IP4256CZ3-M/CZ5-W/CZ6-F

Single and dual-channel passive filter network with ESD protection

Rev. 1 — 23 July 2010 Product data sheet

1. Product profile

1.1 General description

The IP4256CZ3-M is a single-channel low-pass filter while the IP4256CZ5-W and IP4256CZ6-F are dual-channel RC low-pass filters. All devices provide high-level ElectroStatic Discharge (ESD) protection.

The devices are designed to protect a range of portable communication transmitter applications against unwanted RF signals. The devices incorporate diodes to provide protection to downstream components from ESD voltages up to ±25 kV contact discharge far exceeding IEC 61000-4-2, level 4.

The devices are manufactured using monolithic silicon technology in lead-free plastic packages.

1.2 Features and benefits

- Pb-free, Restriction of Hazardous Substances (RoHS) compliant and free of halogen and antimony (Dark Green compliant)
- 100 Ω series channel resistance and 30 pF channel capacitance at 0 V bias voltage (DC)
- ESD protection up to ±25 kV contact discharge far exceeding IEC 61000-4-2, level 4
- Single and dual-channel integrated π-type RC filter network
- IP4256CZ3-M: single-channel device in a 3-pin Quad Flat-pack No-leads (QFN) compatible MicroPak plastic package
- IP4256CZ5-W: dual-channel device in a 5-pin plastic package with 0.5 mm pitch
- IP4256CZ6-F: dual-channel device in a 6-pin QFN compatible MicroPak plastic package with 0.5 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 handset
  - Cordless telephone
  - Wireless data (WAN/LAN) system

1.4 Quick reference data

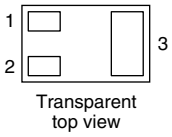
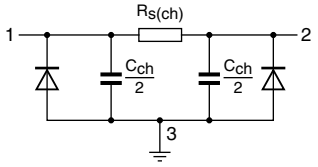
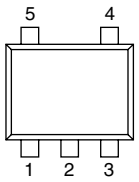
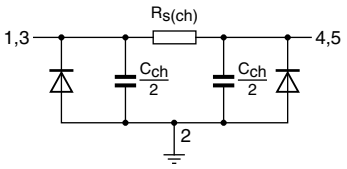
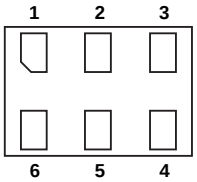
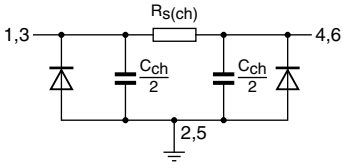
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{ESD}	electrostatic discharge voltage	all pins to ground	[1]				
		contact discharge		-	-	±25	kV
		air discharge		-	-	±25	kV
$R_{s(ch)}$	channel series resistance			80	100	120	Ω
C_{ch}	channel capacitance	for the total channel; f = 100 kHz					
		$V_{bias(DC)}$ = 0 V		-	30	-	pF
		$V_{bias(DC)}$ = 2.5 V		-	19	-	pF

[1] According to IEC 61000-4-2 model.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
IP4256CZ3-M (SOT883)			
1 and 2	channel 1 filter	 Transparent top view	 018aaa042
3	ground (GND)		
IP4256CZ5-W (SOT665)			
1 and 5	channel 1 filter		 018aaa043
2	ground (GND)		
3 and 4	channel 2 filter		
IP4256CZ6-F (SOT886)			
1 and 6	channel 1 filter	 bottom view	 018aaa044
2 and 5	ground (GND)		
3 and 4	channel 2 filter		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
IP4256CZ3-M	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
IP4256CZ5-W	-	plastic surface-mounted package; 5 leads	SOT665
IP4256CZ6-F	XSON-6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

4. Marking

Table 4. Marking codes

Type number	Marking code
IP4256CZ3-M	6M
IP4256CZ5-W	6W
IP4256CZ6-F	6F

5. Limiting values

Table 5. 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	[1]			
		contact discharge		-	±25	kV
		air discharge		-	±25	kV
		IEC 61000-4-2, level 4	[2]			
		contact discharge		-	±8	kV
		air discharge		-	±15	kV
P_{ch}	channel power dissipation	T_{amb} = 85 °C		-	60	mW
P_{tot}	total power dissipation	T_{amb} = 85 °C		-	120	mW
T_{stg}	storage temperature			−55	+150	°C
T_{amb}	ambient temperature			−40	+85	°C

[1] According to IEC 61000-4-2 model.

[2] Devices withstand up to 1000 discharges of ±25 kV according to the IEC 61000-4-2 model without degradation and exceeds the specified level 4 (8 kV contact discharge).

6. Characteristics

Table 6. Channel characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{s(ch)}$	channel series resistance		80	100	120	Ω
C_{ch}	channel capacitance	for the total channel; f = 100 kHz				
		$V_{bias(DC)}$ = 0 V	-	30	-	pF
		$V_{bias(DC)}$ = 2.5 V	-	19	-	pF
I_{RM}	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	−1.5	-	+0.4	V

Table 7. Frequency characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
α_{il}	insertion loss	R_{source} = 50 Ω; R_L = 50 Ω				
		800 MHz < f_i < 3 GHz	20	-	-	dB
		f_i = 1 GHz	-	25	-	dB
α_{ct}	crosstalk attenuation	R_{source} = 50 Ω; R_L = 50 Ω; 800 MHz < f_i < 3 GHz	-	25	-	dB

7. Application information

7.1 Insertion loss

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

The measured insertion loss in a 50 Ω system is shown in Figure 2.

The insertion loss was measured using a test Printed-Circuit Board (PCB) utilizing laser-drilled micro-via holes that connect the PCB ground plane to the ground pins of the device.

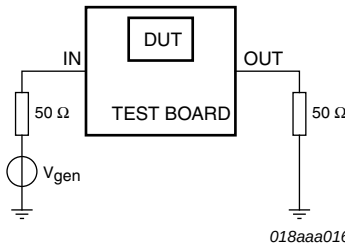
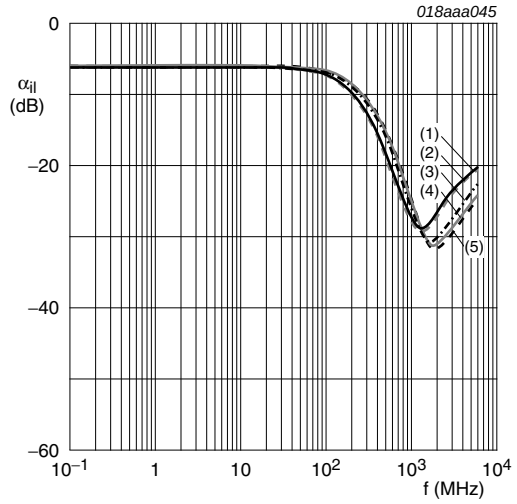


Fig 1. Frequency response setup



(1) IP4256CZ3-M

(2) IP4256CZ5-W; pins 1 to 5

(3) IP4256CZ5-W; pins 3 to 4

(4) IP4256CZ6-F; pins 1 to 6

(5) IP4256CZ6-F; pins 3 to 4

Fig 2. Frequency response curves

7.2 Example applications

The IP4256CZ3-M, IP4256CZ5-W and IP4256CZ6-F are designed as EMI/RFI filters for multichannel interfaces.

Device selection must be made taking the following into account:

- the maximum clock frequency
- the driver strength and the capacitive load
- the capacitive load of the heat sink
- the maximum applicable rise and fall times

7.2.1 Medium-speed applications: LCD interfaces

The devices can be used with digital interfaces running at clock speeds up to 25 MHz. Typical applications include LCD interfaces.

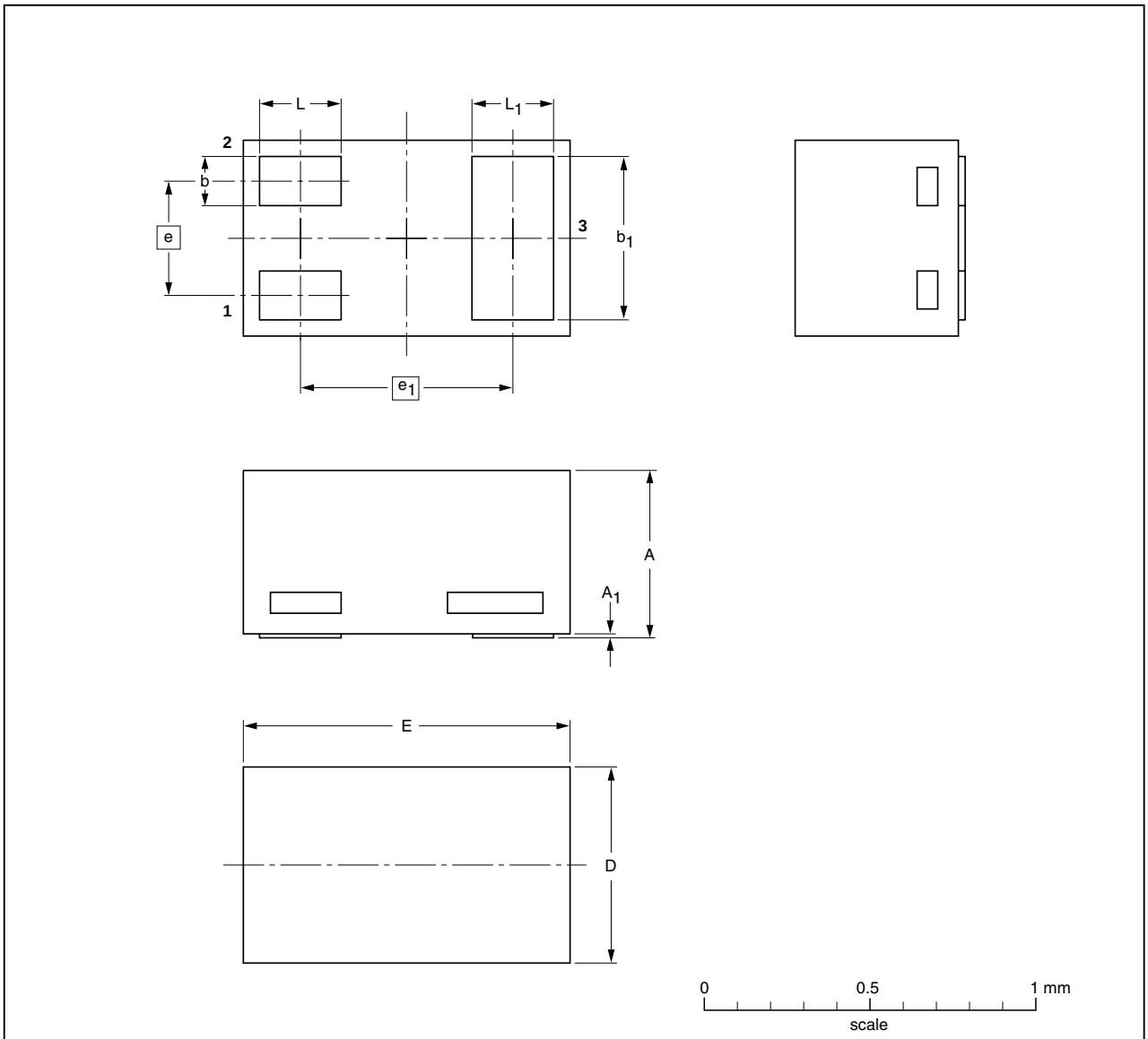
7.2.2 Low-speed applications: keypads, serial and control interfaces

The devices are ideally suited for applications with low transfer speeds which demand robust ESD protection and strong EMI filtering. This includes keypads, low-speed serial interfaces and low-speed control signals.

The very small footprint of the devices makes it easy to locate the ESD and EMI protection very close to the interface to be protected.

8. Package outline

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm **SOT883**



DIMENSIONS (mm are the original dimensions)

UNIT	A(1)	A_1 max.	b	b_1	D	E	e	e_1	L	L_1
mm	0.50 0.46	0.03	0.20 0.12	0.55 0.47	0.62 0.55	1.02 0.95	0.35	0.65	0.30 0.22	0.30 0.22

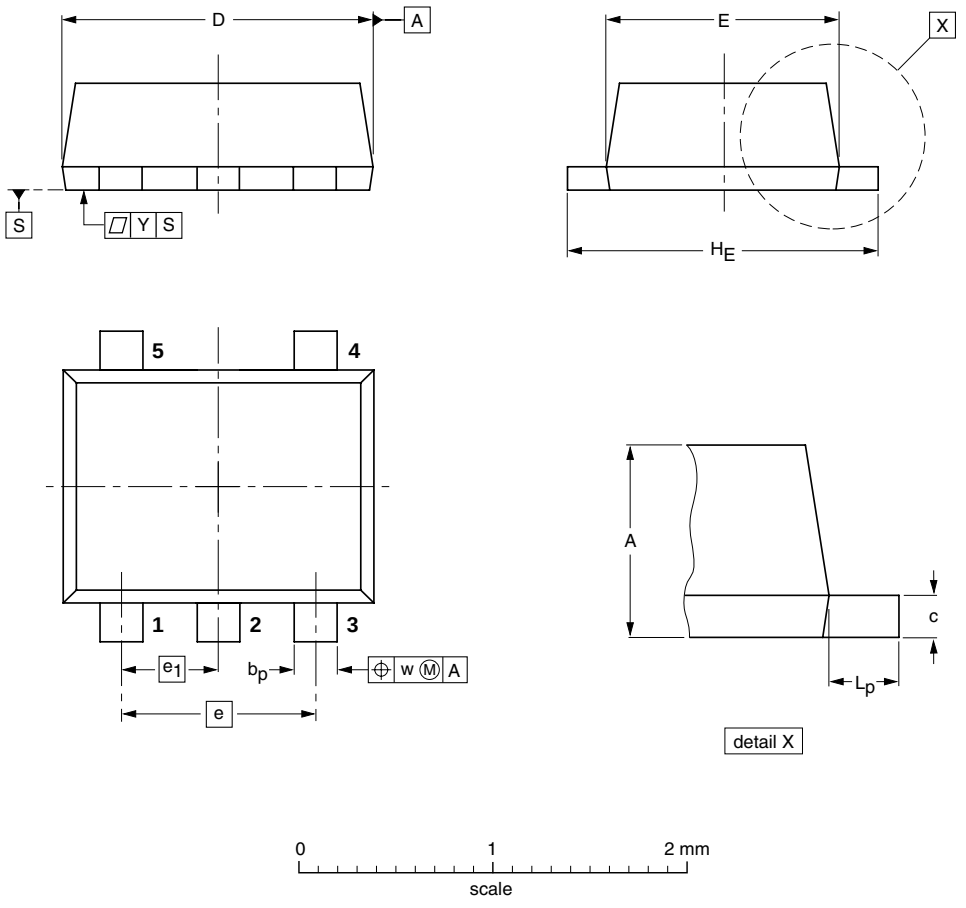
Note

1. Including plating thickness

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT883			SC-101			~~03-02-05~~ 03-04-03

Fig 3. Package outline SOT883 (SC-101)

Plastic surface-mounted package; 5 leads **SOT665**



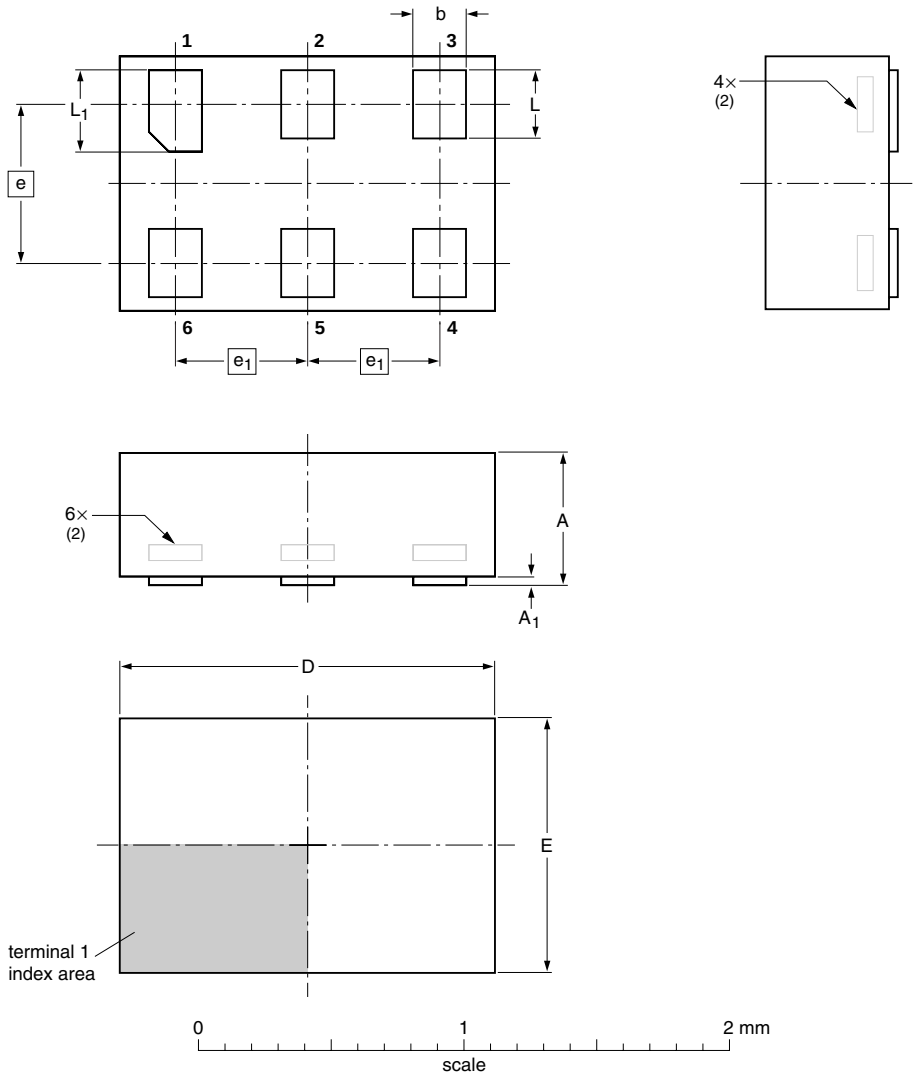
DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	E	e	e_1	H_E	L_p	w	y
mm	0.6 0.5	0.27 0.17	0.18 0.08	1.7 1.5	1.3 1.1	1.0	0.5	1.7 1.5	0.3 0.1	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT665						~~04-11-08~~ 06-03-16

Fig 4. Package outline SOT665

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm **SOT886**



DIMENSIONS (mm are the original dimensions)

UNIT	A(1) max	A1 max	b	D	E	e	e1	L	L1
mm	0.5	0.04	0.25 0.17	1.5 1.4	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

Notes

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT886		MO-252				~~04-07-15~~ 04-07-22

Fig 5. Package outline SOT886 (XSON-6/MO-252)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4256CZ3-M_CZ5-W_CZ6-F v.1	20100723	Product data sheet	-	-

10. Legal information

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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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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