# IP4264CZ8-20; IP4264CZ8-40

## Integrated SIM card passive filter array with ESD protection to IEC 61000-4-2 level 4

Rev. 02 — 27 April 2009 Product data sheet

## 1. Product profile

### 1.1 General description

The IP4264CZ8-20 and IP4264CZ8-40 are 3-channel RC low-pass filter arrays which are designed to provide filtering of undesired RF signals in the 800 MHz to 3000 MHz frequency band. In addition, the IP4264CZ8-20 and IP4264CZ8-40 incorporate diodes to provide protection to downstream components from ElectroStatic Discharge (ESD) voltages as high as ±15 kV contact and > ±15 kV air discharge, far exceeding IEC 61000-4-2, level 4.

The IP4264CZ8-20 and IP4264CZ8-40 are fabricated using monolithic silicon technology and integrate three resistors and seven high-level ESD-protection diodes in a 0.4 mm pitch 8-pin Micropak (compatible with QFN) lead-free plastic package with a height of only 0.5 mm. These features make the IP4264CZ8-20 and IP4264CZ8-40 ideal for use in applications requiring component miniaturization, such as mobile phone handsets, cordless telephones and personal digital devices. The device is also available in wafer level chip-size package WLCSP8, with 0.4 mm pitch (IP4364CX8/LF) and 0.5 mm pitch (IP4064CX8/LF).

### 1.2 Features

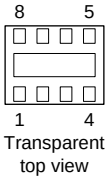
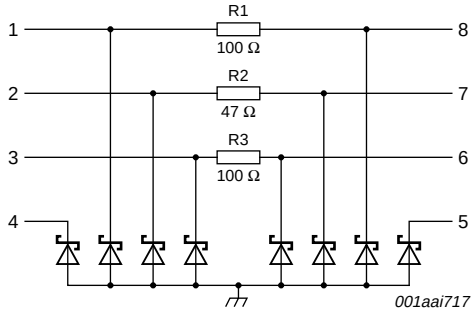
- Pb-free, RoHS compliant and free of Halogen and Antimony (Dark Green compliant)
- 3-channel SIM card interface integrated RC-filter array and SIM voltage ESD-protection
- Integrated 100 Ω/100 Ω/47 Ω series channel resistors
- Total channel capacitance of 20 pF (IP4264CZ8-20) or 40 pF (IP4264CZ8-40)
- Downstream ESD protection up to ±15 kV (contact) according to IEC 61000-4-2
- Micropak (QFN compatible) plastic package with 0.4 mm pitch
- Also available in WLCSP8: IP4364CX8/LF (0.4 mm pitch) and IP4064CX8/LF or IP4044CX8/LF (both using 0.5 mm pitch)

### 1.3 Applications

- SIM (Subscriber Identity Module) interfaces in e.g. cellular and PCS mobile handsets

## 2. Pinning information

**Table 1. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| 1 and 8 | filter channel 1 |  |  |
| 2 and 7 | filter channel 2 | | |
| 3 and 6 | filter channel 3 | | |
| 4 and 5 | ESD protection | | |
| ground pad | ground | | |





## 3. Ordering information

**Table 2. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| IP4264CZ8-20 | HXSON8U | plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; UTLP based; body 1.35 × 1.7 × 0.5 mm | SOT983-1 |
| IP4264CZ8-40 | | | |

## 4. Marking

**Table 3. Marking codes**

| Type number | Marking code |
|---|---|
| IP4264CZ8-20 | N2 |
| IP4264CZ8-40 | N4 |

## 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 | at I/O pins | | –0.5 | +5.5 | V |
| $V_{esd}$ | electrostatic discharge voltage | all pins to ground | | | | |
| | | IP4264CZ8-20 | | | | |
| | | contact discharge | [1] | –15 | +15 | kV |
| | | air discharge | [1] | –15 | +15 | kV |
| | | IP4264CZ8-40 | | | | |
| | | contact discharge | [1] | –25 | +25 | kV |
| | | air discharge | [1] | –25 | +25 | kV |
| | | IEC 61000-4-2, level 4; all pins to ground | | | | |
| | | contact discharge | | –8 | +8 | kV |
| | | air discharge | | –15 | +15 | kV |
| $P_{ch}$ | channel power dissipation | $T_{amb}$ = 70 °C | | - | 60 | mW |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = 70 °C | | - | 180 | mW |
| $T_{stg}$ | storage temperature | | | –55 | +150 | °C |
| $T_{reflow(peak)}$ | peak reflow temperature | 10 s maximum | | - | 260 | °C |
| $T_{amb}$ | ambient temperature | | | –30 | +85 | °C |

[1] IP4264CZ8-40 is qualified to 1000 contact discharges of ±15 kV using the IEC 61000-4-2 model, by far exceeding the specified IEC 61000-4-2, level 4 (8 kV contact discharge).

## 6. Characteristics

**Table 5. Channel resistance**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $R_{s(ch)}$ | channel series resistance | R1, R3 | 75 | 100 | 125 | Ω |
| | | R2 | 35.2 | 47 | 58.8 | Ω |

**Table 6. Channel characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **IP4264CZ8-20** | | | | | | |
| $C_{ch}$ | channel capacitance | total line capacitance including diode capacitance, per channel | | | | |
| | | V = 0 V; f = 1 MHz | - | 17 | 20[1] | pF |
| | | V = 2.5 V; f = 1 MHz | - | 11 | 15[1] | pF |

**Table 6. Channel characteristics** *...continued*

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **IP4264CZ8-40** | | | | | | |
| $C_{ch}$ | channel capacitance | total line capacitance including diode capacitance, per channel | | | | |
| | | V = 0 V; f = 1 MHz | - | 35 | 40[1] | pF |
| | | V = 2.5 V; f = 1 MHz | - | 23 | 28[1] | pF |
| $C_d$ | diode capacitance | measured between pins 4 and 5 | | | | |
| | | V = 0 V; f = 1 MHz | - | 20 | - | pF |
| | | V = 2.5 V; f = 1 MHz | - | 14 | - | pF |
| $I_{LR}$ | reverse leakage current | V = 3 V | - | - | 50 | nA |
| $V_{BR}$ | breakdown voltage | $I_{test}$ = 1 mA | 6 | - | 10 | V |

[1] Guaranteed by design.

# 7. Application information

## 7.1 Insertion loss

The IP4264CZ8-20 and IP4264CZ8-40 are mainly designed as an EMI/RFI filter for SIM card interfaces. The set-up for measuring return loss is shown in Figure 1. The insertion loss in a 50 Ω system for all three channels of the IP4264CZ8-20 with a line capacitance of ≤ 20 pF total channel capacitance is shown in Figure 2, while the insertion loss for IP4264CZ8-40 with a line capacitance of ≤ 40 pF channel capacitance is shown in Figure 3.

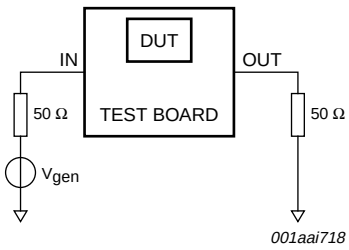
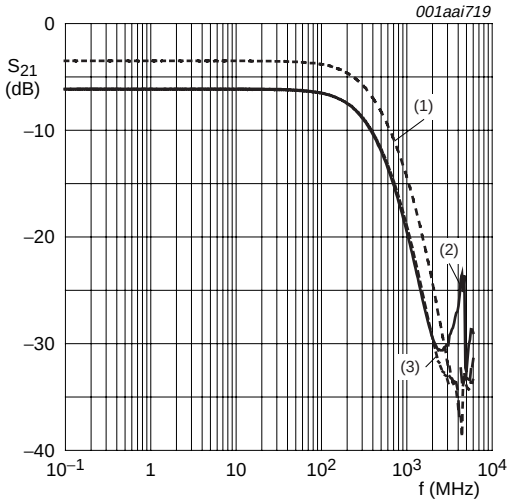
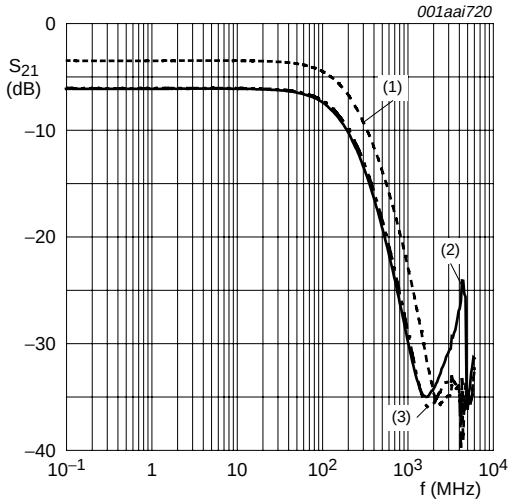



**Fig 1. Frequency response set-up**




(1) Pin 2 to 7.
(2) Pin 1 to 8.
(3) Pin 3 to 6.

**Fig 2. IP4264CZ8-20 frequency response curves (20 pF total channel capacitance)**




(1) Pin 2 to 7.
(2) Pin 1 to 8.
(3) Pin 3 to 6.

**Fig 3. IP4264CZ8-40 frequency response curves (40 pF total channel capacitance)**

## 7.2 Crosstalk

The set-up for measuring crosstalk between channels in a 50 Ω system is shown in Figure 4. The crosstalk for the IP4264CZ8-20 is shown in Figure 5 and Figure 6 for the IP4264CZ8-40. Unused channels are terminated with a 50 Ω resistor to ground.

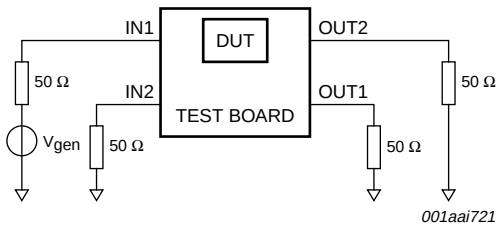
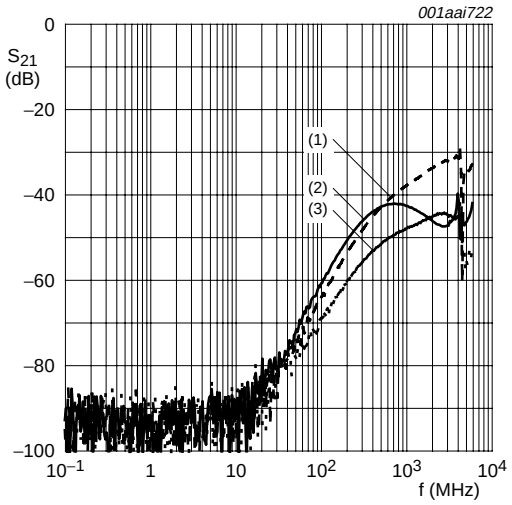



**Fig 4. Crosstalk measurement set-up**

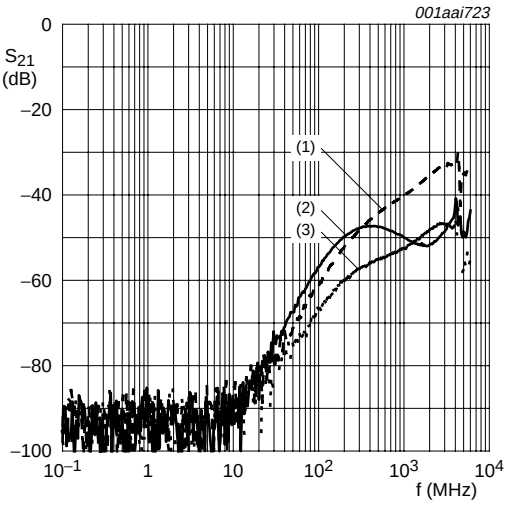



(1) Pin 1 to 7.

(2) Pin 2 to 6.

(3) Pin 3 to 8.

**Fig 5. IP4264CZ8-20 crosstalk behavior (20 pF total channel capacitance)**




(1) Pin 1 to 7.

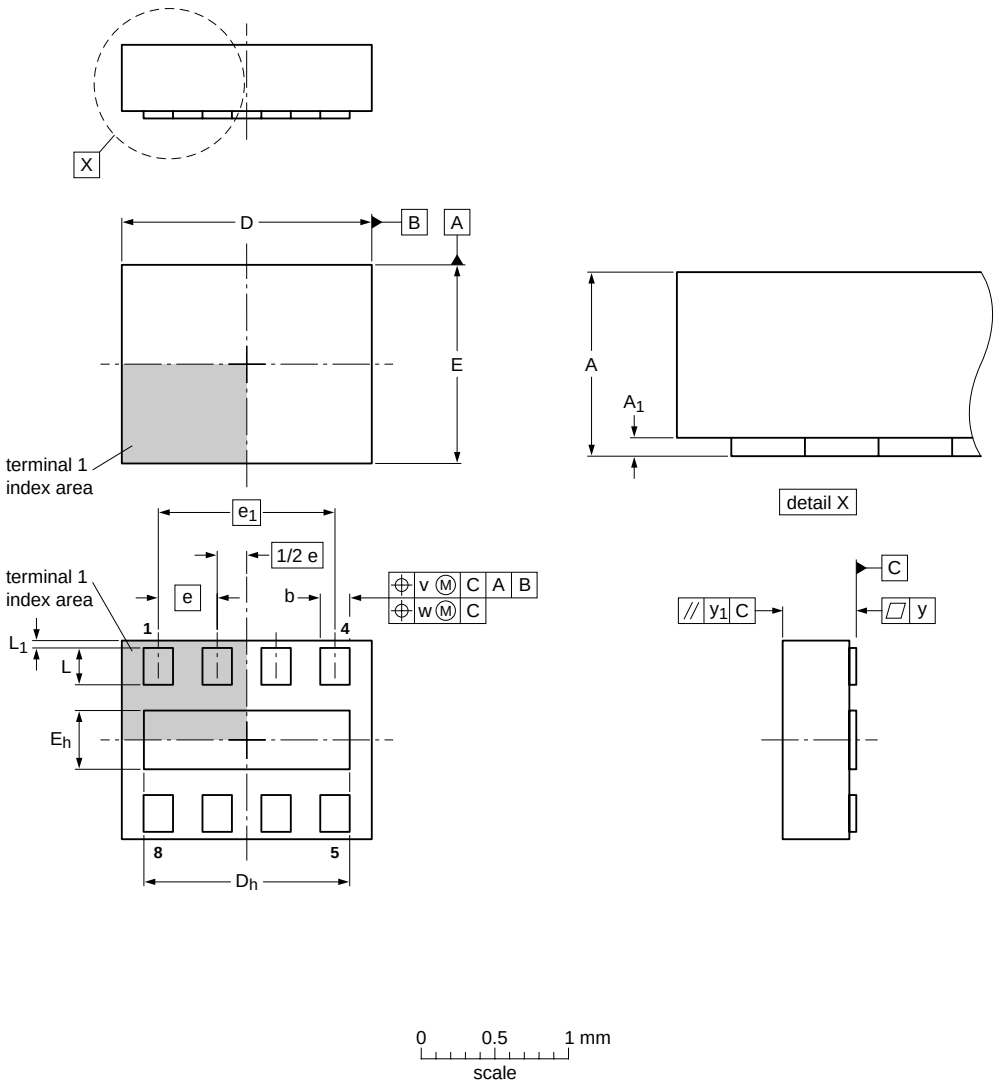
(2) Pin 2 to 6.

(3) Pin 3 to 8.

**Fig 6. IP4264CZ8-40 crosstalk behavior (40 pF total channel capacitance)**

## 8. Package outline

**HXSON8U: plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; UTLP based; body 1.35 x 1.7 x 0.5 mm** **SOT983-1**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A max | $A_1$ | b | D | $D_h$ | E | $E_h$ | e | $e_1$ | L | $L_1$ | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.05<br>0.00 | 0.25<br>0.15 | 1.75<br>1.65 | 1.5<br>1.3 | 1.4<br>1.3 | 0.5<br>0.3 | 0.4 | 1.2 | 0.35<br>0.15 | 0.09<br>0.00 | 0.1 | 0.05 | 0.05 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT983-1 | - - - | | - - - | | | ~~07-01-12~~<br>07-11-14 |

**Fig 7. Package outline SOT983-1 (HXSON8U)**

## 9. Abbreviations

Table 7. Abbreviations

| Acronym | Description |
|---|---|
| DUT | Device Under Test |
| EMI | ElectroMagnetic Interference |
| ESD | ElectroStatic Discharge |
| PCB | Printed-Circuit Board |
| PCS | Personal Communication System |
| RFI | Radio Frequency Interference |
| RoHS | Restriction of the use of certain Hazardous Substances directive |
| SIM | Subscriber Identity Module |

## 10. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| IP4264CZ8-20_IP4264CZ8-40_2 | 20090427 | Product data sheet | - | IP4264CZ8-20_IP4264CZ8-40_1 |
| Modifications: | • Added: Section 4 “Marking”<br>• Table note 1 to Table 4 “Limiting values” reworded<br>• Table note 1 to Table 6 “Channel characteristics” added | | | |
| IP4264CZ8-20_IP4264CZ8-40_1 | 20081106 | Objective data sheet | - | - |

# 11. Legal information

## 11.1 Data sheet status

| Document status[1][2] | Product status[3] | 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

## 11.2 Definitions

**Draft —** The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet —** A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

## 11.3 Disclaimers

**General —** Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes —** NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use —** NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications —** Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values —** Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale —** NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license —** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control —** This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

## 11.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

# 12. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

## 13. Contents





For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 27 April 2009

Document identifier: IP4264CZ8-20_IP4264CZ8-40_2