



PMEG2010EPAS-Q

20 V, 1 A low VF Schottky barrier rectifier

9 July 2024

Product data sheet

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in an ultra thin DFN2020D-3 (SOT1061D) leadless small Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

2. Features and benefits

- Average forward current $I_{F(AV)} \leq 1$ A
- Reverse voltage $V_R \leq 20$ V
- Low forward voltage $V_F \leq 375$ mV
- Low reverse current
- Reduced Printed-Circuit-Board (PCB) area requirements
- Exposed heat sink (cathode pad) for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with visible and solderable side pads
- Suitable for Automatic Optical Inspection (AOI) of solder joints
- 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)
- Free-wheeling application
- Reverse polarity protection
- Low power consumption application
- Battery chargers for mobile equipment
- LED backlight for mobile application

4. Quick reference data

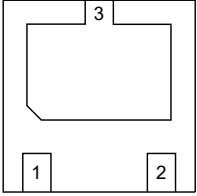
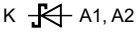
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{amb} \leq 125$ °C	-	-	1	A
		$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 145$ °C	-	-	1	A
V_R	reverse voltage	$T_j = 25$ °C	-	-	20	V
V_F	forward voltage	$I_F = 1$ A; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C; pulsed	-	320	375	mV
I_R	reverse current	$V_R = 20$ V; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C; pulsed	-	335	1900	μ A

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3 , standard footprint.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 Transparent top view DFN2020D-3 (SOT1061D)	 006aab624
2	A	anode		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG2010EPAS-Q	DFN2020D-3	plastic, leadless thermal enhanced ultra thin small outline package with side-wettable flanks (SWF); no leads; 3 terminals; 1.3 mm pitch; 2 mm x 2 mm x 0.65 mm body	SOT1061D

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2010EPAS-Q	CR

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		-	20	V
I _F	forward current	δ = 1; T _{sp} ≤ 140 °C		-	1.4	A
I _{F(AV)}	average forward current	δ = 0.5; f = 20 kHz; square wave; T _{amb} ≤ 125 °C	[1]	-	1	A
		δ = 0.5; f = 20 kHz; square wave; T _{sp} ≤ 145 °C		-	1	A
I _{FRM}	repetitive peak forward current	t _p ≤ 1 ms; δ ≤ 0.25	[2]	-	7	A
I _{FSM}	non-repetitive peak forward current	t _p = 8 ms; square wave; T _{j(init)} = 25 °C	[2]	-	17	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[3]	-	500	mW
			[4]	-	960	mW
			[1]	-	1800	mW
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C

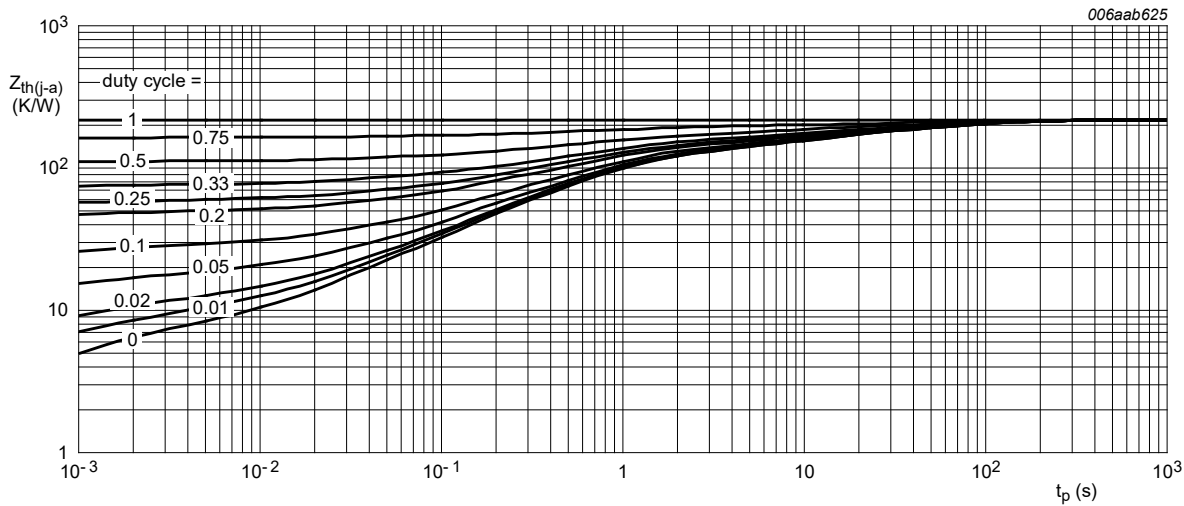
- [1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al₂O₃, standard footprint.
- [2] Both anode pins connected.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

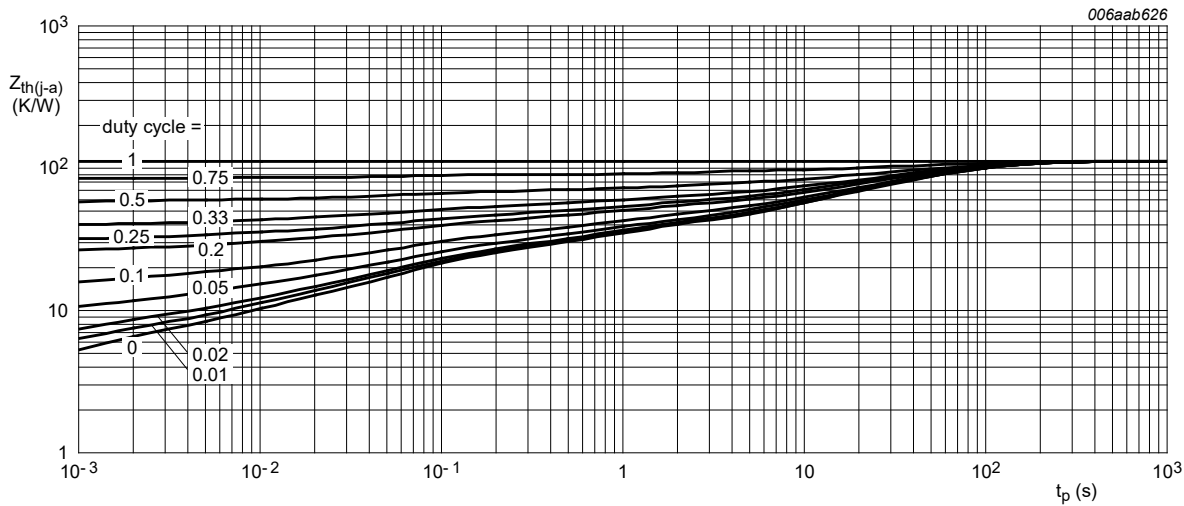
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	250	K/W
			[1] [3]	-	-	130	K/W
			[1] [4]	-	-	70	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point		[5]	-	-	12	K/W

- [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.



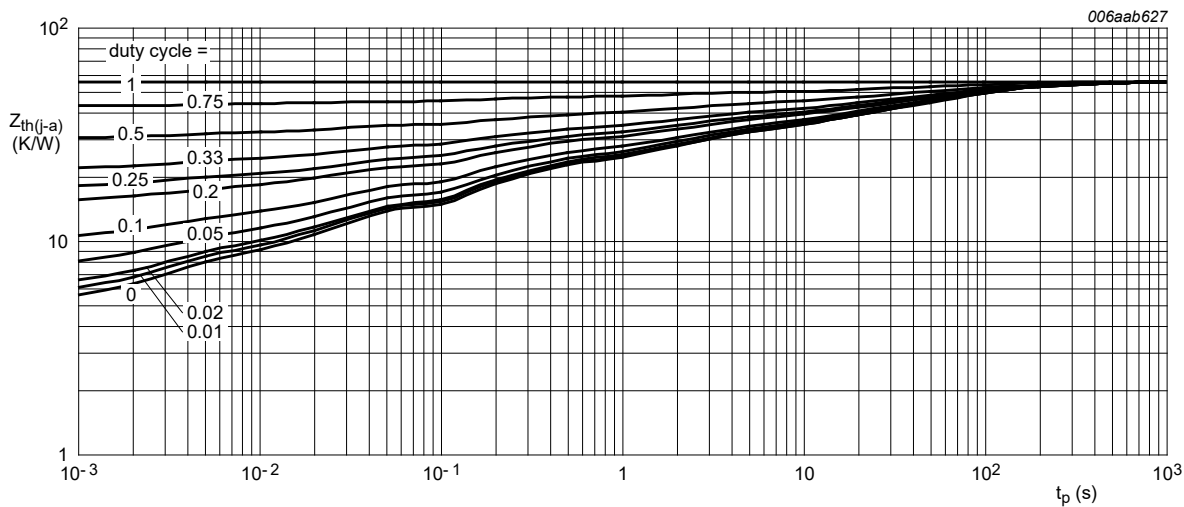
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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



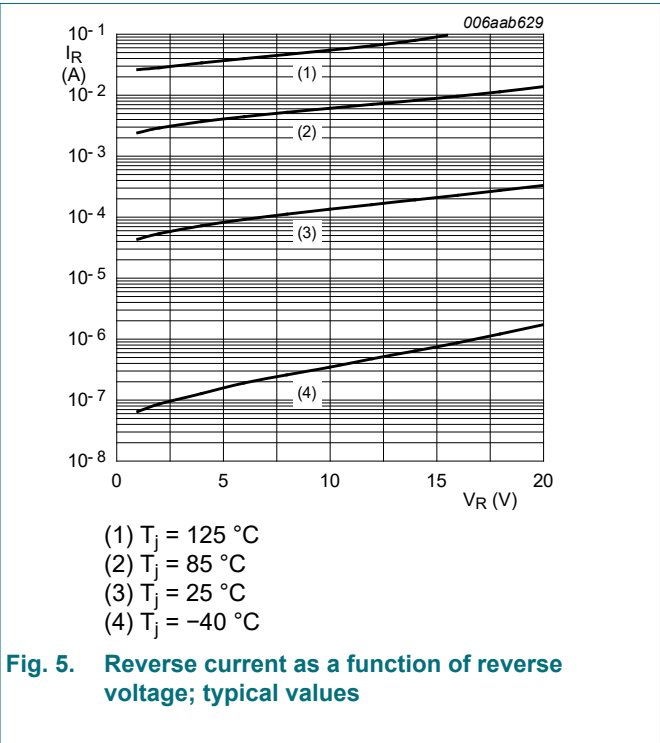
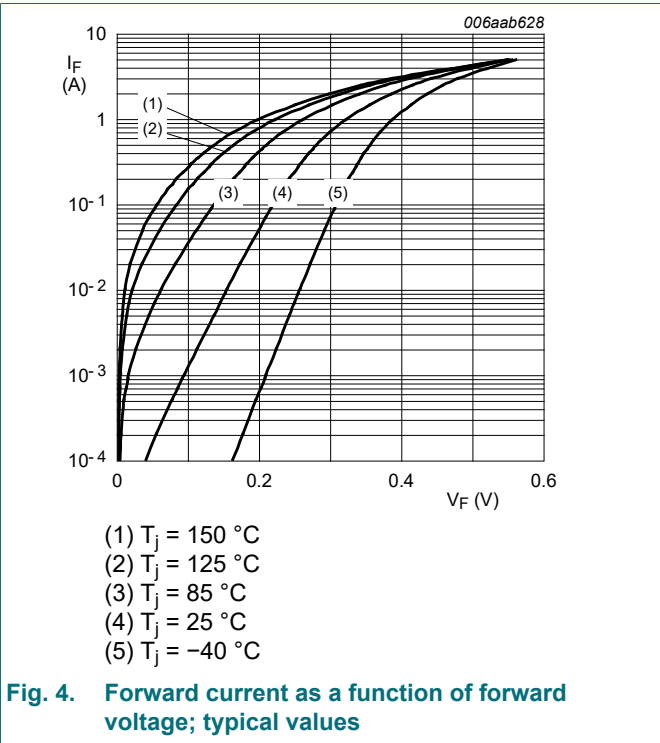
Ceramic PCB, Al₂O₃, standard footprint

Fig. 3. 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	$I_R = 10\text{ mA}$; $t_p = 300\text{ }\mu\text{s}$; pulsed; $\delta = 0.02$; $T_j = 25\text{ }^\circ\text{C}$	20	-	-	V
V_F	forward voltage	$I_F = 0.5\text{ A}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed	-	280	-	mV
		$I_F = 1\text{ A}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed	-	320	375	mV
I_R	reverse current	$V_R = 10\text{ V}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed	-	135	-	μA
		$V_R = 20\text{ V}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed	-	335	1900	μA
C_d	diode capacitance	$V_R = 1\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^\circ\text{C}$	-	175	-	pF
		$V_R = 10\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^\circ\text{C}$	-	65	-	pF
t_{rr}	reverse recovery time	$I_F = 10\text{ mA}$; $I_R = 10\text{ mA}$; $I_{R(\text{meas})} = 1\text{ mA}$; $R_L = 100\text{ }\Omega$; $T_j = 25\text{ }^\circ\text{C}$	-	50	-	ns



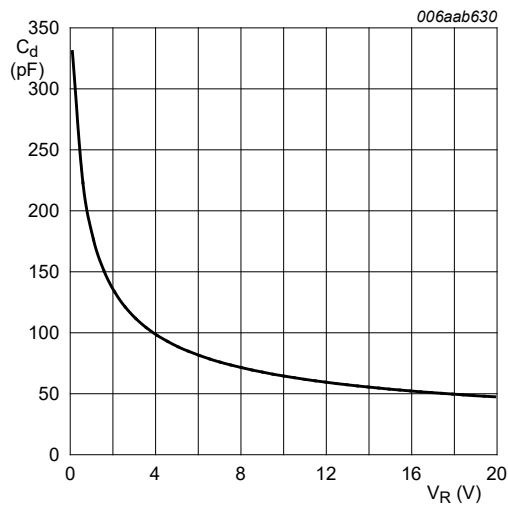


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

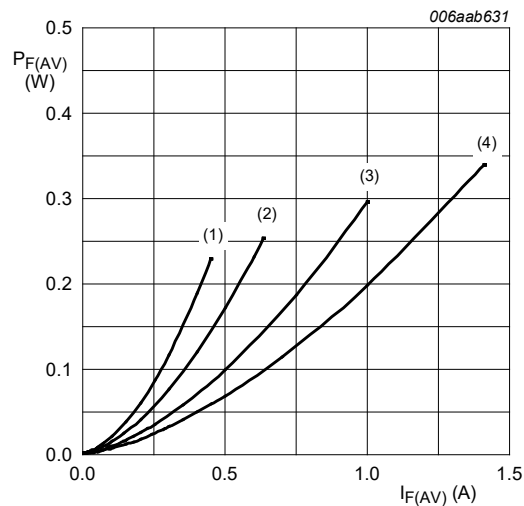


Fig. 7. Average forward power dissipation as a function of average forward current; typical values

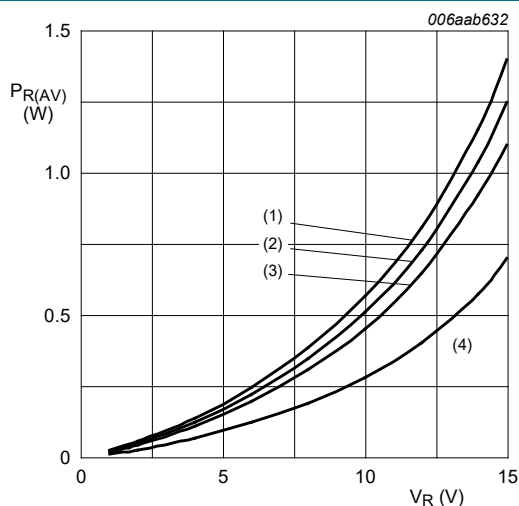


Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values

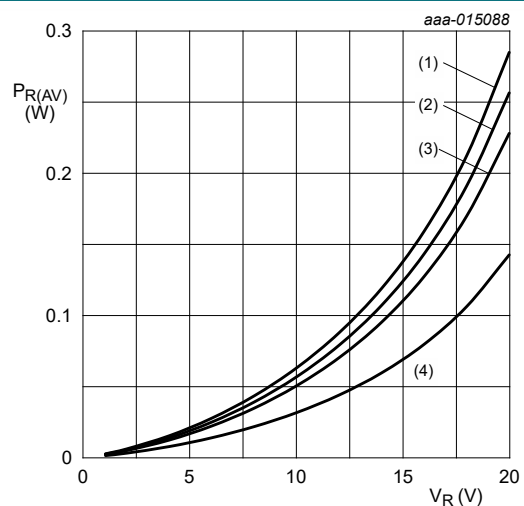
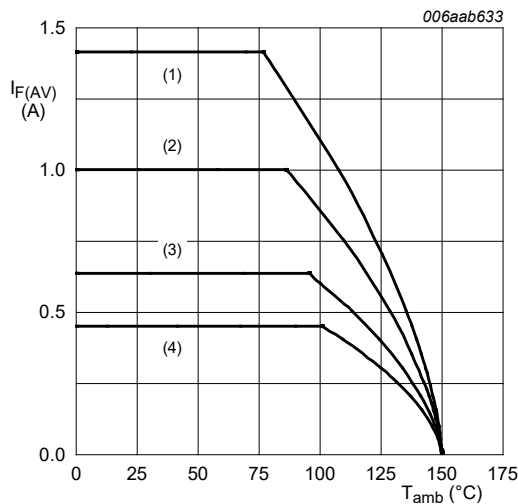
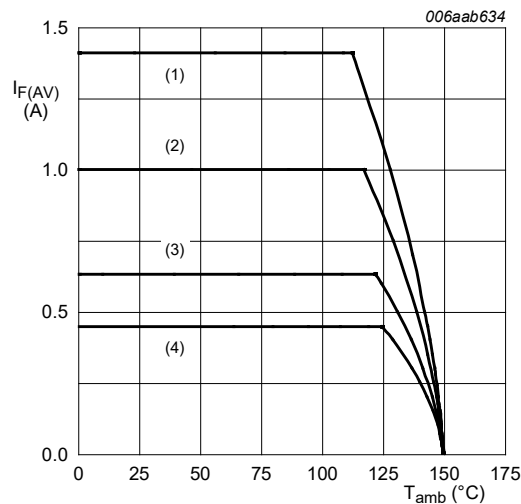


Fig. 9. Average reverse power dissipation as a function of reverse voltage; typical values



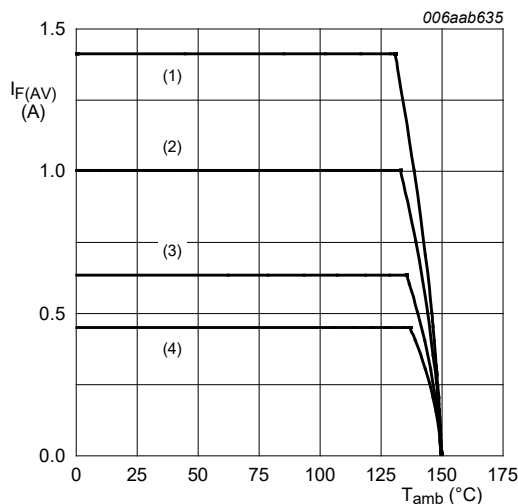
FR4 PCB, standard footprint
 $T_j = 150$ °C
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20$ kHz
(3) $\delta = 0.2$; $f = 20$ kHz
(4) $\delta = 0.1$; $f = 20$ kHz

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



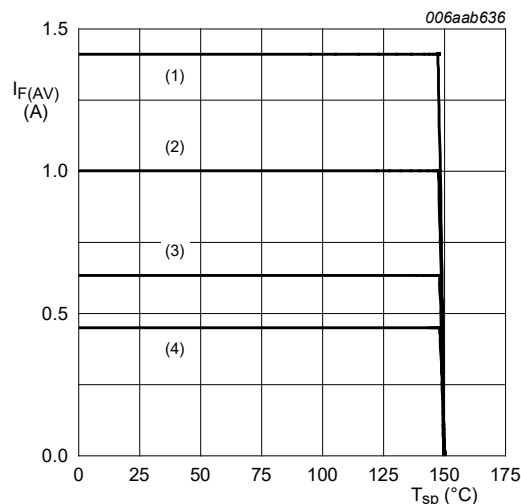
FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 150$ °C
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20$ kHz
(3) $\delta = 0.2$; $f = 20$ kHz
(4) $\delta = 0.1$; $f = 20$ kHz

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



Ceramic PCB, Al₂O₃, standard footprint
 $T_j = 150$ °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. 12. Average forward current as a function of ambient temperature; typical values



$T_j = 150$ °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. 13. Average forward current as a function of solder point temperature; typical values

11. Test information

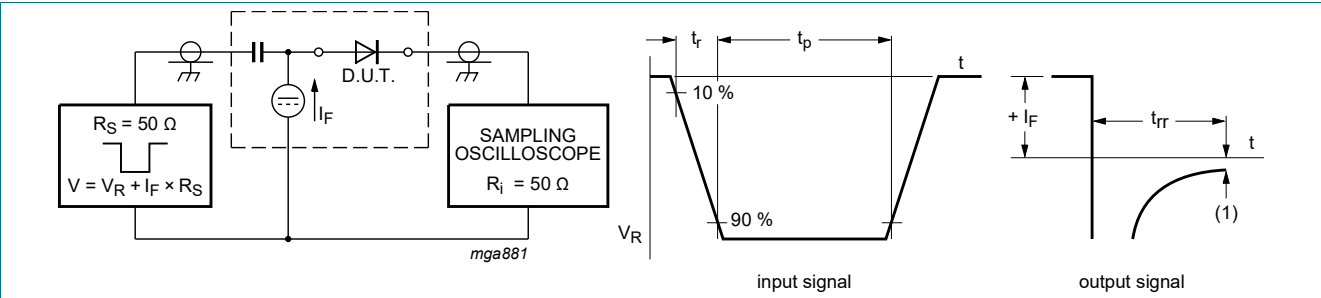


Fig. 14. Reverse recovery time: test circuit and waveforms

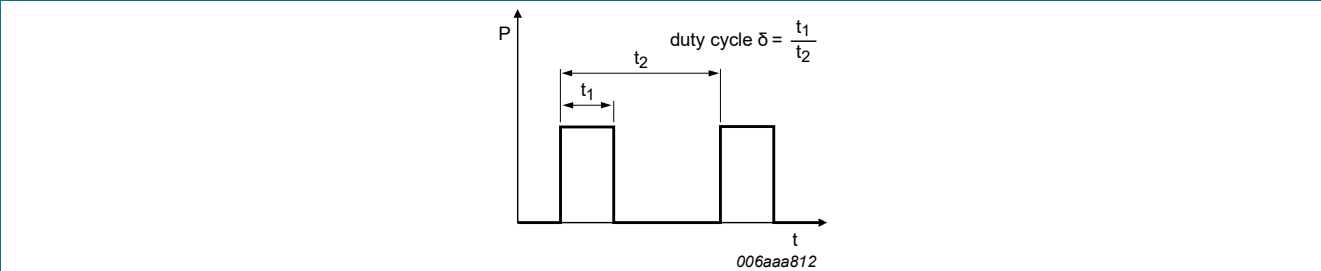


Fig. 15. Duty cycle definition

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, 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

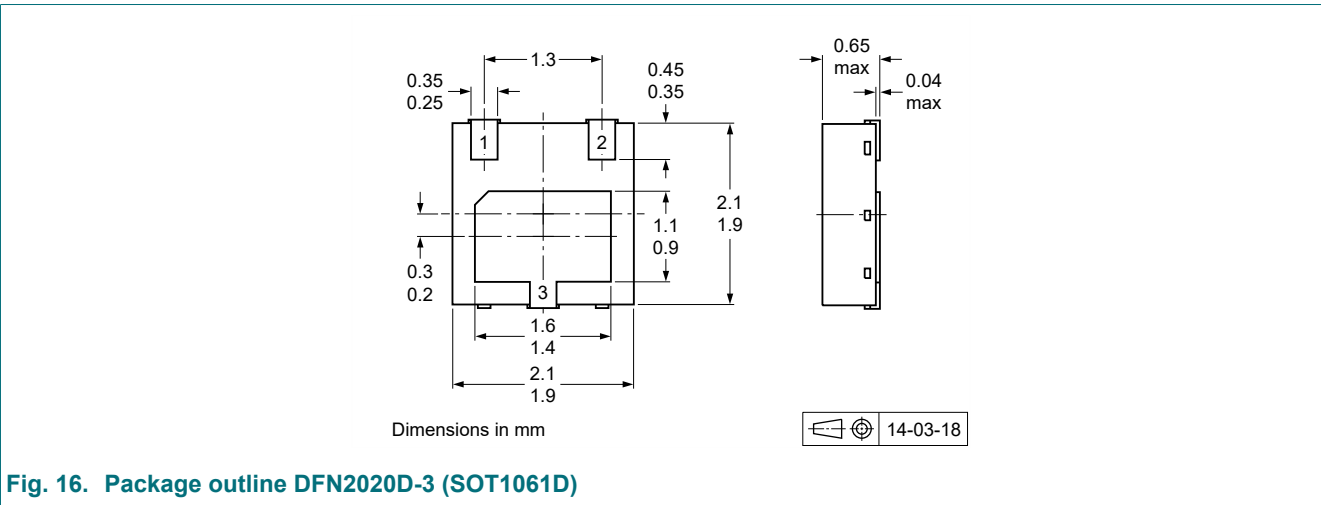


Fig. 16. Package outline DFN2020D-3 (SOT1061D)

13. Soldering

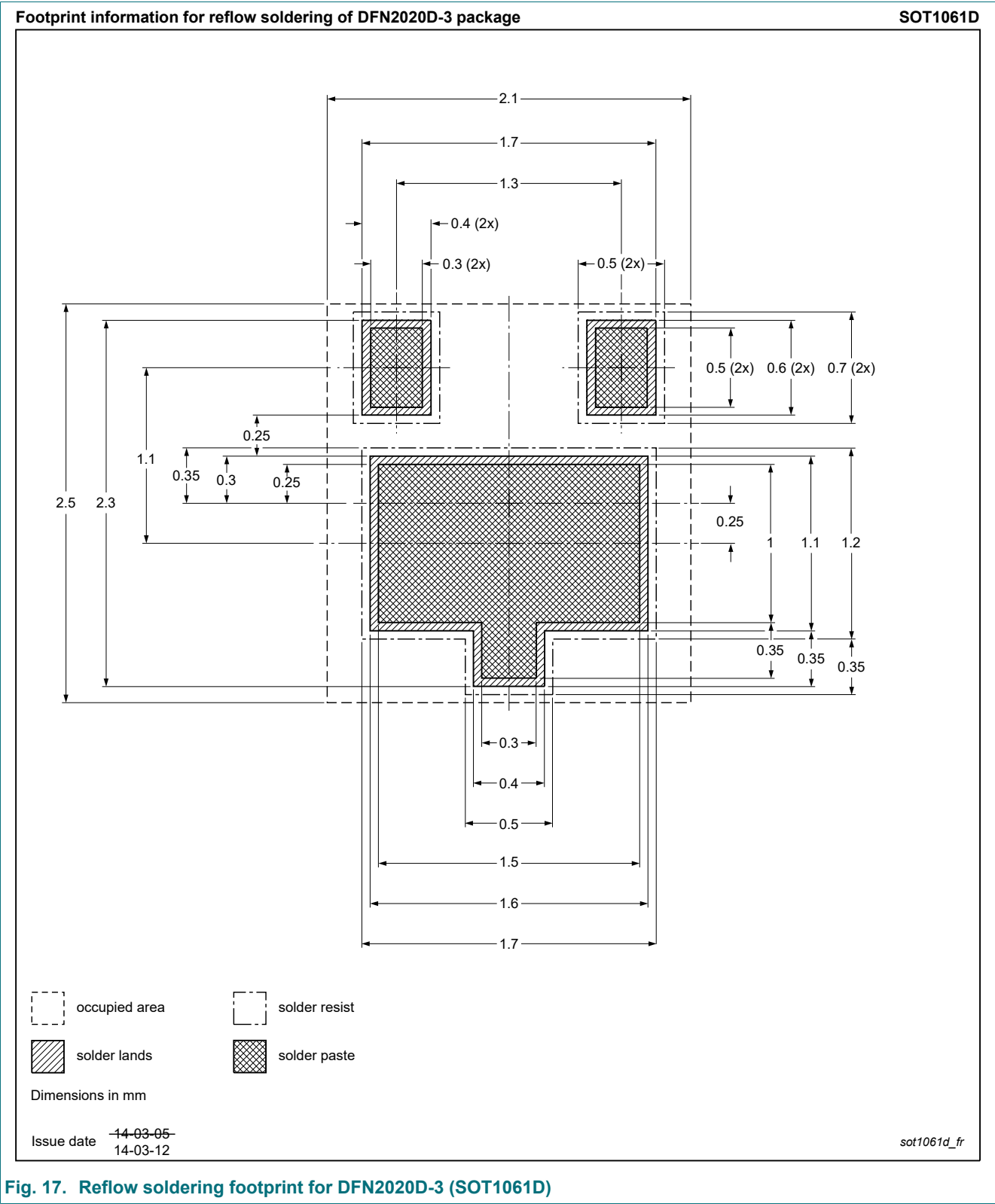


Fig. 17. Reflow soldering footprint for DFN2020D-3 (SOT1061D)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2010EPAS-Q v.1	20240709	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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