

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

Customer Name :

Customer Model :

GoerTek Model : S12OT421-012

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## Restricted

### 1 Security Warning

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### 2 Publication History

Version	Date	Description	Author	Approved
1.0	2019.6.4	New Design	Jasen	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.

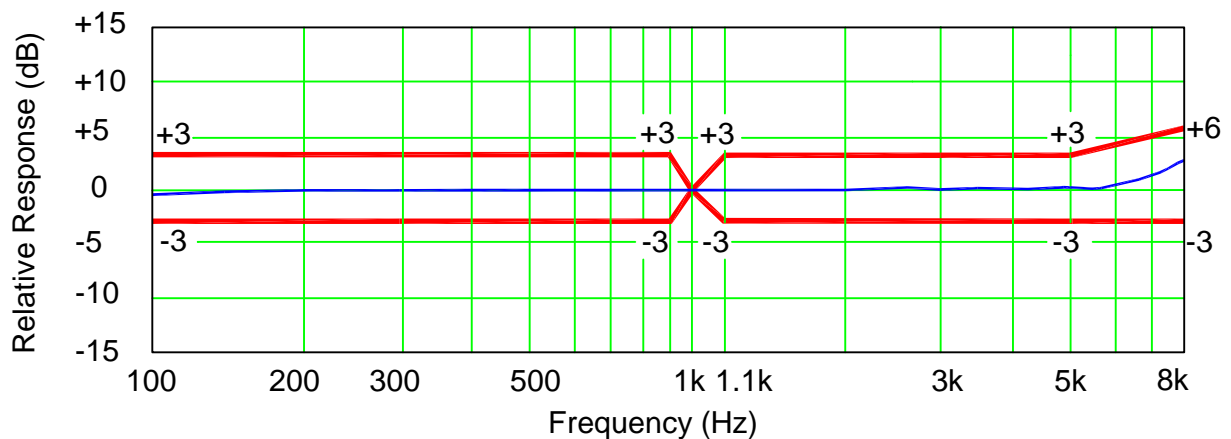
## 2 Test Condition (Vs=2.0V,L=50cm)

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

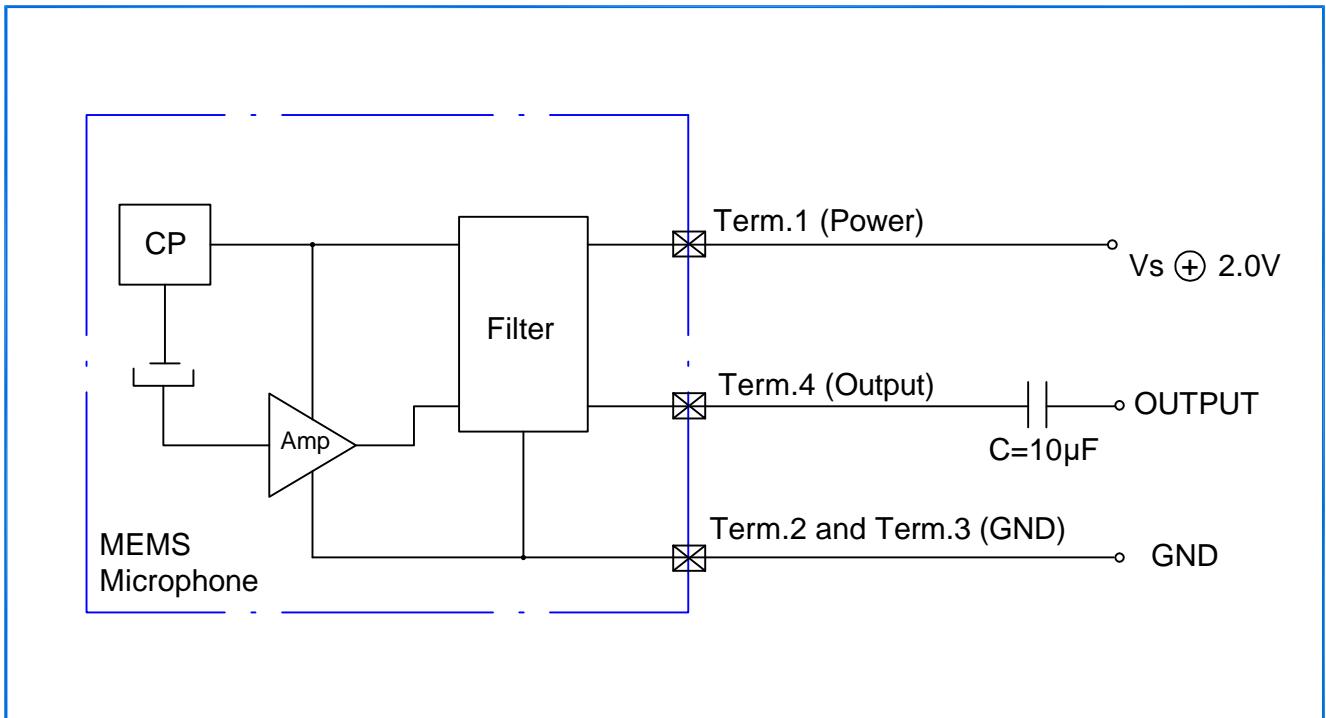
## 3 Electrical Characteristics

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			400	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		3.6	V
Total Harmonic Distortion	THD	110dB SPL@ f=1kHz			1	%

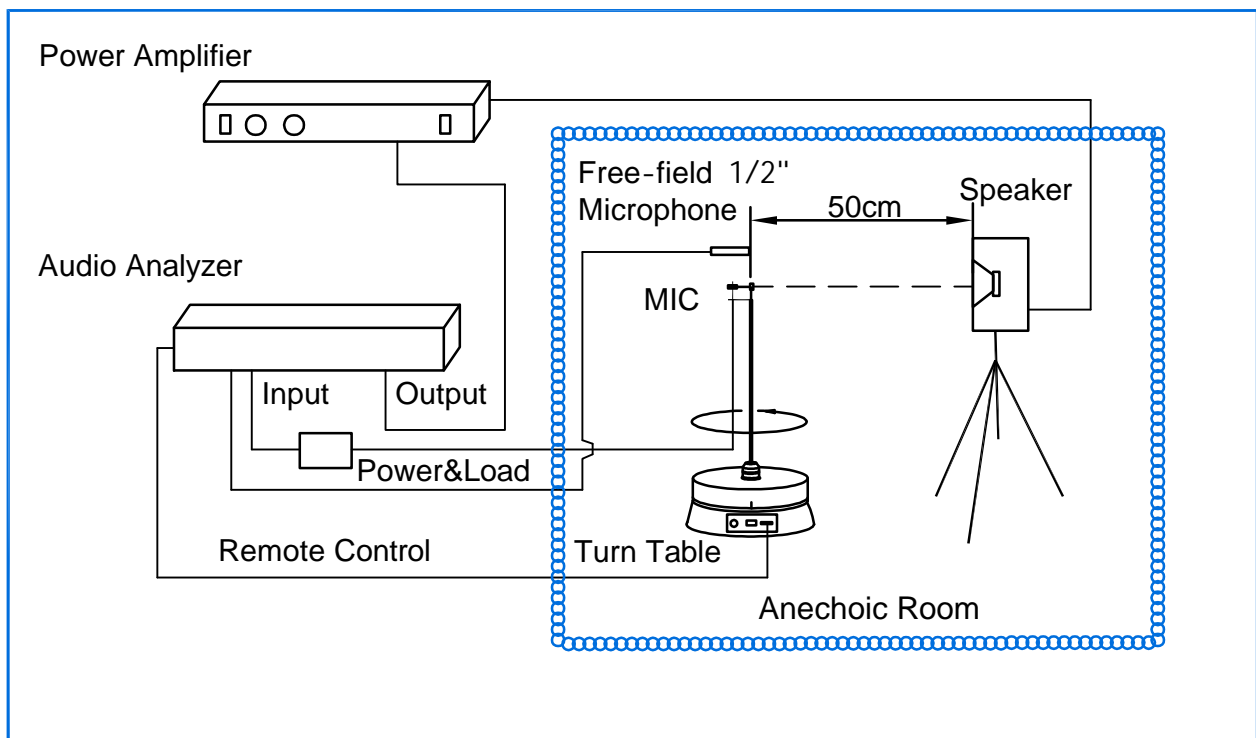
## 4 Frequency Response Curve Limits



## 5 Measurement Circuit

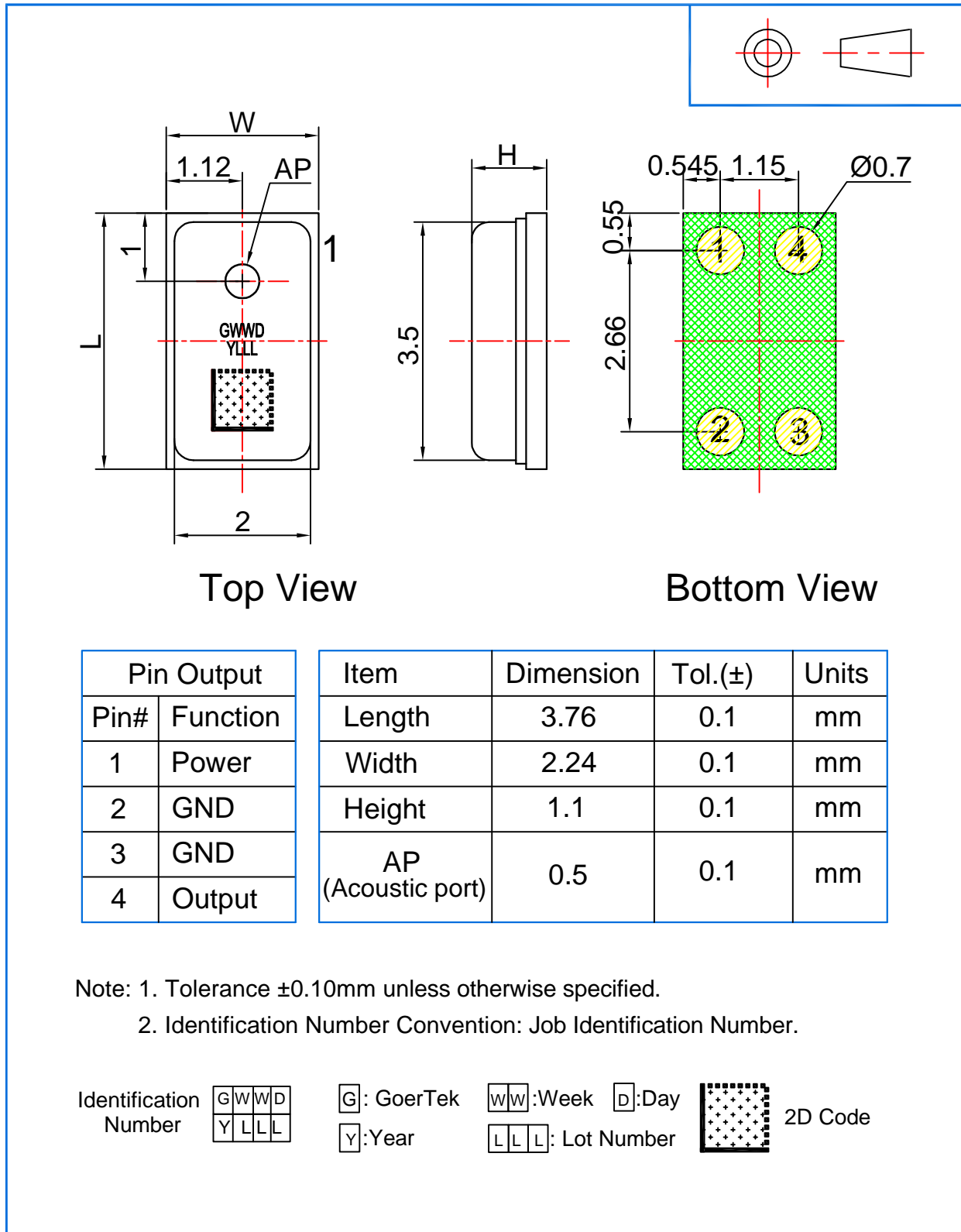


## 6 Test Setup Drawing



## 7 Mechanical Characteristics

### 7.1 Appearance Drawing (Unit: mm)



### 7.2 Weight

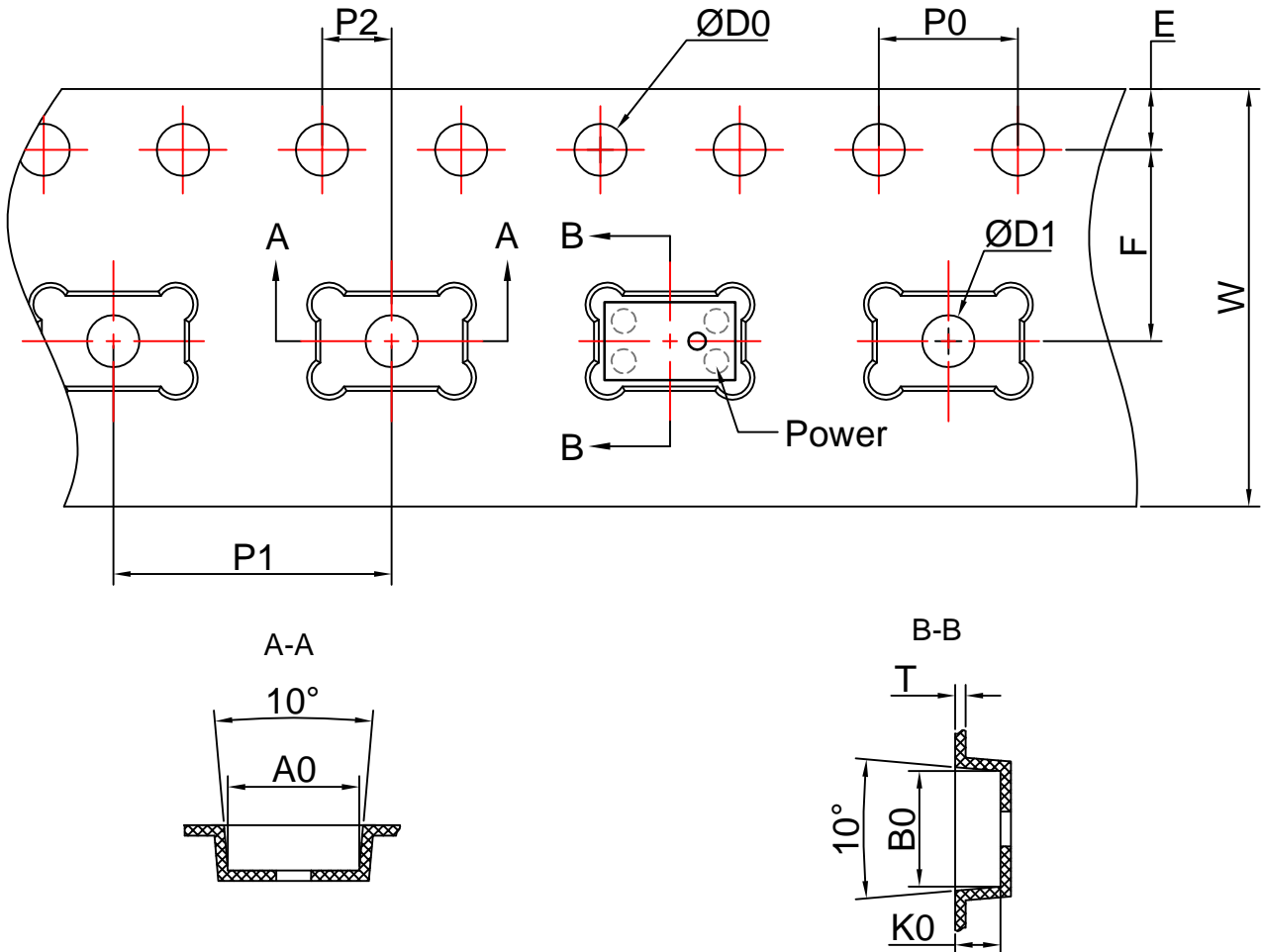
The weight of the MIC is Less than 0.04g.

## 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 <math>\pm 3\text{dB}</math> from initial sensitivity. (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 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 <math>\pm 3\text{dB}</math> from initial sensitivity. (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 Temperature 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. (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%)  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. (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 Humidity 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. (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 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. (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 Thermal 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) 5 cycles, sensitivity should vary within <math>\pm 3\text{dB}</math> from initial sensitivity. (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 Reflow Test</p>	<p>Adopt the reflow curve of item 12.3, after five reflows, sensitivity should vary within <math>\pm 2\text{dB}</math> from initial sensitivity. (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 Electrostatic Discharge Test</p>	<p>Under <math>C=150\text{pF}</math>, <math>R=330\text{ohm}</math>. 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. Grounding. Sensitivity should vary within <math>\pm 2\text{dB}</math> from initial sensitivity.</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>	1.0 MIN
ITEM	P0	10P0	P1	A0	B0
DIM(mm)	4.00±0.10	40.00±0.20	8.00±0.10	4.10±0.10	2.60±0.10
ITEM	K0	P2	T		
DIM(mm)	1.35±0.10	2.00±0.05	0.30±0.05		

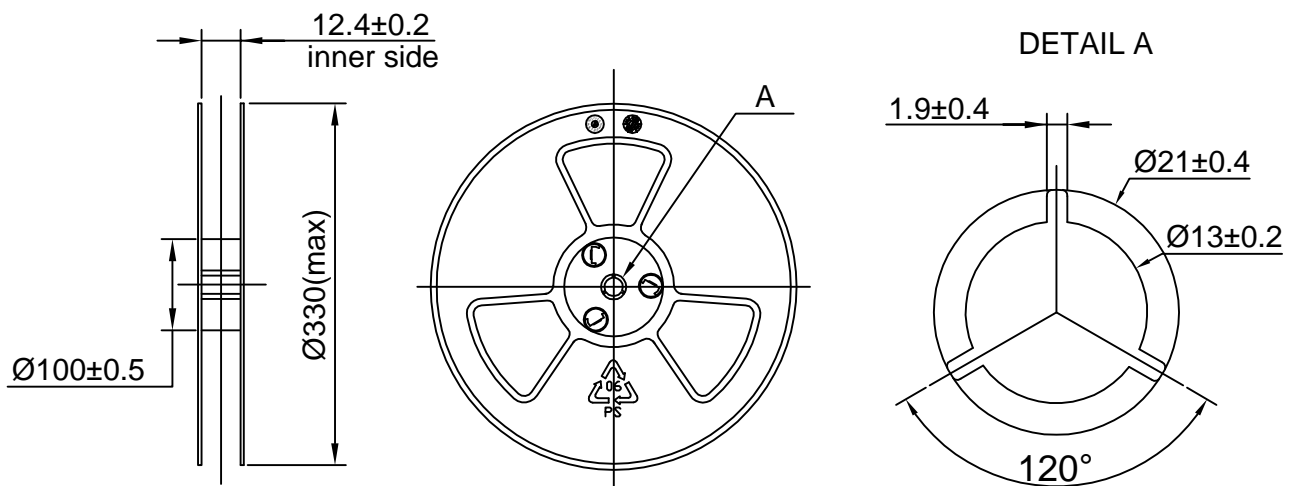


## 9.2 Reel Dimension

7" reel for sample stage

13" reel will be provided for the mass production stage

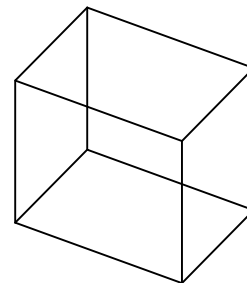
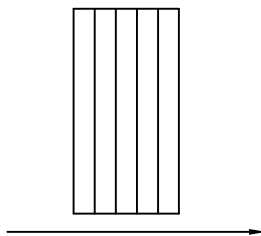
The following is 13" reel dimensions (unit:mm)



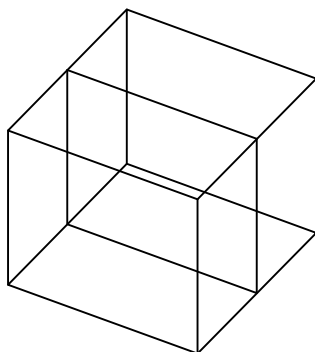
## 9.3 The Content of Box(13" reel)



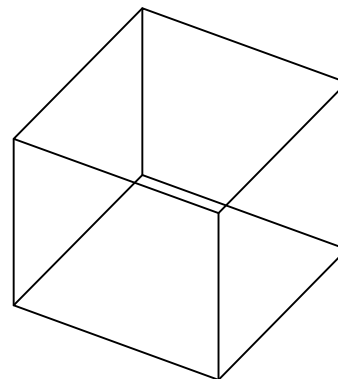
Packing (4,000PCS)



Inner Box(20,000PCS)  
(340mm×135mm×355mm)



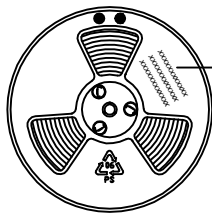
Two Inner Box(40,000PCS)



Outer Box(40,000PCS)  
(370mm×300mm×390mm)

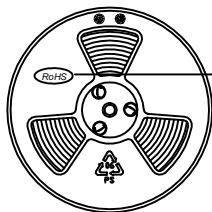
## 9.4 Packing Explain

### 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



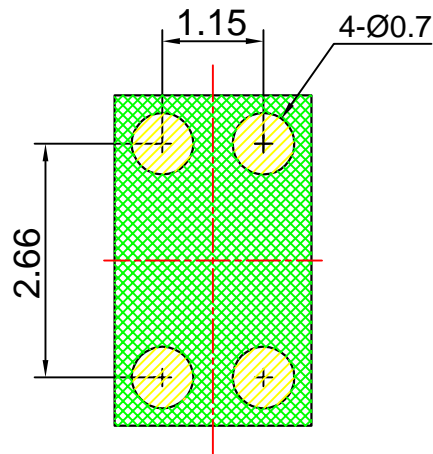
RoHS HF  
Compliance Mark

## 10 Storage and Transportation

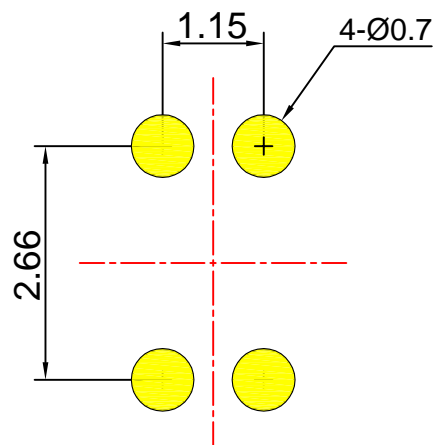
- 10.1 Keep MEMS MIC in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field. Recommend storage period no more than 1 year and floor life(out of bag) at factory no more than 4 weeks.
- 10.2 The MEMS MIC with normal pack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

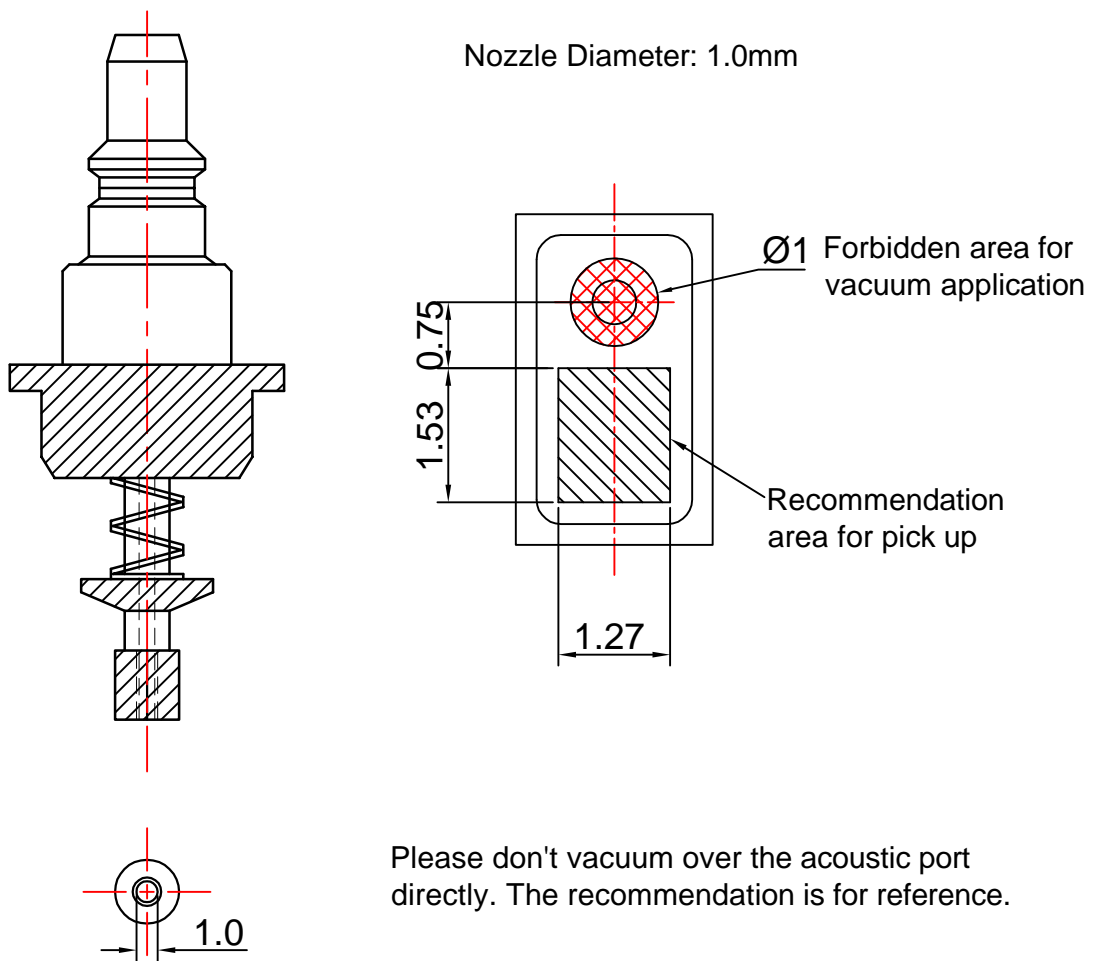


## 12 Soldering Recommendation

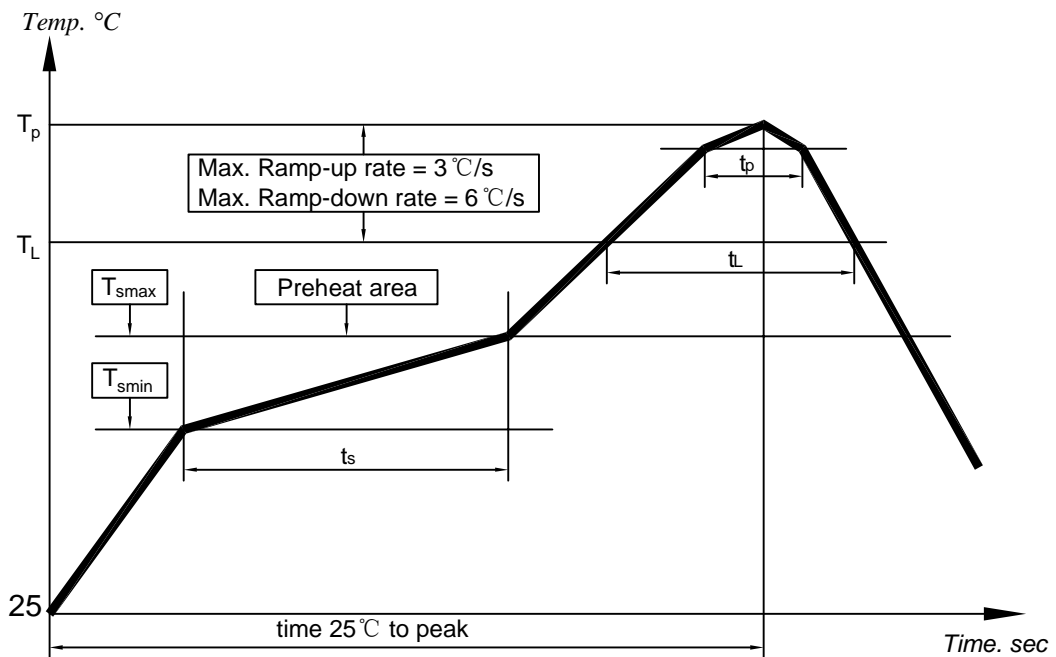
### 12.1 Soldering Machine Condition

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>>.