





# Headset/Speaker EMI Filter with ESD Protection

## CM1416

### Features

- Functionally and pin compatible with the CSPEMI201A and CM1411
- *OptiGuard*™ coated for improved reliability at assembly
- Two channels of EMI filtering for 8Ω speakers
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- Greater than 30dB attenuation at 1GHz
- ±30kV ESD protection on each channel per IEC 61000-4-2 Level 4, contact discharge
- Extremely low lead inductance for optimum filter and ESD performance
- 5-bump, 0.96mm X 1.33mm footprint Chip Scale Package (CSP)
- RoHS-compliant, lead-free finishing

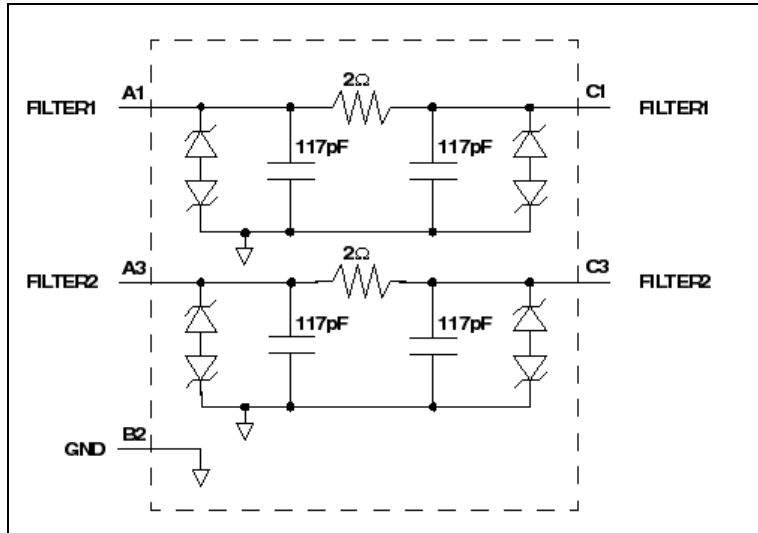
### Applications

- Headset Speaker port in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.

### Product Description

The CM1416 is an EMI filter array with ESD protection, which integrates two Pi-filters (C-R-C). The CM1416 has component values of 117pF-2 - 117pF. The parts include avalanche-type ESD diodes on every pin, which provide a very high level of

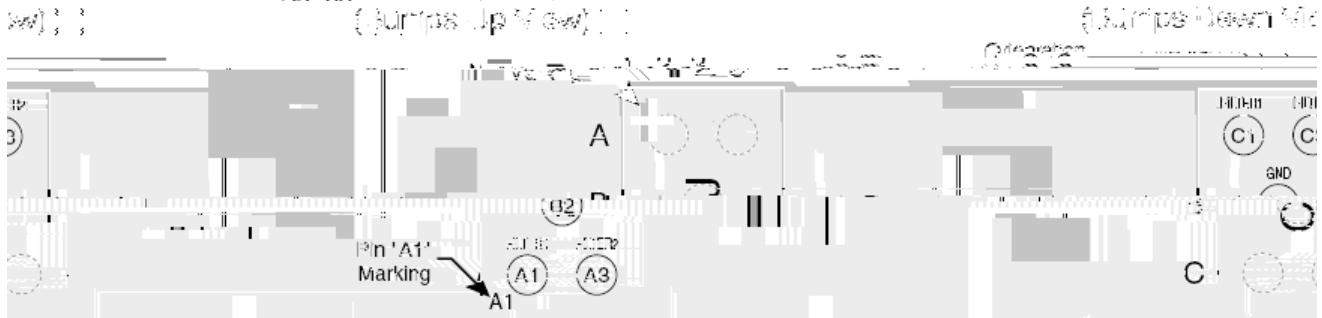
**Block Diagram**



**PACKAGE / PINOUT DIAGRAMS**

TOP VIEW

BOTTOM VIEW



CM1416

5-Bump CSP Package

Notes:

1) These drawings are not to scale.

CM1416

### PIN DESCRIPTIONS

PIN	NAME	DESCRIPTION
A1	FILTER1	EMI Filter 1
A3	FILTER2	EMI Filter 2
B2	GND	Device Ground
C1	FILTER1	EMI Filter 1
C3	FILTER2	EMI Filter 2

### Ordering Information

#### PART NUMBERING INFORMATION

Pins	Package	Lead-free Finish	
		Ordering Part Number <sup>1</sup>	Part Marking
5	CSP	CM1416-03CP	CJ

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

### Specifications

#### ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNITS
Storage Temperature Range	-65 to +150	°C
DC Power per Resistor (note 5)	100	mW
DC Package Power Rating (note 5)	500	mW

#### STANDARD OPERATING CONDITIONS

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

**ELECTRICAL OPERATING CHARACTERISTICS** (SEE NOTE 1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
R	R1 Resistance			2		$\Omega$
C <sub>TOT</sub>	Total Channel Capacitance	At 2.5VDC, 1MHz, 30mVAC	187	234	281	pF
C <sub>1</sub>	C1 Capacitance	At 2.5VDC, 1MHz, 30mVAC	93	117	140	pF
V <sub>DIODE</sub>	Diode Standoff Voltage	I <sub>DIODE</sub> = 10 A		6.0		V
I <sub>LEAK</sub>	Diode Leakage Current	V <sub>IN</sub> = 3.3V (reverse bias voltage)		0.1	2	$\mu$ A
V <sub>SIG</sub>	Signal Clamp Voltage Positive Clamp Negative Clamp	I <sub>LOAD</sub> = 10mA I <sub>LOAD</sub> = -10mA	6.4 -9.8	7.6 -7.6	9.8 -6.4	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	Note 2				
				$\pm 30$		
				$\pm 30$		

CM1416

## Application Information

PARAMETER	VALUE
Pad Size on PCB	0.240mm
Pad Shape	Round
Pad Definition	Non-Solder Mask defined pads
Solder Mask Opening	0.290mm Round
Solder Stencil Thickness	0.125mm - 0.150mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300mm Round

# CM1416

## Mechanical Details


### CSP Mechanical Specifications

The CM1416 is supplied in a custom Chip Scale Package (CSP). Dimensions are presented below.

PACKAGE DIMENSIONS						
<b>Package</b>	Custom CSP					
<b>Bumps</b>	5					
<b>Dim</b>	<b>Millimeters</b>			<b>Inches</b>		
	<b>Min</b>	<b>Nom</b>	<b>Max</b>	<b>Min</b>	<b>Nom</b>	<b>Max</b>





ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such