

## AudioSmart® 2-Mic Development Kit for Amazon AVS

### AudioSmart Product Brief

## AudioSmart Hands-Free 2-Mic Development Kit for Amazon AVS with Synaptics Voice Processing and Alexa Wake Word

### Product Overview

Synaptics' AudioSmart® 2-Mic Development Kit for Amazon AVS features Synaptics' CX20921 Voice Input Processor with embedded hands-free voice processing technology and preloaded Alexa™ wake word. 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' dual-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 2-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 CX20921 Voice Input Processor running its industry-leading hands-free voice pre-processing software technology. The Synaptics hands-free 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 2-Mic Development Kit for Amazon AVS is compatible with the Amazon AVS for Raspberry Pi (RPI) Project.

### Features

- Cost-effective hands-free voice interaction with only two microphones
- 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
- Best-in-class voice barge-in is enabled by full duplex stereo acoustic echo cancellation (AEC) that detects the Alexa wake word even during loud playback of music or voice prompts
- High-dynamic range analog-to-digital converters (ADC) optimized for hands-free voice applications, supports connections to analog microphones and PDM interfaces for connection to digital MEMS microphones
- Integrated voice trigger function that supports low system power Wake-on-Voice (WoV) function
- Multiple Integrated Interchip Sound (I<sup>2</sup>S) serial data interfaces
- Inter-Integrated Circuit (I<sup>2</sup>C) serial control interface
- SPI for low-cost flash support

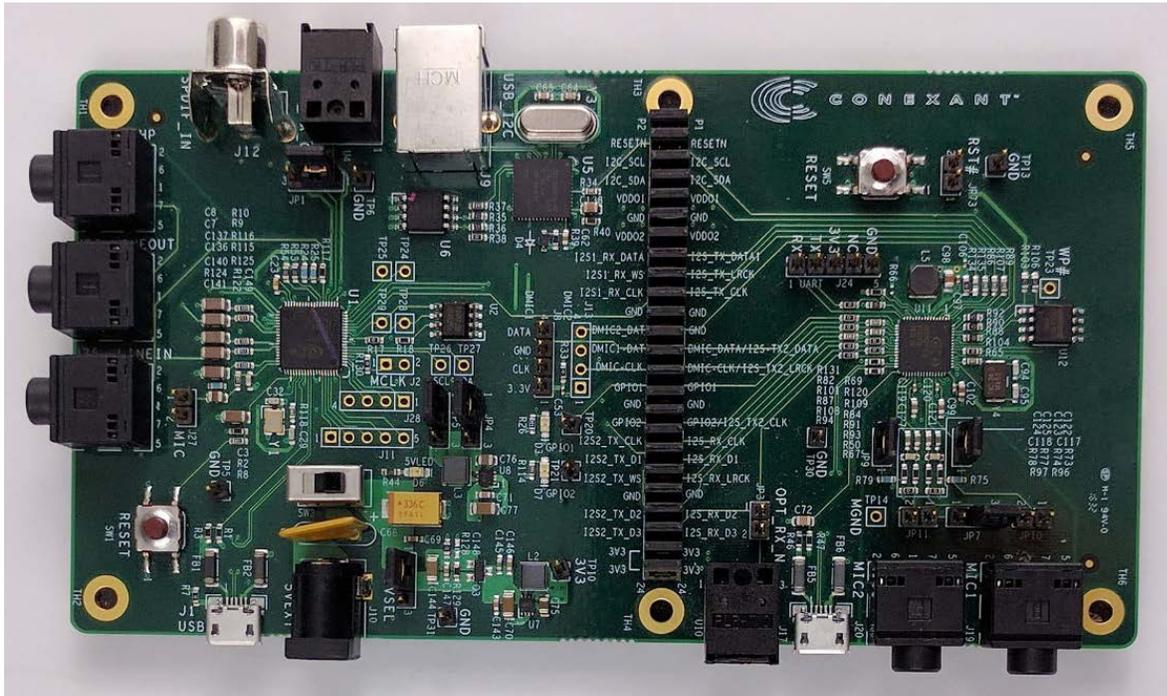
### Applications

- Home Smart appliances
- Home Gateway/Controller
- Lighting
- Speaker/Sound Bar
- Telepresence
- TV/Set-Top Box
- Internet of Things (IoT) devices

# AudioSmart® 2-Mic Development Kit for Amazon AVS

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### AudioSmart 2-Mic Development Kit for Amazon AVS Evaluation Board



### Kit Contents

The Synaptics CX20921 AudioSmart 2-Mic Development Kit for Amazon AVS includes the following:

- CX20921 Evaluation Board, G600Z-C00647R30
- Microphone module with two omnidirectional mics
- Microphone holder board
- Stereo 3.5mm male-to-male audio cable
- Micro-USB cable
- Type A to Type B USB cable
- Cable assembly
- +5V power supply for the CX20921 Evaluation Board

**Note:** Other components required for board evaluation are the Raspberry Pi (RPi3) and powered loudspeakers. These items are not included in the kit.

# AudioSmart<sup>®</sup> 2-Mic Development Kit for Amazon AVS

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### AudioSmart 2-Mic Development Kit for Amazon AVS Specifications

#### Physical Characteristics

Dimensions (mm)	78 x 147 x 1.6 ± 10%
Operating temperature	125°C/0°C (Max/Min)

#### External Interfaces

USB	Full speed USB2.0 Device, supporting up to five fully configurable endpoints.
I2C slave	J9: Maximum clock frequency 1 MHz (fast mode plus). The I <sup>2</sup> C connection is used to program the firmware on the CX20921 Evaluation Board.
I2S-to-USB Playback CODEC	<ul style="list-style-type: none"> <li>• Two channel I<sup>2</sup>S out available through pin multiplexing.</li> <li>• Sample rate support from 8 KHz to 192 KHz.</li> <li>• Independent clock source</li> <li>• (U1) Routes processed microphone signals to Amazon AVS. Mic signals are processed via AudioSmart hands-free voice input processing software.</li> </ul>
SPI Master	Maximum clock frequency up to 50 MHz. See product Application Note for list of supported SPI Flash devices. U12 is the SPI Flash component used to store CX20921 firmware.
UART	J24: Maximum baud rate up to 1.5625 Mbps
GPIO1/2	<ul style="list-style-type: none"> <li>• GPIO1: For WoV function that toggles to wake external device when the CX20921 recognizes an audio wake trigger event. Used for low-power embedded trigger mode.</li> <li>• GPIO2: Generic GPIO</li> </ul>
Master Clock	Default: Off

#### Audio Characteristics

ADC	Two high performance ADCs with preamplifiers. Supports sample rates from 8 to 96 KHz.
ADC low power mode	An enhanced mode that enables reduced power consumption.
ADC Performance	<ul style="list-style-type: none"> <li>• Dynamic range: 106 dB at 0 dB</li> <li>• THD -84 dB at -1 dBFS</li> </ul>
Microphone Bias	Two microphone bias support

#### Microphone Module Features

Microphone holder board dimensions	38.1 x 147.32 x 1.6 ± 10%
Operating temperature	125°C/0°C (Max/Min)

#### Microphone Module

Specifications	<ul style="list-style-type: none"> <li>• Two stereo omnidirectional microphones</li> <li>• Microphones are connected via 3.5 mm male audio cable to J19</li> </ul>
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#### Connectors

Stereo 3.5 mm male-to-male audio cable	J25: Sends the audio response from the Amazon AVS to the CX20921 Evaluation Board. Audio response is routed to the powered speakers via the I2S-to-USB Playback CODEC.
Micro-USB cable	J1: Sends the processed microphone signal to the Amazon AVS.
Type A to Type B USB cable	J9: Used to flash the CX20921 Evaluation Board with firmware.
Cable assembly	P2.pin 14/P2. pin 15: Connects GPIO1/GND pins from EVK to host processor board (such as the Raspberry Pi).

#### Power Supply

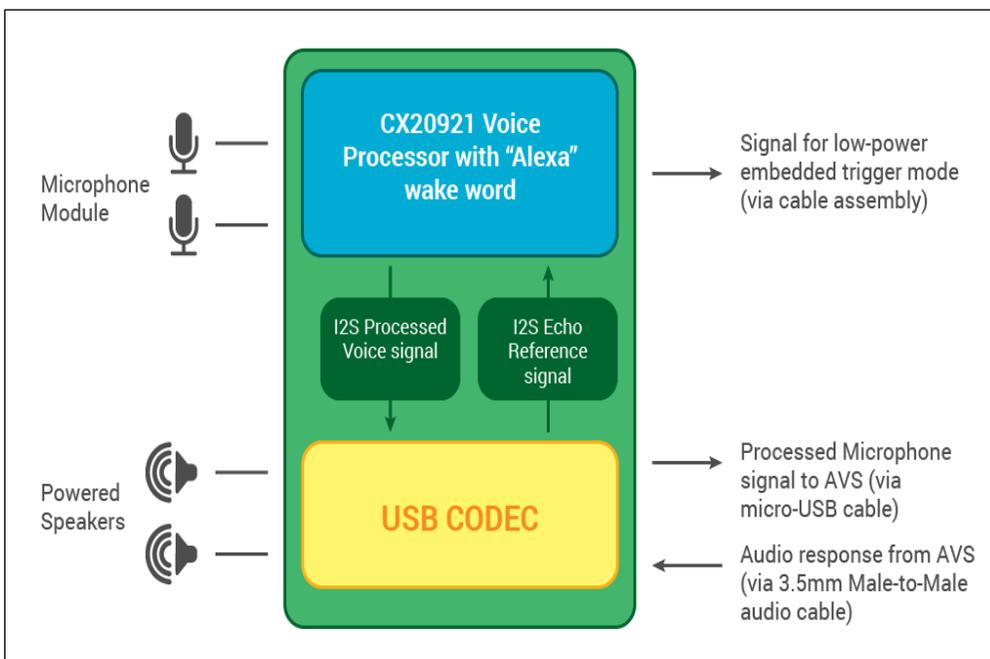
Power Supply input power	5V, min 2A
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AudioSmart 2-Mic Development Kit for Amazon AVS Components



CX20921 Evaluation Board Block Diagram



# AudioSmart® 2-Mic Development Kit for Amazon AVS

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### Ordering Information

Distributor	URL	Part Number	Description
Arrow Electronics	<a href="https://www.arrow.com/en/products/ds20921-evk/conexant-systems">https://www.arrow.com/en/products/ds20921-evk/conexant-systems</a>	DS20921-EVK	AudioSmart 2-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 <https://www.synaptics.com/partners/amazon/ds20921>

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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### About Synaptics

Synaptics is the pioneer and leader of the human interface revolution, bringing innovative and intuitive user experiences to intelligent devices. Synaptics’ broad portfolio of touch, display, biometrics, voice, audio, and multimedia products is built on the company’s rich R&D, extensive IP and dependable supply chain capabilities. With solutions designed for mobile, PC, smart home, and automotive industries, Synaptics combines ease of use, functionality and aesthetics to enable products that help make our digital lives more productive, secure and enjoyable. (NASDAQ: SYNA).

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