Intelligent Room Calibration™

Calibration & Control Module → Measurement Module → EQ Module → Bass Manager Module → Delay Module → Audio Manager → Up to 7.1 Channels of Output

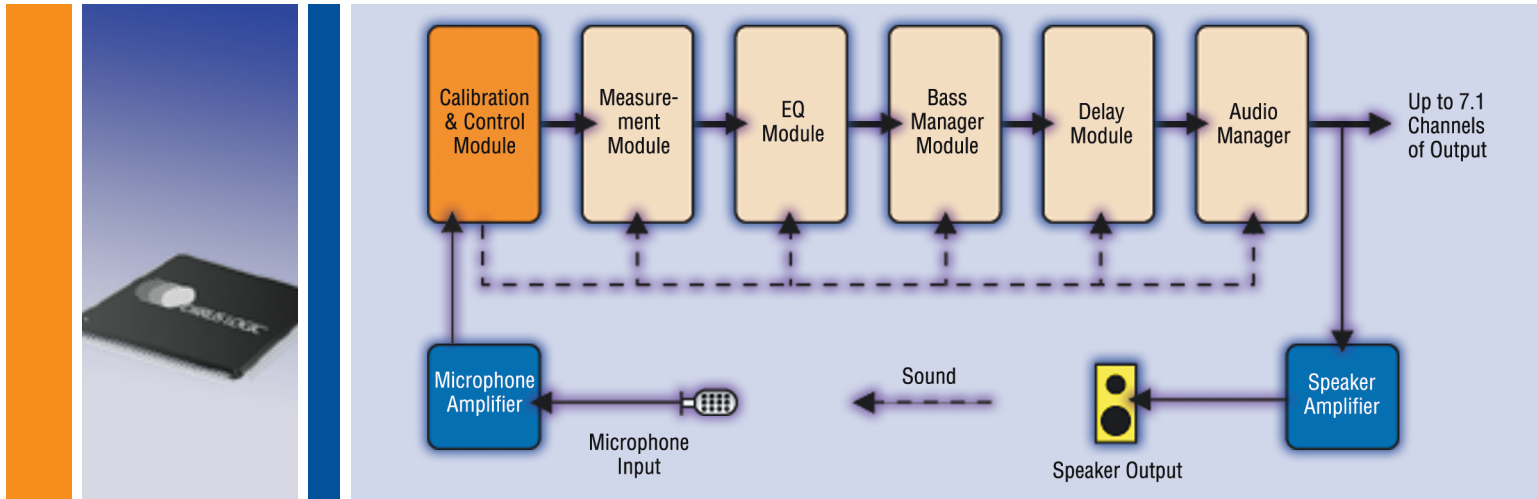Microphone Amplifier — Microphone Input

Sound — Speaker Output — Speaker Amplifier

New On-Chip Software Optimizes AVR System & Speaker Response for Ideal Sound Experience

Intelligent Room Calibration

Cirrus Logic® has introduced advanced on-chip calibration software that enables mass-market and high-end A/V Receiver and DVD Receiver manufacturers to add substantial value to their product offerings. With a simple 60-second setup process – half the time of competing solutions – consumers can take advantage of built-in Intelligent Room Calibration (IRC) software and experience a highly optimized acoustical experience from their home theater system.

Embedded into Cirrus Logic's dual-core audio-optimized digital signal processor (DSP) families, the Intelligent Room Calibration (IRC) software enables consumers to easily perfect their surround-sound system set-up. Cirrus Logic's IRC technology offers a unique algorithmic formula to perform the in-room acoustical adjustments, yielding improved audio quality compared to other automatic acoustic calibration solutions. In fact, by properly balancing out disruptions such as expansive tiled floors, mirrors, heavy carpeting, drapery and other factors that can hinder listening enjoyment, audio enthusiasts will be able to replicate the rich acoustical environment of venues such as state-of-the-art movie theaters and concert halls.

INTELLIGENT ROOM CALIBRATION (IRC) PROVIDES A DISTINCT COMPETITIVE ADVANTAGE

- IRC allows manufacturers to deliver an advanced, hi-value feature at a mass-market price-point
- Simple end-user setup delivers a highly optimized acoustical experience
- Easy process allows users to complete calibration in 60 seconds – half the time of competing solutions
- Two unique software algorithms
- IRC Level 1 (speaker set-up software)
- IRC Level 2 (room equalization software)
- Highly accurate sound quality and consistency of results when the calibration process is repeated

- IRC is available as an option in Cirrus Logic's flagship audio DSPs, the CS49500 and CS49400
- DSP software is self-calibrating and self-configuring – no complicated programming is required
- IRC Level 1 Features
  - Pre-compensation of microphone frequency response
  - Detection of speaker presence
  - Detection of speaker size
  - Speaker polarity detection
  - Distance measurement between speaker and microphone

- Sound pressure level measurement of speakers
- IRC Level 2 Features
  - Includes all IRC Level 1 features
  - Automatic room-equalization using 7-band parametric equalizer
  - Self-calibrating and self-configuring DSP software – no complicated microcontroller programming is required
  - Self-equalization coefficient generation for all sampling frequencies – 32 kHz, 44.1 kHz, 48 kHz, 96 kHz

Intelligent Room Calibration

The 60-second optimization process is quite simple. After setting up home theater equipment that includes Cirrus Logic's Intelligent Room Calibration software, the consumer will hold a microphone, provided by the equipment manufacturer, in the room location where viewing of home movies and listening of hi-fidelity audio takes place.

With a push of a button on the remote control, the Cirrus Logic IRC software sends test signals to the various speakers in the room. The microphone captures the test signals and makes any necessary adjustments to the AVR's audio commands regarding the distance between speaker and listening position, loudness, and frequency response of audio signals from each speaker.

When Cirrus Logic's IRC Level 2 technology (room equalization) is embedded in the processor, the system can be engaged to adjust audio frequencies from each independent channel, providing the user an ultra-high quality stereo or multichannel surround-sound experience.

The Cirrus Logic IRC technology includes two unique software algorithms: IRC Level 1 (speaker set-up software) and IRC Level 2 (room equalization software). These algorithms are available as an option in Cirrus Logic's flagship audio DSPs, the CS49500 and CS49400.

Since Cirrus Logic's IRC algorithm is running on only one of the two DSP cores on the CS49500 and CS49400 ICs, manufacturers can implement this feature without any system hardware changes and thereby differentiate their home theater products against their competition at similar price points.

During the speaker-set up process, (IRC Level 1), the timing of speaker output to the consumer's primary listening position is optimized. This is important, since multiple speaker placements are typically not equidistant to the consumer's favorite couch or recliner. Also, the sound

pressure level and bass redirection of each speaker are calibrated during this IRC Level 1 procedure.

The IRC Level 2 set up is designed as a super-set of the IRC Level 1, which means that it includes all the features of IRC Level 1 and additional features including a room equalization coefficient capability which compensates for the linear distortion that may occur in the speaker and room configuration. All IRC Level 2 procedures are handled by the DSP firmware itself, saving designers the hassle of significant microcontroller programming work that is required by other potential solutions.

Cirrus Logic's edge in delivering these robust consumer features is the result of the company's focus on digital entertainment technology, as opposed to the general purpose silicon architectures offered by many competitors.

IRC Performance Charts
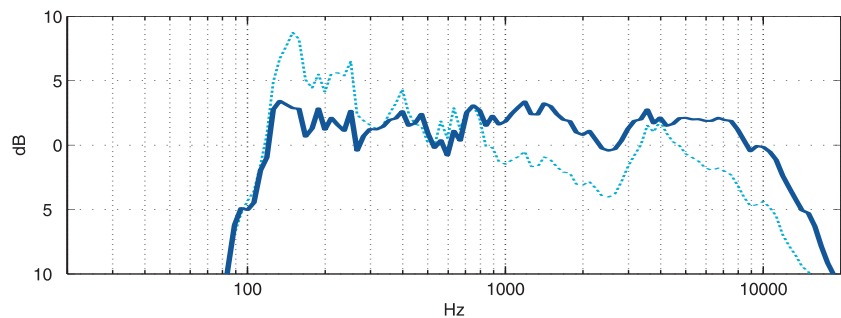
Dotted line indicates performance before calibration. Solid line indicates performance after calibration.
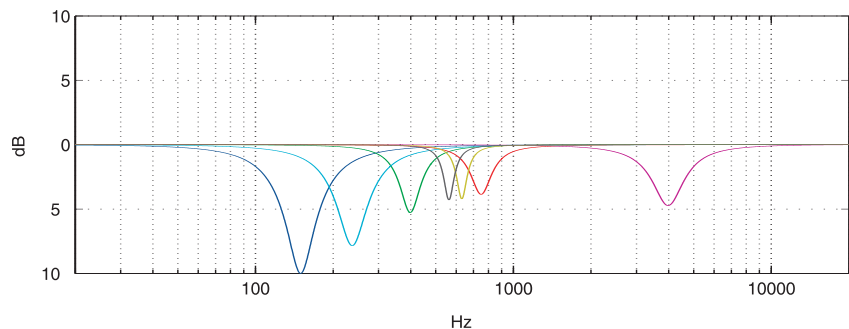
7-band equalizer characteristics after calibration.