

### FEATURES

**4.72 mm × 3.76 mm × 1.0 mm surface mount package**  
**High SNR of 62 dBA**  
**Sensitivity of -42 dBV**  
**Flat frequency response from 100 Hz to 15 kHz**  
**Low current consumption: <250  $\mu$ A**  
**Single-ended analog output**  
**High PSRR of 70 dB**  
**Compatible with Sn/Pb and Pb-free solder processes**  
**GREEN product - RoHS/WEEE compliant**

### APPLICATIONS

**Smart phones and feature phones**  
**Digital video cameras**  
**Bluetooth headsets**  
**Video phones**  
**Teleconferencing systems**

### GENERAL DESCRIPTION

The ADMP401-1 is a high quality, low cost, low power analog output bottom-ported omnidirectional MEMS microphone. The ADMP401-1 consists of a MEMS microphone element, an impedance converter and an output amplifier. The ADMP401-1 sensitivity specification makes it an excellent choice for both near field and far field applications. The ADMP401-1 has a high SNR and flat wideband frequency response resulting in natural sound with high intelligibility. Low current consumption enables long battery life for portable applications. A built-in particle filter provides for high reliability. The ADMP401-1 complies with the TIA-920 "Transmission Requirements for Wideband Digital Wireline Telephones" standard.

The ADMP401-1 is available in a thin 4.72 mm × 3.76 mm × 1.0 mm surface mount package. It is reflow solder compatible with no sensitivity degradation.

### FUNCTIONAL BLOCK DIAGRAM

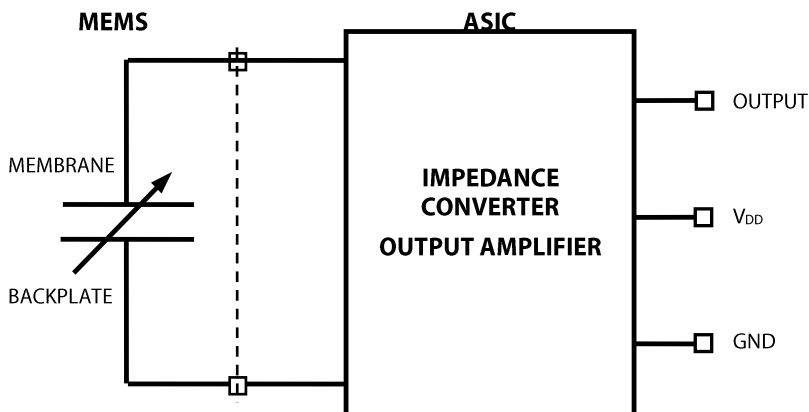


Figure 1.

Rev. PrC

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One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.  
 Tel: 781.329.4700 [www.analog.com](http://www.analog.com)  
 Fax: 781.461.3113 ©2009 Analog Devices, Inc. All rights reserved.

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## SPECIFICATIONS

$T_A = 25^\circ\text{C}$ ,  $V_{DD} = 1.8\text{ V}$ , unless otherwise noted. All minimum and maximum specifications are guaranteed. Typical specifications are not guaranteed.

Table 1.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
PERFORMANCE						
Directionality				Omni		
Sensitivity		1 kHz, 94 dB SPL	−45	−42	−39	dBV
Signal-to-Noise Ratio	SNR			62		dBA
Equivalent Input Noise	EIN			32		dBA SPL
Frequency Response <sup>1</sup>		Low frequency −3 dB point		100		Hz
		High frequency −3 dB point		15		kHz
		Deviation from flat response within passband	−3		+2	dB
Total Harmonic Distortion	THD	105 dB SPL			3	%
Power Supply Rejection Ratio	PSRR	217 Hz, 100 mV p-p square wave superimposed on $V_{DD} = 1.8\text{ V}$		70		dB
Maximum Acoustic Input		Peak		120		dB SPL
POWER SUPPLY						
Supply Voltage	$V_{DD}$		1.5		3.3	V
Supply Current	$I_S$				250	$\mu\text{A}$
OUTPUT CHARACTERISTICS						
Output Impedance	$Z_{OUT}$			200		$\Omega$
Output DC Offset				0.8		V
Output Current Limit				90		$\mu\text{A}$
Polarity				Noninverting <sup>2</sup>		

<sup>1</sup> See Figures 4 and 6 on page 6 for frequency response charts.

<sup>2</sup> Positive going (increasing) pressure on the membrane results in a positive going (increasing) output voltage.

## ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage	3.6 V
Sound Pressure Level (SPL)	160 dB
Mechanical Shock	20,000 g
Vibration	Per MIL-STD-883G
Temperature Range	-40°C to +85°C

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ESD CAUTION



**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

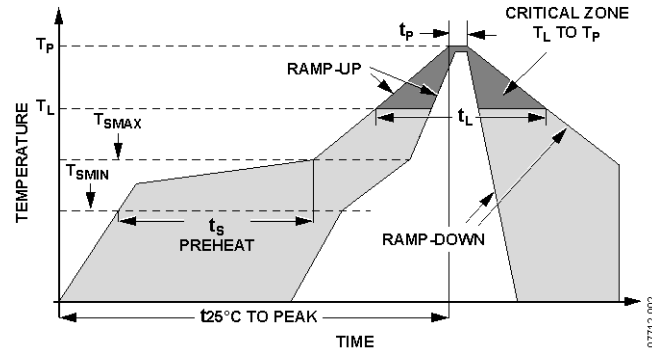


Figure 2. Recommended Soldering Profile

Table 3. Recommended Soldering Profile

Profile Feature	Sn63/Pb37	Pb-Free
Average Ramp Rate ( $T_L$ to $T_P$ )	3°C/sec max	3°C/sec max
Preheat		
Minimum Temperature ( $T_{SMIN}$ )	100°C	150°C
Maximum Temperature ( $T_{SMAX}$ )	150°C	200°C
Time ( $T_{SMIN}$ to $T_{SMAX}$ ), $t_S$	60 sec to 120 sec	60 sec to 120 sec
Ramp-Up Rate ( $T_{SMAX}$ to $T_L$ )	3°C/sec	3°C/sec
Time Maintained Above Liquidous ( $t_L$ )	60 sec to 150 sec	60 sec to 150 sec
Liquidous Temperature ( $T_L$ )	183°C	217°C
Peak Temperature ( $T_P$ )	240°C + 0°C/-5°C	260°C + 0°C/-5°C
Time Within 5°C of Actual Peak Temperature ( $t_P$ )	10 sec to 30 sec	20 sec to 40 sec
Ramp-Down Rate	6°C/sec max	6°C/sec max
Time 25°C to Peak Temperature	6 minute max	8 minute max

## PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

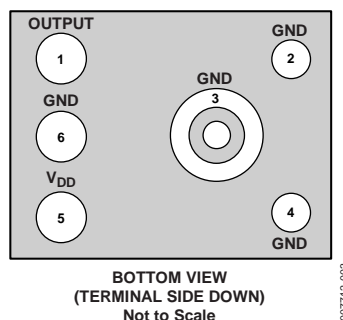


Figure 3. Pin Configuration (Bottom View)

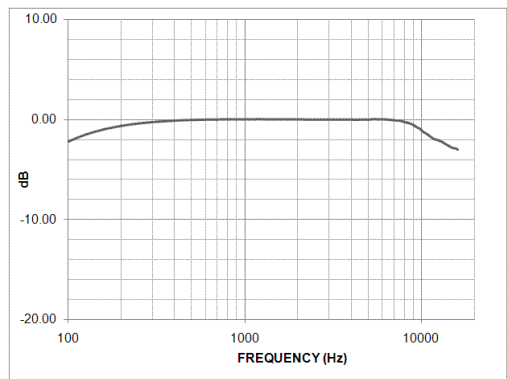
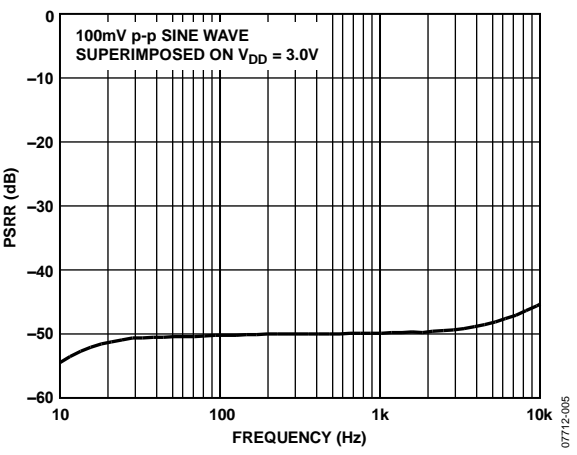
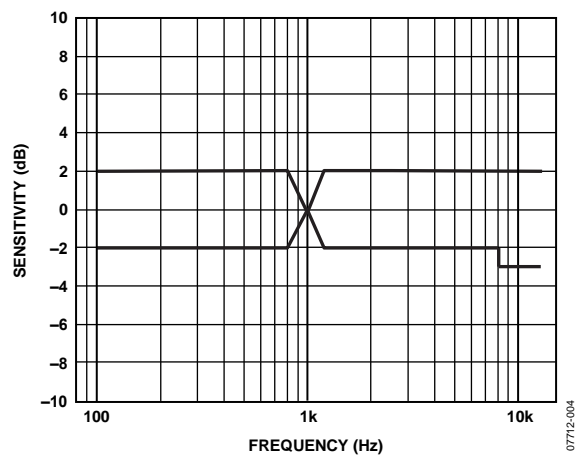
Table 4. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	OUTPUT	Analog Output Signal.
2	GND	Ground.
3	GND	Ground.
4	GND	Ground.
5	V <sub>DD</sub>	Power Supply.
6	GND	Ground.

### PCB LAND PATTERN LAYOUT

The recommended PCB land pattern layout for ADMP40-1 is the same as the solder pads on the microphone package (see Figure 7 on page 8). The land pattern should be laid out to a 1:1 ratio. Care should be taken to avoid applying solder paste to the sound hole in the PCB. The diameter of the sound hole in the PCB should be equal or larger than the diameter of the sound port of the microphone. There is no noticeable performance degradation from the PCB hole offset relative to the microphone sound port, as long as the effective open port diameter remains over 0.25 mm (0.05 mm<sup>2</sup> open area).

TYPICAL PERFORMANCE CHARACTERISTICS



## HANDLING INSTRUCTIONS

### PICK-AND-PLACE EQUIPMENT

The MEMS microphone can be handled using standard pick-and-place and chip shooting equipment. Care should be taken to avoid damage to the MEMS microphone structure as follows:

- Use a standard pickup tool to handle the microphone. Because the microphone hole is on the bottom of the package, the pickup tool can make contact with any part of the lid surface.
- Use care during pick-and-place to ensure that no high shock events above 20 kg are experienced, because such events may cause damage to the microphone.
- Do not pick up the microphone with a vacuum tool that makes contact with the bottom side of the microphone. Do not pull air out or blow air into the microphone port.
- Do not use excessive force to place the microphone on the PCB.

### REFLOW SOLDER

Standard reflow solder conditions specified in Figure 2 can be used to attach the MEMS microphone to the PCB.

### BOARD WASH

When washing the PCB, ensure that water does not make contact with the microphone port. Blow-off procedures and ultrasonic cleaning must not be used.

## OUTLINE DIMENSIONS

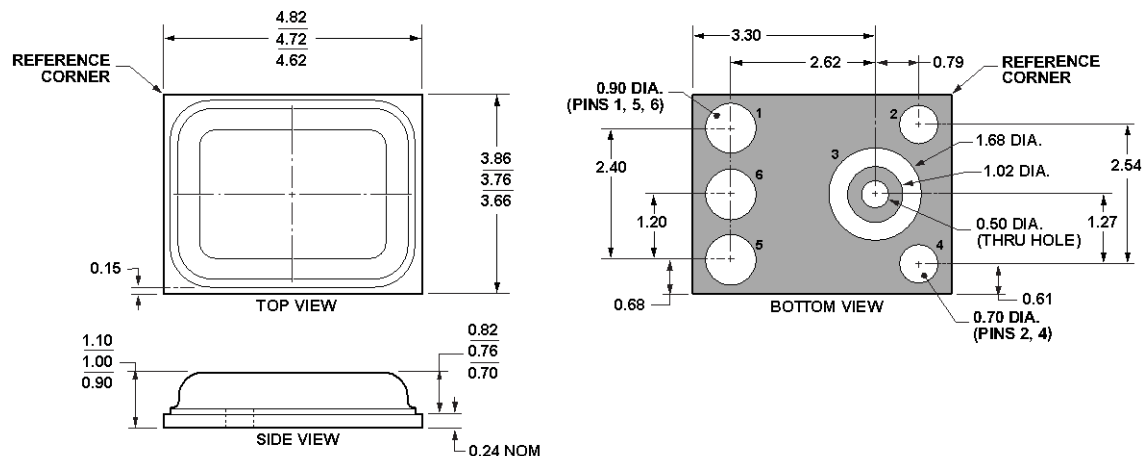


Figure 7. 6-Terminal Chip Array Small Outline No Lead Cavity [LGA\_CAV]  
4.72 mm × 3.76 mm Body  
(CE-6-1)  
Dimensions shown in millimeters

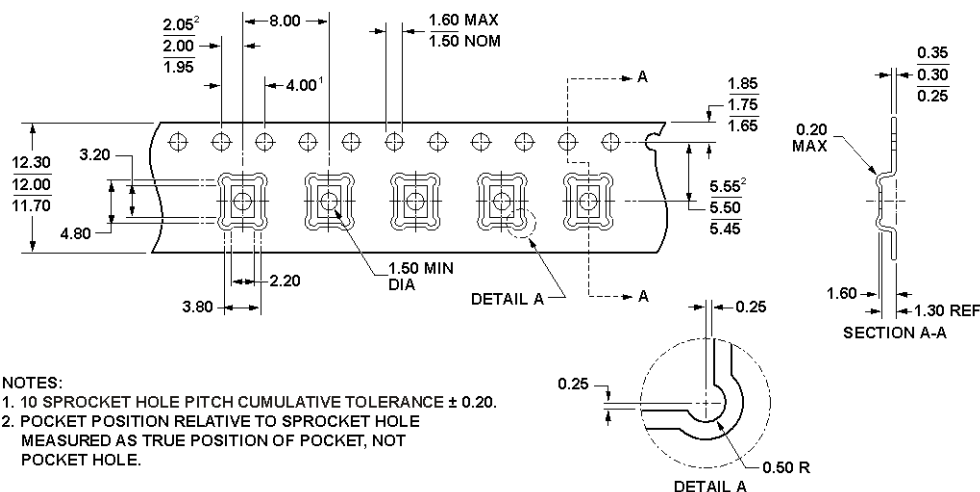


Figure 8. LGA\_CAV Tape and Reel Outline Dimensions  
Dimensions shown in millimeters

## ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option	Ordering Quantity
ADMP401-1ACEZ-RL <sup>1</sup>	-40°C to +85°C	6-Terminal LGA_CAV, 13" Tape and Reel	CE-6-1	4,000
ADMP401-1ACEZ-RL7 <sup>1</sup>	-40°C to +85°C	6-Terminal LGA_CAV, 7" Tape and Reel	CE-6-1	1,000
EVAL-ADMP401-1Z <sup>1</sup>		Evaluation Board		

<sup>1</sup> Z = RoHS Compliant Part.