



PESD2CANFD24V-T

ESD protection for In-vehicle networks

20 December 2019

Product data sheet

1. General description

ESD protection device in a small SOT23 (TO-236AB) 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: $T_j = 175\text{ °C}$
- 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	$T_{amb} = 25\text{ °C}$		-	-	24	V
I_{PPM}	rated peak pulse current	$t_p = 8/20\ \mu\text{s}$	[1] [2]	-	-	2.6	A
V_{CL}	clamping voltage	$I_{PPM} = 1\text{ A}$; $t_p = 8/20\ \mu\text{s}$; $T_{amb} = 25\text{ °C}$	[3] [2]	-	33	42	V

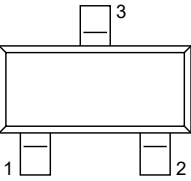
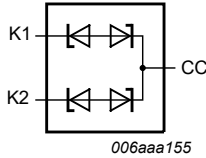
[1] According to IEC 61000-4-5.

[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 style="text-align: center;">SOT23</p>	
2	K2	cathode (diode 2)		
3	CC	common cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD2CANFD24V-T	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PESD2CANFD24V-T	%GL

[1] % = placeholder for manufacturing site code

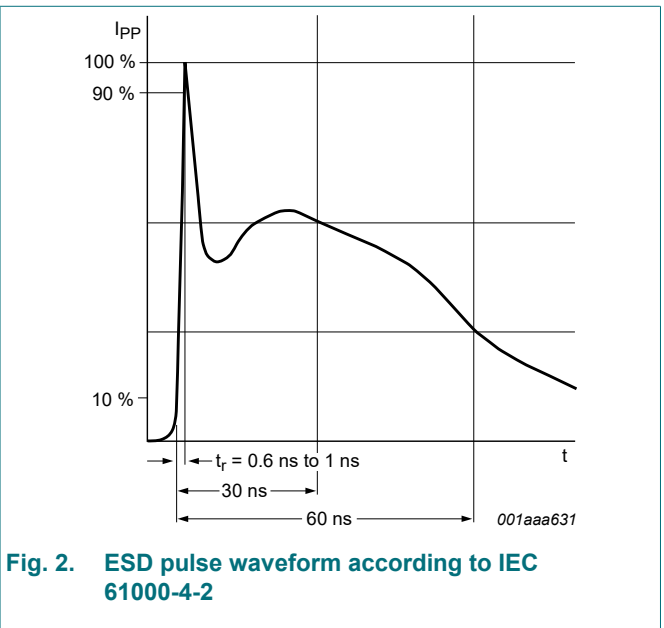
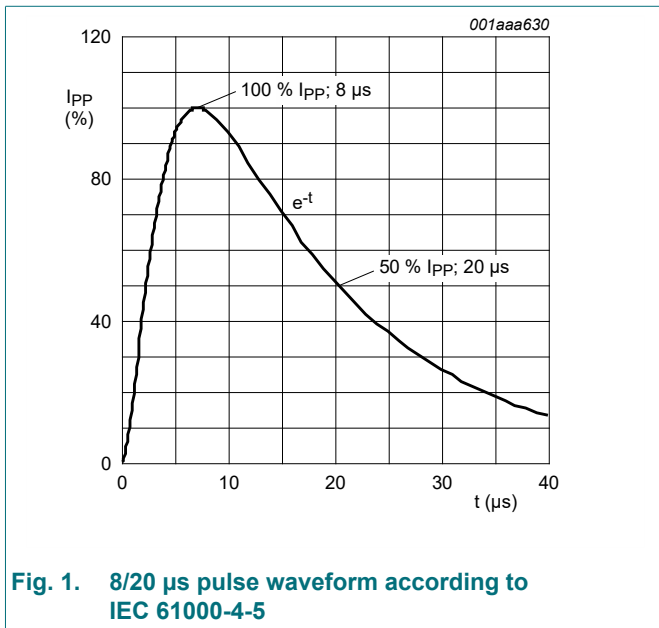
8. Limiting values

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

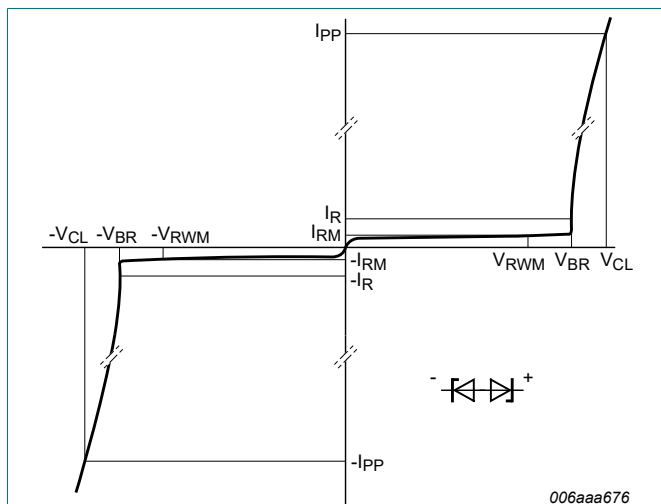


Fig. 3. V-I characteristics for a bidirectional ESD protection diode

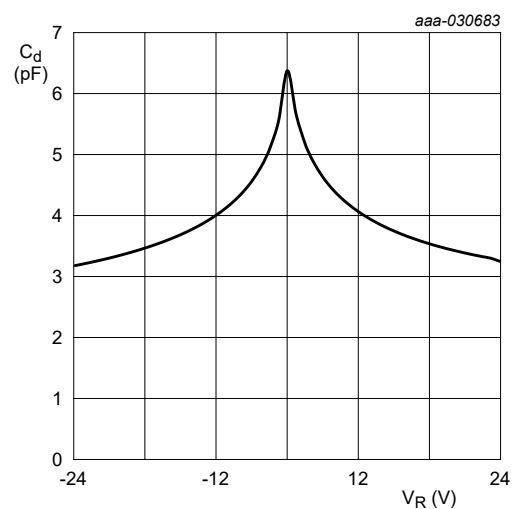
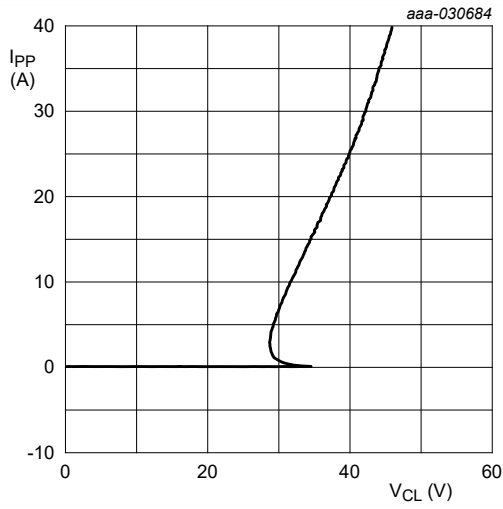
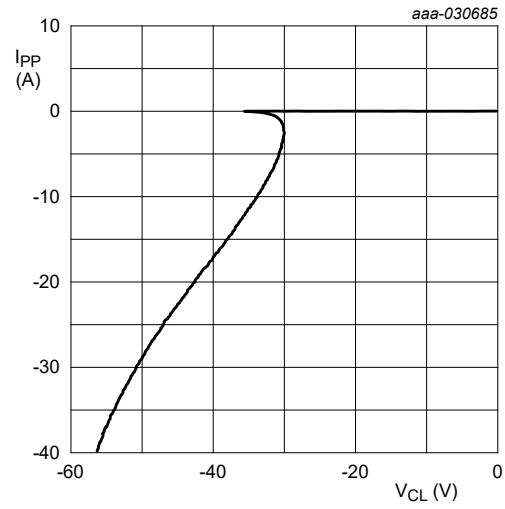


Fig. 4. Diode capacitance as a function of reverse voltage; typical values



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

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



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

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

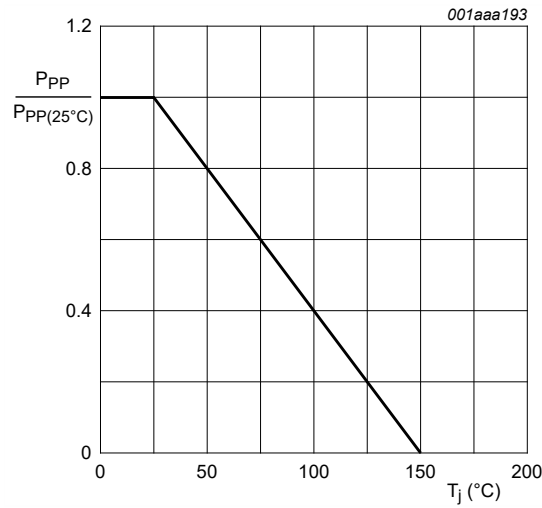


Fig. 7. Relative variation of peak pulse power as a function of junction temperature; typical values

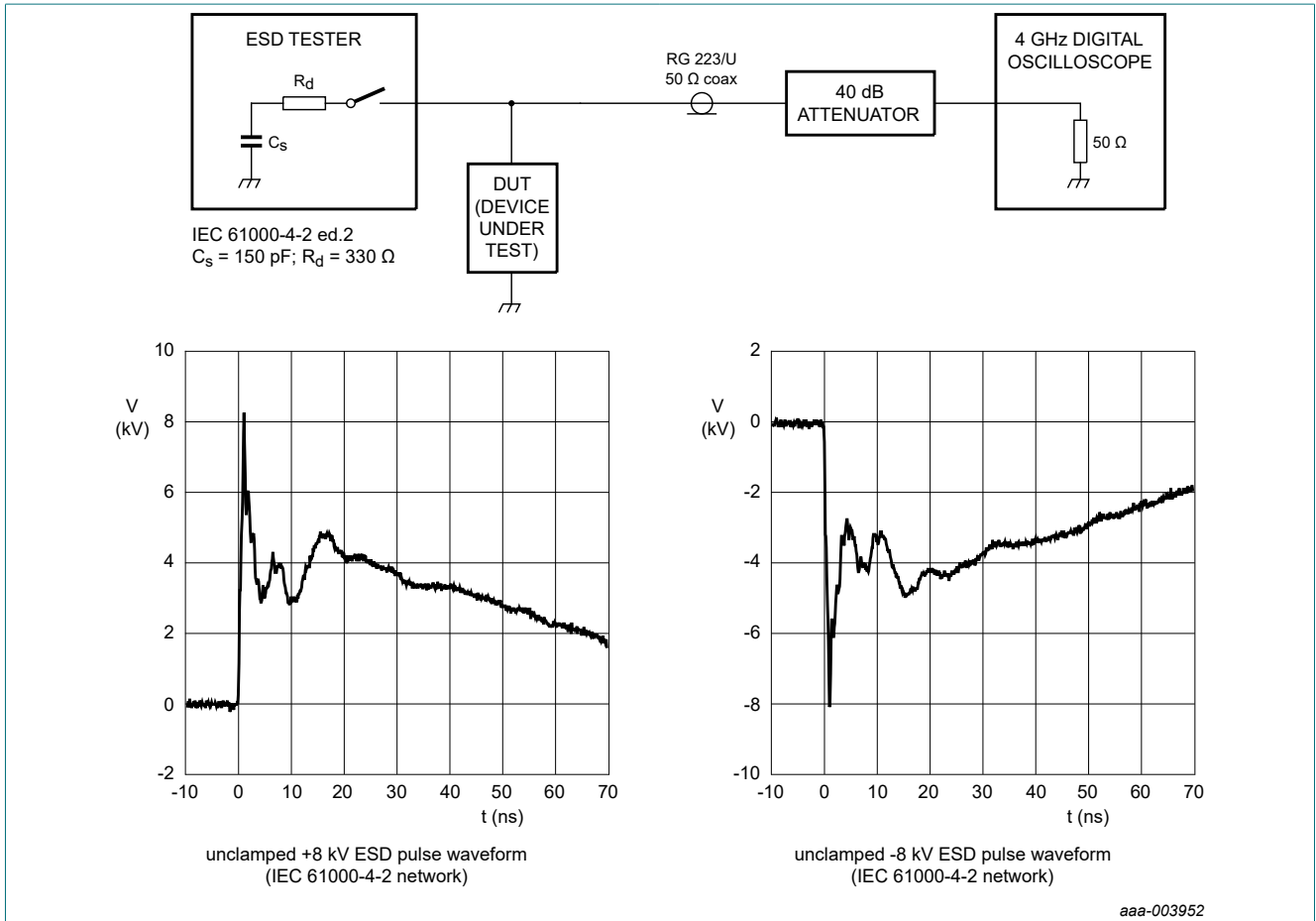
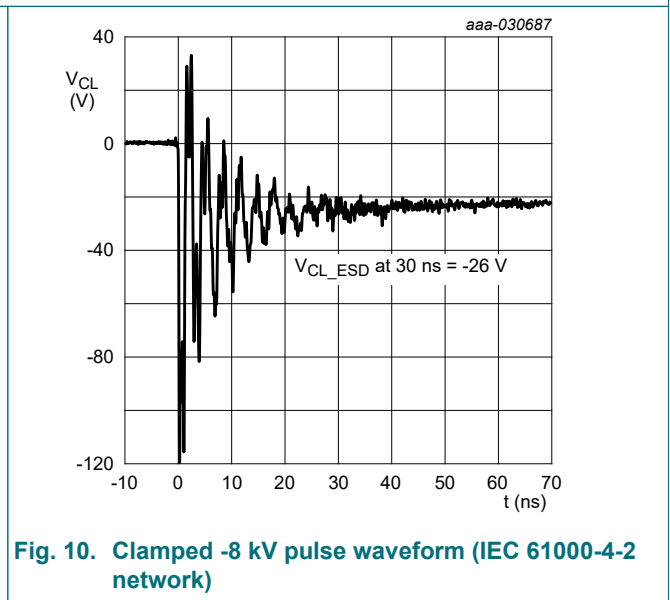
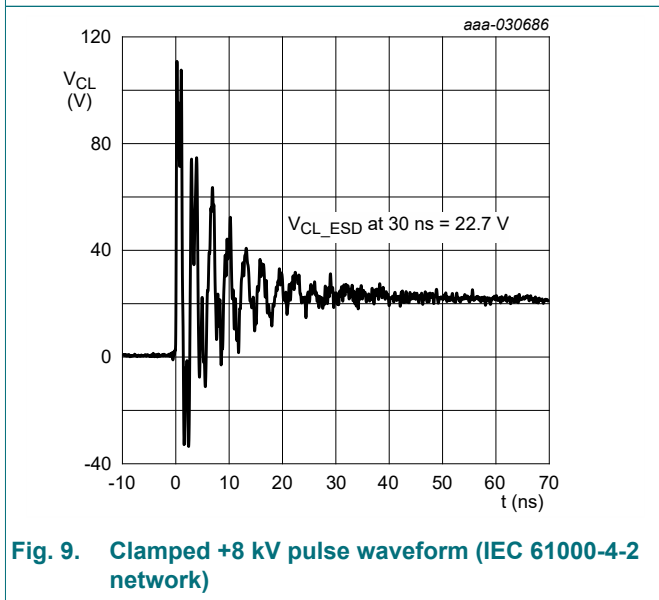


Fig. 8. ESD clamping test setup and waveforms



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

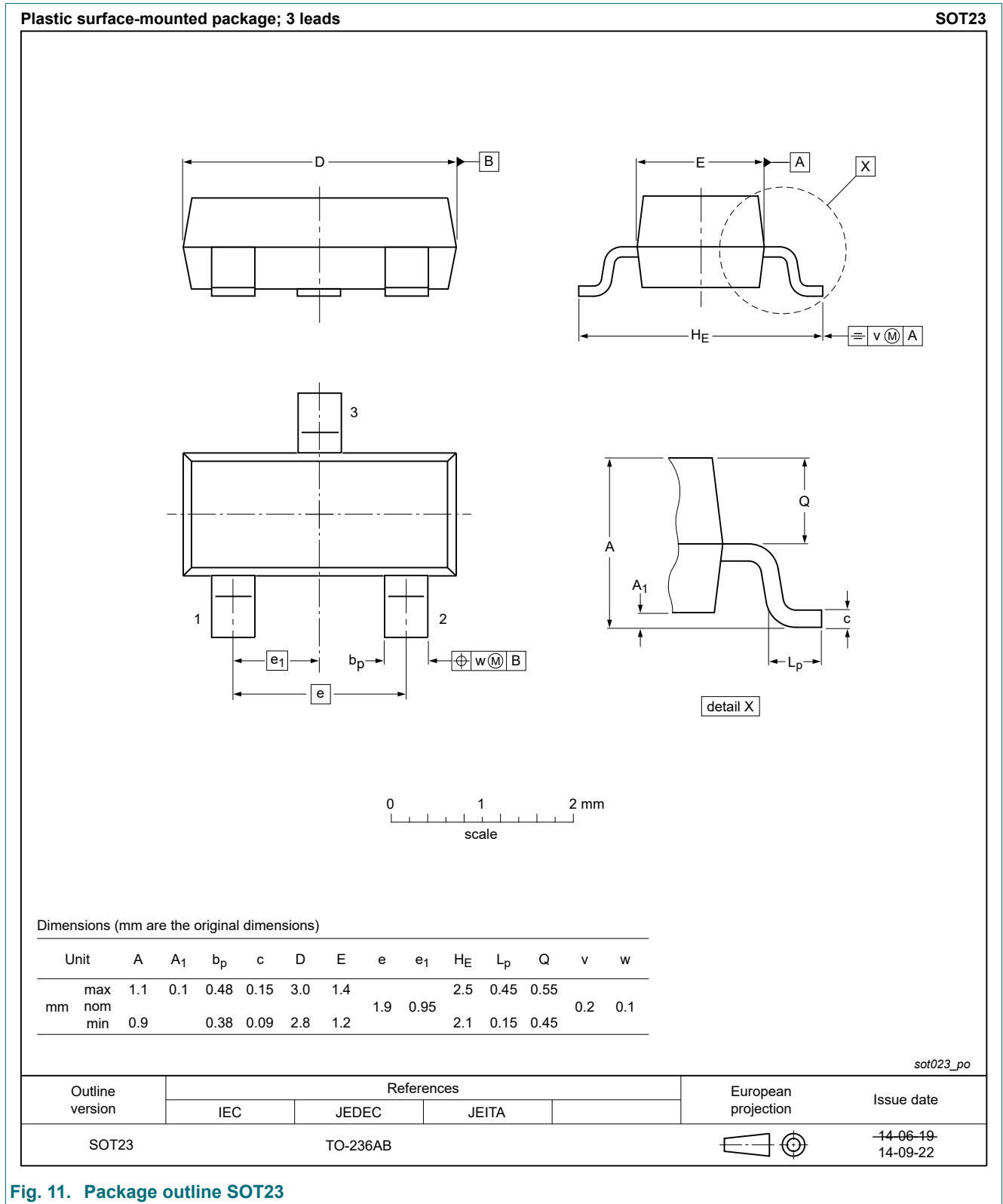


Fig. 11. Package outline SOT23

12. Soldering

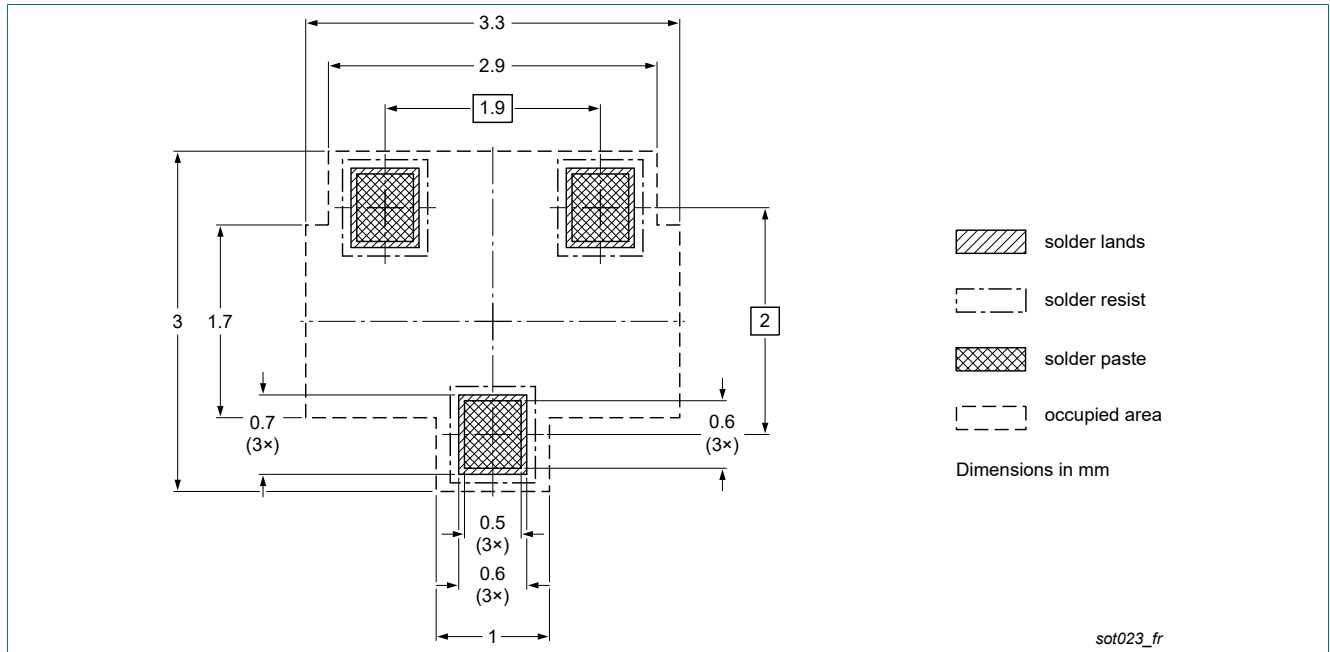


Fig. 12. Reflow soldering footprint for SOT23

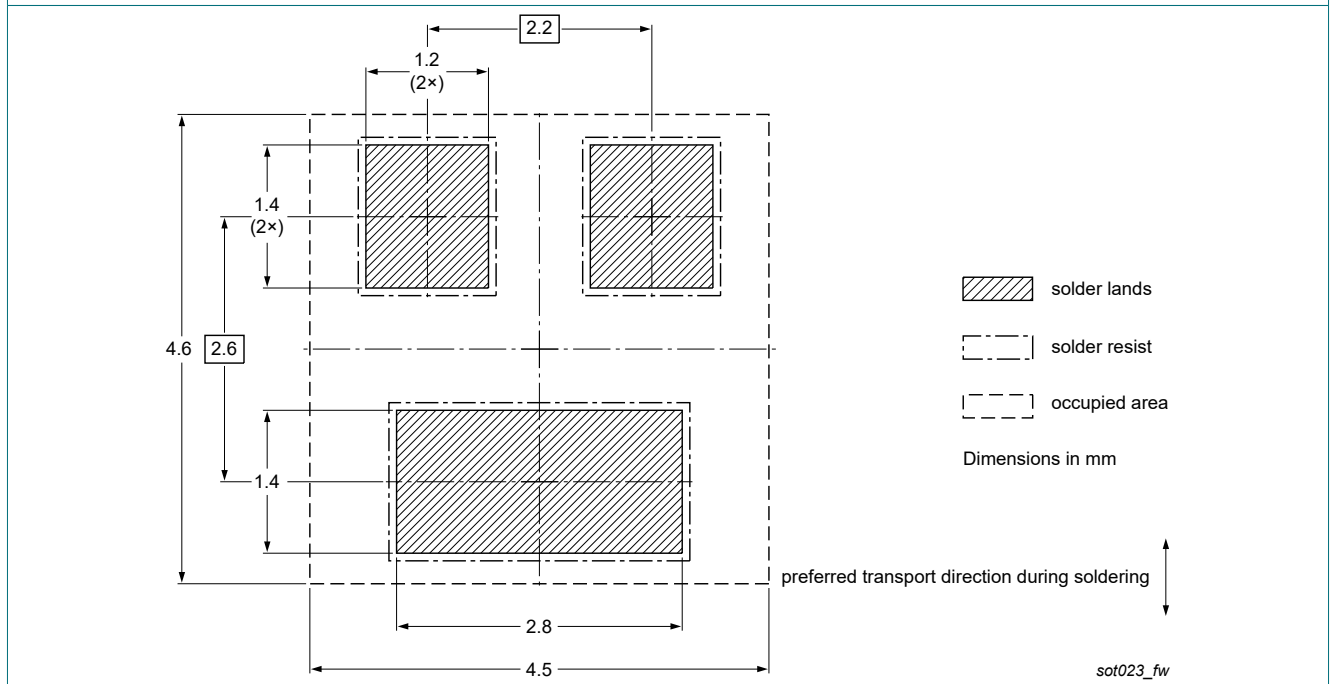


Fig. 13. Wave soldering footprint for SOT23

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD2CANFD24V-T v.2	20191220	Product data sheet	-	PESD2CANFD24V-T 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-T v.1	20190311	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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