PMEG6020AELP

60 V, 2 A low leakage current Schottky barrier rectifier

8 May 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 a SOD128 small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Extremely low leakage current I_R = 235 nA
- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 60$ V
- Low forward voltage V_F = 600 mV
- High power capability due to clip-bonding technology
- High temperature $T_j \leq 175$ °C
- Small and flat lead SMD plastic package
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- 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; $T_{sp} \leq 165$ °C; square wave		-	-	2	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	60	V
V_F	forward voltage	$I_F = 2$ A; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C		-	600	670	mV
I_R	reverse current	$V_R = 60$ V; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C		-	235	700	nA

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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 SOD128	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG6020AELP	SOD128	plastic surface-mounted package; 2 leads	SOD128

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG6020AELP	DL

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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		-	60	V
I_F	forward current	T_{sp} = 160 °C; δ = 1		-	2.83	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; T_{amb} ≤ 110 °C; square wave	[1]	-	2	A
		δ = 0.5; f = 20 kHz; T_{sp} ≤ 165 °C; square wave		-	2	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	50	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	750	mW
			[3]	-	1250	mW
			[1]	-	2500	mW
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	storage temperature			-65	175	°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]	-	-	200	K/W
			[1][3]	-	-	120	K/W
			[1][4]	-	-	60	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 cm^2.
[4] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[5] Soldering point of cathode tab.

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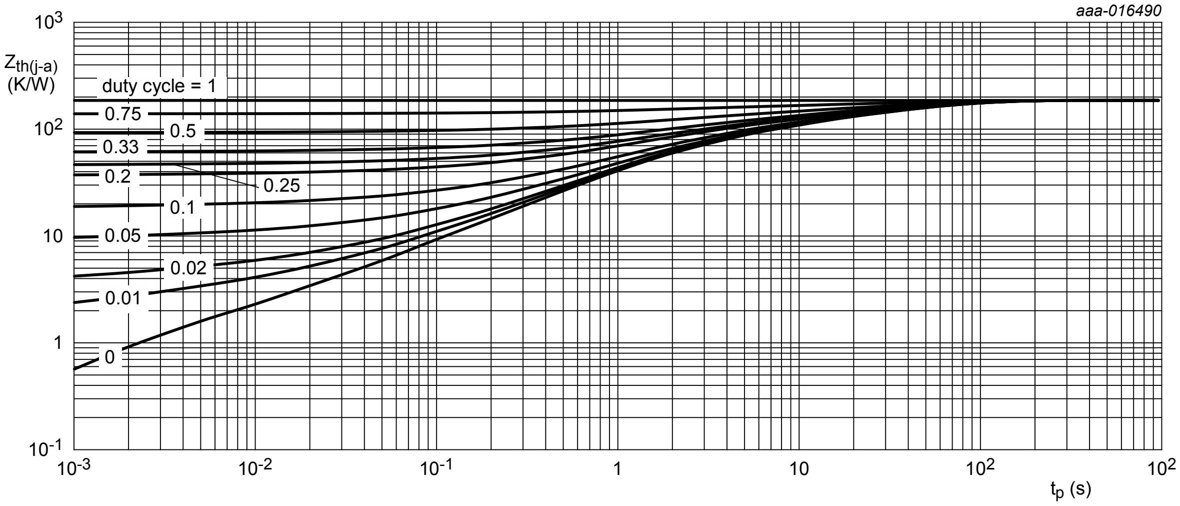
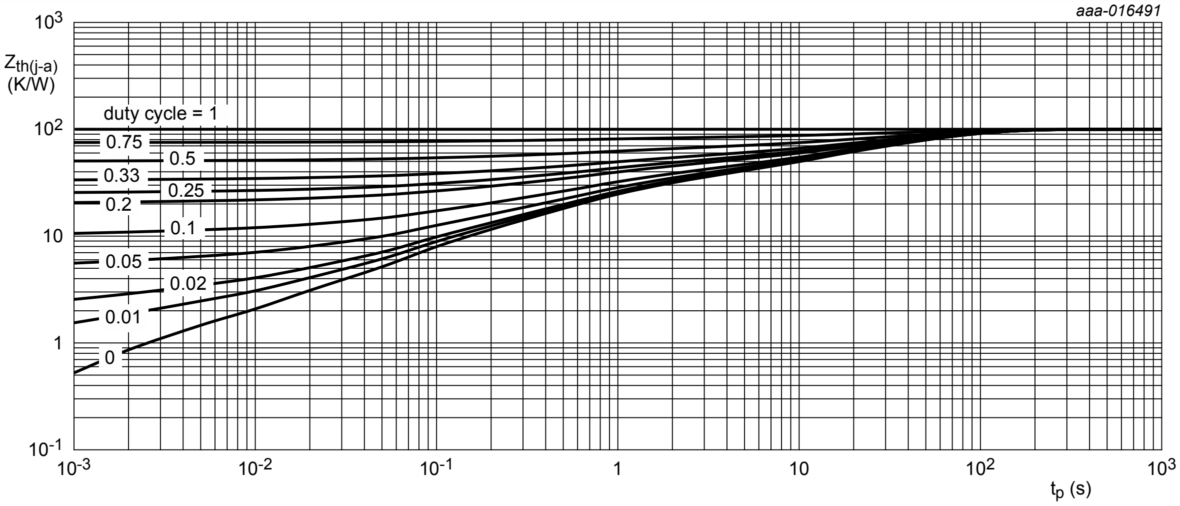


FR4 PCB, standard footprint

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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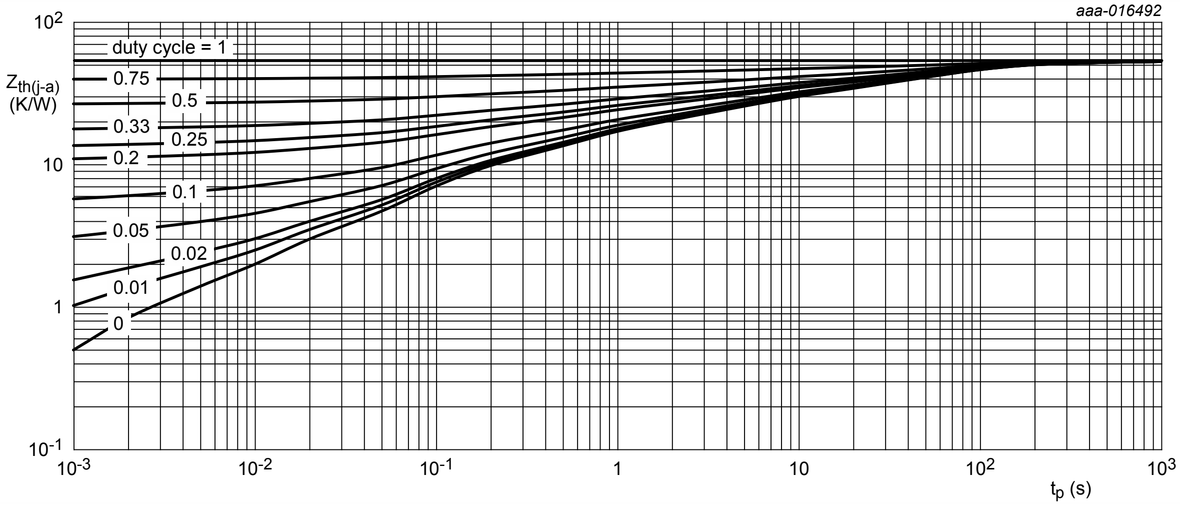

Ceramic PCB, Al_2O_3, standard footprint

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_j = 25 °C; t_p = 300 μs; δ = 0.02		60	-	-	V
V_F	forward voltage	I_F = 0.1 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	450	510	mV
		I_F = 0.5 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	510	570	mV
		I_F = 0.7 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	525	590	mV
		I_F = 1 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	545	610	mV
		I_F = 1.6 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	580	650	mV
		I_F = 2 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	600	670	mV
		I_F = 2 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 125 °C		-	510	630	mV
I_R	reverse current	V_R = 10 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	15	-	nA
		V_R = 40 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	50	-	nA
		V_R = 60 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	235	700	nA
		V_R = 60 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 125 °C		-	285	1400	μA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	220	-	pF
		V_R = 4 V; f = 1 MHz; T_j = 25 °C		-	135	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	88	-	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		-	9	-	ns
V_{FRM}	peak forward recovery voltage	I_F = 0.5 A; T_j = 25 °C; dI_F/dt = 20 A/μs		-	565	-	mV

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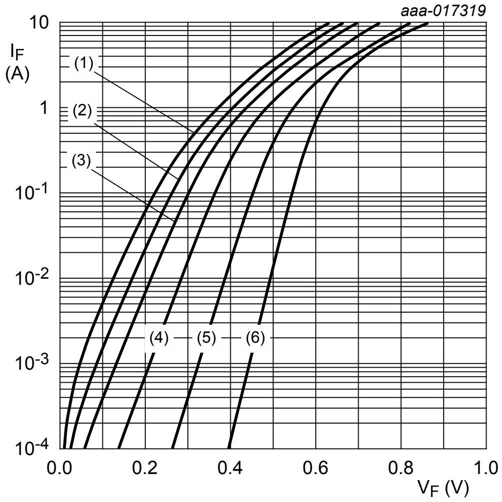
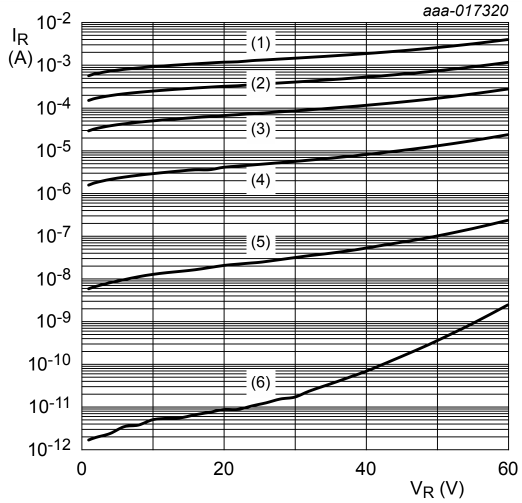


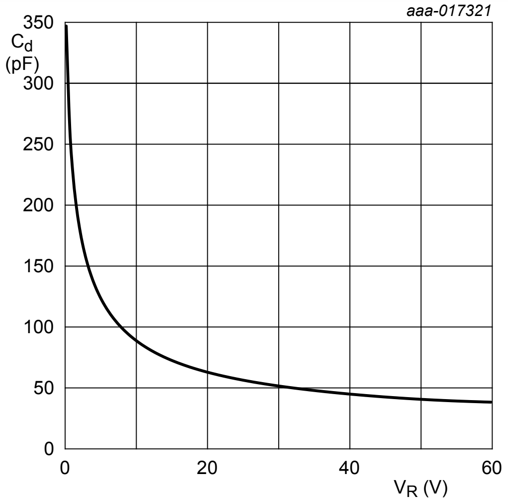
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = −40 °C

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



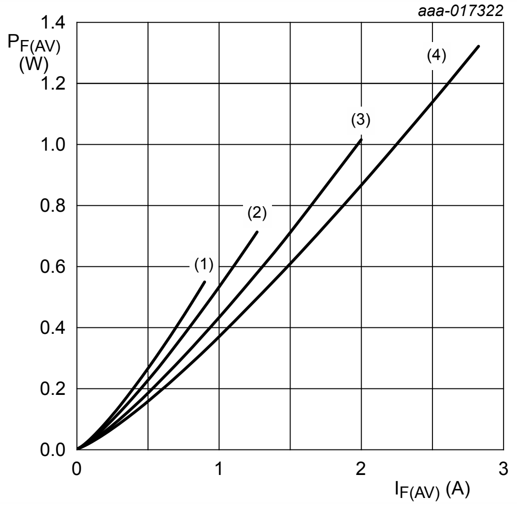
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = −40 °C

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



f = 1 MHz; T_{amb} = 25 °C

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



T_j = 175 °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

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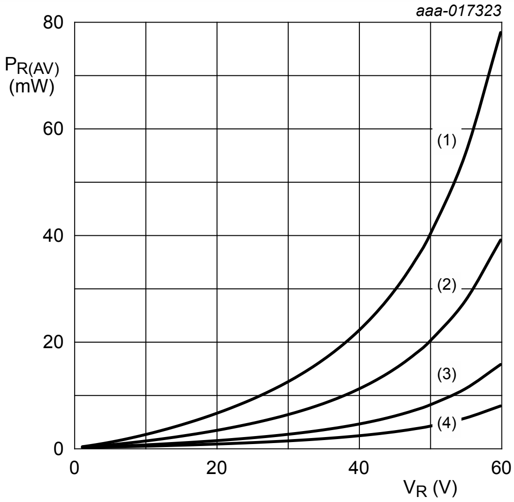
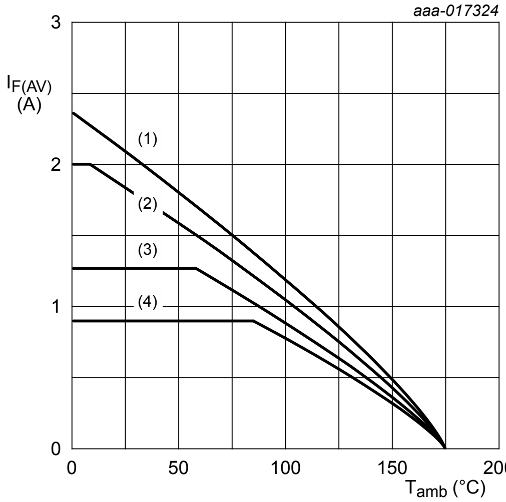


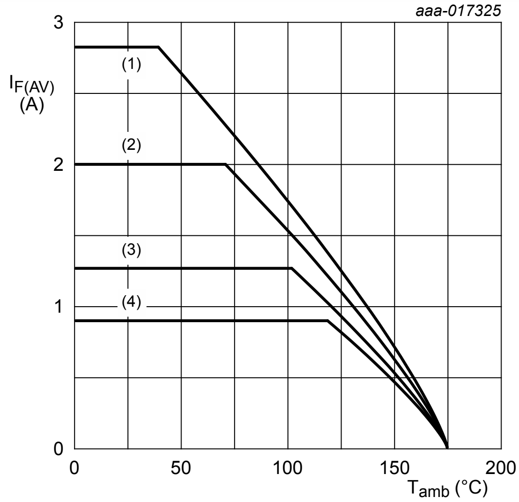
T_j = 150 °C
(1) δ = 1 (DC)
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



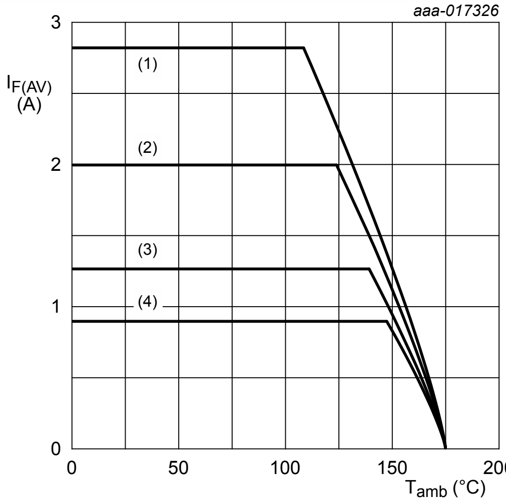
FR4 PCB, standard footprint
T_j = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



FR4 PCB, mounting pad for cathode 1 cm^2
T_j = 175 °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 = 175 °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

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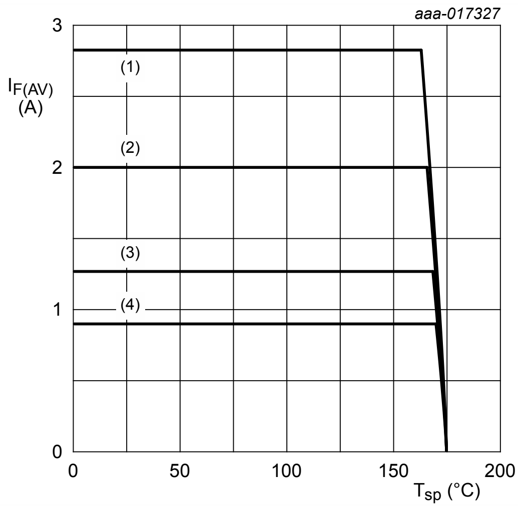

T_j = 175 °C

(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

11. Test information

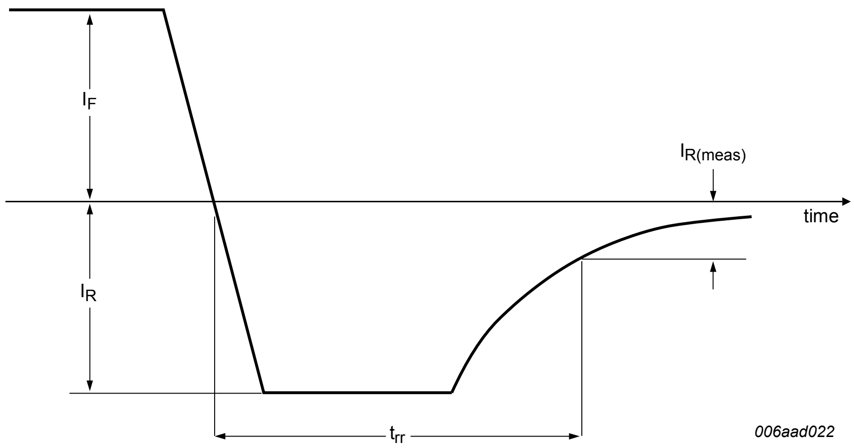

Fig. 13. Reverse recovery definition

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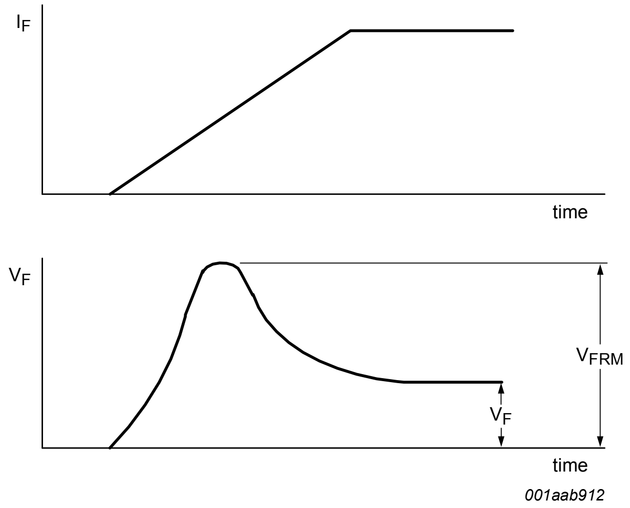

Fig. 14. Forward recovery definition

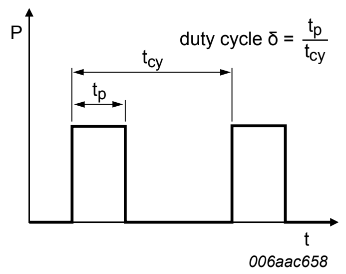

Fig. 15. Duty cycle definition

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.

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

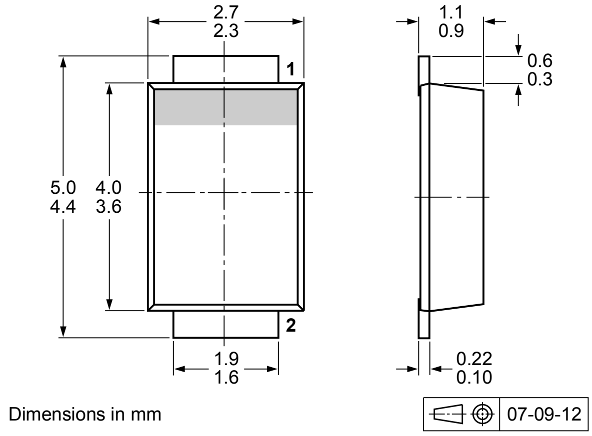

Fig. 16. Package outline SOD128

13. Soldering

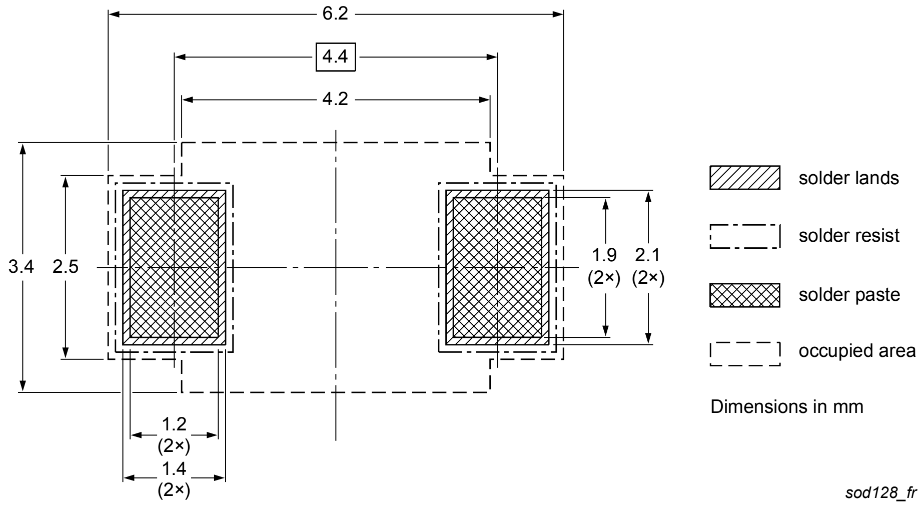

Fig. 17. Reflow soldering footprint for SOD128

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG6020AELP v.1	20150508	Product data sheet	-	-

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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.

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