

PMEG4020EPAS

40 V, 2 A low VF MEGA Schottky barrier rectifier

19 January 2015 **Product data sheet**

1. General description

Planar Maximum Efficiency General Application (MEGA) 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 $I_{F(AV)} \leq 2$ A
- Reverse voltage $V_R \leq 40$ V
- Low forward voltage $V_F \leq 535$ 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
- AEC-Q101 qualified

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

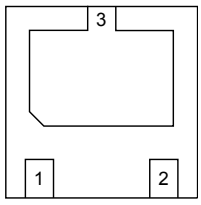
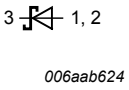
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; f = 20 kHz; $T_{amb} \leq 65$ °C; square wave	[1]	-	-	2	A
		$\delta = 0.5$; f = 20 kHz; $T_{sp} \leq 140$ °C; square wave		-	-	2	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	40	V

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 2 A; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C; pulsed		-	470	535	mV
I_R	reverse current	V_R = 40 V; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C; pulsed		-	20	100	µA

[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
PMEG4020EPAS	DFN2020D-3	DFN2020D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 x 2 x 0.65 mm	SOT1061D

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020EPAS	CS

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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	$T_{sp} \leq 135$ °C; $\delta = 1$		-	2.8	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$; f = 20 kHz; $T_{amb} \leq 65$ °C; square wave	[1]	-	2	A
		$\delta = 0.5$; f = 20 kHz; $T_{sp} \leq 140$ °C; square wave		-	2	A
I_{FRM}	repetitive peak forward current	$t_p \leq 1$ ms; $\delta \leq 0.25$	[2]	-	7	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave	[2]	-	18	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[3]	-	520	mW
			[4]	-	1050	mW
			[1]	-	1900	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), Al_2O_3, 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 cm^2.

9. Thermal characteristics

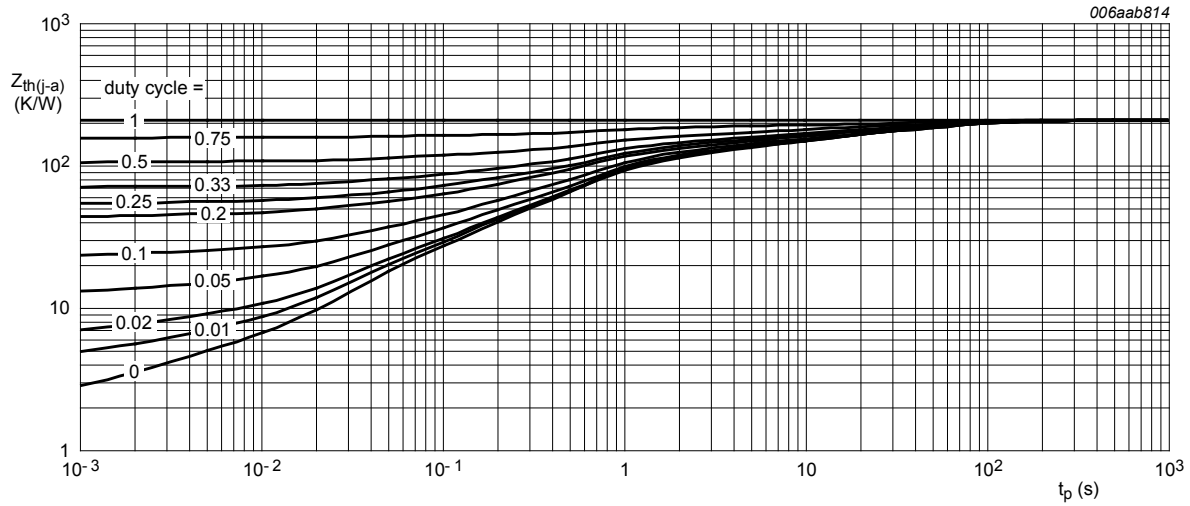
Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	240	K/W
			[1][3]	-	-	120	K/W
			[1][4]	-	-	65	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	10	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^2.
[4] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[5] Soldering point of cathode tab.

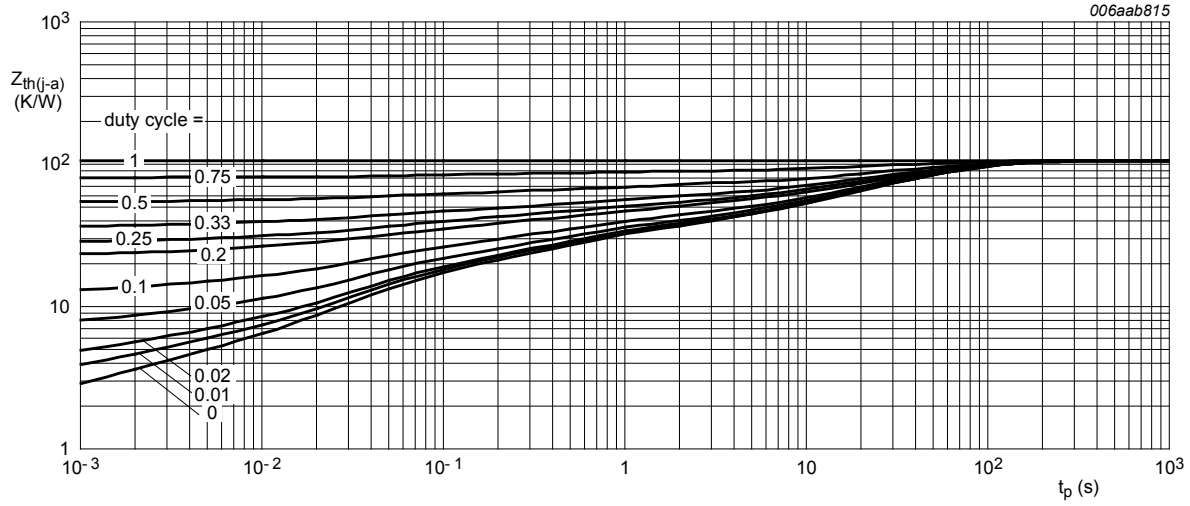
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FR4 PCB, standard footprint

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

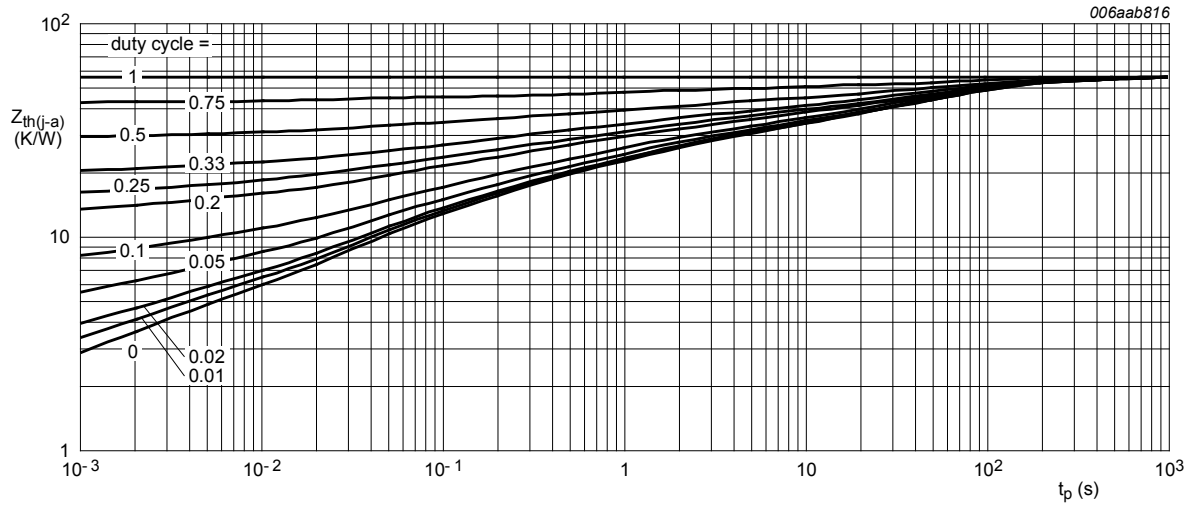


FR4 PCB, mounting pad for cathode 1 cm^2

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

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Ceramic PCB, Al_2O_3, standard footprint

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

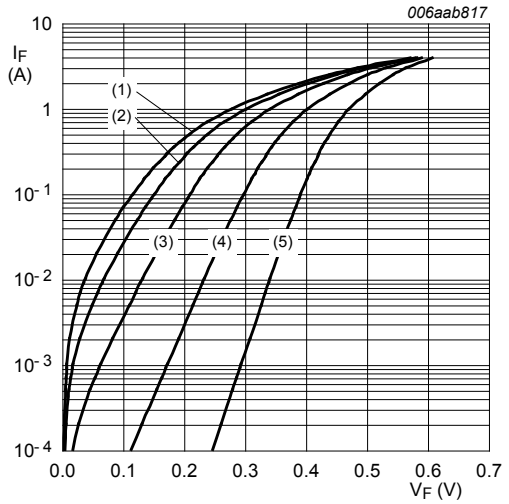
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10. Characteristics

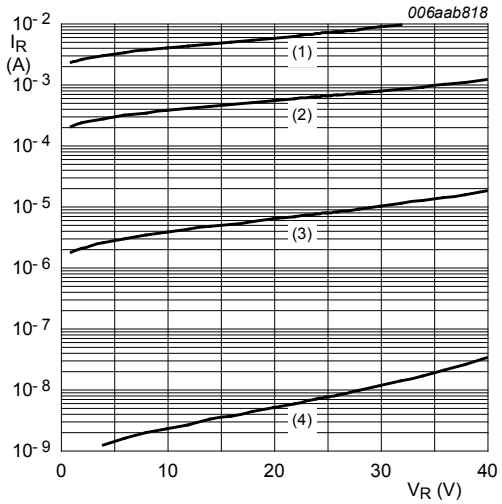
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	I_R = 1 mA; t_p = 300 µs; δ = 0.02; T_j = 25 °C; pulsed		40	-	-	V
V_F	forward voltage	I_F = 0.5 A; t_p ≤ 300 µs; δ ≤ 0.02; T_j = 25 °C; pulsed		-	360	-	mV
		I_F = 1 A; t_p ≤ 300 µs; δ ≤ 0.02; T_j = 25 °C; pulsed		-	400	-	mV
		I_F = 2 A; t_p ≤ 300 µs; δ ≤ 0.02; T_j = 25 °C; pulsed		-	470	535	mV
I_R	reverse current	V_R = 10 V; t_p ≤ 300 µs; δ ≤ 0.02; T_j = 25 °C; pulsed		-	5	-	µA
		V_R = 40 V; t_p ≤ 300 µs; δ ≤ 0.02; T_j = 25 °C; pulsed		-	20	100	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	270	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	100	-	pF
t_{rr}	reverse recovery time	I_F = 0.5 A; I_R = 1 A; $I_{R(meas)}$ = 0.25 A; T_j = 25 °C		-	6	-	ns



(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

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

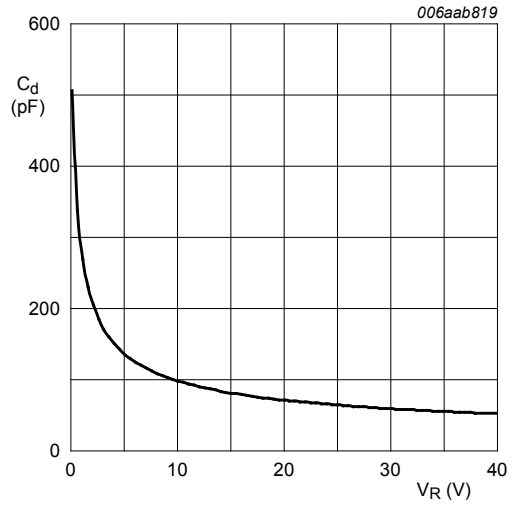


(1) T_j = 125 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

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

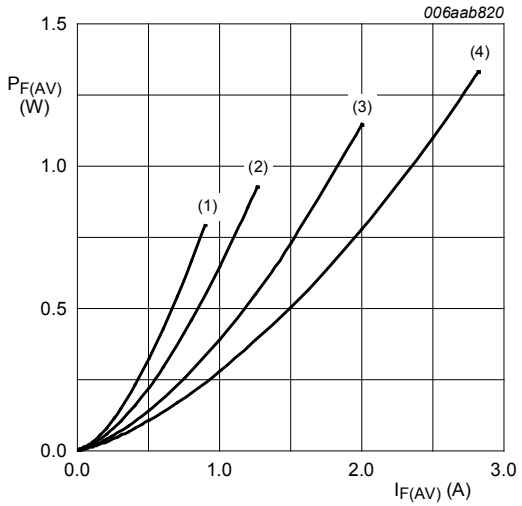
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f = 1 MHz; T_{amb} = 25 °C

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



T_j = 150 °C

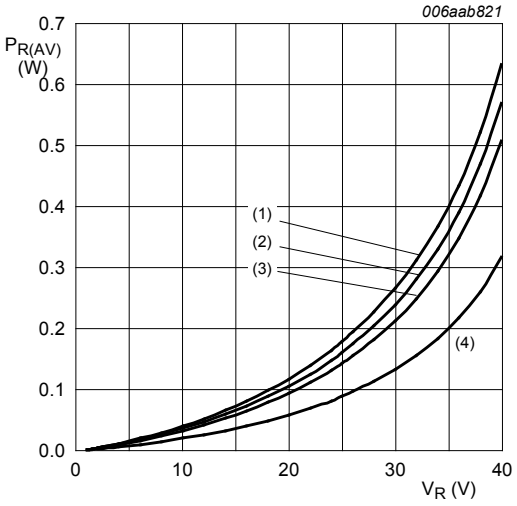
(1) δ = 0.1

(2) δ = 0.2

(3) δ = 0.5

(4) δ = 1

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



T_j = 125 °C

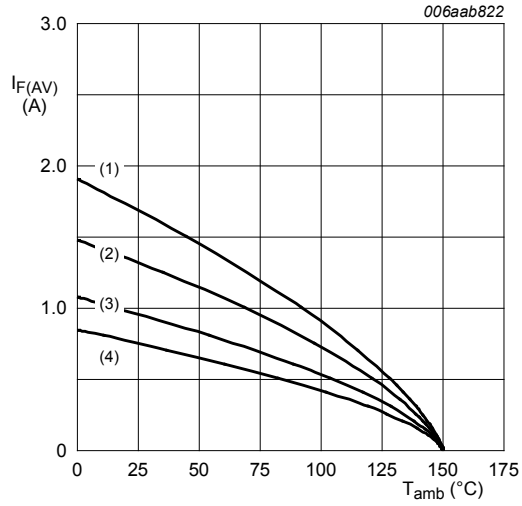
(1) δ = 1

(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

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



FR4 PCB, standard footprint

T_j = 150 °C

(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

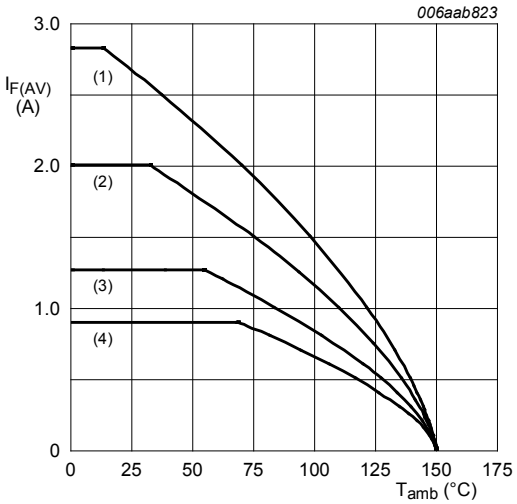
(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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

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FR4 PCB, mounting pad for cathode 1 cm^2

T_j = 150 °C

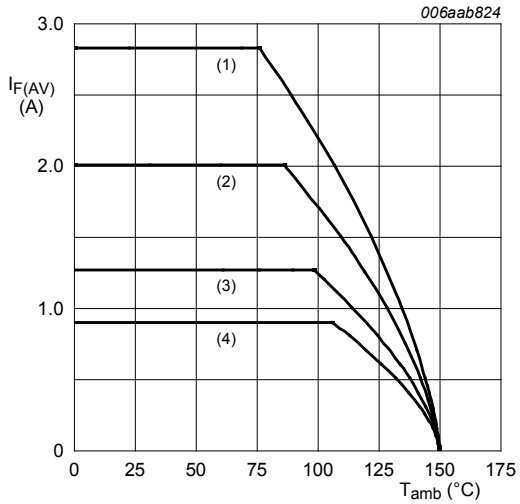
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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



Ceramic PCB, Al_2O_3, standard footprint

T_j = 150 °C

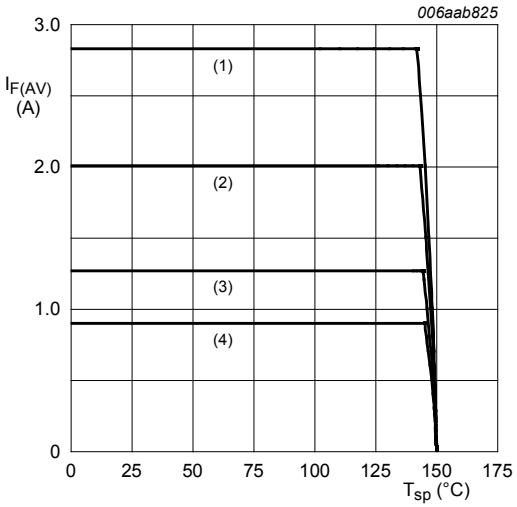
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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



T_j = 150 °C

(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

Fig. 12. Average forward current as a function of solder point temperature; typical values

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11. Test information

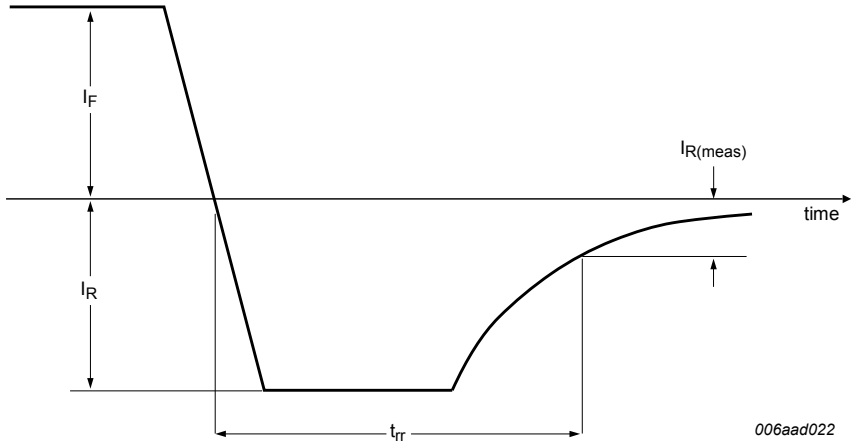


Fig. 13. Reverse recovery definition

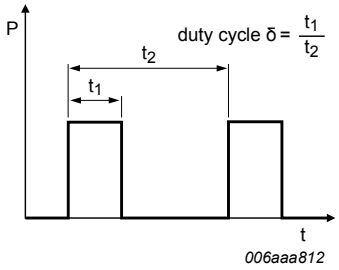


Fig. 14. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ 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.

11.1 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.

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12. Package outline

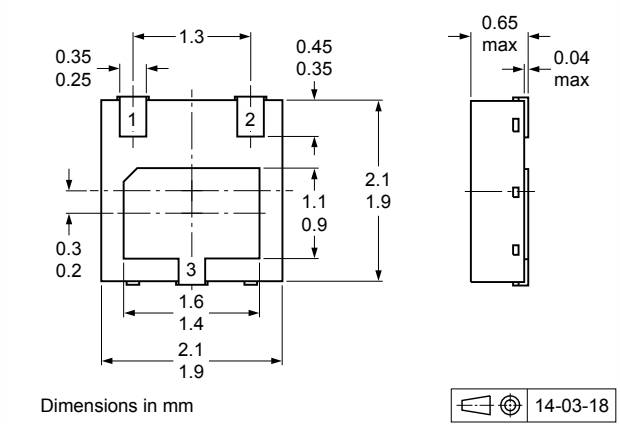


Fig. 15. Package outline DFN2020D-3 (SOT1061D)

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13. Soldering

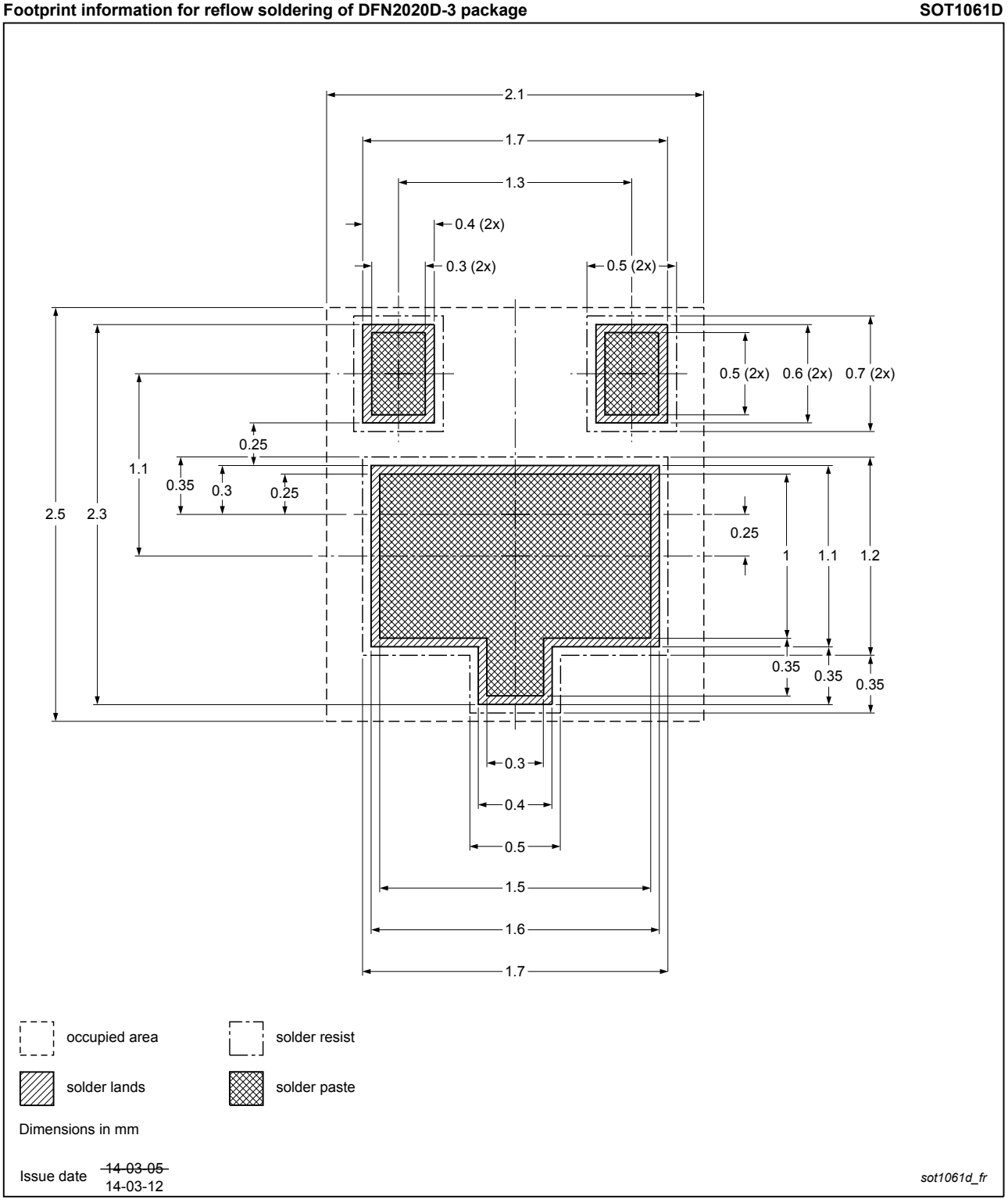


Fig. 16. Reflow soldering footprint for DFN2020D-3 (SOT1061D)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4020EPAS v.2	20150119	Product data sheet	-	PMEG4020EPAS v.1
Modification:	• Product status changed			
PMEG4020EPAS v.1	20141209	Preliminary data sheet	-	-

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15.1 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.

[1] Please consult the most recently issued document before initiating or completing a design.
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