



Low-Noise Bottom Port Piezoelectric MEMS Microphone Evaluation Module

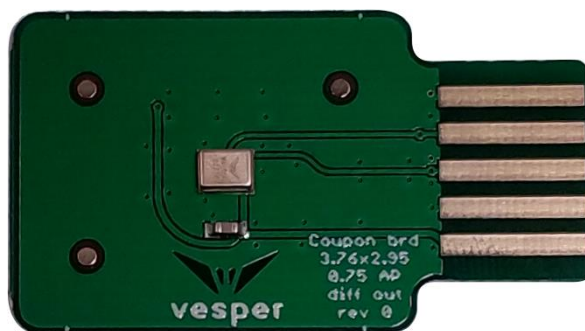
Data Sheet

PMM-3738-VM1000-EB-R

PUI Audio, featuring Vesper's exclusive technology, presents the world's first and only piezoelectric MEMS microphone. The PMM-3738-VM1000-EB-R provides users a simple way to evaluate the performance of the PMM-3738-VM1000-R.

Features:

- Unique piezoelectric MEMS transducer
- Very-low noise floor
- Low part-to-part variation
- High dynamic range
- Stable performance in all conditions
- Dust and water resistant to IP57
- Easy-to-use evaluation board



The PMM-3738-VM1000-R is a low noise, low part-to-part variation, high dynamic range, single ended analog output piezoelectric MEMS microphone. This microphone consists of a piezoelectric sensor and circuitry to buffer and amplify the output.



Specifications

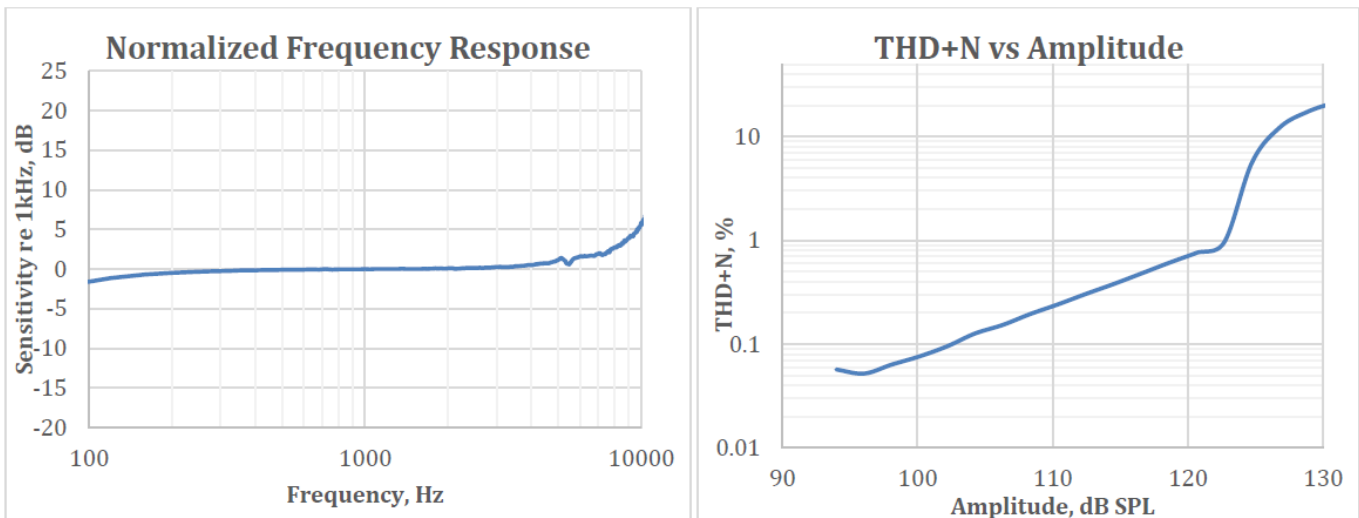
All specifications are at 25°C, $V_{\text{Supply}} = 1.8 \text{ V}$ unless otherwise noted.

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|----------------------------------|------------------|--|----------------------------|------|------|--------|
| Acoustic Specifications | | | | | | |
| Sensitivity | | 1 kHz, 94 dB SPL | -41 | -38 | -35 | dBV |
| Signal-to-Noise Ratio | SNR | 94 dB SPL at 1 kHz signal, 20Hz to 20kHz, A-weighted Noise | | 62 | | dB(A) |
| Signal-to-Noise Ratio Voice Band | SNR | 94 dB SPL at 1 kHz signal, 20Hz to 8kHz, A-weighted Noise | | 64 | | dB(A) |
| Total Harmonic Distortion | THD | 94 dB SPL | | 0.1 | | % |
| Acoustic Overload Point | AOP | 10.0% THD | | 125 | | dB SPL |
| Roll Off Frequency | | -3db at 1KHz | | 85 | | Hz |
| Directivity | | | Omni | | | |
| Polarity | | Increase in sound pressure | Increase in output voltage | | | |
| Electrical Specifications | | | | | | |
| Supply Voltage | | | 1.6 | 1.8 | 3.6 | V |
| Supply Current | | V _{Supply} ≤ 3.6 V (TBR) | | 165 | | μA |
| Power Supply Rejection Ratio | PSRR | VDD = 1.8, 1kHz, 200mV _{PP} Sine wave | | 55 | | dB |
| Power Supply Rejection | PSR | VDD = 1.8, 217Hz, 100mV _{PP} square wave, 20 Hz – 20kHz, A-weighted | | -85 | | dB(A) |
| Output Impedance | Z _{OUT} | | | 400 | | Ω |
| Output DC Offset | | | | 0.8 | | V |
| Startup Time | | | | 100 | | μS |

Absolute Maximum Ratings

| Parameter | Rating | Units |
|-----------------------------|---------------------------------|-------------------|
| Supply Voltage | -0.3 to +3.6 | V |
| Sound Pressure Level | 160 | dB re 20 μ Pa |
| Operating Temperature Range | -40 to +85 | °C |
| Storage Temperature Range | -55 to +150 | °C |
| Mechanical Shock | 10,000g per IEC 60028-2-27:2008 | |
| Vibration | Per MIL-STD 883E, 2007.2 | |

Typical Performance Characteristics



Environmental Robustness

IP adherence is evaluated by 1 kHz Sensitivity spec post stress

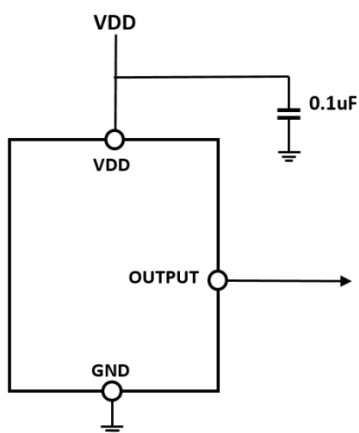
| Ingress Protection Type | Description |
|-------------------------|---|
| Dust Resistance | IP5X; |
| Water Immersion | IPX7; 2 hours drying time, normal dry environment |

Reliability Specifications

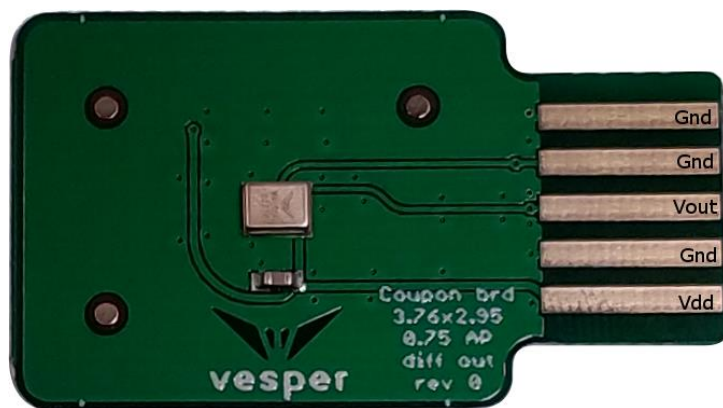
| Stress Test | Description |
|---------------------------------|---|
| Temperature Cycling Test | -40°C to +125°C, 850 cycles |
| High Temperature Operating Life | +125°C, 1000 hours, biased |
| High Temperature Storage | +125°C, 1000 hours, unbiased |
| Temperature Humidity Bias | +85°C, 85% RH, 1000 hours, biased |
| Reflow | 3 reflow cycles with peak temperature of +260°C |
| ESD-HBM | 3 discharges, all pins, ± 2kV |
| ESD-CDM | 3 discharges, all pins, ± 800V |
| ESD-LID/GND | 3 discharges to lid, ± 8kV |
| ESD-MM | 3 discharges, all pins, ± 200V |
| ESD-Air Discharge | 3 discharges, ± 15kV |

Applications Information

Recommended drive circuit and external components.



Evaluation Board Pin Layout and Edge Connector Information



CW Industries CWR-170-10-0000 Edge Connector

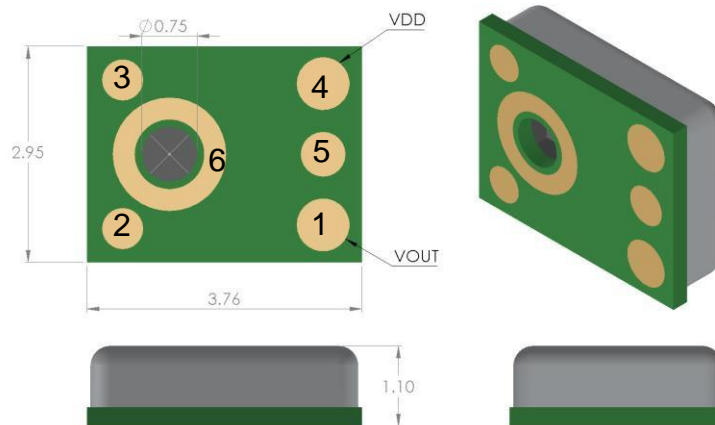


Handling Instructions

The Piezo MEMS microphone is very robust to harsh environments such as dust and moisture. However, to avoid mechanical damage to the microphone, we recommend using appropriate handling procedures when manually handling the parts. The following guidelines will help to avoid damage:

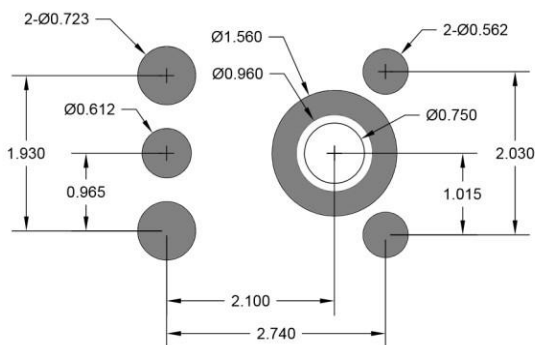
- Do not apply a vacuum to the bottom side of the microphone. A vacuum pen may be used with care on the top side only.
- Do not apply very high air pressure over the sound port hole.
- Do not insert any large particles or objects in the sound port hole. The microphone is resistant to small particles per IP5X specification.
- Do not expose the sound port to harsh chemicals.

Dimensions and Pin Layout

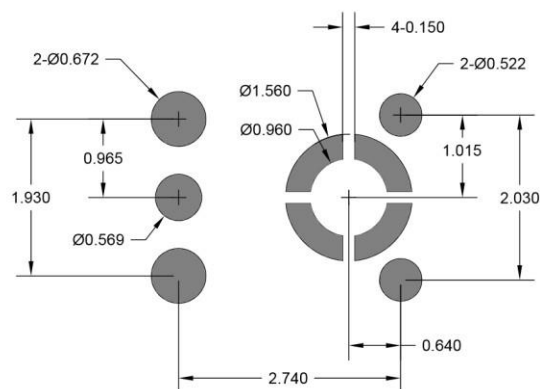


| Pin Number | Pin Name | Description |
|------------|------------------|-----------------------|
| 1 | V _{OUT} | Analog Output Voltage |
| 2 | GND | Ground |
| 3 | GND | Ground |
| 4 | V _{DD} | Power Supply |
| 5 | GND | Ground |
| 6 | GND | Ground |

PMM-3738-VM1000-R PCB Design and Land Pattern Layout



PCB Land Pattern



Solder Stencil Pattern

Specifications Revisions

| Revision | Description | Date |
|----------|---------------------------|----------|
| - | Released from Engineering | 6/7/2017 |

Note:

1. All dimensions are in millimeters.
2. Specifications subject to change or withdrawal without notice.
3. This part is RoHS 2011/65/EU Compliant.

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