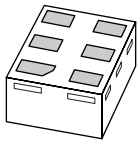


PESD3V3L5UK; PESD5V0L5UK

Low capacitance unidirectional fivefold ESD protection diode arrays

Rev. 1 — 25 August 2010 Product data sheet

1. Product profile

1.1 General description

Low capacitance unidirectional fivefold ElectroStatic Discharge (ESD) protection diode arrays in a leadless ultra small SOT891 Surface-Mounted Device (SMD) plastic package designed to protect up to five unidirectional signal lines from the damage caused by ESD and other transients.

1.2 Features and benefits

- ESD protection of up to five lines
- Low diode capacitance
- Max. peak pulse power: P_{PP} = 30 W
- Low clamping voltage: V_{CL} = 9.5 V
- AEC-Q101 qualified
- Very low leakage current: I_{RM} = 0.5 μA
- ESD protection up to 20 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 3.2 A

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics
- Subscriber Identity Module (SIM) card protection

1.4 Quick reference data

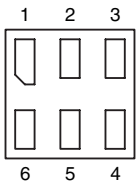
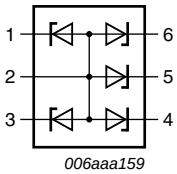
Table 1. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage					
	PESD3V3L5UK		-	-	3.3	V
	PESD5V0L5UK		-	-	5.0	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V				
	PESD3V3L5UK		-	20	24	pF
	PESD5V0L5UK		-	18.5	22	pF

2. Pinning information

Table 2. Pinning

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

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD3V3L5UK	-	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm	SOT891
PESD5V0L5UK			

4. Marking

Table 4. Marking codes

Type number	Marking code
PESD3V3L5UK	P4
PESD5V0L5UK	P5

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]	-		
	PESD3V3L5UK			-	28	W
	PESD5V0L5UK			-	30	W
I_{PP}	peak pulse current	t_p = 8/20 μs	[1][2]	-		
	PESD3V3L5UK			-	3.2	A
	PESD5V0L5UK			-	3.1	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, 5 or 6 to pin 2.

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]			
	PESD3V3L5UK			-	15	kV
	PESD5V0L5UK			-	20	kV
	PESD3V3L5UK PESD5V0L5UK	machine model	[2]	-	400	V
	PESD3V3L5UK PESD5V0L5UK	MIL-STD-883 (human body model)		-	8	kV

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

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

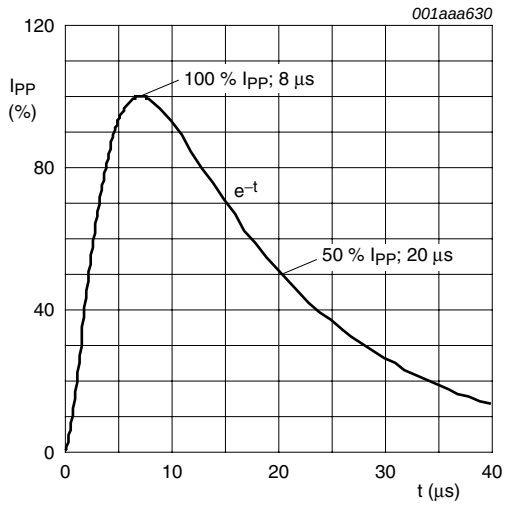


Fig 1. 8/20 µs pulse waveform according to IEC 61000-4-5

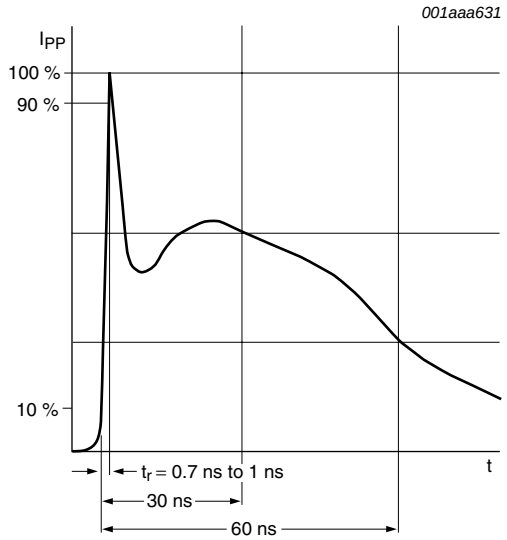


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

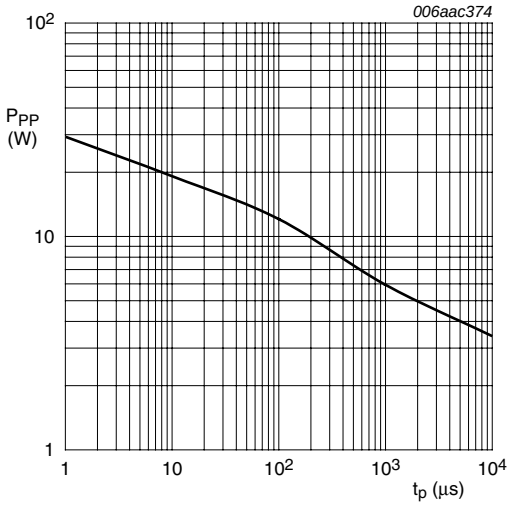
Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage					
	PESD3V3L5UK		-	-	3.3	V
	PESD5V0L5UK		-	-	5.0	V
I_{RM}	reverse leakage current					
	PESD3V3L5UK	V_{RWM} = 3.3 V	-	0.4	2	μA
	PESD5V0L5UK	V_{RWM} = 5.0 V	-	0.08	0.5	μA
V_{BR}	breakdown voltage	I_R = 1 mA				
	PESD3V3L5UK		5.3	5.6	5.9	V
	PESD5V0L5UK		6.47	6.8	7.14	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V				
	PESD3V3L5UK		-	20	24	pF
	PESD5V0L5UK		-	18.5	22	pF
V_{CL}	clamping voltage	[1][2]				
	PESD3V3L5UK	I_{PP} = 3.1 A	-	-	9.5	V
	PESD5V0L5UK	I_{PP} = 3 A	-	-	9.9	V
r_{dif}	differential resistance	I_R = 5 mA				
	PESD3V3L5UK		-	5	16	Ω
	PESD5V0L5UK		-	2.5	8	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, 5 or 6 to pin 2.



T_{amb} = 25 °C

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

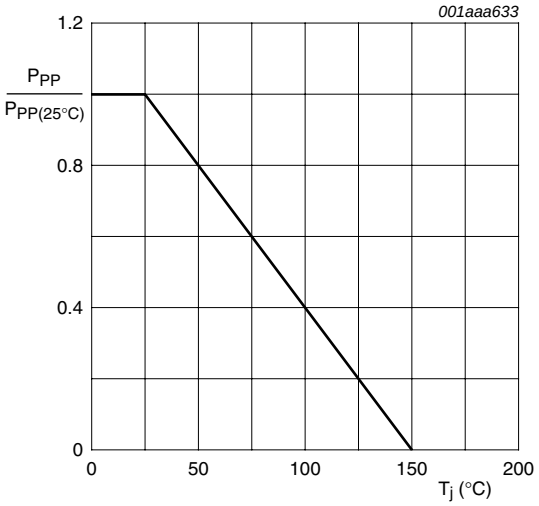
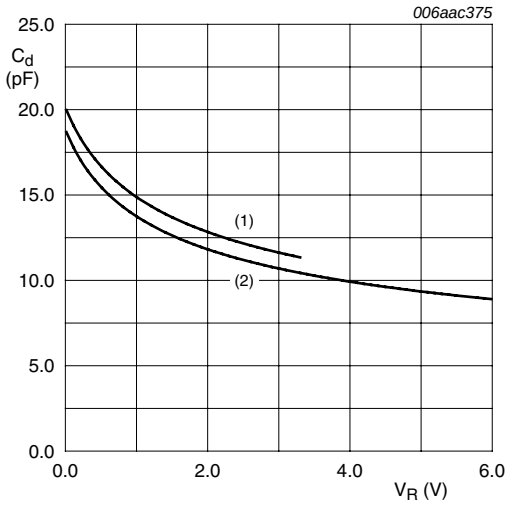


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values

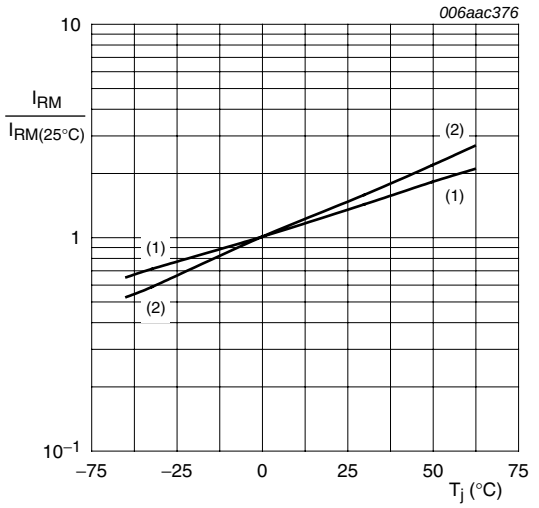


f = 1 MHz; T_{amb} = 25 °C

(1) PESD3V3L5UK

(2) PESD5V0L5UK

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



(1) PESD3V3L5UK

(2) PESD5V0L5UK

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

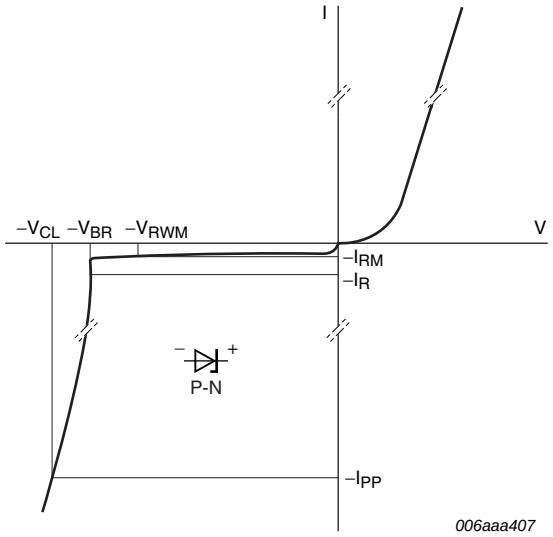


Fig 7. V-I characteristics for a unidirectional ESD protection diode

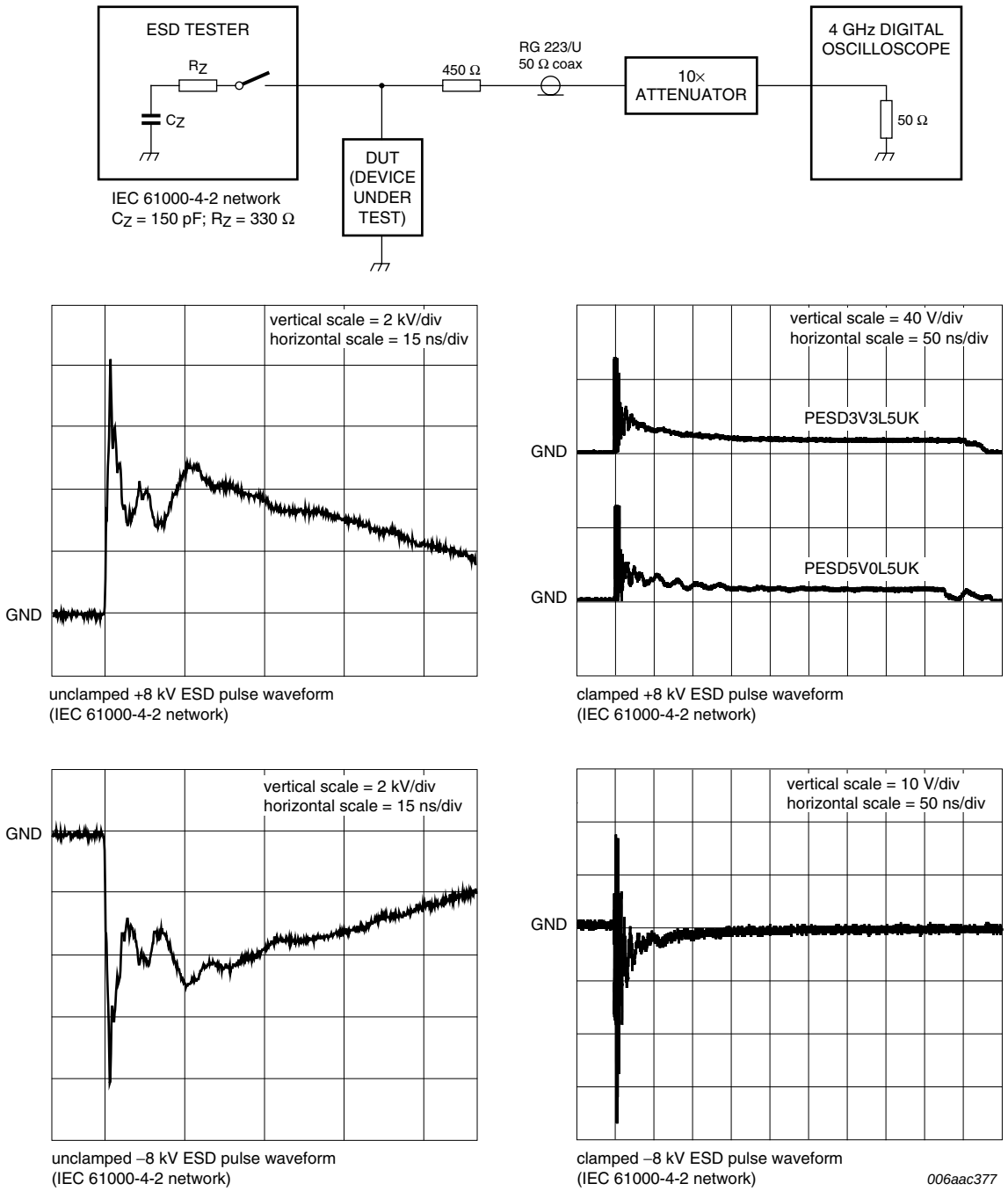


Fig 8. ESD clamping test setup and waveforms

7. Application information

The PESD3V3L5UK and the PESD5V0L5UK are designed for the protection of up to five 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 PESD3V3L5UK provides a surge capability of 28 W per line and the PESD5V0L5UK provides a surge capability of 30 W per line for an 8/20 μs waveform.

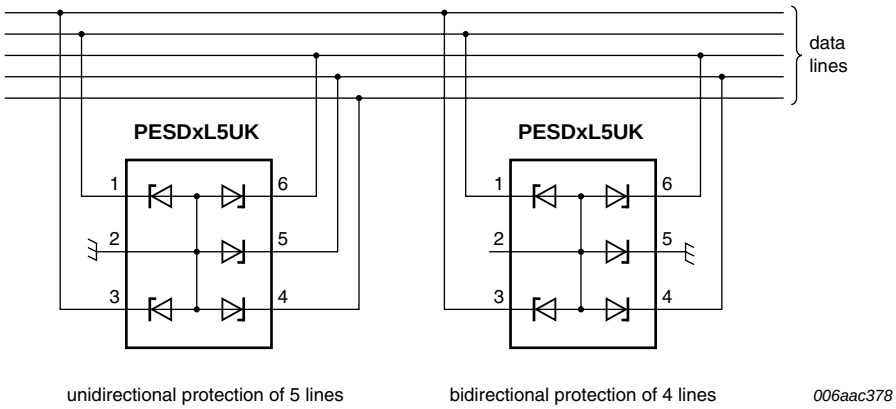


Fig 9. Application diagram

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. 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

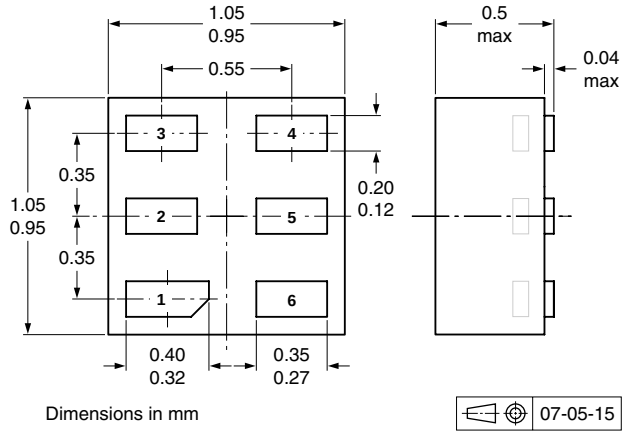


Fig 10. Package outline SOT891

10. Packing information

Table 9. Packing methods

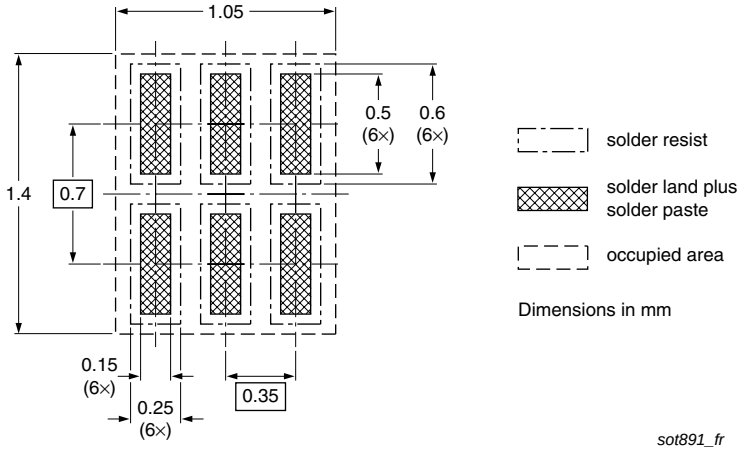
The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity
			5000
PESD3V3L5UK	SOT891	4 mm pitch, 8 mm tape and reel; T4 [2]	-132
PESD5V0L5UK			

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

[2] T4: 90° rotated reverse taping

11. Soldering



Reflow soldering is the only recommended soldering method.

Fig 11. Reflow soldering footprint SOT891

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD3V3L5UK_ PESD5V0L5UK v.1	20100825	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".

[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.nxp.com.

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15. Contents

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Date of release: 25 August 2010
Document identifier: PESD3V3L5UK_PESD5V0L5UK

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PESD3V3L5UK,132 PESD5V0L5UK,132