

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

Customer Name :  
 Customer Model :  
 Goermicro Model : S18OB381-046

| Goermicro   | CUSTOMER APPROVAL |
|---|-------------------|
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## Contents

|      |  |    |
|------|--|----|
| 1    | Introduction                               | 4  |
| 2    | Test Condition                             | 4  |
| 3    | Electrical Characteristics                 | 4  |
| 3.1  | Standard Mode                              | 4  |
| 3.2  | Low Power Mode                             | 5  |
| 4    | Frequency Response Curve                   | 5  |
| 5    | Measurement Circuit                        | 6  |
| 6    | Test Setup Drawing                         | 6  |
| 7    | Mechanical Characteristics                 | 7  |
| 7.1  | Appearance Drawing                         | 7  |
| 7.2  | Weight                                     | 7  |
| 8    | Reliability Test                           | 8  |
| 8.1  | Vibration Test                             | 8  |
| 8.2  | Drop Test                                  | 8  |
| 8.3  | Temperature Test                           | 8  |
| 8.4  | Humidity Test                              | 8  |
| 8.5  | Mechanical Shock Test                      | 8  |
| 8.6  | Thermal Shock Test                         | 8  |
| 8.7  | Reflow Test                                | 8  |
| 8.8  | Electrostatic Discharge Test               | 8  |
| 9    | Package                                    | 9  |
| 9.1  | Tape Specification                         | 9  |
| 9.2  | Reel Dimension                             | 10 |
| 9.3  | The Content of Box                         | 10 |
| 9.4  | Packing Explain                            | 11 |
| 10   | Storage and Transportation                 | 11 |
| 11   | Land Pattern Recommendation                | 12 |
| 11.1 | The Pattern of MIC Pad                     | 12 |
| 11.2 | Recommended Soldering Surface Land Pattern | 12 |
| 12   | Soldering Recommendation                   | 13 |
| 12.1 | Soldering Machine Condition                | 13 |
| 12.2 | The Drawing and Dimension of Nozzle        | 13 |
| 12.3 | Reflow Profile                             | 14 |
| 13   | Cautions                                   | 15 |
| 13.1 | Board Wash Restrictions                    | 15 |
| 13.2 | Nozzle Restrictions                        | 15 |
| 13.3 | Blowing Restrictions                       | 15 |
| 13.4 | Ultrasonic Restrictions                    | 15 |
| 13.5 | Case Adaption to Pressure Restrictions     | 15 |
| 14   | Output Inspection Standard                 | 15 |

## 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, laptop computers, and other portable electronic devices etc.

## 2 Test Condition ( $V_{DD}=2.7V/1.6V$ , $L=50cm$ )

| 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

### 3.1 Standard Mode

(Test Condition:  $V_{DD}=2.3V\sim 3V$ )

| Item                              | Symbol             | Test Conditions  | Min       | Typ  | Max | Unit   |
|-----------------------------------|--------------------|--|-----------|------|-----|--------|
| Sensitivity                       | S                  | f=1kHz, Pin=1pa  | -39       | -38  | -37 | dB     |
| Output Impedance                  | Zout               | f=1kHz, Pin=1pa  |           |      | 400 | Ω      |
| Directivity                       | D(θ)               | Omnidirectional  |           |      |     |        |
| Current Consumption               | I                  | Operating Voltage Range  | 100       | 155  | 200 | μA     |
| S/N Ratio                         | S/N(A)             | f=1kHz, Pin=1Pa<br>A-Weighted Curve                                  |           | 70   |     | dB     |
| Power Supply Rejection            | PSR                | Measured with 217Hz,<br>100mVpp square wave                          |           | -106 |     | dB     |
| Decreasing Voltage Characteristic | ΔS                 | f=1kHz, Pin=1Pa<br>Vs=3.0 --2.3V                                     | No Change |      |     | dB     |
| Operating Voltage Range           | Vs                 |  | 2.3       | 2.7  | 3.0 | V      |
| Total Harmonic Distortion         | THD                | 94dB SPL@1 kHz   |           | 0.2  | 0.5 | %      |
| Acoustic Overload Point           | AOP                | 10% THD @1 kHz   |           | 137  |     | dB SPL |
| Load Resistor                     | RL                 |  | 25        |      |     | kΩ     |
| Load Capacitance                  | CL                 |  |           |      | 150 | pF     |
| V <sub>DD</sub> ramp up time      | t <sub>VDDup</sub> | V <sub>DD</sub> reaches its final value<br>within +/- 10 % tolerance | 0.001     |      | 5   | ms     |
| Corner Frequency                  | LFRO               |  |           | 45   |     | Hz     |

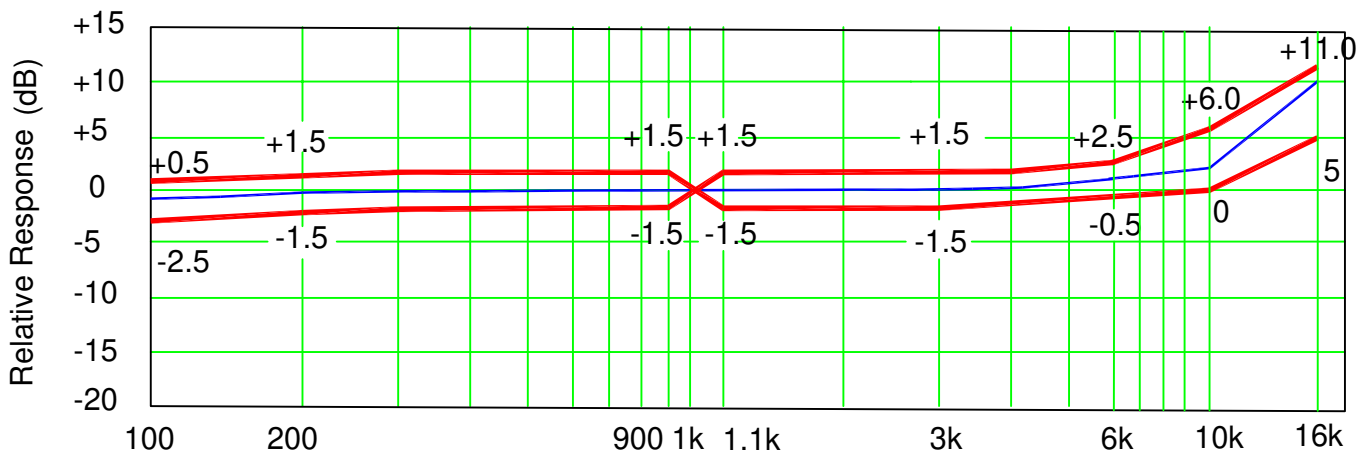
### 3.2 Low Power Mode

(Test Condition:  $V_{DD}=1.5V\sim 1.9V$ )

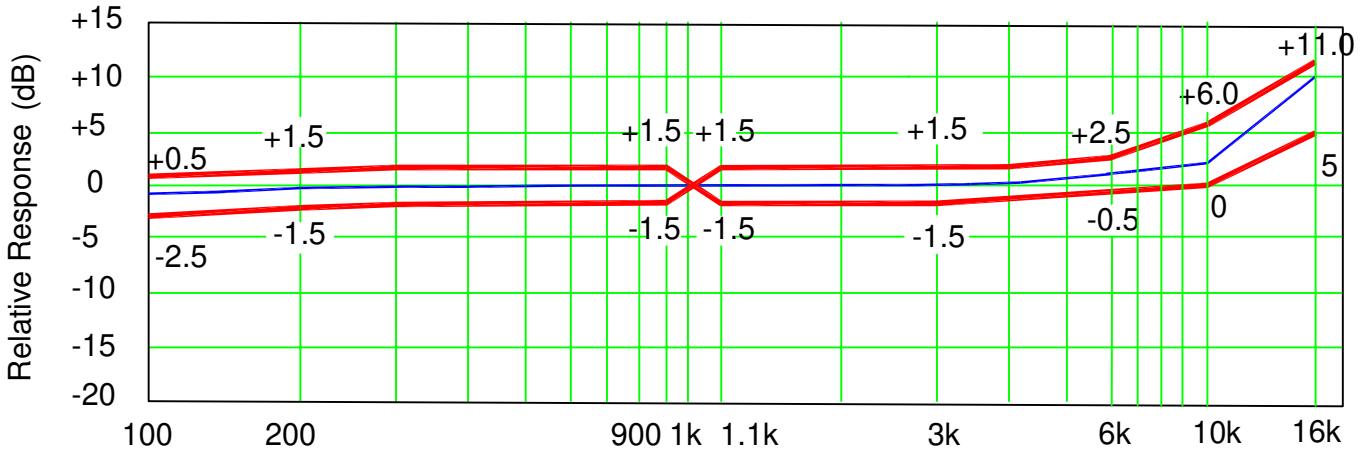
| Item                              | Symbol      | Test Conditions   | Min       | Typ  | Max | Unit     |
|-----------------------------------|-------------|---|-----------|------|-----|----------|
| Operating Voltage Range           | $V_{DD}$    |   | 1.5       | 1.6  | 1.9 | V        |
| Current Consumption               | I           | $V_{DD}=1.6V$   |           |      | 80  | $\mu A$  |
| Sensitivity                       | S           | $f=1kHz, P_{in}=1Pa$  | -39       | -38  | -37 | dB       |
| S/N Ratio                         | SNR         | $f=1kHz, P_{in}=1Pa$<br>A-Weighted Curve                    |           | 68.5 |     | dB       |
| Total Harmonic Distortion         | THD         | 110dB SPL@ $f=1kHz$   |           |      | 1   | %        |
| Acoustic Overload Point           | AOP         | 10%THD@1kHz,S=Typ,<br>$V_{DD}=1.6V, R_{load}>2k\Omega$      |           | 132  |     | dB SPL   |
| Power Supply Rejection            | PSR         | 100mVpp square wave@217Hz,<br>$V_{DD}=1.6V$ A-Weighted      |           | -106 |     | dBV      |
| Power Supply Rejection Ratio      | PSRR        | 200mVpp sine wave@1KHz,<br>$V_{DD}=1.6V, R_{load}>2k\Omega$ |           | 88   |     | dB       |
| Output Impedance                  | $Z_{out}$   | $f=1kHz, P_{in}=1Pa$  |           |      | 400 | $\Omega$ |
| Decreasing Voltage Characteristic | $\Delta S$  | $f=1kHz, P_{in}=1Pa$<br>$V_{DD}=1.9 \text{ --} 1.5V$        | No Change |      |     | dB       |
| Directivity                       | $D(\theta)$ | Omnidirectional   |           |      |     |          |

### 4 Frequency Response Curve and Limits

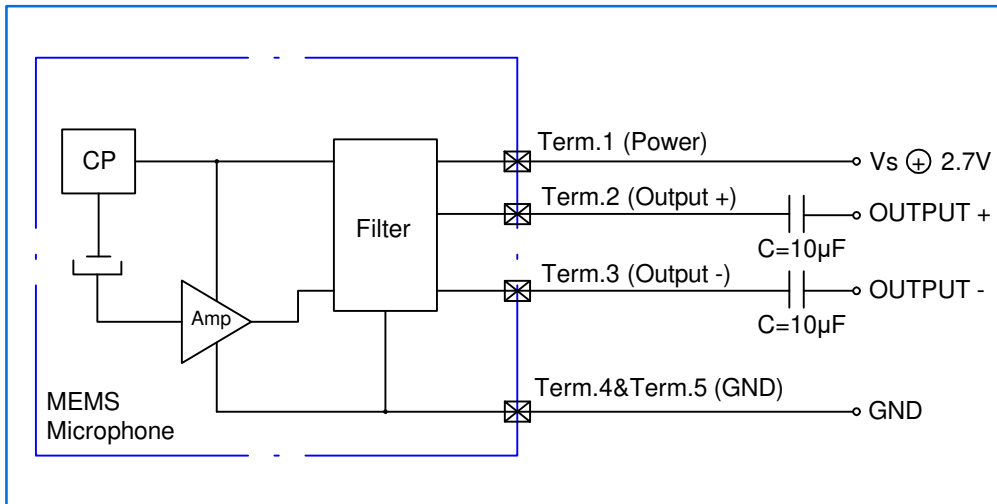
Typical Free Field Response  
Normalized to 1kHz Standard Mode



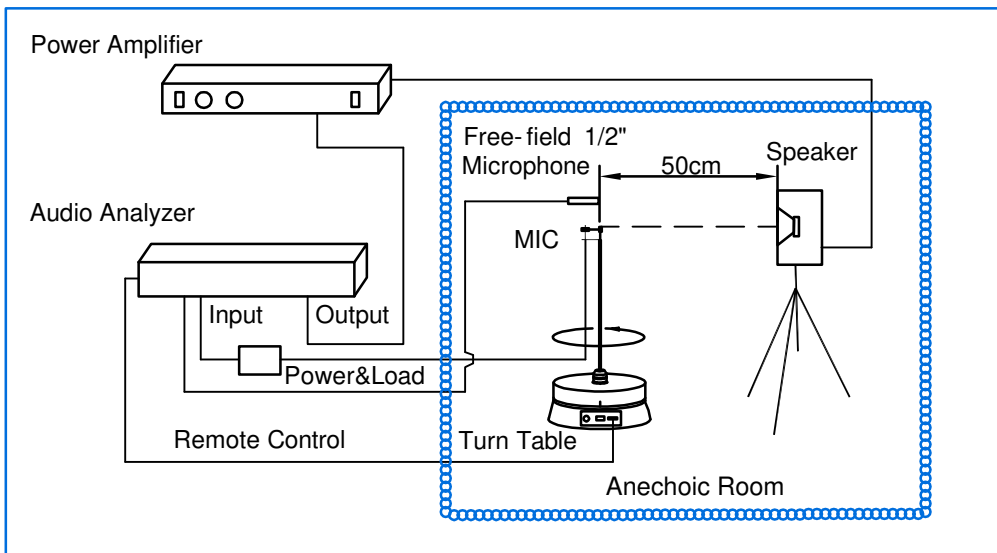
Typical Free Field Response  
Normalized to 1kHz Low Power Mode



## 5 Measurement Circuit

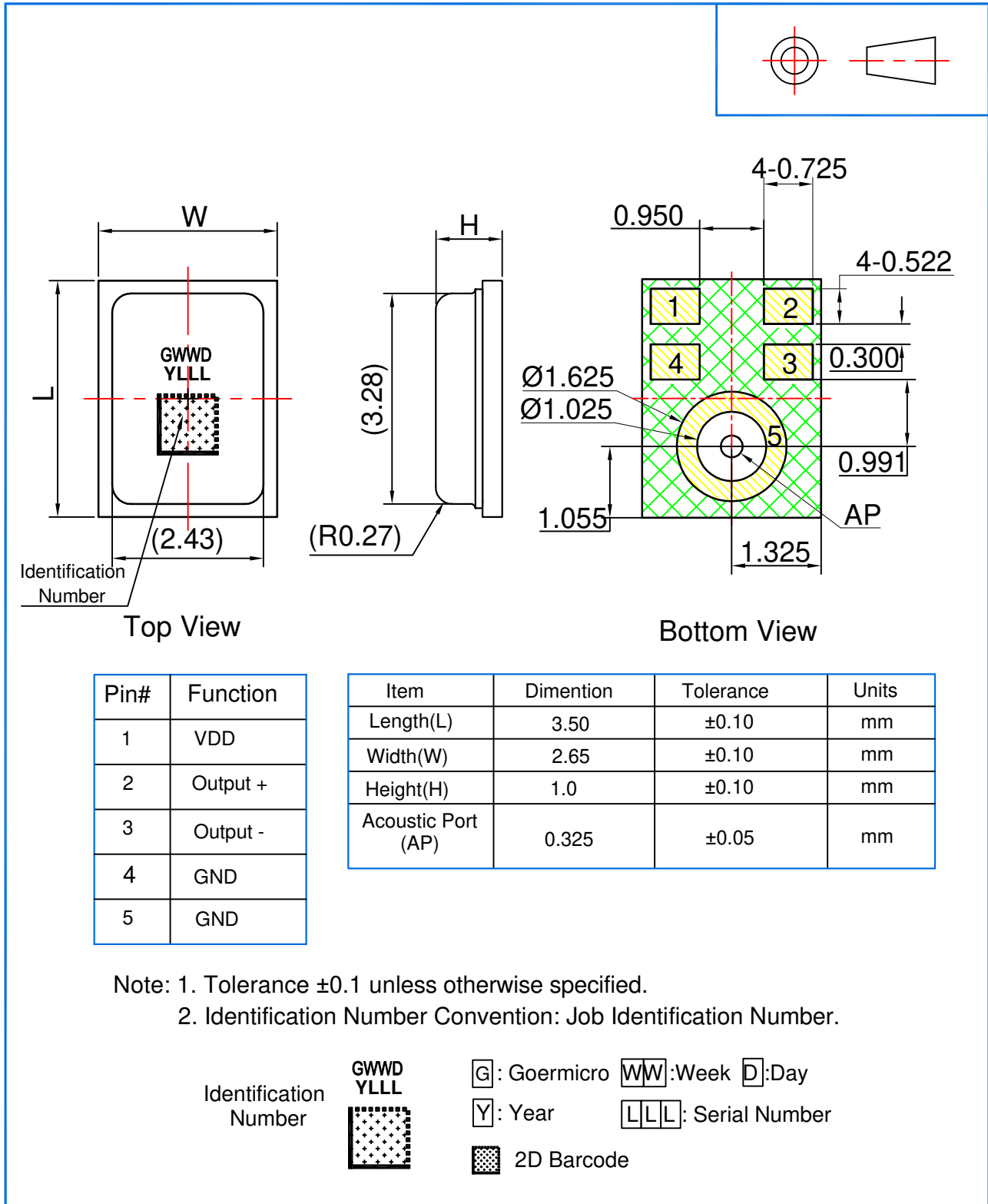


## 6 Test Setup Drawing



## 7 Mechanical Characteristics

### 7.1 Appearance Drawing (Unit: mm)



### 7.2 Weight

The weight of the MIC is Less than 0.04g.

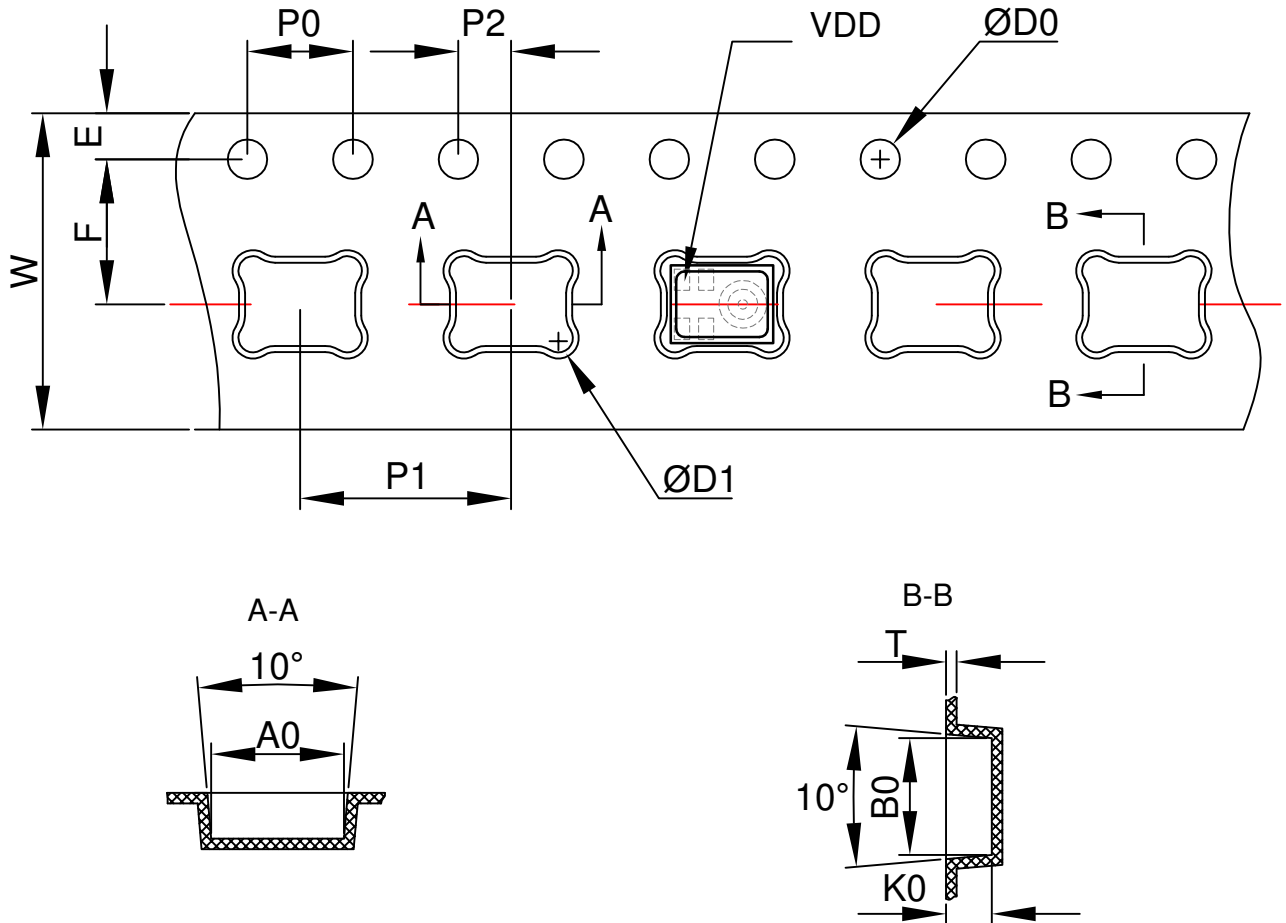
## 8 Reliability Test

|   |  |
|---|--|
| <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</math>dB from initial sensitivity(IEC 60068-2-6:2007).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>  |
| <p>8.2<br/>Drop<br/>Test</p>                        | <p>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 100g, sensitivity should vary within <math>\pm 3</math>dB from initial sensitivity(IEC60068-2-31:2008).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>   |
| <p>8.3<br/>Temperature<br/>Test</p>                 | <p>a) After exposure at +125°C for 200 hours, sensitivity should vary within <math>\pm 3</math>dB from initial sensitivity(IEC 60068-2-1:2007).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)<br/><br/>b) After exposure at -40°C for 200 hours, sensitivity should vary within <math>\pm 3</math>dB from initial sensitivity(IEC 60068-2-1:2007).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p> |
| <p>8.4<br/>Humidity<br/>Test</p>                    | <p>After exposure at +85°C and 85% relative humidity for 200 hours, sensitivity should vary within <math>\pm 3</math>dB from initial sensitivity(IEC 60068-2-67:2019).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, 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</math>dB from initial sensitivity (IEC60068-2-27:2008).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>  |
| <p>8.6<br/>Thermal<br/>Shock Test</p>               | <p>After exposure at -40°C for 30 minutes, at +125°C for 30 minutes (change time 20 seconds) 32 cycles, sensitivity should vary within <math>\pm 3</math>dB from initial sensitivity(IEC 60068-2-14:2009).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, 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</math>dB from initial sensitivity(Refer to customer's request).<br/>(The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>   |
| <p>8.8<br/>Electrostatic<br/>Discharge<br/>Test</p> | <p>Under C=150pF, R=330ohm.<br/>Air discharge to case with<math>\pm 8</math>kV and contact discharge to I/O terminals with<math>\pm 2</math>kV , 10 times, Grounding. Sensitivity should vary within <math>\pm 3</math>dB from initial sensitivity(IEC61000-4-2:2008).</p>   |



## 9 Package

### 9.1 Tape Specification



The Dimensions as Follows:

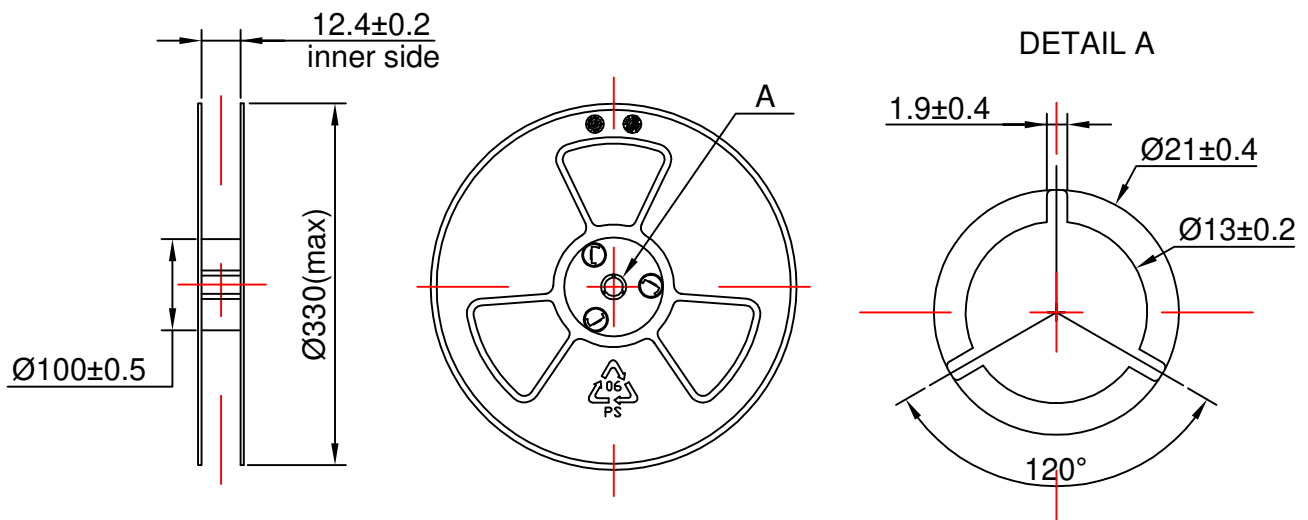
| ITEM    | W               | E                | F               | $\text{ØD0}$     | $\text{ØD1}$    |
|---------|-----------------|------------------|-----------------|------------------|-----------------|
| DIM(mm) | $12.0 \pm 0.30$ | $1.75 \pm 0.10$  | $5.5 \pm 0.05$  | $1.50^{+0.10}_0$ | $0.50 \pm 0.10$ |
| ITEM    | P0              | 10P0             | P1              | A0               | B0              |
| DIM(mm) | $4.00 \pm 0.10$ | $40.00 \pm 0.20$ | $8.00 \pm 0.10$ | $3.75 \pm 0.05$  | $2.85 \pm 0.05$ |
| ITEM    | K0              | P2               | T               |                  |                 |
| DIM(mm) | $1.30 \pm 0.10$ | $2.00 \pm 0.05$  | $0.30 \pm 0.05$ |                  |                 |

## 9.2 Reel Dimension

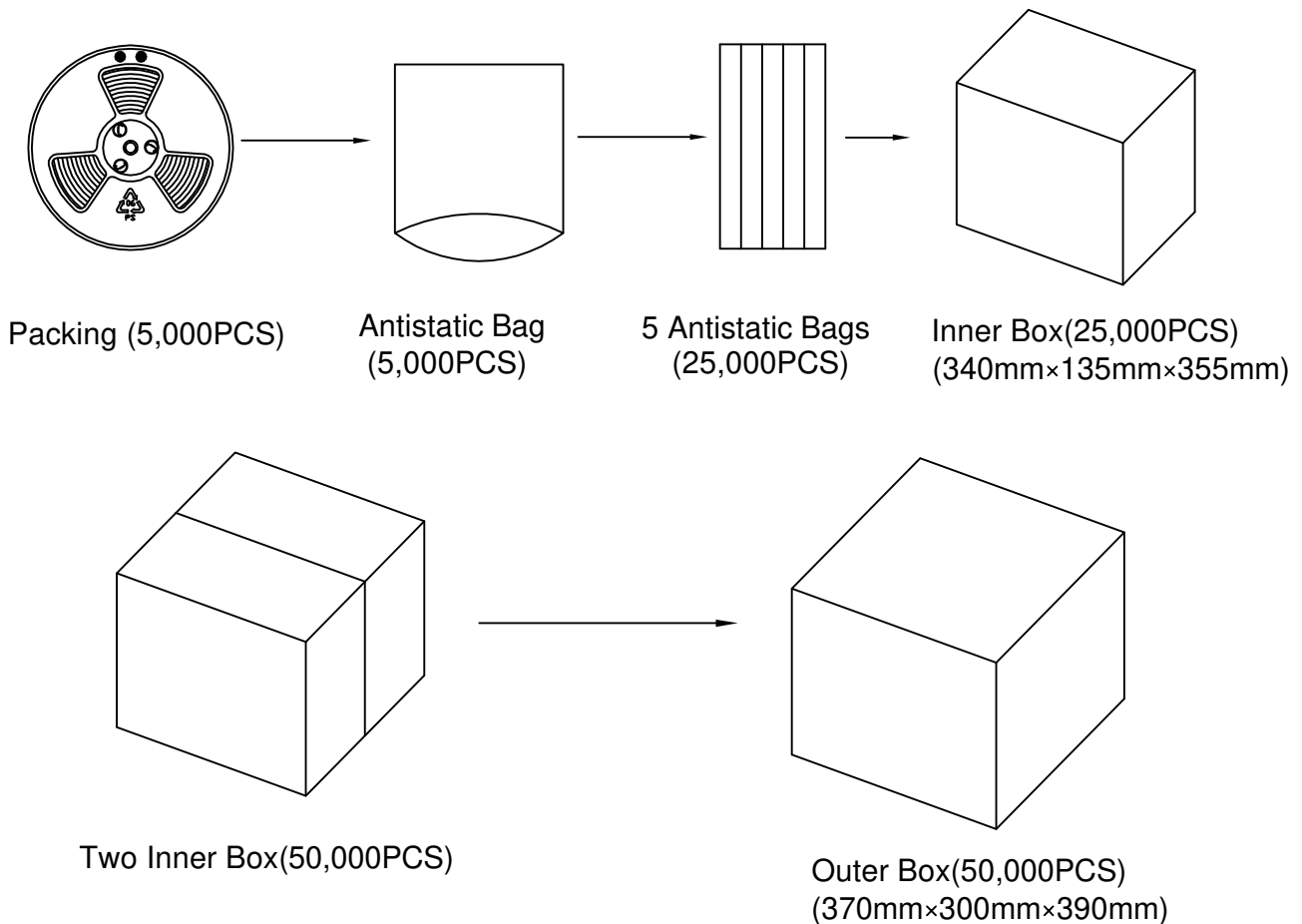
7" reel for sample stage

13" reel will be provided for the mass production stage

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

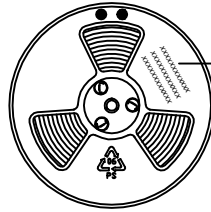


## 9.3 The Content of Box(13" reel)



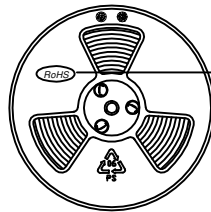
## 9.4 Packing Explain

### 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:  $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$

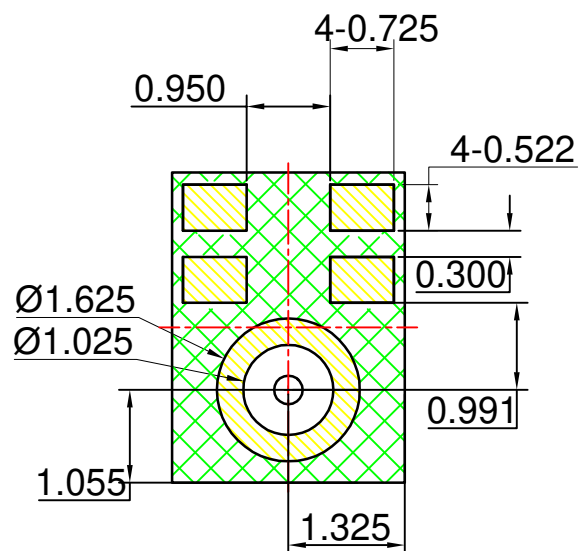
10.4 Operating Temperature Range:  $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$

**Note1:** MSL(moisture sensitivity level) Class 1(IPC/JEDEC-J-STD-020 Revision C)

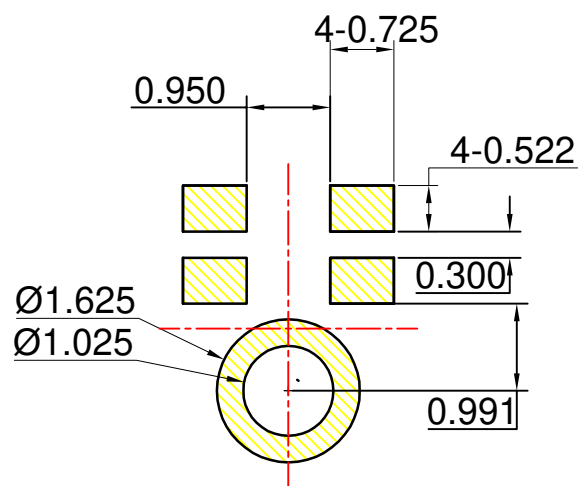
**Note2:** Static sensitive device

## 11 Land Pattern Recommendation

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



### 11.2 Recommended Soldering Surface Land Pattern

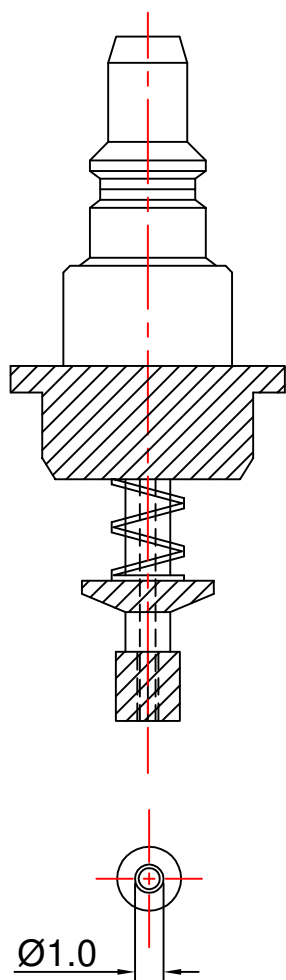


## 12 Soldering Recommendation

### 12.1 Soldering Machine Condition

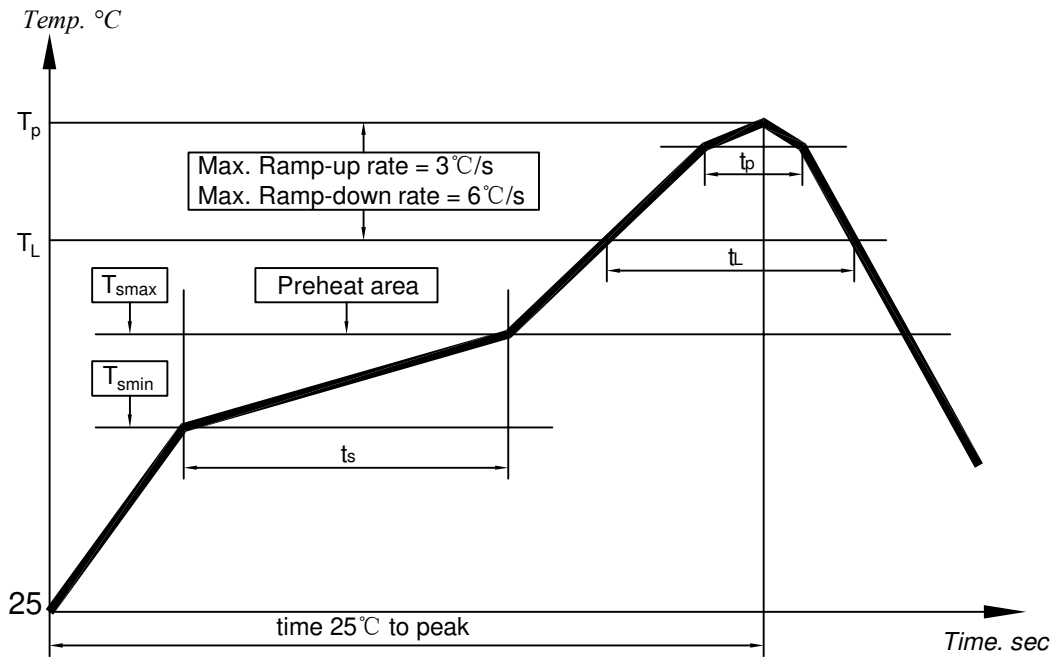
|                     |           |
|---------------------|-----------|
| Temperature Control | 8 zones   |
| Heater Type         | Hot Air   |
| Solder Type         | Lead-free |

### 12.2 The Drawing and Dimension of Nozzle



Nozzle Diameter: Ø1.0mm;  
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.

## 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>>.