

Data Sheet

DMM-3537-B

Features:

The DMM-2735-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.

- -37dBFS sensitivity
- 67dB Signal-to-Noise
- Digital PDM output
- Small 2.65mm x 3.5mm surface-mount package

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

Parameter	Test Condition	Value	Unit
Sensitivity	94dB SPL $f_{IN} = 1\text{ kHz}$ All operating modes	-38 (min) -37 (typ) -36 (max)	dBFS
Supply Voltage		1.8 (typ)	V_{DD}
Supply Voltage Range		1.6 (min) 3.3 (max)	V_{DD}
Supply Current	$V_{DD} = 1.8\text{V}$ $f_{SAMPLE} = 3.072\text{MHz}$	1050 (typ) 1150 (max)	μA
Signal-to-Noise Ratio	$f_{IN} = 1\text{ kHz}$ 94dB SPL A-weighted	67 (typ)	dB
Frequency Range	See Frequency Response Curve for response limits	20 – 20k (typ)	Hz
Total Harmonic Distortion	$f_{IN} = 1\text{ kHz}$ 94dB SPL	0.5 (max)	%
Acoustic Overload Point (AOP)	$f_{IN} = 1\text{ kHz}$ 10% THD	130 (typ)	dB
Power Supply Rejection	100mV _{PP} 217 Hz square wave on V_{DD} A-weighted	-90 (typ)	dB
Phase Response	94dB SPL 50Hz < f_{IN} < 2000Hz	-5 (min) 5 (max)	°

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

Parameter	Test Condition	Value	Unit
Sensitivity	94dB SPL f _{IN} = 1 kHz All operating modes	-22 (min) -21 (typ) -20 (max)	dBFS
Supply Voltage		1.8 (typ)	V _{DD}
Supply Voltage Range		1.6 (min) 3.3 (max)	V _{DD}
Supply Current	V _{DD} = 1.8V f _{SAMPLE} = 768kHz	310 (typ) 410 (max)	μA
Signal-to-Noise Ratio	f _{IN} = 1kHz, 94dB SPL A-weighted	67 (typ)	dB
Frequency Range	See Frequency Response Curve for response limits	20 – 20k(typ)	Hz
Total Harmonic Distortion	f _{IN} = 1kHz 94dB SPL	1.0 (max)	%
Acoustic Overload Point (AOP)	f _{IN} = 1kHz 10% THD	117 (typ)	dB
Power Supply Rejection	100mV _{PP} 217 Hz square wave on V _{DD} , A-weighted	-75 (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/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})		1.6 (min) 1.8 (typ) 3.3 (max)	V
Clock Frequency Range (f_{clock})	Sleep Mode	320 (max)	kHz
	Lower Power Mode	450 (min) 768 (typ) 850 (max)	kHz
	Standard Mode	1.2 (min) 3.072 (typ) 3.3 (max)	MHz
Clock Duty Cycle		45 (min) 55 (max)	%
Input Logic High Level		$0.65 \cdot V_{DD}$ (min) $V_{DD} + 0.3$ (max)	V
Input Logic Low Level		-0.3 (min) $0.28 \cdot V_{DD}$ (max)	
Output Logic High Level		$0.7 \cdot V_{DD}$ (min)	V
Output Logic Low Level		$0.3 \cdot V_{DD}$ (max)	
Output Logic Load Capacitance		200 (max)	pF
Data Valid Time		20 (max)	ms
Time After Stable Clock to Achieve Specified Sensitivity	Sensitivity, ± 0.2 dB	20 (min)	ms

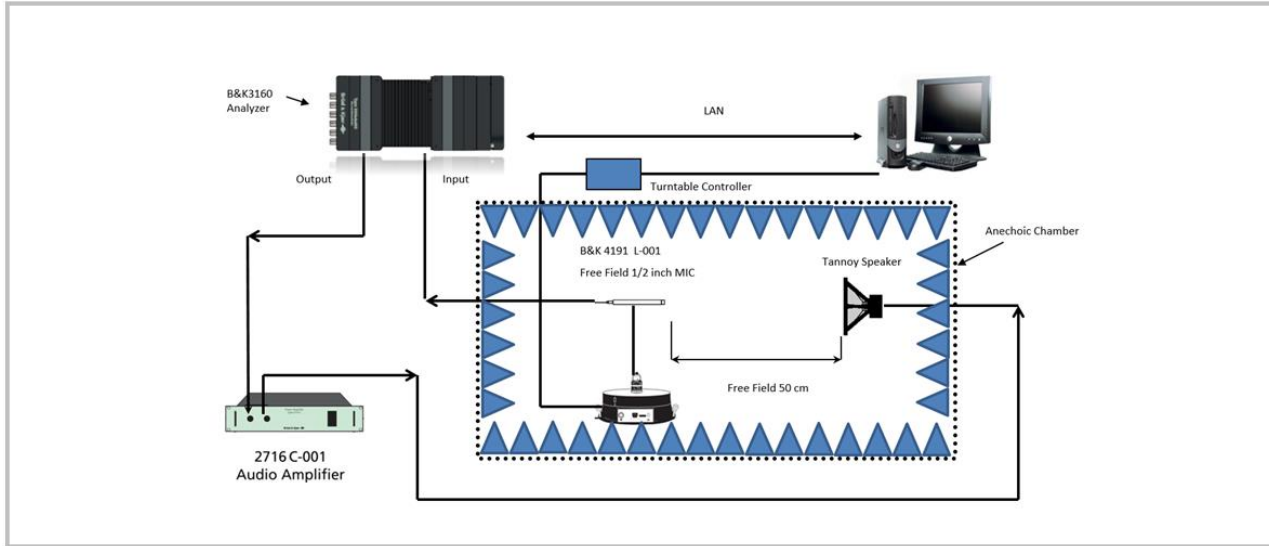
Timing Characteristics

Parameter	Test Condition	Value	Unit
Clock Timing Characteristics			
Clock Duty Cycle (DC_{CLOCK})		45 (min) 55 (max)	%
Clock Rise Time (t_{CR})	10% to 90%	13 (max)	ns
Clock Fall Time (t_{CF})	90% to 10%	13 (max)	ns
Data Timing Characteristics			
Time Delay Between Clock Edge and Data Line Driven [DV _{DD} Mode] (t_{DD_DVDD})	DV _{DD} Digital Interface	28 (min)	ns
Time Delay Between Clock Edge and Data Line Driven [Internal 1.2V Mode] (t_{DD_1V2IO})	Internal 1.2V Digital Interface	24 (min)	ns
Time Delay to Valid Data [Normal Mode] (t_{DV_NM})	DV _{DD} Digital Interface: $f_{CLOCK} = 768kHz, 2.0MHz, 3.072MHz, \text{ or } 4.0MHz$ Internal 1.2V Digital Interface: $f_{CLOCK} = 2.0MHz, 3.072MHz, \text{ or } 4.0MHz$	100 (max)	ns
Time Delay to Valid Data [Low Power or Internal 1.2V Mode] ($t_{DV_LPM_1V2IO}$)	Low Power Mode or Internal 1.2V Mode Digital Interface: $f_{CLOCK} = 768kHz$	185 (max)	ns
Time Delay to Valid Data [Ultrasonic Mode] (t_{DV_UM})	Ultrasonic Mode: $f_{CLOCK} = 4.8MHz$	80 (max)	ns
Time Delay to High Impedance [DV _{DD} Mode] (t_{HZ_DVDD})	DV _{DD} Digital Interface	14 (min) 26 (min)	ns
Time Delay to High Impedance [Internal 1.2V Mode] (t_{HZ_1V2IO})	Internal 1.2V Digital Interface	14 (min) 22 (min)	ns

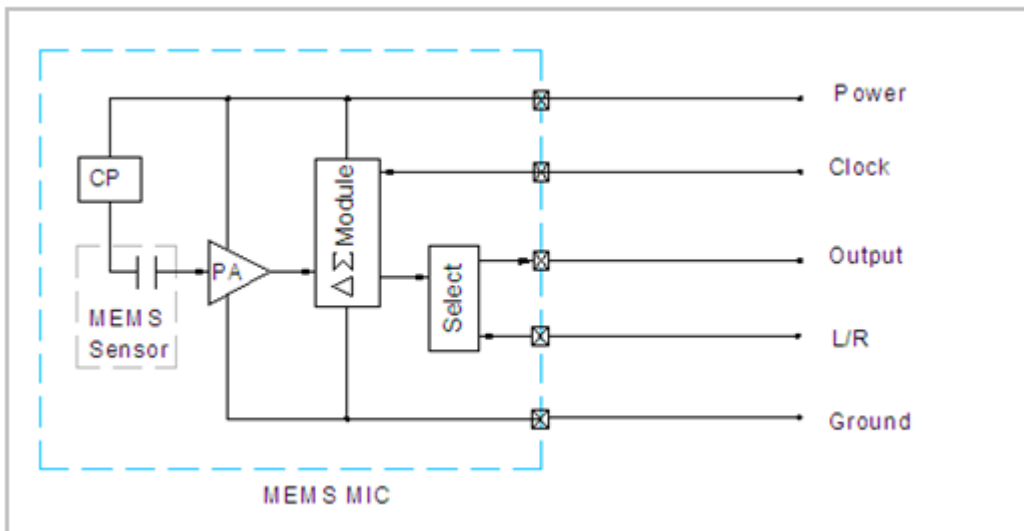
Absolute Maximum Ratings

Parameter	Condition	Value	Unit
Max Voltage on Any Pin		3.3	V _{DC}
Voltage on any Pin		-0.3 (min) V _{DD} + 0.3	V
Max Sound Pressure Level		160	dB
Max Mechanical Shock		10000	G
Max Vibration		Pre-MIL-STD-883 Method 2007, Test Condition B	

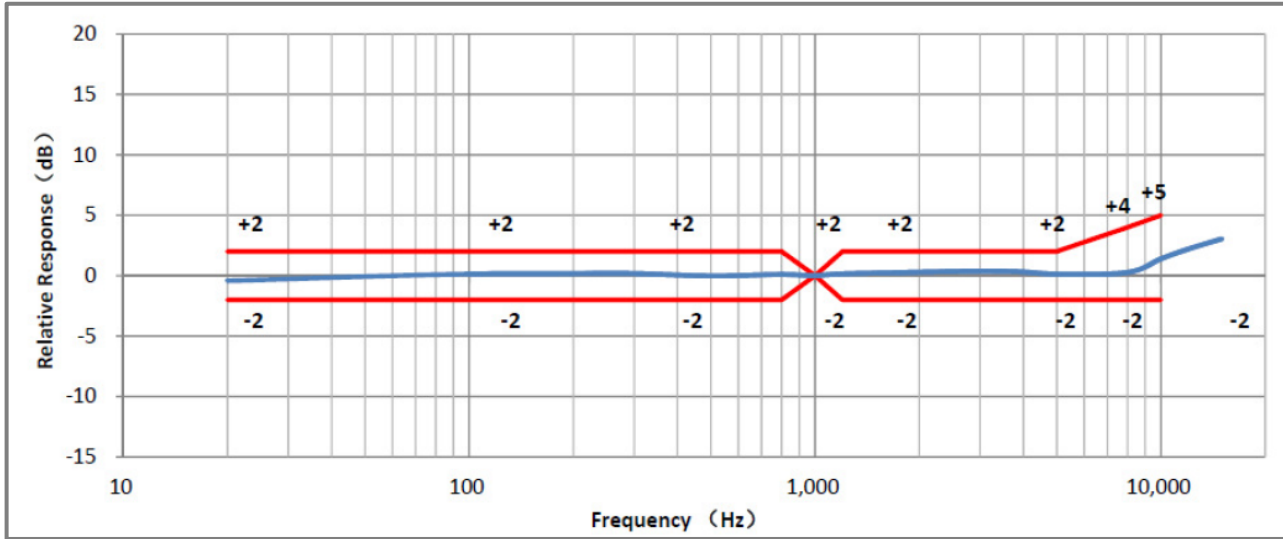
Measurement Method



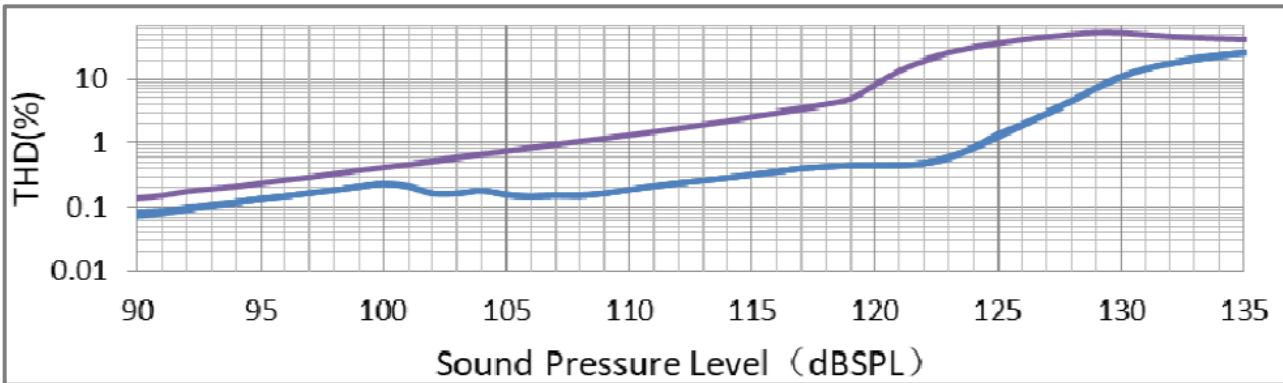
Measurement Circuit



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

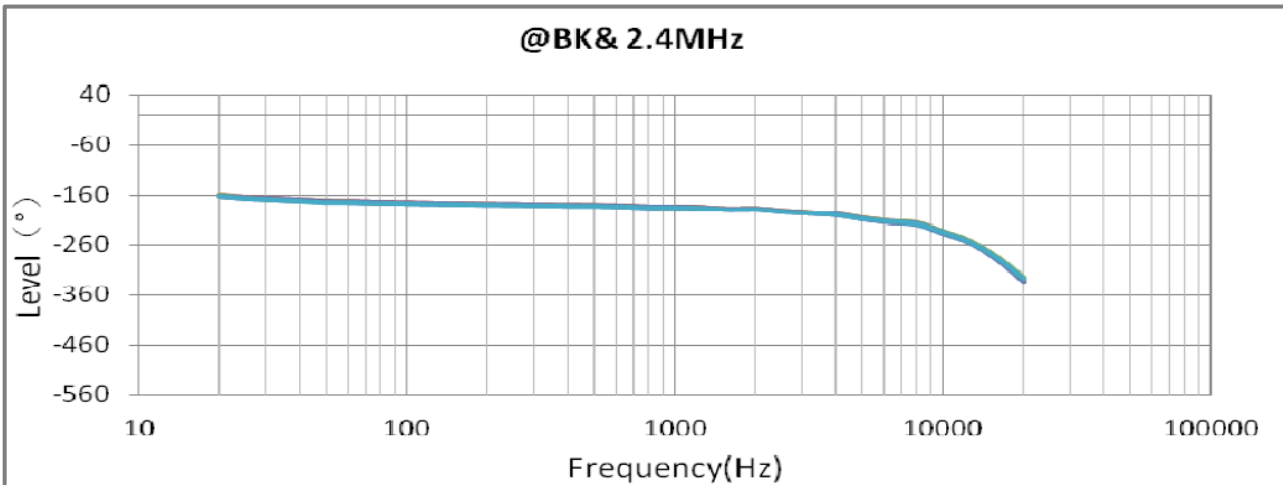


Typical THD Vs SPL

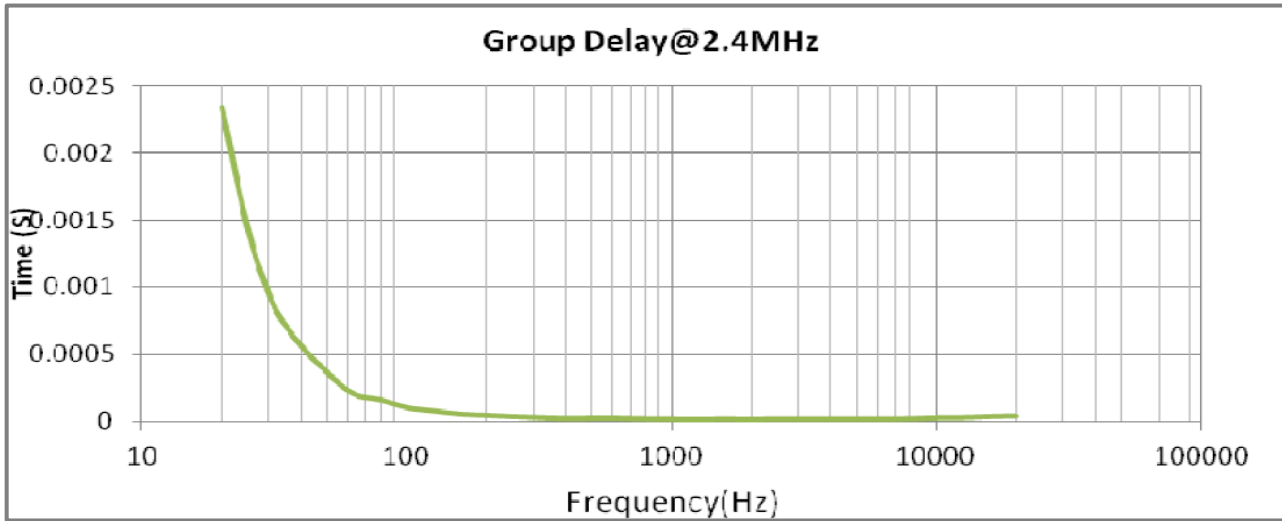


f_{clock}: ___ = 3.072MHz; ___ = 2.400MHz; ___ = 1.536MHz; ___ = 0.768MHz

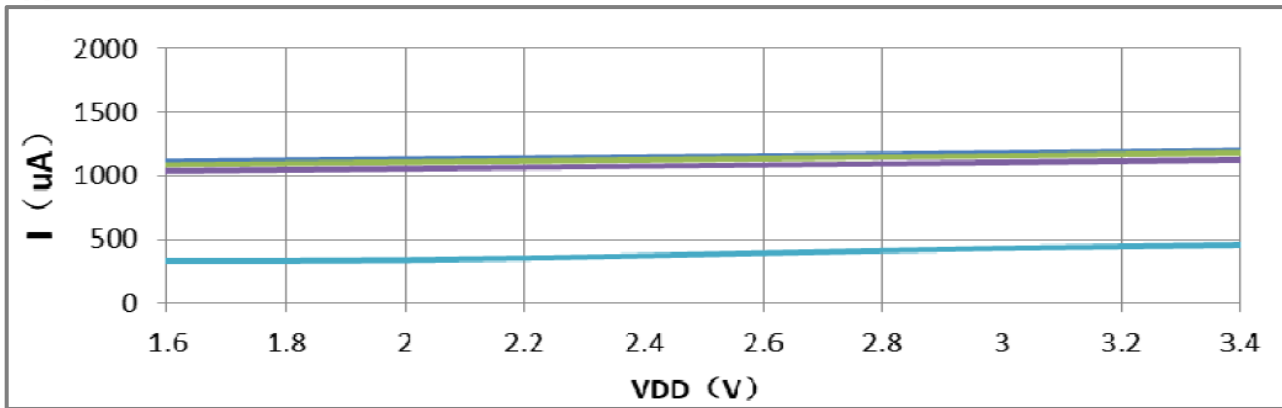
Typical Phase Response



Typical Group Delay

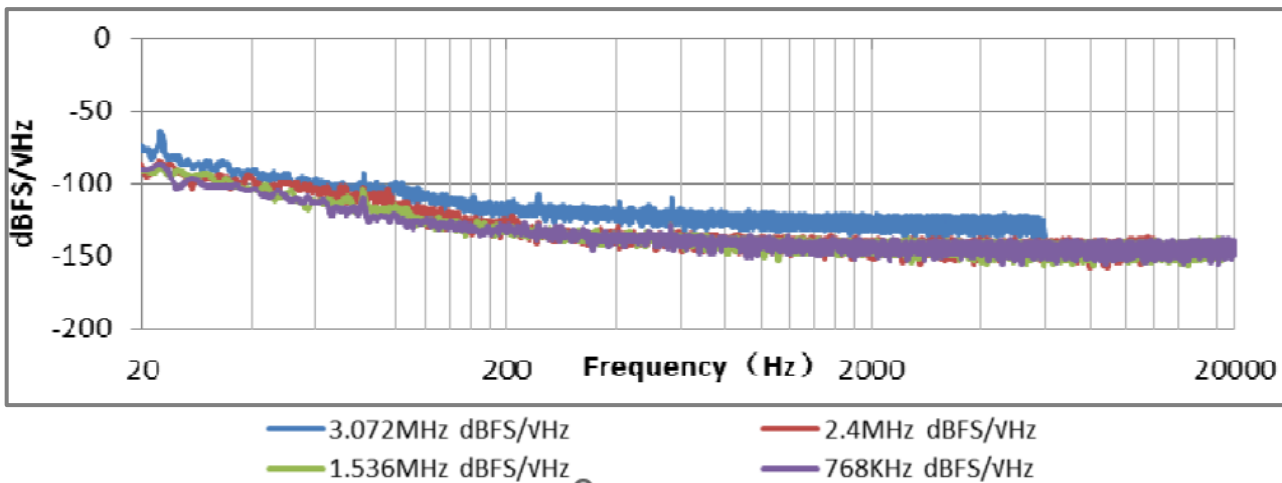


Typical I_{DD} vs. V_{DD}

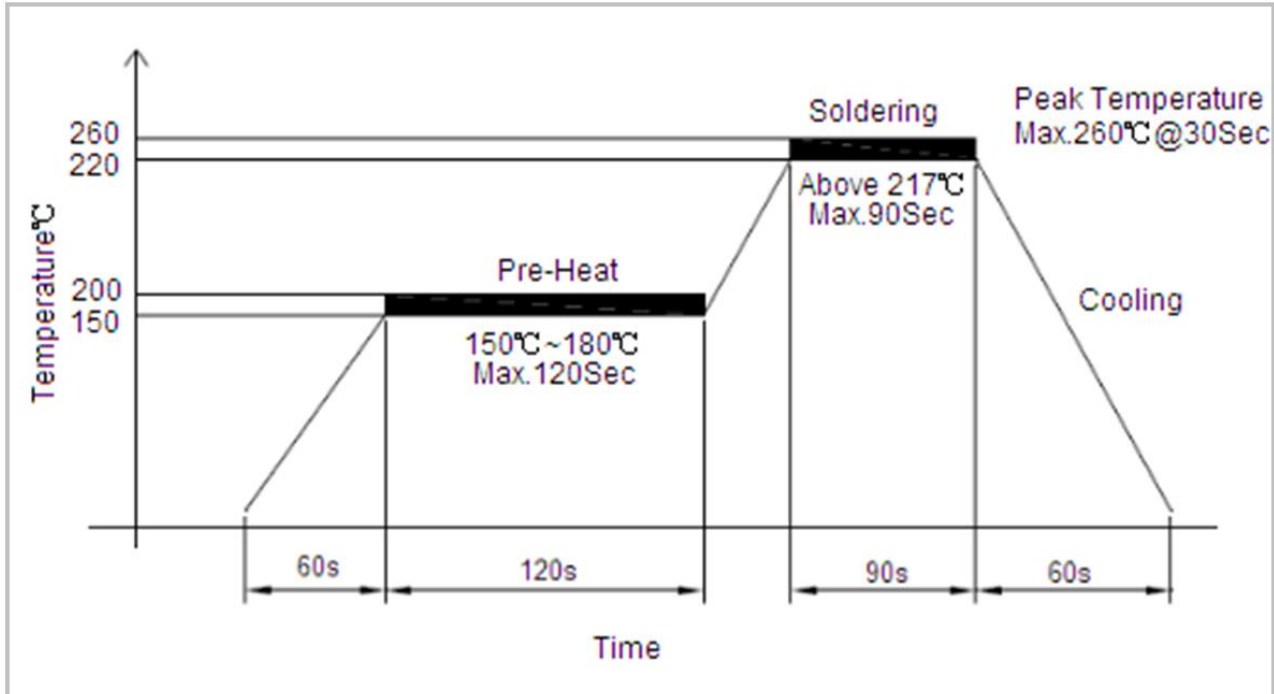


f_{clock}: — = 3.072MHz; — = 2.400MHz; — = 1.536MHz; — = 0.768MHz

Typical Noise Floor (Unweighted)



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



Important notes to minimize device damage

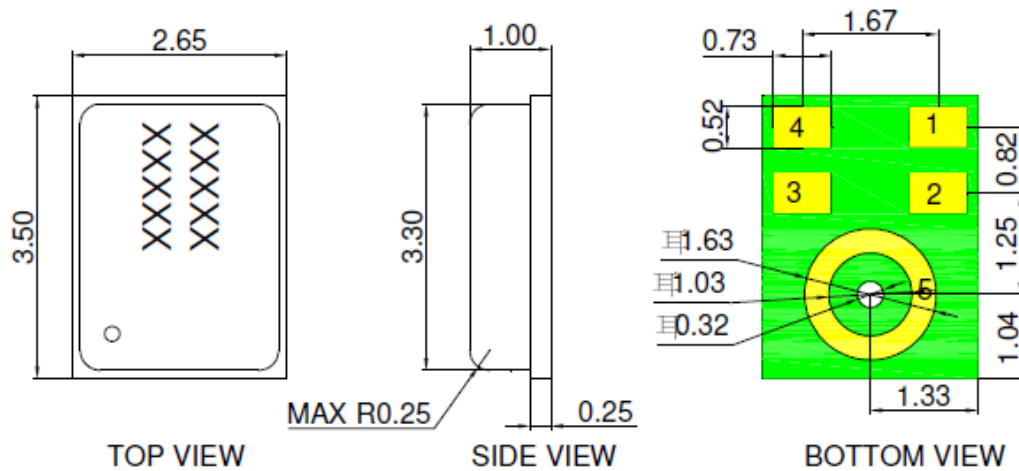
1. Do not handle the microphone with pick-and-place vacuum tools that could contact the microphone acoustic port hole.
2. Never expose the microphone's acoustic port hole to vacuum. Such exposure can damage or destroy the MEMS element.
3. Never allow air to blow air into the microphone acoustic port 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 $T_A = 23 \pm 2^\circ\text{C}$, R.H. = $55 \pm 10\%$ for two hours. After each test completes and corresponding recovery time (if applicable) elapses, any measured sensitivity change is $\leq \pm 3\text{dB}$, unless otherwise specified)

Type of Test	Test Specifications
High Temperature Storage Test	1000hrs at $105 \pm 3^\circ\text{C}$, 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
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 defatation 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 defatation inside the microphone
Temperature-Cycle Testing	Double-case method: 15min at -40±3°C Followed by 15min at 125±3°C 100 cycles, two-hour recovery
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	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
Drop Test	Describe distance, drop surface material, and number of test cycles/how many sides are tested.

Dimensions (Dimension are in mm.)



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)	1.00	0.10	mm
Acoustic Port(AP)	Ø0.32	0.05	mm

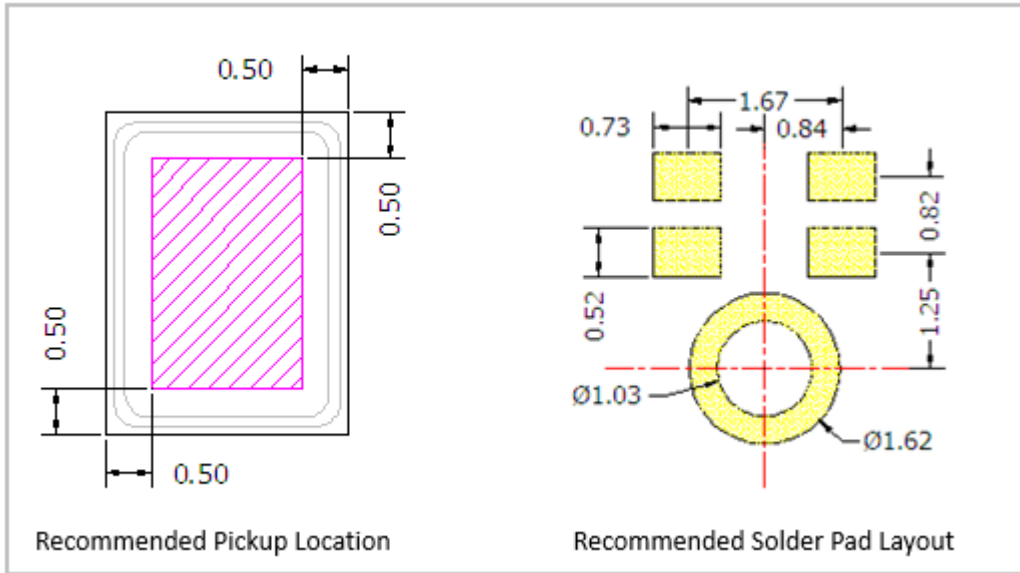
Pin #	Pin Name	Type	Description
1	Output	Signal	Output Signal
2	L/R	L/R Channel	Channel select
3	CLK	Clock	Clock input
4	V _{DD}	Power	Power Supply
5	GND	Ground	Ground

Notes:

All dimensions are in millimeter (mm).

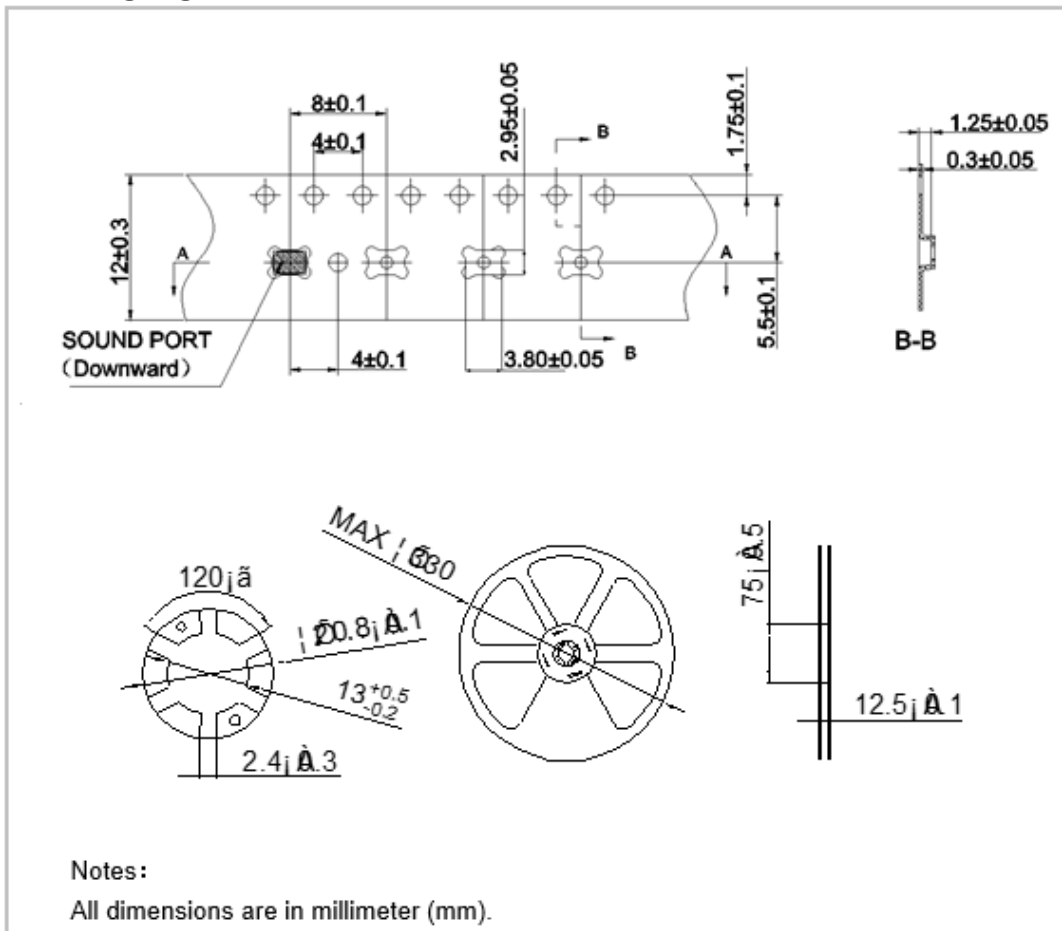
Tolerance ±0.15mm unless otherwise specified.

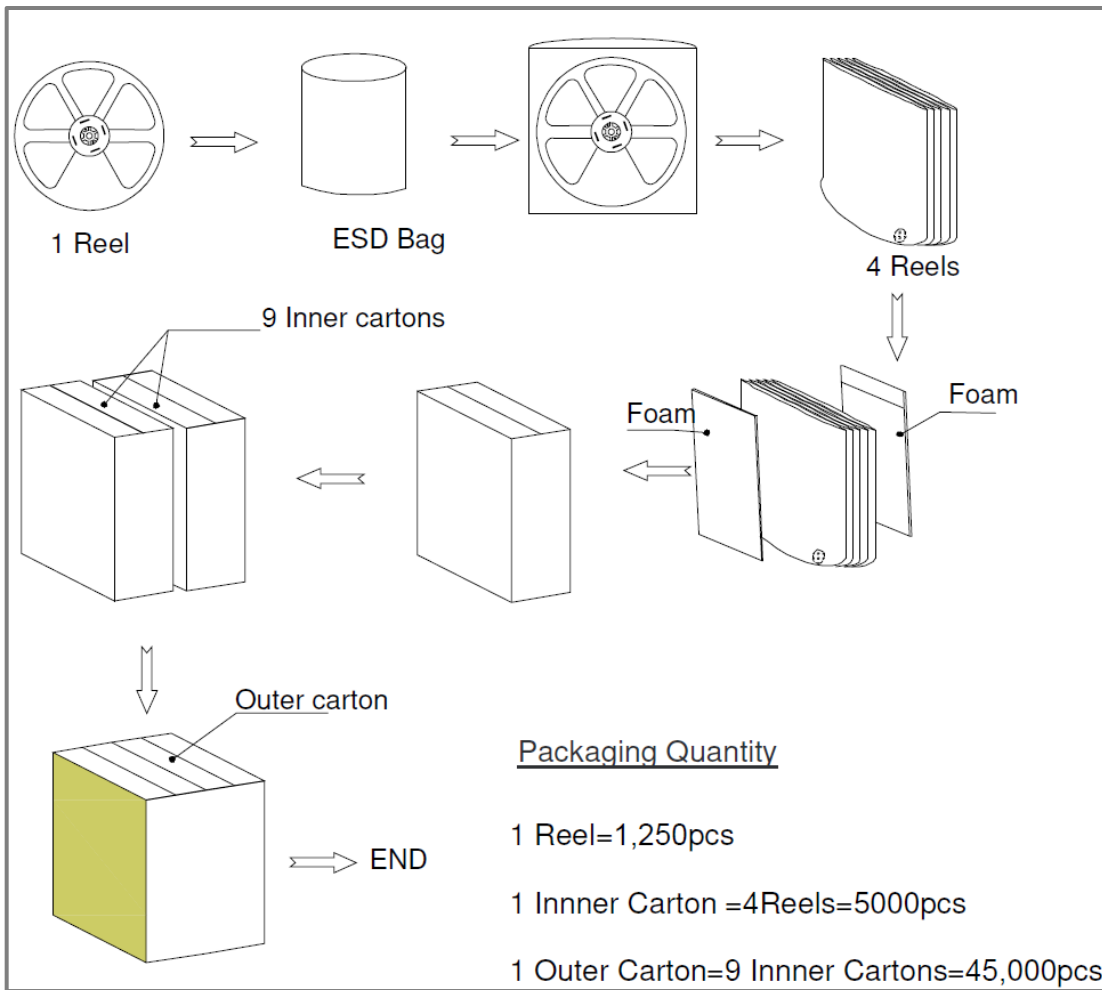
Suggested Land Pattern*



*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	03-16-2023

Note:

1. Unless otherwise specified:
 - A. All dimensions are in millimeters.
 - B. Default tolerances are $\pm 0.5\text{mm}$ and angles are $\pm 3^\circ$.
2. Specifications subject to change or withdrawal without notice.
3. This part is ROHS 2015/863/EU compliant.