PESD3V3S4UF; PESD5V0S4UF

Unidirectional quadruple ESD protection diode arrays

Rev. 01 — 17 January 2008 Product data sheet

1. Product profile

1.1 General description

Unidirectional quadruple ElectroStatic Discharge (ESD) protection diode arrays in a small SOT886 Surface-Mounted Device (SMD) plastic package designed to protect up to four signal lines from the damage caused by ESD and other transients.

1.2 Features

- ESD protection of up to four lines
- Max. peak pulse power: P_{PP} = 110 W
- Low clamping voltage: V_{CL} = 11 V
- Ultra low leakage current: I_{RM} = 4 nA
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 10 A
- AEC-Q101 qualified

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics

1.4 Quick reference data

Table 1. Quick reference data

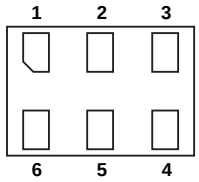
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage					
	PESD3V3S4UF		-	-	3.3	V
	PESD5V0S4UF		-	-	5.0	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V				
	PESD3V3S4UF		-	110	300	pF
	PESD5V0S4UF		-	85	220	pF

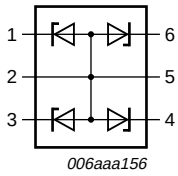
2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	cathode (diode 1)		
2	common anode		
3	cathode (diode 3)		
4	cathode (diode 3)		
5	common anode		
6	cathode (diode 4)		



bottom view



3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD3V3S4UF	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
PESD5V0S4UF			

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PESD3V3S4UF	A3
PESD5V0S4UF	A4

[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 µs	[1][2]	-	110	W
I_{PP}	peak pulse current	t_p = 8/20 µs	[1][2]	-	10	A

Table 5. Limiting values *...continued*

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

Symbol	Parameter	Conditions	Min	Max	Unit
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, 3, 4 or 6 to pin 2 or 5.

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
		MIL-STD-883 (human body model)		-	10	kV

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

[2] Measured from pin 1, 3, 4 or 6 to pin 2 or 5.

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

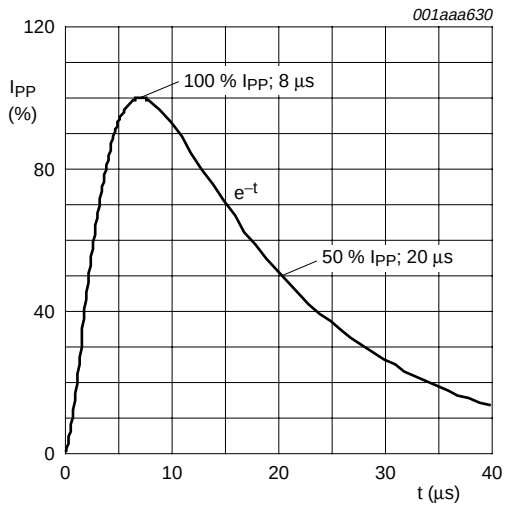


Fig 1. 8/20 µs pulse waveform according to IEC 61000-4-5

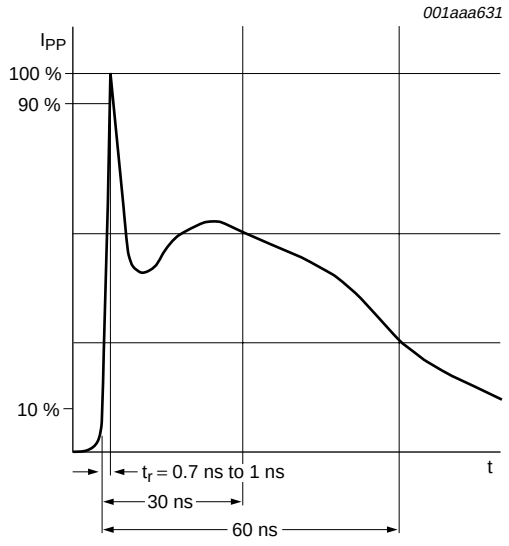


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

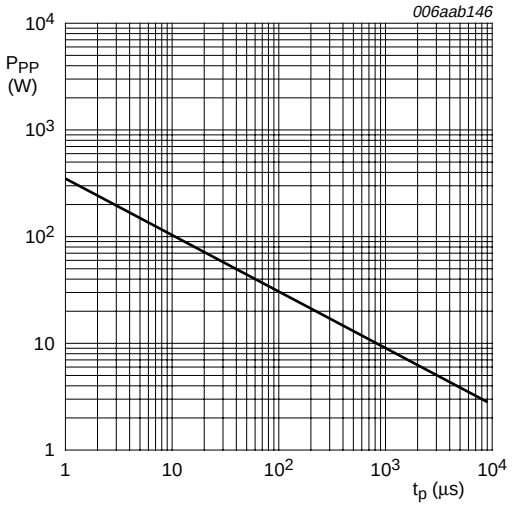
Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage					
	PESD3V3S4UF		-	-	3.3	V
	PESD5V0S4UF		-	-	5.0	V
I_R	reverse current					
	PESD3V3S4UF	V_R = 3.0 V	-	100	1000	nA
	PESD5V0S4UF	V_R = 4.3 V	-	4	100	nA
V_{BR}	breakdown voltage	I_R = 1 mA				
	PESD3V3S4UF		5.32	5.6	5.88	V
	PESD5V0S4UF		6.46	6.8	7.14	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V				
	PESD3V3S4UF		-	110	300	pF
	PESD5V0S4UF		-	85	220	pF
V_{CL}	clamping voltage	[1][2]				
	PESD3V3S4UF	I_{PP} = 1 A	-	-	8	V
		I_{PP} = 10 A	-	-	11	V
	PESD5V0S4UF	I_{PP} = 1 A	-	-	8	V
		I_{PP} = 10 A	-	-	12	V
r_{dif}	differential resistance	I_R = 1 mA				
	PESD3V3S4UF		-	-	400	Ω
	PESD5V0S4UF		-	-	200	Ω

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

[2] Measured from pin 1, 3, 4 or 6 to pin 2 or 5.



T_{amb} = 25 °C

Fig 3. Peak pulse power as a function of exponential pulse duration; typical values

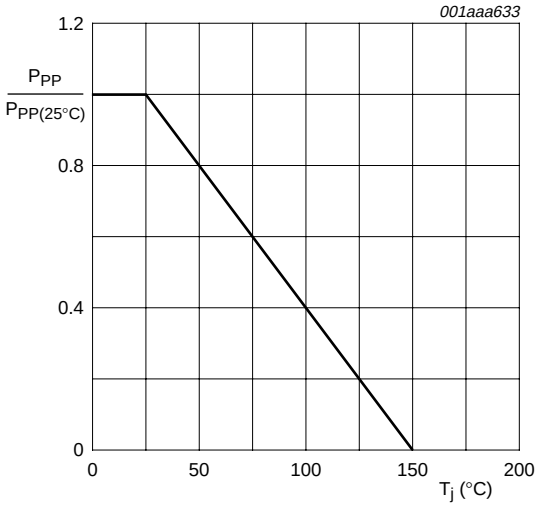
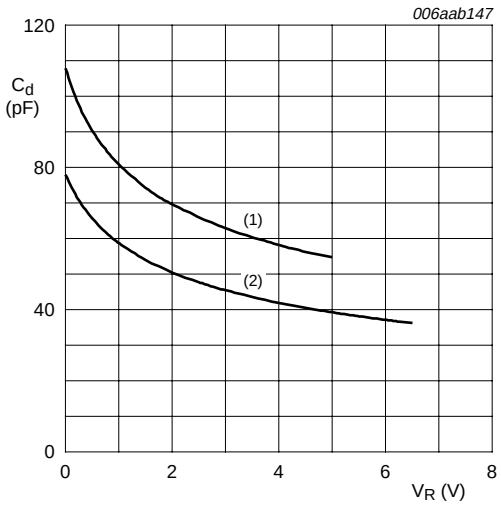


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

(1) PESD3V3S4UF

(2) PESD5V0S4UF

Fig 5. Diode capacitance as a function of reverse voltage; typical values

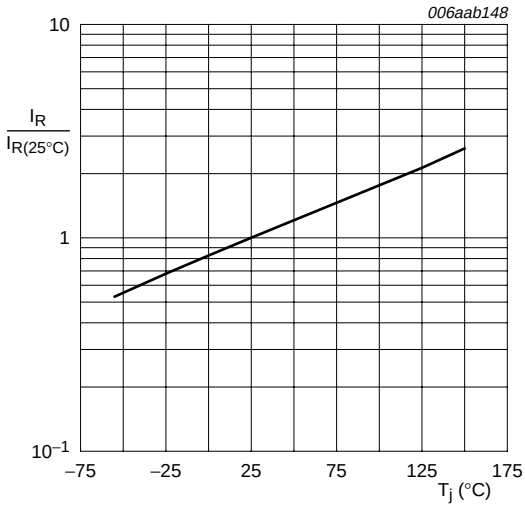


Fig 6. Relative variation of reverse current as a function of junction temperature; typical values

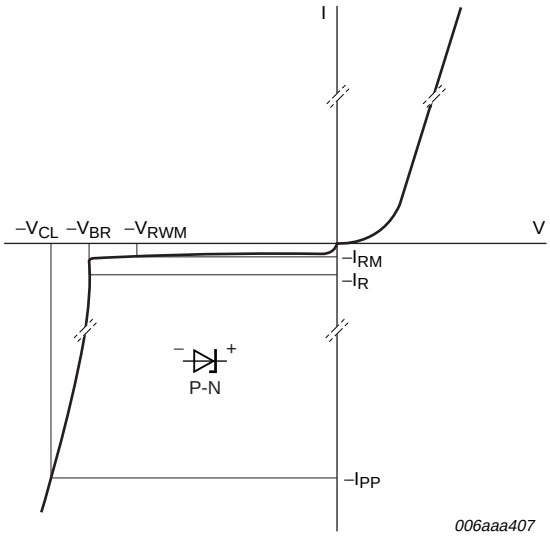


Fig 7. V-I characteristics for a unidirectional ESD protection diode

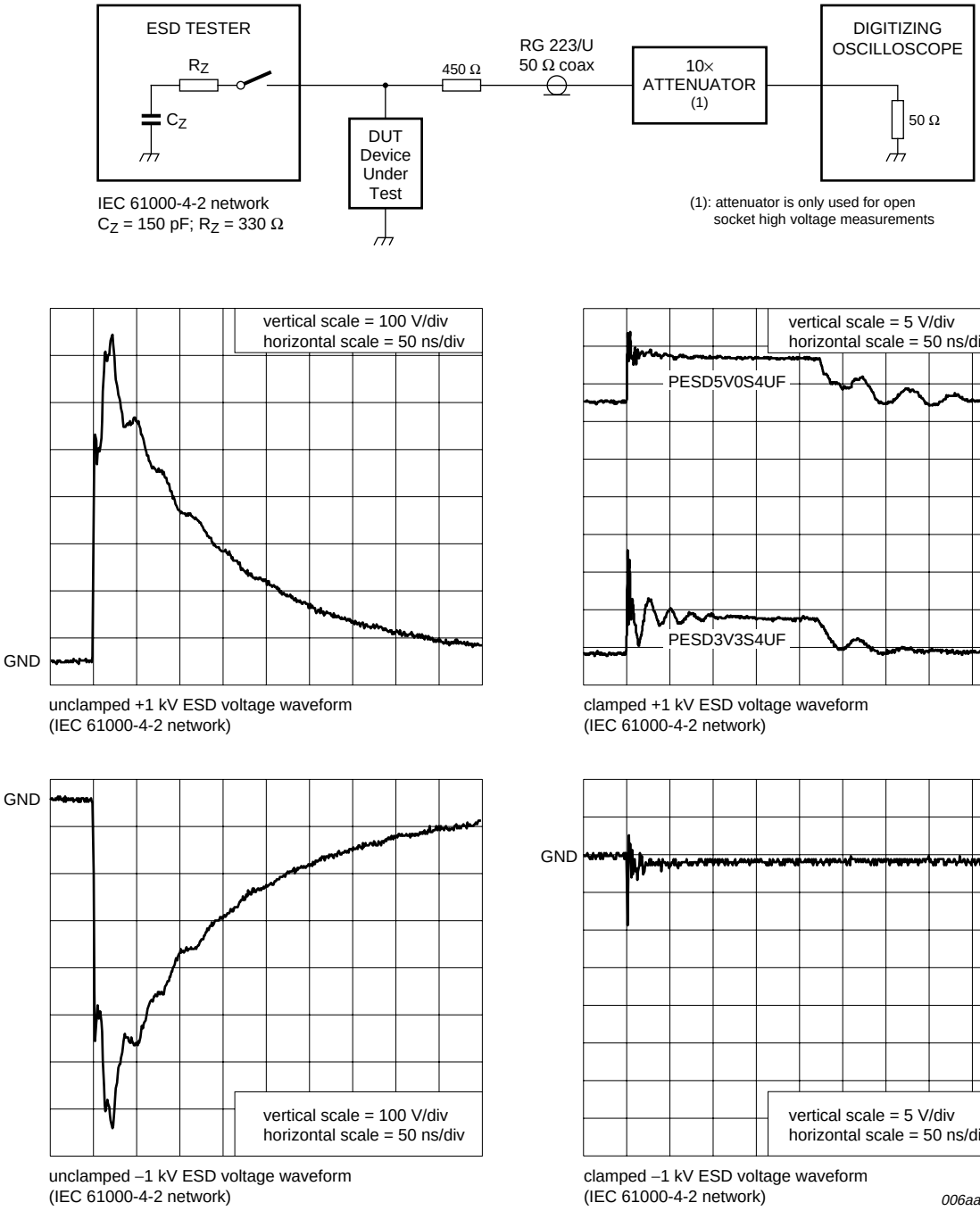


Fig 8. ESD clamping test setup and waveforms

7. Application information

The PESDxS4UF is designed for the protection of up to four unidirectional data or signal lines from the damage caused by ESD and surge pulses. The PESDxS4UF may be used on lines where the signal polarities are either positive or negative with respect to ground. The PESDxS4UF provides a surge capability of 110 W per line for an 8/20 µs waveform each.

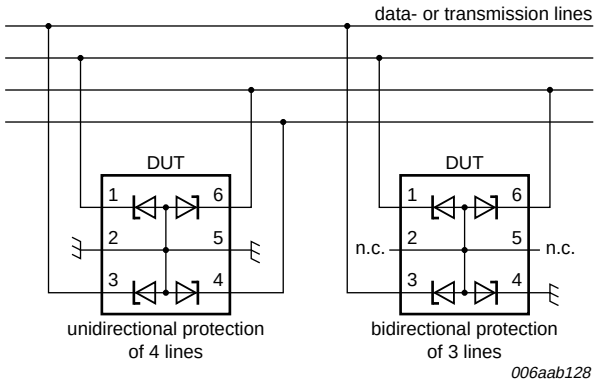


Fig 9. Application diagram

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 PESDxS4UF 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. Package outline

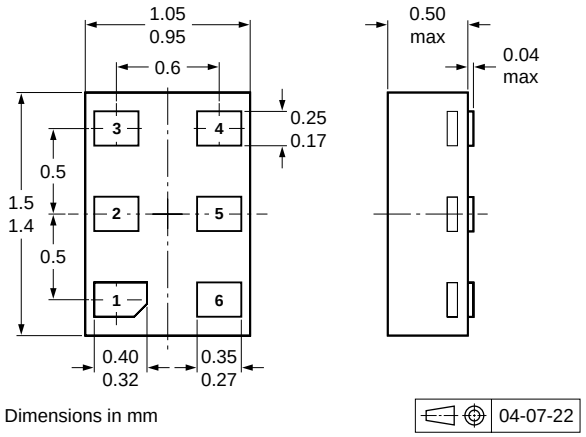


Fig 10. Package outline PESDxS4UF (SOT886)

9. Packing information

Table 9. Packing methods

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

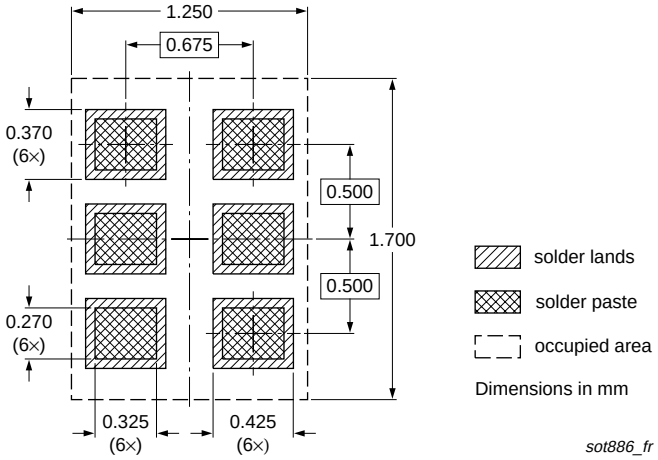
Type number	Package	Description		Packing quantity
				5000
PESD3V3S4UF	SOT886	4 mm pitch, 8 mm tape and reel; T1	[2]	-115
		4 mm pitch, 8 mm tape and reel; T4	[3]	-132
PESD5V0S4UF	SOT886	4 mm pitch, 8 mm tape and reel; T1	[2]	-115
		4 mm pitch, 8 mm tape and reel; T4	[3]	-132

[1] For further information and the availability of packing methods, see Section 13.

[2] T1: normal taping

[3] T4: 90° rotated reverse taping

10. Soldering



Reflow soldering is the only recommended soldering method.

Fig 11. Reflow soldering footprint PESDxS4UF (SOT886)

11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD3V3S4UF_PESD5V0S4UF_1	20080117	Product data sheet	-	-

12. Legal information

12.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

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14. Contents

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Date of release: 17 January 2008