INTRODUCTION OF IOT SOLUTIONS FOR RL78 FAMILY

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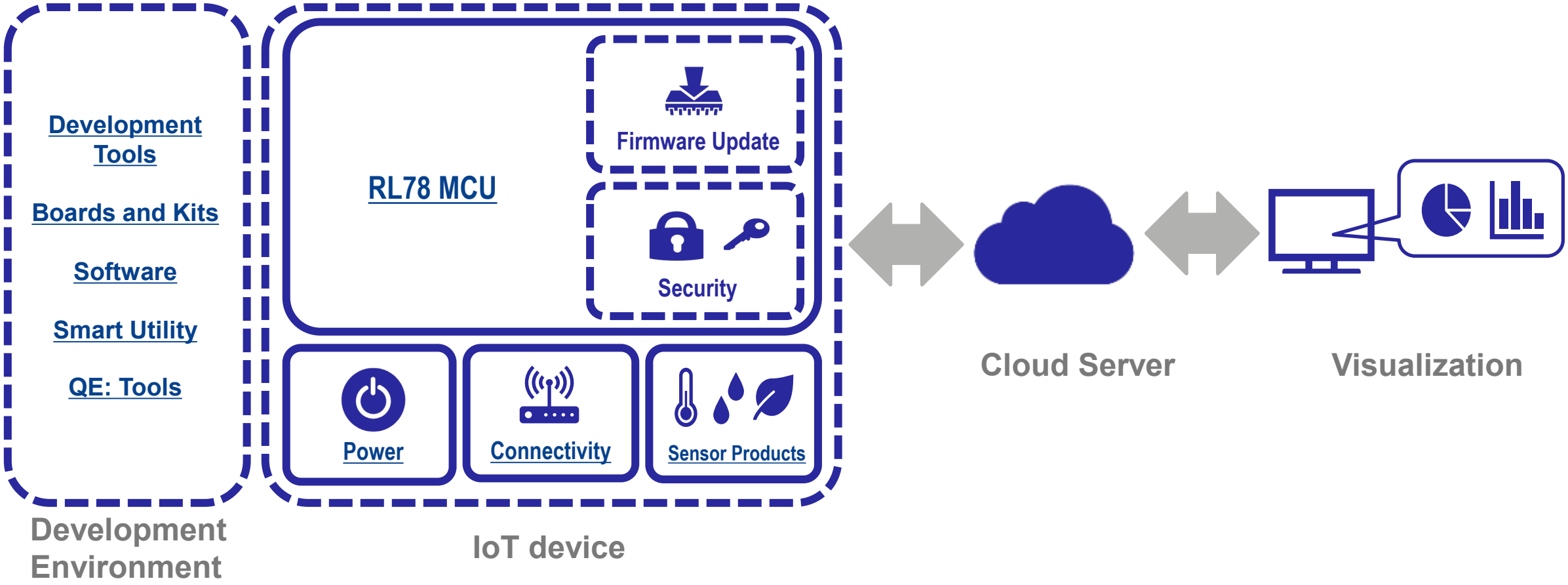
EMBEDDED PROCESSING 2ND BUSINESS DIVISION
EMBEDDED PROCESSING PRODUCT GROUP
RENESAS ELECTRONICS CORPORATION

RL78 FAMILY IOT SOLUTIONS

By using the RL78 family, it is possible to develop IoT device that take advantage of features such as the industry's highest level of low power consumption. We offer various evaluation kits, an easy-to-use development environment (e2 studio and so on), and software solutions for connectivity, sensing, firmware updates, and security to enable IoT.



SOLUTIONS TO REALIZE IOT (1)

Renesas provides various software solutions for IoT development using RL78.

Connectivity 	• LoRa®-based Solutions for RL78 Family • LTE RYZ024A MQTT Communication • US159-DA14531EVZ BLE Control Module Using Software Integration System • HS300x sensor data communication with Bluetooth LE DA14531 • Wireless Communication with the XBee ZB 2SC and HS300x (AT Solution) • Wi-Fi Communication (Soft AP mode) with DA16200/DA16600
Sensing 	• Sensor Software Modules for Renesas MCU Platforms Humidity and Temperature, Air Velocity Sensor, Air Quality Sensor, and so on
Firmware updates 	• Firmware Update Module • Updating Firmware by Using UART Communication and Boot Swapping • Firmware Upgrade Using External Flash Memory via Simplified SPI (CSI) Communication
Security 	• Crypto Library AES Library, RSA Library, SHA Hash Function Library

SOLUTIONS TO REALIZE IOT (2)

Renesas provides various software solutions for IoT development using RL78.

Cloud connection 	• Software for cloud connectivity
Firmware update OTA 	• Remote Firmware Update via OTA

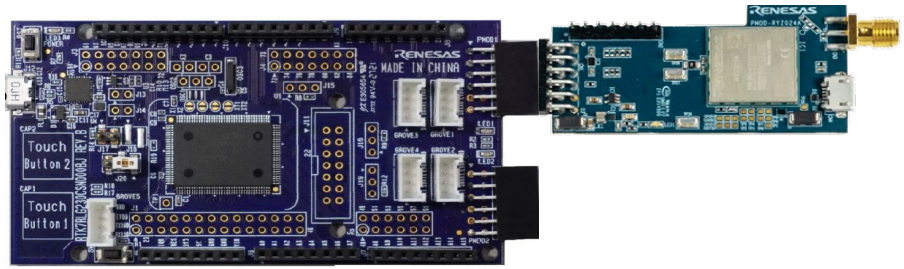
CLOUD CONNECTION

For cloud connectivity, it supports FreeRTOS, a real-time OS for IoT device development provided by Amazon Web Services (AWS). The evaluation board program has AWS device certification, so you can start development immediately. We support your IoT development with various application notes such as visualization of data uploaded to the cloud and OTA firmware updates.

RL78 MICROCONTROLLER EVALUATION BOARD FOR CLOUD CONNECTIVITY

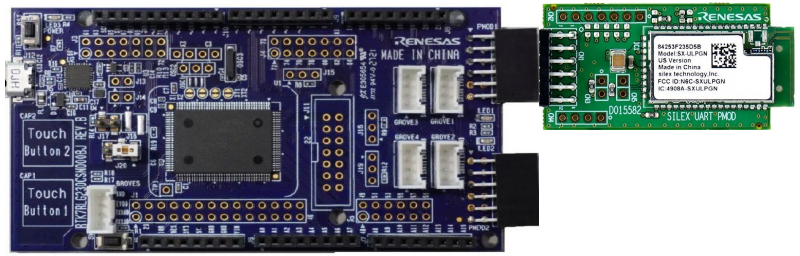
The following evaluation boards that use Cellular and Wi-Fi communications are AWS certified and listed in AWS Partner Device Catalog. (Environments of older OS versions are also included for reference.)

Cellular Environment



RL78/G23-128p Fast Prototyping Board
RTKYZ024A0B00000BE

W-Fi Environment



RL78/G23-128p Fast Prototyping Board
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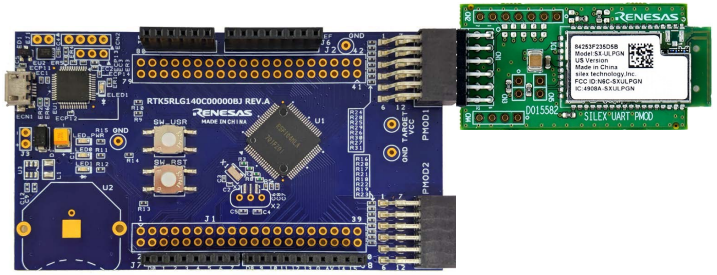
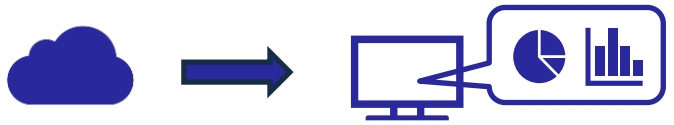


RL78/G14 Fast Prototyping Board
RTK00WFMX0B

SOFTWARE FOR CLOUD CONNECTIVITY



To import AWS certified software, please refer to the “Getting Started Guide”. For cloud connectivity, see “How to Connect to Amazon Web Services with FreeRTOS.” We also provide an application note explaining how to visualize sensor information. (Environments of older OS versions are also included for reference.)

Cellular Environment

- **RL78/G23 Getting Started Guide for Connecting Amazon Web Services in LTE Communication: RL78/G23-128p Fast Prototyping Board + FreeRTOS**
  - **RL78/G23 Group Connecting to Amazon Web Services in LTE communication using FreeRTOS with RL78/G23 FPB**

  * AWS Service FreeRTOS-202210.01-LTS Cellular Integration, Over-the-Air (OTA) Updates

Wi-Fi Environment

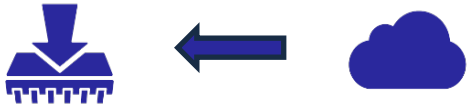
- **RL78/G23 Connecting AWS Cloud with FreeRTOS Getting Started Guide for RL78/G23-128p Fast Prototyping Board**
  - **RL78/G23 Connecting to Amazon Web Services Using FreeRTOS with RL78/G23-128p FPB**
  - **RL78/G23 Visualization of Sensor Information on Amazon Web Services using RL78/G23-128p FPB and FreeRTOS**

  * AWS Service FreeRTOS 202012.00 Wi-Fi Integration

- **Getting started with the RL78/G14 Fast Prototyping Board / WiFi-Pmod-Expansion-Board**
  - **RL78/G14 Group Connecting to Amazon Web Services Using FreeRTOS with RL78/G14 FPB**
  - **RL78/G14 Group Visualization of Sensor Information on Amazon Web Services using RL78/G14 FPB and FreeRTOS**

  * AWS Service FreeRTOS 202002.00 Wi-Fi Integration

REMOTE FIRMWARE UPDATE VIA OTA (1)



The RL78 MCU, which supports AWS FreeRTOS, can perform OTA (Over The Air) firmware updates using the cloud (AWS). We provide an application note to easily incorporate the firmware update function into your system, and a **development support tool (QE for OTA)** to easily try out OTA (Over The Air).

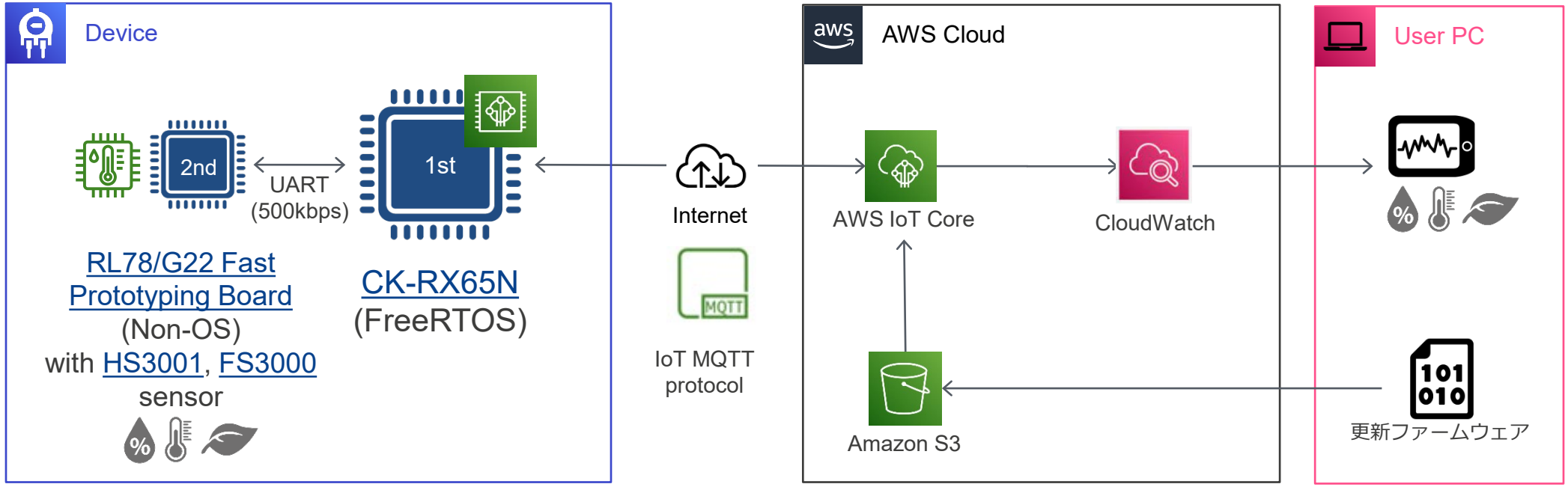
- **RL78/G22,RL78/G23,RL78/G24 Firmware Update Module**
- **QE for OTA: Development Assistance for Cloud**

REMOTE FIRMWARE UPDATE VIA OTA (2)

We also provide a sample program that enables OTA firmware update of the 2nd MCU (RL78/G22) connected via a communication path via the 1st MCU (RX65N) with AWS FreeRTOS communication function.

- **RL78/G22 OTA Firmware Update for a Secondary MCU**

Configure OTA firmware update for secondary MCU:



PARTNER ECOSYSTEM

Renesas is enabling a comprehensive partner ecosystem to deliver an array of software and hardware building blocks that will work out-of-the-box with **Renesas RL78 Family MCUs**.

Renesas RL78 Partner Ecosystem Solutions

- **Security & Safety**
- **Connectivity & Cloud**

APPENDIX

BOARDS & KITS

- Main boards & kits related to RL78 IoT solutions

	RTK7RLG230CSN000BJ - RL78/G23-128p Fast Prototyping Board (RL78/G23-128p FPB)
	RTK5RLG140C00000BJ - RL78/G14 Fast Prototyping Board (RL78/G14 FPB)
	RTKYZ024A0B00000BE - PMOD Expansion Board for RYZ024A
	RTK00WFMX0B - 802.11b/g/n 2.4G Wi-Fi Pmod Expansion Board

DOCUMENTATION (CONNECTIVITY)

RL78/G22 Wi-Fi Communication (Soft AP mode) with DA16200/DA16600 日本語 Related Files:Sample Code
RL78 Family US159-DA14531EVZ BLE Control Module Using Software Integration System Related Files:Sample Code
RL78/G15 HS300x sensor data communication with Bluetooth LE DA14531 Application Note 日本語 Related Files:Sample Code
RL78/G15 Wireless Communication with the XBee ZB 2SC and HS300x (AT Solution) 日本語 Related Files:Sample Code
RL78/G22 LTE MQTT Communication Application Note 日本語 Related Files:Sample Code
RL78/G15 Wireless Communication with the XBee ZB S2C and HS300x 日本語 Related Files:Sample Code
LoRaWAN® Stack Reference Guide
LoRaWAN® Stack Sample Application
RL78/G23, RL78/G22, RL78/G14 LoRaWAN® Sensor Demo Related Files:Sample Code
RL78/G23, RL78/G22, RL78/G14 LoRa®-based Wireless Software Package Related Files:Sample Code

DOCUMENTATION (SENSING)

Sensor Software | Renesas

Sensor Software Combination Manual 日本語
RL78 Family Sensor Control Modules Software Integration System
RL78 Family ZMOD4410, ZMOD4450 and ZMOD4510 Sensor Control Module Software Integration System Related Files:Sample Code
RL78 Family FS2012 Sensor Control Module Software Integration System Related Files:Sample Code
RL78 Family HS400X Sensor Control Module Software Integration System Related Files:Sample Code
RL78 Family FS1015 Sensor Control Module Software Integration System Related Files:Sample Code
RL78 Family OB1203 Sensor Control Module Software Integration System Related Files:Sample Code
RL78 Family Sensor I2C Communication Middleware Control Module Software Integration System Related Files:Sample Code
RL78/G23 SMS HS300x Humidity sensor control by I2C communication Application Notes Rev.1.10 日本語 Related Files:Sample Code

DOCUMENTATION (SECURITY)

Crypto Library | Renesas

RL78/G24 FAA AES Library Introduction Guide 日本語 Related Files:Sample Code
RL78 Family How to change devices in the sample project for the DSP Library and the Security Library 日本語
RL78 Family SHA Hash Function Library: Introduction Guide 日本語 Related Files:Sample Code
RL78 Family AES Library: Introduction Guide 日本語 Related Files:Sample Code
RL78 Family RSA Library: Introduction Guide 日本語 Related Files:Sample Code

DOCUMENTATION (FIRMWARE UPDATE)

RL78/G22 OTA Firmware Update for a Secondary MCU 日本語 Related Files:Sample Code
RL78/G22, RL78/G23, RL78/G24 Firmware Update Module 日本語 Related Files:Sample Code
RL78/G23 Updating Firmware by Using UART Communication and Boot Swapping 日本語 Related Files:Sample Code
RL78/G23 Updating Firmware by Using UART Communication and Boot Swapping 日本語 Related Files:Sample Code

DOCUMENTATION (CLOUD CONNECTION WITH VISUALIZATION)

RL78/G23 Getting Started Guide for Connecting Amazon Web Services in LTE Communication: RL78/G23-128p Fast Prototyping Board + FreeRTOS Rev.1.00 日本語 Related Files:Sample Code
RL78/G23 Connecting to Amazon Web Services Using FreeRTOS with RL78/G23-128p Fast Prototyping Board 日本語
RL78/G23 Getting Started Guide for Connecting Amazon Web Services in LTE Communication: RL78/G23-128p Fast Prototyping Board + FreeRTOS 日本語 Related Files:Sample Code
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RL78/G14 Group Visualization of Sensor Information on Amazon Web Services using RL78/G14 Fast Prototyping Board and FreeRTOS Application Note 日本語 Related Files:Sample Code

VIDEOS

RL78 Family LTE CAT-M1 MQTT Communication Solution [06:12]
This video will show the steps to operate MQTT communication for send and receive (Publish/Subscribe) via MQTT Broker in an LTE CAT-M1 cellular communication.

RL78 Family Secondary Device OTA Update Solution [6:14]
This video will show the steps to operate the secondary device OTA firmware update solution via primary device with the AWS Cloud, tailored for low-end microcontrollers lacking direct internet connectivity.

RL78 LoRa®-based Solution [03:26]
This video introduces RL78 LoRa®-based Solution. It realizes a true low-power wireless IoT system by combination of the world's top-class low power RL78 microcontroller and LoRaWAN®

RL78 LoRaWAN® Sensor Demo Tutorial [06:02]
This video will show you how to set up the RL78 LoRaWAN® Sensor Demo.
Using the RL78 / G23 and LoRaWAN® ecosystem, you can realize both the "LoRaWAN sensor network evaluation" and "IoT system construction using LoRaWAN" with minimal man-hours.

BLOG POSTS

- Renesas Initiatives in Smart Agriculture - Part 1
- Would You Like to Use a LoRa®-Based Solution from Renesas to Develop IoT Applications with Low Power Consumption?
- Why Not Connect to Amazon Web Services (AWS) with RL78?

RESOURCES FOR IOT SOLUTIONS

- Quick-Connect IoT Platform
- Applications
- Sensor Software
- Crypto Library
- Wireless Connectivity
- [Flyer] RL78 Family Real-time OS

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