

## 1. Product profile

### 1.1 General description

The devices are designed to protect high-speed interfaces such as High-Definition Multimedia Interface (HDMI), DisplayPort, external Serial Advanced Technology Attachment (eSATA) and Low-Voltage Differential Signaling (LVDS) interfaces against ElectroStatic Discharge (ESD).

The devices include high-level ESD protection diodes for ultra high-speed signal lines. They are available in two package variants: XSON10 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  $\pm 8$  kV contact according to IEC 61000-4-2, level 4.

### 1.2 Features and benefits

- Pb-free, Restriction of Hazardous Substances (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  $\pm 8$  kV according to IEC 61000-4-2, level 4
- Matched 0.5 mm trace spacing
- Signal lines with  $\leq 0.05$  pF matching capacitance between signal pairs
- Line capacitance of only 0.6 pF for each channel
- 4-channel, XSON10 or TSSOP10 Pb-free package
- Design-friendly ‘pass-thru’ signal routing

### 1.3 Applications

The devices are 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



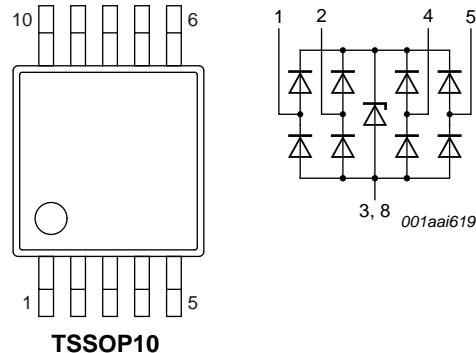
## 2. Pinning information

**Table 1. Pinning**

Pin	Symbol	Description	Simplified outline	Graphic symbol
<b>IP4283CZ10-TBA (SOT1165-1)</b>				
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		
<b>IP4283CZ10-TBR (SOT1176-1)</b>				
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		

**Table 1.** Pinning ...continued

Pin	Symbol	Description	Simplified outline	Graphic symbol
<b>IP4283CZ10-TT (SOT552-1)</b>				
1	TMDS_CH1-	negative channel 1 ESD protection	10	
2	TMDS_CH1+	positive channel 1 ESD protection	6	
3	GND	ground		
4	TMDS_CH2-	negative channel 2 ESD protection		
5	TMDS_CH2+	positive channel 2 ESD protection		
6	n.c.	not connected	1	
7	n.c.	not connected	2	
8	GND	ground	4	
9	n.c.	not connected	5	
10	n.c.	not connected		



### 3. Ordering information

**Table 2.** Ordering information

Type number	Package			Version
	Name	Description		
IP4283CZ10-TBR	XSON10	plastic extremely thin small outline package; no leads; 10 terminals; body $1 \times 2.5 \times 0.5$ mm		SOT1176-1
IP4283CZ10-TBA	XSON10	plastic extremely thin small outline package; no leads; 10 terminals; body $1 \times 2.5 \times 0.5$ mm		SOT1165-1
IP4283CZ10-TT	TSSOP10	plastic thin shrink small outline package; 10 leads; body width 3 mm		SOT552-1

### 4. Marking

**Table 3.** Marking codes

Type number	Marking code
IP4283CZ10-TBR	83
IP4283CZ10-TBA	83
IP4283CZ10-TT	4283

## 5. Limiting values

**Table 4. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_I$	input voltage		-0.5	+5.5	V
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2, level 4	[1]		
		contact discharge	-	$\pm 8$	kV
		air discharge	-	$\pm 15$	kV
$T_{stg}$	storage temperature		-55	+125	°C
$T_{amb}$	ambient temperature		-40	+85	°C

[1] All pins to ground.

## 6. Characteristics

**Table 5. 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	$f = 1$ MHz; $V_{bias} = 2.5$ V	[1][2]	-	0.07	pF
$R_{dyn}$	dynamic resistance	$I = 1$ A	[3]			
		positive transient	-	0.3	-	Ω
		negative transient	-	0.85	-	Ω
$V_{CL(ch)trt(pos)}$	positive transient channel clamping voltage	$V_{ESD} = 8$ kV	[4]	-	8	V

[1] This parameter is guaranteed by design.

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

[3] According to IEC 61000-4-5 (8/20 μs).

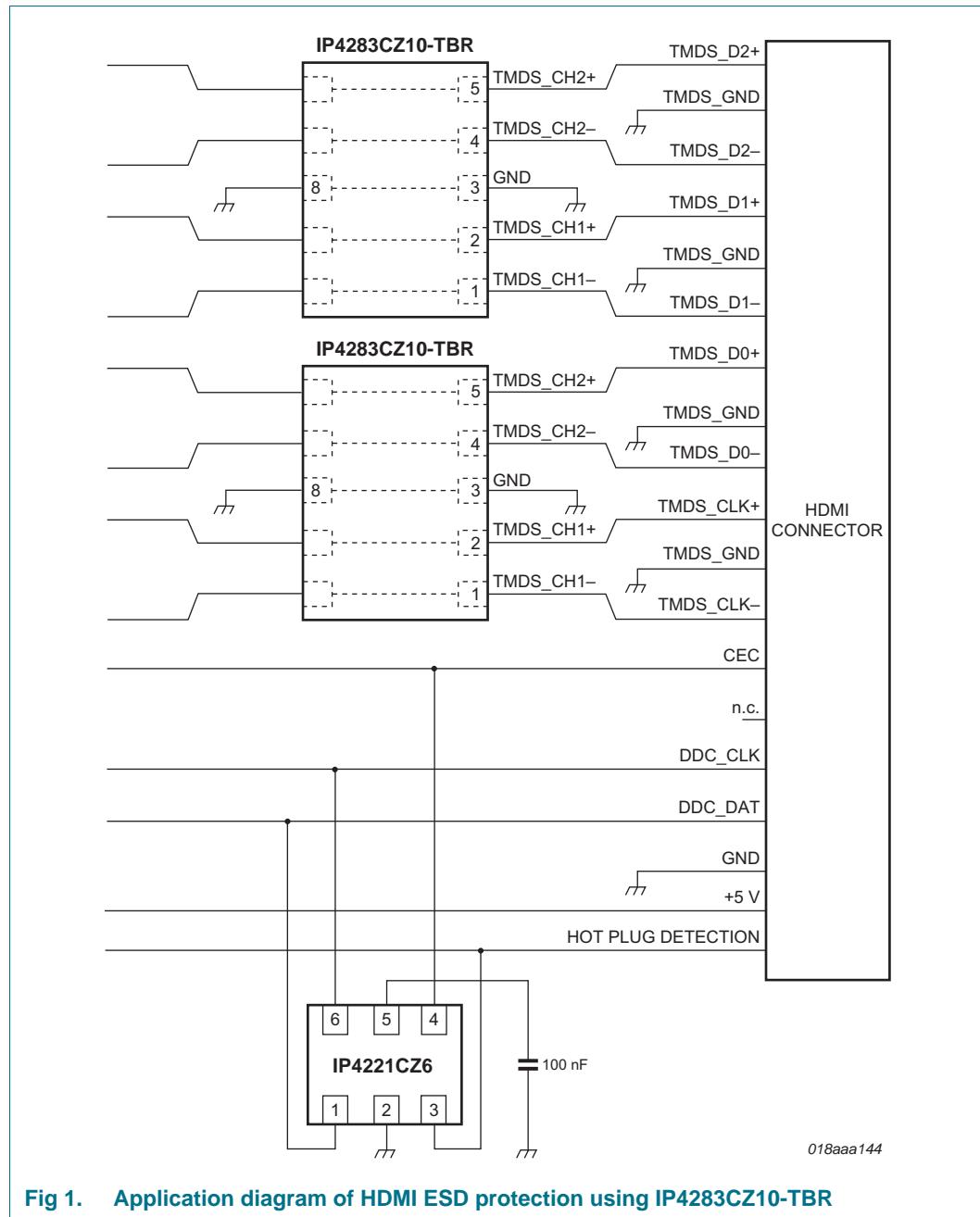
[4] Human Body Model (HBM) according to JESD22-A-J114D.

## 7. Application information

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

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

Basic application diagrams for the ESD protection of an HDMI interface are shown in [Figure 1](#) and [Figure 2](#).



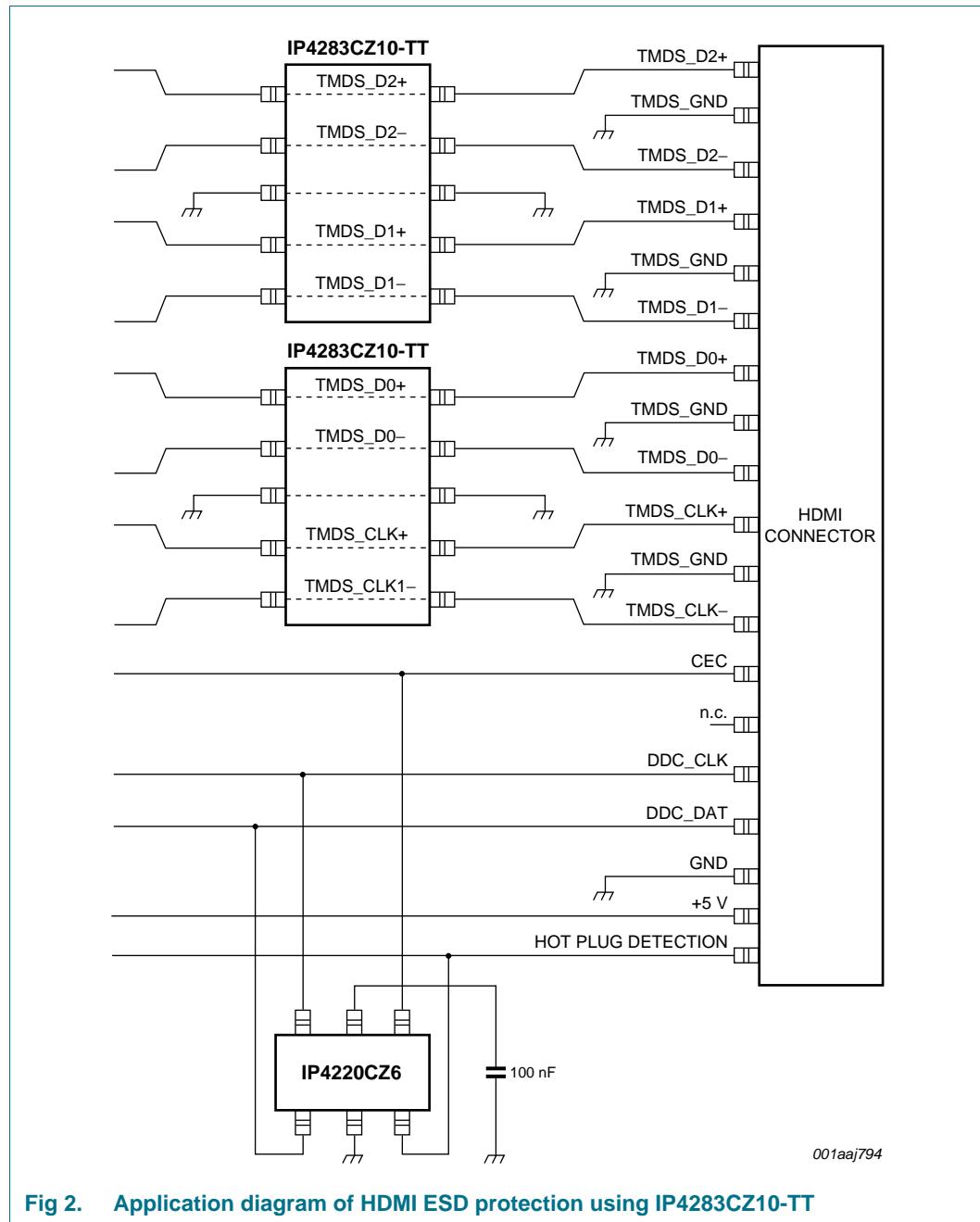


Fig 2. Application diagram of HDMI ESD protection using IP4283CZ10-TT

## 8. Package outline

XSON10: plastic, extremely thin small outline package; no leads;  
10 terminals; body 1 x 2.5 x 0.5 mm

SOT1165-1

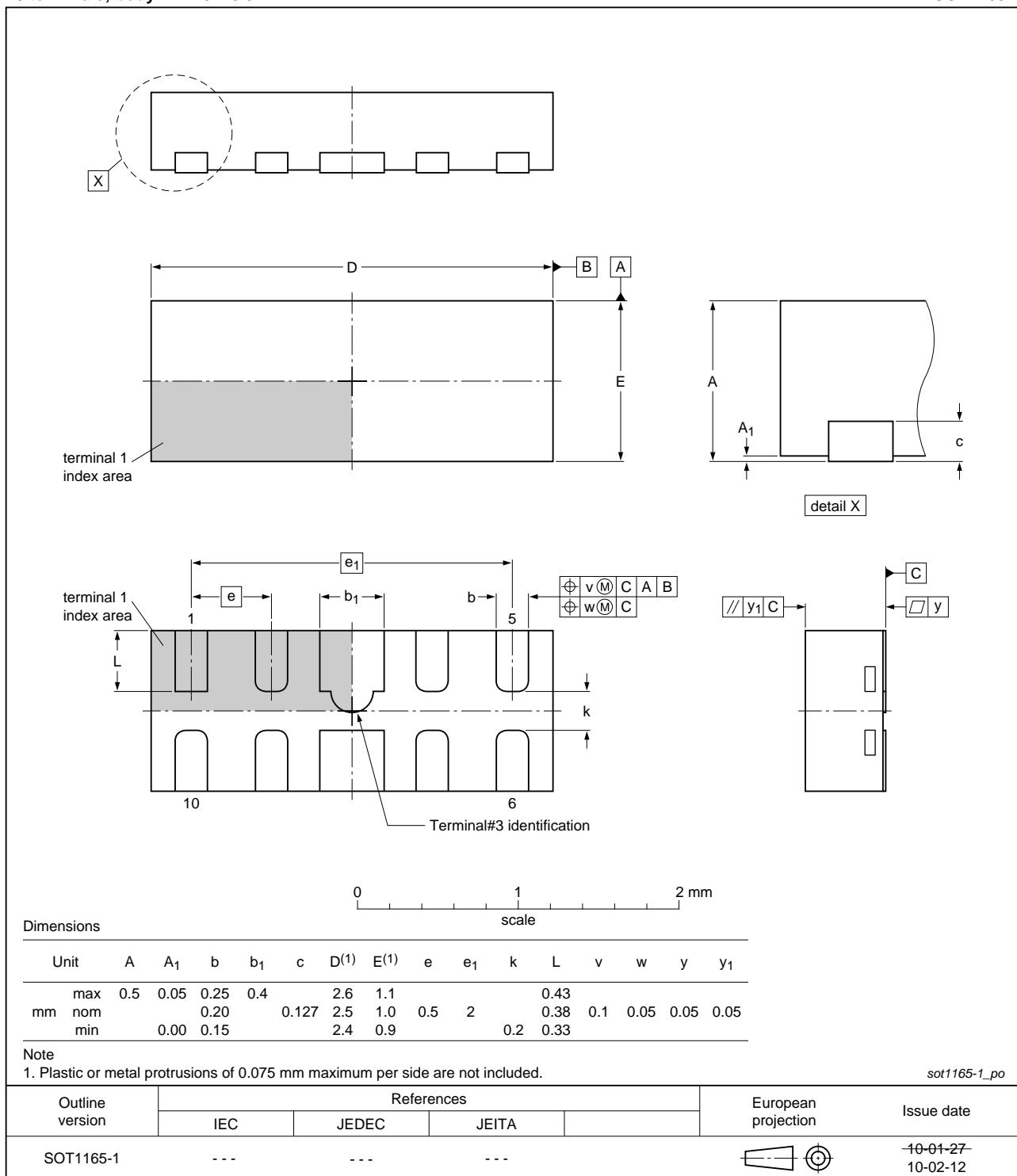


Fig 3. Package outline SOT1165-1 (XSON10)

XSON10: plastic extremely thin small outline package; no leads;  
10 terminals; body 1 x 2.5 x 0.5 mm

SOT1176-1

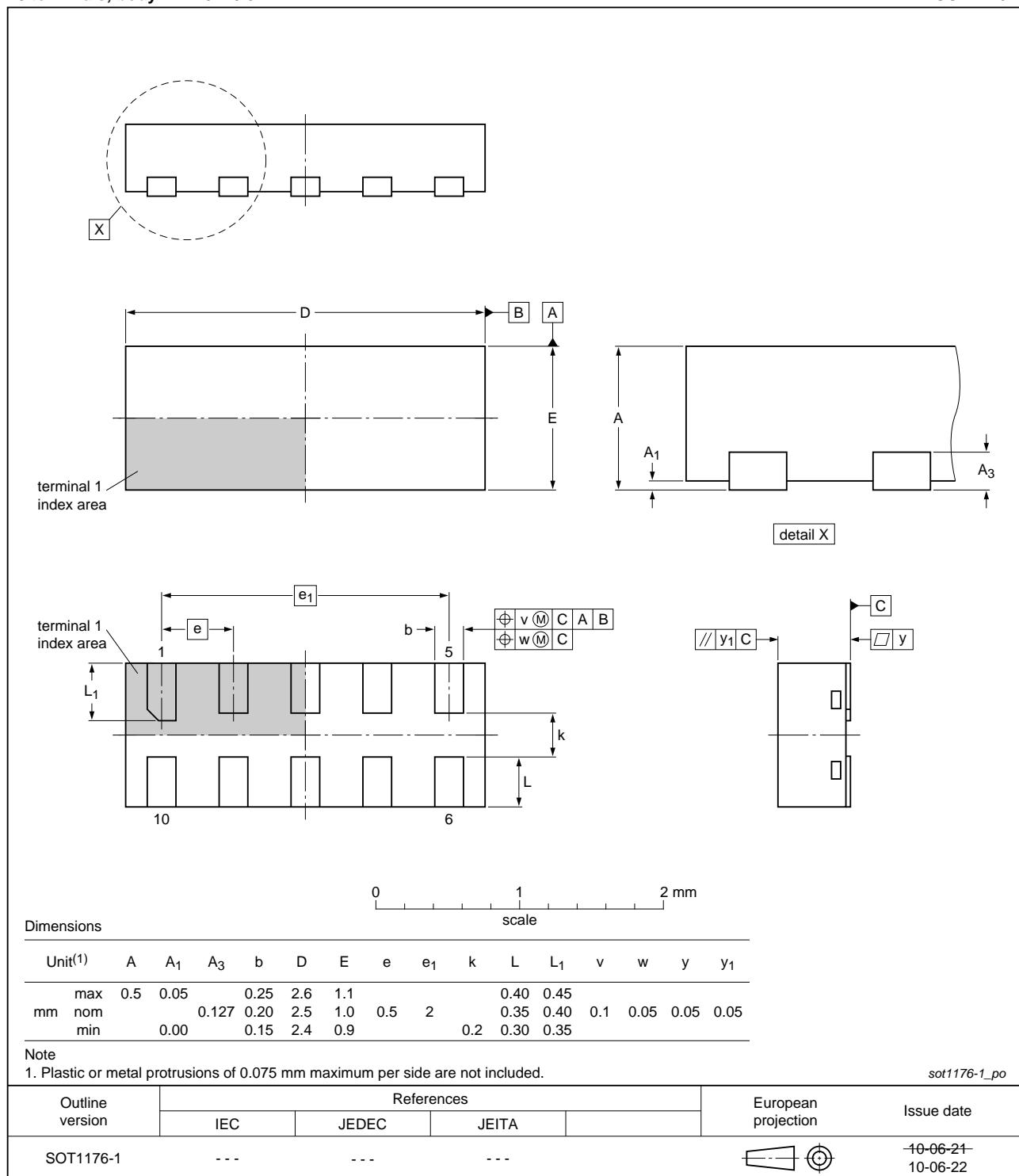
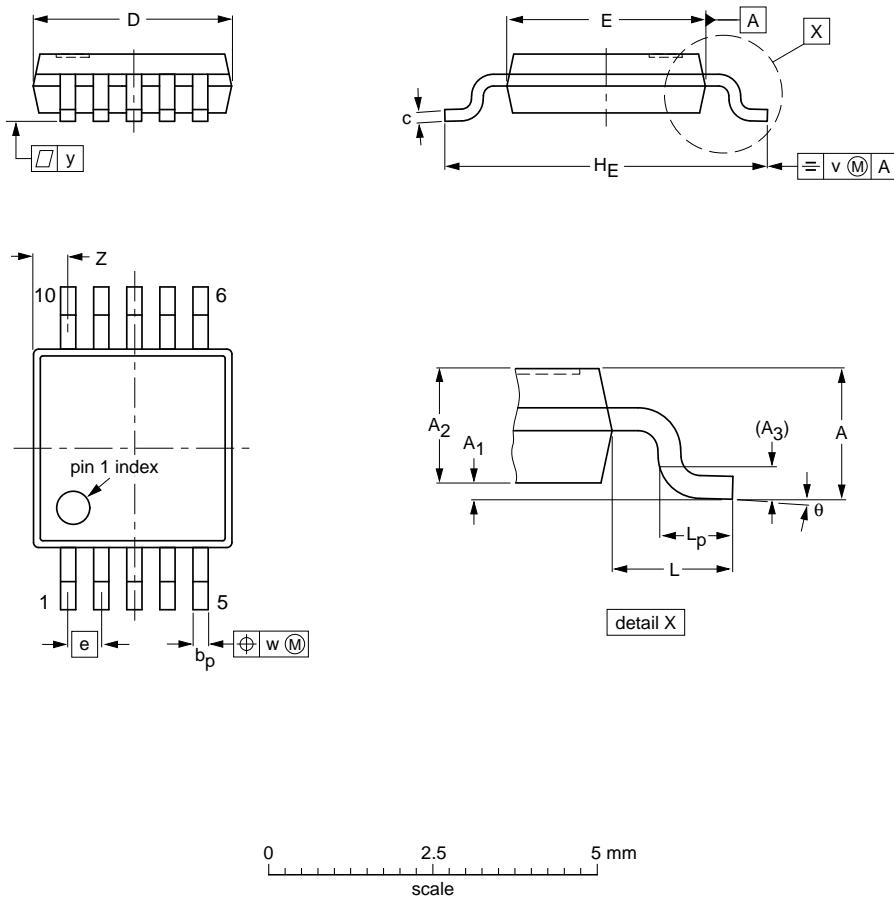


Fig 4. Package outline SOT1176-1 (XSON10)

TSSOP10: plastic thin shrink small outline package; 10 leads; body width 3 mm

SOT552-1

**DIMENSIONS (mm are the original dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	v	w	y	Z <sup>(1)</sup>	θ
mm	1.1 0.05	0.15 0.80	0.95	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°

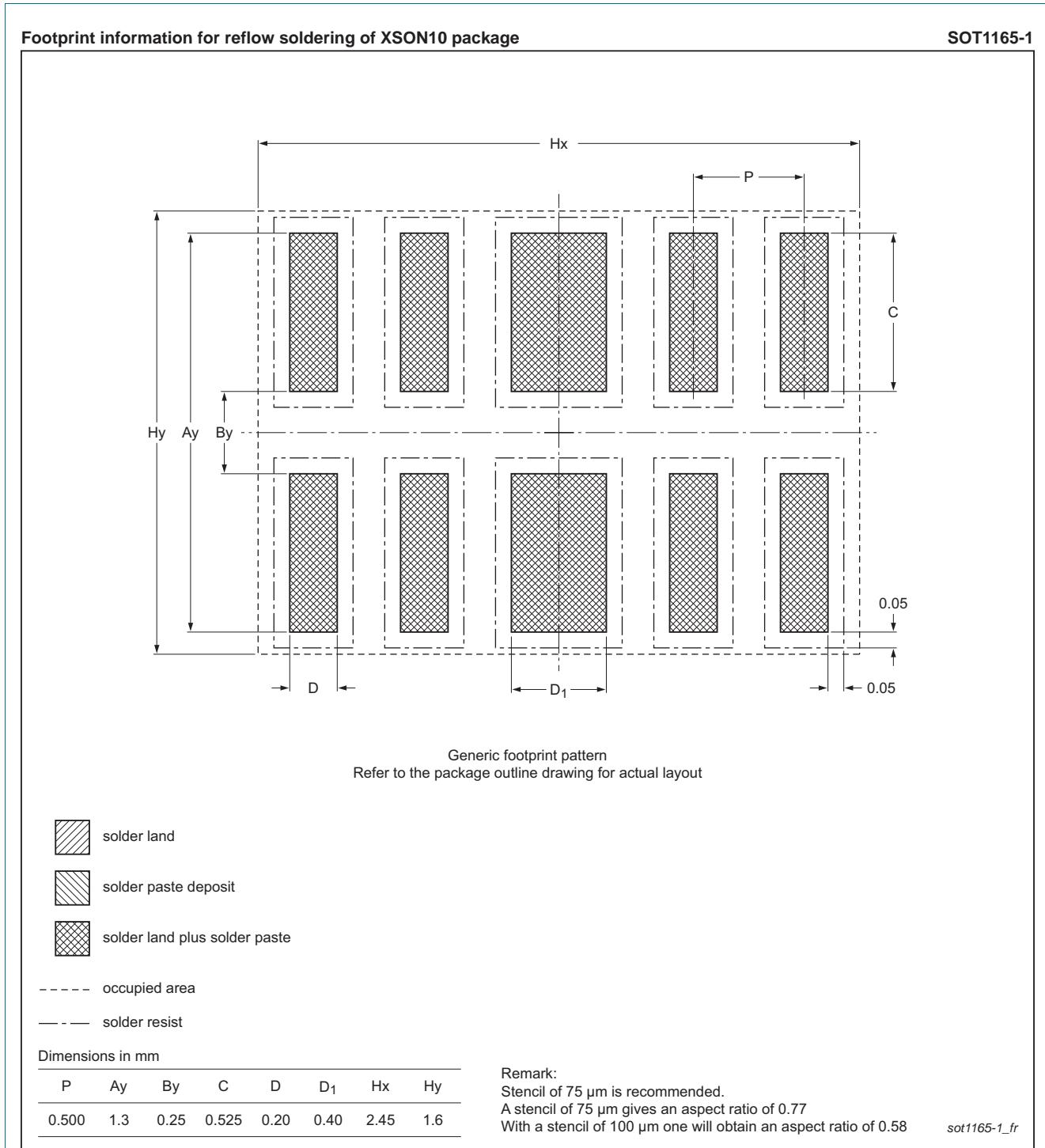
**Notes**

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

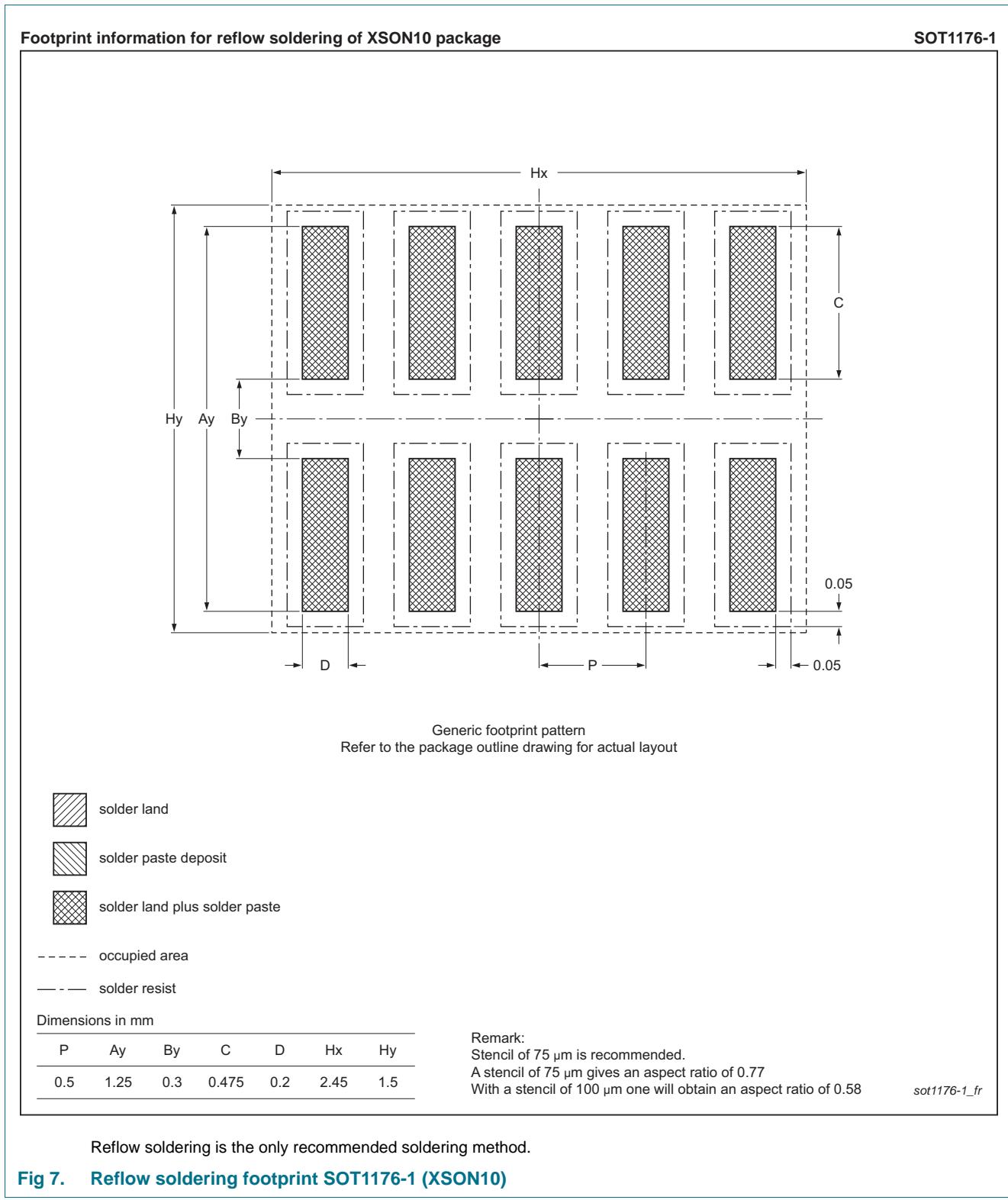
**Fig 5. Package outline SOT552-1 (TSSOP10)**

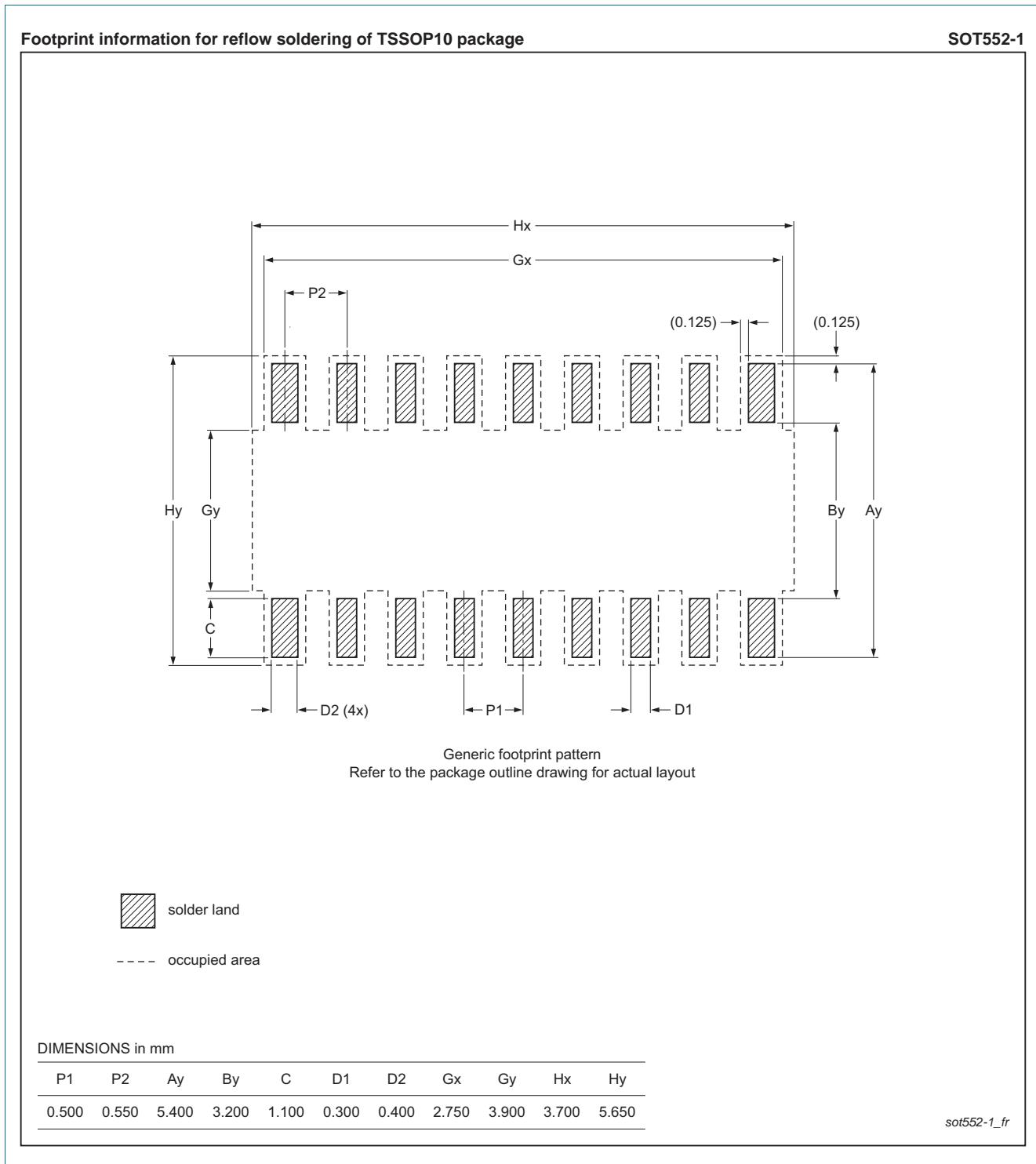
## 9. Soldering



Reflow soldering is the only recommended soldering method.

**Fig 6. Reflow soldering footprint SOT1165-1 (XSON10)**





## 10. Abbreviations

**Table 6. 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
PCB	Printed-Circuit Board
RoHS	Restriction of Hazardous Substances
TMDS	Transition Minimized Differential Signaling
UTLP	Ultra-Thin Leadless Package

## 11. Revision history

**Table 7. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4283CZ10_SER v.3	20110624	Product data sheet	-	IP4283CZ10_SER v.2
Modifications:	<ul style="list-style-type: none"><li>Added type number IP4283CZ10-TBR.</li><li>Deleted type number IP4283CZ10-TB.</li><li><a href="#">Section 4 "Marking"</a>: added.</li><li><a href="#">Table 4</a>: updated.</li><li><a href="#">Section 9 "Soldering"</a>: added.</li></ul>			
IP4283CZ10_SER v.2	20100827	Product data sheet	-	IP4283CZ10 v.1
IP4283CZ10 v.1	20090507	Product data sheet	-	-

## 12. Legal information

### 12.1 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".

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