

IP4283CZ10 series

ESD protection for ultra high-speed interfaces

Rev. 4 — 8 April 2013

Product data sheet

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 four high-level ESD protection diode structures for ultra high-speed signal lines. They are available in three package variants: DFN2510-10 (SOT1165-1), DFN2510A-10 (SOT1176-1) and TSSOP10 (SOT552-1).

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

- 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
- 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

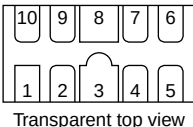
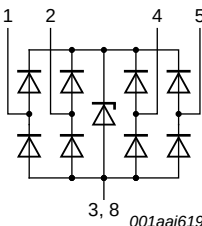
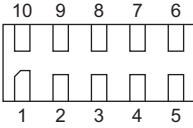
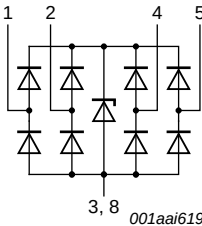
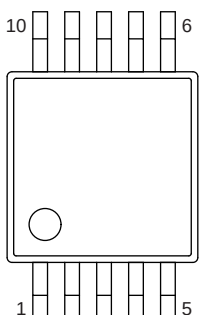
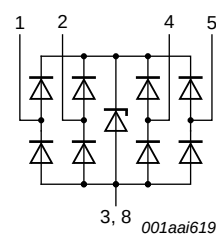
Pin	Symbol	Description	Simplified outline	Graphic symbol
IP4283CZ10-TBA (SOT1165-1)				
1	TMDS_CH1-	negative channel 1 ESD protection	 Transparent top view DFN2510-10	 001aai619
2	TMDS_CH1+	positive channel 1 ESD protection		
3	GND	ground		
4	TMDS_CH2-	negative channel 2 ESD protection		
5	TMDS_CH2+	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	 Transparent top view DFN2510A-10	 001aai619
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	 TSSOP10	 001aai619
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		
	Name	Description	Version
IP4283CZ10-TBA	DFN2510-10	plastic extremely thin small outline package; no leads; 10 terminals; body 1 × 2.5 × 0.5 mm	SOT1165-1
IP4283CZ10-TBR	DFN2510A-10	plastic extremely thin small outline package; no leads; 10 terminals; body 1 × 2.5 × 0.5 mm	SOT1176-1
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-TBA	83
IP4283CZ10-TBR	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	+8	kV
		air discharge	−15	+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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BR}	breakdown voltage	$I_{test} = 1\text{ mA}$	6	-	9	V
I_{LR}	reverse leakage current	per TMDS channel; $V = 3\text{ V}$	-	-	1	μA
V_F	forward voltage	$I_{test} = 1\text{ mA}$	-	0.7	-	V
C_{line}	line capacitance	$f = 1\text{ MHz}$; $V_{bias} = 2.5\text{ V}$	[1] -	0.6	-	pF
ΔC_{line}	line capacitance difference	$f = 1\text{ MHz}$; $V_{bias} = 2.5\text{ V}$	[1] -	0.05	-	pF
$C_{line(mutual)}$	mutual line capacitance	$f = 1\text{ MHz}$; $V_{bias} = 2.5\text{ V}$	[1] [2] -	0.07	-	pF
r_{dyn}	dynamic resistance	surge [3]				
		positive transient	-	0.8	-	Ω
		negative transient	-	0.85	-	Ω
V_{CL}	clamping voltage	positive transient; $I_{PP} = 3.8\text{ A}$	[3] -	9.5	-	V
		negative transient; $I_{PP} = -2.8\text{ A}$	[3] -	-3.2	-	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).

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](#).

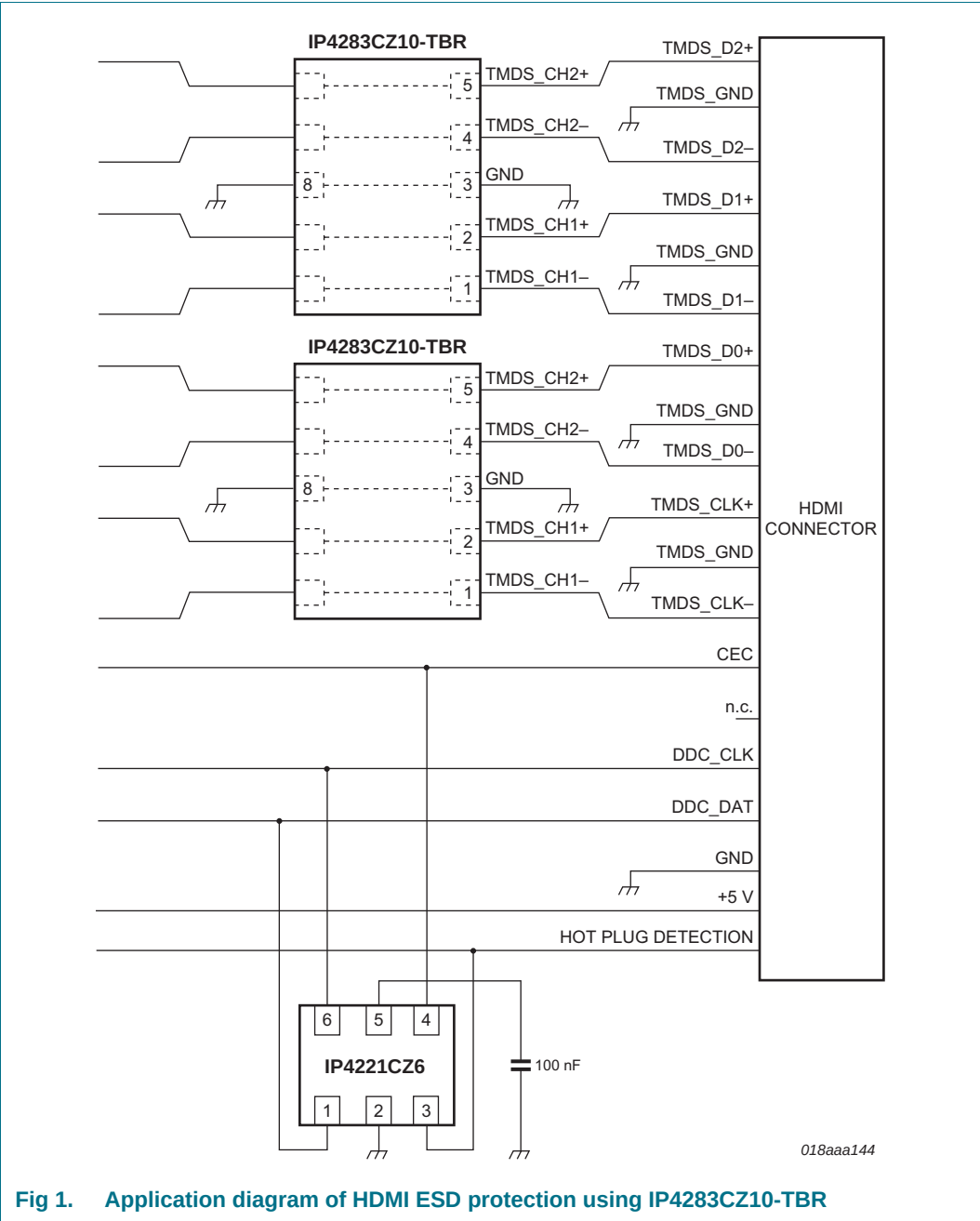
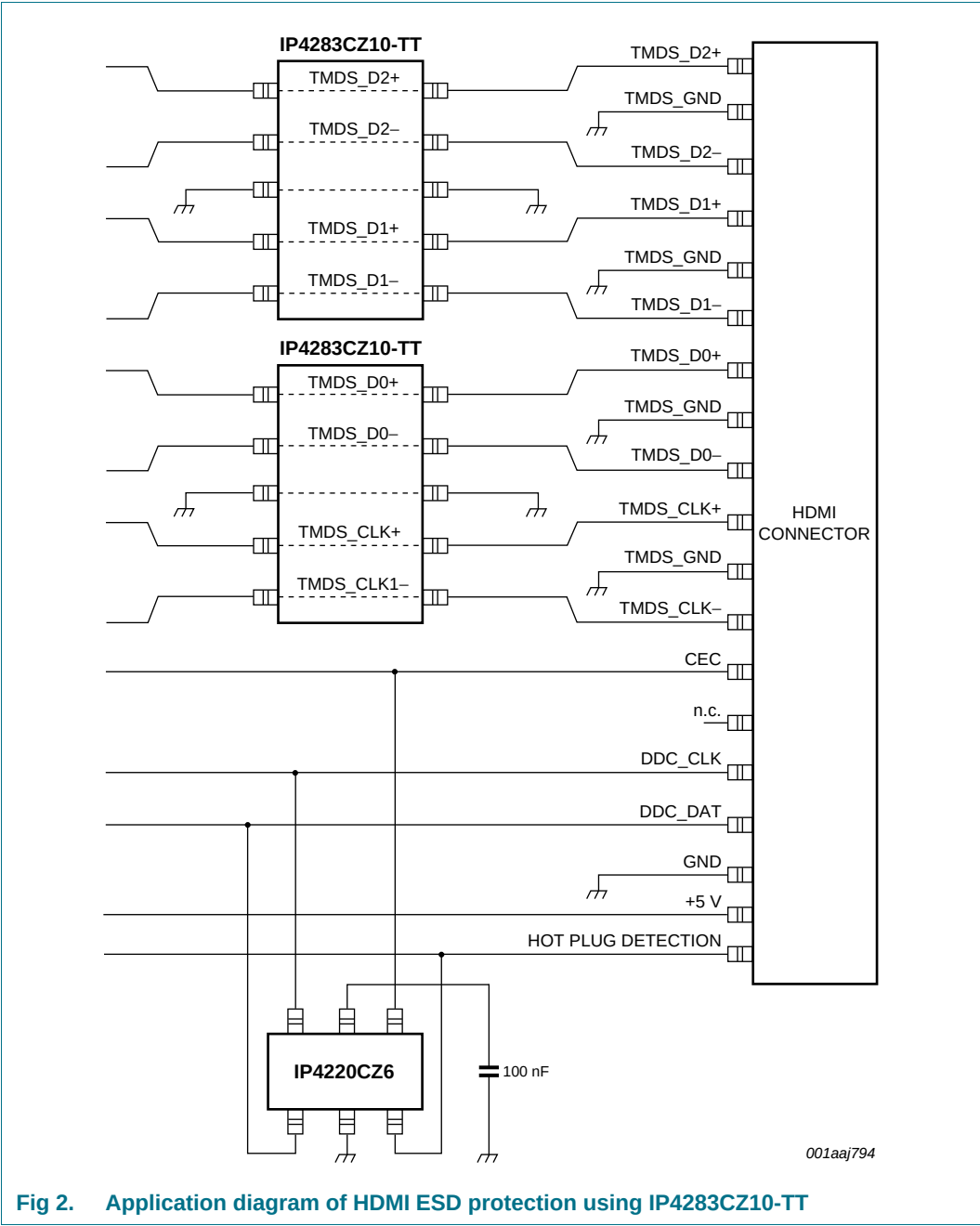


Fig 1. Application diagram of HDMI ESD protection using IP4283CZ10-TBR



8. Package outline

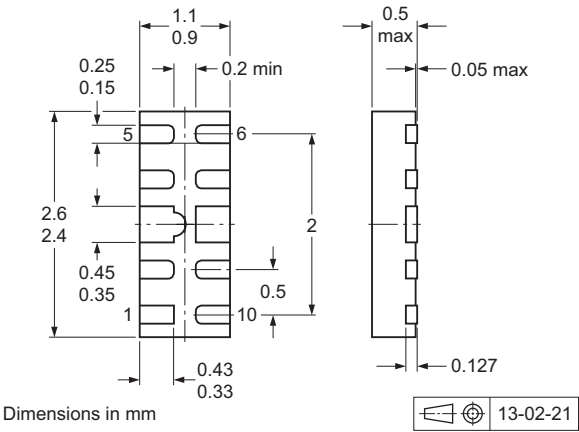


Fig 3. Package outline DFN2510-10 (SOT1165-1)

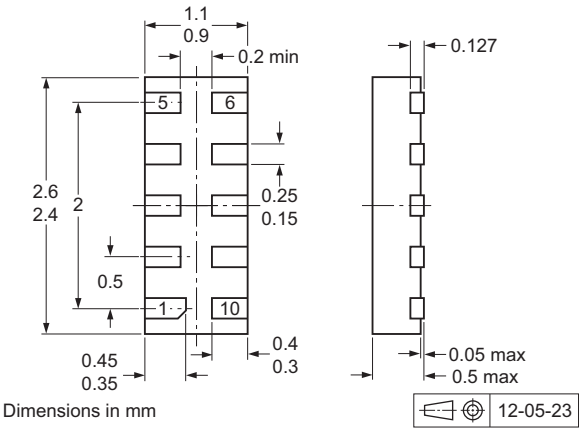


Fig 4. Package outline DFN2510A-10 (SOT1176-1)

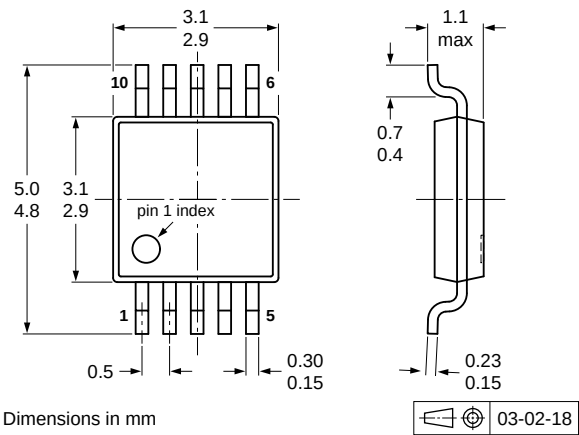


Fig 5. Package outline TSSOP10 (SOT552-1)

9. Soldering

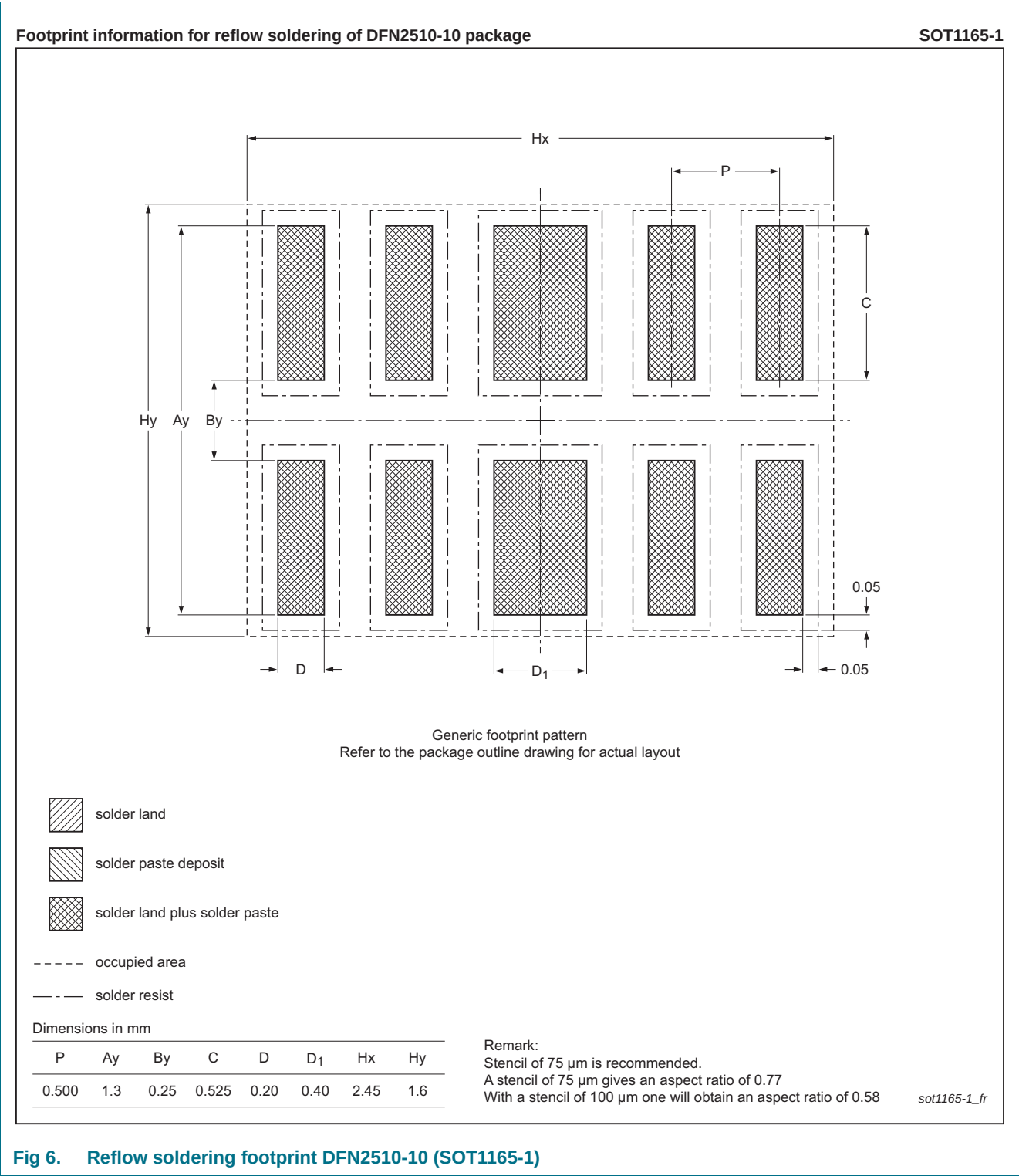
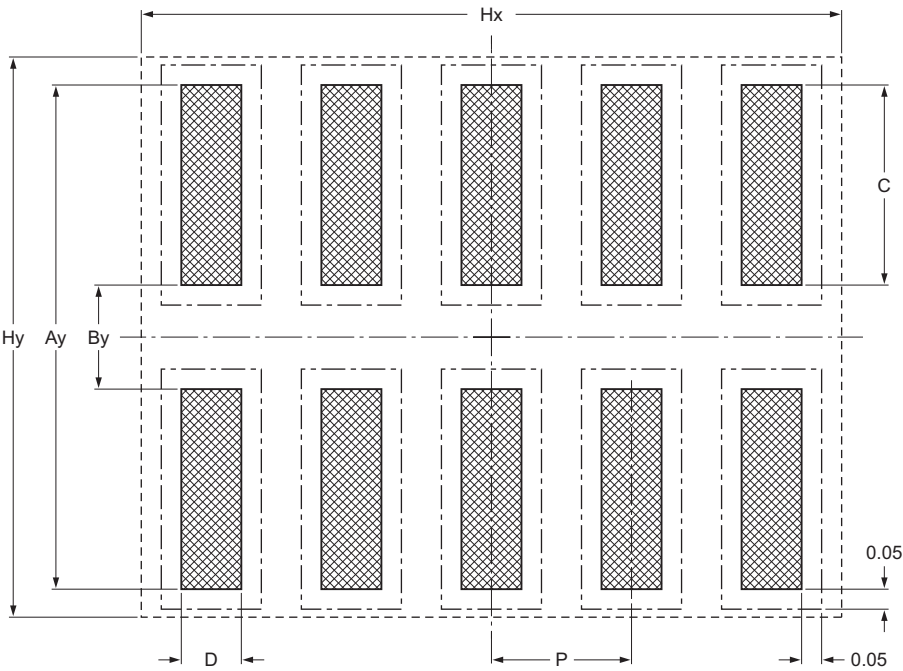


Fig 6. Reflow soldering footprint DFN2510-10 (SOT1165-1)

Footprint information for reflow soldering of DFN2510A-10 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

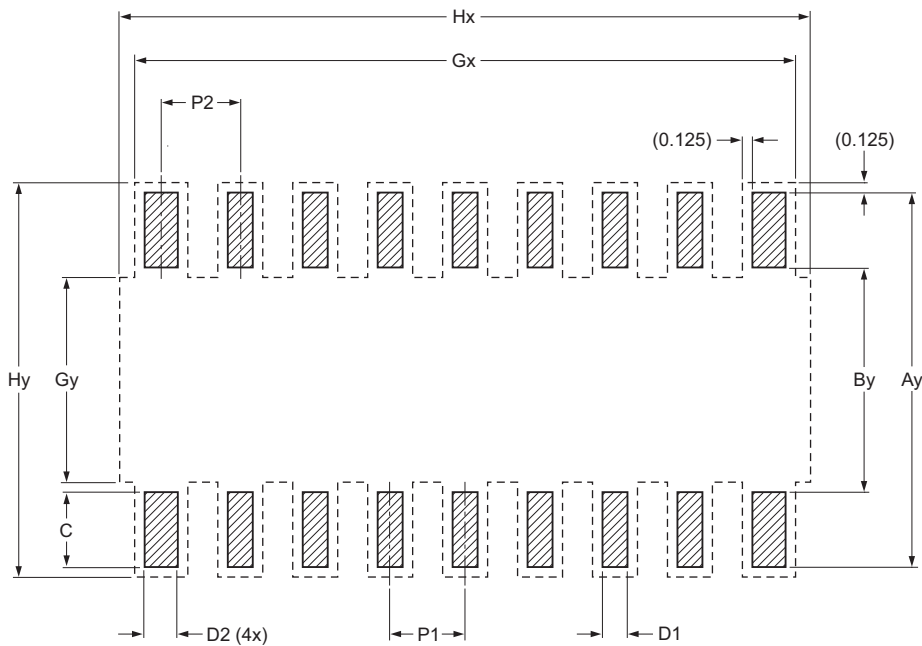
Remark:
 Stencil of 75 µm is recommended.
 A stencil of 75 µm gives an aspect ratio of 0.77
 With a stencil of 100 µm one will obtain an aspect ratio of 0.58

sot1176-1_fr

Fig 7. Reflow soldering footprint DFN2510A-10 (SOT1176-1)

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

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

10. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4283CZ10_SER v.4	20130408	Product data sheet	-	IP4283CZ10_SER v.3
Modifications:	• Section 1.1 "General description": updated • Section 1.2 "Features and benefits": updated • Section 2 "Pinning information": updated • Section 3 "Ordering information": updated • Table 5 "Characteristics": updated; r_{dyn} value corrected • Section 8 "Package outline": drawings replaced with minimized package outline drawings • Section 9 "Soldering": updated • Section 11 "Legal information": updated			
IP4283CZ10_SER v.3	20110624	Product data sheet	-	IP4283CZ10_SER v.2
IP4283CZ10_SER v.2	20100827	Product data sheet	-	IP4283CZ10 v.1
IP4283CZ10 v.1	20090507	Product data sheet	-	-

11. Legal information

11.1 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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