



# PTVSxP1BPL series

600 W Transient Voltage Suppressor

5 August 2024

Product data sheet

## 1. General description

600 W bi-directional Transient Voltage Suppressor (TVS) in a CFP5-FL (SOD128FL) small and flat lead Surface-Mounted Device (SMD) plastic package, designed for transient voltage protection.

## 2. Features and benefits

- Rated peak pulse power at 10/1000  $\mu$ s waveform:  $P_{PPM} = 600$  W
- Reverse standoff voltage:  $V_{RWM} = 9$  V to 160 V
- Very low package height: 1 mm
- Excellent clamping capability
- Small plastic package suitable for surface-mounted design
- Reverse current:  $I_{RM} < 1$   $\mu$ A for  $V_{RWM} \geq 11$ V

## 3. Applications

- Power supply protection
- Power management
- Telecom, Computer, Industrial and Consumer electronics application

## 4. Quick reference data


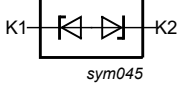
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25$ °C		9	-	160	V
$P_{PPM}$	rated peak pulse power	$t_p = 10/1000$ $\mu$ s; $T_{amb} = 25$ °C	[1]	-	-	600	W

[1] In accordance with IEC 61643-321 (10/1000  $\mu$ s current waveform).

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode 1	 <p>Transparent top view</p> <p><b>CFP5-FL (SOD128FL-1)</b></p>	 <p>sym045</p>
2	K2	cathode 2		

## 6. Ordering information

Table 3. Ordering information

Type number <sup>[1]</sup>	Package		
	Name	Description	Version
PTVSXP1BPL series	CFP5-FL	Plastic, surface mounted package; 2 terminals; 4.275 mm x 2.6 mm x 1 mm body	SOD128FL-1

[1] The series consists of 38 types with reverse standoff voltages from 9 V to 160 V.

## 7. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code
PTVS9V0P1BPL	F3	PTVS43VP1BPL	FN
PTVS10VP1BPL	F4	PTVS45VP1BPL	FP
PTVS11VP1BPL	F5	PTVS48VP1BPL	FR
PTVS12VP1BPL	F6	PTVS51VP1BPL	FS
PTVS13VP1BPL	F7	PTVS54VP1BPL	FT
PTVS14VP1BPL	F8	PTVS58VP1BPL	FU
PTVS15VP1BPL	F9	PTVS60VP1BPL	FV
PTVS16VP1BPL	FA	PTVS64VP1BPL	FW
PTVS17VP1BPL	FB	PTVS70VP1BPL	FY
PTVS18VP1BPL	FC	PTVS75VP1BPL	G2
PTVS20VP1BPL	FD	PTVS78VP1BPL	G3
PTVS22VP1BPL	FE	PTVS85VP1BPL	G4
PTVS24VP1BPL	FF	PTVS90VP1BPL	G5
PTVS26VP1BPL	FG	PTVS100VP1BPL	G6
PTVS28VP1BPL	FH	PTVS110VP1BPL	G7
PTVS30VP1BPL	FJ	PTVS120VP1BPL	G8
PTVS33VP1BPL	FK	PTVS130VP1BPL	G9
PTVS36VP1BPL	FL	PTVS150VP1BPL	GA
PTVS40VP1BPL	FM	PTVS160VP1BPL	GB

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per diode</b>						
$P_{PPM}$	rated peak pulse power	$t_p = 10/1000 \mu s$	[1]	-	600	W
$I_{PPM}$	rated peak pulse current	$t_p = 10/1000 \mu s$	[1]	-	see table 8	A
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-55	150	°C

[1] In accordance with IEC 61643-321 (10/1000  $\mu s$  current waveform).

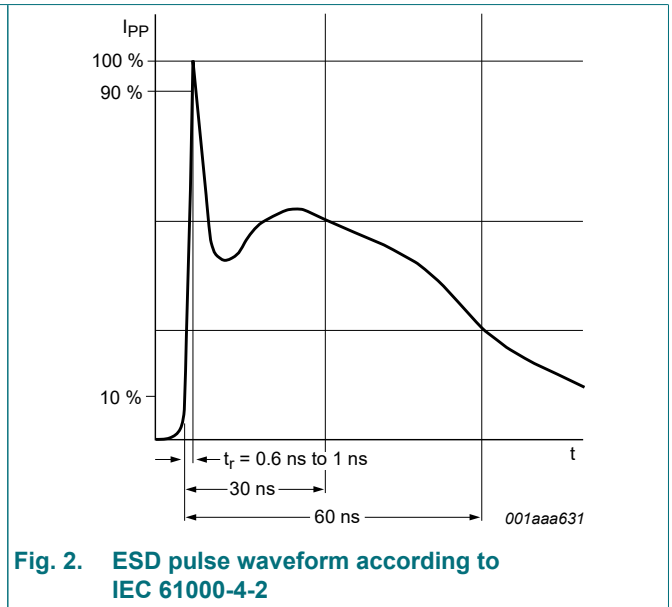
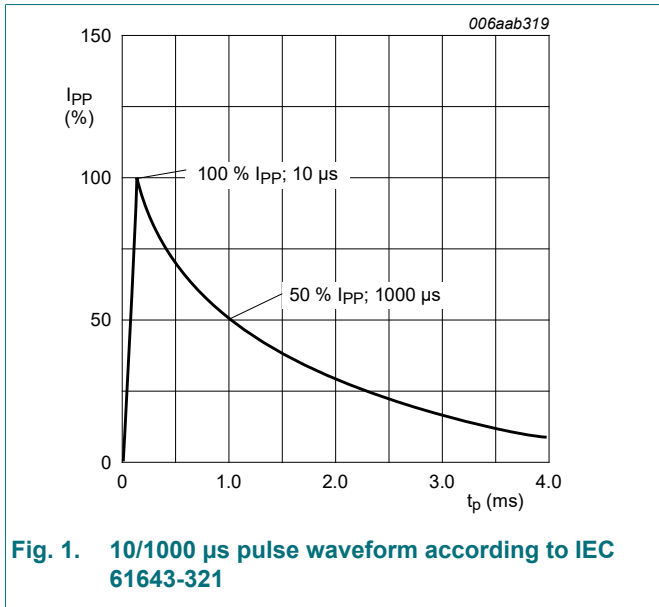
**Table 6. ESD maximum ratings**

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per diode</b>						
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2; contact discharge; $T_{amb} = 25^\circ C$	[1]	-	30	kV

[1] Device stressed with ten non-repetitive ESD pulses.

**Table 7. ESD standards compliance**

Standard	
<b>Per diode</b>	
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3 (human body model)	> 4kV



## 9. Characteristics

**Table 8. Characteristics per type**

$T_{amb} = 25^{\circ}\text{C}$  unless otherwise specified.

Type number	Reverse standoff voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}$ (V) at test current $I_T$			Reverse leakage current $I_{RM}$ at $V_{RWM}$ ( $\mu\text{A}$ )	Test current $I_T$ (mA)	Clamping voltage $V_{CL}$ (V)	
		Max	Min	Typ			Max	Max
PTVS9V0P1BPL	9.0	10.00	10.55	11.10	10	1	15.4	39.0
PTVS10VP1BPL	10	11.10	11.70	12.30	5	1	17.0	35.3
PTVS11VP1BPL	11	12.20	12.85	13.50	1	1	18.2	33.0
PTVS12VP1BPL	12	13.30	14.00	14.70	1	1	19.9	30.2
PTVS13VP1BPL	13	14.40	15.15	15.90	1	1	21.5	28.0
PTVS14VP1BPL	14	15.60	16.40	17.20	1	1	23.2	25.9
PTVS15VP1BPL	15	16.70	17.60	18.50	1	1	24.4	24.6
PTVS16VP1BPL	16	17.80	18.75	19.70	1	1	26.0	23.1
PTVS17VP1BPL	17	18.90	19.90	20.90	1	1	27.6	21.8
PTVS18VP1BPL	18	20.00	21.05	22.10	1	1	29.2	20.6
PTVS20VP1BPL	20	22.20	23.35	24.50	1	1	32.4	18.6
PTVS22VP1BPL	22	24.40	25.65	26.90	1	1	35.5	16.9
PTVS24VP1BPL	24	26.70	28.10	29.50	1	1	38.9	15.5
PTVS26VP1BPL	26	28.90	30.40	31.90	1	1	42.1	14.3
PTVS28VP1BPL	28	31.10	32.75	34.40	1	1	45.4	13.3
PTVS30VP1BPL	30	33.30	35.05	36.80	1	1	48.4	12.4
PTVS33VP1BPL	33	36.70	38.65	40.60	1	1	53.3	11.3
PTVS36VP1BPL	36	40.00	42.10	44.20	1	1	58.1	10.4
PTVS40VP1BPL	40	44.40	46.75	49.10	1	1	64.5	9.3
PTVS43VP1BPL	43	47.80	50.30	52.80	1	1	69.4	8.7
PTVS45VP1BPL	45	50.00	52.65	55.30	1	1	72.7	8.3
PTVS48VP1BPL	48	53.30	56.10	58.90	1	1	77.4	7.8
PTVS51VP1BPL	51	56.70	59.70	62.70	1	1	82.4	7.3
PTVS54VP1BPL	54	60.00	63.15	66.30	1	1	87.1	6.9
PTVS58VP1BPL	58	64.40	67.80	71.20	1	1	93.6	6.5
PTVS60VP1BPL	60	66.70	70.20	73.70	1	1	96.8	6.2
PTVS64VP1BPL	64	71.10	74.85	78.60	1	1	103.0	5.9
PTVS70VP1BPL	70	77.80	81.90	86.00	1	1	113.0	5.3
PTVS75VP1BPL	75	83.30	87.70	92.10	1	1	121.0	5.0
PTVS78VP1BPL	78	86.70	91.25	95.80	1	1	126.0	4.8
PTVS85VP1BPL	85	94.40	99.20	104.0	1	1	137.0	4.4
PTVS90VP1BPL	90	100.0	105.5	111.0	1	1	146.0	4.1
PTVS100VP1BPL	100	111.0	117.0	123.0	1	1	162.0	3.7
PTVS110VP1BPL	110	122.0	128.5	135.0	1	1	177.0	3.4
PTVS120VP1BPL	120	133.0	140.0	147.0	1	1	193.0	3.1
PTVS130VP1BPL	130	144.0	151.5	159.0	1	1	209.0	2.9

Type number	Reverse standoff voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}$ (V) at test current $I_T$			Reverse leakage current $I_{RM}$ at $V_{RWM}$ ( $\mu A$ )	Test current $I_T$ (mA)	Clamping voltage $V_{CL}$ (V)	
		Max	Min	Typ			Max	$I_{PPM}$ (A)
PTVS150VP1BPL	150	167.0	176.0	185.0	1	1	243.0	2.5
PTVS160VP1BPL	160	178.0	187.5	197.0	1	1	259.0	2.3

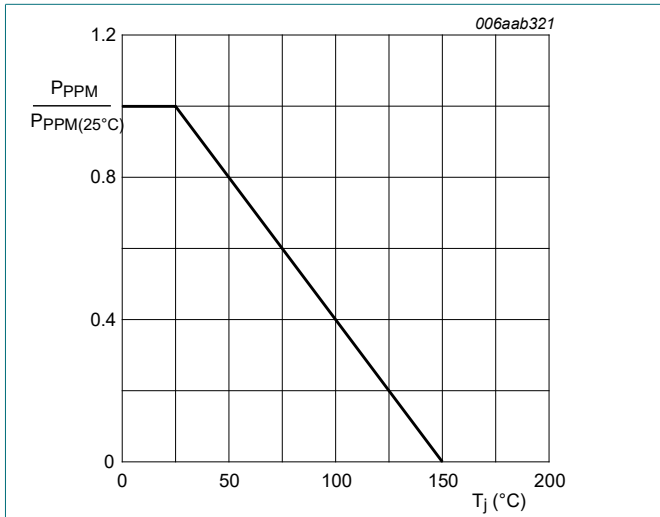


Fig. 3. Relative variation of rated peak pulse power as a function of junction temperature; typical values

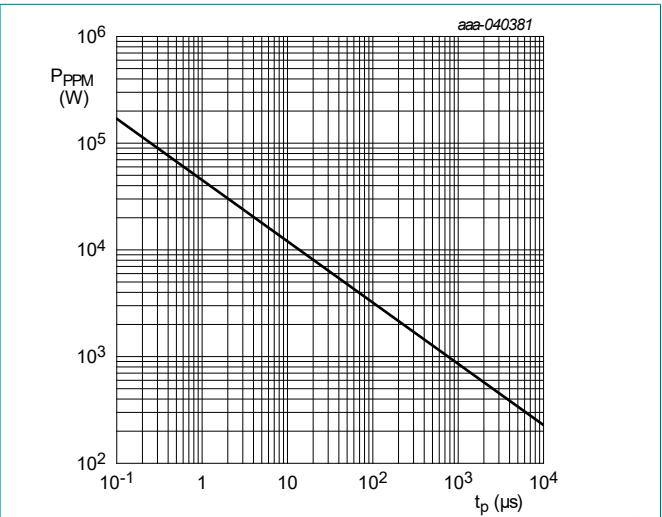
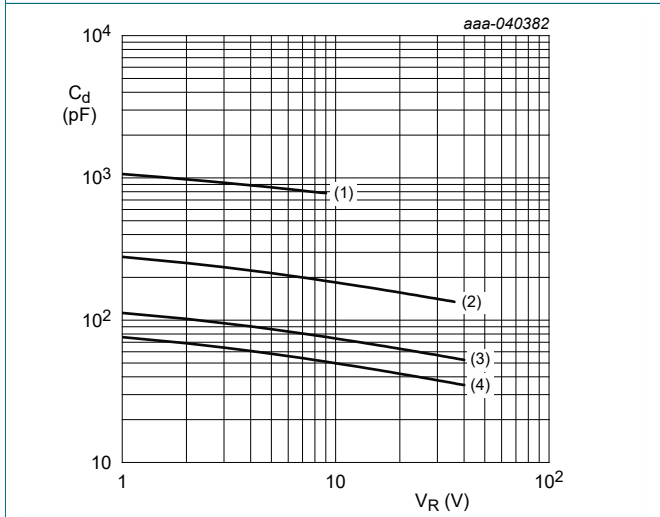


Fig. 4. Peak pulse power as a function of pulse duration; typical values [1] [2] [3]



$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$   
 (1) PTVS9V0P1BPL  
 (2) PTVS36VP1BPL  
 (3) PTVS100VP1BPL  
 (4) PTVS160VP1BPL

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

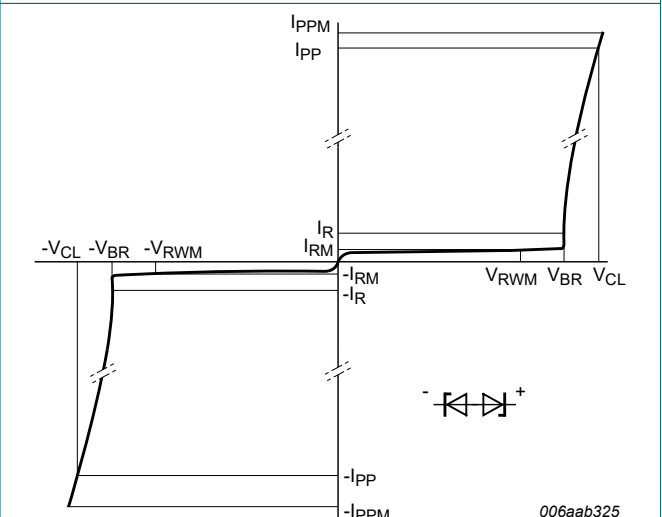


Fig. 6. V-I characteristics for a bidirectional TVS protection diode

[1] Peak pulse power derating curve derived from typical measured values using 8/20  $\mu s$  and 10/1000  $\mu s$  waveforms.  
 [2] In accordance with IEC 61000-4-5 (8/20  $\mu s$  waveforms).  
 [3] In accordance with IEC 61643-321 (10/1000  $\mu s$  waveforms).

10. Package outline

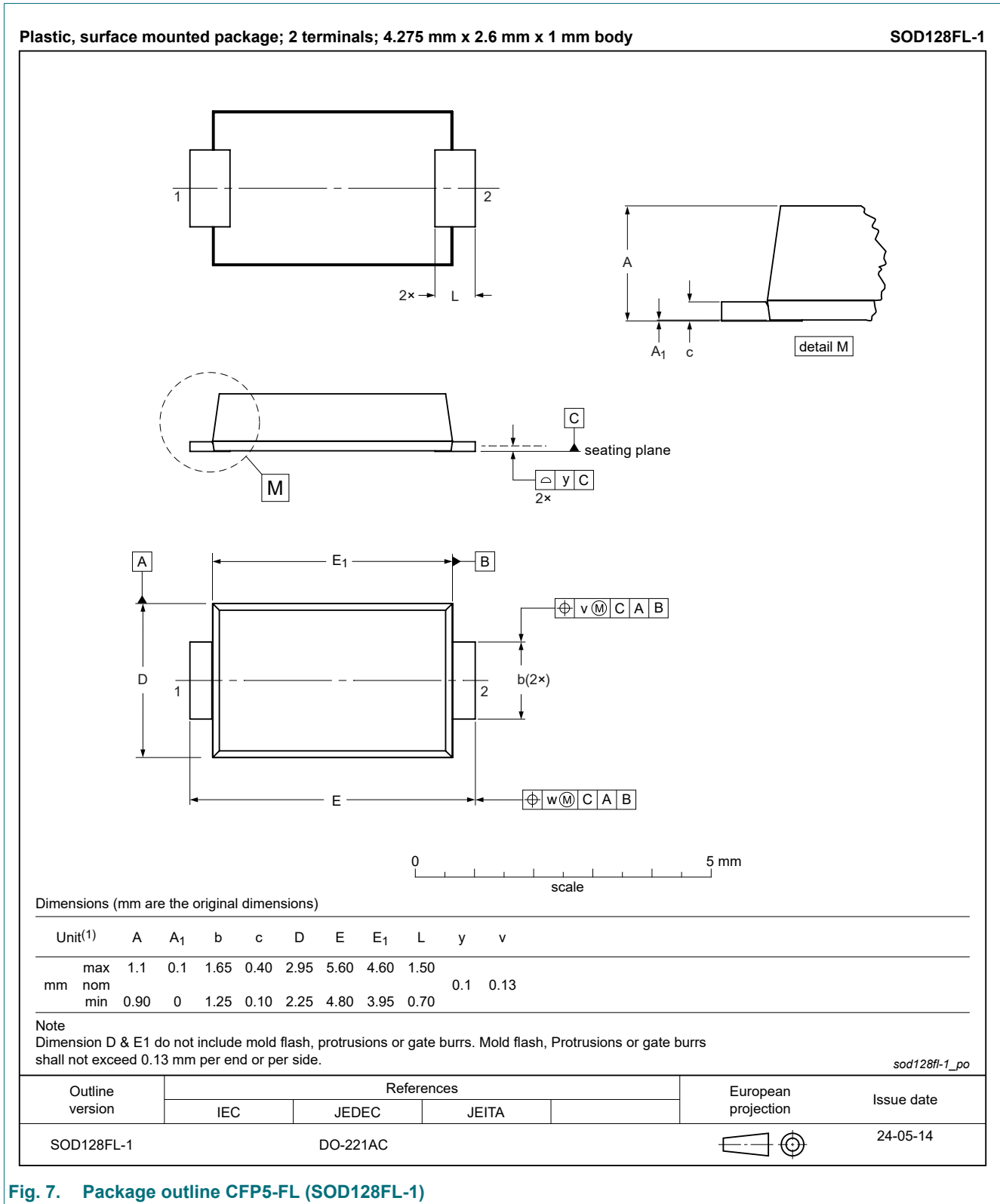
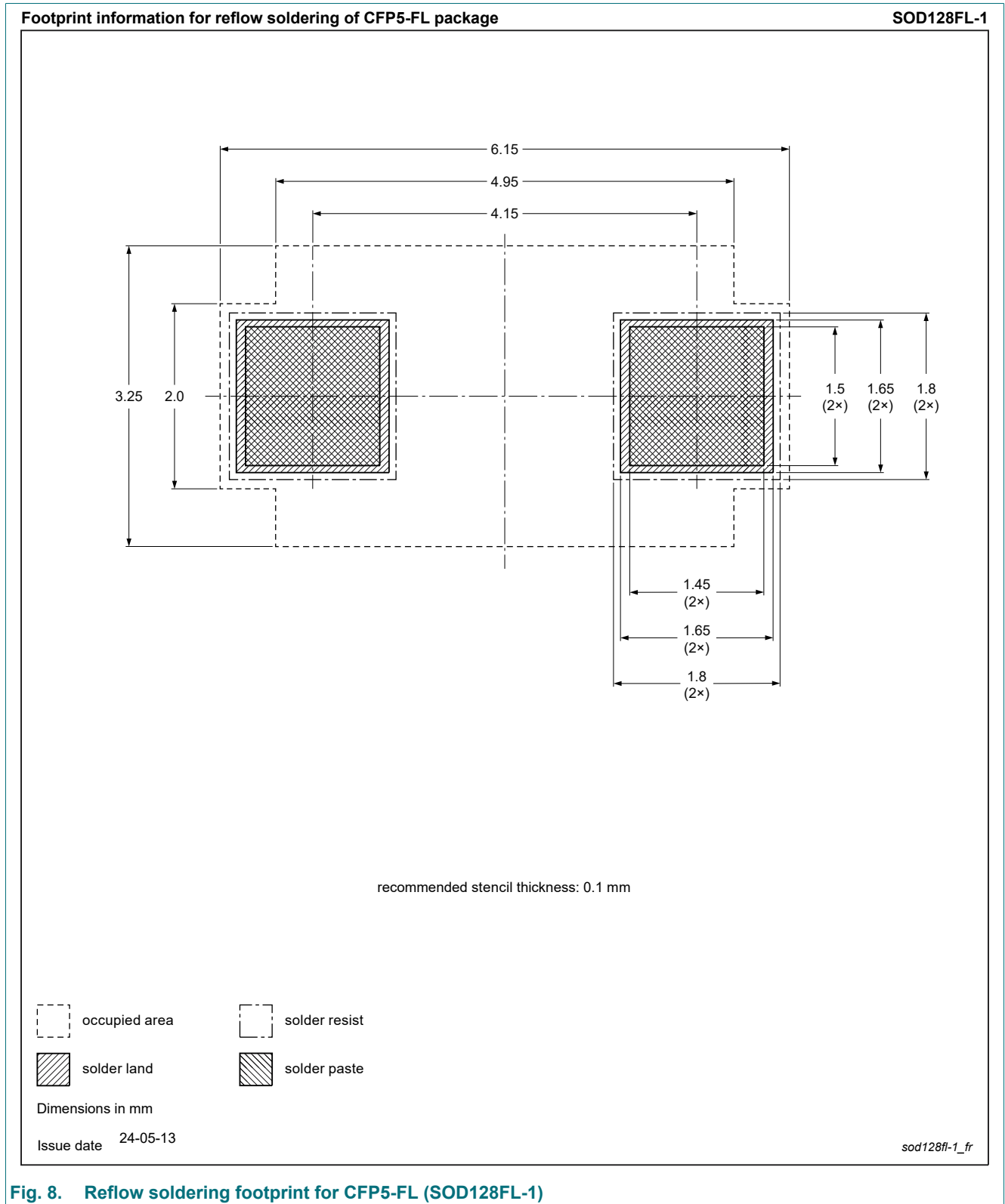


Fig. 7. Package outline CFP5-FL (SOD128FL-1)

## 11. Soldering



**Fig. 8. Reflow soldering footprint for CFP5-FL (SOD128FL-1)**

## 12. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PTVSxP1BPL_SER v.1	20240805	Product data sheet	-	-



## 13. Legal information

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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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