P6SMB series

600 W Transient Voltage Suppressor

2 January 2025 **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} = 7.02 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

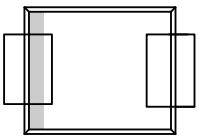
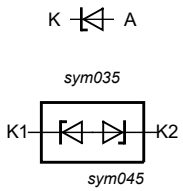
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		7.02	-	214	V
P_{PPM}	rated peak pulse power	t_p = 10/1000 µs; T_{amb} = 25 °C	[1]	-	-	600	W

[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
P6SMB 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 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
P6SMBJ8.2A	AP2	P6SMBJ8.2CA	AU7
P6SMBJ9.1A	AP3	P6SMBJ9.1CA	AU8
P6SMBJ10A	AP4	P6SMBJ10CA	AU9
P6SMBJ11A	AP5	P6SMBJ11CA	AV2
P6SMBJ12A	AP6	P6SMBJ12CA	AV3
P6SMBJ13A	AP7	P6SMBJ13CA	AV4
P6SMBJ15A	AP8	P6SMBJ15CA	AV5
P6SMBJ16A	AP9	P6SMBJ16CA	AV6
P6SMBJ18A	AR2	P6SMBJ18CA	AV7
P6SMBJ20A	AR3	P6SMBJ20CA	AV8
P6SMBJ22A	AR4	P6SMBJ22CA	AV9
P6SMBJ24A	AR5	P6SMBJ24CA	AW2
P6SMBJ27A	AR6	P6SMBJ27CA	AW3
P6SMBJ30A	AR7	P6SMBJ30CA	AW4
P6SMBJ33A	AR8	P6SMBJ33CA	AW5
P6SMBJ36A	AR9	P6SMBJ36CA	AW6
P6SMBJ39A	AS2	P6SMBJ39CA	AW7
P6SMBJ43A	AS3	P6SMBJ43CA	AW8
P6SMBJ47A	AS4	P6SMBJ47CA	AW9

Type number	Marking code	Type number	Marking code
P6SMBJ51A	AS5	P6SMBJ51CA	AX2
P6SMBJ56A	AS6	P6SMBJ56CA	AX3
P6SMBJ62A	AS7	P6SMBJ62CA	AX4
P6SMBJ68A	AS8	P6SMBJ68CA	AX5
P6SMBJ75A	AS9	P6SMBJ75CA	AX6
P6SMBJ82A	AT2	P6SMBJ82CA	AX7
P6SMBJ91A	AT3	P6SMBJ91CA	AX8
P6SMBJ100A	AT4	P6SMBJ100CA	AX9
P6SMBJ110A	AT5	P6SMBJ110CA	AY2
P6SMBJ120A	AT6	P6SMBJ120CA	AY3
P6SMBJ130A	AT7	P6SMBJ130CA	AY4
P6SMBJ150A	AT8	P6SMBJ150CA	AY5
P6SMBJ160A	AT9	P6SMBJ160CA	AY6
P6SMBJ170A	AU2	P6SMBJ170CA	AY7
P6SMBJ180A	AU3	P6SMBJ180CA	AY8
P6SMBJ200A	AU4	P6SMBJ200CA	AY9
P6SMBJ220A	AU5	P6SMBJ220CA	AZ2
P6SMBJ250A	AU6	P6SMBJ250CA	AZ3

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)	> 4 kV

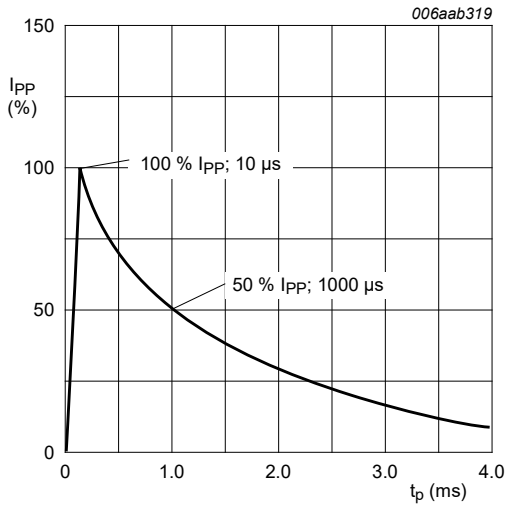


Fig. 1. 10/1000 µs pulse waveform according to IEC 61643-321

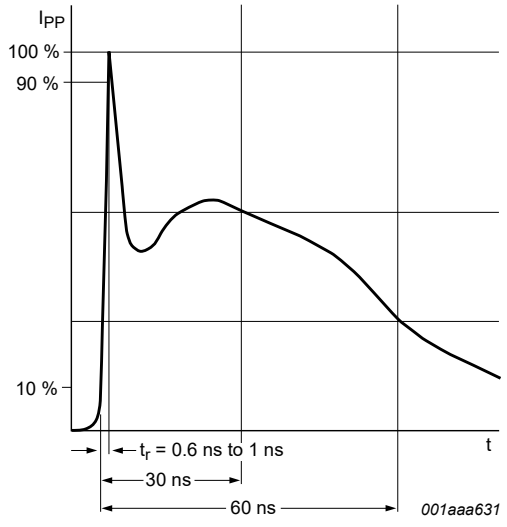


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

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)
P6SMB8.2A	P6SMB8.2CA	7.02	7.79	8.20	8.61	200/400	10	12.1	50.4
P6SMB9.1A	P6SMB9.1CA	7.78	8.65	9.10	9.55	50/100	1	13.4	45.5
P6SMB10A	P6SMB10CA	8.55	9.50	10.0	10.5	10/20	1	14.5	42.1
P6SMB11A	P6SMB11CA	9.40	10.5	11.0	11.6	5/10	1	15.6	39.1
P6SMB12A	P6SMB12CA	10.20	11.4	12.0	12.6	5/10	1	16.7	36.5
P6SMB13A	P6SMB13CA	11.10	12.4	13.0	13.7	1	1	18.2	33.5
P6SMB15A	P6SMB15CA	12.80	14.3	15.0	15.8	1	1	21.2	28.8
P6SMB16A	P6SMB16CA	13.60	15.2	16.0	16.8	1	1	22.5	27.1
P6SMB18A	P6SMB18CA	15.30	17.1	18.0	18.9	1	1	25.5	24.2
P6SMB20A	P6SMB20CA	17.10	19.0	20.0	21.0	1	1	27.7	22.0
P6SMB22A	P6SMB22CA	18.80	20.9	22.0	23.1	1	1	30.6	19.9
P6SMB24A	P6SMB24CA	20.50	22.8	24.0	25.2	1	1	33.2	18.4
P6SMB27A	P6SMB27CA	23.10	25.7	27.0	28.4	1	1	37.5	16.3
P6SMB30A	P6SMB30CA	25.60	28.5	30.0	31.5	1	1	41.4	14.7
P6SMB33A	P6SMB33CA	28.20	31.4	33.0	34.7	1	1	45.7	13.3
P6SMB36A	P6SMB36CA	30.80	34.2	36.0	37.8	1	1	49.9	12.2
P6SMB39A	P6SMB39CA	33.30	37.1	39.0	41.0	1	1	53.9	11.3
P6SMB43A	P6SMB43CA	36.80	40.9	43.0	45.2	1	1	59.3	10.3
P6SMB47A	P6SMB47CA	40.20	44.7	47.0	49.4	1	1	64.8	9.4
P6SMB51A	P6SMB51CA	43.60	48.5	51.0	53.6	1	1	70.1	8.7
P6SMB56A	P6SMB56CA	47.80	53.2	56.0	58.8	1	1	77.0	7.9
P6SMB62A	P6SMB62CA	53.00	58.9	62.0	65.1	1	1	85.0	7.2
P6SMB68A	P6SMB68CA	58.10	64.6	68.0	71.4	1	1	92.0	6.6
P6SMB75A	P6SMB75CA	64.10	71.3	75.0	78.8	1	1	103.0	5.9
P6SMB82A	P6SMB82CA	70.10	77.9	82.0	86.1	1	1	113.0	5.4
P6SMB91A	P6SMB91CA	77.80	86.5	91.0	95.5	1	1	125.0	4.9
P6SMB100A	P6SMB100CA	85.50	95.00	100.0	105.0	1	1	137.0	4.5
P6SMB110A	P6SMB110CA	94.00	105.0	110.0	116.0	1	1	152.0	4.0
P6SMB120A	P6SMB120CA	102.00	114.0	120.0	126.0	1	1	165.0	3.7
P6SMB130A	P6SMB130CA	111.00	124.0	130.0	137.0	1	1	179.0	3.4
P6SMB150A	P6SMB150CA	128.00	143.0	150.0	158.0	1	1	207.0	2.9
P6SMB160A	P6SMB160CA	136.00	152.0	160.0	168.0	1	1	219.0	2.8
P6SMB170A	P6SMB170CA	145.00	162.0	170.0	179.0	1	1	234.0	2.6
P6SMB180A	P6SMB180CA	154.00	171.0	180.0	189.0	1	1	246.0	2.5
P6SMB200A	P6SMB200CA	171.00	190.0	200.0	210.0	1	1	274.0	2.2

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)
P6SMB220A	P6SMB220CA	185.00	209.0	220.0	231.0	1	1	328.0	1.9
P6SMB250A	P6SMB250CA	214.00	237.0	250.0	263.0	1	1	344.0	1.8

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

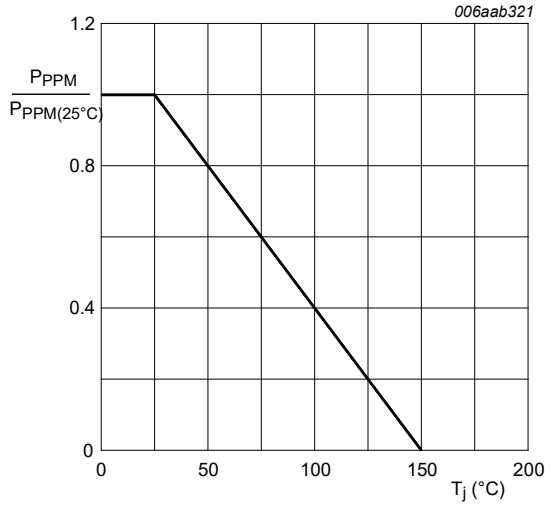
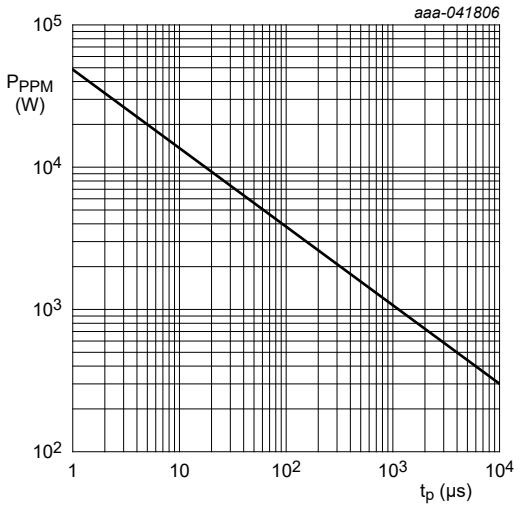


Fig. 3. Relative variation of rated peak pulse power as a function of junction temperature; typical values



[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).

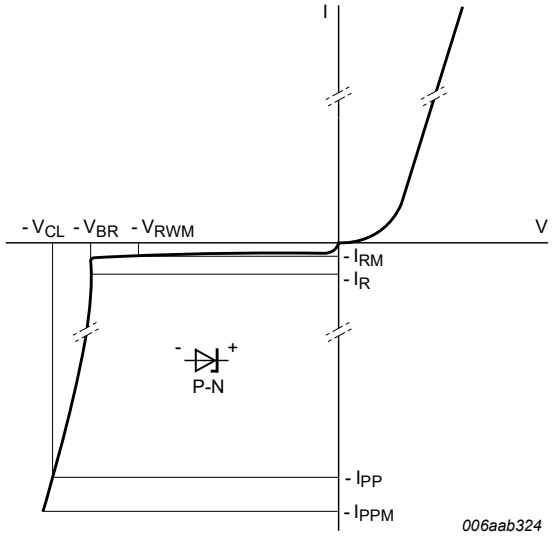


Fig. 5. V-I characteristics for a unidirectional TVS protection diode

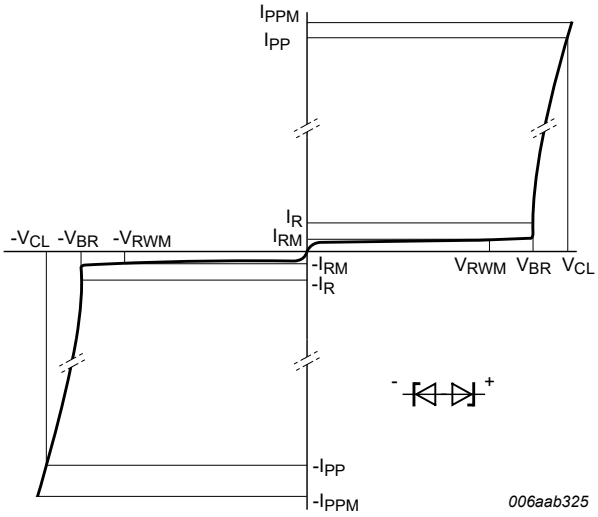
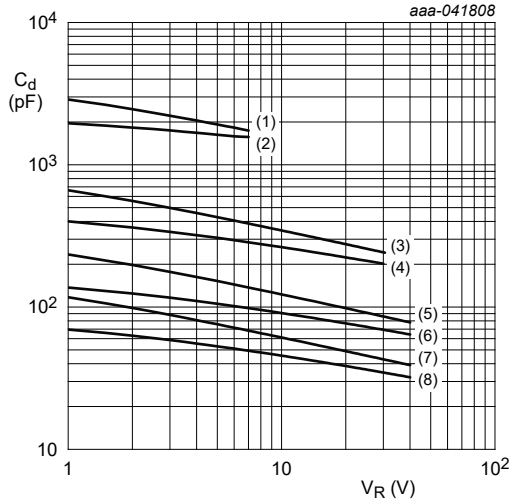


Fig. 6. V-I characteristics for a bidirectional TVS diode



T_{amb} = 25 °C; f = 1 MHz

(1) P6SMB8.2A (5) P6SMB120A

(2) P6SMB8.2CA (6) P6SMB120CA

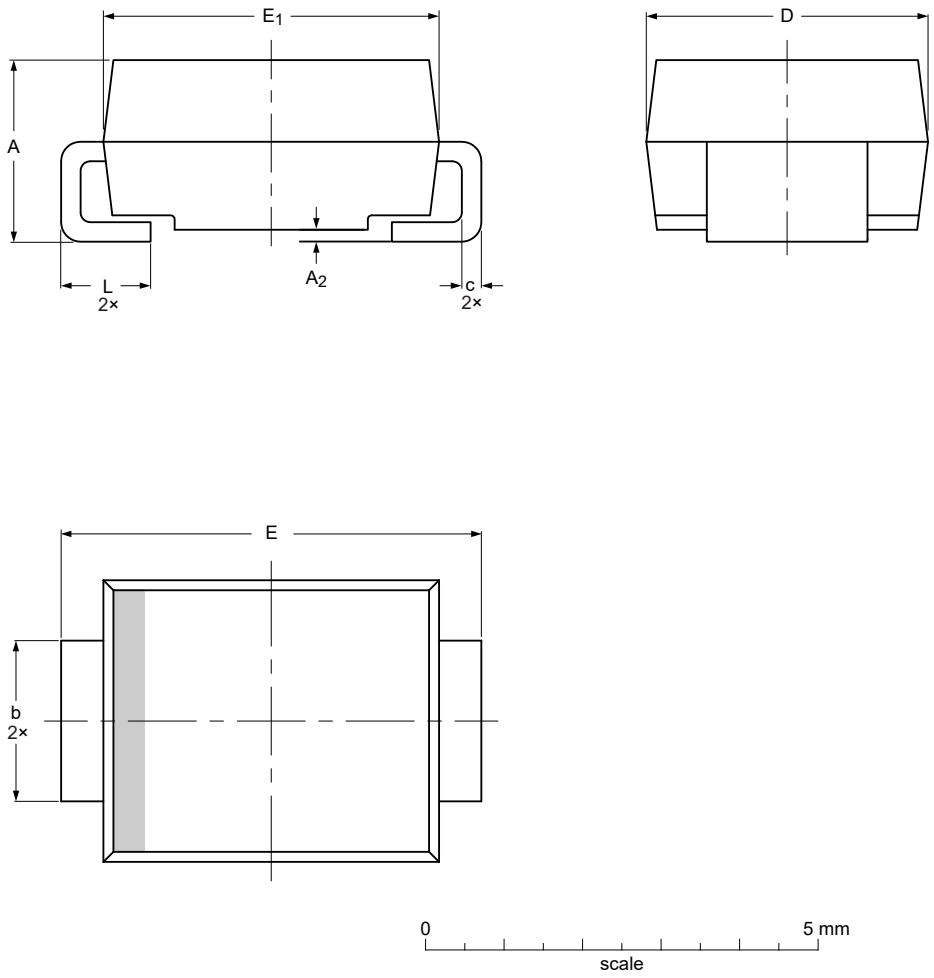
(3) P6SMB36A (7) P6SMB250A

(4) P6SMB36CA (8) P6SMB250CA

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

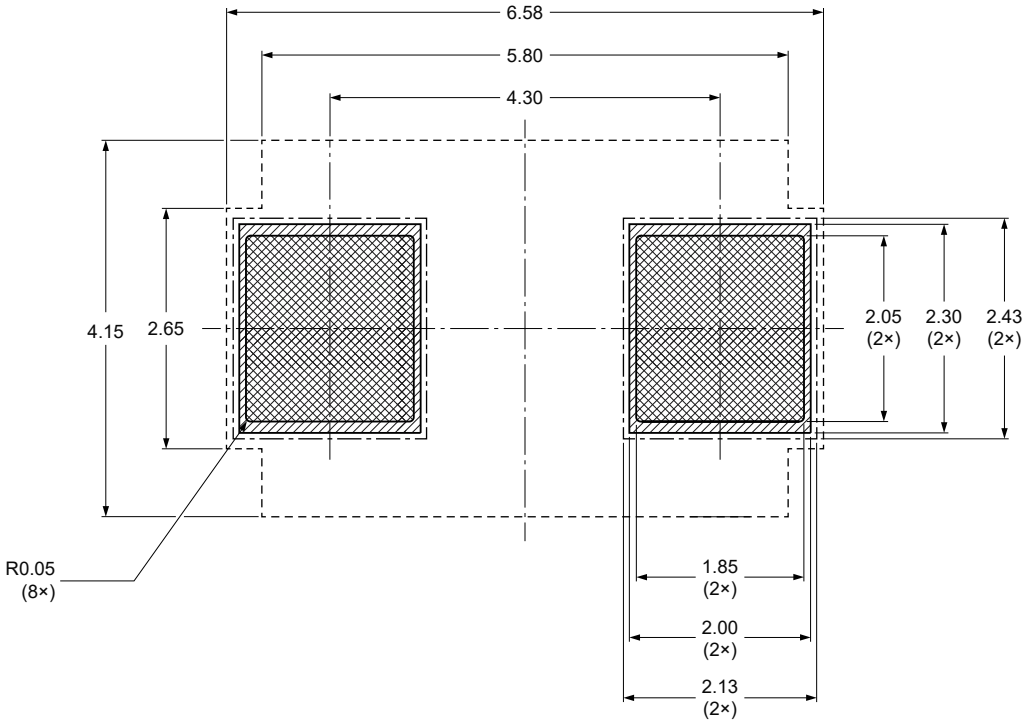
sod1002-1_po

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
P6SMB_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.

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Contents

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Date of release: 2 January 2025