



# PESD16VV1BSF

Extremely symmetrical bidirectional ESD protection diode

3 March 2021

Product data sheet

## 1. General description

Extremely symmetrical bidirectional ElectroStatic Discharge (ESD) protection diode. This device is housed in a DSN0603-2 (SOD962) leadless ultra small Surface-Mounted Device (SMD) package designed to protect one signal line from the damage caused by ESD and other transients.

## 2. Features and benefits

- Bidirectional ESD protection of one line
- Extremely symmetrical layout
- Very low diode capacitance  $C_d = 6.5$  pF maximum values
- Low clamping to protect sensitive I/Os
- Low inductance protection path to ground
- ESD protection up to  $\pm 12$  kV according to IEC 61000-4-2
- Ultra small SMD package

## 3. Applications

- Cellular handsets and accessories
- Portable electronics
- Communication systems
- Computers and peripherals

## 4. Quick reference data

Table 1. Quick reference data


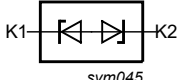
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage		-	-	16	V
$C_d$	diode capacitance	$f = 1$ MHz; $V_R = 0$ V; $T_{amb} = 25$ °C	-	5.7	6.5	pF
$I_{PPM}$	rated peak pulse current	$t_p = 8/20$ $\mu$ s	[1] [2]	-	1.3	A

[1] According to IEC 61000-4-5 and IEC 61643-321.

[2] In positive and negative direction.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 <p>Transparent top view</p> <p><b>DSN0603-2 (SOD962-2)</b></p>	 <p>sym045</p>
2	K2	cathode (diode 2)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD16VV1BSF	DSN0603-2	silicon, leadless ultra small package; 2 terminals; 0.4 mm pitch; 0.6 mm x 0.3 mm x 0.3 mm body	SOD962-2

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PESD16VV1BSF	W

## 8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RWM}$	reverse standoff voltage		-	16	V
$I_{PPM}$	rated peak pulse current	$t_p = 8/20 \mu s$	[1] [2]	1.3	A
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-40	125	°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]	12	kV

[1] According to IEC 61000-4-5 and IEC 61643-321.

[2] In positive and negative direction.

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

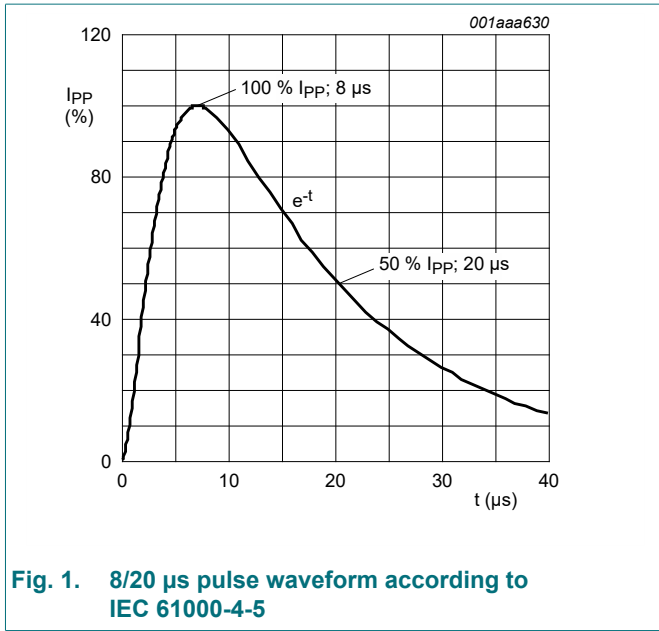


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5

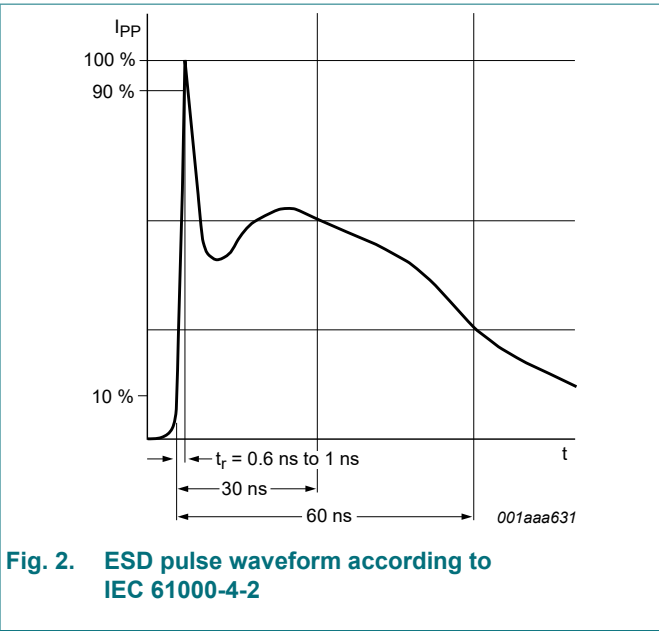


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

## 9. Characteristics

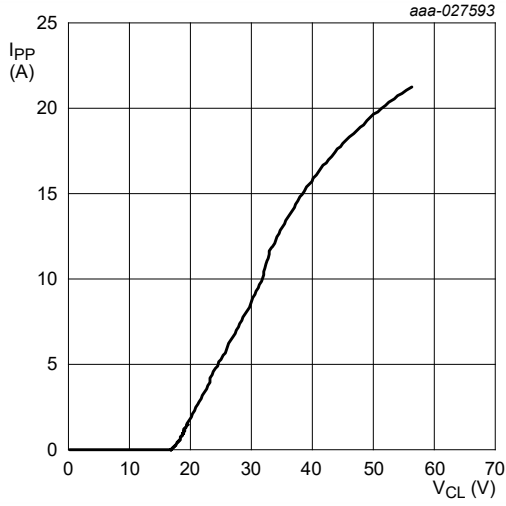
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{BR}$	breakdown voltage	$I_R = 1 \text{ mA}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	16.2	18	-	V	
$I_{RM}$	reverse leakage current	$V_{RWM} = 16 \text{ V}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	1	50	nA	
$C_d$	diode capacitance	$f = 1 \text{ MHz}$ ; $V_R = 0 \text{ V}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	5.7	6.5	pF	
$V_{CL}$	clamping voltage	$I_{PP} = 1.3 \text{ A}$ ; $t_p = 8/20 \text{ } \mu\text{s}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	-	22.6	-	V
		$I_{PP} = 8 \text{ A}$ ; $t_p = \text{TLP}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	[2]	-	29	-	V
		$I_{PP} = 16 \text{ A}$ ; $t_p = \text{TLP}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	[2]	-	40.5	-	V
$R_{dyn}$	dynamic resistance	$I_R = 10 \text{ A}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	[2]	-	1.1	-	$\Omega$
		$I_R = -10 \text{ A}$ ; $T_J = 25 \text{ }^\circ\text{C}$	[2]	-	1.1	-	$\Omega$
<b>normalized to attenuation at 1 MHz</b>							
$f_{-3dB}$	-3 dB cut-off frequency	$T_{amb} = 25 \text{ }^\circ\text{C}$	-	0.97	-	GHz	

[1] According to IEC 61000-4-5 and IEC 61643-321.

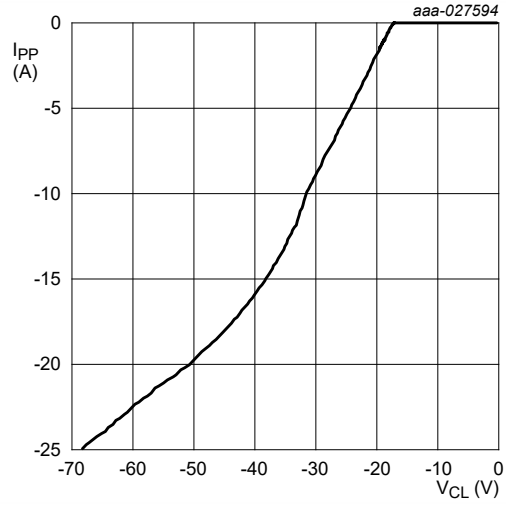
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP)  $t_p = 100 \text{ ns}$ ; square pulse; ANSI / ESD STM5.5.1-2008.

Extremely symmetrical bidirectional ESD protection diode



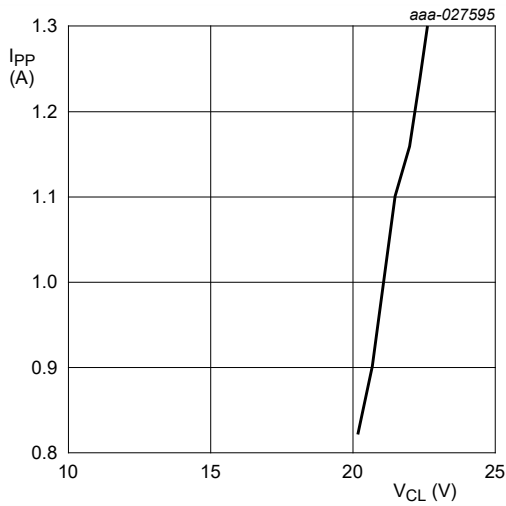
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

**Fig. 3. Dynamic resistance with positive clamping; typical values**



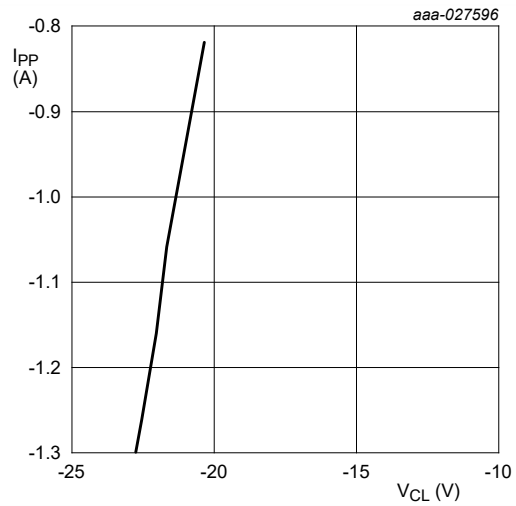
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

**Fig. 4. Dynamic resistance with negative clamping; typical values**



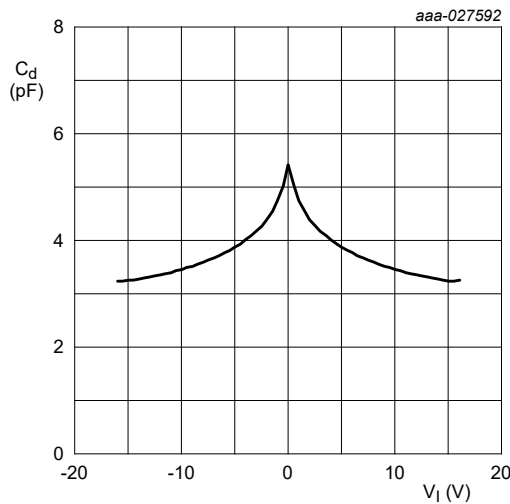
IEC 61000-4-5;  $t_p = 8/20 \text{ }\mu\text{s}$ ; positive pulse

**Fig. 5. Dynamic resistance with positive clamping; typical values**



IEC 61000-4-5;  $t_p = 8/20 \text{ }\mu\text{s}$ ; negative pulse

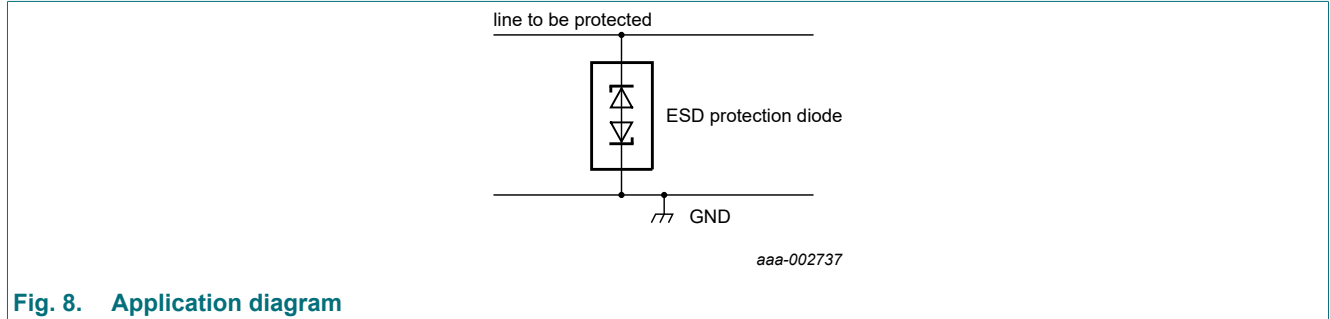
**Fig. 6. Dynamic resistance with negative clamping; typical values**



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

## 10. Application information

The device is designed for the protection of one bidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are both positive and negative with respect to ground.



**Fig. 8. Application diagram**

### Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

### 11. Package outline

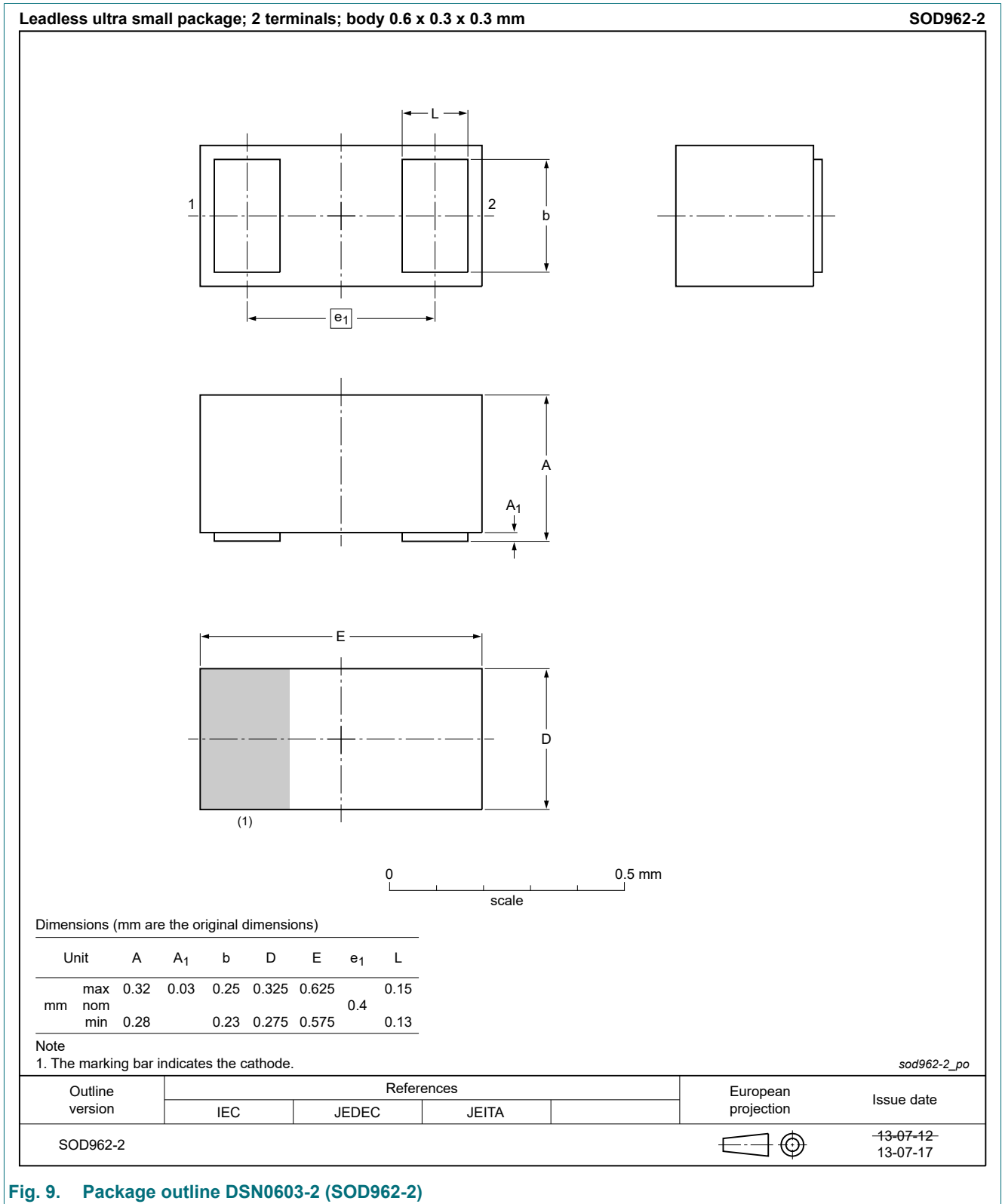


Fig. 9. Package outline DSN0603-2 (SOD962-2)

## 12. Soldering

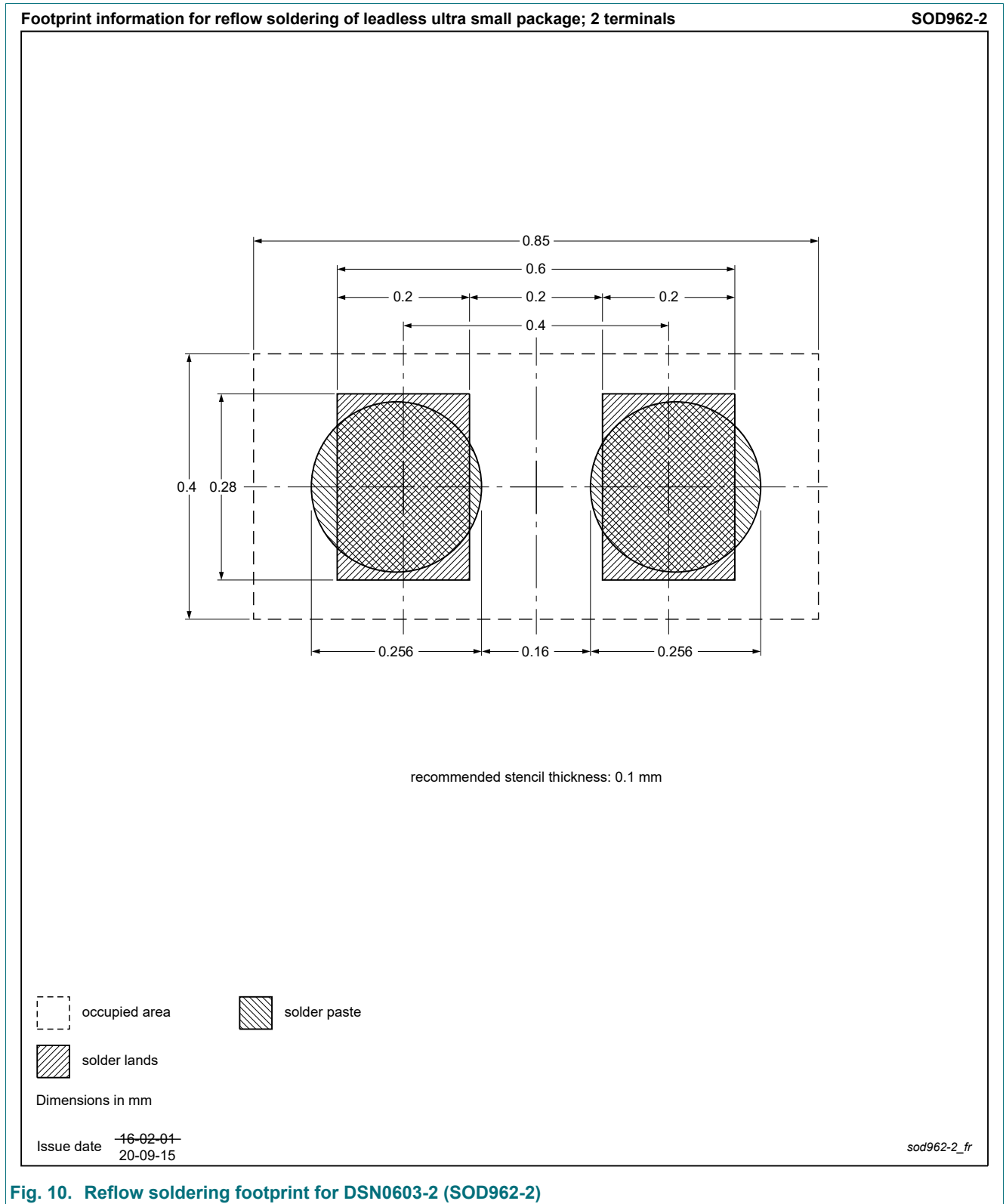


Fig. 10. Reflow soldering footprint for DSN0603-2 (SOD962-2)

## 13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD16VV1BSF v.4	20210303	Product data sheet	-	PESD16VV1BSF v.3
Modifications:	• Figure "Reflow soldering footprint" updated			
PESD16VV1BSF v.3	20180705	Product data sheet	-	PESD16VV1BSF v.2
PESD16VV1BSF v.2	20180420	Product data sheet	-	PESD16VV1BSF v.1
PESD16VV1BSF v.1	20180404	Product data sheet	-	-



## 14. 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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