

SPECIFICATION OF ELECTRET CONDENSER MICROPHONE

(TO :)



MODEL NO. : (R)SOB-413S42-EM H/F

DIRECTIVITY : OMNI-DIRECTIONAL

		Prepared	Checked	Approved
	Name			
	Sign.			
BSE		Prepared	Checked	Approved
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※ All Parts are Halogen Free Material.

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SPECIFICATION HISTORY

History Change	Date	Item	Contents	Grounds
ISSUE From BSE To	2013.08.14	(R)SOB-413S42-EM H/F	1 st Submission of Microphone spec.	

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1. INTRODUCTION

This specification is for the SMD possible Electret Condenser Microphone(ECM) which has endurable reflow temperature of up to 250 °C for under 30 seconds.

2. MODEL NO.

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

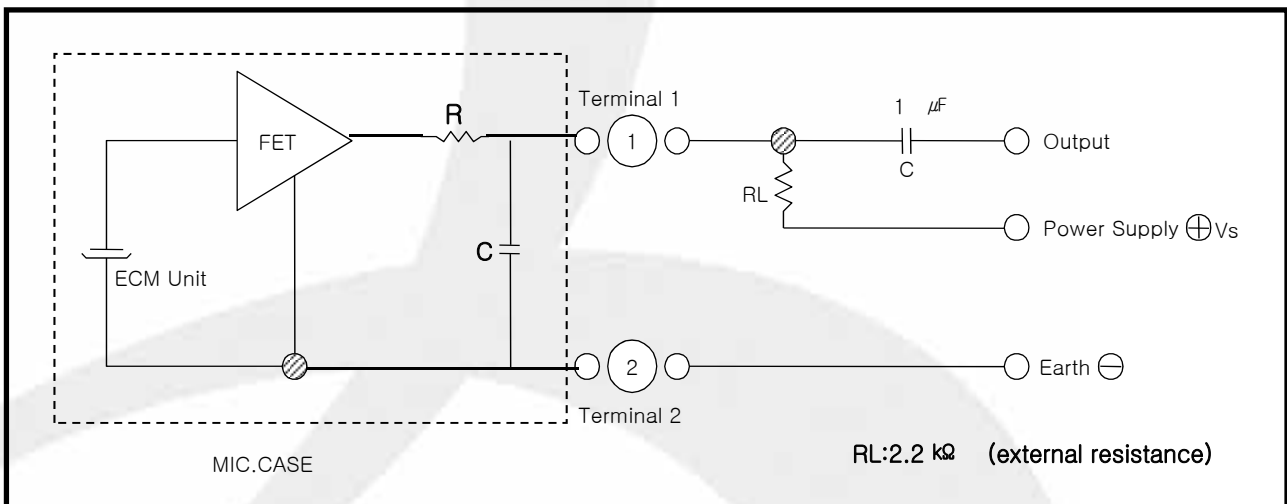
3. ELECTRICAL CHARACTERISTICS

Temp. = 23 ± 2 °C

Room Humidity = 65 ± 5 %

NO.	Parameter	Symbol	Condition	Limits			Unit
				Min.	Center	Max.	
1	Sensitivity	S	f=1kHz, S.P.L =1Pa, 0dB=1V/Pa	-45	-42	-39	dB
2	Output impedance	Z _{OUT}	f= 1kHz			2.2	kΩ
3	Current Consumption	I _{DSS}	V _{CC} =2.0V , R _L = 2.2kΩ			300	μA
4	Signal to Noise Ratio	S/N	f=1kHz, S.P.L =1Pa (A-Weighted Curve)	58			dB
5	Decreasing Voltage	ΔS-VS	V _{CC} =2.0V to 1.5V			-3	dB
6	Operating Voltage			1.5		10	V
7	Maximum input S.P.L.					110	dB
8	Reflow Sensitivity test	R	After 3 times reflow	-45	-42	-39	dB

4. MEASUREMENT CIRCUIT



5. TYPICAL FREQUENCY RESPONSE CURVE (FAR FIELD)

Far Field Measurement Condition

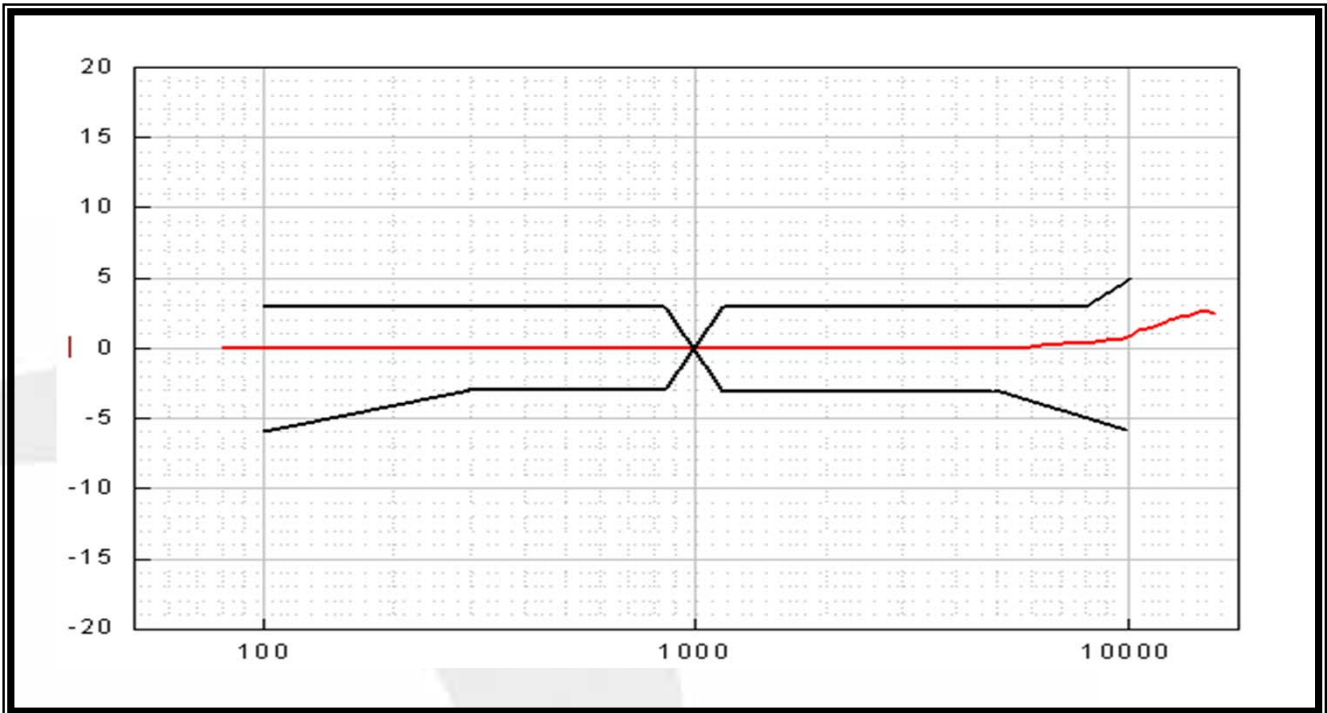
Temperature : 23 ± 2 °C

Bias Voltage : 2.0V (with 2.2kΩ series resistor)

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

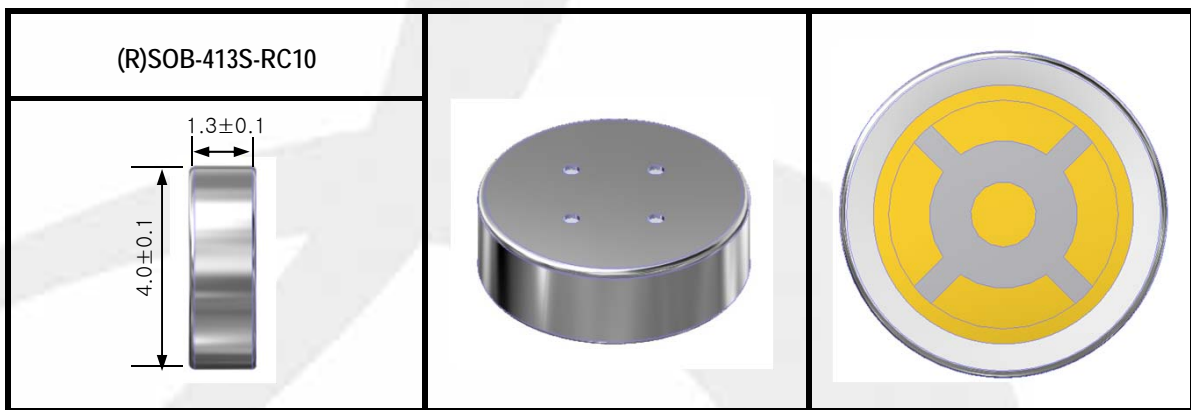
The loud-speaker must be calibrated to make a flat frequency response input signal

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



6. MECHANICAL CHARACTERISTICS

■ SMD Type



7. RELIABILITY TEST

7.1 VIBRATION TEST

To be no interference in operation after vibrations. 10Hz to 55Hz for 1 minute full amplitude 1.52mm , for 2 hours at three axis

7.2 DROP TEST

To be no interference in operation after dropped to concrete floor each one time from 1 meter height at three directions in state of packing

7.3 TEMPERATURE TEST

- After exposure at 85 °C for 96 hours, sensitivity to be within ± 3 dB from initial sensitivity.
(The measurement to be done after 2 hours of conditioning at room temperature)
- After exposure at -30 °C for 96 hours, sensitivity to be within ± 3 dB from initial sensitivity.
(The measurement to be done after 2 hours of conditioning at room temperature)

7.4 HUMIDITY TEST

After exposure at 60 °C and 90 to 90% relative humidity for 96 hours, sensitivity to be within ± 3 dB from initial sensitivity.

7.5 TEMPERATURE CYCLE TEST

After exposure at 25 °C for 2 hours, at 60 °C 90% for 4 hours, 2 hours, at 45 °C 95% for 12 hours, 2 hours, at 20 °C for 1 hour, at 25 °C for 1 hour. 5 cycles, sensitivity to be within ± 3 dB from initial sensitivity
(The measurement to be done after 2 hours of conditioning at room temperature)

7.6 TEMPERATURE SHOCK

Temperature change from -30 °C to 70 °C for 30 minutes . (changing time : 20 sec.)
After 48 cycles, sensitivity to be within ± 3 dB from initial sensitivity
(The measurement to be done after 2 hours of conditioning at room temperature)

7.7 ESD (Electrostatic Discharge) TEST

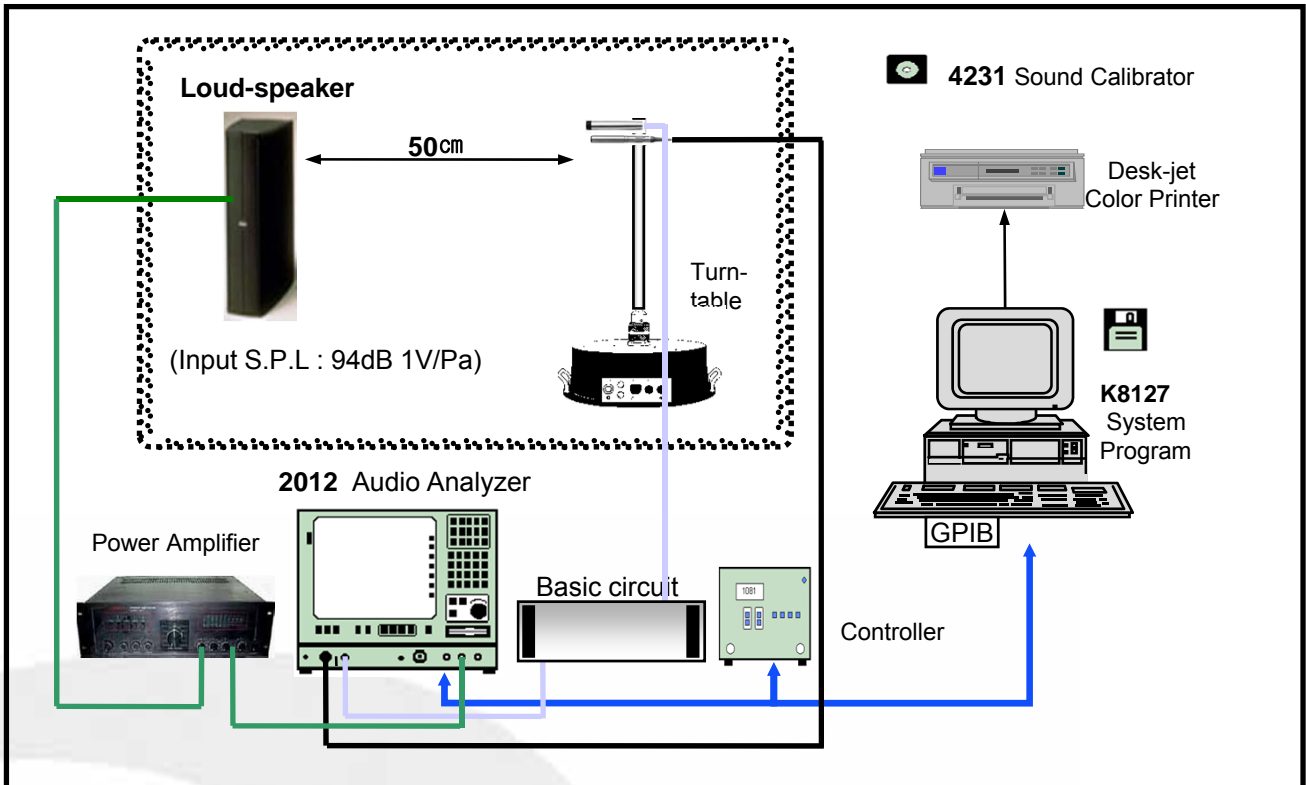
The microphone under test must be discharged between each ESD exposure with ground.
(contact : ± 8 kV , air : ± 15 kV \rightarrow IEC 61000-4-2)
There is no interference in operation after 5 times exposure

8 . TEMPERATURE CONDITIONS

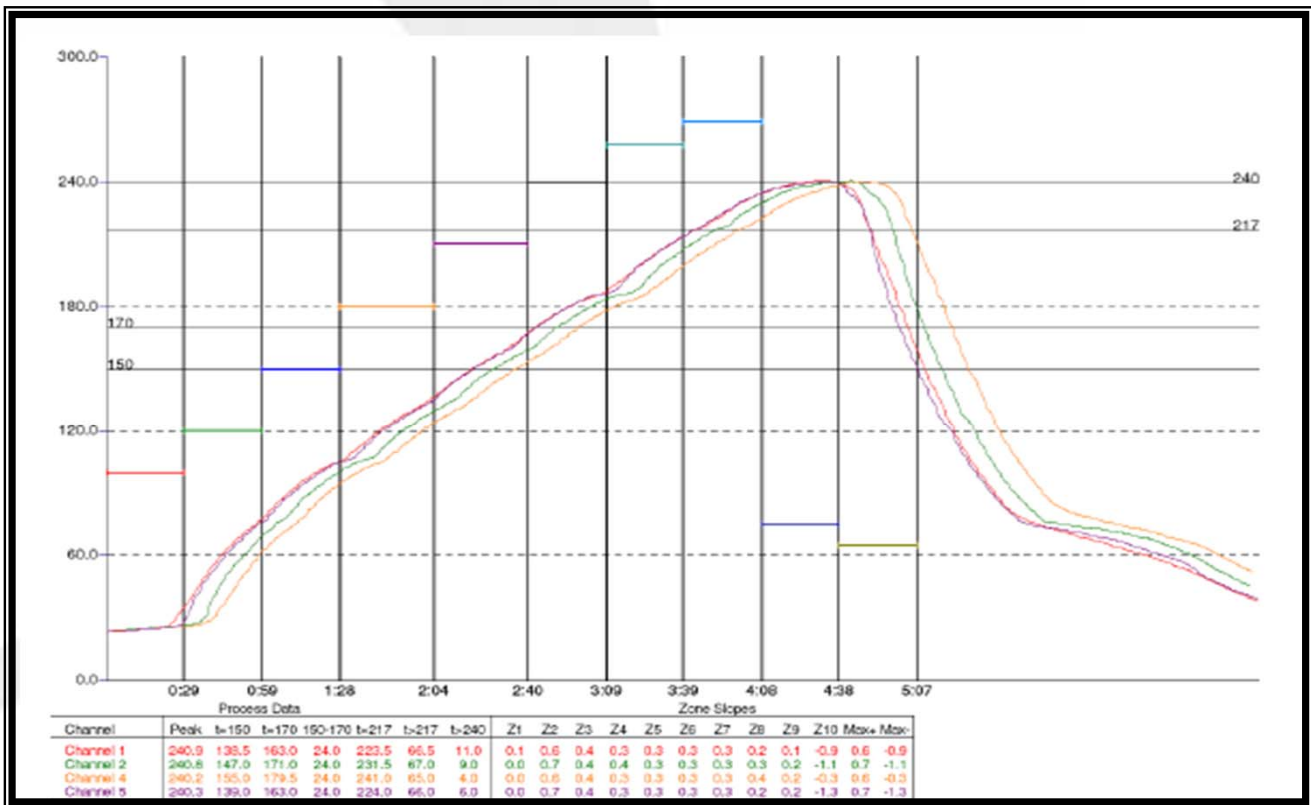
8.1 STORAGE TEMPERATURE : -30 °C ~ +85 °C

8.2 OPERATING TEMPERATURE : -30 °C ~ +85 °C

9. MEASUREMENT SYSTEM



10. REFLOW PROFILE (Guaranteed Maximum Reflow Condition)



11. CAUTIONS WITH USING SMD MICROPHONE

11-1 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 $^{\circ}$ C for 2hrs) after X-ray inspection is recommended for stabilizing SMD microphone

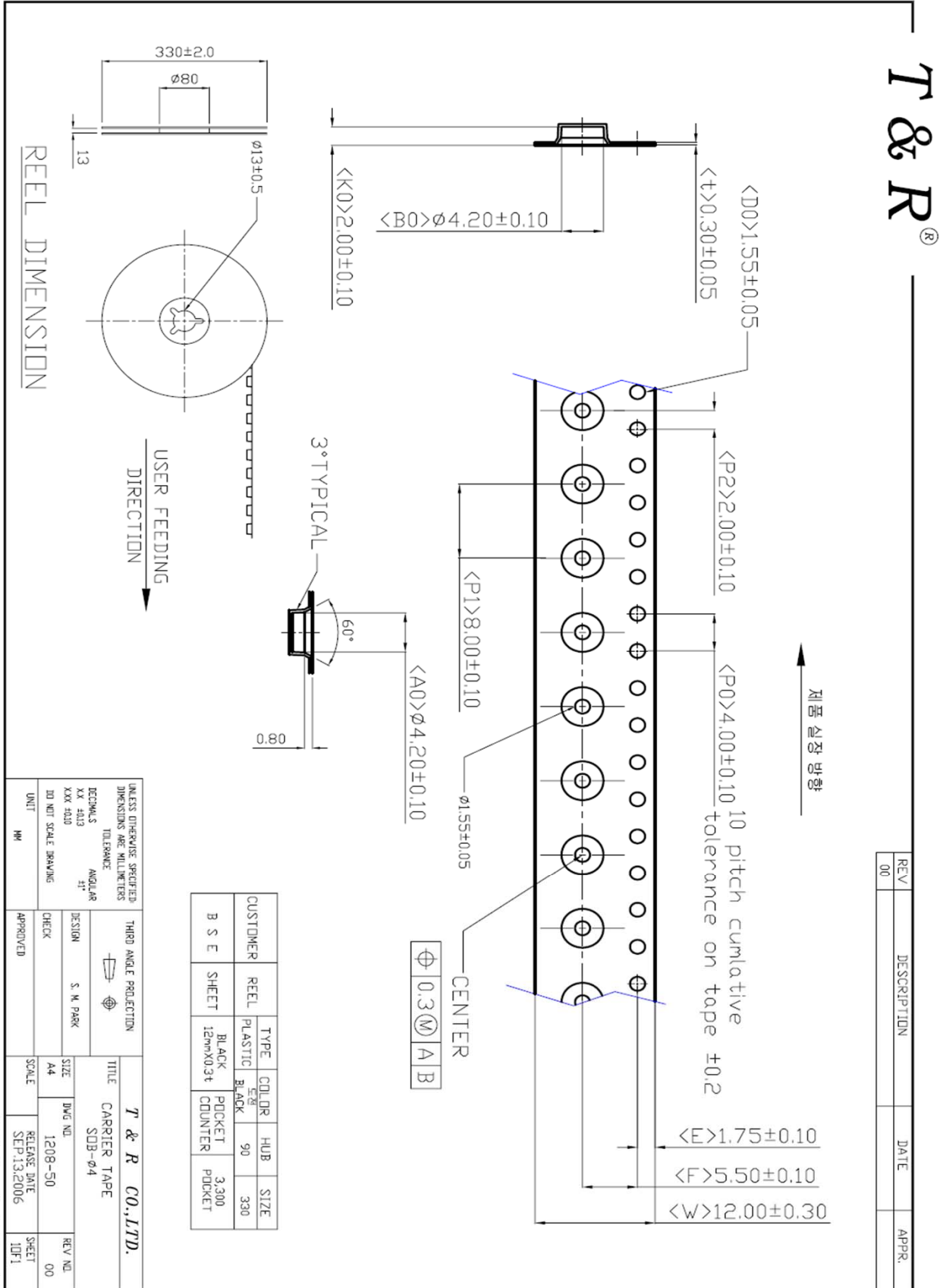
11-2 Cleaning process

- 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

11-3 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

12.1 TAPING SPECIFICATION

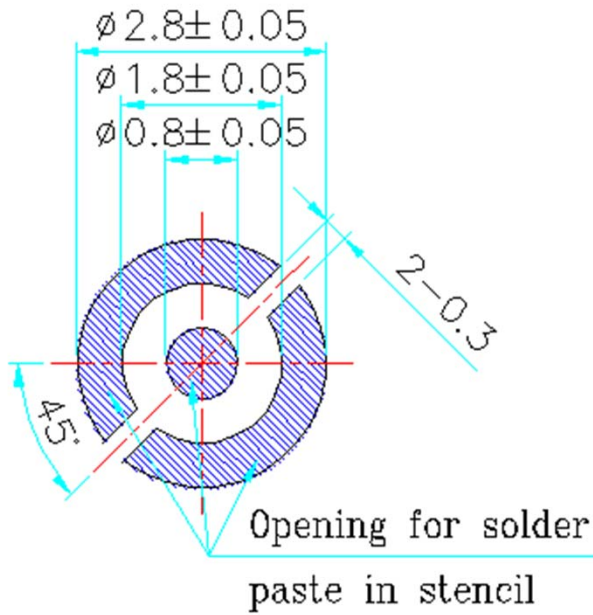


12.2 Recommended Metal Mask(Stencil Design) and Land Pattern

Pattern $\varnothing 4.1$

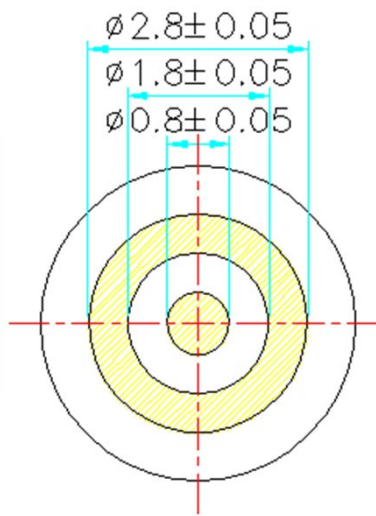
(Unit: mm)

Metal Mask Pattern

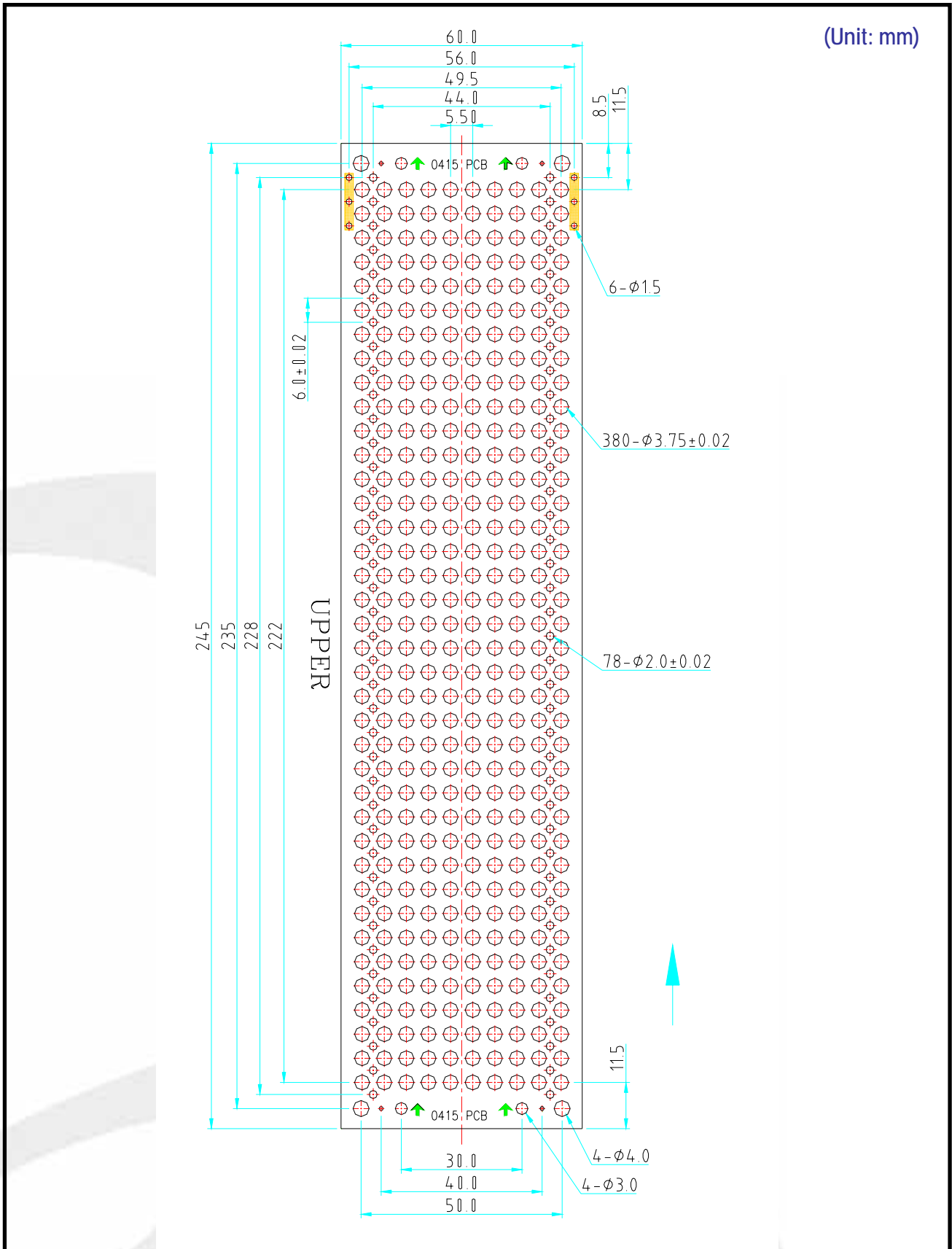


thickness of metal mask : 0.1mm

Soldering Surface – Land Pattern



12.3 Test Board Layout



13. REWORK

13.1 Rework Machine

13.1.1 Rework Machine

Manufacturer		Meisho
Model		MS9000S
Temperature control		6 zones
Top heater	Type	Hot air flow N2 gas (recommended)
	Flow rate	≤ 20(30) ℓ/min
Bottom heater		150 °C ~200 °C (IR heater)
Alignment		vision
Pick-up nozzle		≤ φ0.5 mm
Solder/flux		1. Removing or pre-heating the solder residue before mounting new part 2. Apply lead-free flux only or apply 2 ~ 3 points of solder paste instead



* Note : It's possible to use the 'hot air gun' for SMD mic. rework, but it might affect to microphone characteristics depending on rework conditions.

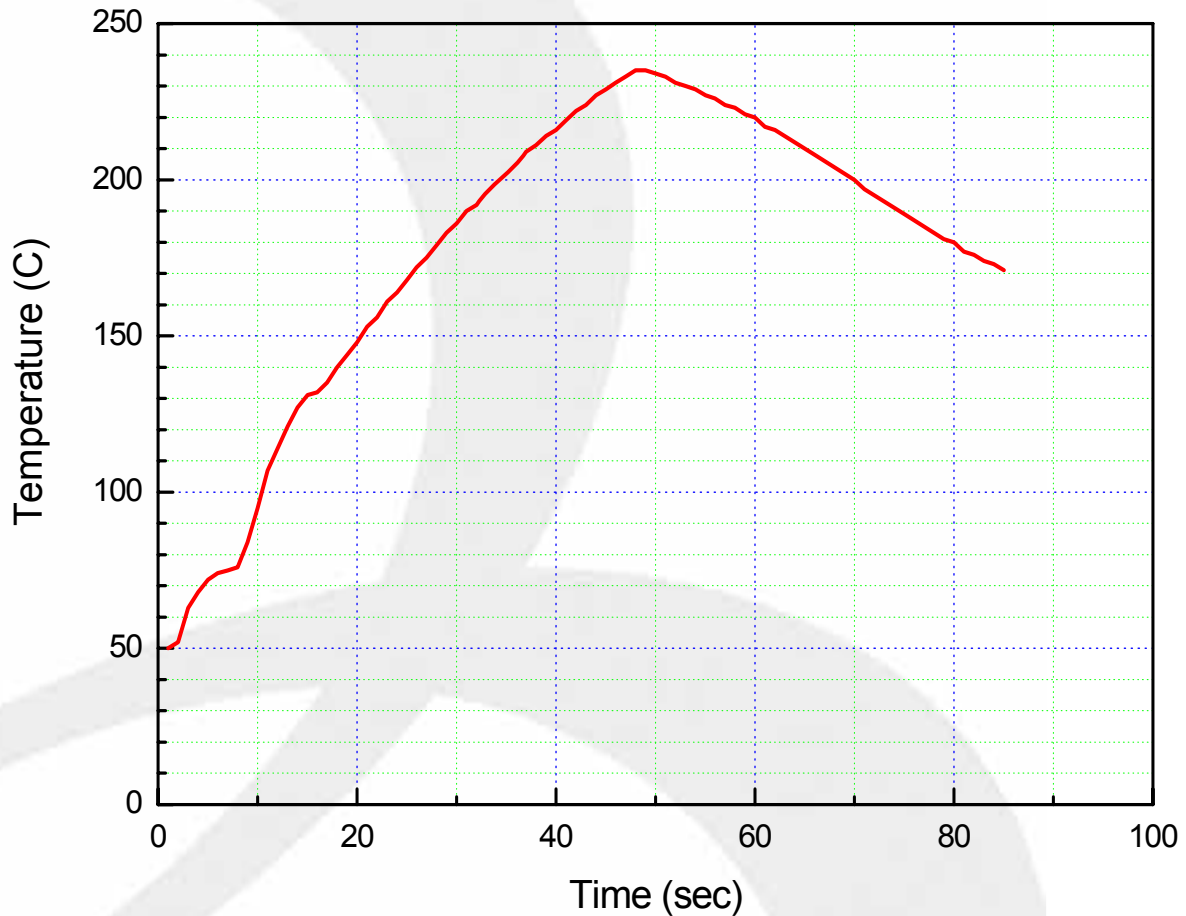
13.1.2 Setting Condition

① Setting Condition I

Time	Temperature(°C)	
	setting	Real
0	450	50
10		95
20		148
30		186
40		216
45		229
50	cooling	234
60		220
70		200
80		180
85		172

Setting 조건		
Temperature	Top	450
	bottom	420
Time	45 sec	
cooling	40 sec	
Air flow rate	20ℓ/min	

Recommended Rework Profile

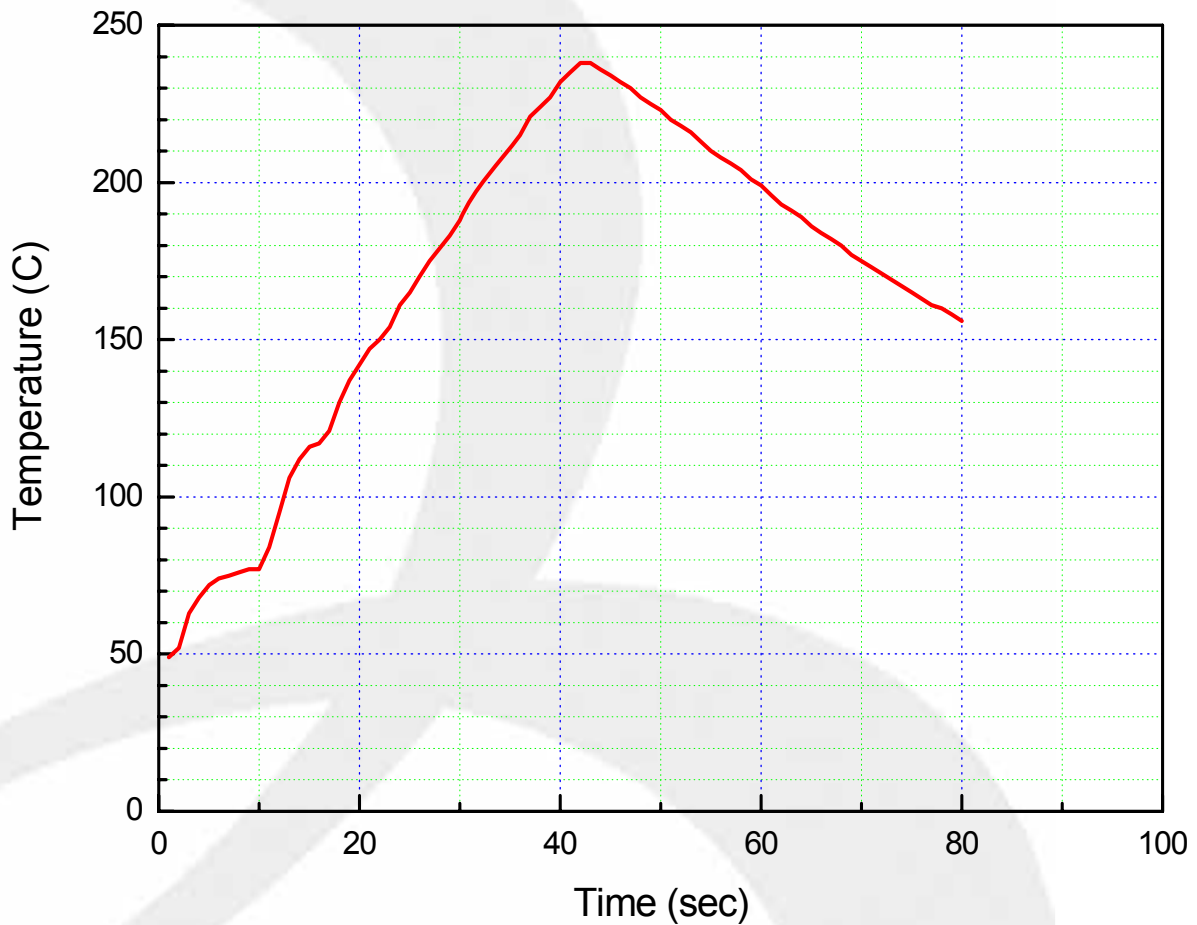


② Setting Condition II

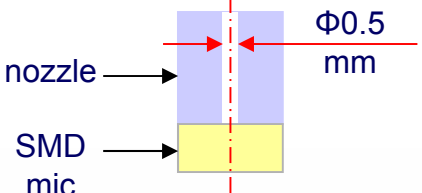
Time	Temperature(°C)	
	setting	Real
0	450	49
10		77
20		142
30		188
40		232
45	cooling	234
50		223
60		199
70		175
80		156

Setting Condition		
Temperature	Top	450
	bottom	450
Time	40 sec	
cooling	40 sec	
Air flow rate	30ℓ/min	

Recommended Rework Profile



13.1.3 Rework Process Condition (using 'Rework Machine')

Bottom heater	IR heater is the best option
Alignment	Using a vision equipment to do alignment easily and precisely
Pick-up nozzle	<p>Pick up the center of the SMD microphone using a nozzle with less than 0.5 mm in diameter.</p> <p>If the whole nozzle fixture can cover the front side of the SMD microphone like the picture on left, it's better for safe rework.</p> 
Solder/flux Process Options	<p>1. Removing the solder residue before mounting new part</p> <ul style="list-style-type: none"> - print lead-free solder paste on the SMD mic terminals using mask → mounting
	<p>2-1. Pre-heating the solder residue before mounting new part</p> <ul style="list-style-type: none"> - apply lead-free flux onto the land pattern (halogen-free flux : ALPHA Solids 26F FLUX by Alpha Metal Co. Ltd.,)
	<p>2-2. Pre-heating the solder residue before mounting new part</p> <ul style="list-style-type: none"> - apply 2 ~ 3 points of lead-free solder paste onto the land pattern
	<p>3. After removing damaged part, apply lead-free flux or 2~3 points of lead-free solder paste onto the land pattern</p>

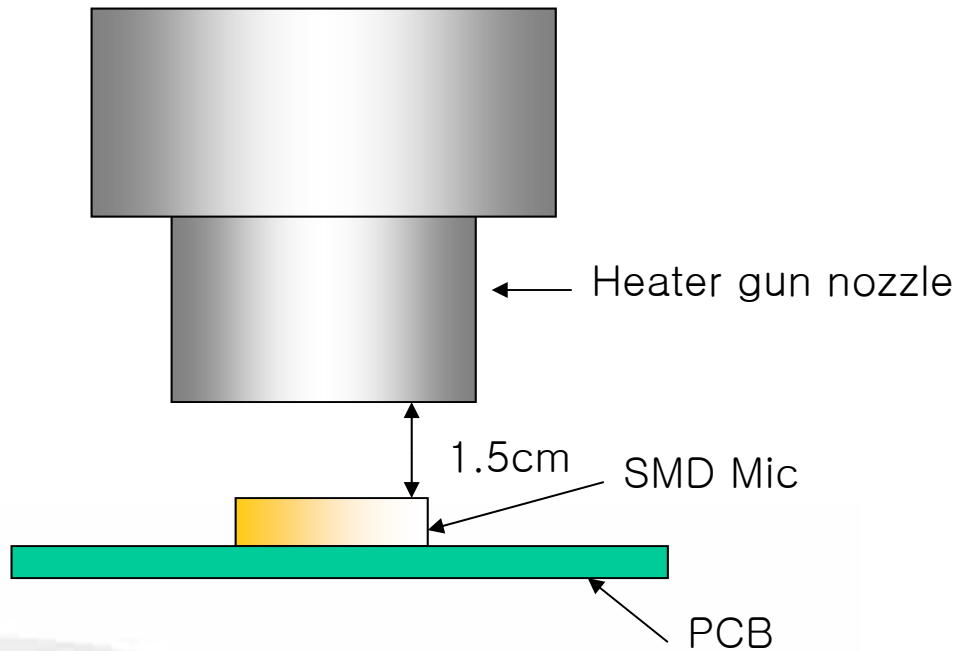
13.2 Heater Gun (1)

13.2.1 Heater Gun Specification

Manufacturer		Quick Korea
Model		990D ESD
Temperature control		PID control
Top heater	Type	Hot air flow
	Flow rate	< 20 ℓ/min
Alignment		visual
Pick-up		Manual
Solder/flux		<ol style="list-style-type: none"> 1. Removing or pre-heating the solder residue before mounting new part 2. Apply lead-free flux only or apply 2 ~ 3 points of solder paste instead



13.2.2 Setting Condition



Heater gun setting Temperature		330 °C
Distance between Nozzle and mic		1.5 cm
Flow setting		7.0
Alignment		Visual
Pick-up		Manual
Work Period	removal	20 ~ 25 sec
	rework	20 ~ 25 sec

No 01. It'll be the safest rework condition, when 'rework' time is set as same period as 'removal'. Please check out the 'removal' time first, then 'rework' will be finished within 'removal' time + 5 sec.

No 02. It might be impossible to be done properly with this rework setting condition according to the main board specification. In this case, one possible way is search for the 'removal' time with same condition first, then set the 'rework' time as 'removal' time + 5sec. It's important to find out the way to shorten work period to maintain the original property by controlling setting temperature and air flow.

* Note : The guaranteed sensitivity deviation after rework with this temperature condition is within ± 2.0 dB.

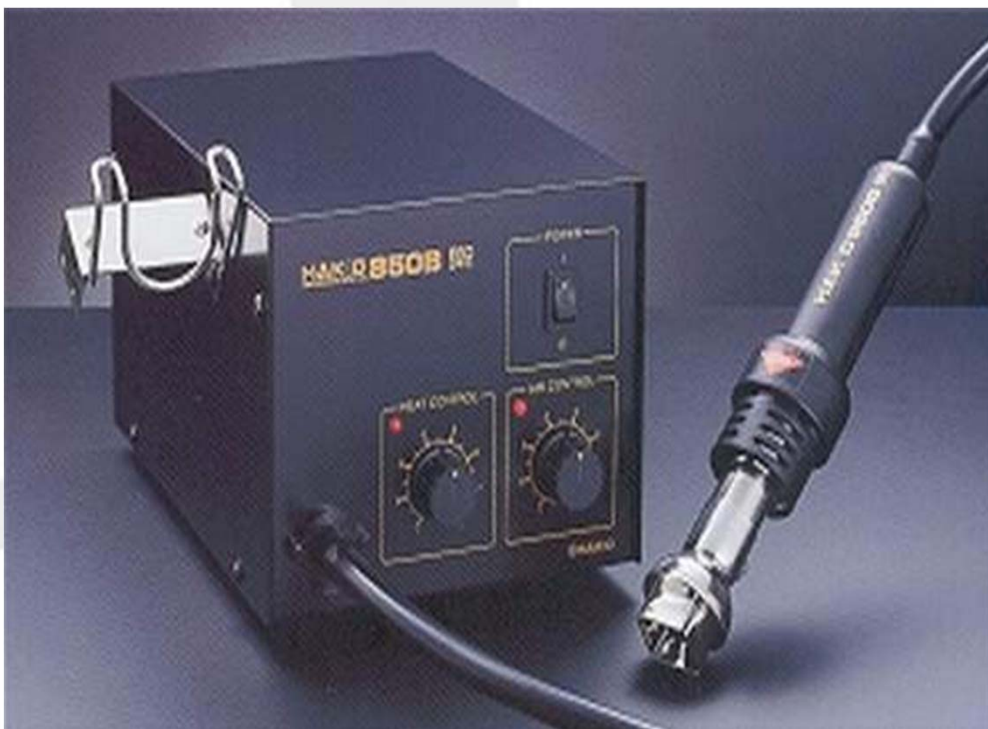
13.2.3 Rework Process Condition (using 'Heater Gun (1)')

Bottom heater	IR heater is the best option
Alignment	Visual
Temperature	330 °C
Time	20 ~ 25 Seconds
Nozzle	No additional nozzle is needed
Solder/flux Process Options	1. Removing the solder residue before mounting new part - print lead-free solder paste on the SMD mic terminals using mask → mounting
	2-1. Pre-heating the solder residue before mounting new part - apply lead-free flux onto the land pattern (halogen-free flux : ALPHA Solids 26F FLUX by Alpha Metal Co. Ltd.)
	2-2. Pre-heating the solder residue before mounting new part - apply 2 ~ 3 points of lead-free solder paste onto the land pattern
	3. After removing damaged part, apply lead-free flux or 2~3 points of lead-free solder paste onto the land pattern

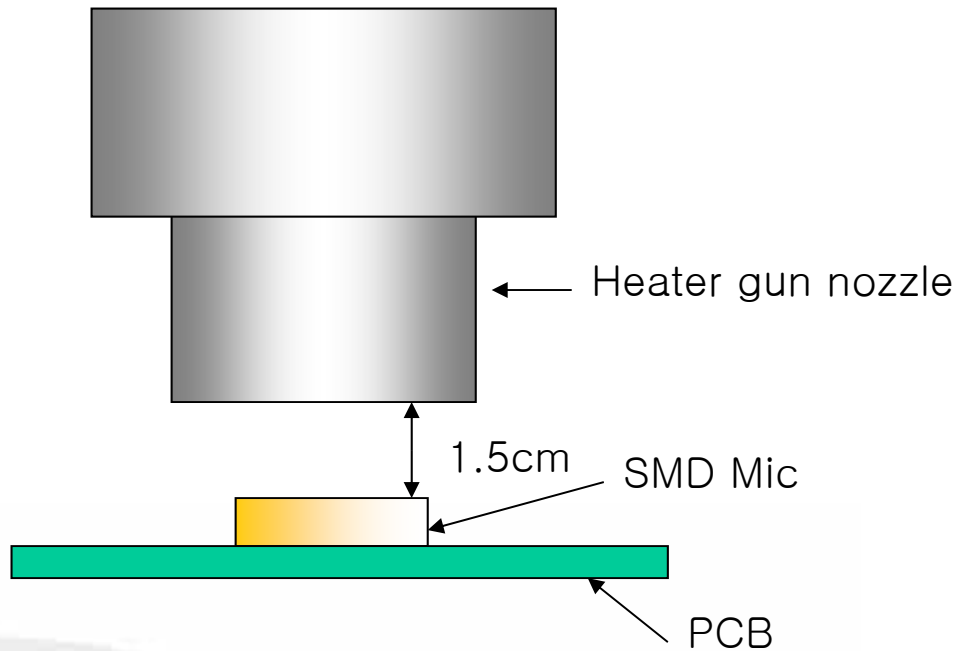
13.3 Heater Gun (2)

13.3.1 Heater Gun Specification

Manufacturer		HAKKO
Model		850B ESD
Temperature control		100 ~ 420
Top heater	Type	Hot air flow
	Flow rate	< 23 ℓ/min
Alignment		visual
Pick-up		Manual
Solder/flux		<ol style="list-style-type: none"> 1. Removing or pre-heating the solder residue before mounting new part 2. Apply lead-free flux only or apply 2 ~ 3 points of solder paste instead



13.3.2 Setting Condition



Heater gun setting		3.75
Temperature		
Distance between Nozzle and mic		1.5 cm
Flow setting		2.0
Alignment		Visual
Pick-up		Manual
Work Period	removal	15 ~ 25 sec
	rework	15 ~ 25 sec

No 01. It'll be the safest rework condition, when 'rework' time is set as same period as 'removal'. Please check out the 'removal' time first, then 'rework' will be finished within 'removal' time + 5 sec.

No 02. It might be impossible to be done properly with this rework setting condition according to the main board specification. In this case, one possible way is search for the 'removal' time with same condition first, then set the 'rework' time as 'removal' time + 5sec. It's important to find out the way to shorten work period to maintain the original property by controlling setting temperature and air flow.

* Note : The guaranteed sensitivity deviation after rework with this temperature condition is within ± 2.0 dB.

13.3.3 Rework Process Condition (using 'Heater Gun (2)')

Bottom heater	IR heater is the best option
Alignment	Visual.
Temperature	330 °C
Time	20 ~ 25 Seconds
Nozzle	No additional nozzle is needed
Solder/flux Process Options	1. Removing the solder residue before mounting new part - print lead-free solder paste on the SMD mic terminals using mask → mounting
	2-1. Pre-heating the solder residue before mounting new part - apply lead-free flux onto the land pattern (halogen-free flux : ALPHA Solids 26F FLUX by Alpha Metal Co. Ltd.)
	2-2. Pre-heating the solder residue before mounting new part - apply 2 ~ 3 points of lead-free solder paste onto the land pattern
	3. After removing damaged part, apply lead-free flux or 2~3 points of lead-free solder paste onto the land pattern

14. MICROPHONE PCB DRAWING

REF. NO	
THIS DRAWING MUST NOT BE REPRODUCED OR DISCLOSED TO THIRDPARTIES WITHOUT THE PRIOR CONSENT OF BSE CO., LTD.	

TOP VIEW

SIDE VIEW

BOTTOM VIEW

BACUUM NOZZLE PICK UP AREA

REV.	NO.	CONTENTS	BY	DATE	APPROVED

LIST OF MATERIALS					
NO	NAME	QTY	DESCRIPTION	REMARKS	
UNLESS TOLERANCE ARE SPECIFIED					
3 DECIMAL DIMENSIONAL WILL BE ±0.005mm					
2 DECIMAL DIMENSIONAL WILL BE ±0.02mm					
1 DECIMAL DIMENSIONAL WILL BE ±0.1mm					
BSE CO.,LTD.					
DRAWING NAME					
φ4X1.3MM C-MIC ASSEMBLY					
DRAWN	D.S.LEE	PART NAME	BACK ELECTRET CONDENSER MICROPHON		
DESIGNED	D.S.LEE	PART NO.	BECM-0413S-EM H/F		
PROCESS SKETCHED		MODEL NO.	R508-413S-EM H/F		
CHECKED	M.H.Ham	SCALE	10/1		
APPROVED	M.J.Lee	DATE	2013.04.19		
MODEL YR	2013				
SHEETS					
SHEET NO.					
DRAWING NO.					

84 BSRD 03-04

REV 3 (2007. 6)

Microphone Technology Leadership