# 2-Channel Headset / Microphone EMI Filter Array with ESD Protection

# **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 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 35 dB attenuation in the 800 to 2700 MHz range. These pi-style filters support bidirectional filtering that control 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  $\pm 8$  kV, 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  $\pm 15$  kV.

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  $OptiGuard^{TM}$  coating which results in improved reliability at assembly and is available in a space–saving, low–profile Chip Scale Package with lead–free finishing.

## Features

- Functionally and Pin Compatible with ON Semiconductor'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 40 dB Attenuation at 1 GHz
- ±8 kV ESD Protection on Each Channel (IEC 61000-4-2 Level 4, Contact Discharge)
- ±15 kV 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, 0.930 mm X 1.410 mm Footprint Chip Scale Package (CSP)
- These Devices are Pb-Free and are RoHS Compliant

#### **Applications**

- EMI Filtering and ESD Protection for Headset Microphone Ports
- Wireless Handsets
- Handheld PCs / PDAs
- MP3 Players



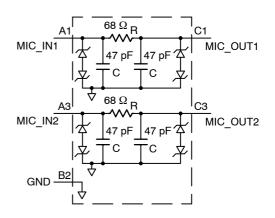
# ON Semiconductor®

http://onsemi.com



WLCSP5 CP SUFFIX CASE 567AZ

### **BLOCK DIAGRAM**



#### **MARKING DIAGRAM**

СВ

CB = CM1412-03CP

### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
CM1412-03CP	WLCSP5	3500/Tape & Reel
	(Pb-Free)	

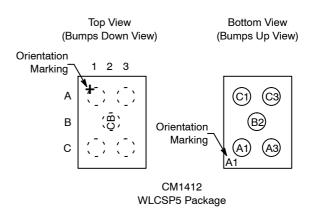
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

- Digital Camcorders
- Notebooks
- Desktop PCs

**Table 1. PIN DESCRIPTIONS** 

Pin	Name	Description	
A1	MIC_IN1	Microphone Input 1 (from Microphone)	
А3	MIC_IN2	Microphone Input 2 (from Microphone)	
B2	GND	Device Ground	
C1	MIC_OUT1	Microphone Output 1 (to Audio Circuitry)	
СЗ	MIC_OUT2	Microphone Output 2 (to Audio Circuitry)	

#### **PACKAGE / PINOUT DIAGRAMS**



# **SPECIFICATIONS**

**Table 2. 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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Table 3. STANDARD OPERATING CONDITIONS** 

Parameter	Rating	Units
Operating Temperature Range	-40 to +85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Тур	Max	Units
R	Resistance		61	68	75	Ω
R <sub>MATCH</sub>	Resistance Matching				5	%
С	Capacitance		38	47	56	pF
I <sub>LEAK</sub>	Diode Leakage Current	V <sub>IN</sub> = 5.0 V			1.0	μΑ
V <sub>SIG</sub>	Signal Voltage Positive Clamp Negative Clamp	I <sub>LOAD</sub> = 10 mA	5 -15	7 –10	15 –5	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 and 4)	±15 ±8			kV
V <sub>CL</sub>	Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8 kV Positive Transients Negative Transients	(Notes 2, 3 and 4)		+15 -19		V
f <sub>C</sub>	Cut-Off Frequency, $Z_{SOURCE}$ = 50 $\Omega$ , $Z_{LOAD}$ = 50 $\Omega$	R = 68 Ω, C = 47 pF		60		MHz

<sup>1.</sup> T<sub>A</sub> = 25°C unless otherwise specified.

<sup>2.</sup> ESD applied to input and output pins with respect to GND, one at a time.

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.

<sup>4.</sup> Unused pins are left open.

# PERFORMANCE INFORMATION

Typical Filter Performance (nominal conditions unless specified otherwise, 50  $\Omega$  Environment)

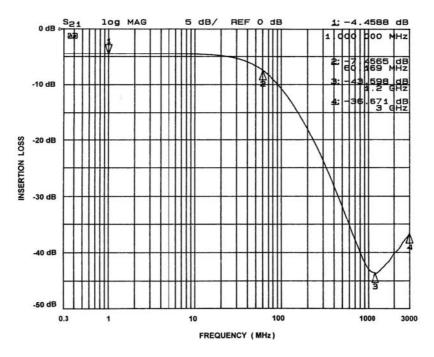


Figure 1. Insertion Loss vs. Frequency (A1-C1 to GND B2)

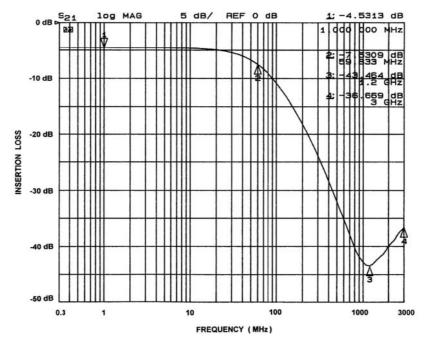


Figure 2. Insertion Loss vs. Frequency (A3-C3 to GND B2)

# CM1412

# **APPLICATION INFORMATION**

Parameter	Value	
Pad Size on PCB	0.240 mm	
Pad Shape	Round	
Pad Definition	Non-Solder Mask defined pads	
Solder Mask Opening	0.290 mm Round	
Solder Stencil Thickness	0.125 mm – 0.150 mm	
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300 mm 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	±50 μm	
Solder Ball Side Coplanarity	±20 μm	
Maximum Dwell Time Above Liquidous	60 seconds	
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C	

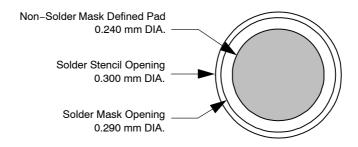


Figure 3. Recommended Non-Solder Mask Defined Pad Illustration

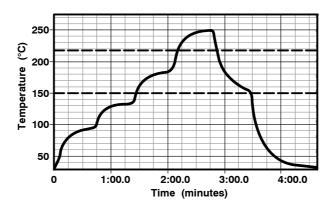


Figure 4. Lead-free (SnAgCu) Solder Ball Reflow Profile







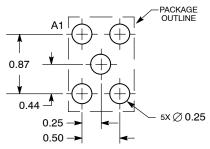
WLCSP5, 0.94x1.41 CASE 567AZ ISSUE O

**DATE 26 JUL 2010** 

- NOTES:
  1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

	MILLIMETERS			
DIM	MIN	MAX		
Α	0.56	0.72		
A1	0.21	0.27		
A2	0.40 REF			
b	0.29	0.35		
D	0.94 BSC			
E	1.41 BSC			
eD	0.50 BSC			
еE	0.435 BSC			

#### **RECOMMENDED SOLDERING FOOTPRINT\***



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PIN A1 REFERENCE
2X
OptiGuard Option A2  0.05 C  NOTE 3 A1 SIDE VIEW  OptiGuard Option A2  A  SEATING PLANE
5x Ø b  0.05 C A B  0.03 C  B  1 2 3  BOTTOM VIEW

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