



SMAJ series

400 W Transient Voltage Suppressor

5 September 2024

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 μ s waveform: $P_{PPM} = 400$ W
- Reverse standoff voltage: $V_{RWM} = 7$ V to 220 V
- Reverse current: I_R less than 1 μ A for $V_{RWM} \geq 11$ 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


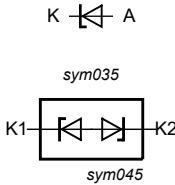
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25$ °C	7	-	220	V
P_{PPM}	rated peak pulse power	$t_p = 10/1000$ μ s; $T_{amb} = 25$ °C	[1]	-	400	W

[1] In accordance with IEC 61643-321 (10/1000 μ s 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	 <p>Transparent top view SMA (SOD1001-1)</p>	 <p>K A sym035 K1 K2 sym045</p>
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
SMAJ 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 92 types with reverse standoff voltages from 7 V to 220 V.

7. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code
SMAJ7.0A	AZ2	SMAJ7.0CA	BE8
SMAJ7.5A	AZ3	SMAJ7.5CA	BE9
SMAJ8.0A	AZ4	SMAJ8.0CA	BF2
SMAJ8.5A	AZ5	SMAJ8.5CA	BF3
SMAJ9.0A	AZ6	SMAJ9.0CA	BF4
SMAJ10A	AZ7	SMAJ10CA	BF5
SMAJ11A	AZ8	SMAJ11CA	BF6
SMAJ12A	AZ9	SMAJ12CA	BF7
SMAJ13A	BA2	SMAJ13CA	BF8
SMAJ14A	BA3	SMAJ14CA	BF9
SMAJ15A	BA4	SMAJ15CA	BG2
SMAJ16A	BA5	SMAJ16CA	BG3
SMAJ17A	BA6	SMAJ17CA	BG4
SMAJ18A	BA7	SMAJ18CA	BG5
SMAJ20A	BA8	SMAJ20CA	BG6
SMAJ22A	BA9	SMAJ22CA	BG7
SMAJ24A	BB2	SMAJ24CA	BG8
SMAJ26A	BB3	SMAJ26CA	BG9
SMAJ28A	BB4	SMAJ28CA	BH2

Type number	Marking code	Type number	Marking code
SMAJ30A	BB5	SMAJ30CA	BH3
SMAJ33A	BB6	SMAJ33CA	BH4
SMAJ36A	BB7	SMAJ36CA	BH5
SMAJ40A	BB8	SMAJ40CA	BH6
SMAJ43A	BB9	SMAJ43CA	BH7
SMAJ45A	BC2	SMAJ45CA	BH8
SMAJ48A	BC3	SMAJ48CA	BH9
SMAJ51A	BC4	SMAJ51CA	BJ2
SMAJ54A	BC5	SMAJ54CA	BJ3
SMAJ58A	BC6	SMAJ58CA	BJ4
SMAJ60A	BC7	SMAJ60CA	BJ5
SMAJ64A	BC8	SMAJ64CA	BJ6
SMAJ70A	BC9	SMAJ70CA	BJ7
SMAJ75A	BD2	SMAJ75CA	BJ8
SMAJ78A	BD3	SMAJ78CA	BJ9
SMAJ85A	BD4	SMAJ85CA	BK2
SMAJ90A	BD5	SMAJ90CA	BK3
SMAJ100A	BD6	SMAJ100CA	BK4
SMAJ110A	BD7	SMAJ110CA	BK5
SMAJ120A	BD8	SMAJ120CA	BK6
SMAJ130A	BD9	SMAJ130CA	BK7
SMAJ150A	BE2	SMAJ150CA	BK8
SMAJ160A	BE3	SMAJ160CA	BK9
SMAJ170A	BE4	SMAJ170CA	BL2
SMAJ180A	BE5	SMAJ180CA	BL3
SMAJ200A	BE6	SMAJ200CA	BL4
SMAJ220A	BE7	SMAJ220CA	BL5

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	$t_p = 10/1000 \mu s$	[1]	-	400	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 μs current waveform).

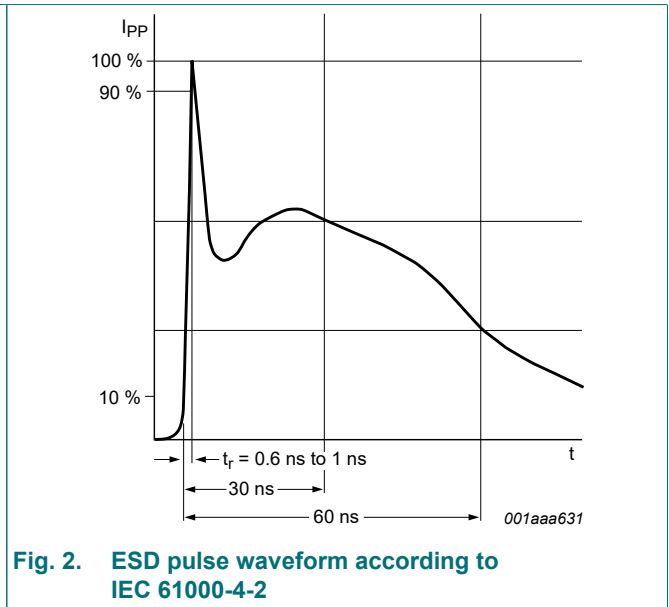
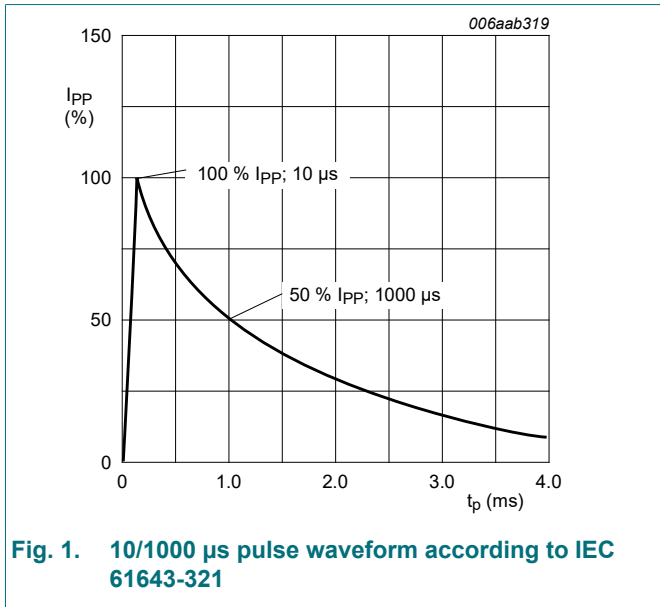
Table 6. ESD maximum ratings

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2; contact discharge; $T_{amb} = 25^\circ C$	[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)	> 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} (μA) [1]	Test current I_T (mA)	Clamping voltage V_{CL} (V)	
uni-directional	bi-directional		Max	Min	Typ			Max	Max
SMAJ7.0A	SMAJ7.0CA	7.0	7.78	8.19	8.60	200/400	10	12.0	33.3
SMAJ7.5A	SMAJ7.5CA	7.5	8.33	8.77	9.21	100/200	1	12.9	31
SMAJ8.0A	SMAJ8.0CA	8.0	8.89	9.36	9.83	50/100	1	13.6	29.4
SMAJ8.5A	SMAJ8.5CA	8.5	9.44	9.92	10.40	20/40	1	14.4	27.8
SMAJ9.0A	SMAJ9.0CA	9.0	10.00	10.55	11.10	10/20	1	15.4	26
SMAJ10A	SMAJ10CA	10	11.10	11.70	12.30	5/10	1	17.0	23.5
SMAJ11A	SMAJ11CA	11	12.20	12.85	13.50	1	1	18.2	22
SMAJ12A	SMAJ12CA	12	13.30	14.00	14.70	1	1	19.9	20.1
SMAJ13A	SMAJ13CA	13	14.40	15.15	15.90	1	1	21.5	18.6
SMAJ14A	SMAJ14CA	14	15.60	16.40	17.20	1	1	23.2	17.2
SMAJ15A	SMAJ15CA	15	16.70	17.60	18.50	1	1	24.4	16.4
SMAJ16A	SMAJ16CA	16	17.80	18.75	19.70	1	1	26.0	15.4
SMAJ17A	SMAJ17CA	17	18.90	19.90	20.90	1	1	27.6	14.5
SMAJ18A	SMAJ18CA	18	20.00	21.05	22.10	1	1	29.2	13.7
SMAJ20A	SMAJ20CA	20	22.20	23.35	24.50	1	1	32.4	12.3
SMAJ22A	SMAJ22CA	22	24.40	25.65	26.90	1	1	35.5	11.3
SMAJ24A	SMAJ24CA	24	26.70	28.10	29.50	1	1	38.9	10.3
SMAJ26A	SMAJ26CA	26	28.90	30.40	31.90	1	1	42.1	9.5
SMAJ28A	SMAJ28CA	28	31.10	32.75	34.40	1	1	45.4	8.8
SMAJ30A	SMAJ30CA	30	33.30	35.05	36.80	1	1	48.4	8.3
SMAJ33A	SMAJ33CA	33	36.70	38.65	40.60	1	1	53.3	7.5
SMAJ36A	SMAJ36CA	36	40.00	42.10	44.20	1	1	58.1	6.9
SMAJ40A	SMAJ40CA	40	44.40	46.75	49.10	1	1	64.5	6.2
SMAJ43A	SMAJ43CA	43	47.80	50.30	52.80	1	1	69.4	5.8
SMAJ45A	SMAJ45CA	45	50.00	52.65	55.30	1	1	72.7	5.5
SMAJ48A	SMAJ48CA	48	53.30	56.10	58.90	1	1	77.4	5.2
SMAJ51A	SMAJ51CA	51	56.70	59.70	62.70	1	1	82.4	4.9
SMAJ54A	SMAJ54CA	54	60.00	63.15	66.30	1	1	87.1	4.6
SMAJ58A	SMAJ58CA	58	64.40	67.80	71.20	1	1	93.6	4.3
SMAJ60A	SMAJ60CA	60	66.70	70.20	73.70	1	1	96.8	4.1
SMAJ64A	SMAJ64CA	64	71.10	74.85	78.60	1	1	103.0	3.9
SMAJ70A	SMAJ70CA	70	77.80	81.90	86.00	1	1	113.0	3.5
SMAJ75A	SMAJ75CA	75	83.20	87.65	92.10	1	1	121.0	3.3
SMAJ78A	SMAJ78CA	78	86.70	91.25	95.80	1	1	126.0	3.2
SMAJ85A	SMAJ85CA	85	94.40	99.20	104.0	1	1	137.0	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} (μA) [1]	Test current I_T (mA)	Clamping voltage V_{CL} (V)	
uni-directional	bi-directional		Max	Min	Typ			Max	Max
SMAJ90A	SMAJ90CA	90	100.0	105.5	111.0	1	1	146.0	2.7
SMAJ100A	SMAJ100CA	100	111.0	117.0	123.0	1	1	162.0	2.5
SMAJ110A	SMAJ110CA	110	122.0	128.5	135.0	1	1	177.0	2.3
SMAJ120A	SMAJ120CA	120	133.0	140.0	147.0	1	1	193.0	2.1
SMAJ130A	SMAJ130CA	130	144.0	151.5	159.0	1	1	209.0	1.9
SMAJ150A	SMAJ140CA	150	167.0	176.0	185.0	1	1	243.0	1.6
SMAJ160A	SMAJ160CA	160	178.0	187.5	197.0	1	1	259.0	1.5
SMAJ170A	SMAJ170CA	170	189.0	199.0	209.0	1	1	275.0	1.5
SMAJ180A	SMAJ180CA	180	201.0	211.5	222.0	1	1	292.0	1.4
SMAJ200A	SMAJ200CA	200	224.0	235.5	247.0	1	1	324.0	1.2
SMAJ220A	SMAJ220CA	220	246.0	259.0	272.0	1	1	356.0	1.1

[1] I_{RM} Max. is doubled for bi-directional type with $V_{RWM} \leq 10$ V

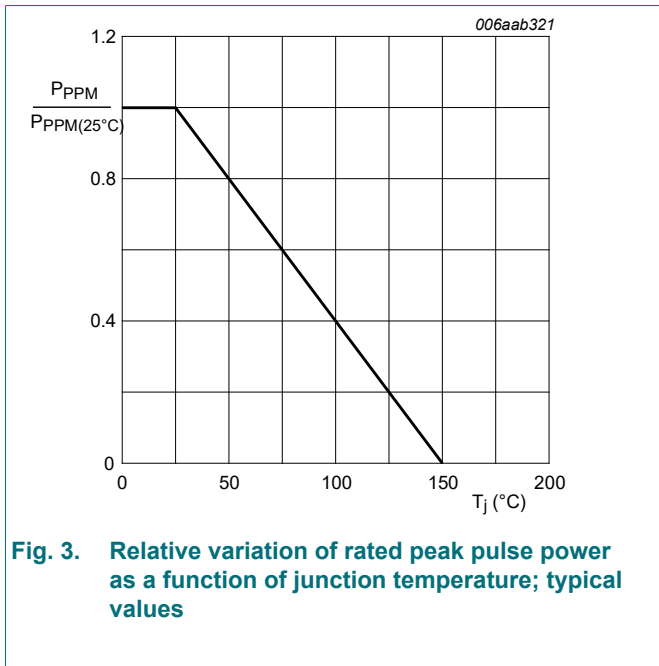


Fig. 3. Relative variation of rated peak pulse power as a function of junction temperature; typical values

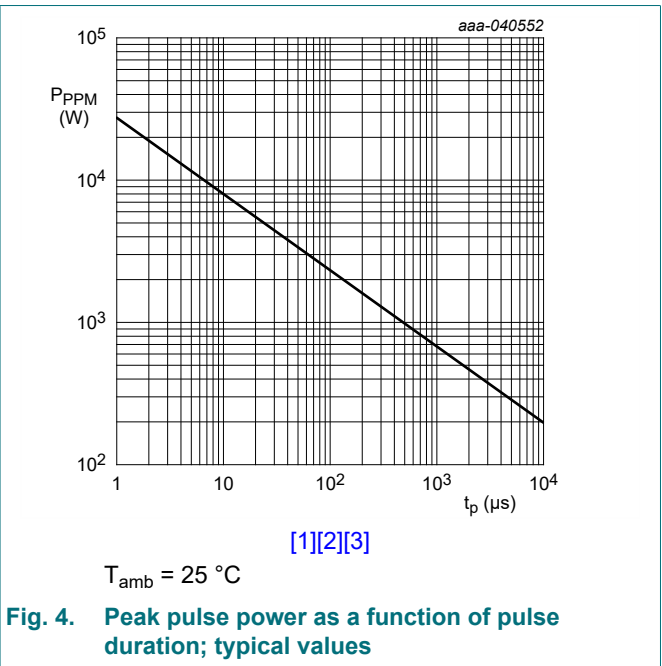


Fig. 4. Peak pulse power as a function of pulse duration; typical values
 $T_{amb} = 25^\circ C$
 [1][2][3]

[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).

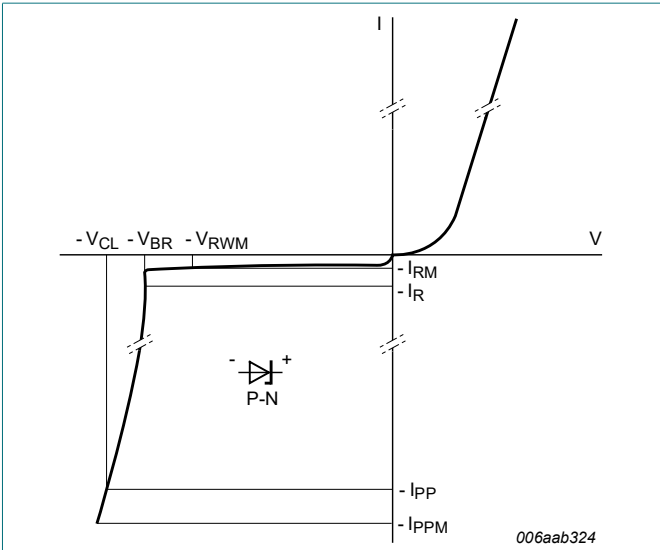


Fig. 5. V-I characteristics for a unidirectional TVS protection diode

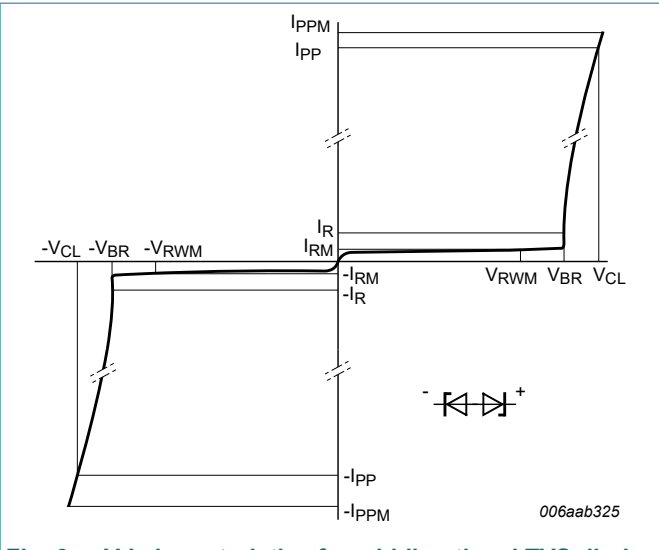


Fig. 6. V-I characteristics for a bidirectional TVS diode

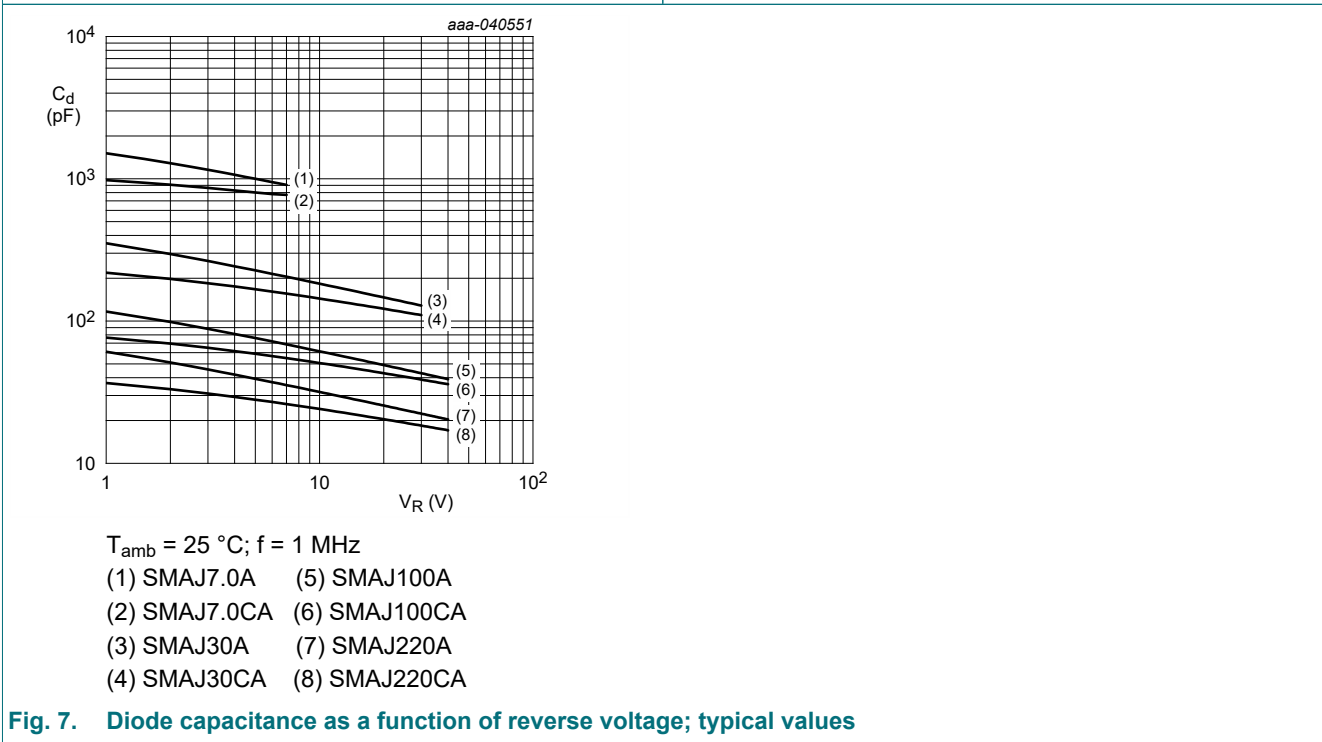
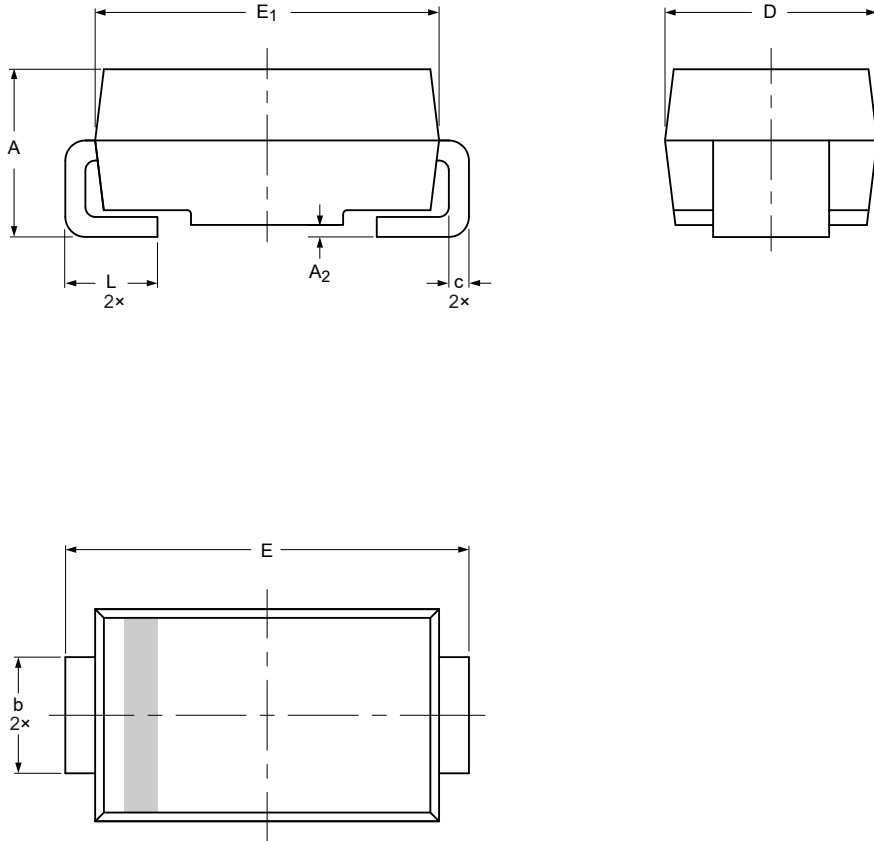


Fig. 7. Diode capacitance as a function of reverse voltage; typical values

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
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

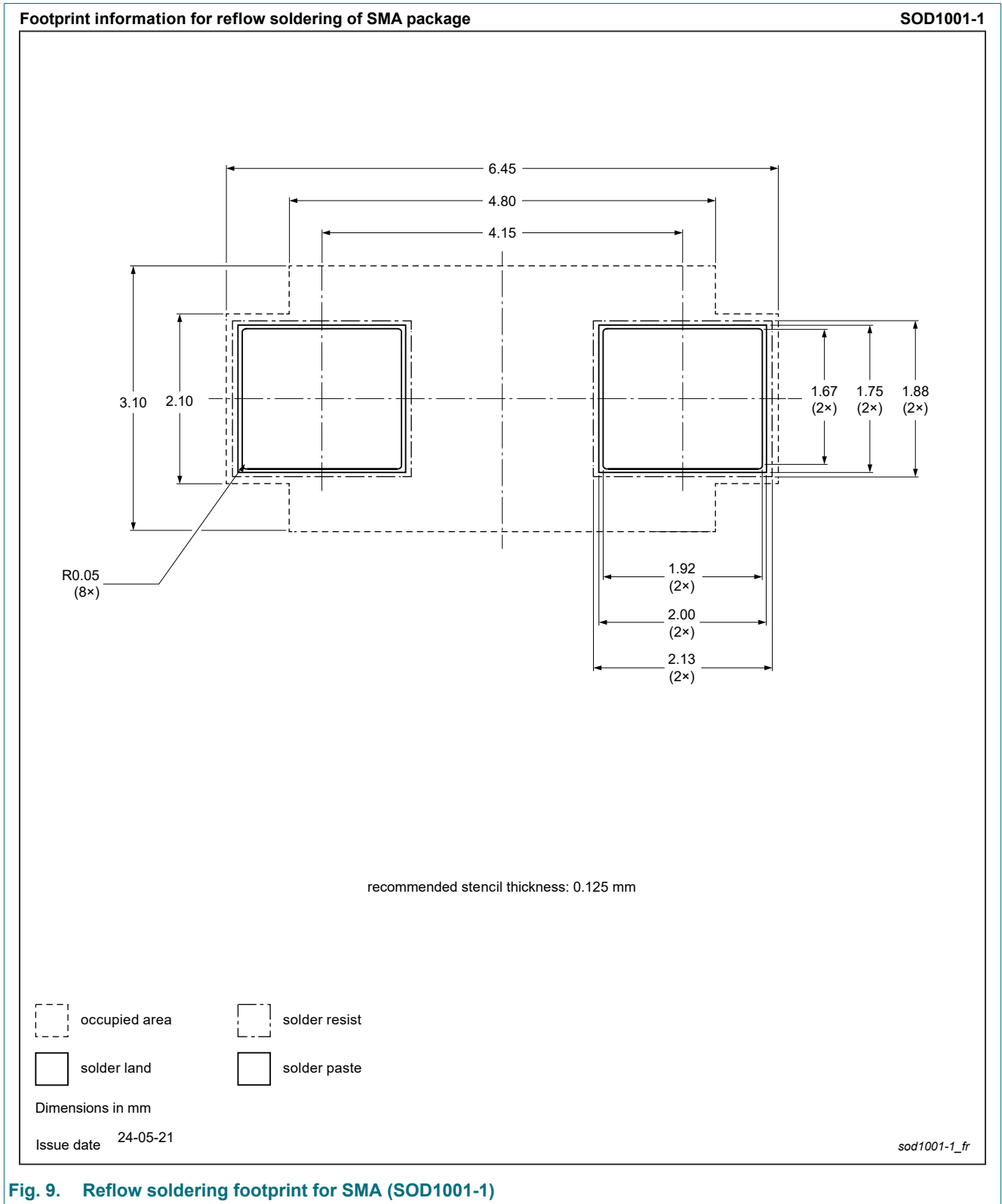


Fig. 9. Reflow soldering footprint for SMA (SOD1001-1)

12. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
SMAJ_SER v.1	20240905	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.

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