



PESD2CANFD24V-U

ESD protection for In-vehicle networks

20 December 2019

Product data sheet

1. General description

ESD protection device in a small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package designed to protect two automotive In-vehicle network bus lines from the damage caused by ElectroStatic discharge (ESD) and other transients

2. Features and benefits

- Reverse stand-off voltage: $V_{RWM} = 24\text{ V}$
- Low clamping voltage: $V_{CL} = 33\text{ V}$ at $I_{PP} = 1\text{ A}$
- ESD protection up to 23 kV (IEC 61000-4-2)
- Ultra low capacitance: $C_d = 6\text{ pF}$
- ESD protection up to 23 kV (ISO 10605; $C = 150\text{ pF}$; $R = 330\ \Omega$)
- High temperature capability: $T_j = 175\text{ }^\circ\text{C}$
- AEC-Q101 qualified

3. Applications

ESD protection for In-vehicle network lines in automotive environments

- CAN-FD
- CAN
- FlexRay
- SENT

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25\text{ }^\circ\text{C}$		-	-	24	V
I_{PPM}	rated peak pulse current	$t_p = 8/20\ \mu\text{s}$	[1] [2]	-	-	2.6	A
V_{CL}	clamping voltage	$I_{PPM} = 1\text{ A}$; $t_p = 8/20\ \mu\text{s}$; $T_{amb} = 25\text{ }^\circ\text{C}$	[3] [2]	-	33	42	V

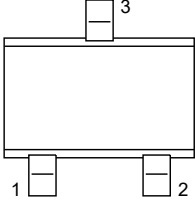
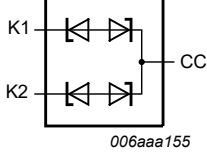
[1] According to IEC 61000-4-5.

[2] Measured from pin 1 or 2 to pin 3.

[3] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 <p>SC-70 (SOT323)</p>	
2	K2	cathode (diode 2)		
3	CC	common cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD2CANFD24V-U	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PESD2CANFD24V-U	Z2%

[1] % = placeholder for manufacturing site code

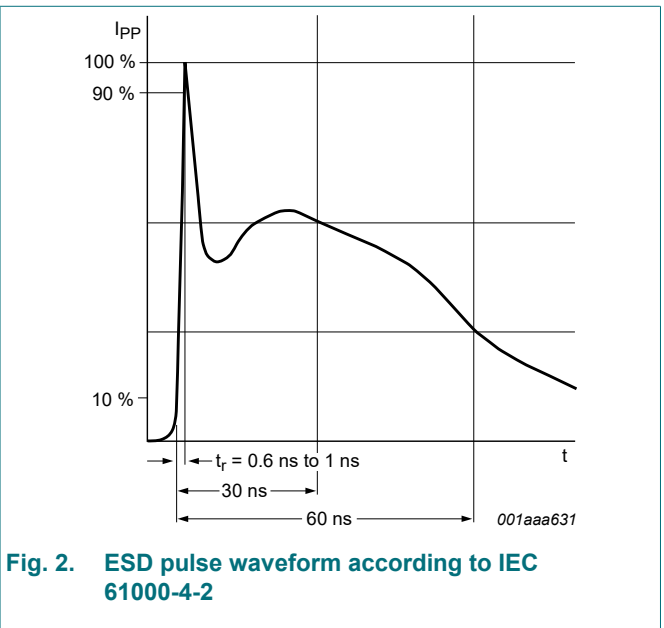
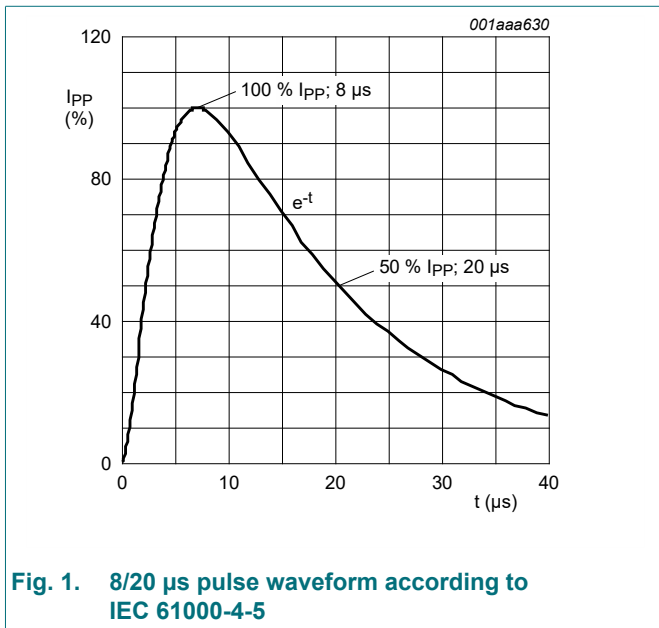
8. Limiting values

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	$t_p = 8/20 \mu s$	[1] [2]	-	2.6	A
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	storage temperature			-65	175	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[2] [3]	-	23	kV
		ISO 10605; contact discharge; C = 330 pF, R = 330 Ω	[2] [3]	-	20	kV
		ISO 10605; contact discharge; C = 150 pF, R = 330 Ω	[2] [3]	-	23	V

- [1] According to IEC 61000-4-5.
- [2] Measured from pin 1 or 2 to pin 3.
- [3] Device stressed with ten non-repetitive ESD pulses.



9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	24	V
V_{BR}	breakdown voltage	$I_R = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	25.5	30	35.5	V
I_{RM}	reverse leakage current	$V_{RWM} = 24\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	1	50	nA
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 2.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	5.2	6	pF
		$f = 1\text{ MHz}; V_R = -2.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	5.2	6	pF
$\Delta C_d/C_d$	diode capacitance matching	$f = 1\text{ MHz}; V_R = 2.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	0.5	-	%
		$f = 1\text{ MHz}; V_R = -2.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	0.5	-	%
V_{CL}	clamping voltage	$I_{PPM} = 1\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[3] [1]	-	33	42	V
R_{dyn}	dynamic resistance	$I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[4] [1]	-	0.7	-	Ω

[1] Measured from pin 1 or 2 to pin 3.

[2] ΔC_d is the difference of the capacitance measured between pin 1 and pin 3 and the capacitance measured between pin 2 and pin 3.

[3] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.

[4] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008

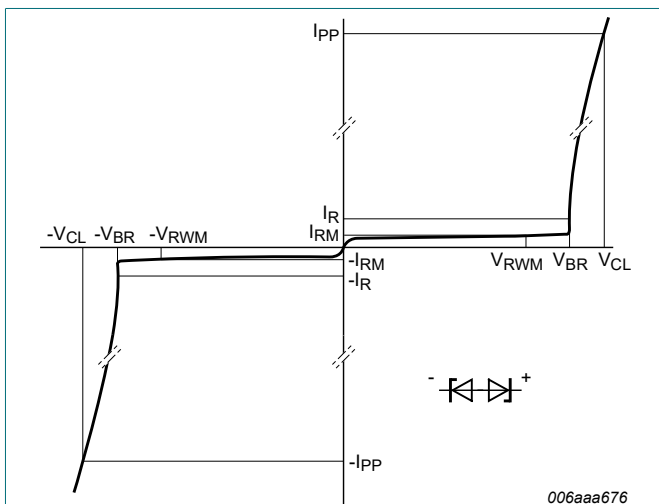


Fig. 3. V-I characteristics for a bidirectional ESD protection diode

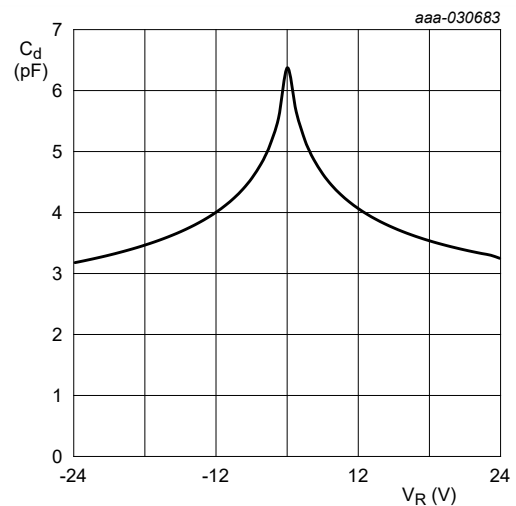
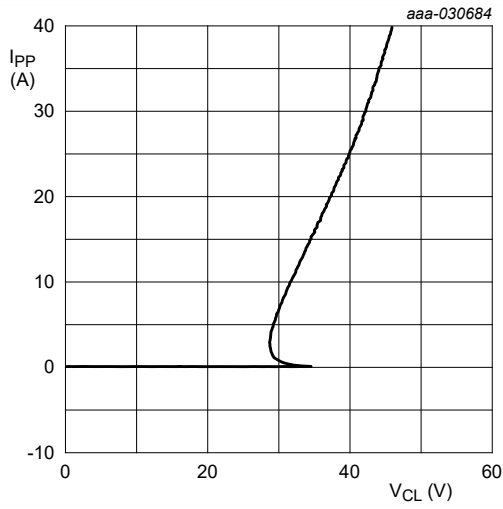
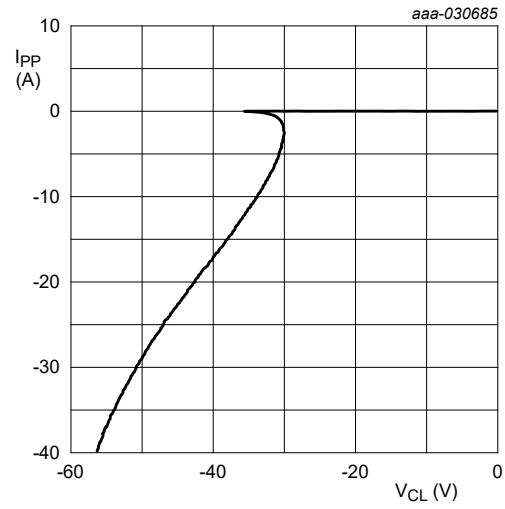


Fig. 4. Diode capacitance as a function of reverse voltage; typical values



$t_p = 100$ ns; Transmission Line Pulse (TLP)

Fig. 5. Positive clamping voltage (TLP); typical values



$t_p = 100$ ns; Transmission Line Pulse (TLP)

Fig. 6. Negative clamping voltage (TLP); typical values

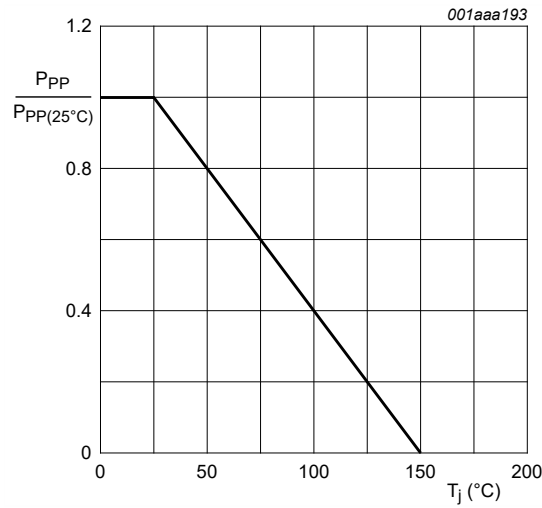


Fig. 7. Relative variation of peak pulse power as a function of junction temperature; typical values

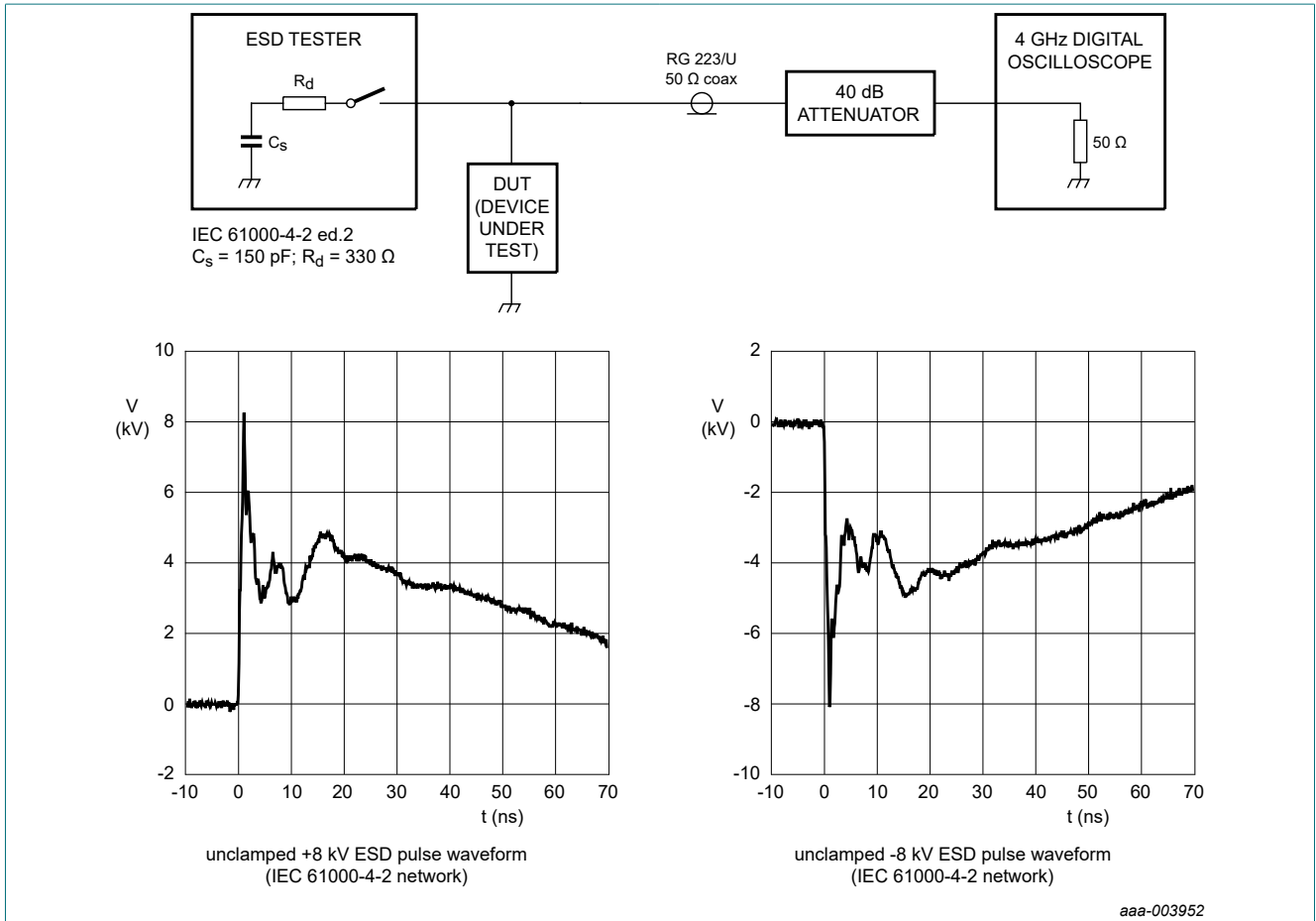


Fig. 8. ESD clamping test setup and waveforms

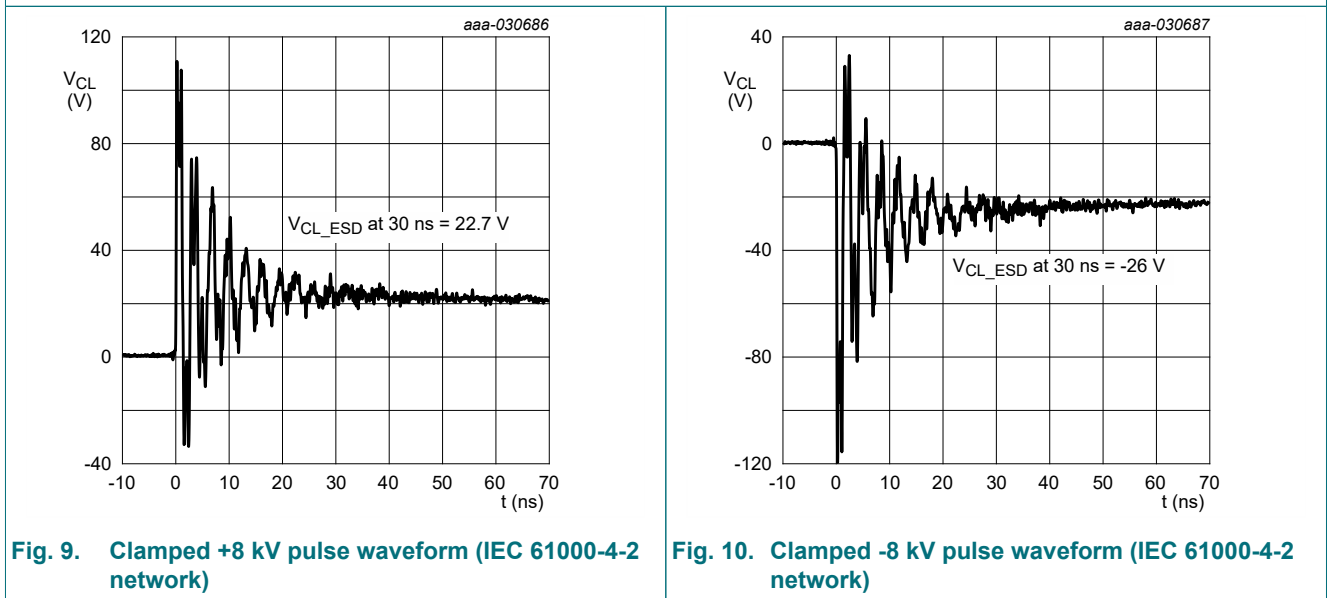


Fig. 9. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

Fig. 10. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

10. 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.

11. Package outline

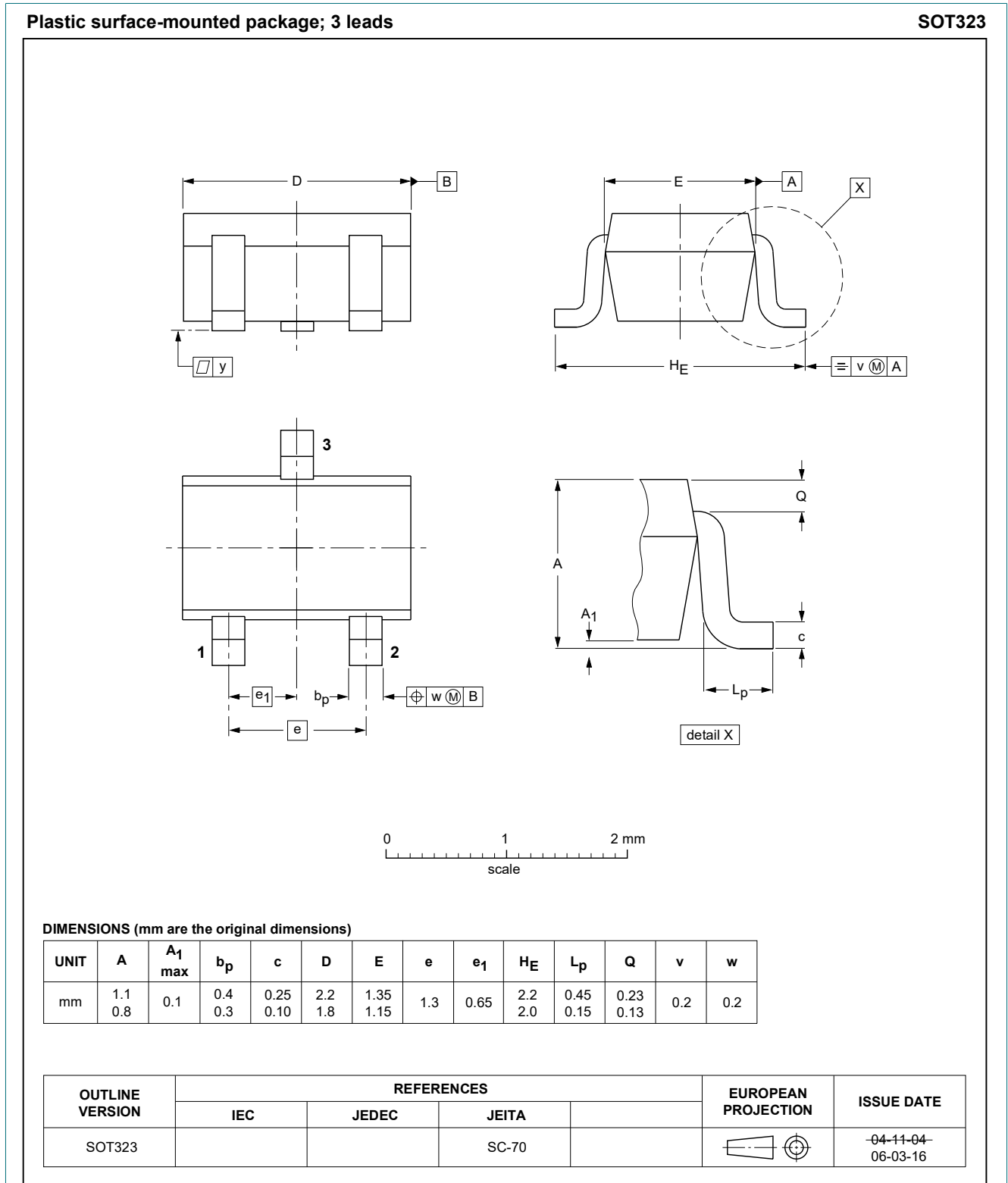


Fig. 11. Package outline SC-70 (SOT323)

12. Soldering

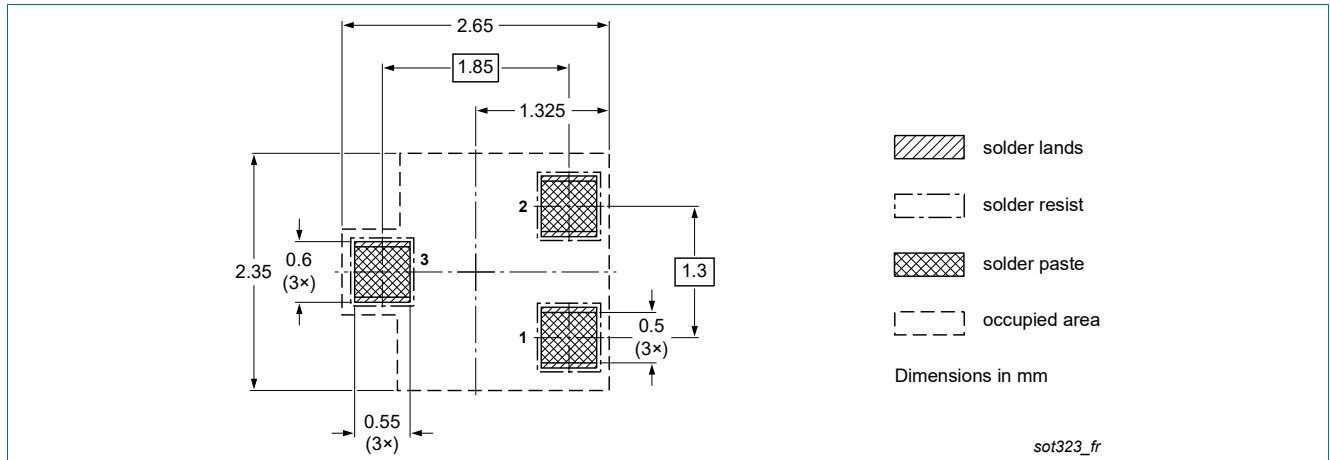


Fig. 12. Reflow soldering footprint for SC-70 (SOT323)

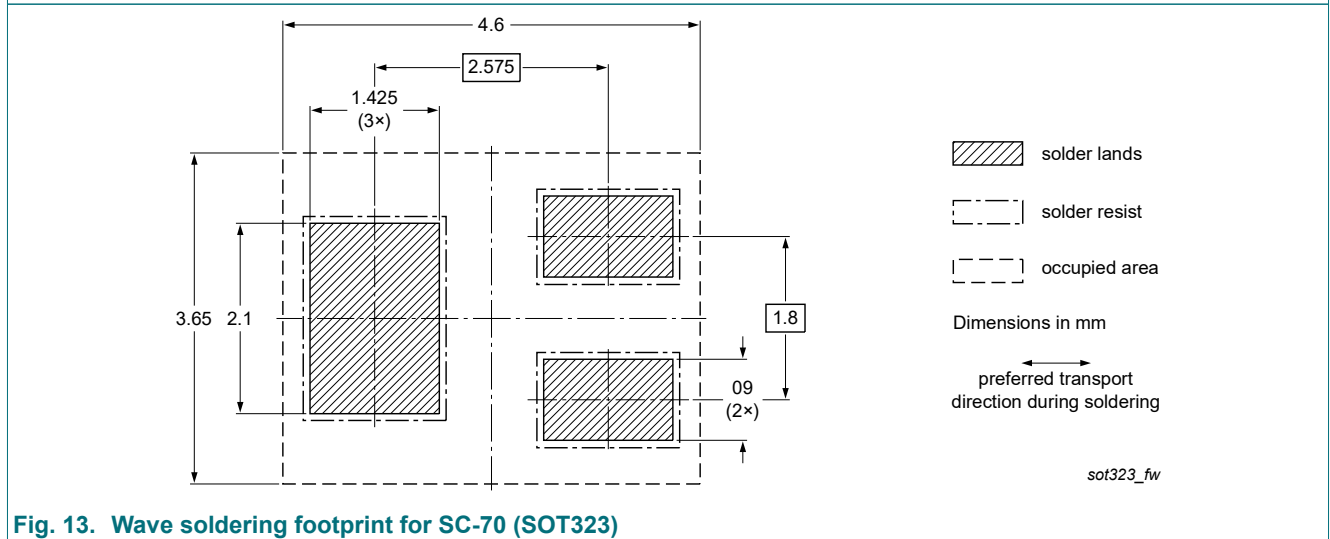


Fig. 13. Wave soldering footprint for SC-70 (SOT323)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD2CANFD24V-U v.2	20191220	Product data sheet	-	PESD2CANFD24V-U v.1
Modifications:	<ul style="list-style-type: none">• Features and benefits: updated• Limiting values: updated with new measurements• Characteristics: updated with new measurements			
PESD2CANFD24V-U v.1	20190801	Objective 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.

- [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: 20 December 2019
