

Figure 1. Top View of AT6216

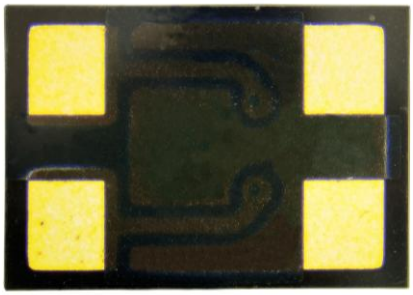


Figure 2. Bottom View of AT6216

FEATURES

- The lowest frequency microphone in the world
- Flat Frequency Response SNR of 65dBA
- Sensitivity of −38dBV/Pa
- Low Current
- Max RF protection
- Ultra-Stable Performance
- Standard SMD Reflow
- Omni-directional
- 2.75mm × 1.85mm × 1.00mm surface-mounted mall-sized package

APPLICATIONS

- Mobile Telephones
- Smart Phones
- PDAs
- Digital Video Cameras
- Portable Media Devices with Audio Input

DESCRIPTION

The AT6216 is a high quality, low cost, low power analog output Top-ported omni-directional MEMS microphone. AT6216 consists of a MEMS microphone element and a preamplifier. AT6216 has a high SNR and flat wideband frequency response, resulting in natural sound with high intelligibility. Extra EMI filter for RF noise attenuation is built inside. Due to the built-in filter, AT6216 shows high immunity to EMI. The AT6216 is available in a thin 2.75mm × 1.85mm × 1.00mm surface-mount package. It is reflowing solder compatible with no sensitivity degradation. The AT6216 is halide Halogen and Lead free.

PIN CONFIGURATIONS

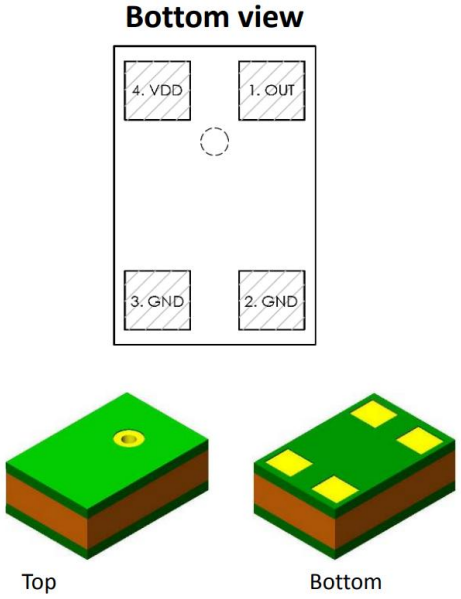


Figure 3. Pin Configurations

PIN DESCRIPTION

Table 1.

Pin	Symbol	Description
1	OUT	Analog output signal
2	GND	Ground
3	GND	Ground
4	VDD	Power supply

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ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
VDD to Ground	−0.5V to +5V
OUT to Ground	−0.3V to V_{DD} +0.3V
Input Current to Any Pin	±5mA
OperatingTemperature	−40°C to +125°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.



ESD CAUTION

This integrated circuit can be damaged by ESD. It is recommended that all integrated circuits be handled with proper precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure.

ELECTRICAL CHARACTERISTICS

(TEST CONDITIONS: 23 ± 2°C, 55 ± 20% R.H., V_{DD}(min) ≤ V_{DD} ≤ V_{DD}(max), no load, unless otherwise indicated.)

Table 3.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Power Supply Voltage[1]	V_{DD}		1.5		3.6	V
Power Supply Current[1, 2]	I_{DD}			120	150	μA
Sensitivity[1]	S	94dB SPL @1kHz	−39	−38	−37	dBV/Pa
Signal to Noise Ratio	SNR	94dB SPL @1kHz, A-weighted	63	65		dB(A)
Total Harmonic Distortion	THD	94dB SPL 1 kHz		0.2	1	%
Acoustic Over load Point	AOP	10% THD @1kHz		125		dB SPL
Power Supply Rejection Ratio	PSRR	200mVpp sinewave @1kHz, V_{DD} = 1.8V		65		dB
Power Supply Rejection	PSR	100mV_{p-p} square wave @217Hz, V_{DD}= 1.8V, A-weighted		−90		dBV(A)
DC Output		V_{DD} = 1.5V		0.9		V
Output Impedance	Z_{OUT}	@1kHz		100		
Directivity			Omni-directional			
Polarity		Increasing sound pressure	Increasing output pressure			

Note:

1 100% tested

2 Maximum specifications are measured at maximum V_{DD}. Typical specifications are measured at V_{DD} = 1.8V.

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BLOCK DIAGRAM

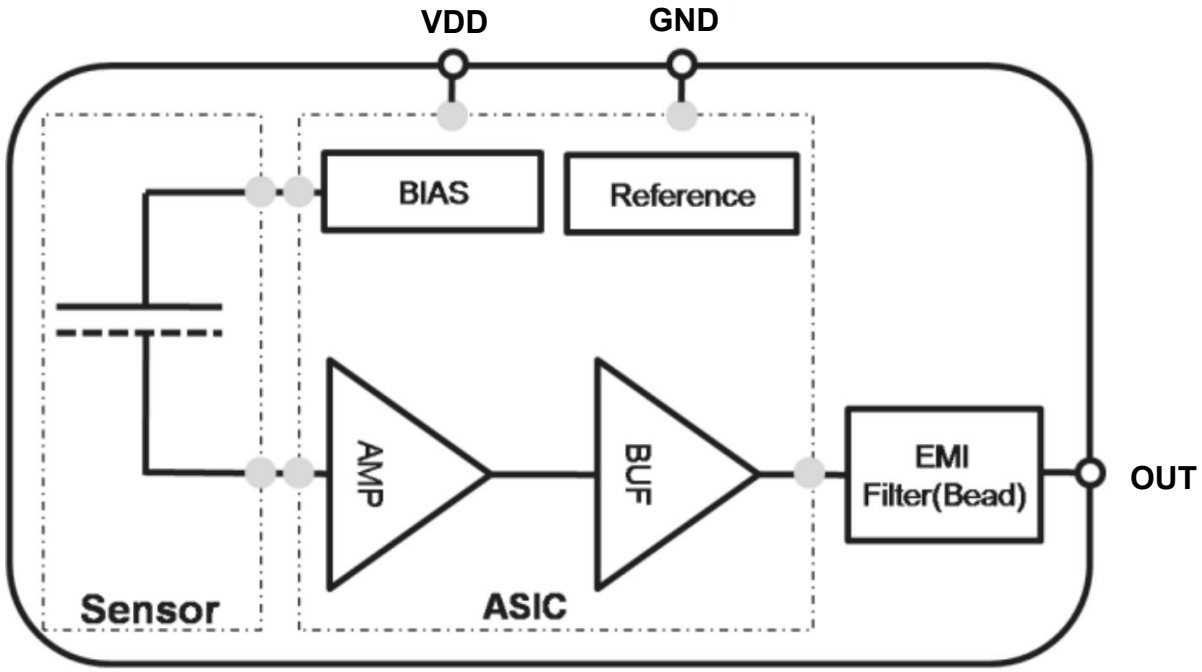


Figure 4. Block Diagram

TYPICAL CIRCUIT APPLICATION

The AT6216 output can be connected to a codec microphone input or to a high input impedance gain stage.

A dc-blocking capacitor is required at the output of the microphone

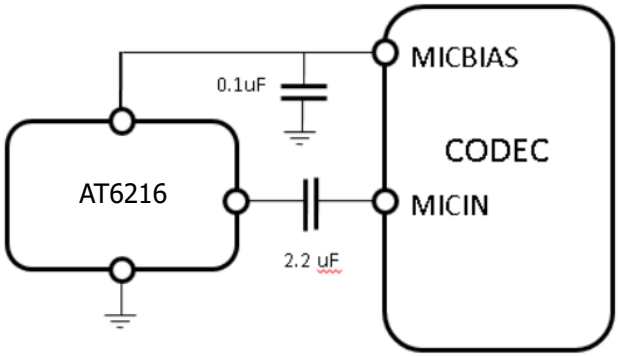


Figure 5. Connect to Audio OPAM

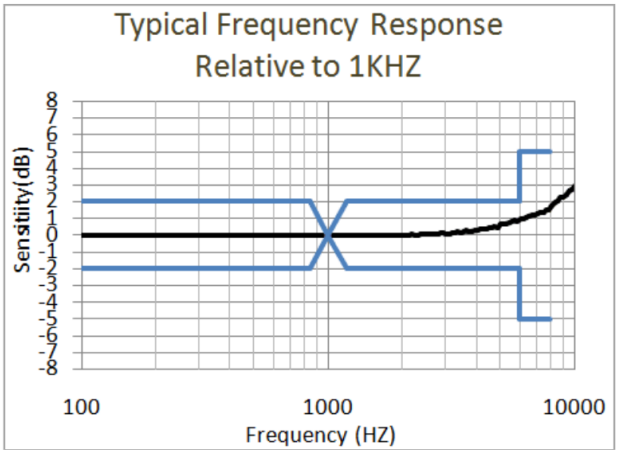
Note:

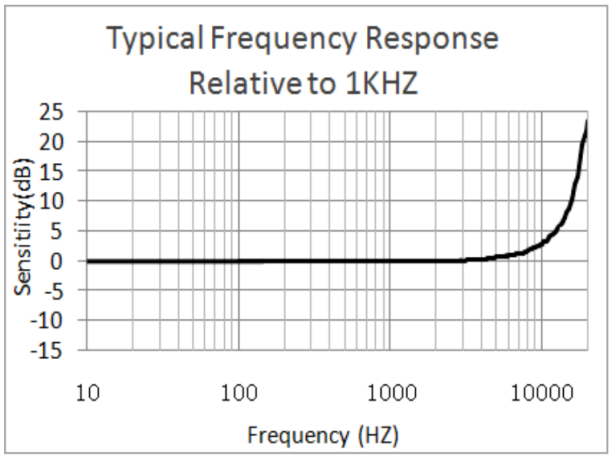
All Ground pins must be connected to ground.

Capacitors near the microphone should not contain Class 2 dielectrics.

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TYPICAL CHARACTERISTICS





TYPICAL CHARACTERISTICS

The microphone sensitivity after stress must deviate by no more than ±3dB from the initial value.

1. Heat Test, Operational	Temperature: 125±3°C Duration: 1000 hours Voltage: Applied
2. Cold Test, Operational	Temperature: −40±3°C Duration: 1000 hours Voltage: Applied
3. Heat Test, Non-Operational	Temperature: 125±3°C Duration: 1000 hours Voltage: Not Applied
4. Cold Test, Non-Operational	Temperature: −40±3oC Duration:1000 hours Voltage: Not Applied
5. Thermal Shock Test, Non-Operational	Temperature: −40±3°C and 125±3°C Duration: 30 minutes each, during 5 minutes ramp, 256 cycles Voltage: Not applied
6. Temperature humidity storage	Temperature: 85±3°C Humidity: 85±3%RH Duration: 1000 hours
	Temperature: 65±3°C Humidity: 95±3%RH Duration: 168 hours
7. Free Fall Test 1.5m	Placed inside test fixture and dropped on concrete from height 1.5m. 4 times by each surface and corner.
8. Vibration	4 cycles of 20 to 2000Hz sinusoidal sweep with 20G peak acceleration lasting 12 minutes in X, Y, and Z directions.
9. Mechanical Shock	5 pulses of 10000g in each of the ±X, ±Y, and±Z directions.

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10. Electrostatic Discharge Test	Capacitance: 150pF Resistance: 330Ω Duration: 10 times Air Discharge: Level 4 (±15kV) Direct contact discharge: Level 4 (±8kV)
11. Human Body Mode	±2000 Volt
12. Charged-Device Model	±250 Volt
13. Reflow	5 reflow cycles with peak temperature of 260°C
14. Solderability	245±5°C, 5sec, 95% Tin on pad surface
15. Tumble test	300 tumbles from a height of 1m onto a steel base.
16. HAST	Temperature: 130±3°C Humidity: 85±3%RH Duration: 96 hours Voltage: Applied
17. Air Blow	0.45MPa, distance: 3cm, time: 10s

OUTLINE DIMENSIONS

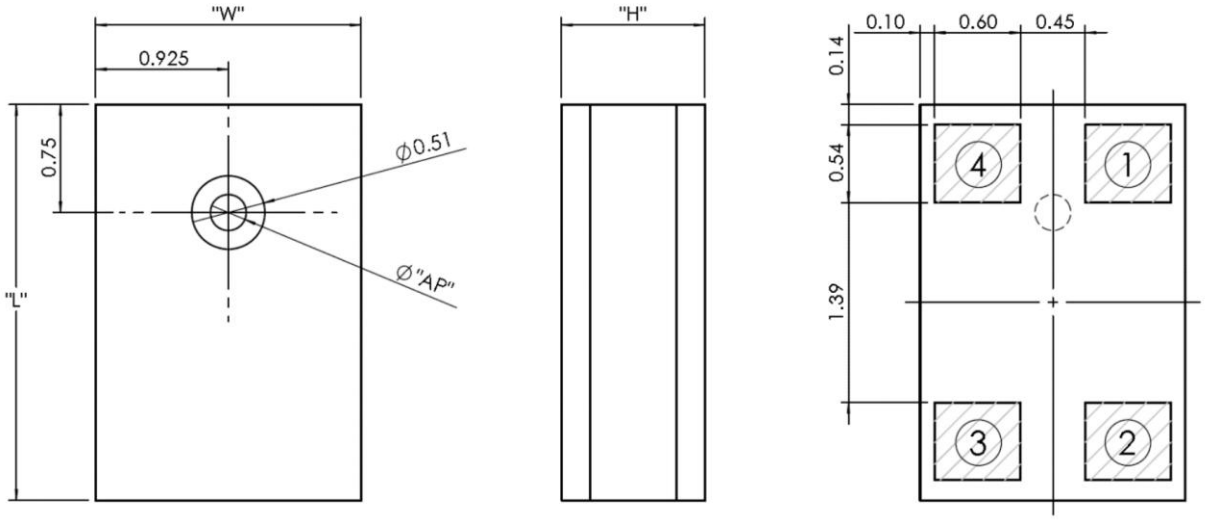


Figure 6. Outline Dimensions

Symbol	Dimensions		Tolerance	
	mm	inch	mm	inch
Length (L)	2.75	0.108	±0.100	±0.0039
Width (W)	1.85	0.073	±0.100	±0.0039
Height (H)	1.00	0.039	±0.100	±0.0039
Acoustic Port (AP)	Ø 0.50	Ø 0.020	±0.050	±0.0019

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RECOMMENDED CUSTOMER LAND PATTERN

The recommended PCB land pattern for the AT6216 should have a 1:1 ratio to the solder pads on the microphone package. Care should be taken to avoid applying solder paste to the sound hole in PCB. The dimensions of suggested solder paste pattern refer to the land pattern which should be shrunk by 0.025 per side.

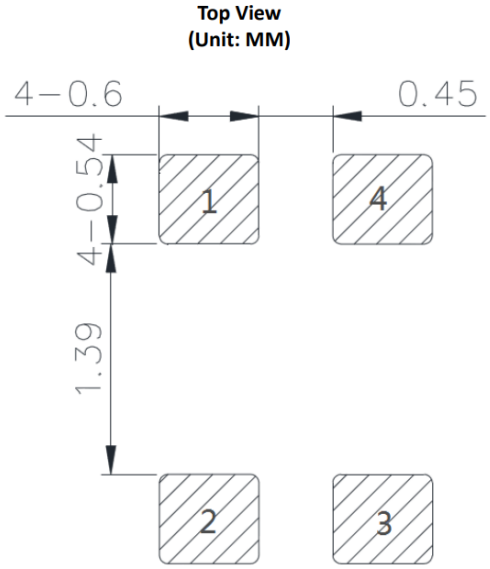
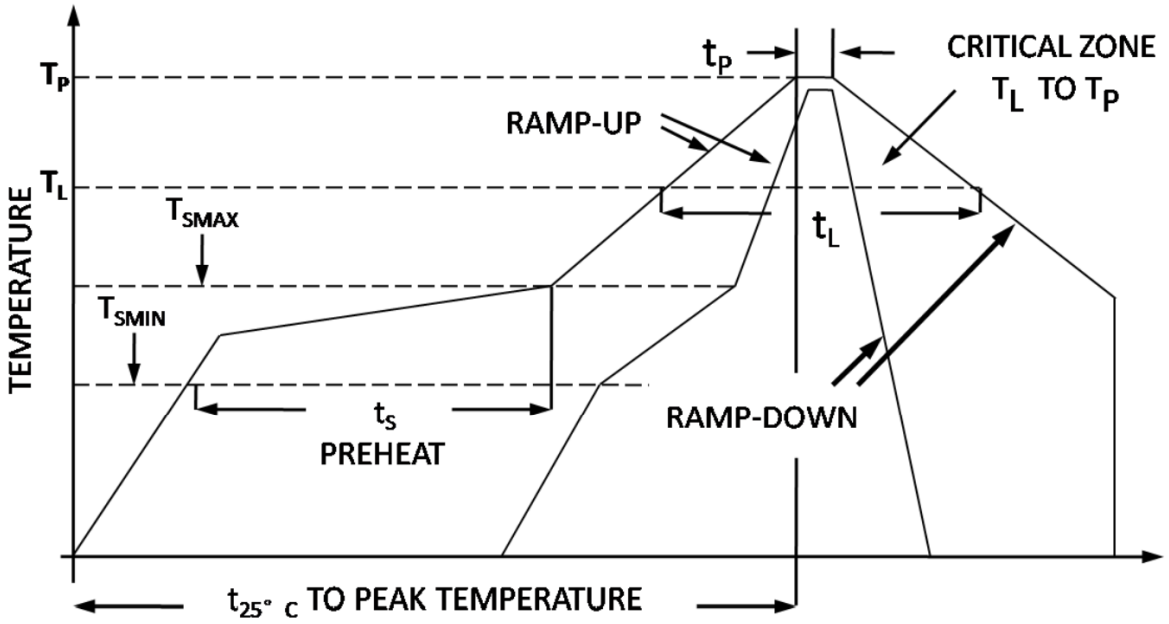


Figure 7. Recommended Land Pattern

SOLDER FLOW PROFILE

The reflow profile specified in this section describes expected maximum heat exposure of components during the reflow process of NMP product PWBs. Temperature is measured on top of component. All components have to tolerate at least this profile five times (5x) without affecting electrical performance, mechanical performance or reliability.



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Pb-free and Sn63/Pb37 reflow profile requirements for soldering heat resistance:

Parameter		Reference	Pb-Free	Sn63/Pb37
Average Ramp Rate		T_L to T_P	1.25°C/sec max	1.25°C/sec max
Prehear	Minimum Temperature	T_{SMIN}	100°C	100°C
	Maximum Temperature	T_{SMAX}	200°C	150°C
	Time	T_{SMIN} to T_{SMAX}	60sec to 120sec	60sec to 120sec
Ramp-Up Rate		T_{SMAX} to T_L	1.25°C/sec	1.25°C/sec
Time Maintained Above Liquidous		t_L	60sec to 150sec	60sec to 150sec
Liquidous Temperature		T_L	217°C	183°C
Peak Temperature		T_P	260°C +0°C/−5°C	215°C ±3°C
Time within +5°C of Actual Peak Temperature		t_P	20 sec to 30 sec	20 sec to 30 sec
Ramp-Down Rate		Tpeak	6°C/sec max	6°C/sec max
Time +25°C ($t_{25°C}$) to Peak Temperature			8 min max	6 min max

ORDERING INFORMATION

Part Number	Buy Now
AT6216	

NOTICE

1. It is important to carefully read and follow the warnings, cautions, and product-specific notes provided with electronic components. These instructions are designed to ensure the safe and proper use of the component and to prevent damage to the component or surrounding equipment. Failure to follow these instructions could result in malfunction or failure of the component, damage to surrounding equipment, or even injury or harm to individuals. Always take the necessary precautions and seek professional assistance if unsure about proper use or handling of electronic components.

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