



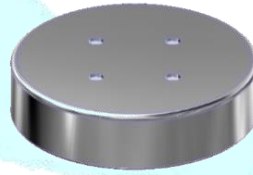
Circle type Analog SMD
Electret Condenser Microphone
DATA SHEET

(R)SOB-413S42-EM H/F

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Φ4, SMD Type

OMNI-DIRECTIONAL



Best sound electronics

Value no1. Micro sound provider

Creative technology starts from respecting of life of the individuals

Creative technologies to respect human life

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We offer you happiness with our excellent technology beyond an ordinary sound what you expect

Superior technology to deliver happiness

Best sound electronics

Value no1. Micro sound provider

Keep basic fundamentals to fill sound with new innovations

Creative technologies to respect human life



1. INTRODUCTION

- Analog Electret Condenser Microphone
- Circle Type
- Single & Differential Mode
- Sensitivity is Typical -42dBV/Pa
- Omni-directional
- RF Shielded
- Compatible with Sn/Pb and Halogen-free solder process
- RoHS compliant
- SMD reflow temperature of up to 250°C for over 10 seconds

2. APPLICATIONS

- Smartphones
- Ear-sets, Bluetooth Headsets
- Tablet Computers
- Wearable Devices
- Electrical Appliances
- Voice Recognition Systems of Appliances

3. MODEL NO.

(R)SOB-413S42-EM H/F

4. GENERAL MICROPHONE SPECIFICATIONS

Test Condition : 23 ± 2°C, Room Humidity = 55 ± 20 %, V_{CC}=2.0V, unless otherwise noticed.

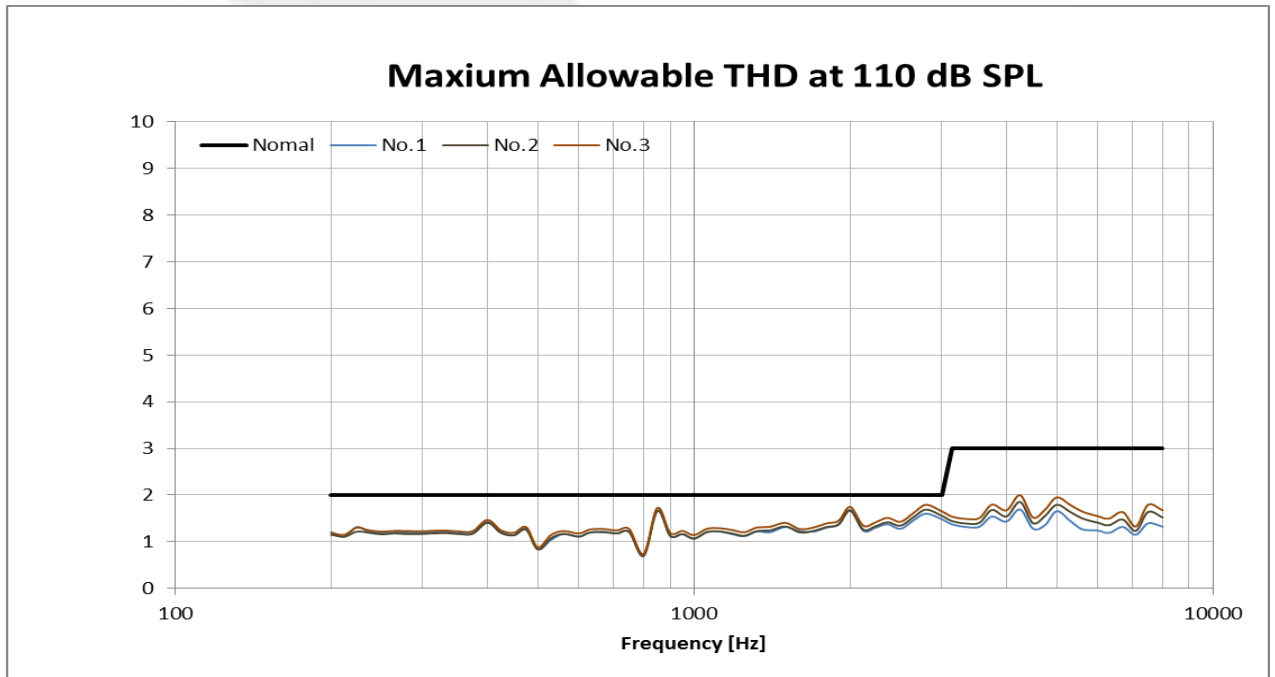
Parameter	Conditions	Min	Typ	Max	Units
Directivity		Omni-directional			
Operating Voltage		1	-	10	V
Sensitivity Change across Voltage	ΔS-VS, V _{CC} =2.0V to 1.5V	-	-	-3	dB

5. ELECTRO-ACOUSTIC CHARACTERISTICS

Test Condition : 23 ± 2°C, Room Humidity = 55 ± 20 %, V_{CC}=2.0V, unless otherwise noticed.

Parameter	Conditions	Min	Typ	Max	Units
Sensitivity (S)	94dB SPL at 1kHz, 0dB=1V/Pa	-45	-42	-39	dBV/Pa
Output Impedance (Z_{out})	94dB SPL at 1kHz	-	-	2.2	kΩ
Current Consumption	V _{CC} =2.0V , R _L = 2.2kΩ	-	-	300	μA
Signal to Noise Ratio (SNR)	94dB SPL at 1kHz, A-weighted (20Hz~20kHz)	58	60	-	dB(A)
Equivalent Input Noise (EIN)	94dB SPL at 1kHz, A-weighted (20Hz~20kHz)	-	34	-	dB(A)SPL
Total Harmonic Distortion (THD)	94dB SPL at 1kHz	-	-	0.3	%
	108dB SPL at 1kHz	-	-	1.0	
	117.5dB SPL at 1kHz	-	-	3.0	
	121.5dB SPL at 1kHz	-	-	5.0	
Acoustic Overload Point (AOP)	THD>10% at 1kHz	130.5	131.5	-	dB SPL

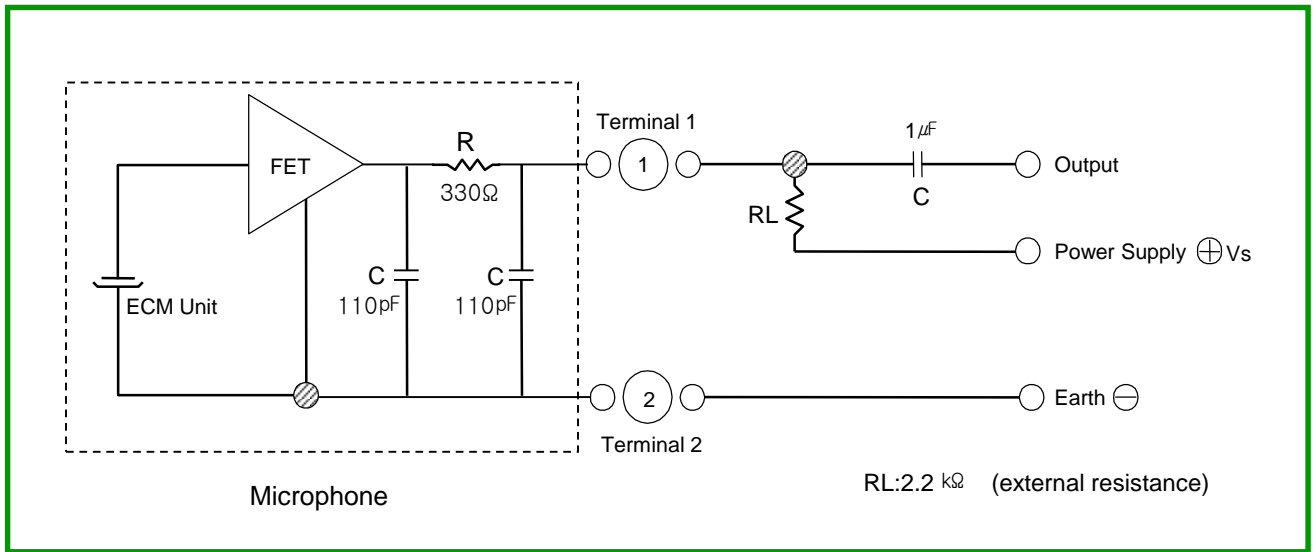
[Total Harmonics Distortion chart]



2% Max. at 200Hz and 3000Hz

3% Max. at 8000Hz

6. MEASUREMENT CIRCUIT



7. TYPICAL FREQUENCY RESPONSE CURVE(FAR FIELD)

Far Field Measurement Condition

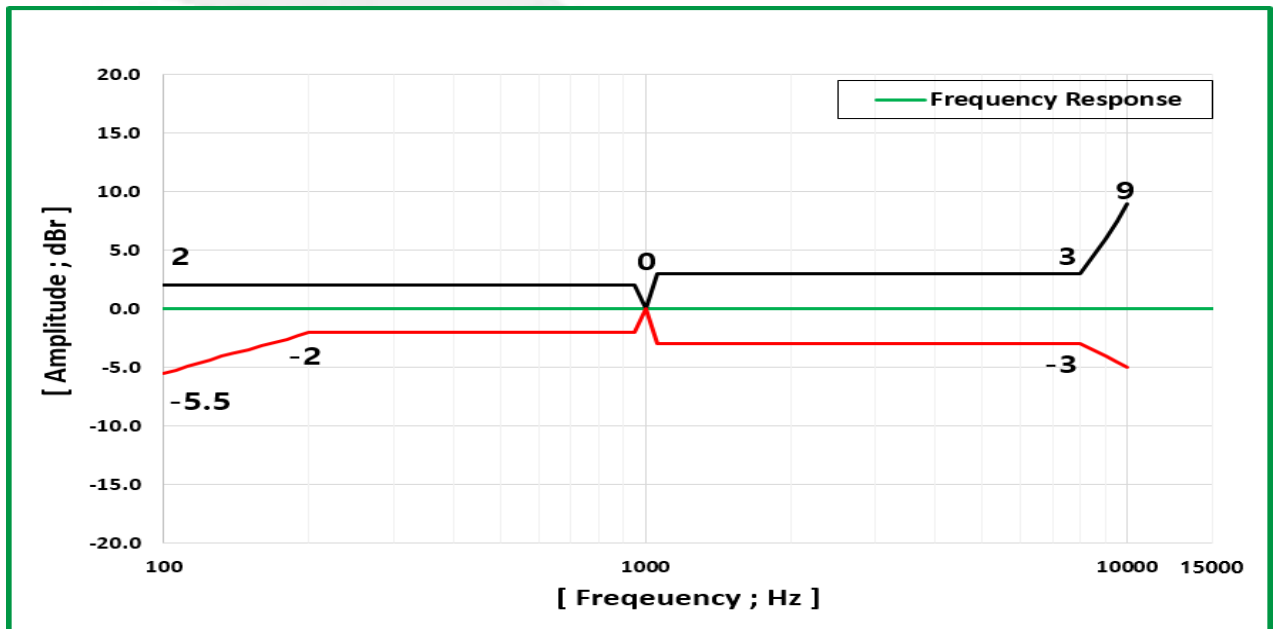
Temperature : $23 \pm 2 \text{ }^\circ\text{C}$

Supply Voltage : 2.0V

Acoustic stimulus : 1Pa (94dB SPL at 1kHz) at 50 cm from the loud-speaker.

The loud-speaker must be calibrated to make a flat frequency response input signal.

Position : The frequency response of microphone unit measured at 50 cm from the loud-speaker.

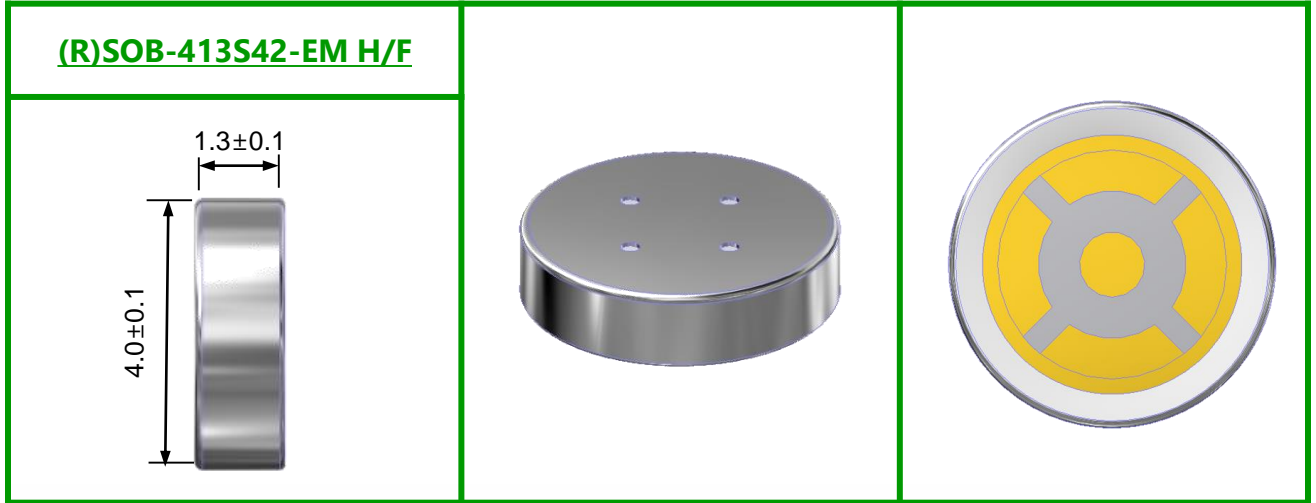


Frequency [Hz]	100	200	300~1000	1000	1000~3000	8000	10000
Upper Limit [dB]	2	2	2	0	3	3	9
Low Limit [dB]	-5.5	-2	-2	0	-3	-3	-

8. MECHANICAL CHARACTERISTICS

※ PCB design & Pin size can be changed by model No.

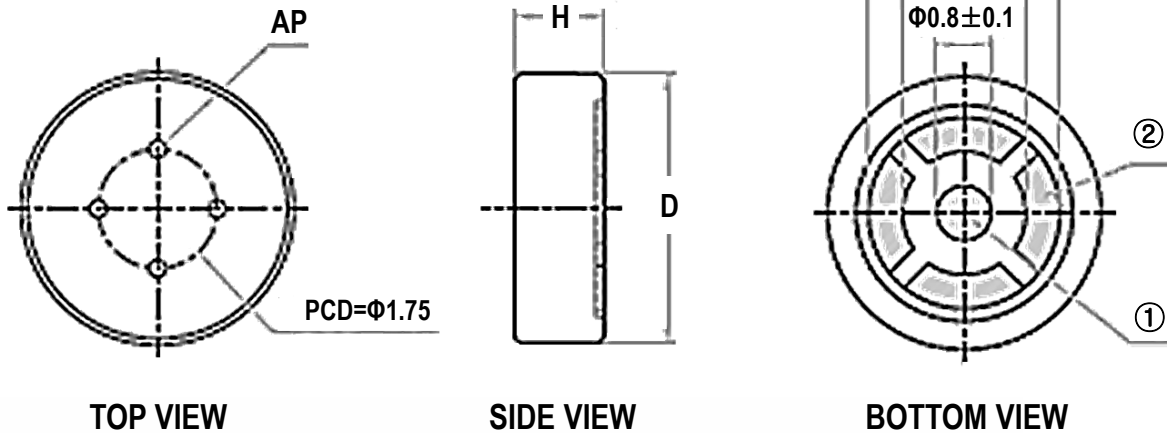
■ SMD Type



8. MECHANICAL CHARACTERISTICS

- Mechanical dimensions & Pad Lay-out

Dimensions (Unit : mm)



Item	Dimension	Tolerance (+/-)	Units
External Diameter (D)	Φ 4.0	0.10	mm
Height (H)	1.30	0.10	mm
Acoustic Port (AP)	Φ 0.25 (4X)	0.05	mm
	PCD= Φ 1.75		mm

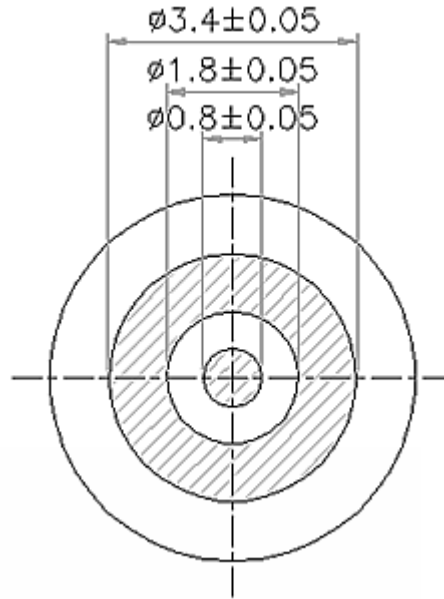
Pin #	Pin Name	Type	Description
1	Power (VS)	Power (+)	Power Supply
	Output (Vout)	Signal (+)	Output Signal
2	GND	Ground (-)	Ground

**Note : All ground Pins must be connected to ground.
General Tolerance \pm 010mm.**

8. MECHANICAL CHARACTERISTICS

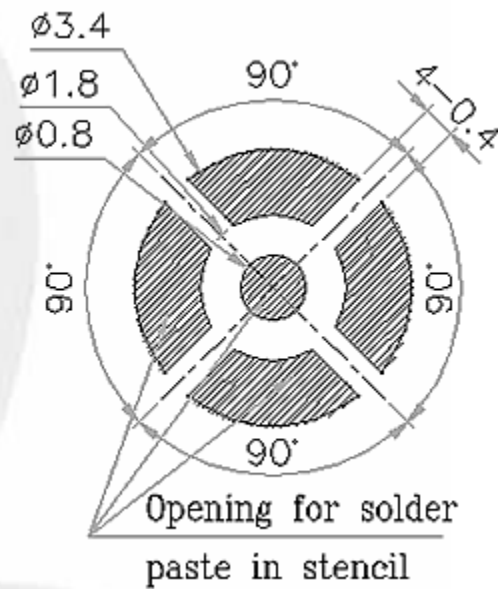
- Recommended Land Pattern & Stencil Pattern

**Recommended
PCB land pattern**
(Unit : mm)



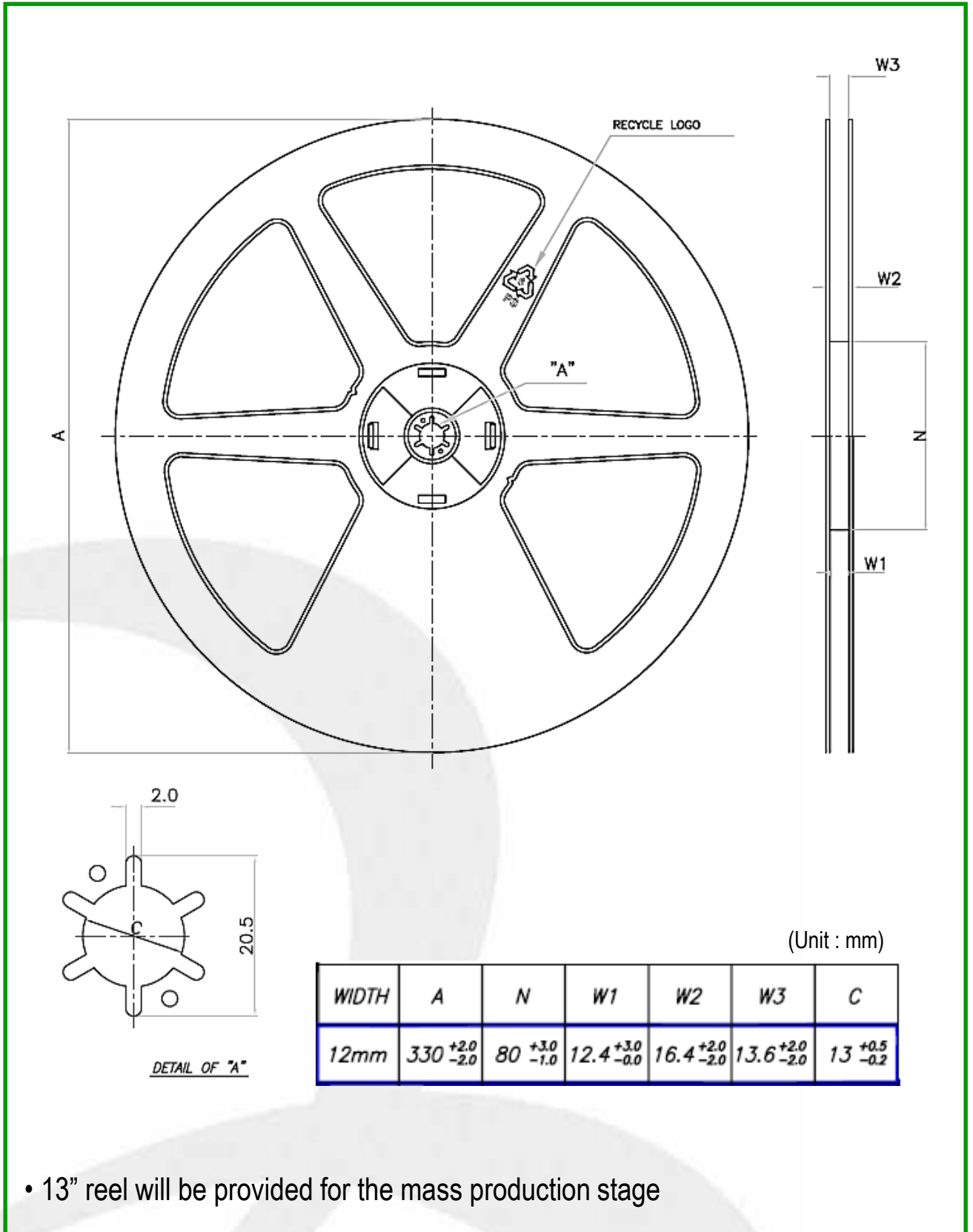
**Recommended
solder stencil pattern**
(Unit : mm)

(thickness of metal mask: 0.10T)



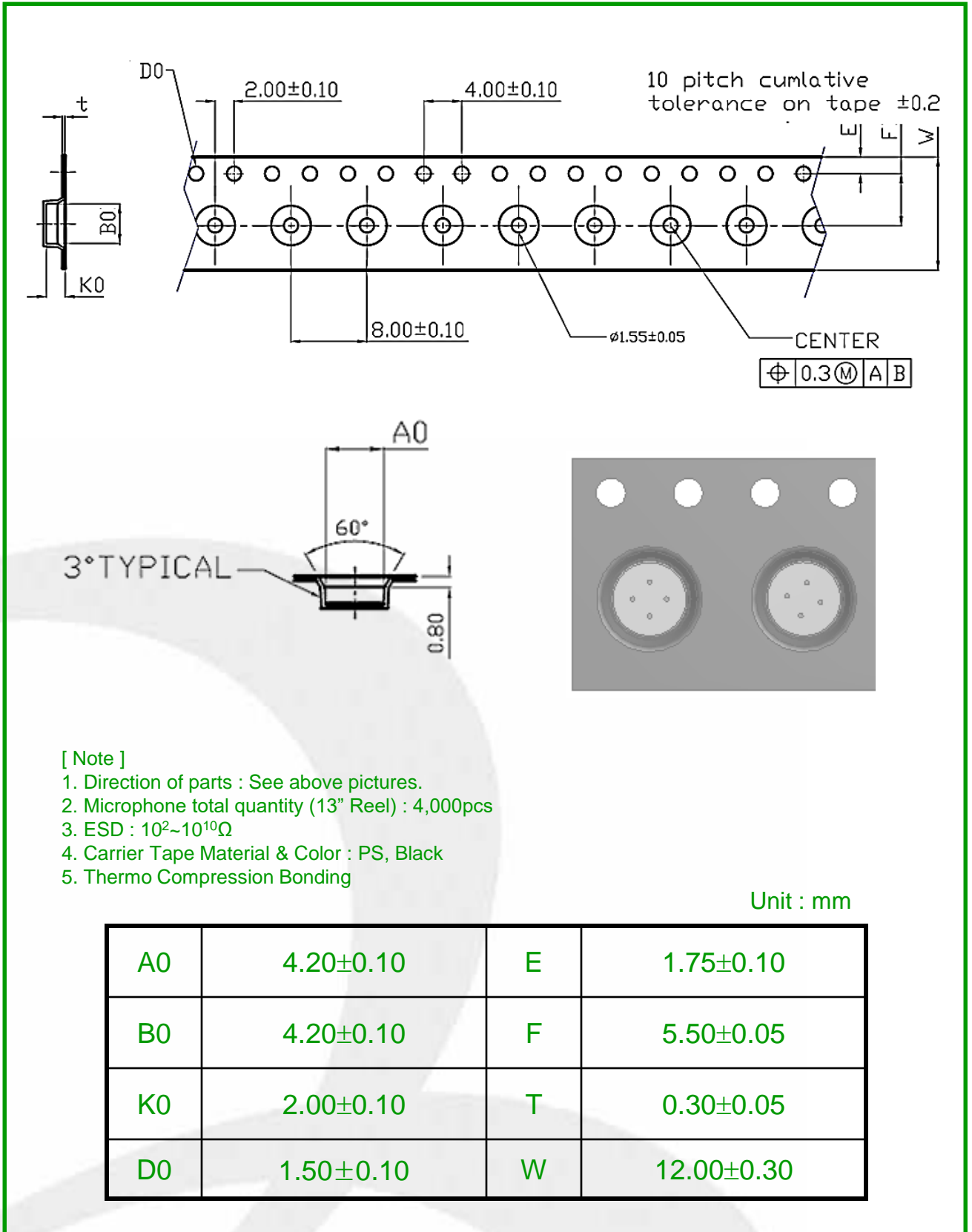
9. PACKAGING SPECIFICATION

- Reel



9. PACKAGING SPECIFICATION

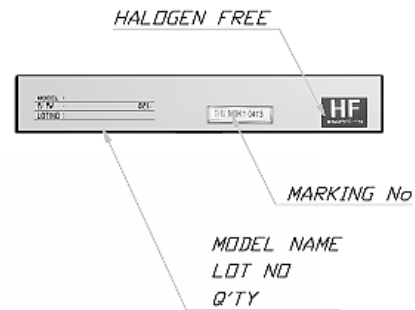
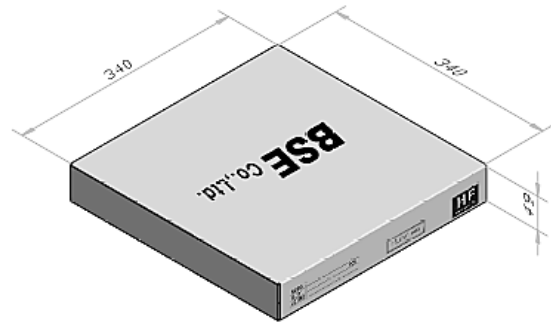
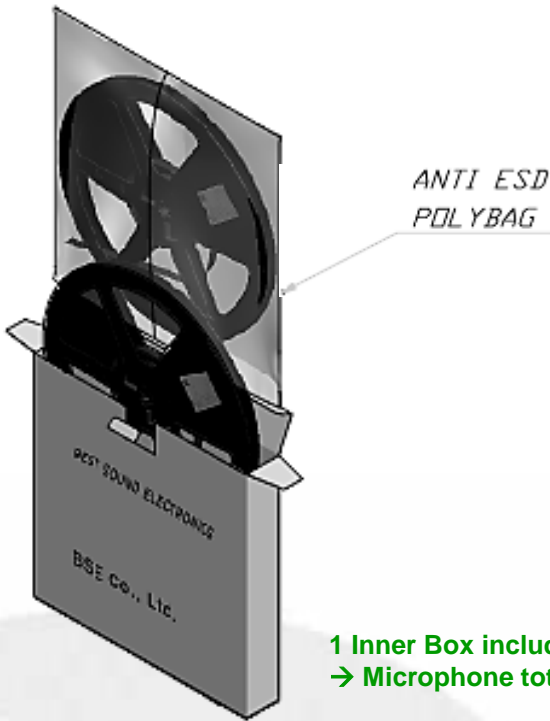
- Taping



9. PACKAGING SPECIFICATION

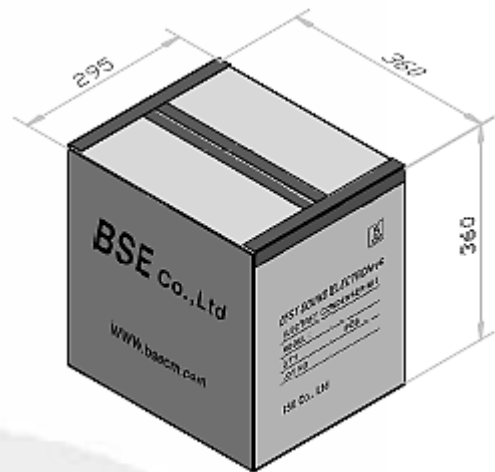
- Packing

Inner Box spec.



**1 Inner Box included 2 reels
→ Microphone total quantity : 8,000 pcs**

Outer Box Spec.



**1 Outer Box included 5 Inner Boxes
→ Microphone total quantity : 40,000 pcs**

10. RELIABILITY TEST CONDITIONS

Note : After test conditions are performed, the sensitivity of the microphone shall not deviate more than $\pm 3\text{dB}$ from its initial value.

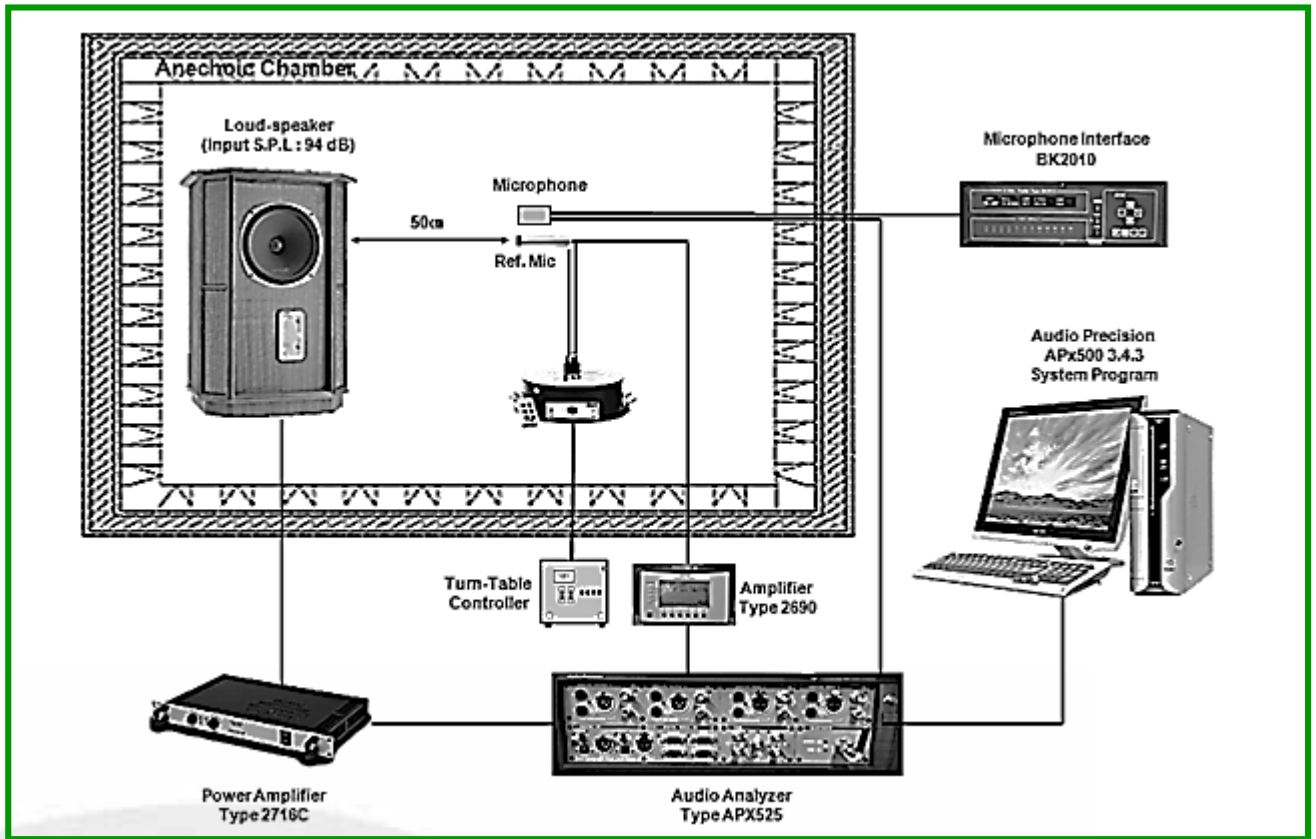
TEST	DESCRIPTION
TEMPERATURE CYCLE	After exposure at -25°C for 30 minutes , at 20°C for 10 minutes, at 70°C for 30 minutes, at 20°C for 10 minutes. 5 cycles (The measurement to be done after 2 hours of conditioning at room temperature)
HUMIDITY	After exposure at 60°C and $95\pm 2\%$ relative humidity for 200 hours (The measurement to be done after 2 hours of conditioning at room temperature)
TEMPERATURE STORAGE	After exposure at 85°C for 200 hours (The measurement to be done after 2 hours of conditioning at room temperature)
	After exposure at -30°C for 200 hours (The measurement to be done after 2 hours of conditioning at room temperature)
DROP	To be no interference in operation after dropped to steel floor 18 times from 1.52 meter height in state of packing
VIBRATION	To be no interference in operation after vibrations. 10Hz to 55Hz for 1 minute full amplitude 1.52mm , for 2 hours at three axes
TEMPERATURE SHOCK	Temperature change from -40°C to 85°C for 30 minutes . (changing time : 20 sec.) After 32 cycles (The measurement to be done after 2 hours of conditioning at room temperature)
REFLOW SENSITIVITY	2 reflow cycles. Refer to reflow profile from specification item 13.

11 . TEMPERATURE CONDITIONS

11.1 STORAGE TEMPERATURE : $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

11.2 OPERATING TEMPERATURE : $-30^{\circ}\text{C} \sim +85^{\circ}\text{C}$

12. MEASUREMENT SYSTEM

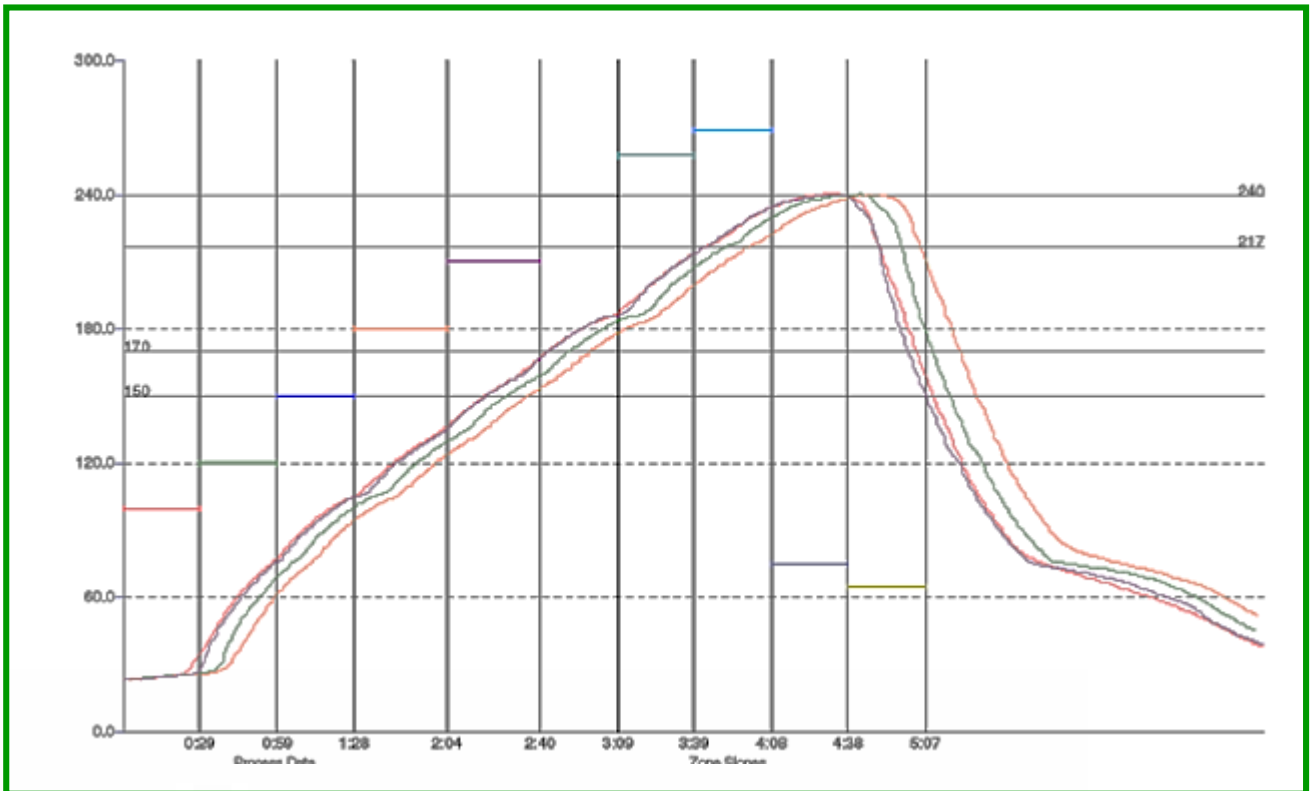


12.1 Measurement Condition

- (a) Supply voltage : 2.0V
- (b) Acoustic stimulus : 94dB SPL at 1kHz
- (c) Distance between MIC & SPK : 50cm
- (d) Measurement frequency : 50 (Hz) ~ 20 (kHz)

Machine	Model No	Purpose
Standard MIC	4191	Revision of input signal & SPK spec
Audio Analyzer	APX525	Audio Analysis (include Power Supply)
Loud-speaker	GRF Memory HE	SPK (Input sound Signal occur)
Power Amplifier	2716C	Power amplification
Charging Conditioning Amplifier	2690	Ref. MIC Signal Transformation
Microphone Interface	BK2010	Voltage & impedance supply to MIC
Operating Software	APx500 3.4.3	A-D Freq. Resp.
Sound Level Calibrator	4231	Standard MIC Calibration purpose

13. SOLDER REFLOW PROFILE (Guaranteed Maximum Reflow Condition)



Parameter	Specification
Average temp. gradient In preheating	2.5°C/s
Soak time	2 ~ 3 minutes
Time above 217°C	Max. 60 s
Time above 230°C	Max. 50 s
Time above 240°C	Max. 10 s
Peak temp.	240°C(-0/+10°C)
Temp. gradient in cooling	Max. -5°C/s

14. RECOMMENDED PICK-UP NOZZLE CONDITIONS

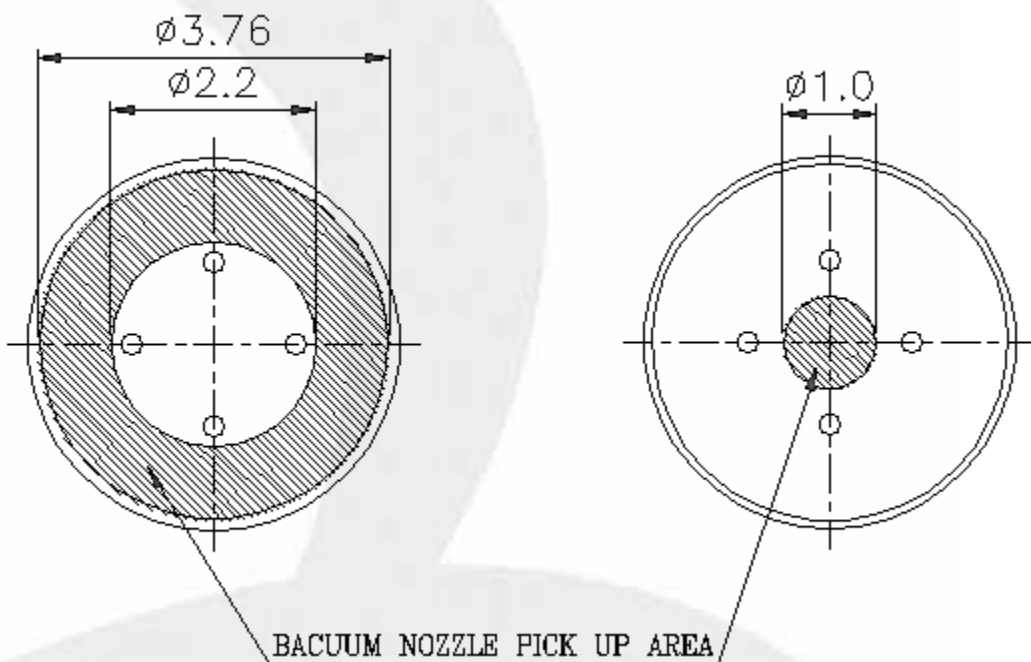
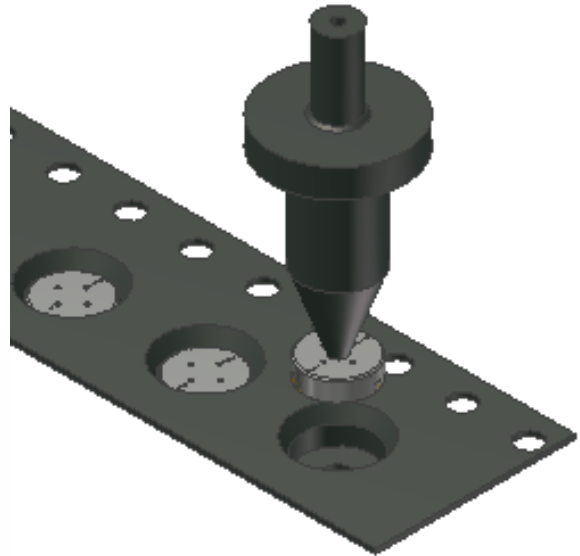
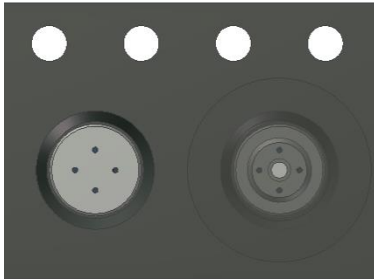
14.1. Nozzle material : Metal or Rubber, Etc.

14.2. Case Weight

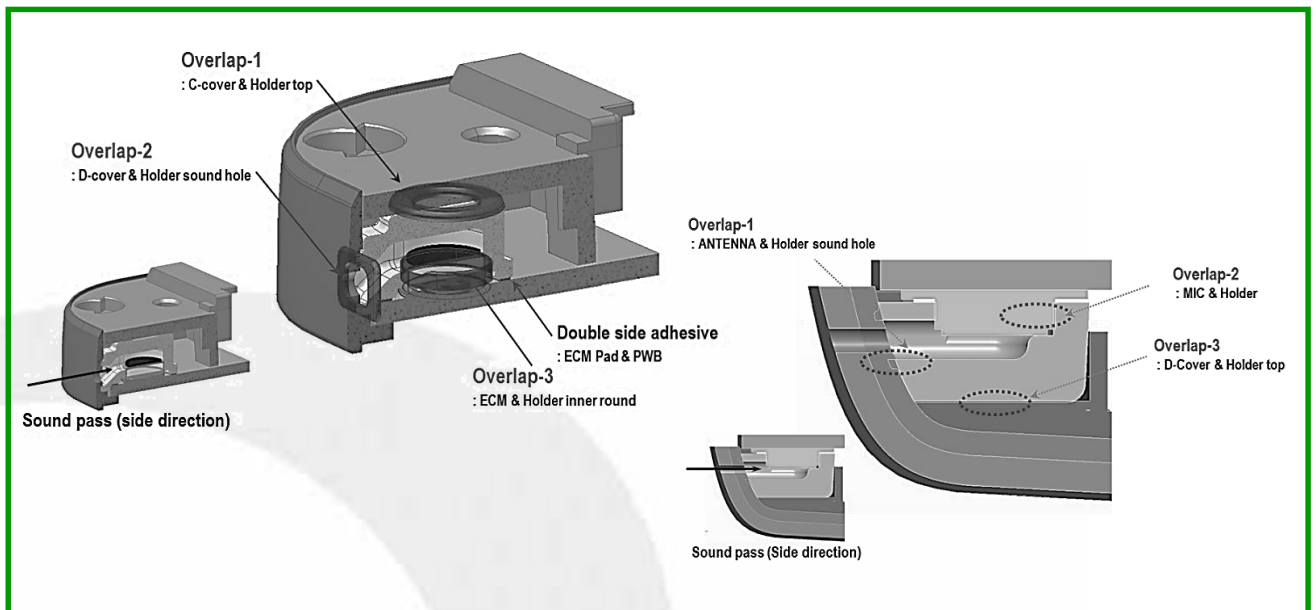
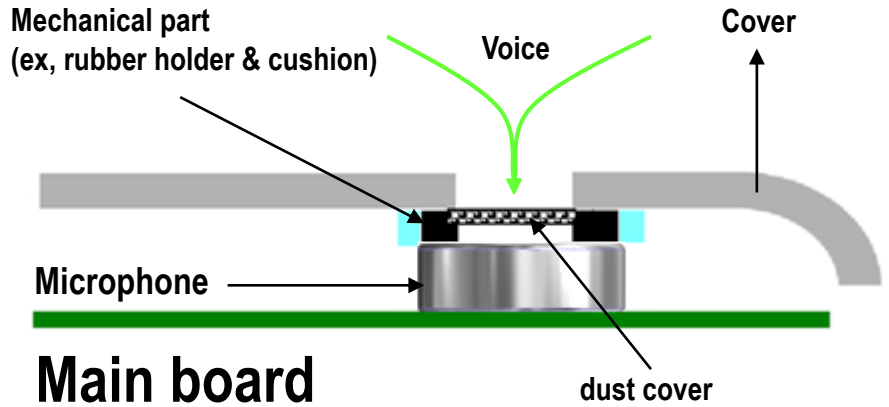
- If tool outer size is bigger than MIC. : Max. 10N
- If tool outer size is smaller than MIC. : Max. 4N

14.3. Nozzle position : MIC. Center

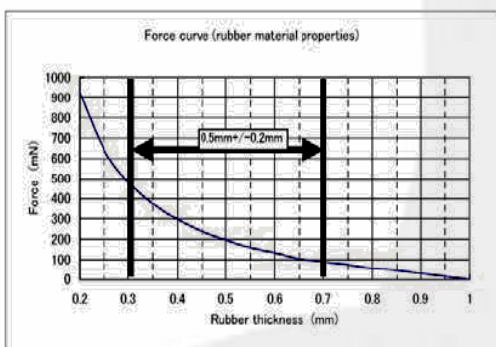
- Nozzle inner diameter size : Max. $\varnothing 1.0$



15. APPLICATION EXAMPLE

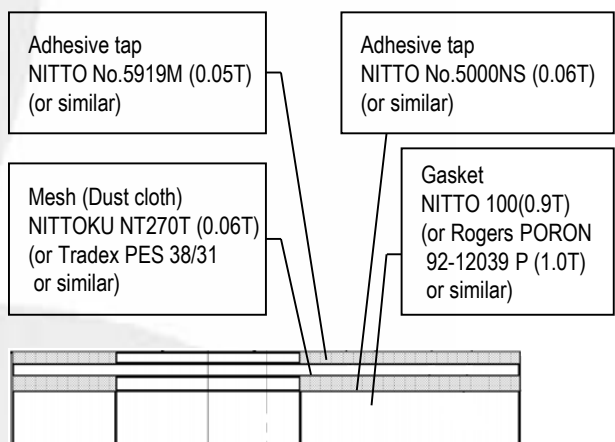


Compression force for sealing



Gasket compression range for sealing
→ 0.5±0.2mm

Gasket Layers



16. HANDLING GUIDE

16.1. Handling Guide of Process

* Note 1. X-ray inspection

- X-ray inspection is possible only under the setting conditions with Voltage : 60~80kV, Current : 60~100 μ A, Time : within 1min
- Don't do the REFLOW or REWORK process after X-ray inspection
- BUT, post-baking (at 105°C for 2hrs) after X-ray inspection is recommended for stabilizing SMD microphone

* Note 2. Cleaning process

- Don't do the cleaning process with any kind of volatile solvent(Acetone, TCE, alcohol, etc.), water, or detergent
- Possible only for the purpose of removing any dust or particle only with tissue or cotton tip without direct contact to the microphone

* Note 3. Router process on Printed Circuit Board after reflow

- It's possible to affect the acoustic properties of SMD microphone, when any particle gets into the SMD microphone inside through sound holes

SPECIFICATION HISTORY

Version	Date	Comments
1.0	Feb. 8. 17	1 st Submission of Electro-Acoustical specification
2.0	Mar. 6. 18	Change of frequency response mask management specifications
3.0	Jan. 14. 19	Change of PCB Module
4.0	Mar.25. 21	Update sensitivity mask spec.

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