# IP4253CZ8/CZ12/CZ16; IP4254CZ8/CZ12/CZ16

## Integrated 4-, 6- and 8-channel passive filter network with ESD protection to IEC 61000-4-2, level 4

Rev. 02 — 8 November 2007 Product data sheet

## 1. Product profile

### 1.1 General description

The IP4253CZ8/CZ12/CZ16; IP4254CZ8/CZ12/CZ16 family consists of 4-, 6- and 8-channel RC low-pass filter arrays which are designed to provide filtering of undesired RF signals on the I/O ports of portable communication or computing devices. In addition, the IP4253CZ8/CZ12/CZ16; IP4254CZ8/CZ12/CZ16 family incorporates diodes to provide protection to downstream components from ElectroStatic Discharge (ESD) voltages as high as ±30 kV.

The IP4253CZ8/CZ12/CZ16; IP4254CZ8/CZ12/CZ16 family is fabricated using monolithic silicon technology and integrates up to 8 resistors and 16 diodes in a 0.4 mm pitch 8-, 12- or 16-pin MicroPak (compatible with QFN) lead-free plastic package with a height of 0.5 mm only.

### 1.2 Features

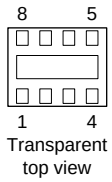
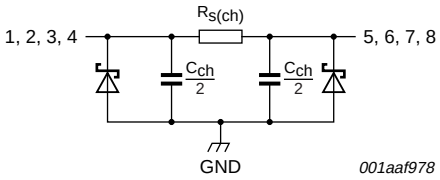
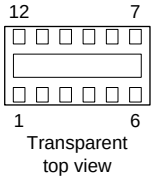
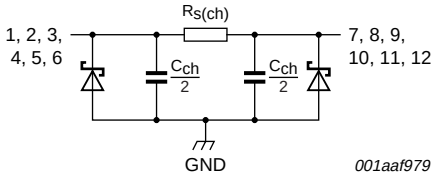
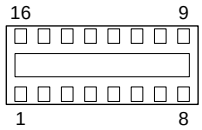
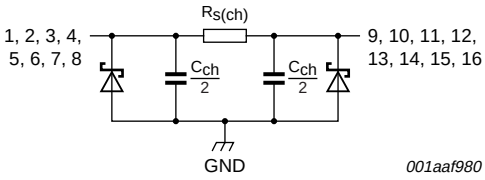
- Pb-free and dark green compliant
- 4-, 6- and 8-channel integrated π-type RC filter network
- IP4253CZ8/CZ12/CZ16: 200 Ω channel series resistance, 30 pF (at 2.5 V DC) channel capacitance
- IP4254CZ8/CZ12/CZ16: 100 Ω channel series resistance, 30 pF (at 2.5 V DC) channel capacitance
- ESD protection to ±30 kV contact discharge according to IEC 61000-4-2 standard far exceeding level 4
- MicroPak (QFN compatible) plastic package with 0.4 mm pitch

### 1.3 Applications

- General purpose ElectroMagnetic Interference (EMI) and Radio-Frequency Interference (RFI) filtering and downstream ESD protection for:
  - Cellular and Personal Communication System (PCS) mobile handsets
  - Cordless telephones
  - Wireless data (WAN/LAN) systems
  - PDAs

## 2. Pinning information

**Table 1. Pinning IP4253CZx and IP4254CZx**

| Pin | Description | Simplified outline | Symbol |
|---|---|---|---|
| **CZ8** | | | |
| 1 and 8 | filter channel 1 |   |   |
| 2 and 7 | filter channel 2 | | |
| 3 and 6 | filter channel 3 | | |
| 4 and 5 | filter channel 4 | | |
| ground pad | ground | | |
| **CZ12** | | | |
| 1 and 12 | filter channel 1 |   |   |
| 2 and 11 | filter channel 2 | | |
| 3 and 10 | filter channel 3 | | |
| 4 and 9 | filter channel 4 | | |
| 5 and 8 | filter channel 5 | | |
| 6 and 7 | filter channel 6 | | |
| ground pad | ground | | |
| **CZ16** | | | |
| 1 and 16 | filter channel 1 |   |   |
| 2 and 15 | filter channel 2 | | |
| 3 and 14 | filter channel 3 | | |
| 4 and 13 | filter channel 4 | | |
| 5 and 12 | filter channel 5 | | |
| 6 and 11 | filter channel 6 | | |
| 7 and 10 | filter channel 7 | | |
| 8 and 9 | filter channel 8 | | |
| ground pad | ground | | |

## 3. Ordering information

**Table 2. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| IP4253CZ8-4 | HXSON8 | plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.7 × 0.5 mm | SOT983-1 |
| IP4253CZ12-6 | HXSON12 | plastic thermal enhanced extremely thin small outline package; no leads; 12 terminals; body 1.35 × 2.5 × 0.5 mm | SOT984-1 |
| IP4253CZ16-8 | HXSON16 | plastic thermal enhanced extremely thin small outline package; no leads; 16 terminals; body 1.35 × 3.3 × 0.5 mm | SOT985-1 |
| IP4254CZ8-4 | HXSON8 | plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.7 × 0.5 mm | SOT983-1 |
| IP4254CZ12-6 | HXSON12 | plastic thermal enhanced extremely thin small outline package; no leads; 12 terminals; body 1.35 × 2.5 × 0.5 mm | SOT984-1 |
| IP4254CZ16-8 | HXSON16 | plastic thermal enhanced extremely thin small outline package; no leads; 16 terminals; body 1.35 × 3.3 × 0.5 mm | SOT985-1 |

## 4. Limiting values

**Table 3. Limiting values**

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | | –0.5 | +5.6 | V |
| $V_{esd}$ | electrostatic discharge voltage | all pins to ground | | | | |
| | | contact discharge | [1] | –30 | +30 | kV |
| | | air discharge | [1] | –30 | +30 | 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 | $T_{amb}$ = 85 °C | | - | 60 | mW |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = 85 °C | | - | 200 | mW |
| $T_{stg}$ | storage temperature | | | –55 | +150 | °C |
| $T_{amb}$ | ambient temperature | | | –40 | +85 | °C |

[1] Device withstands ≥ 1000 discharges with ±30 kV using the IEC 61000-4-2 model without degradation.

## 5. Thermal characteristics

**Table 4. Thermal characteristics**

| Symbol | Parameter | Conditions | Typ | Unit |
|---|---|---|---|---|
| $R_{th(j\text{-}pcb)}$ | thermal resistance from junction to printed-circuit board | 2 layer printed-circuit board | 120[1] | K/W |

[1] Depends on layout details.

# 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 | IP4253CZ8/CZ12/CZ16 | 160 | - | 240 | Ω |
| | | IP4254CZ8/CZ12/CZ16 | 80 | - | 120 | Ω |

**Table 6. Channel characteristics**

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

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $C_{ch}$ | channel capacitance | for the total channel; f = 100 kHz | | | | | |
| | | $V_{bias(DC)}$ = 2.5 V | | - | 30 | - | pF |
| | | $V_{bias(DC)}$ = 0 V | [1] | - | 45 | - | pF |
| $I_{LR}$ | reverse leakage current | per channel; $V_I$ = 3.5 V | | - | - | 0.1 | µA |
| $V_{BR}$ | breakdown voltage | positive clamp; $I_I$ = 1 mA | | 5.8 | - | 9 | V |
| $V_F$ | forward voltage | negative clamp; $I_F$ = 1 mA | | 0.4 | - | 1.5 | V |

[1] Guaranteed by design.

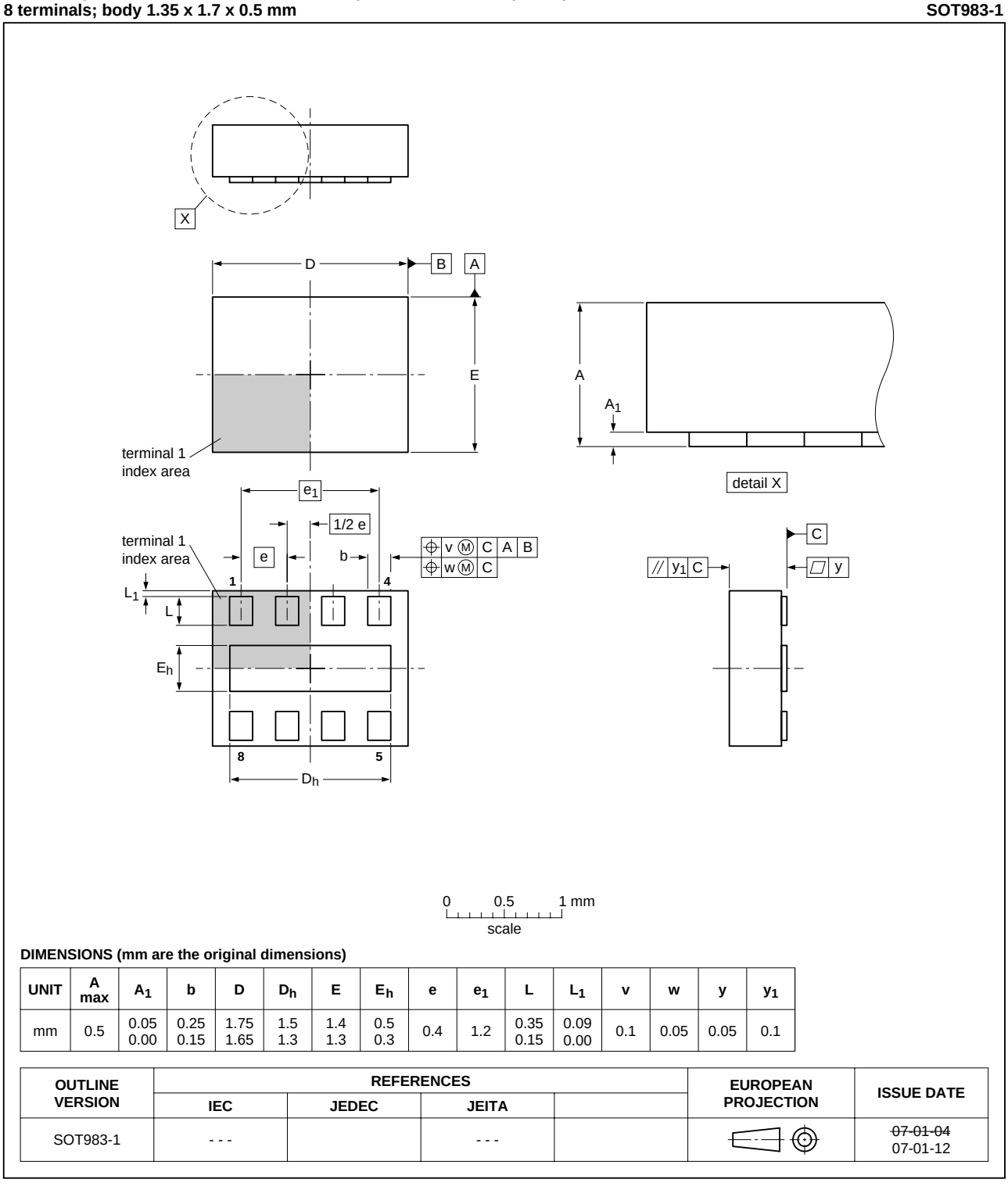
**Table 7. Frequency characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **IP4253CZ8/CZ12/CZ16** | | | | | | |
| $\alpha_{il}$ | insertion loss | $R_{source}$ = 50 Ω; $R_L$ = 50 Ω | | | | |
| | | 800 MHz < f < 3 GHz | - | 25 | - | dB |
| | | f = 1 GHz | 30 | - | - | dB |
| $\alpha_{ct}$ | crosstalk attenuation | $R_{source}$ = 50 Ω; $R_L$ = 50 Ω; 800 MHz < f < 3 GHz | - | 25 | - | dB |
| **IP4254CZ8/CZ12/CZ16** | | | | | | |
| $\alpha_{il}$ | insertion loss | $R_{source}$ = 50 Ω; $R_L$ = 50 Ω | | | | |
| | | 800 MHz < f < 3 GHz | - | 20 | - | dB |
| | | f = 1 GHz | 25 | - | - | dB |
| $\alpha_{ct}$ | crosstalk attenuation | $R_{source}$ = 50 Ω; $R_L$ = 50 Ω; 800 MHz < f < 3 GHz | - | 21 | - | dB |

## 7. Package outline

**HXSON8: plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1.7 x 0.5 mm** **SOT983-1**



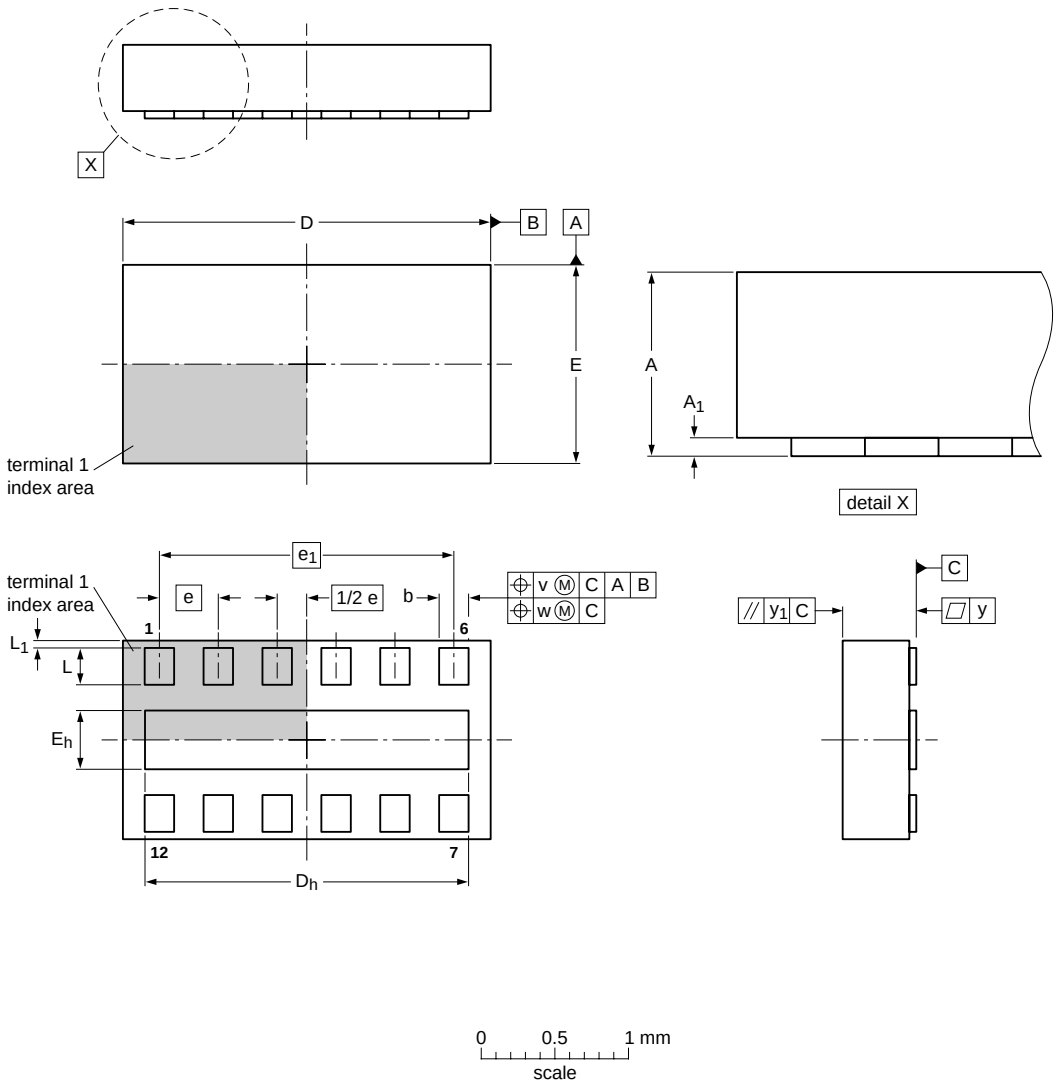

**DIMENSIONS (mm are the original dimensions)**

| 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 | - - - | | - - - | | | ~~07-01-04~~<br>07-01-12 |

**Fig 1. Package outline SOT983-1 (HXSON8)**

**HXSON12: plastic thermal enhanced extremely thin small outline package; no leads; 12 terminals; body 1.35 x 2.5 x 0.5 mm** **SOT984-1**



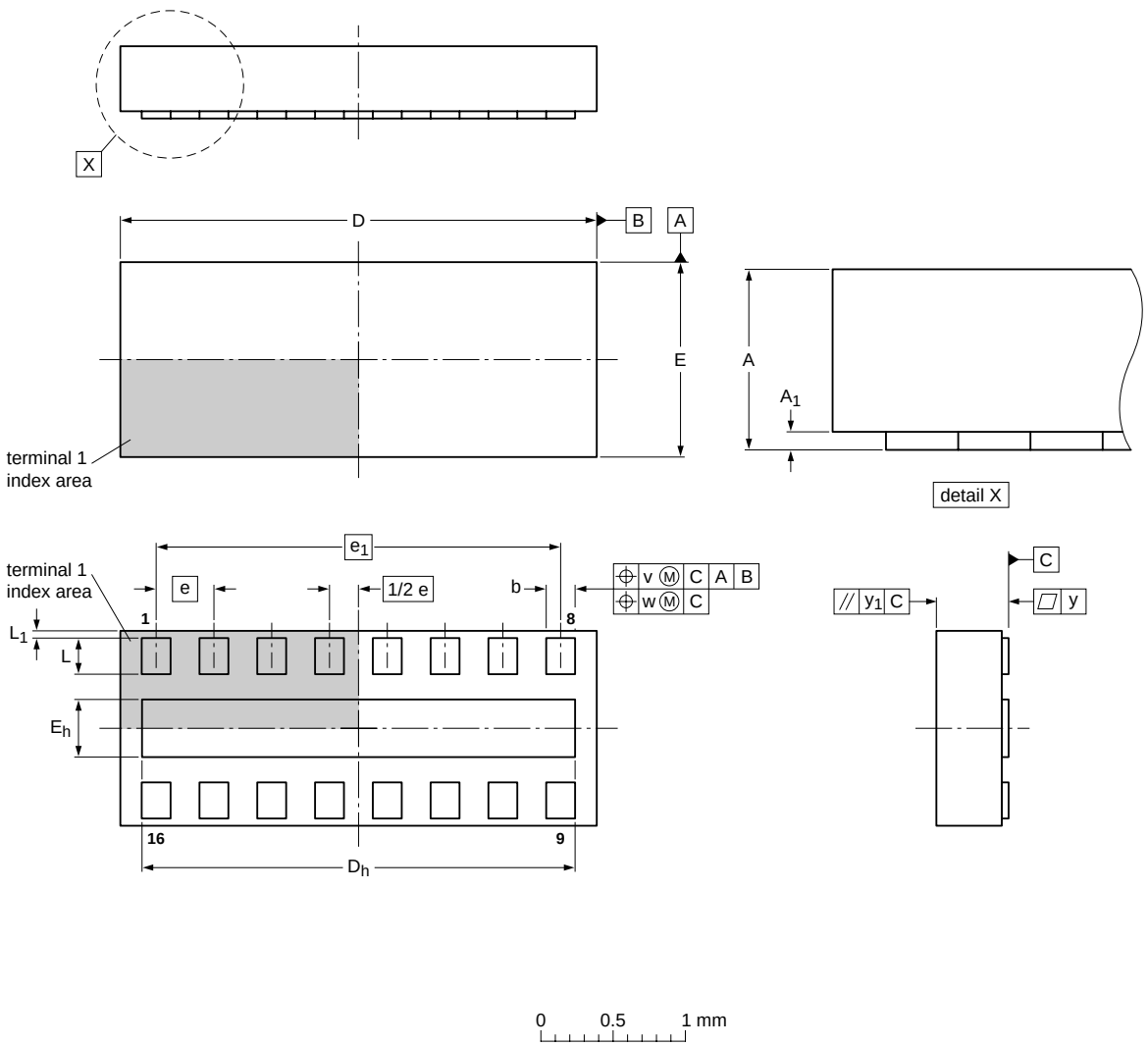

**DIMENSIONS (mm are the original dimensions)**

| 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 | 2.55<br>2.45 | 2.3<br>2.1 | 1.4<br>1.3 | 0.5<br>0.3 | 0.4 | 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 | | | |
| SOT984-1 | - - - | | - - - | | | ~~07-01-04~~<br>07-01-12 |

**Fig 2. Package outline SOT984-1 (HXSON12)**

**HXSON16: plastic thermal enhanced extremely thin small outline package; no leads; 16 terminals; body 1.35 x 3.3 x 0.5 mm** **SOT985-1**




**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 | 3.35<br>3.25 | 3.1<br>2.9 | 1.4<br>1.3 | 0.5<br>0.3 | 0.4 | 2.8 | 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 | | | |
| SOT985-1 | - - - | | - - - | | | ~~07-01-04~~<br>07-01-12 |

**Fig 3. Package outline SOT985-1 (HXSON16)**

## 8. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| IP4253_54_CZ8_CZ12_CZ16_2 | 20071108 | Product data sheet | - | IP4253_54_CZ8_CZ12_CZ16_1 |
| Modifications: | • All <tbd> values filled in. | | | |
| IP4253_54_CZ8_CZ12_CZ16_1 | 20070209 | Objective data sheet | - | - |

# 9. Legal information

## 9.1 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.

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