

AudioSmart[®] 4-Mic Development Kit for Amazon AVS AudioSmart Product Brief

AudioSmart Fair-Field 4-Mic Development Kit for Amazon AVS with Synaptics Voice Processing and Alexa Wake Word

Product Overview

Synaptics' AudioSmart 4-Mic Development Kit for Amazon AVS features Synaptics' CX20924 Voice Input Processor with embedded far-field voice processing technology, Smart Source Locator™ (SSL) that detects the direction of a user, and preloaded Alexa™ wake word. For optimal audio quality for music and Alexa voice prompts, Synaptics' CX22721 Audio Playback CODEC is also integrated to power speakers. The kit is designed to help manufacturers and developers quickly and easily build smart home device prototypes that offer an ideal voice user experience.

Enabling speech recognition from a distance requires overcoming substantial acoustic challenges related to echo cancellation, background noise, microphone position, speaker placement and more. Synaptics' four-microphone voice processing solution is designed to recognize the Alexa wake word and deliver speech requests for processing, from anywhere in a room, even in noisy, real-world conditions. The solution also enables voice barge-in capabilities, allowing users to interrupt their Alexa device when it's playing sound.

The AudioSmart 4-Mic Development Kit for Amazon AVS reduces engineering time and costs associated with developing noise-robust voice-enabled devices.

The core component of the kit is Synaptics' AudioSmart CX20924 Voice Input Processor running its industry-leading far-field voice pre-processing software technology. The Synaptics far-field voice input processor system captures the user's voice from anywhere within the room, separates the voice commands from music and voice prompts being played out of the device, even with background noise present, and provides a clean audio signal to the speech recognition engine. This solution ensures that the speech recognition engine hears only the user's command, and nothing else - providing consistent accuracy and an ideal end-user experience.

The AudioSmart 4-Mic Development Kit for Amazon AVS is compatible with the Amazon AVS for Raspberry Pi (RPI) Project.

Features

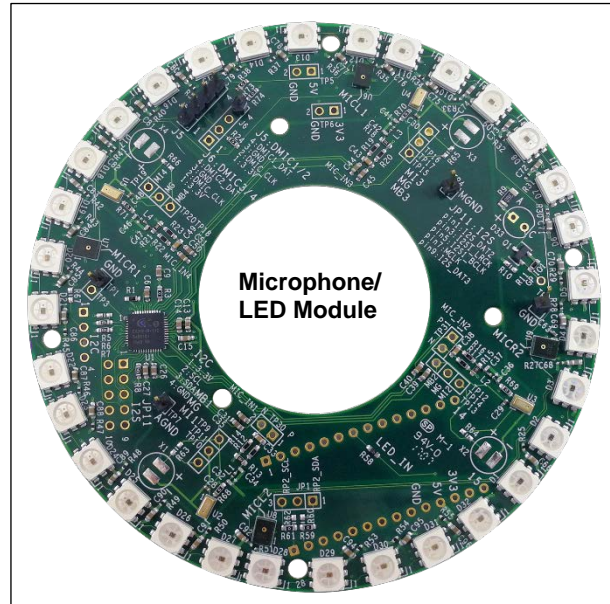
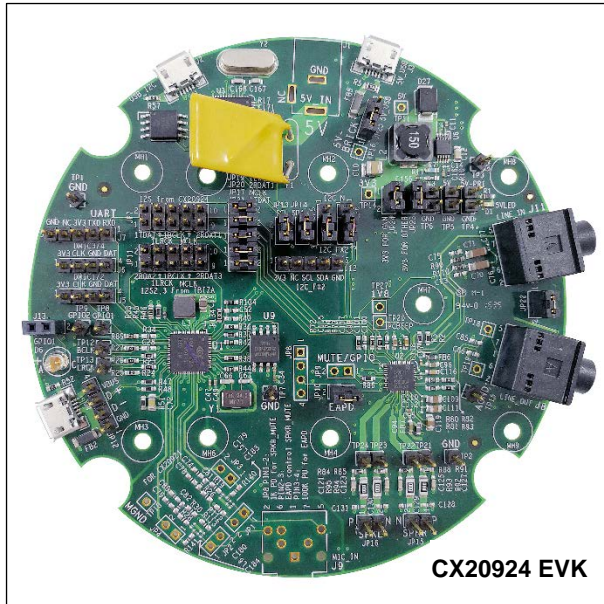
- Industry-leading far-field voice interaction with four microphones.
- Proprietary Smart Source Locator technology identifies direction of user 360-degrees around the device.
- Proprietary Smart Source Pickup™ (SSP) technology detects voice and cancels noise from all directions around the device (omnidirectionally), even if noise sources are from the same direction as the user.
- Enhanced noise suppression: Improved AVS speech recognition performance through improved suppression of non-stationary ambient noise sources such as TVs.
- Voice barge-in enabled by full duplex acoustic echo cancellation (AEC): detects the Alexa wake word even when the device is playing music or voice prompts loudly.
- Integrated voice trigger function that supports low system power Wake-on-Voice (WoV) function.
- Multiple Integrated Interchip Sound (I²S) serial data interfaces.
- High performance, 2W stereo class-D speaker amplifier with digital I²S I/O with I²C control.
- Inter-Integrated Circuit (I²C) serial control interface
- SPI for low-cost flash support.

Applications

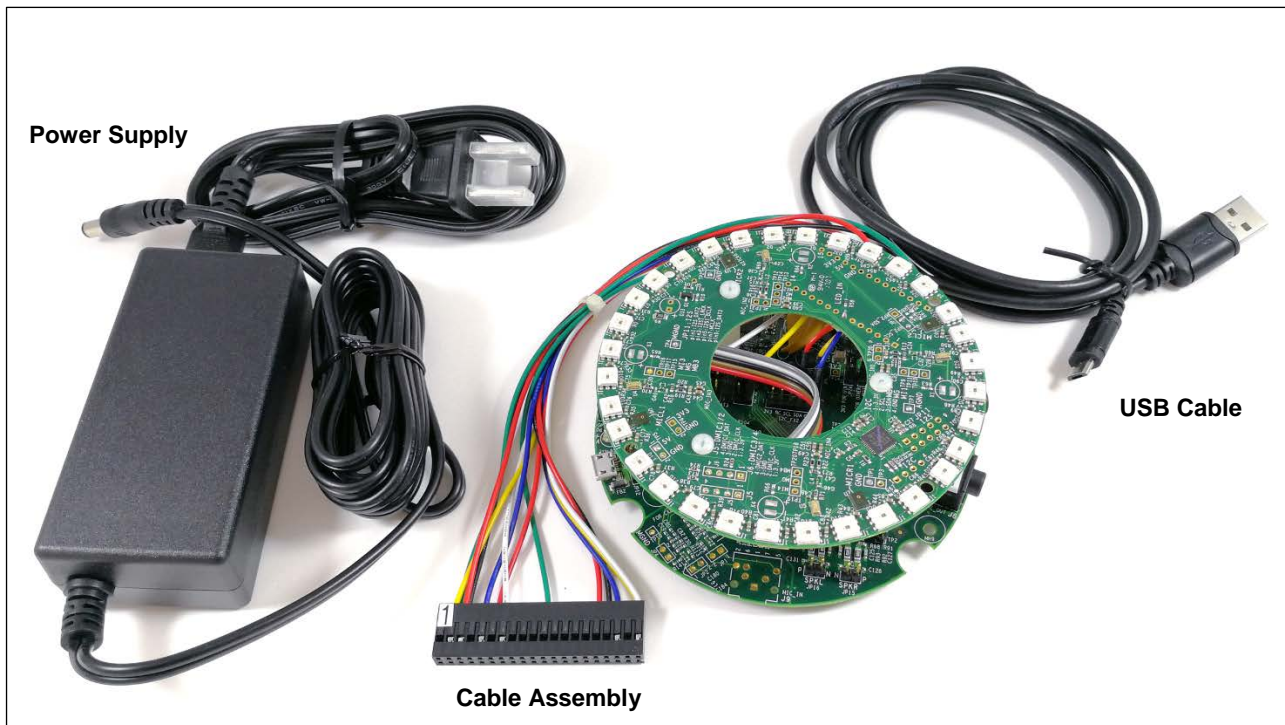
- Voice-controlled Smart TV/STB
- Home Gateway/Controller
- Smart Bluetooth/WiFi speaker
- Voice interactive smart appliance
- Internet of Things (IoT) devices

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Kit Contents



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Kit Contents Description

The Synaptics CX20924 AudioSmart 4-Mic Development Kit for Amazon AVS includes the following:

- CX20924 EVK, G600Z-C00691R40
- Microphone/LED module with four omnidirectional digital MEMS mics, G600Z-C00713R20
- USB cable
- Cable assembly
- +5V power supply for the CX20924 EVK

Note: Other components required for kit evaluation are the Raspberry Pi (RPi2) and powered loudspeakers. These items are not included in the kit.

AudioSmart 4-Mic Development Kit for Amazon AVS Specifications

Microphone Module/LED Features

Physical Characteristics

Dimensions (mm)	Radius 51.0 ± 10%
Operating temperature	125°C/0°C (Max/Min)

External Interfaces

Processed Voice Signal and Control (USB)	Output of CX20924 processing signal (J4). Also, control of the CX20924 is enabled in the firmware. Operates as a full-speed USB2.0 device.
I ² C slave	J2: Maximum clock frequency 1 MHz (fast mode plus). The I ² C connection is used to program the firmware on the CX20924 EVK.
Input Power (USB or Brick)	Input power requirement: <ul style="list-style-type: none"> • 5V, min 4A • USB (J3) • Brick (J1) Power connection is only required via J3 or J1, but not both.
SPI Master	Maximum clock frequency up to 50 MHz. See product Application Note for list of supported SPI Flash devices. U9 is the SPI Flash component used to store CX20924 firmware.
UART	J7: Maximum baud rate up to 1.5625 Mbps.
GPIO1/2	<ul style="list-style-type: none"> • GPIO1: For WoV function that toggles to wake external device when the CX20924 recognizes an audio wake trigger event. Used for low-power embedded trigger mode. • GPIO2: GPIO multiplexed with I²S TX CLK 2.
Master Clock	Set to 12.888 MHz by the firmware.

Input Audio Characteristics

DMIC	Supports four PDM digital microphones using two stereo data pins, stereo operation, and independent sample rates from 8 kHz to 96 kHz.
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Output Audio Characteristics


CX22721 Playback	Synaptics' AudioSmart I ² S CODEC: <ul style="list-style-type: none"> • Supports AVS playback stream for speech and music content via an I2S connection from the RPi2 to the CX22721 device. • Linux driver is required for the RPi2. Follow the instructions provided in the Synaptics AudioSmart 4-Mic Development Kit for Amazon AVS (005UGR0x). • Provides echo reference signal to the CX20924 device. • The CX22721 device is controlled via the RPi I2C interface. • Supports powered speakers or passive speaker: <ul style="list-style-type: none"> ○ J8: Labeled as LINEOUT to connect to Powered Speakers. ○ JP15 and JP16 to connect to passive 4-ohm or 8-ohm speakers. Make sure to note the speaker's polarity.
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Ordering Information

Distributor	URL	Part Number	Description
Arrow Electronics	https://www.arrow.com/en/products/ds20924-evk/conexant-systems	DS20924-EVK	AudioSmart 4-Mic Development Kit, for Amazon AVS

The devices in this publication are lead-free (Pb-Free) and China RoHS compliant. 

Contact your local Synaptics sales office for advanced software options.

To learn more about Synaptics and its development kit, please visit <http://synaptics.com/partners/amazon/ds20924>

To learn more about Amazon Alexa Voice Service and access the Amazon AVS API reference guide, visit:

<https://developer.amazon.com/alexa-voice-service/>

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