

# IP3253CZ8/CZ12/CZ16

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

Rev. 02 — 16 October 2009

Objective data sheet

## 1. Product profile

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### 1.1 General description

The IP3253CZ8/CZ12/CZ16 family consists of 4-, 6- and 8-channel LC low-pass filter arrays designed to filter unwanted RF signals on the I/O ports of portable communication, computing and media player devices. In addition, the IP3253CZ8/CZ12/CZ16 family incorporates diodes which protect downstream components from ElectroStatic Discharge (ESD) voltages as high as  $\pm 15$  kV.

These devices are fabricated using monolithic silicon technology and integrate up to 8 inductors and 16 diodes in a 0.4 mm pitch 8-, 12- or 16-pin MicroPak lead-free plastic package. The package is QFN compatible and has a height of only 0.5 mm.

### 1.2 Features

- Pb-free, Restriction of Hazardous Substances (RoHS) and Dark Green compliant
- 4-, 6- and 8-channel integrated  $\pi$ -type LC filter network
- ESD protection to  $\pm 15$  kV contact discharge according to IEC 61000-4-2 standard far exceeding level 4
- ESD protection to  $\pm 30$  kV contact discharge according to MIL-STD-883 (Method 3015) Human Body Model
- UTLP (QFN compatible) plastic package with 0.4 mm pitch

### 1.3 Applications

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

## 2. Pinning information

**Table 1. Pinning IP3253CZ8/CZ12/CZ16**

Pin	Description	Simplified outline	Symbol
<b>CZ8</b>			
1 and 8	filter channel 1	<p>Transparent top view</p>	<p>001aaJ745</p>
2 and 7	filter channel 2		
3 and 6	filter channel 3		
4 and 5	filter channel 4		
ground pad	ground		
<b>CZ12</b>			
1 and 12	filter channel 1	<p>Transparent top view</p>	<p>001aaJ746</p>
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		
<b>CZ16</b>			
1 and 16	filter channel 1	<p>Transparent top view</p>	<p>001aaJ747</p>
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		Version
	Name	Description	
IP3253CZ8-4	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
IP3253CZ12-6	HXSON12U	plastic thermal enhanced extremely thin small outline package; no leads; 12 terminals; UTLP based; body 1.35 × 2.5 × 0.5 mm	SOT984-1
IP3253CZ16-8	HXSON16U	plastic thermal enhanced extremely thin small outline package; no leads; 16 terminals; UTLP based; 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 <sub>CC</sub>	supply voltage		-0.5	+5.6	V
V <sub>ESD</sub>	electrostatic discharge voltage	all pins to ground; contact discharge			
		Human Body Model; MIL-STD-883, Method 3015	-30	+30	kV
		IEC 61000-4-2, level 4	-15	+15	kV
I <sub>ch</sub>	channel current (DC)	T <sub>amb</sub> = 85 °C	-	20	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
T <sub>amb</sub>	ambient temperature		-40	+85	°C

## 5. Characteristics

**Table 4. Channel characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$L_{s(ch)}$	channel series inductance		-	18	-	nH	
$C_{ch}$	channel capacitance	for the total channel; $f_i = 100\text{ kHz}$					
		$V_{bias(DC)} = 2.5\text{ V}$	[1]	20	25	30	pF
		$V_{bias(DC)} = 0\text{ V}$	[1]	-	43	-	pF
$I_{LR}$	reverse leakage current	per channel; $V_i = 3.5\text{ V}$	-	-	0.1	$\mu\text{A}$	
$V_{BR}$	breakdown voltage	positive clamp; $I_i = 1\text{ mA}$	5.8	-	10	V	
$V_F$	forward voltage	negative clamp; $I_F = -1\text{ mA}$	-1.5	-	-0.4	V	

[1] Guaranteed by design.

**Table 5. Frequency characteristics**

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

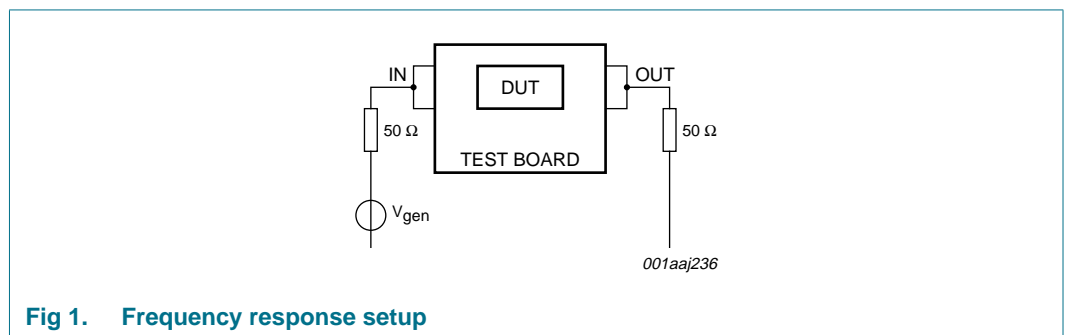
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\alpha_{il}$	insertion loss	$R_{source} = 50\text{ }\Omega$ ; $R_L = 50\text{ }\Omega$ ; $1\text{ GHz} < f_i < 4\text{ GHz}$	-	30	-	dB
$f_{-3dB}$	cut-off frequency	$R_{source} = 50\text{ }\Omega$ ; $R_L = 50\text{ }\Omega$ ; $V = 0\text{ V}$	-	175	-	MHz
$f_{roll-off}$	roll-off frequency	measured at $f_i = -6\text{ dB}$ ; $R_{source} = 50\text{ }\Omega$ ; $R_L = 50\text{ }\Omega$ ; $V = 0\text{ V}$	-	370	-	MHz

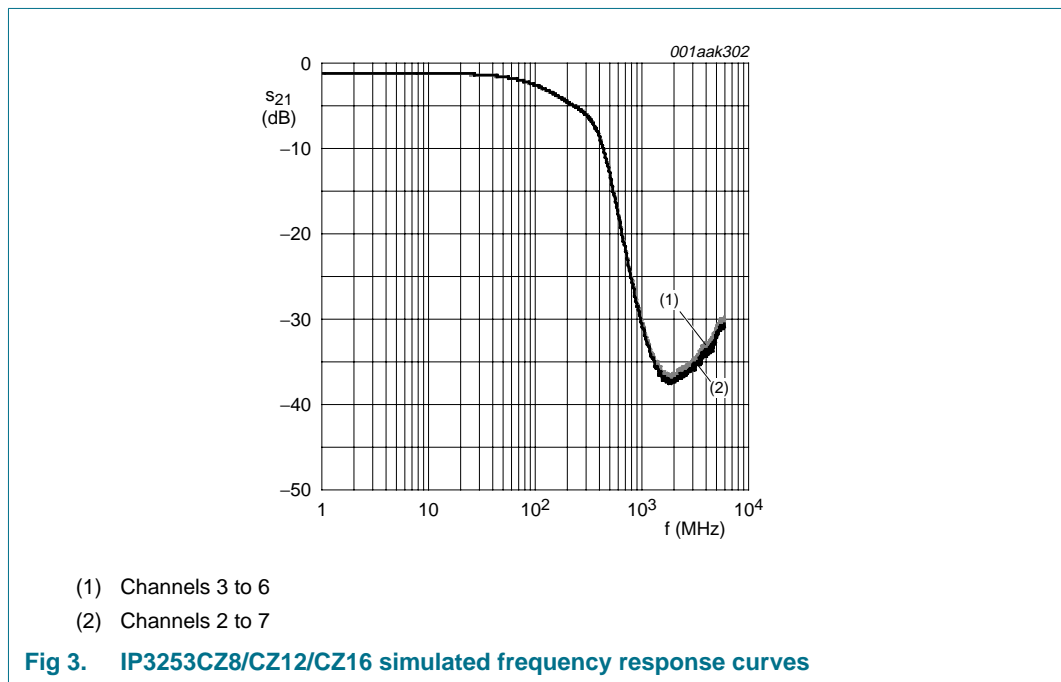
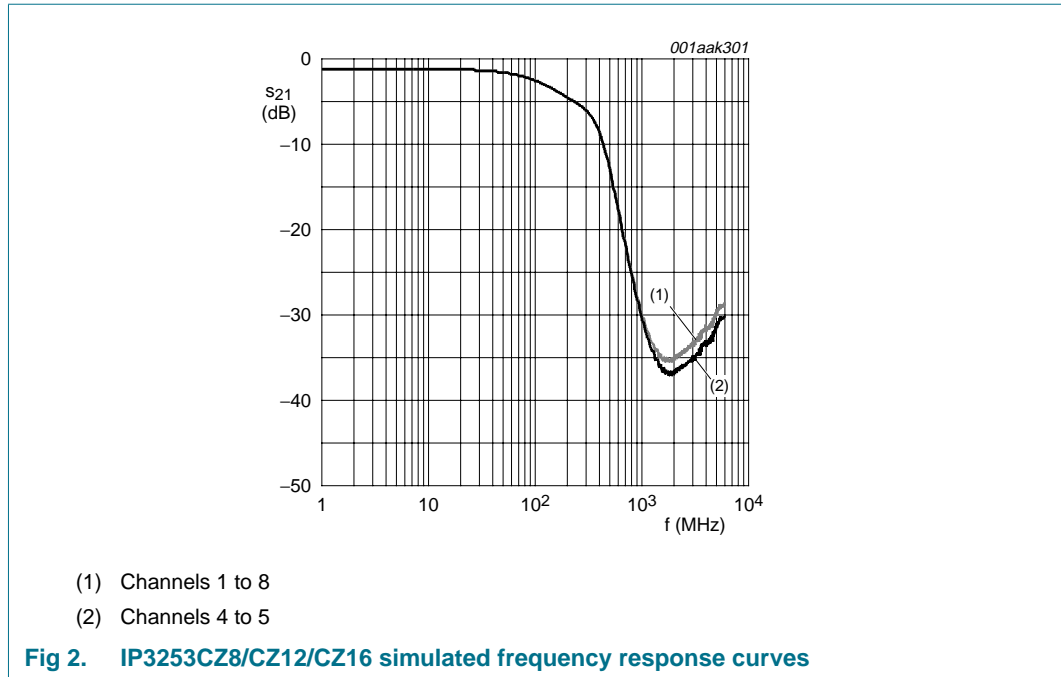
## 6. Application information

### 6.1 Insertion loss

The devices are specifically designed as EMI/RFI filters for multichannel interfaces.

The block schematic for measuring insertion loss in a  $50\text{ }\Omega$  system is shown in [Figure 1](#). An example of the measurement curves for all channels is shown in [Figure 2](#).





7. 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

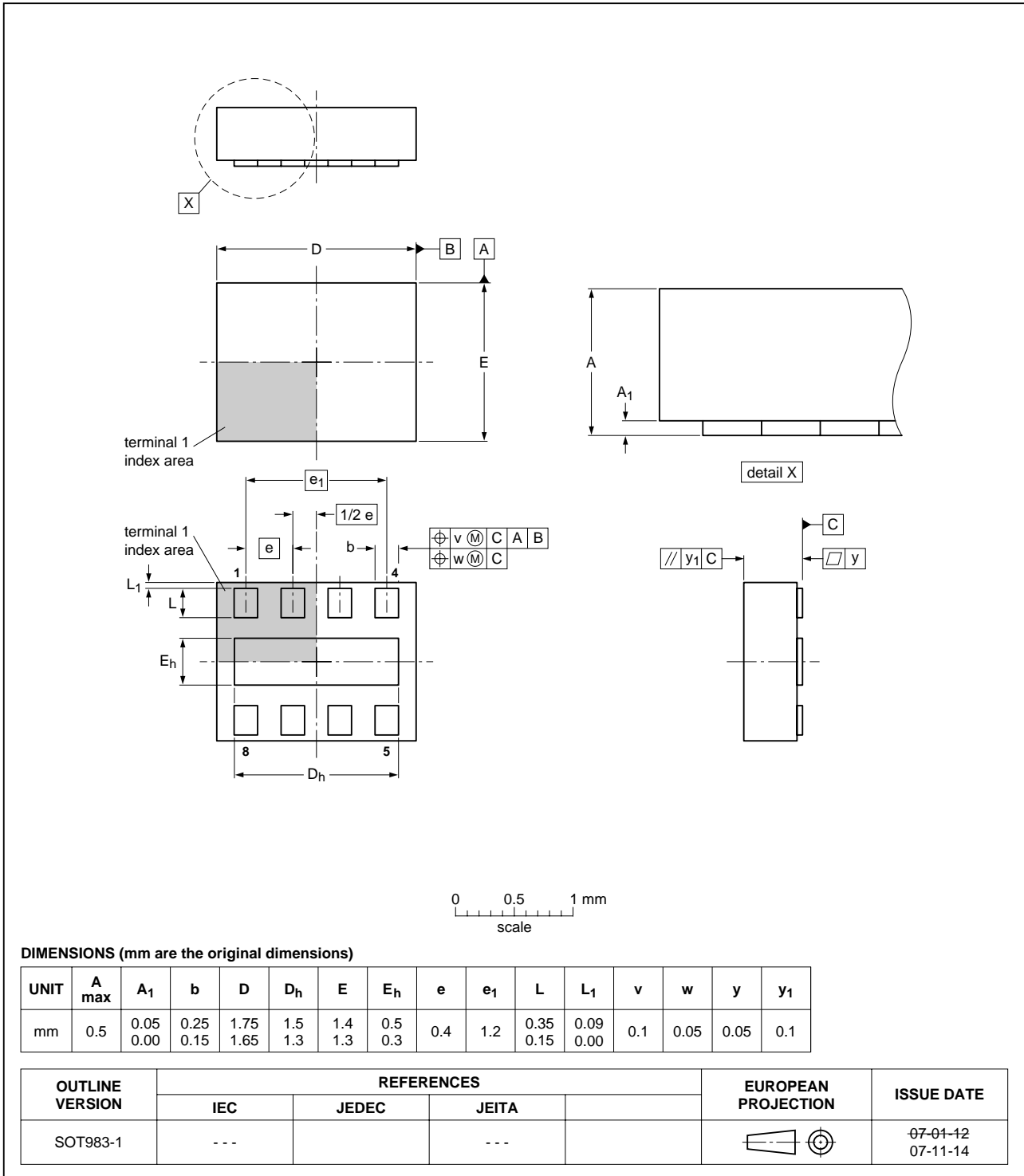


Fig 4. Package outline SOT983-1 (HXSON8U)

HXSON12U: plastic thermal enhanced extremely thin small outline package; no leads; 12 terminals; UTLP based; body 1.35 x 2.5 x 0.5 mm

SOT984-1

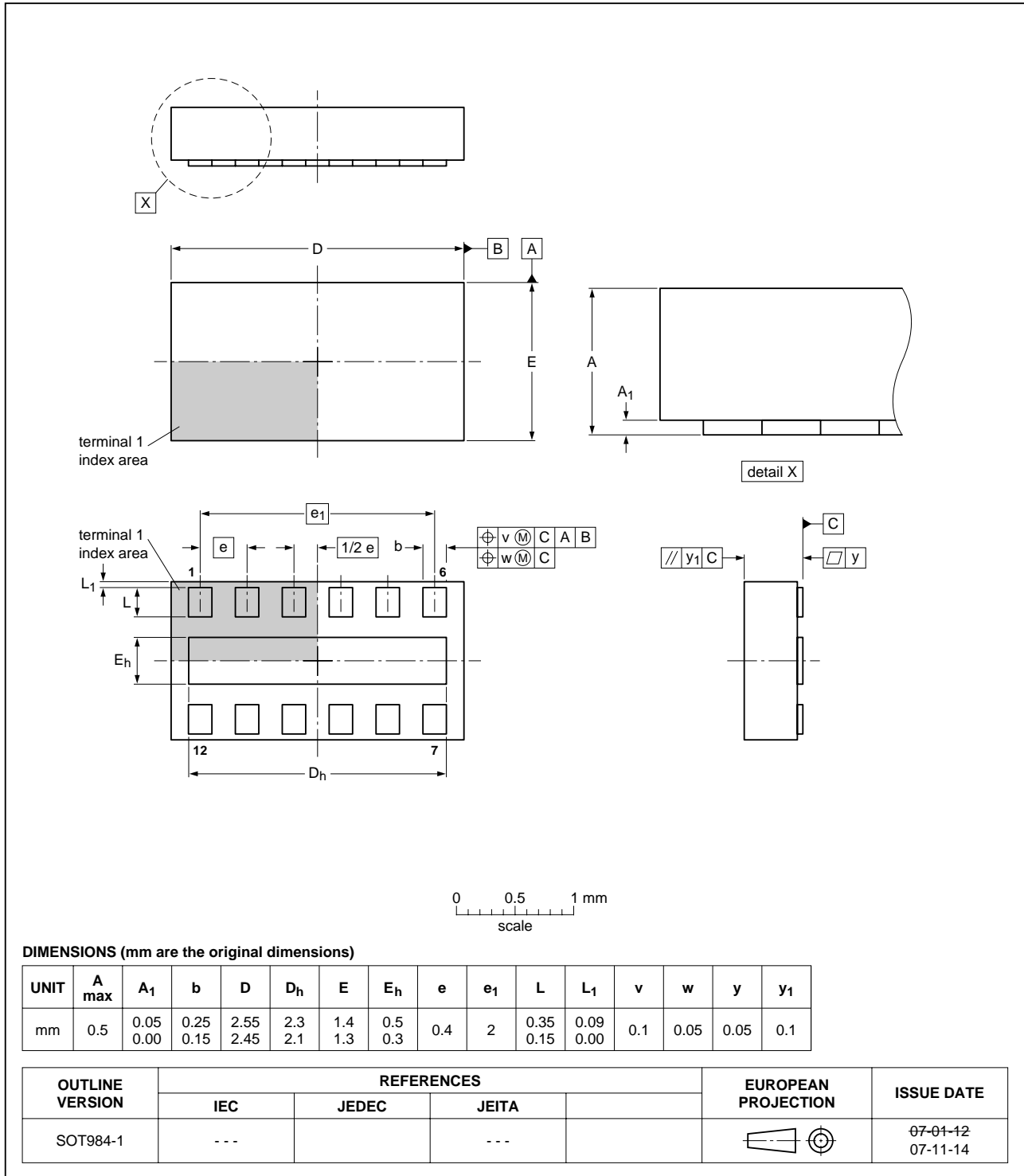


Fig 5. Package outline SOT984-1 (HXSON12U)

HXSON16U: plastic thermal enhanced extremely thin small outline package; no leads; 16 terminals; UTLP based; body 1.35 x 3.3 x 0.5 mm

SOT985-1

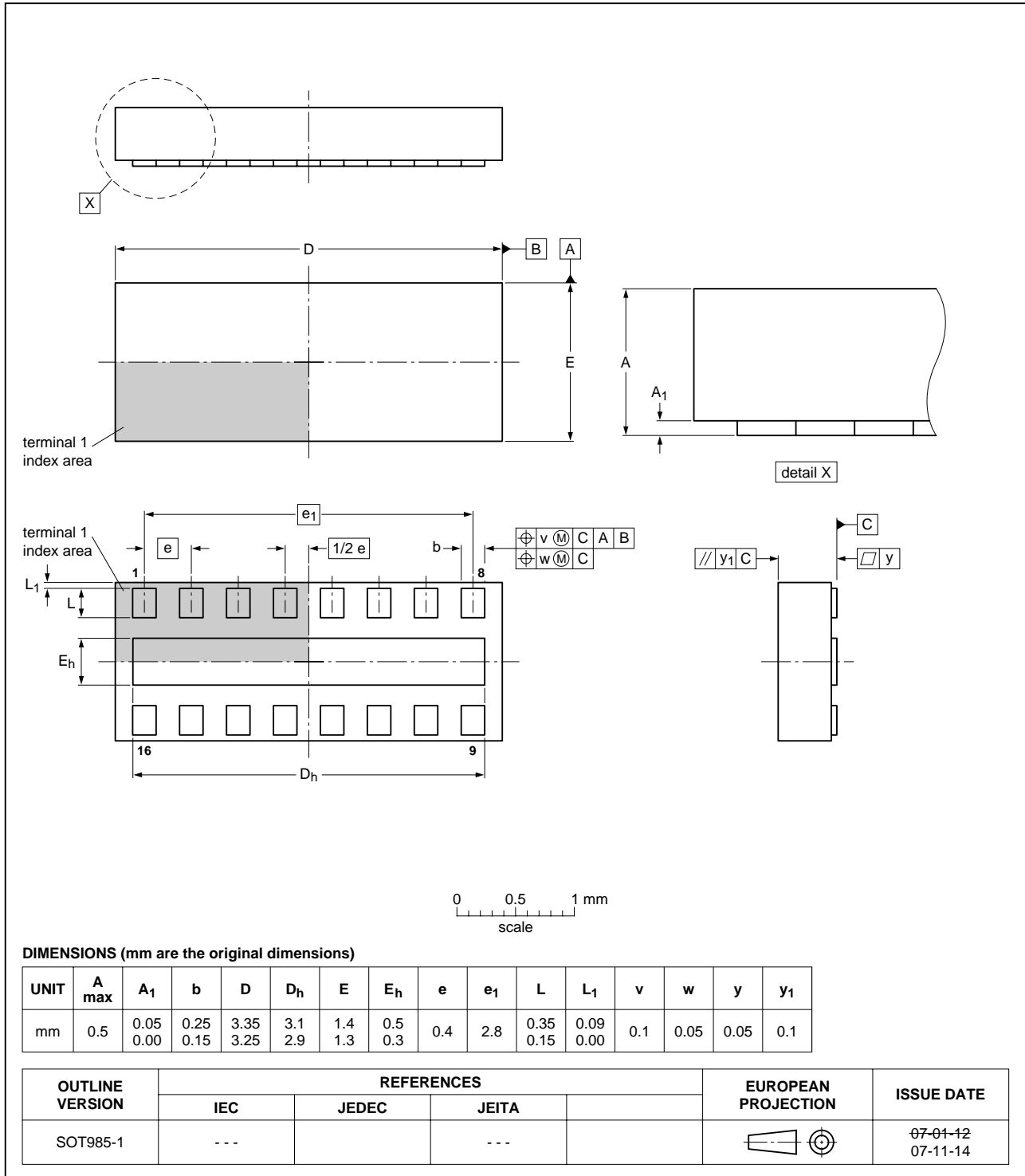


Fig 6. Package outline SOT985-1 (HXSON16U)

## 8. Abbreviations

Table 6. Abbreviations

Acronym	Description
EMI	ElectroMagnetic Interference
ESD	ElectroStatic Discharge
LAN	Local Area Network
PCB	Printed-Circuit Board
PCS	Personal Communication System
QFN	Quad Flat No leads
RFI	Radio Frequency Interference
RoHS	Restriction of Hazardous Substances
UTLP	Ultra-Thin Leadless Package
WAN	Wide Area Network

## 9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP3253CZ8_CZ12_CZ16_2	20091016	Objective data sheet	-	IP3253CZ8_CZ12_CZ16_1
Modifications:				
<ul style="list-style-type: none"> <li>• Various minor textual inconsistencies in the data sheet corrected.</li> <li>• Changed <a href="#">Table 5</a>: <math>\alpha_{il}</math> insertion loss 1 GHz &lt; <math>f_i</math> &lt; 3 GHz to 1 GHz &lt; <math>f_i</math> &lt; 4 GHz.</li> <li>• Changed <a href="#">Table 5</a>: <math>f_{-3dB}</math> cut-off frequency Typ value from 275 MHz to 175 MHz.</li> <li>• Changed <a href="#">Table 5</a>: <math>f_{roll-off}</math> roll-off frequency Typ value from 400 MHz to 370 MHz.</li> <li>• Replaced <a href="#">Section 6: Figure 2 on page 5</a>.</li> <li>• Added <a href="#">Section 6: Figure 3 on page 5</a>.</li> </ul>				
IP3253CZ8_CZ12_CZ16_1	20090514	Objective data sheet	-	-

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### 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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