

# DATA SHEET

## **IP4220CZ6**

Dual USB 2.0 Integrated ESD  
protection to IEC 61000-4-2 level 4

Product Specification

2005 January 05

## Dual USB 2.0 Integrated ESD Protection

IP4220CZ6

### FEATURES

- ESD IEC 61000-4-2 level 4,  $\pm 8$ kV contact discharge compliant protection
- Four ultra-low input capacitance (1 pF typ.) ESD rail-to-rail protection diodes
- Low voltage clamping due to integrated Zener diode
- Small 6 lead SO6 (SOT457) package



### APPLICATIONS

General-purpose downstream ESD protection high frequency analog signals and high-speed serial data transmission for ports inside:

- Cellular and PCS mobile handsets
- PC-/Notebook USB2.0/IEEE1394 ports
- DVI interfaces
- Cordless telephones
- Wireless data (WAN/LAN) systems
- PDAs

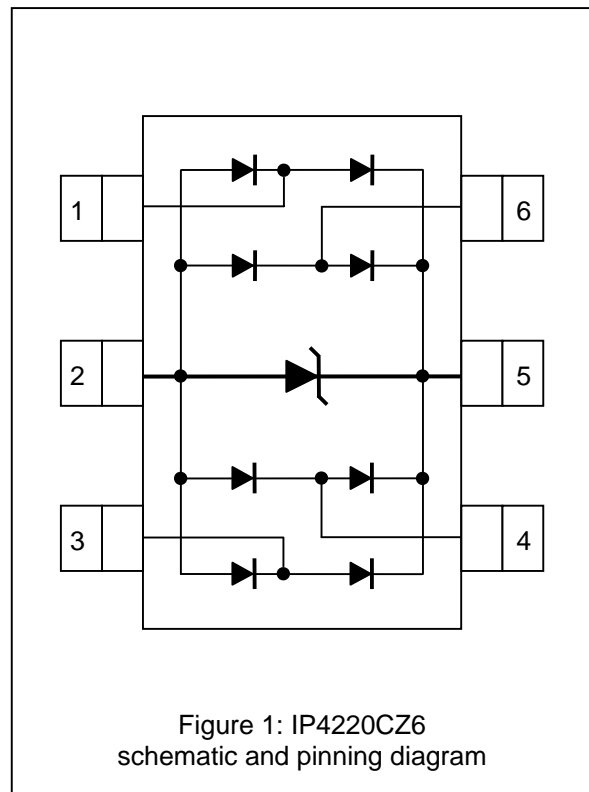
### DESCRIPTION

The IP4220CZ6 is designed to protect I/Os being sensitive concerning capacitive load, such as USB 2.0, Ethernet, DVI etc. from destruction by Electro Static Discharges (ESD).

Therefore, the IP4220CZ6 incorporates four pairs of ultra-low capacity rail-to-rail diodes plus an additional Zener diode to provide protection to downstream signal and supply components from Electrostatic Discharge (ESD) voltages as high as  $\pm 8$  kV contact discharge.

Due to the rail-to-rail diodes being connected to the Zener diode, the protection is working independent from the availability of a supply voltage.

The IP4220CZ6 is fabricated using thin film-on-silicon technology and integrates 4 ultra-low capacity rail-to-rail ESD protection diodes in a miniature 6-lead SOT457 package.



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### ABSOLUTE MAXIMUM RATINGS

| SYMBOL    | PARAMETER                            | TEST CONDITIONS                    | MIN | MAX  | UNIT |
|-----------|--------------------------------------|------------------------------------|-----|------|------|
| $V_{I/O}$ | DC input voltage range               |                                    | 0   | +5.5 | V    |
| ESD       | Electrostatic Discharge,<br>all pins | IEC 61000-4-2, Level 4,<br>Contact | -8  | +8   | kV   |
| $T_{stg}$ | Device storage temperature range     |                                    | -55 | +125 | °C   |

### RECOMMENDED OPERATING CONDITIONS

|                             | MIN | MAX | UNIT |
|-----------------------------|-----|-----|------|
| Operating temperature range | -40 | +85 | °C   |

### ELECTRICAL CHARACTERISTICS

$T_c = 25^\circ\text{C}$  unless otherwise specified

| SYMBOL        | PARAMETER                                                   | TEST CONDITIONS                                              | MIN | TYP | MAX | UNIT |
|---------------|-------------------------------------------------------------|--------------------------------------------------------------|-----|-----|-----|------|
| $C_{I/O}$     | Pin capacitance to ground,<br>Pins 1, 3, 4, 6               | $V_{dc} = 0\text{ V}$ ; $f = 1\text{ MHz}$<br>Pin 5 = +3.0 V | -   | 1.0 | -   | pF   |
| $I_{lkg}$     | Diode reverse leakage current,<br>Pins 1, 3, 4, 6 to ground | $V = +3.0\text{ V}$                                          | -   | -   | 100 | nA   |
| $C_{Zener}$   | Zener diode capacitance to<br>ground, Pin 5 to 2            | $V_{dc} = 0\text{ V}$ ; $f = 1\text{ MHz}$<br>Pin 5 = +3.0 V | -   | 40  | -   | pF   |
| $V_{BR\ I/O}$ | Zener diode breakdown voltage,<br>Pin 5 to 2                | $I = 1\text{ mA}$                                            | 6   | -   | 9   | V    |
| $V_F$         | Forward voltage                                             |                                                              | -   | 0.7 | -   | V    |

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Application Information

Universal Serial Bus 2.0 protection

The IP4220CZ6 is optimized to protect e.g. two USB 2.0 ports of Electro-Static-Discharge (ESD). Each device is capable of protection both USB data lines and the  $V_{BUS}$  supply. A typical application is shown in the schematic below.

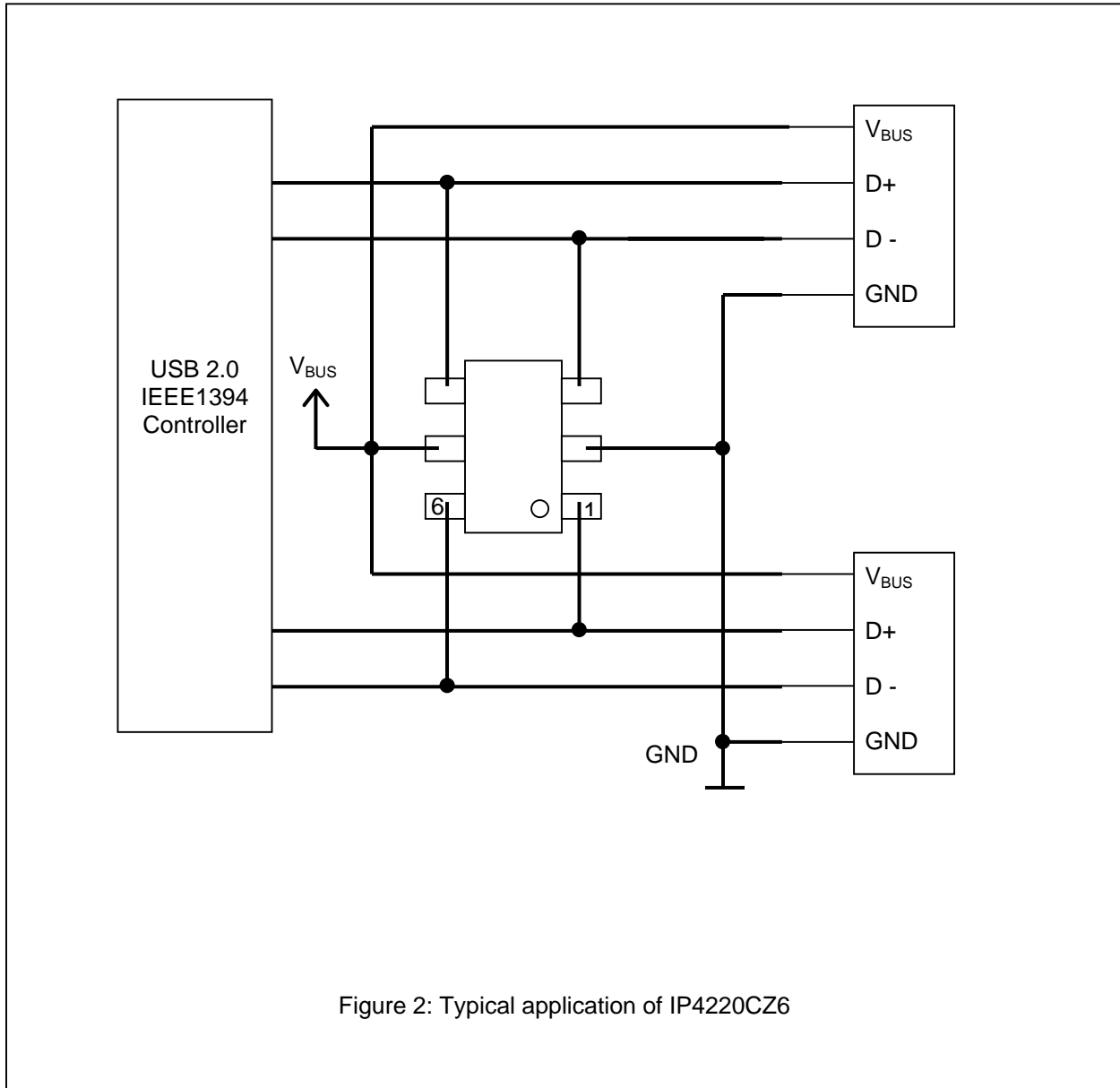


Figure 2: Typical application of IP4220CZ6

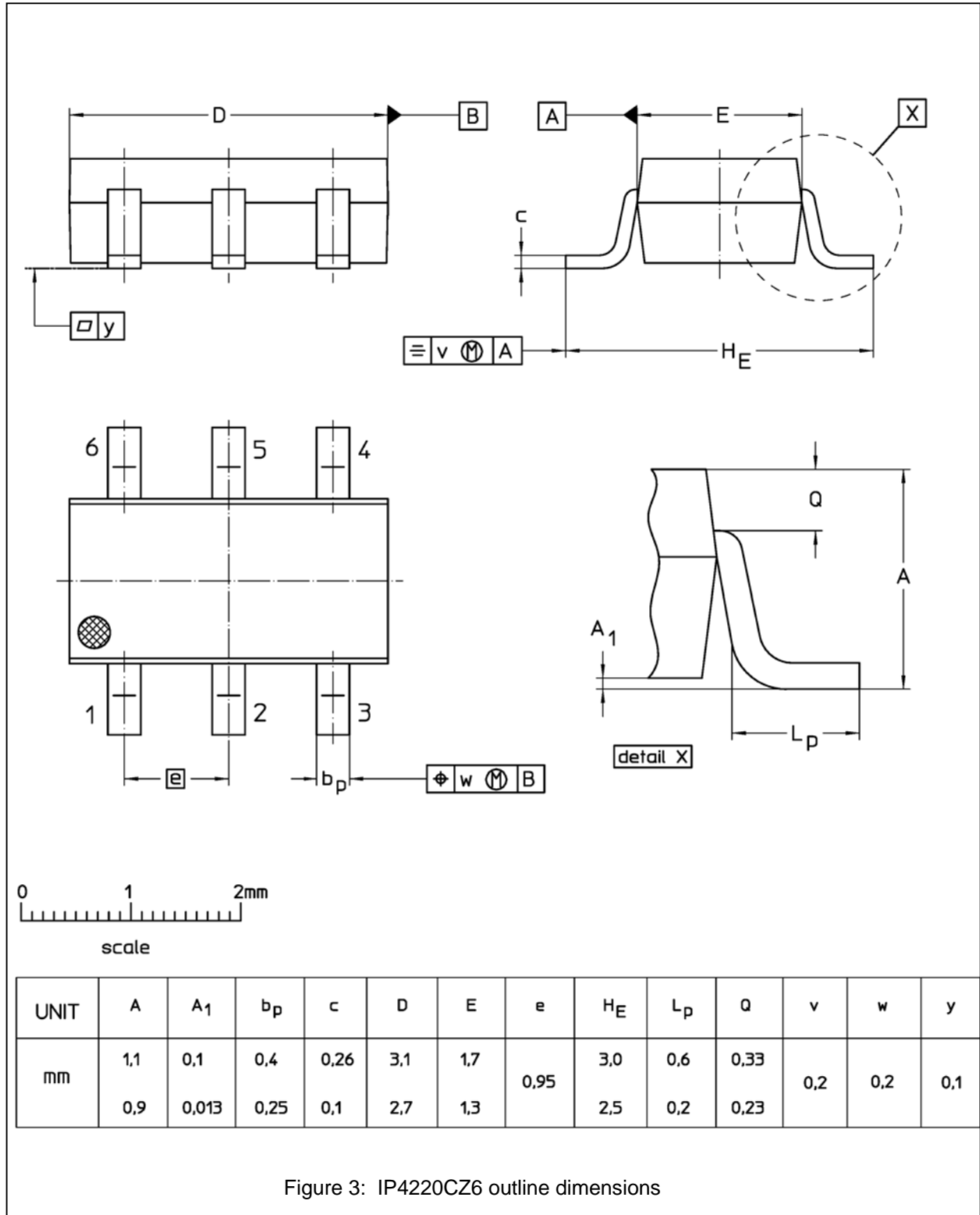
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PACKAGE OUTLINE

Plastic small outline package; 6 leads; body width 1.5 mm

SOT457



# Dual USB 2.0

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### DEFINITIONS

| Data Sheet Identification        | Product Status         | Definition                                                                                                                                                                                                                                                     |
|----------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Objective Specification</i>   | Formative or in Design | This data sheet contains the target or goal specifications for product development. Specifications may change in any manner without notice.                                                                                                                    |
| <i>Preliminary Specification</i> | Preproduction Product  | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve the design and supply the best possible product. |
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