



PMEG4002EJ-Q

40 V, 200 mA low VF Schottky barrier rectifier

21 September 2023

Product data sheet

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD323F (SC-90) small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 0.2$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- Small and flat lead SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Ultra high-speed switching
- 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; square wave; $T_{amb} \leq 130$ °C	[1]	-	-	0.2	A
		$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 145$ °C		-	-	0.2	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	40	V
V_F	forward voltage	$I_F = 200$ mA; $T_j = 25$ °C		-	520	600	mV
I_R	reverse current	$V_R = 40$ V; $T_j = 25$ °C		-	0.7	10	μ A

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SC-90 (SOD323F)	 K  A sym001
2	A	anode		

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6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4002EJ-Q	SC-90	plastic, surface-mounted package; 2 leads; 1.7 mm x 1.25 mm x 0.7 mm body	SOD323F

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4002EJ-Q	1N

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(AV)}	average forward current	δ = 0.5; f = 20 kHz; square wave; T _{amb} ≤ 130 °C	[1]	-	0.2	A
		δ = 0.5; f = 20 kHz; square wave; T _{sp} ≤ 145 °C		-	0.2	A
I _{FRM}	repetitive peak forward current	t _p ≤ 1 ms; δ ≤ 0.25		-	2.6	A
I _{FSM}	non-repetitive peak forward current	t _p = 8 ms; square wave; T _{j(init)} = 25 °C	[2]	-	2.75	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2] [3]	-	385	mW
			[2] [4]	-	695	mW
			[1] [2]	-	1.045	W
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 PCB, Al₂O₃, standard footprint.
- [2] Reflow soldering is the only recommended soldering method.
- [3] Device mounted on an FR4 Printed-Circuit Board (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 cm².

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] [3]	-	-	325	K/W
			[1] [2] [4]	-	-	180	K/W
			[1] [2] [5]	-	-	120	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	25	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] Reflow soldering is the only recommended soldering method.
- [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 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Soldering point of cathode tab.

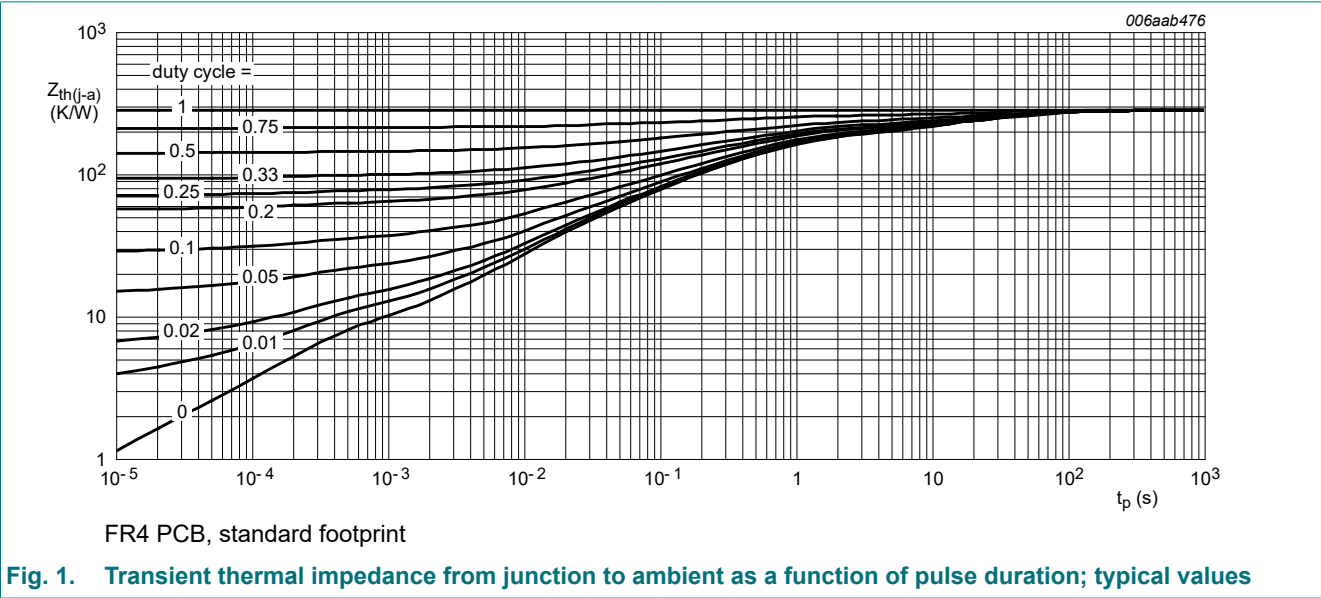


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

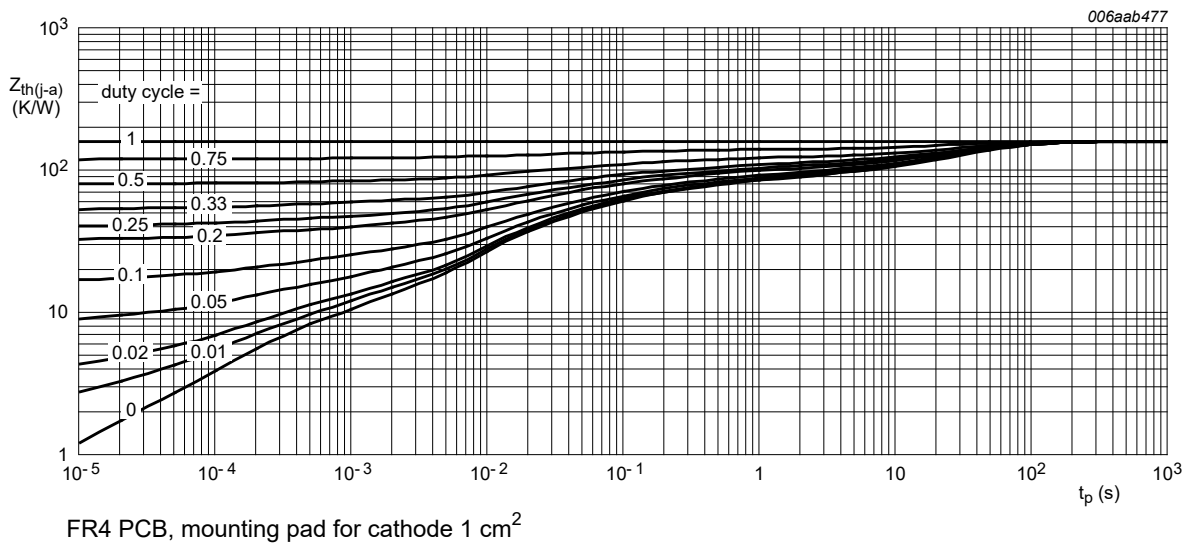


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

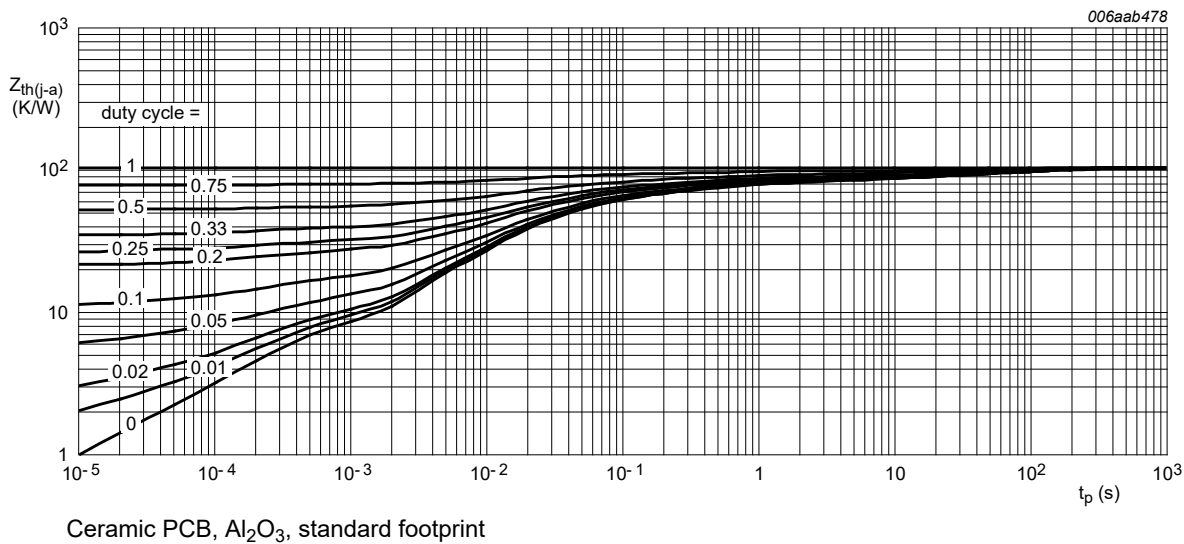


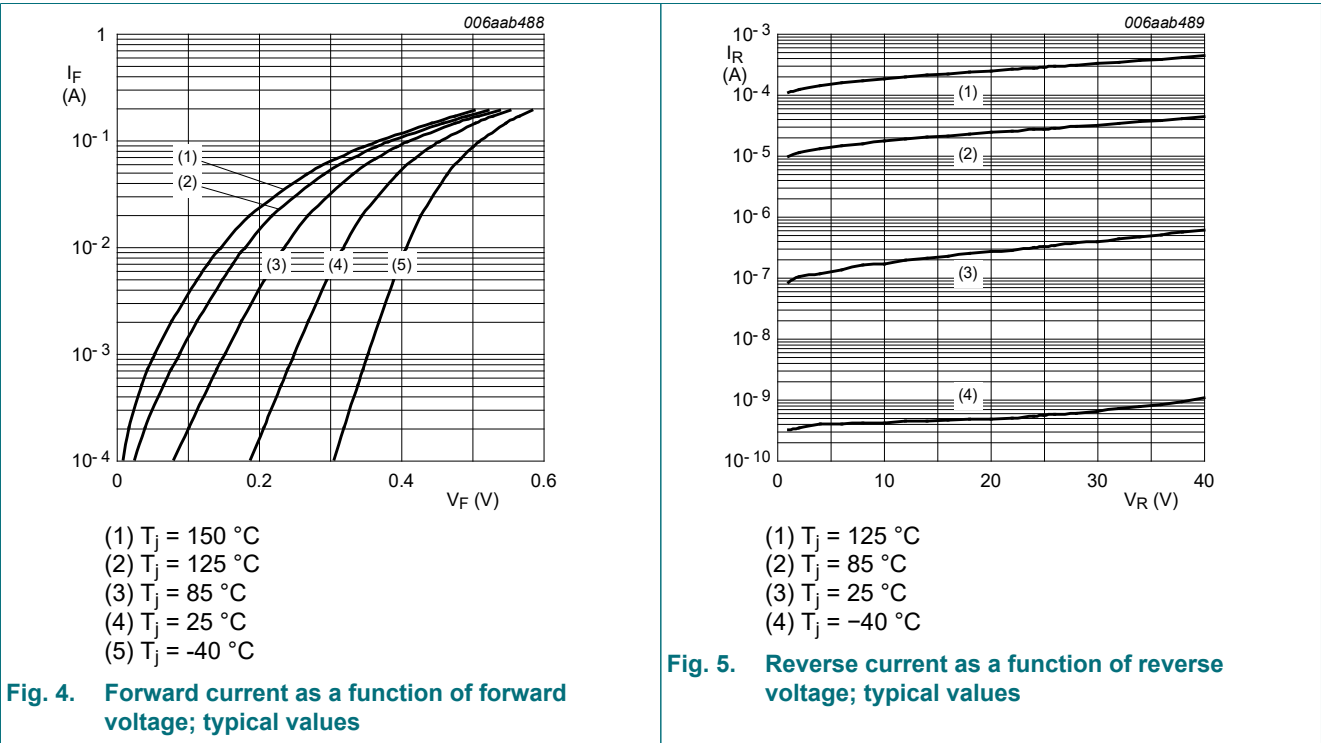
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

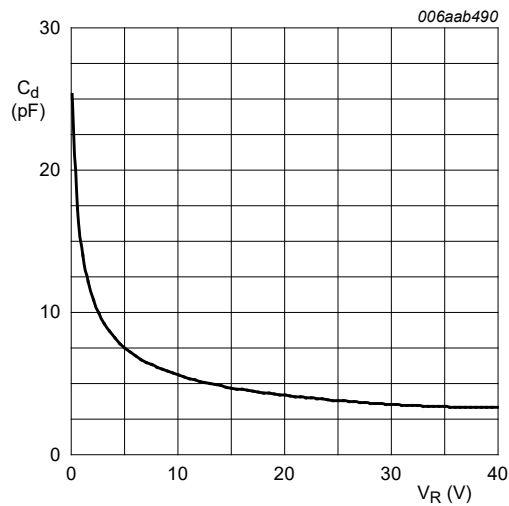
10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _F	forward voltage	I _F = 0.1 mA; T _j = 25 °C	[1]	-	190	220	mV
		I _F = 1 mA; T _j = 25 °C		-	250	290	mV
		I _F = 10 mA; T _j = 25 °C		-	320	360	mV
		I _F = 100 mA; T _j = 25 °C		-	440	500	mV
		I _F = 200 mA; T _j = 25 °C		-	520	600	mV
I _R	reverse current	V _R = 10 V; T _j = 25 °C		-	0.2	0.3	µA
		V _R = 25 V; T _j = 25 °C		-	0.3	0.5	µA
		V _R = 40 V; T _j = 25 °C		-	0.7	10	µA
C _d	diode capacitance	V _R = 1 V; f = 1 MHz; T _j = 25 °C		-	14	-	pF
		V _R = 10 V; f = 1 MHz; T _j = 25 °C		-	6	-	pF
t _{rr}	reverse recovery time	when switched from I _{asub>F} = 10 mA to I _R = 10 mA; R _L = 100 W; measured at I _R = 1 mA; T _j = 25 °C		-	5	-	ns

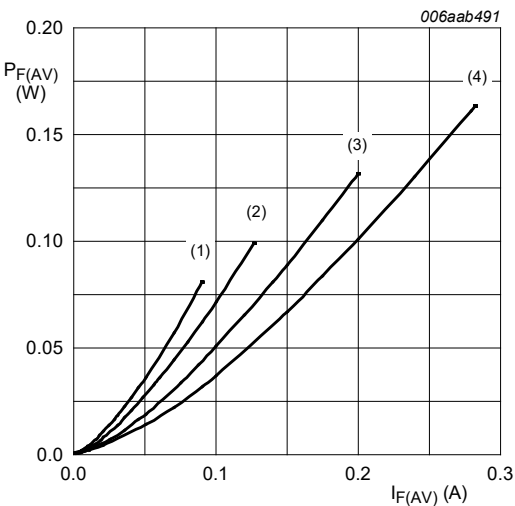
[1]





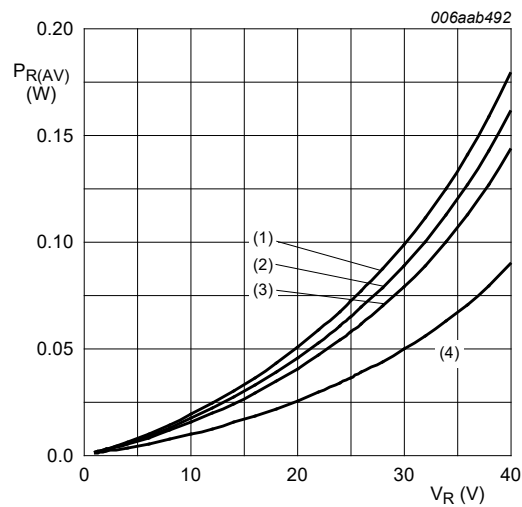
$f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$

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



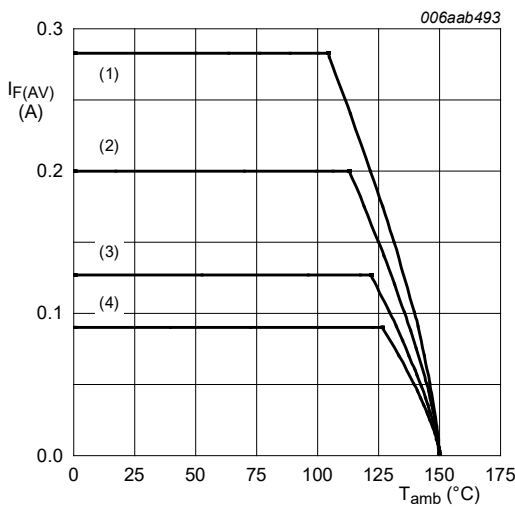
$T_j = 150 \text{ }^{\circ}\text{C}$
(1) $\delta = 0.1$
(2) $\delta = 0.2$
(3) $\delta = 0.5$
(4) $\delta = 0.8$
(5) $\delta = 1$

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



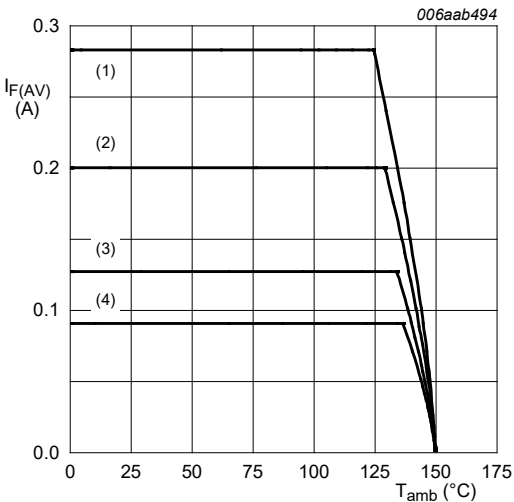
$T_j = 125 \text{ }^{\circ}\text{C}$
(1) $\delta = 1$
(2) $\delta = 0.9$
(3) $\delta = 0.8$
(4) $\delta = 0.5$

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



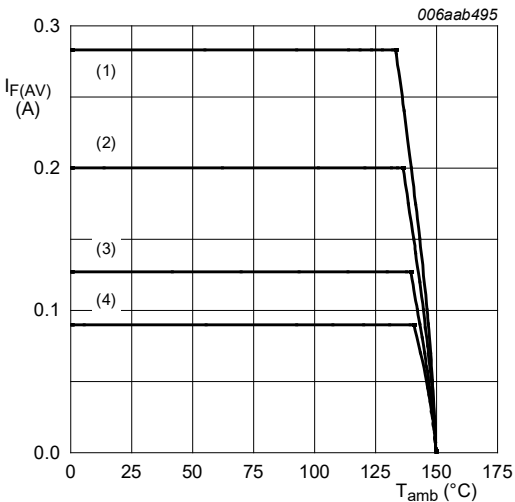
FR4 PCB, standard footprint
 $T_j = 150 \text{ }^{\circ}\text{C}$
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20 \text{ kHz}$
(3) $\delta = 0.2$; $f = 20 \text{ kHz}$
(4) $\delta = 0.1$; $f = 20 \text{ kHz}$

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



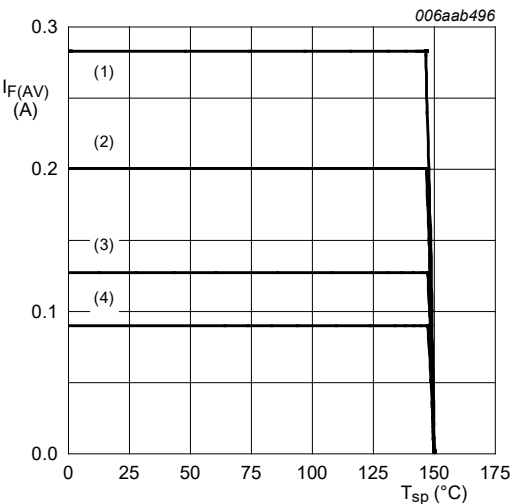
FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 150^\circ\text{C}$
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20\text{ kHz}$
(3) $\delta = 0.2$; $f = 20\text{ kHz}$
(4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



Ceramic PCB, Al₂O₃, standard footprint
 $T_j = 150^\circ\text{C}$
(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



$T_j = 150^\circ\text{C}$
(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 solder point temperature; typical values

11. Test information

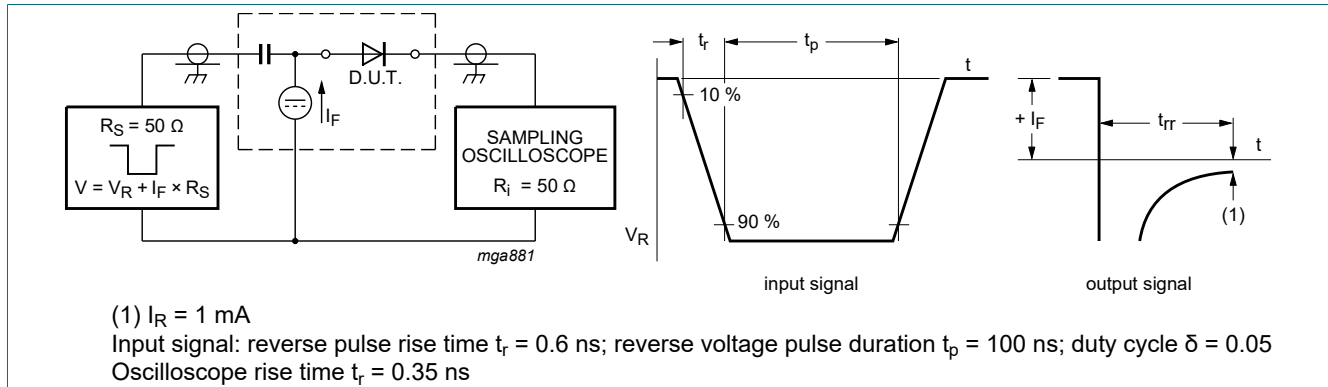


Fig. 13. Reverse recovery time: test circuit and waveforms

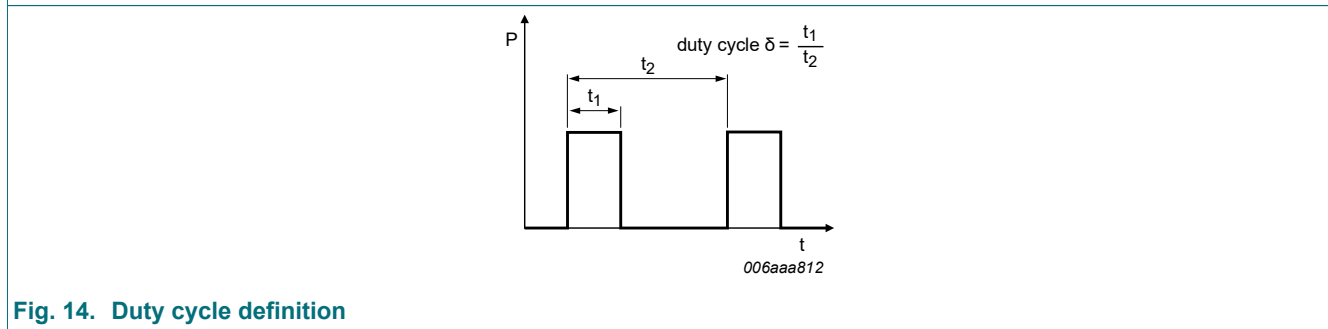


Fig. 14. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

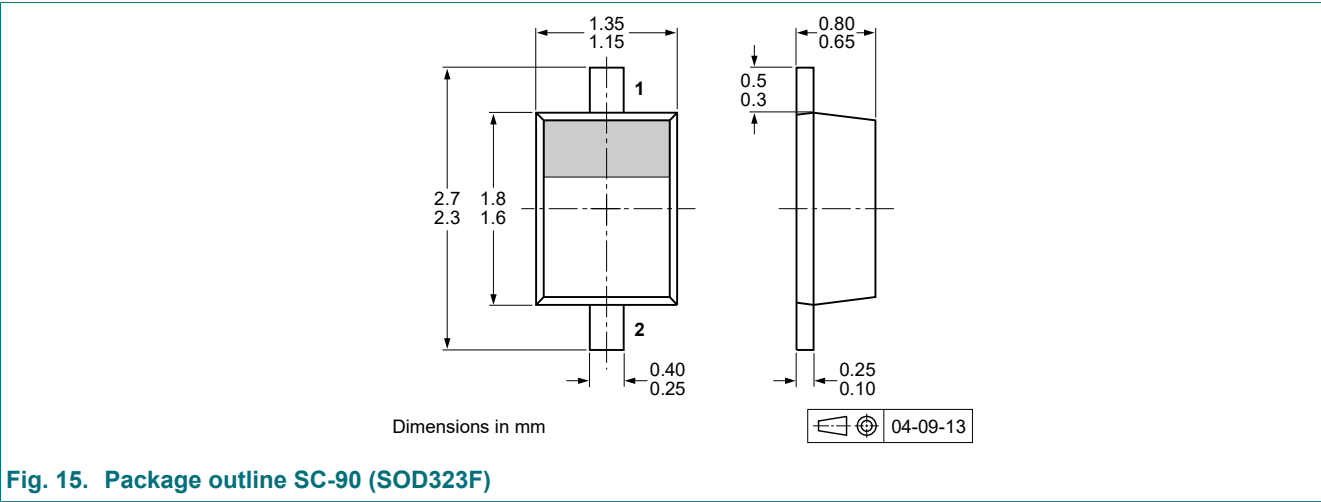
$$I_{RMS} = I_{F(AV)} \text{ at DC}$$

$$I_{RMS} = I_M \times \sqrt{\delta} \text{ with } I_{RMS} \text{ defined as RMS current}$$

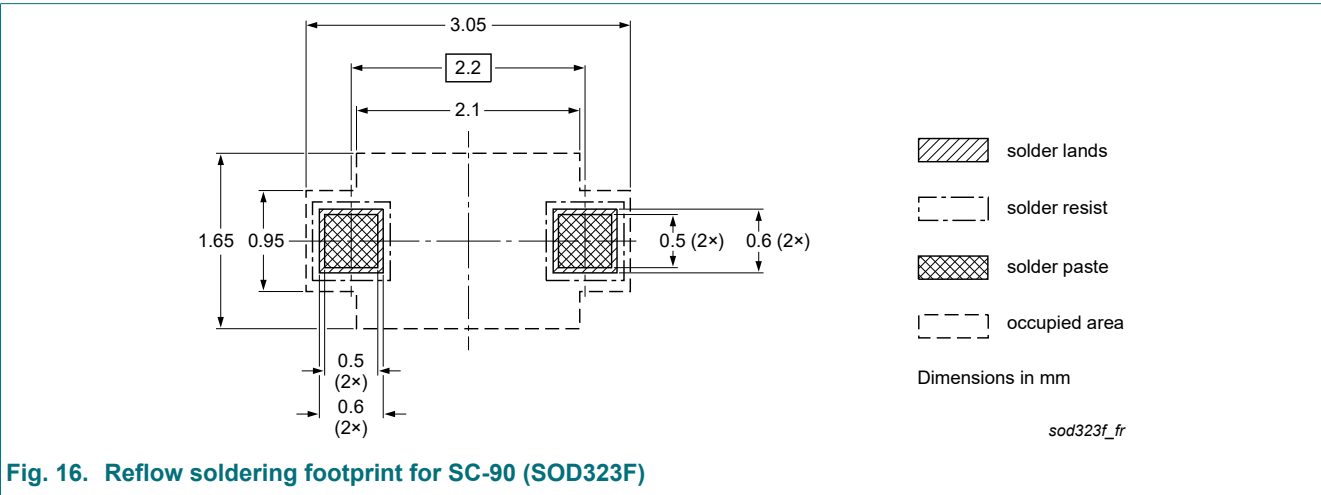
Quality information

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



13. Soldering



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4002EJ-Q v.1	20230921	Product data sheet	-	-

15. Legal information

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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