



# 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

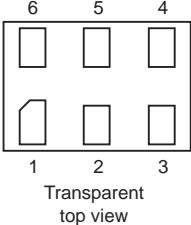
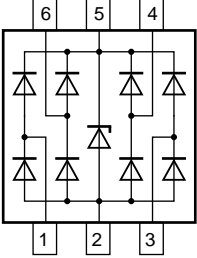
The device is designed for high-speed receiver and transmitter port protection:

- 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 |  |  |
| 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 |   |   |

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## 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

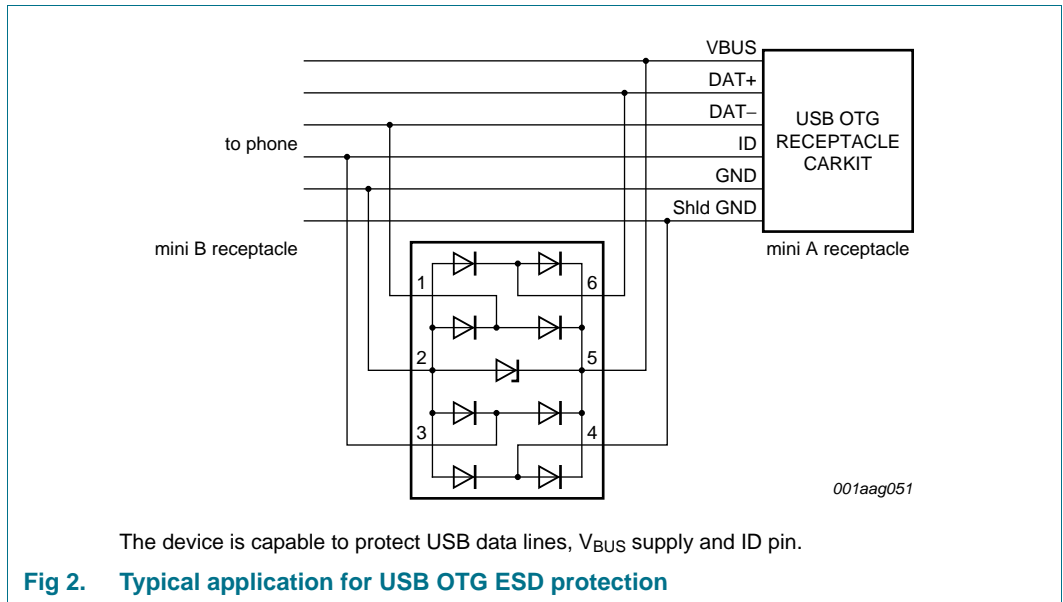
In accordance with the Absolute Maximum Rating System (IEC 60134).

| 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><br>contact discharge | -8   | +8   | kV   |
| T <sub>stg</sub> | storage temperature             |  | -55  | +125 | °C   |
| T <sub>amb</sub> | ambient temperature             |  | -40  | +85  | °C   |

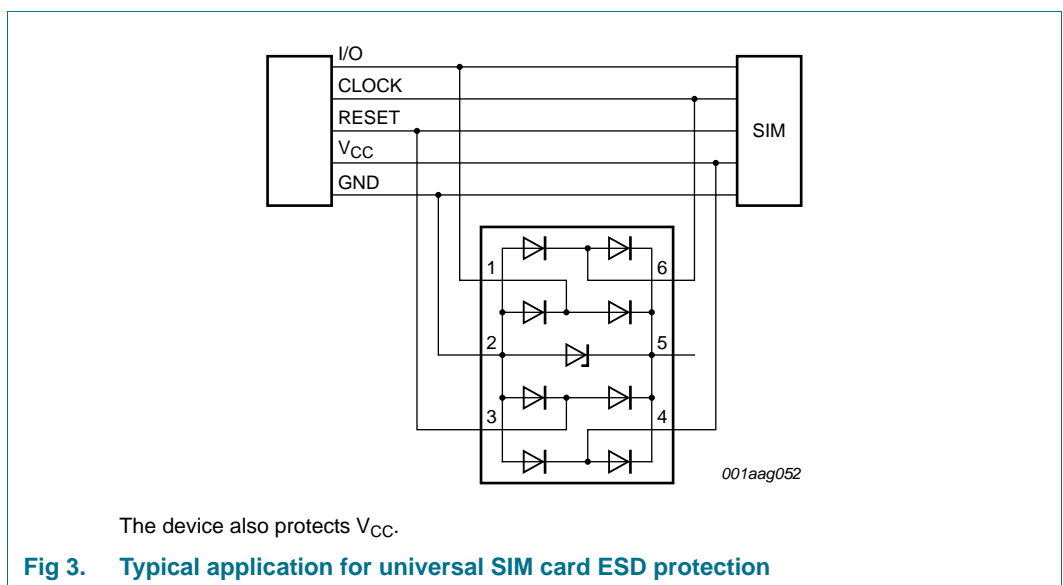
[1] All pins to ground.



### 7.2 USB On-The-GO (OTG) protection



### 7.3 Universal SIM card protection



7.4 IEEE 1394a/b protection

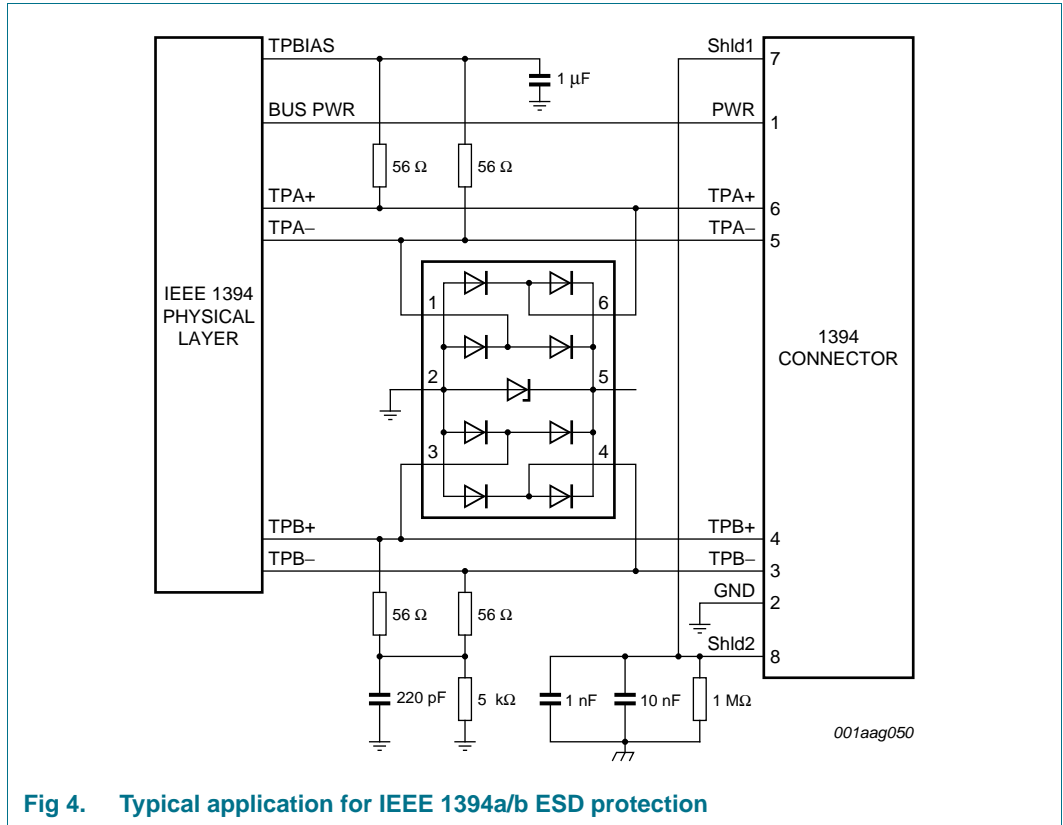


Fig 4. Typical application for IEEE 1394a/b ESD protection

7.5 Gigabit Ethernet transceiver protection

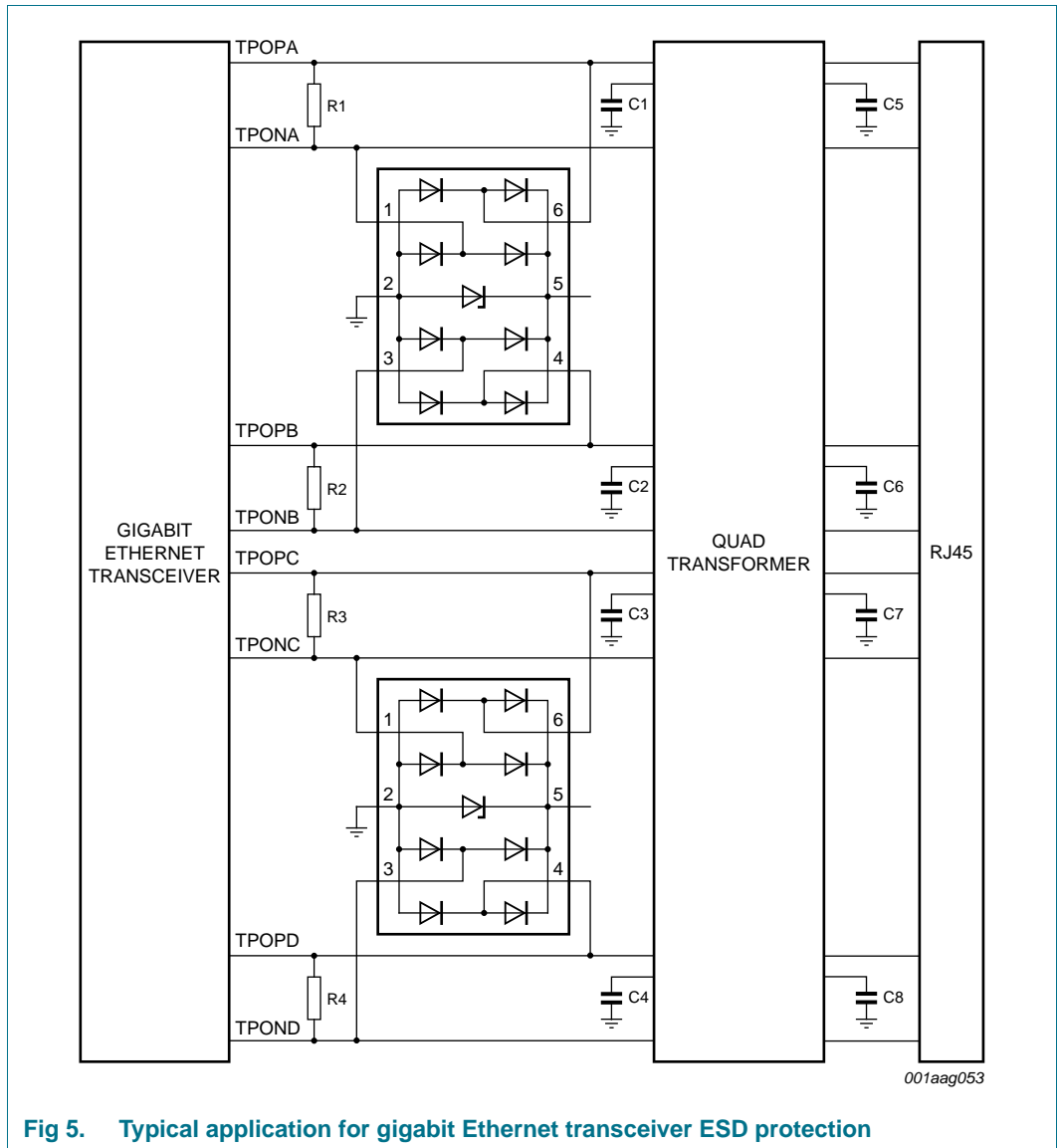


Fig 5. Typical application for gigabit Ethernet transceiver ESD protection

7.6 Universal microSD/TransFlash and SD memory card protection

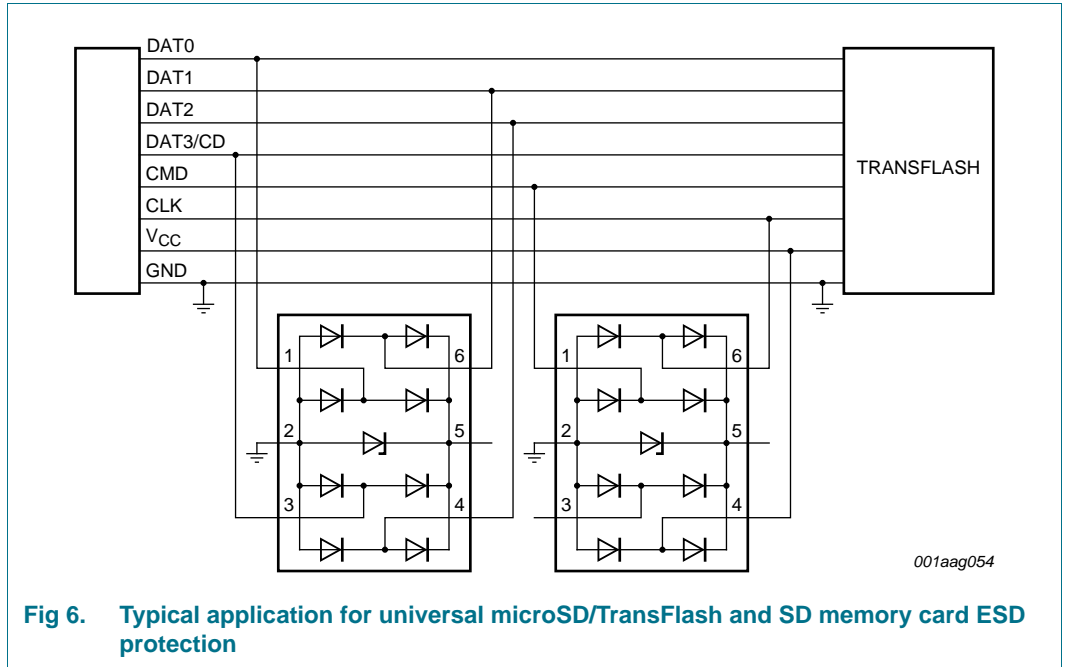


Fig 6. Typical application for universal microSD/TransFlash and SD memory card ESD protection

8. Package outline

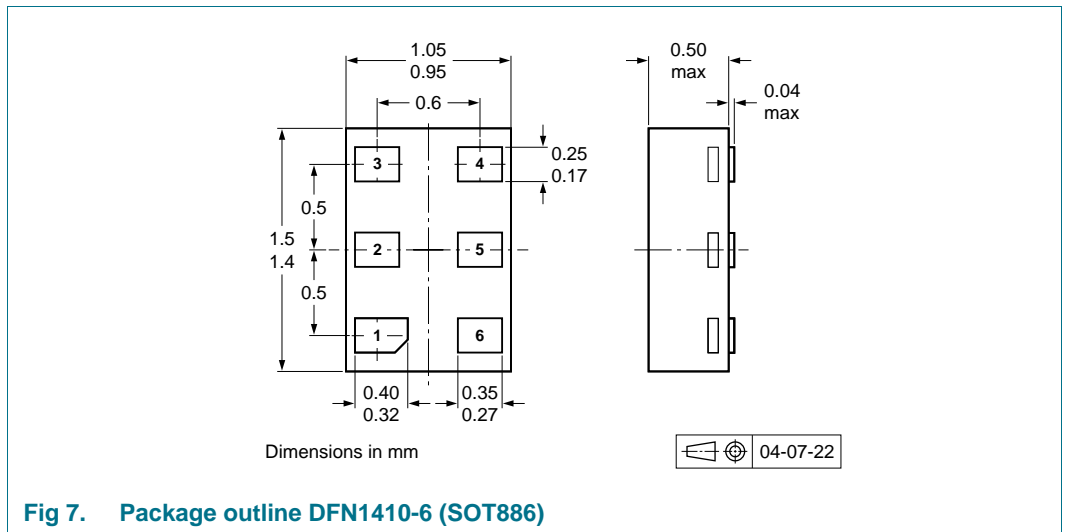


Fig 7. Package outline DFN1410-6 (SOT886)

## 9. Packing information

**Table 6. Packing methods**

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

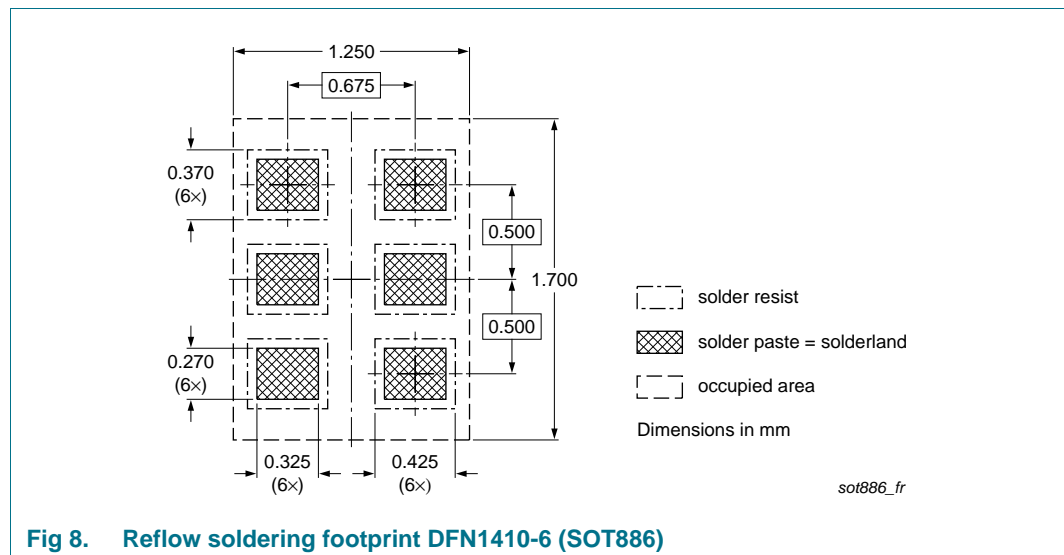
| Type number | Package               | Description                        | Packing quantity |      |
|-------------|-----------------------|------------------------------------|------------------|------|
|             |                       |                                    |                  | 5000 |
| IP4221CZ6-S | DFN1410-6<br>(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.                                     |

[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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