T_j = 100 \text{ }^\circ\text{C}$

- (1) $\delta = 1$
- (2) $\delta = 0.8$
- (3) $\delta = 0.5$
- (4) $\delta = 0.2$
- (5) $\delta = 0.1$

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

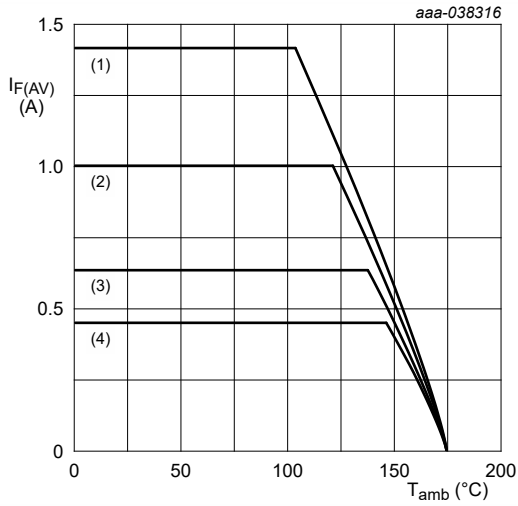


FR4 PCB, standard footprint

$T_j = 175 \text{ }^\circ\text{C}$

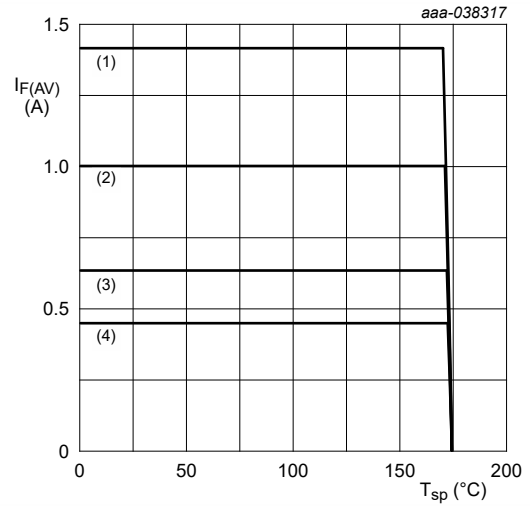
- (1) $\delta = 1$
- (2) $\delta = 0.5; f = 20 \text{ kHz}$
- (3) $\delta = 0.2; f = 20 \text{ kHz}$
- (4) $\delta = 0.1; f = 20 \text{ kHz}$

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



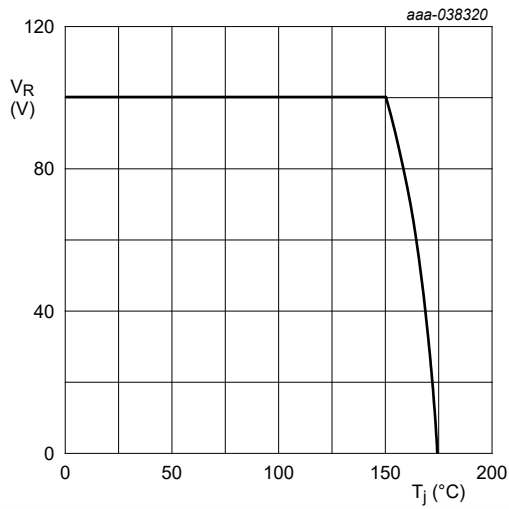
FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 175$ °C
 (1) $\delta = 1$
 (2) $\delta = 0.5$; $f = 20$ kHz
 (3) $\delta = 0.2$; $f = 20$ kHz
 (4) $\delta = 0.1$; $f = 20$ kHz

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



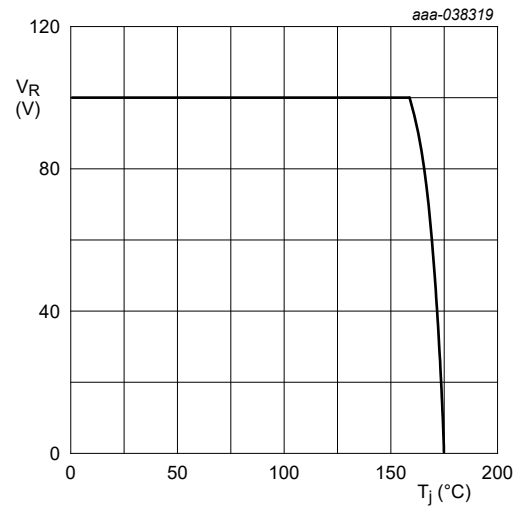
$T_j = 175$ °C
 (1) $\delta = 1$
 (2) $\delta = 0.5$; $f = 20$ kHz
 (3) $\delta = 0.2$; $f = 20$ kHz
 (4) $\delta = 0.1$; $f = 20$ kHz

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



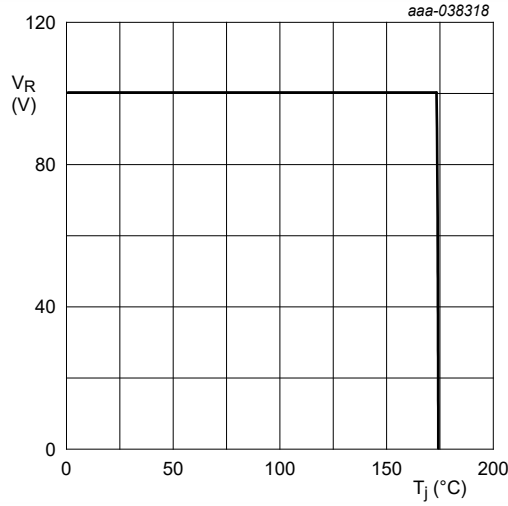
FR4 PCB, standard footprint
 $R_{th} = 200$ K/W

Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm²
 $R_{th} = 115$ K/W

Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values



Soldering point of cathode tab
 $R_{th} = 6 \text{ K/W}$

Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values

11. Test information

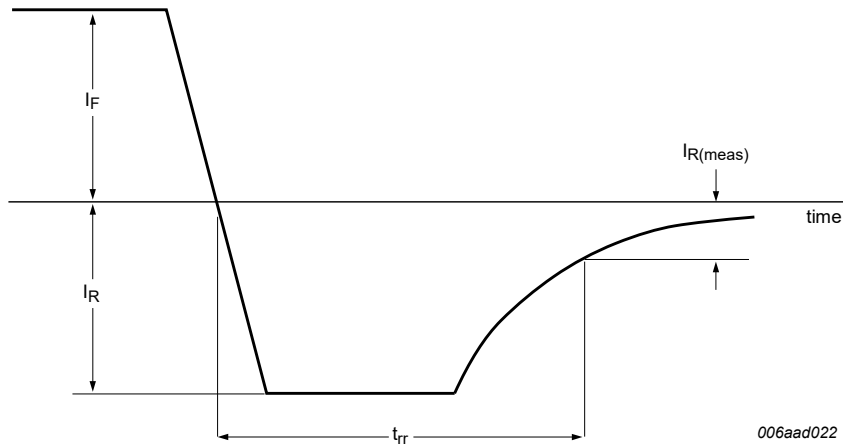


Fig. 14. Reverse recovery definition; step recovery

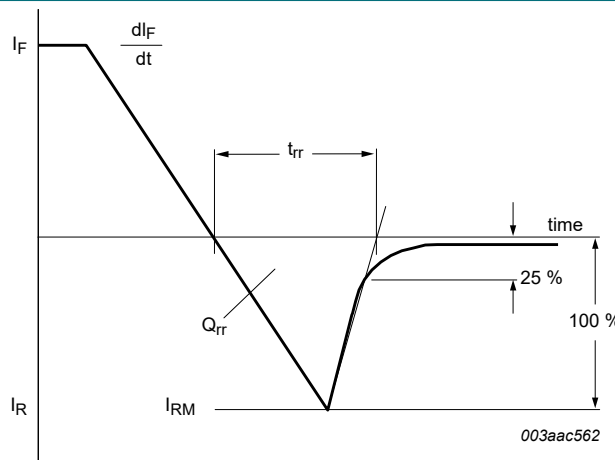


Fig. 15. Reverse recovery definition; ramp recovery

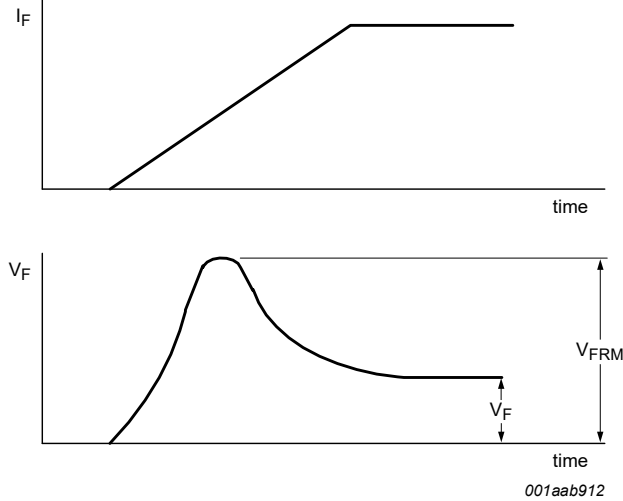


Fig. 16. Forward recovery definition

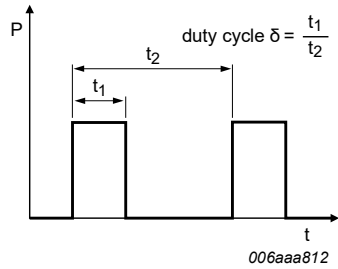


Fig. 17. Duty cycle definition

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

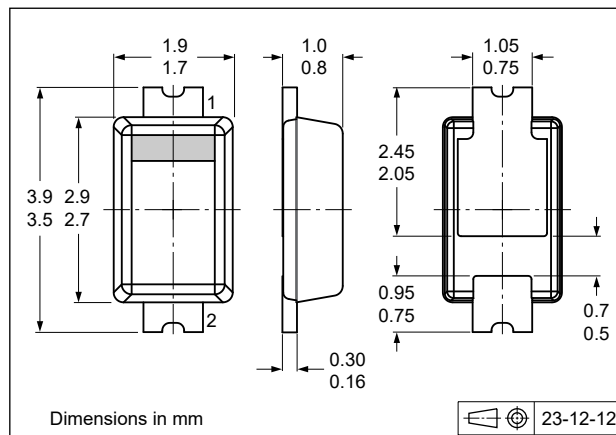


Fig. 18. Package outline CFP3-HP (SOD123HP)

13. Soldering

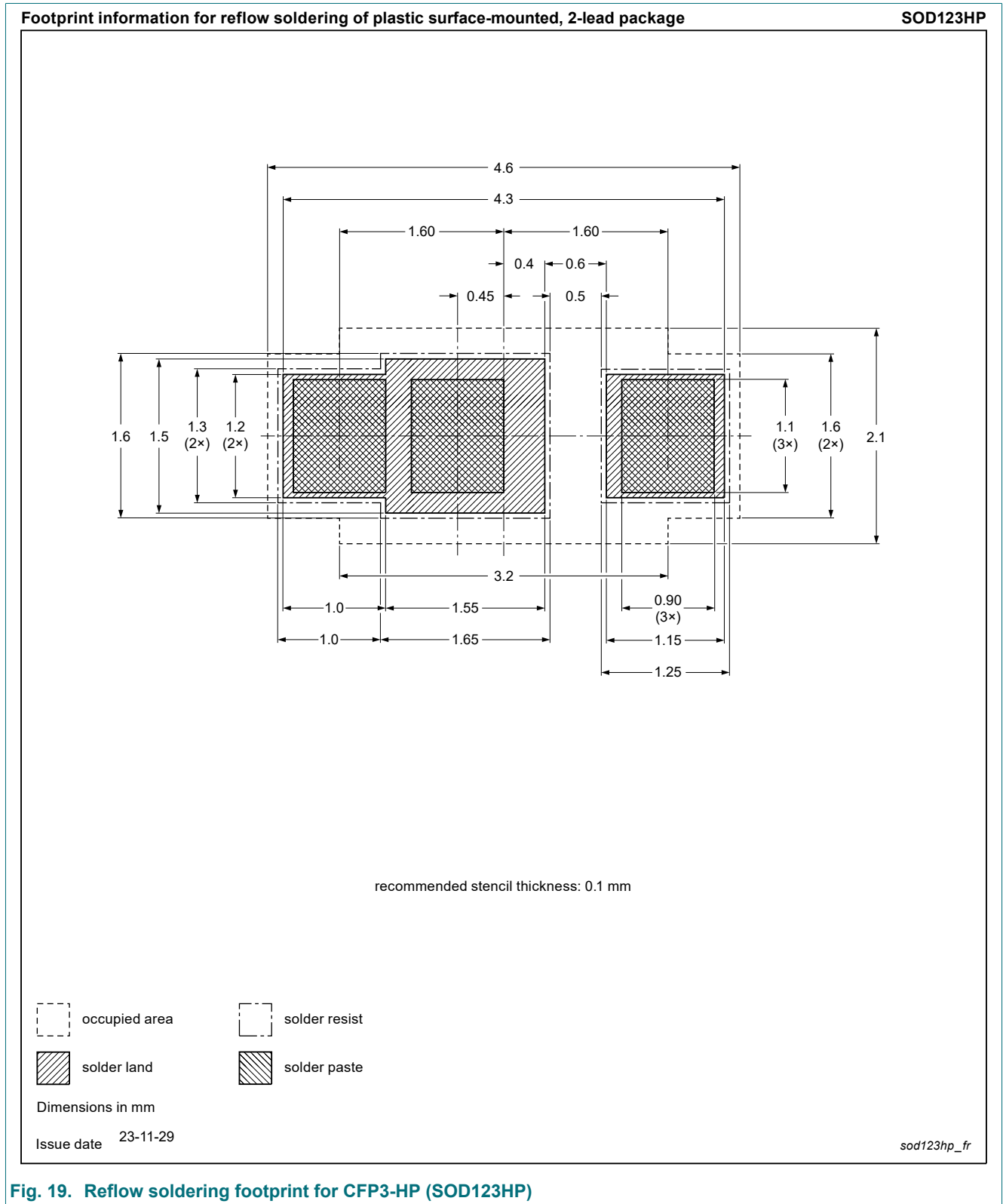


Fig. 19. Reflow soldering footprint for CFP3-HP (SOD123HP)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG10010ELXE 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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