PMEG4005CEJ

40 V, 0.5 A low VF MEGA Schottky barrier rectifier

12 May 2016 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 an SOD323F (SC-90) very small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 0.5$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage typ. $V_F = 550$ mV
- Low reverse current typ. $I_R = 1.5$ µA
- Very 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 (SMPS)
- Reverse polarity protection
- Low power consumption applications
- Automotive applications

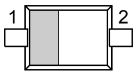
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; f = 20 kHz; $T_{sp} \leq$ 135 °C; square wave		-	-	0.5	A
V_R	reverse voltage	T_j = 25 °C		-	-	40	V
V_F	forward voltage	I_F = 500 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C		-	550	640	mV
I_R	reverse current	V_R = 40 V; pulsed; T_j = 25 °C		-	1.5	8	µA
		V_R = 40 V; pulsed; T_j = 125 °C		-	1	8	mA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SOD323F	 sym001
2	A	anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4005CEJ	SOD323F	plastic surface-mounted package; 2 leads	SOD323F

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4005CEJ	2F

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} ≤ 130 °C; δ = 1		-	0.7	A
$I_{F(AV)}$	average forward current	δ = 0.5 ; f = 20 kHz; T_{sp} ≤ 135 °C; square wave		-	0.5	A
I_{FRM}	repetitive peak forward current	t_p ≤ 1 ms; δ ≤ 0.25		-	2	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	8	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[1]	-	415	mW
			[2]	-	715	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

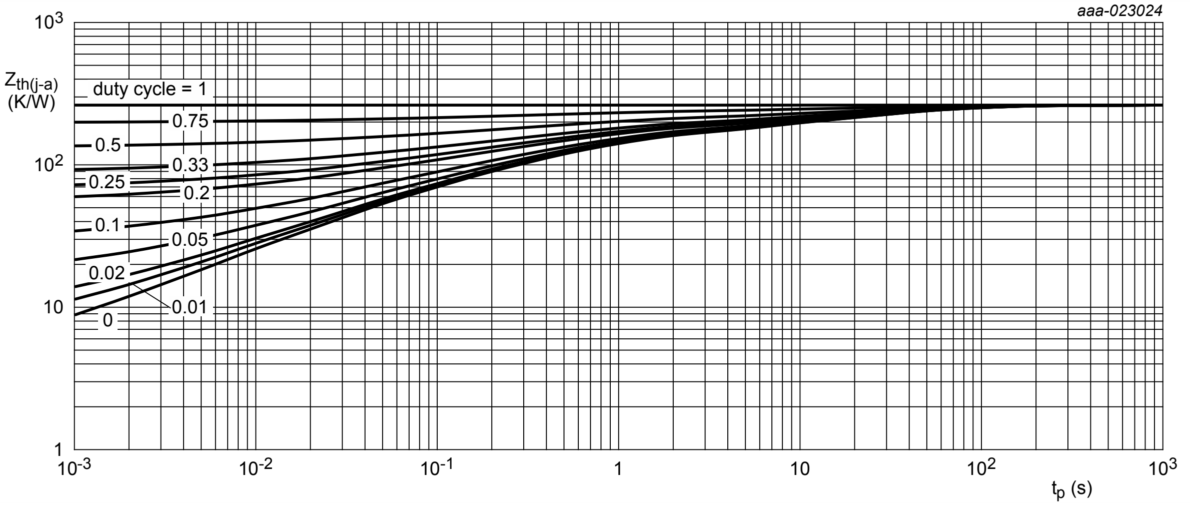
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

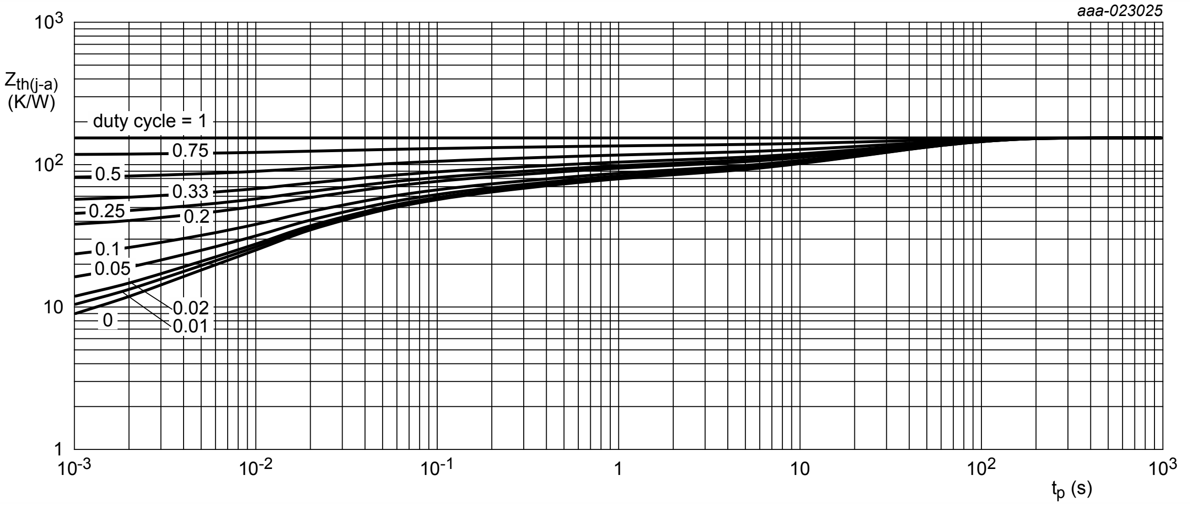
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	300	K/W
			[1][3]	-	-	175	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	45	K/W

[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] 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



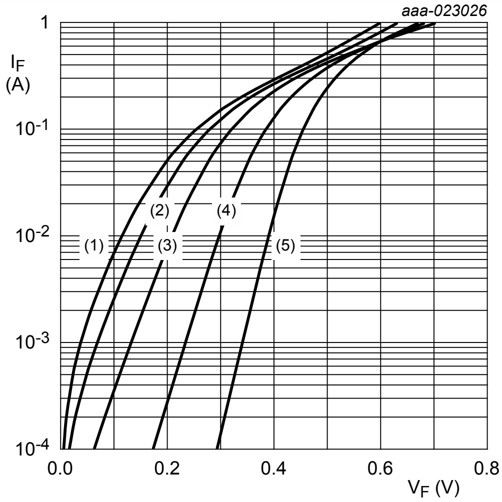
FR4 PCB, mounting pad for cathode 1 cm^2

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

10. Characteristics

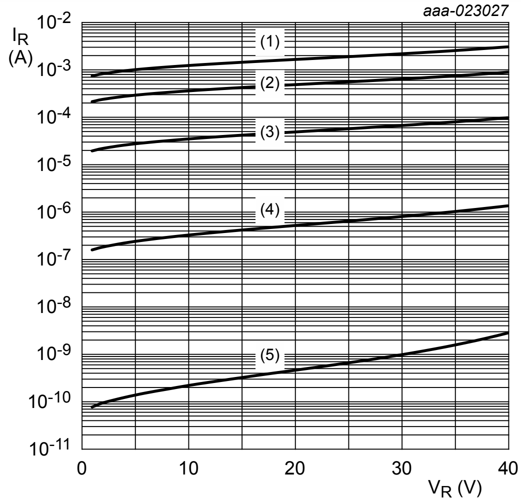
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	I_R = 1 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	40	-	-	V
V_F	forward voltage	I_F = 10 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	-	300	380	mV
		I_F = 100 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	-	390	470	mV
		I_F = 200 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	-	435	510	mV
		I_F = 300 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	-	475	560	mV
		I_F = 400 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	-	515	600	mV
		I_F = 500 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 25 °C	-	550	640	mV
		I_F = 500 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = -40 °C	-	570	670	mV
		I_F = 500 mA; $t_p \leq$ 300 μs; δ ≤ 0.02 ; T_j = 125 °C	-	520	610	mV
I_R	reverse current	V_R = 30 V; pulsed; T_j = 25 °C	-	1	5	μA
		V_R = 40 V; pulsed; T_j = 25 °C	-	1.5	8	μA
		V_R = 40 V; pulsed; T_j = 125 °C	-	1	8	mA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C	-	24	-	pF
		V_R = 4 V; f = 1 MHz; T_j = 25 °C	-	13.5	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C	-	9	-	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	-	1.8	-	ns



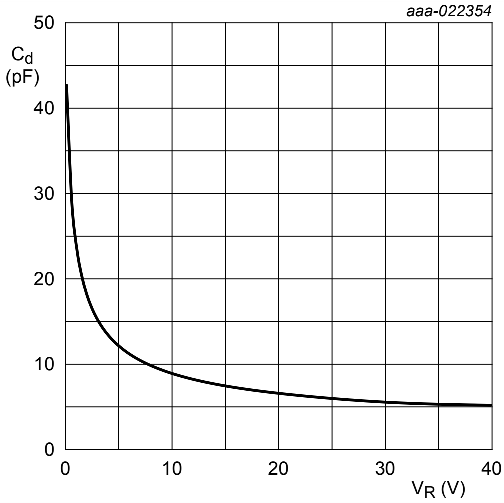
pulsed condition
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = -40 °C

Fig. 3. Forward current as a function of forward voltage; typical values



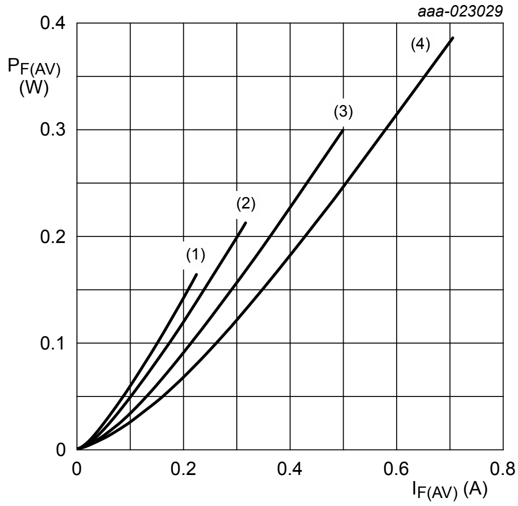
pulsed condition
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

Fig. 4. Reverse current as a function of reverse voltage; typical values



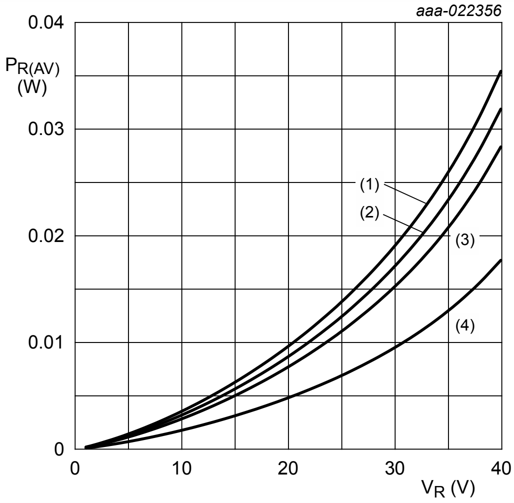
f = 1 MHz; T_{amb} = 25 °C

Fig. 5. Diode capacitance as a function of reverse voltage; typical values



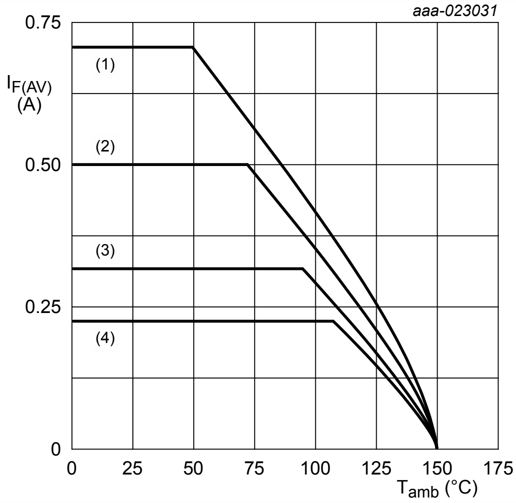
T_j = 150 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(2) δ = 1 (DC)

Fig. 6. Average forward power dissipation as a function of average forward current; typical values



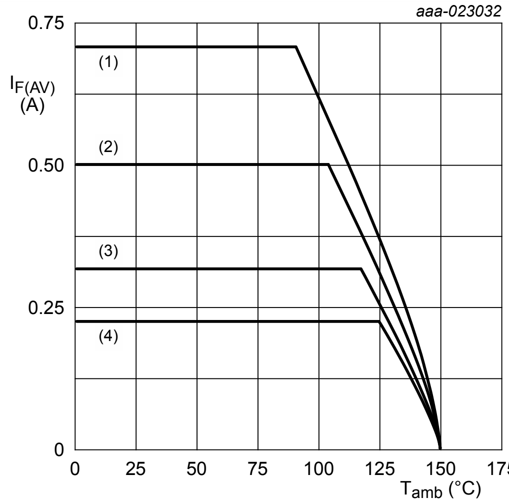
T_j = 125 °C
(1) δ = 1; DC
(2) δ = 0.9; f = 20 kHz
(3) δ = 0.8; f = 20 kHz
(4) δ = 0.5; f = 20 kHz

Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values



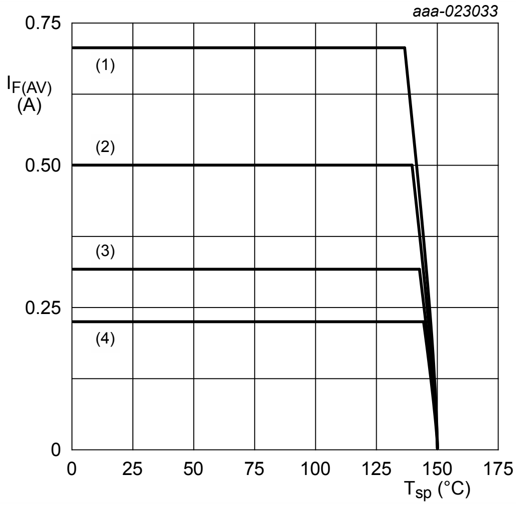
FR4 PCB, standard footprint
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 8. 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. 9. 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. 10. Average forward current as a function of solder point temperature; typical values

11. Test information

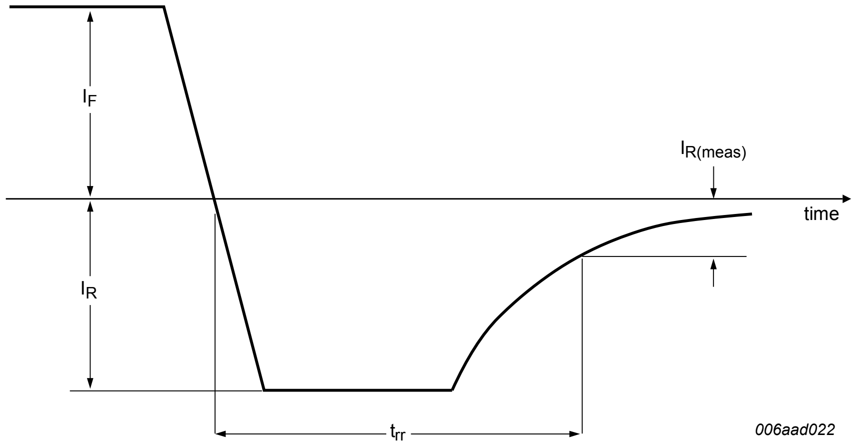


Fig. 11. Reverse recovery definition

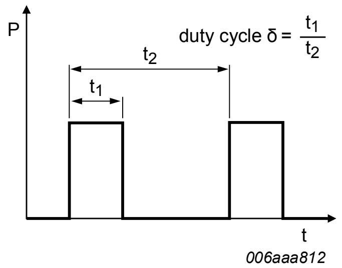


Fig. 12. Duty cycle definition

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.

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

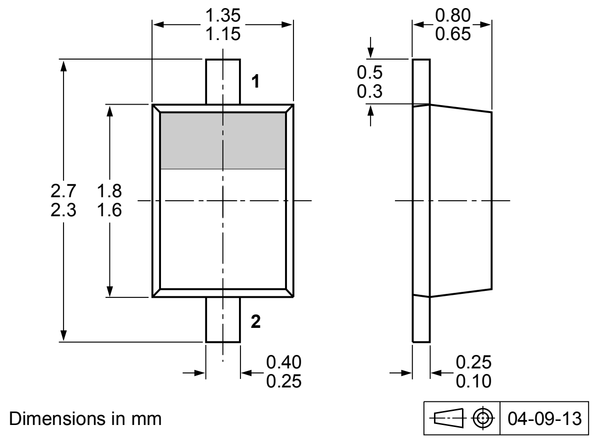


Fig. 13. Package outline SOD323F

13. Soldering

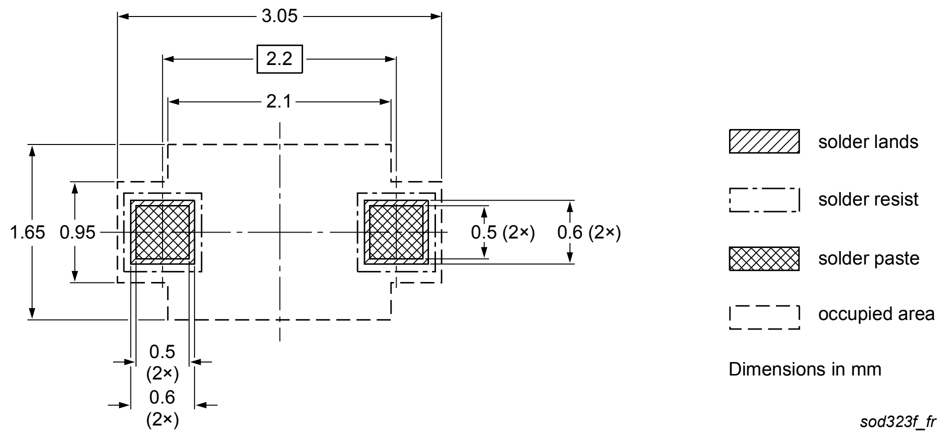


Fig. 14. Reflow soldering footprint for SOD323F

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4005CEJ v.1	20160512	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.

[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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