2 Channel Headset EMI Filter with ESD Protection

Features

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- Two channels of EMI filtering, one for a microphone and one for an earpiece speaker
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- Chip Scale Package features extremely low parasitic inductance for optimum filter performance
- Greater than 30dB relative attenuation in the 800-2700MHz range
- ±8kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±15kV ESD protection on each channel (HBM)
- 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 and earpiece speaker ports
- Cellular / Mobile Phones
- Notebooks and Personal Computers
- Handheld PCs / PDAs / Tablets
- Wireless Handsets
- Digital Camcorders

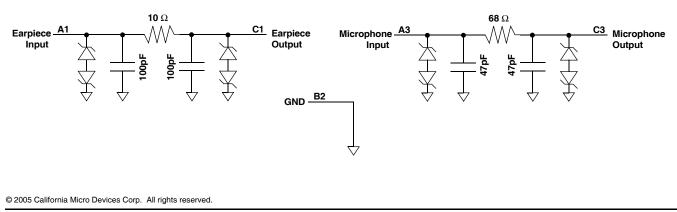
Product Description

The CSPEMI204 is a low-pass filter array designed specifically to reduce EMI/RFI emissions and provide ESD protection for a headset port on a cellular and mobile devices. The CSPEMI204 integrates two high quality, pi-style filters (C-R-C) filters, one for a microphone and one for an earpiece or speaker, each providing more than 30dB attenuation relative to the pass band attenuation in the 800-2700 MHz range. These filters support bidirectional filtering, reducing EMI both to and from the headset port and support bipolar audio signals without distortion.

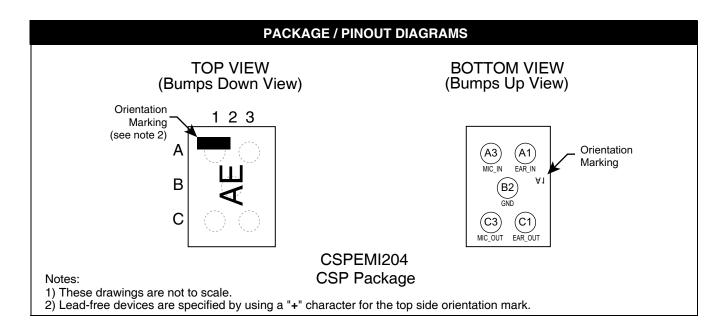
In addition, the CSPEMI204 provides a very high level of protection for sensitive electronic components that may be subject to electrostatic discharge (ESD). The CSPEMI204 can safely dissipate ESD strikes of \pm 8kV, the maximum requirement of the IEC 61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the device provides protection for contact discharges to greater than \pm 15kV. The CSPEMI204 protects sensitive components such as CPU and DSPs that have much weaker internal ESD protection circuitry usually only intended for mechanical handling protection.

The CSPEMI204 is particularly well-suited for portable electronics because of its small package format and low weight. The CSPEMI204 is available in a spacesaving, low-profile Chip Scale Package with optional lead-free finishing.

Electrical Schematic







PIN DESCRIPTIONS					
PIN	PIN NAME DESCRIPTION				
A1	EAR_IN	Earpiece Input (from audio circuitry)			
A3	A3 MIC_IN Microphone Input (from microphone)				
B2	2 GND Device Ground				
C1	EAR_OUT	Earpiece Output (to earpiece)			
C3	MIC_OUT	Microphone Output (to audio circuitry)			

Ordering Information

PART NUMBERING INFORMATION							
		Standar	rd Finish	Lead-fre	e Finish ²		
_	_ .	Ordering Part		Ordering Part			
Bumps	Package	Number ¹	Part Marking	Number ¹	Part Marking		
5	CSP	CSPEMI204	AE	CSPEMI204G	AE		

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	300	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 ₁	Resistance		9	10	11	Ω			
R ₂	Resistance		54	68	75	Ω			
C ₁	Capacitance		80	100	120	pF			
C ₂	Capacitance		38	47	57	pF			
I _{LEAK}	Diode Leakage Current	V _{IN} =5.0V			1.0	μA			
V _{SIG}	Signal Voltage Positive Clamp Negative Clamp	I _{LOAD} = 10mA	5 -15	7 -10	15 -5	V V			
V _{ESD}	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 kV			
V _{CL}	Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8kV Positive Transients Negative Transients	Notes 2,3 and 4		+15 -19		V V			
f _{C1}	Cut-off frequency 1; Note 5	R = 10Ω, C = 100pF		33		MHz			
f _{C2}	Cut-off frequency 2; Note 5	R = 68Ω, C = 47pF		61		MHz			

Note 1: $T_A=25^{\circ}C$ 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: The parameters are guaranteed by design.

Note 5: Z_{SOURCE} =50 Ω , Z_{LOAD} =50 Ω

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Performance Information

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

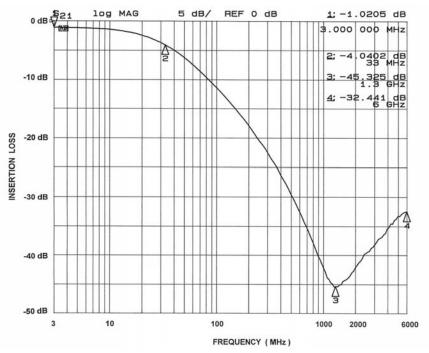
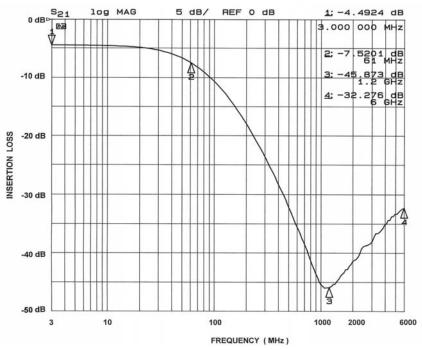
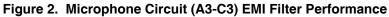


Figure 1. Earpiece Circuit (A1-C1) EMI Filter Performance





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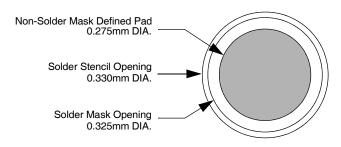
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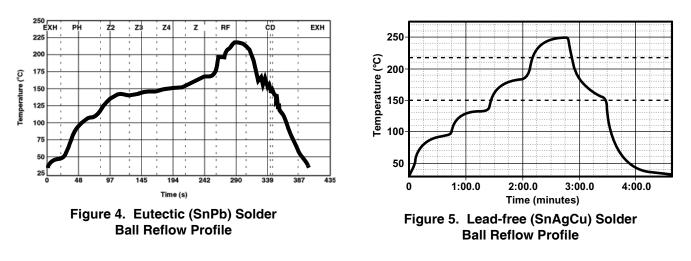
Application Information

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	0.125mm - 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 (183°C)	60 seconds					
Maximum Soldering Temperature for EutecticDevices using Eutectic Solder Paste	240°C					
Maximum Soldering Temperature for Lead-free Devices using Lead-free Solder Paste	260°C					







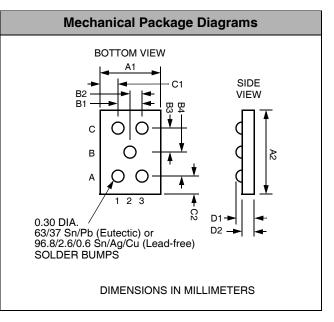
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Mechanical Details

CSP Mechanical Specifications

The CSPEMI204 is supplied in a custom Chip Scale Package (CSP). Dimensions are presented below. For complete information on CMD's Chip Scale Package, see the California Micro Devices CSP Package Information document.

PACKAGE DIMENSIONS								
Pack	age	Custom CSP						
Bum	nps	5						
Dim	Μ	lillimete	rs		Inches			
Dim	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 0.0					0.0573		
B1	0.495	0.500	0.505	0.0195 0.0197		0.0199		
B2	0.245	0.250	0.255	0.0096	0.0098	0.0100		
B3	0.430			0.0169	0.0171	0.0173		
B4	0.430			0.0169	0.0171	0.0173		
C1	0.165	0.215	0.265	0.0065	0.0104			
C2	0.220	0.270	0.320	0.320 0.0087 0.0106 0.650 0.0221 0.0239		0.0126		
D1	0.562	0.606	0.650			0.0256		
D2	0.356	0.381	0.406	0.0140	0.0150	0.0160		
# per taj ree				3500 pied	ces			
	Controlling dimension: millimeters							



Package Dimensions for CSPEMI204 Chip Scale Package

CSP Tape and Reel Specifications

PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B ₀ X A ₀ X K ₀	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P ₀	Р ₁
CSPEMI204	1.41 X 0.93 X 0.606	1.52 X 1.07 X 0.72	8mm	178mm (7")	3500	4mm	4mm

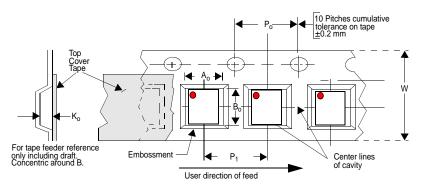


Figure 6. Tape and Reel Mechanical Data

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