

Specification of MEMS Microphone (RoHS Compliance & Halogen Free)

Customer Name :

Customer Model :

Goertek Model : S15OT421-011

| Goertek | | CUSTOMER APPROVAL |
|-----------------|--------------------------|-------------------|
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Restricted

1 Security Warning

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2 Publication History

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| 1.0 | 2020.09.14 | New Design | Lein | Roy |
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1 Introduction:

MEMS MIC which is able to endure reflow temperature up to 260 °C 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.

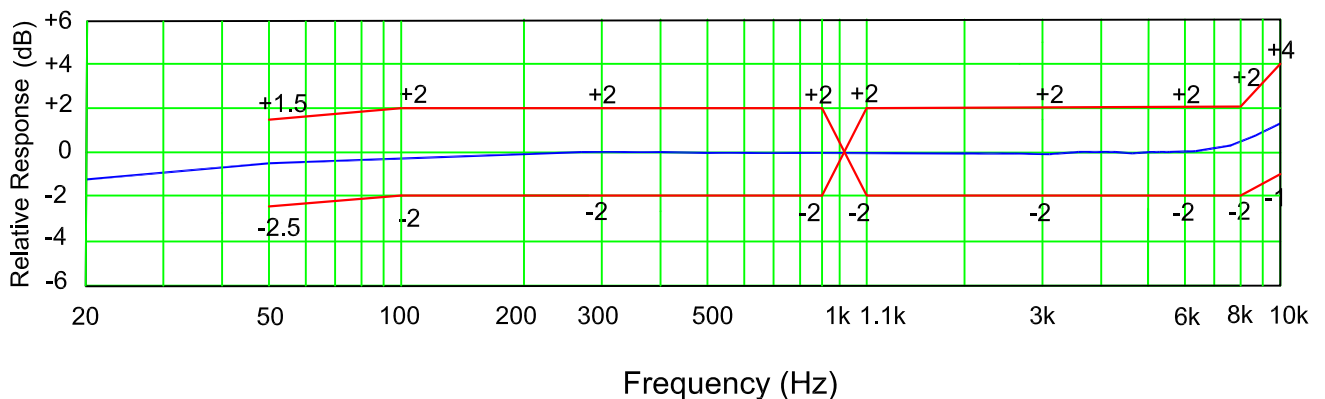
2 Test Condition (Vs=2.0V,L=50cm)

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

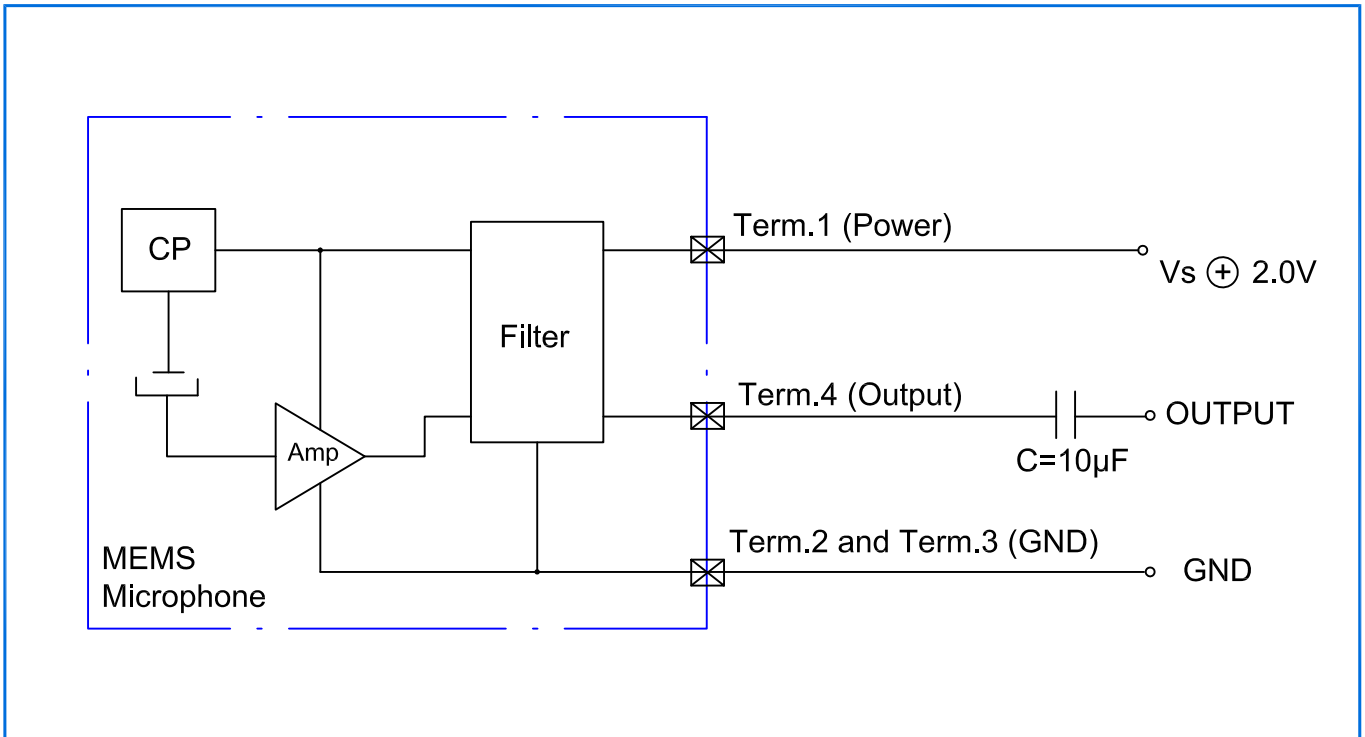
3 Electrical Characteristics

| Item | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-----------------------------------|--------|----------------------------------|-----------------|-----|-----|--------|
| Sensitivity | S | f=1kHz, Pin=1Pa | -43 | -42 | -41 | dB |
| Output Impedance | Zout | f=1kHz, Pin=1Pa | | | 450 | Ω |
| Directivity | D(θ) | | Omnidirectional | | | |
| Current Consumption | I | | 50 | | 150 | μA |
| S/N Ratio | S/N(A) | f=1kHz, Pin=1Pa A-Weighted | | 59 | | dB |
| Decreasing Voltage Characteristic | ΔS | f=1kHz, Pin=1Pa Vs=3.6 ~ 1.5V | No Change | | | |
| Operating Voltage Range | Vs | | 1.5 | | 3.3 | V |
| Total Harmonic Distortion | THD | 110dB SPL @ f=1kHz | | | 1 | % |
| Acoustic Overload Point | AOP | 10% THD @1kHz | | 132 | | dB SPL |

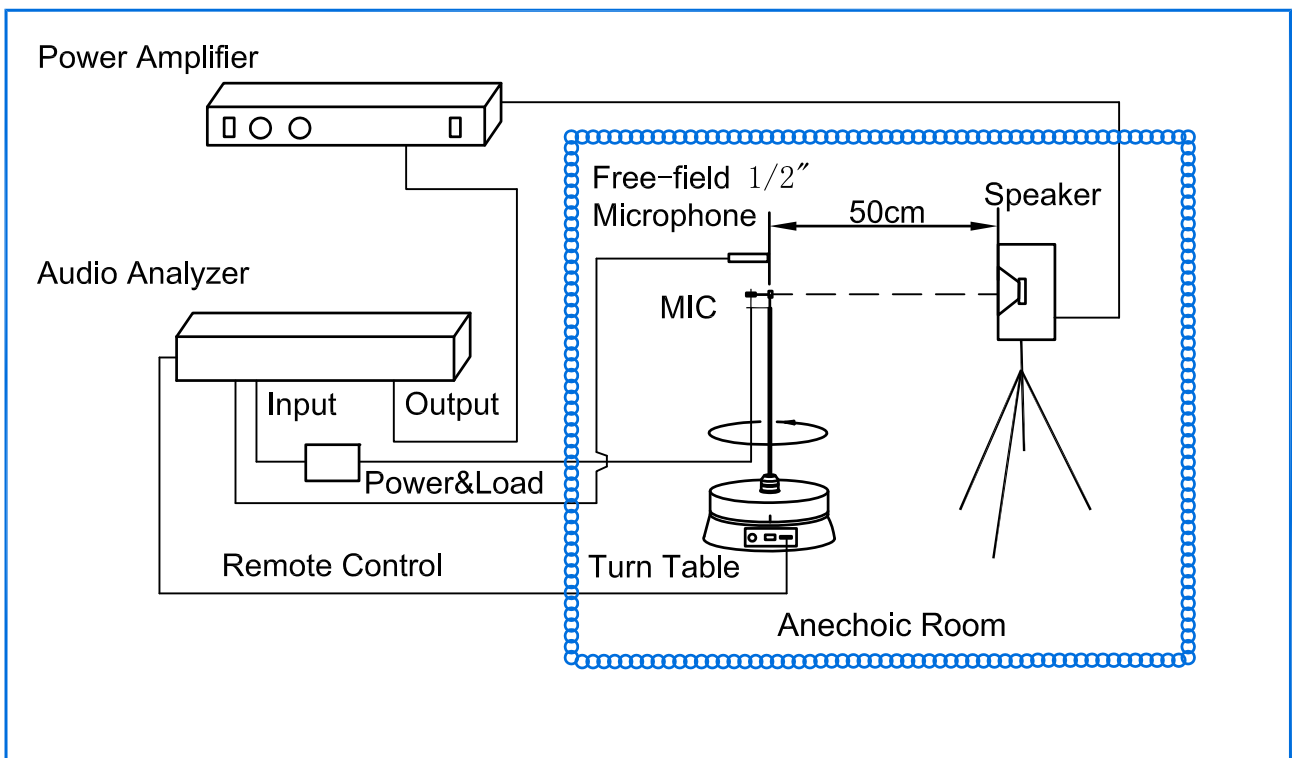
4 Frequency Response Curve Limits



5 Measurement Circuit

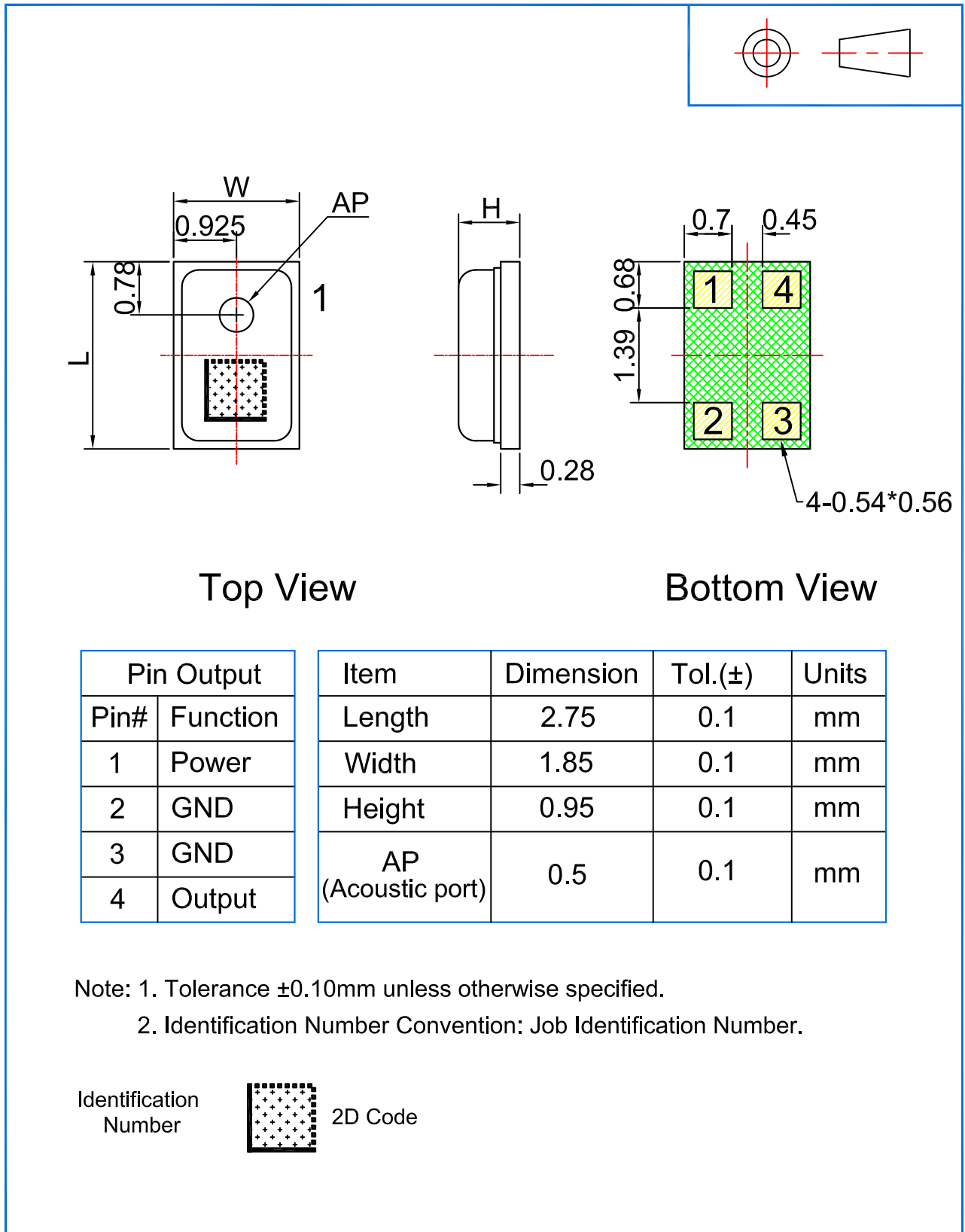


6 Test Setup Drawing



7 Mechanical Characteristics

7.1 Appearance Drawing (Unit: mm)



7.2 Weight

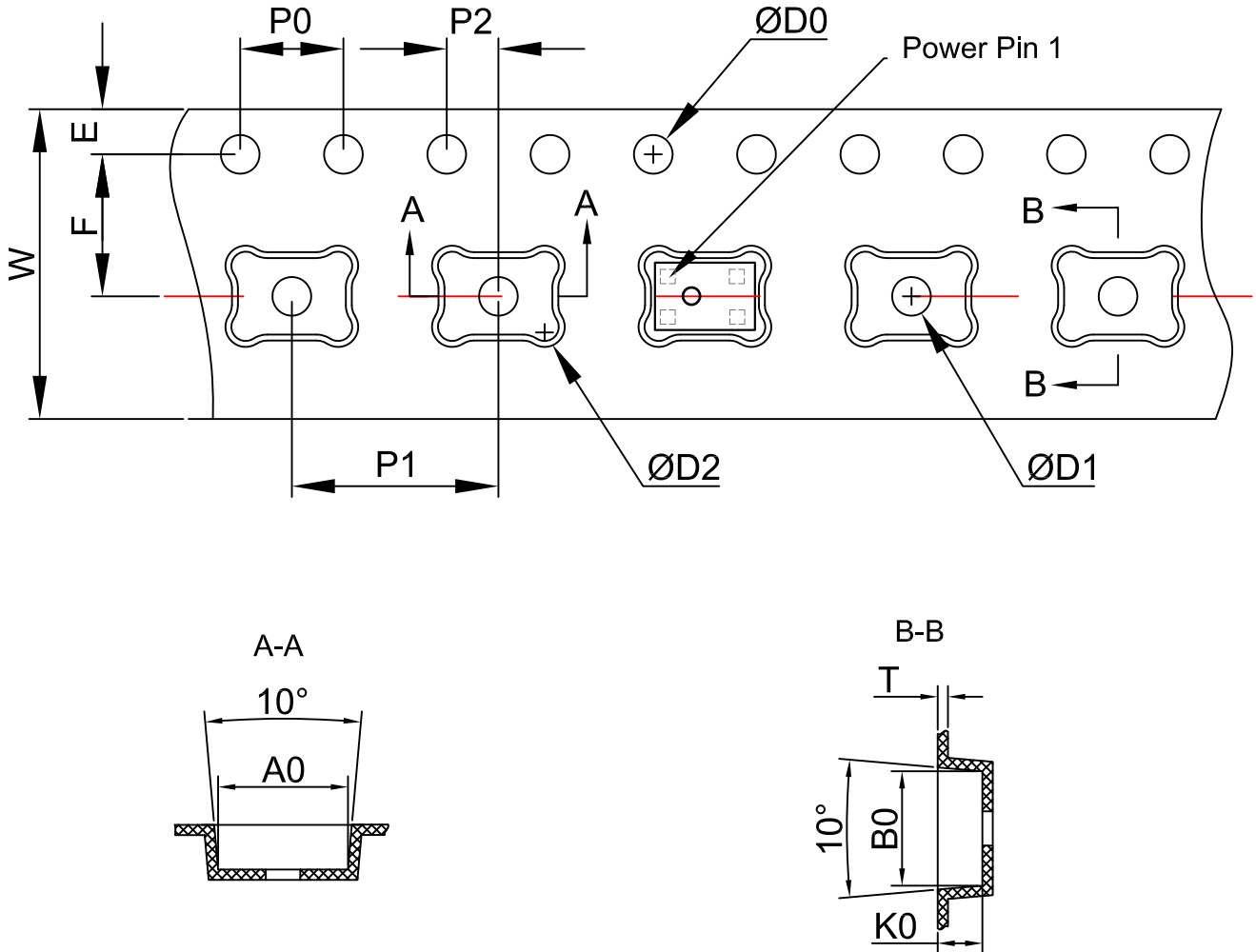
The weight of the MIC is Less than 0.04g.

8 Reliability

| | |
|---|--|
| <p>8.1 Vibration Test</p> | <p>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 $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.2 Drop Test</p> | <p>To be no interference in operation after dropped to 1.0cm steel plate 18 times from 1.5 meter height, sensitivity should vary within $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.3 Temperature Test</p> | <p>a) After exposure at $+125^{\circ}\text{C}$ for 200 hours, sensitivity should vary within $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%) b) After exposure at -40°C for 200 hours, sensitivity should vary within $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.4 Humidity Test</p> | <p>After exposure at $+85^{\circ}\text{C}$ and 85% relative humidity for 200 hours, sensitivity should vary within $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.5 Mechanical Shock Test</p> | <p>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 $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.6 Thermal Shock Test</p> | <p>After exposure at -40°C for 30 minutes, at $+125^{\circ}\text{C}$ for 30 minutes (change time 20 seconds) 5 cycles, sensitivity should vary within $\pm 3\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.7 Reflow Test</p> | <p>Adopt the reflow curve of item 12.3, after five reflows, sensitivity should vary within $\pm 2\text{dB}$ from initial sensitivity. (The measurement to be done after 2 hours of conditioning at $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$, R.H 25%~75%)</p> |
| <p>8.8 Electrostatic Discharge Test</p> | <p>Under $C=150\text{pF}$, $R=330\text{ohm}$. Tested to $\pm 8\text{KV}$ contact to the case and tested to $\pm 2\text{KV}$ contact to I/O terminals.10 times. Grounding. Sensitivity should vary within $\pm 2\text{dB}$ from initial sensitivity.</p> |

9 Package

9.1 Tape Specification



The Dimensions as Follows:

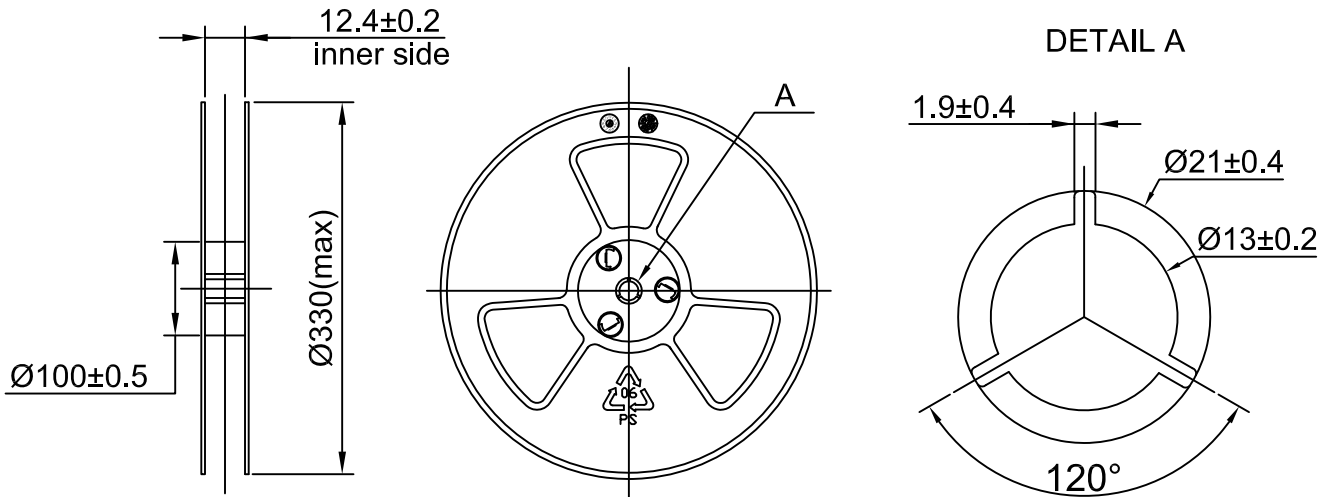
| | | | | | |
|---------|-----------------|------------------|-----------------|------------------|------------------|
| ITEM | W | E | F | $\varnothing D0$ | $\varnothing D1$ |
| DIM(mm) | 12.0 ± 0.30 | 1.75 ± 0.10 | 5.5 ± 0.05 | $1.50^{+0.10}_0$ | $1.00^{+0.10}_0$ |
| ITEM | P0 | 10P0 | P1 | A0 | B0 |
| DIM(mm) | 4.00 ± 0.10 | 40.00 ± 0.20 | 8.00 ± 0.10 | 3.00 ± 0.05 | 2.05 ± 0.05 |
| ITEM | K0 | P2 | T | $\varnothing D2$ | |
| DIM(mm) | 1.10 ± 0.10 | 2.00 ± 0.1 | 0.30 ± 0.05 | 0.50 ± 0.10 | |

9.2 Reel Dimension

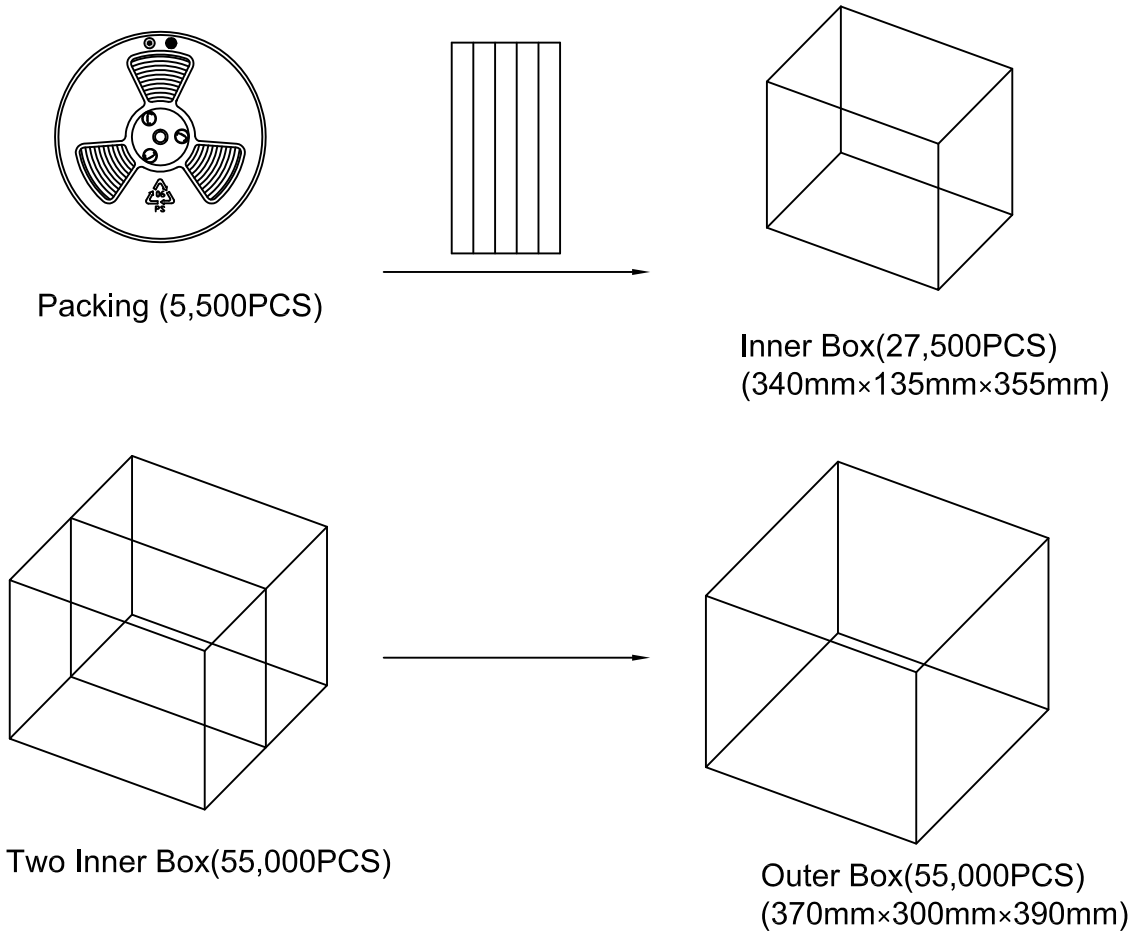
7" reel for sample stage

13" reel will be provided for the mass production stage

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

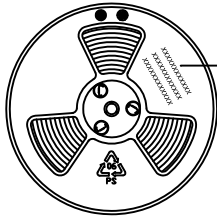


9.3 The Content of Box(13" reel)



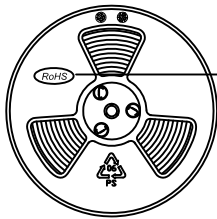
9.4 Packing Explain

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



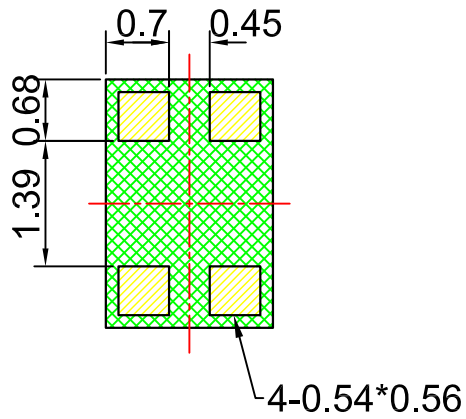
RoHS HF
Compliance Mark

10 Storage and Transportation

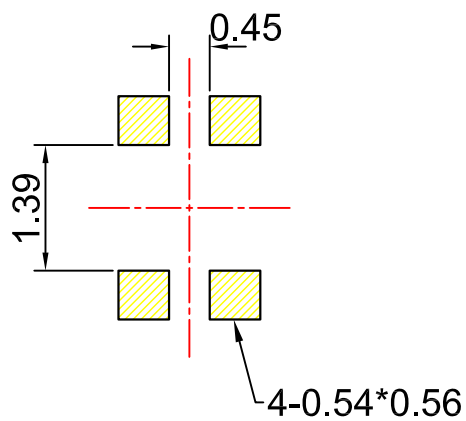
- 10.1 Keep MEMS MIC in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field. Recommend storage period no more than 1 year and floor life(out of bag) at factory no more than 4 weeks.
- 10.2 The MEMS MIC with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.
- 10.3 Storage Temperature Range: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$ (Microphone units with package)
- 10.4 Operating Temperature Range: $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$

11 Land Pattern Recommendation

11.1 The Pattern of MIC Pad(Unit:mm)



11.2 Recommended Soldering Surface Land Pattern

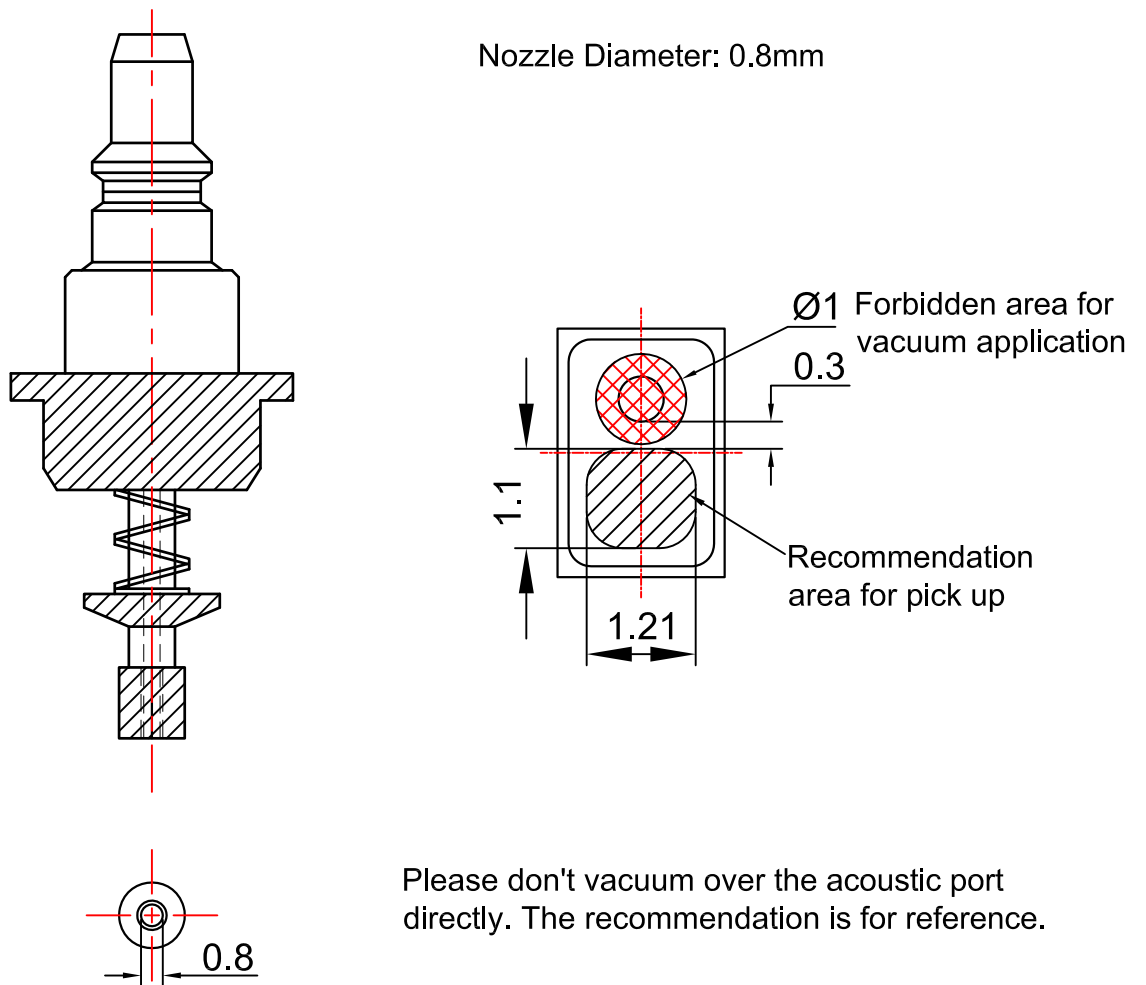


12 Soldering Recommendation

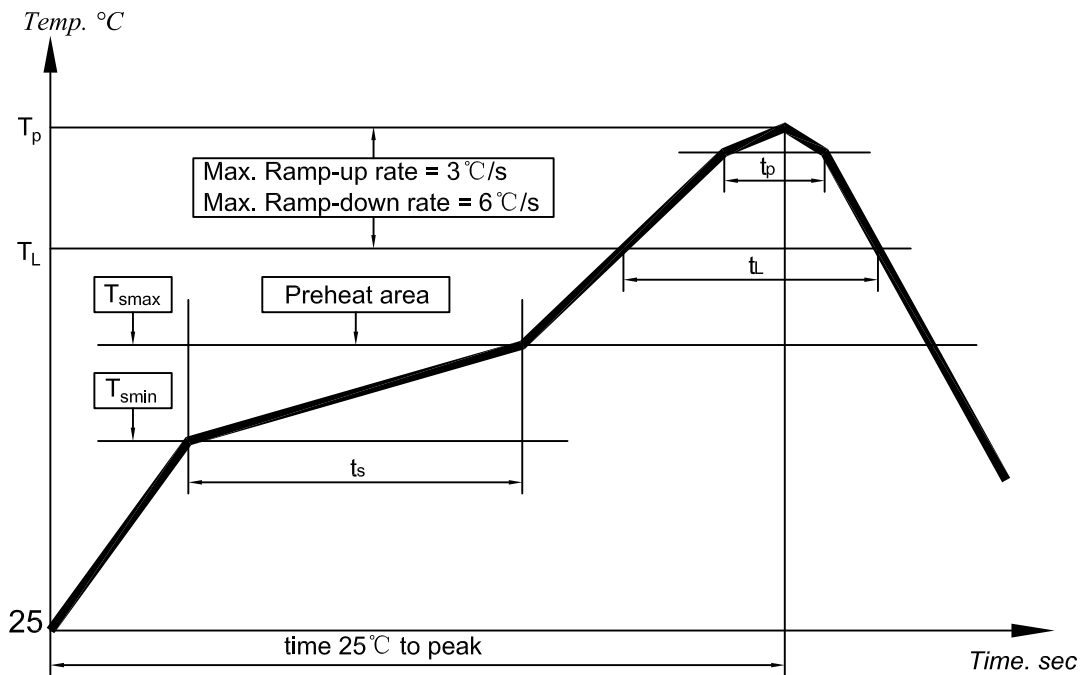
12.1 Soldering Machine Condition

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

12.2 The Drawing and Dimension of Nozzle



12.3 Reflow Profile



Key Features of The Profile:

| | |
|--|---------------------------|
| Average Ramp-up rate(T_{smax} to T_p) | 3°C/s max. |
| Preheat : Temperature Min(T_{smin}) Temperature Max(T_{smax}) Time(T_{smin} to T_{smax})(t_s) | 150°C 200°C 60~180s |
| Time maintained above : Temperature(T_L) Time(t_L) | 217°C 60~150s |
| Peak Temperature(T_p) | 260°C |
| Time within 5°C of actual Peak Temperature(t_p) : | 30~40s |
| Ramp-down rate(T_p to T_{smax}) | 6°C/s max |
| Time 25°C 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°C~270°C, maximum 30 sec, Peak temperature 330°C.
- (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 wash the PCBA after reflow process, otherwise this could damage the microphone.

13.2 Nozzle Restrictions

It is very important not to be put a nozzle over the acoustic hole of the microphone, otherwise this could damage the microphone.

13.3 Blowing Restrictions

It is very important not to blow the acoustic port of the microphone directly, otherwise this could damage the microphone.

13.4 Ultrasonic Restrictions

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

13.5 Case Adaption to Pressure Restrictions

It is very important not to press the case with a force larger than 2.5kgf, otherwise this would damage the microphone.

14 Output Inspection Standard

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