

PRODUCT DESCRIPTION

The SM0102B-RDSY55-M02 is a bottom port, analog omni-directional MEMS microphone with a high performance of SNR. This microphone consists of a MEMS transducer and an ASIC which have low noise preamplifier. It enables good quality on voice pick up and very low power consumption. The LGA package make it SMT compatible with no sensitivity degradation. Tight ± 1 dB sensitivity tolerance and enhanced RF immunity make full-automated assembly process and reliable system level audio performance.

PRODUCT FEATURES

- Omnidirectional
- Package size: 3.35mmx2.5mmx1.3mm
- Bottom Port
- Sensitivity Matching (-55 ± 1 dB)
- SNR of 70.5 dB(A)
- AOP at 121 dB SPL
- Standard SMD Reflow

TYPICAL APPLICATIONS

- Hearing Aids

BLOCK DIAGRAM

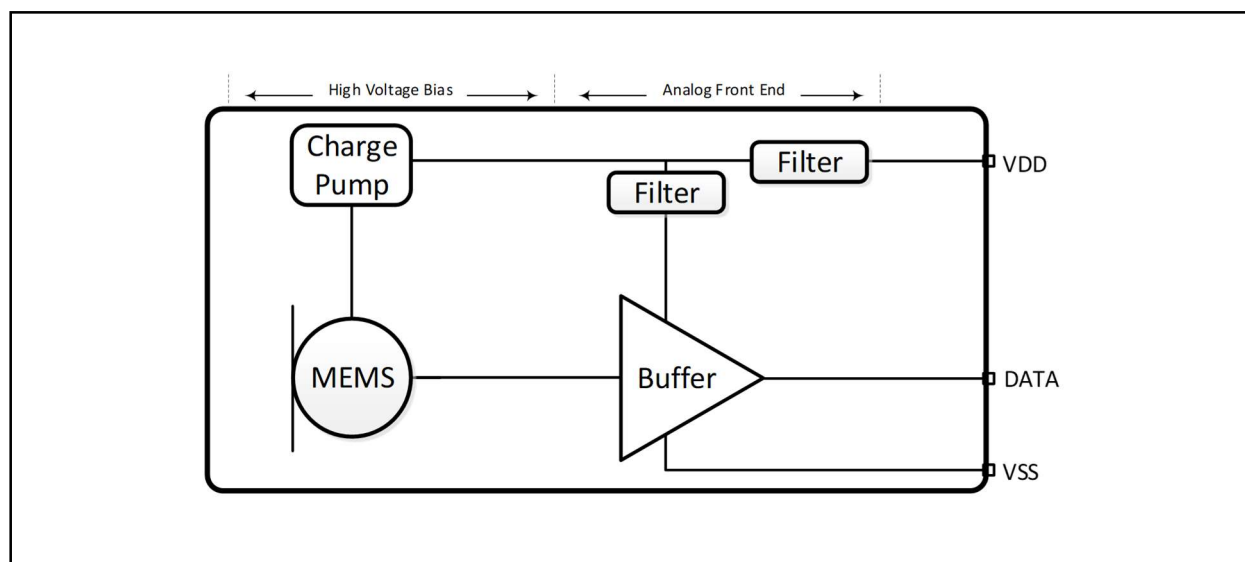


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MECHANICAL LAYOUT AND DIMENSIONS

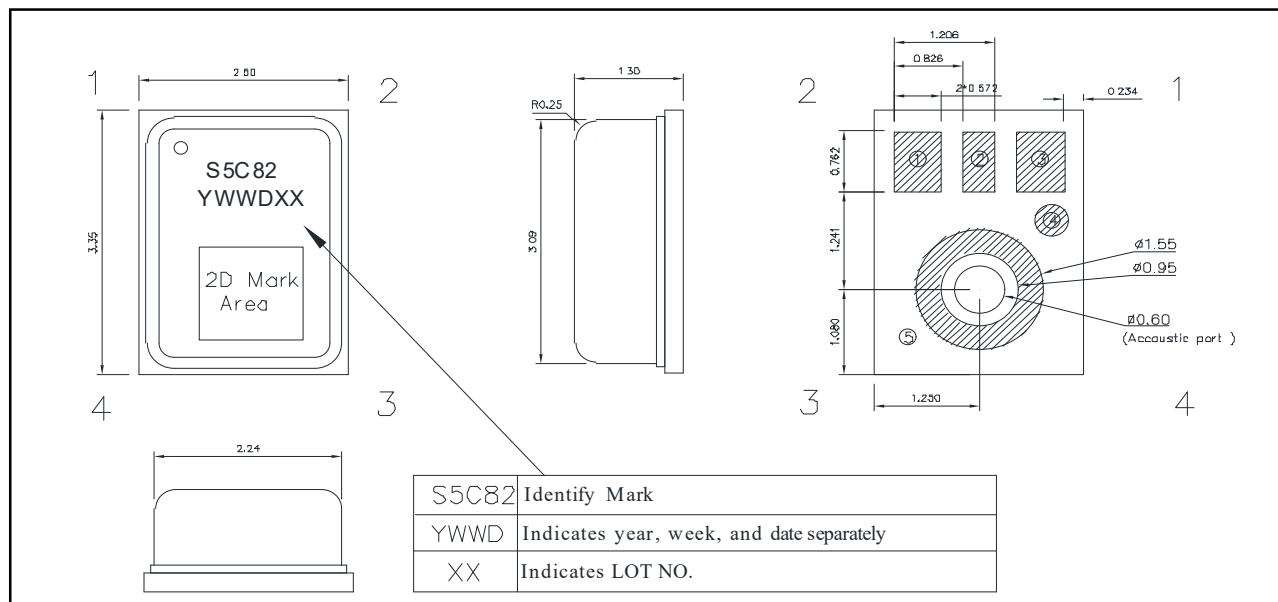


Table 1: Pin description

No.	Name	Description
1	Vdd	Power supply
2	Ground	Ground
3	Output	Data output from the microphone
4	Calibration	Calibration PIN
5	Ground	Ground

Table 2: Package size

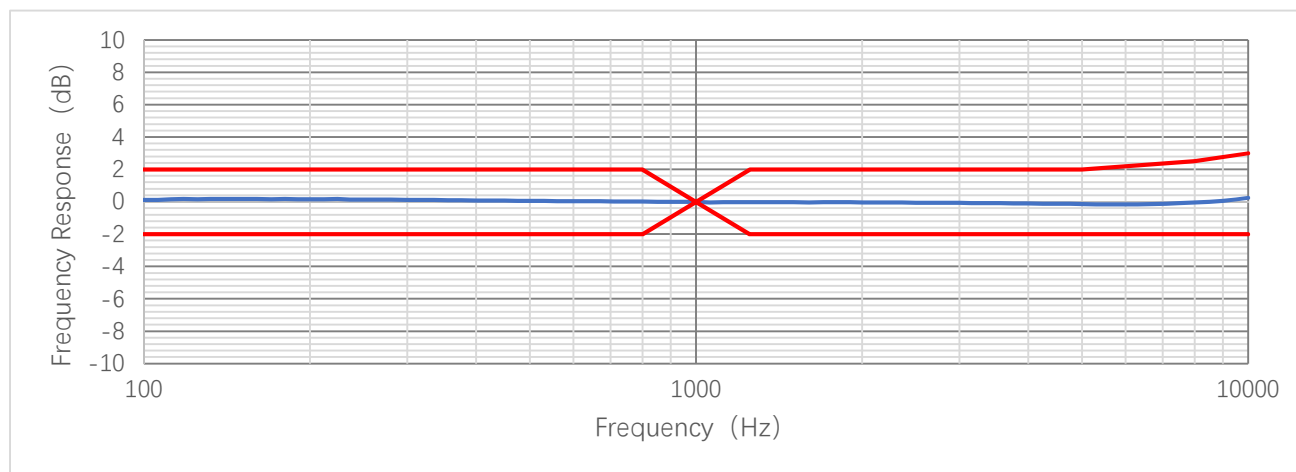
Item	Dim.	Tol. (+/-)	Unit
Length (L)	3.35	0.10	mm
Width (W)	2.50	0.10	mm
Height (H)	1.30	0.10	mm
Acoustic Port (AP)	0.60	0.05	mm

Note: Tolerance is +/-0.08mm unless otherwise specified

TYPICAL PERFORMANCE CUEVES

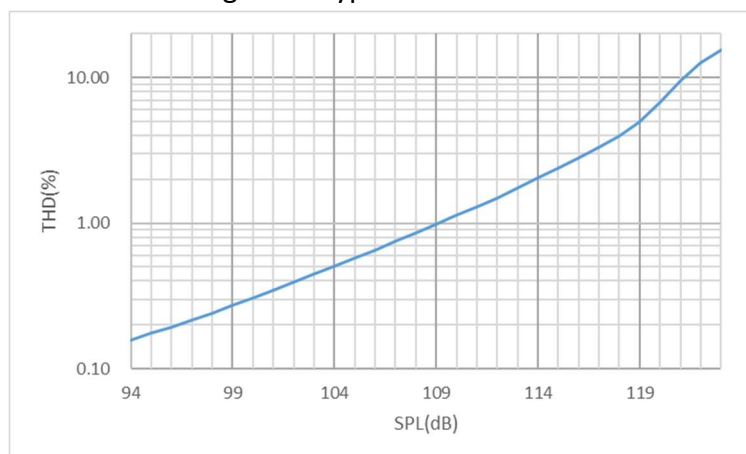
Test Conditions: 23°C, 60% R.H., Vdd=0.9V, unless otherwise indicated

Figure 1: Typical Amplitude response and Test Masks



Frequency (Hz)	100	200	800	1000	1250	5000	8000	10000
USL	2	2	2	0	2	2	2.5	3
LSL	-2	-2	-2	0	-2	-2	-2	-2

Figure 2: Typical THD vs. SPL



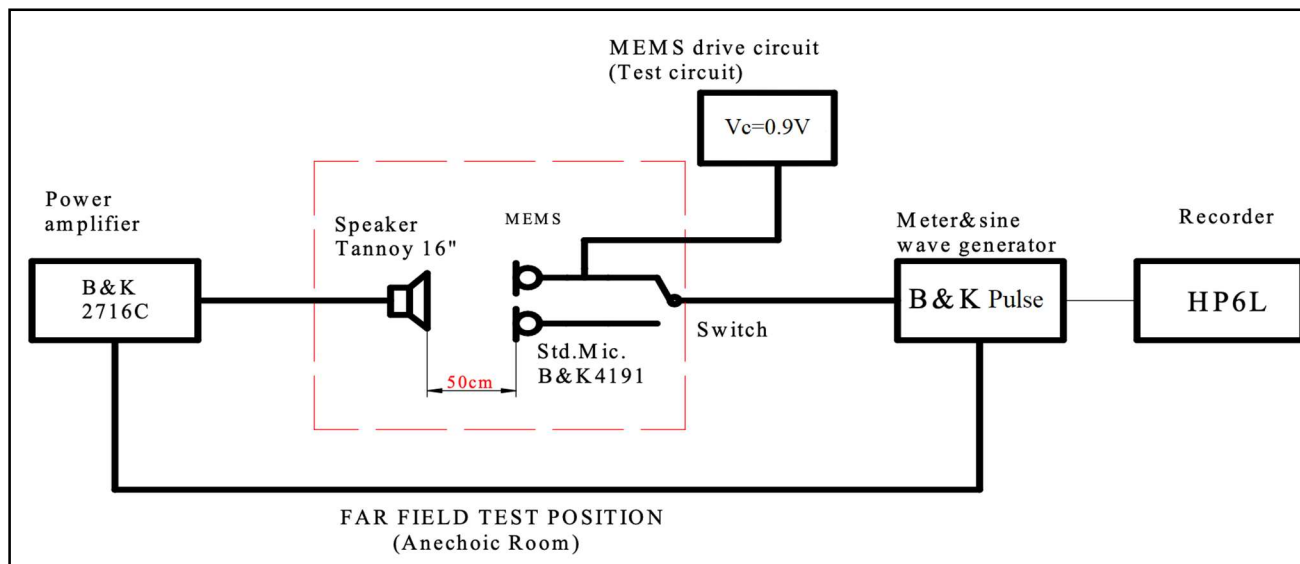
ACOUSTIC & ELECTRICAL CHARACTERISTICS

Unless otherwise indicated, test conditions are: $V_{dd}=0.9V$, $F_{IN} = 1\text{ kHz}$ @ 94dB SPL, $T_a=23^{\circ}C$, 60% R.H., SNR & noise measurement is based on 20-20kHz pass band with A-weighting filter applied.

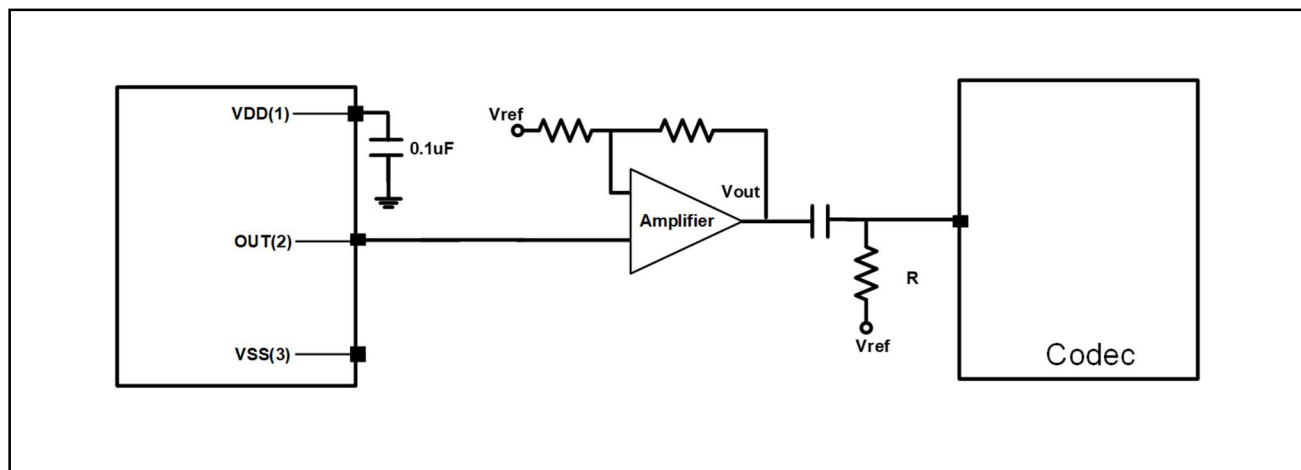
Table 3: Product Specification

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Units
Directivity		Omni-Directional				
Sensitivity	Sen	0.1Pa@1kHz, $V_{dd}=0.9V$	-56.0	-55.0	-54.0	dB
Output Impedance	Z_{out}	94dB SPL@1kHz, $V_{dd}=0.9V$		4000		Ω
Supply Voltage	V_{dd}		0.9	0.9	1.3	V
Rated Current		94dB SPL@1kHz, $V_{dd}=0.9V$		31	50	μA
Signal-to-Noise Ratio	SNR	94dB SPL@1kHz, A-weighted	-	70.5	-	dB
Total Harmonic Distortion	THD	94dB SPL@1kHz	-	0.2	0.50	%
Acoustic Overload Point	AOP	10% THD @1kHz $S=Typ$, $V_{DD}=0.9V$		121	-	dB SPL
Power Supply Rejection	PSR	100mVpp square wave @217Hz A weight	-	-85	-	dBV
Power Supply Rejection Ratio	PSRR	200mVpp sinewave, @1KHz	-	51	-	dB

TEST SETUP



RECOMMENDED INTERFACE CIRCUIT



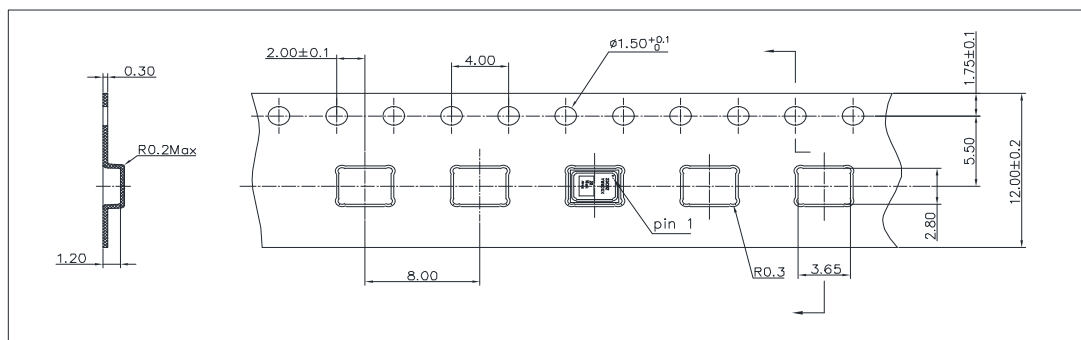
RELIABILITY SPECIFICATIONS

Stress	Test Conditions
Reflow	3 times with microphone mounted upside-down under conditions of 260°C for 30 seconds maximum
Low Temp Operating Life	-40°C environment while under bias for 1000 hours
Low Temp Storage Life	-40°C environment for 1000 hours
High Temp operating life	105°C environment while under bias for 1000 hours
High Temp storage life	105°C environment for 1000 hours
Temperature humidity bias	+85°C, 85%R.H. environment while under bias for 1000 hours.
Temperature humidity storage	+85°C, 85% R.H. environment for 1000 hours
Temperature cycling	+85°C,30min→-40°C,30min, 100cycles
ESD	3 discharges at +/-8KV direct contact to metal cap when unit is grounded (IEC 61000-4-2) and 3 discharges at +/-2KV direct contact to I/O pins. (MIL 883E,Method 3015.7)
Mechanical shock	3 pulses, 0.5 msec duration, 10,000 g peak acceleration in X, Y and Z planes
Variable Frequency Vibration	20-2K-20 Hz (logarithmic variation) in 12 minutes, 4x in each orientation, 20 g peak acceleration
Drop test	To be no interference in operation after drop to steel plate, each time from 1.52 meters' height in 150g jig at three directions in state of packing. Totally for 12 times.

The measurement shall to be done after 2 hours of conditioning at room temperature. The sensitivity changes after stress must not more than 3dB compare to its initial value.

PACKAGING

Figure 5: Tape and reel packing information



Notes:

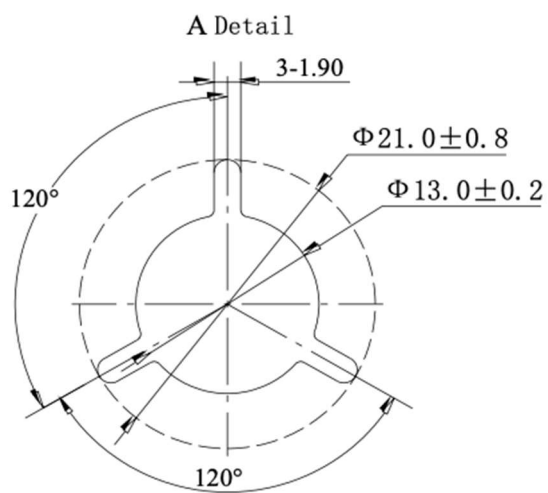
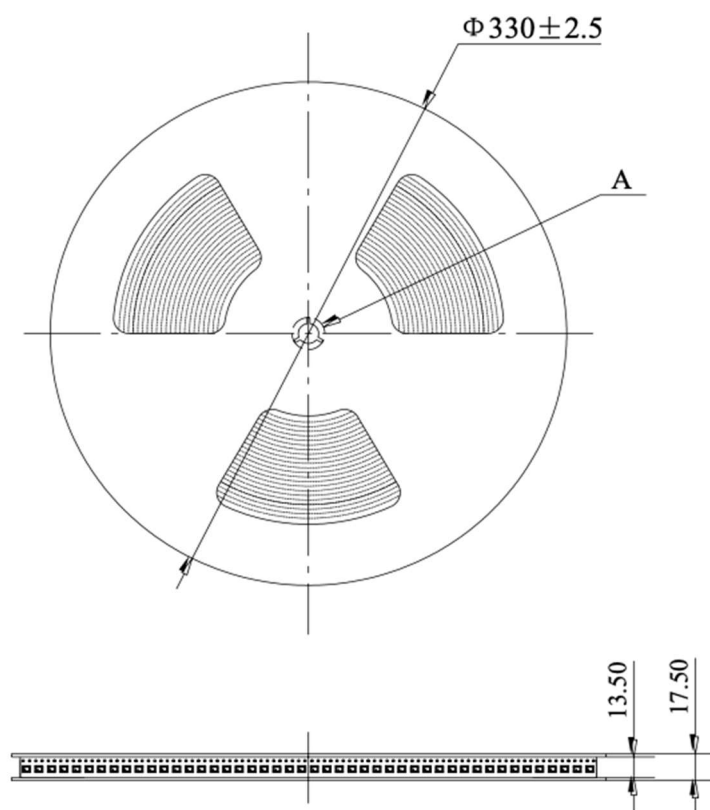
1. Dimensions are in millimeters unless otherwise specified.
2. Carrier camber is in compatible with EIA481.
3. Label applied to external package and reel. Per customer's requires.

Table 4: Ordering guide

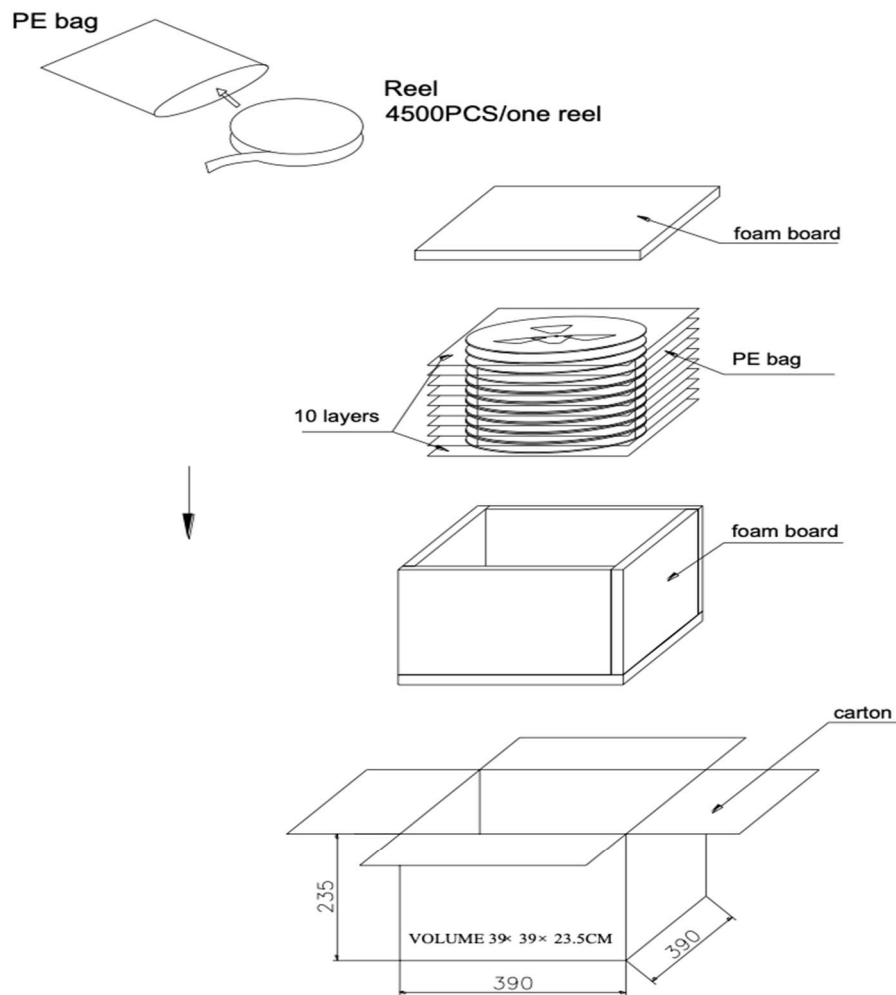
Part Number	Reel Diameter	Qty per Reel
SM0102B-RDSY55-M02	13"	4500

Table 5: Environmental Ratings

Parameters	Rating	Units
Storage Temperature	-40 to +105	°C
	-10 to +50 (in tape and reel)	°C
Operating Temperature	-40 to +85	°C



4,500 PCS PRODUCTS/1 reel



4,5000 PCS PRODUCTS/1 CARTON

LAND PATTERN AND SOLDER STENCIL PATTERN

The acoustic hole size should be larger than the MEMS microphone acoustic hole to avoid performance degradation. The customer's land pattern and solder stencil pattern are recommended in below figures.

Figure 6: Recommended land pattern

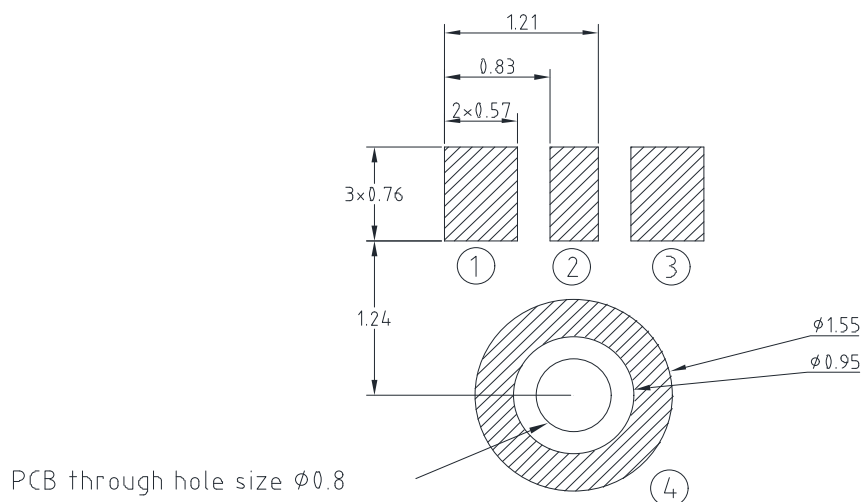
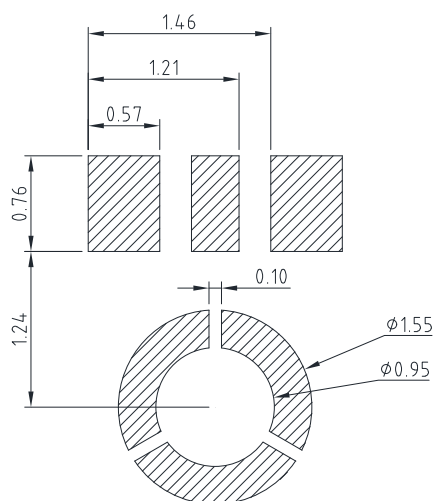
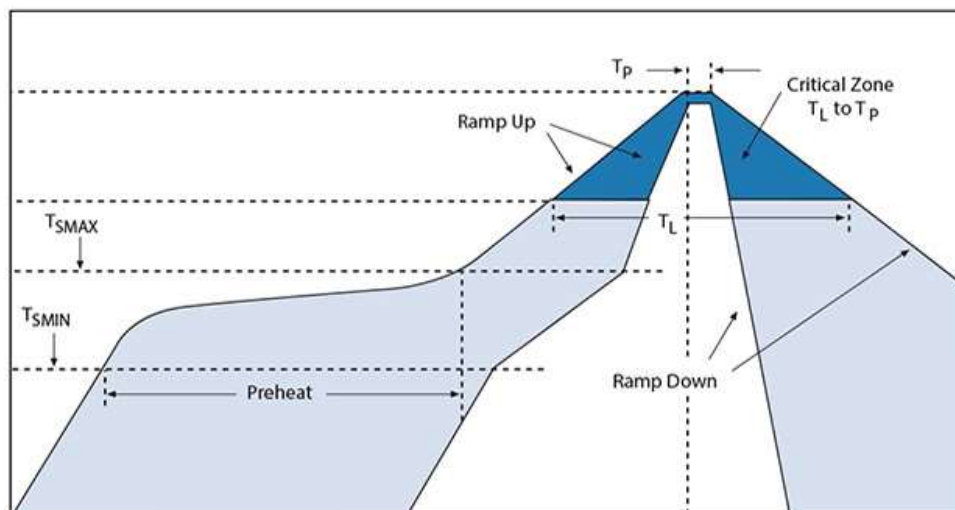


Figure 7: Recommended solder stencil pattern



Dimensions are in millimeters unless otherwise indicated.

RECOMMENDED REFLOW PROFILE



Profile Feature	Pb-Free Assembly
Average Ramp-up rate (T_{SMAX} to T_P)	3°C/second max.
Preheat - Temperature Min (T_{SMIN}) - Temperature Max (T_{SMAX}) - Time (T_{SMIN} to T_{SMAX}) (t_s)	150°C 200°C 60-180 seconds
Time maintained above - Temperature (T_L) - Time (T_L)	217°C 60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down rate (T_P to T_{SMAX})	6°C/second max
Time 25°C to Peak Temperature	8 minutes max

Notes:

1. Recommended maximum reflow cycles is no more than 3.
2. Moisture sensitivity level (MSL) of AAC MEMS microphone is Class 1.
3. Don't wash or clean the board after reflow process.
4. Do not expose microphone to ultrasonic processing, welding or cleaning.
5. Do not pull vacuum or high air pressure to microphone acoustic hole.
6. Do not insert any particles or objects in the acoustic hole.

REVISION HISTORY

Revision	Reviser	Detail of changes	Date of release
V1	Wang Tianjiao	Initial Release	2024/06/05