# Specification of MEMS Microphone

(RoHS Compliance & Halogen Free)

Customer Name :

Customer Model :

GoerTek Model : S08OT421-025

| GoerTek | | | CUSTOMER APPROVAL |
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# Restricted

## 1 Security Warning

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## 2 Publication History

| Version | Description | Date | Author | Approved |
|---|---|---|---|---|
| 1.0 | New Design | 2015.08.30 | Jasen | Worden |
| 2.0 | Update Reliability Condition | 2017.01.11 | Jasen | Mars |
| 3.0 | Update Appearance Drawing | 2017.05.22 | Jasen | Mars |
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# Contents

## 1 Introduction

MEMS MIC which is able to endure reflow temperature up to 260 ℃ for 50 seconds can be used in SMT process. It is widely used in telecommunication and electronics device such as mobile phone, MP3, PDAs etc.

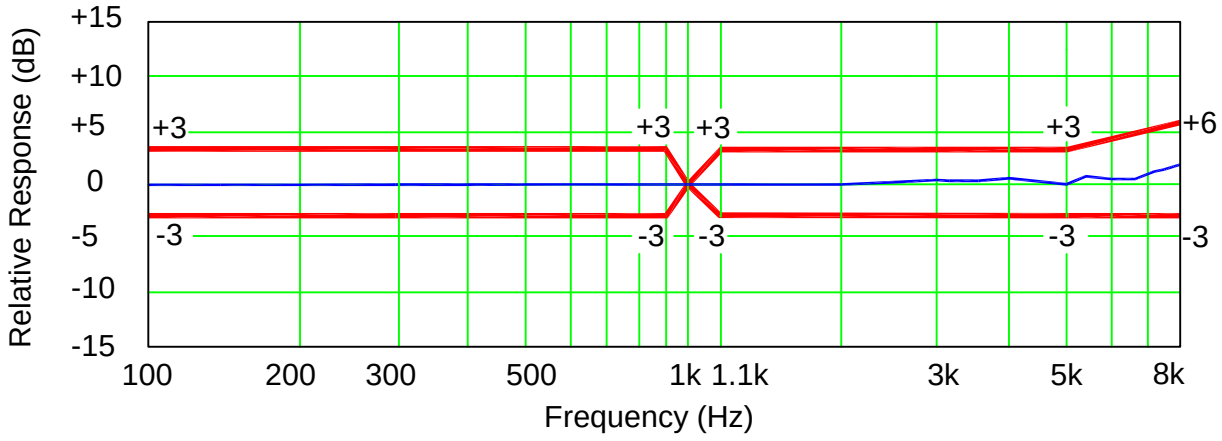
## 2 Test Condition (Vs=2.0V, L=50cm)

| StandardConditions (As IEC 60268-4) | Temperature | Humidity | Air pressure |
|---|---|---|---|
| Environment Conditions | +15℃～+35℃ | 25％R.H.～75%R.H. | 86kPa～106kPa |
| Basic Test Conditions | +20℃ ± 2℃ | 60％R.H.～70%R.H. | 86kPa～106kPa |

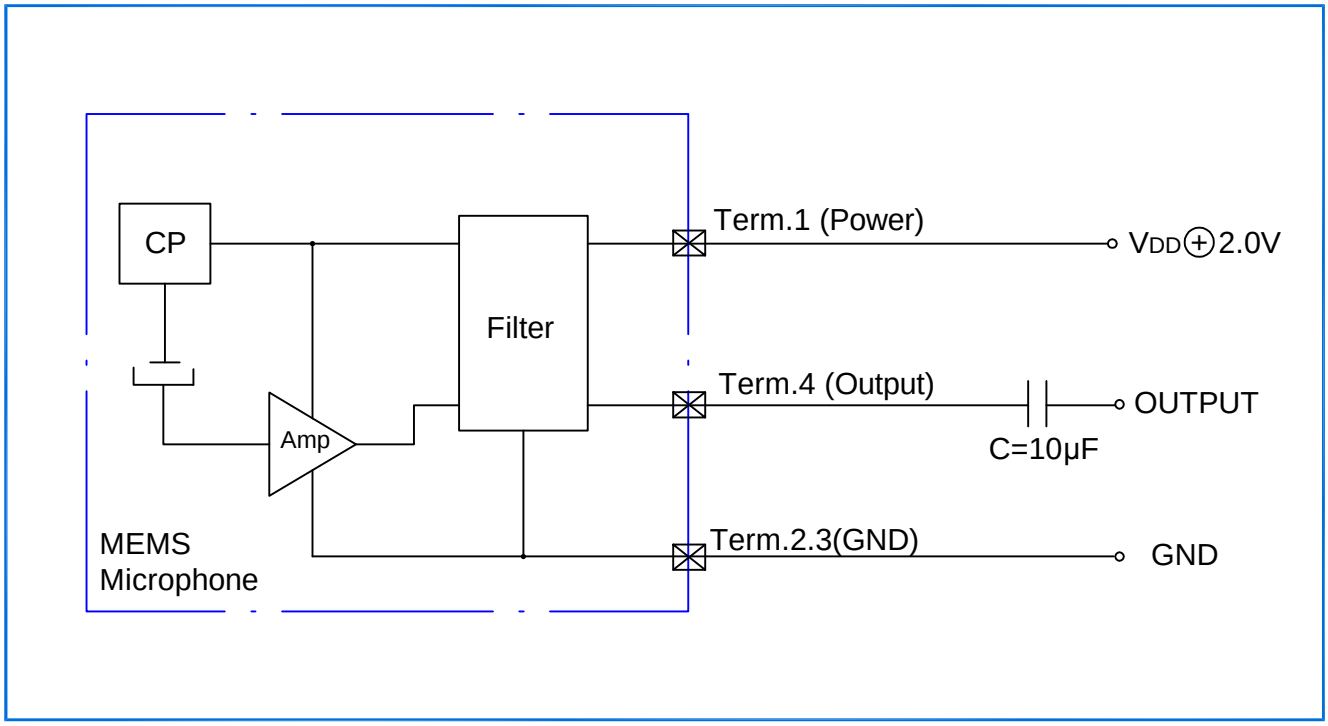
## 3 Acoustic and Electrical Characteristics

| Item | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Sensitivity | S | f=1kHz, Pin=1Pa | -43 | -42 | -41 | dBV/Pa |
| Directivity | D(θ) | Omnidirectional | | | | |
| Output Impedance | Zout | f=1kHz, Pin=1Pa | | | 300 | Ω |
| Operating Voltage Range | $V_S$ | ——— | 1.5 | 2.0 | 3.3 | V |
| Current Consumption | I | ——— | | | 150 | μA |
| Decreasing Voltage Characteristic | △S | f=1kHz, Pin=1Pa Vs =3.3 → 1.5V | No Change | | | dBV/Pa |
| S/N Ratio | S/N(A) | f=1kHz, Pin=1Pa (A-weighted) | | 58 | | dB |
| Power Supply Rejection | PSR | 100mVpp Square wave@217Hz $V_{DD}$=2.0V, A-weighted | | | -83 | dBV |
| Power Supply Rejection Ratio | PSRR | 200mVpp sinewave,1kHz, $V_{DD}$=3.6V, Rload>2kohm | 60 | | | dB |
| Total Harmonic Distortion | THD | 110dB SPL@1 kHz | | | 1 | % |
| Acoustic Overload Point | AOP | 10% THD @1 kHz | | 130 | | dB SPL |

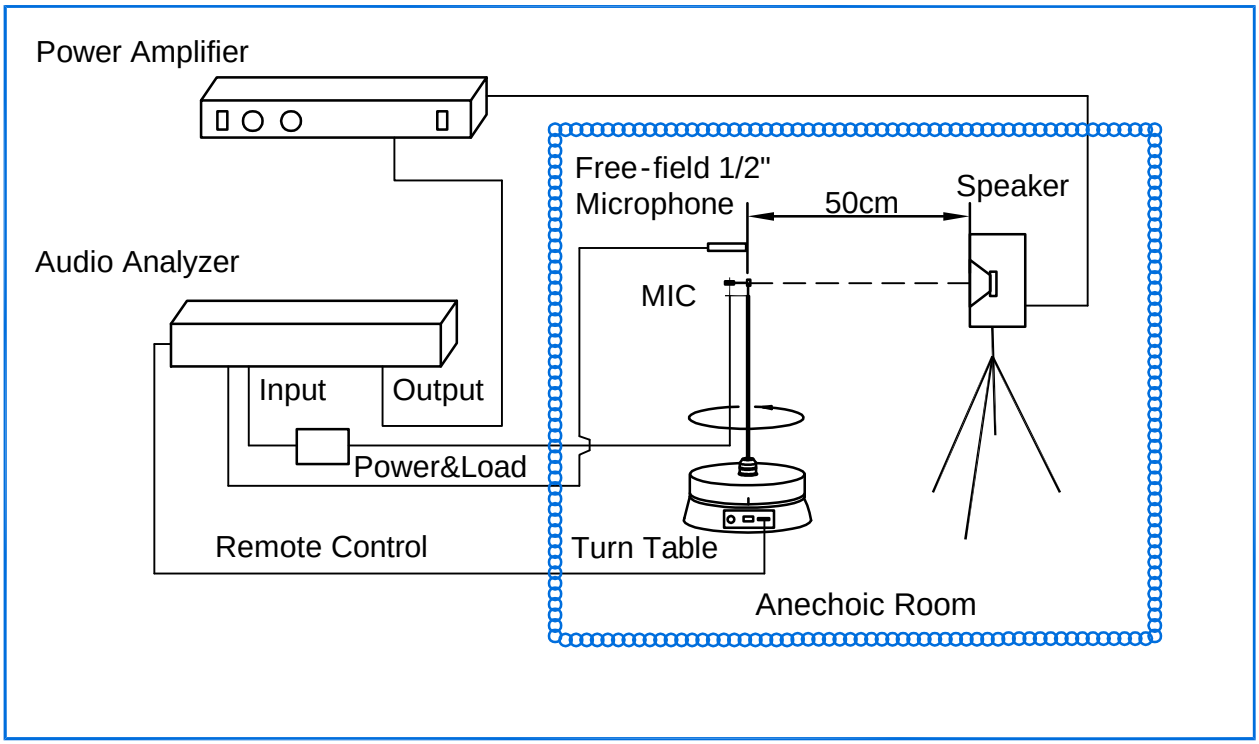
## 4 Frequency Response Curve and Limits



## 5 Measurement Circuit

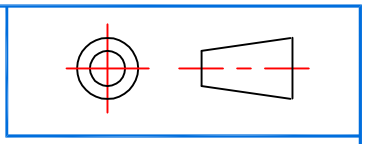


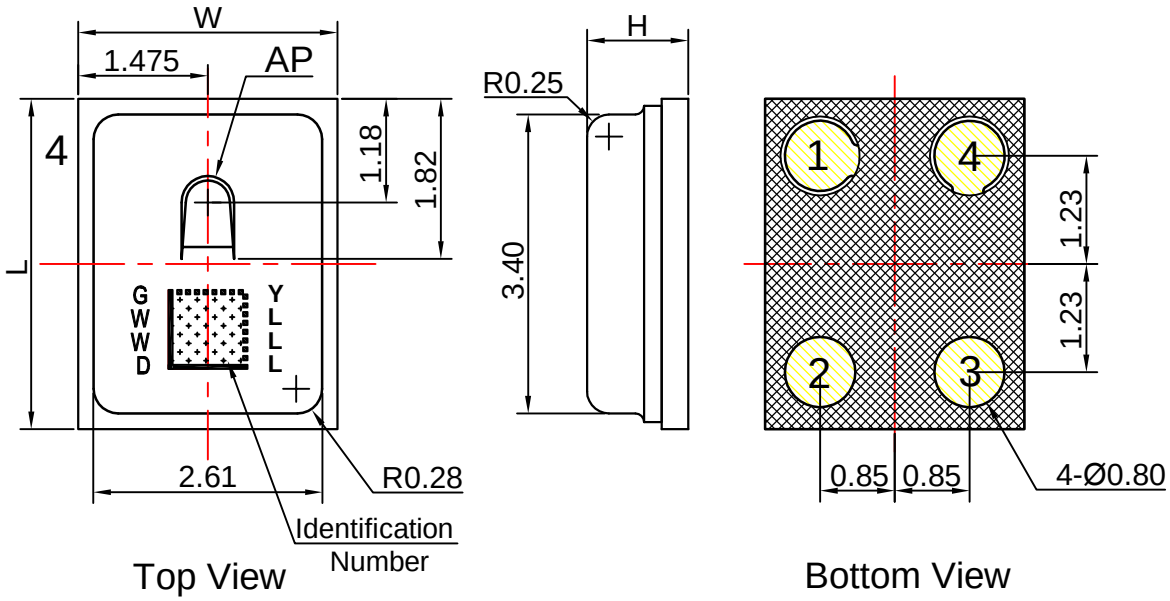

## 6 Test Setup Drawing



# 7 Mechanical Characteristics

## 7.1 Appearance Drawing (Unit: mm)






Top View

Bottom View

| Pin# | Function |
|---|---|
| 1 | Power |
| 2 | GND |
| 3 | GND |
| 4 | Output |

| Item | Dimension | Tol.(±) | Units |
|---|---|---|---|
| Length | 3.76 | 0.10 | mm |
| Width | 2.95 | 0.10 | mm |
| Height | 1.10 | 0.10 | mm |
| Acoustic Port (AP) | Ø0.60 | 0.10 | mm |

Note: 1. Tolerance ±0.10mm unless otherwise specified.

2. Identification Number Convention: Job Identification Number.

Identification Number [G][W][W][D] / [Y][L][L][L]

[G]: GoerTek [WW]:Week [D]:Day

[Y]:Year [LLL]: Lot Number

2D Code

## 7.2 Weight

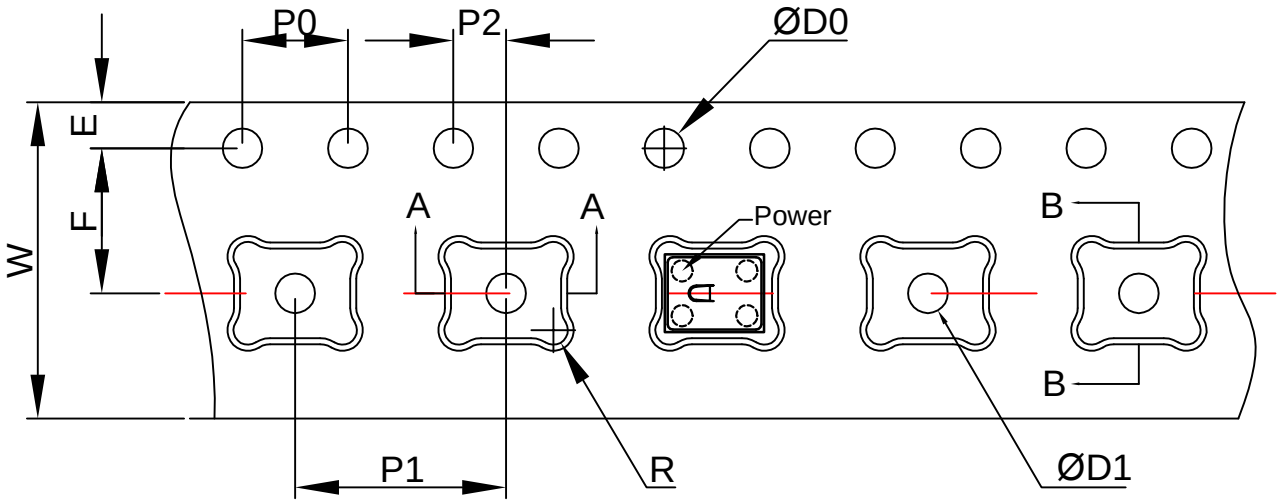
The weight of the MIC is Less than 0.04g.

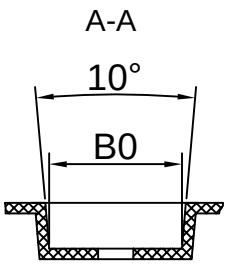
## 8 Reliability Condition

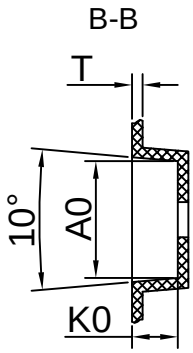
| | |
|---|---|
| 8.1 Vibration Test | To be no interference in operation after vibrations, 4 cycles, from 20 to 2,000Hz in each direction(X,Y,Z), 48 minutes, using peak acceleration of 20g, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.2 Drop Test | To be no interference in operation after dropped to 1.0cm steel plate 12 times from 1.5 meter height in state of JIG, JIG weight of 150g, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.3 Temperature Test | a) After exposure at +125℃ for 200 hours, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%)<br><br>b) After exposure at -40℃ for 200 hours, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.4 Humidity Test | After exposure at +85℃ and 85% relative humidity for 200 hours, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.5 Mechanical Shock Test | Then subject samples to three one-half sine shock pulses (3000 g for 0.3 milliseconds) in each direction (for six axes in total) along each of the three mutually perpendicular axes for a total of 18 shocks, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.6 Thermal Shock Test | After exposure at -40℃ for 30 minutes, at +125℃ for 30 minutes (change time 20 seconds) 32 cycles, sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.7 Reflow Test | Adopt the reflow curve of item 12.3, after three reflows, sensitivity should vary within ±2dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.8 Electrostatic Discharge Test | Under C=150pF, R=330ohm.<br>Tested to ±8KV contact to the case and tested to ±2kV contact to I/O terminals.10 times.<br>Grounding. Sensitivity should vary within ±3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |
| 8.9 Air Blow Test | 0.4MPa, 30mm, 10s, airgun diameter: 1mm, 20pcs. Sensitivity should vary within 3dB from initial sensitivity.<br>(The measurement to be done after 2 hours of conditioning at +15℃～+35℃, R.H.25%～75%) |

# 9 Package

## 9.1 Tape Specification




**The Dimensions as Follows:**

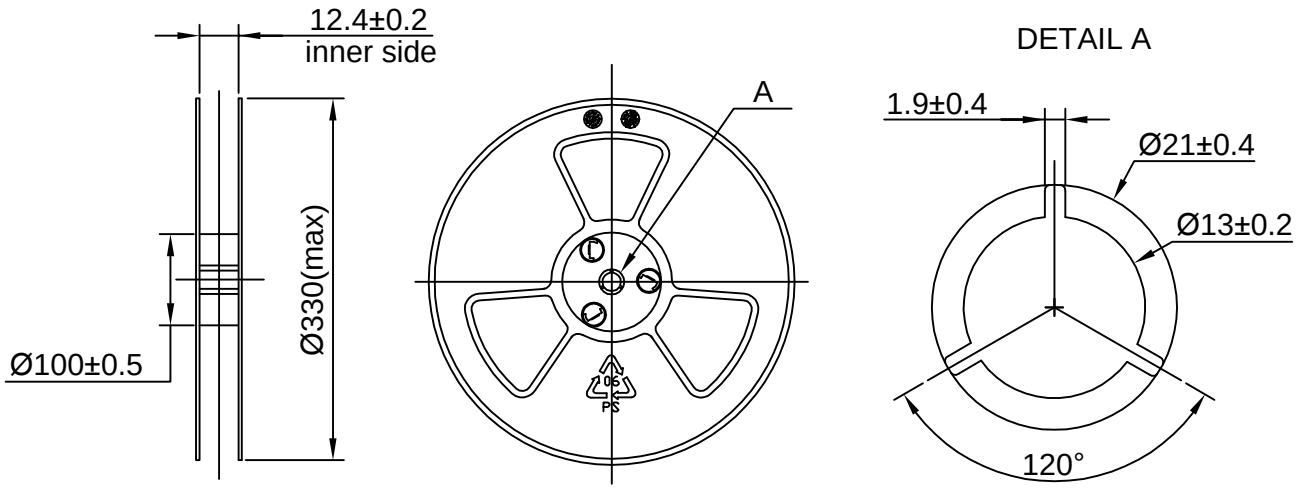
| ITEM | W | E | F | ØD0 | ØD1 |
|---|---|---|---|---|---|
| DIM(mm) | 12.0±0.30 | 1.75±0.10 | 5.5±0.05 | $1.50^{+0.10}_{0}$ | $1.50^{+0.10}_{0}$ |
| ITEM | P0 | 10P0 | P1 | A0 | B0 |
| DIM(mm) | 4.00±0.10 | 40.00±0.20 | 8.00±0.10 | 3.28±0.05 | 4.03±0.05 |
| ITEM | K0 | P2 | T | R | |
| DIM(mm) | 1.30±0.10 | 2.00±0.05 | 0.30±0.05 | 0.25±0.10 | |

## 9.2 Reel Dimension

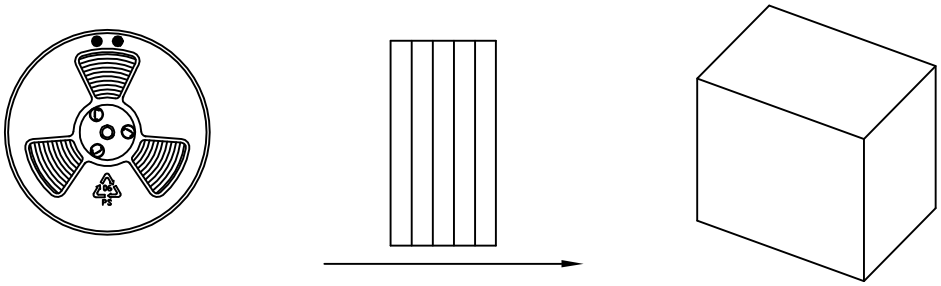
7" reel for sample stage

13" reel will be provided for the mass production stage

The following is 13" reel dimensions (unit:mm)

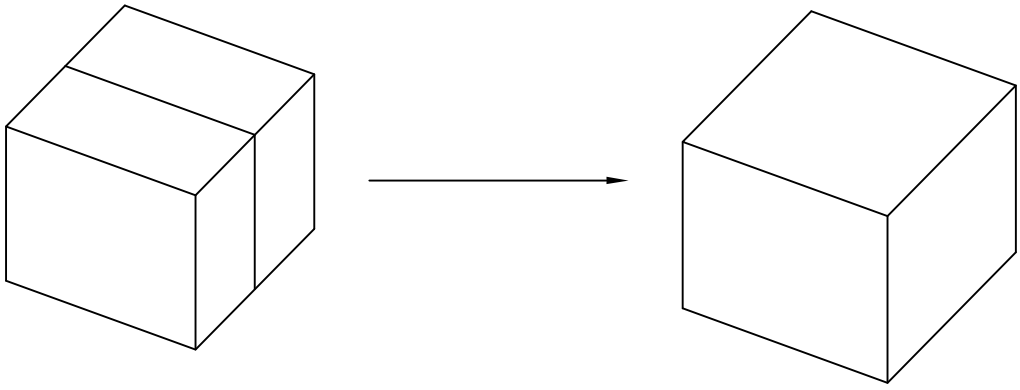



## 9.3 The Content of Box(13" reel)



Packing (5,000PCS)

Inner Box(25,000PCS)
(340mm×135mm×355mm)

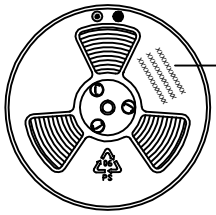


Two Inner Box(50,000PCS)

Outer Box(50,000PCS)
(370mm×300mm×390mm)

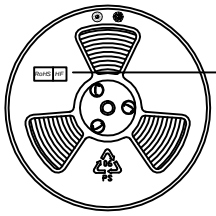
## 9.4 Packing Explain

### 9.4.1 The Label Content of the Reel



The Content Includes:
Product type, Lot, Customer P/N;
and other essential information such as
Quantity, Date etc.

### 9.4.2 The RoHS Label



RoHS
Compliance Mark&
Halogen Free

# 10 Storage and Transportation

10.1 Keep MEMS MIC in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field. Recommend storage period no more than 1 year and floor life(out of bag) at factory no more than 4 weeks.

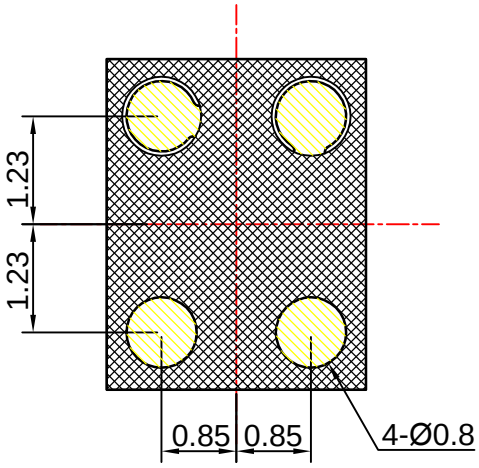
10.2 The MEMS MIC with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.

10.3 Storage Temperature Range：-40℃～+70℃（Microphone units with package）

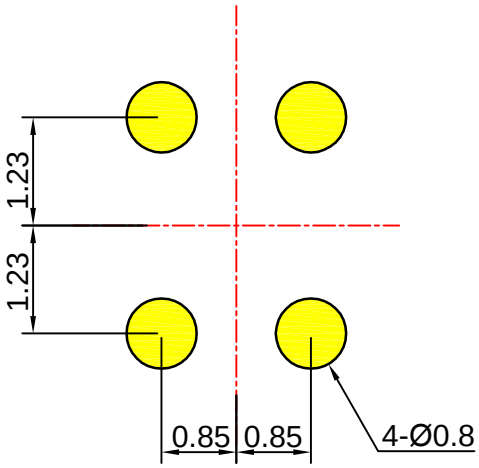
10.4 Operating Temperature Range：-40℃～+105℃

# 11 Land Pattern Recommendation

## 11.1 The Pattern of MIC Pad(Unit:mm)




## 11.2 Recommended Soldering Surface Land Pattern(Unit:mm)

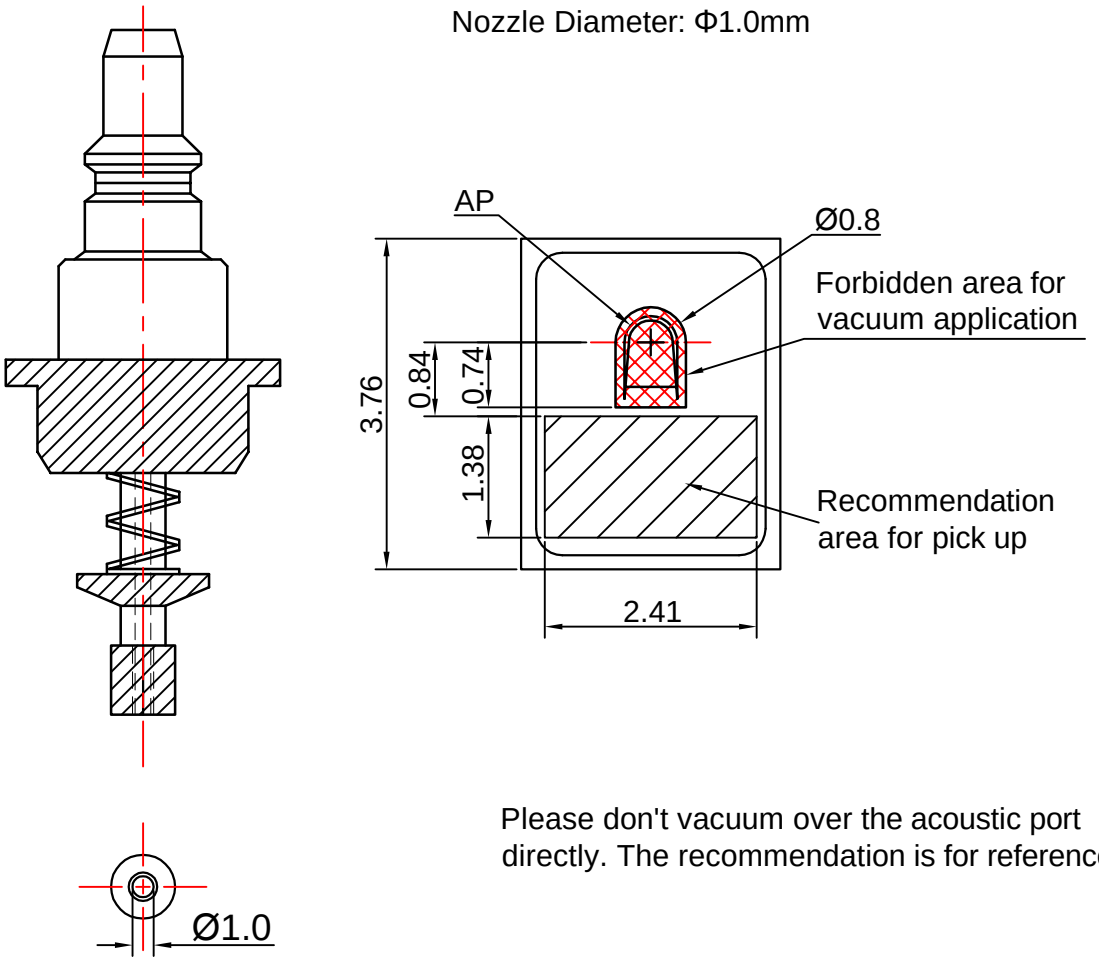


# 12 Soldering Recommendation

## 12.1 Soldering Machine Condition

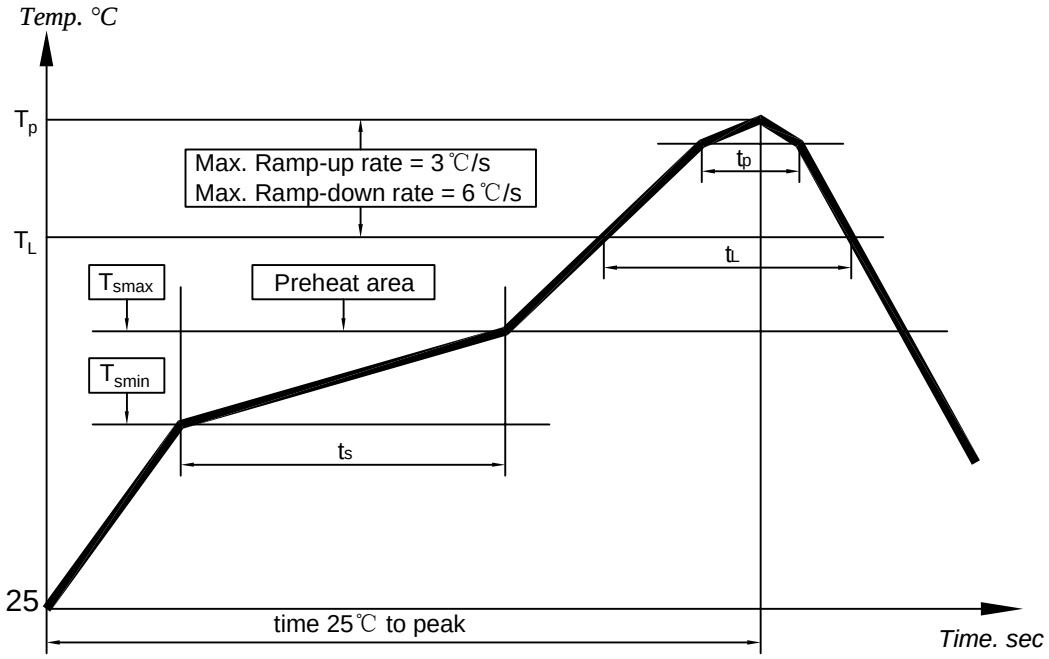
| | |
|---|---|
| Temperature Control | 8 zones |
| Heater Type | Hot Air |
| Solder Type | Lead-free |

## 12.2 The Drawing and Dimension of Nozzle




Please don't vacuum over the acoustic port directly. The recommendation is for reference.

## 12.3 Reflow Profile




### Key Features of The Profile:

| | |
|---|---|
| Average Ramp-up rate($T_{smax}$ to $T_p$) | 3℃/s max. |
| Preheat :<br>Temperature Min($T_{smin}$)<br>Temperature Max($T_{smax}$)<br>Time($T_{smin}$ to $T_{smax}$)($t_s$) | <br>150℃<br>200℃<br>60~180s |
| Time maintained above :<br>Tempreature($T_L$)<br>Time($t_L$) | <br>217℃<br>60~150s |
| Peak Temperature($T_p$) | 260℃ |
| Time within 5℃ of actual Peak Temperature($t_p$) : | 30~40s |
| Ramp-down rate($T_p$ to $T_{smax}$) | 6℃/s max |
| Time 25℃ to Peak Temperature | 8min max |

When MEMS MIC is soldered on PCB, the reflow profile is set according to solder paste and the thickness of PCB etc.

### 12.4 Rework

(1) 250℃～270℃, maximum 30 sec， Peak temperature 330℃.
(2) Wind speed: 15L/m.
(3) It is very important not to put a heatgun over the acoustic port of the microphone.

## 13 Cautions

### 13.1 Board Wash Restrictions

It is very important not to board wash the PCBA after reflow process, otherwise this could damage the microphone.

### 13.2 Vacuum Restrictions

It is very important not to put a vacuum over the acoustic port of the microphone. otherwise this could damage the microphone.

### 13.3 Ultrasonic Restrictions

It is very important not to use ultrasonic process. otherwise this could damage the microphone.

## 14 Output Inspection Standard

Output inspection standard is executed according to <<ISO2859-1:1999>>.