

# IP4242CZ6

ESD protection for high-speed interfaces

Rev. 01 — 12 March 2009

Product data sheet

# HDMI

## 1. Product profile

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### 1.1 General description

The IP4242CZ6 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 0.9 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

- Pb-free, RoHS compliant and free of Halogen and Antimony (Dark Green compliant)
- ESD protection for HDMI
- 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 0.9 pF for each channel
- 2-channel, 6-terminal UTLP
- HDMI 1.3a compliant
- DisplayPort compliant

### 1.3 Applications

The IP4242CZ6 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	<p>bottom view</p>	<p>001aaj776</p>
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		
	Name	Description	Version
IP4242CZ6	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	$I = 1 \text{ mA}$	[1] 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] -	0.9	-	pF
$\Delta C_{ch(TMDS)}$	TMDS channel capacitance difference	$f = 1 \text{ MHz}; V_{bias} = 2.5 \text{ V}$	[1] -	0.15	-	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] -	0.15	-	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 IP4242CZ6 is designed mainly to provide high-level ESD protection for high-speed serial data buses such as HDMI, DVI, DisplayPort, USB2.0 and other LVDS data lines.

It is recommended that when designing the printed-circuit board, careful consideration is given to impedance matching, and signal coupling.

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

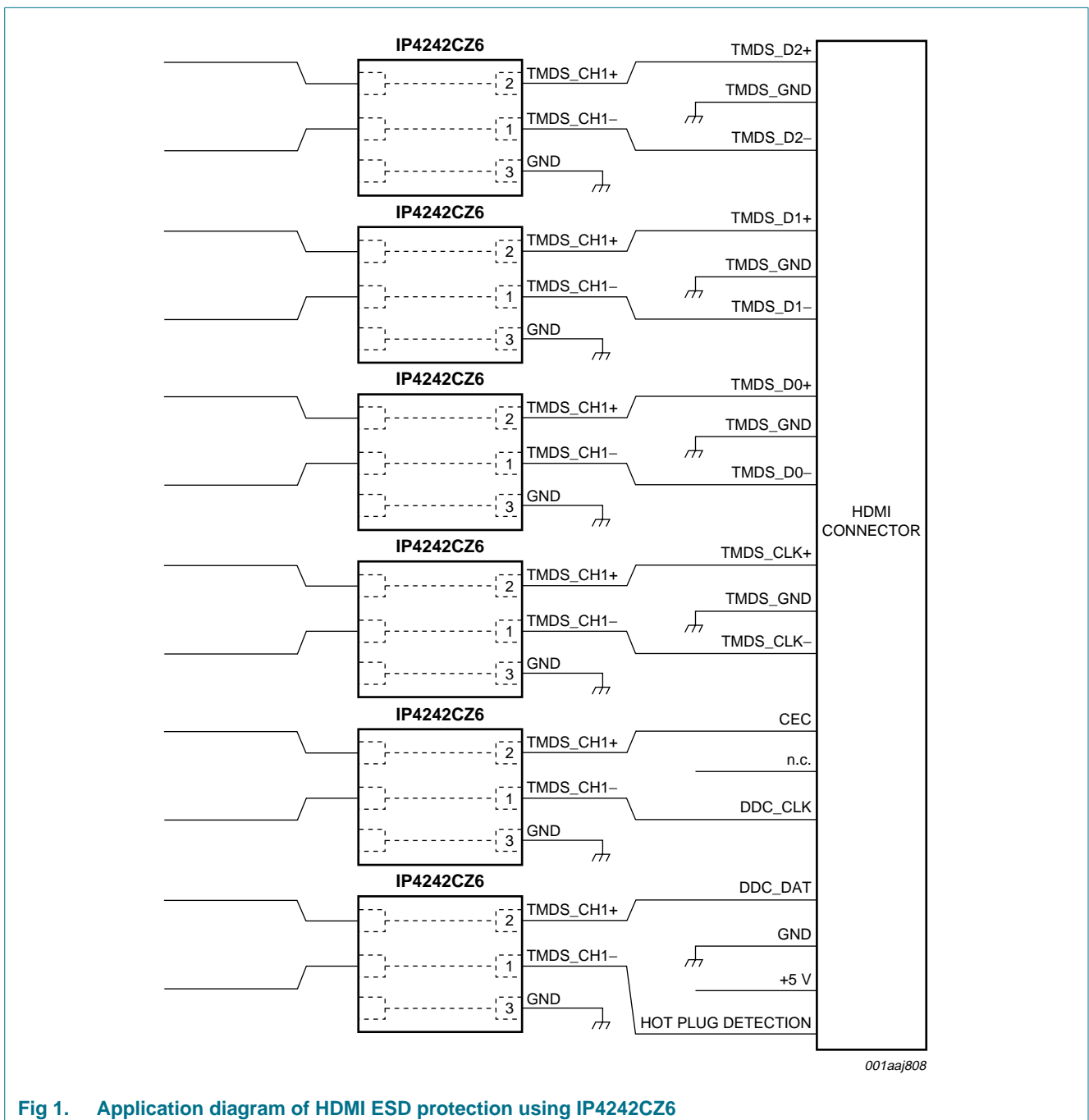
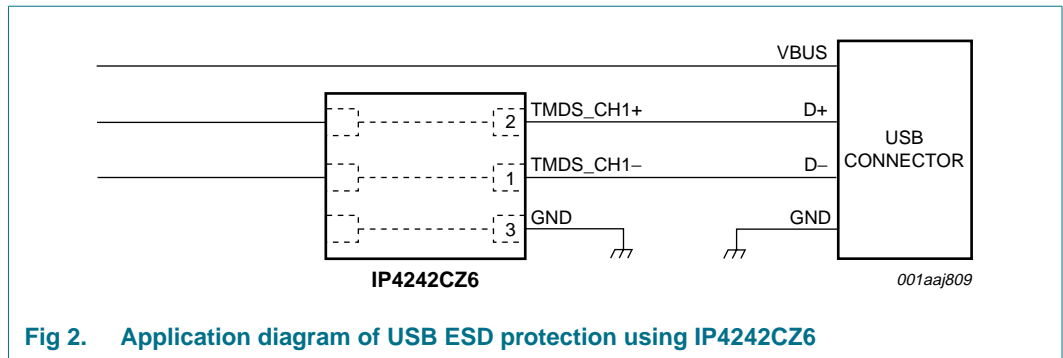


Fig 1. Application diagram of HDMI ESD protection using IP4242CZ6



## 7. Package outline

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

SOT886

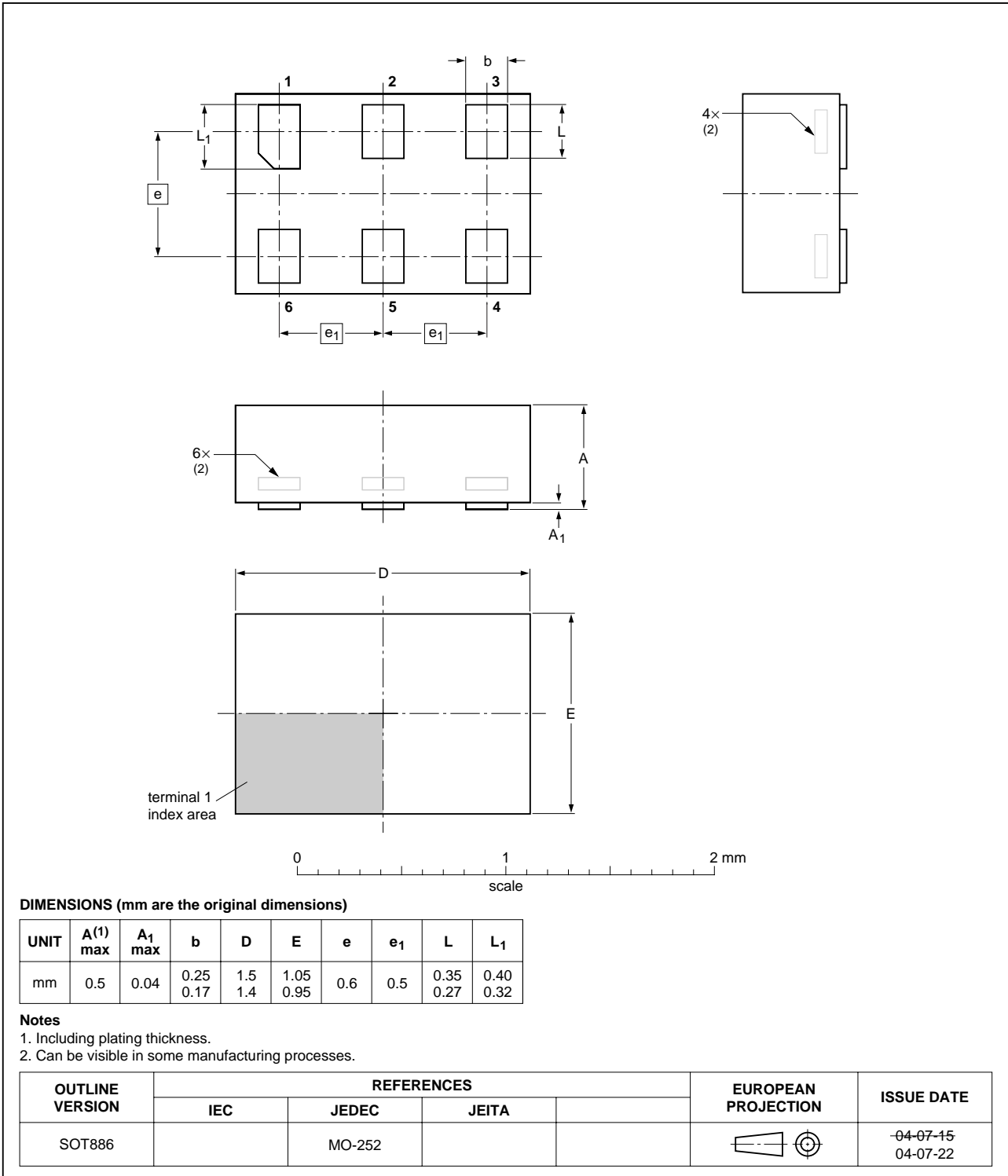


Fig 3. Package outline SOT886 (XSON6)

## 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
IP4242CZ6_1	20090312	Product data sheet	-	-

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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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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