



# PTVSxS1UR series

## 400 W Transient Voltage Suppressor

1 December 2025

Product data sheet

### 1. General description

400 W unidirectional Transient Voltage Suppressor (TVS) in a SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package, designed for transient overvoltage protection.

### 2. Features and benefits

- Rated peak pulse power:  $P_{PPM} = 400$  W (350 W for 3V3)
- Reverse standoff voltage range:  $V_{RWM} = 3.3$  V to 64 V
- Reverse current:  $I_{RM} = 0.001$   $\mu$ A
- Very low package height: 1 mm
- Small plastic package suitable for surface-mounted design
- AEC-Q101 qualified <sup>[1]</sup>

[1] Part of the products (as listed in the revision history) have removed automotive qualification status.

### 3. Applications

- Power supply protection
- Automotive application <sup>[2]</sup>
- Industrial application
- Power management

[2] Part of the products (as listed in the revision history) have removed automotive qualification status, thus not applicable to automotive applications.

### 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$P_{PPM}$	rated peak pulse power		[1] [2]	-	-	400	W
$V_{RWM}$	reverse standoff voltage	$T_j = 25$ °C		3.3	-	64	V

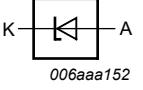
[1] In accordance with IEC 61643-321 (10/1000  $\mu$ s current waveform).

[2] For PTVS3V3S1UR:  $P_{PPM} = 350$  W.

**nexperia**

## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 CFP3 (SOD123W)	 006aaa152
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

**Table 3. Ordering information**

Type number[1]	Package		
	Name	Description	Version
PTVSxS1UR series	CFP3	plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body	SOD123W

[1] The series consists of 35 types with reverse standoff voltages from 3.3 V to 64 V.

## 7. Marking

**Table 4. Marking codes**

Type number	Marking code	Type number	Marking code
PTVS3V3S1UR	A1	PTVS20VS1UR	AL
PTVS5V0S1UR	A2	PTVS22VS1UR	AM
PTVS6V0S1UR	A3	PTVS24VS1UR	AN
PTVS6V5S1UR	A4	PTVS26VS1UR	AP
PTVS7V0S1UR	A5	PTVS28VS1UR	AR
PTVS7V5S1UR	A6	PTVS30VS1UR	AS
PTVS8V0S1UR	A7	PTVS33VS1UR	AT
PTVS8V5S1UR	A8	PTVS36VS1UR	AU
PTVS9V0S1UR	A9	PTVS40VS1UR	AV
PTVS10VS1UR	AA	PTVS43VS1UR	AW
PTVS11VS1UR	AB	PTVS45VS1UR	AX
PTVS12VS1UR	AC	PTVS48VS1UR	AY
PTVS13VS1UR	AD	PTVS51VS1UR	AZ
PTVS14VS1UR	AE	PTVS54VS1UR	B1
PTVS15VS1UR	AF	PTVS58VS1UR	B2
PTVS16VS1UR	AG	PTVS60VS1UR	B3
PTVS17VS1UR	AH	PTVS64VS1UR	B4
PTVS18VS1UR	AK	-	-

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
$P_{PPM}$	rated peak pulse power		[1] [2]	-	400	W
$I_{PPM}$	rated peak pulse current		[1]	-	see table <a href="#">7</a> and <a href="#">8</a>	A
$I_{FSM}$	non-repetitive peak forward current	single half-sine wave; $t_p = 8.3$ ms		-	50	A
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C
<b>ESD maximum ratings</b>						
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[3]	-	30	kV
		MIL-STD-883; human body model (HBM)		-	> 4	kV

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

[2] For PTVS3V3S1UR:  $P_{PPM} = 350$ W.

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

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	220	K/W
			[2]	-	-	130	K/W
			[3]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	18	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[3] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

[4] Soldering point of cathode tab.

## 10. Characteristics

**Table 7. Characteristics per type; PTVS3V3S1UR to PTVS7V0S1UR**

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

Type number PTVSxS1UR	Reverse standoff voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}$ (V)			Reverse leakage current $I_{RM}$ ( $\mu\text{A}$ )		Clamping voltage $V_{CL}$ (V)	
		$I_R = 10 \text{ mA}$			at $V_{RWM}$ (V)			
		Max	Min	Typ	Max	Typ	Max	$I_{PPM}$ (A)
3V3	3.3	5.20	5.60	6.00	5	600	8.0	43.8
5V0	5.0	6.40	6.70	7.00	5	400	9.2	43.5
6V0	6.0	6.67	7.02	7.37	5	400	10.3	38.8
6V5	6.5	7.22	7.60	7.98	5	250	11.2	35.7
7V0	7.0	7.78	8.20	8.60	3	100	12.0	33.3

**Table 8. Characteristics per type; PTVS7V5S1UR to PTVS64VS1UR**

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

Type number PTVSxS1UR	Reverse standoff voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}$ (V)			Reverse leakage current $I_{RM}$ ( $\mu\text{A}$ )		Clamping voltage $V_{CL}$ (V)	
		$I_R = 1 \text{ mA}$			at $V_{RWM}$ (V)			
		Max	Min	Typ	Max	Typ	Max	$I_{PPM}$ (A)
7V5	7.5	8.33	8.77	9.21	0.2	50	12.9	31.0
8V0	8.0	8.89	9.36	9.83	0.03	25	13.6	29.4
8V5	8.5	9.44	9.92	10.40	0.01	10	14.4	27.8
9V0	9.0	10.00	10.55	11.10	0.005	5	15.4	26.0
10V	10	11.10	11.70	12.30	0.005	2.5	17.0	23.5
11V	11	12.20	12.85	13.50	0.005	2.5	18.2	22.0
12V	12	13.30	14.00	14.70	0.005	2.5	19.9	20.1
13V	13	14.40	15.15	15.90	0.001	0.1	21.5	18.6
14V	14	15.60	16.40	17.20	0.001	0.1	23.2	17.2
15V	15	16.70	17.60	18.50	0.001	0.1	24.4	16.4
16V	16	17.80	18.75	19.70	0.001	0.1	26.0	15.4
17V	17	18.90	19.90	20.90	0.001	0.1	27.6	14.5
18V	18	20.00	21.00	22.10	0.001	0.1	29.2	13.7
20V	20	22.20	23.35	24.50	0.001	0.1	32.4	12.3
22V	22	24.40	25.60	26.90	0.001	0.1	35.5	11.3
24V	24	26.70	28.10	29.50	0.001	0.1	38.9	10.3
26V	26	28.90	30.40	31.90	0.001	0.1	42.1	9.5
28V	28	31.10	32.80	34.40	0.001	0.1	45.4	8.8
30V	30	33.30	35.10	36.80	0.001	0.1	48.4	8.3
33V	33	36.70	38.70	40.60	0.001	0.1	53.3	7.5
36V	36	40.00	42.10	44.20	0.001	0.1	58.1	6.9
40V	40	44.40	46.80	49.10	0.001	0.1	64.5	6.2
43V	43	47.80	50.30	52.80	0.001	0.1	69.4	5.8
45V	45	50.00	52.65	55.30	0.001	0.1	72.7	5.5

Type number PTVSxS1UR	Reverse standoff voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}$ (V)			Reverse leakage current $I_{RM}$ ( $\mu$ A)		Clamping voltage $V_{CL}$ (V)	
		$I_R = 1$ mA			at $V_{RWM}$ (V)			
		Max	Min	Typ	Max	Typ	Max	$I_{PPM}$ (A)
48V	48	53.30	56.10	58.90	0.001	0.1	77.4	5.2
51V	51	56.70	59.70	62.70	0.001	0.1	82.4	4.9
54V	54	60.00	63.15	66.30	0.001	0.1	87.1	4.6
58V	58	64.40	67.80	71.20	0.001	0.1	93.6	4.3
60V	60	66.70	70.20	73.70	0.001	0.1	96.8	4.1
64V	64	71.10	74.85	78.60	0.001	0.1	103.0	3.9

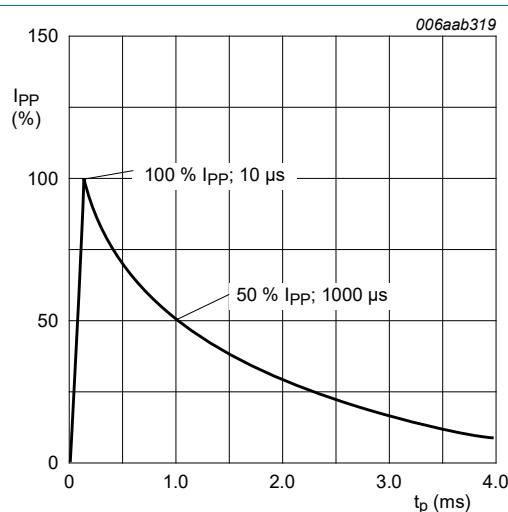


Fig. 1. 10/1000  $\mu$ s pulse waveform according to IEC 61643-321

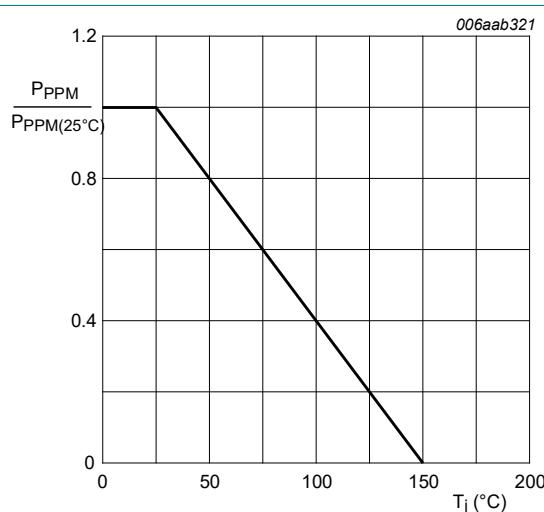
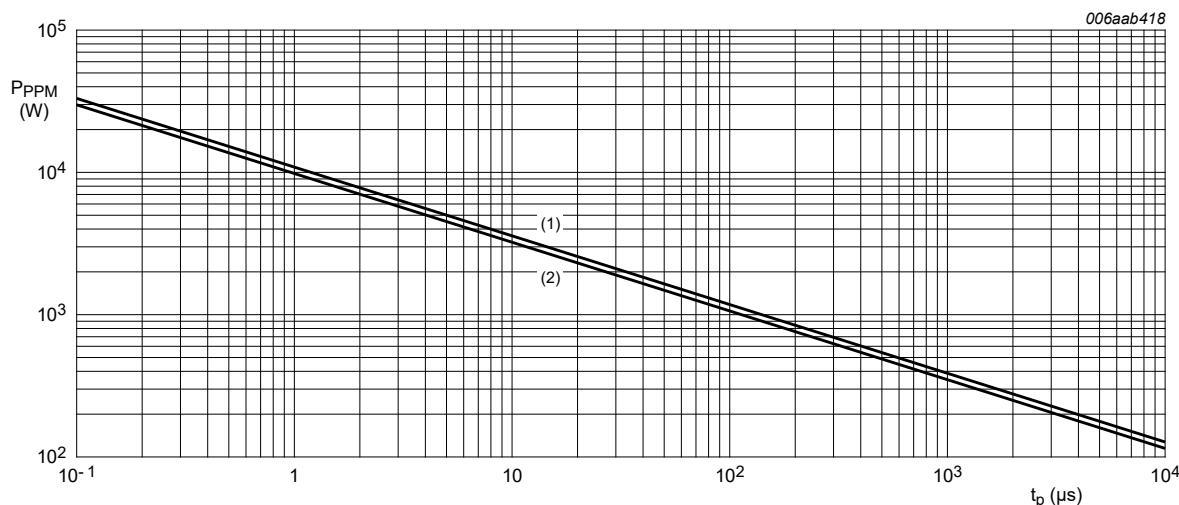


Fig. 2. Relative variation of rated peak pulse power as a function of junction temperature; typical values



$T_{amb} = 25$  °C

(1) PTVS5V0S1UR to PTVS64VS1UR

(2) PTVS3V3S1UR

Fig. 3. Rated peak pulse power as a function of pulse duration; typical values

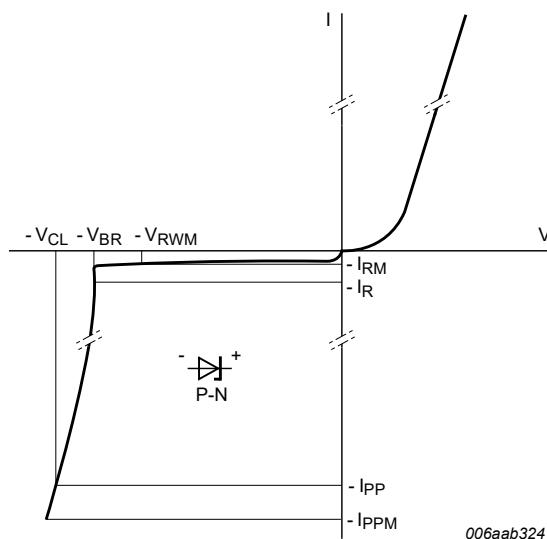


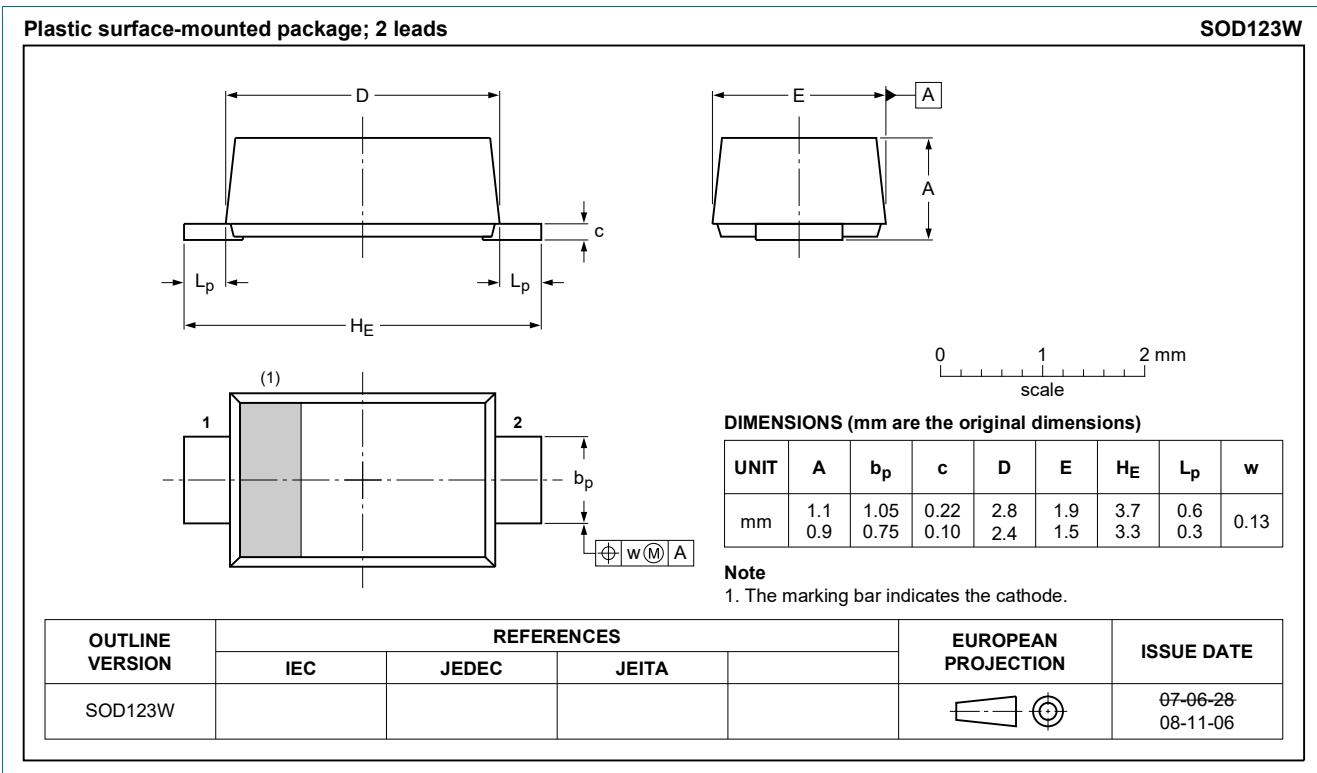
Fig. 4. V-I characteristics for a unidirectional TVS protection diode

## 11. Test information

### Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 12. Package outline



## 13. Soldering

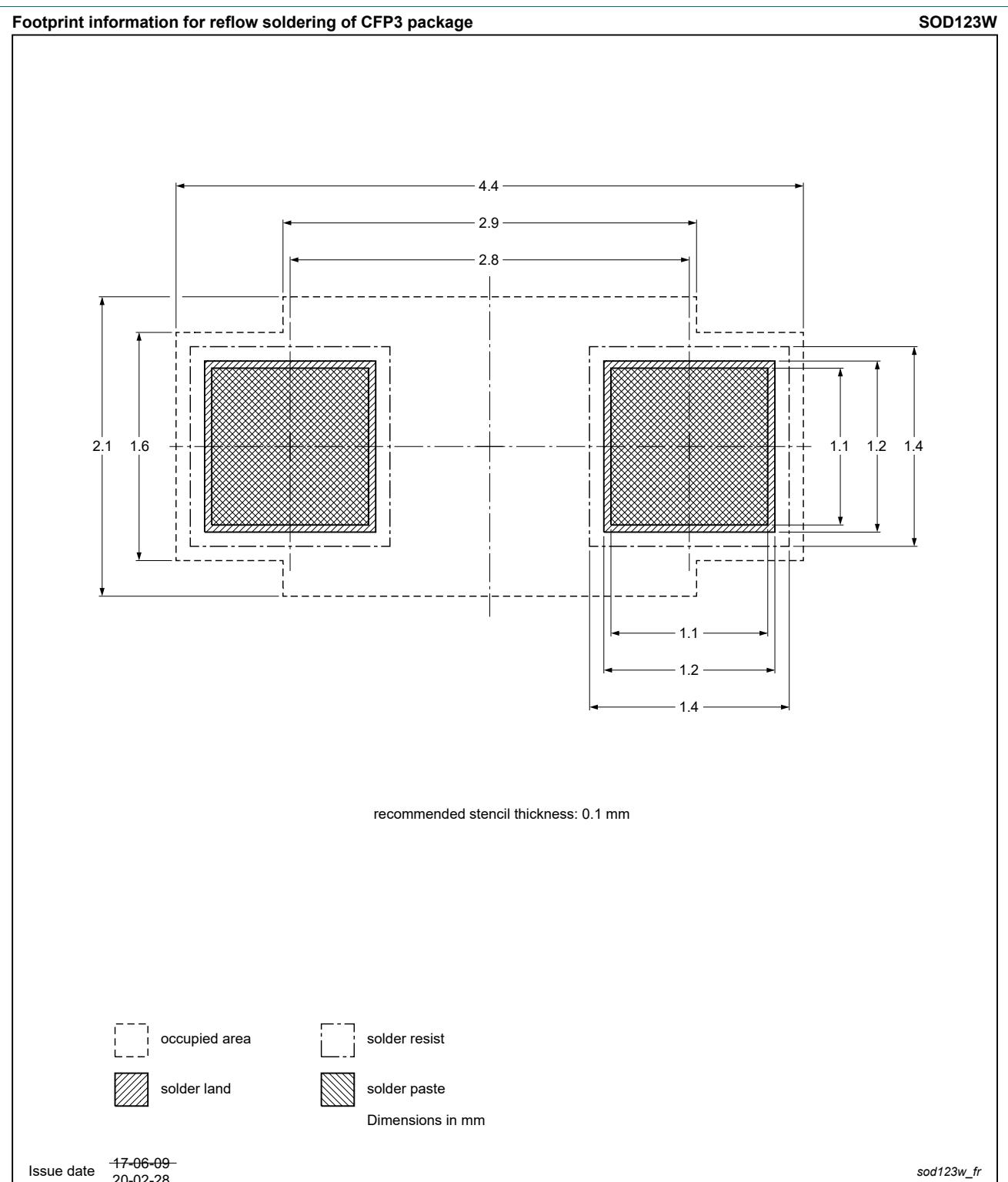
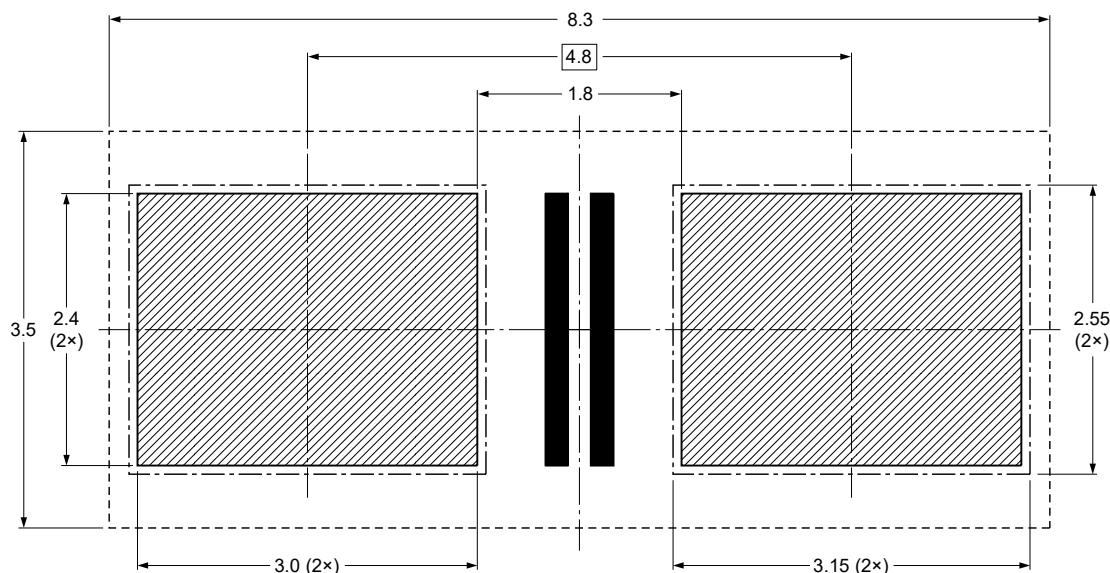


Fig. 6. Reflow soldering footprint for CFP3 (SOD123W)

## Wave soldering footprint information

SOD123W



occupied area

solder resist

solder lands

dummy track (solder resist and Cu free)

Dimensions in mm

Issue date 17-06-06  
17-06-07

sod123w\_fw

Fig. 7. Wave soldering footprint for CFP3 (SOD123W)

## 14. Revision history

**Table 9. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PTVSxS1UR_SER v.4	20251201	Product data sheet	-	PTVSxS1UR_SER v.3
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia</li> <li>Legal texts have been adapted to the new company name where appropriate</li> <li>Section "Packing information" removed</li> <li>33 products changed to standard qualification:</li> </ul> <p>PTVS3V3S1UR  PTVS5V0S1UR  PTVS6V0S1UR  PTVS6V5S1UR  PTVS7V0S1UR  PTVS7V5S1UR  PTVS8V0S1UR  PTVS8V5S1UR  PTVS10VS1UR  PTVS11VS1UR  PTVS12VS1UR  PTVS13VS1UR  PTVS14VS1UR  PTVS15VS1UR  PTVS16VS1UR  PTVS17VS1UR  PTVS18VS1UR  PTVS20VS1UR  PTVS24VS1UR  PTVS26VS1UR  PTVS28VS1UR  PTVS30VS1UR  PTVS33VS1UR  PTVS36VS1UR  PTVS40VS1UR  PTVS43VS1UR  PTVS45VS1UR  PTVS48VS1UR  PTVS51VS1UR  PTVS54VS1UR  PTVS58VS1UR  PTVS60VS1UR  PTVS64VS1UR</p>			
PTVSxS1UR_SER v.3	20110110	Product data sheet	-	PTVSxS1UR_SER v.2
PTVSxS1UR_SER v.2	20090910	Product data sheet	-	PTVSxS1UR_SER v.1
PTVSxS1UR_SER v.1	20090202	Product data sheet	-	-

## 15. 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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