



# IP4221CZ6-S

ESD protection for high-speed interfaces

Rev. 2 — 13 December 2012

Product data sheet

## 1. Product profile

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### 1.1 General description

The device is designed to protect high-speed interfaces such as USB 2.0, Ethernet and Digital Visual Interface (DVI) against ElectroStatic Discharge (ESD).

The device includes four high-level ESD protection diode structures for high-speed signal lines and is encapsulated in a leadless ultra small DFN1410-6 (SOT886) plastic package.

Special diode configuration protects all signal lines and offers ultra low line capacitance of only 1 pF. The rail-to-rail diodes are connected to the Zener diode which allows ESD protection to be independent of supply voltage.

### 1.2 Features and benefits

- System ESD protection for high-speed data lines such as USB 2.0, Ethernet and DVI
- 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
- Line capacitance of only 1 pF for each channel
- Leadless ultra small DFN1410-6 package:  $1 \times 1.45 \times 0.5$  mm; pitch 0.5 mm

### 1.3 Applications

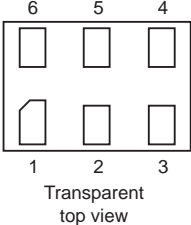
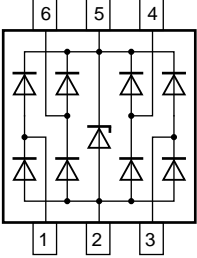
The device is designed for high-speed receiver and transmitter port protection:

- Mobile phones, smartphones and handsets
- TVs and monitors
- DVD recorders and players
- Notebooks, mother boards, graphic cards and ports
- Set-top boxes and game consoles



## 2. Pinning information

Table 1. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I/O 1	ESD protection	 <p>Transparent top view</p>	
2	GND	ground		
3	I/O 2	ESD protection		
4	I/O 3	ESD protection		
5	V <sub>CC</sub>	supply voltage		
6	I/O 4	ESD protection		

001aag273

## 3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
IP4221CZ6-S	DFN1410-6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

## 4. Marking

Table 3. Marking codes

Type number	Marking code
IP4221CZ6-S	1S

## 5. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>I</sub>	input voltage		-0.5	+5.5	V
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2, level 4; <a href="#">[1]</a> contact discharge	-8	+8	kV
T <sub>stg</sub>	storage temperature		-55	+125	°C
T <sub>amb</sub>	ambient temperature		-40	+85	°C

[1] All pins to ground.

## 6. Characteristics

**Table 5. Characteristics**

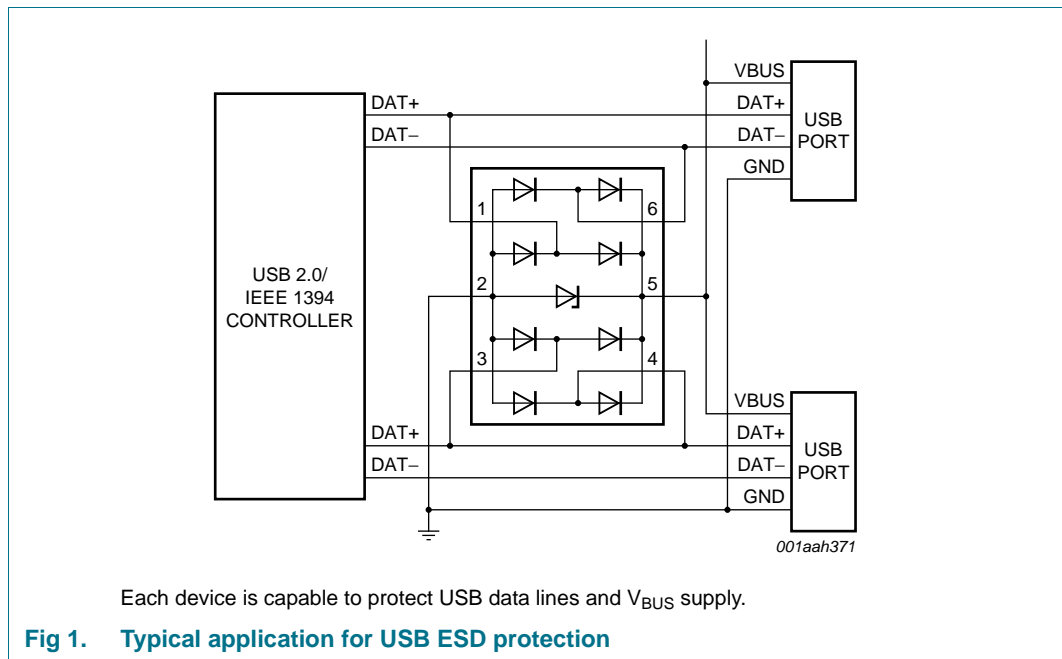
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{(I/O-GND)}$	input/output to ground capacitance	$V_I = 0\text{ V}$ ; $f = 1\text{ MHz}$ ; $V_{CC} = 3\text{ V}$	[1][2] -	1	1.2	pF
$I_{RM}$	reverse leakage current	$V_I = 3\text{ V}$	[3][2] -	-	100	nA
$V_{BRzd}$	Zener diode breakdown voltage	$I_I = 1\text{ mA}$	[4] 6	-	9	V
$V_F$	forward voltage	$I_{test} = 10\text{ mA}$	-	0.7	-	V

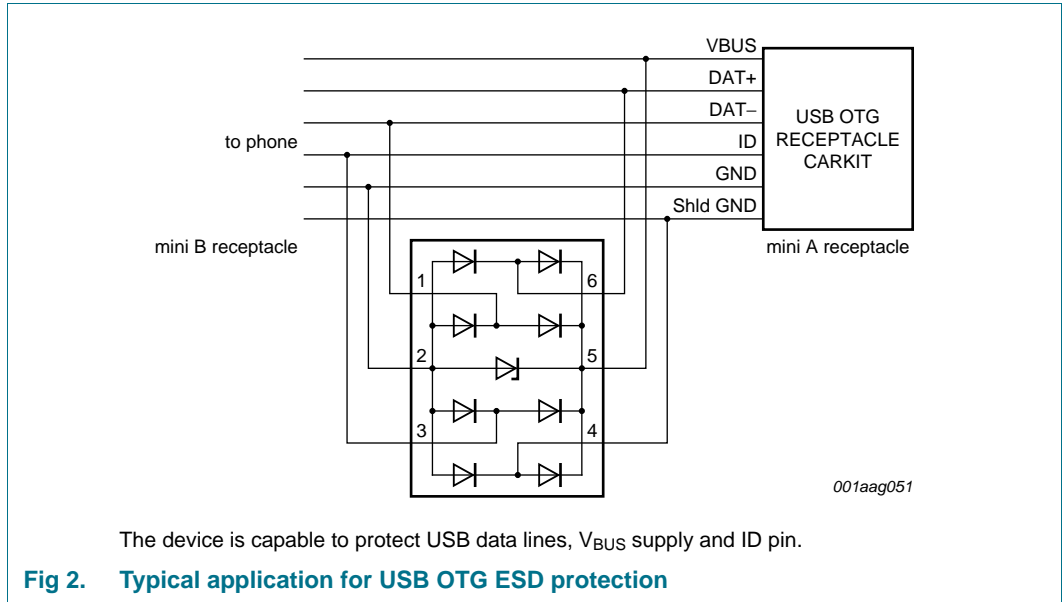
- [1] This parameter is guaranteed by design.
- [2] Pins 1, 3, 4 and 6 are measured to ground.
- [3] All pins measured to ground (pin 2).
- [4] Measured from pin 5 to pin 2.

## 7. Application information

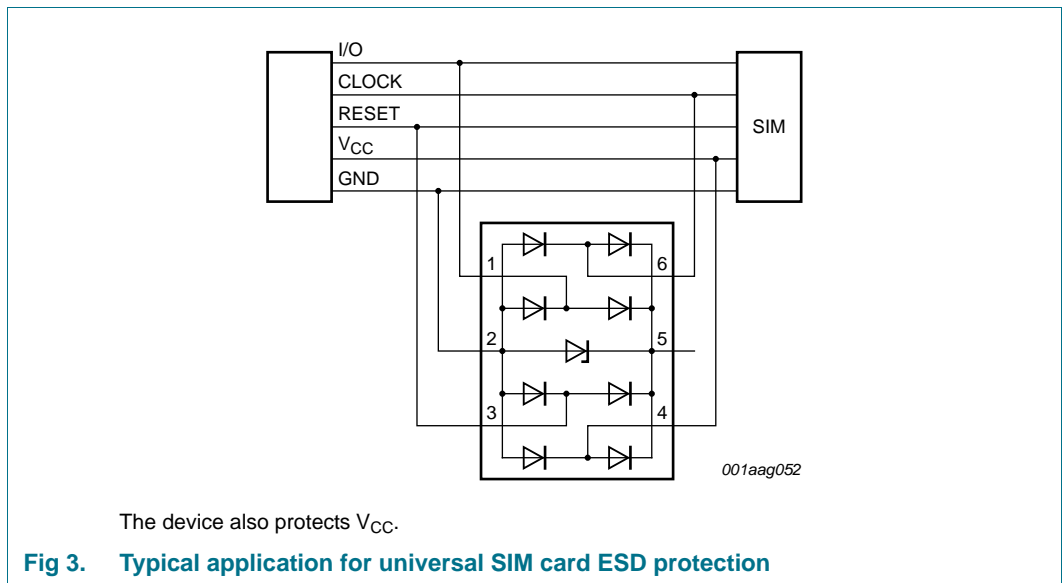
### 7.1 USB 1.1 and 2.0 protection



7.2 USB On-The-GO (OTG) protection



7.3 Universal SIM card protection



7.4 IEEE 1394a/b protection

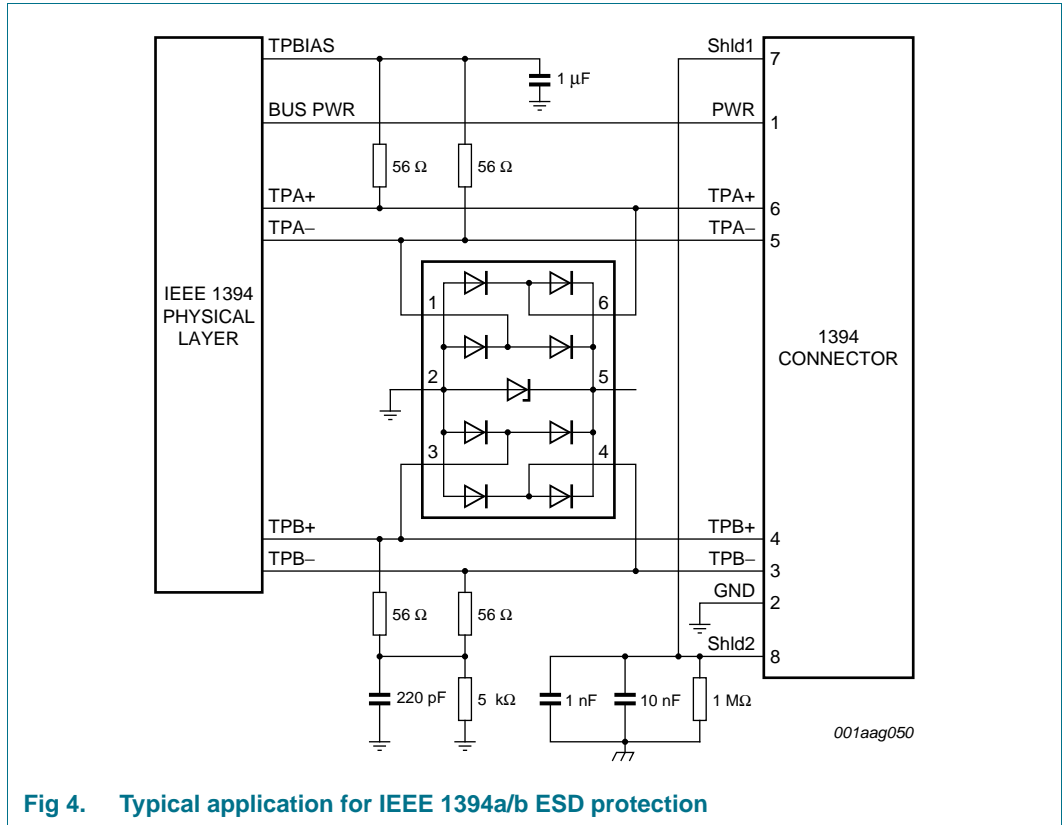


Fig 4. Typical application for IEEE 1394a/b ESD protection

7.5 Gigabit Ethernet transceiver protection

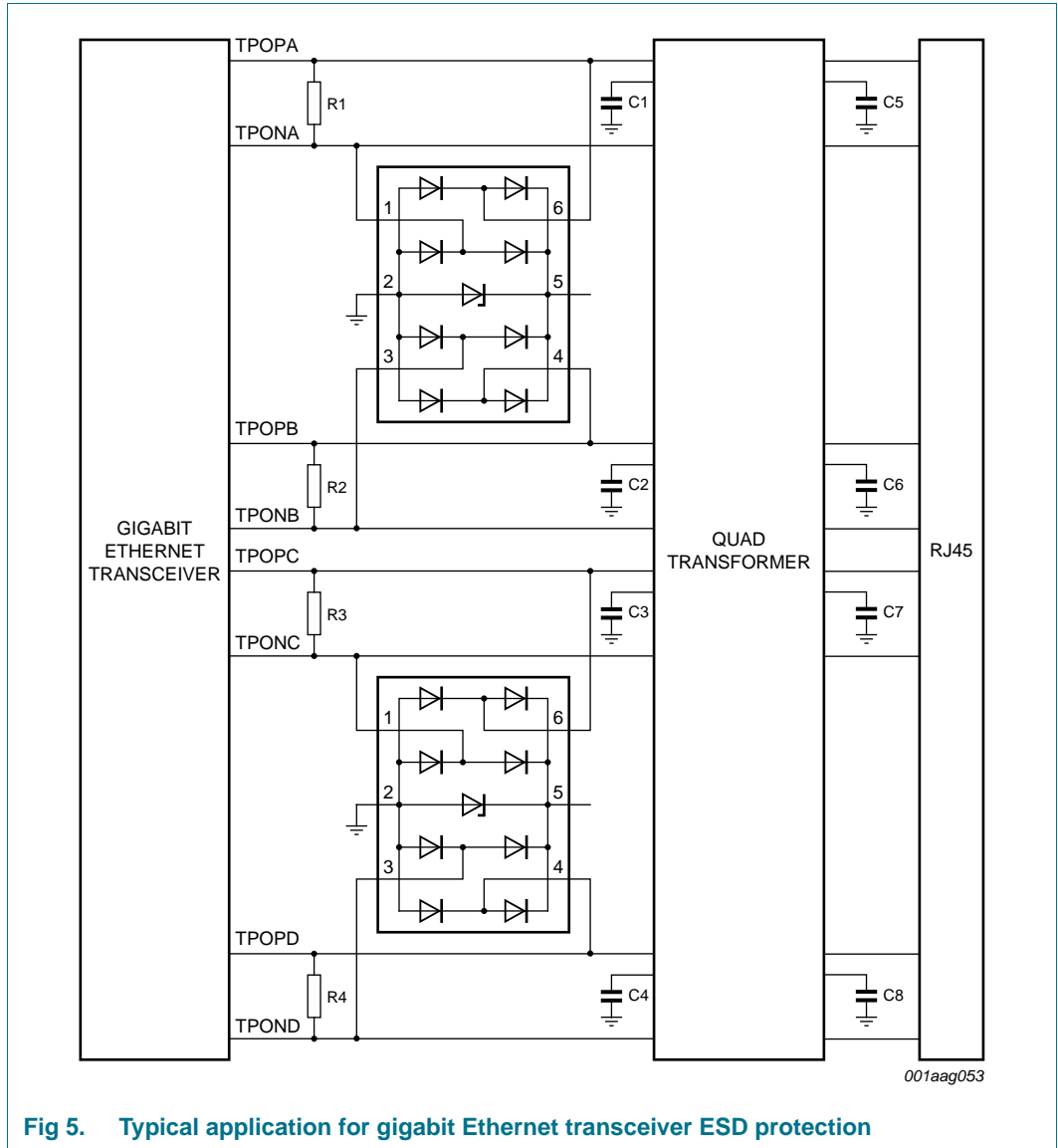


Fig 5. Typical application for gigabit Ethernet transceiver ESD protection

7.6 Universal microSD/TransFlash and SD memory card protection

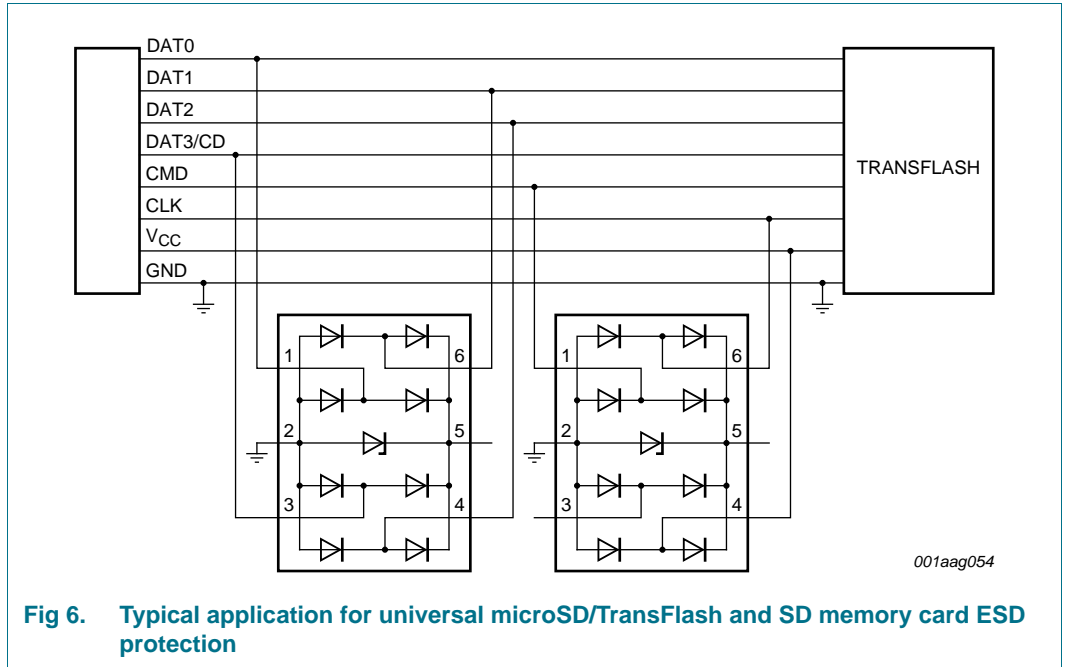


Fig 6. Typical application for universal microSD/TransFlash and SD memory card ESD protection

8. Package outline

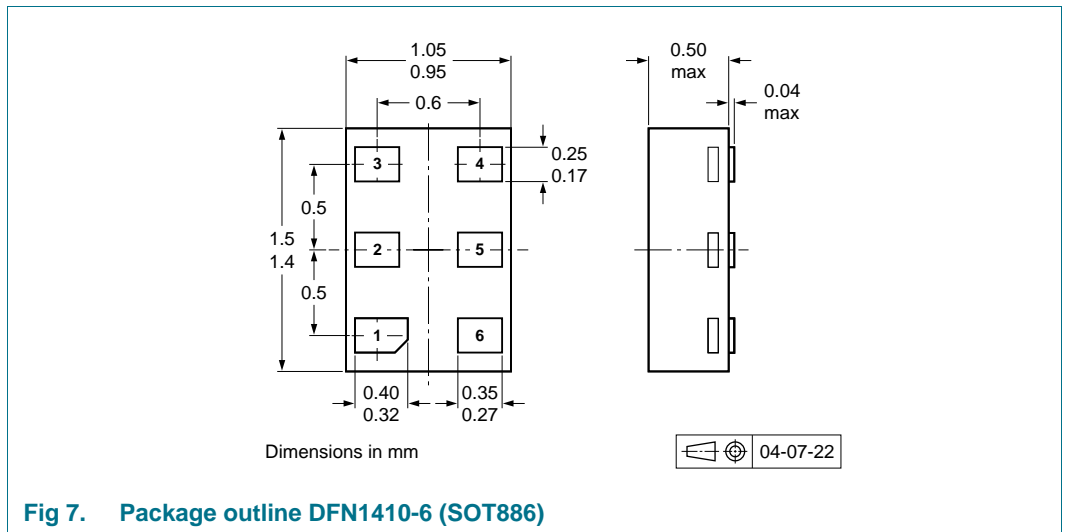


Fig 7. Package outline DFN1410-6 (SOT886)

## 9. Packing information

**Table 6. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code. [1]

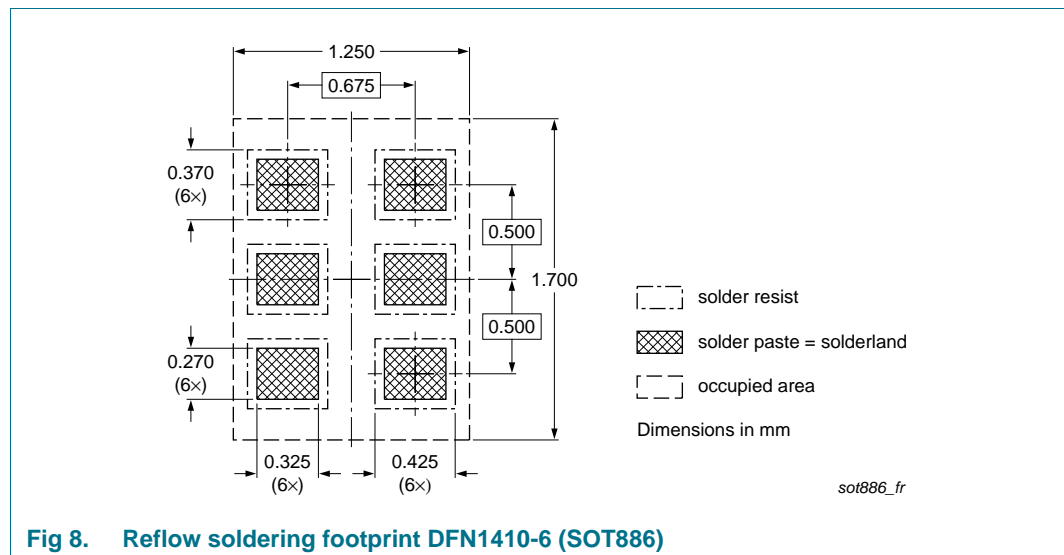
Type number	Package	Description	Packing quantity
			5000
IP4221CZ6-S	DFN1410-6 (SOT886)	4 mm pitch, 8 mm tape and reel; T1	[2] -115
		4 mm pitch, 8 mm tape and reel; T4	[3] -132

[1] For further information and the availability of packing methods, see [Section 13](#).

[2] T1: normal taping

[3] T4: reverse taping

## 10. Soldering





## 11. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4221CZ6-S v.2	20121213	Product data sheet	-	IP4221CZ6-S v.1
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 1 "Product profile"</a>: updated</li> <li>• <a href="#">Section 4 "Marking"</a>: added</li> <li>• <a href="#">Section 5 "Limiting values"</a>: T<sub>amb</sub> added</li> <li>• Recommended operating conditions: removed</li> <li>• <a href="#">Table 5 "Characteristics"</a>: updated</li> <li>• <a href="#">Section 7 "Application information"</a>: updated</li> <li>• <a href="#">Section 8 "Package outline"</a>: drawing replaced with minimized package outline drawing</li> <li>• <a href="#">Section 10 "Soldering"</a>: updated</li> <li>• <a href="#">Section 12 "Legal information"</a>: updated</li> </ul>			
IP4221CZ6-S v.1	20080429	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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## 14. Contents

<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features and benefits . . . . .	1
1.3	Applications . . . . .	1
<b>2</b>	<b>Pinning information</b> . . . . .	<b>2</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Marking</b> . . . . .	<b>2</b>
<b>5</b>	<b>Limiting values</b> . . . . .	<b>2</b>
<b>6</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Application information</b> . . . . .	<b>3</b>
7.1	USB 1.1 and 2.0 protection . . . . .	3
7.2	USB On-The-GO (OTG) protection . . . . .	4
7.3	Universal SIM card protection . . . . .	4
7.4	IEEE 1394a/b protection . . . . .	5
7.5	Gigabit Ethernet transceiver protection . . . . .	6
7.6	Universal microSD/TransFlash and SD memory card protection . . . . .	7
<b>8</b>	<b>Package outline</b> . . . . .	<b>7</b>
<b>9</b>	<b>Packing information</b> . . . . .	<b>8</b>
<b>10</b>	<b>Soldering</b> . . . . .	<b>8</b>
<b>11</b>	<b>Revision history</b> . . . . .	<b>9</b>
<b>12</b>	<b>Legal information</b> . . . . .	<b>10</b>
12.1	Data sheet status . . . . .	10
12.2	Definitions . . . . .	10
12.3	Disclaimers . . . . .	10
12.4	Trademarks . . . . .	11
<b>13</b>	<b>Contact information</b> . . . . .	<b>11</b>
<b>14</b>	<b>Contents</b> . . . . .	<b>12</b>

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Date of release: 13 December 2012

Document identifier: IP4221CZ6-S