

# IP4282CZ6

ESD protection for high-speed interfaces

Rev. 01 — 30 March 2009

Product data sheet

## HDMI

### 1. Product profile

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#### 1.1 General description

The IP4282CZ6 is designed to protect high-speed interfaces such as HDMI, DVI and DisplayPort interfaces. The device includes high-level ElectroStatic Discharge (ESD) protection diodes for the TMDS signal lines.

All TMDS intra-pairs are protected by a special diode configuration offering a low line capacitance of only 0.7 pF. These diodes provide protection to downstream components from ESD voltages up to  $\pm 8$  kV contact according to IEC 61000-4-2, level 4.

#### 1.2 Features

- 'Pass-thru' signal line routing
- Pb-free, RoHS compliant and free of Halogen and Antimony (Dark Green compliant)
- All TMDS lines with integrated rail-to-rail clamping diodes for downstream ESD protection of  $\pm 8$  kV according to IEC 61000-4-2, level 4
- Matched 0.5 mm trace spacing
- Line capacitance of only 0.7 pF for each channel
- 2-channel, 6-terminal UTLP
- HDMI 1.3a compliant
- DisplayPort compliant

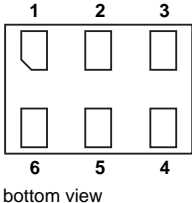
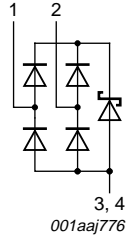
#### 1.3 Applications

The IP4282CZ6 is designed for HDMI receiver and transmitter port protection:

- TVs, monitors
- DVD recorders and players
- Notebooks, main board graphics cards and ports
- Set-top boxes and game consoles

## 2. Pinning information

Table 1. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	TMDS_CH1-	negative channel 1 ESD protection		
2	TMDS_CH1+	positive channel 1 ESD protection		
3	GND	ground		
4	GND	ground		
5	n.c.	not connected		
6	n.c.	not connected		

## 3. Ordering information

Table 2. Ordering information

Type number	Package		Version
	Name	Description	
IP4282CZ6	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

## 4. Limiting values

Table 3. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_I$	input voltage		GND – 0.5	+5.5	V
$V_{esd}$	electrostatic discharge voltage	all pins to ground; IEC 61000-4-2, level 4; contact discharge	–8	+8	kV
$T_{stg}$	storage temperature		–55	+125	°C
$T_{amb}$	ambient temperature		–40	+85	°C

## 5. Characteristics

Table 4. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{BRzd}$	Zener diode breakdown voltage	$I = 1 \text{ mA}$	6	-	9	V
$I_{LRzd}$	Zener diode reverse leakage current	per TMDS channel; $V = 3.0 \text{ V}$	-	-	1	$\mu\text{A}$
$V_F$	forward voltage		-	0.7	-	V
$C_{ch(TMDS)}$	TMDS channel capacitance	$f = 1 \text{ MHz}; V_{bias} = 2.5 \text{ V}$	[1]	-	0.7	pF
$\Delta C_{ch(TMDS)}$	TMDS channel capacitance difference	$f = 1 \text{ MHz}; V_{bias} = 2.5 \text{ V}$	[1]	-	0.05	pF
$C_{ch(mutual)}$	mutual channel capacitance	between signal pin and pin n.c.; $f = 1 \text{ MHz}; V_{bias} = 2.5 \text{ V}$	[1]	-	0.07	pF

**Table 4. Characteristics ...continued**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>dyn</sub>	dynamic resistance	I = 1 A; T <sub>amb</sub> = 25 °C; IEC 61000-4-5/9				
		positive transient	-	2.4	-	Ω
		negative transient	-	1.3	-	Ω
V <sub>CL(ch)trt(pos)</sub>	positive transient channel clamping voltage	V <sub>esd</sub> = 8 kV HBM; T <sub>amb</sub> = 25 °C	[2] -	8	-	V

[1] This parameter is guaranteed by design.  
 [2] Human Body Model according to JESD22-A-J114D.

## 6. Application information

The IP4282CZ6 is designed to provide high-level ESD protection for high-speed serial data buses such as HDMI, DVI, DisplayPort, USB2.0 and other LVDS data lines.

A basic application diagram for the ESD protection of an HDMI interface is shown in [Figure 1](#), and a USB interface in [Figure 2](#).

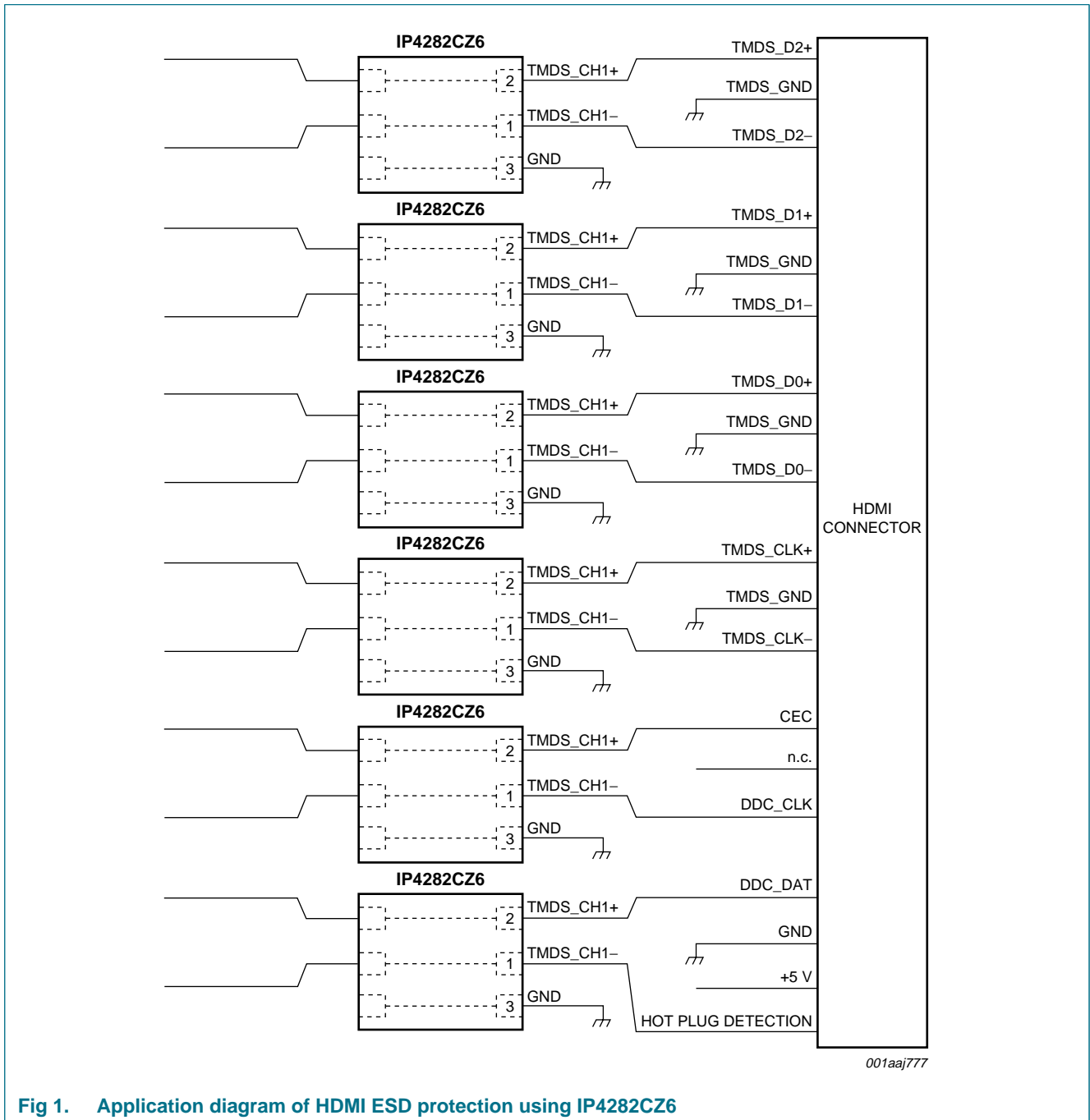
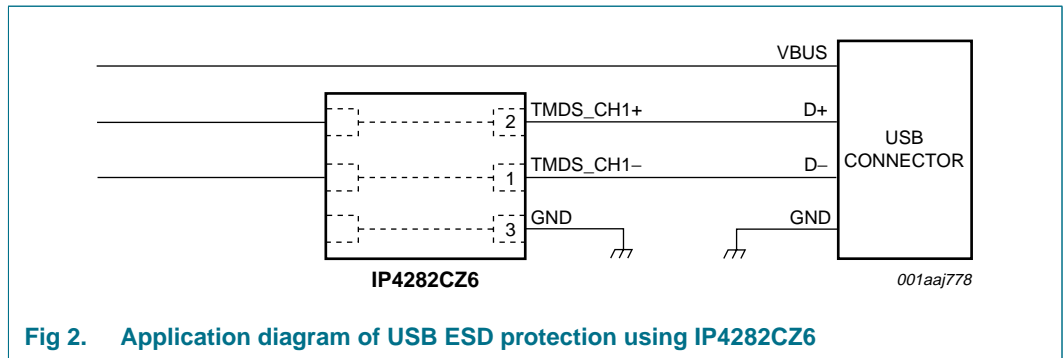


Fig 1. Application diagram of HDMI ESD protection using IP4282CZ6



## 7. Package outline

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886

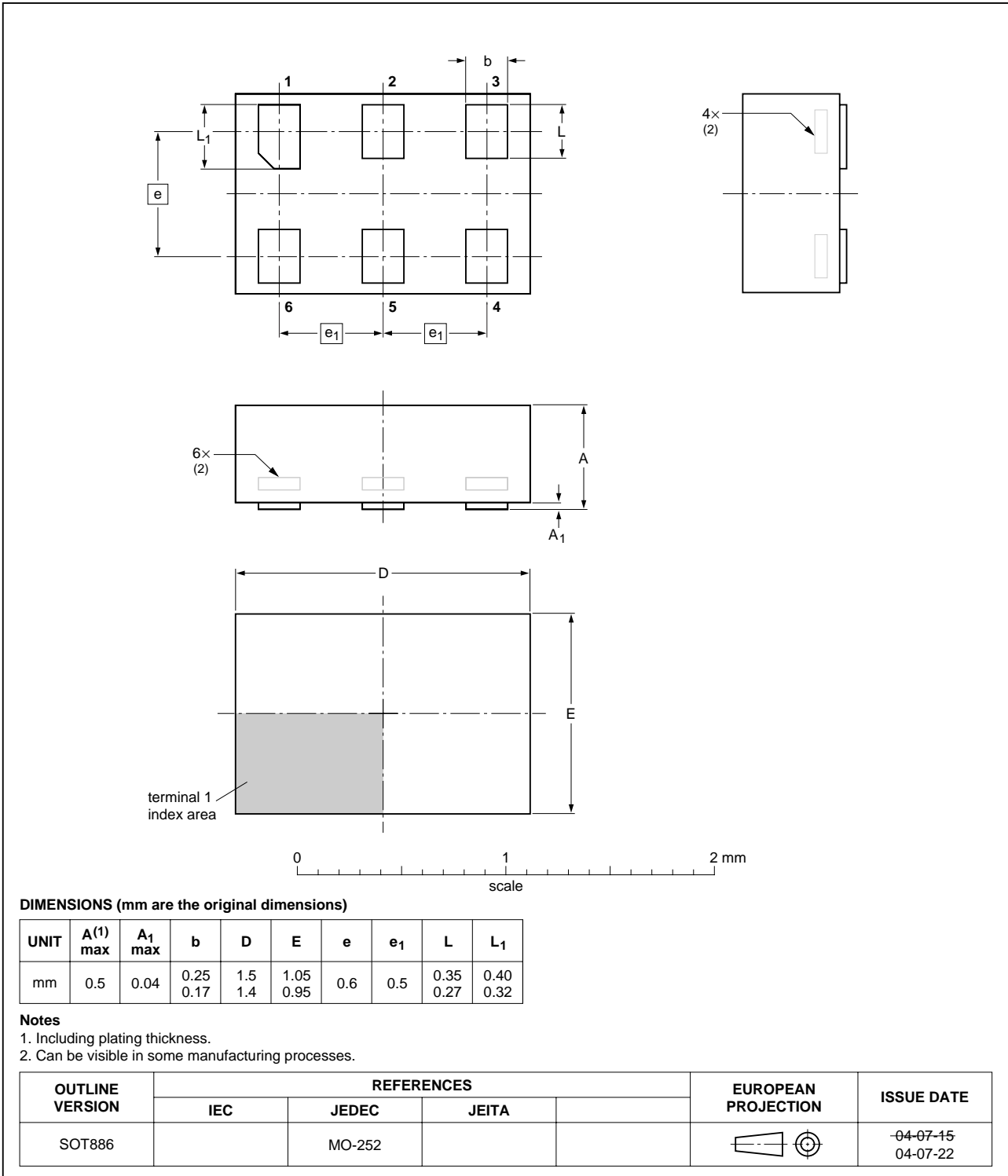


Fig 3. Package outline SOT886 (XSON6)

## 8. Abbreviations

**Table 5. Abbreviations**

Acronym	Description
DVD	Digital Versatile Disc
DVI	Digital Visual Interface
ESD	ElectroStatic Discharge
HBM	Human Body Model
HDMI	High-Definition Multimedia Interface
LVDS	Low-Voltage Differential Signaling
RoHS	Restriction of Hazardous Substances
TMDS	Transition Minimized Differential Signaling
USB	Universal Serial Bus
UTLP	Ultra-Thin Leadless Package

## 9. Revision history

**Table 6. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4282CZ6_1	20090330	Product data sheet	-	-

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### 10.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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