

Qualcomm

# Qualcomm® MAPX Series CSRA67xxx

**Family of versatile, programmable audio processing SoCs to help design a range of products from entry-level to high-end.**

The MAPX series of audio SoCs is extremely versatile, supporting developers in designing a wide variety of end products with minimal incremental PCB design effort.

The MAPX family is a portfolio of integrated, high-performance audio SoCs, embedding three audio DSP cores, memory and a multitude of digital and high quality analog audio inputs and outputs.

The seven sub-families vary by the level of embedded DSP, RAM and number of on-chip analog and digital audio I/O interfaces. MAPX SoCs are designed to be software compatible with each other and pin-to-pin compatible in the same package. This compatibility helps manufacturers to reduce their development time, by using the same hardware and software base when designing for the entire range of end-products from entry-level to high-end.

The USB interface supports digital audio file playback and firmware updates from USB storage devices and the integrated USB PHY is designed to connect directly without external active components.

With integrated high resolution audio PWM modulator technology, MAPX processors are designed to directly connect to up to 8 digital class-D amplifiers, helping to remove the cost of external PWM modulators. Alternatively, the embedded high performance DACs are designed to connect directly to analog (linear) amplifiers helping to remove the cost of external DACs.

## Solution Highlights

### Family concept for device compatibility

The MAPX series of SoCs includes seven sub-families that are available in one of two pin-compatible package types. The entire family of MAPX SoCs are designed to be software compatible, to help make it easier for developers to switch between different devices to create unique products with varying feature sets.



### Extensive range of processing technologies available

MAPX audio processors include a range of processing technologies, including the royalty-free Qualcomm® meloD™ audio processing suite, extensive lip-sync audio delay and third party processing from Dolby, DTS and others.



### Maximum differentiation with almost unlimited flexibility

Helping manufacturers to realize maximum differentiation with the DSP code download option and Customizable Modular Processing (CMP), MAPX supports custom algorithms and filters by providing a C-language SDK.



### Highly integrated audio SoCs

With 9MB embedded RAM and 3 DSP cores (432MHz), the highest grade MAPX family SoC is engineered to provide capability for HD audio decoding and up to 192kHz internal processing chain. The device is also designed to integrate high quality analog audio inputs and outputs, multiple SPDIF and I2S interfaces, USB, I2C, SPI and UART.





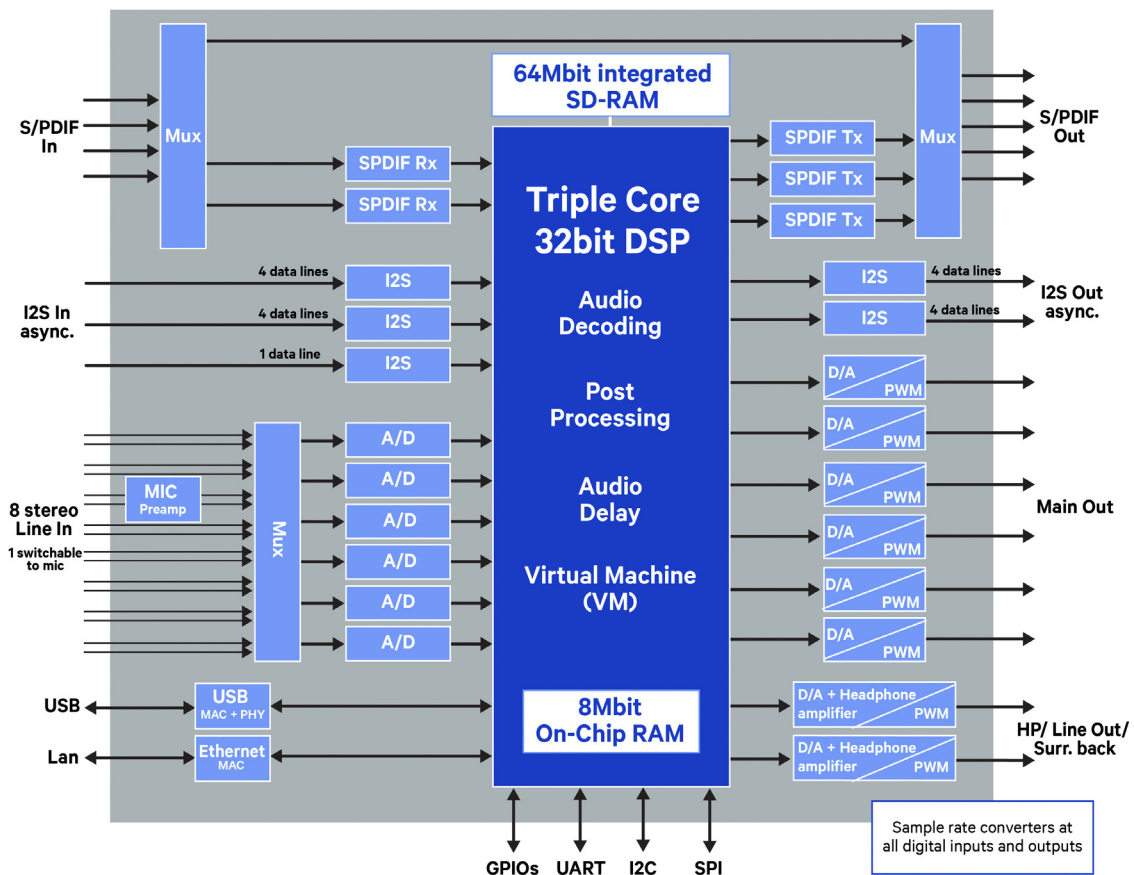
## MAPX Target Applications

- Home Theaters
- Entry Level AVRs
- Networked Mini Systems
- Soundbars
- Speakers

## Features

- 3 DSP cores 2x 32bit MAC per cycle, each core running @ up to 432MHz equals 3 x 432 MIPS x 2 = 2592 MIPS total
- HD Audio Decoding (DTS-HD, Dolby TrueHD, FLAC)
- High-Resolution Audio Processing
  - 32bit 192kHz internal processing designed to outperform 96/24 and 192/24 processing
  - Variety of pre-programmed processing blocks available from Qualcomm Technologies International, Ltd. and third parties
  - Programmable DSP - customers can port their own algorithms
- Audio Delay (for Audio/Video sync)
- Audio Playback from USB - includes mp3 + WMA9 + FLAC decoders
- RAM integrated - no external RAM necessary
- 2 Control Modes:
  - via I2C from external MCU
  - via integrated Virtual Machine (makes an external MCU obsolete)
- High performance ADCs @ up to 108dBA SNR and DACs @ up to 110dBA SNR
- Integrated PWM modulators – to drive Class-D Power Stages
- I2S and SPDIF inputs and outputs

## MAPX Block Diagram CSRA6718x (Smaller variants are available with reduced functionality - see SoC Variants table)





## MAPX Series

Family of versatile, programmable audio processing SoCs to help design a range of products from entry-level to high-end.

### CSRA67xxx SoC Variants

	MAPX 5-Series	MAPX 6-Series	MAPX 7-Series	MAPX 8-Series
	CSRA6705x CSRA6715x	CSRA6706x CSRA6716x	CSRA6707x CSRA6717x	CSRA6718x
DSP Cores	3	3	3	3
DSP MHz (each Core)	324MHz	370MHz	370MHz	432MHz
DSP MIPS (2x 32-bit MAC per cycle)	972MIPS x2 = 1944 MIPS total	1110MIPS x2 = 2220 MIPS total	1110MIPS x2 = 2220 MIPS total	1296MIPS x2 = 2592 MIPS total
RAM Total (Data RAM, Instruction RAM)	512KBytes	1024KBytes	1024KBytes	1024KBytes + 8192KBytes
Audio Playback / Updates from USB Stick	CSRA6715x only	CSRA6716x only	CSRA6717x only	Yes
Analog Input Pairs (MUX)	3	3	8	8
ADCs / DACs	2/4	6/4	6/8	6/8
DACs Switchable to PWM Output	0	0	8	8
Package	QFN64	QFN64	LQFP144	LQFP144

### Available Pre-programmed Audio Processing Modules

- meloD suite:
  - meloD MATRIX (Upmixer, Matrix Decoder)
  - meloD VOICE+ (Voice Enhancer)
  - meloD AROUND Pro (Virtualizer)
  - meloD BASS+ (Bass Enhancer)
  - meloD NIGHT+ (Night Listening Mode)
  - meloD VOLUME+ (Automatic Volume Leveler)
  - meloD SOUNDFIELD+ (Room Simulator)
- Audio Delay (for Audio/Video sync)
- Bass Management
- Tone Control (Bass/Treble/Loudness)
- Graphic Equalizer
- Parametric Equalizer
- Biquad Filter
- FIR Filter
- Multiband Dynamic Range Compressor
- Multiband Output Limiter
- Volume control & Master Volume control
- Multichannel Mixer blocks
- Speaker Downmix
- Signal Generator and Analyzer
- 2- and 3-Way Active Crossover
- Tab Delay
- Audio Playback & Firmware Update from USB
- FLAC decoding from USB
- WAV file playback from USB

### Available Only to Licensees of the Respective Technology

- Dolby TrueHD
- Dolby Digital
- Dolby Digital Plus
- Dolby Digital EX
- Dolby ProLogic IIx
- Dolby ProLogic II
- Dolby Volume
- Dolby Virtual Speaker
- Dolby Headphone
- DTS-HD (M6)
- DTS Digital Surround 96/24 (DTS Core Decoder)
- DTS Virtual:X
- DTS StudioSound II
- DTS:NEO6
- DTS TruVolume HD (Multichannel)
- DTS TruSurround HD and HD4
- WMA-9 decoding from USB
- mp3 decoding from USB
- AAC-LC, HE-AAC
- ZIRENE SOUND - Audio Enhancement by AM3D (via Qualcomm® eXtension program)
- HFFx - High Frequency Effect for restoring and enhancing audio bandwidth by Oxford Digital Limited (via Qualcomm eXtension program)

To learn more visit: [qualcomm.com](http://qualcomm.com)

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