ESTONE TECHNOLOGY

i.MX8M Voice Control Solutions

AGENDA

- Processor Platform
- Voice Capture Technology
- Estone Voice Control Reference Design
- Software Platform
- Estone Voice Control Solutions
- Work with Us

“Estone Technology’s i.MX8M voice control solution is based on NXP’s latest ARM Cortex-A53 processor, Cirrus Logic Smart Codec with built-in voice capture DSP and Sensory's TrulyHandsfree wake word engine. It takes the advantages of the NXP’s imx-alexa-sdk support for Yocto embedded Linux for rapid product development, both for IoT devices and smart touch panels.

PROCESSOR PLATFORM

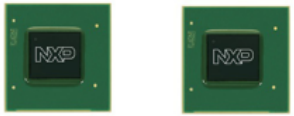
i.MX 8M Family – Applications Processor:

- Up to four 1.5 GHz Cortex-A53 processors
- Cortex-M4 for real time requirements
- Highest levels of pro audio fidelity
- Voice Solutions
- 10-15 Years Long Life Cycle Support
- i.MX Applications Processor Scalability
- Evolution of the successful i.MX 6 Series

SCALABLE SOLUTIONS FOR THE BROAD MARKET

i.MX 8M Quad Family

A53 GPU M4



i.MX 8M Quad
i.MX 8M Dual

i.MX 8M
QuadLite

Pin Compatible

Advanced Audio, Voice, 4K Video, 3D GPU, ML, Broad Connectivity

i.MX 8M Mini Family

NEW

A53 GPU M4

i.MX 8M Mini
Quad/Dual/Solo

i.MX 8M Mini
QuadLite/Dual
Lite/SoloLite

Pin Compatible

Advanced Audio, Voice, 1080p Video, 3D GPU, Power Efficient 14FF

i.MX 8M Nano Family

NEW

A53 GPU M7

Next

Pin Compatible

Next

Software Compatible (including GPU Tools)

High-end ($$$) => Mid-end ($$) => Low-end ($)

I.MX 8M FAMILY FOR EMBEDDED APPLICATIONS

Family Name	i.MX 8M Quad/QuadLite i.MX 8M Dual/DualLite	i.MX 8M Mini Quad/QuadLite i.MX 8M Mini Dual/DualLite i.MX 8M Solo/SoloLite
Main CPU	2x or 4x Cortex-A53 @ 1.5 GHz, 1MB L2	**1x**, 2x or 4x A53 @ **1.6-2.0 GHz**, **512KB L2 cache**
Microcontroller	Cortex-M4 266MHz	Cortex-M4 **400MHz**
DDR	x16/x32 LPDDR4/DDR4/DDR3L	x16/x32 **(x32 for PoP LPDDR4)** LPDDR4/DDR4/DDR3L
GPU	GC7000Lite (4 shader), OpenCL	**GC NanoUltra 3D (1 shader) + GC320 2D**
Display Features	4K HDR, DCSS, LCDIF	**LCDIF**
Display Interfaces	1xMIPI-DSI, HDMI 2.0a Tx (ARC) **+ eDP**	**1x MIPI-DSI**
Video Playback (Decode)	4Kp60 HEVC H.265, VP9, H.264	1080p60 HEVC H.265, VP9, H.264, VP8
Audio Interface	**20x I2S TDM (32b @384KHz)**	**20x I2S TDM (32b @384KHz)**
Digital Microphone Input	-	**8ch PDM DMIC input**
Camera Interface	2x MIPI-CSI (4-lanes each)	**1x** MIPI-CSI (4-lanes)
USB	2x USB3.0 Type C	2x USB**2.0**
Ethernet	1x GbE	1x GbE

BEST IN CLASS AUDIO PLAYBACK PERFORMANCE

i.MX8M's Audio Block:

- Supports 20 channels in/out all at 32bit 384KHz, and
- Could even support 768KHz on a smaller number of channels
- 6 external ports (6 SAI) asynchronous multi-format ports
- SPDIF Tx and Rx
- HDMI Audio Return Channel (ARC)
- DSD support for up to DSD512 5.1 channels
- Enough performance on the Cortex-A53 NEON to decode even the most complex streams (like Dolby Atmos, DTS:X, etc)

TARGET CONSUMER APPLICATIONS: MEDIA IOT

Video Streaming

- By 2018 IP video will represent 79% percent of all global traffic (source: Cisco)
- Cord cutting momentum shifts markets from traditional STB to OTT (over-the-top IP based video on demand)
- 4K and HDR driving need for updated equipment – Amazon, Google Chromecast, Roku, and MSOs drive volume – Key specs are video quality and low power.

Voice

- 25-30% of ALL internet searches today are initiated by voice commands, and this number is growing rapidly (source: Google)
- Industry partnerships with major players such as Google, Amazon, Apple Homekit drive consumer adoption.
- Developer reference platforms to speed time-to-market.

Audio Streaming & Immersive Audio

- With TV Panels are getting slimmer, audio is being separated into separate sound bars.
- Also, DSP migration to ARM driving system architecture change for immersive audio.
- Fast migration of Bluetooth speakers to Networked Wifi Speakers with the advent of voice control (always connected, always ready to answer).

Smart Home

- Surge of IOT and voice control are revolutionizing the smart home. Machine learning and Artificial Intelligence (AI) to drive this market even higher.
- Many home appliances are adding voice or other smart controls
- Major ecosystems to drive all the growth.

I.MX 8M INDUSTRIAL TARGET APPLICATIONS

Imaging and Scanning

- Portable platforms need faster response and battery life that exceeds a work shift (12 hours)
- Sensor module targets are now below 10 cubic millimeters
- Durable products operate more than 10 years in an unconditioned environment (-40C to +85C ambient)

Human Machine Interface (HMI)

- Industrial workers expect to use rich graphics and video on higher resolution displays, similar to their personal devices
- Time is money – the HMI must respond accurately, and in milliseconds, to voice, touch screen and gesture inputs
- Efficient development leverages scalable performance and reusable software across multiple product platforms

Building Automation

- Mobile and stationary machines want full access to cloud- based knowledge
- This demands increasingly faster and more reliable wired and wireless connectivity
- Security is at the forefront, to protect human privacy and commercial assets

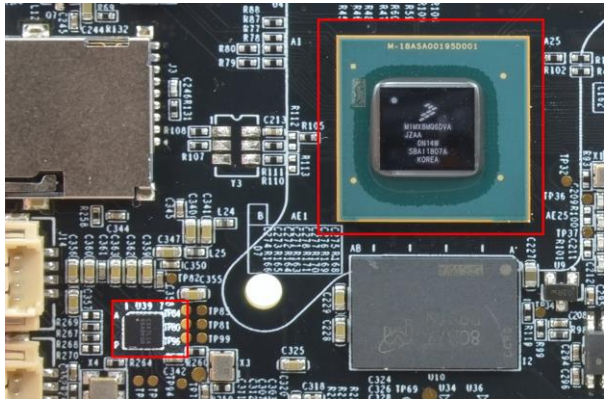
Machine Vision

- Machines “see” through multiple camera and sensor inputs
- Developers prefer to migrate away from DSPs and ASICs to leverage well-supported GPU and ARM technology
- Software tools and reference designs enable advanced math processors (GPU, ARM NEON) for faster image processing

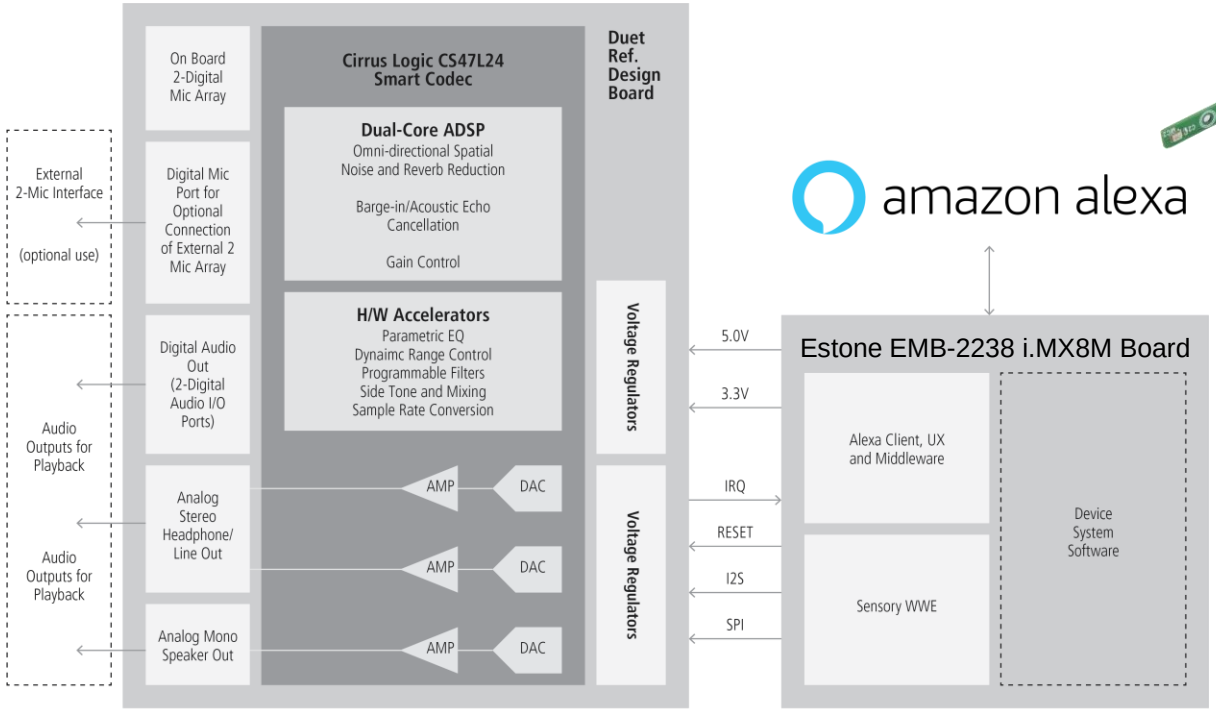
VOICE CAPTURE TECHNOLOGY

Cirrus Logic CS47L24 Smart Codec:

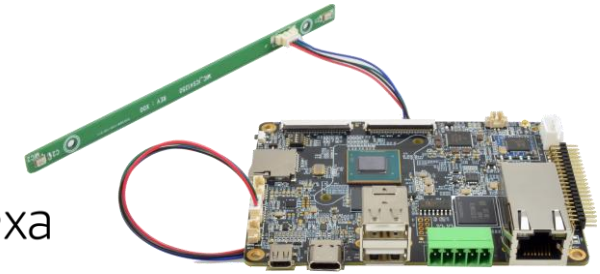
- High performance audio hub codec
- Advanced 300 MIPS dual core DSP
- Dual digital MEMS microphones
- Sensory's TrulyHandsfree™ wake word engine tuned to "Alexa"
- SoundClear® algorithms for voice capture, noise suppression, and echo cancellation



ESTONE AMAZON AVS DEVICE DESIGN WITH CS47L24

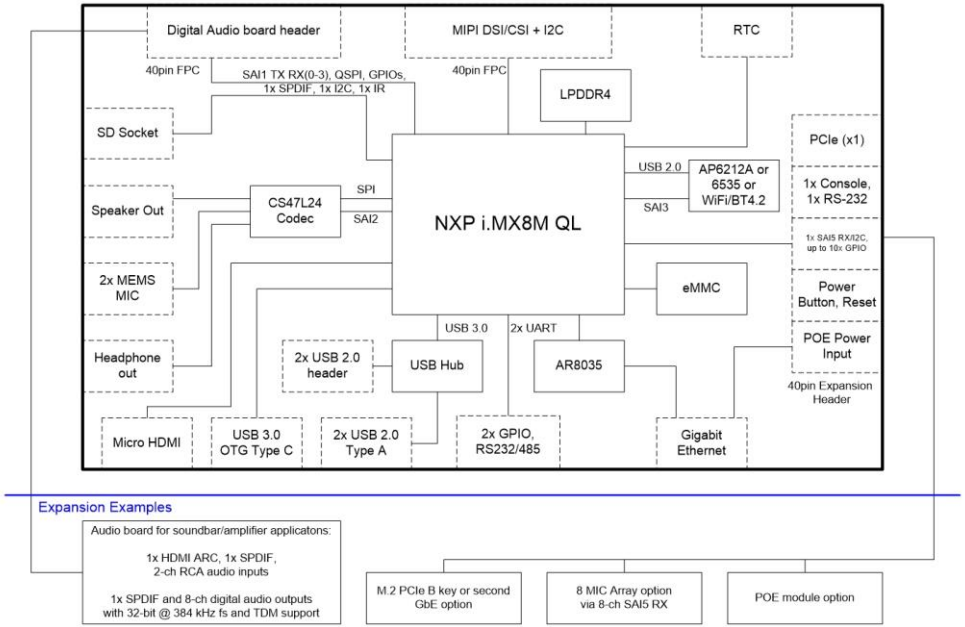


amazon alexa



ESTONE VOICE CONTROL REFERENCE DESIGN

EMB-2238 Block Diagram

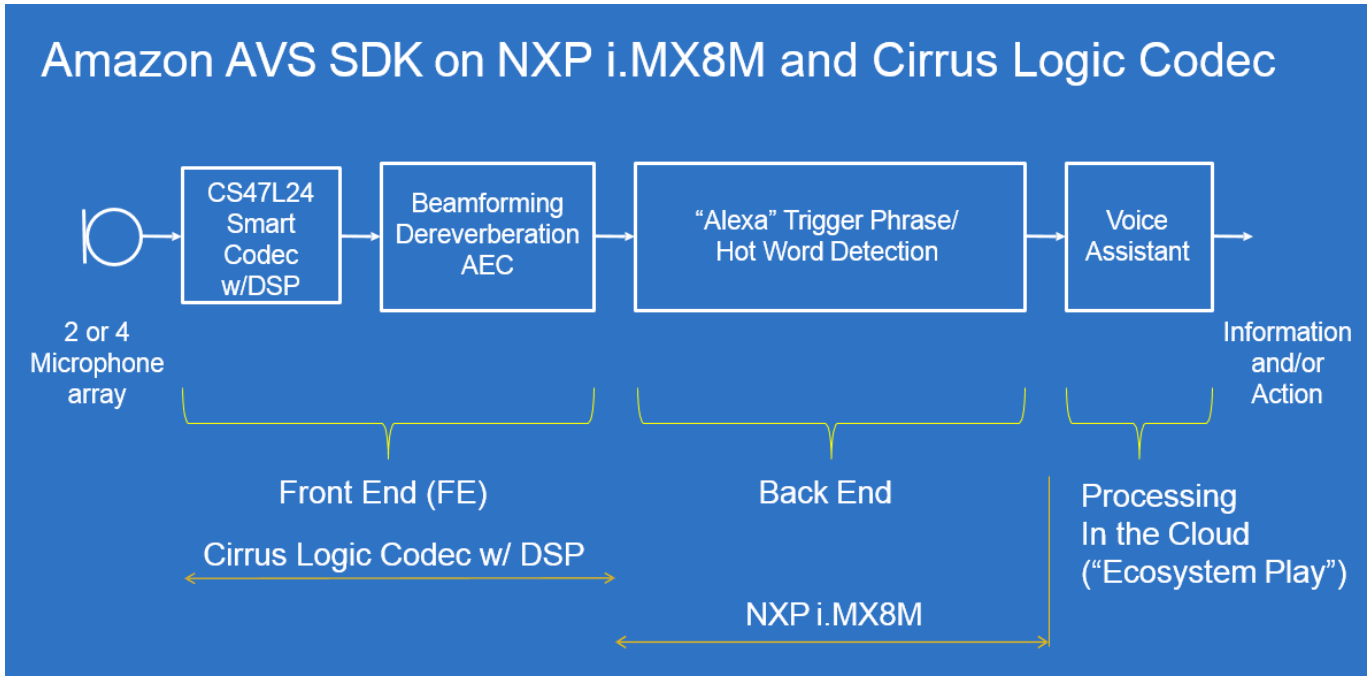


ESTONE REFERENCE BOARD EMB-2238

EMB-2238 Features:

- NXP i.MX8M 1.5 GHz Quad Core Processor
- One Gigabit Ethernet ports, one WiFi/Bluetooth module
- MIPI DSI for LCD panel, built-in I2C touch panel support
- Build-in POE (Power over Ethernet) and POE+ option
- Supports audio expansion of 10-Ch in and out all at 32bit 384KHz based on SPDIF and QSPI
- Up to 10 x GPIO, 4 x I2S in, PCIe x 1, 2x UART I/O expansion

SOFTWARE PLATFORM

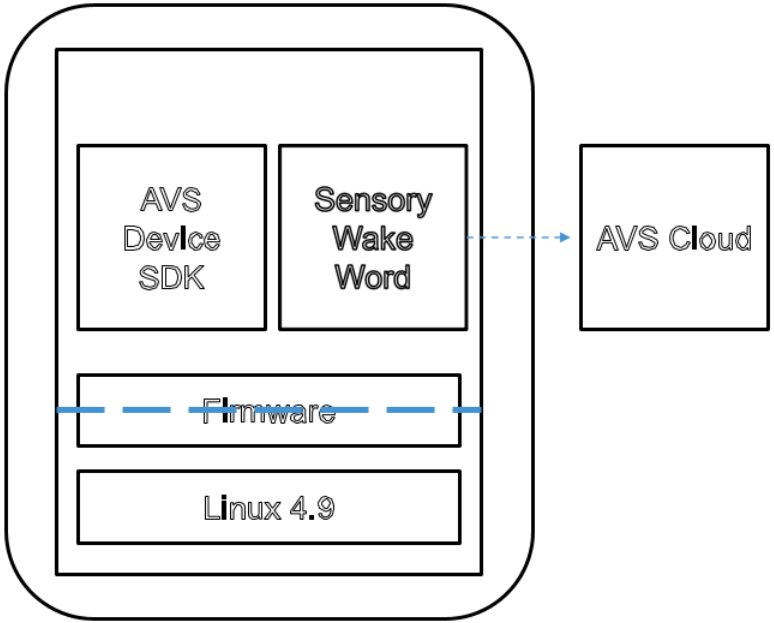


amazon alexa

Linux

yocto PROJECT

NXP YOCTO LINUX IMAGE & SOURCE



meta-avs-demos (Yocto meta layer)
https://source.codeaurora.org/external/imxsupport/meta-avs-demos

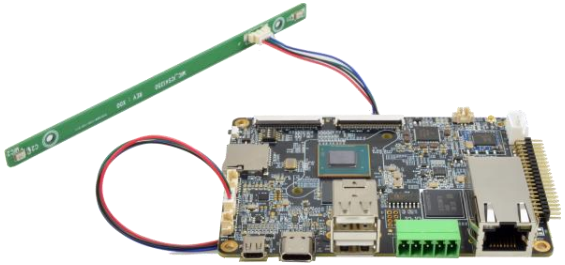
- Include with EMB-2238 NXP i.MX8M BSP
- Allows to build the AVS SDK or install it at runtime.
- Includes Sensory WakeWord at runtime

BUILT FOR ADVANCE DIGITAL AUDIO APPLICATIONS

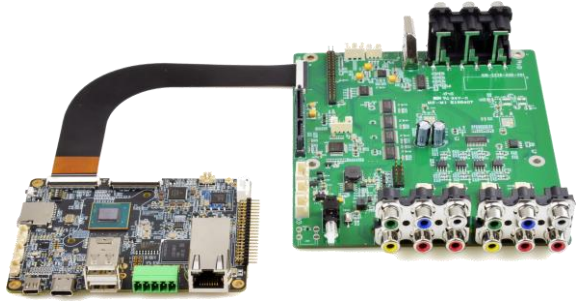
High Performance Audio Input and Streaming Solution Powered by EMB-2238:

8-Ch digital and analog audio out, analog and, HDMI ARC In, one SPDIF in and out, all at 32bit 384KHz

ESTONE VOICE CONTROL SOLUTIONS



Reference Design with MEMS microphones



Audio Board Reference Design

Box PC System

Touch Panels Computers

ESTONE PRODUCT DEVELOPMENT PROCESS

PRD

- Marketing spec
- Feasibility analysis

Planning

- Establish project development team
- Kick-off meeting
- Release product spec
- Planning
- Release CCL, project code
- Create development plan
- P2 review meeting

Design

- System mechanical, schematics, software design
- Create EVT test plan
- DFX review
- Layout review
- Release BOM, AVL
- Prepare materials
- Evaluate BOM cost
- P3 review meeting

EVT

- EVT build/assembly
- Power on test
- Power test
- Signal integrity test
- System integrated test
- Agency & safety test
- Debug & update design
- Product review
- Create DVT test plan
- Update BOM, AVL
- Prepare materials
- Evaluate BOM cost
- P4 review meeting

DVT

- EVT build
- Power on test
- Power test
- Signal integrity test
- System integrated test
- Agency & safety test
- Reliability test
- Debug & update design
- Product review
- Create PVT test plan, SOP
- Update BOM, AVL
- Prepare materials
- Evaluate BOM cost
- P5 review meeting

PVT

- Prepare RTP package
- PVT build
- System regression test
- Agency sampling test
- Update product cost & quote
- Create MP test plan, SOP
- P6 review meeting

MP

- Mass production
- Sustaining

WORK WITH US

Take Advantage of:

- Strong OEM/ODM Services
- Proven Embedded PC Platform
- Expertise in Linux and Driver Development
- Partnership with World Industry Leaders
- Designed and Manufactured in China
- Dedicated Design Team for Embedded Board and System
- Local Sales, Tech Support and Project Management

THANKS!

Any questions?

You can find us at

www.estonetech.com