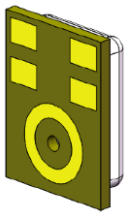
PUIaudio



Data Sheet DMM-3526-4-B

Features:

The DMM-3526-4-B digital MEMS microphone features a specialized pre-amplification ASIC that provides high sensitivity and high SNR output from a capacitive audio sensor. It's packaged for surface mounting and high temperature reflow assembly. The digital data format is single-bit PDM.

- -26dBFS sensitivity
- 65dB Signal-to-Noise
- Digital PDM output
- Small 2.65mm x 3.5mm surface-mount package

Specifications (f_{CLOCK} = 2.4MHz, V_{DD} = 1.8V, unless otherwise specified.)

Parameter	Test Condition	Value	Unit
Sensitivity	f_{IN} = 1 kHz 94dBSPL All operating modes	-27 (min) -26 (typ) -25 (max)	dBFS
Supply Voltage		1.8 (typ)	V_{DD}
Supply Voltage Range		1.62 (min) 3.6 (max)	V_{DD}
Supply Current	V_{dd} = 1.8V f_{SAMPLE} = 3.072MHz	650 (typ) 950 (max)	µA
Signal-to-Noise Ratio	f_{IN} = 1kHz 94dBSPL A-weighted	65 (typ)	dB
Frequency Range	See Frequency Response Curve for response limits	100 – 10k	Hz
Total Harmonic Distortion	f_{IN} = 1 kHz 94dBSPL	0.5 (max)	%
Acoustic Overload Point (AOP)	f_{IN} = 1kHz 10% THD	120 (typ)	dB
Power Supply Rejection	100mV_{PP} 217 Hz square wave on V_{DD} A-weighted	-90 (typ)	dB
Phase Response	50Hz < f_{IN} < 2000Hz 94dBSPL	-5 (min) 5 (max)	°

Specifications (f_{CLOCK} = 768kHz, V_{DD} = 1.8V, unless otherwise specified.)

Parameter	Test Condition	Value	Unit
Sensitivity	94dBSPL f_{IN} = 1 kHz All operating modes	-27 (min) -26 (typ) -25 (max)	dBFS
Supply Voltage		1.8 (typ)	V_{DD}
Supply Voltage Range		1.62 (min) 3.6 (max)	V_{DD}
Supply Current	V_{dd} = 1.8V f_{SAMPLE} = 768kHz	300 (typ) 450 (max)	µA
Signal-to-Noise Ratio	f_{IN} = 1kHz, 94dBSPL, A-weighted	65 (typ)	dB
Frequency Range	See Frequency Response Curve for response limits	100 – 10k	Hz
Total Harmonic Distortion	f_{IN} = 1kHz, 94dBSPL	0.5 (max)	%
Acoustic Overload Point (AOP)	(1kHz, 10% THD)	120 (typ)	dB
Power Supply Rejection	100mV_{PP} 217 Hz square wave on V_{DD}, A-weighted	-90 (typ)	dB

Physical Properties

Parameter	Condition	Value	Unit
Directivity		Omnidirectional	
Weight		0.3 (max)	Grams
Operating Temperature		-40 (min) 85 (max)	°C
Storage Temperature		-40 (min) 100 (max)	°C
MSL (Moisture Sensitivity Level)*		Class 1	
Acceptable Soldering Methods		See page 3 for reflow soldering information	
Environmental Compliances		RoHS/REACH/ Halogen Free	

*MSL level dependent on product remaining in sealed packaging until use

Operating Ratings

Parameter	Test Condition	Value	Unit
Power Supply Voltage (V_{DD})		1.62 (min) 1.8 (typ) 3.6 (max)	V
Clock Frequency Range (f_{CLOCK})	Sleep Mode	50 (max)	kHz
	Lower Power Mode	150 (min) 768 (typ) 900 (max)	kHz
	Standard Mode	1 (min) 3.072 (typ) 4.8 (max)	MHz
Clock Duty Cycle		40 (min) 60 (max)	%
Input Logic High Level		0.65•V_{DD} (min) V_{DD}+0.3 (max)	V
Input Logic Low Level		-0.3 (min) 0.35•V_{DD} (max)	
Output Logic High Level		V_{DD}-0.45 (min)	V
Output Logic Low Level		0.45 (max)	
Output Logic Load Capacitance		200 (max)	pF
Short Circuit Current	Data Output Pin VDD = 1.8V	1 (min) 20 (max)	mA

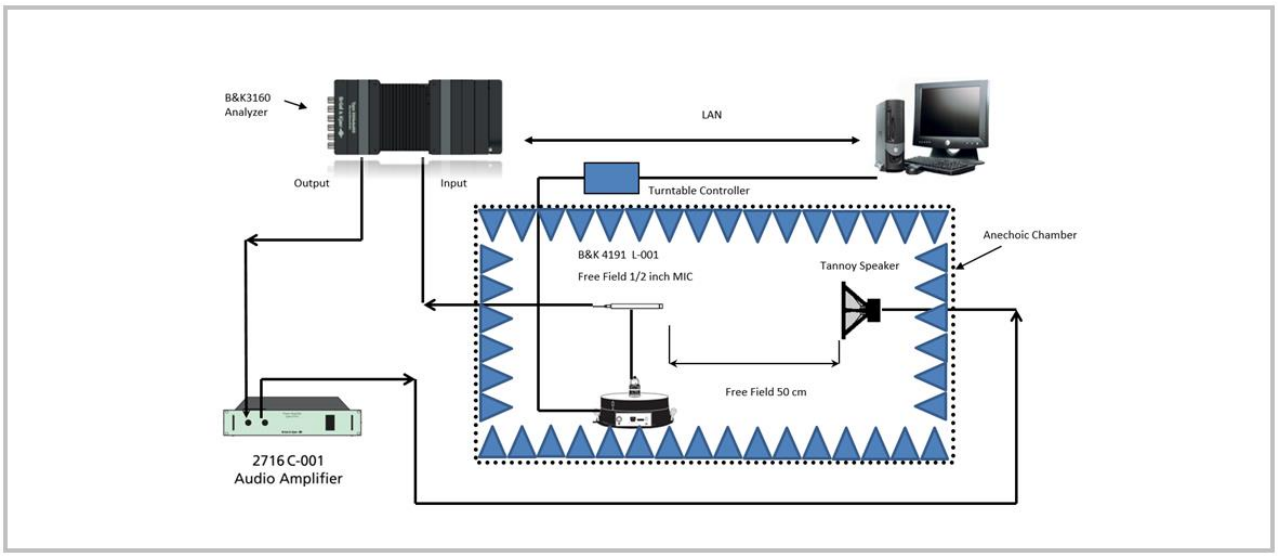
Timing Characteristics

Parameter	Test Condition	Value	Unit
Clock Timing Characteristics			
Clock Duty Cycle (DC_{CLOCK})		40 (min) 50 (typ) 60 (max)	%
Clock Rise Time (t_{CR})	10% to 90%	15 (max)	ns
Clock Fall Time (t_{CF})	90% to 10%	15 (max)	ns
Data Timing Characteristics			
Time Delay Between Clock Edge and Data Line Driven [DV_{DD} Mode] (t_{DD_DVDD})	DV_{DD} Digital Interface	24 (min)	ns
Time Delay to Valid Data [Normal Mode] (t_{DV_NM})	DV_{DD} Digital Interface: f_{CLOCK} = 768kHz, 2.0MHz, 3.072MHz, or 4.0MHz	48 (max)	ns
Time Delay to High Impedance [DV_{DD} Mode] (t_{HZ_DVDD})	DV_{DD} Digital Interface	0 (min) 20 (min)	ns
Sleep Time	f_{CLOCK} < 50kHz	5 (typ)	µs
Wake Time	f_{CLOCK} > 150kHz	30 (typ)	µs
Power Valid Time		35 (typ)	µs
Mode Change Time		10 (max)	µs
Data Valid Time		24 (min) 36 (typ) 48 (max)	ns
Clock Jitter	RMS period jitter	0.5 (max)	ns

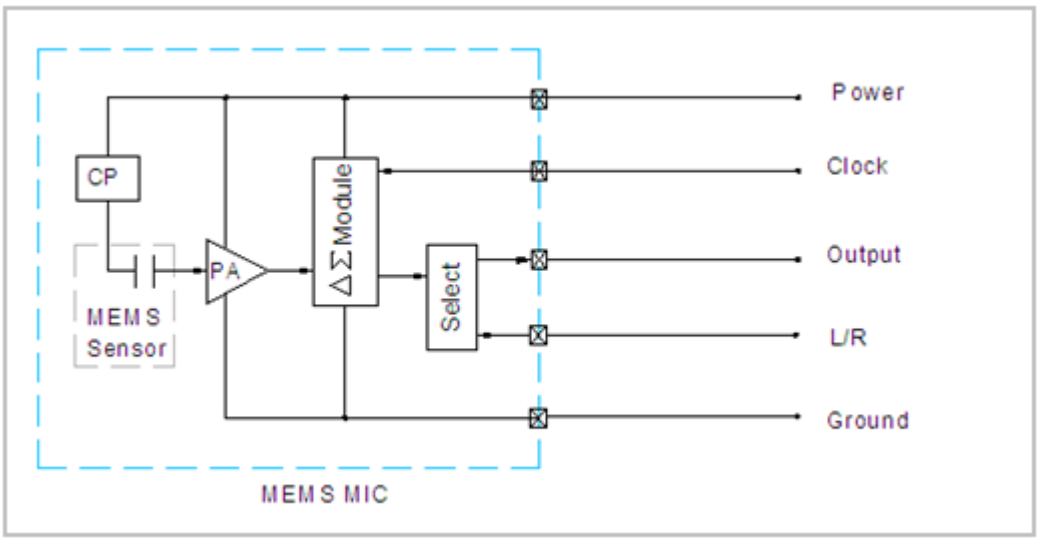
Absolute Maximum Ratings

Parameter	Condition	Value	Unit
Max Voltage on Any Pin		3.6	V_{DC}
Voltage on Any Pin		-0.3 (min) V_{DD} + 0.3 (max)	V_{DC}
Max Sound Pressure Level		160	dB
Max Mechanical Shock		10000	G
Max Vibration		Pre-MIL-STD-883 Method 2007, Test Condition B	

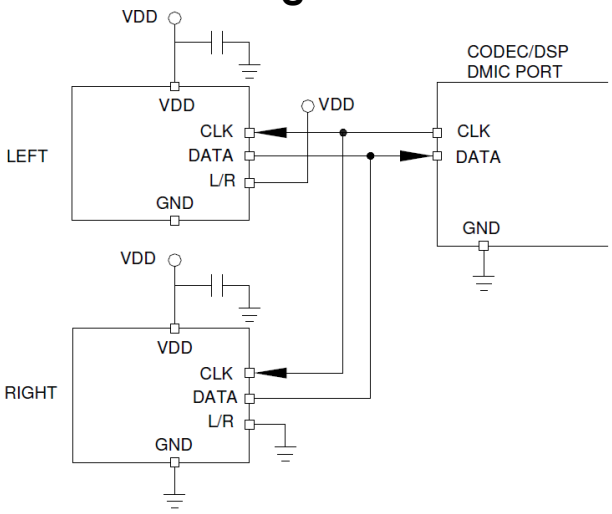
Measurement Method



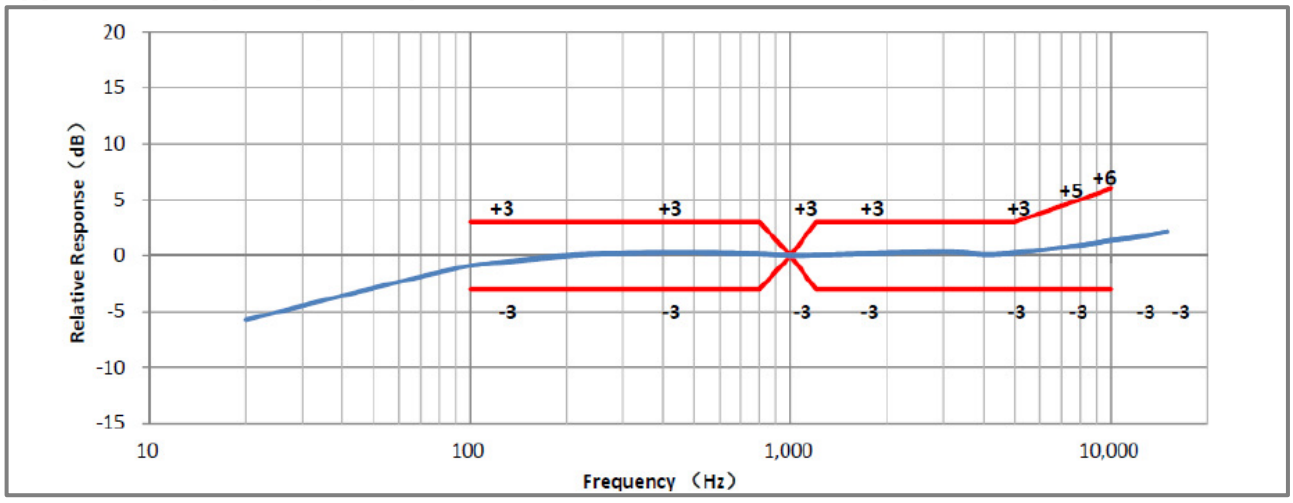
Measurement Circuit



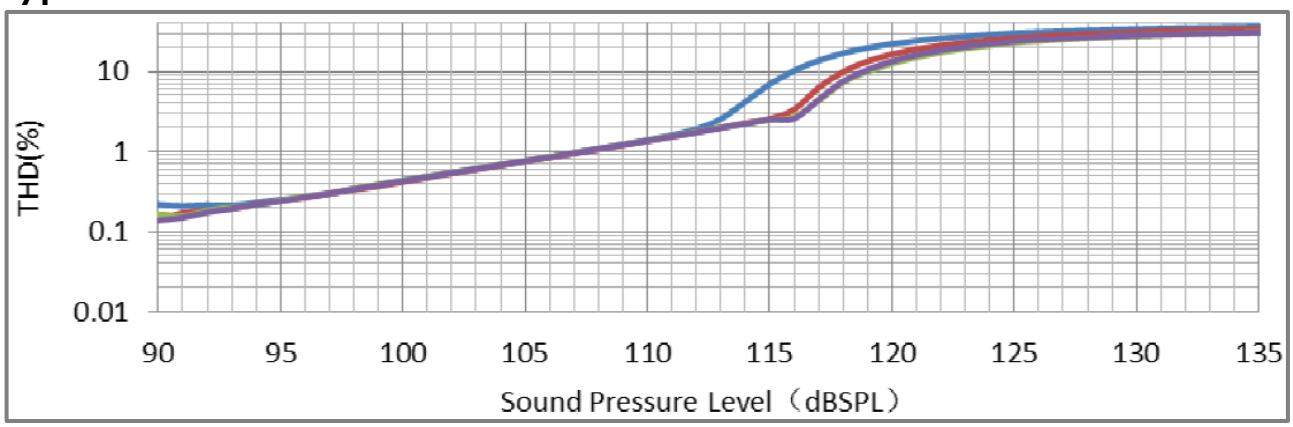
Connection Diagram



Typical Frequency Response (Normalized to 0dB at 1kHz)

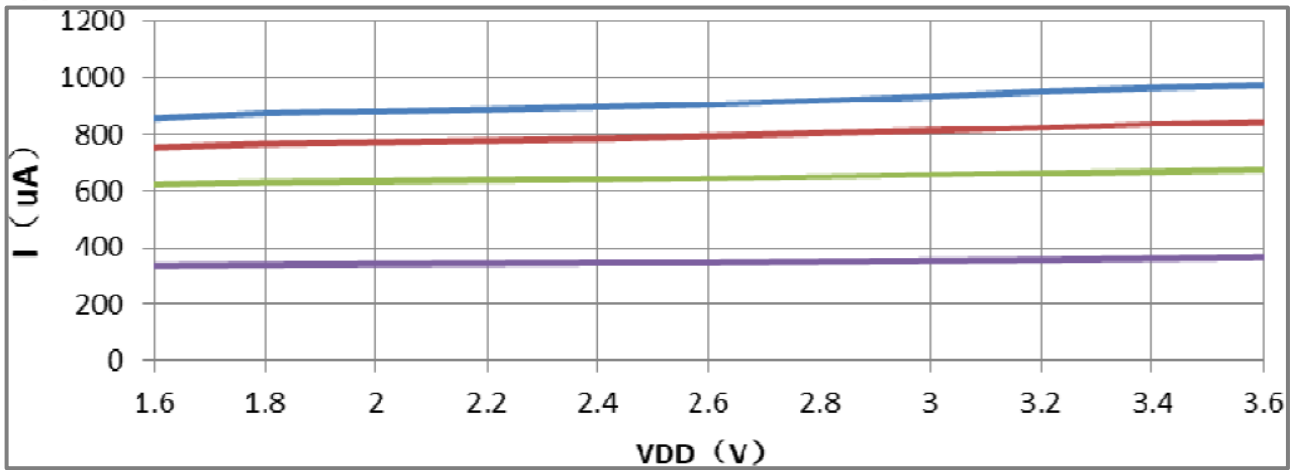


Typical THD vs. Sound Pressure Level



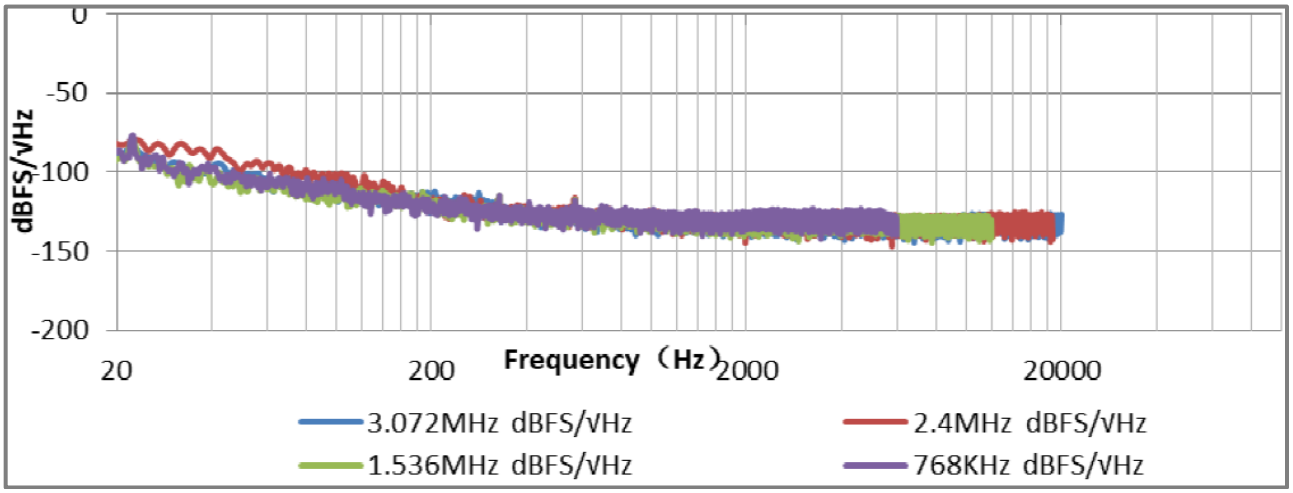
f_{CLOCK}: ____ **= 3.072MHz;** ____ **= 2.400MHz;** ____ **= 1.536MHz;** ____ **= 0.768MHz**

Typical I_{DD} vs. V_{DD}

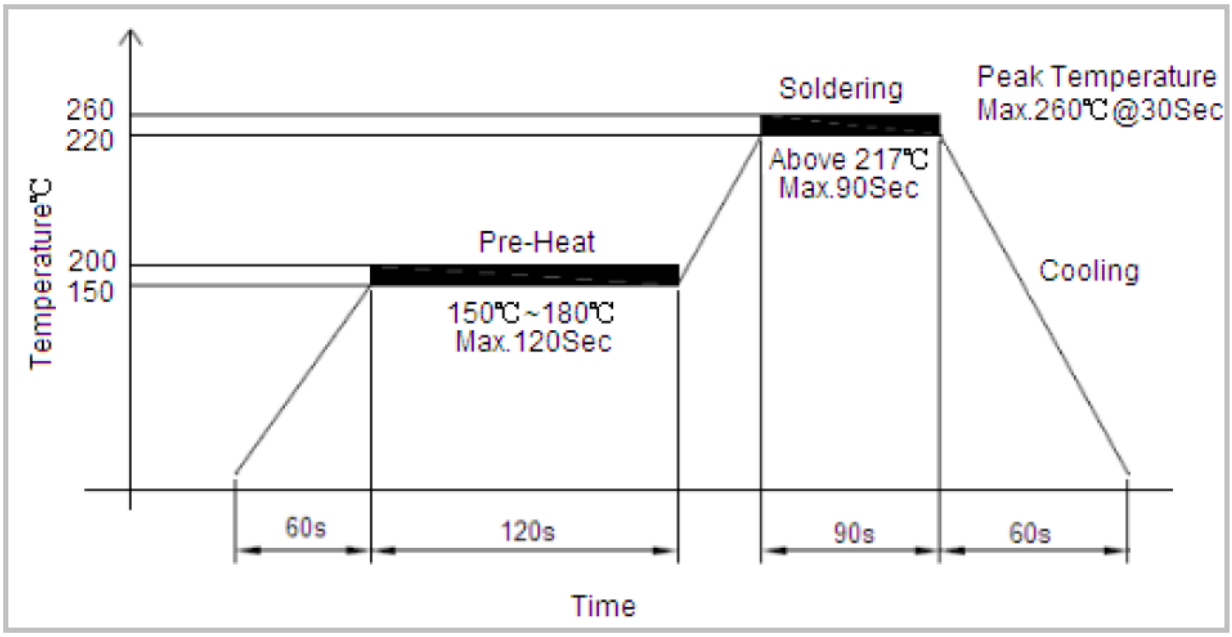


f_{CLOCK}: ____ **= 3.072MHz;** ____ **= 2.400MHz;** ____ **= 1.536MHz;** ____ **= 0.768MHz**

Typical Noise Floor vs. Frequency



Recommended Reflow Soldering Procedure (Recommended profile, temperature ≤ 260°C, 30s maximum at peak temperature)



Important notes to minimize device damage

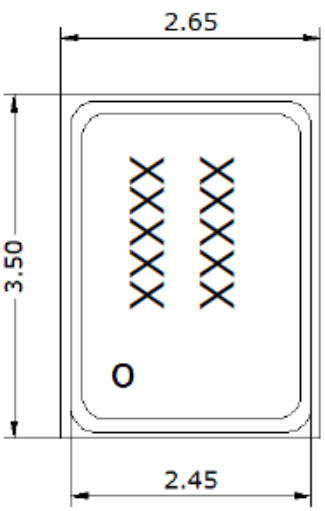
1. Do not handle the microphone with pick-and-place vacuum tools that could contact the microphone acoustic port hole.
2. Never expose the microphone's acoustic port hole to vacuum. Such exposure can damage or destroy the MEMS element.
3. Never allow air to blow air into the microphone acoustic port hole. The port hole must be sealed to prevent particle contamination if a blown air-cleaning process is used,
4. A clean room environment is recommended for PCB assembly to avoid microphone contamination.
5. Do not use blown air or ultrasonic cleaning procedures on MEMS Microphones. A no-clean paste is recommended for the assembly, avoiding subsequent cleaning steps. cleaning substances can severely damage the microphone MEMS element.
6. it is recommended to cover the sound port with protective tape during PCB sawing or system assembly. This prevents blocking or partially blocking the acoustic port hole during PCB assembly.
7. Do not use excessive force to place the microphone on the PCB. Use industry standard pick and place tools to limit the mechanical force exerted on the package.

Reliability Testing (Samples under test are acclimated at T_A = 23±2°C, R.H. = 55±10% for two hours. After each test completes and corresponding recovery time (if applicable) elapses, any measured sensitivity change is ≤ ±3dB, unless otherwise specified)

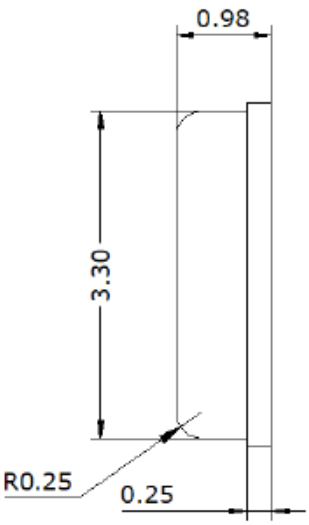
Type of Test	Test Specifications
High Temperature Storage Test	1000hrs at 105±3°C, two-hour recovery
High Temperature Operational Test	1000hrs at 105±3°C, V_{DD} = V_{DD} (max), four-hour recovery
Low Temperature Storage Test	1000hrs at -40±3°C, two-hour recovery
Low Temperature Operational Test	1000hrs at -40±3°C, V_{DD} = V_{DD} (max), four-hour recovery
Temperature-Cycle Testing	30min at -40±3°C Followed by 30min at 125±3°C Five-minute transition 30 cycles
High Humidity, High Temperature Operating Test	1000hrs at 85±3°C and 85%RH, V_{DD} = V_{DD} (max), twelve-hour recovery, no corrosion or defamation inside the microphone
High Humidity, High Temperature Operating Test	168hrs at 65±3°C and 95%RH, V_{DD} = V_{DD} (max), twelve-hour recovery, no corrosion or defamation inside the microphone
Static Humidity	One hour at 25°C precondition 1000hrs at 85±3°C and 85%RH Dry at room ambient temperature
Vibration Test	Twelve minutes along the x, y, and z axis f_{IN} = 20Hz to 2kHz 20G peak acceleration Two-hour recovery Less than 1dB sensitivity change
Shock Test	Half sine shock pulses 3000g±15% for 0.3ms 6 times in each of X/Y/Z directions
Drop Test	Height: 1.5m Fixture weight: 150±10g Fixture's sound hole diameter is ≥0.8mm Reference surface is marble floor Duration: four corners x four times; six faces x four times Less than 1dB sensitivity change

Simulated Reflow (without solder)	Samples are qualified with three 260±5°C reflow profile passes Two hours of settling is required between each reflow profile test
ESD Sensitivity	Measured according to MIL-STD-883G, Method 3015.7, Human Body Model (HBM) Identify ESD threshold levels indicating 3000V HBM passage.
Operational Life	Samples tested at 125°C for 168hrs at $V_{DD(MAX)}$

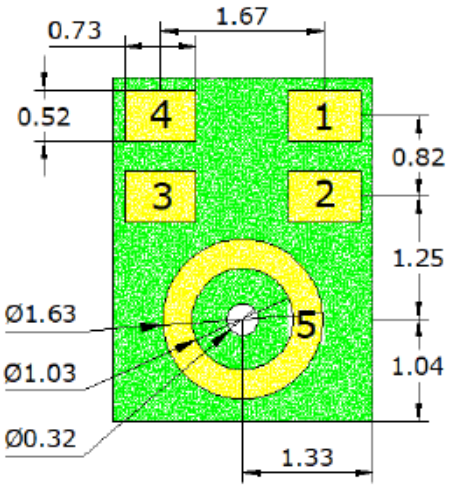
Dimensions (Dimension are in mm.)



Top view



Side view



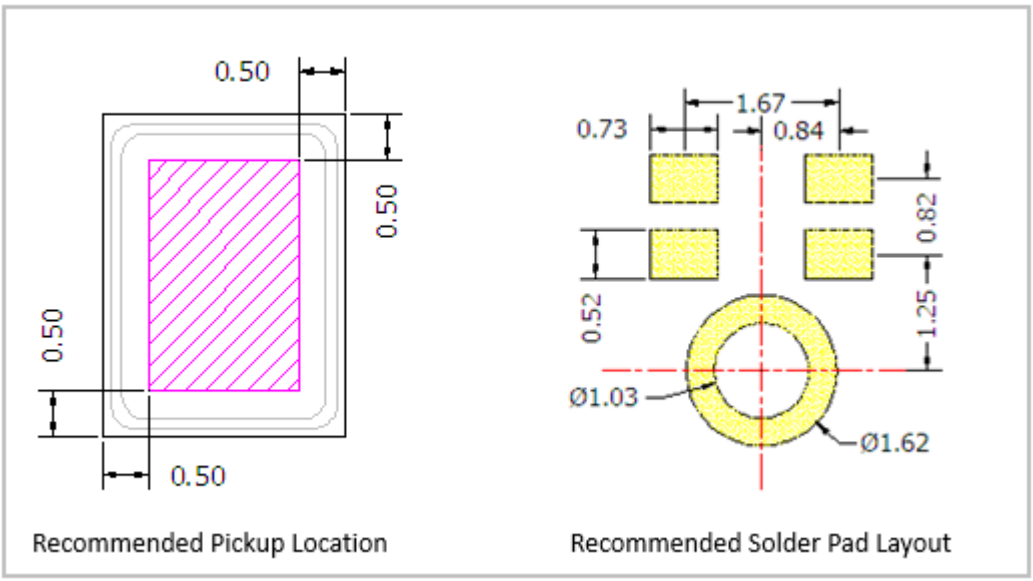
Bottom view

Laser Mark	Description
XXXXX XXXXX	Date Code

Item	Dimension	Tolerance(+/-)	Units
Length(L)	3.50	0.10	mm
Width(W)	2.65	0.10	mm
Height(H)	0.98	0.10	mm
Acoustic Port(AP)	Ø0.32	0.05	mm

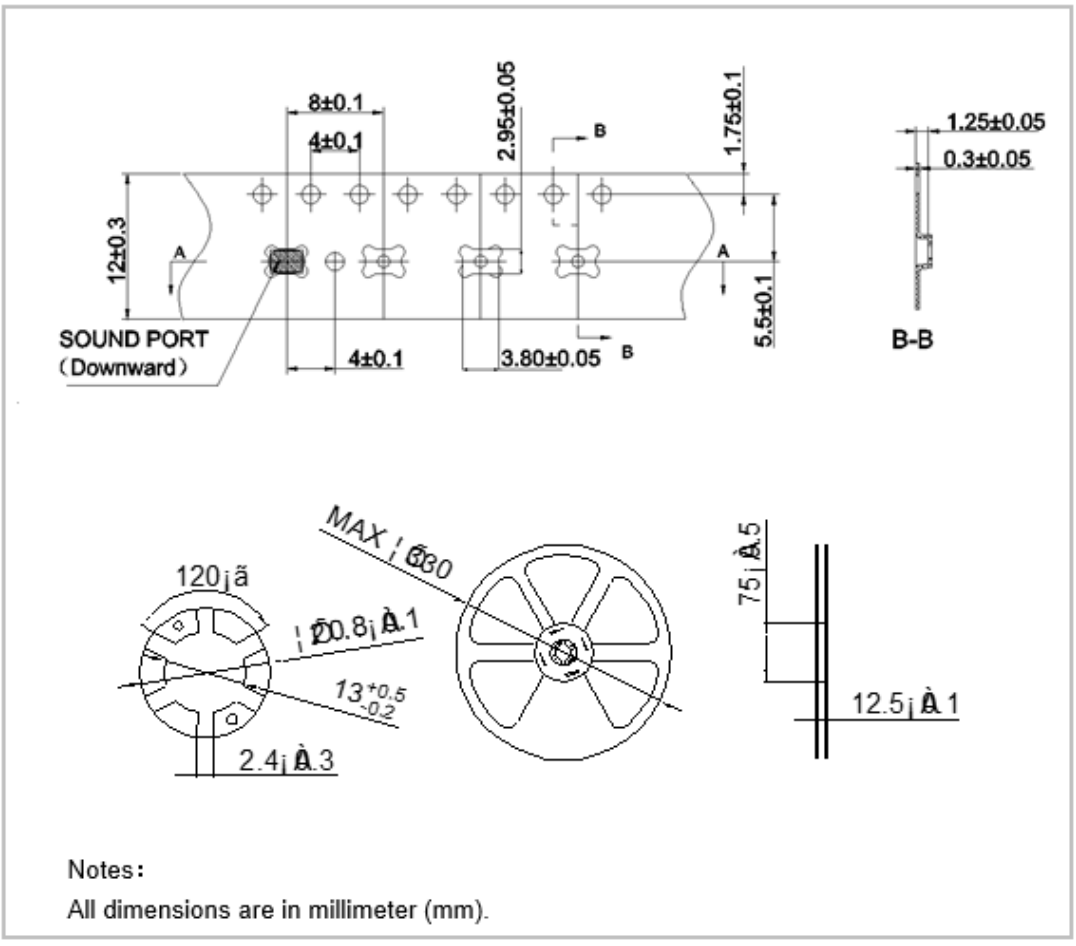
Pin #	Pin Name	Type	Description
1	Output	Signal	Output Signal
2	L/R	L/R Channel	Channel select
3	CLK	Clock	Clock input
4	V_{DD}	Power	Power Supply
5	GND	Ground	Ground

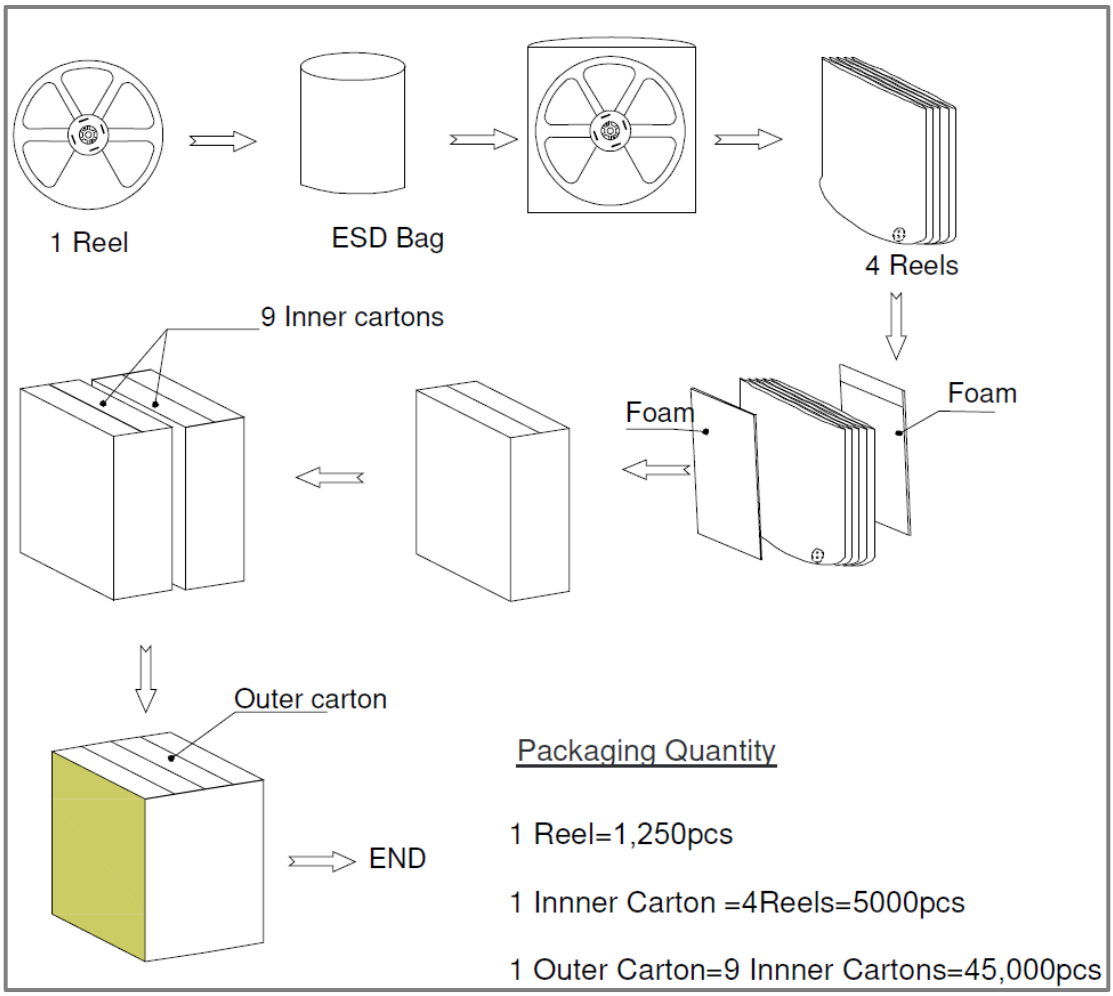
Suggested Land Pattern*



*This land pattern is advisory only and its use or adaptation is entirely voluntary. PUI Audio disclaims all liability of any kind associated with the use, application, or adaptation of this land pattern.

Packaging





Specifications Revisions

Revision	Description	Date
A	Released from Engineering	5/9/2023

Note:

1. Unless otherwise specified:
   A. All dimensions are in millimeters.
   B. Default tolerances are ±0.5mm and angles are ±3°.
2. Specifications subject to change or withdrawal without notice.
3. This part is ROHS 2015/863/EU compliant.