

## Specification of MEMS Microphone (RoHS Compliance & Halogen Free)

Customer Name :

Customer Model :

GoerTek Model : S15OB381-081

Tel : + 86 536 3051234

E- Mail : [goertek@goertek.com](mailto:goertek@goertek.com)

Website: <http://www.goertek.com>

Address: No.268 Dongfang Road, High-Tech Industry  
Development District, Weifang, Shandong, P.R.C.

## Restricted

### 1 Security Warning

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### 2 Publication History

| Version | Description | Date       | Author | Approved |
|---------|-------------|------------|--------|----------|
| 1.0     | New Design  | 2019.07.14 | Samual | Daniel   |
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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.

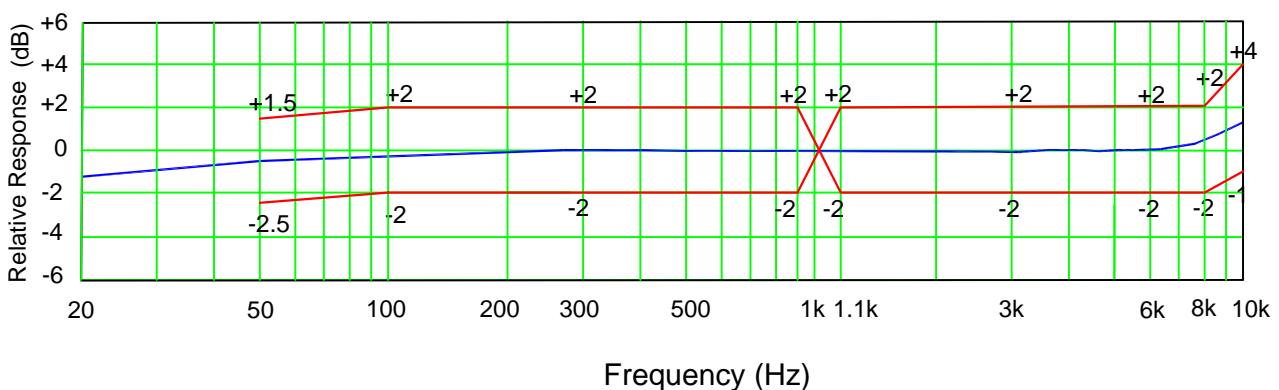
## 2 Test Condition (Vs=2.7V, L=50cm)

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

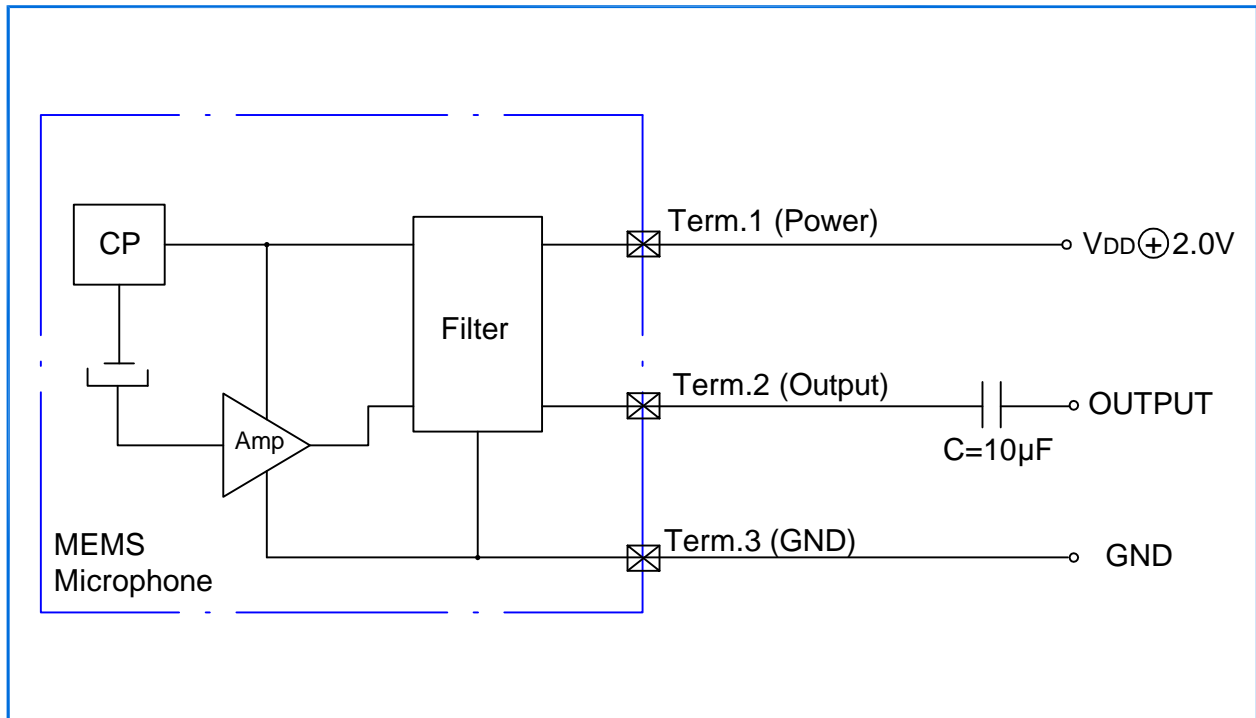
## 3 Acoustic and Electrical Characteristics

| Item                              | Symbol | Test Conditions                                  | Min             | Typ | Max | Unit   |
|-----------------------------------|--------|--|-----------------|-----|-----|--------|
| Operating Voltage Range           | Vs     |  | 1.5             |     | 3.6 | V      |
| Current Consumption               | I      | Vs=2.7V  |                 |     | 150 | µA     |
| Sensitivity                       | S      | f=1kHz, Pin=1Pa                                  | -39             | -38 | -37 | dBV    |
| S/N Ratio                         | SNR    | f=1kHz, Pin=1Pa<br>A-Weighted Curve              |                 | 63  |     | dB     |
| Total Harmonic Distortion         | THD    | 94dB SPL@1kHz                                    |                 |     | 1   | %      |
|                                   |        | 110dB SPL@1kHz                                   |                 |     | 2   | %      |
| Acoustic Overload Point           | AOP    | 10%THD@1kHz                                      |                 | 128 |     | dB SPL |
| Power Supply Rejection            | PSR    | 100mVpp square wave@217Hz<br>Vs=2.7V, A-Weighted |                 | -96 |     | dBV    |
| Power Supply Rejection Ration     | PSRR   | 200mVpp sinewave@1k Hz,<br>Vs=2.7V, Rload>2Kohm  |                 | 68  |     | dB     |
| Output Impedance                  | Zout   | f=1kHz, Pin=1Pa                                  |                 |     | 400 | Ω      |
| Decreasing Voltage Characteristic | ΔS     | f=1kHz, Pin=1Pa<br>Vs=3.6 --1.5V                 | No Change       |     |     |        |
| Directivity                       | D(θ)   |  | Omnidirectional |     |     |        |

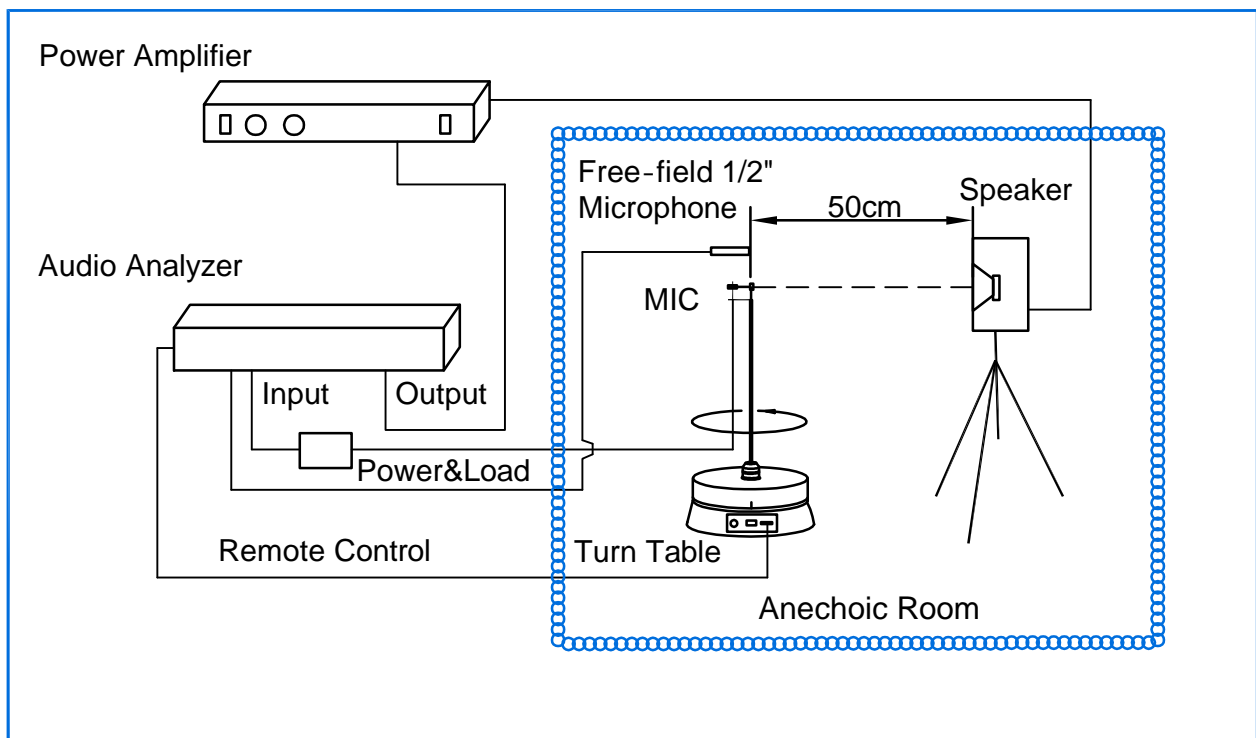
## 4 Frequency Response Curve and Limits



**5 Measurement Circuit**

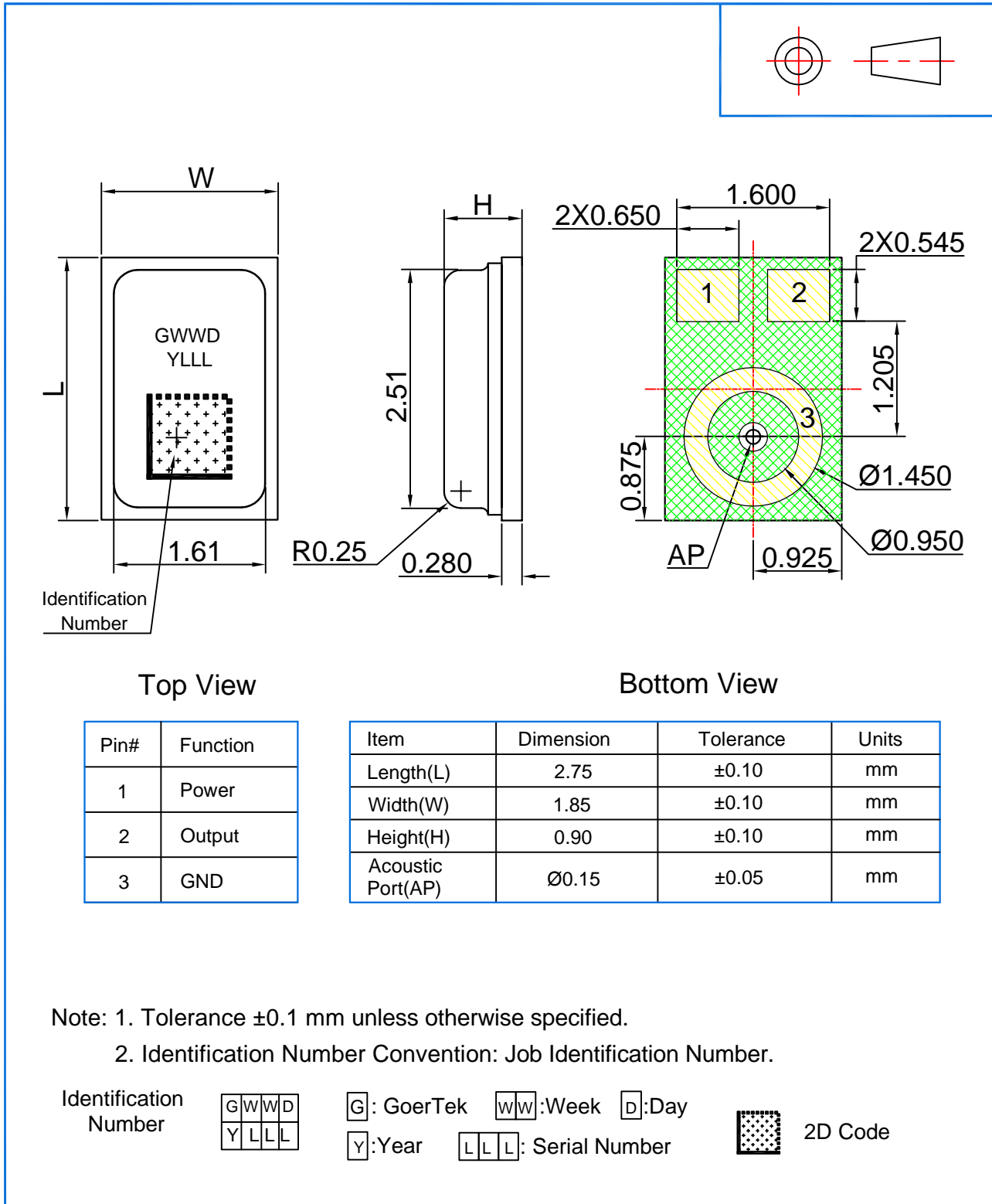


**6 Test Setup Drawing**



## 7 Mechanical Characteristics

### 7.1 Appearance Drawing (Unit: mm)



### 7.2 Weight

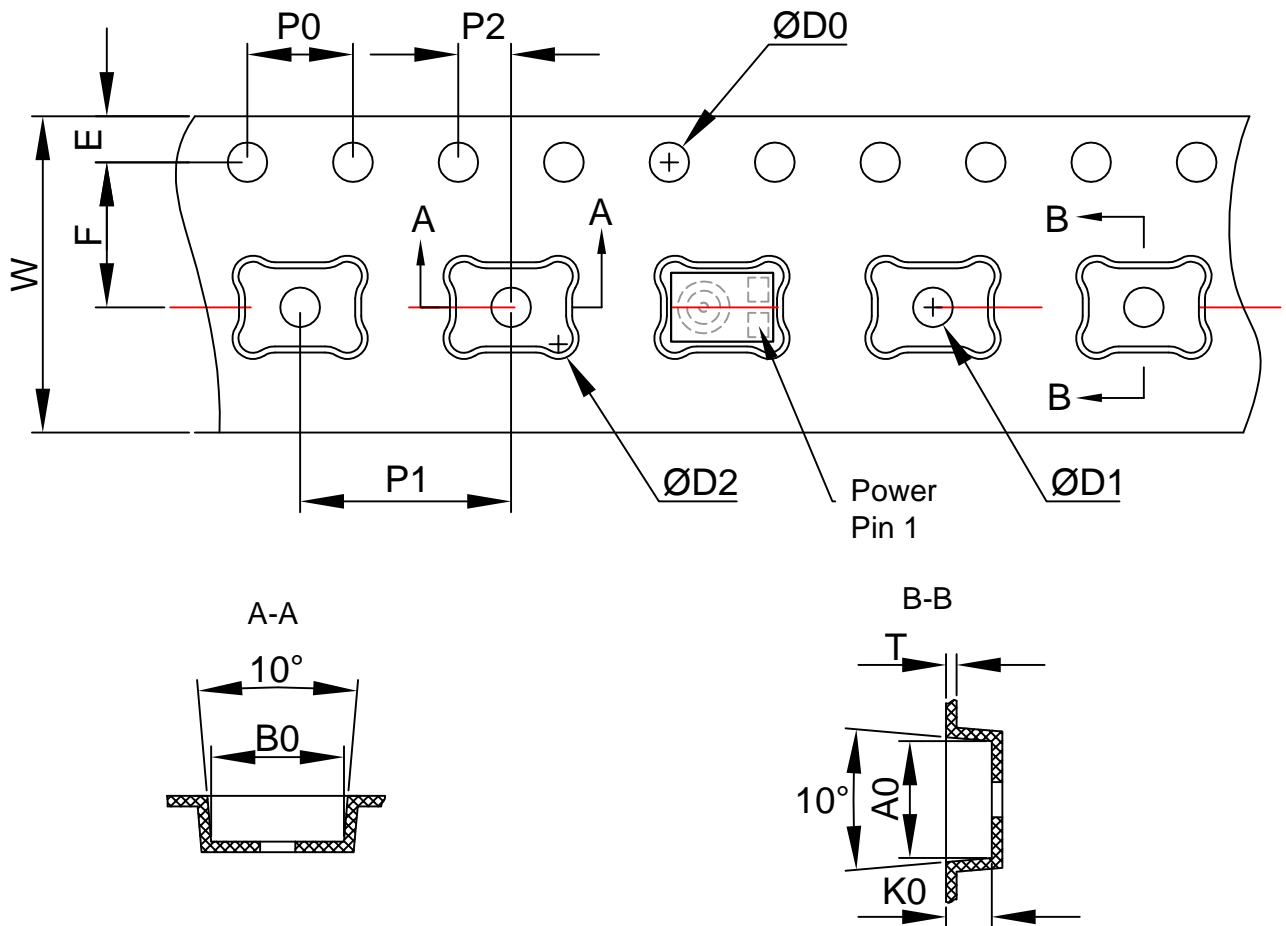
The weight of the MIC is Less than 0.02g.

## 8 Reliability Test

|   |   |
|---|---|
| <p>8.1<br/>Vibration<br/>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 <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>  |
| <p>8.2<br/>Drop<br/>Test</p>                        | <p>To be no interference in operation after dropped to marble 12 times from 1.5 meter height in state of JIG,JIG weight of 150g, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>  |
| <p>8.3<br/>Temperature<br/>Test</p>                 | <p>a) After exposure at <math>+125^{\circ}\text{C}</math> for 200 hours, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)<br/>b) After exposure at <math>-40^{\circ}\text{C}</math> for 200 hours, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p> |
| <p>8.4<br/>Humidity<br/>Test</p>                    | <p>After exposure at <math>+85^{\circ}\text{C}</math> and 85% relative humidity for 200 hours, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>  |
| <p>8.5<br/>Mechanical<br/>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 <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>   |
| <p>8.6<br/>Thermal<br/>Shock Test</p>               | <p>After exposure at <math>-40^{\circ}\text{C}</math> for 30 minutes, at <math>+125^{\circ}\text{C}</math> for 30 minutes (change time 20 seconds) 32 cycles, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>   |
| <p>8.7<br/>Reflow<br/>Test</p>                      | <p>Adopt the reflow curve of item 12.3, after three reflows, sensitivity should vary within <math>\pm 2\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>  |
| <p>8.8<br/>Electrostatic<br/>Discharge<br/>Test</p> | <p>Under <math>C=150\text{pF}</math>, <math>R=330\text{ohm}</math>.<br/>Tested to <math>\pm 8\text{KV}</math> contact to the case and tested to <math>\pm 2\text{kV}</math> contact to I/O terminals.10 times.<br/>Grounding. Sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity.<br/>(The measurement to be done after 2 hours of conditioning at <math>+15^{\circ}\text{C} \sim +35^{\circ}\text{C}</math>, R.H.25%~75%)</p>   |

## 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 <sup>+0.10</sup> <sub>0</sub> | 1.00 <sup>+0.10</sup> <sub>0</sub> |
| 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         | ØD2                                |                                    |
| DIM(mm) | 1.10±0.10 | 2.00±0.05  | 0.30±0.05 | 0.50±0.10                          |                                    |

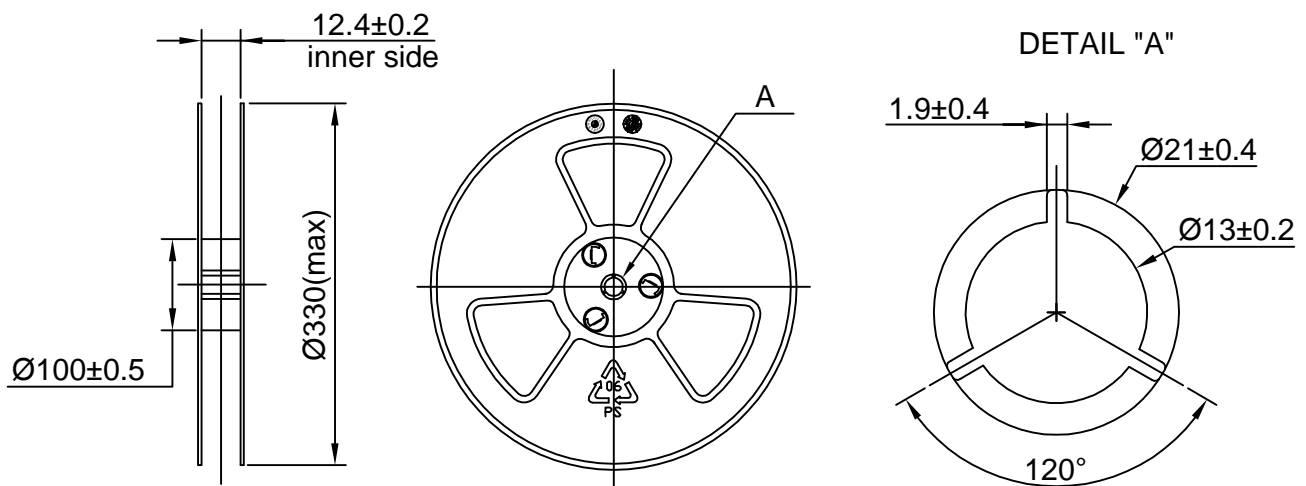


## 9.2 Reel Dimension

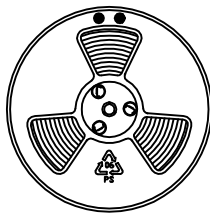
7" reel for sample stage

13" reel will be provided for the mass production stage

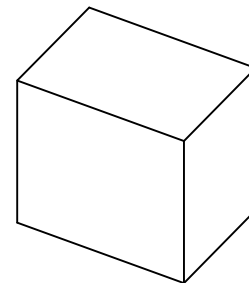
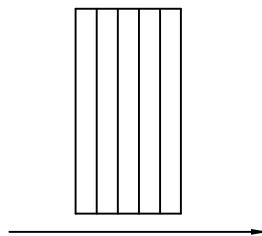
The following is 13" reel dimensions (unit:mm)



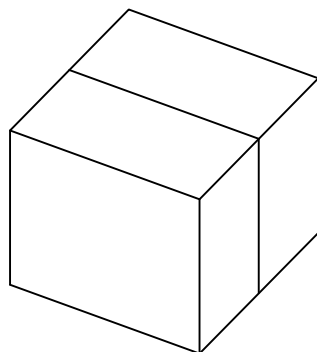
## 9.3 The Content of Box(13" reel)



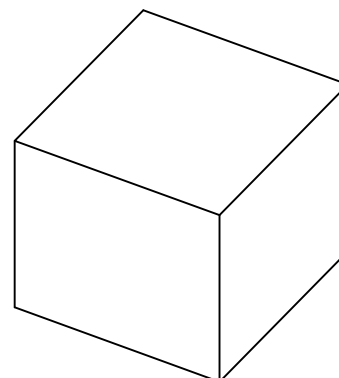
Packing (5,500PCS)



Inner Box(27,500PCS)  
(340mm×135mm×355mm)



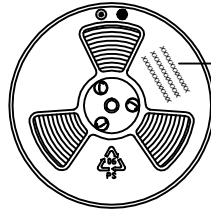
Two Inner Box(55,000PCS)



Outer Box(55,000PCS)  
(370mm×300mm×390mm)

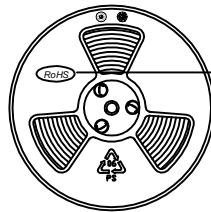
## 9.4 Packing Explain

### 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 &  
Halogen Free 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.

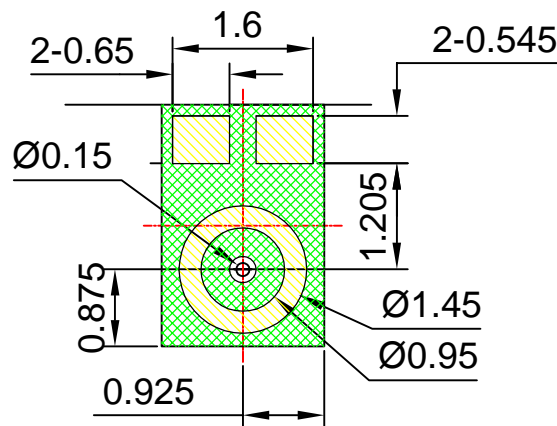
10.2 The MEMS MIC with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.

10.3 Storage Temperature Range :  $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$  (Microphone units with package )

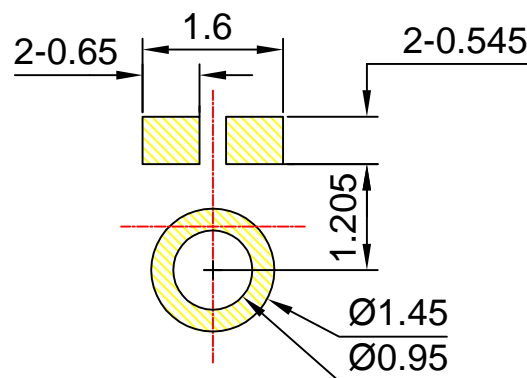
10.4 Operating Temperature Range :  $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$

## 11 Land Pattern Recommendation

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



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

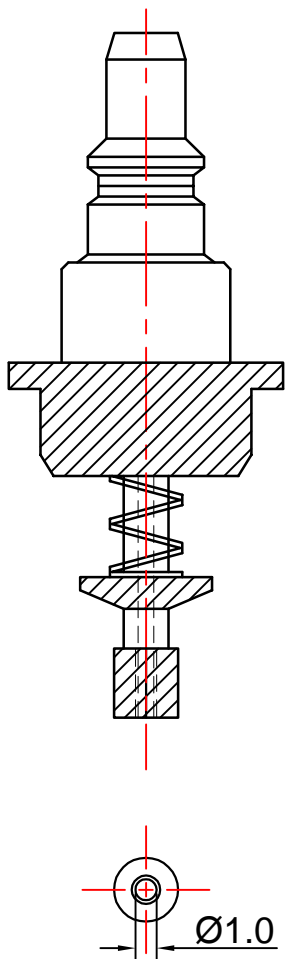


## 12 Soldering Recommendation

### 12.1 Soldering Machine Condition

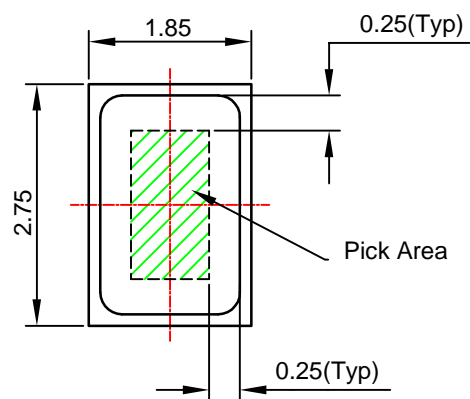
|                     |           |
|---------------------|-----------|
| Temperature Control | 8 zones   |
| Heater Type         | Hot Air   |
| Solder Type         | Lead-free |

### 12.2 The Drawing and Dimension of Nozzle

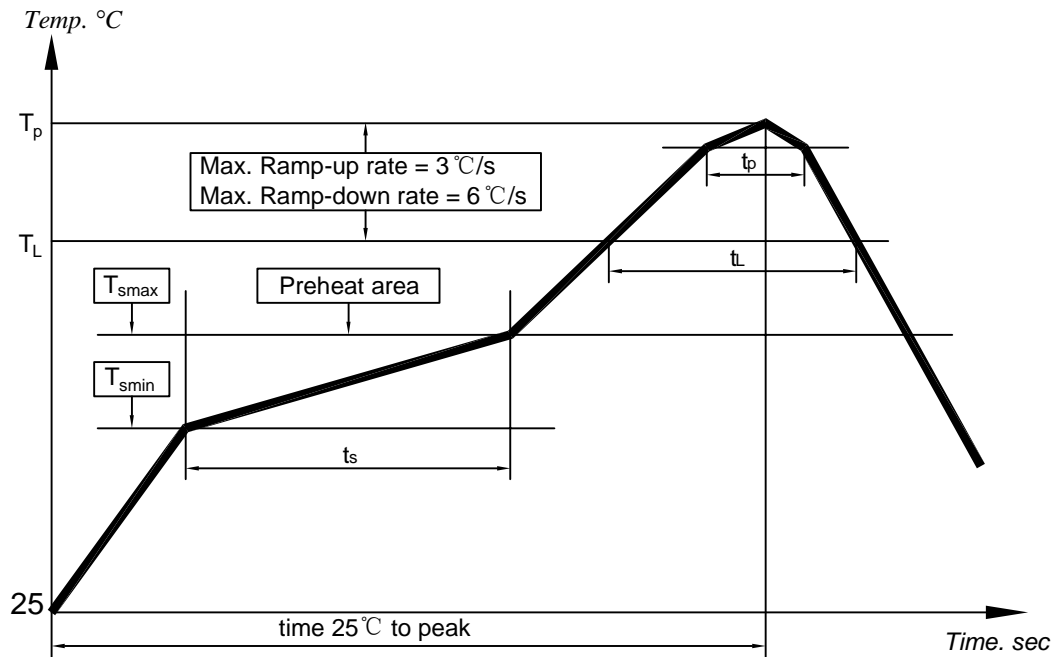


Inside Diameter:  $\text{Ø}1.0\text{mm}$ ;

Please don't vacuum over the acoustic port directly.  
Please don't blow the acoustic port directly.



## 12.3 Reflow Profile



### Key Features of The Profile:

|  |                           |
|--|---------------------------|
| Average Ramp-up rate( $T_{smax}$ to $T_p$ )  | 3°C/s max.                |
| Preheat :<br>Temperature Min( $T_{smin}$ )<br>Temperature Max( $T_{smax}$ )<br>Time( $T_{smin}$ to $T_{smax}$ )( $t_s$ ) | 150°C<br>200°C<br>60~180s |
| Time maintained above :<br>Temperature( $T_L$ )<br>Time( $t_L$ )   | 217°C<br>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 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.

### 13.4 Air Blow Restrictions

It is very important not to use air gun near the port hole of the microphone, otherwise this could damage the microphone.

## 14 Output Inspection Standard

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