VoIP Speaker Phone with Acoustic Echo Cancellation

Version 2.00, 2008-04-25
VoIP Speaker Phone: Interface

- Uses VS1000 and VS1003
- Microphone
- Mono speaker / stereo earphones
- MMC/SD/SDHC media card slot
- Full-speed USB
- Five buttons
- Four LEDs
VoIP Speaker Phone: 5 in 1

• Applications:
  – VoIP speaker / earphone telephone
  – Media player
  – Voice and phone conversation conversation recorder
  – USB Mass storage device
  – Sound card
Application: VoIP Speaker Phone

- A speaker phone is often more convenient than headset
- **Automatic acoustic echo cancellation**
- Easy to install: no software drivers needed!
- Standard USB Audio device:
  - 32 kHz stereo playback
  - 8 kHz mono recording
- USB-powered, needs no external power
- Compatible with Windows XP / Vista and Max OS X
- Automatic Li-Ion 3.7V battery charging logic
Application: Media player

- Media player can play several formats from media card:
  - .MP3: MPEG 1 layer III
  - .OGG: Ogg Vorbis
  - .WMA: Windows Media Audio
  - .MID: Midi
  - .WAV: RIFF IMA ADPCM and PCM WAV
Application: Voice recorder

• When in Media Player or Speaker Phone mode, one-touch recording can be used to activate dictation recorder

• Recording parameters:
  - Mono 16-bit PCM WAV
  - 8 kHz
  - 128 kbit/s (1 GB memory card offers over 17 hours recording time)
  - Recording length limited by size of memory card
Application: USB Mass storage device

- USB Mass Storage Device lets the user transfer programs, files and settings along with him/her
- Full-speed USB supported
- SDHC cards with over 4 GB capacity supported
Application: Sound card

• When not engaged in a VoIP conversation, the VoIP Speaker Phone can be used as an external USB sound card for the computer

• Supports 32 kHz stereo for playback

• Supports 8 kHz mono for recording
Why echo cancellation? (1/3)

• When two people are speaking with headsets, there is no problem because signals that come to the earphones don't significantly leak to the microphone.
Why echo cancellation? (2/3)

- When Near-End Speaker uses speaker phone set without echo cancellation, Far-End Speaker's voice is picked up by the Near-End mic and is echoed back to him/her.

- Echo makes it difficult for the Far-End Speaker to talk to you because (s)he hears his/her own voice delayed.
Why echo cancellation? (3/3)

- Echo cancellation uses an adaptive filter to remove the Far-End Signal from the Near-End Speaker's microphone signal.
- Now the Far-End Speaker doesn't hear his own voice echoed and conversation is easier.
How echo cancellation works (1/2)

• Echo cancellation is **not** on your phone to help you, it is there to **help the speaker on the other end**!

• Echo cancellation analyzes the microphone signal and creates a model of the room's acoustic response. This model can be used to cancel the Far-End Speaker's signal from the microphone input.
How echo cancellation works (2/2)

• If you hear excessive amounts of echo during a VoIP or telephone call, it is because the other end doesn't have working echo cancellation.

• Echo cancellation has to learn about the room, so it takes a few seconds before cancellation fully works.

• Echo cancellation is mandatory on GSM phones:
  - When placing a GSM call, you can often hear your own sound for a few seconds. This is the echo cancellation training period.
VoIP Speaker Phone Summary

- Convenient device that allows conference calls or single-person hands-free calls with high audio quality
- Media player with many supported formats
- Voice and phone conversation conversation recorder
- Mass storage device for storing files
- External USB audio card
- No drivers needed. No hidden costs. It just works!
Technical support

- Technical support is helping you at support@vlsi.fi. From this address you can request:
  - Schematics and user instructions
  - Demonstration boards
  - More information