



PMEG2020EPK

20 V, 2 A low VF MEGA Schottky barrier rectifier

Rev. 1 — 25 April 2012

Product data sheet

1. Product profile

1.1 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.

1.2 Features and benefits

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 20$ V
- Low forward voltage $V_F \leq 450$ mV
- Low reverse current
- AEC-Q101 qualified
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package

1.3 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

1.4 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; [1] square wave	-	-	2	A
		$\delta < 0.5$; $f = 20$ kHz; $T_{sp} \leq 130$ °C; square wave	-	-	2	A
V_R	reverse voltage	$T_j = 25$ °C	-	-	20	V
V_F	forward voltage	$I_F = 2$ A; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C	-	395	450	mV
I_R	reverse current	$V_R = 10$ V; $T_j = 25$ °C	-	70	350	μ A



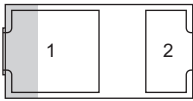

Table 1. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_R = 0.5\text{ A}$; $I_F = 0.5\text{ A}$; $I_{R(\text{meas})} = 0.1\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$	-	5	-	ns

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

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode ^[1]	 <p>Transparent top view DFN1608D-2 (SOD1608)</p>	 <i>sym001</i>
2	A	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

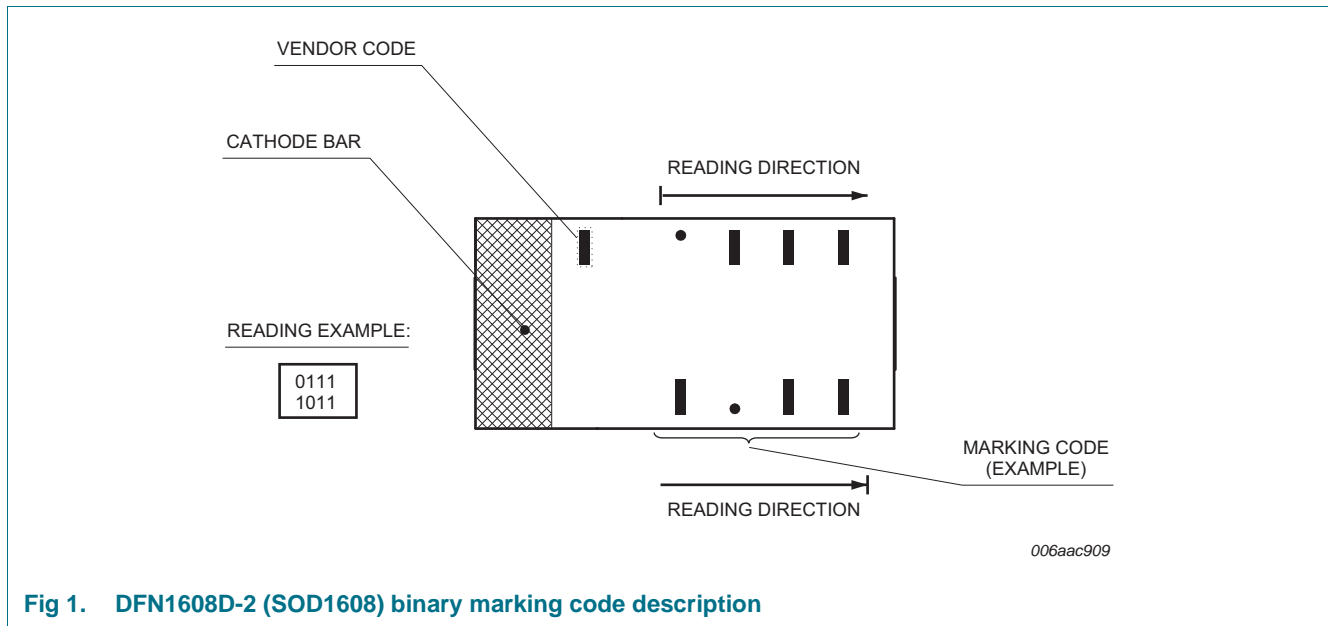
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG2020EPK	DFN1608D-2	Leadless ultra small plastic package; 2 terminals	SOD1608

4. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2020EPK	1100 0000



5. 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	$T_j = 25\text{ °C}$	-	20	V
I_F	forward current	$T_{sp} \leq 125\text{ °C}$	-	2.83	A
$I_{F(AV)}$	average forward current	$\delta < 0.5$; $f = 20\text{ kHz}$; square wave; $T_{amb} \leq 65\text{ °C}$	[1]	2	A
		$\delta < 0.5$; $f = 20\text{ kHz}$; square wave; $T_{sp} \leq 130\text{ °C}$	-	2	A
I_{FRM}	repetitive peak forward current	$t_p = 1\text{ ms}$; $\delta = 0.25$	-	4	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8\text{ ms}$; $T_{j(Init)} = 25\text{ °C}$; square wave	-	5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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 cm².

6. 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

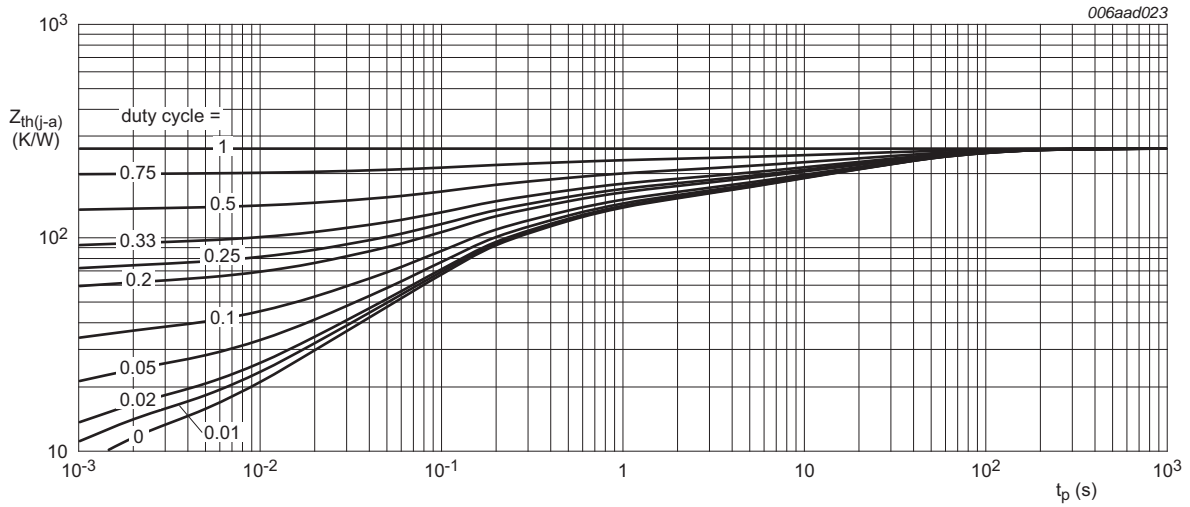
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

[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 cm².

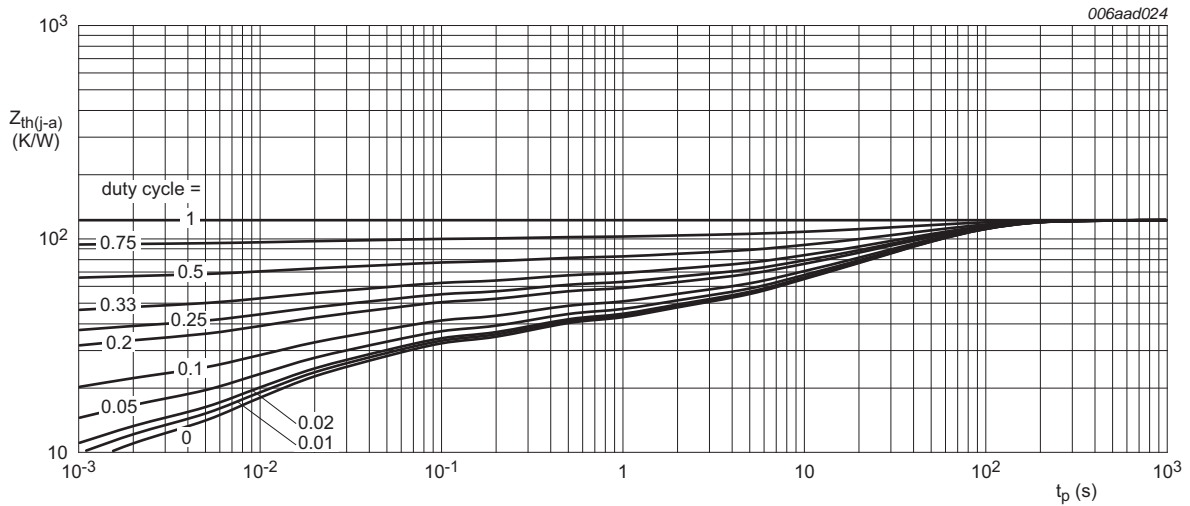
[4] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.

[5] Soldering point of cathode tab.



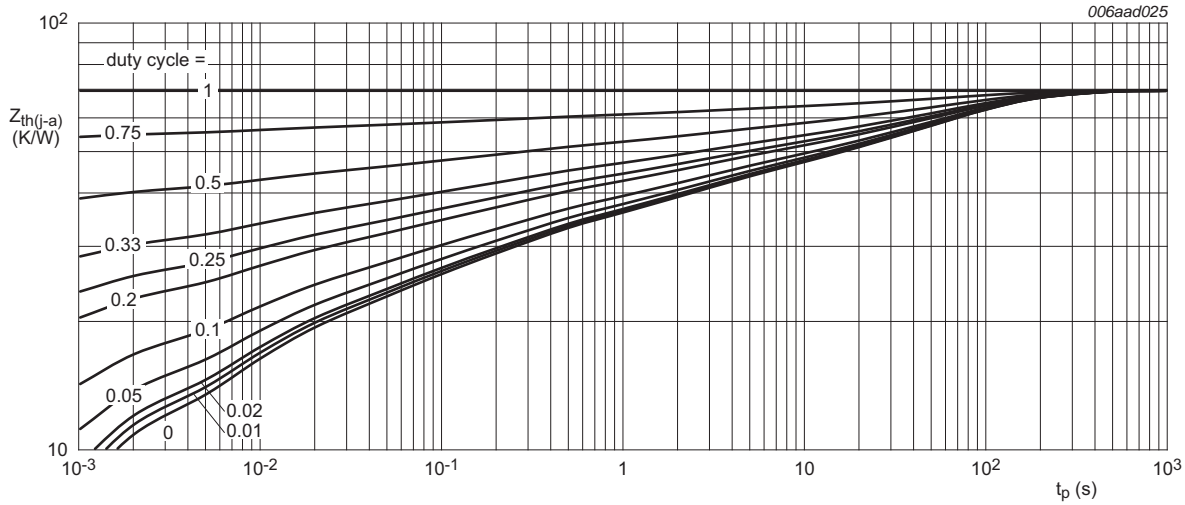
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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



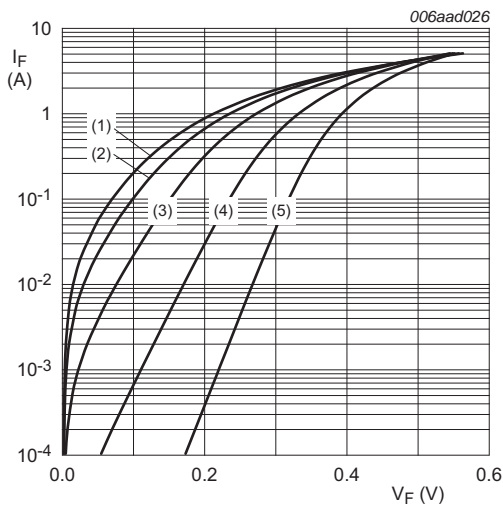
Ceramic PCB, Al₂O₃, standard footprint

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

7. Characteristics

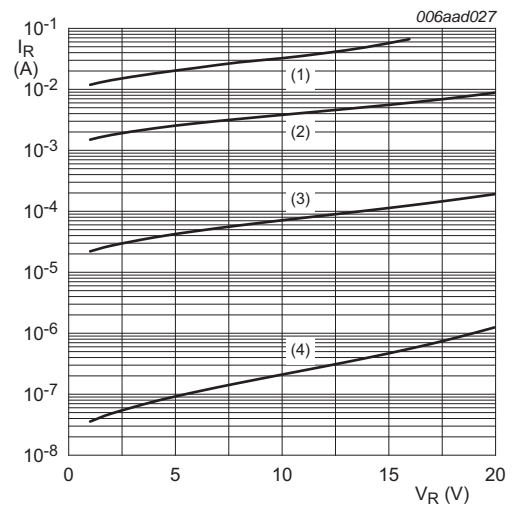
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _F	forward voltage	I _F = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 25 °C	-	230	260	mV
		I _F = 500 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 25 °C	-	290	330	mV
		I _F = 1 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 25 °C	-	330	380	mV
		I _F = 2 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 25 °C	-	395	450	mV
I _R	reverse current	V _R = 10 V; T _j = 25 °C	-	70	350	μA
		V _R = 20 V; T _j = 25 °C	-	220	900	μA
C _d	diode capacitance	V _R = 1 V; f = 1 MHz; T _j = 25 °C	-	105	120	pF
		V _R = 10 V; f = 1 MHz; T _j = 25 °C	-	40	50	pF
Dynamic characteristics						
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	-	5	-	ns
V _{FRM}	peak forward recovery voltage	I _F = 0.5 A; dI _F /dt = 20 A/μs; T _j = 25 °C	-	320	-	mV



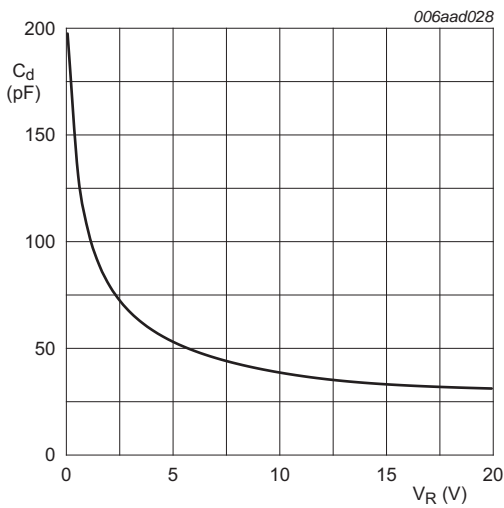
- (1) $T_j = 150\text{ }^\circ\text{C}$
- (2) $T_j = 125\text{ }^\circ\text{C}$
- (3) $T_j = 85\text{ }^\circ\text{C}$
- (4) $T_j = 25\text{ }^\circ\text{C}$
- (5) $T_j = -40\text{ }^\circ\text{C}$

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



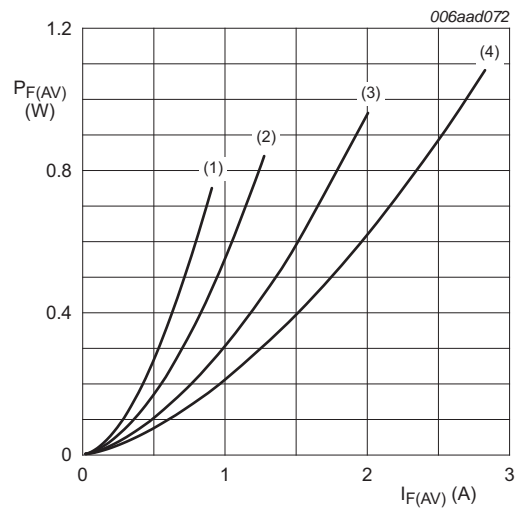
- (1) $T_j = 125\text{ }^\circ\text{C}$
- (2) $T_j = 85\text{ }^\circ\text{C}$
- (3) $T_j = 25\text{ }^\circ\text{C}$
- (4) $T_j = -40\text{ }^\circ\text{C}$

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



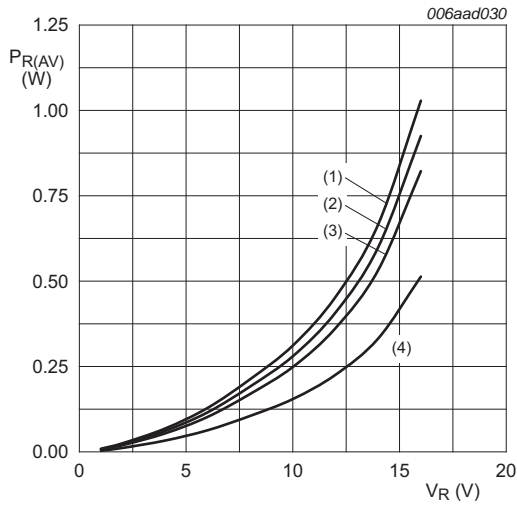
$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

Fig 7. Diode capacitance as a function of reverse voltage; typical values



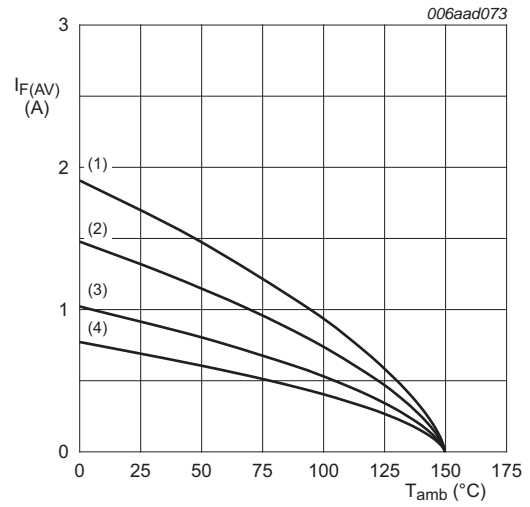
- $T_j = 150\text{ }^\circ\text{C}$
- (1) $\delta = 0.1$
- (2) $\delta = 0.2$
- (3) $\delta = 0.5$
- (4) $\delta = 1$

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



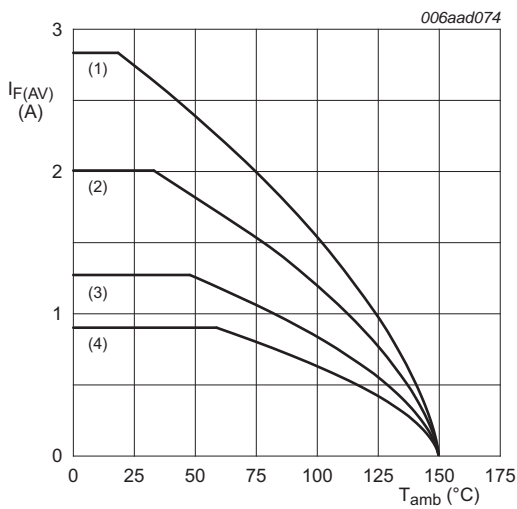
$T_j = 125\text{ °C}$
 (1) $\delta = 1$
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$

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



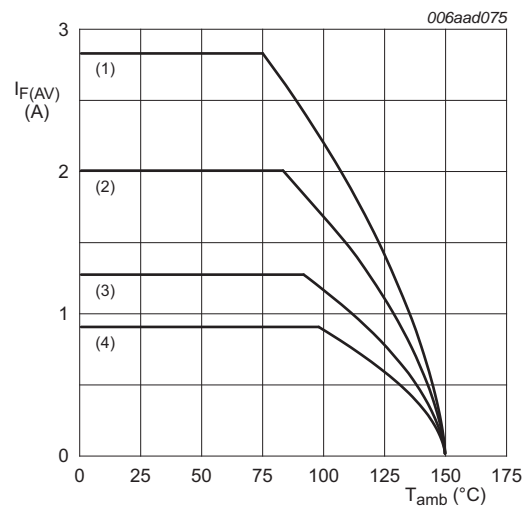
FR4 PCB, standard footprint
 $T_j = 150\text{ °C}$
 (1) $\delta = 1$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



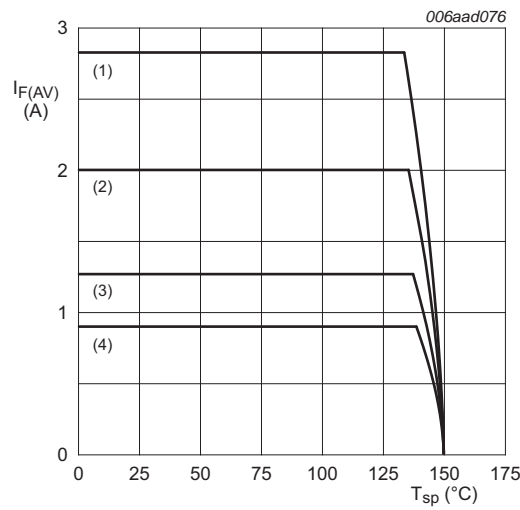
FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 150\text{ °C}$
 (1) $\delta = 1$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



Ceramic PCB, Al_2O_3 , standard footprint
 $T_j = 150\text{ °C}$
 (1) $\delta = 1$ (DC)
 (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 12. Average forward current as a function of ambient temperature; typical values



$T_j = 150\text{ °C}$

(1) $\delta = 1$ (DC)

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

8. Test information

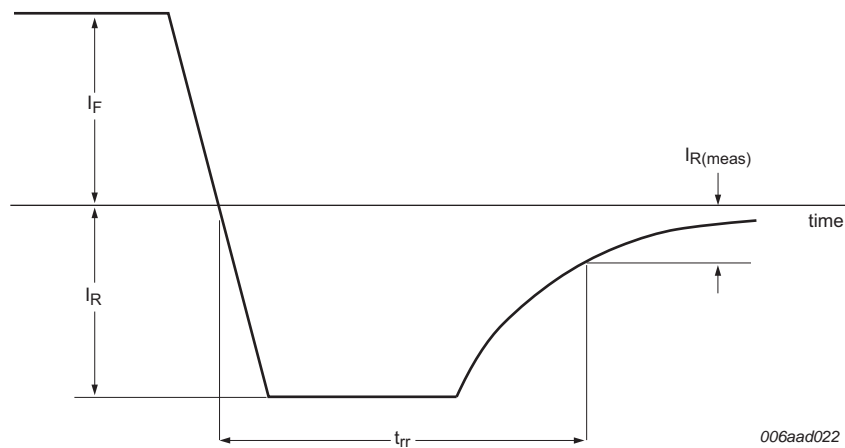


Fig 14. Reverse recovery definition

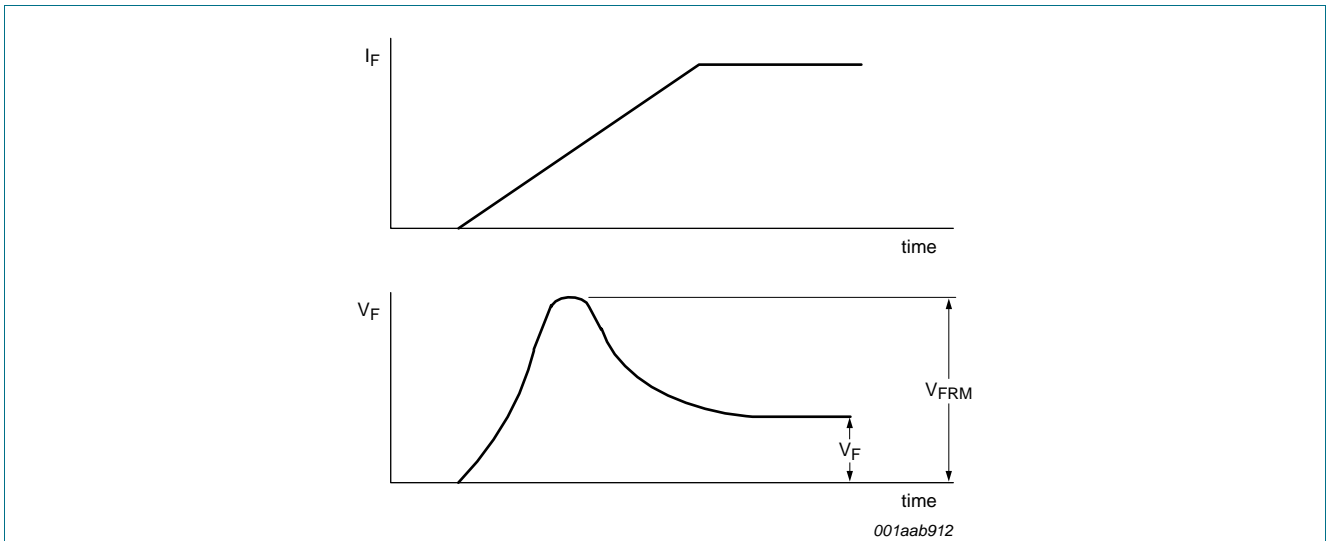


Fig 15. Forward recovery definition

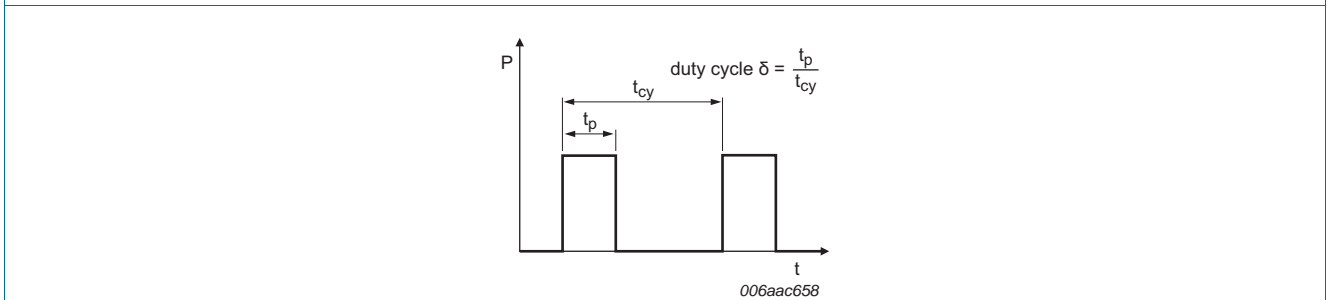


Fig 16. Duty cycle definition

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.

8.1 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.

9. Package outline

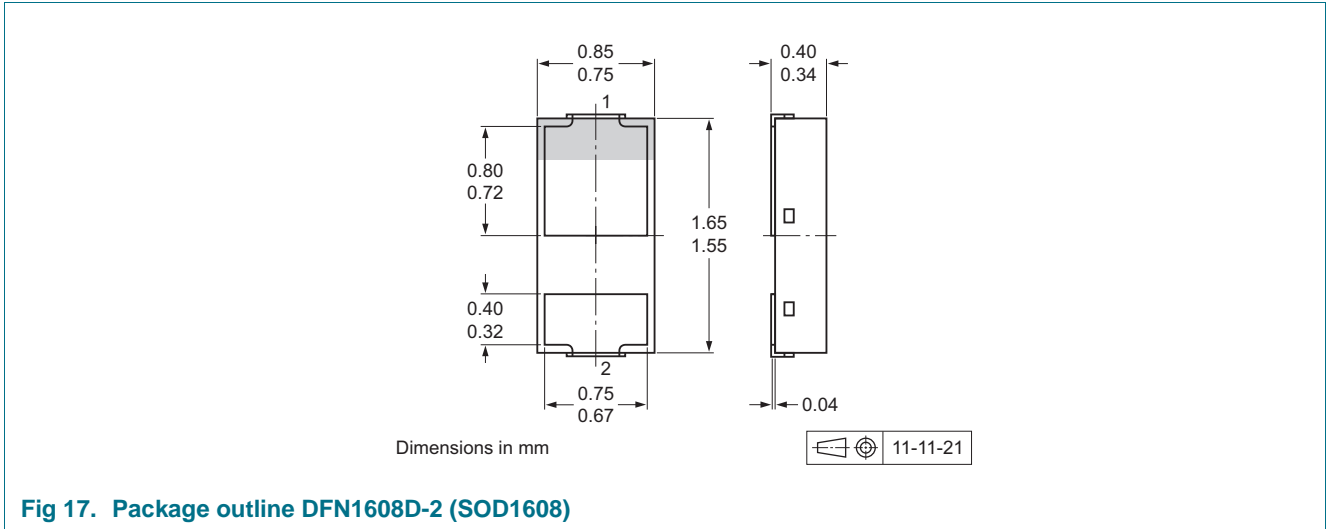


Fig 17. Package outline DFN1608D-2 (SOD1608)

10. Soldering

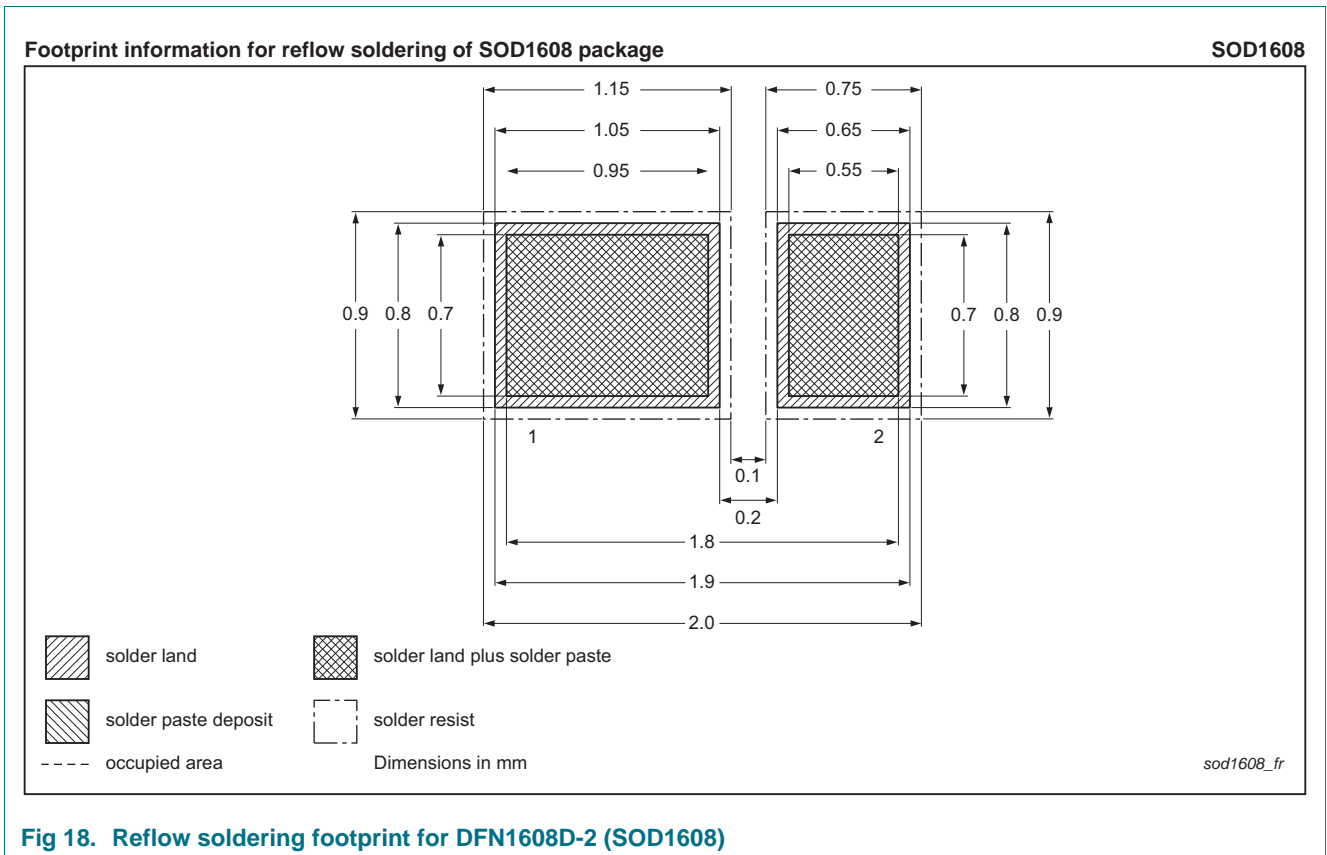


Fig 18. Reflow soldering footprint for DFN1608D-2 (SOD1608)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2020EPK v.1	20120425	Product data sheet	-	-

12. Legal information

12.1 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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