CS48LV41F

High Performance, Multi-Mic, Far-Field Voice Processor

Featuring Voice Control and
Voice Communications for Distances up to Six Meters
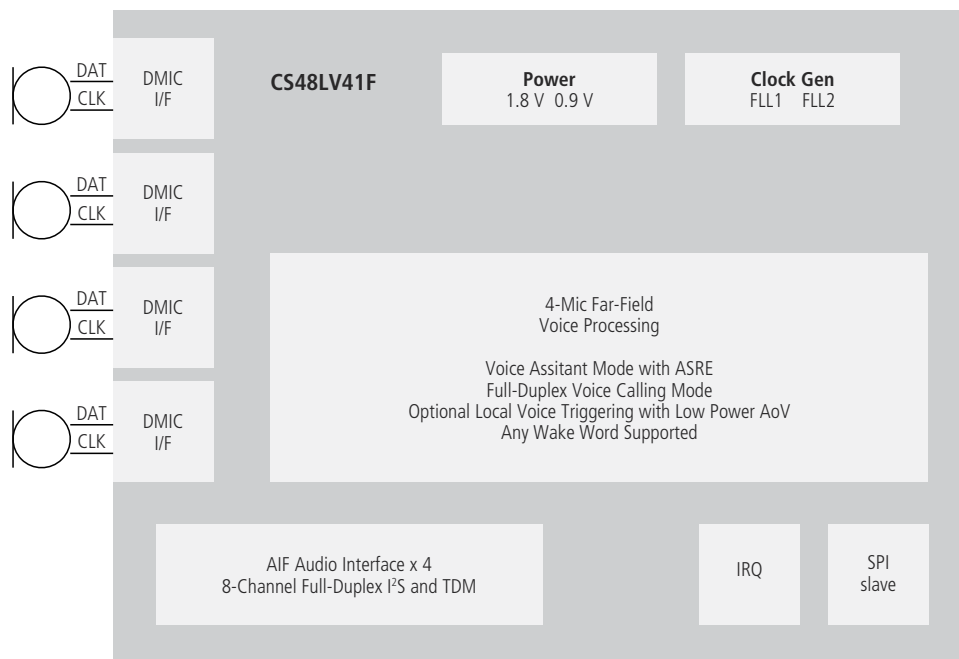
CIRRUS LOGIC ®

Product Overview

The Cirrus Logic CS48LV41F is a complete far-field voice solution that delivers accurate, low power triggering, local command recognition, and high quality two-way voice communications for distances up to six meters. This device improves ASR (automatic speech recognition) through sophisticated, patented far-field spatial processing techniques, and it supports multi-channel echo cancellation, barge-in and full-duplex voice calling. It is targeted at voice enabled products that require the highest quality far-field voice performance.

The CS48LV41F features four microphone processing to deliver better WW (wake word) and RAR (response accuracy rate) performance at a reduced system BOM (bill-of-materials) cost. While highest accuracy is achieved using all four microphones, the solution is scalable to three or two microphones for mid-field voice capture devices or lower cost applications that do not have the same stringent performance requirements as high end systems. The CS48LV41F is designed with break though reverberation and noise reduction processing to enhance the performance of speech recognition engines in high noise and high reverb environments. The device cancels the most common and challenging noise sources in the home including human-like speech from a television. The CS48LV41F can differentiate real human speech from this type of noise to boost far-field pick-up performance in noisy conditions while tracking moving and multiple talkers.

With high flexibility in the mic array configuration and mic placement, the solution gives OEMs the freedom to design distinct industrial designs that are unique to their brand. The CS48LV41F is configurable in low power mode to achieve an ideal balance of power and performance with reliable voice wake-up. Combined with its 360-degree voice pick-up, this device is well suited for wall powered devices, as well as portable battery powered devices that require low power AoV (always-on voice). This includes table-top, desk, wall, ceiling, or just about anywhere a far-field voice enabled product might be located.

The CS48LV41F is cloud agnostic and compliant with Amazon AVS, Google and other popular cloud based assistants. Voice calling is Skype/Lync tested for far-field conference phones. Visual indicators are supported including trigger word detection and DOA (direction of arrival). Offered in a 98-ball WLCSP package with a very small footprint (5.2 mm x 3.2 mm x 0.5 mm), the CS48LV41F is supported by development and tuning tools, reference designs and world-wide technical support to insure fast time-to-market, cloud compliant testing and helping customers achieve the best voice control and voice calling performance in smart home applications.

Product Block Diagram

Target Applications

The CS48LV41F is ideal for digital assistants, smart speakers, smart home cameras, air quality sensors, thermostats, TVs, remotes, smart appliances, and other smart home applications requiring high performance far-field voice processing.

System Features

All modes
- 6 meter far-field performance
- 360° voice pick up, any angle and azimuth
- 4-microphones (scalable to 3 or 2 for low cost applications)
- Flexible mic array for unique industrial designs
- Supports desktop, tabletop, wall, or ceiling devices

Noise reduction
- Cancels TV, music, babble, all home noises
- Transient and stationary noise reduction
- Works in high reverb up to 1 second T60

Barge-in
- High performance echo canceller
- Mono, stereo and multi-channel AEC
- Barge-in during loud music playback
- No need to duck audio to process command

Low power "always-on" voice triggering and command recognition
- <8 mW
- Local triggering or AP based trigger
- Local small vocabulary commands or AP or cloud ASR
- Cloud agnostic, supports all trigger and all ASR engines
- 16 kHz sampling on voice mics

Full-duplex voice calling
- Supports VoIP calling
- Lync/Skype tested

Three full digital audio interfaces
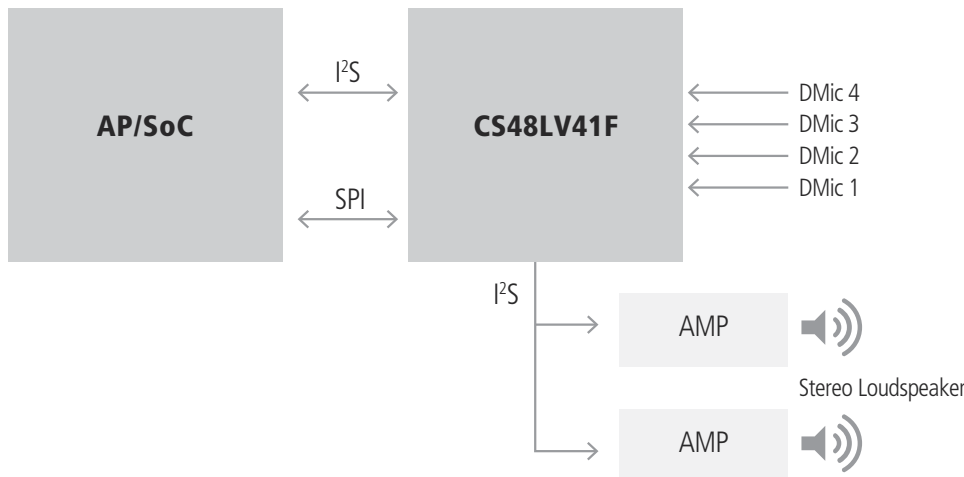- Standard sample rates 8 to 192 kHz
- TDM and I²S support on all AIFs

Other Features
- DoA indicator
- High performance SRC
- Includes simple to use tuning and diagnostic tools
- Complete reference designs available
- Extensive worldwide audio support and technical labs in China, Taiwan, Korea, Japan, Europe, and the US
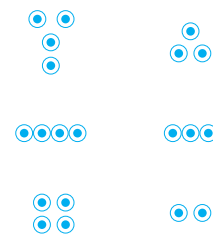
Device
- Compact 98-ball WLCSP package (5.2 mm x 3.2 mm x 0.5 mm)
- 0.4 mm pitch

Typical Connection Diagram

Mic Arrays Supported