



# IP4285CZ6-TY

ESD protection for high-speed interfaces

Rev. 1 — 3 November 2011

Objective data sheet

## 1. Product profile

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### 1.1 General description

This device is designed to protect electrical interfaces such as USB 2.0 ports in computer or communication devices against ElectroStatic Discharge (ESD).

The device includes high-level ESD protection diodes for high-speed signal lines. It is encapsulated in a very small 6-pin SOT363 Surface-Mounted Device (SMD) plastic package. Due to the small package dimensions the device is suitable for portable devices.

A special diode configuration protects all signal lines. These diodes offer ultra low line capacitance of 0.85 pF maximum and provide protection to downstream components from ESD voltages up to  $\pm 12$  kV contact according to IEC 61000-4-2, level 4.

### 1.2 Features and benefits

- Pb-free, Restriction of Hazardous Substances (RoHS) compliant and free of halogen and antimony (Dark Green compliant)
- System ESD protection for USB 2.0
- All signal lines with integrated rail-to-rail clamping diodes for downstream ESD protection of  $\pm 12$  kV according to IEC 61000-4-2, level 4
- Signal lines with  $\leq 0.05$  pF matching capacitance between signal pairs
- Line capacitance of 0.85 pF maximum for each channel

### 1.3 Applications

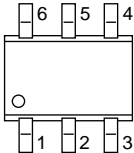
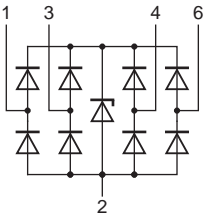
The device is designed for receiver and transmitter port protection in:

- Portable devices
- Mobile handsets
- TVs, 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	Description	Simplified outline	Graphic symbol
1	ESD protection for I/O signals		
2	ground		
3	ESD protection for I/O signals		
4	ESD protection for I/O signals		
5	n.c.		
6	ESD protection for I/O signals		

018aaa176

## 3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
IP4285CZ6-TY	SC-88	plastic surface-mounted package; 6 leads	SOT363

## 4. Marking

Table 3. Marking codes

Type number	Marking code <sup>[1]</sup>
IP4285CZ6-TY	85*

[1] \* = placeholder for manufacturing site code.

## 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	pins 1, 3, 4, 6; IEC 61000-4-2, level 4	[1]		
		contact discharge	-	±12	kV
		air discharge	-	±18	kV
$T_{amb}$	ambient temperature		-40	+85	°C
$T_{stg}$	storage temperature		-55	+125	°C

[1] All pins to ground.

## 6. Characteristics

**Table 5. Characteristics**

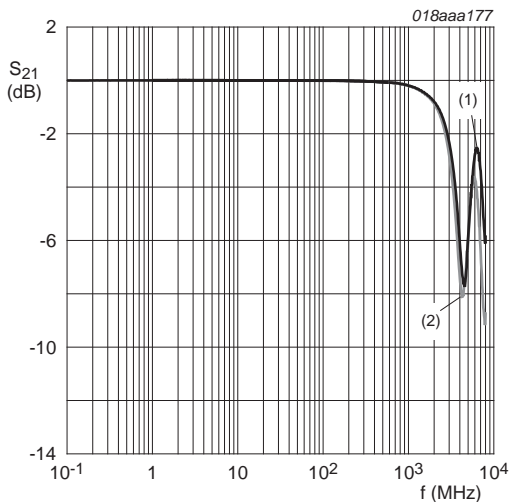
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{BRzd}$	Zener diode breakdown voltage	$I_{test} = 1\text{ mA}$	6	-	9	V
$I_{LRzd}$	Zener diode reverse leakage current	per channel; $V_I = 5.0\text{ V}$	-	-	1	$\mu\text{A}$
$V_F$	forward voltage		-	0.7	-	V
$C_{ch}$	channel capacitance	$f = 1\text{ MHz}$	[1]			
		$V_{bias} = 0\text{ V}$	-	-	0.85	pF
		$V_{bias} = 2.5\text{ V}$	-	-	0.75	pF
$\Delta C_{ch}$	channel capacitance difference	$f = 1\text{ MHz};$ $V_{bias} = 2.5\text{ V}$	[1]	-	0.1	pF
$C_{ch(mutual)}$	mutual channel capacitance	$f = 1\text{ MHz};$ $V_{bias} = 2.5\text{ V}$	[1][2]	-	0.25	pF
$R_{dyn}$	dynamic resistance	$I_{PP} = 1\text{ A}$	[3]			
		positive transient	-	0.42	-	$\Omega$
		negative transient	-	0.33	-	$\Omega$
$V_{CL(ch)trt(pos)}$	positive transient channel clamping voltage	$I_{PP} = 4\text{ A}$	[3]	-	4.2	V

[1] This parameter is guaranteed by design.

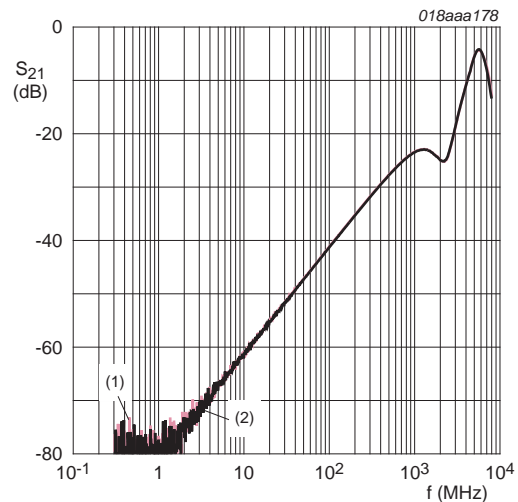
[2] Between signal pin and pin n.c.

[3] According to IEC 61000-4-5.



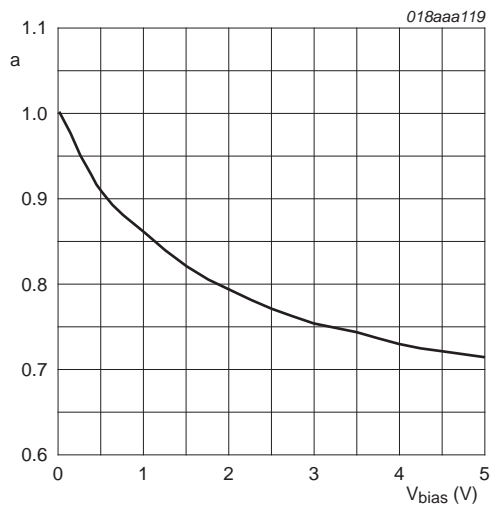
- (1) Pin 1 and 3
- (2) Pin 4 and 6

**Fig 1. Insertion loss**



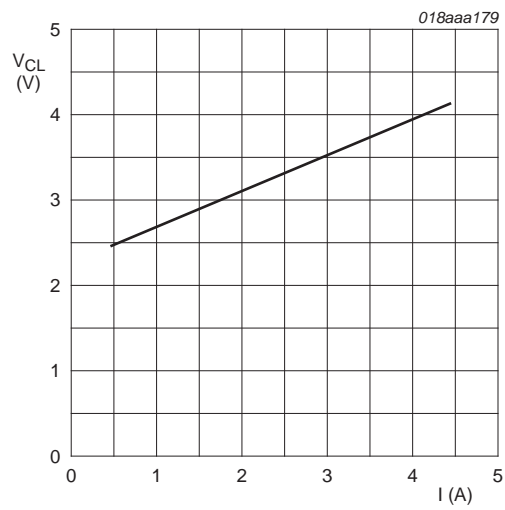
- (1) Pin 1 to 6
- (2) Pin 3 to 4

**Fig 2. Crosstalk response curves**



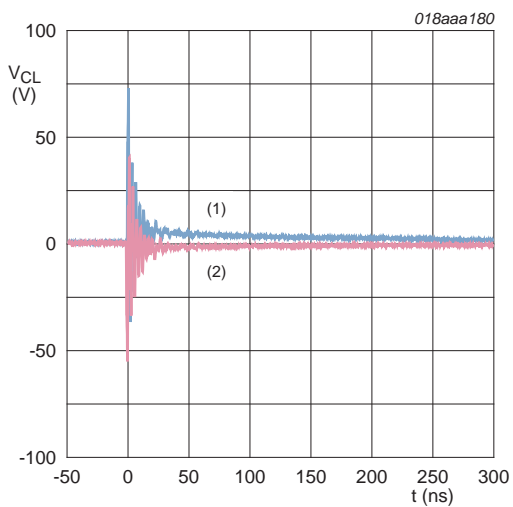
$$a = \frac{C_{ch}}{C_{ch}(0V_{bias})}$$

**Fig 3. Line capacitance as a function of bias voltage; typical values**



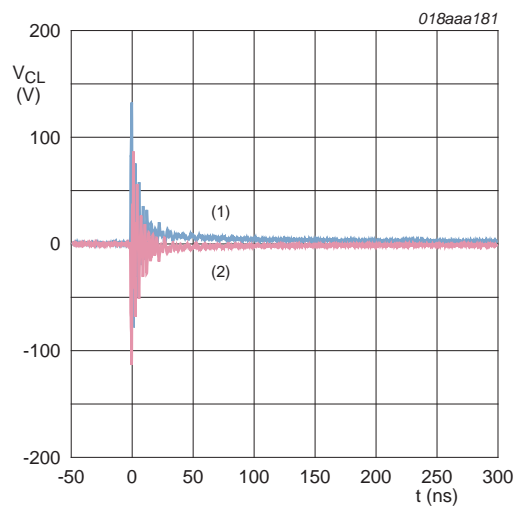
IEC 61000-4-5;  $t_p = 8/20 \mu s$

**Fig 4. Dynamic resistance with negative clamping**



- (1) +4 kV
- (2) -4 kV

**Fig 5. Clamped ±4 kV ESD pulse waveform (IEC 61000-4-2 network)**



- (1) +8 kV
- (2) -8 kV

**Fig 6. Clamped ±8 kV ESD pulse waveform (IEC 61000-4-2 network)**

7. Package outline

Plastic surface-mounted package; 6 leads

SOT363

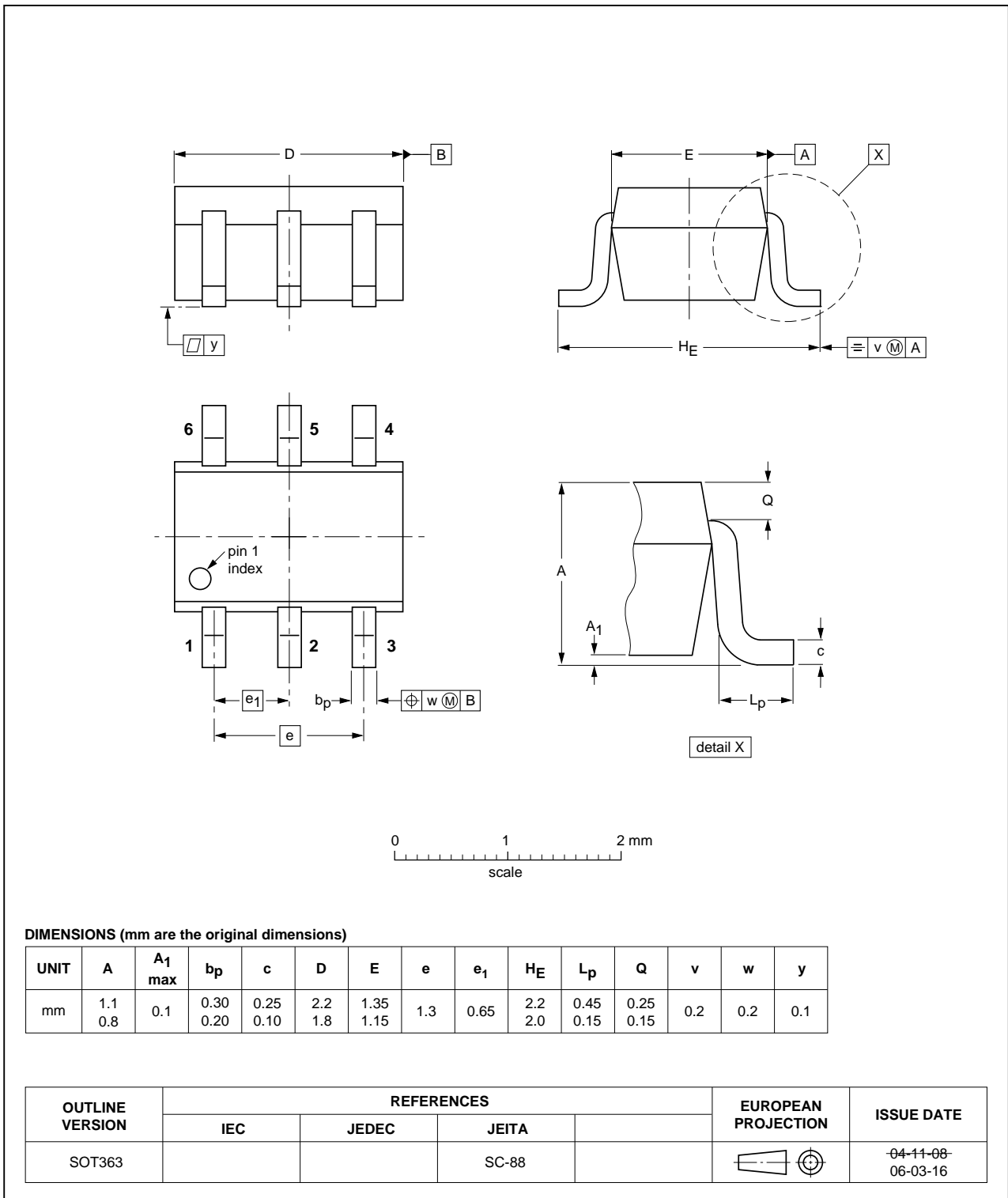


Fig 7. Package outline SOT363 (SC-88)

## 8. Soldering

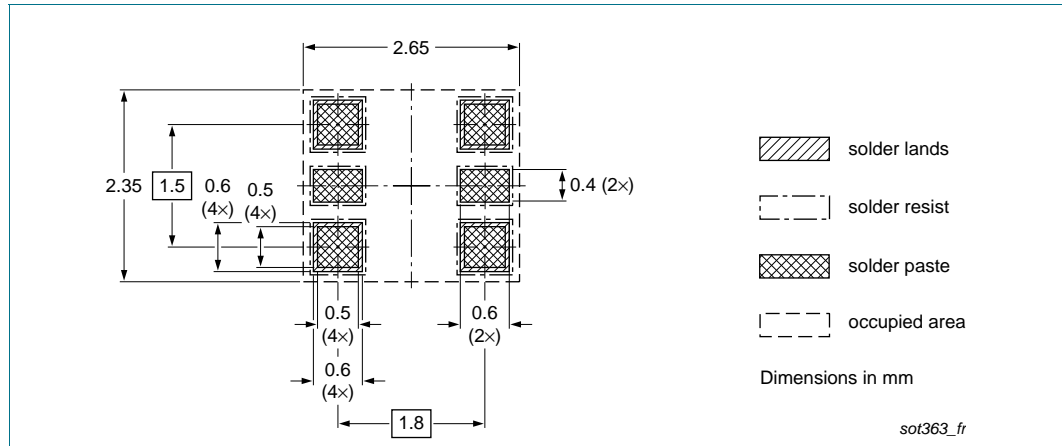


Fig 8. Reflow soldering footprint SOT363 (SC-88)

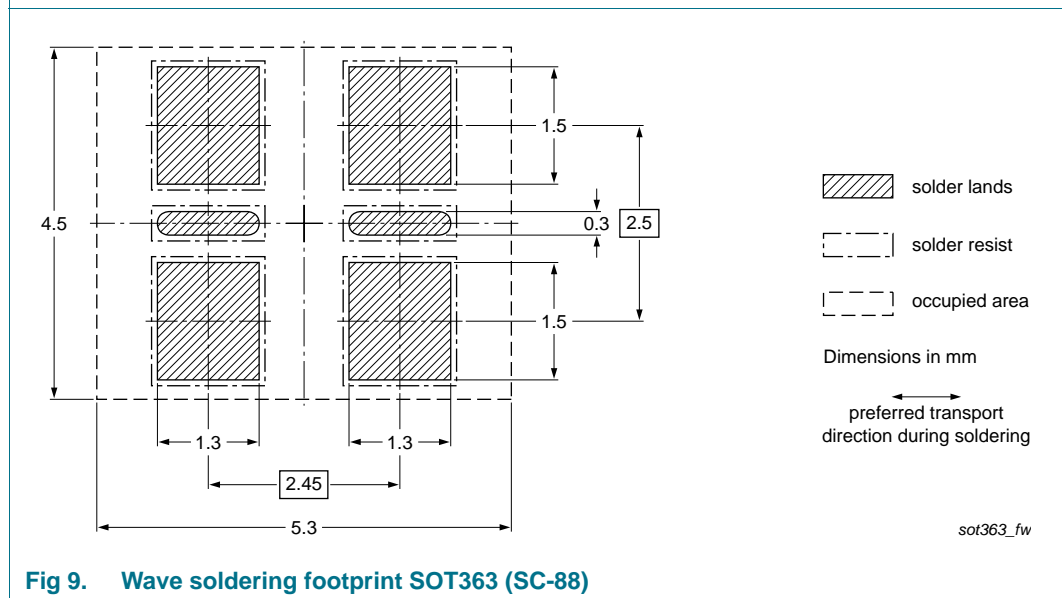


Fig 9. Wave soldering footprint SOT363 (SC-88)

## 9. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4285CZ6-TY v.1	20111103	Objective data sheet	-	-

## 10. Legal information

### 10.1 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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