

PMEG60T30ELP

60 V, 3 A low leakage current Trench MEGA Schottky barrier rectifier

24 May 2018

Product data sheet

1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP5 (SOD128) small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: I_{F(AV)} ≤ 3 A
- Reverse voltage: V_R ≤ 60 V
- Low forward voltage
- Low leakage current due to Trench MEGA Schottky technology
- High power capability due to clip-bonding technology
- Small and flat lead SMD power plastic package
- · Capable for reflow and wave soldering
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Freewheeling application
- · Reverse polarity protection
- · Low power consumption application

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
I _{F(AV)}	average forward current	δ = 0.5; f = 20 kHz; $T_{sp} \le 155$ °C; square wave		-	-	3	Α
V _R	reverse voltage	T _j = 25 °C		-	-	60	V
V _F	forward voltage	I _F = 3 A; pulsed; T _j = 25 °C	[1]	-	550	620	mV
I _R	reverse current	V_R = 10 V; pulsed; T_j = 25 °C	[1]	-	0.14	0.9	μΑ
		V_R = 60 V; pulsed; T_j = 25 °C	[1]	-	0.3	1.8	μA

[1] Very short pulse, in order to maintain a stable junction temperature.



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		к .} А
2	А	anode	1 2	sym001
			CFP5 (SOD128)	

6. Ordering information

Table 3. Ordering information

Type number	Package						
	Name	Description	Version				
PMEG60T30ELP	CFP5	plastic, surface mounted package; 2 terminals; 4 mm pitch; 3.8 mm x 2.6 mm x 1 mm body	SOD128				

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG60T30ELP	E2

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	δ = 1; T _{sp} ≤ 150 °C		-	4.2	Α
I _{F(AV)}	average forward current	δ = 0.5; f = 20 kHz; $T_{sp} \le 155$ °C; square wave		-	3	А
I _{FSM}	non-repetitive peak forward current	t_p = 8 ms; square wave; $T_{j(init)}$ = 25 °C		-	50	А
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	0.75	W
			[2]	-	1.2	W
Tj	junction temperature			-	175	°C
T _{amb}	ambient temperature			-55	175	°C
T _{stg}	storage temperature			-65	175	°C

- [1] Device mounted on an FR4 Printed-Circuit Board (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 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
1	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	200	K/W
			[1] [3]	-	-	120	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point		[4]	-	-	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.

Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

^[4] Soldering point of cathode tab.

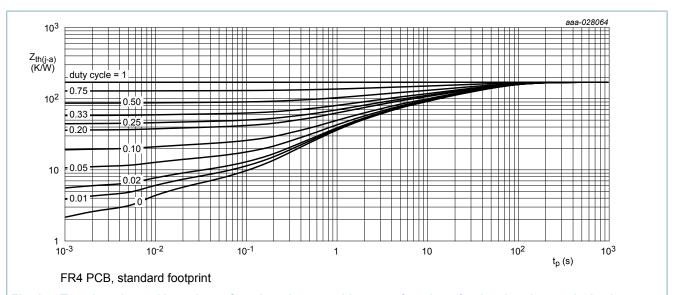


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

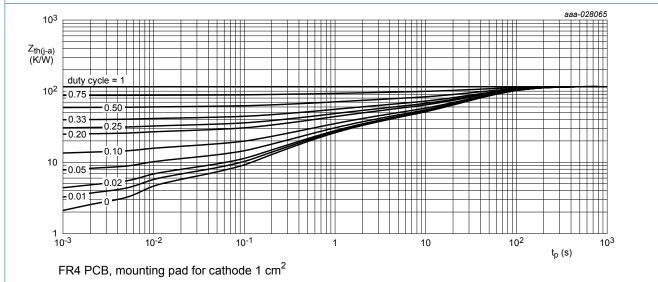


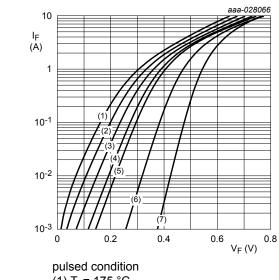
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V _{(BR)R}	reverse breakdown voltage	I _R = 1 mA; pulsed; T _j = 25 °C	[1]	60	-	-	V
V _F	forward voltage	I _F = 0.1 A; pulsed; T _j = 25 °C	[1]	-	380	450	mV
		I _F = 0.5 A; pulsed; T _j = 25 °C	[1]	-	440	510	mV
		I _F = 1 A; pulsed; T _j = 25 °C	[1]	-	470	540	mV
		I _F = 2 A; pulsed; T _j = 25 °C	[1]	-	515	590	mV
		I _F = 3 A; pulsed; T _j = 25 °C	[1]	-	550	620	mV
		I _F = 3 A; pulsed; T _j = -40 °C	[1]	-	610	-	mV
		I _F = 3 A; pulsed; T _j = 125 °C	[1]	-	480	-	mV
I _R	reverse current	V _R = 10 V; pulsed; T _j = 25 °C	[1]	-	0.14	0.9	μA
		V _R = 40 V; pulsed; T _j = 25 °C	[1]	-	0.18	-	μA
		V _R = 60 V; pulsed; T _j = 25 °C	[1]	-	0.3	1.8	μA
		V _R = 60 V; pulsed; T _j = 125 °C	[1]	-	0.5	-	mA
C _d	diode capacitance	V _R = 1 V; f = 1 MHz; T _j = 25 °C		-	560	-	pF
		V _R = 10 V; f = 1 MHz; T _j = 25 °C		-	170	-	pF
t _{rr}	reverse recovery time step recovery	$I_F = 0.5 \text{ A}$; $I_R = 0.5 \text{ A}$; $I_{R(meas)} = 0.1 \text{ A}$; $T_j = 25 ^{\circ}\text{C}$		-	16	-	ns
	reverse recovery time ramp recovery	$dI_F/dt = 200 \text{ A/}\mu\text{s}; I_F = 6 \text{ A}; V_R = 26 \text{ V};$ $T_j = 25 \text{ °C}$		-	16	-	ns
V_{FRM}	peak forward recovery voltage	$I_F = 0.5 \text{ A}$; $dI_F/dt = 20 \text{ A/}\mu\text{s}$; $T_j = 25 \text{ °C}$		-	460	-	mV

^[1] Very short pulse, in order to maintain a stable junction temperature.



(1) $T_j = 175 \,^{\circ}C$

(2) $T_j = 150 \,^{\circ}\text{C}$

(3) $T'_j = 125 \,^{\circ}\text{C}$ (4) $T_j = 100 \,^{\circ}\text{C}$

 $(5) T_j = 85 ^{\circ}C$

 $(6) T_i = 25 ^{\circ}C$

 $(7) T_i = -40 ^{\circ}C$

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

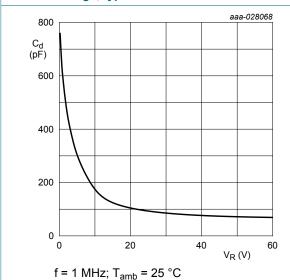
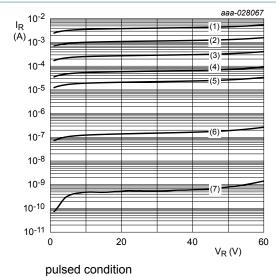


Fig. 5. Diode capacitance as a function of reverse voltage; typical values



(1) $T_i = 175 \,^{\circ}C$

(2) $T_j = 150 \,^{\circ}\text{C}$

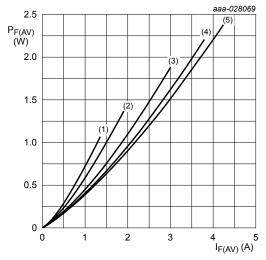
(3) $T_j = 125 \,^{\circ}\text{C}$

(4) $T_j = 100 \,^{\circ}\text{C}$ (5) $T_j = 85 \,^{\circ}\text{C}$

(6) $T_i = 25 \,^{\circ}\text{C}$

 $(7) T_i = -40 ^{\circ}C$

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



T_i = 100 °C

 $(1) \delta = 0.1$

 $(2) \delta = 0.2$

 $(3) \delta = 0.5$

(4) $\delta = 0.8$ (5) $\delta = 1$; DC

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

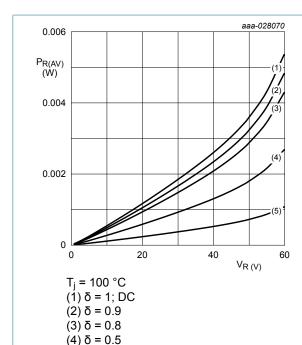
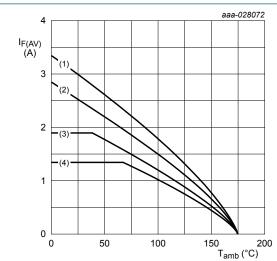


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values



FR4 PCB, mounting pad for cathode 1 cm^2

 $T_j = 175 \,^{\circ}C$

 $(5) \delta = 0.2$

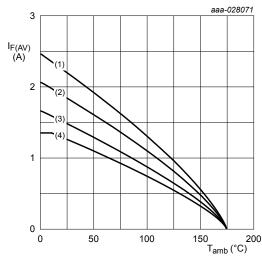
 $(1) \delta = 1; DC$

(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, standard footprint

T_i = 175 °C

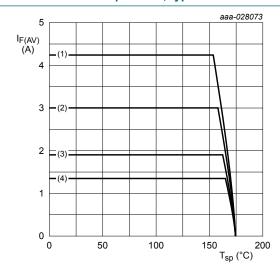
 $(1) \delta = 1; DC$

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) $\delta = 0.1$; f = 20 kHz

Fig. 8. Average forward current as a function of ambient temperature; typical values



 $T_i = 175 \,{}^{\circ}\text{C}$

 $(1) \delta = 1; DC$

(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

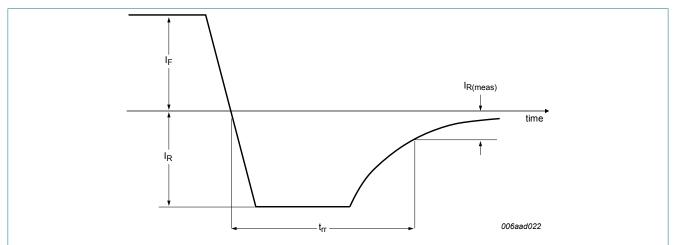


Fig. 11. Reverse recovery definition; step recovery

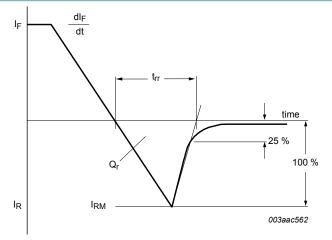


Fig. 12. Reverse recovery definition; ramp recovery

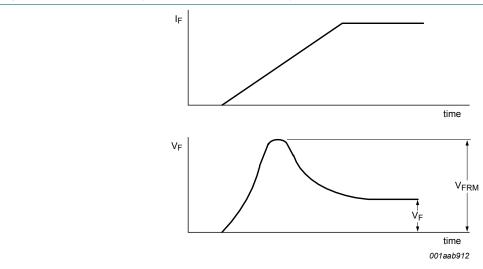
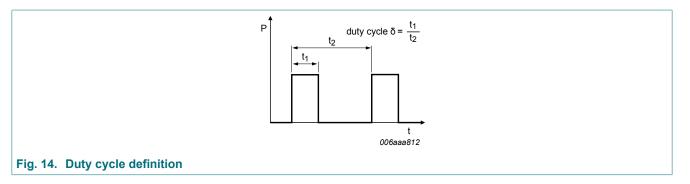


Fig. 13. Forward recovery definition



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,

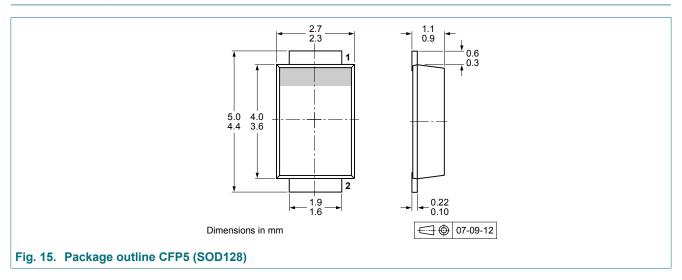
 $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_{M} \times \sqrt{\delta}$

with I_{RMS} defined as RMS current.

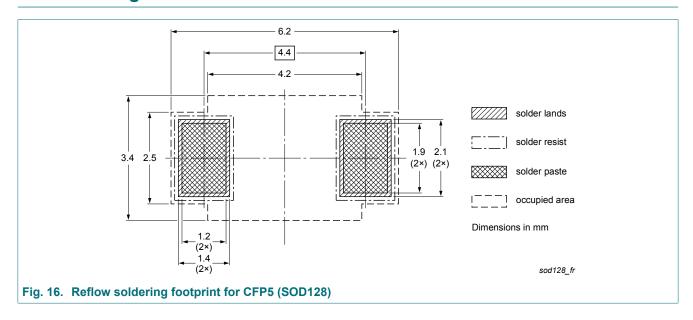
Quality information

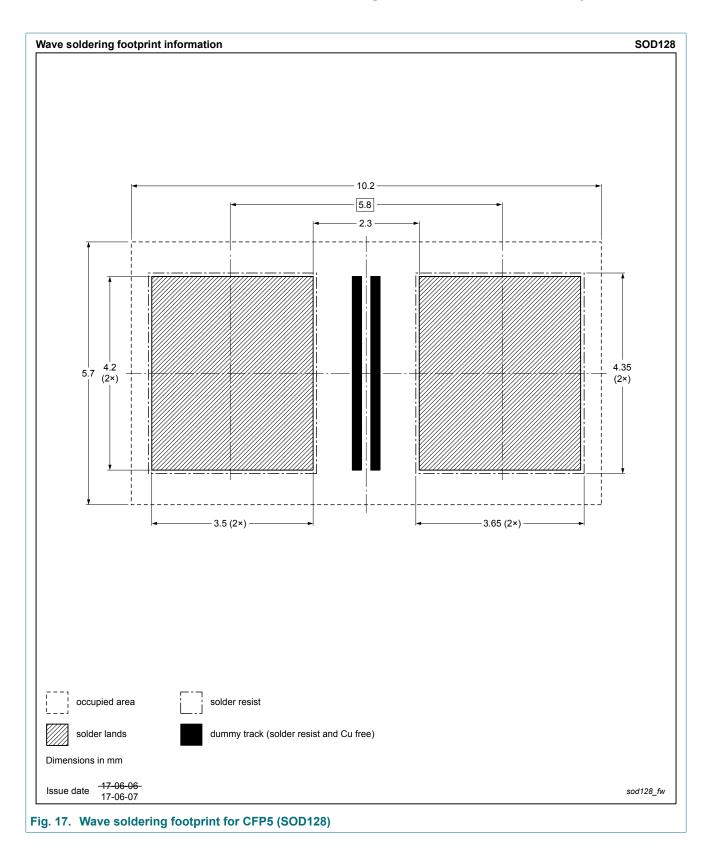
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

12. Package outline



13. Soldering





14. Revision history

Table 8. Revision history

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Data sheet ID	Release date	Data sheet status	Change notice	Supersedes			
PMEG60T30ELP v.2	20180524	Product data sheet	-	PMEG60T30ELP v.1			
Modifications:	Product status changed						
PMEG60T30ELP v.1	20180227	Preliminary data sheet	-	-			

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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.
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Product [short] data sheet	Production	This document contains the product specification.

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