



PMEG100T100ELPE

100 V, 10 A low leakage current Trench MEGA Schottky barrier rectifier

23 September 2020

Preliminary data sheet

1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP15B (SOT1289B) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- Low Q_{rr} and low I_{RM}
- Low leakage current
- High power capability due to clip-bonding technology
- Small and flat lead SMD power plastic package
- AEC-Q101 qualified

3. Applications

- High efficiency DC-to-DC conversion
- Automotive LED lighting
- Switch mode power supply
- Freewheeling application
- Reverse polarity protection
- OR-ing

4. Quick reference data

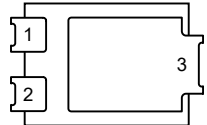
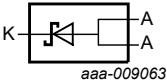
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square wave; $f = 20$ kHz; $T_{sp} \leq 162$ °C		-	-	10	A
V_R	reverse voltage	$T_j = 25$ °C		-	-	100	V
V_F	forward voltage	$I_F = 10$ A; pulsed; $T_j = 25$ °C	[1]	-	750	810	mV
I_R	reverse current	$V_R = 100$ V; pulsed; $T_j = 25$ °C	[1]	-	0.85	5	μ A
		$V_R = 100$ V; pulsed; $T_j = 125$ °C	[1]	-	1.25	6	mA

[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	A	anode	 CFP15B (SOT1289B)	 aaa-009063
2	A	anode		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG100T100ELPE	CFP15B	plastic, thermal enhanced ultra thin SMD package; 3 leads; 2.13 mm pitch; 5.8 x 4.3 x 0.95 mm body	SOT1289B

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG100T100ELPE	100T L10E

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_R	reverse voltage	$T_j = 25\text{ °C}$		-	100	V
I_F	forward current	$\delta = 1; T_{sp} \leq 158\text{ °C}$		-	14.1	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square wave; $f = 20\text{ kHz}$; $T_{sp} \leq 162\text{ °C}$		-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$; half sine wave; $T_{j(init)} = 25\text{ °C}$		-	180	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	1.66	W
			[2]	-	2.15	W
T_j	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	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	90	K/W
			[1] [3]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	7	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 cm².
- [4] Soldering point of cathode tab.

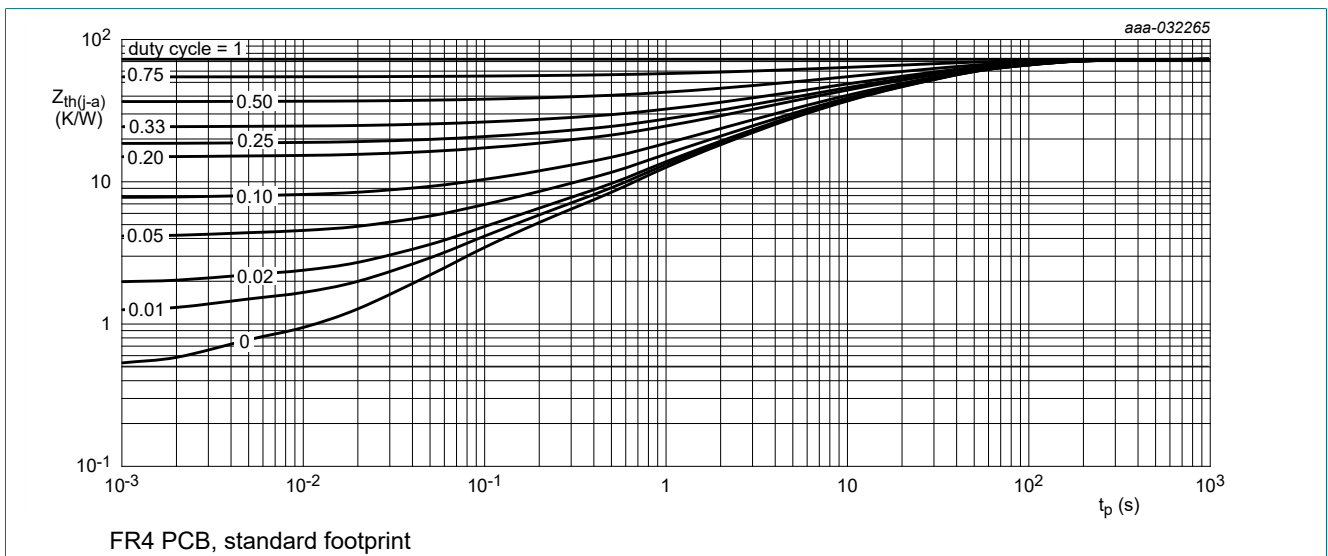


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

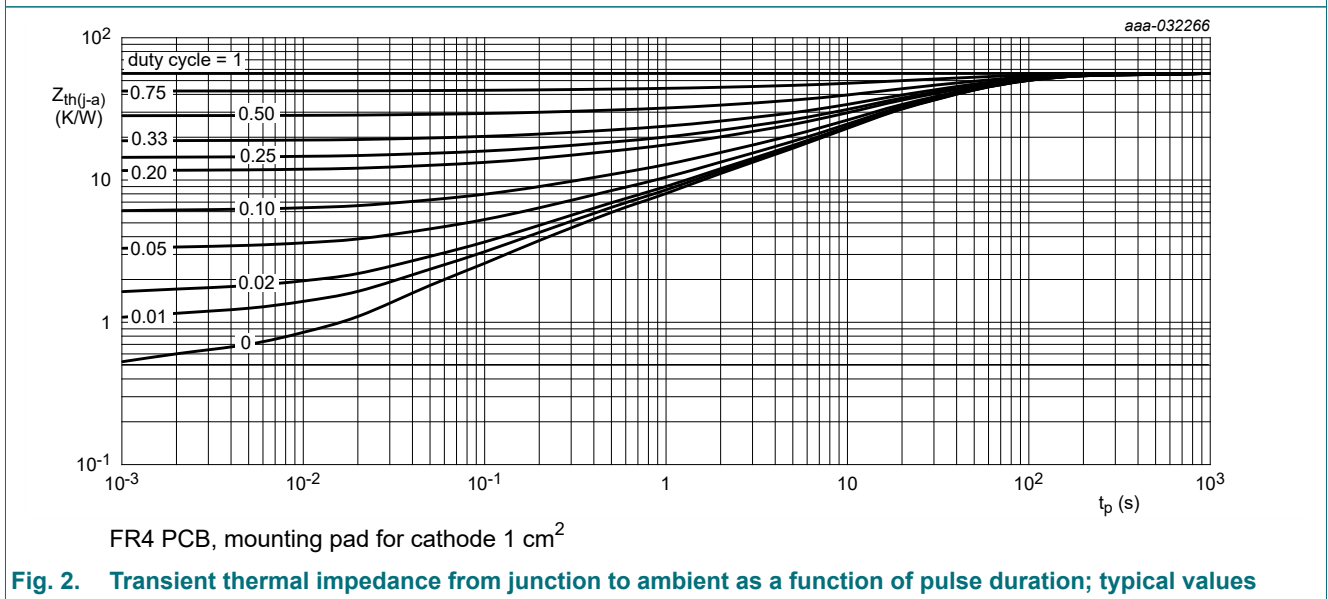


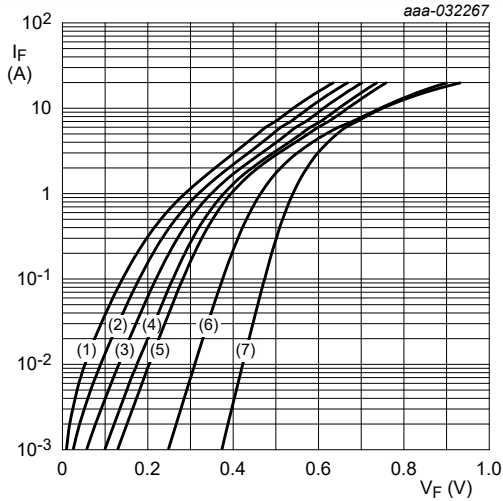
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

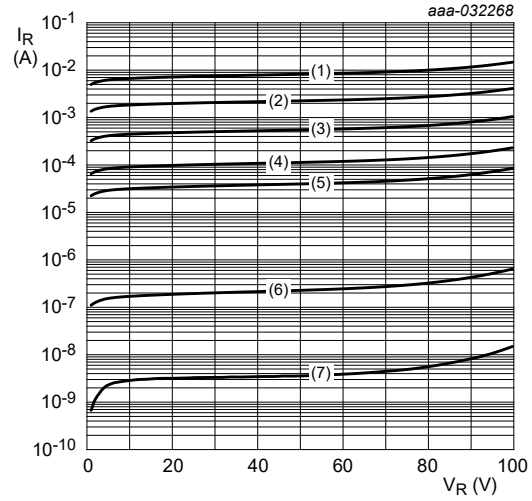
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	[1]	100	-	-	V
V_F	forward voltage	$I_F = 1 \text{ A}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	460	520	mV
		$I_F = 3 \text{ A}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	545	610	mV
		$I_F = 5 \text{ A}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	620	690	mV
		$I_F = 8 \text{ A}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	705	780	mV
		$I_F = 10 \text{ A}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	750	810	mV
		$I_F = 10 \text{ A}; \text{pulsed}; T_j = -40 \text{ }^\circ\text{C}$	[1]	-	755	820	mV
		$I_F = 10 \text{ A}; \text{pulsed}; T_j = 125 \text{ }^\circ\text{C}$	[1]	-	615	690	mV
		$I_F = 10 \text{ A}; \text{pulsed}; T_j = 150 \text{ }^\circ\text{C}$	[1]	-	580	650	mV
I_R	reverse current	$V_R = 60 \text{ V}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	0.3	1.5	μA
		$V_R = 100 \text{ V}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	0.85	5	μA
		$V_R = 100 \text{ V}; \text{pulsed}; T_j = 125 \text{ }^\circ\text{C}$	[1]	-	1.25	6	mA
		$V_R = 100 \text{ V}; \text{pulsed}; T_j = 150 \text{ }^\circ\text{C}$	[1]	-	4.8	25	mA
C_d	diode capacitance	$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$		-	850	-	pF
		$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$		-	240	-	pF
t_{rr}	reverse recovery time step recovery	$I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_{R(\text{meas})} = 0.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$		-	22	-	ns
	reverse recovery time ramp recovery	$dI_F/dt = 200 \text{ A}/\mu\text{s}; I_F = 6 \text{ A}; V_R = 26 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	13	-	ns
I_{RM}	peak reverse recovery current			-	1.3	-	A
Q_{rr}	reverse recovery charge	$dI_F/dt = 200 \text{ A}/\text{s}; I_F = 6 \text{ A}; V_R = 26 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	11.5	-	nC
V_{FRM}	peak forward recovery voltage	$I_F = 0.5 \text{ A}; dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$		-	415	-	mV

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



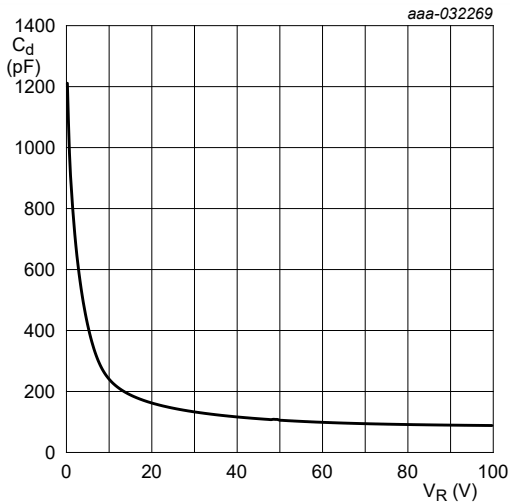
pulsed condition
 (1) $T_j = 175\text{ }^\circ\text{C}$
 (2) $T_j = 150\text{ }^\circ\text{C}$
 (3) $T_j = 125\text{ }^\circ\text{C}$
 (4) $T_j = 100\text{ }^\circ\text{C}$
 (5) $T_j = 85\text{ }^\circ\text{C}$
 (6) $T_j = 25\text{ }^\circ\text{C}$
 (7) $T_j = -40\text{ }^\circ\text{C}$

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



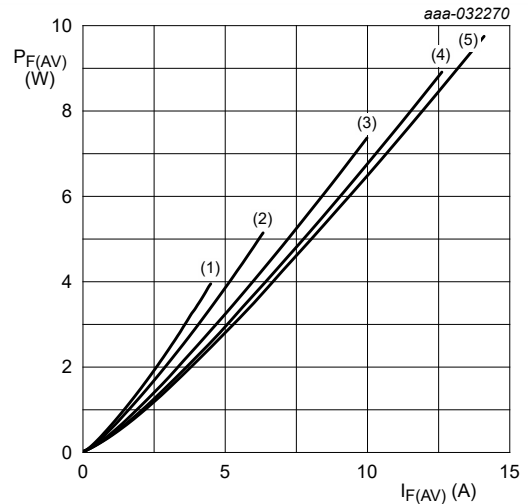
pulsed condition
 (1) $T_j = 175\text{ }^\circ\text{C}$
 (2) $T_j = 150\text{ }^\circ\text{C}$
 (3) $T_j = 125\text{ }^\circ\text{C}$
 (4) $T_j = 100\text{ }^\circ\text{C}$
 (5) $T_j = 85\text{ }^\circ\text{C}$
 (6) $T_j = 25\text{ }^\circ\text{C}$
 (7) $T_j = -40\text{ }^\circ\text{C}$

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



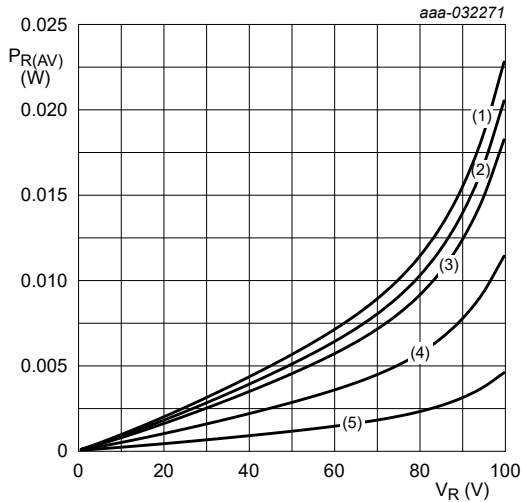
$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

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



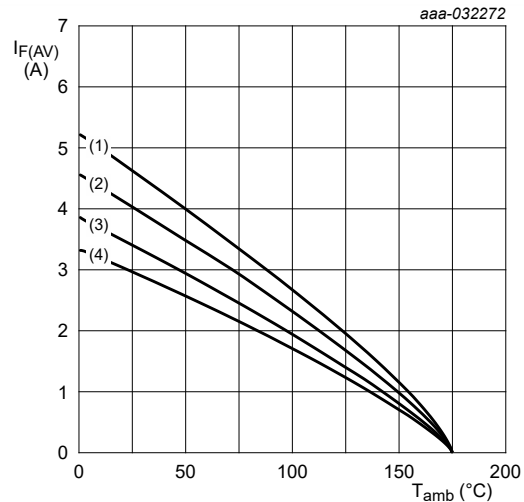
$T_j = 100\text{ }^\circ\text{C}$
 (1) $\delta = 0.1$
 (2) $\delta = 0.2$
 (3) $\delta = 0.5$
 (4) $\delta = 1$; DC
 (5) $\delta = 1$; DC

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



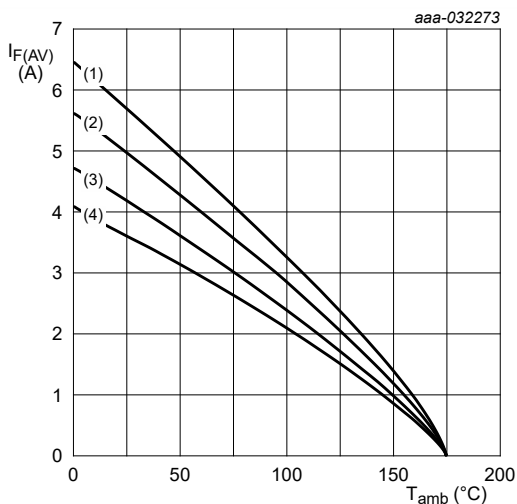
$T_j = 100\text{ }^\circ\text{C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$
 (5) $\delta = 0.2$

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



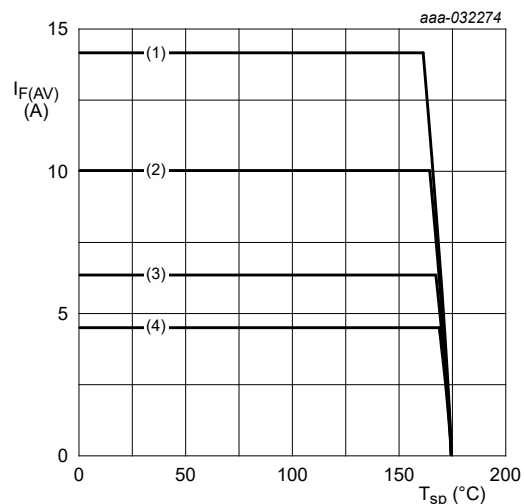
FR4 PCB, standard footprint
 $T_j = 175\text{ }^\circ\text{C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 175\text{ }^\circ\text{C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

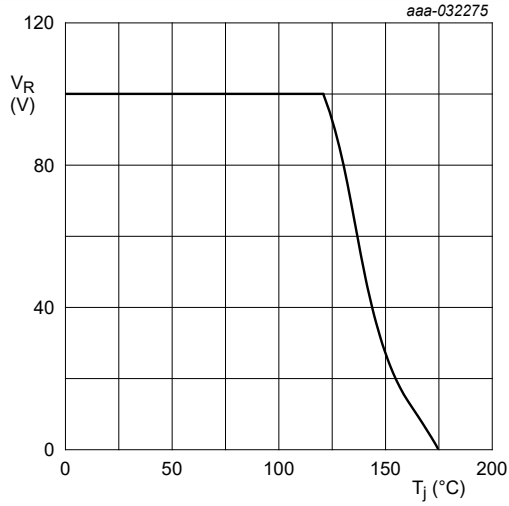
Fig. 9. Average forward current as a function of ambient temperature; typical values



$T_j = 175\text{ }^\circ\text{C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

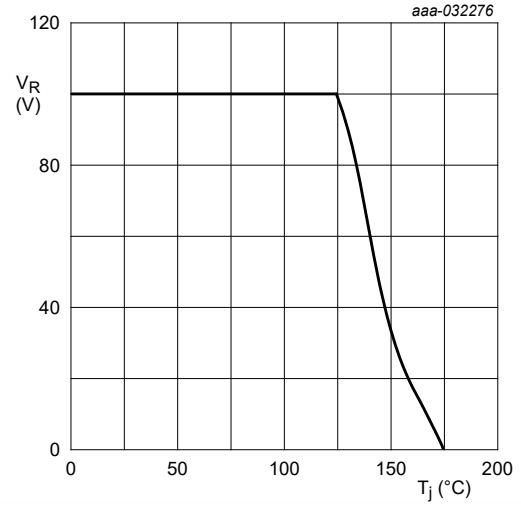
Fig. 10. Average forward current as a function of solder point temperature; typical values

100 V, 10 A low leakage current Trench MEGA Schottky barrier rectifier



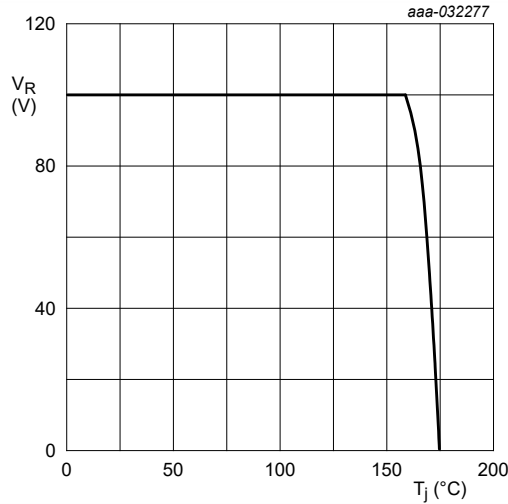
FR4 PCB, standard footprint
R_{th} = 90 K/W

Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm²
R_{th} = 70 K/W

Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values



Soldering point of cathode tab
R_{th} = 7 K/W

Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values

11. Test information

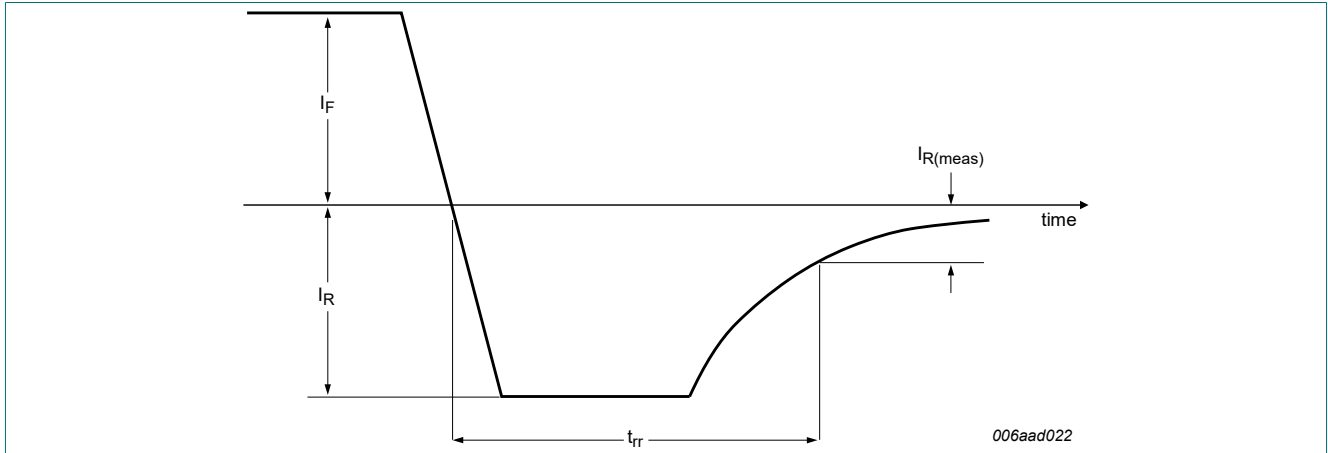


Fig. 14. Reverse recovery definition; step recovery

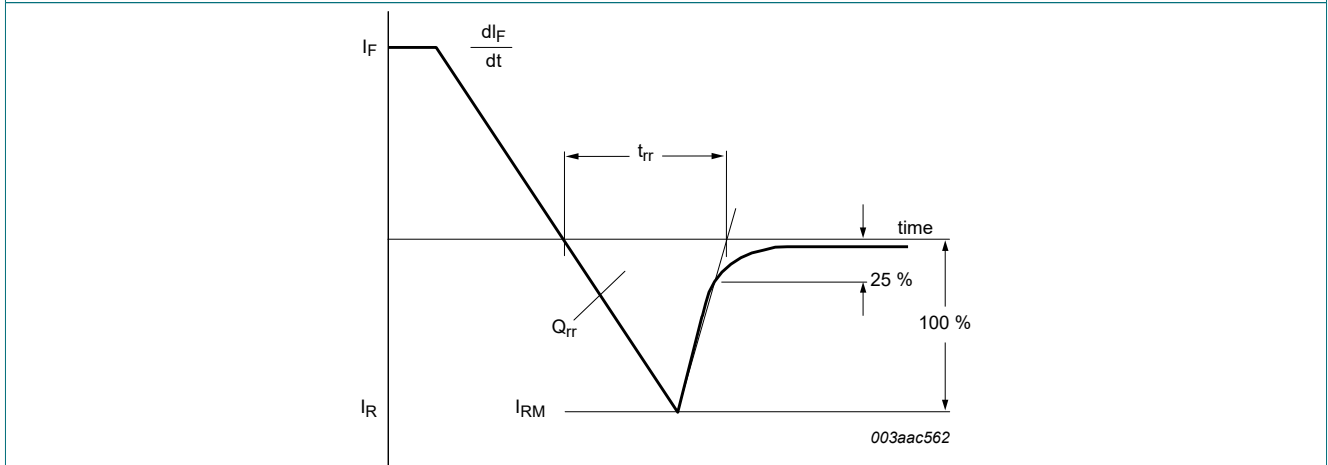


Fig. 15. Reverse recovery definition; ramp recovery

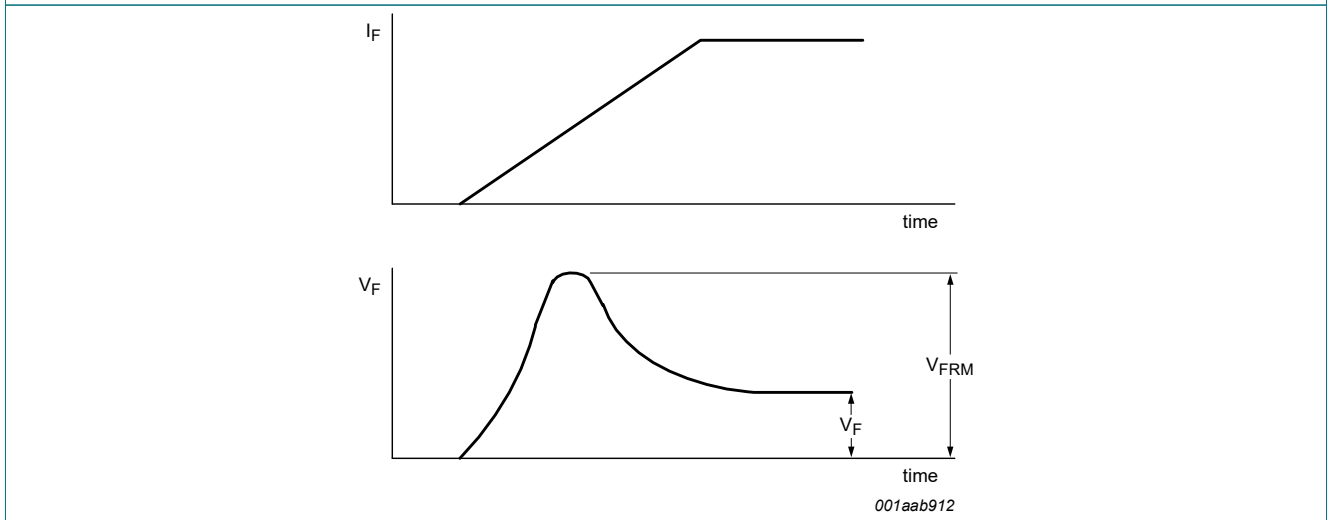


Fig. 16. Forward recovery definition

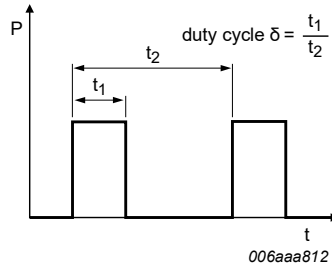


Fig. 17. Duty cycle definition

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

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

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

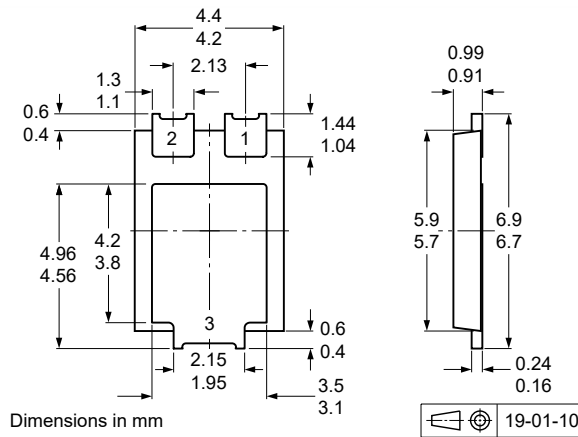


Fig. 18. Package outline CFP15B (SOT1289B)

13. Soldering

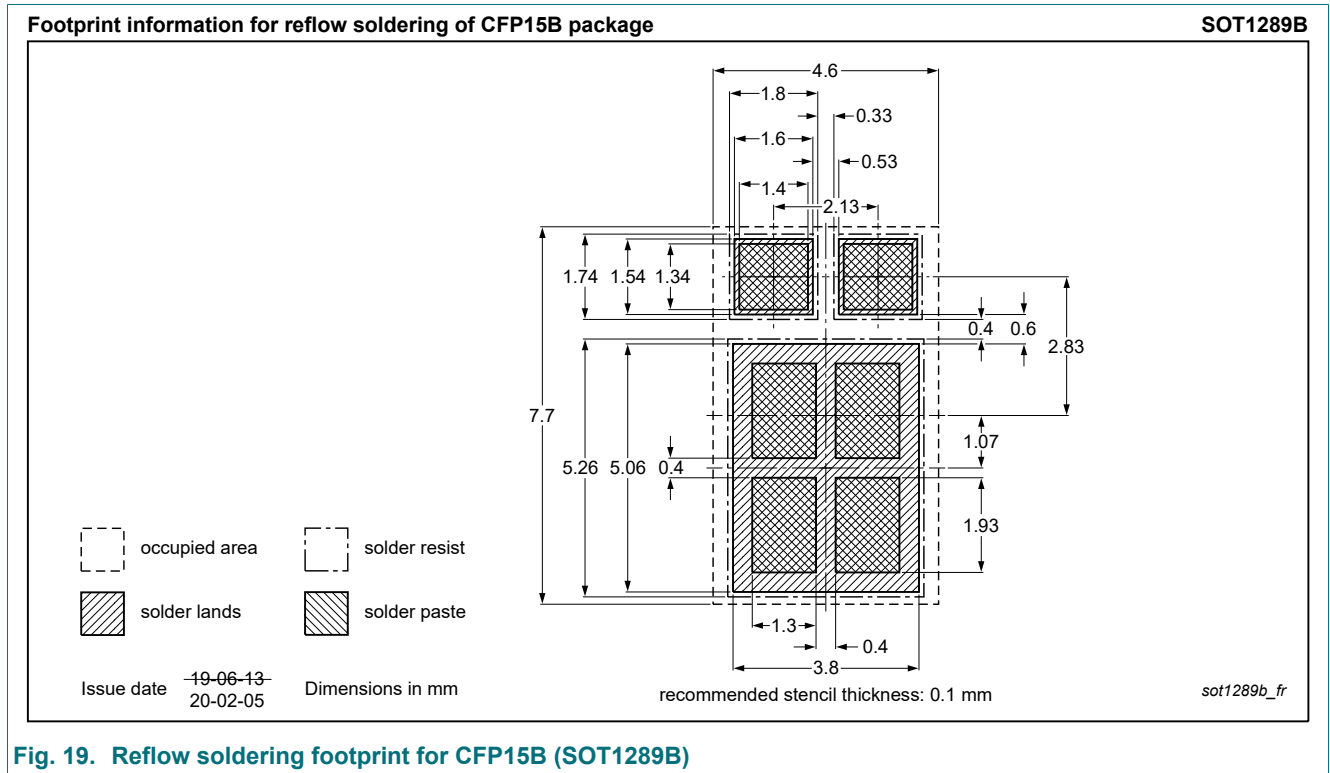


Fig. 19. Reflow soldering footprint for CFP15B (SOT1289B)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG100T100ELPE v.1	20200923	Preliminary 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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