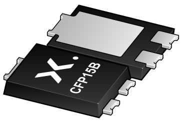


PMEG045T100EPE-Q

45 V, 10 A low VF Trench MEGA Schottky barrier rectifier

7 May 2021 Product 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

- Average forward current: $I_{F(AV)} \leq 10$ A
- Reverse voltage: $V_R \leq 45$ V
- Extremely low forward voltage
- High power capability due to clip-bonding technology and heat sink
- Small and thin SMD power plastic package, typical height 0.95 mm
- 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
- Freewheeling application
- Reverse polarity protection
- Low power consumption application

4. Quick reference data

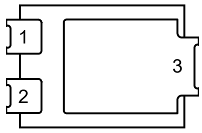
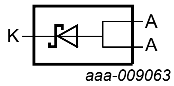
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	T_j = 25 °C		-	-	45	V
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; $T_{sp} \leq$ 142 °C		-	-	10	A
V_F	forward voltage	I_F = 10 A; T_j = 25 °C; pulsed	[1]	-	480	545	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C; pulsed	[1]	-	11	41	µA
		V_R = 45 V; T_j = 25 °C; pulsed	[1]	-	22	80	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	A	anode	 CFP15B (SOT1289B)	
2	A	anode		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG045T100EPE-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
PMEG045T100EPE-Q	045T M10E

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		-	45	V
I_F	forward current	δ = 1; T_{sp} ≤ 137 °C		-	14	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; T_{sp} ≤ 142 °C		-	10	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; square wave; $T_{j(init)}$ = 25 °C		-	130	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °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

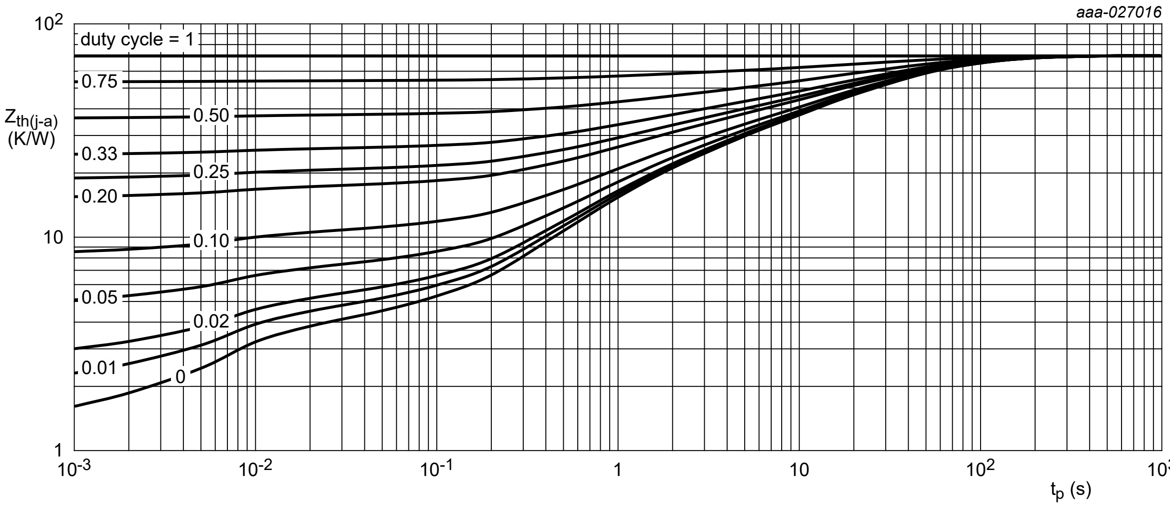
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

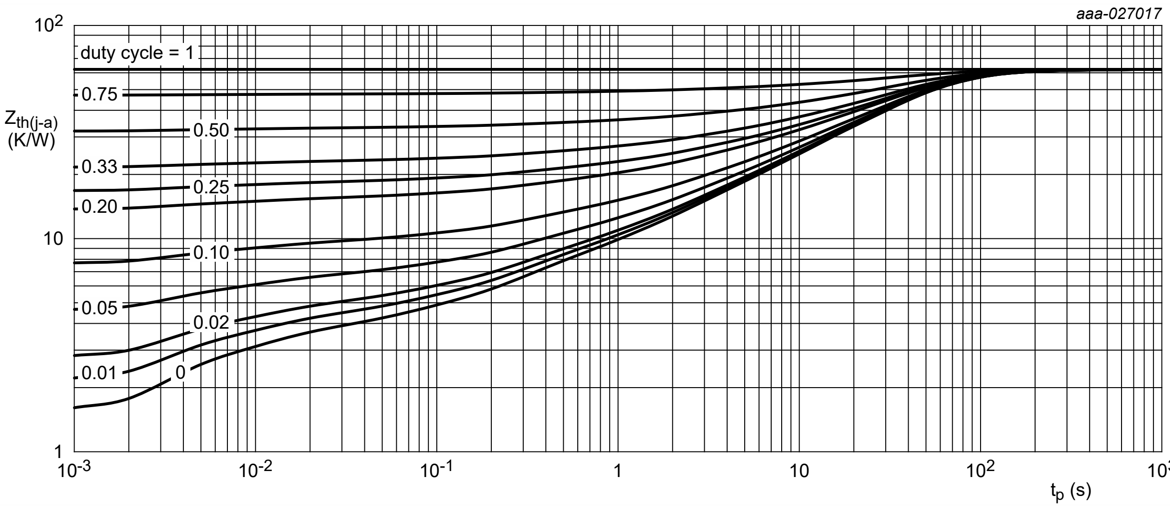
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	90	K/W
			[1] [3]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	3	K/W

[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 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

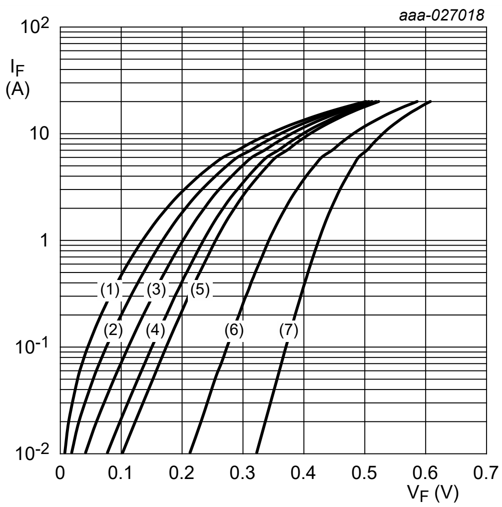
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

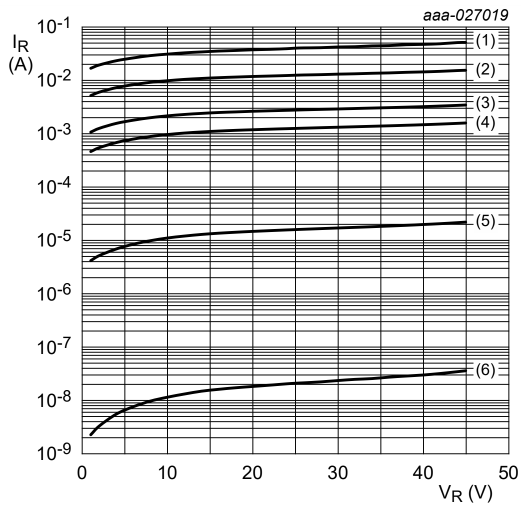
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	I_R = 1 mA; pulsed; T_j = 25 °C	[1]	45	-	-	V
V_F	forward voltage	I_F = 0.1 A; T_j = 25 °C; pulsed	[1]	-	275	-	mV
		I_F = 1 A; T_j = 25 °C; pulsed	[1]	-	340	385	mV
		I_F = 5 A; T_j = 25 °C; pulsed	[1]	-	415	475	mV
		I_F = 10 A; T_j = 25 °C; pulsed	[1]	-	480	545	mV
		I_F = 10 A; T_j = -40 °C; pulsed	[1]	-	530	-	mV
		I_F = 10 A; T_j = 125 °C; pulsed	[1]	-	380	-	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C; pulsed	[1]	-	11	41	μA
		V_R = 30 V; T_j = 25 °C; pulsed	[1]	-	17	-	μA
		V_R = 45 V; T_j = 25 °C; pulsed	[1]	-	22	80	μA
		V_R = 45 V; T_j = 125 °C; pulsed	[1]	-	15	-	mA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	1.4	-	nF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	0.6	-	nF
t_{rr}	reverse recovery time step recovery	I_F = 0.5 A; I_R = 0.5 A; $I_{R(meas)}$ = 0.1 A; T_j = 25 °C		-	40	-	ns
	reverse recovery time ramp recovery	dI_F/dt = 200 A/μs; I_F = 6 A; T_j = 25 °C		-	20	-	ns

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



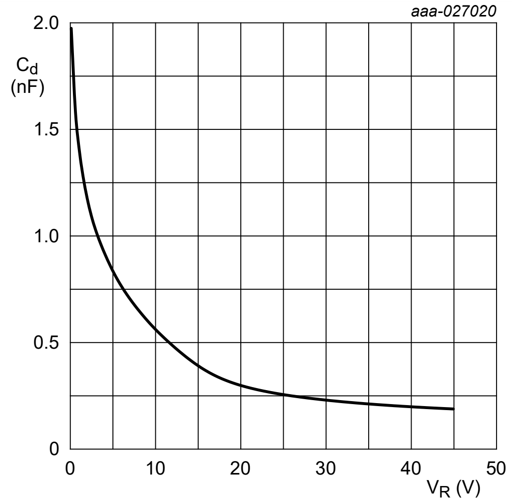
pulsed condition
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 100 °C
(5) T_j = 85 °C
(6) T_j = 25 °C
(7) T_j = −40 °C

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



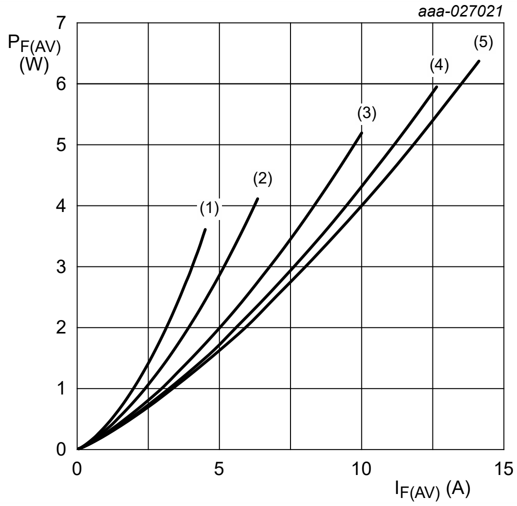
pulsed condition
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 100 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = −40 °C

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



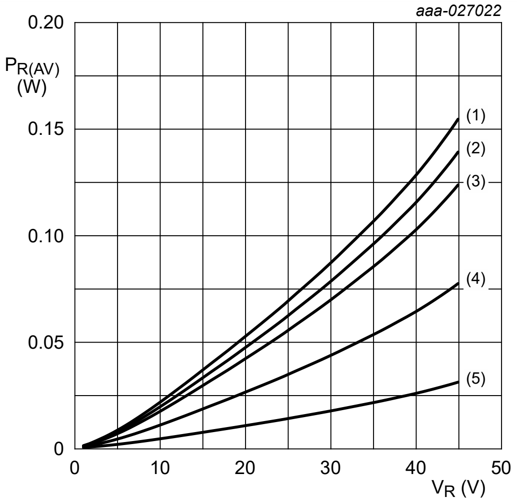
f = 1 MHz; T_{amb} = 25 °C

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



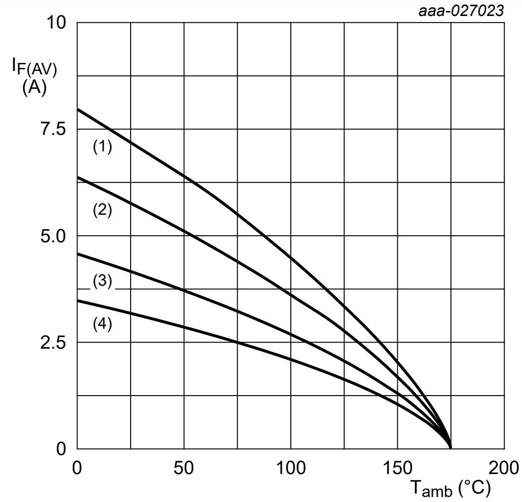
T_j = 100 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 0.8
(5) δ = 1; DC

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



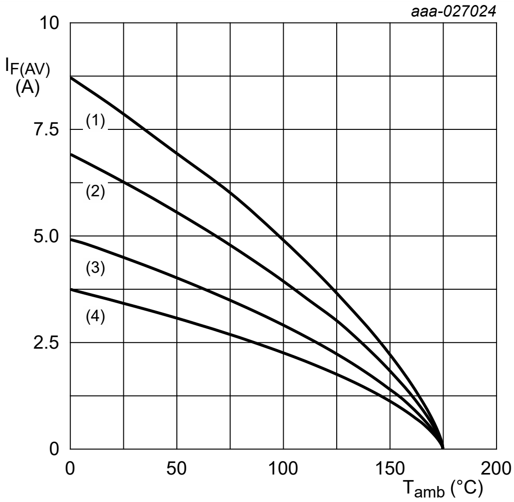
T_j = 100 °C
(1) δ = 1; DC
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5
(5) δ = 0.2

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



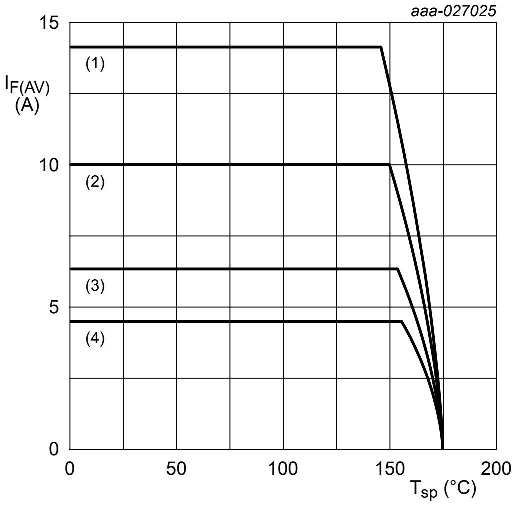
FR4 PCB, standard footprint
T_j = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



FR4 PCB, mounting pad for cathode 1 cm^2
T_j = 175 °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 = 175 °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

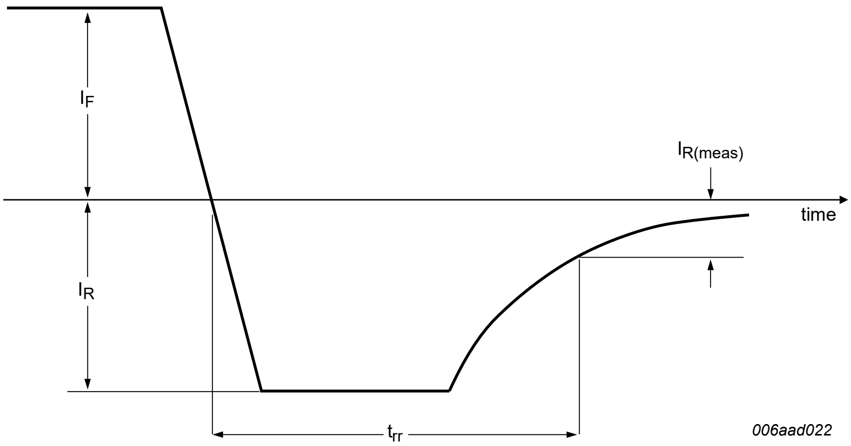


Fig. 11. Reverse recovery definition; step recovery

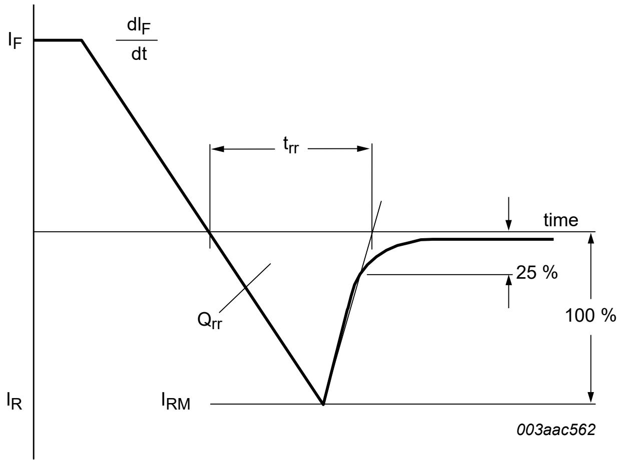


Fig. 12. Reverse recovery definition; ramp recovery

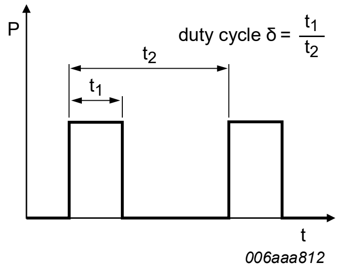


Fig. 13. Duty cycle definition

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

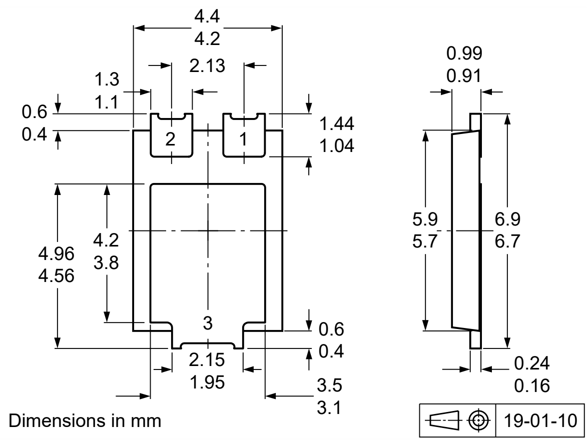


Fig. 14. Package outline CFP15B (SOT1289B)

13. Soldering

Footprint information for reflow soldering of CFP15B package **SOT1289B**

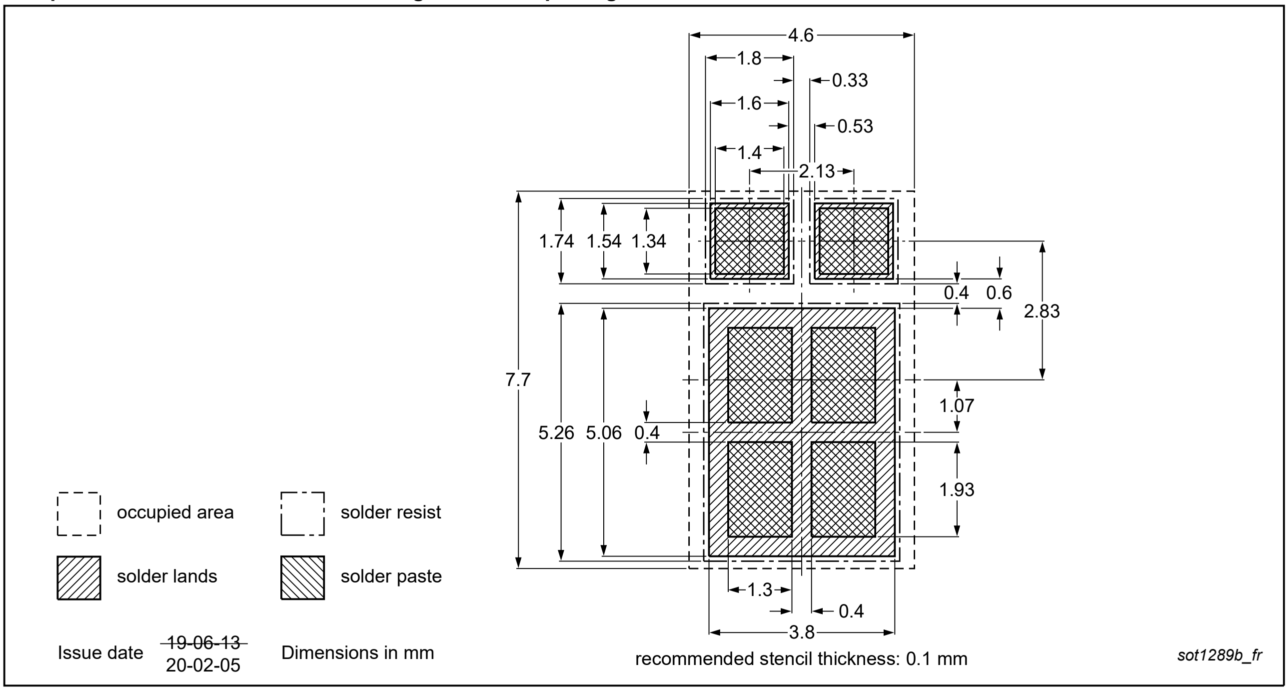


Fig. 15. Reflow soldering footprint for CFP15B (SOT1289B)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG045T100EPE-Q v.2	20210507	Product data sheet	-	PMEG045T100EPE-Q v.1
Modifications:	• Features and benefits: added recommendation for automotive applications			
PMEG045T100EPE-Q v.1	20210303	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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