

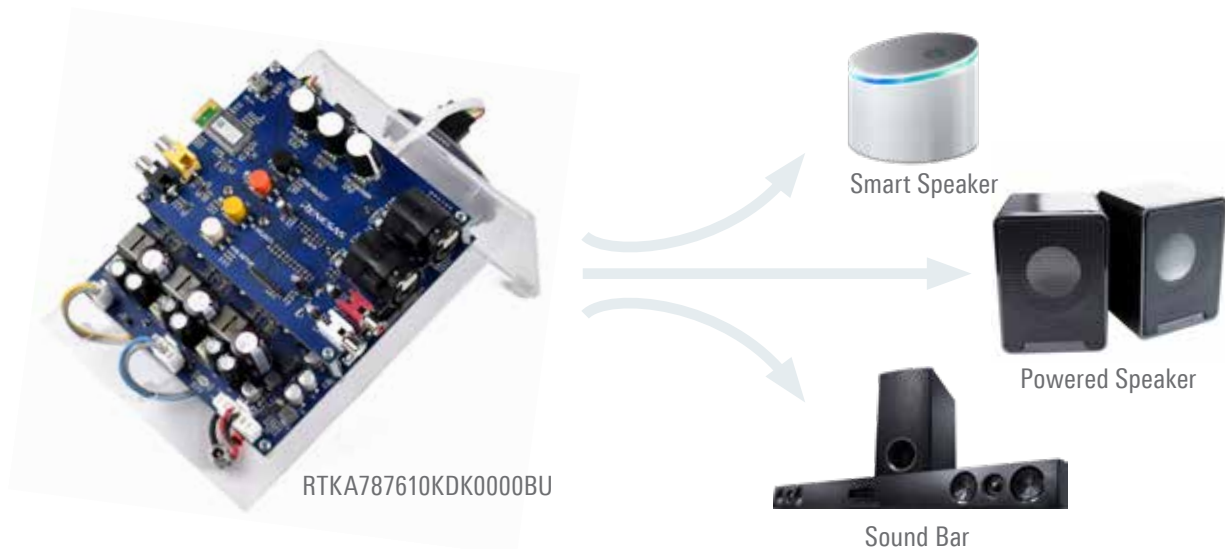
AUDIO SYSTEM SOLUTIONS

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

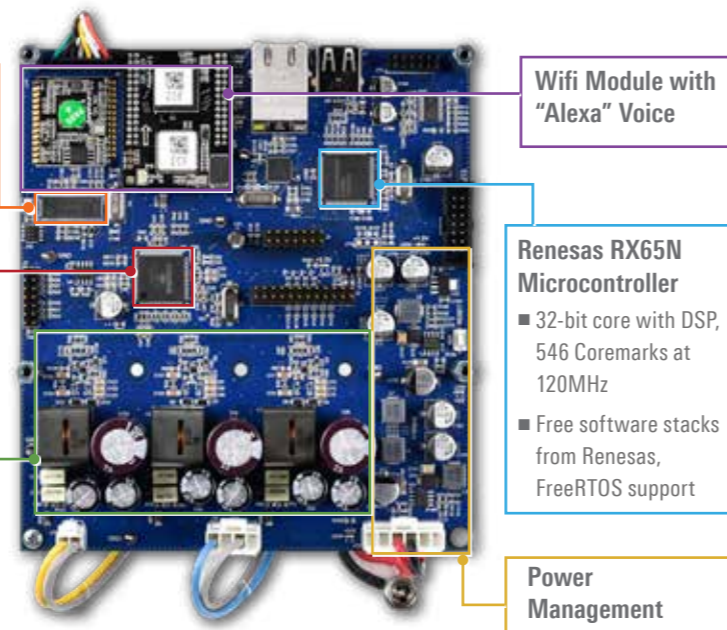
- Wireless output for Sub woofer in either application
- Wireless output to drive surround speakers (Sound Bar) or a paired speaker (Powered Speaker)

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



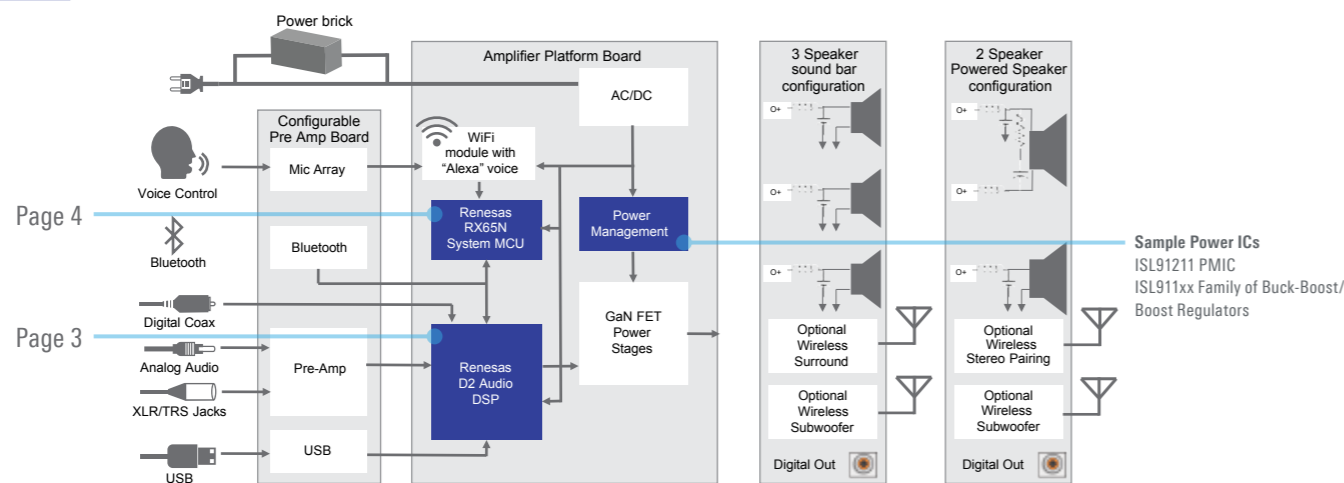
Wifi Module with "Alexa" Voice

Renesas RX65N Microcontroller

- 32-bit core with DSP, 546 Coremarks at 120MHz
- Free software stacks from Renesas, FreeRTOS support

Power Management

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

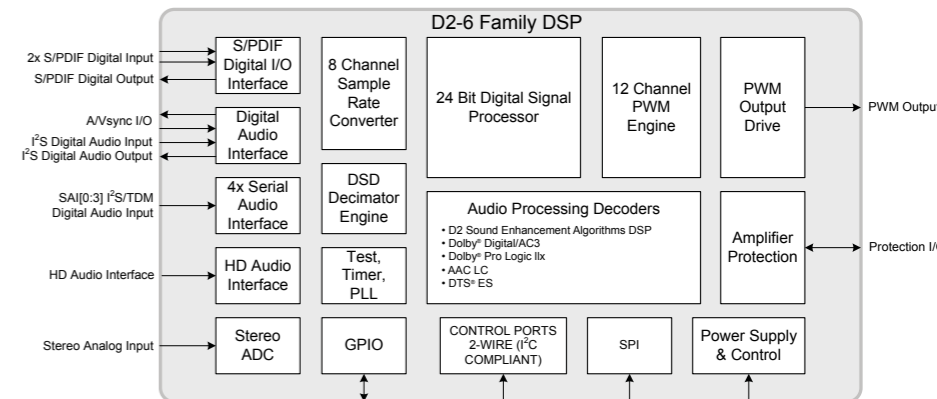
- GaN FET Power Output Stage
- Stereo Digital Output: Coaxial Digital
- Wireless Subwoofer link available
- Wireless Surround Sound or Stereo Speaker pairing available

AUDIO ICs

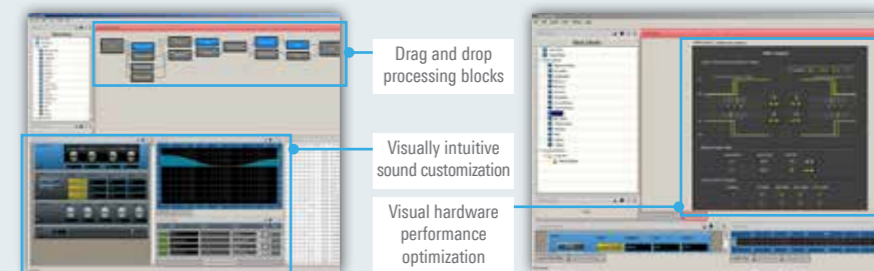
D2-6 Family

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

Family	Sound Processors			Power Stage
	DAE-4 (4P)	DAE-3 (HT)	DAE-6	D2-IPS
ASRC Channels	2x	8 Channels		-
PWM Channels	5 Ch	12 Channels		4 Ch
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 1x S/PDIF	4x I2S 1x S/PDIF	4x I2S 1x S/PDIF	25W x 2 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

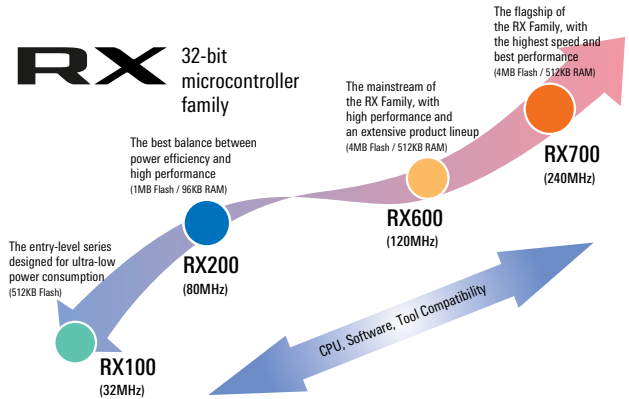
To learn more, visit: www.renesas.com/products/audio-video/audio

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.

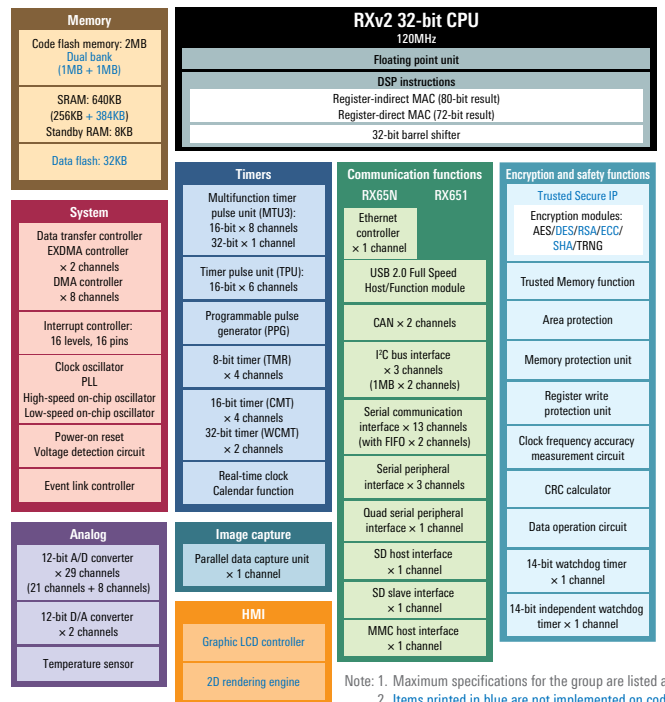


RX65x Series

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 e²studio 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



Renesas Electronics America Inc. | renesas.com
1001 Murphy Ranch Road, Milpitas, CA 95035 | Phone: 1-888-468-3774

© 2018 Renesas Electronics America Inc. (REA). All rights reserved. Cortex is a registered trademark of Arm; CoreMark is a trademark of EEMBC. All other trademarks are the property of their respective owners. REA believes the information herein was accurate when given but assumes no risk as to its quality or use. All information is provided as-is without warranties of any kind, whether express, implied, statutory, or arising from course of dealing, usage, or trade practice, including without limitation as to merchantability, fitness for a particular purpose, or non-infringement. REA shall not be liable for any direct, indirect, special, consequential, incidental, or other damages whatsoever, arising from use of or reliance on the information herein, even if advised of the possibility of such damages. REA reserves the right, without notice, to discontinue products or make changes to the design or specifications of its products or other information herein. All contents are protected by U.S. and international copyright laws. Except as specifically permitted herein, no portion of this material may be reproduced in any form, or by any means, without prior written permission from Renesas Electronics America Inc. Visitors or users are not permitted to modify, distribute, publish, transmit or create derivative works of any of this material for any public or commercial purposes.