



Product Overview:

Andrea Superbeam® Array Microphone: Enabling The “Freedom of Voice®”

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An effective, natural communication interface requires clear, noise free audio input. By ensuring highly intelligible, low noise audio source input (spoken words), Andrea Electronics’ digital microphone products and technologies enable more accurate and reliable communication as well as high performance speech recognition in noisy office environments. In the past, the only way to obtain a clear voice signal that provided the optimum level of communication and an acceptable level of speech recognition performance was to wear a headset. By wearing a headset, the microphone is at close proximity to the speaker’s mouth, thereby, forcing the voice to be the primary signal (the acoustical environment [noise] becomes insignificant when the distance between the microphone and the speaker’s mouth is negligible). Our products and technologies enable a person speaking to be at a distance from the audio input source, *freeing* the speaker from having to hold or wear a conventional “close talking” microphone, while maintaining the same level of performance. We refer to this capability as untethered, “far-field” microphone operation.

One of the most significant barriers to speech recognition performance and, as a result, in speech recognition usage and popularity, is the high sensitivity to the acoustic environment and, in particular, to the surrounding noise in any real office or workstation. The only technically acceptable solution, until recently, was to use a headset; however, this made the user experience annoying, uncomfortable and inconvenient. Recent noise canceling microphone array product developments have enabled users to be untethered; however, these solutions are very expensive and, therefore, less appealing to an average user. Andrea Electronics, together with Analog Devices, has developed a groundbreaking solution: The Andrea Superbeam Array Microphone (the “Superbeam Array”). Analog Devices has developed an interface that allows the Superbeam Array to connect to the PC and run the necessary software instructions on the PC’s processor. The Superbeam Array is a two-microphone (two-channel) device that attaches to the top of any laptop or PC equipped with Analog Devices’ next generation SoundMax Cadenza software. The SoundMax Cadenza software is integrated with Andrea Electronics’ PureAudio and DSDA (Digital Super Directional Array) noise-cancellation software, thereby removing the high costs associated with required memory and processing power from the microphone device (now powered by the PC’s host processor).

Andrea’s PureAudio is a voice enhancement noise reduction algorithm that can detect non-voice signals and eliminate them from the incoming audio stream. PureAudio is very effective in reducing repetitive and stationary noises such as computer-fans, air conditioners, and other background noises. Andrea’s DSDA (Digital Super Directional Array) utilizes a two microphone array configuration which studies the signals that are coming from the two microphones in order to create a narrow reception cone. The array behaves as a directional antenna that “looks” (or actually listens) to the voices that are coming from its “look” direction and ignores noises or voices that are coming from other directions, thus eliminating a large number of interferences, including neighboring speakers and reverberations.

The end result: *freeing a speaker from having to hold, or wear, a conventional microphone with a very high-tech, low cost, sleek hardware accessory.*

We developed the attached white paper in order to document the effectiveness of the Superbeam microphone when compared to that of the conventional alternative microphone products. In particular, we demonstrate that Andrea’s technologies enable far-field microphone operation that is at least equal to that of an industry-leading USB headset. Equally as important: *the Superbeam Array is 70% less expensive than the USB alternative (Superbeam Microphone MSRP \$24.95).*

In the attached white paper, we demonstrate the effectiveness of our technologies through speech recognition performance results. We show that the Superbeam Array performs at least equivalent to that of a “close talking” microphone, even though it is used in the “far field” mode, providing the untethered

experience desire by the average user. Speech recognition performance represents the harshest environment with which to benchmark microphone performance due to the high sensitivity of the application to the surrounding noise and acoustic environment. The microphone is required to eliminate the noise but also be able to address the nature, location and intensity of the noise, the size and reverberant quality of the room, the clarity of the speaker, and the microphone's capability to adjust to movement by the speaker during dictation. The speech recognition test results provide a quantitative measure of relative microphone performance.

Although we used speech recognition results as a measure of relative microphone performance, the Superbeam Array improves the quality and intelligibility of the voice signal. Using communication applications such as VoIP, audio conferencing or videoconferencing, the improved intelligibility leads to a better understanding for the listener, thereby enhancing the overall end user experience.