



PMEG040V050EPE-Q

40 V, 5 A low VF Schottky barrier rectifier

18 July 2022

Product data sheet

1. General description

Planar Low V_F Schottky barrier rectifier encapsulated in a CFP15B (SOT1289B) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Very low forward voltage
- High power capability due to clip-bond technology
- Small and thin SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High efficiency DC-to-DC conversion
- Low voltage rectification
- 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	$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 172$ °C	-	-	5	A
V_R	reverse voltage	$T_j = 25$ °C	-	-	40	V
V_F	forward voltage	$I_F = 5$ A; pulsed; $T_j = 25$ °C	[1]	475	520	mV
I_R	reverse current	$V_R = 40$ V; pulsed; $T_j = 25$ °C	[1]	30	120	μ A

[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
PMEG040V050EPE-Q	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
PMEG040V050EPE-Q	040V U05E

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	$T_j = 25\text{ }^{\circ}\text{C}$		-	40	V
I_F	forward current	$\delta = 1; T_{sp} \leq 171\text{ }^{\circ}\text{C}$		-	7	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz; square wave; } T_{sp} \leq 172\text{ }^{\circ}\text{C}$		-	5	A
I_{FSM}	non-repetitive peak forward current	half sine-wave pulse; $t_p = 8.3\text{ ms; } T_{j(init)} = 25\text{ }^{\circ}\text{C}$		-	120	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[1]	-	1.66	W
			[2]	-	2.15	W
T_j	junction temperature			-	175	$^{\circ}\text{C}$
T_{amb}	ambient temperature			-55	175	$^{\circ}\text{C}$
T_{stg}	storage temperature			-65	175	$^{\circ}\text{C}$

[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 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]	-	-	3	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.

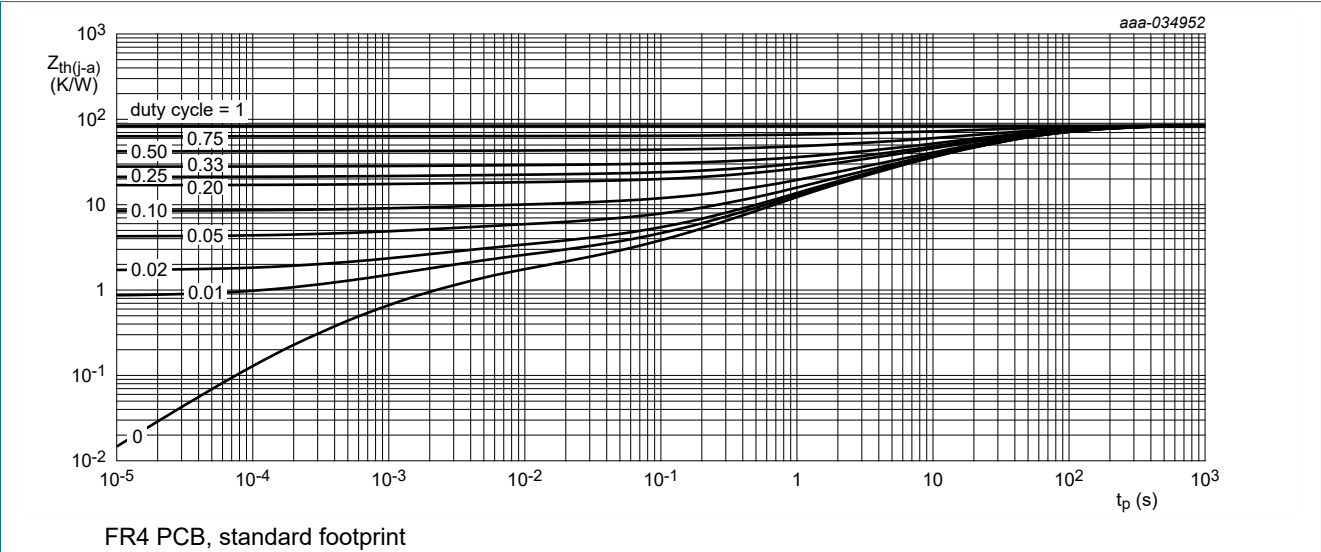


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

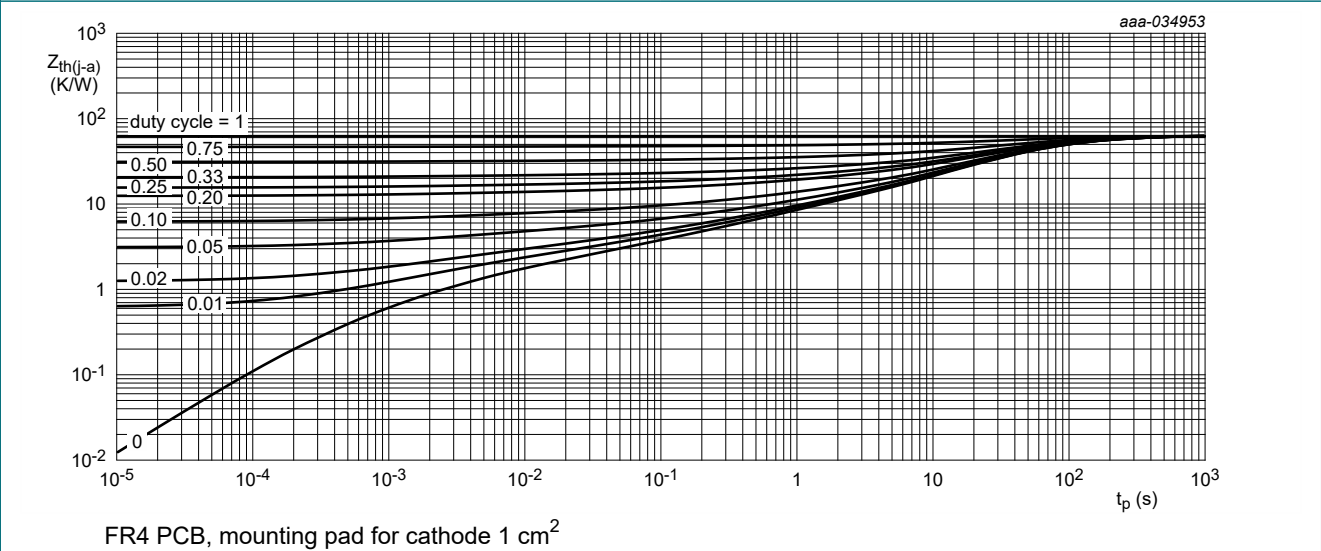


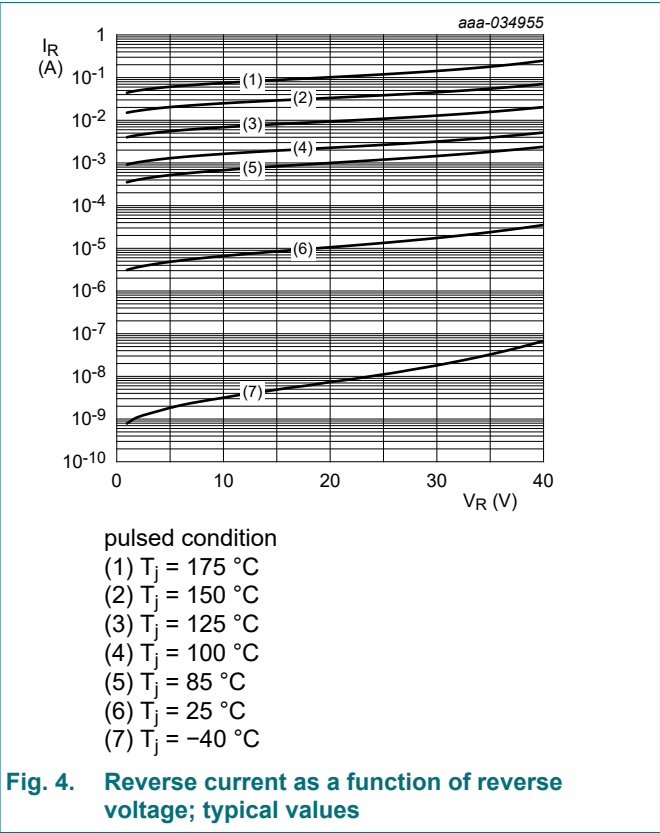
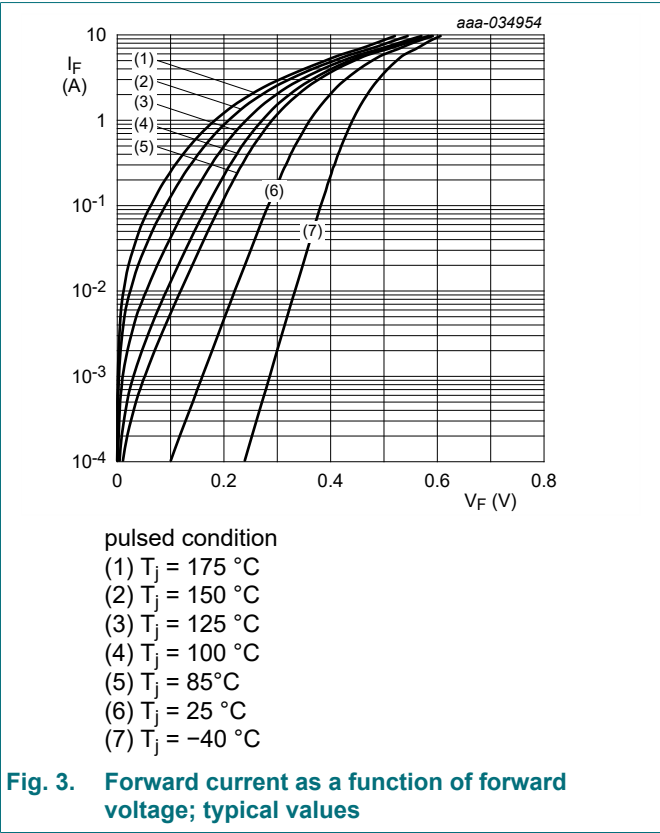
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 3\text{ mA}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	40	-	-	V
V_F	forward voltage	$I_F = 1\text{ A}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	360	420	mV
		$I_F = 3\text{ A}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	425	490	mV
		$I_F = 5\text{ A}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	475	520	mV
		$I_F = 5\text{ A}$; pulsed; $T_j = -40\text{ }^{\circ}\text{C}$	[1]	-	515	590	mV
		$I_F = 5\text{ A}$; pulsed; $T_j = 125\text{ }^{\circ}\text{C}$	[1]	-	415	480	mV
I_R	reverse current	$V_R = 40\text{ V}$; pulsed; $T_j = 25\text{ }^{\circ}\text{C}$	[1]	-	30	120	μA
C_d	diode capacitance	$V_R = 1\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	370	-	pF
		$V_R = 10\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	125	-	pF
t_{rr}	reverse recovery time step recovery	$I_F = 0.5\text{ A}$; $I_R = 0.5\text{ A}$; $I_{R(\text{meas})} = 0.1\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	12	-	ns
	reverse recovery time ramp recovery	$dI_F/dt = 100\text{ A}/\mu\text{s}$; $I_F = 3\text{ A}$; $V_R = 30\text{ V}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	11	-	ns
V_{FRM}	peak forward recovery voltage	$I_F = 0.5\text{ A}$; $dI_F/dt = 20\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^{\circ}\text{C}$		-	340	-	mV

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



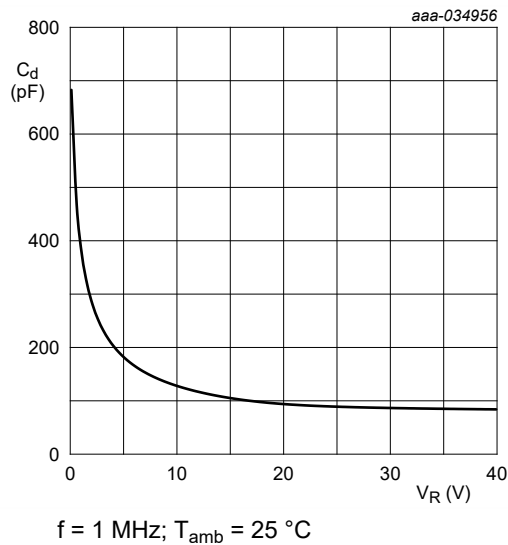


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

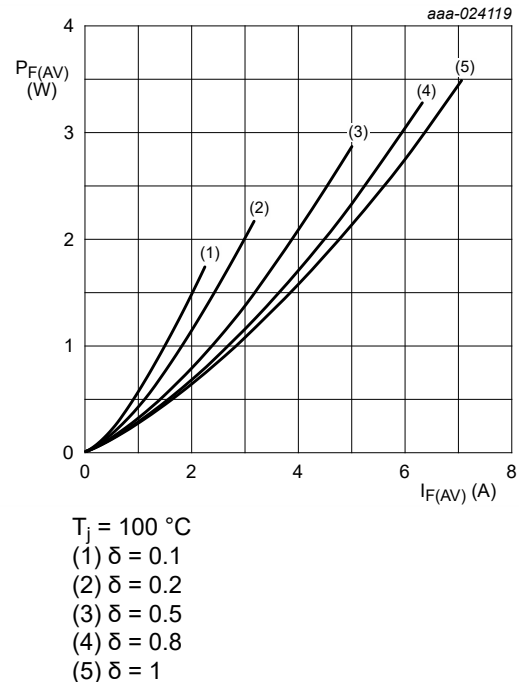


Fig. 6. Average forward power dissipation as a function of average forward current; typical values

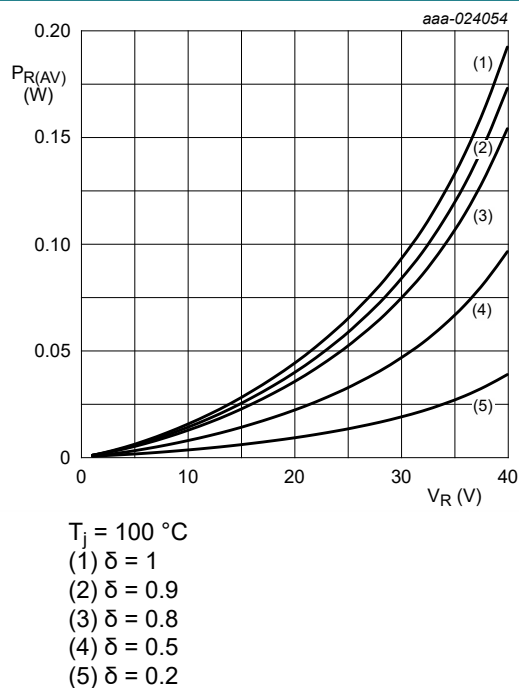


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

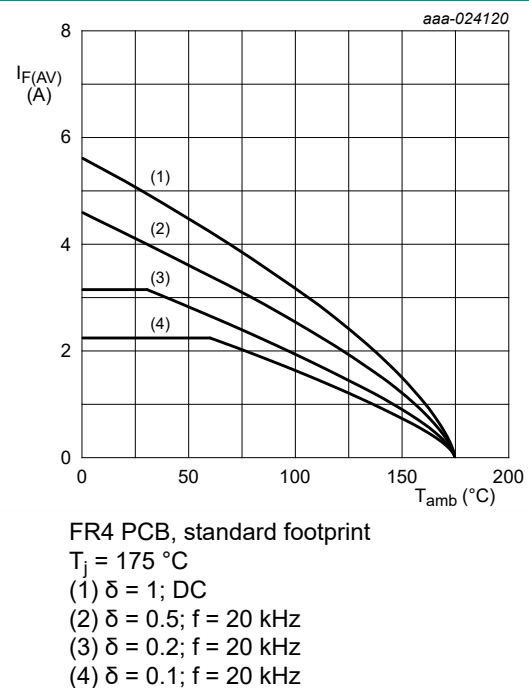
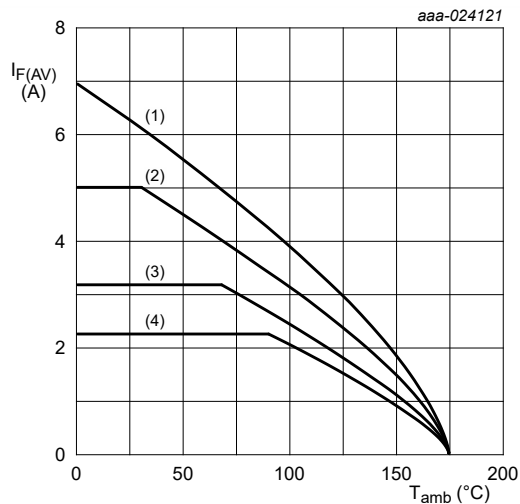
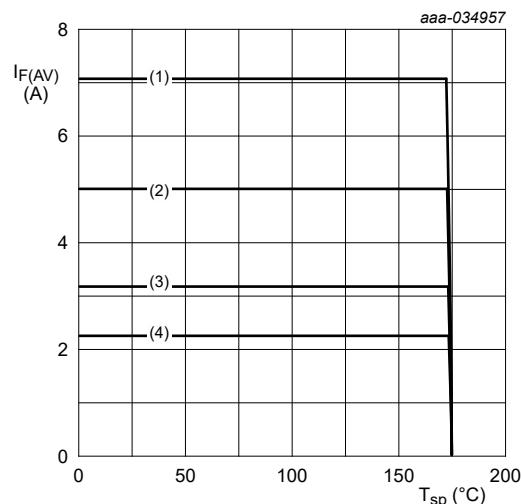


Fig. 8. Average forward current as a function of ambient temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 175$ °C
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20$ kHz
(3) $\delta = 0.2$; $f = 20$ kHz
(4) $\delta = 0.1$; $f = 20$ kHz

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



$T_j = 175$ °C
(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20$ kHz
(3) $\delta = 0.2$; $f = 20$ kHz
(4) $\delta = 0.1$; $f = 20$ kHz

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

11. Test information

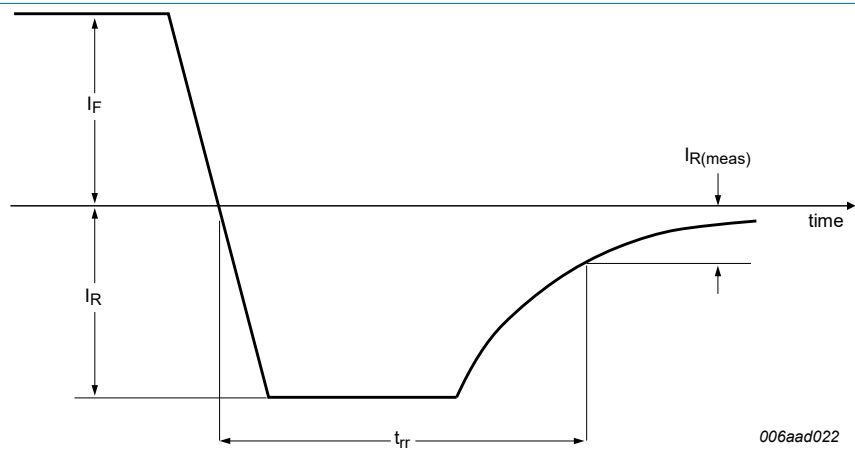


Fig. 11. Reverse recovery definition; step recovery

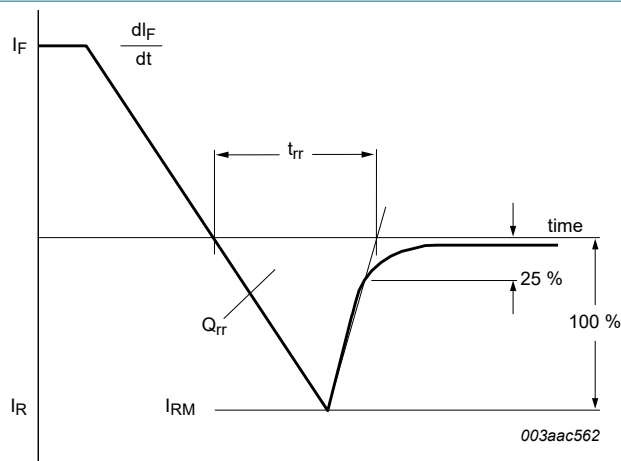


Fig. 12. Reverse recovery definition; ramp recovery

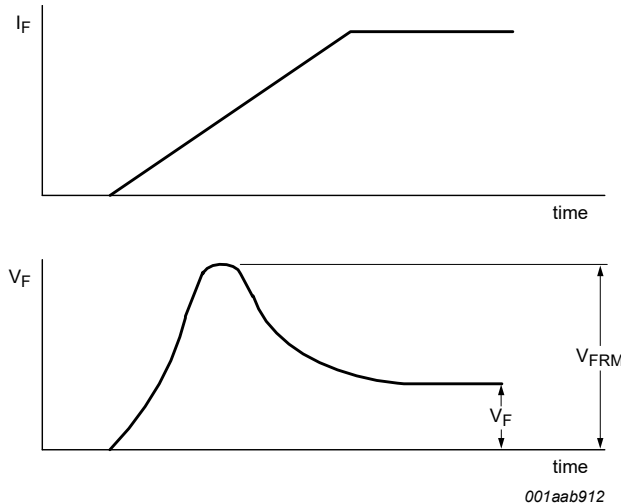


Fig. 13. Forward recovery definition

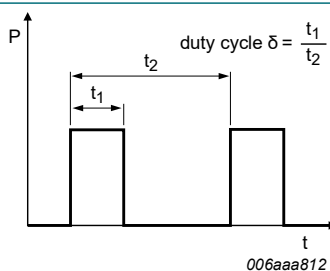


Fig. 14. Duty cycle definition

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

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

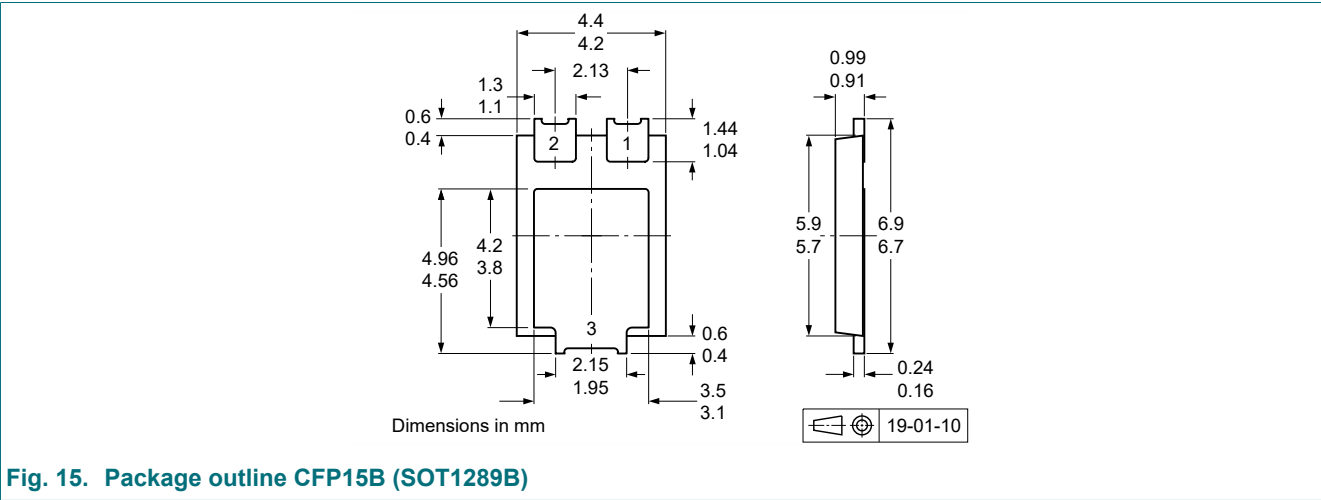
$$I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta}$$

with I_{RMS} defined as RMS current.

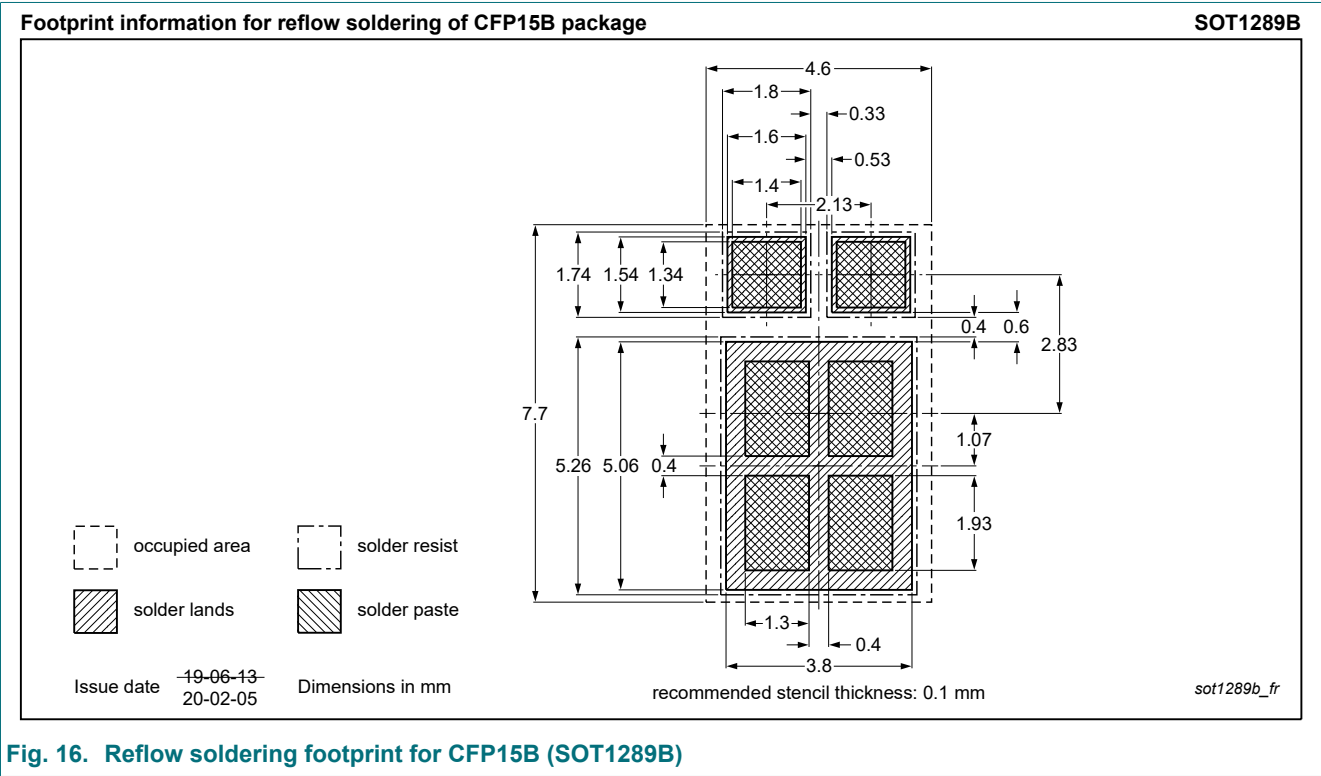
Quality information

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

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG040V050EPE-Q v.1	20220718	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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