



PMEG4020ER-Q

40 V, 2 A low VF Schottky barrier rectifier

16 November 2022

Product data sheet

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- High power capability due to clip-bond technology
- Small and flat lead SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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; $T_{amb} \leq 85$ °C	-	-	2	A
		$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 140$ °C	-	-	2	A
V_R	reverse voltage	$T_j = 25$ °C	-	-	40	V
V_F	forward voltage	$I_F = 2$ A; $T_j = 25$ °C	-	430	490	mV
I_R	reverse current	$V_R = 40$ V; $T_j = 25$ °C	-	25	100	μ 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	K	cathode[1]	 CFP3 (SOD123W)	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4020ER-Q	CFP3	plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body	SOD123W

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020ER-Q	BE

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	$T_j = 25\text{ }^{\circ}\text{C}$		-	40	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{amb} \leq 85\text{ }^{\circ}\text{C}$	[1]	-	2	A
		$\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{sp} \leq 140\text{ }^{\circ}\text{C}$		-	2	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$; half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$		-	50	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[2]	-	0.57	W
			[3]	-	0.95	W
			[1]	-	1.8	W
T_j	junction temperature			-	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature			-55	150	$^{\circ}\text{C}$
T_{stg}	storage temperature			-65	150	$^{\circ}\text{C}$

- [1] Device mounted on a ceramic PCB, Al₂O₃, 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 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]	-	-	220	K/W
			[1] [3]	-	-	130	K/W
			[1] [4]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	18	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 cm².
- [4] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [5] Soldering point of cathode tab.

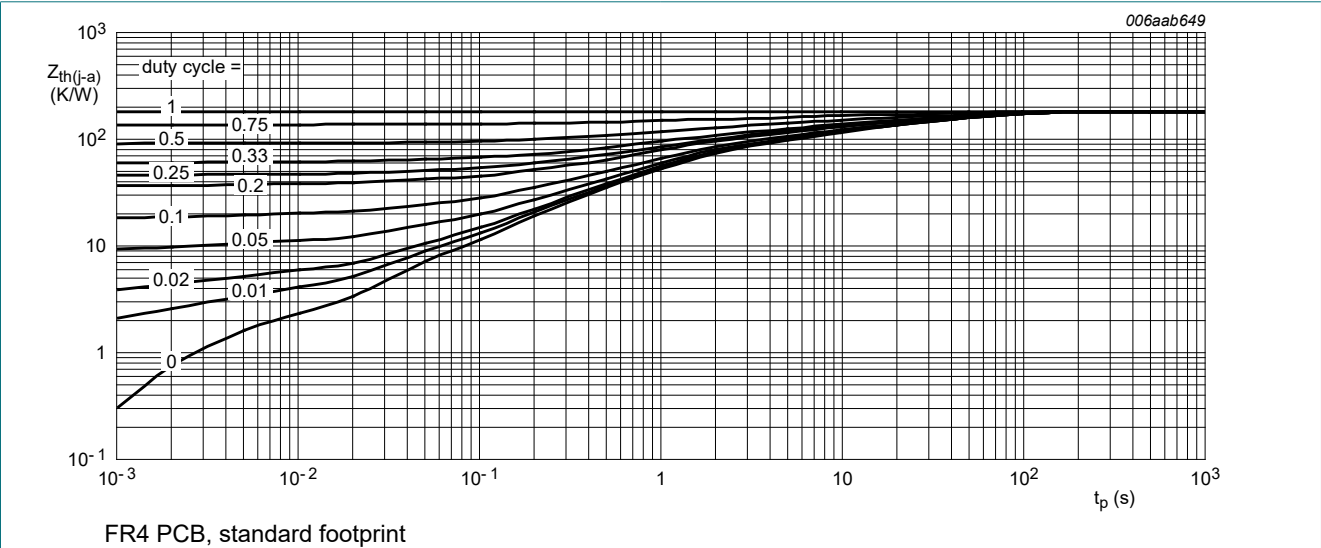


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

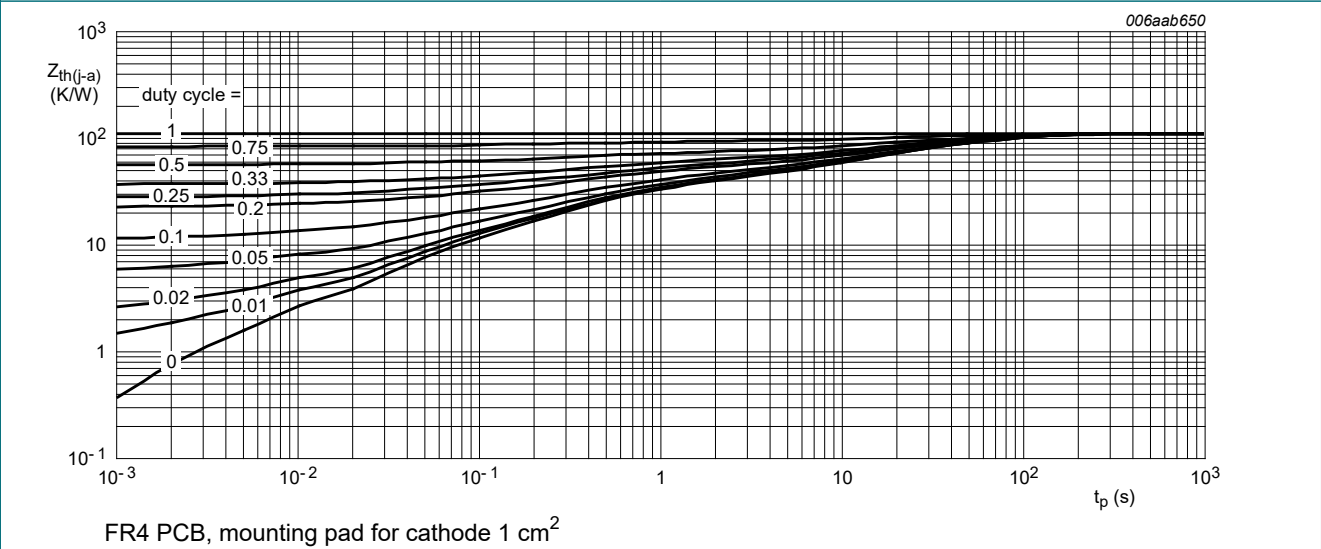
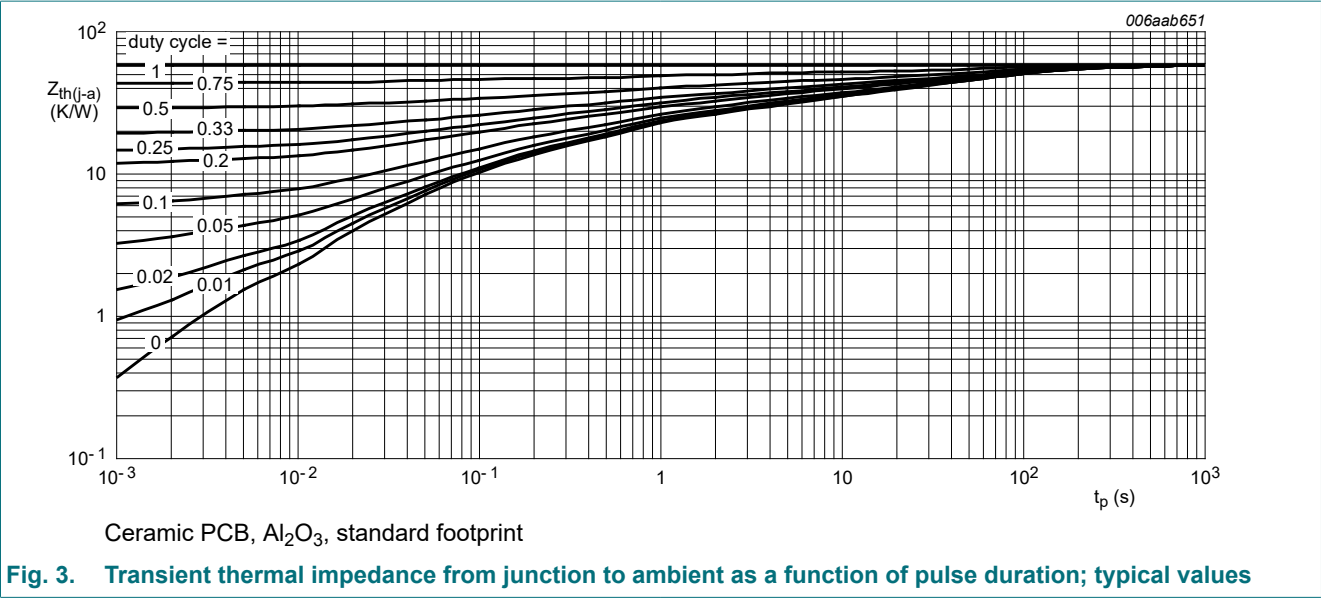


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _F	forward voltage	I _F = 0.1 A; T _j = 25 °C	-	295	330	mV
		I _F = 1 A; T _j = 25 °C	-	380	440	mV
		I _F = 2 A; T _j = 25 °C	-	430	490	mV
I _R	reverse current	V _R = 10 V; T _j = 25 °C	-	5	-	μA
		V _R = 40 V; T _j = 25 °C	-	25	100	μA
C _d	diode capacitance	V _R = 1 V; f = 1 MHz; T _j = 25 °C	-	250	-	pF
		V _R = 10 V; f = 1 MHz; T _j = 25 °C	-	95	-	pF

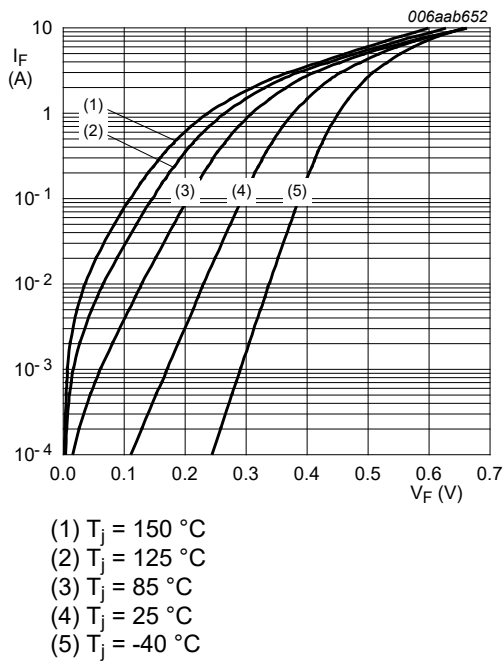


Fig. 4. Forward current as a function of forward voltage; typical values

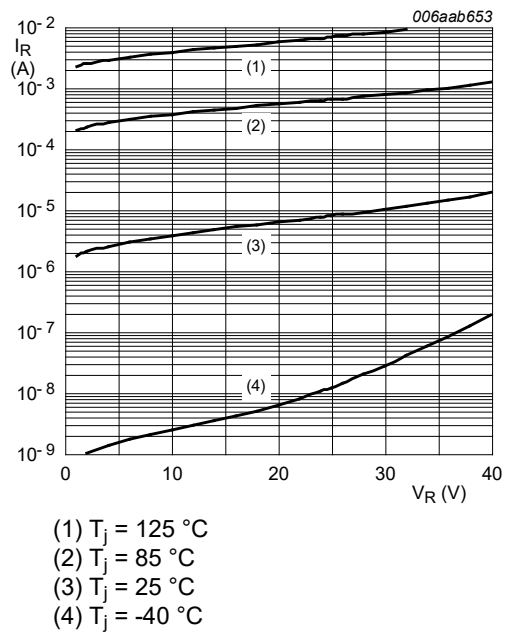


Fig. 5. Reverse current as a function of reverse voltage; typical values

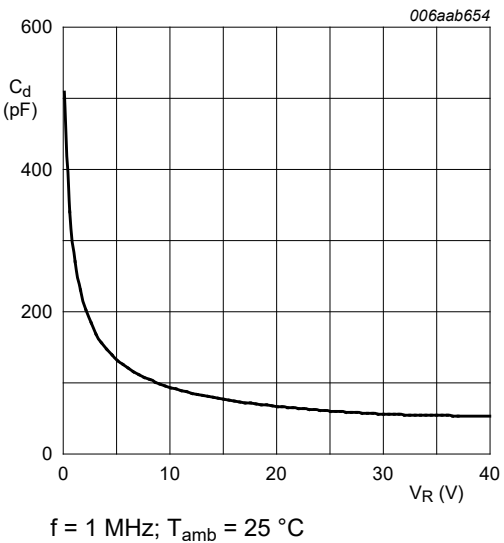


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

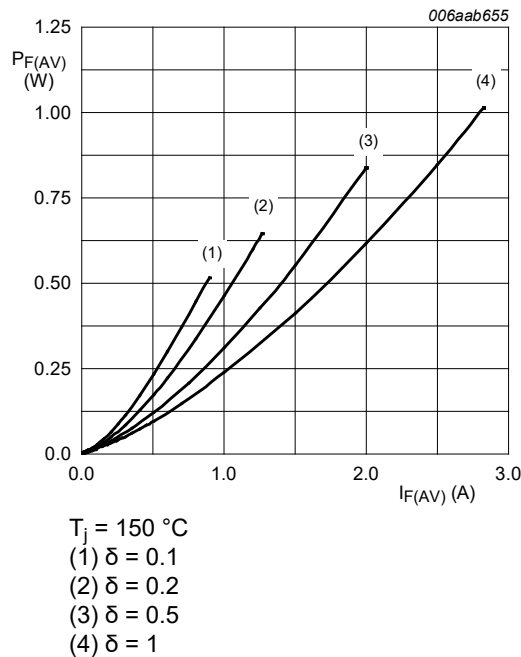


Fig. 7. Average forward power dissipation as a function of average forward current; typical values

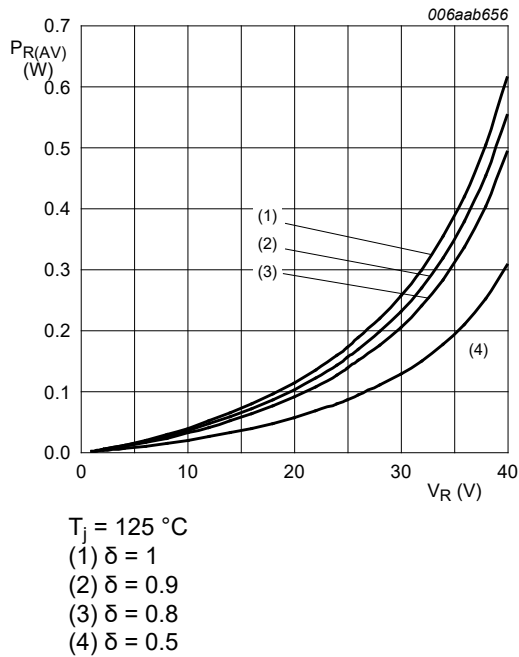


Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values

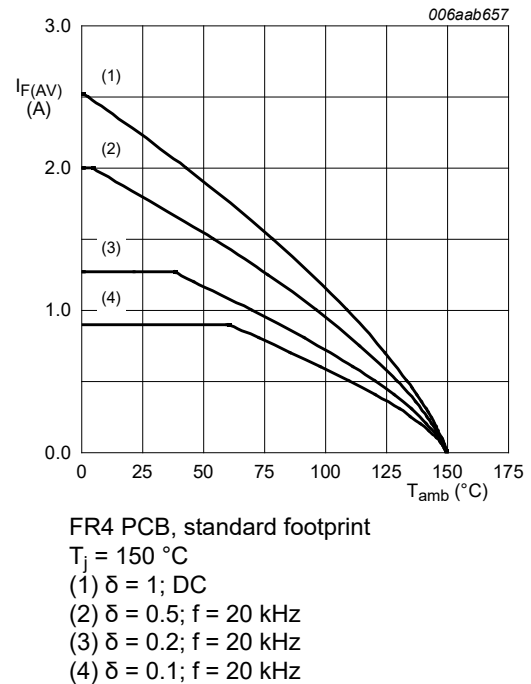


Fig. 9. Average forward current as a function of ambient temperature; typical values

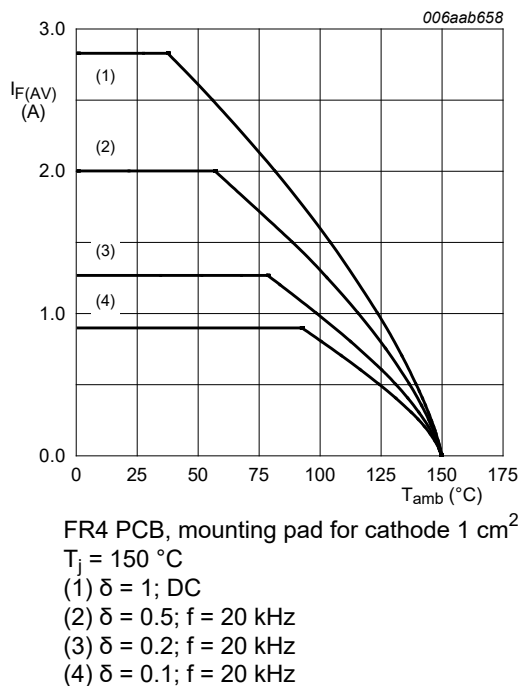


Fig. 10. Average forward current as a function of ambient temperature; typical values

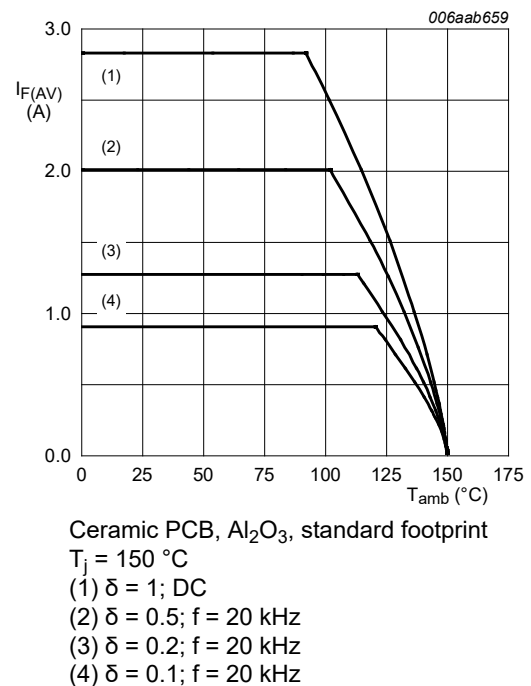
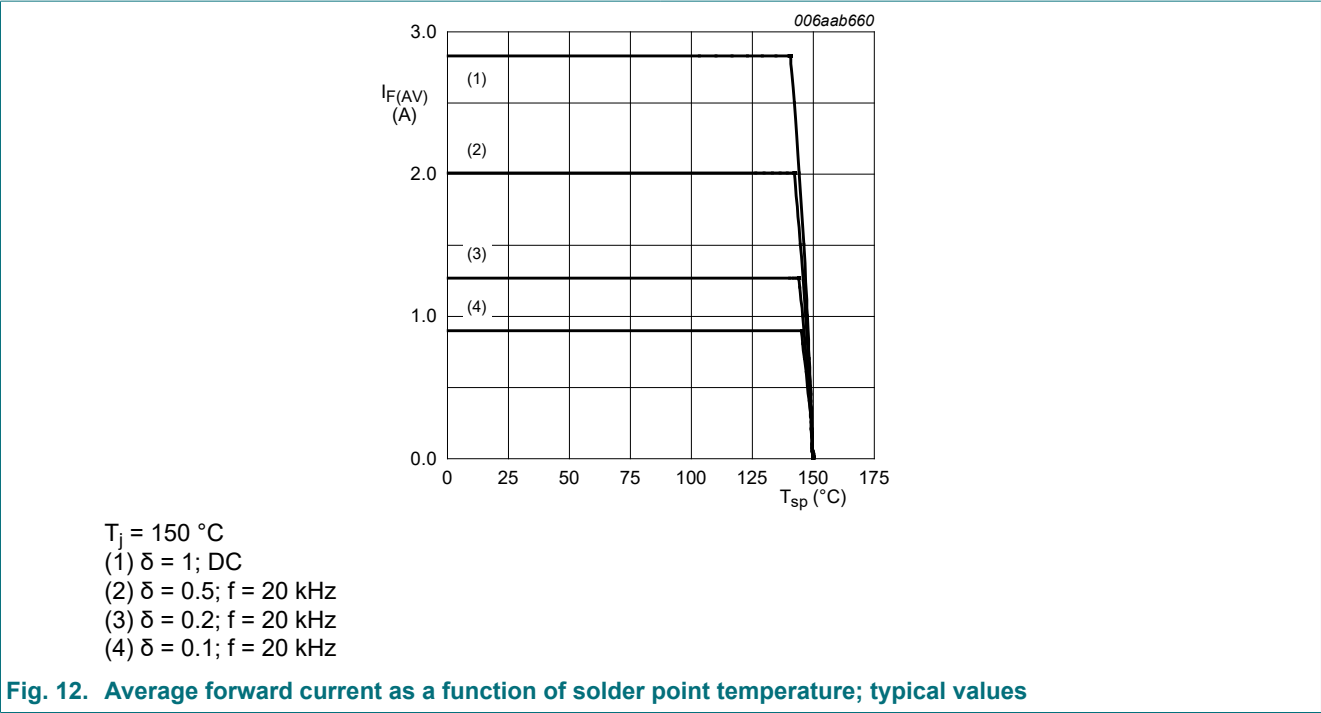
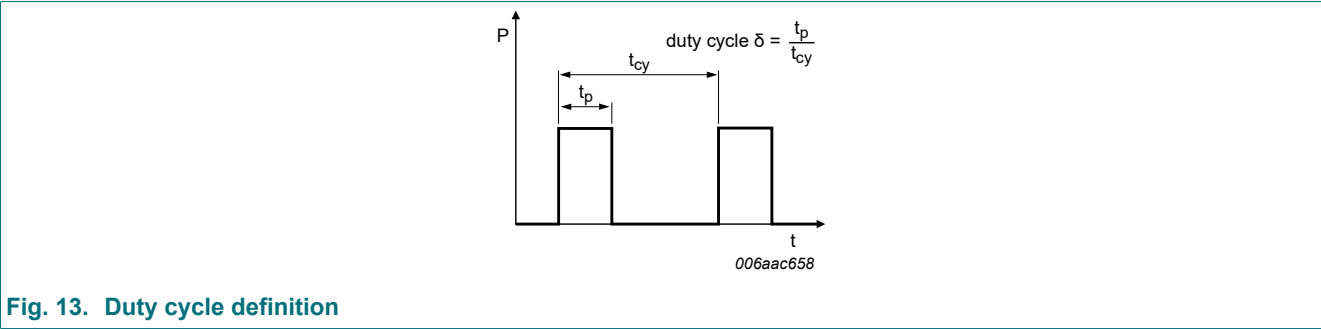


Fig. 11. Average forward current as a function of ambient temperature; typical values



11. Test information



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

$I_{RMS} = I_M \times \sqrt{\delta}$ 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

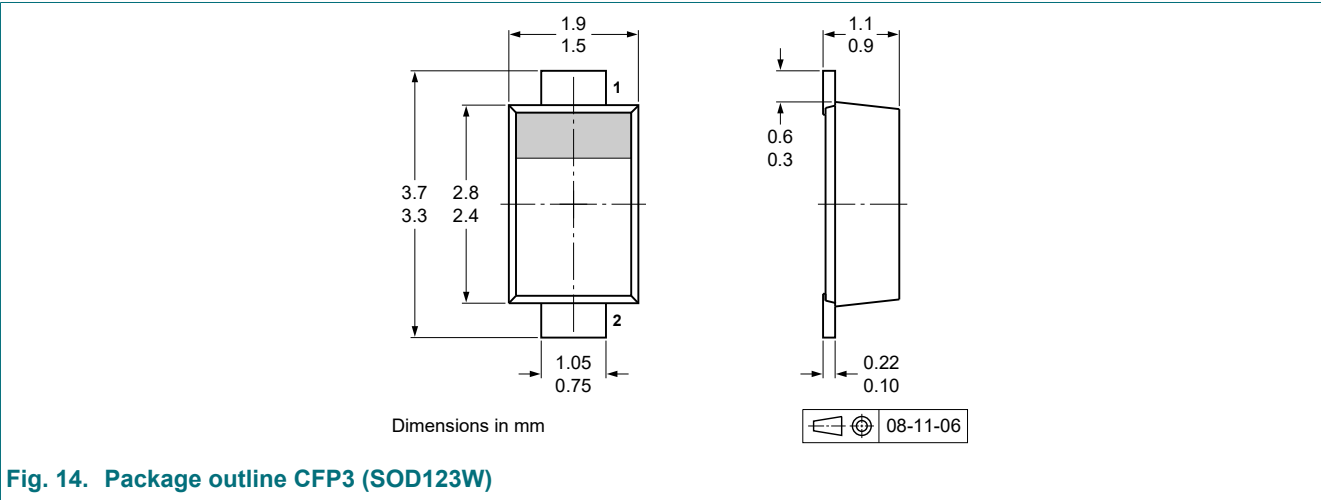


Fig. 14. Package outline CFP3 (SOD123W)

13. Soldering

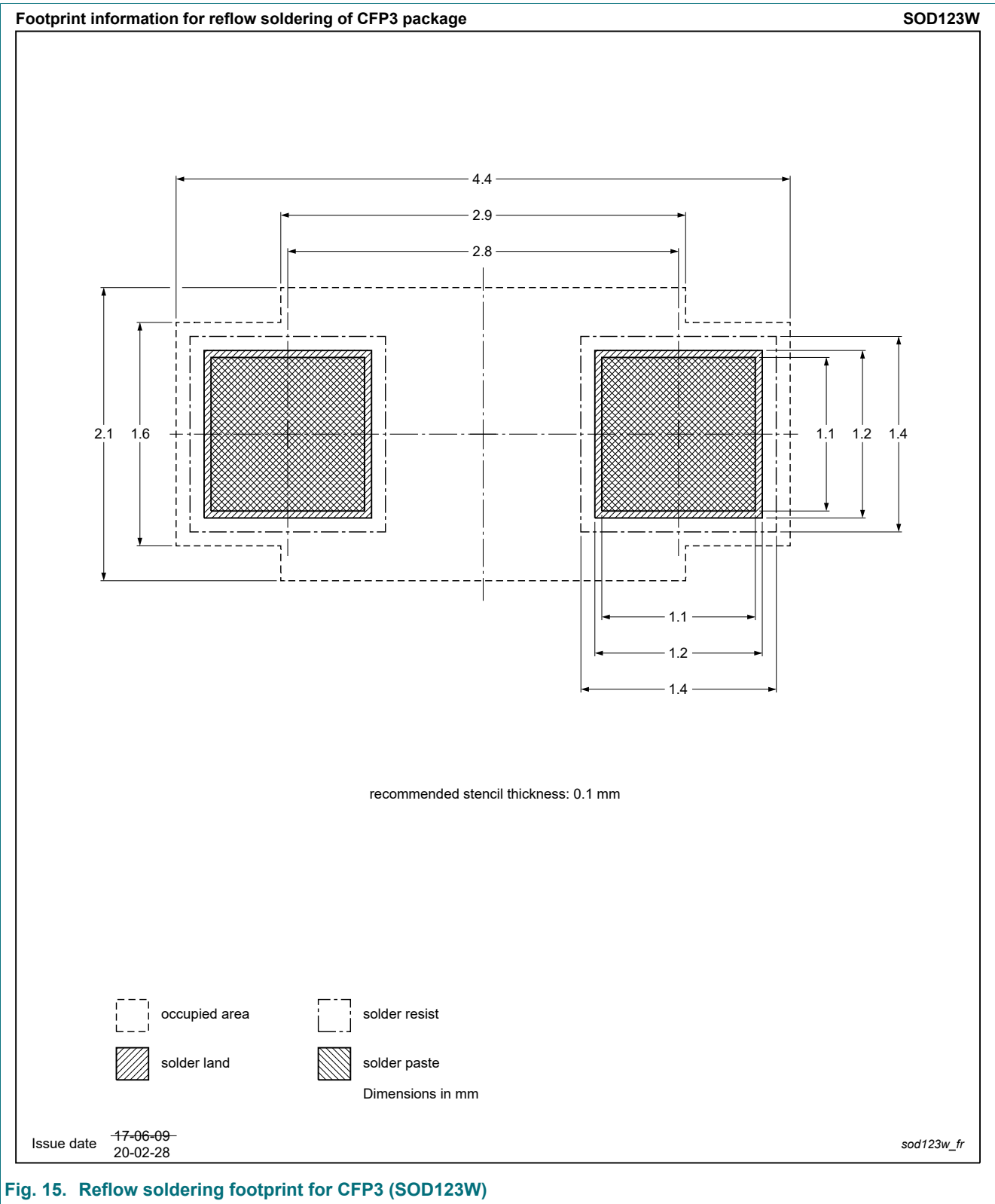


Fig. 15. Reflow soldering footprint for CFP3 (SOD123W)

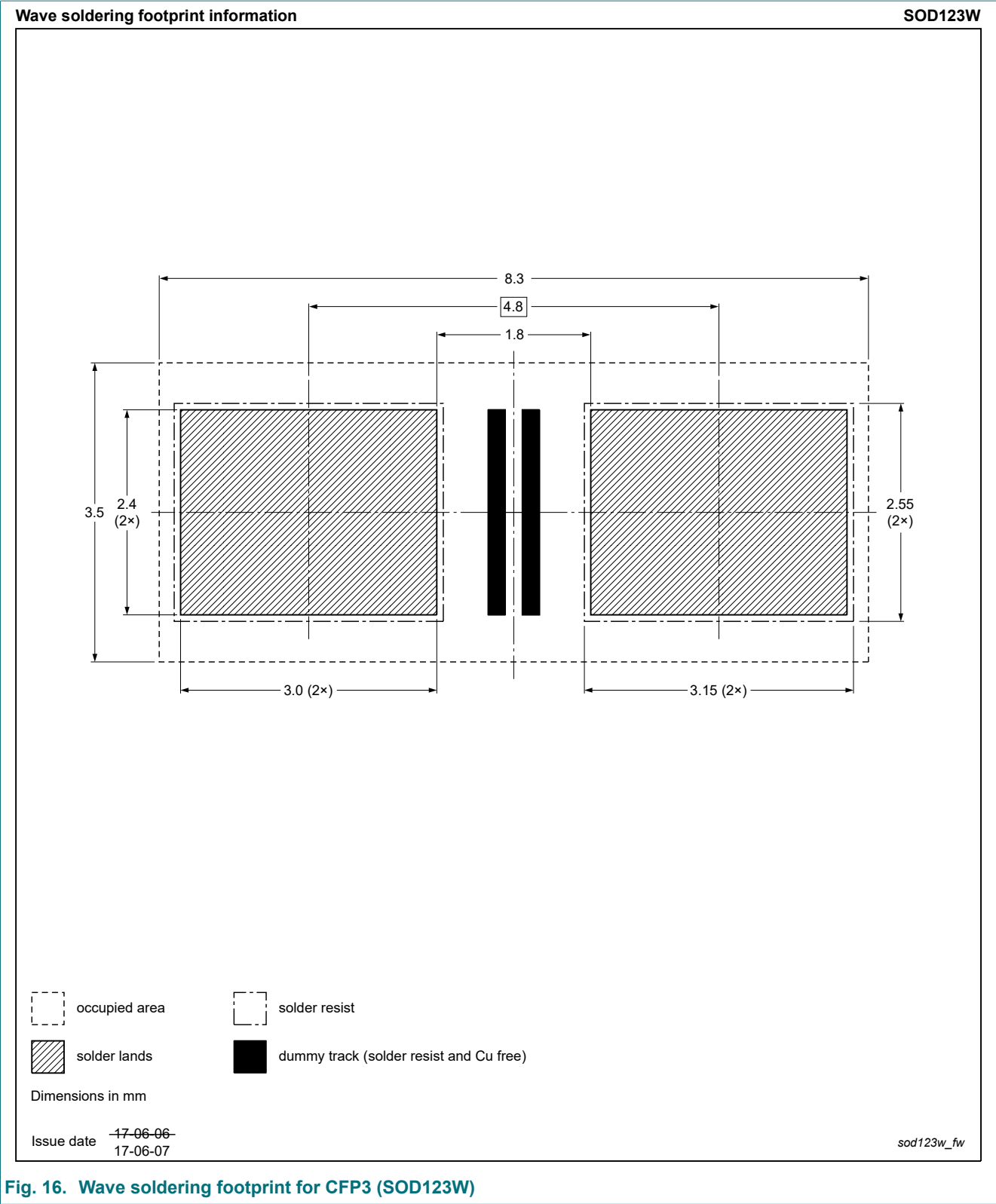


Fig. 16. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4020ER-Q v.2	20221116	Product data sheet	-	PMEG4020ER-Q v.1
Modifications:	<ul style="list-style-type: none">Limiting values: Measurement conditions for I_{FSM} changed from square wave to half-sine wave.			
PMEG4020ER-Q v.1	20210611	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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