

# IP4306CX2/A

Schottky barrier power diode in WLCSP

Rev. 1 — 28 November 2011

Product data sheet

## 1. Product profile

### 1.1 General description

The IP4306CX2/A is a single Schottky barrier power diode providing a low forward voltage and a high reverse breakdown voltage.

The device is fabricated using monolithic silicon technology and integrates one Schottky barrier power diode in a single two ball 0.4 mm pitch Wafer-Level Chip-Scale Package (WLCSP). These features make the IP4306CX2/A ideal for use in applications requiring the utmost in miniaturization such as mobile phone handsets, cordless telephones and other portable electronic devices.

### 1.2 Features and benefits

- Pb-free, RoHS compliant and free of halogen and antimony (Dark Green compliant)
- Reverse voltage:  $V_R \leq 20$  V
- Low forward voltage
- Downstream ElectroStatic Discharge (ESD) protection withstanding  $\pm 2$  kV according to IEC 61000-4-2
- Two ball WLCSP with 0.4 mm pitch

### 1.3 Applications

- Cellular handsets and accessories
- Portable electronics
- Low voltage rectification
- Reverse polarity protection
- Low power consumption applications

### 1.4 Quick reference data

**Table 1. Quick reference data**

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

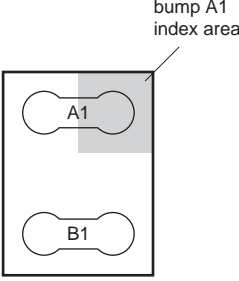
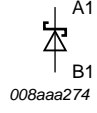
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 85$ °C	[1]	-	0.3	A
$V_R$	reverse voltage		-	-	20	V
$V_F$	forward voltage	$I_F = 300$ mA	-	500	800	mV
$I_R$	reverse current	$V_R = 20$ V	-	-	3.0	$\mu$ A

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
A1	cathode	 <p>008aaa273</p> <p>transparent top view, solder balls facing down</p>	 <p>008aaa274</p>
B1	anode		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
IP4306CX2/A	WLCSP2	wafer level chip-size package; 2 bumps (A1-B1)	IP4306CX2/A

## 4. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2			
		contact discharge	-2	+2	kV
		air discharge	-2	+2	kV
V <sub>R</sub>	reverse voltage	T <sub>amb</sub> = 25 °C	-	20	V
I <sub>F(AV)</sub>	average forward current	square wave; δ = 0.5; f = 20 kHz; T <sub>amb</sub> ≤ 85 °C	[1]	0.3	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	240	mW
T <sub>j</sub>	junction temperature		-	150	°C
T <sub>amb</sub>	ambient temperature		-35	+85	°C
T <sub>stg</sub>	storage temperature		-55	+150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 5. Characteristics

**Table 5. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 1\text{ mA}$	-	250	370	mV
		$I_F = 10\text{ mA}$	-	330	420	mV
		$I_F = 100\text{ mA}$	-	380	460	mV
		$I_F = 200\text{ mA}$	-	430	500	mV
		$I_F = 300\text{ mA}$	-	500	800	mV
$I_R$	reverse current	$T_{amb} = 25\text{ °C}$				
		$V_R = 6\text{ V}$	-	-	1.5	$\mu\text{A}$
		$V_R = 20\text{ V}$	-	-	3.0	$\mu\text{A}$
		$T_{amb} = 85\text{ °C}$				
		$V_R = 6\text{ V}$	-	-	150	$\mu\text{A}$
		$V_R = 20\text{ V}$	-	-	300	$\mu\text{A}$
$V_{BR}$	breakdown voltage	$I_R = 1\text{ mA}$	21	-	-	V
$C_d$	diode capacitance	$f = 1\text{ MHz}$				
		$V_R = 0\text{ V}$	-	65	-	pF
		$V_R = 10\text{ V}$	-	6	-	pF

## 6. Package outline

WLCSP2: wafer level chip-size package; 2 bumps (A1-B1)

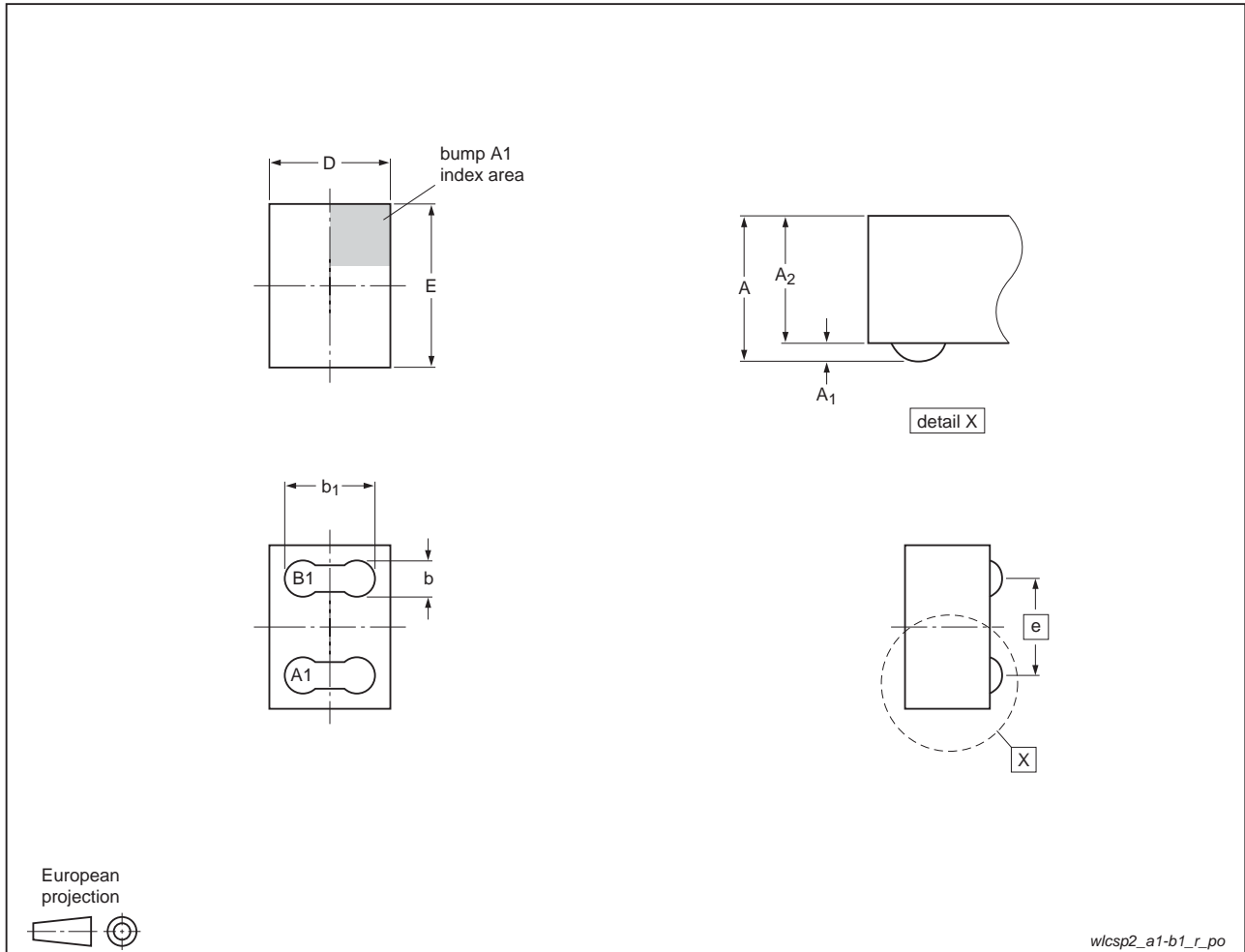


Fig 1. Package outline IP4306CX2/A (WLCSP2)

Table 6. Dimensions for Figure 1

Symbol	Min	Typ	Max	Unit
A	0.37	0.40	0.43	mm
A <sub>1</sub>	0.05	0.06	0.07	mm
A <sub>2</sub>	0.32	0.34	0.36	mm
b	-	0.13	-	mm
b <sub>1</sub>	-	0.35	-	mm
D	0.49	0.52	0.55	mm
E	0.67	0.70	0.73	mm
e	-	0.4	-	mm

## 7. Soldering

### 7.1 Thermal PCB design considerations

The PCB footprint on FR4 material has to provide reasonable copper area in order to allow sufficient heat dissipation. In particular for forward current  $I_F > 200$  mA the forward voltage characteristics can degrade over lifetime when heat dissipation is insufficient.

### 7.2 Reflow soldering recommendation

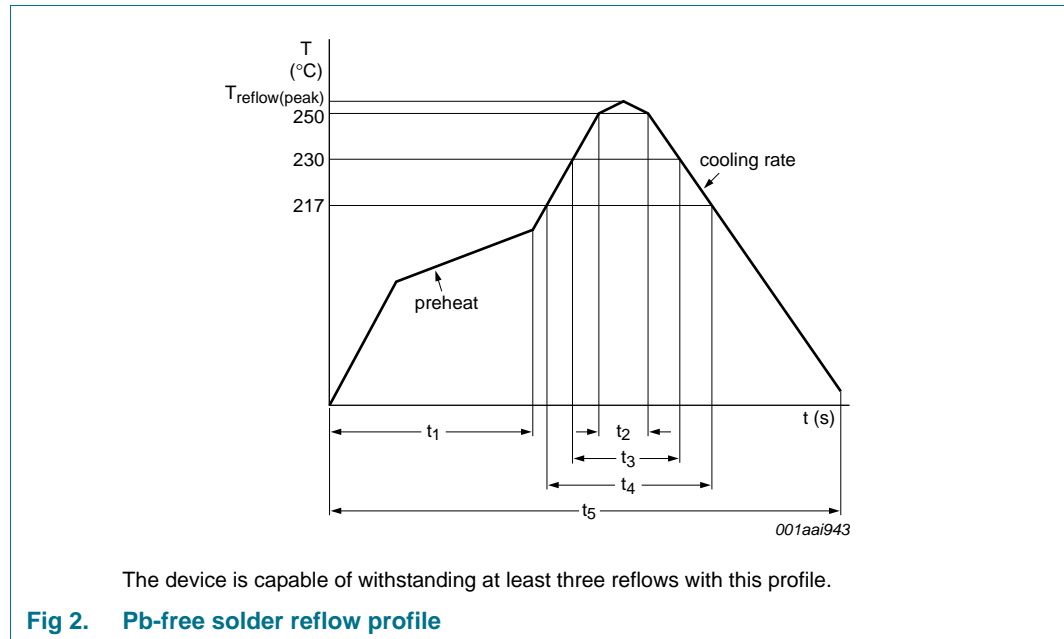


Fig 2. Pb-free solder reflow profile

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{\text{reflow(peak)}}$	peak reflow temperature		230	-	260	°C
$t_1$	time 1	soak time	60	-	180	s
$t_2$	time 2	time during $T \geq 250$ °C	-	-	30	s
$t_3$	time 3	time during $T \geq 230$ °C	10	-	50	s
$t_4$	time 4	time during $T > 217$ °C	30	-	150	s
$t_5$	time 5		-	-	540	s
$dT/dt$	rate of change of temperature	cooling rate	-	-	-6	°C/s
		preheat	2.5	-	4.0	°C/s

## 8. Abbreviations

Table 8. Abbreviations

Acronym	Description
ESD	ElectroStatic Discharge
FR4	Flame Retard 4
PCB	Printed-Circuit Board
RoHS	Restriction of Hazardous Substances
WLCSP	Wafer-Level Chip-Scale Package

## 9. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4306CX2_A v.1	20111128	Product 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.
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Date of release: 28 November 2011

Document identifier: IP4306CX2\_A