Introduction

FM2010 is an ultimate analog voice processor with SAM™ (Small Array Microphone) technology of Fortémedia™ to provide a small-footprint, low-power solution for echo cancellation, and noise suppression with beam-forming.

With analog-to-analog interface is easy and ideal for any existing products or a new designed voice application such as notebooks, motherboards, mobile phones, PDA, navigators, Bluetooth headsets, VoIP handset, speaker phone, or any other portable devices. This is an easy plug-and-played component to enhance the voice quality with no much circuitry changed. The 22-pin 3.934×2.044 mm² CSP proprietary package and low power consumption enable the smallest footprint and more flexibility in space for the space and power sensitive applications, such as mobiles and Bluetooth headsets. The 48-pin 7×7 mm² standard QFN package is also available for these space and power non-sensitive applications, such as notebook and PC.

FM2010 is an intransigent choice for portable applications to feature a beam-forming SAM™ technology. There is no compromise on the footprint size, sensitive power consumption, and voice communication performance to fulfill the stringent requirement on mobile voice applications.

Applications

Target applications for FM2010 are
- Cellular mobile and Smartphone
- PDA and PND
- VoIP card phone and handset speaker phone.
- Desktop PC motherboard
- LCD monitor conference modules
- Bluetooth headset

Single-Chip Voice Processor Features

- SAM (Small Array Microphone) technologies built for the beam-forming function of the dual microphones. Support 1~2 microphones acoustic processing with/without the beam-forming, for the superior noise suppression and acoustic echo cancellation capability
- Customized 16-bit voice processor with built-in hardware accelerations up to 49 MIPS. Highly integrated mixed circuit and signal processor for voice processing with built-in ROM code and necessary RAM
- Built-in 3 ADCs (Analog to Digital Converter) and 1 DAC (Digital to Analog Converter) for dual-microphone inputs, one line-in reference, and one line-out output
- Built-in on-chips microphone pre-amplifiers in each microphone input
- Non-stationary noise suppression with beam-forming of Fortémedia's technology on two microphones up to 20dB to enable clear voice communication
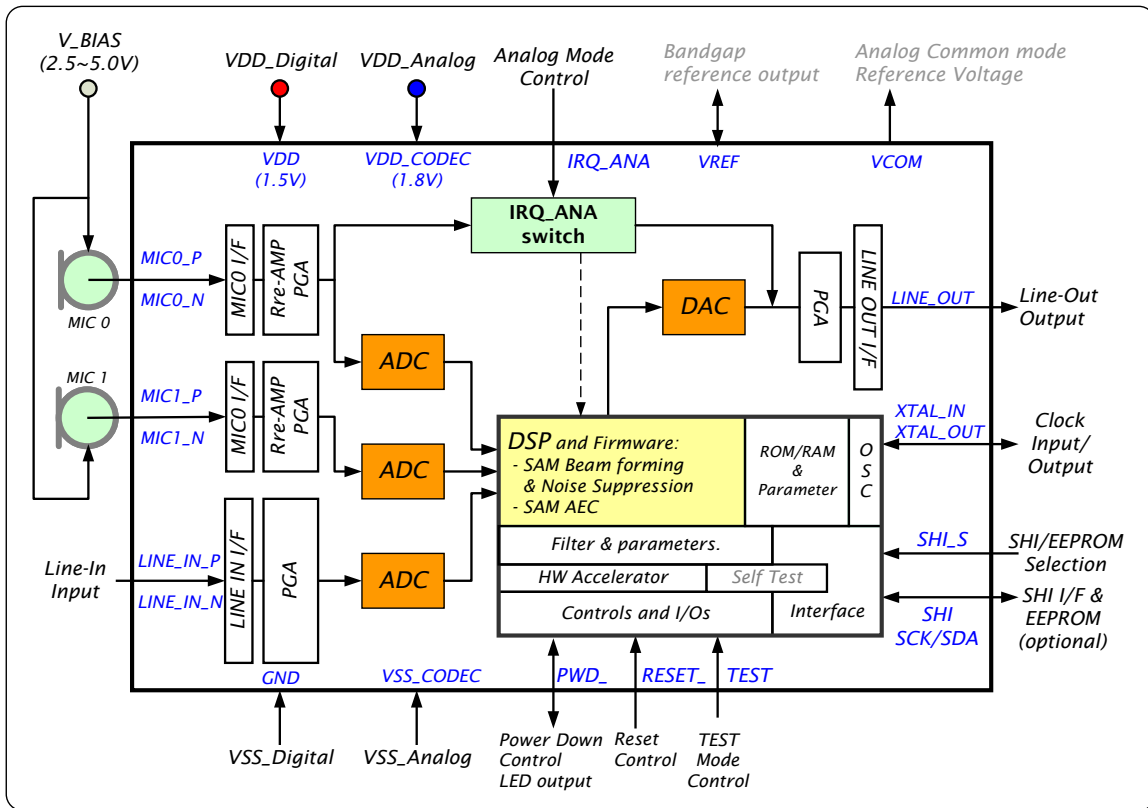- Noise suppression in each microphone input up to 12dB
- Superior acoustic echo cancellation with Non-Linear Filter and Adaptive Step-sized Sub-band process performance up to 60dB, which makes the one-piece speaker phone possible as a 4.0cm between microphones and speaker even while the sound pressure up to 120 dB.
- Side tone cancellation up to 25~35dB
- Separated power in digital and analog domain to increase power noise immunity.
- Superior enhanced full duplex operation
- Low power consumption:
  - 27mW in two microphones application.
  - 21mW in one microphone application
  - 15mW in by-pass mode with PGA.
  - Less than 300μA in the power-down mode.
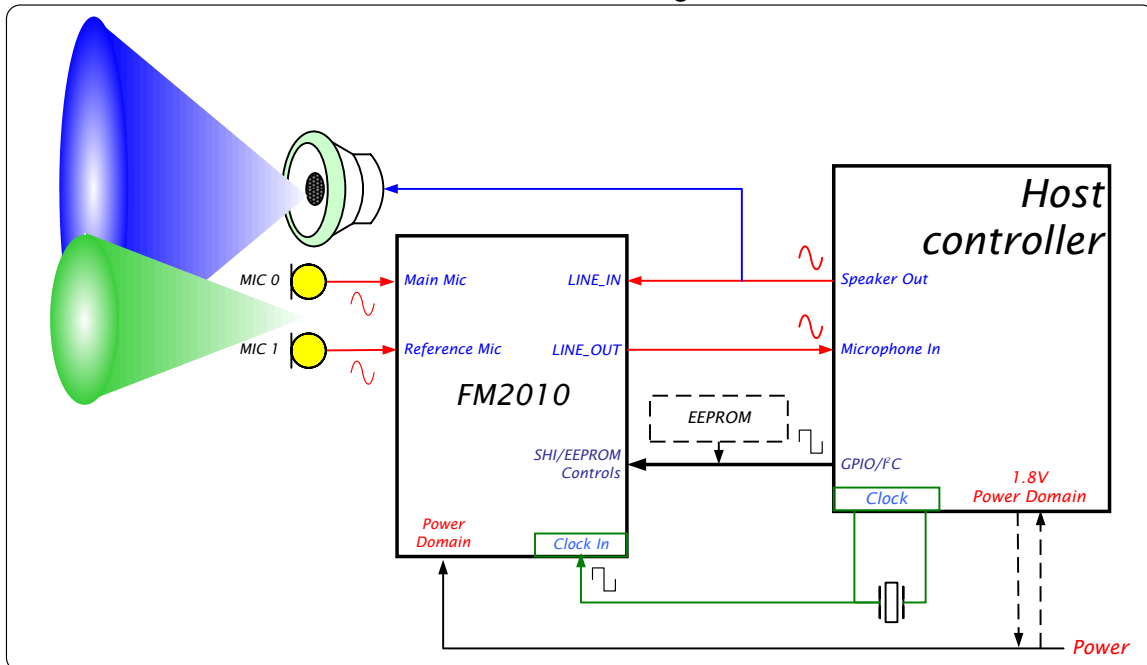
Signal Processing Performance

- 120-3400Hz bandwidth with 8kHz sampling on ADCs/DAC for vocal-band processing
- ADCs(3 analog inputs)
  - Differential microphone inputs and line-in input increase noise immunity and keep from radio frequency interference.
  - 84 dB SNR for each input.
  - On-chip microphone amplifiers built-in
  - Programmable gain control
- DAC(1 analog output)
  - Line out 75 dB SNR with a single-end output
  - Programmable gain control
- Crystal or external clock source requirement:
  - Crystal: 4.096 MHz or 13.0 MHz
  - External clock source: 13 MHz to 48 MHz by 1 MHz increments, and 12.288 MHz to 36.864 MHz by 4.096 MHz increments
- Hardware SHI interface supported
  - Up to 400 kb/s (I²C Fast-mode compatible)
  - External EEPROM supported for parameter downloading
  - On-the-fly commanding supported.

Other Features

- 0.18 μm low power process
- 1.5~1.8V low power operation for digital.
- Package available:
  - 22-pin 3.934 mm × 2.044 mm proprietary CSP package/ 0.5mm pitch minimum
  - 48-pin 7 mm × 7 mm standard QFN package/ 0.5mm pitch

FM2010 Block Diagram

FM2010 Reference Design Block Diagram