SMBJ series

600 W Transient Voltage Suppressor

5 August 2024 **Product data sheet**

1. General description

600 W uni- and bi-directional Transient Voltage Suppressor (TVS) in a SMB 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} = 600 W
- Reverse standoff voltage: V_{RWM} = 7 V to 220 V
- Reverse current: I_R less than 1 µA for $V_{RWM} \geq 11V$
- 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

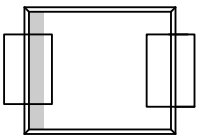
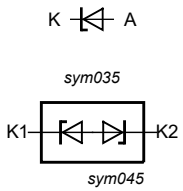
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		7	-	220	V
P_{PPM}	rated peak pulse power	t_p = 10/1000 µs; T_{amb} = 25 °C	[1]	-	-	600	W

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

nexperia

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 **SMB (SOD1002-1)**	
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
SMBJ series	SMB	plastic, surface mounted package; 2 terminals; 4.32 mm × 3.62 mm × 2.30 mm body	SOD1002-1

[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
SMBJ7.0A	AA5	SMBJ7.0CA	AG3
SMBJ7.5A	AA6	SMBJ7.5CA	AG4
SMBJ8.0A	AA7	SMBJ8.0CA	AG5
SMBJ8.5A	AA8	SMBJ8.5CA	AG6
SMBJ9.0A	AA9	SMBJ9.0CA	AG7
SMBJ10A	AB2	SMBJ10CA	AG8
SMBJ11A	AB3	SMBJ11CA	AG9
SMBJ12A	AB4	SMBJ12CA	AH2
SMBJ13A	AB5	SMBJ13CA	AH3
SMBJ14A	AB6	SMBJ14CA	AH4
SMBJ15A	AB7	SMBJ15CA	AH5
SMBJ16A	AB8	SMBJ16CA	AH6
SMBJ17A	AB9	SMBJ17CA	AH7
SMBJ18A	AC2	SMBJ18CA	AH8
SMBJ20A	AC3	SMBJ20CA	AH9
SMBJ22A	AC4	SMBJ22CA	AJ2
SMBJ24A	AC5	SMBJ24CA	AJ3
SMBJ26A	AC6	SMBJ26CA	AJ4
SMBJ28A	AC7	SMBJ28CA	AJ5

Type number	Marking code	Type number	Marking code
SMBJ30A	AC8	SMBJ30CA	AJ6
SMBJ33A	AC9	SMBJ33CA	AJ7
SMBJ36A	AD2	SMBJ36CA	AJ8
SMBJ40A	AD3	SMBJ40CA	AJ9
SMBJ43A	AD4	SMBJ43CA	AK2
SMBJ45A	AD5	SMBJ45CA	AK3
SMBJ48A	AD6	SMBJ48CA	AK4
SMBJ51A	AD7	SMBJ51CA	AK5
SMBJ54A	AD8	SMBJ54CA	AK6
SMBJ58A	AD9	SMBJ58CA	AK7
SMBJ60A	AE2	SMBJ60CA	AK8
SMBJ64A	AE3	SMBJ64CA	AK9
SMBJ70A	AE4	SMBJ70CA	AL2
SMBJ75A	AE5	SMBJ75CA	AL3
SMBJ78A	AE6	SMBJ78CA	AL4
SMBJ85A	AE7	SMBJ85CA	AL5
SMBJ90A	AE8	SMBJ90CA	AL6
SMBJ100A	AE9	SMBJ100CA	AL7
SMBJ110A	AF2	SMBJ110CA	AL8
SMBJ120A	AF3	SMBJ120CA	AL9
SMBJ130A	AF4	SMBJ130CA	AM2
SMBJ150A	AF5	SMBJ150CA	AM3
SMBJ160A	AF6	SMBJ160CA	AM4
SMBJ170A	AF7	SMBJ170CA	AM5
SMBJ180A	AF8	SMBJ180CA	AM6
SMBJ200A	AF9	SMBJ200CA	AM7
SMBJ220A	AG2	SMBJ220CA	AM8

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]	-	600	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)	> 4kV

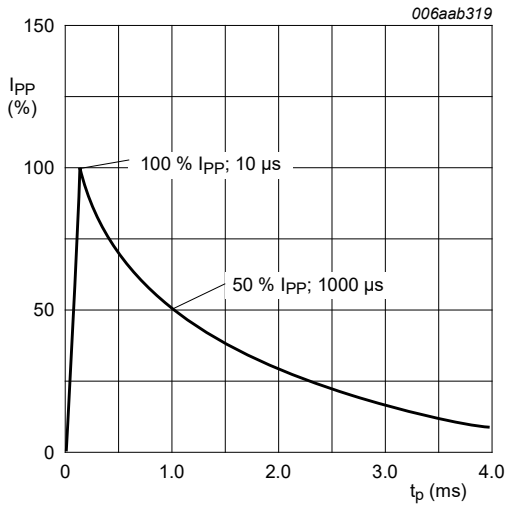


Fig. 1. 10/1000 µs pulse waveform according to IEC 61643-321

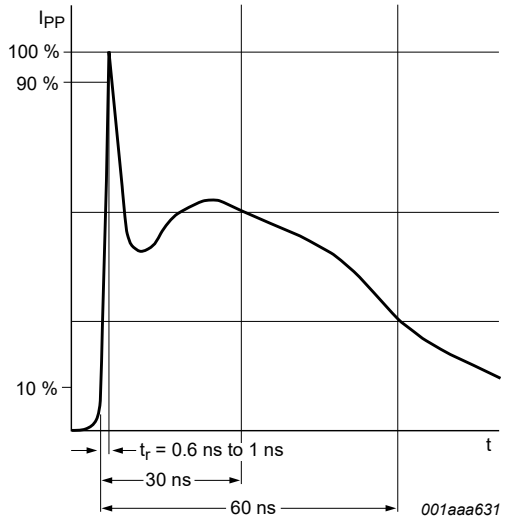


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

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)	Test current I_T (mA)	Clamping voltage V_{CL} (V)	
uni-directional	bi-directional	Max	Min	Typ	Max	Max		Max	I_{PPM} (A)
SMBJ7.0A	SMBJ7.0CA	7.0	7.78	8.19	8.60	200/400	10	12.0	50.0
SMBJ7.5A	SMBJ7.5CA	7.5	8.33	8.77	9.21	100/200	1	12.9	46.6
SMBJ8.0A	SMBJ8.0CA	8.0	8.89	9.36	9.83	50/100	1	13.6	44.2
SMBJ8.5A	SMBJ8.5CA	8.5	9.44	9.92	10.40	20/40	1	14.4	41.7
SMBJ9.0A	SMBJ9.0CA	9.0	10.00	10.55	11.10	10/20	1	15.4	39.0
SMBJ10A	SMBJ10CA	10	11.10	11.70	12.30	5/10	1	17.0	35.3
SMBJ11A	SMBJ11CA	11	12.20	12.85	13.50	1	1	18.2	33.0
SMBJ12A	SMBJ12CA	12	13.30	14.00	14.70	1	1	19.9	30.2
SMBJ13A	SMBJ13CA	13	14.40	15.15	15.90	1	1	21.5	28.0
SMBJ14A	SMBJ14CA	14	15.60	16.40	17.20	1	1	23.2	25.9
SMBJ15A	SMBJ15CA	15	16.70	17.60	18.50	1	1	24.4	24.6
SMBJ16A	SMBJ16CA	16	17.80	18.75	19.70	1	1	26.0	23.1
SMBJ17A	SMBJ17CA	17	18.90	19.90	20.90	1	1	27.6	21.8
SMBJ18A	SMBJ18CA	18	20.00	21.05	22.10	1	1	29.2	20.6
SMBJ20A	SMBJ20CA	20	22.20	23.35	24.50	1	1	32.4	18.6
SMBJ22A	SMBJ22CA	22	24.40	25.65	26.90	1	1	35.5	16.9
SMBJ24A	SMBJ24CA	24	26.70	28.10	29.50	1	1	38.9	15.5
SMBJ26A	SMBJ26CA	26	28.90	30.40	31.90	1	1	42.1	14.3
SMBJ28A	SMBJ28CA	28	31.10	32.75	34.40	1	1	45.4	13.3
SMBJ30A	SMBJ30CA	30	33.30	35.05	36.80	1	1	48.4	12.4
SMBJ33A	SMBJ33CA	33	36.70	38.65	40.60	1	1	53.3	11.3
SMBJ36A	SMBJ36CA	36	40.00	42.10	44.20	1	1	58.1	10.4
SMBJ40A	SMBJ40CA	40	44.40	46.75	49.10	1	1	64.5	9.3
SMBJ43A	SMBJ43CA	43	47.80	50.30	52.80	1	1	69.4	8.7
SMBJ45A	SMBJ45CA	45	50.00	52.65	55.30	1	1	72.7	8.3
SMBJ48A	SMBJ48CA	48	53.30	56.10	58.90	1	1	77.4	7.8
SMBJ51A	SMBJ51CA	51	56.70	59.70	62.70	1	1	82.4	7.3
SMBJ54A	SMBJ54CA	54	60.00	63.15	66.30	1	1	87.1	6.9
SMBJ58A	SMBJ58CA	58	64.40	67.80	71.20	1	1	93.6	6.5
SMBJ60A	SMBJ60CA	60	66.70	70.20	73.70	1	1	96.8	6.2
SMBJ64A	SMBJ64CA	64	71.10	74.85	78.60	1	1	103.0	5.9
SMBJ70A	SMBJ70CA	70	77.80	81.90	86.00	1	1	113.0	5.3
SMBJ75A	SMBJ75CA	75	83.20	87.65	92.10	1	1	121.0	5.0
SMBJ78A	SMBJ78CA	78	86.70	91.25	95.80	1	1	126.0	4.8
SMBJ85A	SMBJ85CA	85	94.40	99.20	104.0	1	1	137.0	4.4
SMBJ90A	SMBJ90CA	90	100.0	105.5	111.0	1	1	146.0	4.1

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)	Test current I_T (mA)	Clamping voltage V_{CL} (V)	
uni-directional	bi-directional	Max	Min	Typ	Max	Max		Max	I_{PPM} (A)
SMBJ100A	SMBJ100CA	100	111.0	117.0	123.0	1	1	162.0	3.7
SMBJ110A	SMBJ110CA	110	122.0	128.5	135.0	1	1	177.0	3.4
SMBJ120A	SMBJ120CA	120	133.0	140.0	147.0	1	1	193.0	3.1
SMBJ130A	SMBJ130CA	130	144.0	151.5	159.0	1	1	209.0	2.9
SMBJ150A	SMBJ140CA	150	167.0	176.0	185.0	1	1	243.0	2.5
SMBJ160A	SMBJ160CA	160	178.0	187.5	197.0	1	1	259.0	2.3
SMBJ170A	SMBJ170CA	170	189.0	199.0	209.0	1	1	275.0	2.2
SMBJ180A	SMBJ180CA	180	201.0	211.5	222.0	1	1	292.0	2.1
SMBJ200A	SMBJ200CA	200	224.0	235.5	247.0	1	1	324.0	1.9
SMBJ220A	SMBJ220CA	220	246.0	259.0	272.0	1	1	356.0	1.7

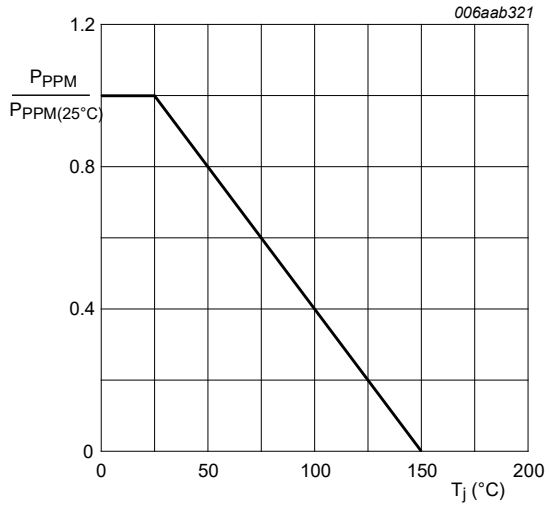
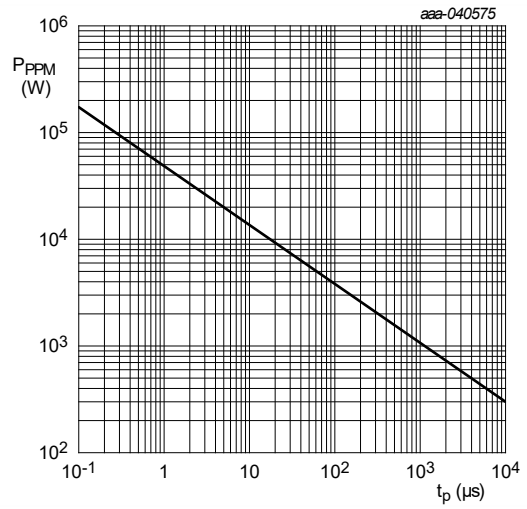


Fig. 3. Relative variation of rated peak pulse power as a function of junction temperature; typical values



T_{amb} = 25 °C

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

[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).

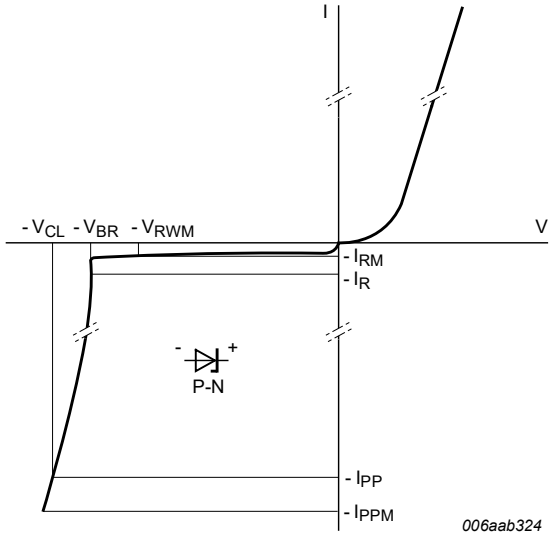


Fig. 5. V-I characteristics for a unidirectional TVS protection diode

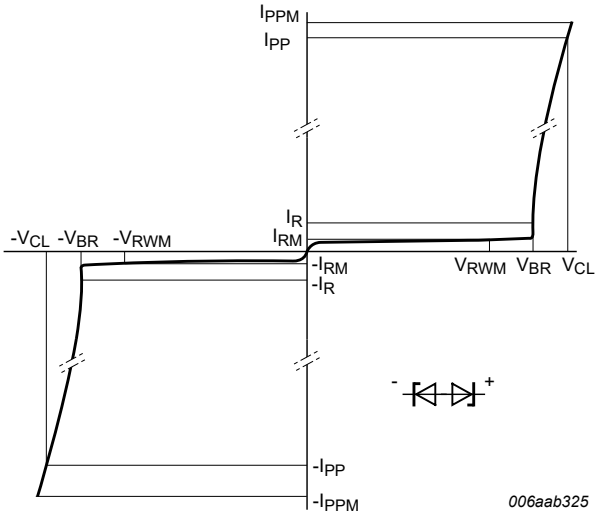
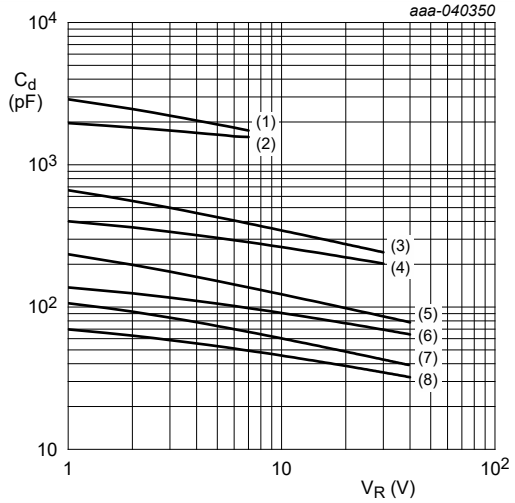


Fig. 6. V-I characteristics for a bidirectional TVS diode



T_{amb} = 25 °C; f = 1 MHz

(1) SMBJ7.0A (5) SMBJ100A

(2) SMBJ7.0CA (6) SMBJ100CA

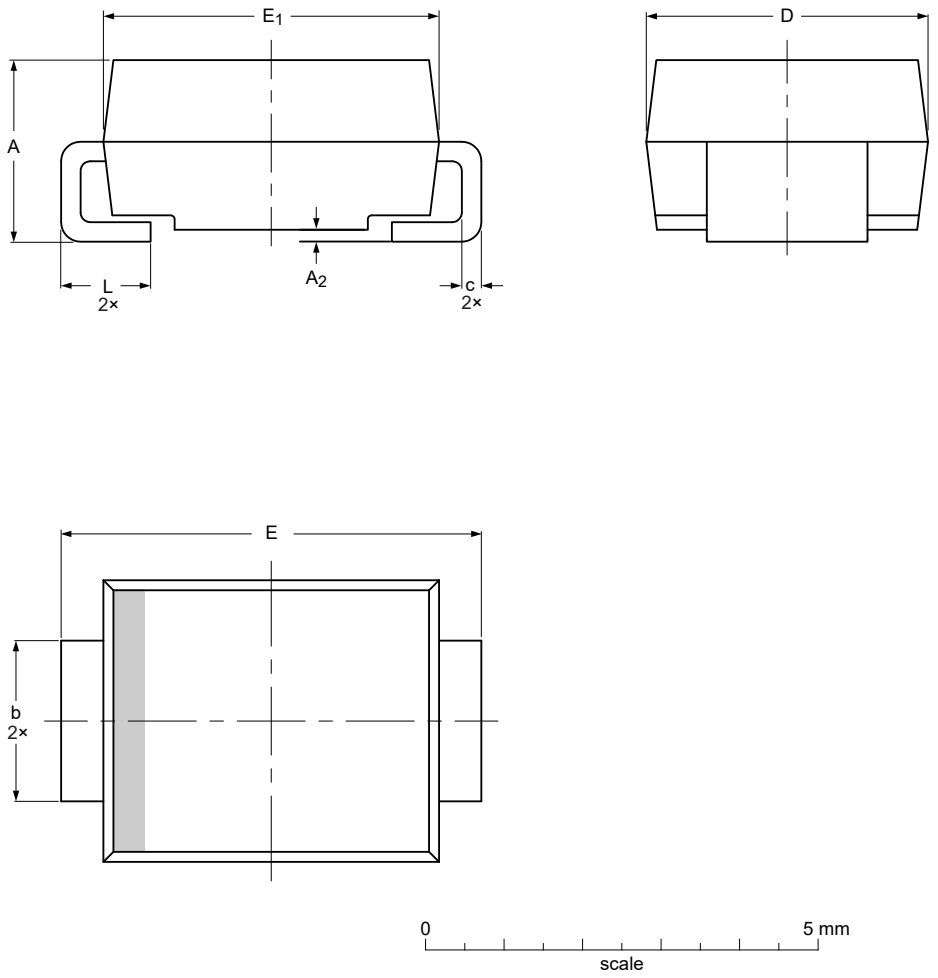
(3) SMBJ30A (7) SMBJ220A

(4) SMBJ30CA (8) SMBJ220CA

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

10. Package outline

SMB: plastic, surface mounted package; 2 terminals; 4.32 mm × 3.62 mm × 2.30 mm body **SOD1002-1**



Dimensions (mm are the original dimensions)

Unit[1]		A	A_2	b	c	D	E	E_1	L
mm	max	2.65	0.20	2.20	0.36	3.94	5.59	4.60	1.60
	nom								
	min	1.99	0.05	1.95	0.15	3.30	5.10	4.05	0.76

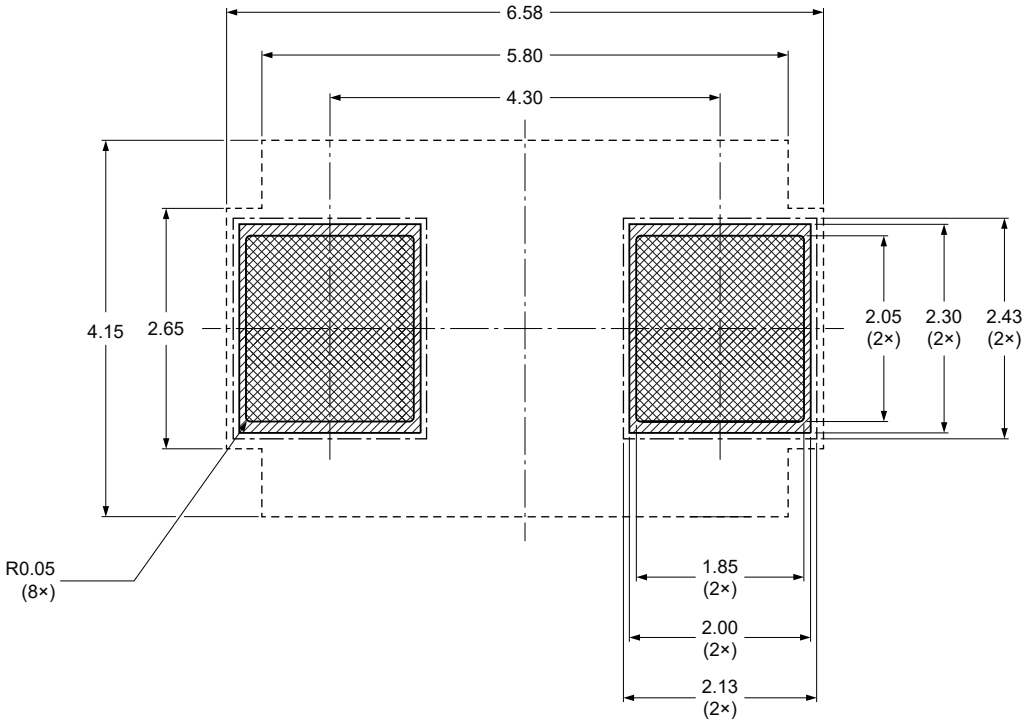
sod1002-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	EIAJ			
SOD1002-1						24-05-20

Fig. 8. Package outline SMB (SOD1002-1)

11. Soldering

Footprint information for reflow soldering of SMB package **SOD1002-1**



recommended stencil thickness: 0.125 mm

occupied area

solder resist

solder land

solder paste

Dimensions in mm

Issue date 24-05-21

sod1002-1_fr

Fig. 9. Reflow soldering footprint for SMB (SOD1002-1)

12. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
SMBJ_SER v.1	20240805	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: 5 August 2024