

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 ± 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 ± 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, 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

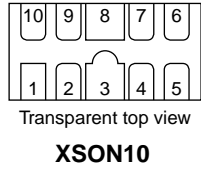
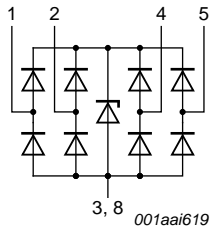
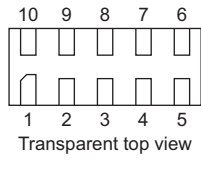
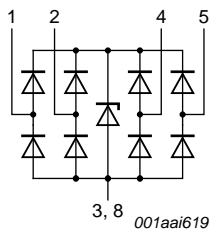
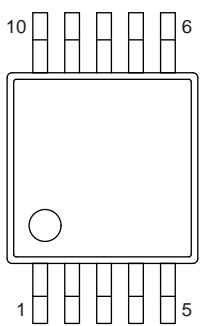
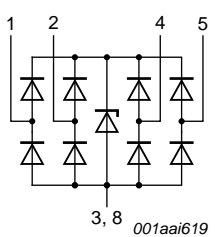
Pin	Symbol	Description	Simplified outline	Graphic symbol
IP4283CZ10-TBA (SOT1165-1)				
1	TMDS_CH1-	negative channel 1 ESD protection	 <p>Transparent top view XSON10</p>	 <p>001aai619</p>
2	TMDS_CH1+	positive channel 1 ESD protection		
3	GND	ground		
4	TMDS_CH2-	negative channel 2 ESD protection		
5	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		
IP4283CZ10-TBR (SOT1176-1)				
1	TMDS_CH1-	negative channel 1 ESD protection	 <p>Transparent top view XSON10</p>	 <p>001aai619</p>
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
IP4283CZ10-TT (SOT552-1)				
1	TMDS_CH1-	negative channel 1 ESD protection	 <p style="text-align: center;">TSSOP10</p>	 <p style="text-align: center;">001aa1619</p>
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		

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 × 2.5 × 0.5 mm	SOT1176-1
IP4283CZ10-TBA	XSON10	plastic extremely thin small outline package; no leads; 10 terminals; body 1 × 2.5 × 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	-	±8	kV
		air discharge	-	±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 [2](#).

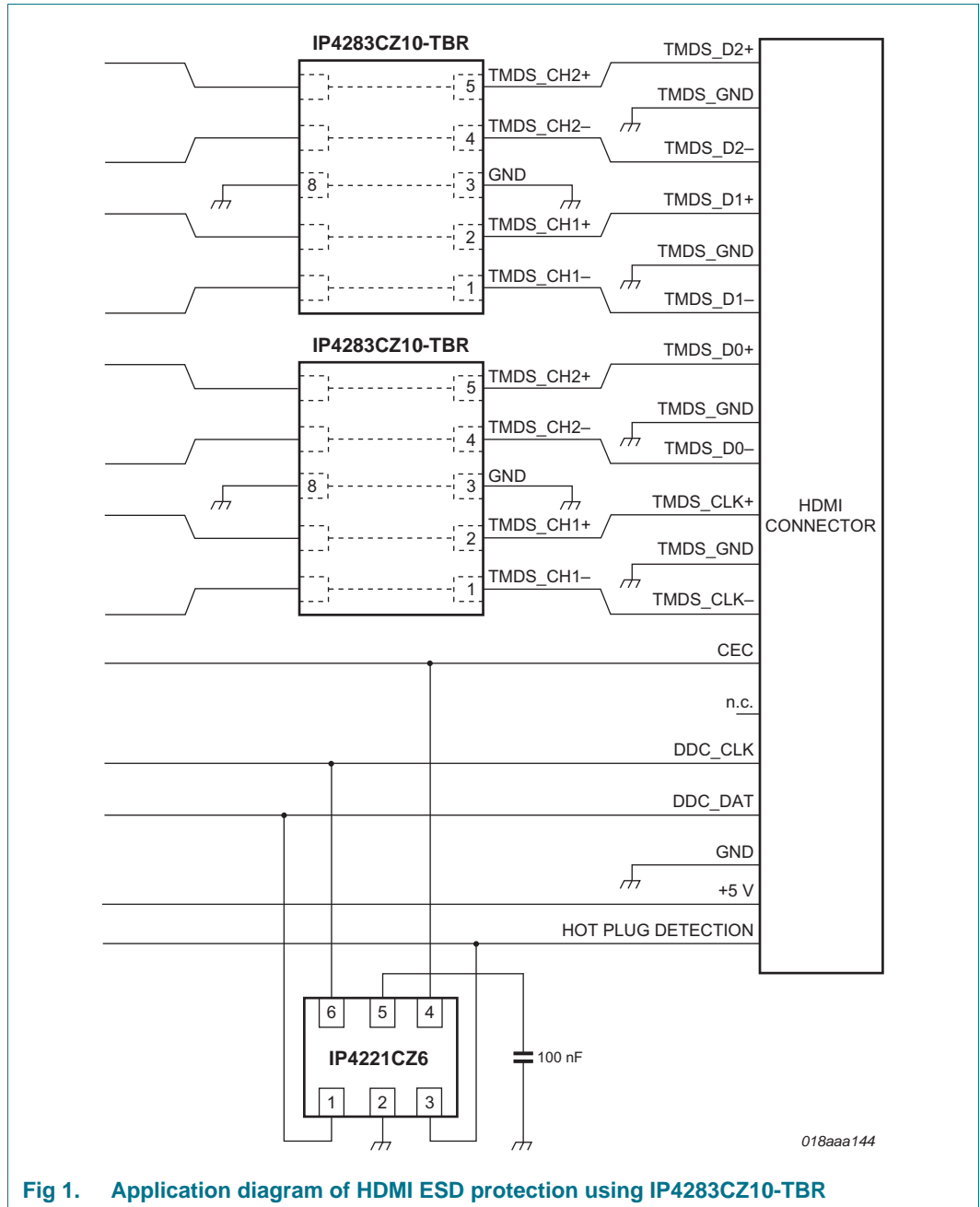
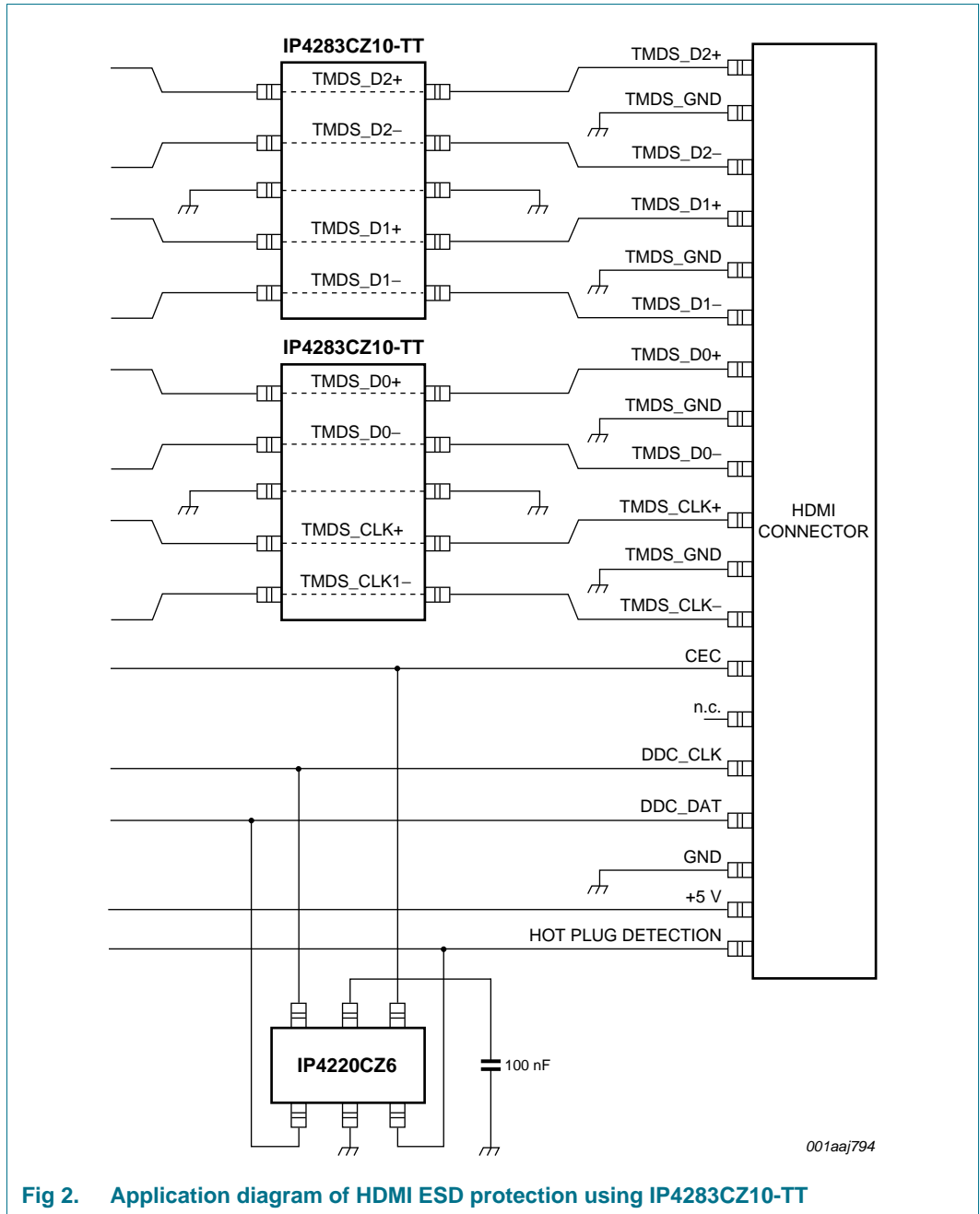


Fig 1. Application diagram of HDMI ESD protection using IP4283CZ10-TBR



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

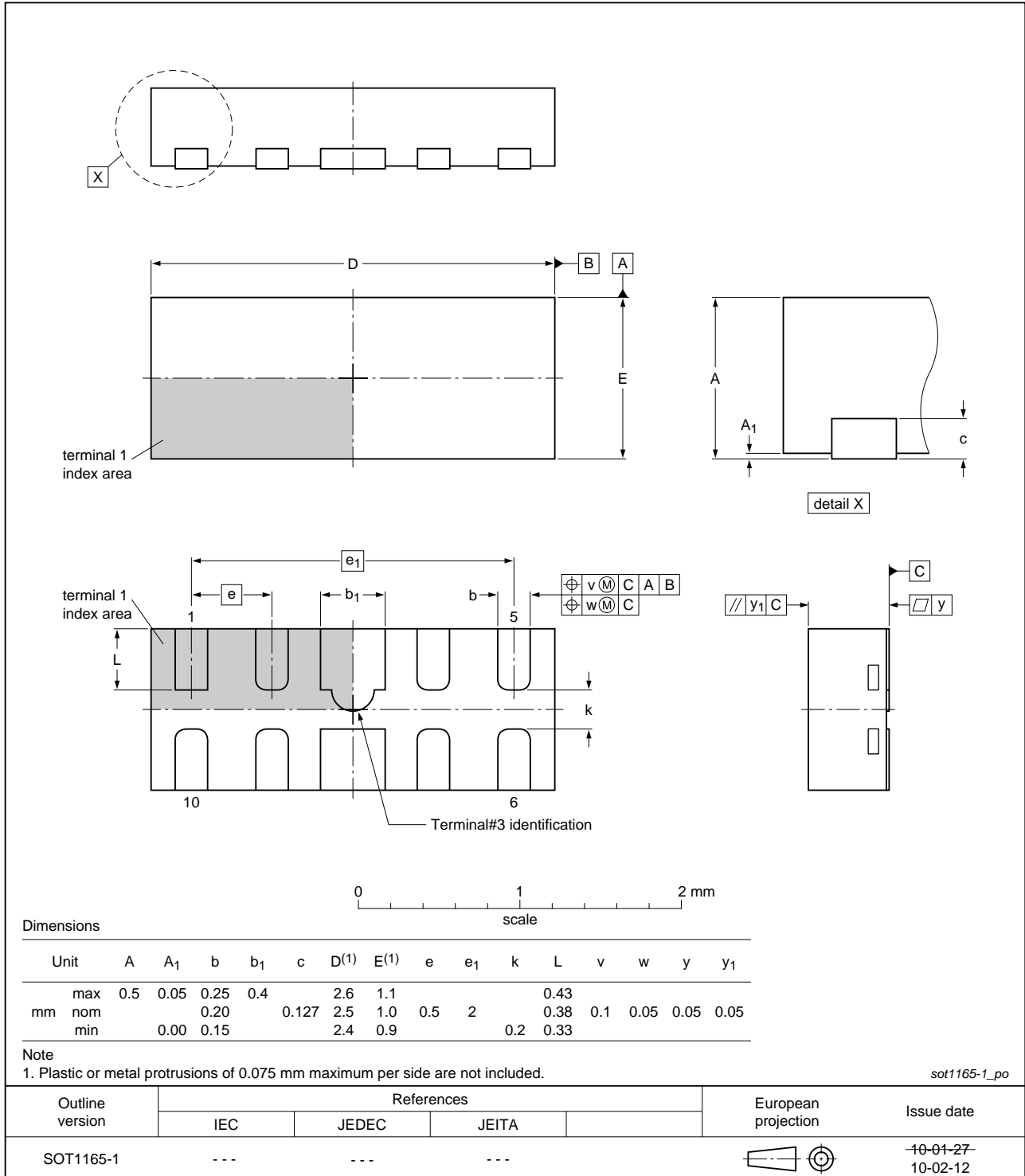


Fig 3. Package outline SOT1165-1 (XSON10)

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

SOT1176-1

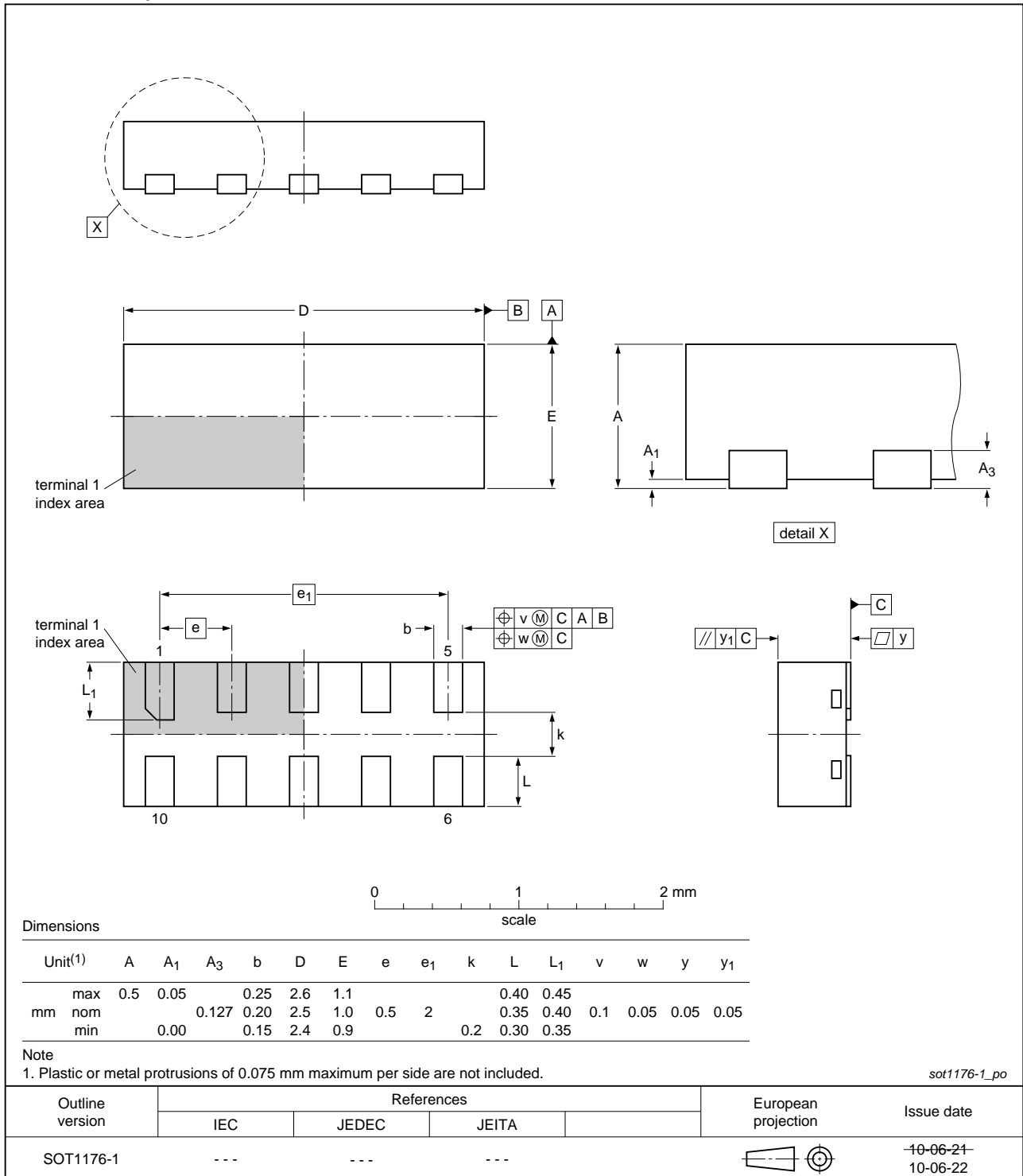


Fig 4. Package outline SOT1176-1 (XSON10)

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

SOT552-1

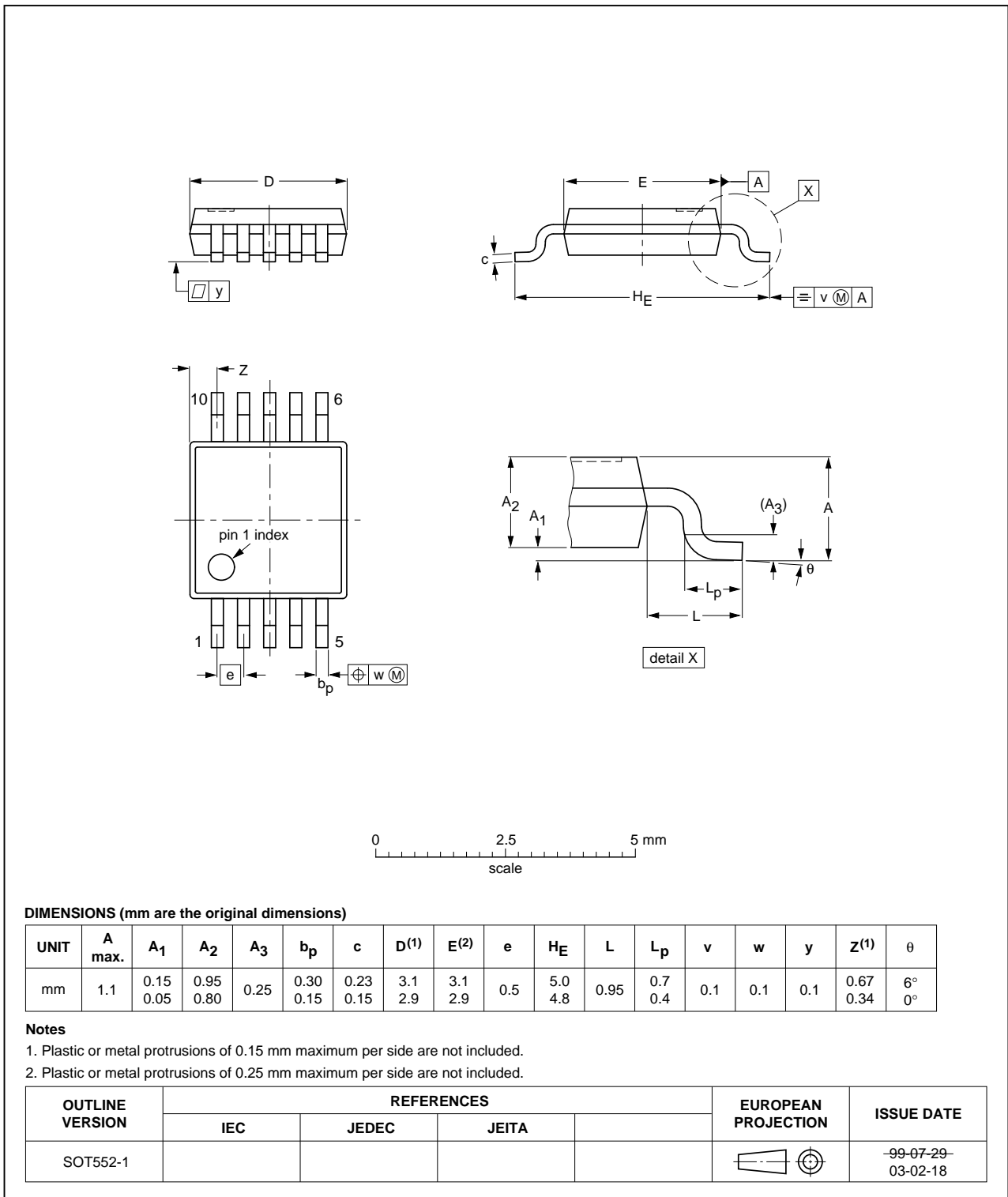
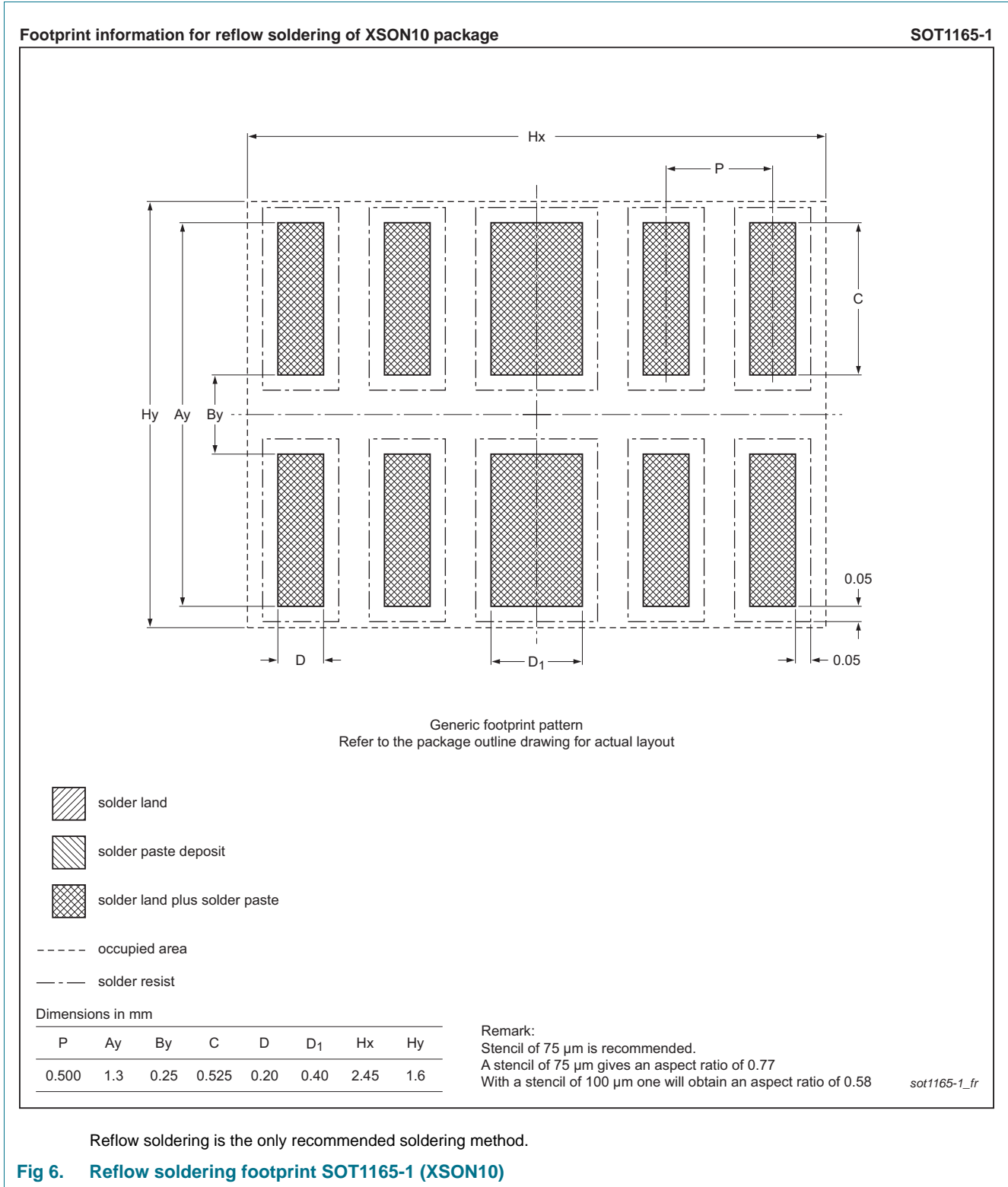


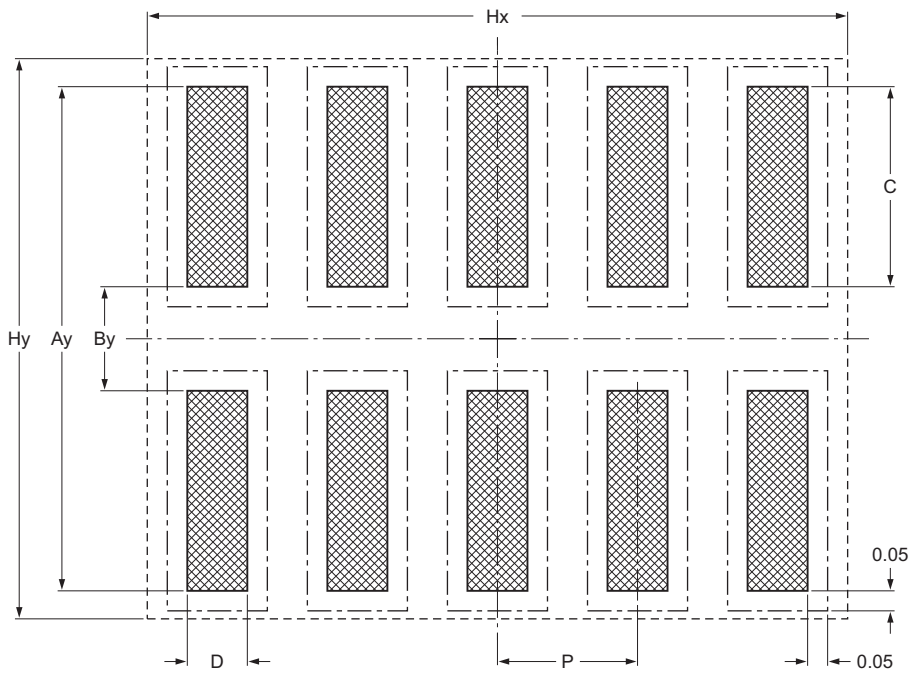
Fig 5. Package outline SOT552-1 (TSSOP10)

9. Soldering






Footprint information for reflow soldering of XSON10 package

SOT1176-1



Generic footprint pattern
Refer to the package outline drawing for actual layout

-  solder land
-  solder paste deposit
-  solder land plus solder paste

- occupied area
- solder resist

Dimensions in mm

P	Ay	By	C	D	Hx	Hy
0.5	1.25	0.3	0.475	0.2	2.45	1.5

Remark:
Stencil of 75 µm is recommended.
A stencil of 75 µm gives an aspect ratio of 0.77
With a stencil of 100 µm one will obtain an aspect ratio of 0.58

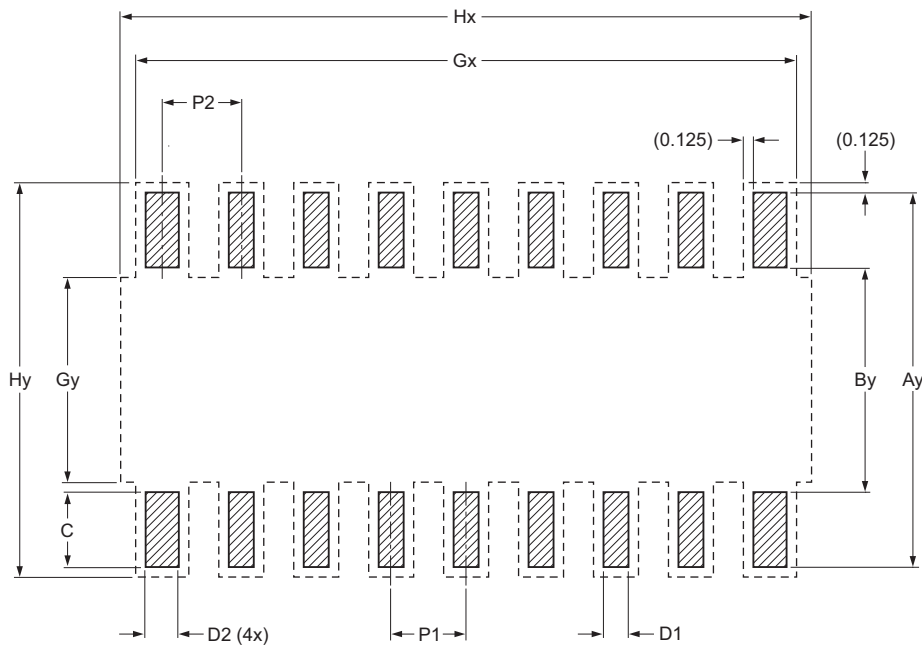
sot1176-1_fr

Reflow soldering is the only recommended soldering method.


Fig 7. Reflow soldering footprint SOT1176-1 (XSON10)

Footprint information for reflow soldering of TSSOP10 package

SOT552-1



Generic footprint pattern
Refer to the package outline drawing for actual layout

 solder land

----- occupied area

DIMENSIONS in mm

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.500	0.550	5.400	3.200	1.100	0.300	0.400	2.750	3.900	3.700	5.650

sot552-1_fr

Reflow soldering is the only recommended soldering method.

Fig 8. Reflow soldering footprint SOT552-1 (TSSOP10)

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">• Added type number IP4283CZ10-TBR.• Deleted type number IP4283CZ10-TB.• Section 4 "Marking": added.• Table 4: updated.• Section 9 "Soldering": added.			
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 ^{[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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