IP4283CZ10

ESD protection for ultra high-speed interfaces

HDMI

1. Product profile

1.1 General description

The IP4283CZ10 is designed to protect high-speed interfaces such as HDMI, DisplayPort, eSATA and LVDS against ElectroStatic Discharge (ESD). The device includes high-level ESD protection diodes for ultra high-speed signal lines and is available in two package variants: UTLP10 and TSSOP10.

All signal lines are protected by a special diode configuration offering ultra-low line capacitance of only 0.6 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)
■ System ESD protection for HDMI, DisplayPort, eSATA and LVDS
■ All signal 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
■ Signal lines with ≤ 0.05 pF matching capacitance between signal pairs
■ Line capacitance of only 0.6 pF for each channel
■ 4-channel, UTLP10 or TSSOP10 Pb-free package
■ HDMI 1.3a compliant
■ DisplayPort compliant
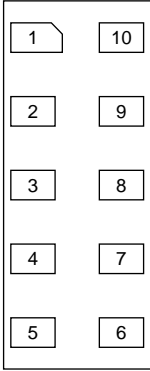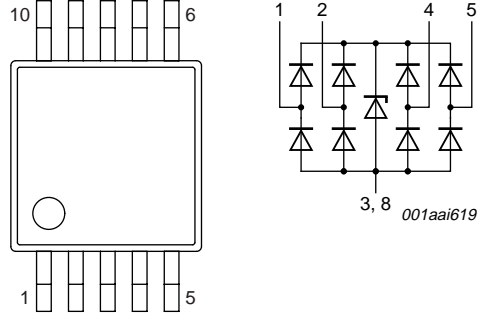■ Design-friendly 'pass-thru' signal routing

1.3 Applications

The IP4283CZ10 is designed for high-speed receiver and transmitter port protection:

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

NXP founded by Philips

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	TMDS_CH2−	negative channel 2 ESD protection		
5	TMDS_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		

Transparent top view
XSON10U

TSSOP10

001aai619

3. Ordering information

Table 2.   Ordering information

Type number	Package			
	Name	**Description**		**Version**
IP4283CZ10-TB	XSON10U	plastic extremely thin small outline package; no leads; 10 terminals; UTLP based; body $1 \times 2.5 \times 0.5$ mm		SOT1059-1
IP4283CZ10-TT	TSSOP10	plastic thin shrink small outline package; 10 leads; body width 3 mm		SOT552-1

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

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{BRzd}	Zener diode breakdown voltage	I = 1 mA		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]	-	0.6	-	pF
$\Delta C_{ch(TMDS)}$	TMDS channel capacitance difference	f = 1 MHz; V_{bias} = 2.5 V	[1]	-	0.05	-	pF
$C_{ch(mutual)}$	mutual channel capacitance	between signal pin and pin n.c.; f = 1 MHz; V_{bias} = 2.5 V	[1]	-	0.07	-	pF
R_{dyn}	dynamic resistance	I = 1 A; T_{amb} = 25 °C	[3]				
		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.

[3]   According to IEC 61000-4-5/9.

6. Application information

The IP4283CZ10 is designed mainly to provide high-level ESD protection for high-speed serial data buses such as HDMI, DisplayPort, eSATA and LVDS data lines.

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

A basic application diagram for the ESD protection of an HDMI interface is shown in Figure 1 and Figure 2 for package versions TB and TT respectively.
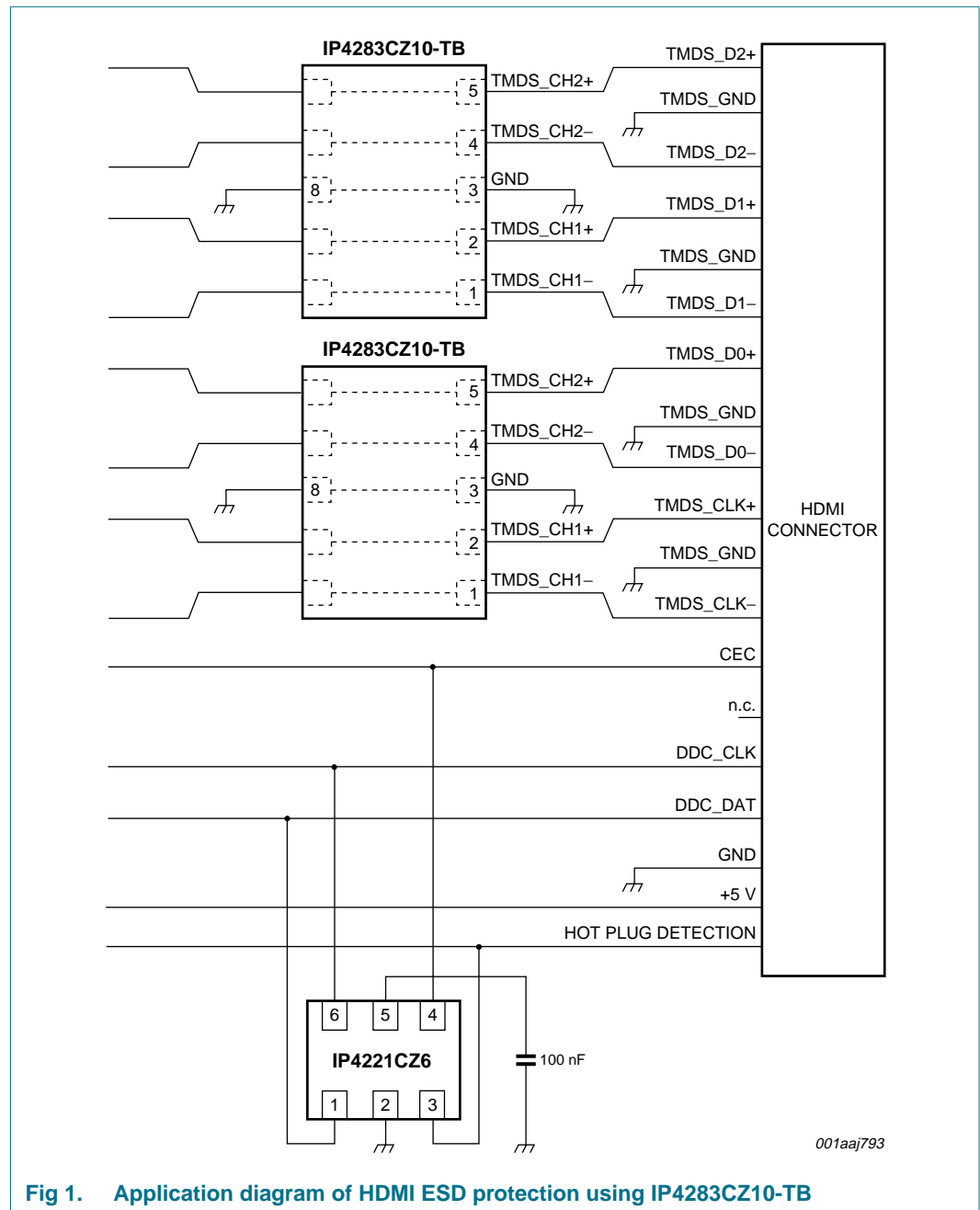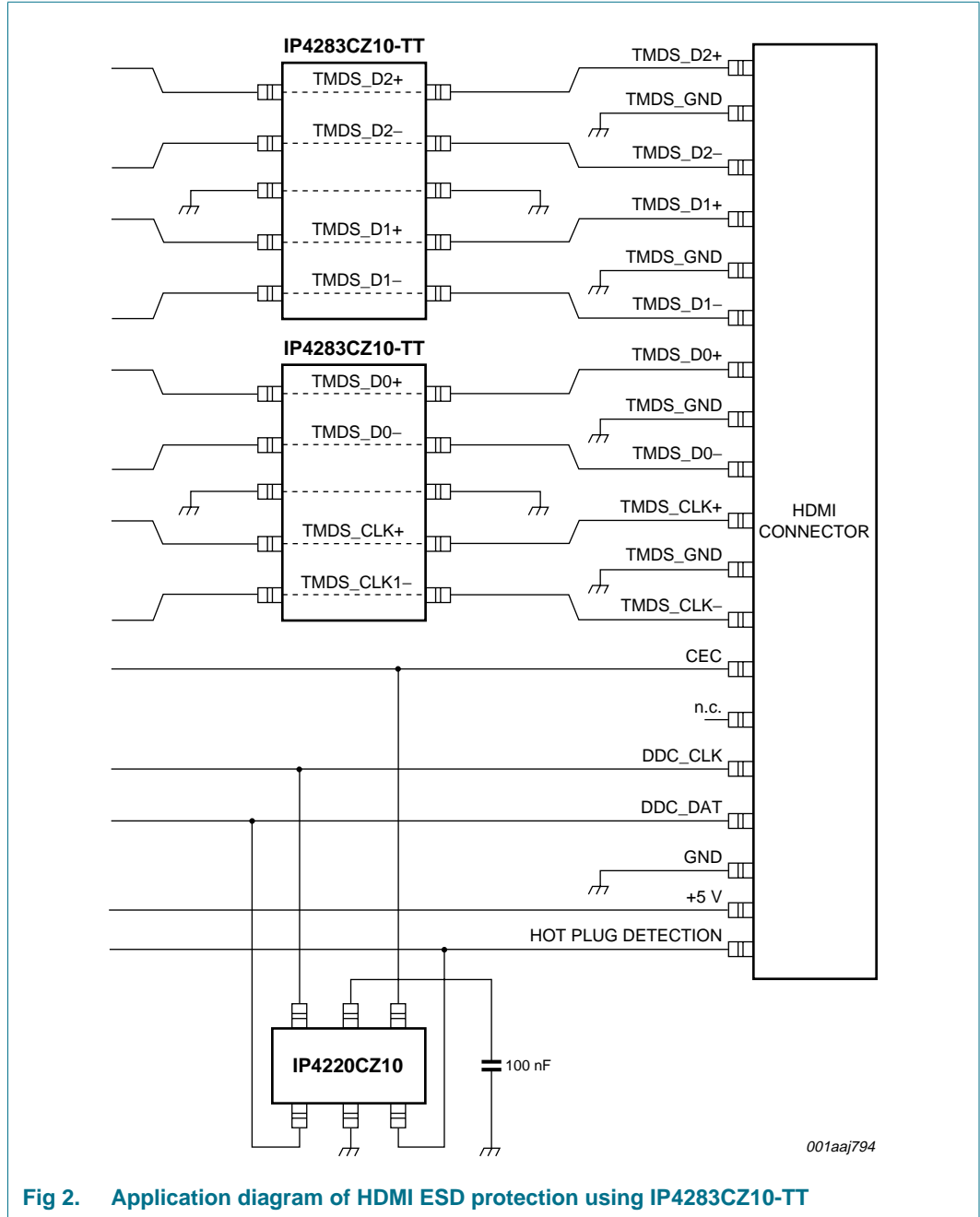

Fig 1. **Application diagram of HDMI ESD protection using IP4283CZ10-TB**

Fig 2.   Application diagram of HDMI ESD protection using IP4283CZ10-TT

7. Package outline

XSON10U: plastic extremely thin small outline package; no leads;
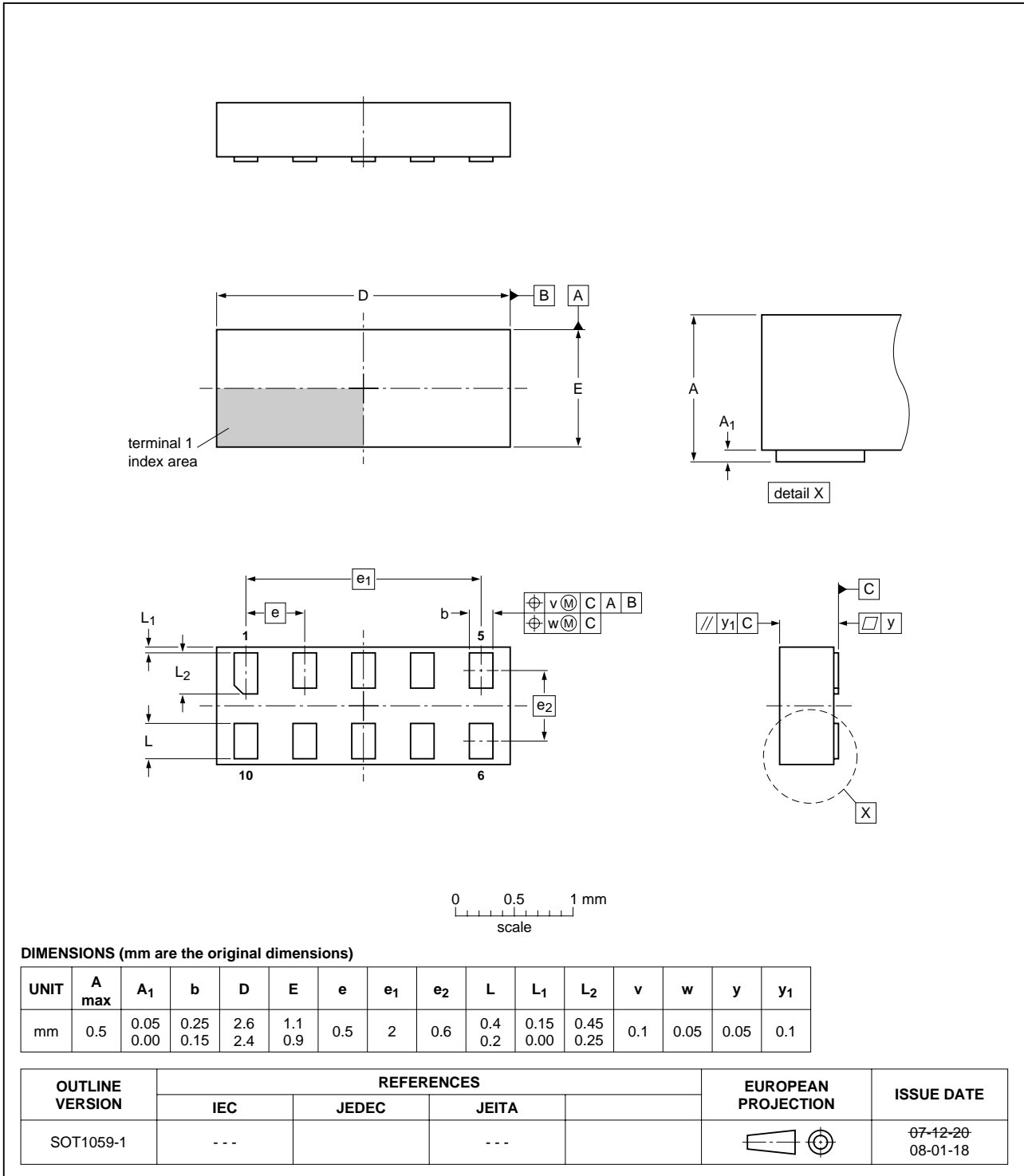**10 terminals; UTLP based; body 1 x 2.5 x 0.5 mm**

SOT1059-1

DIMENSIONS (mm are the original dimensions)

UNIT	A max	A₁	b	D	E	e	e₁	e₂	L	L₁	L₂	v	w	y	y₁
mm	0.5	0.05 0.00	0.25 0.15	2.6 2.4	1.1 0.9	0.5	2	0.6	0.4 0.2	0.15 0.00	0.45 0.25	0.1	0.05	0.05	0.1

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT1059-1	- - -		- - -		~~07-12-20~~ 08-01-18

Fig 3.   Package outline SOT1059-1 (XSON10U)

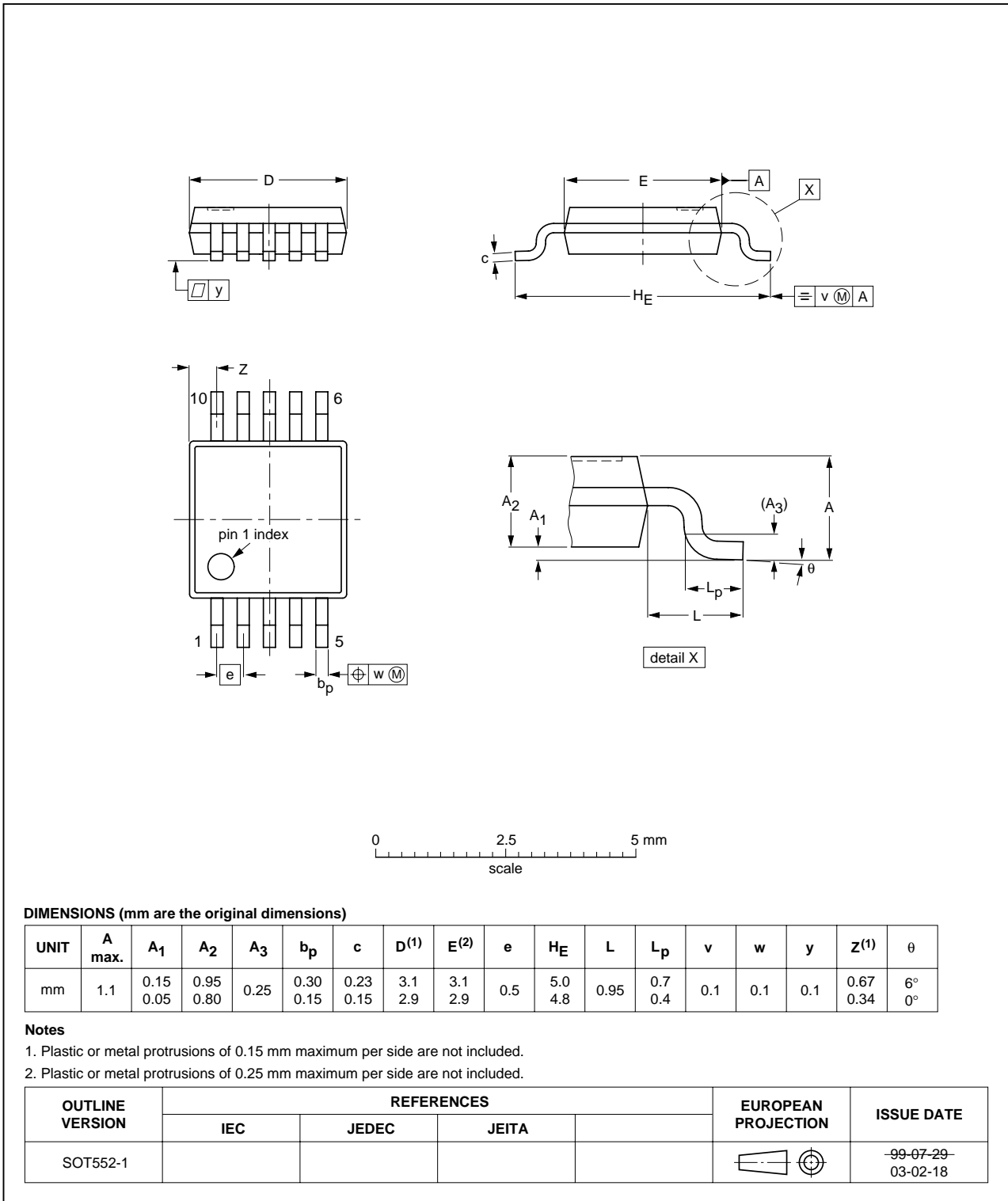TSSOP10: plastic thin shrink small outline package; 10 leads; body width 3 mm **SOT552-1**

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	b_p	c	D[1]	E[2]	e	H_E	L	L_p	v	w	y	Z[1]	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.15	0.23 0.15	3.1 2.9	3.1 2.9	0.5	5.0 4.8	0.95	0.7 0.4	0.1	0.1	0.1	0.67 0.34	6° 0°

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT552-1						~~99-07-29~~ 03-02-18

Fig 4.   Package outline SOT552-1 (TSSOP10)

IP4283CZ10_1

8. Abbreviations

Table 5. **Abbreviations**

Acronym	Description
DVD	Digital Versatile Disc
eSATA	external Serial Advanced Technology Attachment
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
UTLP	Ultra-Thin Leadless Package

9. Revision history

Table 6. **Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4283CZ10_1	20090507	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".

[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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