PESD1LVDS

ESD protection for in-vehicle ultra high-speed interfaces

Rev. 3 — 5 July 2016 Product data sheet

1. Product profile

1.1 General description

The device is designed to protect in-vehicle ultra high-speed interfaces in automotive applications, such as Low-Voltage Differential Signaling (LVDS), High-Definition Multimedia Interface (HDMI) and DisplayPort interfaces against ElectroStatic Discharge (ESD).

The device is housed in an ultra small SOT1165-1 (XSON10) Surface-Mounted Design (SMD) plastic package.

1.2 Features and benefits

- System ESD protection for LVDS, HDMI and DisplayPort interfaces
- Line capacitance of only 0.6 pF with ≤ 0.05 pF matching capacitance between signal pairs
- Ultra small XSON10 package with design-friendly ‘pass-thru’ signal routing
- AEC-Q101 qualified

1.3 Applications

The devices are designed for high-speed receiver and transmitter port protection:

- Automotive A/V monitors, displays and cameras

1.4 Quick reference data

Table 1. Quick reference data

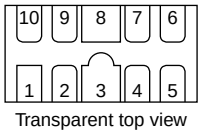
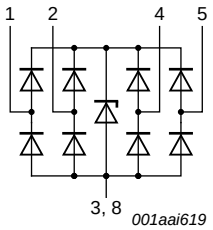
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage		-	-	5.5	V
C_{ch}	channel capacitance	f = 1 MHz; V_{bias} = 2.5 V [1]	-	0.6	-	pF

[1] This parameter is guaranteed by design.

nexperia

2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	CH1–	negative channel 1 ESD protection	 Transparent top view **XSON10**	
2	CH1+	positive channel 1 ESD protection		
3	GND	ground		
4	CH2–	negative channel 2 ESD protection		
5	CH2+	positive channel 2 ESD protection		
6	n.c.	not connected		
7	n.c.	not connected		
8	GND	ground		
9	n.c.	not connected		
10	n.c.	not connected		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD1LVDS	XSON10	plastic extremely thin small outline package; no leads; 10 terminals; body 1 × 2.5 × 0.5 mm	SOT1165-1

4. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
T_{stg}	storage temperature		–55	+125	°C
T_{amb}	ambient temperature		–40	+125	°C

Table 5. ESD maximum ratings

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge) [1][2]	-	±8	kV

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

[2] All pins to ground.

Table 6. ESD standards compliance

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

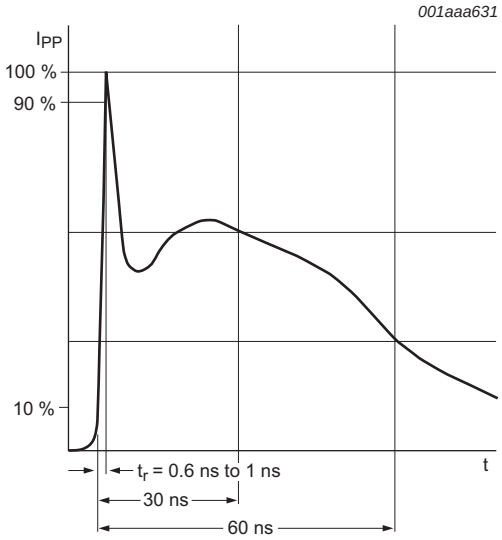


Fig 1. ESD pulse waveform according to IEC 61000-4-2

5. Characteristics

Table 7. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage		-	-	5.5	V
I_{RM}	reverse leakage current	per channel; V = 3.0 V	-	-	1	µA
V_{BR}	breakdown voltage	I = 1 mA	6	-	9	V
V_F	forward voltage		-	0.7	-	V
$C_{(I/O-GND)}$	input/output to ground capacitance	f = 1 MHz; V_{bias} = 2.5 V [1]	-	0.6	-	pF
$\Delta C_{(I/O-GND)}$	input/output to ground capacitance variation	f = 1 MHz; V_{bias} = 2.5 V [1]	-	0.05	-	pF
$C_{ch(mutual)}$	mutual channel capacitance	f = 1 MHz; V_{bias} = 2.5 V [1][2]	-	0.07	-	pF

[1] This parameter is guaranteed by design.

[2] Between signal pin and pin n.c.

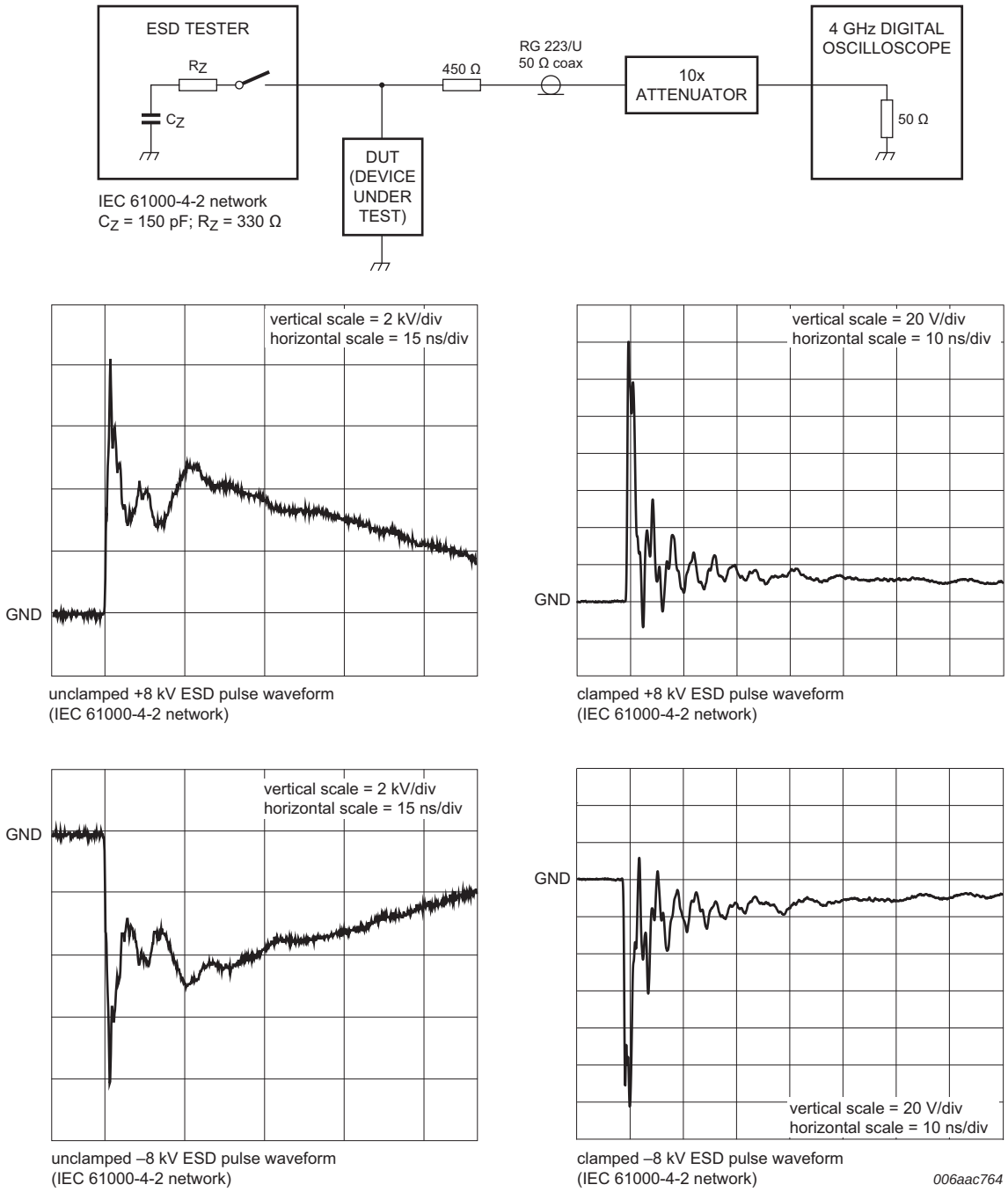


Fig 2. ESD clamping test setup and waveforms

6. Application information

The devices are designed to provide high-level ESD protection for high-speed serial data buses such as LVDS, HDMI and DisplayPort data lines.

When designing the Printed-Circuit Board (PCB), careful consideration should be given to impedance matching, and signal coupling.

Basic application diagrams for the ESD protection of an HDMI interface are shown in Figure 3.

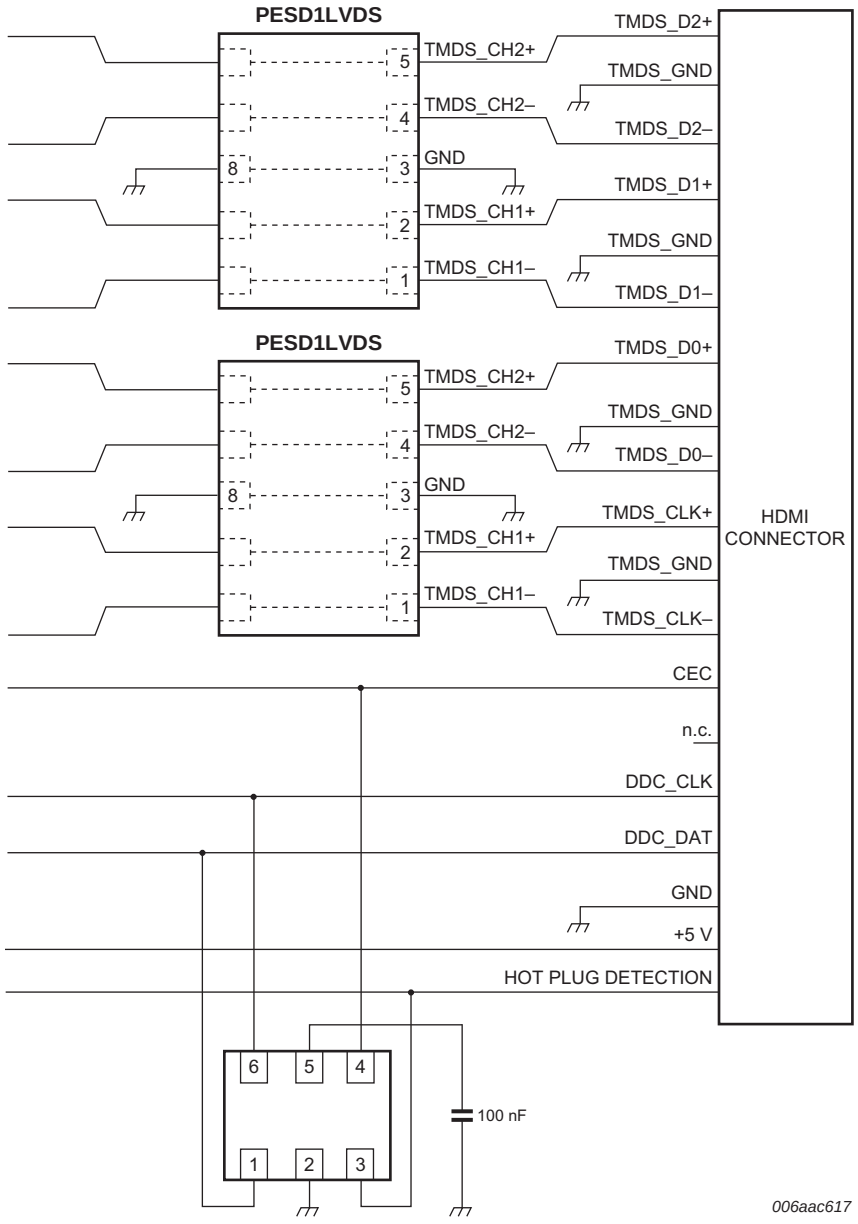


Fig 3. Application diagram of HDMI ESD protection

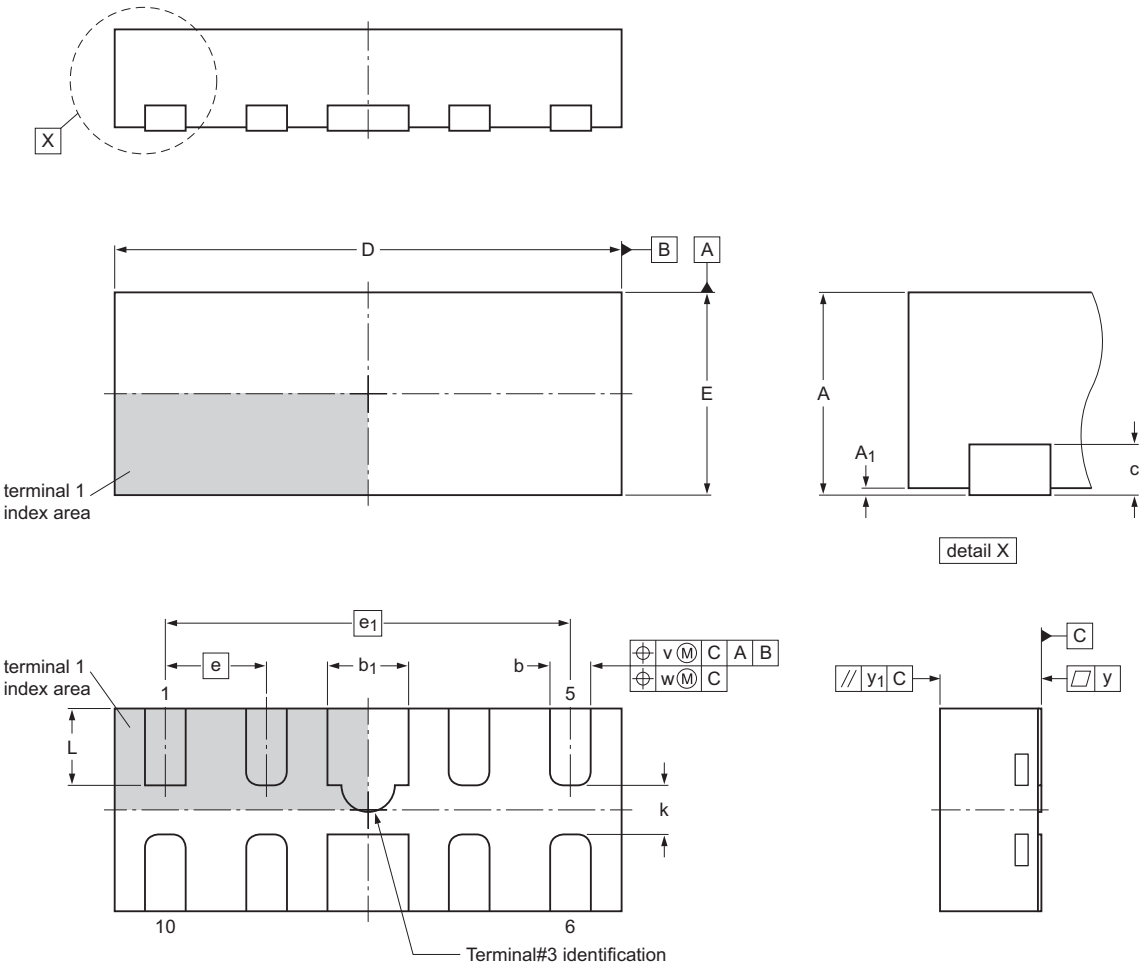
7. Test information

7.1 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.

8. Package outline

DFN2510-10: plastic, extremely thin small outline package; no leads; 10 terminals; body 1 x 2.5 x 0.5 mm **SOT1165-1**



Dimensions

Unit		A	A_1	b	b_1	c	$D^{(1)}$	$E^{(1)}$	e	e_1	k	L	v	w	y	y_1
	max	0.5	0.05	0.25	0.45		2.6	1.1				0.43				
mm	nom			0.20	0.40	0.127	2.5	1.0	0.5	2		0.38	0.1	0.05	0.05	0.05
	min		0.00	0.15	0.35		2.4	0.9			0.2	0.33				

Note
1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

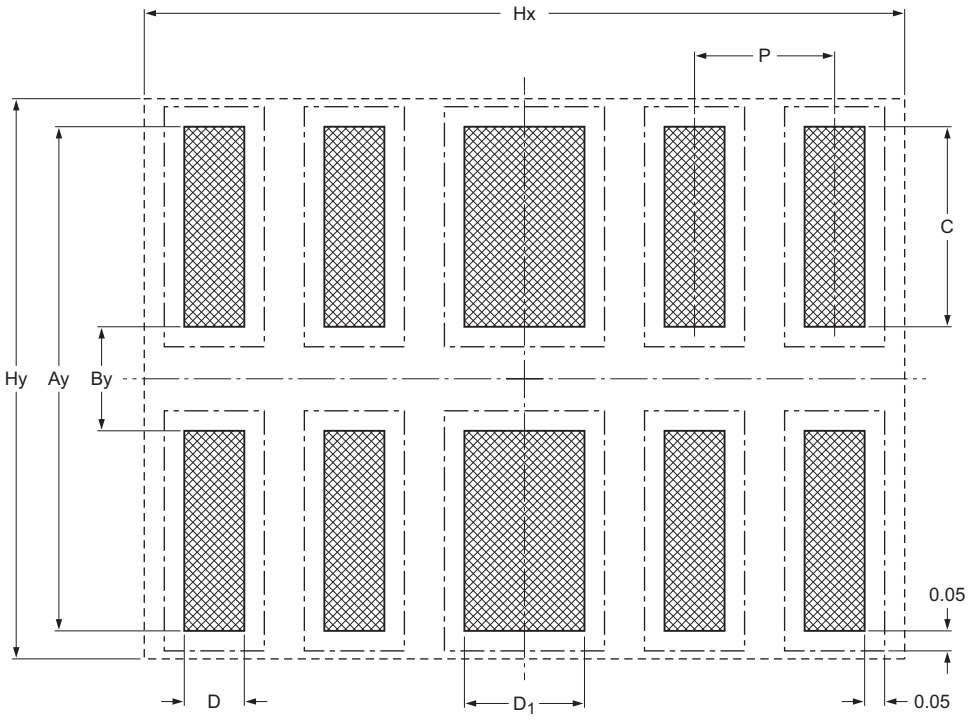
sot1165-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1165-1	- - -	- - -	- - -			~~13-01-09~~ 13-02-18

Fig 4. Package outline SOT1165-1 (XSON10)

9. Soldering

Footprint information for reflow soldering of DFN2510-10 package **SOT1165-1**



Generic footprint pattern
Refer to the package outline drawing for actual layout

solder land

solder paste deposit

solder land plus solder paste

occupied area

solder resist

Dimensions in mm

P	Ay	By	C	D	D_1	Hx	Hy
0.500	1.3	0.25	0.525	0.20	0.40	2.45	1.6

Remark:
Stencil of 75 µm is recommended.
A stencil of 75 µm gives an aspect ratio of 0.77
With a stencil of 100 µm one will obtain an aspect ratio of 0.58

sot1165-1_fr

Reflow soldering is the only recommended soldering method.

Fig 5. Reflow soldering footprint SOT1165-1 (XSON10)

10. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD1LVDS v.3	20160705	Product data sheet	-	PESD1LVDS v.2
Modifications:	• Table 4 “Limiting values”: updated maximum ambient temperature T_{amb} from +85 °C to +125 °C			
PESD1LVDS v.2	20130123	Product data sheet	-	PESD1LVDS v.1
PESD1LVDS v.1	20111010	Product data sheet	-	-

11. Legal information

11.1 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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13. Contents

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