PMEG10010ELR

100 V, 1 A low leakage current Schottky barrier rectifier

7 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 SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 1$ A
- Reverse voltage: $V_R \leq 100$ V
- Low forward voltage: $V_F = 710$ mV
- High power capability due to clip-bonding technology
- Extremely low leakage current $I_R = 40$ nA
- High temperature $T_j \leq 175$ °C
- 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

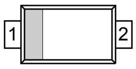
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; $T_{sp} \leq 170$ °C; square wave		-	-	1	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	100	V
V_F	forward voltage	$I_F = 1$ A; $t_p \leq 300$ μs; δ ≤ 0.02; $T_j = 25$ °C		-	710	770	mV
I_R	reverse current	$V_R = 100$ V; $t_p \leq 300$ μs; δ ≤ 0.02; $T_j = 25$ °C		-	40	150	nA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 SOD123W	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG10010ELR	SOD123W	plastic surface mounted package; 2 leads	SOD123W

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG10010ELR	K7

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		-	100	V
I_F	forward current	T_{sp} = 165 °C; δ = 1		-	1.4	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; T_{amb} ≤ 135 °C; square wave	[1]	-	1	A
		δ = 0.5; f = 20 kHz; T_{sp} ≤ 170 °C; square wave		-	1	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]	-	680	mW
			[3]	-	1150	mW
			[1]	-	2140	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]	-	-	220	K/W
			[1][3]	-	-	130	K/W
			[1][4]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	-	18	K/W

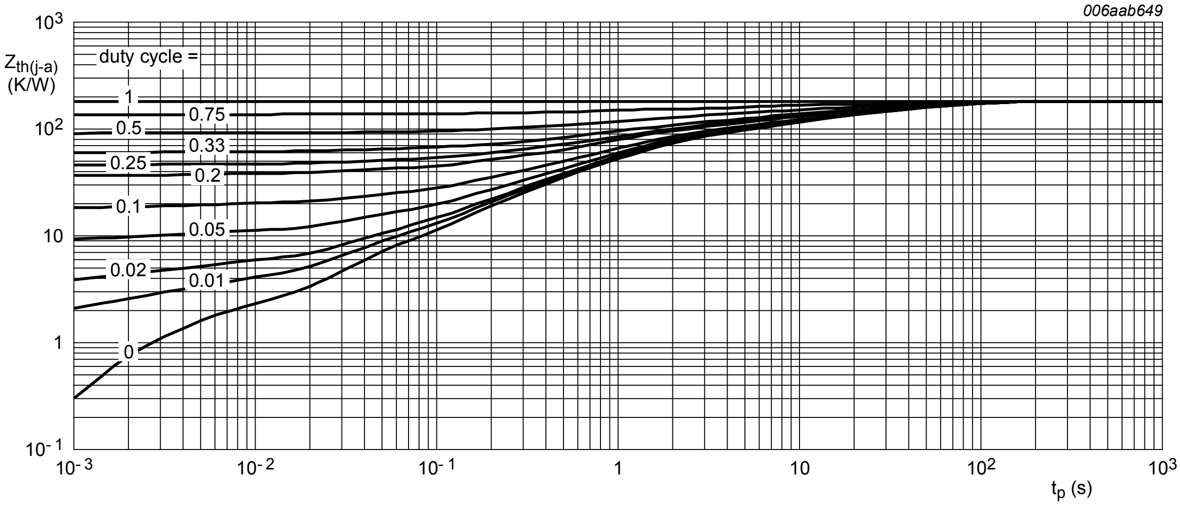
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

[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.

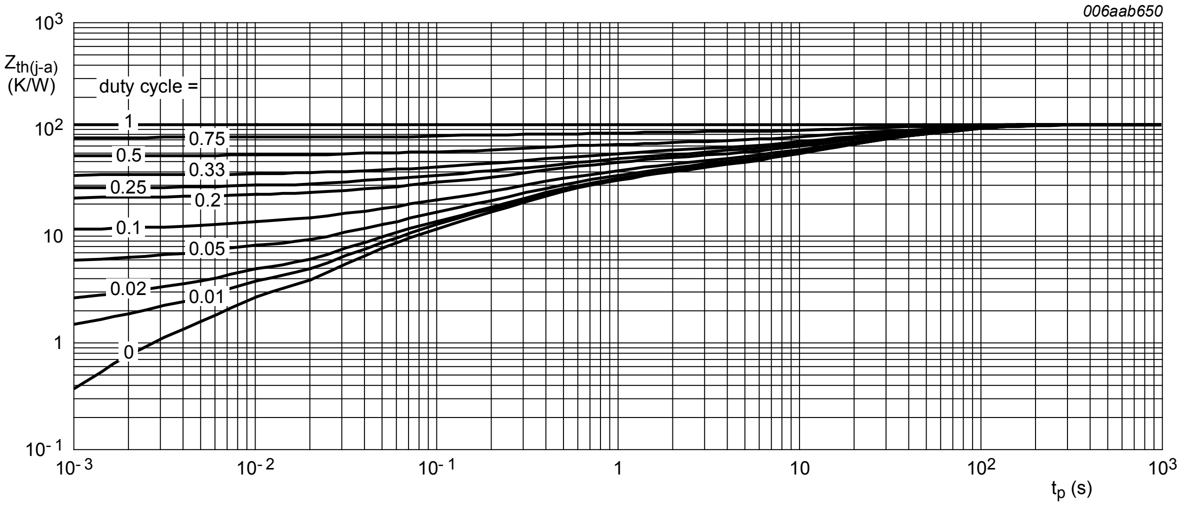
[4] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

[5] Soldering point of cathode tab.



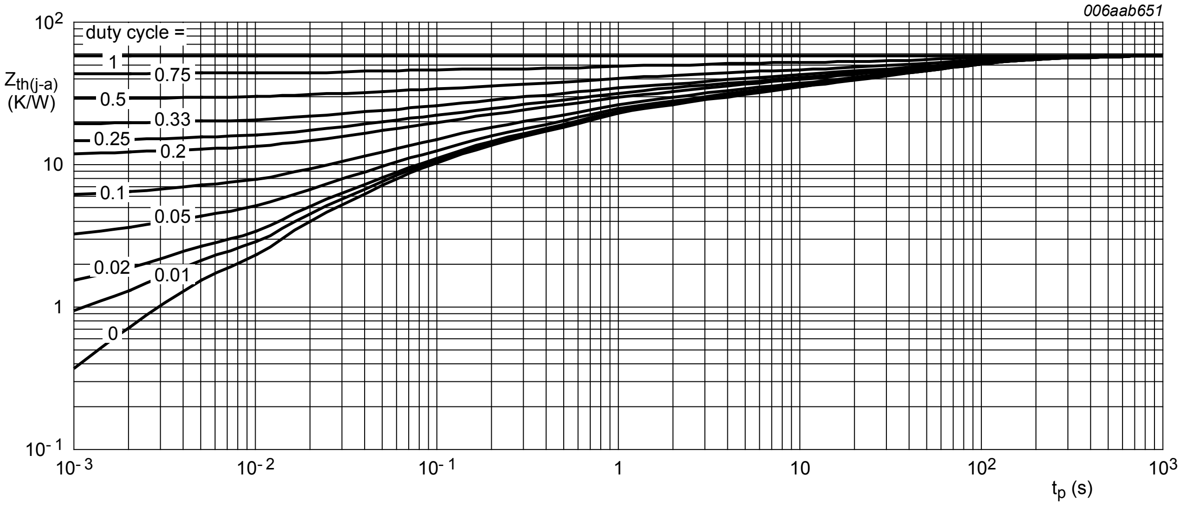
FR4 PCB, standard footprint

Fig. 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



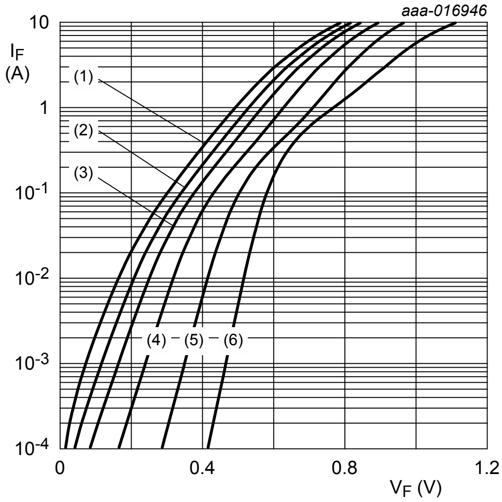
Ceramic PCB, Al_2O_3, standard footprint

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

10. Characteristics

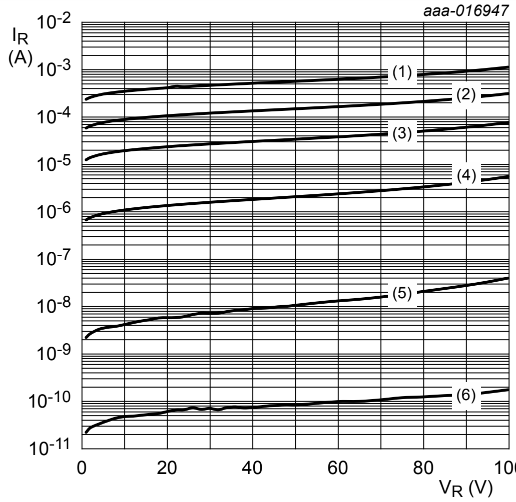
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	I_R = 1 mA; T_j = 25 °C; t_p = 300 μs; δ = 0.02		100	-	-	V
V_F	forward voltage	I_F = 0.1 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	505	565	mV
		I_F = 0.5 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	640	710	mV
		I_F = 0.7 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	675	740	mV
		I_F = 1 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	710	770	mV
		I_F = 1 A; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 125 °C		-	575	680	mV
I_R	reverse current	V_R = 10 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	4	-	nA
		V_R = 60 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	12	-	nA
		V_R = 100 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 25 °C		-	40	150	nA
		V_R = 100 V; t_p ≤ 300 μs; δ ≤ 0.02; T_j = 125 °C		-	70	500	μA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	70	-	pF
		V_R = 4 V; f = 1 MHz; T_j = 25 °C		-	42	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	28	-	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		-	3.7	-	ns
V_{FRM}	peak forward recovery voltage	I_F = 0.5 A; dI_F/dt = 20 A/μs; T_j = 25 °C		-	690	-	V



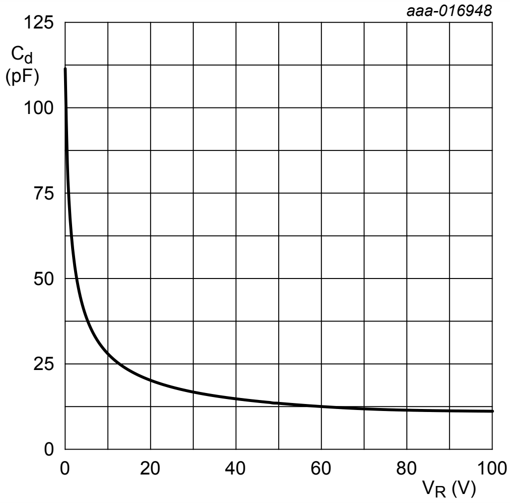
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = −40 °C

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



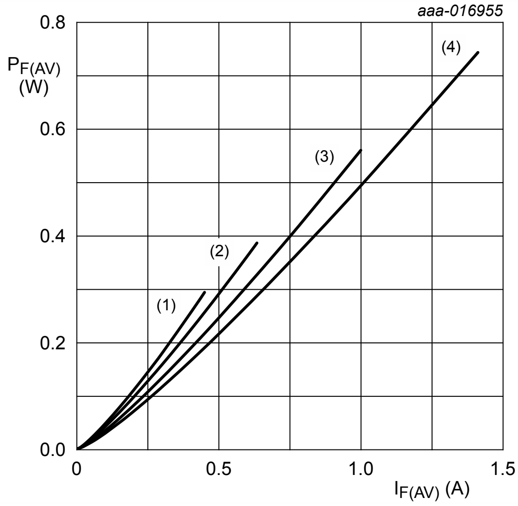
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = −40 °C

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



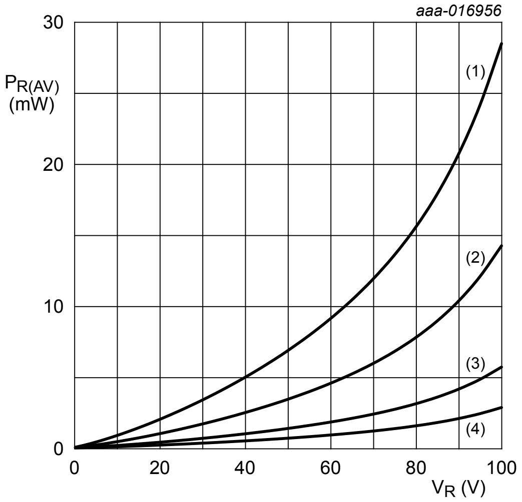
f = 1 MHz; T_{amb} = 25 °C

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



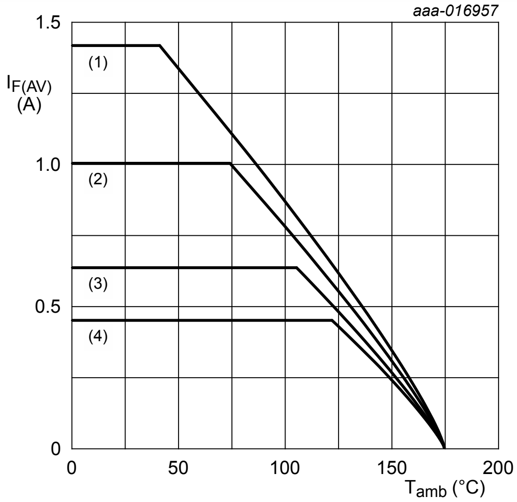
T_j = 175 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 1

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



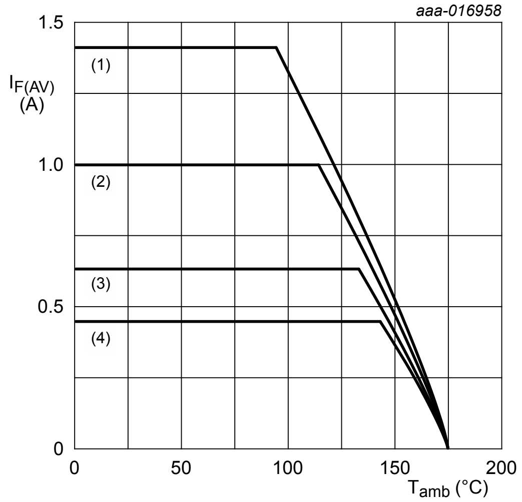
T_j = 150 °C
(1) δ = 1 (DC)
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



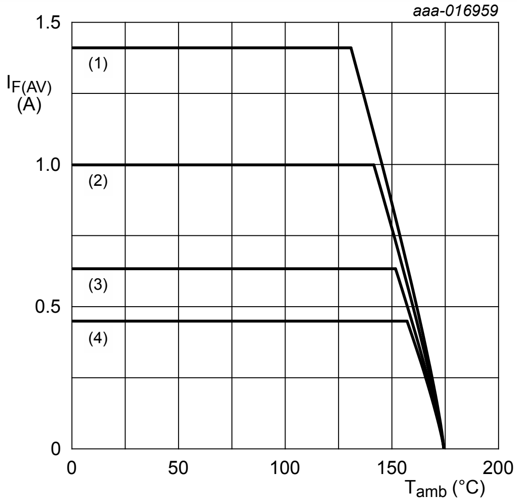
FR4 PCB, standard footprint
T_j = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



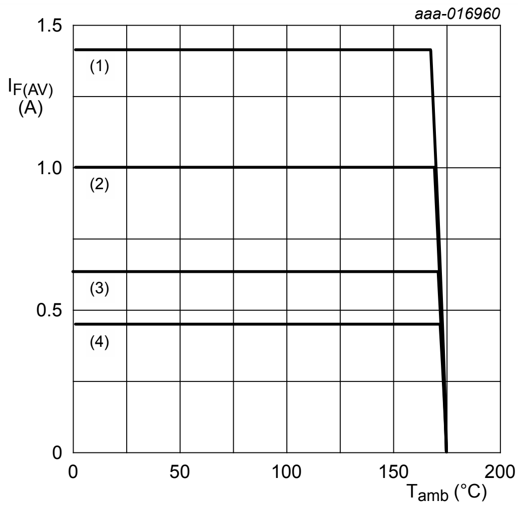
FR4 PCB, mounting pad for cathode 1 cm^2
T_j = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



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

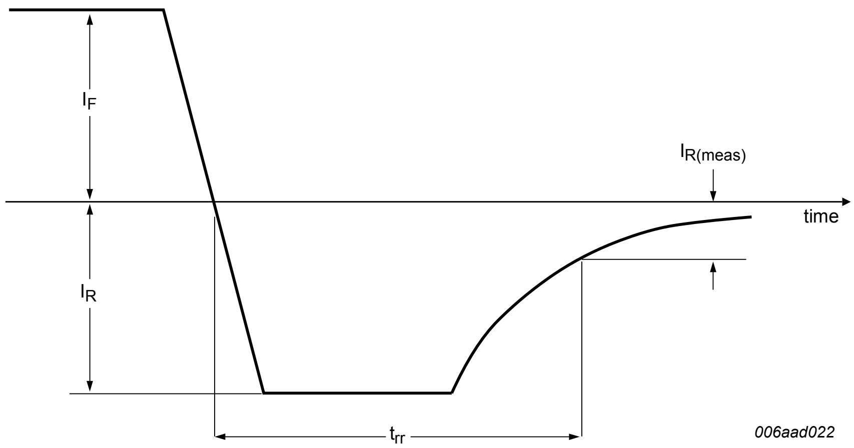


Fig. 13. Reverse recovery definition

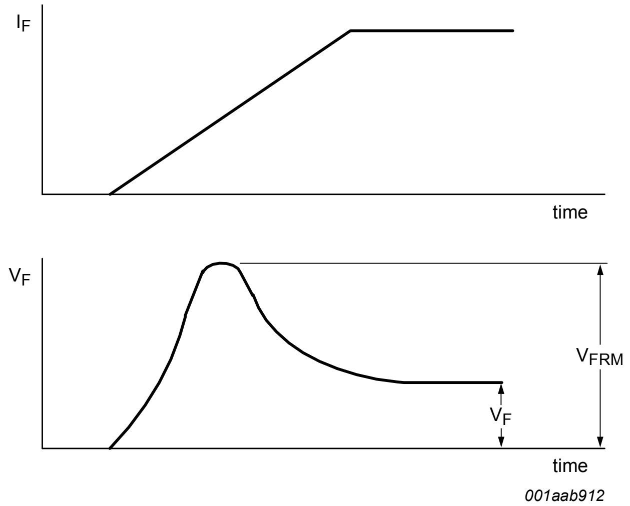


Fig. 14. Forward recovery definition

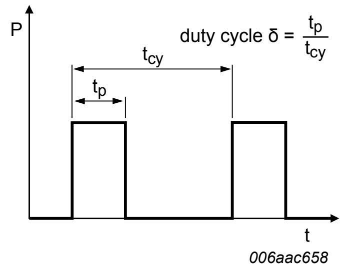


Fig. 15. Duty cycle definition

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.

12. Package outline

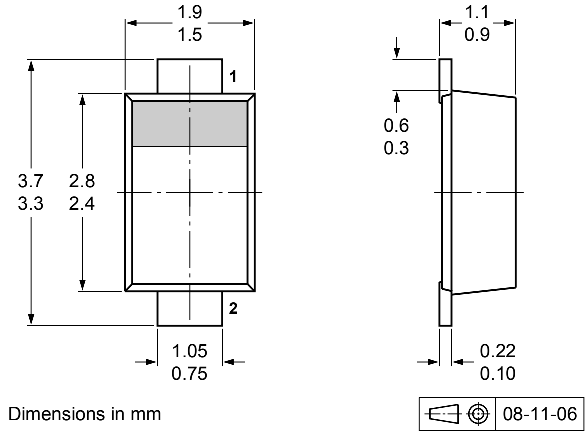


Fig. 16. Package outline SOD123W

13. Soldering

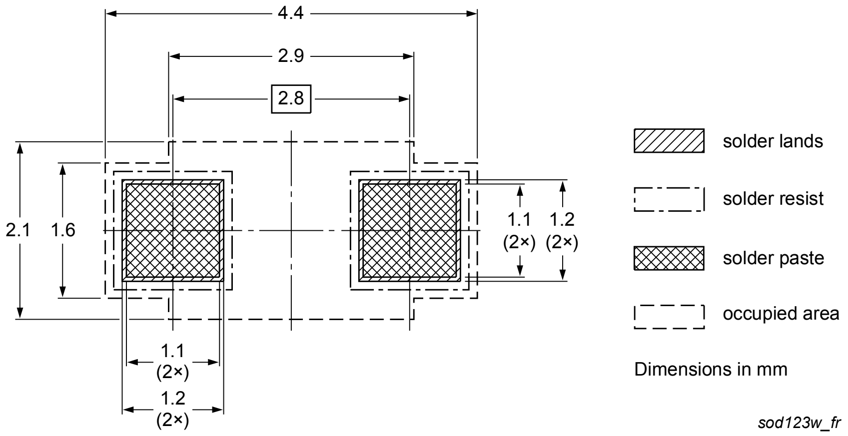


Fig. 17. Reflow soldering footprint for SOD123W

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG10010ELR v.2	20150507	Product data sheet	-	PMEG10010ELR v.1
Modifications:	• Product status changed			
PMEG10010ELR v.1	20150220	Preliminary 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.

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