**Arm® Cortex®-R52 Based MPU**

**RENESAS RZ/N2L GROUP**

**Easily Implement Industrial Ethernet and TSN on Industrial Systems**

The RZ/N2L industrial Ethernet microprocessor (MPU) easily adds network functionality onto industrial equipment and machine. RZ/N2L is optimized as a dedicated networking companion chip that can easily implement industrial Ethernet communication and TSN in industrial equipment. The RZ/N2L is a single chip solution for both industrial network and application processing.

**Key Features**

- Arm® Cortex®-R52 @ Max 400MHz
- A tightly coupled memory (256KB) directly connected to CPU
- 3-port Gigabit Ethernet switch supporting next-generation network standard TSN and EtherCAT® slave controller
- Host interface allows application CPU to directly connect to RZ/N2L, and access at high speed
- Application CPU can directly access to the system RAM of RZ/N2L
- ELC (Event Link Controller) can be operated without the support of CPU processing
- Supports functional safety like a safety MCU

**Benefits**

- Enable next-generation network standard TSN, and major industrial Ethernet protocols such as EtherCAT®, PROFINET, EtherNet/IP™
- Add industrial Ethernet features to industrial equipment without major system change
- Operate industrial Ethernet and user application on one chip
- Realize synchronized operation with low latency to the time synchronization in TSN network
- Accelerate functional safety (FuSa) development and certification through upcoming certified FuSa solution for RZ/N2L

**Target Applications**

- Communication unit
- Remote IO
- Sensor Hub
- Gateway
- Motor Drive

**Block Diagram**

- Arm® Cortex®-R52 400MHz
- FPU
- TCM 256KB (with ECC)
- Embedded 1.5MB (with ECC)
- 3-port Gigabit Ethernet switch with TSN
- EtherCAT slave controller
- Serial host I/F, Parallel host I/F
- xSPI
- CAN-FD
- PWM Timer
- \(\Delta \Sigma\) I/F
- ADC
- Trigonometric function unit

---

**Arm® Cortex®-R52**

400MHz / 200MHz

- I Cache 16KB w/ECC
- D Cache 16KB w/ECC
- GIC
- FPU
- MPU
- Debug

- ATCM 128KB w/ECC
- BTCM 128KB w/ECC

- CAN-FD (2ch)
- SPI (4ch)
- EtherCAT Slave Controller
- Ether MAC w/ switch
- SCI (6ch)
- \(\Delta \Sigma\) I/F (6ch)
- MTU3
- (16bit x 4ch + 32bit x 1ch)
- QPT
- (32bit x 1ch)
- I2C (3ch)
- xSPI (2ch)
- CMT (16bit x 6ch)
- CMTW (32bit x 2ch)
- DMA (8ch x 2unit)
- QSPI Slave (1ch)
- WDT (16bit x 1ch)
- Temp sensor
- 12bit A/D (4ch+8ch)
- Embedded RAM 1.5MB
- CRC
- DOC
- ELC
- External BUS I/F (RS422/485)
- USB HS PunchHost
- Security
REnesas RZ/N2L GROUP

Industrial Network Protocol Supported

- EtherCAT®
- PROFINET RT/IRT
- EtherNet/IP™
- OPC UA over TSN
- TSN (IEC/IEEE 60802 Industrial Profile)
- CC-Link IE Field Basic/TSN class A
- Modbus/TCP
- POWERLINK
- DeviceNet
- PROFIBUS
- CANopen
- Modbus/RTU, ASCII
- BACnet

Evaluation Environment and Software

- Renesas e’studio + J-Link by Segger
- IAR Embedded Workbench for Arm + I-Jet ICE/ I-Jet Trace by IAR
- Flexible Software Package (FSP)
  - Hardware drivers
  - FreeRTOS
- Industrial network protocol (sample code)
- Security software package

Product Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>R9A07G084M08GB</th>
<th>R9A07G084M04GB</th>
<th>R9A07G084M08GBA</th>
<th>R9A07G084M04GBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Cortex®-R52 (Max 400MHz)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tightly Coupled Memory</td>
<td>ATCM 128KB (w/ECC) / BTCM 128KB (w/ECC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAM</td>
<td>1.5MB (w/ECC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External bus</td>
<td>8, 16bit</td>
<td>Not supported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host I/F</td>
<td>Serial Host</td>
<td>OSPI/QSPI</td>
<td>QSPI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parallel Host</td>
<td>8, 16bit</td>
<td>Not supported</td>
<td></td>
</tr>
<tr>
<td>Industrial Ethernet Protocol</td>
<td>EtherCAT®, PROFINET RT/IRT, EtherNet/IP™, TSN (IEC/IEEE 60802 Industrial Profile), CC-Link IE Field Basic, OPC UA over TSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ether Port</td>
<td>3 ports</td>
<td>2 ports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Control Peripherals</td>
<td>PWM Timer (MTU3, GPT), ADC*, ΣΔ Interface, Trigonometric function unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>Supported</td>
<td>Not Supported</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Power</td>
<td>1.1V, 1.8V, 3.3V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Tj = -40 to +125°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package</td>
<td>FBGA</td>
<td>FBGA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin Count</td>
<td>225pin</td>
<td>121pin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package Information</td>
<td>13mm x 13mm, 0.8mm pitch</td>
<td></td>
<td>10mm x 10mm, 0.8mm pitch</td>
<td></td>
</tr>
</tbody>
</table>

Visit www.renesas.com/rzn2l to learn more about RZ/N2L.

Visit www.renesas.com/rskrzn2l for more information about the evaluation kit of RZ/N2L.