

DA16200/DA16600

SDK Update Guide

Introduction

This application note explains the process of updating the Software Development Kit (SDK) for the DA16200 and DA16600 Wi-Fi system-on-chip (SoC) devices, enabling users to start quickly and efficiently using the latest firmware for each device.

It describes the hardware, pin connections, and software required to update the SDK, and demonstrates the process of flashing the SDK firmware to the device.

Target Device

US159-DA16200EVZ DA16200 Pmod™ board

US159-DA16600EVZ DA16600 Pmod board

Contents

1. Required Hardware	2
2. DA16600 Pin Connections	2
3. DA16600 Required Software	4
4. DA16600 Implementation	5
5. DA16200 Pin Connections	6
6. DA16200 Required Software	8
7. DA16200 Implementation	9

1. Required Hardware

The following hardware is required for updating the DA16200 and DA16600 SDK:

- EK-RA6M4 board (or any Renesas Evaluation Kit with Type 2A Pmod slot)
- US159-DA16200EVZ DA16200 Pmod board
- US159-DA16600EVZ DA16600 Pmod board
- USB-to-TTL adapter cable (DSD TECH SH-U09C5 used in this example)
- USB cable (Type A)
- User PC

2. DA16600 Pin Connections

In this example, the hardware connections are explained using the EK-RA6M4:

- Connect the Pmod board to the PMOD2 header of the EK-RA6M4.
- Connect the USB-to-TTL cable pins to header J3 of the Pmod board (Figure 1):
 - Pin 1 can be ignored (VCC not required).
 - Pin 2 – RXD (connect TXD).
 - Pin 3 – TXD (connect RXD).
 - Pin 4 – GND.
- Connect the USB side of the USB-to-TTL adapter to the PC.
- Connect the USB cable from the DEBUG1 header of the EK-RA6M4 to the PC.



Figure 1. US159-DA16600EVZ Board

The complete connections are shown in the following figures.

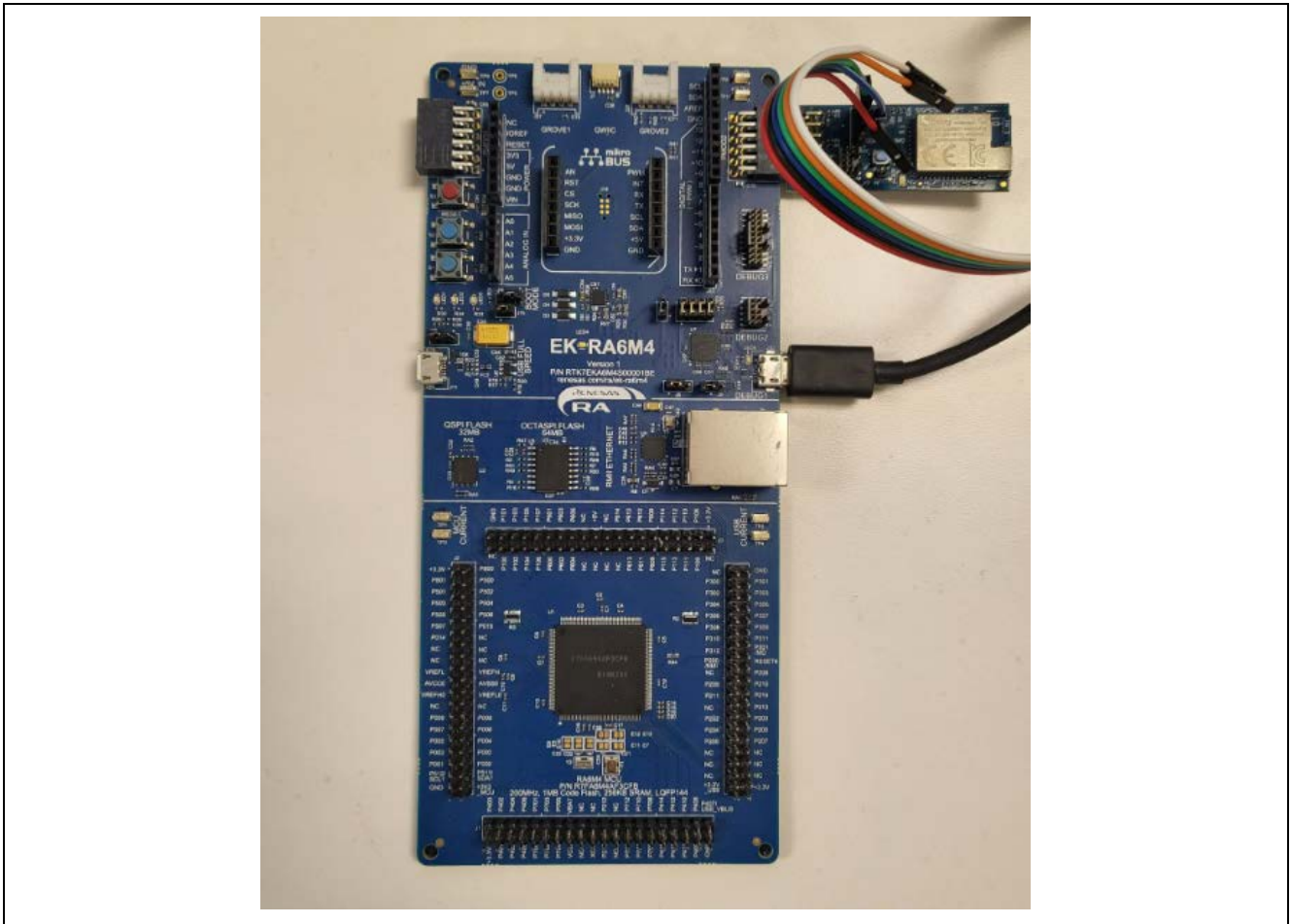


Figure 2. Pin Connections

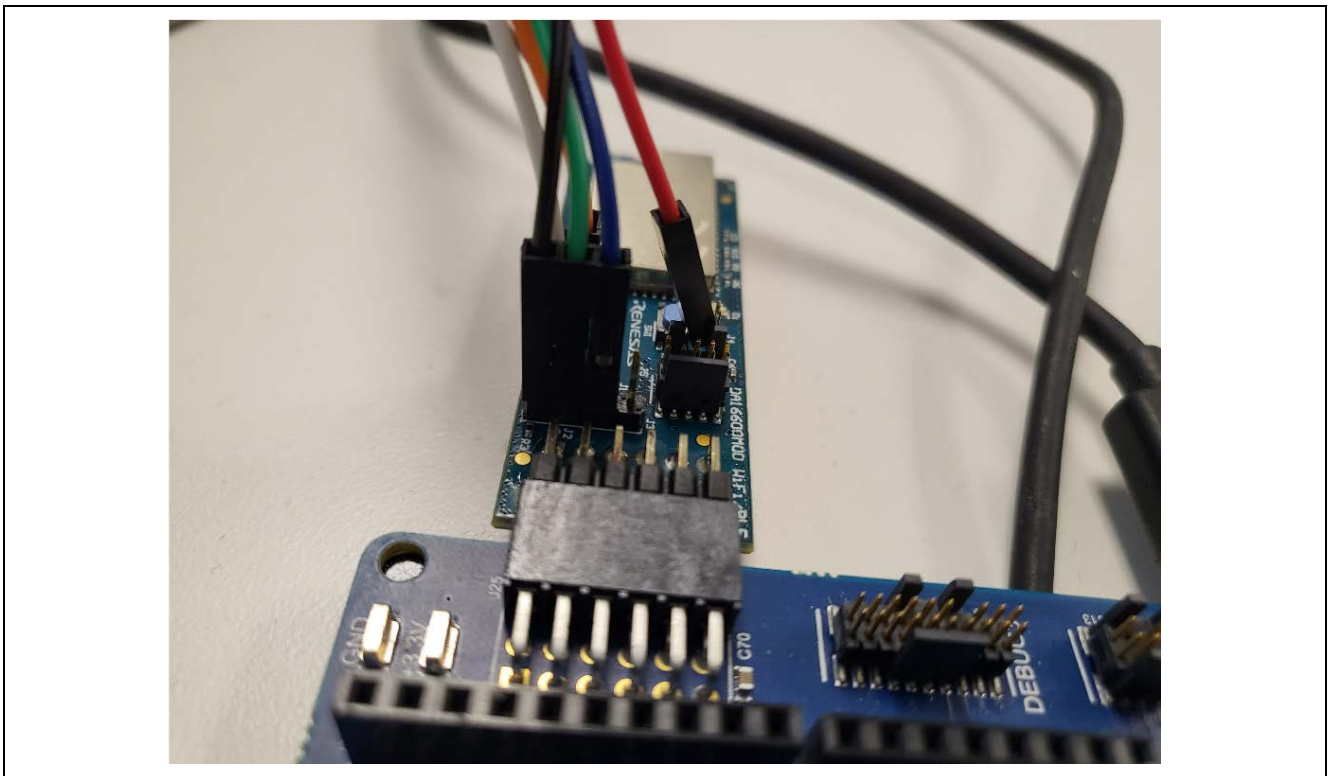


Figure 3. DA16600 Pin Connections



Figure 4. USB-to-TTL Cable

3. DA16600 Required Software

The following software is required for the firmware update:

1. Download and install serial emulator software (such as Tera Term) on the PC.
2. Go to the [DA16600 product page](#), scroll down to "Software Downloads".
3. Download the "DA16200 DA16600 FreeRTOS SDK Image v3.2.8.0" shown in Figure 5.
Note: Make sure the file selected says "Image". Do not download the SDK source.

Software Downloads

Type to filter results by title All types Date

AWS IoT Reference for FreeRTOS SDK ZIP 3.48 MB Related Files: • AWS IoT Reference Release Notes	Software & Tools - Software	Sep 7, 2023
Azure IoT ATCMD Image for FreeRTOS ZIP 3.32 MB	Software & Tools - Software	Aug 30, 2023
Azure IoT Reference for FreeRTOS SDK ZIP 3.82 MB Related Files: • Azure IoT Reference Release Notes	Software & Tools - Software	Aug 30, 2023
DA16200 DA16600 FreeRTOS SDK Image v3.2.8.0 ZIP 12.00 MB	Software & Tools - Software	Aug 18, 2023
DA16200 DA16600 FreeRTOS SDK v3.2.8.0 ZIP 342.25 MB Related Files: • DA16200 DA16600 FreeRTOS SDK Release Note v3.2.8.0	Software & Tools - Software	Aug 18, 2023
DA16200 DA16600 Linux Driver v5.1.1.0 ZIP 714 KB Related Files: • DA16200 DA16600 Linux Driver Release Note v5.1.1.0	Software & Tools - Software	Mar 31, 2023

17 items

Figure 5. SDK Image

4. DA16600 Implementation

Use the following process to update the SDK firmware:

1. Open Tera Term on the PC.
2. Select the port number corresponding to the USB-to-TTL cable.
3. Go to **Setup > Serial Port** and set Speed (baud rate) to 230400 (default).
4. Power cycle the EK-RA6M4 board. There should be messages displayed in Tera Term.

Note: Information may not be displayed in the serial emulator after power cycling, and it may be required to press and hold the reset button during command input to proceed with the update.

Note: Also ensure that the module reset pin (P708) is not being held low in the EK-RA6M4 firmware. The FSP default pin configuration will prevent the DA16600 module from being updated. You can avoid this issue by erasing the EK-RA6M4 firmware or changing the P708 to input or output high.

5. Type the 'reset' command into the terminal and wait for bootloader splash screen (Figure 6).

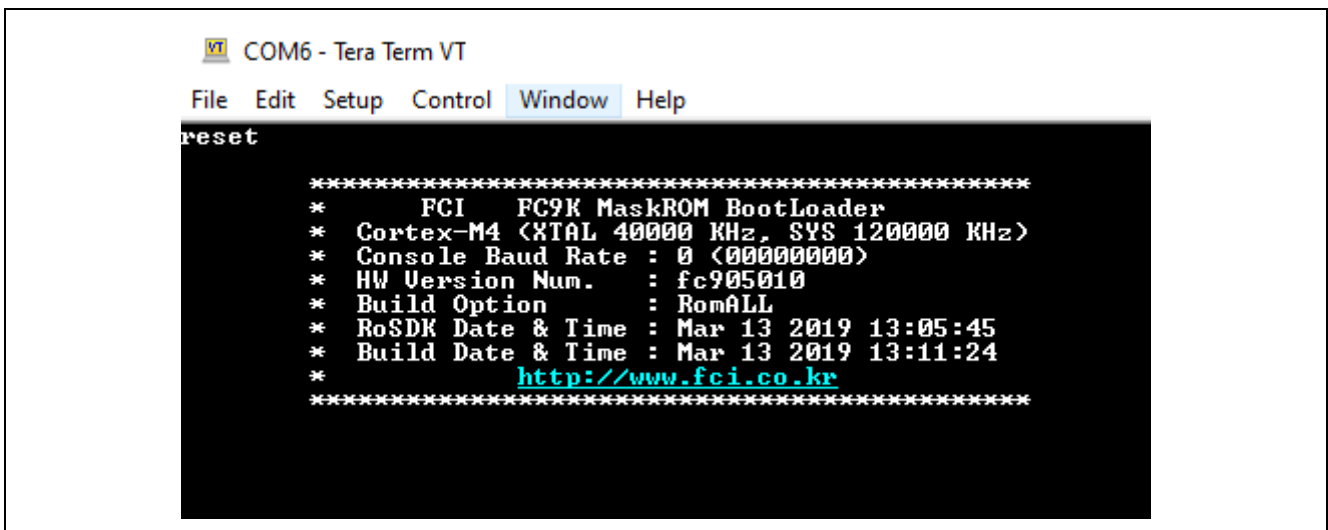


Figure 6. Bootloader Splash Screen

6. Enter the 'sflash info' command to check the type of flash (DA16600 has 2 types of flash).
7. Make note of the result:
 - In the case of W25Q32JW, the output is:
 - [MROM] sflash info
 - SFLASH:ef601615
 - Density:01ffffff
 - [MROM]
 - In the case of AT25SL321, the output is:
 - [MROM] sflash info
 - SFLASH:1f421615
 - Density:01ffffff
 - [MROM]
8. Unzip the downloaded image file, then unzip the "DA16600_IMG_FreeRTOS_ATCMD_UART2_EVK_v3.2.8.0_4MB" folder.
9. Go back to Tera Term, then go to **Control > Macro** and select the following file from within the previously unzipped folder:
 - da16600_da14531_1_download.ttl
10. When prompted select the flash memory type discovered in the step above.
11. Wait for execution to finish with the new SDK version (takes approximately two minutes).
12. Confirm that v3.2.8.0 is shown as the version on the splash screen (Figure 7).

```

*****
*                               DA16600 SDK Information                               *
*-----*
* - CPU Type      : Cortex-M4 <120MHz>
* - OS Type       : FreeRTOS 10.4.3
* - Serial Flash  : 4 MB
* - SDK Version   : U3.2.8.0 GEN-ATCMD
* - F/W Version   : FRTOS-GEN01-01-f017bfd51-006558
* - F/W Build Time : Aug 10 2023 14:09:33
* - Boot Index    : 0
*
*****

```

Figure 7. SDK Information

5. DA16200 Pin Connections

In this example, the hardware connections are explained using the EK-RA6M4:

- Connect the Pmod board to the PMOD2 header of the EK-RA6M4.
- Connect the USB-to-TTL cable pins to header J3 of the Pmod board (Figure 8Figure 1):
 - Pin 1 can be ignored (VCC not required).
 - Pin 2 – RXD (connect TXD).
 - Pin 3 – TXD (connect RXD).
 - Pin 4 – GND.
- Connect the USB side of the USB-to-TLL adapter to the PC.
- Connect the USB cable from the DEBUG1 header of the EK-RA6M4 to the PC.

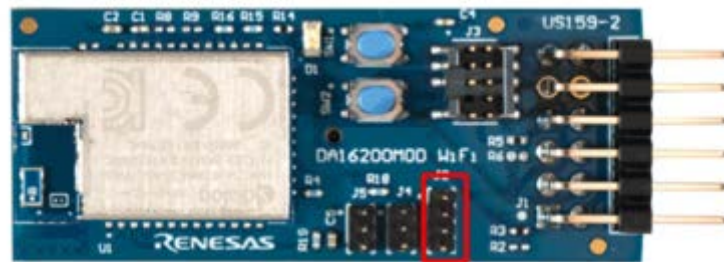


Figure 8. US159-DA16200EVZ Board

The complete connections are shown in the following figures.

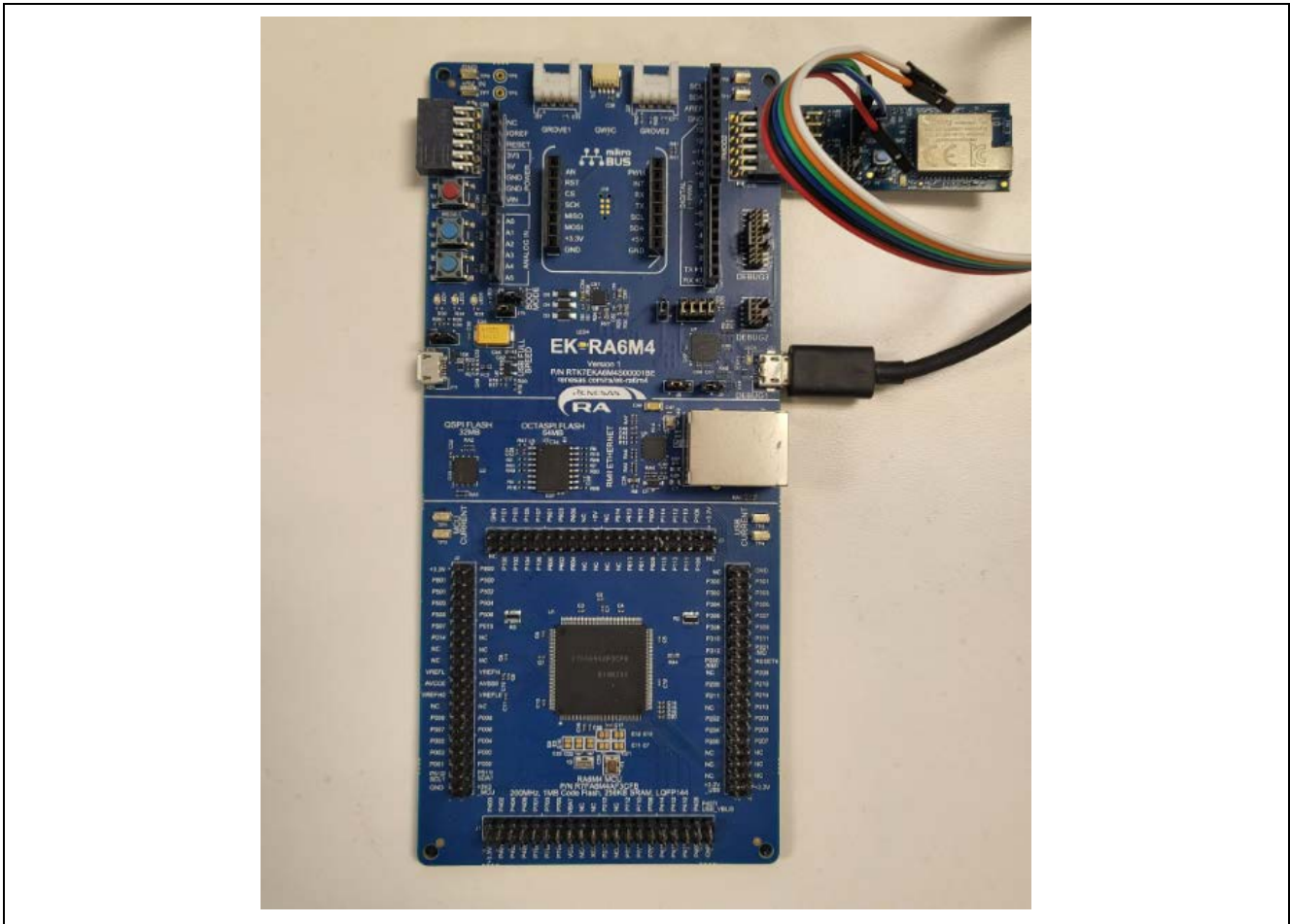


Figure 9. Pin Connections

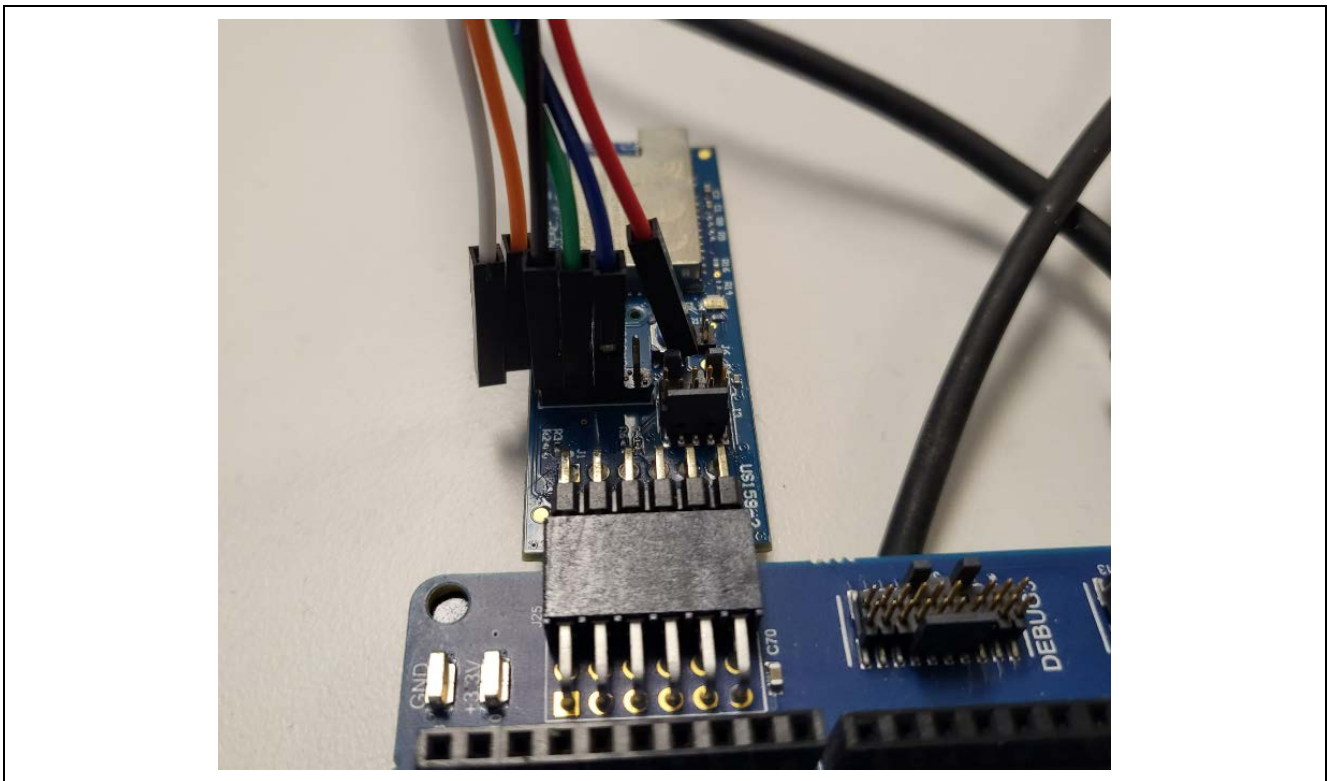


Figure 10. DA16200 Pin Connections



Figure 11. USB-to-TTL Cable

6. DA16200 Required Software

The following software is required for the firmware update:

1. Download and install serial emulator software (such as Tera Term) on the PC.
2. Go to the [DA16200 product page](#), scroll down to "Software Downloads".
3. Download the "DA16200 DA16600 FreeRTOS SDK Image v3.2.8.0" shown in Figure 12.
Note: Make sure the file selected says "Image". Do not download the SDK source.

Software Downloads

Type to filter results by title All types Date

Download Name	Format	Size	Category	Date
AWS IoT Reference for FreeRTOS SDK	ZIP	3.48 MB	Software & Tools - Software	Sep 7, 2023
Azure IoT ATCMD Image for FreeRTOS	ZIP	3.32 MB	Software & Tools - Software	Aug 30, 2023
Azure IoT Reference for FreeRTOS SDK	ZIP	3.82 MB	Software & Tools - Software	Aug 30, 2023
DA16200 DA16600 FreeRTOS SDK Image v3.2.8.0	ZIP	12.00 MB	Software & Tools - Software	Aug 18, 2023
DA16200 DA16600 FreeRTOS SDK v3.2.8.0	ZIP	342.25 MB	Software & Tools - Software	Aug 18, 2023
DA16200 DA16600 Linux Driver v5.1.1.0	ZIP	714 KB	Software & Tools - Software	Mar 31, 2023

17 items

Figure 12. SDK Image

7. DA16200 Implementation

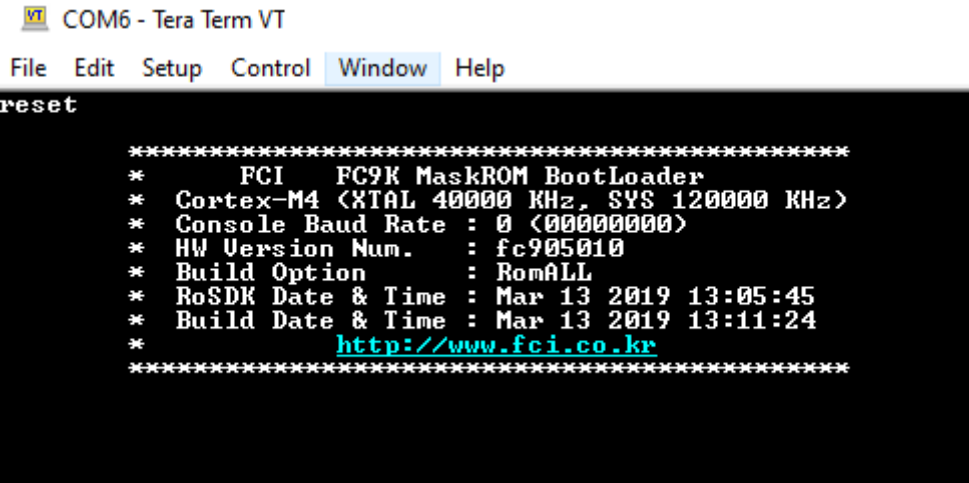
Use the following process to update the SDK firmware:

1. Open Tera Term on the PC.
2. Select the port number corresponding to the USB-to-TTL cable.
3. Go to **Setup > Serial Port** and set Speed (baud rate) to 230400 (default).
4. Press the reset button on the Pmod/RA boards, there should be messages displayed in Tera Term.

Note: Information may not be displayed in the serial emulator after power cycling, and it may be required to press and hold the reset button during command input to proceed with the update.

Note: Also ensure that the module reset pin (P708) is not being held low in the EK-RA6M4 firmware. The FSP default pin configuration will prevent the DA16200 module from being updated. You can avoid this issue by erasing the EK-RA6M4 firmware or changing the P708 to input or output high.

5. Type the 'reset' command into the terminal and wait for bootloader splash screen (Figure 13).



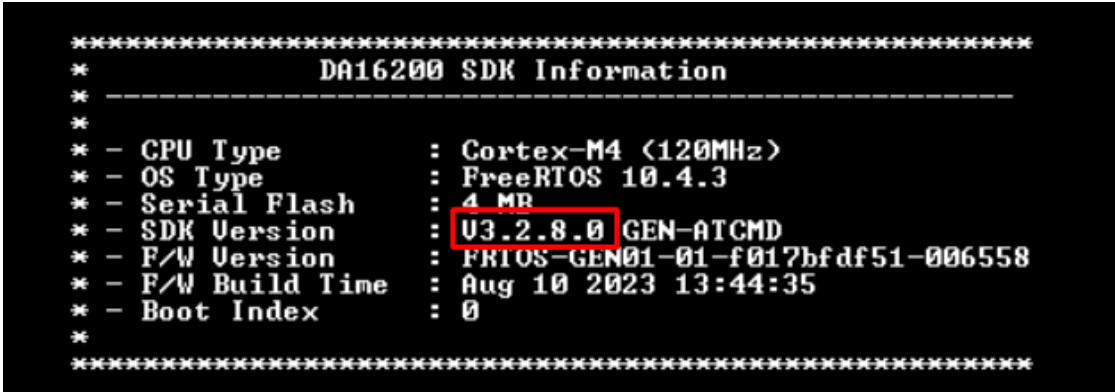
```

VT COM6 - Tera Term VT
File Edit Setup Control Window Help
reset
*****
*      FCI   FC9K MaskROM BootLoader
* Cortex-M4 (XTAL 40000 KHz, SYS 120000 KHz)
* Console Baud Rate : 0 (00000000)
* HW Version Num.   : fc905010
* Build Option      : RomALL
* RoSDK Date & Time : Mar 13 2019 13:05:45
* Build Date & Time : Mar 13 2019 13:11:24
*                  http://www.fci.co.kr
*****

```

Figure 13. Bootloader Splash Screen

6. Unzip the downloaded image file, then unzip the "DA16200_IMG_FreeRTOS_ATCMD_UART1_EVK_v3.2.8.0_4MB" folder.
7. Go back to Tera Term, then go to **Control > Macro** and select the following file from within the previously unzipped folder:
— Download_W25Q32JW_FreeRTOS.ttl
8. Wait for execution to finish with the new SDK version (takes approximately two minutes).
9. Confirm that v3.2.8.0 is shown as the version on the splash screen (Figure 14).



```

*****
*      DA16200 SDK Information
*      -----
*
* - CPU Type       : Cortex-M4 (120MHz)
* - OS Type        : FreeRTOS 10.4.3
* - Serial Flash   : 4 MB
* - SDK Version    : U3.2.8.0 GEN-ATCMD
* - F/W Version    : FRIOS-GEN01-01-f017bfd51-006558
* - F/W Build Time : Aug 10 2023 13:44:35
* - Boot Index     : 0
*
*****

```

Figure 14. SDK Information

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Aug.23.23	—	First release document.
1.01	Sep.14.23	4-9	Updated instructions for latest SDK version (3.2.8.0). Added DA16200 sections. Added note for module reset pin settings.

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

- 1. Precaution against Electrostatic Discharge (ESD)**

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
- 2. Processing at power-on**

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
- 3. Input of signal during power-off state**

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
- 4. Handling of unused pins**

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
- 5. Clock signals**

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
- 6. Voltage application waveform at input pin**

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
- 7. Prohibition of access to reserved addresses**

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
- 8. Differences between products**

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall be responsible for determining what licenses are required from any third parties, and obtaining such licenses for the lawful import, export, manufacture, sales, utilization, distribution or other disposal of any products incorporating Renesas Electronics products, if required.
5. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
6. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.
"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.
"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.
7. Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
8. No semiconductor product is absolutely secure. Notwithstanding any security measures or features that may be implemented in Renesas Electronics hardware or software products, Renesas Electronics shall have absolutely no liability arising out of any vulnerability or security breach, including but not limited to any unauthorized access to or use of a Renesas Electronics product or a system that uses a Renesas Electronics product. RENESAS ELECTRONICS DOES NOT WARRANT OR GUARANTEE THAT RENESAS ELECTRONICS PRODUCTS, OR ANY SYSTEMS CREATED USING RENESAS ELECTRONICS PRODUCTS WILL BE INVULNERABLE OR FREE FROM CORRUPTION, ATTACK, VIRUSES, INTERFERENCE, HACKING, DATA LOSS OR THEFT, OR OTHER SECURITY INTRUSION ("Vulnerability Issues"). RENESAS ELECTRONICS DISCLAIMS ANY AND ALL RESPONSIBILITY OR LIABILITY ARISING FROM OR RELATED TO ANY VULNERABILITY ISSUES. FURTHERMORE, TO THE EXTENT PERMITTED BY APPLICABLE LAW, RENESAS ELECTRONICS DISCLAIMS ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS DOCUMENT AND ANY RELATED OR ACCOMPANYING SOFTWARE OR HARDWARE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE.
9. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
10. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
11. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
12. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
13. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
14. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
15. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.5.0-1 October 2020)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/.