CSPEMI201AG

2 Channel Headset Speaker EMI Filter with ESD Protection

ON Semiconductor®

http://onsemi.com



WLCSP5
AG SUFFIX
CASE 567AZ

Product Description

The CSPEMI201AG 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 speaker port on a cellular telephone or similar device. Each high quality filter provides more than 35 dB attenuation in the 800−2700 MHz range. These pi−style filters support bidirectional filtering, controlling EMI both to and from a speaker element. They also support bipolar signals with a cutoff frequency of 31 MHz, enabling audio signals to pass through without distortion.

In addition, the CSPEMI201AG provides a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The CSPEMI201AG can safely dissipate ESD strikes of ±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 ±15 kV.

The CSPEMI201AG is particularly well−suited for portable electronics (e.g. cellular telephones, PDAs, notebook computers) because of its small package and low weight. The CSPEMI201AG is available in a space−saving, low−profile Chip Scale Package with RoHS compliant lead−free finishing.

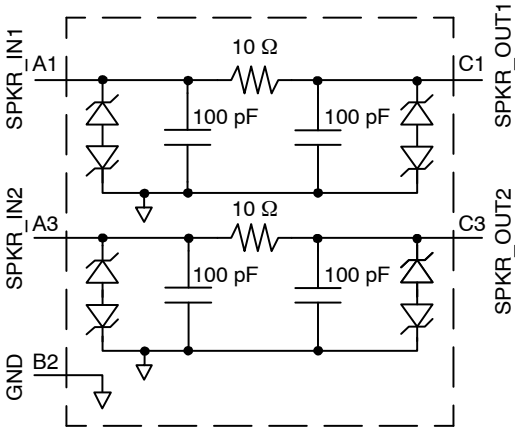
Features

- 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 in each Channel (HBM)
- Supports AC Signals − Ideal for Audio Applications
- Extremely Low Lead Inductance for Optimum Filter and ESD Performance
- 5−Bump, 0.930 x 1.410 mm Footprint Chip Scale Package (CSP)
- These Devices are Pb−Free and are RoHS Compliant

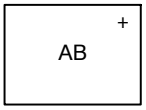
Applications

- EMI Filtering and ESD Protection for Headset Speaker Ports
- Wireless Handsets
- Handheld PCs / PDAs
- MP3 Players
- Digital Camcorders
- Notebooks
- Desktop PCs

ELECTRICAL SCHEMATIC



MARKING DIAGRAM



AB = CSPEMI201AG

ORDERING INFORMATION

Device	Package	Shipping†
CSPEMI201AG	CSP−5 (Pb−Free)	3500/Tape & Reel

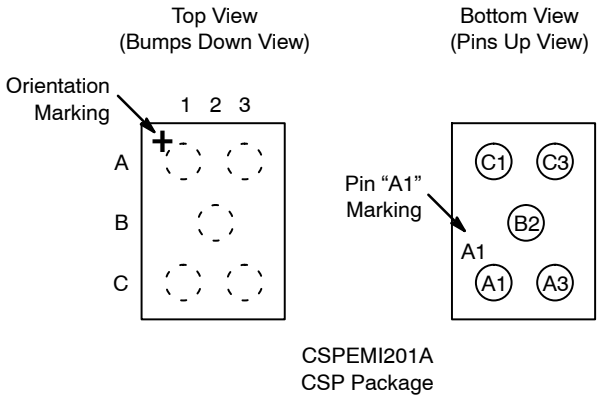
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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Table 1. PIN DESCRIPTIONS

5−bump CSP Package		
Pin	**Name**	**Description**
A1	SPKR_IN1	Speaker Input 1 (from audio circuitry)
A3	SPKR_IN2	Speaker Input 2 (from audio circuitry)
B2	GND	Device Ground
C1	SPKR_OUT1	Speaker Output 1 (to speaker)
C3	SPKR_OUT1	Speaker Output 2 (to speaker)

PACKAGE / PINOUT DIAGRAMS



CSPEMI201A
CSP Package

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	Typ	Max	Units
R	Resistance		9	10	11	Ω
C	Capacitance		80	100	120	pF
I_{LEAK}	Diode Leakage Current	V_{IN} = 5.0 V			1.0	μA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	I_{LOAD} = 10 mA	 5 −15	 7 −10	 15 −5	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	(Note 2)	 ±15 ±8			kV
V_{CL}	Clamping Voltage during ESD Discharge MIL−STD−883 (Method 3015), 8 kV Positive Transients Negative Transients	(Notes 2 and 3)		 +15 −19		V
f_C	Cut−off frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω	R = 10 Ω, C = 100 pF		31		MHz

1. T_A = 25°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.
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.

PERFORMANCE INFORMATION

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

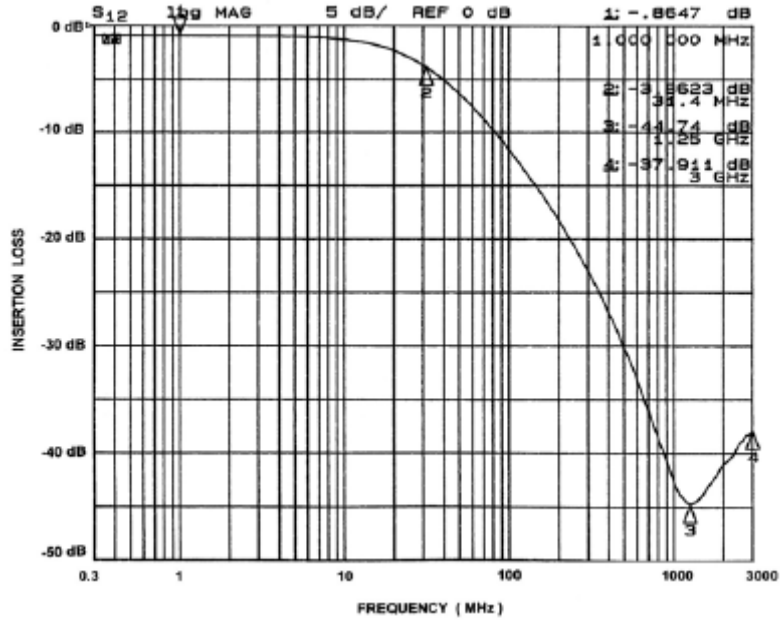


Figure 1. Insertion Loss vs. Frequency (A1−C1 to GND B2)

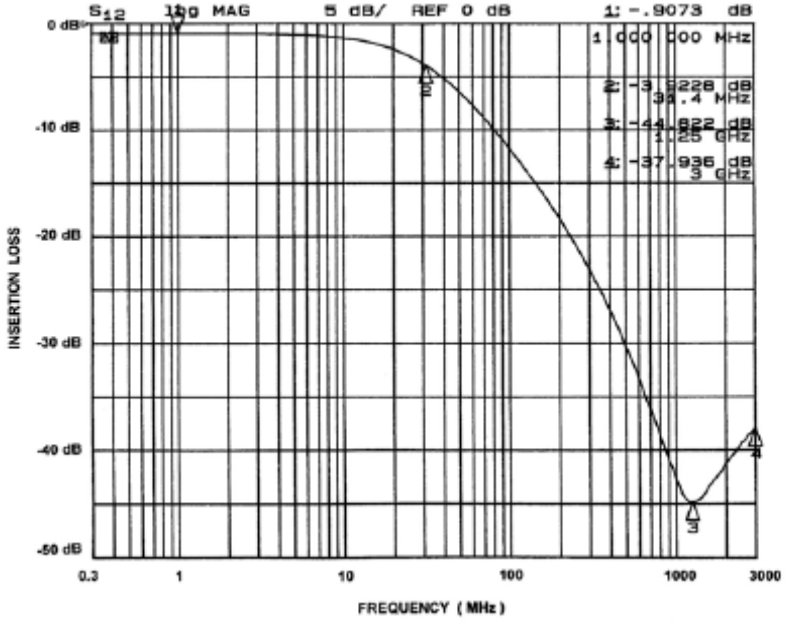


Figure 2. Insertion Loss vs. Frequency (A3−C3 to GND B2)

APPLICATION INFORMATION

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

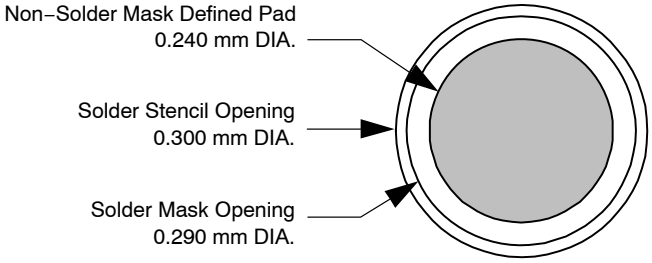


Figure 3. Recommended Non−Solder Mask Defined Pad Illustration

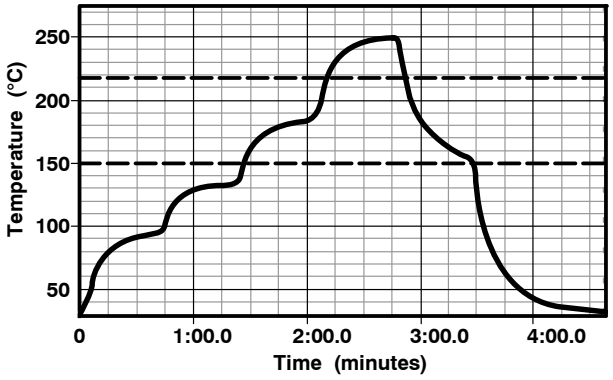
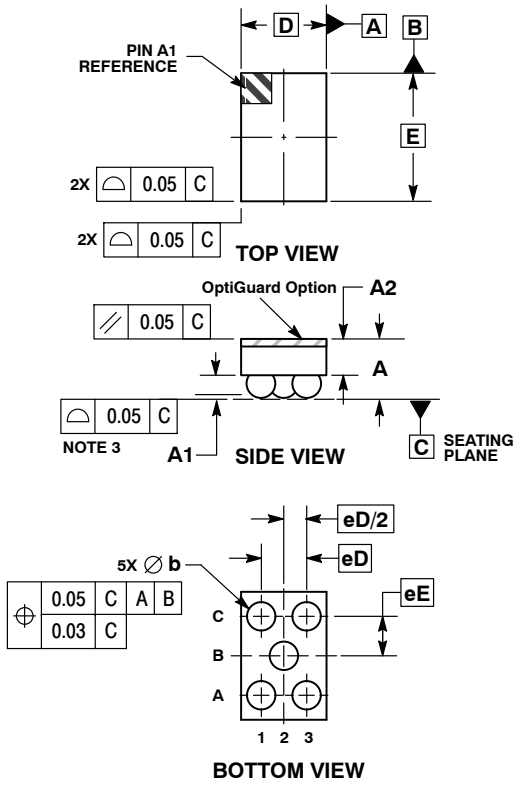


Figure 4. Lead−free (SnAgCu) Solder Ball Reflow Profile

CSPEMI201AG

PACKAGE DIMENSIONS

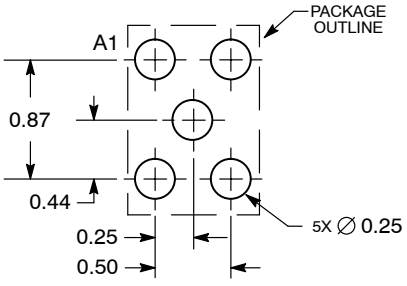
WLCSP5, 0.94x1.41
CASE 567AZ−01
ISSUE O



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
A	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	
eE	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.

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