

# Specification of MEMS Microphone

(RoHS Compliance & Halogen Free)

Customer Name :

Customer Model :

Goermicro Model : S15OB381-068

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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, laptop computers, and other portable electronic devices etc.

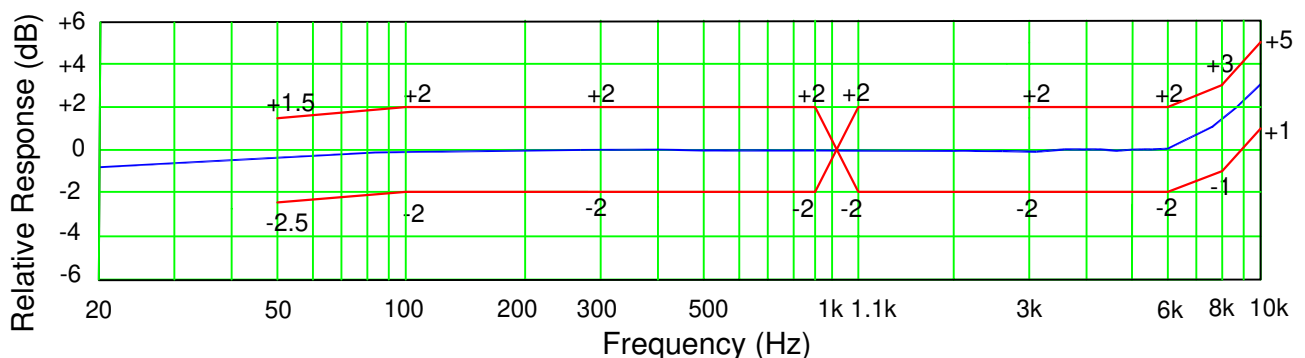
## 2 Test Condition (Vs=2.7V, L=50cm)

StandardConditions (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

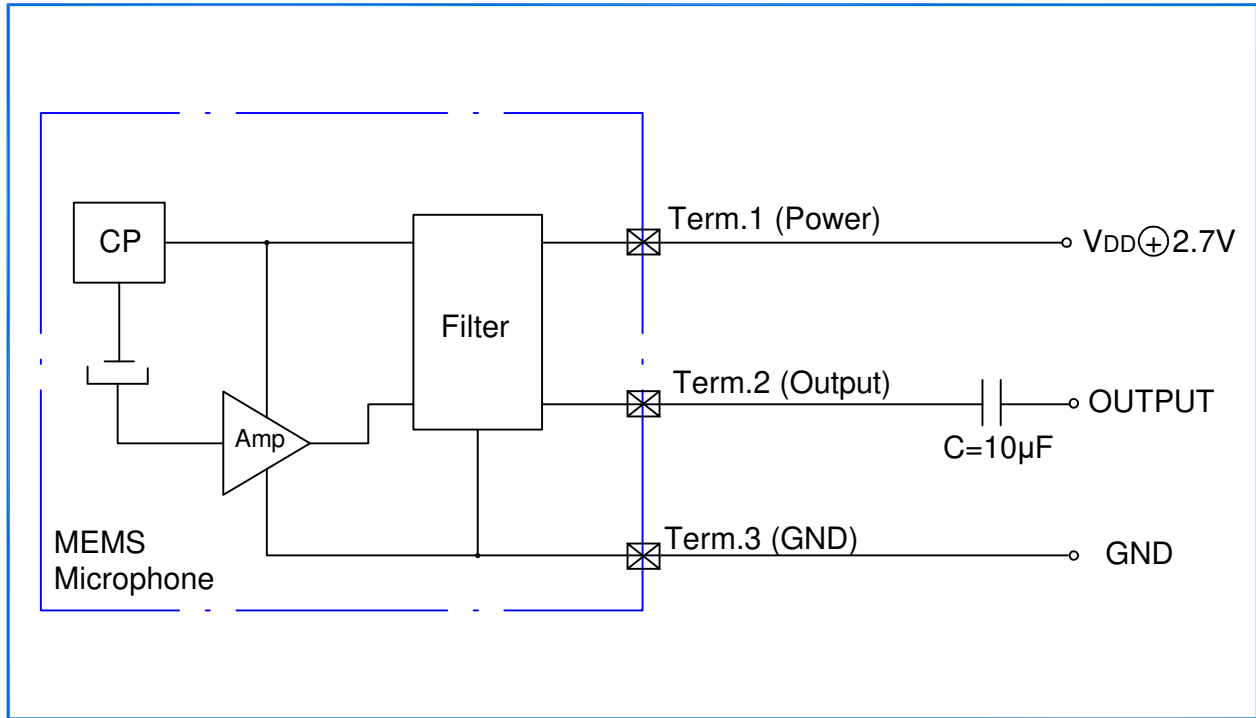
## 3 Acoustic and Electrical Characteristics

Item	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Voltage Range	V <sub>s</sub>		1.5	2.7	3.6	V
Current Consumption	I	V <sub>s</sub> =2.7V			150	μA
Sensitivity	S	f=1kHz, Pin=1Pa	-39	-38	-37	dBV
S/N Ratio	SNR	f=1kHz, Pin=1Pa A-Weighted Curve		64		dB
Total Harmonic Distortion	THD	<b>1%THD@1kHz</b>		<b>116</b>		<b>dB SPL</b>
Acoustic Overload Point	AOP	10%THD@1kHz		128		dB SPL
Phase Response	PR	V <sub>dd</sub> =2.7V, 94dB SPL, test, Frequency 100Hz to 10KHz	-5		5	°
Power Supply Rejection	PSR	100mVpp square wave@217Hz, V <sub>s</sub> =2.7V, A-Weighted		-96		dBV
<b>Low Frequency Roll-off</b>	<b>LFRO</b>	<b>-3dB corner refrence to 1kHz sensitivity</b>		<b>10</b>		<b>Hz</b>
Power Supply Rejection Ration	PSRR	200mVpp sinewave@1k Hz, V <sub>s</sub> =2.7V		68		dB
Output Impedance	Zout	f=1kHz, Pin=1Pa			400	Ω
Decreasing Voltage Characteristic	ΔS	f=1kHz, Pin=1Pa V <sub>s</sub> =3.6 --1.5V	No Change			
Directivity	D(θ)		Omnidirectional			

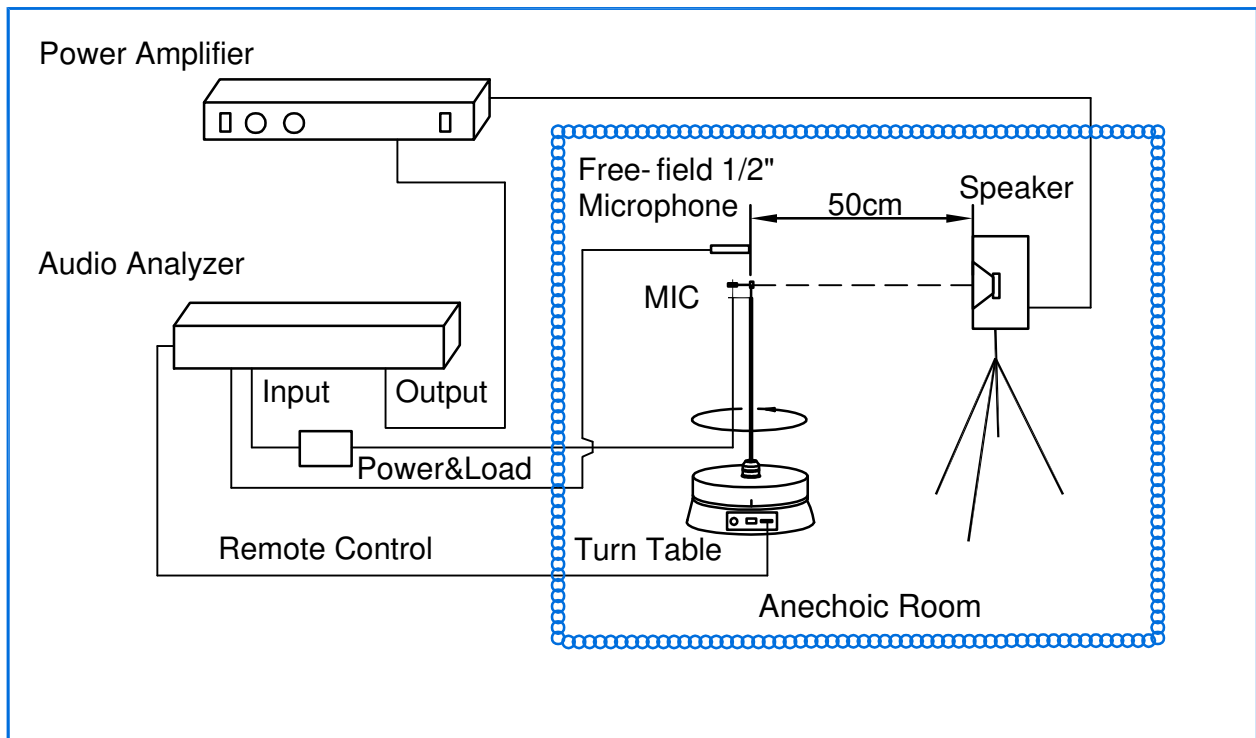
## 4 Frequency Response Curve and Limits



5 Measurement Circuit

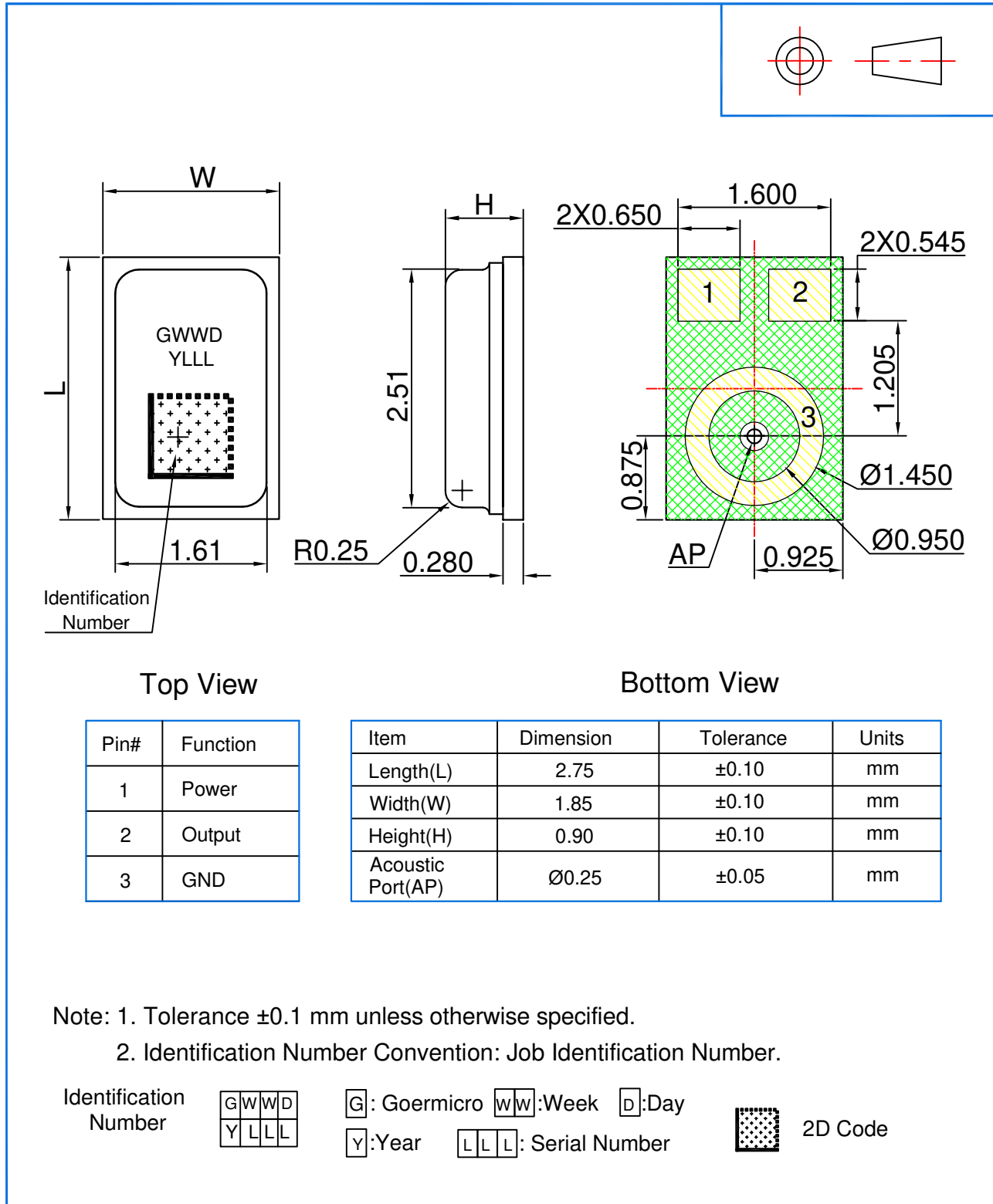


6 Test Setup Drawing



## 7 Mechanical Characteristics

### 7.1 Appearance Drawing (Unit: mm)



### 7.2 Weight

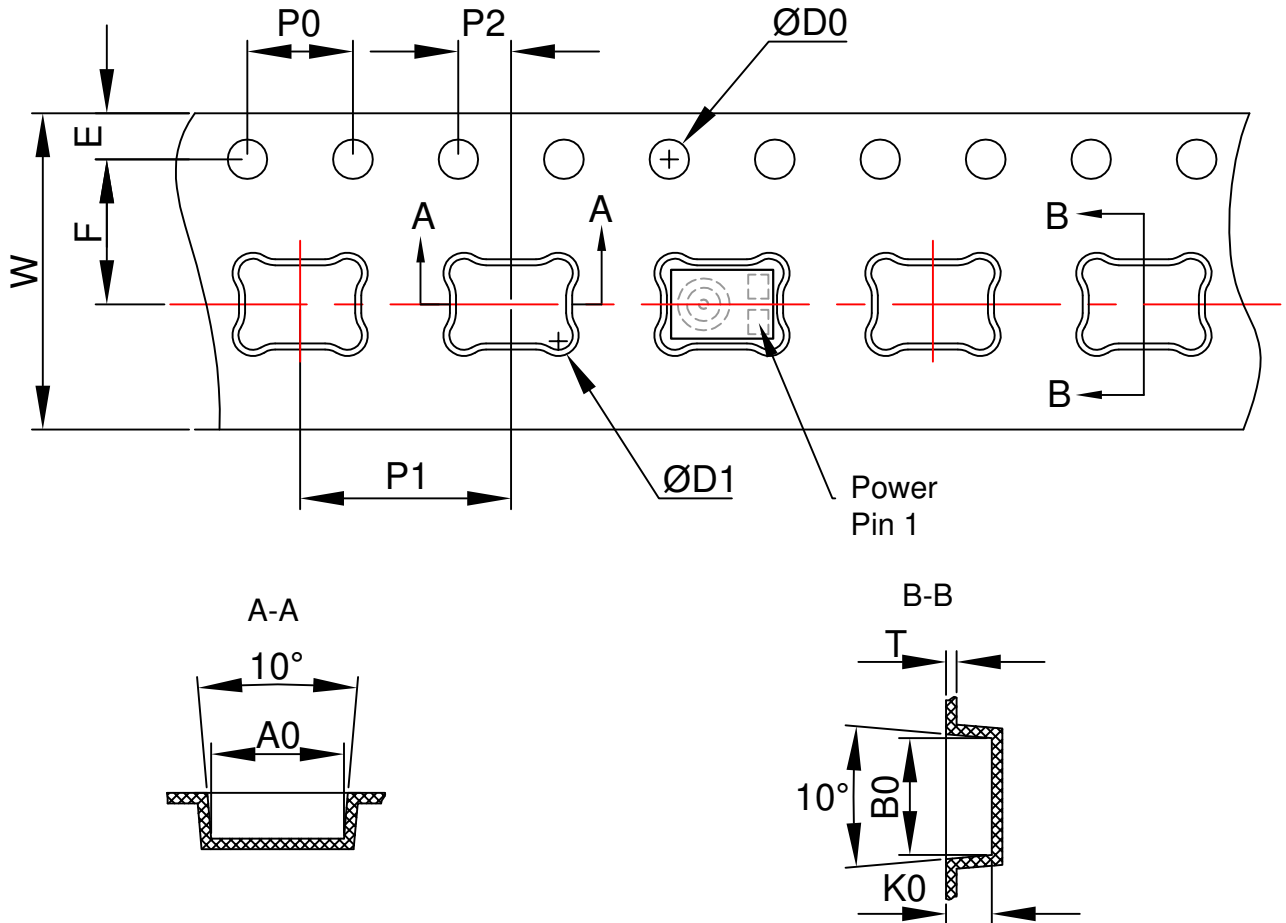
The weight of the MIC is Less than 0.02g.

**8 Reliability Test**

<p>8.1 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 <math>\pm 3\text{dB}</math> from initial sensitivity(IEC 60068-2-6:2007). (The measurement to be done after 2 hours of condition at 15°C-35°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 12 times from 1.5 meter height in state of JIG,JIG weight of 100g, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity(IEC60068-2-31:2008). (The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>
<p>8.3 Temperature Test</p>	<p>a) After exposure at +125°C for 200 hours, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity(IEC 60068-2-1:2007). (The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)  b) After exposure at -40°C for 200 hours, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity(IEC 60068-2-1:2007). (The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>
<p>8.4 Humidity Test</p>	<p>After exposure at +85°C and 85% relative humidity for 200 hours, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity(IEC 60068-2-67:2019). (The measurement to be done after 2 hours of condition at 15°C-35°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 <math>\pm 3\text{dB}</math> from initial sensitivity (IEC60068-2-27:2008). (The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>
<p>8.6 Thermal 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\text{dB}</math> from initial sensitivity(IEC 60068-2-14:2009). (The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>
<p>8.7 Reflow 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(Refer to customer's request). (The measurement to be done after 2 hours of condition at 15°C-35°C, R.H. 25%~75%)</p>
<p>8.8 Electrostatic Discharge Test</p>	<p>Under C=150pF, R=330ohm. Air discharge to case with<math>\pm 8\text{kV}</math> and contact discharge to I/O terminals with<math>\pm 2\text{kV}</math> , 10 times, Grounding. Sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity(IEC61000-4-2:2008).</p>

## 9 Package

### 9.1 Tape Specification



The Dimensions as Follows:

ITEM	W	E	F	$\text{Ø}D0$	$\text{Ø}D1$
DIM(mm)	$12.0 \pm 0.30$	$1.75 \pm 0.10$	$5.5 \pm 0.05$	$1.50^{+0.10}_0$	$0.50^{+0.10}_0$
ITEM	P0	10P0	P1	A0	B0
DIM(mm)	$4.00 \pm 0.10$	$40.00 \pm 0.20$	$8.00 \pm 0.10$	$2.95 \pm 0.05$	$2.05 \pm 0.05$
ITEM	K0	P2	T		
DIM(mm)	$1.10 \pm 0.10$	$2.00 \pm 0.05$	$0.30 \pm 0.05$		

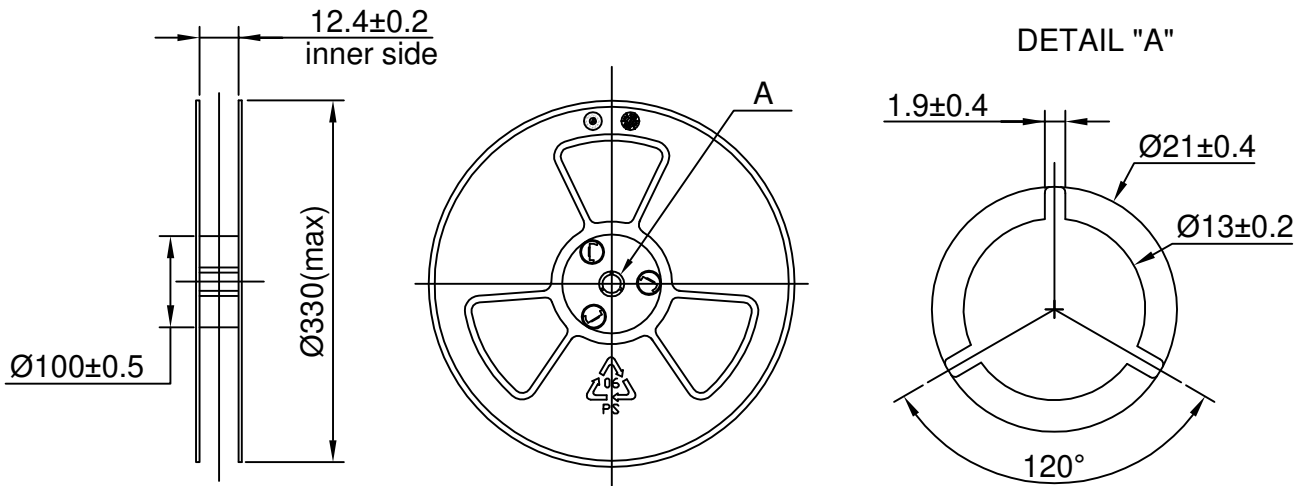


## 9.2 Reel Dimension

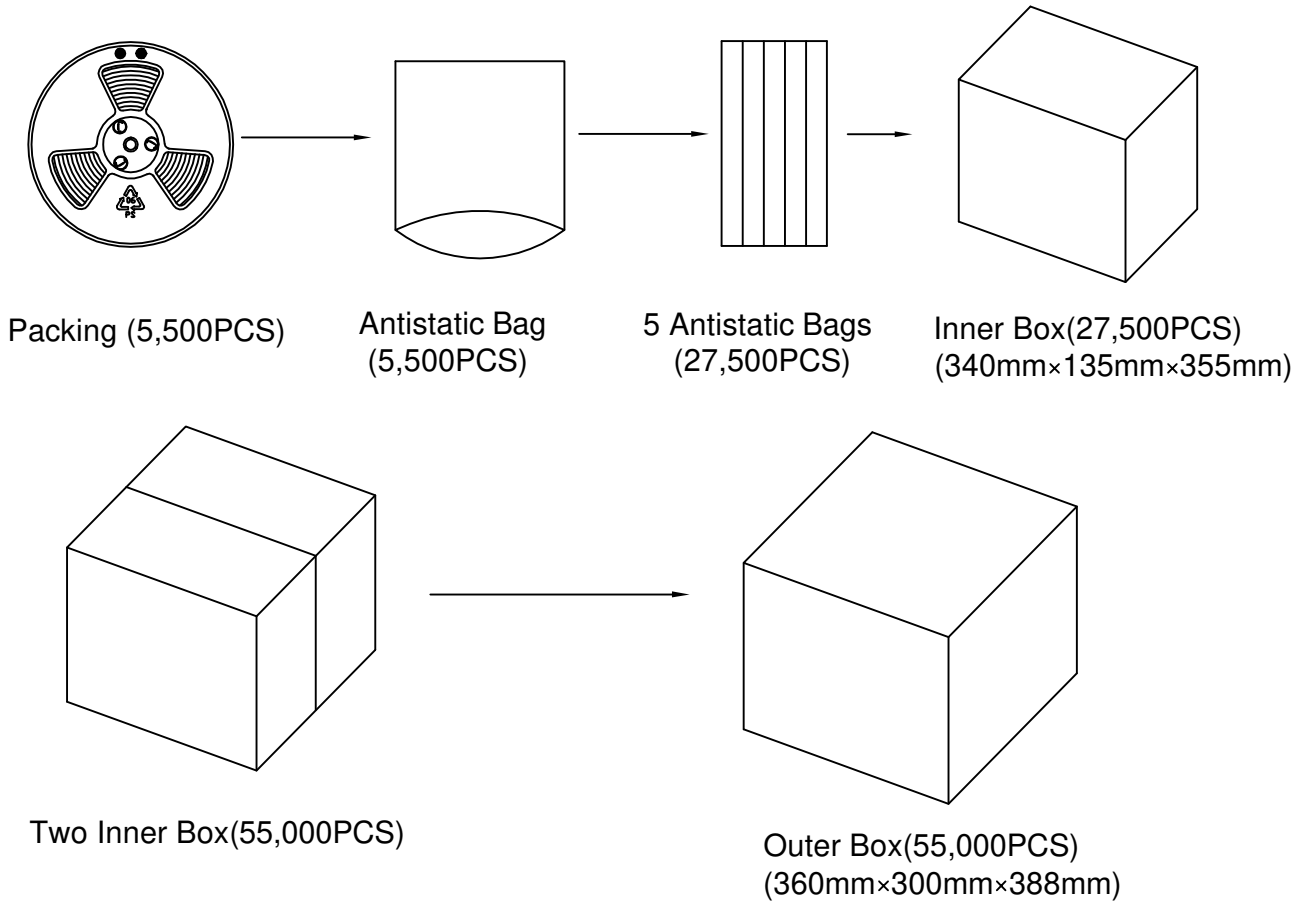
7" reel for sample stage

13" reel will be provided for the mass production stage

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

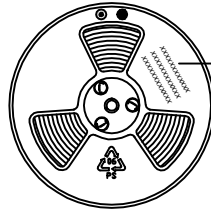


## 9.3 The Content of Box(13" reel)



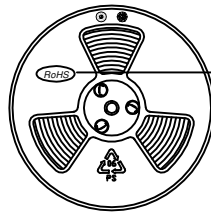
## 9.4 Packing Explain

### 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 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)

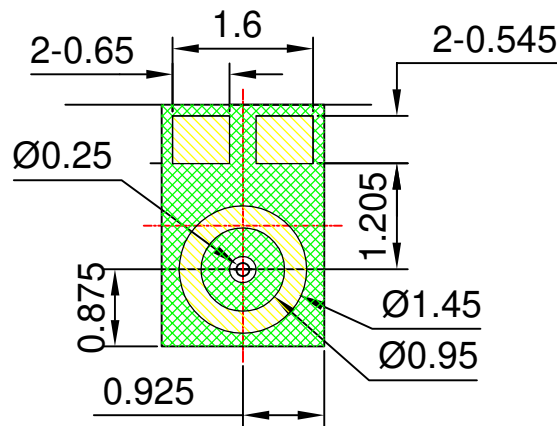
10.4 Operating Temperature Range:  $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$

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

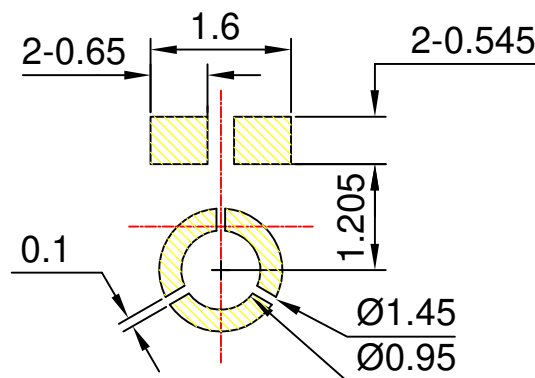
**Note2:** Static sensitive device

## 11 Land Pattern Recommendation

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



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

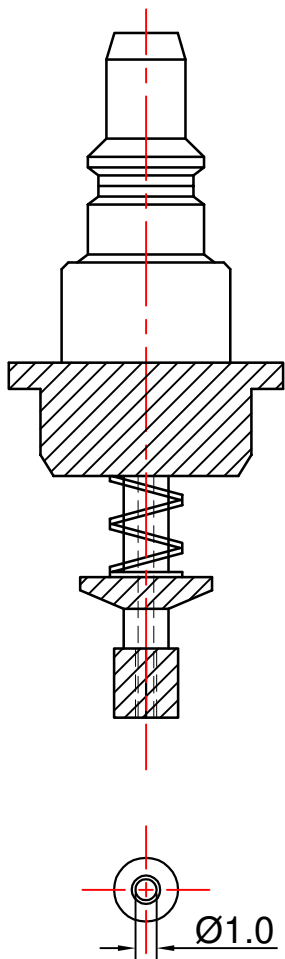


## 12 Soldering Recommendation

### 12.1 Soldering Machine Condition

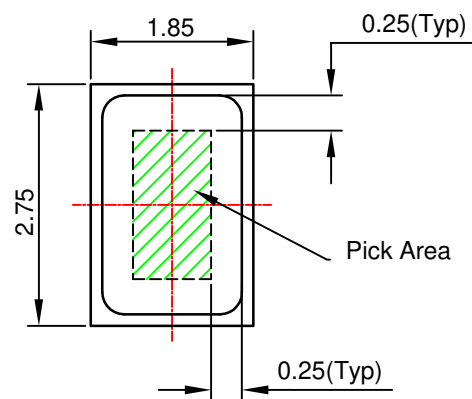
Temperature Control	8 zones
Heater Type	Hot Air
Solder Type	Lead-free

### 12.2 The Drawing and Dimension of Nozzle

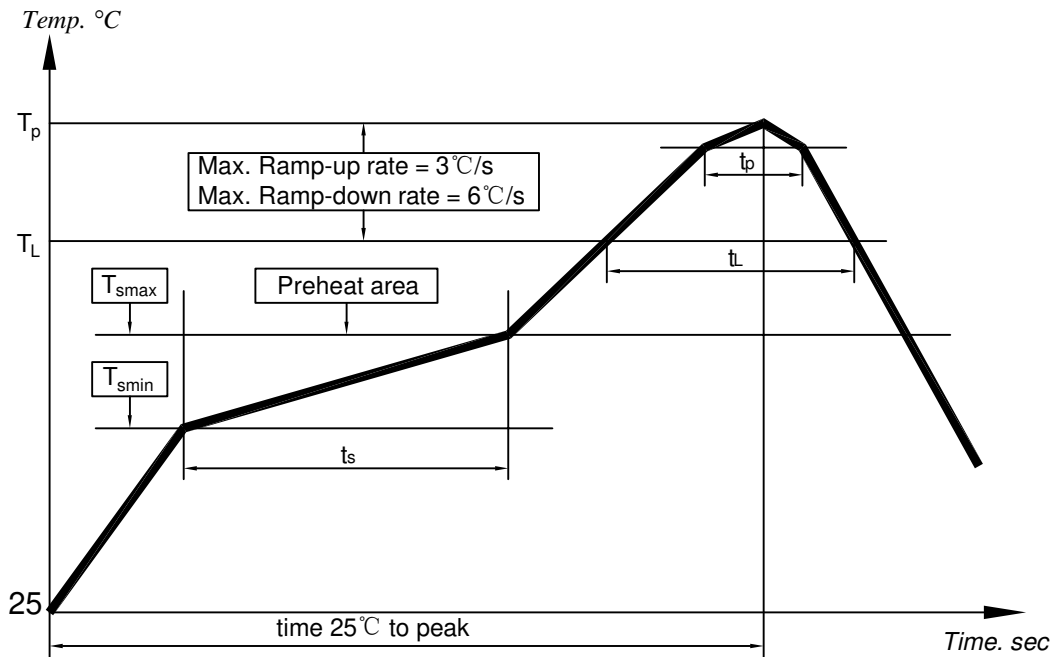


Inside Diameter: Ø1.0mm;

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 : 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.

## 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>>.