

PESD36VS2UT

Low capacitance unidirectional double ESD protection diode

Rev. 01 — 16 July 2009

Product data sheet

1. Product profile

1.1 General description

Low capacitance unidirectional double ElectroStatic Discharge (ESD) protection diode in a SOT23 (TO-236AB) small Surface-Mounted Device (SMD) plastic package designed to protect up to two signal lines from the damage caused by ESD and other transients.

1.2 Features

- Unidirectional ESD protection of two lines
- Low diode capacitance: $C_d = 17$ pF
- Max. peak pulse power: $P_{PP} = 160$ W
- Low clamping voltage: $V_{CL} = 55$ V
- Ultra low leakage current: $I_{RM} \leq 1$ μ A
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 2.5$ A
- AEC-Q101 qualified

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Subscriber Identity Module (SIM) card protection
- Portable electronics
- Communication systems
- 10/100 Mbit/s Ethernet

1.4 Quick reference data

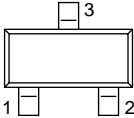
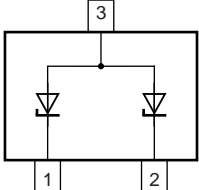
Table 1. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage		-	-	36	V
C_d	diode capacitance	$f = 1$ MHz; $V_R = 0$ V	-	17	35	pF

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode (diode 1)		
2	cathode (diode 2)		
3	common anode		

006aaa154

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD36VS2UT	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PESD36VS2UT	LF*

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
P_{PP}	peak pulse power	$t_p = 8/20 \mu s$	^{[1][2]} -	160	W
I_{PP}	peak pulse current	$t_p = 8/20 \mu s$	^{[1][2]} -	2.5	A
Per device					
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	+150	°C
T_{stg}	storage temperature		-65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

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

Table 6. ESD maximum ratings
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
V _{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1][2] -	30	kV
		machine model	[2] -	400	V
		MIL-STD-883 (human body model)	-	8	kV

- [1] Device stressed with ten non-repetitive ESD pulses.
[2] Measured from pin 1 to pin 2.

Table 7. ESD standards compliance

Standard	Conditions
Per diode	
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3 (human body model)	> 4 kV

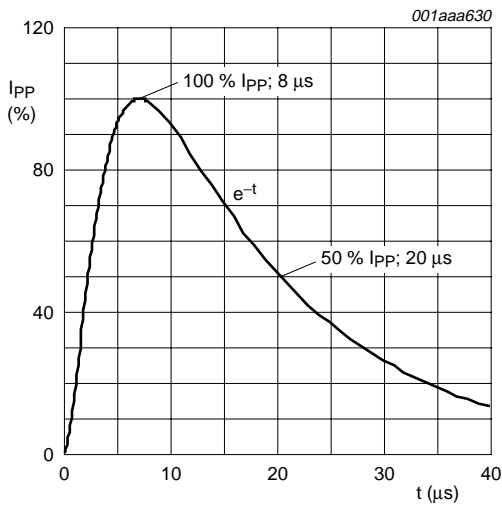


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

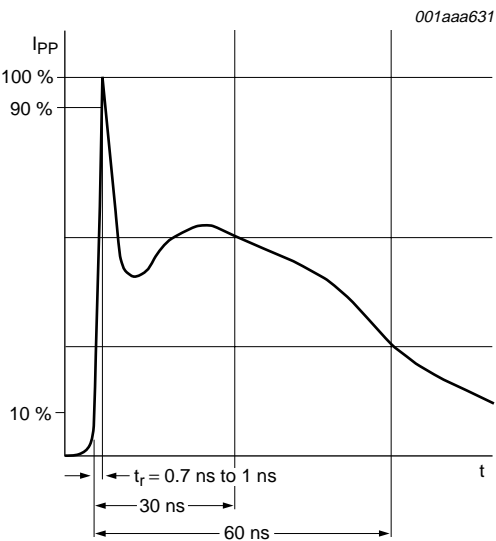


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

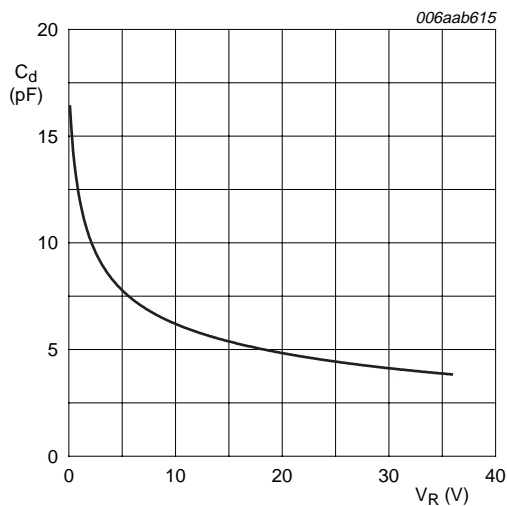
Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage		-	-	36	V
I_{RM}	reverse leakage current	$V_{RWM} = 30\text{ V}$	-	< 0.02	1	μA
V_{BR}	breakdown voltage	$I_R = 5\text{ mA}$	40	44	-	V
C_d	diode capacitance	$f = 1\text{ MHz};$ $V_R = 0\text{ V}$	[1]	17	35	pF
V_{CL}	clamping voltage	$I_{PP} = 1\text{ A}$	[1][2]	55	60	V
r_{dif}	differential resistance	$I_R = 0.5\text{ mA}$	-	-	300	Ω

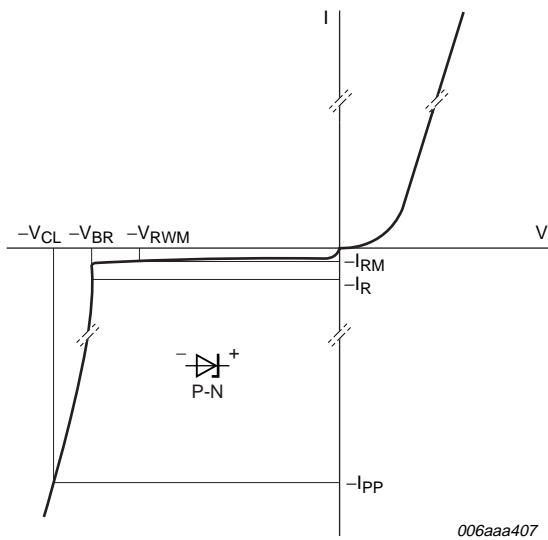
[1] Measured from pin 1 or 2 to pin 3.

[2] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.



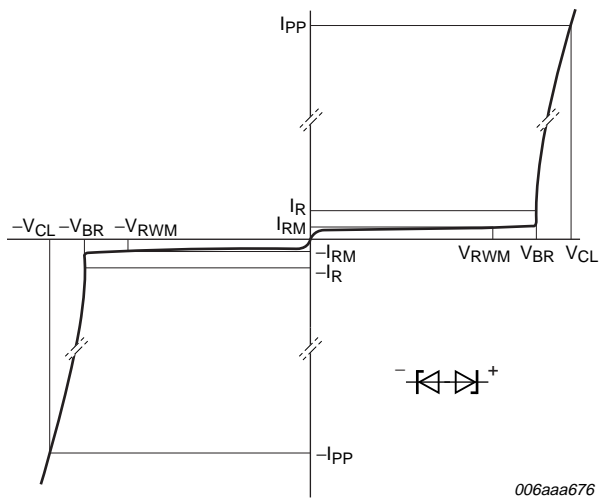
$f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$

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



Measured from pin 1 or 2 to pin 3.

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



Measured from pin 1 to pin 2.

Fig 5. V-I characteristics for a bidirectional ESD protection diode

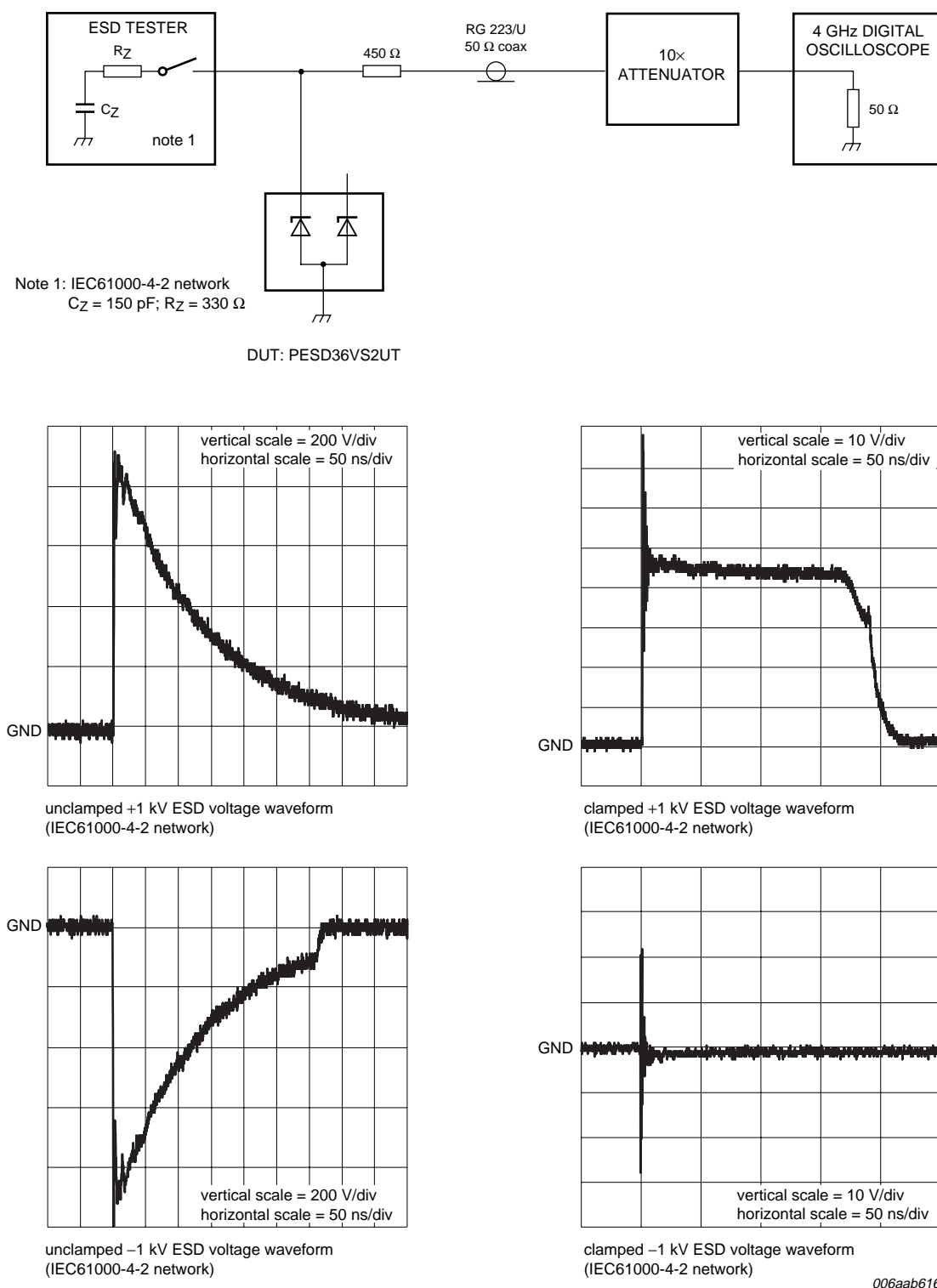
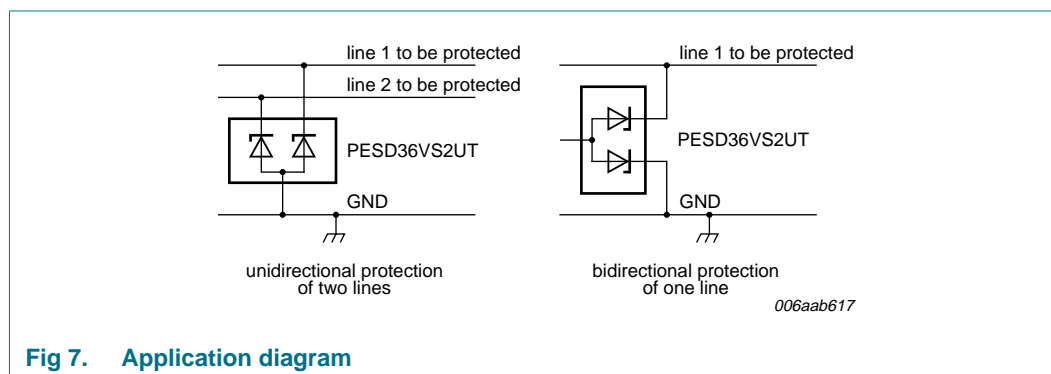


Fig 6. ESD clamping test setup and waveforms

7. Application information

The PESD36VS2UT is designed for the protection of up to two unidirectional data or signal lines from the damage caused by ESD and surge pulses. The devices may be used on lines where the signal polarities are either positive or negative with respect to ground. The PESD36VS2UT provides a surge capability of 160 W per line for an 8/20 μ s waveform.



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:

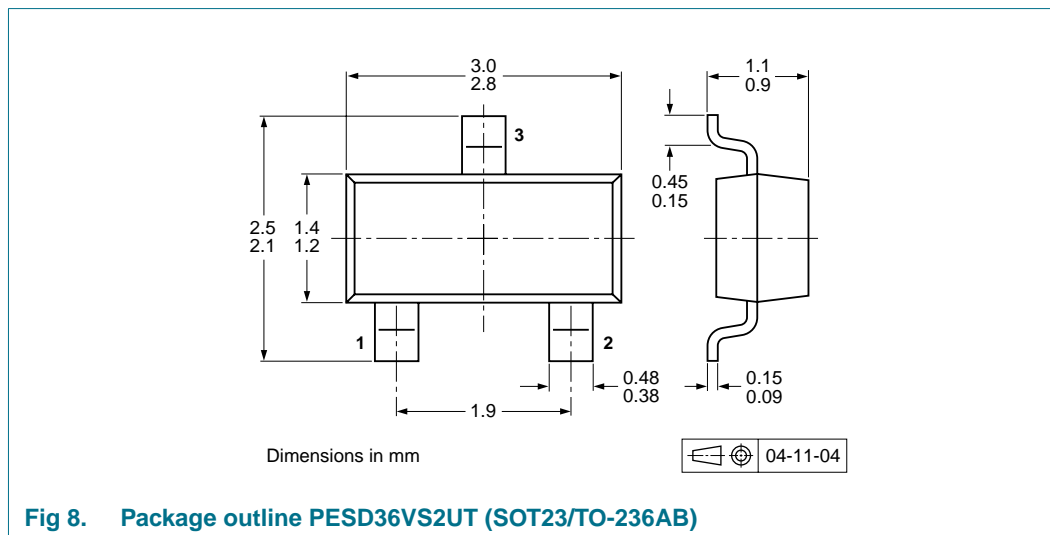
1. Place the device as close to the input terminal or connector as possible.
2. The path length between the device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

8. Test information

8.1 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.

9. Package outline



10. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
PESD36VS2UT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-135

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

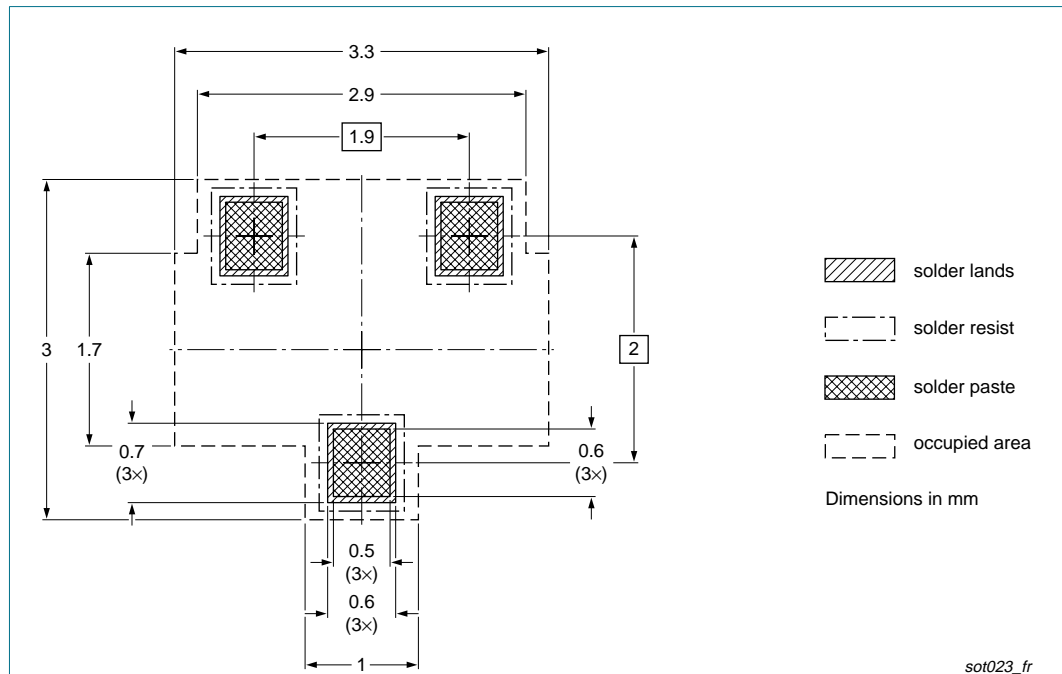


Fig 9. Reflow soldering footprint PESD36VS2UT (SOT23/TO-236AB)

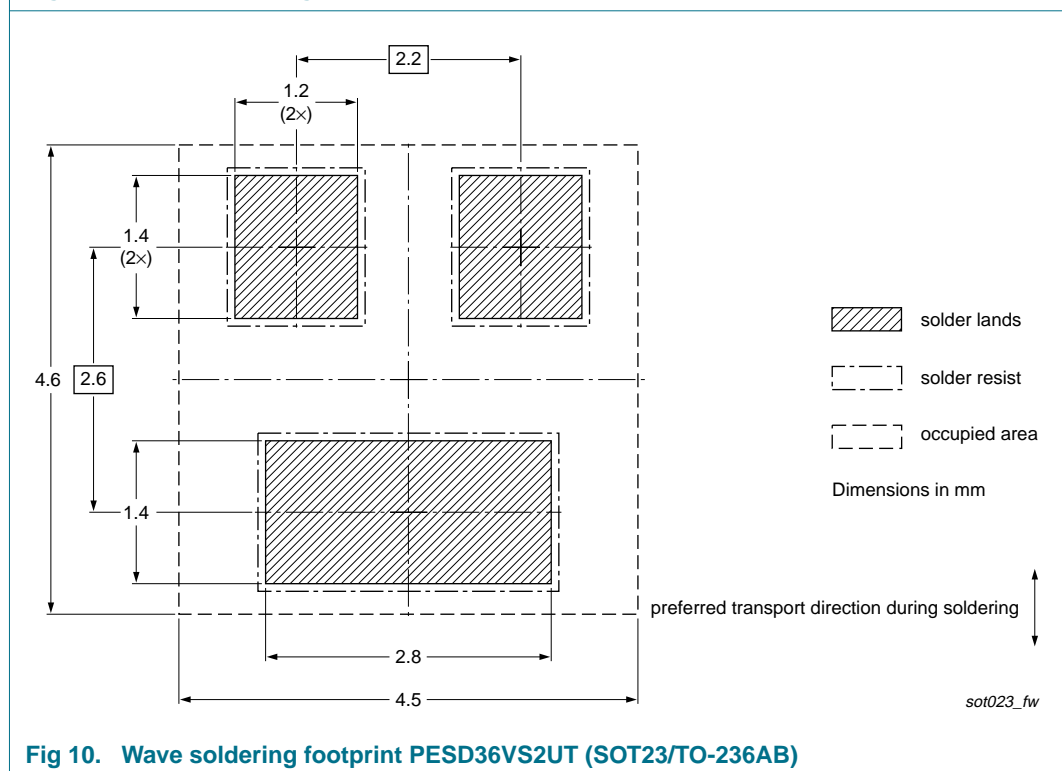


Fig 10. Wave soldering footprint PESD36VS2UT (SOT23/TO-236AB)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD36VS2UT_1	20090716	Product data sheet	-	-

13. Legal information

13.1 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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