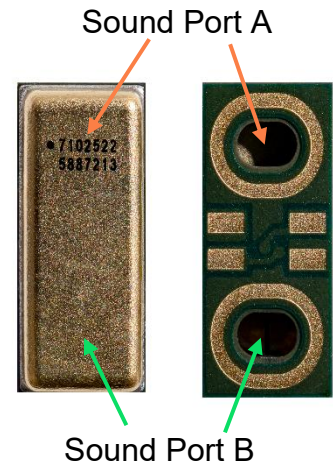




The SKR0710 PDM Directional Microphone

The SKR0710 is an in-plane, directional PDM MEMS microphone that delivers superior signal isolation. This microphone provides a compact solution to achieve a directional audio pickup. This microphone can be used as a single microphone solution when integrated with an external gasket or paired with a traditional omnidirectional microphone (See AN242).

This application note describes the integration of the SKR0710 with an external gasket to enhance both the directionality and the SNR of the SKR0710. In this configuration, a resistive mesh can be used to alter the directivity pattern from a dipole to a cardioid pattern, for example. This provides a single microphone solution for applications that need directional pickup without the component count and DSP complexity of multi-microphone arrays.



When to Use the Standalone Configuration

When used in a standalone configuration, without an omnidirectional microphone placed beside it, (See AN242), the SKR0710 should always be incorporated with a gasket to leverage the maximum available performance of the microphone. Using the SKR0710 as a standalone microphone is ideal when:

- A fixed pickup direction is acceptable (no beam steering required)
- Voice bandwidth (20 Hz to 8 kHz) is sufficient for the application
- Minimizing component count and DSP complexity is a priority
- Cost optimization favors a single microphone solution

For applications requiring full 20 kHz bandwidth, switchable polar patterns, or beam steering, pair the SKR0710 with an omnidirectional microphone instead (see AN242 Beamforming with the SKR0710).

The Bare SKR0710 Microphone

The SKR0710’s fundamental polar pattern is that of a dipole. By placing both sound ports on the PCB side of the microphone (see Figure 1), the microphone can be integrated into end products similarly to omnidirectional microphones. The performance of the bare SKR0710 microphone is shown below in Figures 2 and 3. Note that in Figure 2 there is a gradual loss of the dipole nulls as frequency increases.

Based upon a product’s need, the performance of the microphone can be improved by creating a sound port gasket with audio channels to extend the distance between sound ports A and B, the performance can be enhanced as described in the following section.

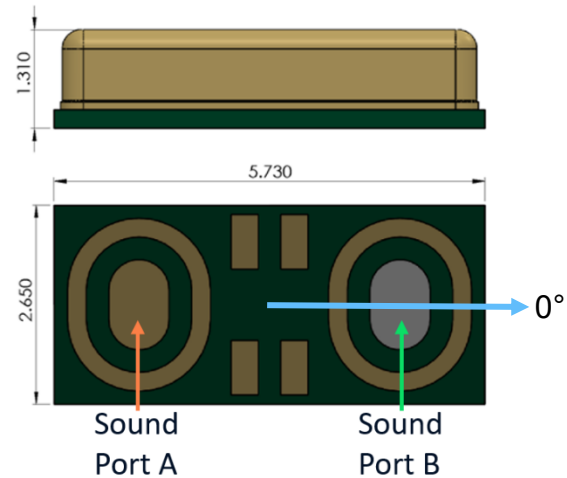


Figure 1: SKR0710 Side and Bottom View (bare microphone)

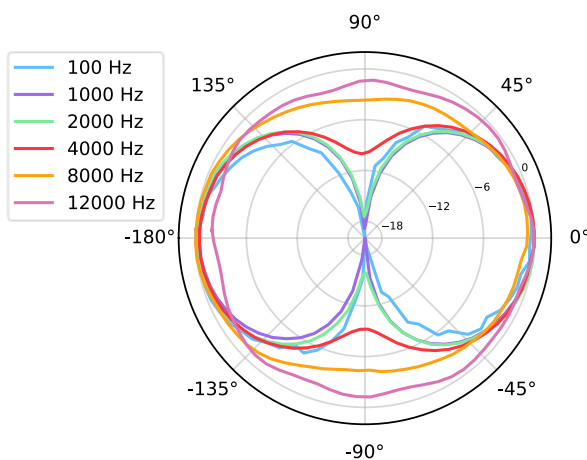


Figure 2: SKR0710 Polar Pattern (no audio channel gaskets)

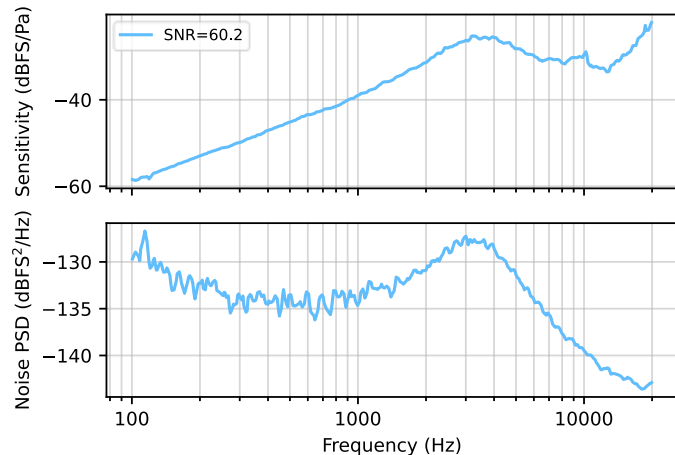


Figure 3: SKR0710 Frequency Response and Power Spectral Density (no audio channel gaskets)

Performance Improvement by Creating an Ideal Dipole

The SKR0710 may be placed on top of a gasket with embedded acoustic channels that increase the spacing between the two sound ports (see Figure 4). The SKR0710 has a Sound Port A that sits directly underneath the lid marking, and a Sound Port B in that sits on the side opposite of the microphone’s lid marking. Sound Port B (sometimes referred to as the front port since it points to the 0° direction) of the microphone is further extended to build better symmetry around the MEMS element. When remeasuring the polar pattern of the SKR0710 in combination with the recommended gasket, the dipole directivity at the high frequencies is regained, and the microphone exhibits a consistent directivity across the audio spectrum (see Figure 5).

The ideal center-to-center port spacing after adding the gasket is ~9.6mm an increase of 6mm from using just the bare microphone. The channel which should be extended is the port opposite of the lid marking side, or that connected to Sound Port B. The channels within the gasket are shown below in orange and green.

Additionally, because of the increased port spacing, the pressure difference seen by the MEMS transducer for a given sound pressure wave is increased. This has the additional benefit of boosting the microphone’s sensitivity and thus signal-to-noise ratio (see Figure 6).

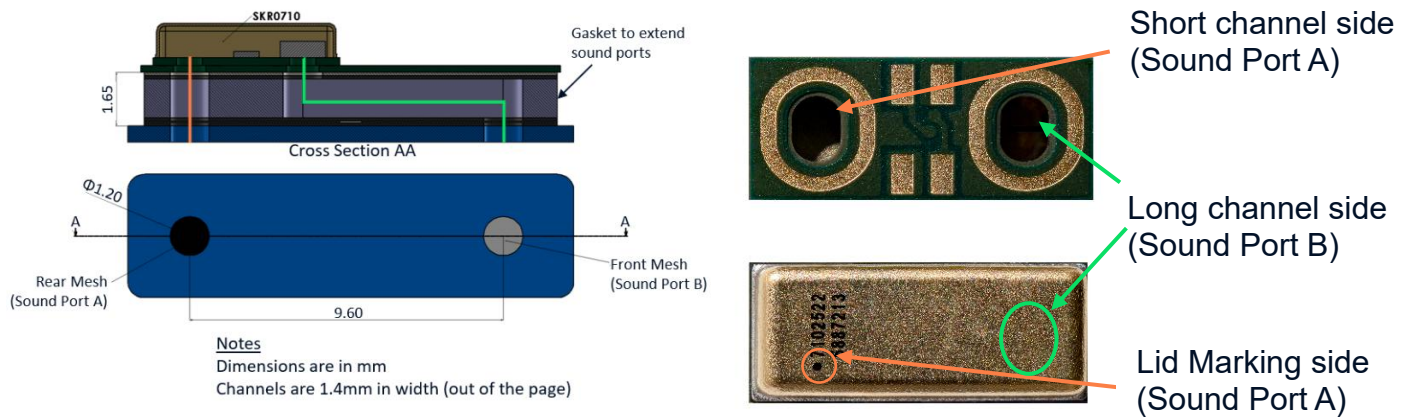


Figure 4: SKR0710 with Extended Channel Gasket

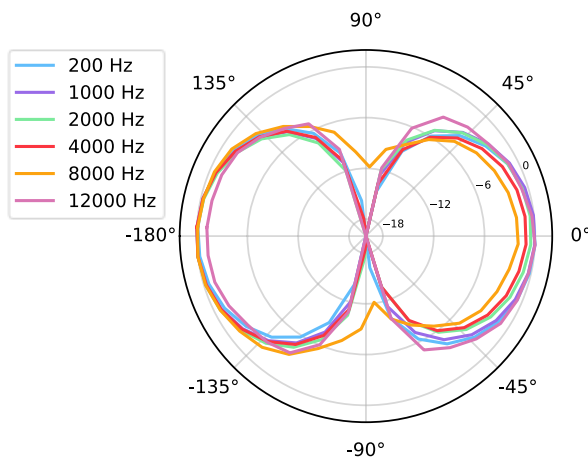


Figure 5: Polar Pattern of SKR0710 with Extended Channel Gasket

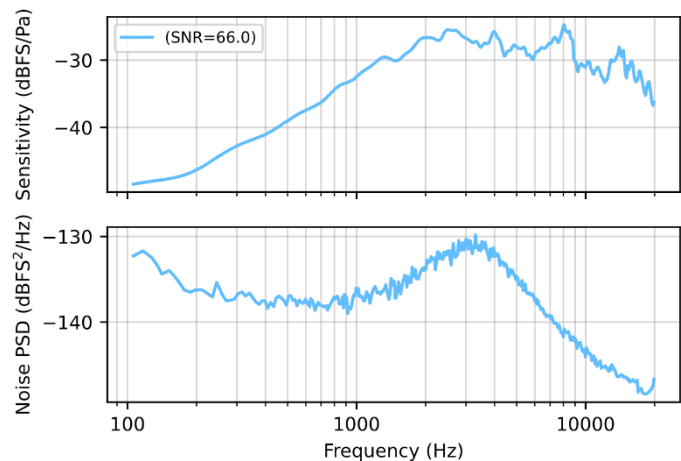


Figure 6: Frequency Response of SKR0710 with Extended Channel Gasket, a ~6dB Improvement from the Bare Mic

Altering the Beam Pattern

By placing a stronger acoustic mesh on the Sound Port A (rear port) of the gasket from Figure 4, compared to the acoustic mesh on the Sound Port B (front port), the directivity pattern of the SKR0710 can be converted from a dipole to various cardioid-like patterns. While the cardioid beam patterns may lose directionality at the high frequencies, a strong directivity can be maintained up to 8kHz which is sufficient for most applications focused on speech pickup. The table below shows the beam pattern and corresponding signal-to-noise ratio (SNR) when using acoustic meshes of different resistances on Sound Port A (rear port) of the microphone. For best performance, the same gasket should be used as described in Figure 4 to extend the sound ports.

Resistance of Rear Port Mesh (Sound Port A)	Resistance of Front Port Mesh (Sound Port B)	SNR	Beam Pattern
42 rayl (Saati Acoustex 042HY or equivalent)	42 rayl (Saati Acoustex 042HY or equivalent)	66 dBA	
570 rayl (Saati HD12)	42 rayl (Saati Acoustex 042HY or equivalent)	65 dBA	

Additional Support

For further information on Soundskrit’s products, visit our website at <http://www.soundskrit.ca> where you can find more application notes, datasheets, and purchasing information. If you have any questions or need technical support, please reach out to applications@soundskrit.ca.

Revision History

Rev	Date	Changes
-	April 2026	Initial release



Soundskrit developed the first high-performance directional MEMS microphone on the market, leveraging years of research in bio-inspired MEMS based on how spiders and other insects in nature hear. In combination with Soundskrit's in-house audio processing algorithms, directional microphones can be used to capture and isolate any sound in an environment with a fraction of the size, power, and computation of traditional omnidirectional-based microphone arrays.

Soundskrit was founded in 2019 and is headquartered in Montreal, Quebec with an R&D facility in Ann Arbor, Michigan.

