

PESD5V0F1USF

Extremely low capacitance unidirectional ESD protection diode

1 March 2021 Product data sheet

1. General description

Extremely low capacitance unidirectional ElectroStatic Discharge (ESD) protection diode 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

- Unidirectional ESD protection of one line
- Extremely low diode capacitance C_d = 0.6 pF
- ESD protection up to ±10 kV according to IEC 61000-4-2
- Ultra low leakage current I_{RM} = 1 nA
- Ultra small SMD package

3. Applications

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

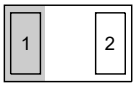
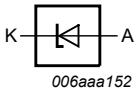
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	0.6	0.75	pF

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **DSN0603-2 (SOD962)**	
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0F1USF	DSN0603-2	silicon, leadless ultra small package; 2 terminals; 0.4 mm pitch; 0.6 x 0.3 x 0.3 mm body	SOD962

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD5V0F1USF	4

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8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1]	-	3	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[2]	-	10	kV
		IEC 61000-4-2 (air discharge)	[2]	-	10	kV
		machine model		-	400	V
		MIL-STD-883 (human body model)		-	10	kV

[1] Non-repetitive current pulse 8/20 µs exponentially decaying waveform according to IEC 61000-4-5 and IEC61643-321.
[2] Device stressed with ten non-repetitive ESD pulses.

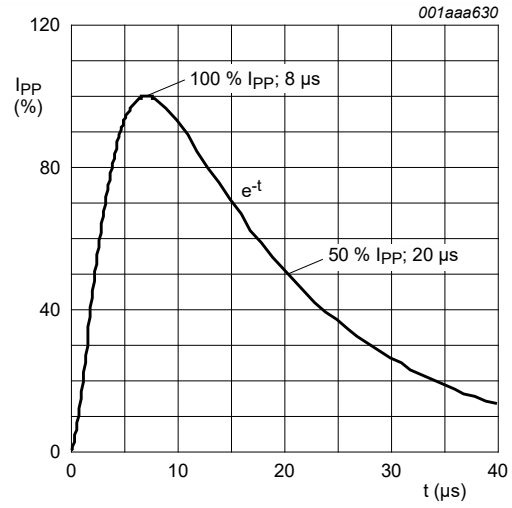


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

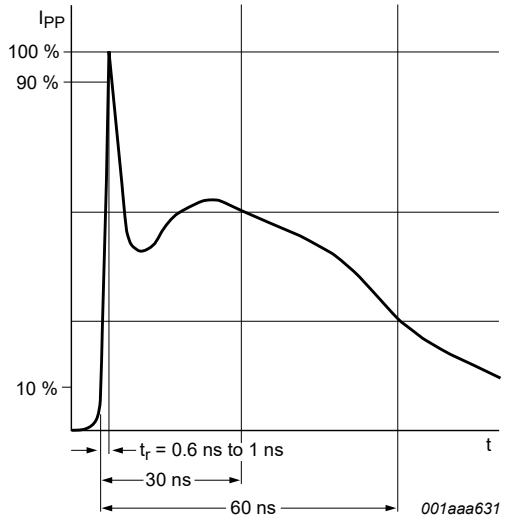


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

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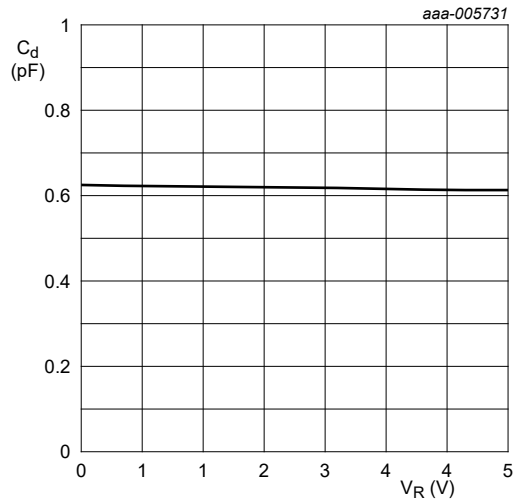
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9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5	V
V_{BR}	breakdown voltage	I_R = 5 mA; T_{amb} = 25 °C		6	8	10	V
I_{RM}	reverse leakage current	V_{RWM} = 5 V; T_{amb} = 25 °C		-	1	100	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	0.6	0.75	pF
V_{CL}	clamping voltage	I_{PPM} = 3 A; T_{amb} = 25 °C	[1]	-	10	12	V
R_{dyn}	dynamic resistance	I_R = 10 A; T_{amb} = 25 °C	[2]	-	0.7	-	Ω

[1] Non-repetitive current pulse 8/20 µs exponential decay waveform according to IEC 61000-4-5 and IEC61643-321.
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANSI/ESD STM5.5.1-2008.



f = 1 MHz; T_{amb} = 25 °C

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

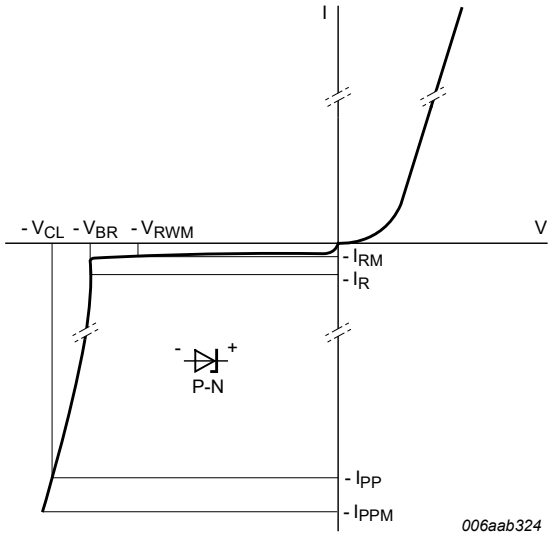
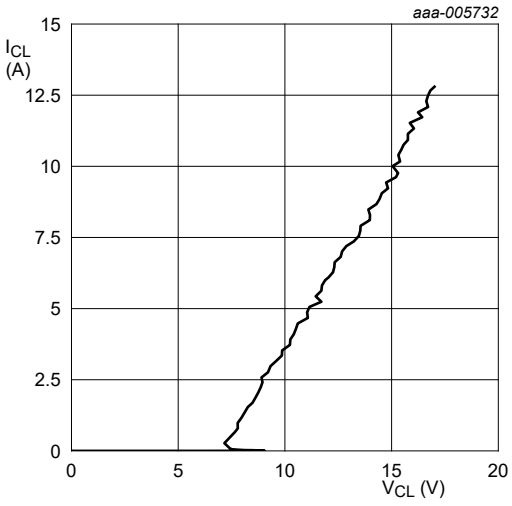


Fig. 4. V-I characteristics for a unidirectional ESD protection diode



t_p = 100 ns; Transmission Line Pulse (TLP)

Fig. 5. Dynamic resistance; typical values

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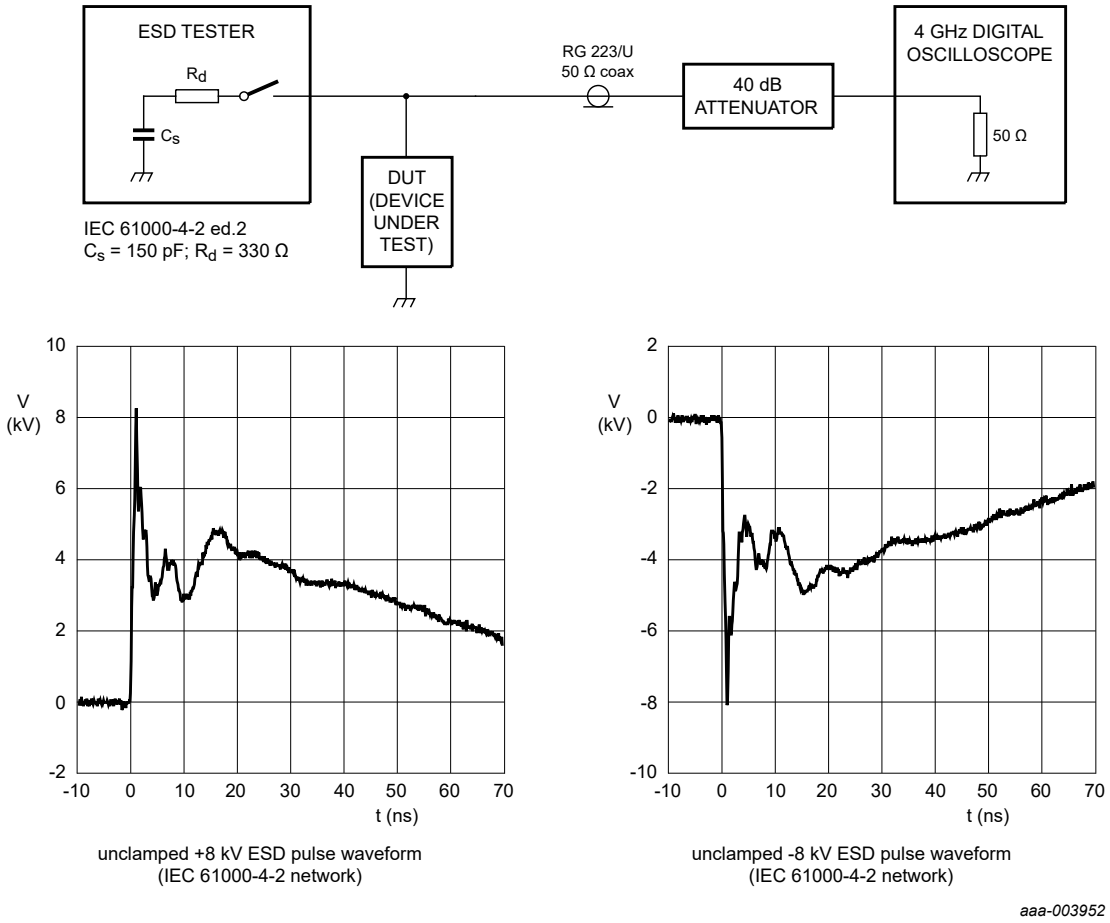


Fig. 6. ESD clamping test setup and waveforms

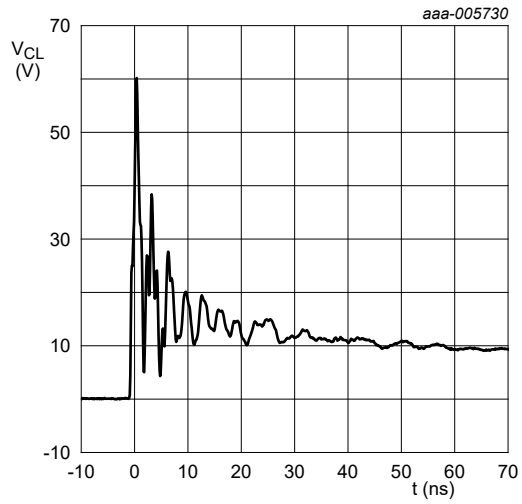


Fig. 7. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

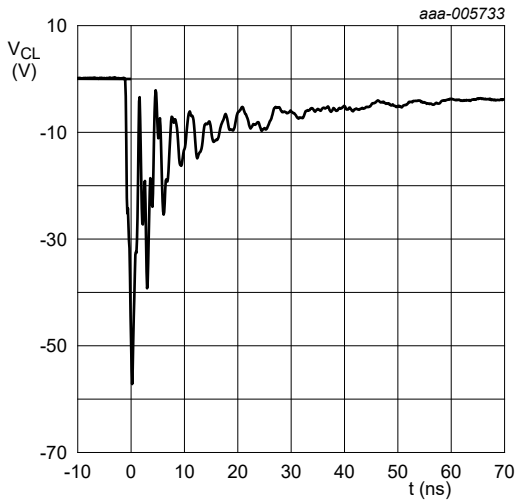


Fig. 8. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

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10. Application information

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

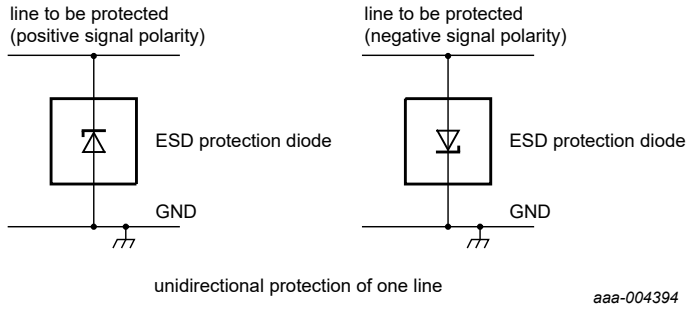


Fig. 9. Application diagram

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:

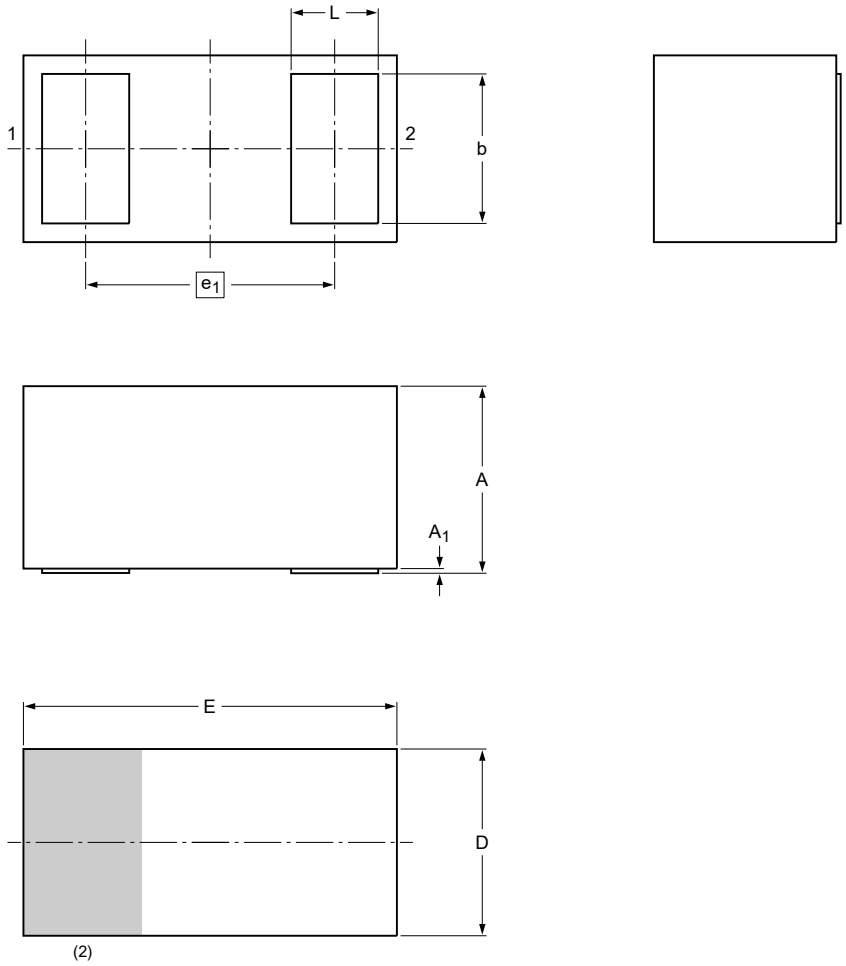
1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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.

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11. Package outline

Leadless ultra small package; 2 terminals; body 0.6 x 0.3 x 0.3 mm **SOD962**



Dimensions

Unit		A(1)	A1	b	D	E	e1	L
mm	max	0.32	0.0076	0.25	0.325	0.625		0.15
	nom						0.4	
	min	0.28		0.23	0.275	0.575		0.13

Note
1. Dimension A is including coating foil thickness.
2. The marking bar indicates the cathode.

sod962_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD962						~~10-11-03~~ 10-11-11

Fig. 10. Package outline DSN0603-2 (SOD962)

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12. Soldering

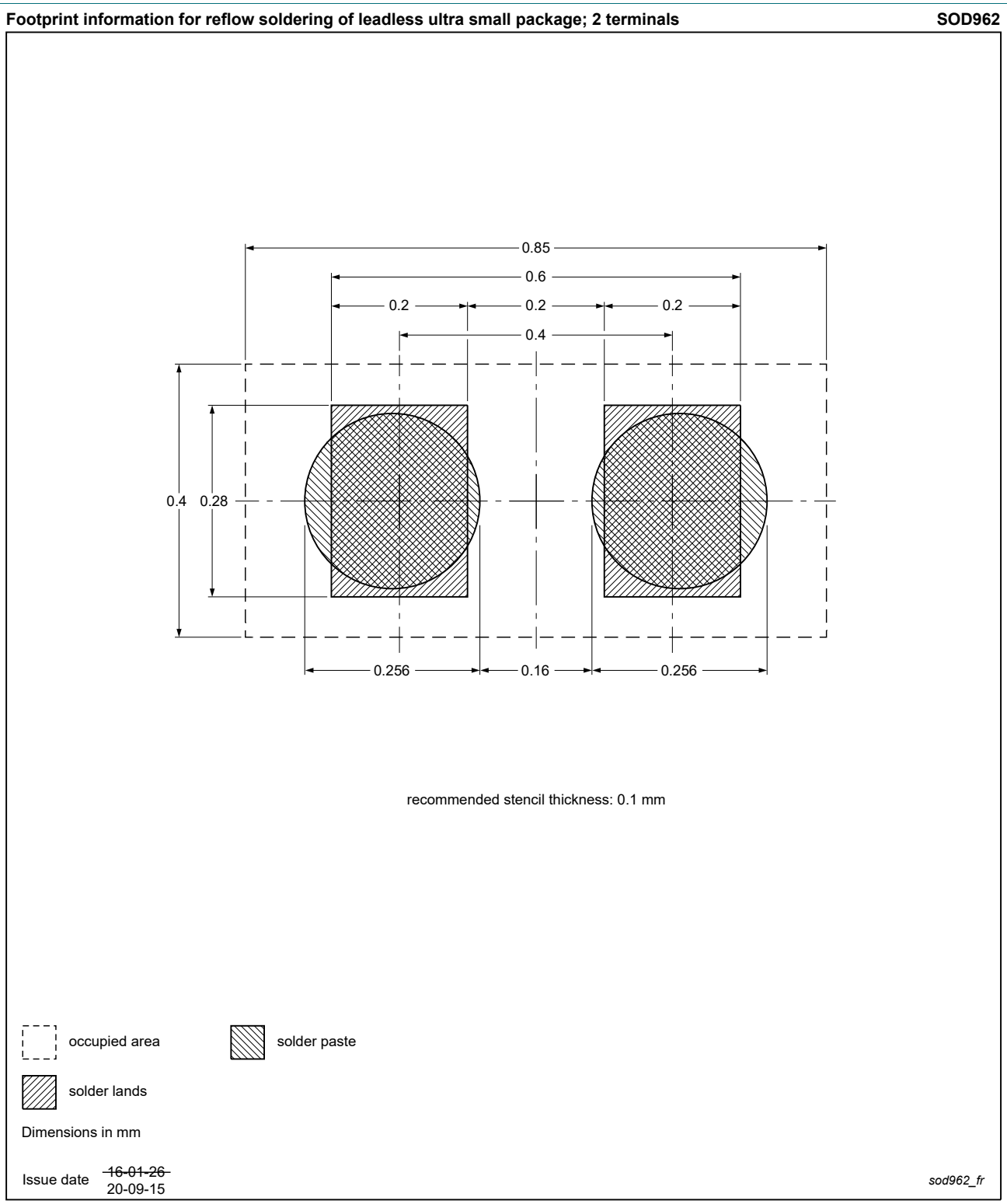


Fig. 11. Reflow soldering footprint for DSN0603-2 (SOD962)

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13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0F1USF v.3	20210301	Product data sheet	-	PESD5V0F1USF v.2
Modifications:	• Figure "Reflow soldering footprint" updated			
PESD5V0F1USF v.2	20190304	Product data sheet	-	PESD5V0F1USF v.1
PESD5V0F1USF v.1	20121211	Product data sheet	-	-

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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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