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1.Introduction

1.1 Overview

MIC-EMM4030-381 is an analog bottom port MEMS microphone with high performance and reliability. The MIC-EMM4030-381 integrates a MEMS microphone element, an impedance converter, and an output amplifier.

Other high-performance specifications include 130 dB SPL acoustic overload point in high performance mode, ± 1 dB sensitivity tolerance and enhanced immunity to both radiated and conducted RF interface.

Excellent acoustic performance, along with the compact size(4.00*3.00*1.10mm) is best-suited for a wide range of consumer electronic products, offering a product with high-quality to meet the application requirement.

1.2 Product Features

- Omnidirectional
- Small Size
- High SNR
- RF Protection
- HD Voice MEMS Microphone
- RoHS/Halogen free compliant
- Standard SMD Reflow

1.3 Typical Application

- ANC headphones
- Bluetooth headset
- Cameras
- Wearable intelligent equipment
- Portable electronics

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2. Absolute Maximum Ratings

Parameter	Absolute Maximum Rating	Units
Voltage Range of VDD to Ground	-0.3 to +3.9	V
Voltage Range of Output to Ground	-0.3 to +3.9	V
Input Current to Any Pin	± 5	mA
Temperature Range	-40 to +100	°C

Stresses exceeding these “Absolute Maximum Ratings” could cause permanent damage to the microphone. These are stress rating only. Functional operation at these or any other conditions beyond those indicated under “Absolute and Electrical Characteristics” is not implied. Exposure beyond those indicated under “Acoustic and Electrical Characteristics” for extended periods may affect microphone reliability.

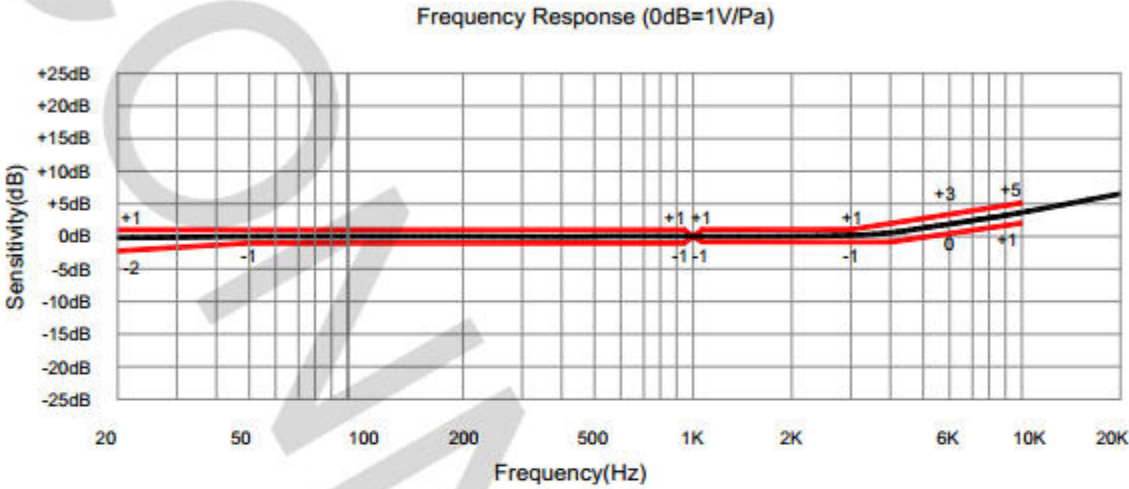
3. Acoustic and Electrical Characteristics

(Test Conditions: 23±2°C, 55±20% R.H)

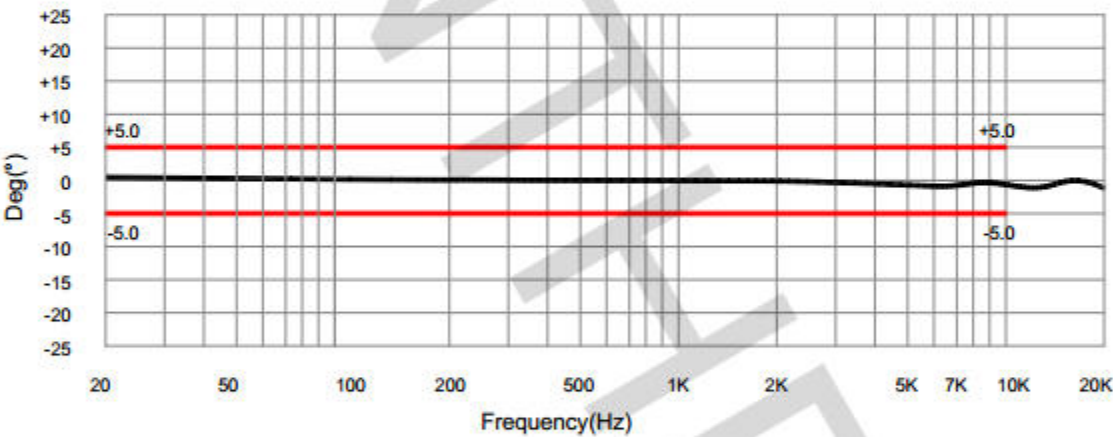
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Directivity	D(θ)	Omni-Directional				
Sensitivity	S	94dB SPL @1kHz	-39	-38	-37	dBV/Pa
Supply Voltage	V _{DD}		1.6	2.0	3.6	V
Current Consumption	I _{DSS}	V _{DD} =2.0V				μA
S/N Ratio	S/N	94dB SPL @1kHz (A-weighted)		70	73	dB(A)
Total Harmonic Distortion	THD	94dB SPL @1kHz		0.15	0.5	%
Acoustic Overload Point	AOP	10% THD @ 1kHz VDD=2.3~3.6V		130		dB SPL
Power Supply Rejection Ratio	PSRR	200mVpp sinewave @ 1kHz, VDD = 2.0V		75		dB
Power Supply Rejection	PSR	100 mVpp square wave @ 217 Hz, VDD = 2.0V, A-weighted		-105		dBV(A)
Phase	θ	20~10kHz@94dB	-5		5	deg
Output Impedance	Zout	@1kHz			300	Ω
DC Output				1.0		V

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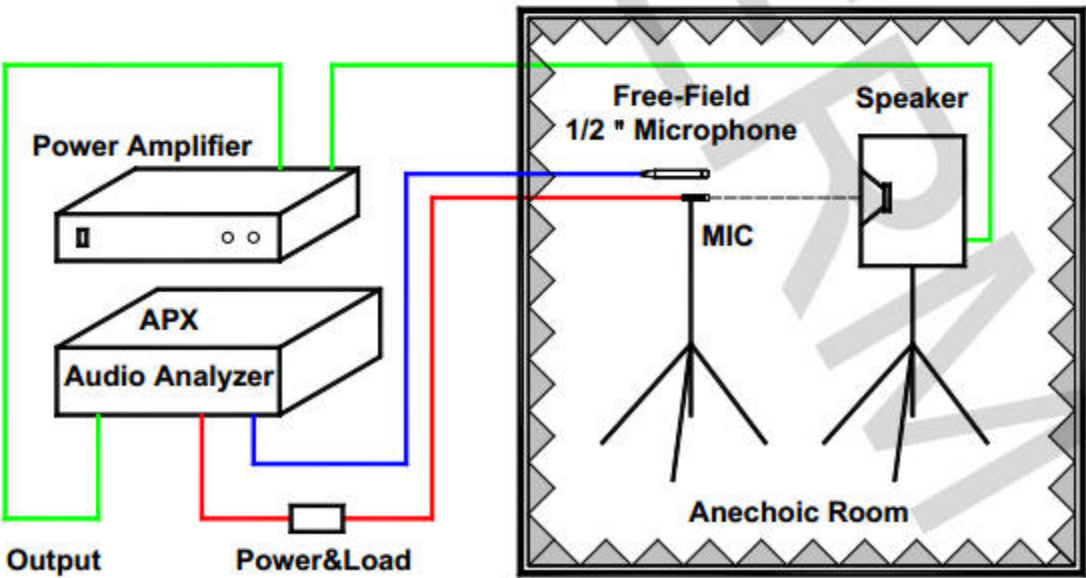
4.Frequency Response Curve



Phase

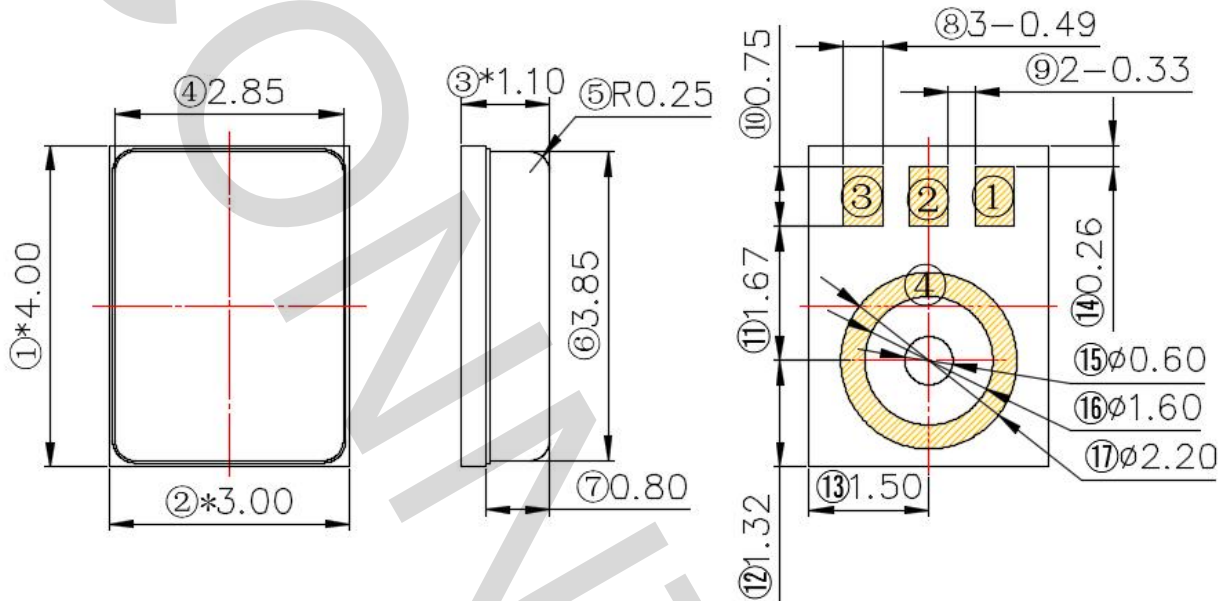


5.Test Setup Drawing



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6.Mechanical Specifications



Item	Dimension	Tolerance	Units
Length(L)	4.00	±0.10	mm
Width(W)	3.00	±0.10	mm
Height(H)	1.10	±0.10	mm
Acoustic port(AP)	Φ0.60	±0.10	mm

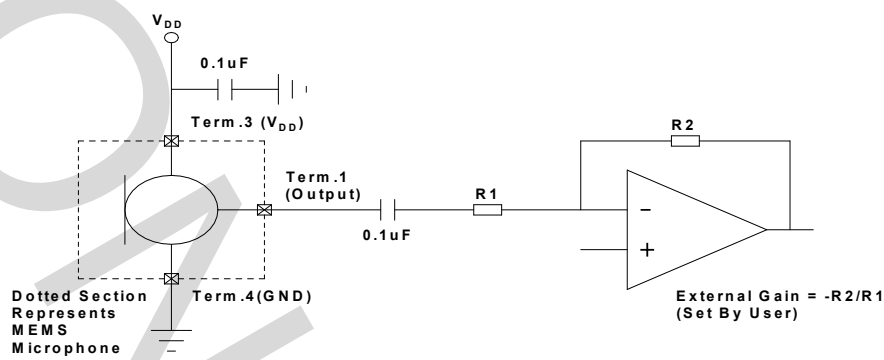
Pin Output	
Pin#	Function
1	Output
2	NC
3	V _{DD}
4	GND

Note:

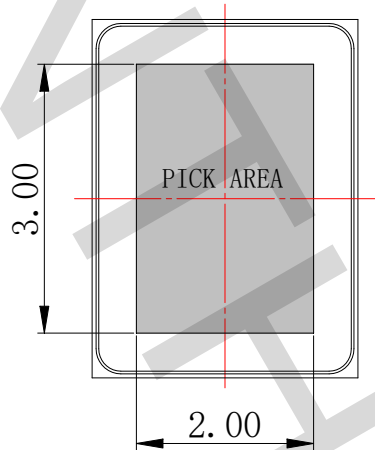
- All dimensions are in millimeter(mm).
- Tolerance: +/-0.1mm unless otherwise specified.
- The dimensions marked with * are the key controlled dimensions.

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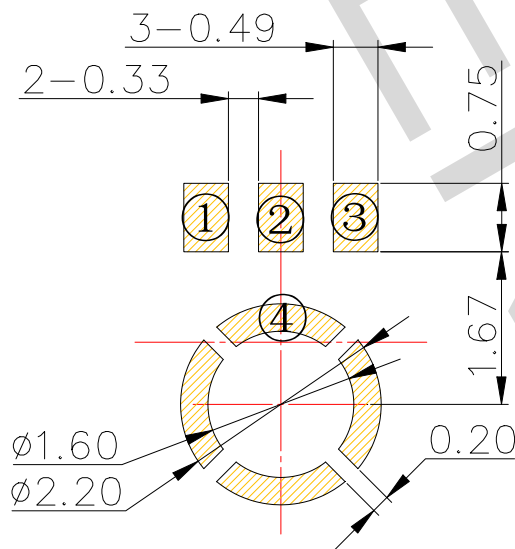
7.Recommended Interface Circuit



8. Vacuum nozzle pickup location

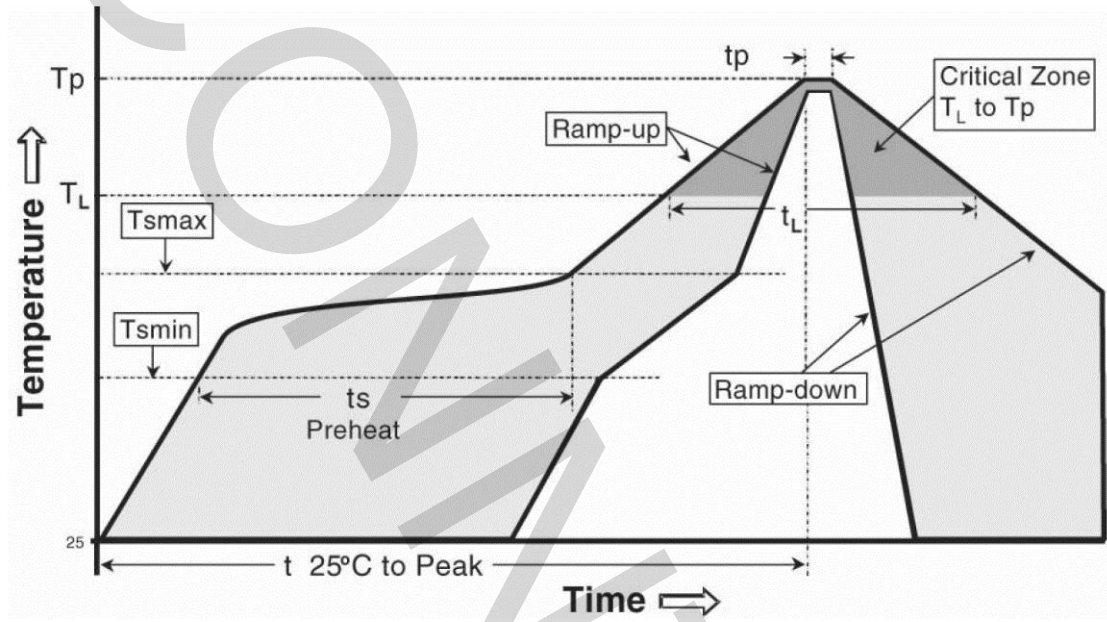


9. Example solder stencil patter



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10. Test Setup Drawing



Profile Feature	Pb-Free
Average Ramp-up rate (T_{smax} to T_P)	3°C/second max.
Preheat Temperature Min (T_{smin}) Temperature Max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	150°C 200°C 60-180 seconds
Time maintained above: Temperature (T_L) Time (t_L)	217°C 60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down rate(T_P to T_{smax})	6°C/second max
Time 25°C to Peak Temperature	8 minutes max

- Notes:
1. Pulling vacuum over acoustical hole of the microphone is not allowed, because the device can be damaged by vacuum.
 2. Wash the board after reflow process is not allowed, because board washing and cleaning agents can damage the device. Device should not be exposed to ultrasonic processing or cleaning.
 3. Recommended number of reflow is no more than 3 times.

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11. Reliability Specifications

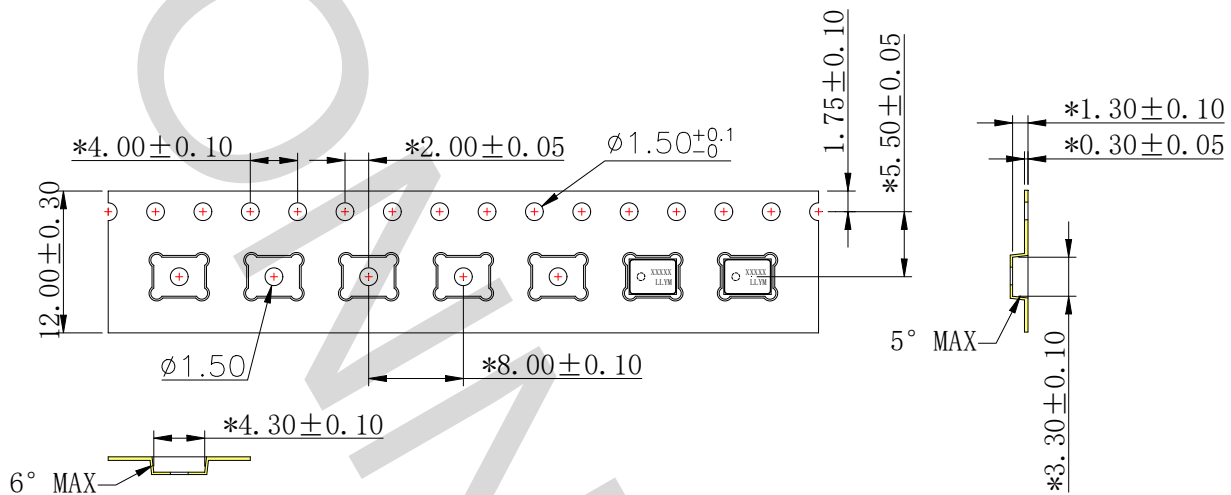
Test Item	Detail
Thermal Shock	100 cycles of air-air thermal shock from -40°C to +105°C with 15 minute soaks.
High Temperature Storage	+105°C environment for 500 hours.
Low Temperature Storage	-40°C environment for 500 hours.
High Temperature Test	+105°C environment while under bias for 500 hours.
Low Temperature Test	-40°C environment while under bias for 500 hours.
Humidity Test	+85°C/85% R.H. environment while under bias for 500 hours.
Vibration Test	16 minutes in each X, Y, Z axis from 20 to 2,000 Hz with peak acceleration of 20G.
Drop Test	1.5-meter height onto a concrete surface each time at three directions in state of packaging.
Reflow Test	5 reflow cycles with peak temperature of +260°C.
ESD Test	Under C=150pF, R=330ohm. Tested to $\pm 8KV$ contact to the case and tested to $\pm 2KV$ contact to I/O terminals. 10 times. Grounding.

Note: The microphone sensitivity after stress must deviate by no more than $\pm 3dB$ from the initial value.

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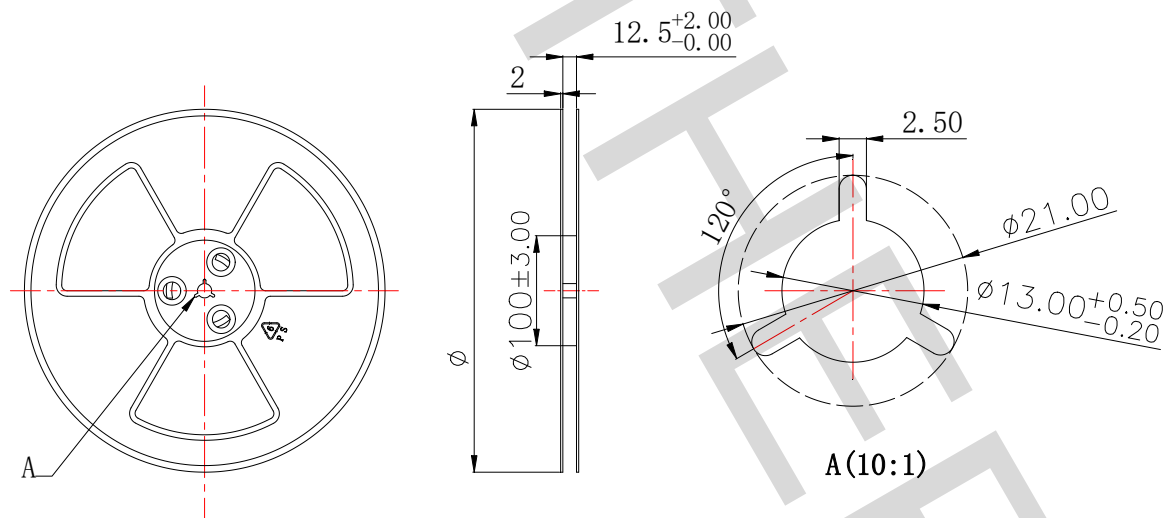
12.Packaging Specifications

12.1. Tape Specification



12.2. Reel Dimension

13" reel dimensions (unit:mm)



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12.3 *The Content of Box

