

APPROVAL SHEET

Model No. : CM03M-03S26-MD-3
 Only No. : _____
 Date : _____
 Description : Digital MEMS Microphone

APPROVER	CHECKER	DESIGN

Please kindly make approval of our samples, And return this form by fax or airmail,
Thanks for your kind attention and co-operation.

Customer Name : _____

Customer Model No. : _____

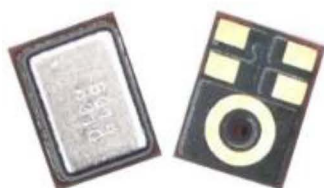
Customer Project No. : _____

CUSTOMER APPROVAL

Acoustic Specifications

Product Part Number: CM03M-03S26-MD-3

Product Picture



Revision Record

No.	Date	Description	Revision	Acoustics Engineer
0	7/7/22	Original Specification	0-2022	AL
1	6/18/24	Migrate to new MEMS format	1-2024	AL

Contents

1. Features	4
2. Application.....	4
3. Absolute Maximum Ratings.....	4
4. Electrical Characteristics	5
5. Microphone State Diagram	6
6. Application information	7
7. Clock Timing Diagram.....	8
8. Frequency Response Curve	9
9. Mechanical Specifications	10
10. Example Land Pattern.....	11
11. Example Solder Stencil Pattern	11
12. Reflow Profile.....	12
13. Typical Reliability Test Items.....	13
14. Addition Notes	13
15. Packing Information	14

1. Features

- PDM Output
- High SNR
- Ultra–Stable Performance
- Standard SMD Reflow
- Omnidirectional

2. Application

- Portable communication device
- Smart phones
- Notebook and desktop
- Smart speakers
- Digital still cameras
- Portable music recorders

3. Absolute Maximum Ratings

Parameter	Conditions	Min	Typ	Max	Unit
Supply voltage	VDD to GND	-0.3	-	5	V
	L/R,CLOCK,DATA Voltage to GND	-0.3	-	VDD+0.3v	V
ESD Tolerance	The Lid Mode	±8			KV
	The I/O Pin Mode	±2			KV
Operating Temperature		-40	-	+85	°C
Storage Temperature	Solder on PCB	-40	-	+105	°C
	In Tape and Reel	-10	-	+50	°C

Stresses exceeding these “Absolute Maximum Ratings” could cause permanent damage to the microphone. These are stress rating only. Functional operation at these or any other conditions beyond those indicated under “Electrical Characteristics” is not implied. Exposure beyond those indicated under “Electrical Characteristics” for extended periods may affect microphone reliability.

4. Electrical Characteristics

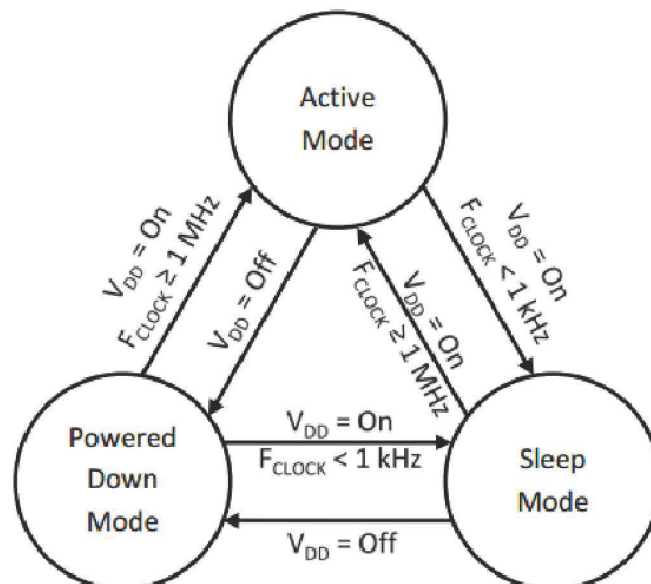
Test Condition: 23 ±2° C, 55±20% R.H., VDD=1.8V, Fclock=2.048MHz, Duty Cycle=50%, SELECT pin grounded, no load, unless otherwise indicated.

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Supply Voltage	VDD		1.6	-	3.6	V
Supply Current	IDD	Normal operation,	-	640	850	µA
	I _{sleep}	Sleep mode, fCLOCK off	-	-	5	µA
Sensitivity	Sense	94dB SPL @1KHz	-27	-26	-25	dBFS
Signal to Noise Ratio	SNR	94dB SPL @1KHz, A-weighted	-	64	-	dB(A)
Total Harmonic Distortion	THD	100dB SPL @1KHz, S=Typ	-	0.2	0.5	%
		115dB SPL @1KHz, S=Typ	-	0.5	1	
Acoustic Overload Point	AOP	10%THD@1KHz,S=Typ,	-	120	-	dB SPL
Power Supply Rejection	PSR	100mVpp square wave @217Hz, A-weighted	-	-85	-	dBFS
Output impedance	ZOUT	@1KHz	-	-	100	Ω
Directivity			Omnidirectional			
Data Format			1/2 Cycle 1 bit PDM			
Logic Input High	V _{ih}		0.75x VDD	-	-	V
Logic Input Low	V _{il}		-	-	0.25x VDD	V
Logic Output High	V _{oh}		VDDx 0.9	-	-	V
Logic Output Low	V _{ol}		-	-	0.1x VDD	V

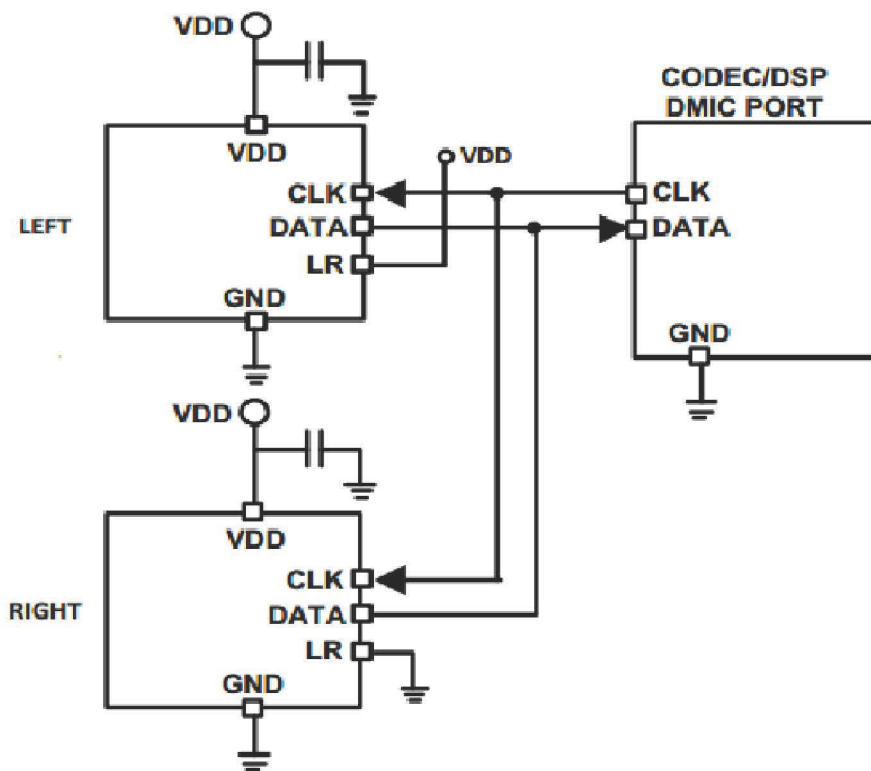
Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Output Load	CLOAD		-	-	100	PF
Short Circuit Output Current		94dB SPL @1KHz	1		10	mA
Clock Frequency	FCLOCK		1.024	2.048	3.072	MHz
Clock Duty Cycle			40	50	60	%
Clock Rise/Fall Time	TEDGE		-	-	10	ns

- 100% tested.
- IDD varies with CLOAD according to: $\Delta IDD = 0.5 * VDD * \Delta CLOAD * FCLOCK$.
- Maximum specifications are measured at maximum VDD. Typical specifications are measured at standard test Conditions.
- Valid microphones states are: Power Down Mode (mic off), Low Power Mode (mic clock speed), Sleep Mode (low current, DATA = high-Z, fast startup), and Normal Mode (normal operation).
- Time from FCLOCK < 1kHz to ISLEEP specification is met when transitioning from Normal Mode to Sleep Mode.
- Time from FCLOCK \geq 1 MHz to all applicable specifications are met when transitioning from Sleep Mode to Normal Mode.

5. Microphone State Diagram



6. Application information



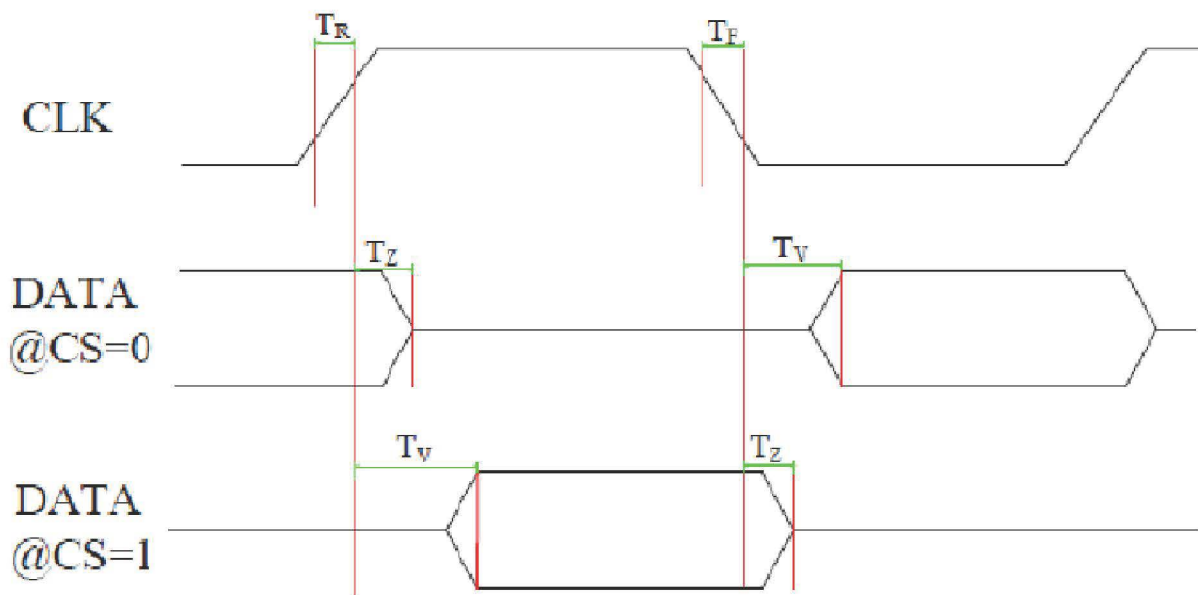
Microphone	SELECT	Asserts DATA On	Latch DATA On
Mic (High)	V _{DD}	Rising Clock Edge	Falling Clock Edge
Mic (Low)	GND	Falling Clock Edge	Rising Clock Edge

Note:

All GND pins must be connected to ground.

Capacitors near the microphone should not contain Class 2 dielectrics.

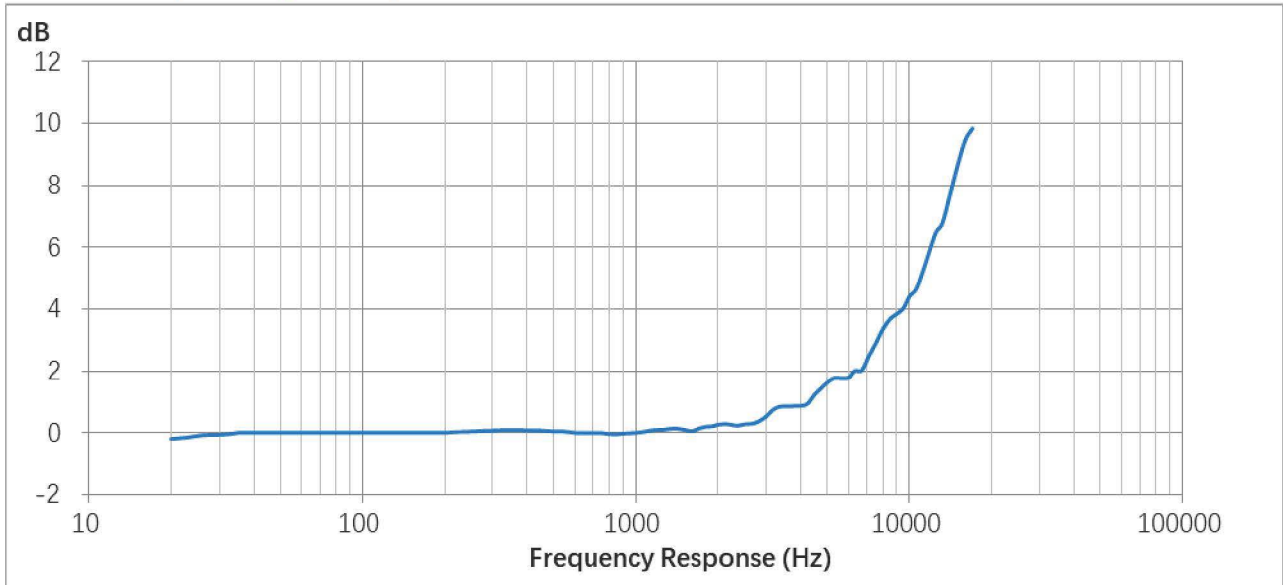
7. Clock Timing Diagram



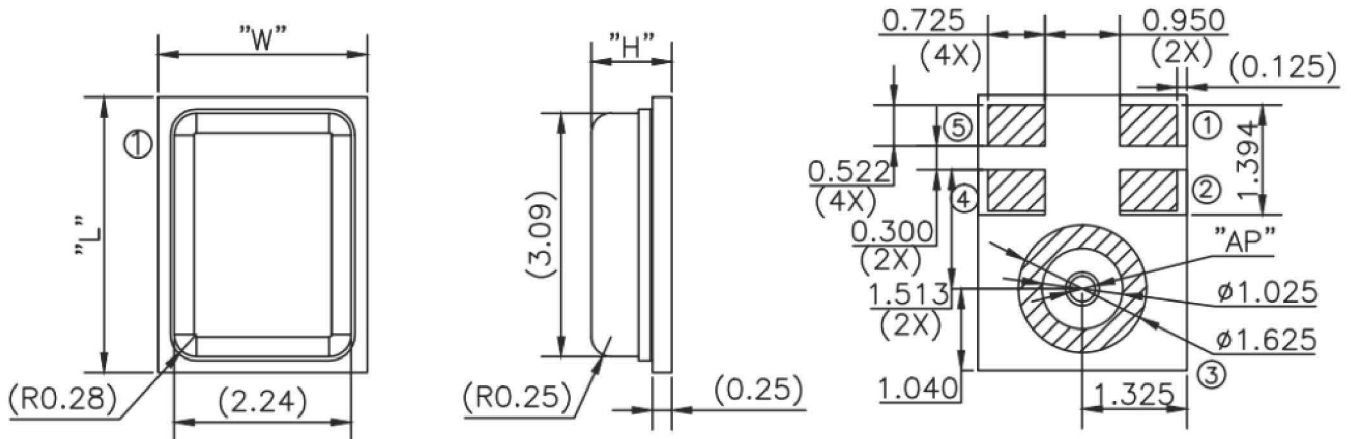
Timing Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Comments
Clock Rising Time	TR			10	ns	RL=1MΩ, CL=12pF
Clock Falling Time	TF			10	ns	RL=1MΩ, CL=12pF
DATA into Hi Z Time	TZ	0		15	ns	RL=1MΩ, CL=12pF
DATA Valid Time	TV	18		40	ns	RL=1MΩ, CL=12pF
Clock Jitter				0.5	ns	Period jitter in RMS
Clock Duty Cycle		40	50	60	%	
Clock Frequency		1.024	2.048	3.072	MHZ	

8. Frequency Response Curve



9. Mechanical Specifications

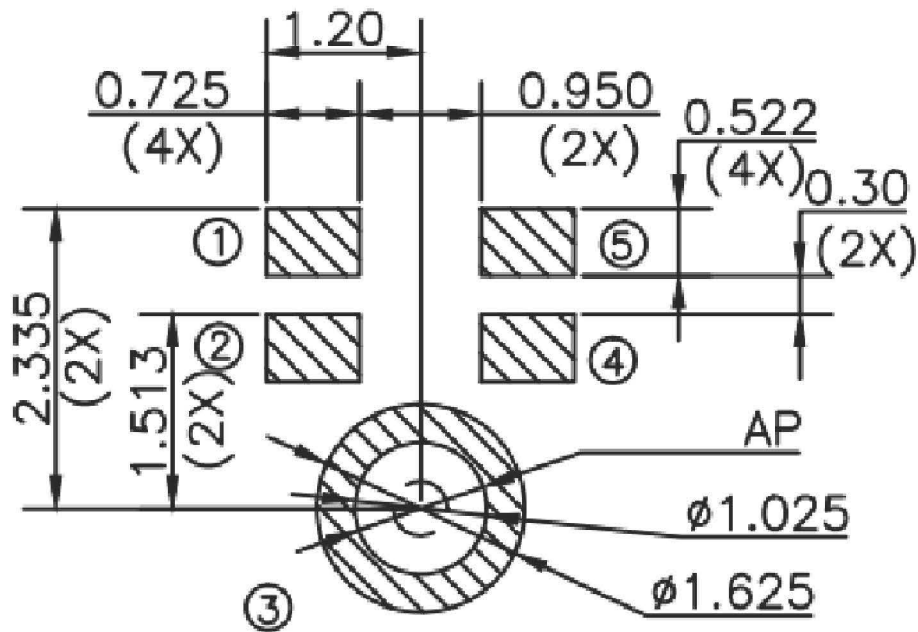


Item	Dimension	Tolerance
Length(L)	3.50	±0.10
Width(W)	2.65	±0.10
Height(H)	0.98	±0.10
Acoustic Port (AP)	Ø0.325	±0.05

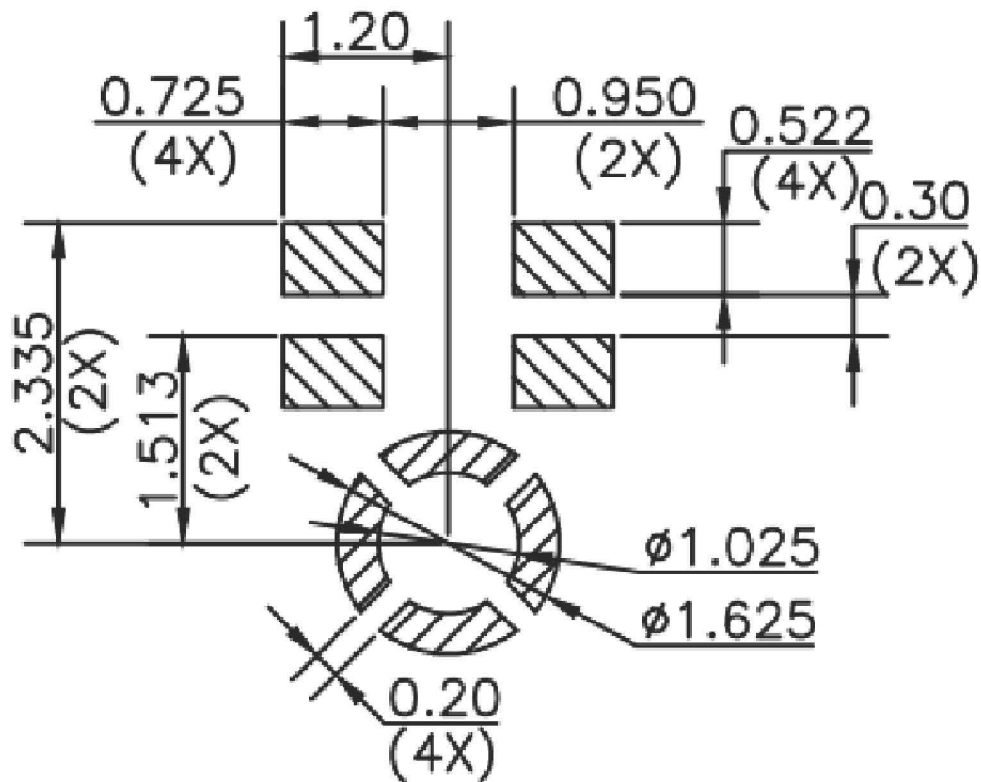
Pin#	Pin Name	Description
1	DATA	PDM Output
2	SELECT	Lo/Hi (L/R) Select This pin is internally pulled low but should not be left floating
3	GND	GND
4	CLOCK	Clock input
5	VDD	Power Supply

- Dimensions are in millimeters unless otherwise specified.
- Tolerance is ±0.10mm unless otherwise specified.
- Pick Area only extends to 0.25 mm of any edge or hole unless otherwise specified.
- Suggestion to use the same date code microphone in one array microphone module.

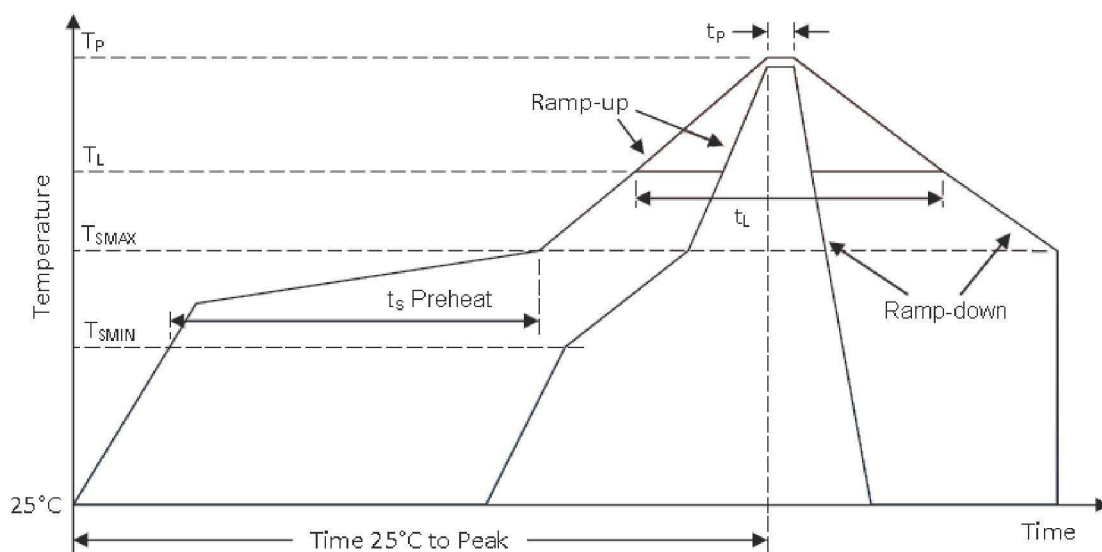
10. Example Land Pattern



11. Example Solder Stencil Pattern



12. Reflow Profile



Profile Feature		Lead(Pb) Free Solder
Preheat	Temperature min.(T_{SMIN})	150°C
	Temperature max.(T_{SMAX})	200°C
	Time (t_s)	60–180 Seconds
Liquidous	Temperature (T_L)	217°C
	Time (t_L)	60–150 Seconds
Peak	Temperature (T_P)	260°C
	Time within 5°C of actual peak temperature (t_p)	20–40 Seconds
Ramp up	Average ramp up rate T_{SMAX} to T_P	3°C / Second Max.
Ramp down	Average ramp down rate T_P to T_{SMAX}	6°C / Second Max.
Time 25°C to Peak temperature		8 Minutes Max.

Note:

All temperatures refer to topside of the package, measured on the package body surface.

13. Typical Reliability Test Items

Test	Description
Thermal Shock	100 cycles air-to-air thermal shock from -40° C to $+125^{\circ}$ C with 15 minute soaks.
High Temperature Storage	1000 hours at $+105^{\circ}$ C environment.
Low Temperature Storage	1000 hours at -40° C environment.
Temperature / Humidity	1000 hours at $+85^{\circ}$ C /85% R.H.
Vibration	4 cycles of 20 to 2,000 Hz sinusoidal sweep with 20g peak acceleration lasting 12 minutes in X, Y, and Z directions.
ESD-HBM	3 discharges of ± 2 kV direct contact to I/O pins.
ESD-LID/GND	3 discharges of ± 8 kV direct contact to lid while unit is grounded.
ESD-MM	3 discharges of ± 200 V direct contact to I/O pins.
Reflow	5 reflow cycles with peak temperature of $+260^{\circ}$ C.
Mechanical Shock	3 pulses of 10000g in the X, Y, and Z direction.

Note:

1. After reliability tests are performed, the sensitivity of the microphones shall not deviate more than 3 dB from its initial value

14. Addition Notes

(A) MSL (moisture sensitivity level) Class 1.

(B) Maximum of 3 reflow cycles is recommended.

(C) In order to minimize device damage:

Do not board wash or clean after the reflow process.

Do not brush board with or without solvents after the reflow process.

Do not directly expose to ultrasonic processing, welding, or cleaning.

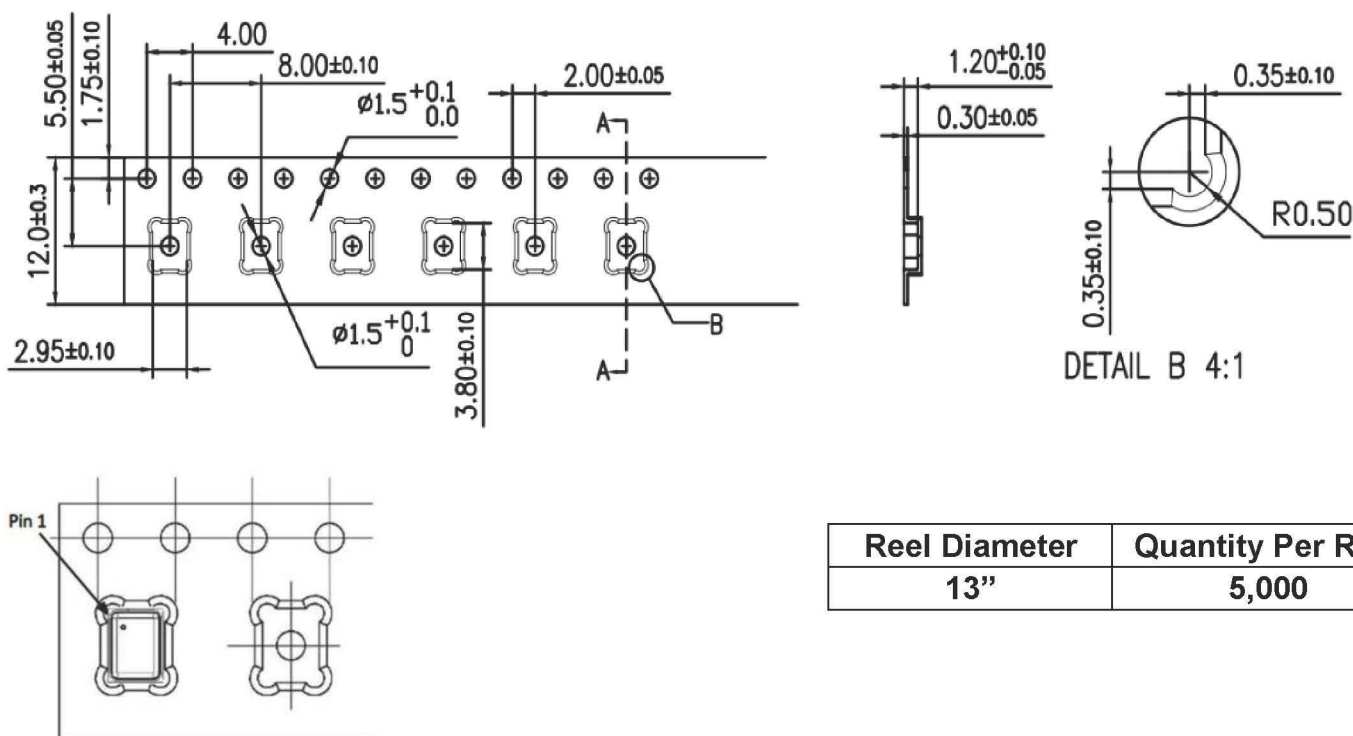
Do not insert any object in port hole of device at any time.

Do not apply over 30 psi of air pressure into the port hole.

Do not pull a vacuum over port hole of the microphone.

Do not apply a vacuum when repacking into sealed bags at a rate faster than 0.5 atm/sec.

15. Packing Information



Reel Diameter	Quantity Per Reel
13"	5,000

Notes:

- Dimensions are in millimeters unless otherwise specified.
- Vacuum pickup only in the pick area indicated in Mechanical Specifications.
- Tape & reel per EIA-481.
- Labels applied directly to reel and external package.