P4SMA series

400 W Transient Voltage Suppressor

2 January 2025 **Product data sheet**

1. General description

400 W uni- and bi-directional Transient Voltage Suppressor (TVS) in a SMA Surface-Mounted Device (SMD) plastic package, designed for transient voltage protection.

2. Features and benefits

- Rated peak pulse power at 10/1000 µs waveform: P_{PPM} = 400 W
- Reverse standoff voltage: V_{RWM} = 7.02 V to 214 V
- Reverse current: I_R less than 1 µA for $V_{RWM} \geq 11.1$ V
- Excellent clamping capability
- Small plastic package suitable for surface-mounted design

3. Applications

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

4. Quick reference data

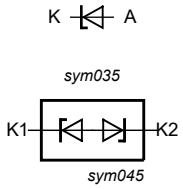
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		7.02	-	214	V
P_{PPM}	rated peak pulse power	t_p = 10/1000 µs; T_{amb} = 25 °C	[1]	-	-	400	W

[1] In accordance with IEC 61643-321 (10/1000 µs current waveform).

5. Pinning information

Table 2. Pinning information

Pin	Description uni-directional	Description bi-directional	Simplified outline	Graphic symbol
1	cathode [1] [2]	cathode 1	 Transparent top view **SMA (SOD1001-1)**	
2	anode	cathode 2		

[1] The marking bar indicates the cathode for uni-directional device.
[2] Marking bar is used for uni-directional device only.

6. Ordering information

Table 3. Ordering information

Type number[1]	Package		
	Name	Description	Version
P4SMA series	SMA	plastic, surface mounted package; 2 terminals; 4.30 mm x 2.65 mm x 2.10 mm body	SOD1001-1

[1] The series consists of 74 types with reverse standoff voltages from 7.02 V to 214 V.

7. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code
P4SMAJ8.2A	CA2	P4SMAJ8.2CA	CE7
P4SMAJ9.1A	CA3	P4SMAJ9.1CA	CE8
P4SMAJ10A	CA4	P4SMAJ10CA	CE9
P4SMAJ11A	CA5	P4SMAJ11CA	CF2
P4SMAJ12A	CA6	P4SMAJ12CA	CF3
P4SMAJ13A	CA7	P4SMAJ13CA	CF4
P4SMAJ15A	CA8	P4SMAJ15CA	CF5
P4SMAJ16A	CA9	P4SMAJ16CA	CF6
P4SMAJ18A	CB2	P4SMAJ18CA	CF7
P4SMAJ20A	CB3	P4SMAJ20CA	CF8
P4SMAJ22A	CB4	P4SMAJ22CA	CF9
P4SMAJ24A	CB5	P4SMAJ24CA	CG2
P4SMAJ27A	CB6	P4SMAJ27CA	CG3
P4SMAJ30A	CB7	P4SMAJ30CA	CG4
P4SMAJ33A	CB8	P4SMAJ33CA	CG5
P4SMAJ36A	CB9	P4SMAJ36CA	CG6
P4SMAJ39A	CC2	P4SMAJ39CA	CG7
P4SMAJ43A	CC3	P4SMAJ43CA	CG8
P4SMAJ47A	CC4	P4SMAJ47CA	CG9

Type number	Marking code	Type number	Marking code
P4SMAJ51A	CC5	P4SMAJ51CA	CH2
P4SMAJ56A	CC6	P4SMAJ56CA	CH3
P4SMAJ62A	CC7	P4SMAJ62CA	CH4
P4SMAJ68A	CC8	P4SMAJ68CA	CH5
P4SMAJ75A	CC9	P4SMAJ75CA	CH6
P4SMAJ82A	CD2	P4SMAJ82CA	CH7
P4SMAJ91A	CD3	P4SMAJ91CA	CH8
P4SMAJ100A	CD4	P4SMAJ100CA	CH9
P4SMAJ110A	CD5	P4SMAJ110CA	CJ2
P4SMAJ120A	CD6	P4SMAJ120CA	CJ3
P4SMAJ130A	CD7	P4SMAJ130CA	CJ4
P4SMAJ150A	CD8	P4SMAJ150CA	CJ5
P4SMAJ160A	CD9	P4SMAJ160CA	CJ6
P4SMAJ170A	CE2	P4SMAJ170CA	CJ7
P4SMAJ180A	CE3	P4SMAJ180CA	CJ8
P4SMAJ200A	CE4	P4SMAJ200CA	CJ9
P4SMAJ220A	CE5	P4SMAJ220CA	CK2
P4SMAJ250A	CE6	P4SMAJ250CA	CK3

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
P_{PPM}	rated peak pulse power	t_p = 10/1000 µs	[1]	-	400	W
I_{PPM}	rated peak pulse current	t_p = 10/1000 µs	[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 µs current waveform).

Table 6. ESD maximum ratings

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2; contact discharge; T_{amb} = 25°C	[1]	-	30	kV

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

Table 7. ESD standards compliance

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

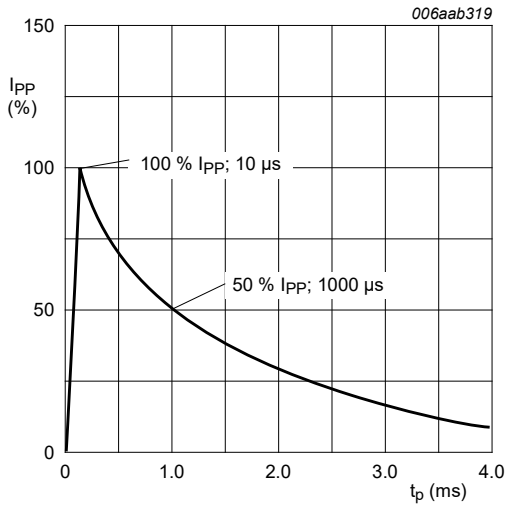


Fig. 1. 10/1000 µs pulse waveform according to IEC 61643-321

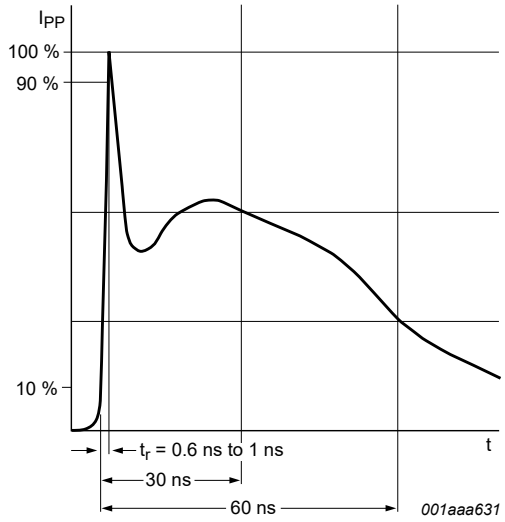


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 8. Characteristics per type;

T_{amb} = 25°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} (μA) [1]	Test current I_T (mA)	Clamping voltage V_{CL} (V)	
uni-directional	bi-directional	Max	Min	Typ	Max	Max		Max	I_{PPM} (A)
P4SMA8.2A	P4SMA8.2CA	7.02	7.79	8.20	8.61	200/400	10	12.1	33.9
P4SMA9.1A	P4SMA9.1CA	7.78	8.65	9.10	9.55	50/100	1	13.4	30.6
P4SMA10A	P4SMA10CA	8.55	9.50	10.0	10.5	10/20	1	14.5	28.3
P4SMA11A	P4SMA11CA	9.40	10.5	11.0	11.6	5/10	1	15.6	26.3
P4SMA12A	P4SMA12CA	10.20	11.4	12.0	12.6	5/10	1	16.7	24.6
P4SMA13A	P4SMA13CA	11.10	12.4	13.0	13.7	1	1	18.2	22.5
P4SMA15A	P4SMA15CA	12.80	14.3	15.0	15.8	1	1	21.2	19.3
P4SMA16A	P4SMA16CA	13.60	15.2	16.0	16.8	1	1	22.5	18.2
P4SMA18A	P4SMA18CA	15.30	17.1	18.0	18.9	1	1	25.5	16.1
P4SMA20A	P4SMA20CA	17.10	19.0	20.0	21.0	1	1	27.7	14.8
P4SMA22A	P4SMA22CA	18.80	20.9	22.0	23.1	1	1	30.6	13.4
P4SMA24A	P4SMA24CA	20.50	22.8	24.0	25.2	1	1	33.2	12.3
P4SMA27A	P4SMA27CA	23.10	25.7	27.0	28.4	1	1	37.5	10.9
P4SMA30A	P4SMA30CA	25.60	28.5	30.0	31.5	1	1	41.4	9.9
P4SMA33A	P4SMA33CA	28.20	31.4	33.0	34.7	1	1	45.7	9.0
P4SMA36A	P4SMA36CA	30.80	34.2	36.0	37.8	1	1	49.9	8.2
P4SMA39A	P4SMA39CA	33.30	37.1	39.0	41.0	1	1	53.9	7.6
P4SMA43A	P4SMA43CA	36.80	40.9	43.0	45.2	1	1	59.3	6.9
P4SMA47A	P4SMA47CA	40.20	44.7	47.0	49.4	1	1	64.8	6.3
P4SMA51A	P4SMA51CA	43.60	48.5	51.0	53.6	1	1	70.1	5.8
P4SMA56A	P4SMA56CA	47.80	53.2	56.0	58.8	1	1	77.0	5.3
P4SMA62A	P4SMA62CA	53.00	58.9	62.0	65.1	1	1	85.0	4.8
P4SMA68A	P4SMA68CA	58.10	64.6	68.0	71.4	1	1	92.0	4.5
P4SMA75A	P4SMA75CA	64.10	71.3	75.0	78.8	1	1	103.0	4.0
P4SMA82A	P4SMA82CA	70.10	77.9	82.0	86.1	1	1	113.0	3.6
P4SMA91A	P4SMA91CA	77.80	86.5	91.0	95.5	1	1	125.0	3.3
P4SMA100A	P4SMA100CA	85.50	95.00	100.0	105.0	1	1	137.0	3.0
P4SMA110A	P4SMA110CA	94.00	105.0	110.0	116.0	1	1	152.0	2.7
P4SMA120A	P4SMA120CA	102.00	114.0	120.0	126.0	1	1	165.0	2.5
P4SMA130A	P4SMA130CA	111.00	124.0	130.0	137.0	1	1	179.0	2.3
P4SMA150A	P4SMA150CA	128.00	143.0	150.0	158.0	1	1	207.0	2.0
P4SMA160A	P4SMA160CA	136.00	152.0	160.0	168.0	1	1	219.0	1.9
P4SMA170A	P4SMA170CA	145.00	162.0	170.0	179.0	1	1	234.0	1.8
P4SMA180A	P4SMA180CA	154.00	171.0	180.0	189.0	1	1	246.0	1.7
P4SMA200A	P4SMA200CA	171.00	190.0	200.0	210.0	1	1	274.0	1.5

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} (μA) [1]	Test current I_T (mA)	Clamping voltage V_{CL} (V)	
uni-directional	bi-directional	Max	Min	Typ	Max	Max		Max	I_{PPM} (A)
P4SMA220A	P4SMA220CA	185.00	209.0	220.0	231.0	1	1	328.0	1.3
P4SMA250A	P4SMA250CA	214.00	237.0	250.0	263.0	1	1	344.0	1.2

[1] I_{RM} Max. is doubled for bi-directional type with $V_{RWM} \leq 10.2$ V

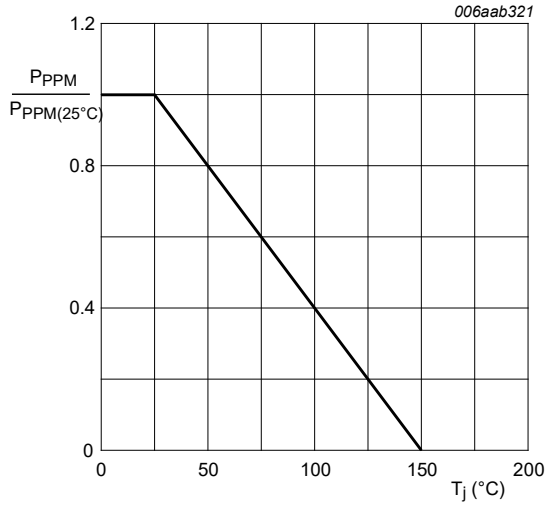
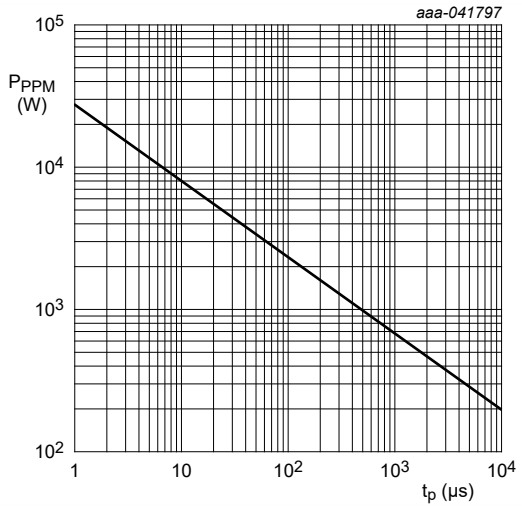


Fig. 3. Relative variation of rated peak pulse power as a function of junction temperature; typical values



[1][2][3]

T_{amb} = 25 °C

Fig. 4. Peak pulse power as a function of pulse duration; typical values

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

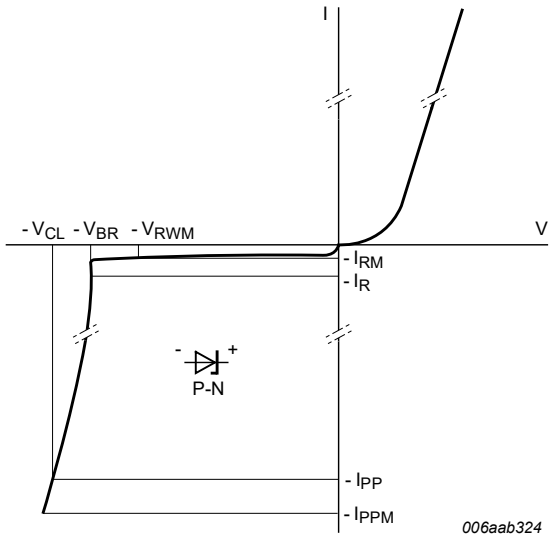


Fig. 5. V-I characteristics for a unidirectional TVS protection diode

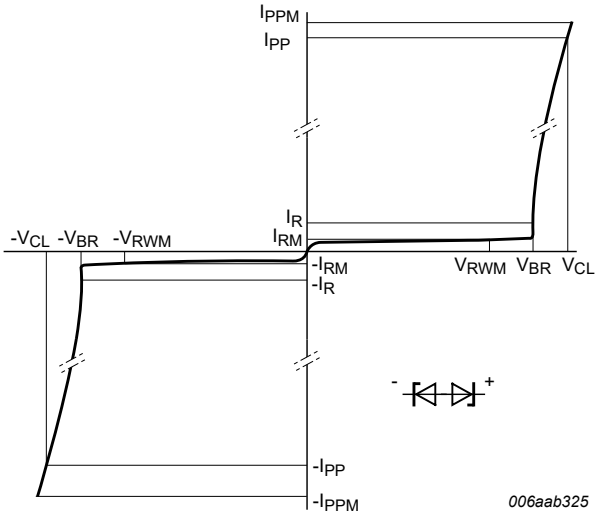
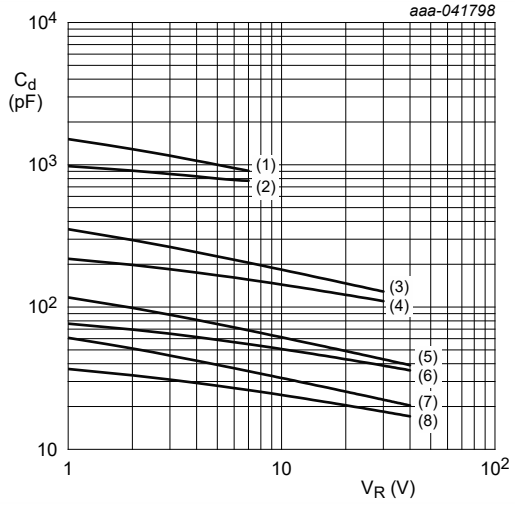


Fig. 6. V-I characteristics for a bidirectional TVS diode



T_{amb} = 25 °C; f = 1 MHz

(1) P4SMA8.2A (5) P4SMA120A

(2) P4SMA8.2CA (6) P4SMA120CA

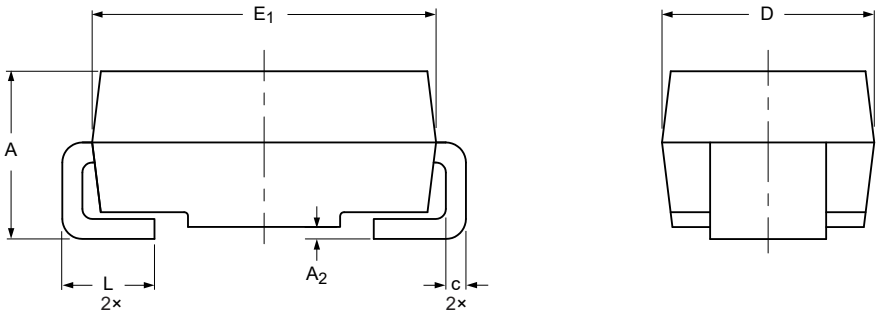
(3) P4SMA36A (7) P4SMA250A

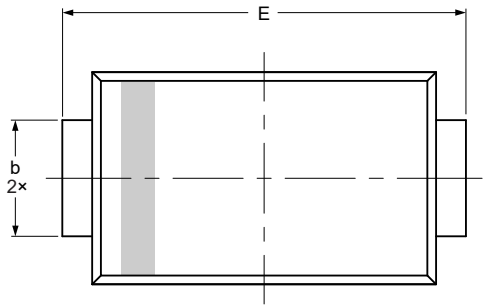
(4) P4SMA36CA (8) P4SMA250CA

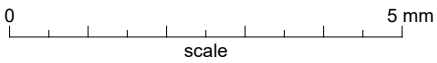
Fig. 7. Diode capacitance as a function of reverse voltage; typical values

10. Package outline

SMA: plastic, surface mounted package; 2 terminals; 4.30 mm x 2.65 mm x 2.10 mm body **SOD1001-1**







Dimensions (mm are the original dimensions)

Unit[1]		A	A_2	b	c	D	E	E_1	L
mm	max	2.45	0.20	1.65	0.36	2.92	5.59	4.60	1.52
	nom								
	min	1.95	0.05	1.25	0.15	2.40	4.80	3.95	0.75

sod1001-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD1001-1						24-05-22

Fig. 8. Package outline SMA (SOD1001-1)

11. Soldering

Footprint information for reflow soldering of SMA package **SOD1001-1**

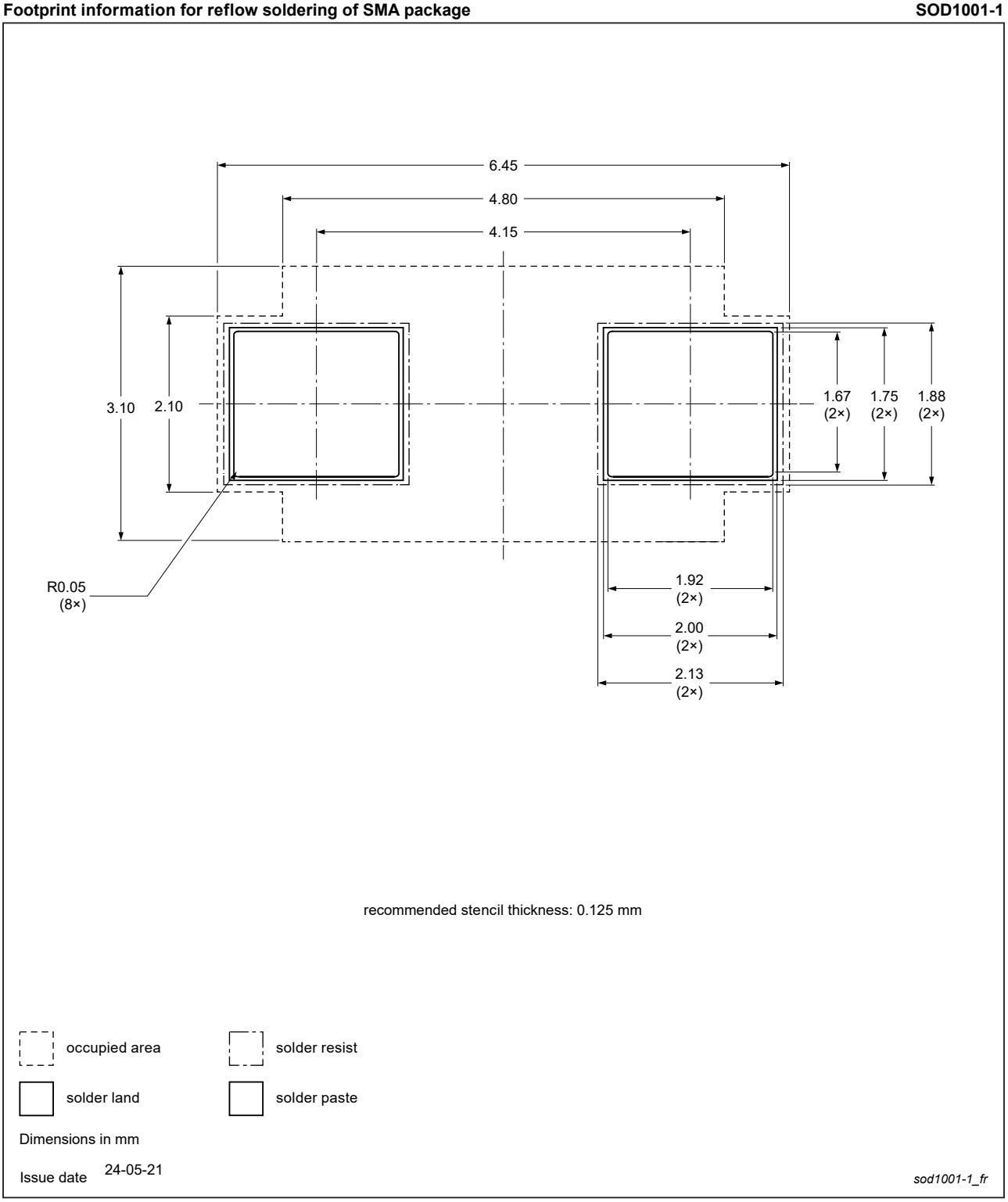


Fig. 9. Reflow soldering footprint for SMA (SOD1001-1)

12. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
P4SMA_SER v.1	20250102	Product data sheet	-	-

13. 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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Date of release: 2 January 2025