

# SINGLE-CHIP TWO-ELEMENT USB MICROPHONE ARRAY SOLUTION FOR WINDOWS® VISTA

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## ABSTRACT

A single-chip two-element USB microphone array solution for speech enhancement is presented which uses the Micronas UAC 3576B IC.

## 1. INTRODUCTION

Most PCs or laptops have only one microphone for speech input. In hands-free speech communication systems, this is a poor solution for capturing speech: The microphone signal acquired is usually corrupted by electronic noise, ambient noise and reverberation leading to a significant decrease in speech intelligibility. A microphone array can alleviate these problems by using appropriate signal processing techniques.

The single-chip two-element USB microphone array solution is an application of Micronas Universal Serial Bus (USB) Codec UAC 3576B [1]. The microphone array signal processing is performed by the audio subsystem announced for the next generation Microsoft operating system Windows Vista.

## 2. WINDOWS VISTA AUDIO SUBSYSTEM

Windows Vista includes microphone array support as part of a complete audio subsystem [2]. This audio subsystem provides (i) acoustic echo cancellation, (ii) microphone array support, (iii) stationary noise suppression, and (iv) automatic gain control.

The microphone array support of Windows Vista incorporates i. a. (i) a class driver to support USB Audio devices, (ii) algorithms to support several tested microphone array geometries, and (iii) the ability to identify microphone array geometries based on descriptors as reported by a USB device.

## 3. TWO-ELEMENT MICROPHONE ARRAY

The structure of a typical two-element microphone array with Micronas UAC 3576B IC is depicted in fig. 1. The microphone array is directly connected to the USB port of a PC or laptop. Microphone array signal processing is enabled by appropriate Windows applications, which apply signal processing algorithms provided by the audio subsystem of Windows Vista.

A two-element USB microphone array solution with the Micronas UAC 3576B IC is shown in fig. 2. A Windows XP demonstration application is presented which uses signal processing algorithms, i. e. beamforming and noise reduction, of a Windows XP based preliminary version of the Windows Vista audio subsystem.

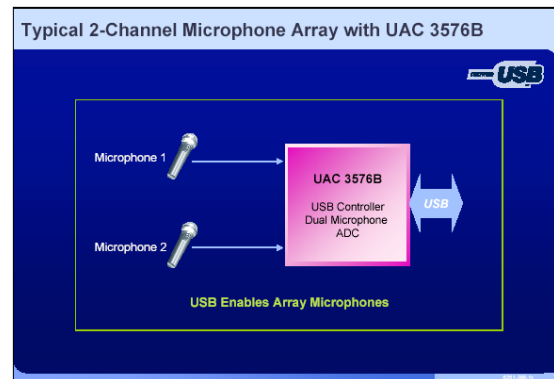


Figure 1: Typical structure of a two-element microphone array with Micronas UAC 3576B.



Figure 2: Two-element microphone array with Micronas UAC 3576B.

## 4. REFERENCES

- [1] Micronas GmbH: UAC357xB Universal Serial Bus (USB) Codec. Micronas Product Information 2005 (<http://www.micronas.com/usb>).
- [2] Microsoft Corporation: Microphone Array Support in Windows Longhorn. Windows Hardware Engineering Conference (WinHEC) 2005 (<http://www.microsoft.com/whdc/device/audio/default.msp>).