

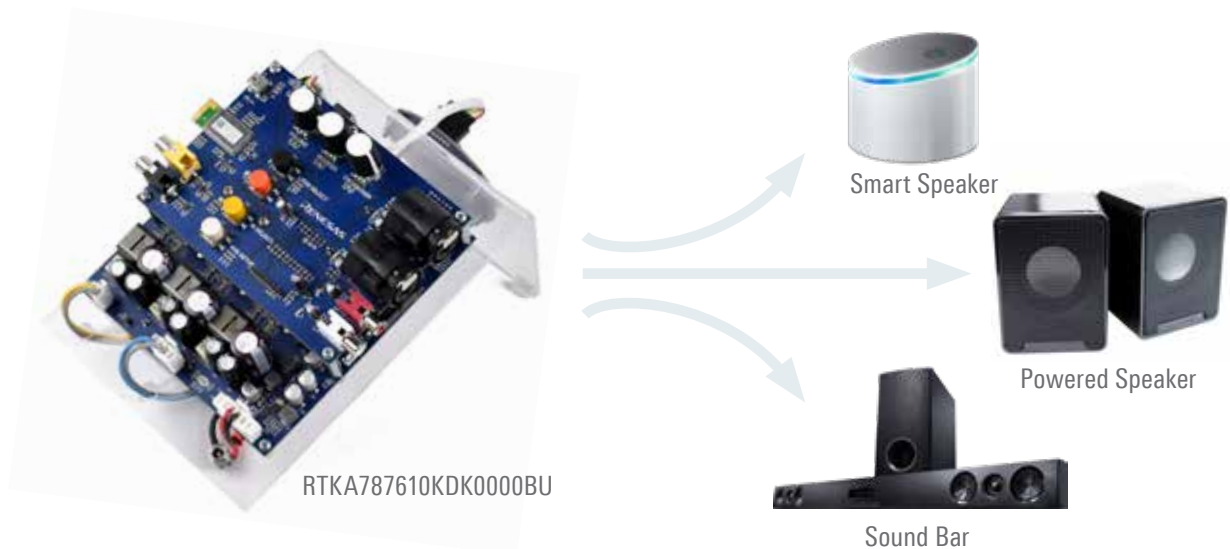
# AUDIO SYSTEM SOLUTIONS

A wide range of digital sound processing SoCs, MCUs, and analog and power devices providing a complete solution for superior smart speakers, sound bars and powered speakers



## 3-IN-1 AUDIO SYSTEM REFERENCE DESIGN

Turn key, ready to use reference design available for audio system developers. By adding or deleting design blocks, the same reference design can be configured as a Smart Speaker, Sound Bar, or Powered Speaker.



# AUDIO SYSTEM REFERENCE DESIGN

## Amplifier Board Key Features

### SKAA Wireless Output

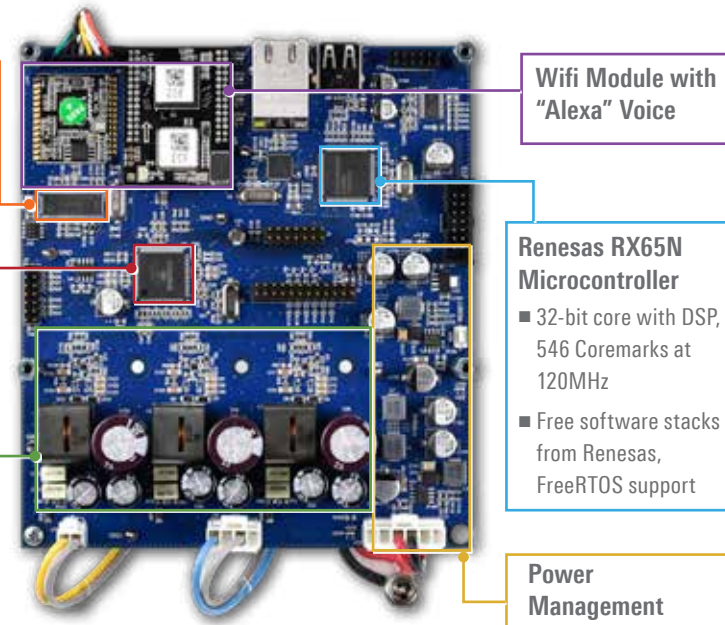
- Wireless output for Sub woofer in either application
- Wireless output to drive surround speakers (Sound Bar) or a paired speaker (Powered Speaker)

### Renesas D2-3 or D2-6 Family Audio SoC

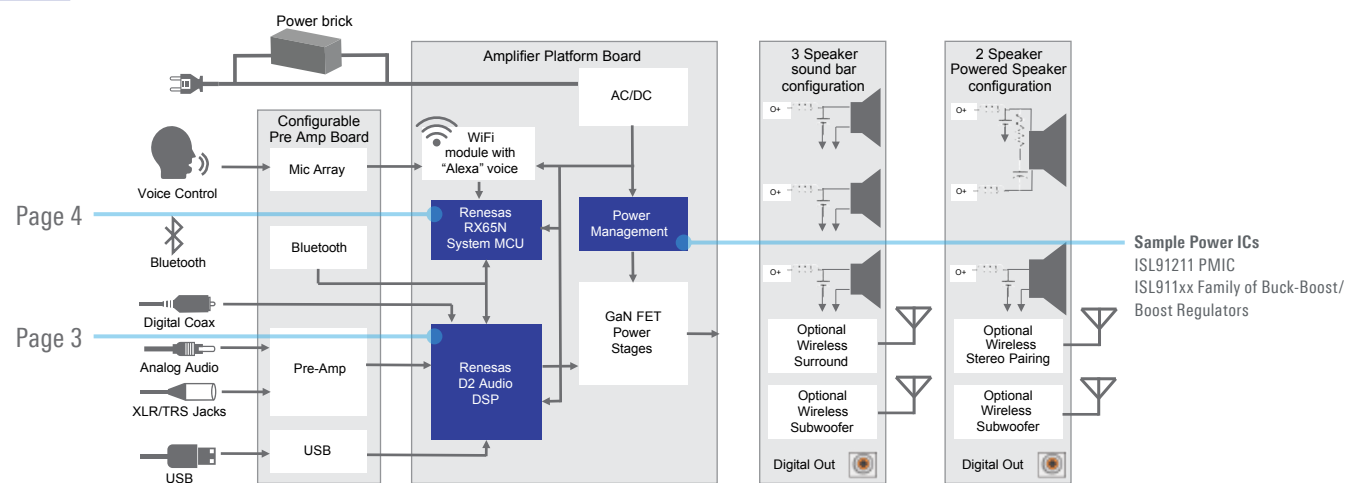
- Complete System on Chip audio processor and Class D amplifier with integrated DSP

### Output Power Stage

- GaN FET Output Power stage drives up to 100W of power
- Configure to drive 2 speakers (woofer and tweeter) for Powered speaker applications
- Configure to drive 3 speakers (left, center, right) for Sound Bar applications



## Block Diagram



- Audio Performance
  - Amp Freq Response: 20Hz to 20kHz, +/-0.5dB
  - THD+N: < 0.3%
  - SNR: > 110dB (ref Full Power)

### Audio Inputs Available

- RCA Phono Jack
- XLR/TRS Combicon
- Coaxial S/PDIF
- USB Audio Streaming

### Wireless Connectivity

- WiFi w/“Alexa” Voice Control
- Bluetooth 4.2

### App Control

- Portable app code for iPhone or Android OS

### System Microcontroller

- Renesas RX65N

### Audio DSP Engine

- Renesas D2-3 or D2-6 family Audio Processor
- Configurable sound stream using D2 Audio Customization GUI
- Optional Dolby Digital, Dolby Digital Plus, and/or DTS decoding

### Audio Outputs Available

- GaN FET Power Output Stage
- Stereo Digital Output: Coaxial Digital
- Wireless Subwoofer link available
- Wireless Surround Sound or Stereo Speaker pairing available

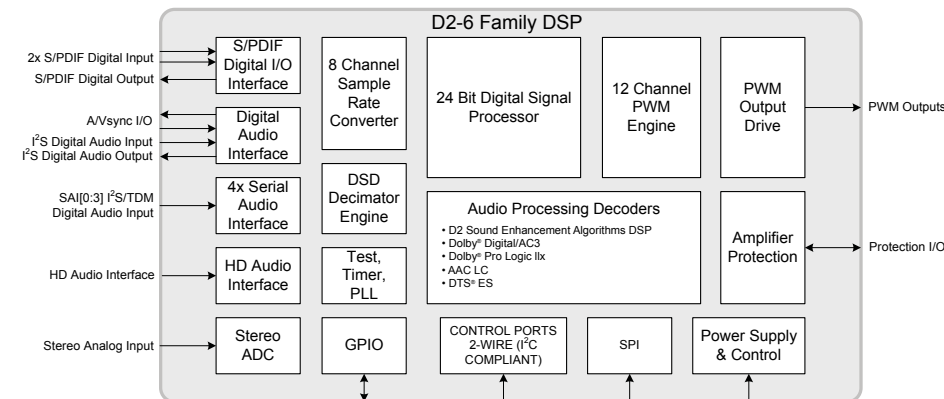
# AUDIO ICs

## D2-6 Family

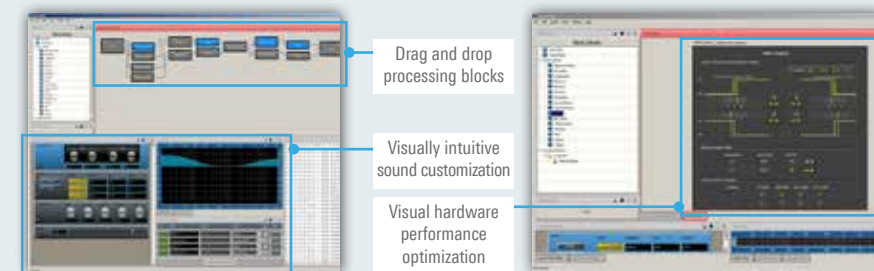
The D2-6 family of Digital Audio Processors is a complete System on Chip (SoC) audio processor and Class-D amplifier controller.

Integrated DSP processing and configurable audio processing algorithms provide an extremely flexible platform for feature rich and cost effective quality audio solutions.

- Advanced D2-6 Digital Audio Processor Family
- Total System on Chip (SoC)
  - All Digital Class-D Amplifier Controller
  - Full 5.1/7.1/9.1-Channel Amplifier Platform Support
- Enhanced Audio Processing Decoders
  - Dolby® Digital/AC3, Dolby® Digital Plus, Dolby® Pro Logic IIx, DTS® (SRS) TruSurround HD4™, DTS® Studio Sound II, DTS® TruVolume
- D2 Audio DSP Processor Embedded Audio Enhancement and Virtualization Firmware
- Expanded On-Chip Memory Capacity
- Integrated DSP Processing
  - 12 Channels of Digital Signal Processing (DSP) Including Equalizers, Filters, Mixers and Other Common Audio
- Processing Blocks
  - Fully Configurable and Routable Audio Signal Paths
- Flexible Audio Input and Output Configurations



## Easy Customization with D2 Audio Customization GUI v3



## Audio ICs Product Portfolio

	Sound Processors			Power Stage
Family	DAE-4 (4P)	DAE-3 (HT)	DAE-6	D2-IPS
ASRC Channels	2x	8 Channels		
PWM Channels	5 Ch	12 Channels		
Signal Flow	Fixed	Configurable		
Optional Decoders	DTS® Wow	Dolby® Digital, Dolby® Pro Logic® II	Dolby® Digital, Dolby® Pro Logic® II, DTS® Digital Surround, Dolby® Digital Plus	-
Supported Audio Inputs	1x I2S 1x S/PDIF 4x fault INT	4x I2S 2x (1x) S/PDIF 8x fault INT ADC (non-HT only)	4x I2S 2x S/PDIF 8x fault INT ADC	4
Supported Audio Outputs	5x (4x) PWM	12x PWM	12x PWM	10W x 4
	3x PWM	4x I2S	4x I2S	25W x 2
	1x S/PDIF	1x S/PDIF	1x S/PDIF	50W x 1
Value Add Features	D2 Audio PWM Engine, Graceful Fault Recovery, D2 Sound Enhancement Algorithms, D2 Audio Customization GUI v3			

Customers must obtain licenses from Dolby and DTS to use the decoders

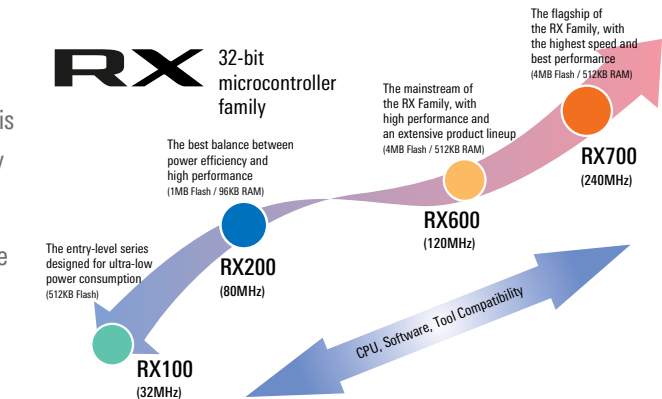
To learn more, visit: [www.renesas.com/products/audio-video/audio](http://www.renesas.com/products/audio-video/audio)

# 32-BIT HIGH POWER EFFICIENCY MCUs

## RX Family

The RX family of MCUs feature the revolutionary RX architecture and meet current and projected system design requirements in terms of memory size, power consumption, scalability, feature set and price. The RX600/700 series is high speed and high performance MCU family with RXv2 core, large-capacity RAM, and enhanced security, connectivity, and HMI.

- All RX family devices are CPU and peripheral compatible and share the same software tools and ecosystem.
- Many devices offer advanced connectivity with Ethernet, USB host function, and multiple CAN interfaces and solutions for motors and power inverters.

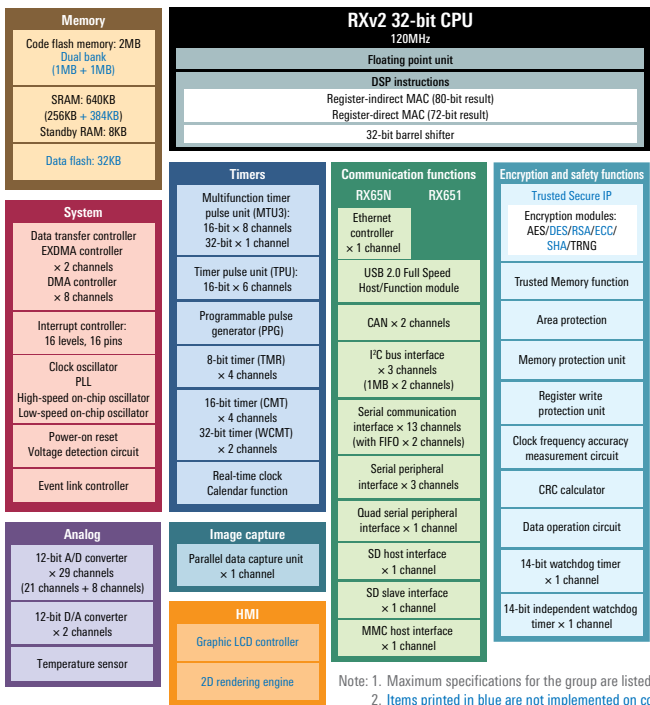


## RX65x Series

### RXv2 Core, Large-capacity RAM, and Enhanced Security, Connectivity, and HMI

- Enhanced Security
  - MPU, AES, DES, SHA, TRNG, Unique ID
  - Trusted security IP, trusted memory, key management
  - Area protection, ID code protection
- Optimized Connectivity Hub Architecture
  - USB, Ethernet, SDHI/SDIO, Up to 17 serial channels
  - Layered bus architecture with DMA, external DMA and data transfer controller
- High Performance
  - 546 Coremarks at 120MHz, 32-bit core with DSP
  - Extensive peripheral set, and variants with up to 640KB RAM, 2MB Flash, Ethernet and TFT-LCD
  - Scalable product range to fit exact need
- Advanced HMI for Consumer Devices
  - Variants with graphic LCD with 2D engine and CMOS camera interface
- Power Efficient
  - High efficiency 40nm process, 34 CoreMark/ma
- Comprehensive Development Tools and Software
  - IAR IDE and Eclipse-based e’studio IDE
  - Free middleware and drivers from Renesas
  - Extensive RTOS support, including FreeRTOS

### RX65N/RX651 Group Product Block Diagram



Note: 1. Maximum specifications for the group are listed above.  
2. Items printed in blue are not implemented on code flash memory is less than 1.0MB products.

To learn more, visit: [www.renesas.com/RX](http://www.renesas.com/RX)



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