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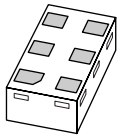


IP4242CZ6

ESD protection for high-speed interfaces

Rev. 01 — 12 March 2009 Product data sheet

1. Product profile

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 ±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 ±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

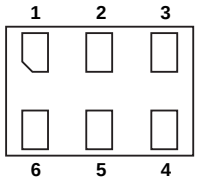
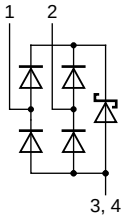
1.3 Applications

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		
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 mA	[1]	6	-	9	V
I_{LRzd}	Zener diode reverse leakage current	per TMDS channel; V = 3.0 V		-	-	1	µA
V_F	forward voltage			-	0.7	-	V
$C_{ch(TMDS)}$	TMDS channel capacitance	f = 1 MHz; V_{bias} = 2.5 V	[1]	-	0.9	-	pF
$\Delta C_{ch(TMDS)}$	TMDS channel capacitance difference	f = 1 MHz; V_{bias} = 2.5 V	[1]	-	0.15	-	pF
$C_{ch(mutual)}$	mutual channel capacitance	between signal pin and pin n.c.; f = 1 MHz; V_{bias} = 2.5 V	[1]	-	0.15	-	pF

Table 4. Characteristics *…continued*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R_{dyn}	dynamic resistance	I = 1 A; T_{amb} = 25 °C; IEC 61000-4-5/9					
		positive transient		-	2.4	-	Ω
		negative transient		-	1.3	-	Ω
$V_{CL(ch)trt(pos)}$	positive transient channel clamping voltage	V_{esd} = 8 kV HBM; T_{amb} = 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.

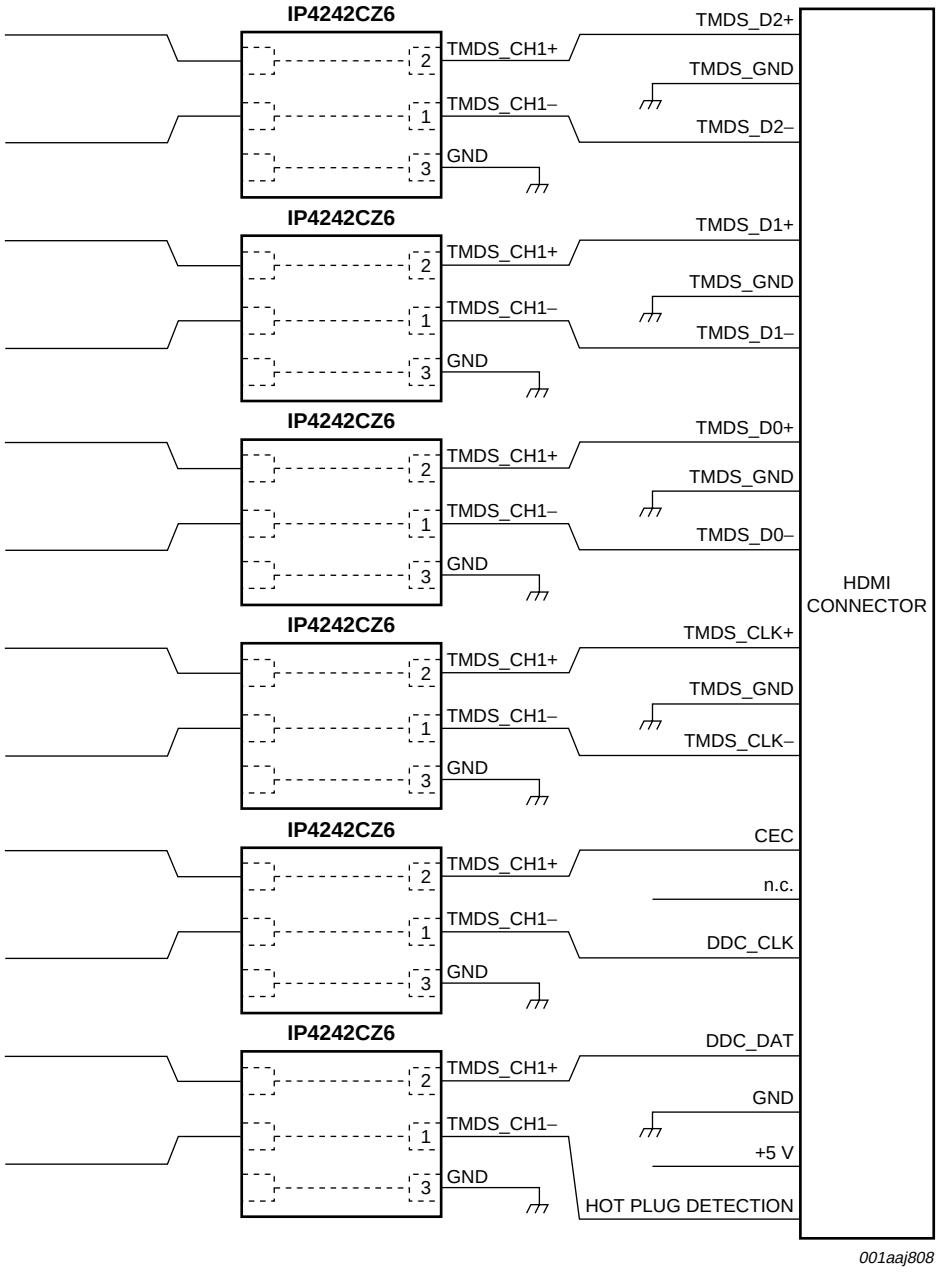


Fig 1. Application diagram of HDMI ESD protection using IP4242CZ6

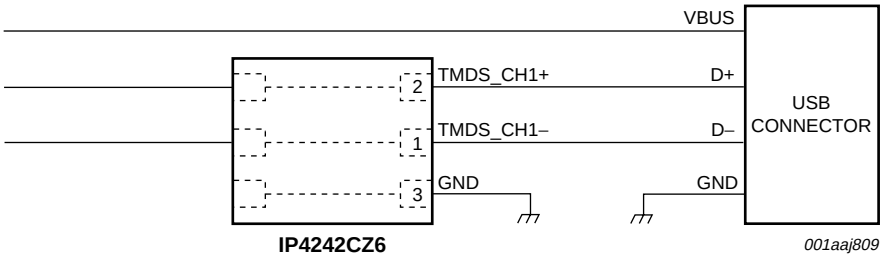
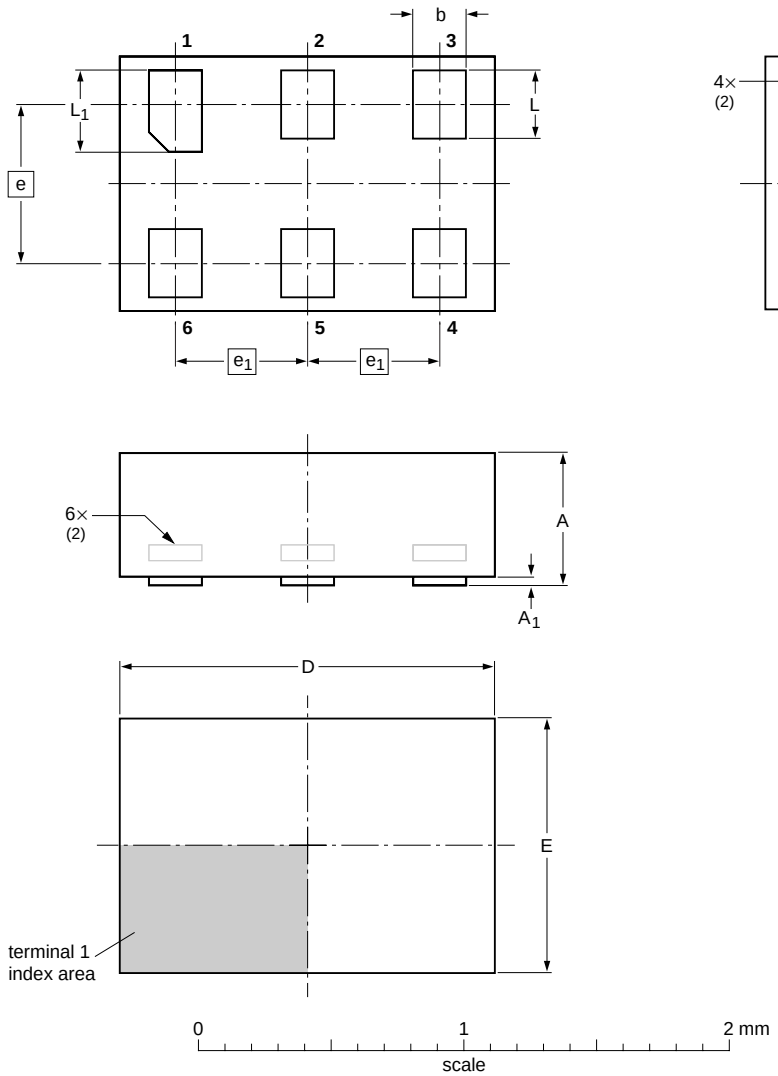


Fig 2. Application diagram of USB ESD protection using IP4242CZ6

7. Package outline

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm **SOT886**



DIMENSIONS (mm are the original dimensions)

UNIT	A(1) max	A1 max	b	D	E	e	e1	L	L1
mm	0.5	0.04	0.25 0.17	1.5 1.4	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

Notes

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT886		MO-252				~~04-07-15~~ 04-07-22

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	-	-

10. Legal information

10.1 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".

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12. Contents

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