

# IP3253/IP3254-TTL

Integrated 4-, 6- and 8-channel passive EMI-filter network with high-level ESD protection

Rev. 1 — 5 May 2011

Product data sheet

## 1. Product profile

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### 1.1 General description

The IP3253/IP3254-TTL 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 and computing devices. In addition, the IP3253/IP3254-TTL family incorporates diodes which protect downstream components from ElectroStatic Discharge (ESD) voltages up to  $\pm 15$  kV.

These devices are fabricated using monolithic silicon technology integrating up to 8 inductors and 16 diodes in a 0.4 mm pitch 8-, 12- or 16-pin ultra-thin leadless Quad Flat No-leads (QFN) plastic package.

### 1.2 Features and benefits

- Pb-free, Restriction of Hazardous Substances (RoHS) compliant and free of halogen and antimony (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, level 4
- ESD protection to  $\pm 30$  kV contact discharge according to MIL-STD-883 (method 3015) Human Body Model (HBM)
- QFN plastic package with 0.4 mm pitch and 0.5 mm height

### 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**

Pin	Description	Simplified outline	Graphic symbol
<b>IP3253CZ8-4-TTL; IP3254CZ8-4-TTL (SOT1166-1)</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>IP3253CZ12-6-TTL; IP3254CZ12-6-TTL (SOT1167-1)</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>IP3253CZ16-8-TTL; IP3254CZ16-8-TTL (SOT1168-1)</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-TTL	HUSON8	plastic, thermal enhanced ultra thin small outline package; no leads; 8 terminals; body 1.35 × 1.7 × 0.55 mm	SOT1166-1
IP3253CZ12-6-TTL	HUSON12	plastic, thermal enhanced ultra thin small outline package; no leads; 12 terminals; body 1.35 × 2.5 × 0.55 mm	SOT1167-1
IP3253CZ16-8-TTL	HUSON16	plastic, thermal enhanced ultra thin small outline package; no leads; 16 terminals; body 1.35 × 3.3 × 0.55 mm	SOT1168-1
IP3254CZ8-4-TTL	HUSON8	plastic, thermal enhanced ultra thin small outline package; no leads; 8 terminals; body 1.35 × 1.7 × 0.55 mm	SOT1166-1
IP3254CZ12-6-TTL	HUSON12	plastic, thermal enhanced ultra thin small outline package; no leads; 12 terminals; body 1.35 × 2.5 × 0.55 mm	SOT1167-1
IP3254CZ16-8-TTL	HUSON16	plastic, thermal enhanced ultra thin small outline package; no leads; 16 terminals; body 1.35 × 3.3 × 0.55 mm	SOT1168-1

### 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			
		HBM; MIL-STD-883, method 3015	-	±30	kV
		IEC 61000-4-2, level 4	[1] -	±15	kV
$I_{ch}$	channel current (DC)	$T_{amb} = 85\text{ °C}$	-	30	mA
$P_{ch}$	channel power dissipation		-	10	mW
$P_{tot}/pack$	total power dissipation per package	$T_{amb} = 85\text{ °C}$	-	500	mW
$T_{stg}$	storage temperature		-65	+150	°C
$T_{amb}$	ambient temperature		-40	+85	°C

[1] Device tested with 1000 pulses of ±15 kV contact discharges, according to the IEC 61000-4-2 model, far exceeding IEC 61000-4-2 level 4 (8 kV contact discharge).

## 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; $f_i = 100\text{ kHz}$	[1]			
		IP3253CZx-y-TTL	$V_{bias(DC)} = 2.5\text{ V}$	20	25	28.2
		$V_{bias(DC)} = 0\text{ V}$	34	43	48	pF
	IP3254CZx-y-TTL	$V_{bias(DC)} = 2.5\text{ V}$	25	33	40	pF
	$V_{bias(DC)} = 0\text{ V}$	38	50	60	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
$R_{(ch-ch)}$	resistance between channels	$V_I = 3.5\text{ V}$	10	-	-	$\text{M}\Omega$
$R_{s(ch)}$	channel series resistance		-	8	-	$\Omega$

[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
$\alpha_{ij}$	insertion loss	$R_{source} = 50\ \Omega$ ; $R_L = 50\ \Omega$ ; $1\text{ GHz} < f_i < 4\text{ GHz}$	-	30	-	dB
$f_{-3dB}$	cut-off frequency	$R_{source} = 50\ \Omega$ ; $R_L = 50\ \Omega$ ; $V_I = 0\text{ V}$				
		IP3253CZx-y-TTL	-	175	-	MHz
		IP3254CZx-y-TTL	-	145	-	MHz
$f_{rolloff}$	roll-off frequency	$R_{source} = 50\ \Omega$ ; $R_L = 50\ \Omega$ ; $V_I = 0\text{ V}$	[1]			
		IP3253CZx-y-TTL	-	350	-	MHz
		IP3254CZx-y-TTL	-	315	-	MHz

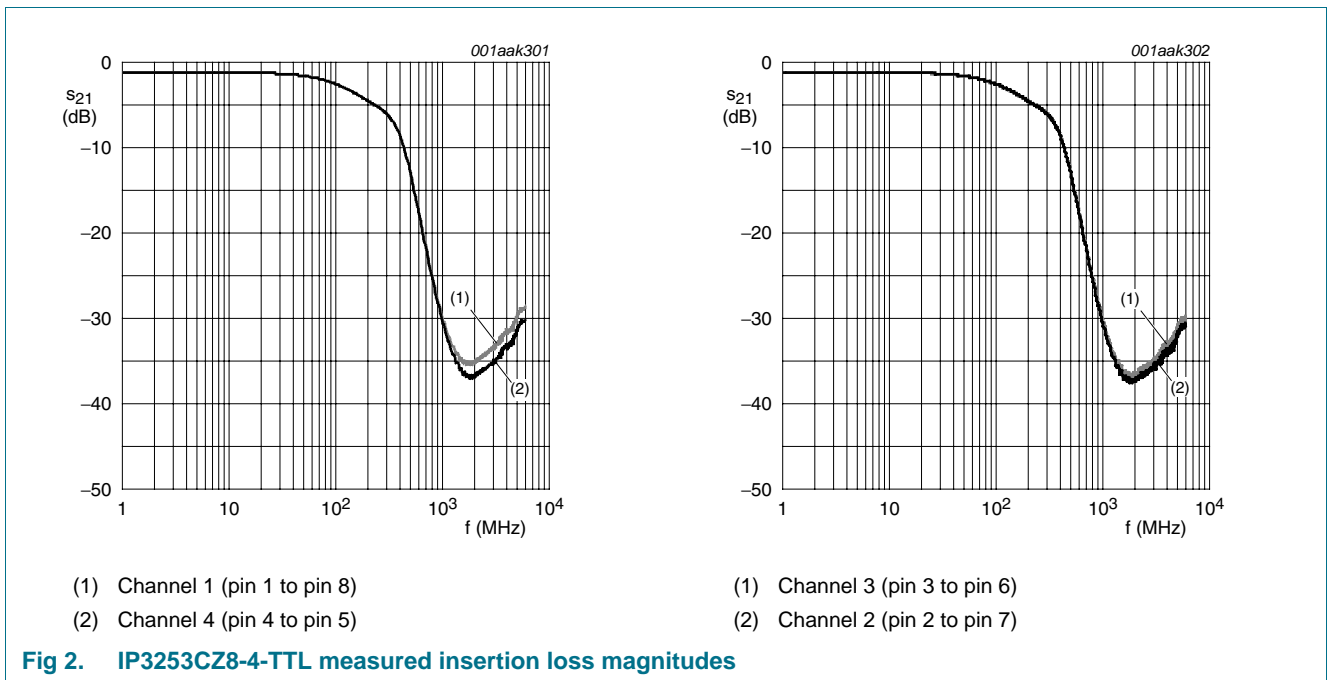
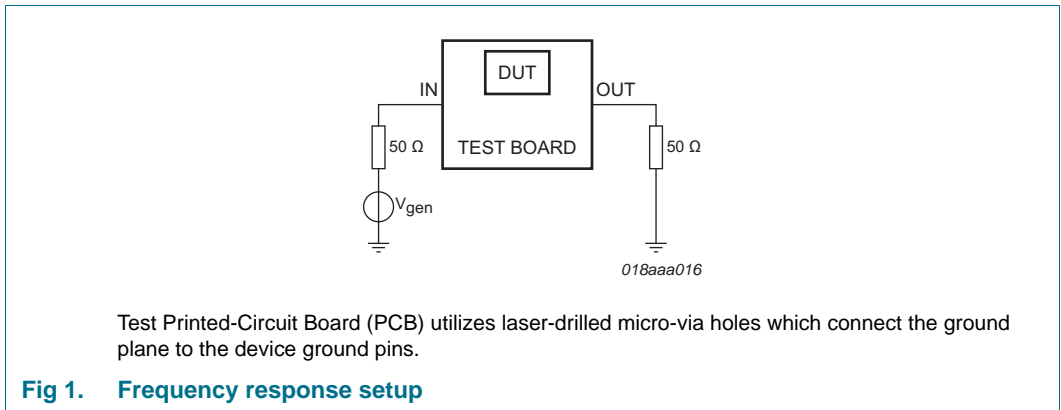
[1] Measured at 6 dB attenuation.

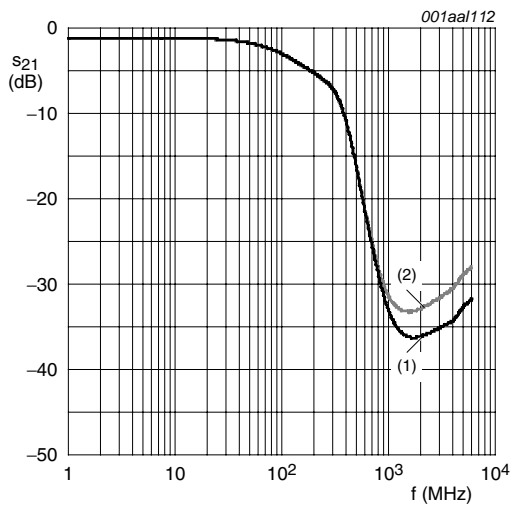
## 6. Application information

### 6.1 Insertion loss

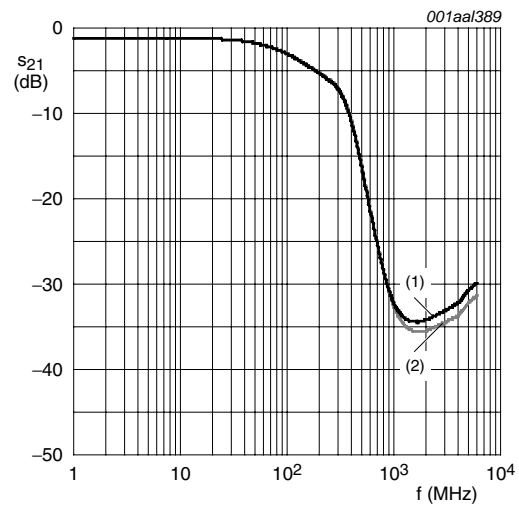
The devices are specifically designed as EMI/RFI filters for multichannel interfaces.

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





- (1) Channel 1 (pin 1 to pin 8)
- (2) Channel 4 (pin 4 to pin 5)



- (1) Channel 3 (pin 3 to pin 6)
- (2) Channel 2 (pin 2 to pin 7)

Fig 3. IP3254CZ8-4-TTL measured insertion loss magnitudes

7. Package outline

HUSON8: plastic, thermal enhanced ultra thin small outline package; no leads; 8 terminals; body 1.35 x 1.7 x 0.55 mm

SOT1166-1

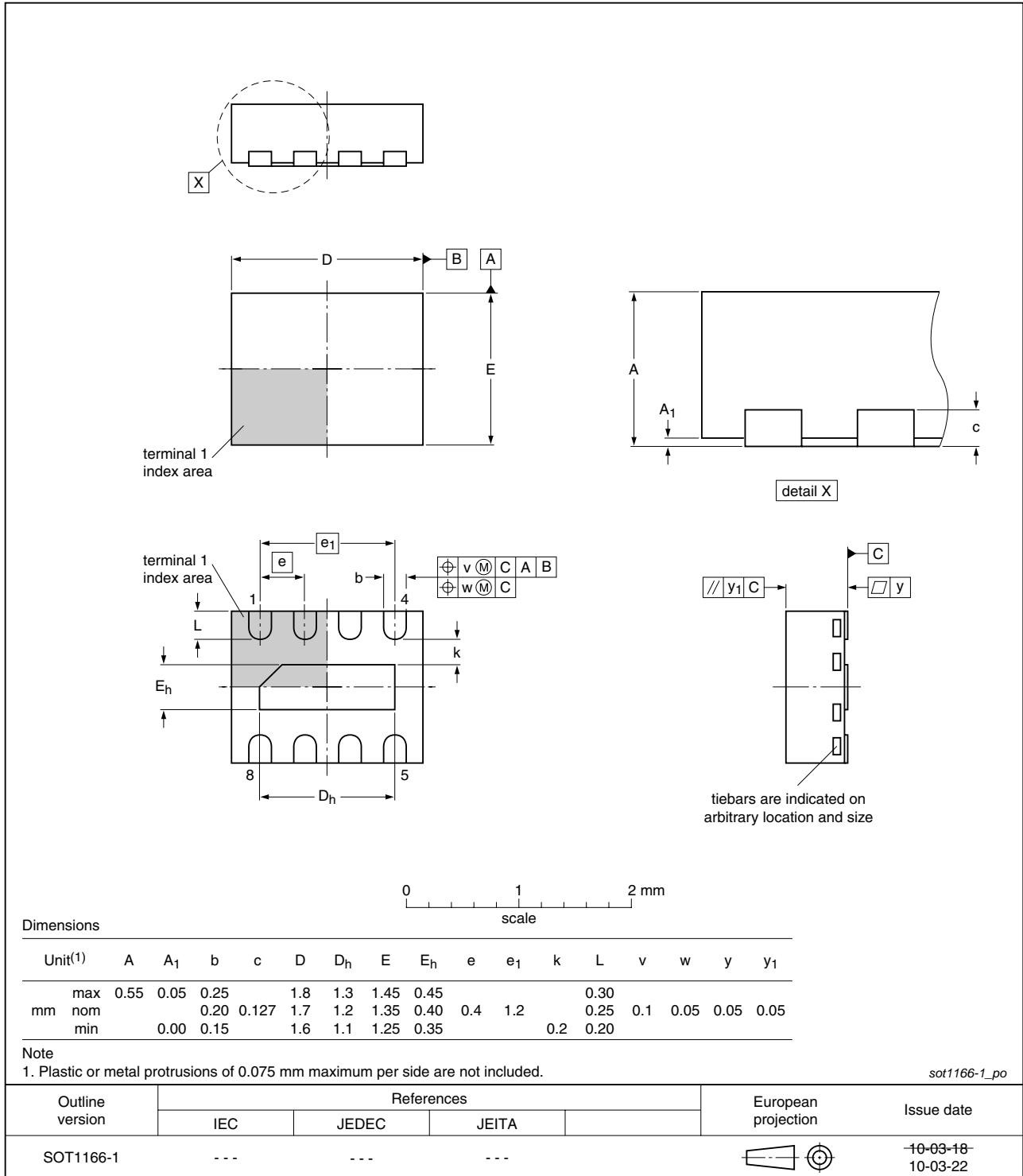


Fig 4. Package outline SOT1166-1 (HUSON8)

HUSON12: plastic, thermal enhanced ultra thin small outline package; no leads; 12 terminals; body 1.35 x 2.5 x 0.55 mm

SOT1167-1

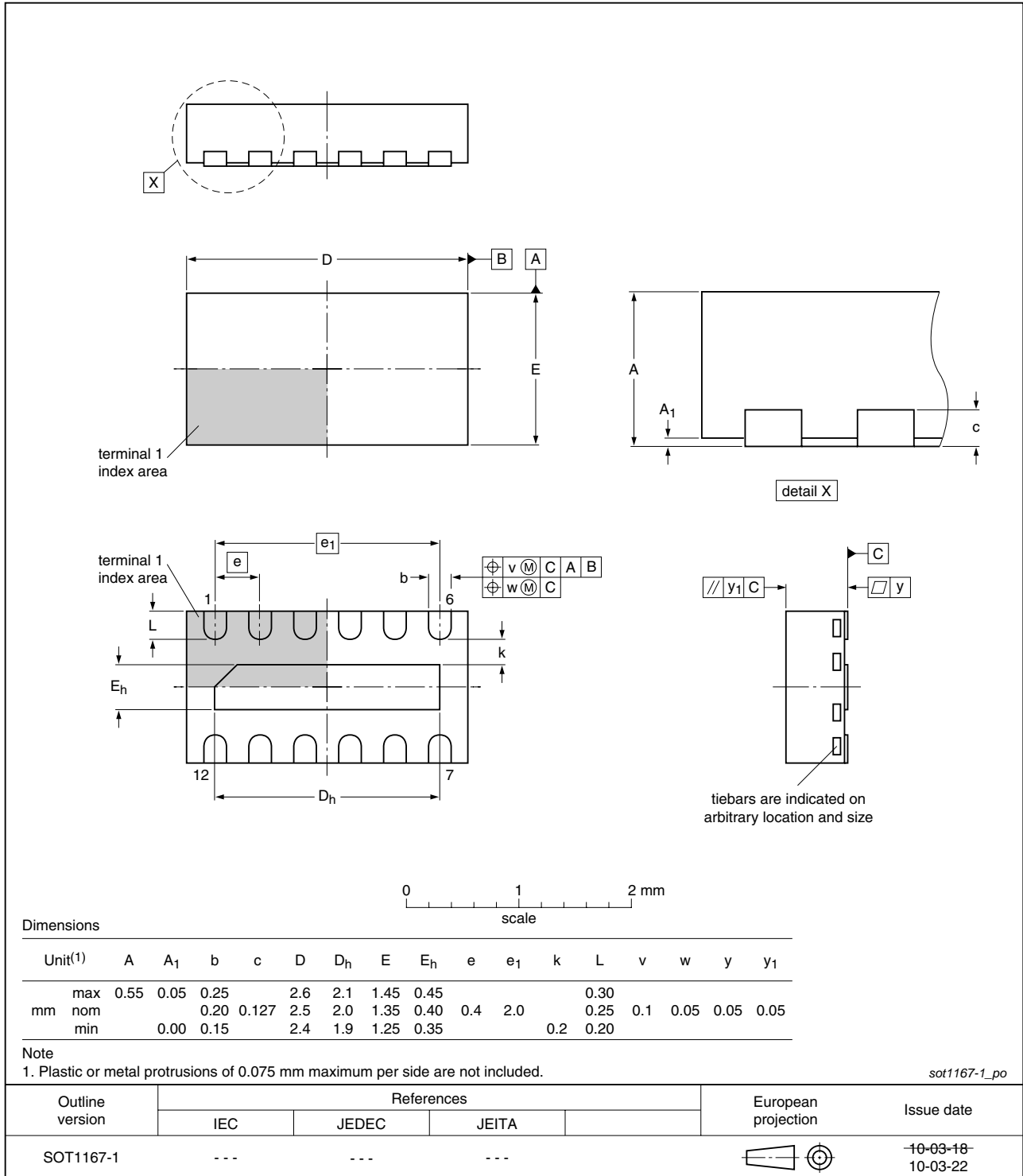


Fig 5. Package outline SOT1167-1 (HUSON12)



HUSON16: plastic, thermal enhanced ultra thin small outline package; no leads; 16 terminals; body 1.35 x 3.3 x 0.55 mm

SOT1168-1

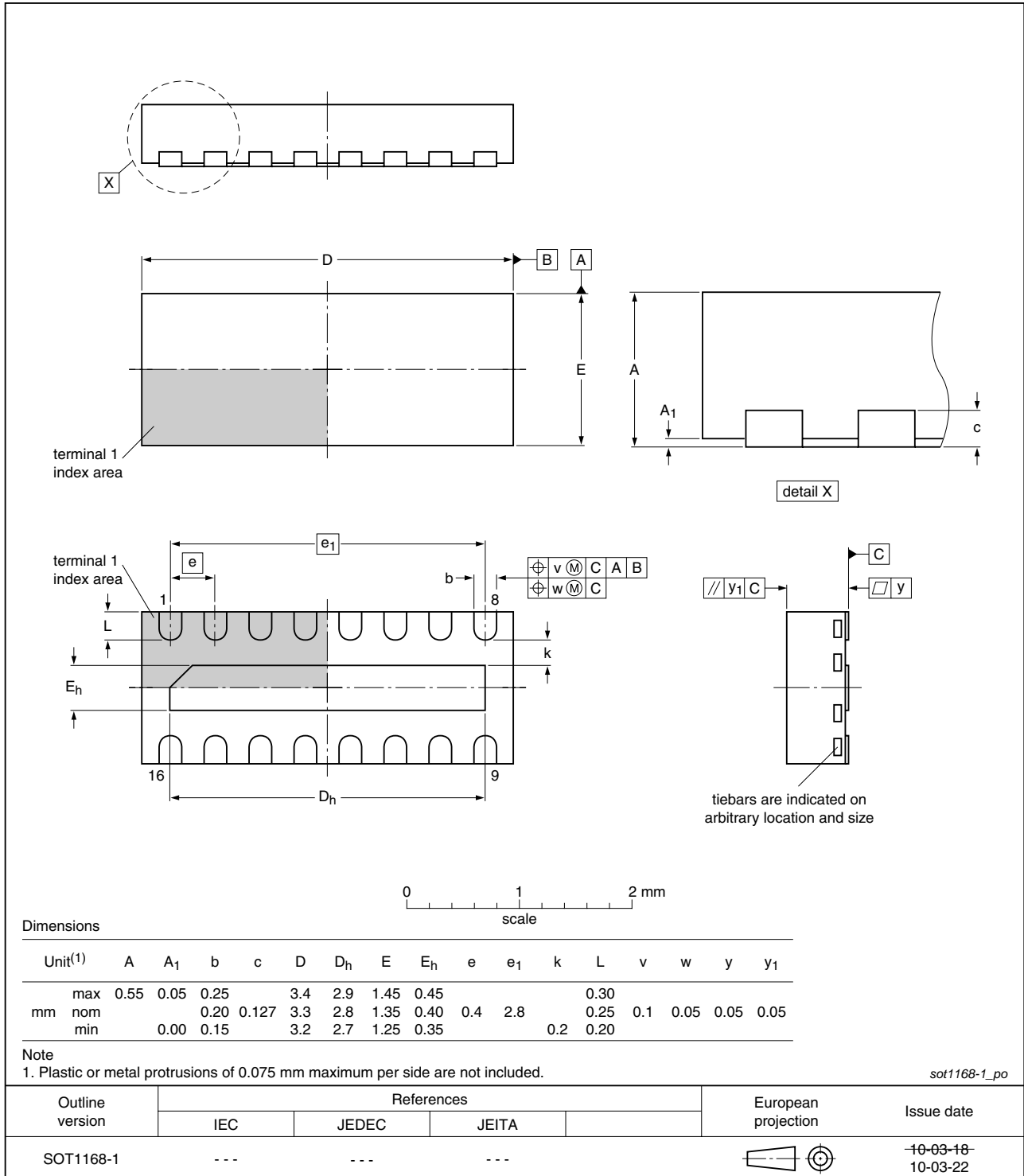


Fig 6. Package outline SOT1168-1 (HUSON16)

## 8. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP3253_IP3254-TTL v.1	20110505	Product data sheet	-	-

## 9. Legal information

### 9.1 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.

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Date of release: 5 May 2011  
 Document identifier: IP3253\_IP3254-TTL