

# 2 Channel Headset Microphone EMI Filter with ESD Protection

#### **Features**

- Functionally and pin compatible with CMD's CSPEMI202A
- OptiGuard<sup>™</sup> coated for improved reliability at assembly
- Two channels of EMI filtering
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- Greater than 40dB attenuation at 1GHz
- ±8kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±15kV ESD protection on each channel (HBM)
- Supports AC signals—ideal for audio applications
- Chip Scale Package features extremely low lead inductance for optimum filter and ESD performance
- 5-bump, 0.930mm X 1.410mm footprint Chip Scale Package (CSP)
- Lead-free version available

## **Applications**

- EMI filtering and ESD protection for headset microphone ports
- Wireless Handsets
- Handheld PCs / PDAs
- MP3 Players
- **Digital Camcorders**
- Notebooks
- Desktop PCs

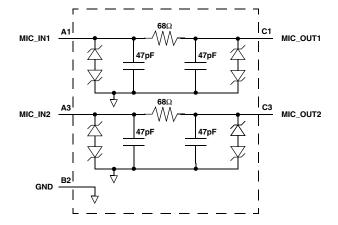
### **Product Description**

The CM1412 is a dual low-pass filter array integrating two pi-style filters (C-R-C) that reduce EMI/RFI emissions while at the same time providing ESD protection. This part is custom-designed to interface with a microphone port on a cellular telephone or similar device. Each high quality filter provides more than 35dB attenuation in the 800-2700 MHz range. These pi-style filters support bidirectional filtering, controlling EMI both to and from a microphone element. They also support AC signals, enabling audio signals to pass through without distortion.

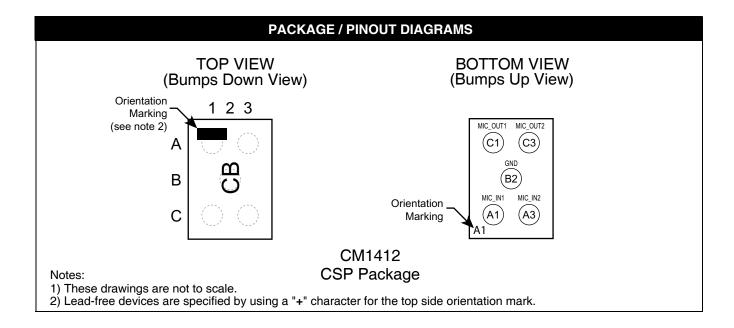
In addition, the CM1412 provides a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The input pins safely dissipate ESD strikes of ±8kV, the maximum requirement of the IEC 61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the device provides protection for contact discharges to greater than  $\pm 15kV$ .

The CM1412 is particularly well suited for portable electronics (e.g., cellular telephones, PDAs, notebook computers) because of its small package format and low weight. The CM1412 incorporates OptiGuard™ coating which results in improved reliability at assembly and is available in a space-saving, low-profile Chip Scale Package with optional lead-free finishing.

#### **Electrical Schematic**







PIN DESCRIPTIONS					
PIN NAME DESCRIPTION					
A1	MIC_IN1	Microphone Input 1 (from microphone)			
A3	MIC_IN2	Microphone Input 2 (from microphone)			
B2	GND	Device Ground			
C1	MIC_OUT1	Microphone Output 1 (to audio circuitry)			
C3	MIC_OUT2	Microphone Output 2 (to audio circuitry)			

# **Ordering Information**

	PART NUMBERING INFORMATION						
		Standa	rd Finish	Lead-fre	e Finish <sup>2</sup>		
		Ordering Part		Ordering Part			
Bumps	Package	Number <sup>1</sup>	Part Marking	Number <sup>1</sup>	Part Marking		
5	CSP	CM1412-03CS	СВ	CM1412-03CP	СВ		

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

Note 2: Lead-free devices are specified by using a "+" character for the top side orientation mark.



# **Specifications**

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	RATING	UNITS			
Storage Temperature Range	-65 to +150	°C			
DC Power per Resistor	100	mW			
DC Package Power Rating	200	mW			

STANDARD OPERATING CONDITIONS					
PARAMETER	RATING	UNITS			
Operating Temperature Range	-40 to +85	°C			

	ELECTRICAL OPERATING CHARACTERISTICS (NOTE 1)							
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS		
R <sub>1</sub>	Resistance		61	68	75	Ω		
C <sub>1</sub>	Capacitance		38	47	56	pF		
I <sub>LEAK</sub>	Diode Leakage Current	V <sub>IN</sub> =5.0V			1.0	μΑ		
V <sub>SIG</sub>	Signal Voltage Positive Clamp Negative Clamp	I <sub>LOAD</sub> = 10mA	5 -15	7 -10	15 -5	V V		
V <sub>ESD</sub>	In-system ESD Withstand Voltage a) Human Body Model, MIL-STD-883, Method 3015 b) Contact Discharge per IEC 61000-4-2 Level 4	Notes 2,4 and 5	±15			kV kV		
V <sub>CL</sub>	Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8kV Positive Transients Negative Transients	Notes 2,3,4 and 5		+15 -19		V V		
f <sub>C</sub>	Cut-off frequency $Z_{SOURCE} = 50\Omega$ , $Z_{LOAD} = 50\Omega$	R = 68Ω, C = 47pF		60		MHz		

Note 1:  $T_A=25$ °C unless otherwise specified.

Note 2: ESD applied to input and output pins with respect to GND, one at a time.

Note 3: Clamping voltage is measured at the opposite side of the EMI filter to the ESD pin. For example, if ESD is applied to Pin A1, then clamping voltage is measured at Pin C1.

Note 4: Unused pins are left open.

Note 5: These parameters are guaranteed by design and characterization.



### **Performance Information**

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

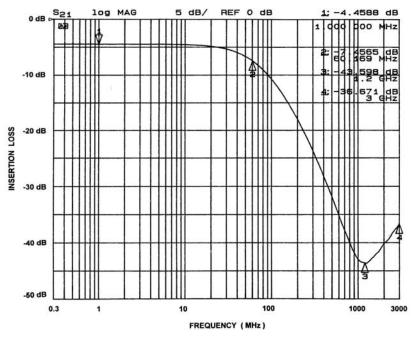


Figure 1. Insertion Loss VS. Frequency (A1-C1 to GND B2)

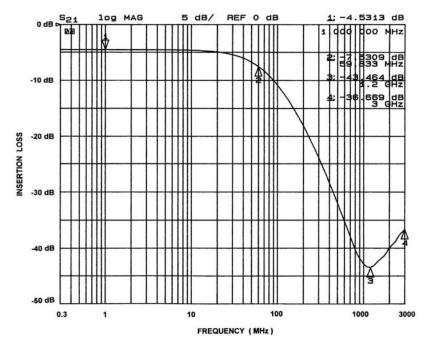


Figure 2. Insertion Loss VS. Frequency (A3-C3 to GND B2)



## **Application Information**

Refer to Application Note AP-217, "The Chip Scale Package", for a detailed description of Chip Scale Packages offered by California Micro Devices.

PRINTED CIRCUIT BOARD RECOMMENDATIONS					
PARAMETER	VALUE				
Pad Size on PCB	0.275mm				
Pad Shape	Round				
Pad Definition	Non-Solder Mask defined pads				
Solder Mask Opening	0.325mm Round				
Solder Stencil Thickness	0.125 - 0.150mm				
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.330mm Round				
Solder Flux Ratio	50/50 by volume				
Solder Paste Type	No Clean				
Pad Protective Finish	OSP (Entek Cu Plus 106A)				
Tolerance — Edge To Corner Ball	<u>+</u> 50μm				
Solder Ball Side Coplanarity	<u>+</u> 20μm				
Maximum Dwell Time Above Liquidous	60 seconds				
Maximum Soldering Temperature for Eutectic Devices using a Eutectic Solder Paste	240°C				
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C				

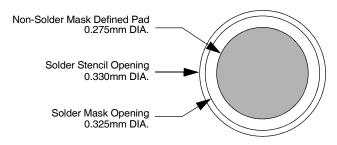


Figure 3. Recommended Non-Solder Mask Defined Pad Illustration

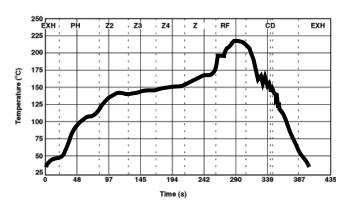


Figure 4. Eutectic (SnPb) Solder **Ball Reflow Profile** 

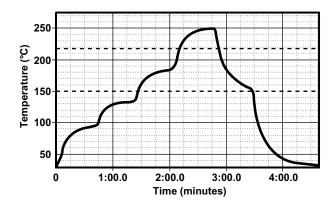


Figure 5. Lead-free (SnAgCu) Solder **Ball Reflow Profile** 

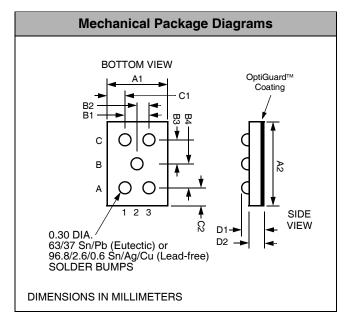


#### **Mechanical Details**

#### **CSP Mechanical Specifications**

CM1412 devices are packaged in a custom Chip Scale Package (CSP). Dimensions are presented below. For complete information on CSP packaging, see the California Micro Devices CSP Package Information document.

PACKAGE DIMENSIONS							
Pack	age	Custom CSP					
Bur	ıps	5					
Dim	M	lillimeters					
Diiii	Min	Nom	Max	Min	Nom	Max	
A1	0.885	0.930	0.975	0.0348	0.0366	0.0384	
A2	1.365	1.410	1.455	0.0537	0.0555	0.0573 0.0199	
B1	0.495	0.500	0.505	0.0195	0.0197		
B2	0.245	0.250	0.255	0.0096	0.0098	0.0100	
В3	0.430	0.435	0.440	0.0169 0.0171		0.0173	
B4	0.430	0.435	0.440	0.0169	0.0169 0.0171 0.0065 0.0085 0.0087 0.0106		
C1	0.165	0.215	0.265	0.0065			
C2	0.220	0.270	0.320	0.0087			
D1	0.575	0.644	0.714	0.0226 0.0254		0.0281	
D2	0.368	0.419	0.470	0.0145	0.0165	0.0185	
# per tap		3500 pieces					
	Controlling dimension: millimeters						



**Package Dimensions for** CM1412 Chip Scale Package

#### **CSP Tape and Reel Specifications**

PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B <sub>0</sub> X A <sub>0</sub> X K <sub>0</sub>	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P <sub>0</sub>	P <sub>1</sub>
CM1412	1.41 X 0.95 X 0.644	1.52 X 1.07 X 0.720	8mm	178mm (7")	3500	4mm	4mm

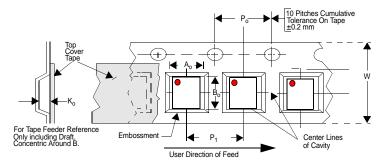


Figure 6. Tape and Reel Mechanical Data