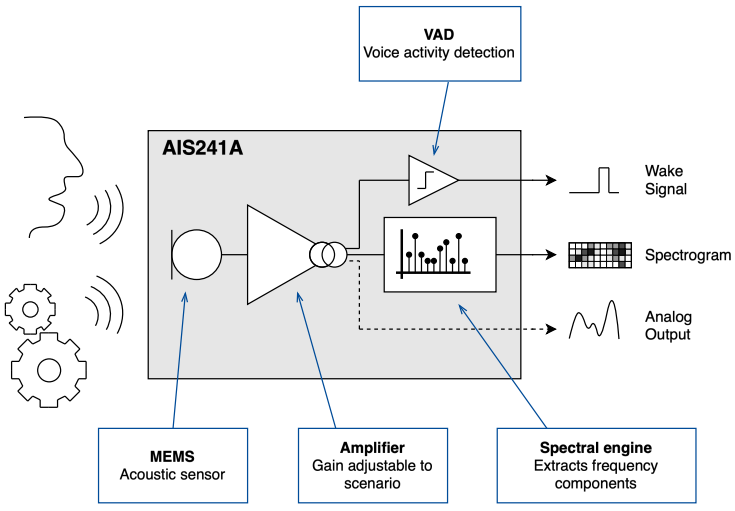
AIS241A MEMS Microphone with Feature Extraction

General description

The AIS241A “SpectroPhone” is a smart ultralow-power MEMS microphone that integrates a spectral feature extractor. It continuously converts acoustic signals into its frequency components in real time and provides them via a standard SPI interface, enabling efficient audio analysis at the edge.
An interrupt can notify or wake a host controller whenever acoustic activity exceeds a programmable threshold. A backlog of the recently recorded spectral data is then available. This way, the host controller can enter a power saving state between periods of acoustic activity of interest, enabling energy-efficient and event-driven operation.
The device also provides the sensor’s analog audio signal with adjustable signal gain for additional processing or monitoring, along with further features to dynamically adapt to changes in environmental acoustic conditions.
This makes the device particularly suitable as a sensor frontend for power critical automated acoustic monitoring systems that require permanent listening, unloading the task of extracting the spectral components from the host controller.

Block Diagram



Features

- Acoustic/Voice activity detection (VAD) with adjustable threshold level and frequency characteristic
- Feature extraction with 1 to 49 configurable frequency bins
- Buffer for 1.1 s spectral data recording
- 16 ms time resolution of spectrum data
- Ultra-low current consumption:
  - 330 µA with 49 frequency bins active
  - 170 µA with 16 frequency bins active
  - 22 µA in VAD-only mode
- Optional spectral data compression (square root)
- SPI interface and VAD interrupt line enables direct interfacing to low-cost microcontrollers
- Analog output current pair providing differential or single ended signal
- Single 1.8V supply
- Sensitivity selection range exceeding -50...0 dBV at 94dB$_{SPL}$
- SNR 60dB$_{A}$, AOP 113dB$_{SPL}$
- Small footprint in a 11-pin package with acoustic port on bottom (4 mm x 3 mm)

Applications

- Wake-word recognition
- Keyword spotting
- Acoustic Anomaly / Event Detection
- Event Based classifier templates

Package Illustration