

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		
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		
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	10 6	1 2 3 4 5 3, 8 001aa1619
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	1 5	
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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BR}	breakdown voltage	$I_{test} = 1$ mA	6	-	9	V
I_{LR}	reverse leakage current	per TMDS channel; $V = 3$ V	-	-	1	µA
V_F	forward voltage	$I_{test} = 1$ mA	-	0.7	-	V
C_{line}	line capacitance	$f = 1$ MHz; $V_{bias} = 2.5$ V	[1]	0.6	-	pF
ΔC_{line}	line capacitance difference	$f = 1$ MHz; $V_{bias} = 2.5$ V	[1]	0.05	-	pF
$C_{line(mutual)}$	mutual line capacitance	$f = 1$ MHz; $V_{bias} = 2.5$ 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; $I_{PP} = 3.8$ A	[3]	-	9.5	V
		negative transient; $I_{PP} = -2.8$ A	[3]	-	-3.2	V

[1] This parameter is guaranteed by design.

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

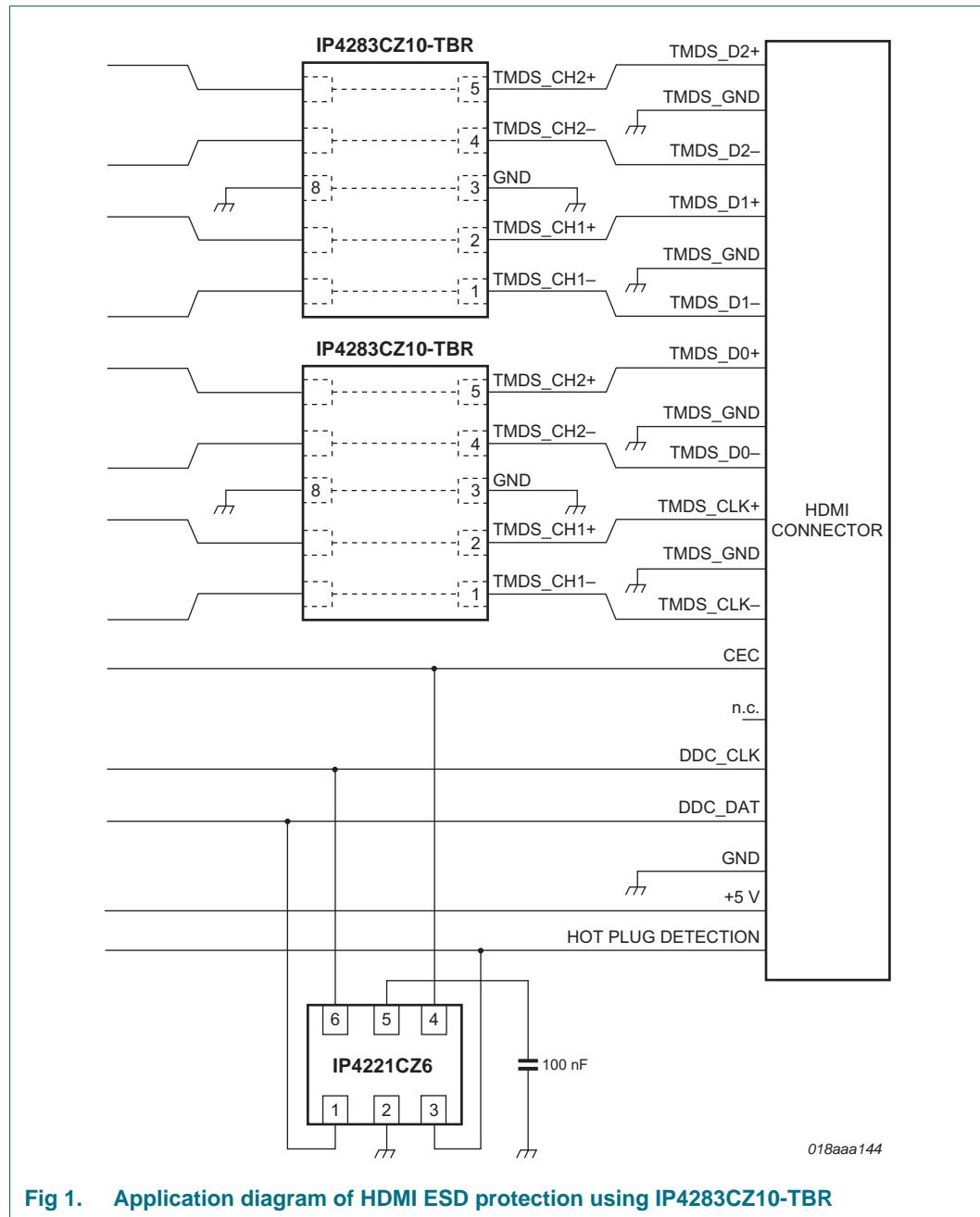
[3] According to IEC 61000-4-5 (8/20 µs).

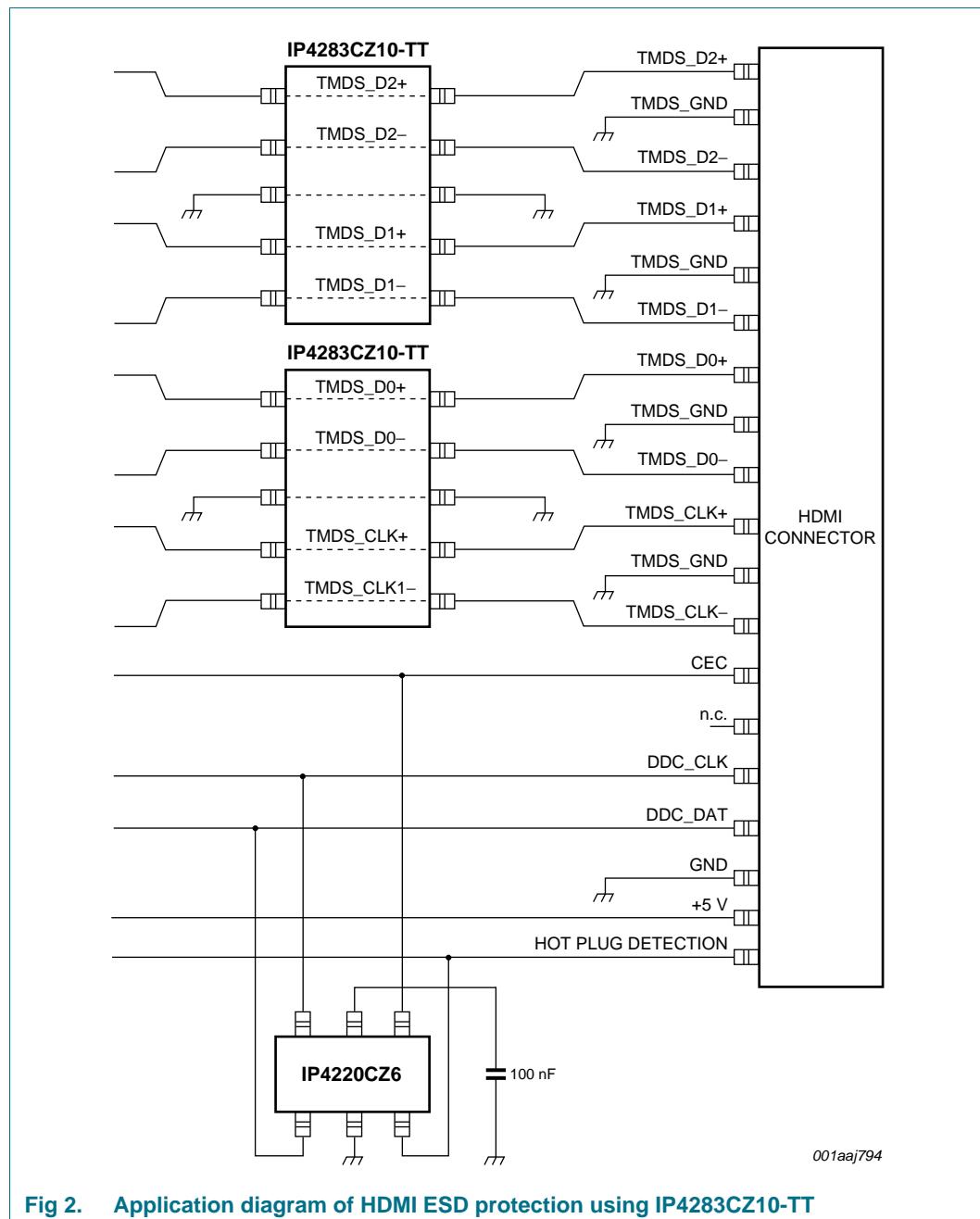
7. Application information

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 [Figure 2](#).





8. Package outline

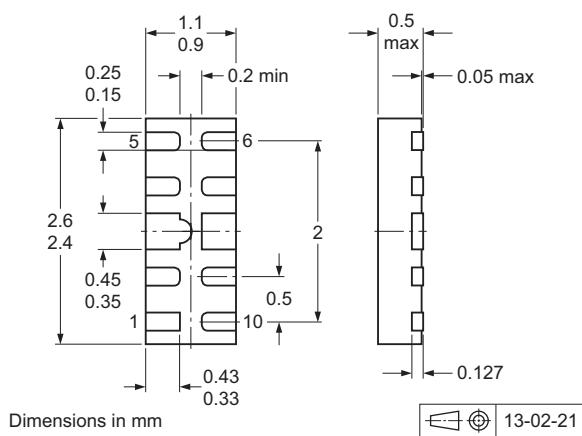


Fig 3. Package outline DFN2510-10 (SOT1165-1)

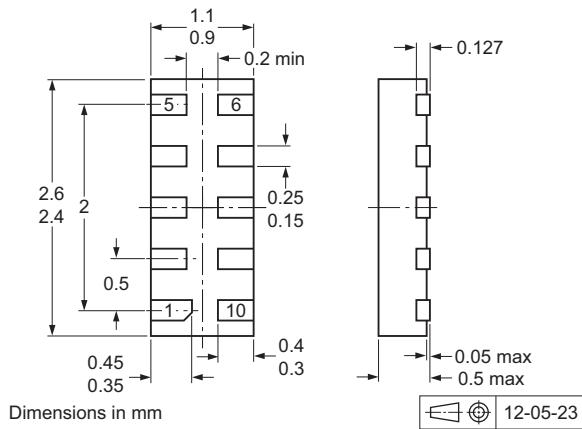


Fig 4. Package outline DFN2510A-10 (SOT1176-1)

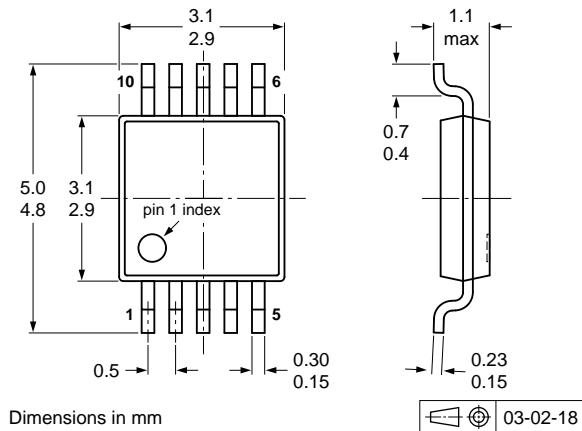


Fig 5. Package outline TSSOP10 (SOT552-1)

9. Soldering

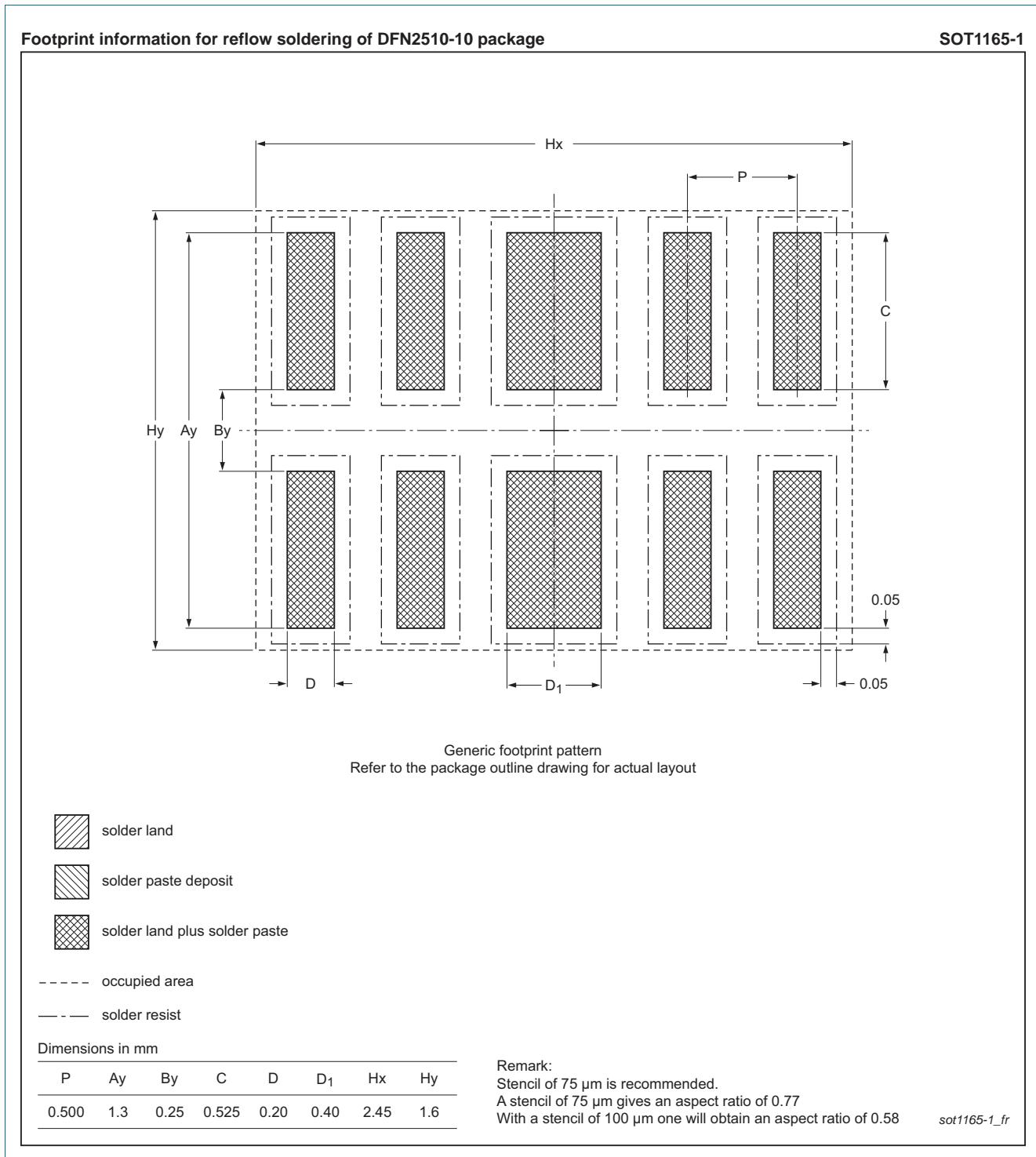


Fig 6. Reflow soldering footprint DFN2510-10 (SOT1165-1)

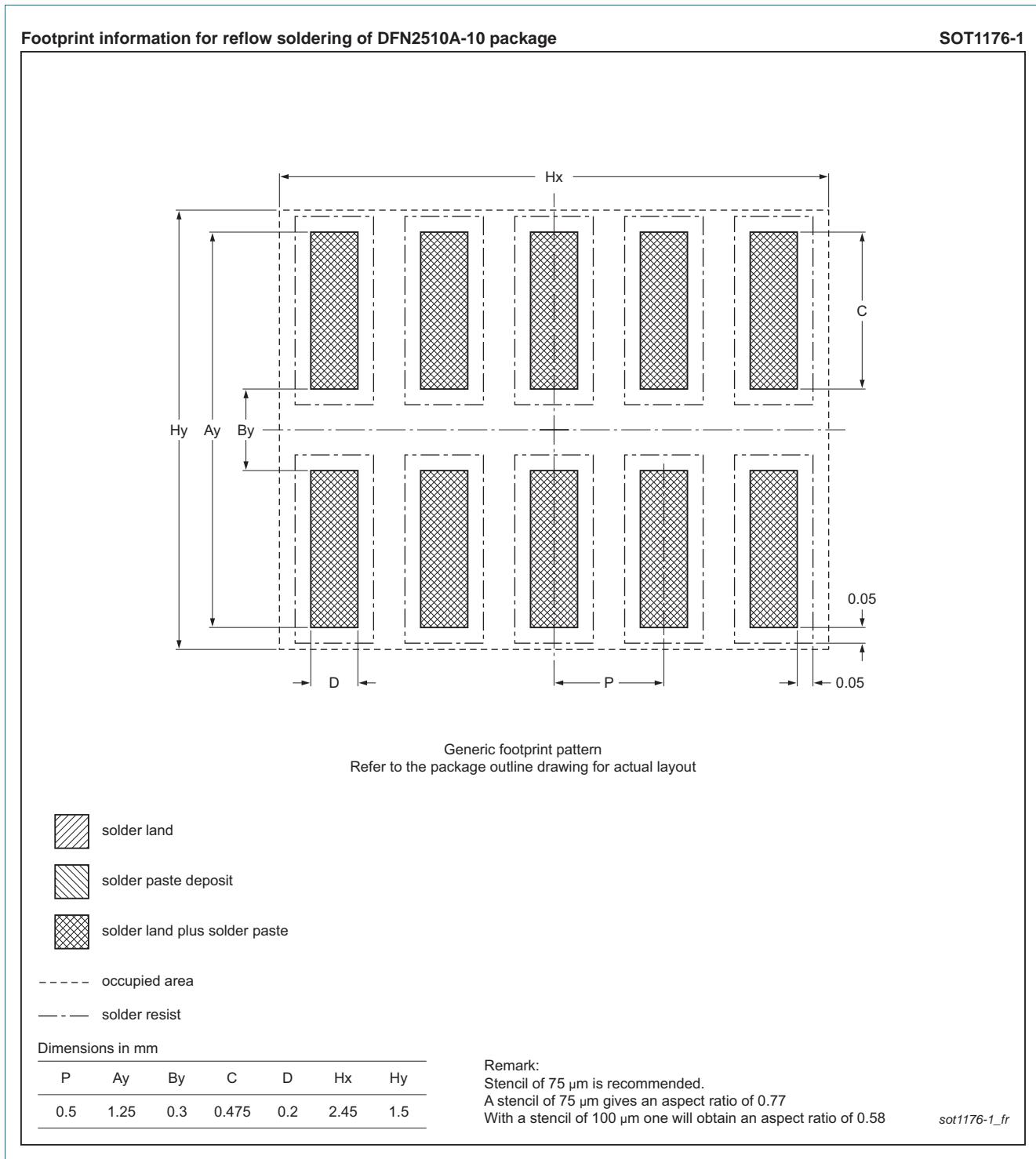
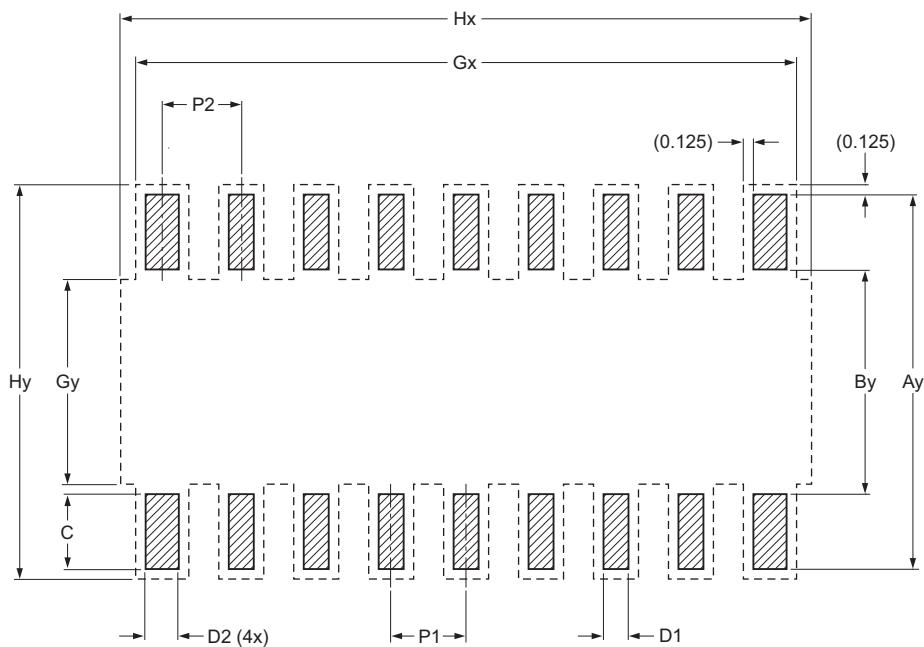


Fig 7. Reflow soldering footprint DFN2510A-10 (SOT1176-1)

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:	<ul style="list-style-type: none">• 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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13. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
2	Pinning information	2
3	Ordering information	3
4	Marking	3
5	Limiting values	4
6	Characteristics	4
7	Application information	5
8	Package outline	7
9	Soldering	8
10	Revision history	11
11	Legal information	12
11.1	Data sheet status	12
11.2	Definitions	12
11.3	Disclaimers	12
11.4	Trademarks	13
12	Contact information	13
13	Contents	14

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