

# RX65N, RX651 GROUP

The Mainstream of the Next Generation RX



BIG IDEAS  
FOR EVERY SPACE

# THE MAINSTREAM OF THE NEXT GENERATION RX

## WITH RXV2 CORE, LARGE RAM AND ENHANCED CONNECTIVITY

- 120 MHz/15 mA MCU with higher performance and lower power consumption**  
 RXv2 core using new process, achieves operation at 120 MHz/15 mA (Typ), with 1.5 times higher operational performance than and appx. 5 times higher power efficiency than competing MCUs!!  
 RX65N/RX651 support devices that require higher performance with lower power consumption
- Enhanced connectivity in peripheral functions with RX63N/RX631**  
 Equipped with SD host/slave interface for growing demand of network. SD connection compliant wireless LAN support is now available. Also additional enhanced functions of RX63x such as serial communication with FIFO, higher-speed Quad SPI communication, and larger RAM of 256 kB etc., to meet customers demands!!
- Easy to migrate with compatibility in pin assignments and FIT support drivers**  
 Full compatibility with pin assignments between RX63N/RX631, RX64M/RX71M enables easy migration. FIT support drives and middleware with RX63N/RX631, RX64M/RX71M are also available for RX65N/RX651!!

**MEMORY**

- Code Flash 1 MB
- SRAM 256 kB
- Standby RAM 8 kB

**ANALOG**

- 12-bit A/D  
29 ch (21 ch + 8 ch)
- 12-bit D/A  
2 ch
- Temperature sensor

**DATA CAPTURE**

- Parallel data capture unit  
1 ch

**RXv2 32-bit CPU 120 MHz**

- Floating point units
- DSP instructions
- Register in-direct MAC (Result 80-bit)
- Register direct MAC (Result 72-bit)
- Barrel shifter 32-bit

**SYSTEM**

- Data transfer controller, ExDMA controller × 2 ch  
DMA controller × 8 ch
- Interrupt controller  
16 levels, 16 pins
- Clock oscillator PLL  
High / Low speed on-chip oscillator
- Power-on reset Voltage detection circuit
- Event link controller

**COMMUNICATION FUNCTIONS RX651**

- Data transfer controller, ExDMA controller × 2 ch  
DMA controller × 8 ch
- Interrupt controller  
16 levels, 16 pins
- Clock oscillator PLL  
High / Low speed on-chip oscillator
- Power-on reset Voltage detection circuit
- Event link controller

**TIMER**

- Multifunction timer pulse unit (MTU3)  
16-bit 8 ch, 32-bit 1ch
- Timer pulse unit (TPU)  
16-bit 6 ch
- Programmable pulse generator (PPG)
- 8-bit timer (TMR) 4 ch
- 16-bit timer (CMT) 4 ch  
32-bit timer (WCMT) 2 ch
- Real-time clock calendar function

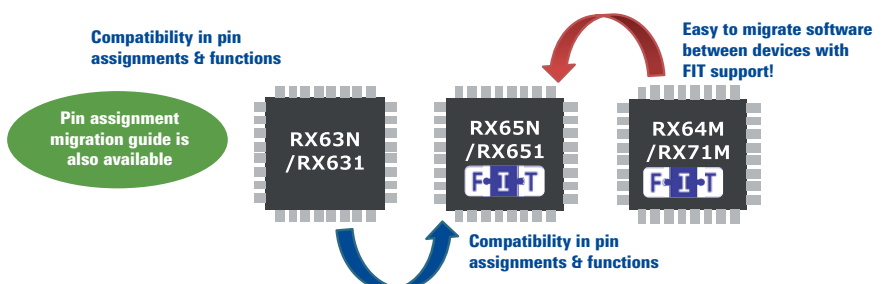
**ENCRYPTION / SAFETY FUNCTIONS**

- Encryption module AES, RNG
- Trusted memory function
- Memory protection unit
- Register write protection unit
- Clock frequency accuracy measurement circuit
- CRC calculator
- Data operation circuit
- Watchdog timer 14-bit 1ch
- Independent watchdog timer 14-bit 1ch

Note: Maximum specifications for the group are listed above.

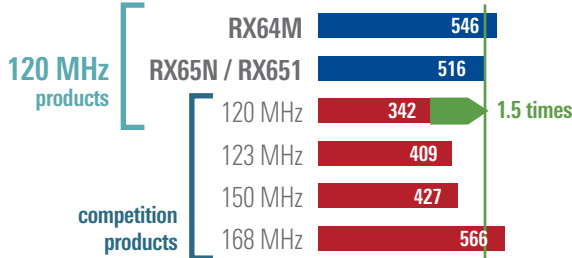
## HIGH COMPATIBILITY BETWEEN RX600 SERIES IN PIN ASSIGNMENTS AND FUNCTIONS

- High compatibility in pin assignments to provide an easy update/optimize path
- Migration APN (application notes) is also available



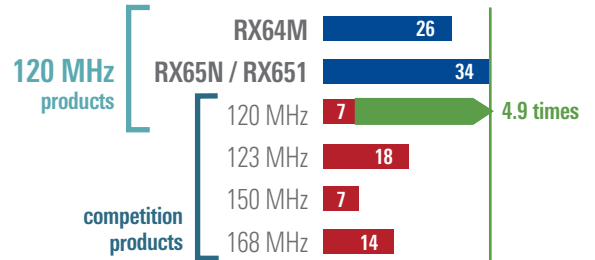
## RX65N/RX651 vs. COMPETING MCUs

**More advanced operation capacity than competing MCUs**  
CoreMark\*



\*based on normal values from EEMBC

**With significantly higher power efficiency**  
CoreMark / mA\*\*



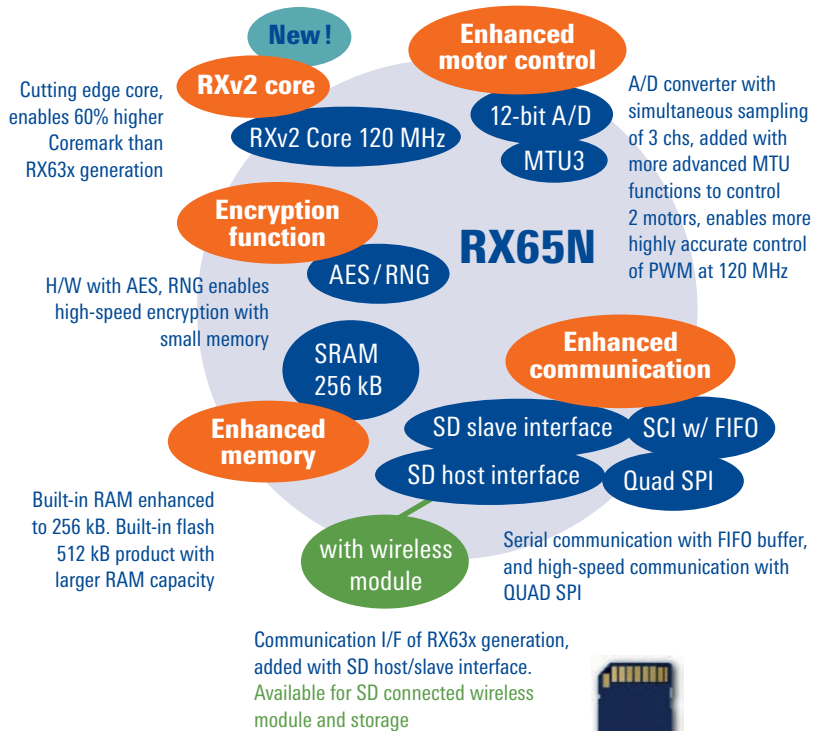
\*\*calculation based on coremark value and type current on datasheet

## RX65N/RX651 GROUP MEMORY/PACKAGE LINE-UP

Flash RAM E2 Data Flash	R5F565Nxxxxx	R5F5651xxxxx	Under development Standard version with more improved performance and functions from RX63x group				T.B.D.	T.B.D.	T.B.D.
T.B.D.									
T.B.D.									
1024 kB 256 kB 0 kB	9FDFP 9BDFP 9EDFP 9ADFP	9FDLJ 9BDLJ 9EDLJ 9ADLJ	9FDFB 9BDFB 9EDFB 9ADFB	9FDLK 9BDLK 9EDLK 9ADLK					
768 kB 256 kB 0 kB	7FDFP 7BDFP 7EDFP 7ADFP	7FDLJ 7BDLJ 7EDLJ 7ADLJ	7FDFB 7BDFB 7EDFB 7ADFB	7FDLK 7BDLK 7EDLK 7ADLK	Standard				
512 kB 256 kB 0 kB	4FDFP 4BDFP 4EDFP 4ADFP	4FDLJ 4BDLJ 4EDLJ 4ADLJ	4FDFB 4BDFB 4EDFB 4ADFB	4FDLK 4BDLK 4EDLK 4ADLK					
Pin counts	100	100	144	145					
Package	LQFP	LGA	LQFP	TFLGA					
Pitch mm	0.5	0.65	0.5	0.5					
Size mm	14 x	7 x 7	20 x	7 x 7					

Encryption function (AES, RNG), SDHI  
 No encryption function (AES, RNG), SDHI  
 Encryption function (AES, RNG), no SDHI  
 No encryption function (AES, RNG), no SDHI

## NOTABLE FUNCTIONS



### Application examples:

- Industrial system controller
- HVA controller
- Industrial inverter control
- Communication unit for smart meter
- System controller for printer
- etc.

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Before purchasing or using any Renesas Electronics products listed herein, please refer to the latest product manual and/or data sheet in advance.

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