PMEG4020EPK

40 V, 2 A low VF MEGA Schottky barrier rectifier

11 February 2014 — 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 a leadless ultra small DFN1608D-2 (SOD1608) 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 $V_F \leq 660$ mV
- Low reverse current
- AEC-Q101 qualified
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- LED backlight for mobile application
- Low power consumption applications
- Ultra high-speed switching
- Reverse polarity protection

4. Quick reference data

Table 1. Quick reference data

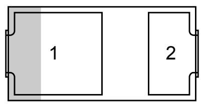
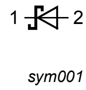
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; $T_{sp} \leq 130$ °C; square wave		-	-	2	A
		δ = 0.5; f = 20 kHz; $T_{amb} \leq 25$ °C; square wave	[1]	-	-	2	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	40	V
V_F	forward voltage	$I_F = 2$ A; pulsed; $t_p \leq 300$ µs; δ ≤ 0.02; $T_j = 25$ °C		-	585	660	mV

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_R	reverse current	V_R = 10 V; T_j = 25 °C		-	1	5	µA
t_{rr}	reverse recovery time	I_R = 0.5 A; I_F = 0.5 A; $I_{R(meas)}$ = 0.1 A; T_j = 25 °C		-	4	-	ns

[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	K	cathode[1]	 Transparent top view **DFN1608D-2 (SOD1608)**	
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4020EPK	DFN1608D-2	DFN1608D-2: leadless ultra small plastic package; 2 terminals	SOD1608

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020EPK	0001 0000

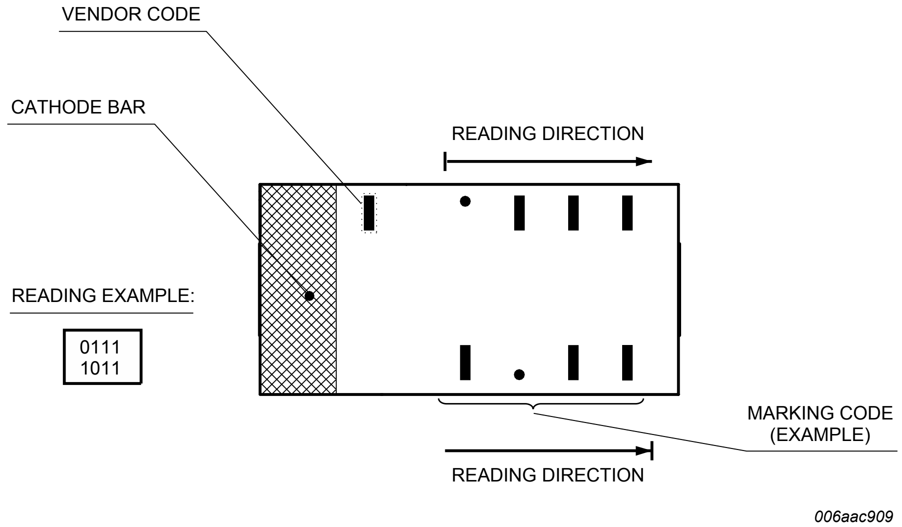


Fig. 1. SOD1608 binary marking code description

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} ≤ 125 °C		-	2.83	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; T_{sp} ≤ 130 °C; square wave		-	2	A
		δ = 0.5; f = 20 kHz; T_{amb} ≤ 25 °C; square wave	[1]	-	2	A
I_{FRM}	repetitive peak forward current	t_p ≤ 1 ms; δ ≤ 0.25		-	4	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	5	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	415	mW
			[3]	-	895	mW
			[1]	-	1565	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

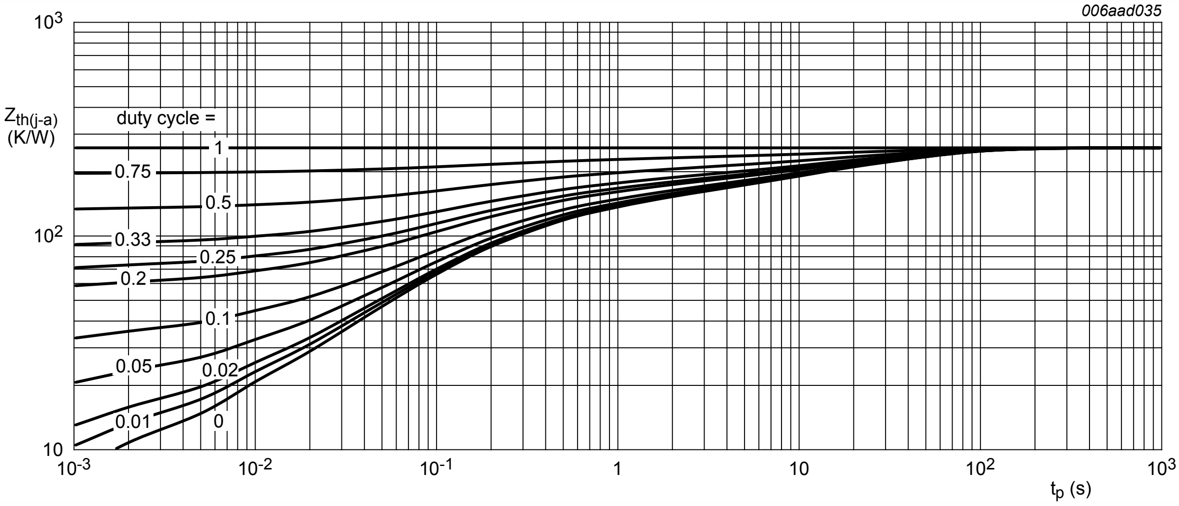
[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

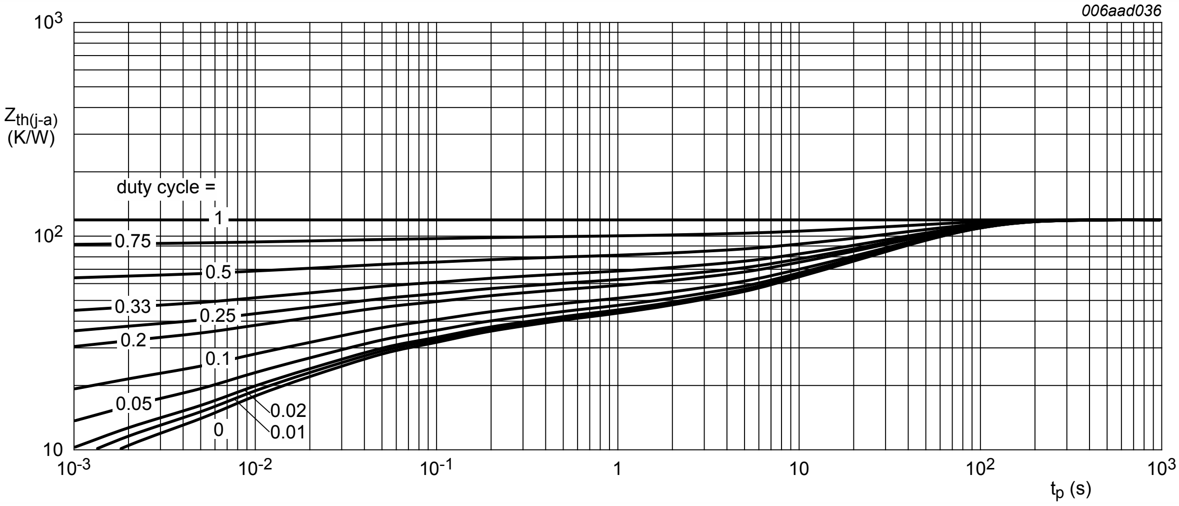
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	300	K/W
			[1][3]	-	-	140	K/W
			[1][4]	-	-	80	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	20	K/W

[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.



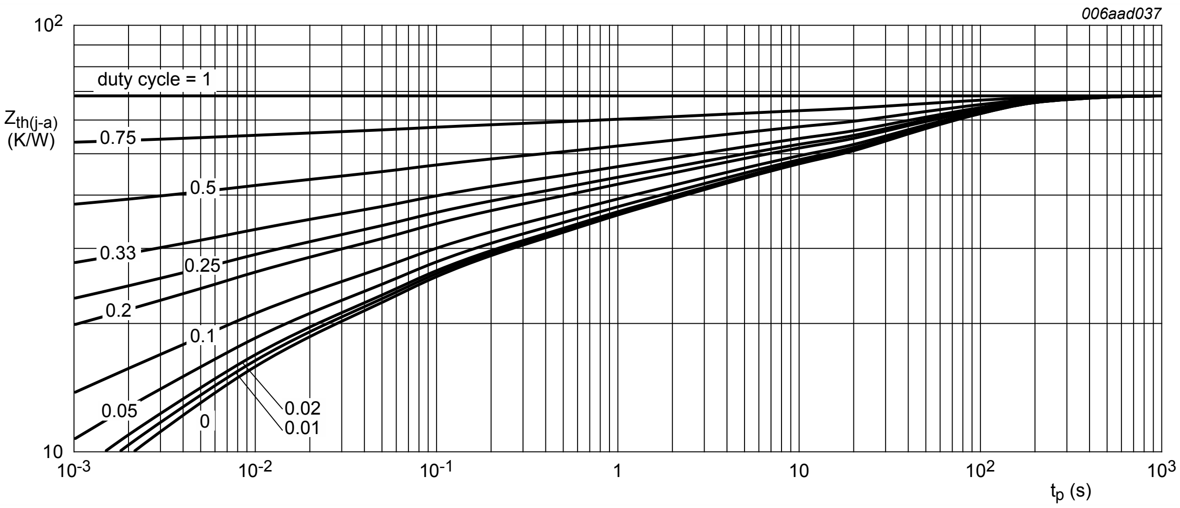
FR4 PCB, standard footprint

Fig. 2. 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. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



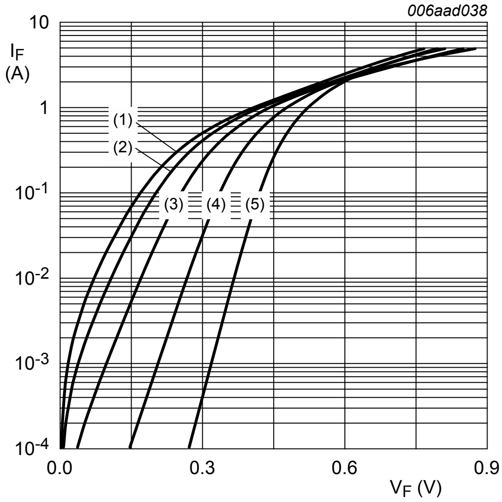
Ceramic PCB, Al_2O_3, standard footprint

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

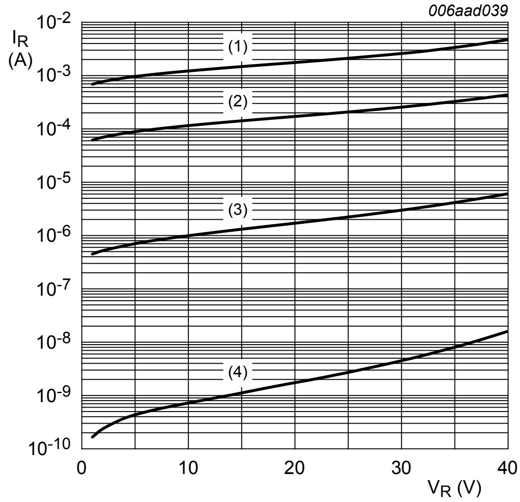
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA; pulsed; $t_p \leq$ 300 μs; $\delta \leq$ 0.02; T_j = 25 °C		-	330	380	mV
		I_F = 500 mA; pulsed; $t_p \leq$ 300 μs; $\delta \leq$ 0.02; T_j = 25 °C		-	415	480	mV
		I_F = 1 A; pulsed; $t_p \leq$ 300 μs; $\delta \leq$ 0.02; T_j = 25 °C		-	490	550	mV
		I_F = 2 A; pulsed; $t_p \leq$ 300 μs; $\delta \leq$ 0.02; T_j = 25 °C		-	585	660	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C		-	1	5	μA
		V_R = 40 V; T_j = 25 °C		-	8	30	μA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	75	90	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	30	40	pF
t_{rr}	reverse recovery time	I_F = 0.5 A; I_R = 0.5 A; $I_{R(meas)}$ = 0.1 A; T_j = 25 °C		-	4	-	ns
V_{FRM}	peak forward recovery voltage	I_F = 0.5 A; dI_F/dt = 20 A/μs; T_j = 25 °C		-	440	-	mV



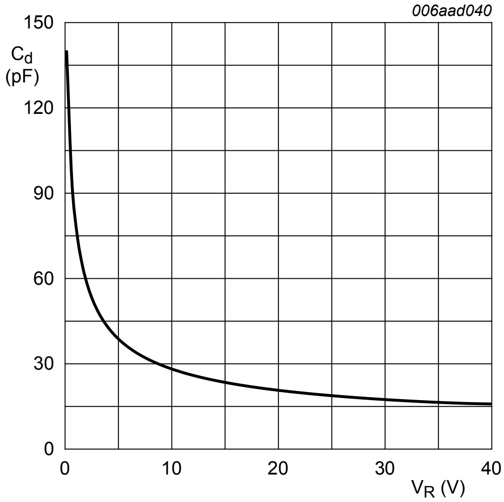
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

Fig. 5. Forward current as a function of forward voltage; typical values



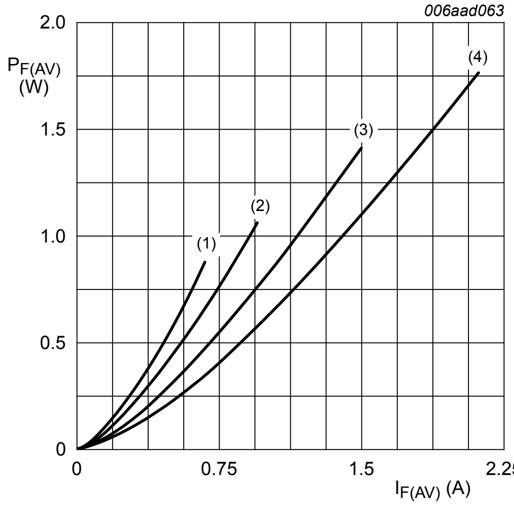
(1) T_j = 125 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

Fig. 6. Reverse current as a function of reverse voltage; typical values



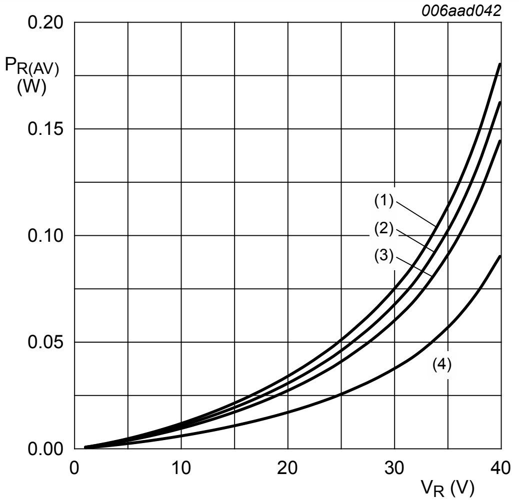
f = 1 MHz; T_{amb} = 25 °C

Fig. 7. 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. 8. Average forward power dissipation as a function of average forward current; typical values



T_j = 125 °C

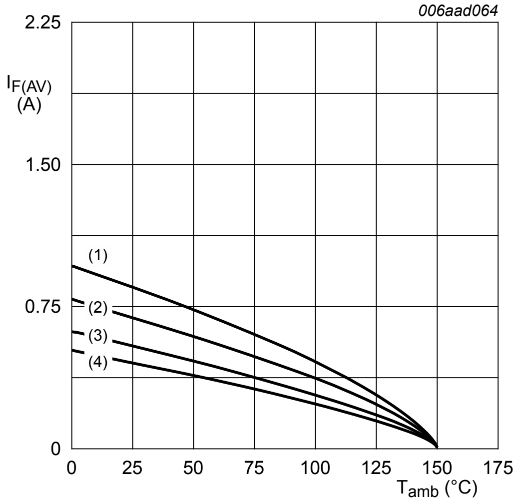
(1) δ = 1

(2) δ = 0.9

(3) δ = 0.8

(4) δ = 0.5

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



FR4 PCB, standard footprint

T_j = 150 °C

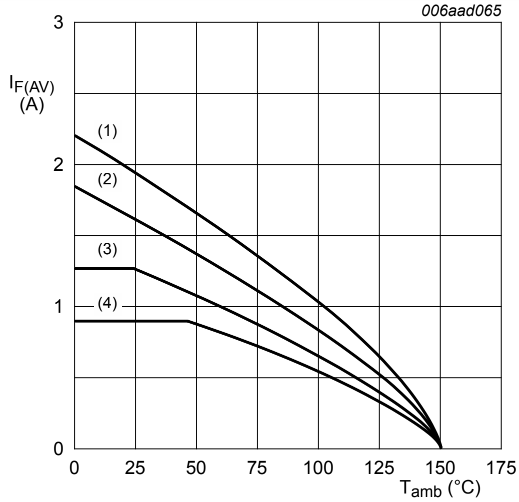
(1) δ = 1 (DC)

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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



FR4 PCB, mounting pad for cathode 1 cm^2

T_j = 150 °C

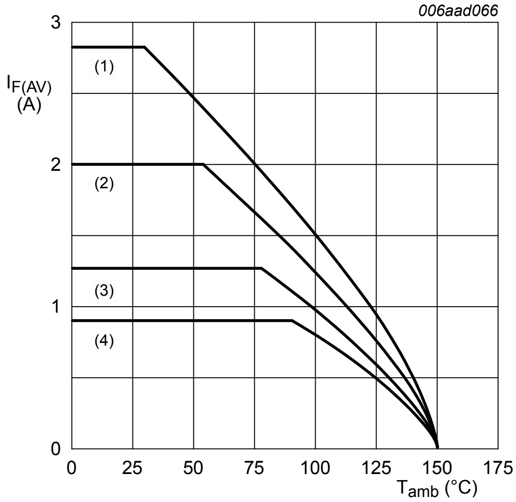
(1) δ = 1 (DC)

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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



Ceramic PCB, Al_2O_3, standard footprint

T_j = 150 °C

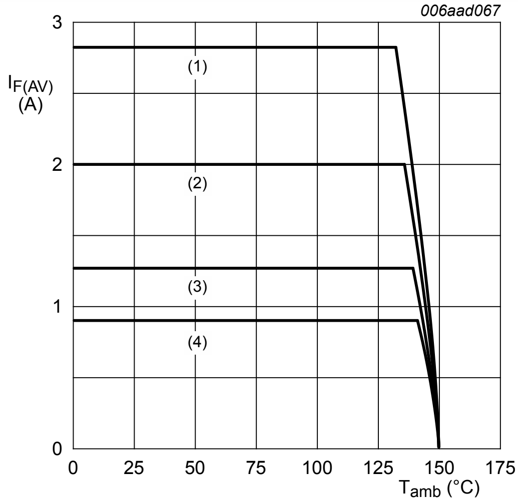
(1) δ = 1 (DC)

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

Fig. 12. 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. 13. Average forward current as a function of solder point temperature; typical values

11. Test information

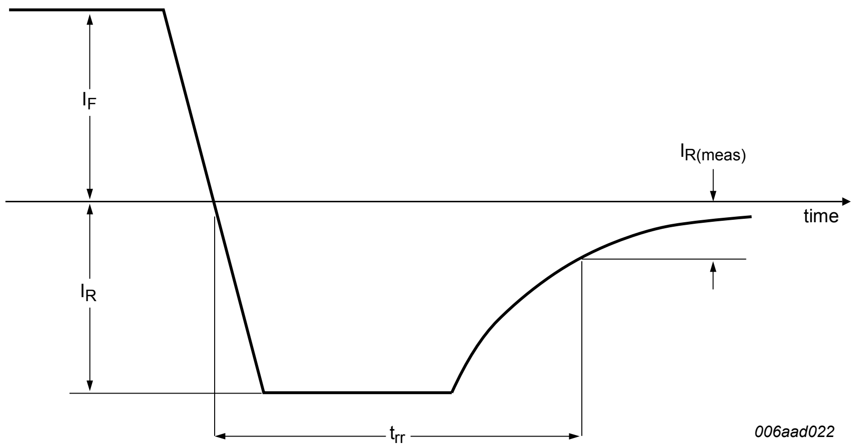


Fig. 14. Reverse recovery definition

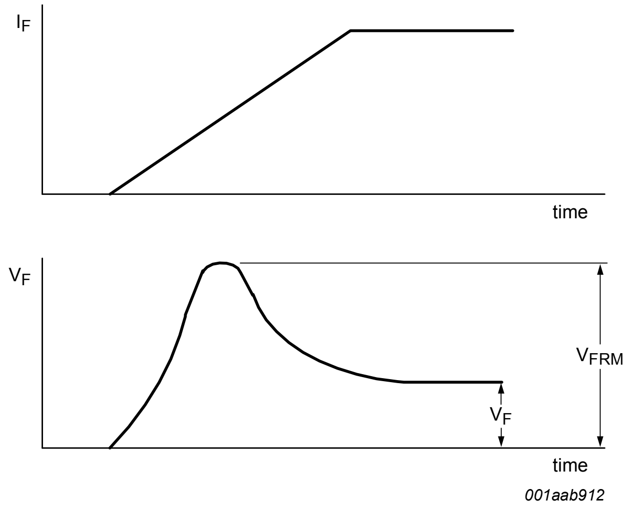


Fig. 15. Forward recovery definition

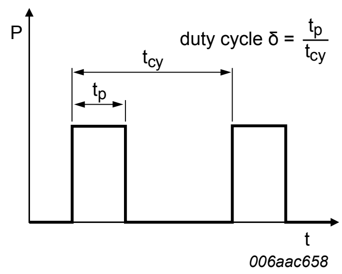


Fig. 16. Duty cycle definition

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.

12. Package outline

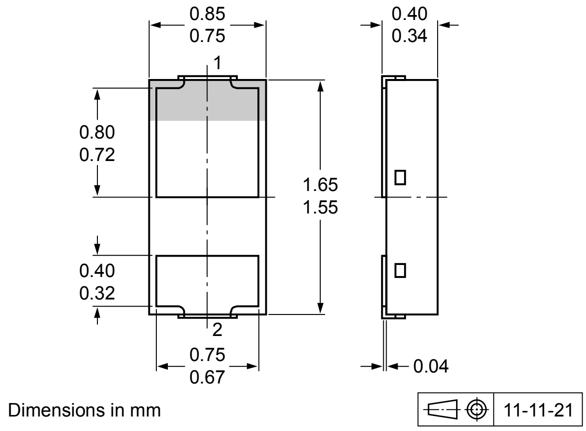


Fig. 17. Package outline DFN1608D-2 (SOD1608)

13. Soldering

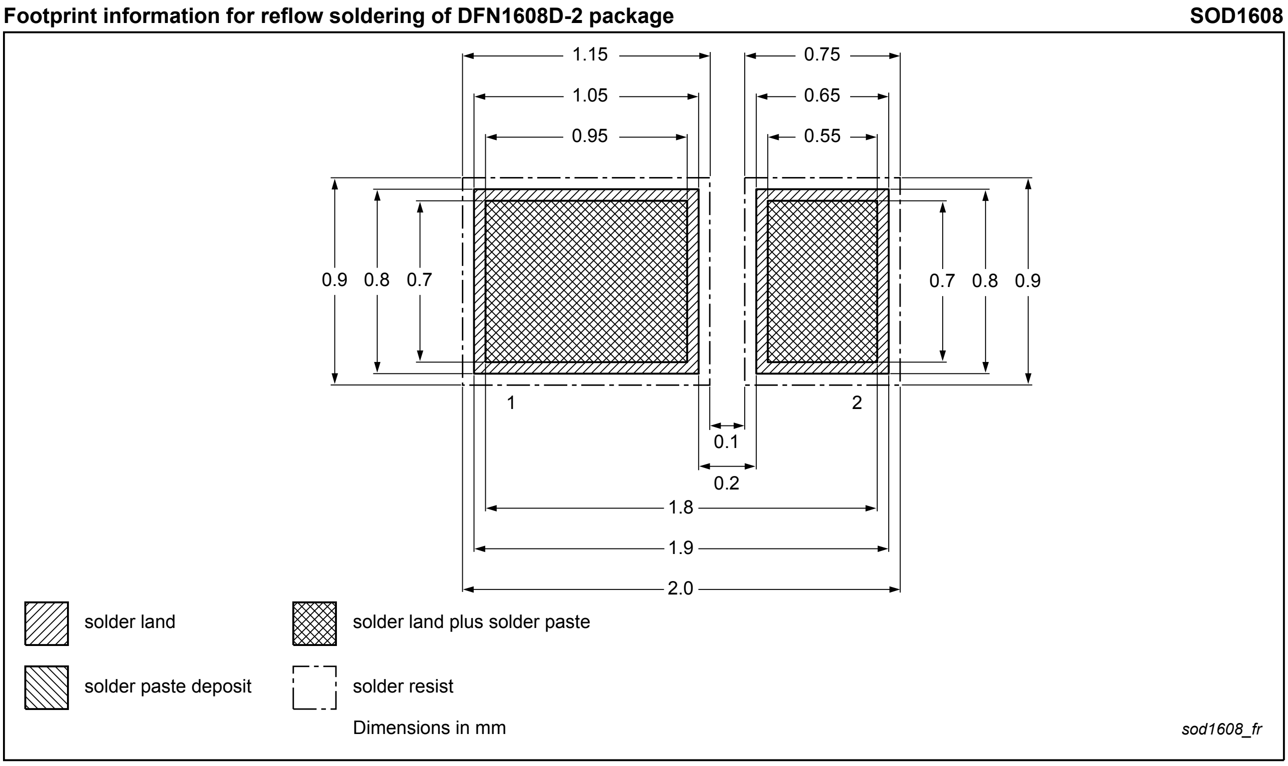


Fig. 18. Reflow soldering footprint for DFN1608D-2 (SOD1608)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4020EPK v.2	20140211	Product data sheet	-	PMEG4020EPK v.1
Modifications:	• Marking code corrected			
PMEG4020EPK v.1	20120425	Product data sheet	-	-

15. Legal information

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

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