

User Manual

DA16200 SPI SFlash Downloader

UM-WI-012

Abstract

This User Manual explains how to setup and use the DA16200 SPI Serial flash Downloader.

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1 Terms and Definitions

DPM	Dynamic Power Management
GUI	Graphical User Interface
SPI	Serial Peripheral Interface
SFDP	Serial Flash Discoverable Parameter
UART	Universal Asynchronous Receiver Transmitter

2 References

- [1] DA16200, Datasheet, Renesas Electronics
- [2] DA16200, SDK Programmer Guide, Renesas Electronics
- [3] DA16200, EVK User Manual, Renesas Electronics
- [4] DA16200, AT Command User Manual, Renesas Electronics

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3 Prepare

The SPI SFlash downloader tool serves to download the images to SFLASH via an SPI slave interface. For the USB to SPI interface, the FT2232H module needs to be used. There are 3 prepare steps needed to use the SPI SFlash downloader tool.

- The first is to set pin configuration for the SPI slave interface. See Section 3.3 and 3.4.
- The second is to connect the SPI slave interface with the FT2232H module. See Chapter 4.
- The third is to download DA16200 images with the SPI SFlash downloader tool. See Chapter 5.

3.1 DA16200 Images

The following FreeRTOS firmware images are available for the DA16200:

- Bootloader: This image contains the important Serial Flash type information
- RTOS: This image contains RF drivers, DPM & Wi-Fi libraries and system/user applications

NOTE

In the case of the ThreadX firmware, the SLIB image needs to be downloaded to the dedicated address.

3.2 Setup PC Environment

The DA16200 EVK supports the use of a USB port. A micro-USB cable is used to connect the test PC with the EVK. Two UART ports will be detected automatically.

The FT2232 USB to Serial driver needs to be installed to use the SPI downloader tool with the DA16200 EVK. In most cases, the driver will be installed automatically when using a Windows PC.

If the driver is not installed automatically, use the following URL to download and install the driver: http://www.ftdichip.com/Drivers/CDM/CDM21224_Setup.zip.

3.3 Setup Pin Configuration for SPI Slave

The DA16200 has two SPI slave ports with a GPIO pin mux setting, which are GPIOA[3:0] and GPIOA[9:6]. The default pins for the DA16200 SPI slave interface are GPIOA[9:6]. See Table 1.

The recommendation for the DA16200 EVK is to use GPIOA[3:0] pins, because the DA16200 EVK uses GPIOA[9:6] for other functions such as GPIOA6 for WPS and GPIOA7 for Factory Reset.

The SPI downloader tool on the designed customer board allows GPIOA[9:6] to be used as the SPI Slave interface.

Table 1: SPI Pin Multiplexing on DA16200 EVK

SPI Slave Signals	DA16200 EVK Pin Multiplexing	
	GPIOA[3:0]	GPIOA[9:6]
SPI_MISO	GPIOA0	GPIOA8
SPI_MOSI	GPIOA1	GPIOA9
SPI_CS	GPIOA2	GPIOA6
SPI_CLK	GPIOA3	GPIOA7

NOTE

[Appendix A](#) describes the setup SPI slave configuration on the DA16200 EVK, version 9.0 and lower.

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For using the SPI slave interface on the DA16200 EVK, SW1/SW2/SW3 should be set as [Table 2](#) and the SW4 and SW10 are optional.

Table 2: SPI Slave Switch Setup on DA16200 EVK

GPIOs for SPI Slave	DA16200 EVK Switch Setup	
	ON	OFF
GPIOA[3:0]	SW3	SW1, SW2
GPIOA[9:6]	SW1	SW2, SW3, SW4, SW10

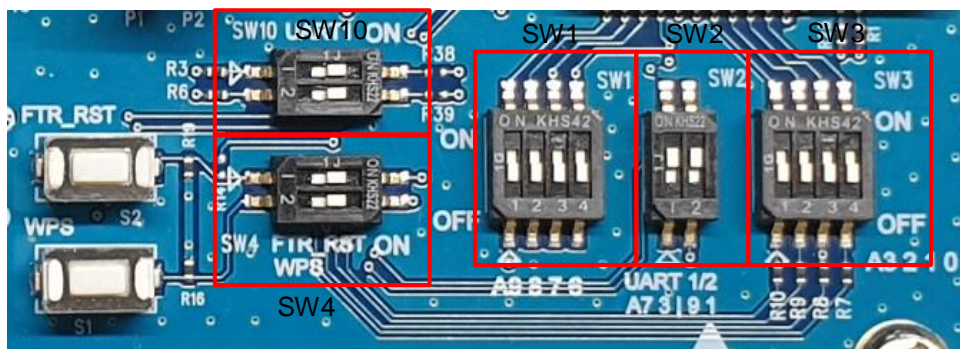


Figure 1: Setup Switch for SPI Slave

3.4 Setup SPI Slave Pin Configuration of GPIOA[3:0]

When using the GPIOA[3:0] pins for the SPI slave interface, the value 0x3F699311 must be set to address 0x50001208 at the MROM prompt to synchronize with the hardware settings of the DA16200 EVK.

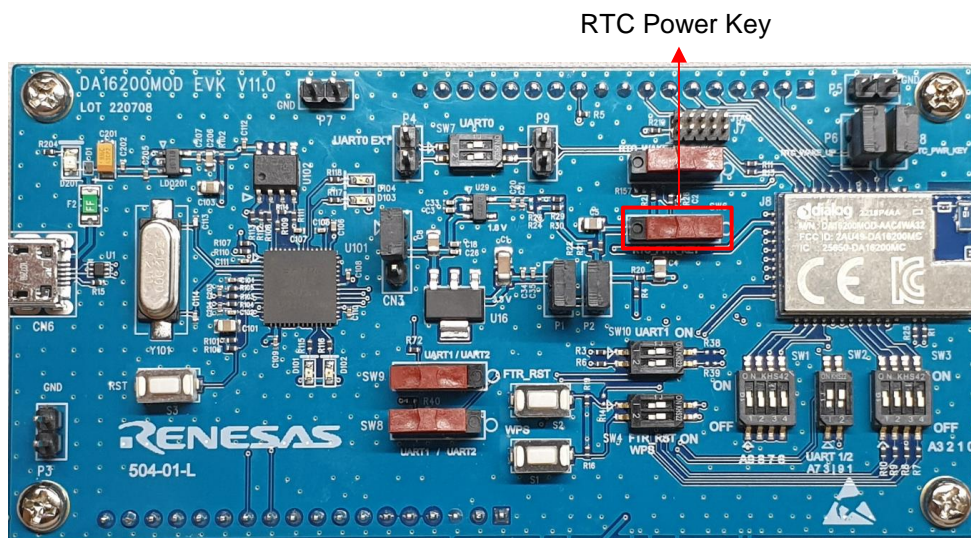


Figure 2: DA16200 EVK Board

1. Hold down the <ESC> key and press the ON/OFF RTC power key to enter the MROM prompt. (See [Figure 2](#))

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2. Type command `lrd 50001208` to read the default pin configuration register value. (See Figure 3)
3. Use command `lwr 50001208 3f699311` to write the pin configuration register value for the SPI slave (GPIOA[3:0]).

Type command `lrd 50001208` to check the changed pin configuration register value.

Command `lrd` means 'long read data'. Command `lwr` means 'long write data' and these commands read and write per 4 bytes. The serial window should be opened until the image download is complete.

```

CI   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
*****

o such command - type help
[MROM]
[MROM] lrd 50001208
[0x50001208] : 0x3F611389
[MROM] lwr 50001208 3f699311
[MROM] lrd 50001208
[0x50001208] : 0x3F699311
[MROM]
    
```

Figure 3: Setup SPI Slave Pin Configuration of GPIOA[3:0]

Table 3: Register value for SPI slave

Address: [0x50001208]	Default value: 0x3F611389
GPIOA[3:0]	0x3F699311
GPIOA[9:6]	0x3F611389

NOTE

When GPIOA[9:6] pins are used for the SPI slave interface. It doesn't need to set the register value because the default value of GPIOA[9:6] is the SPI slave interface.

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4 CLI program for SPI Interface

The CLI program (`wifi_usb2spi_flash_dn.exe`) checks the SPI interface connection between the DA16200 EVK and the FT2232H module. [Figure 4](#) shows a list of files for the SPI SFlash downloader.

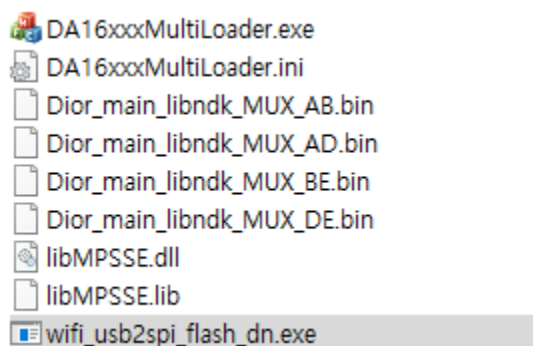


Figure 4: Configuration for GUI

4.1 Check SPI Connection

To check if the SPI connection is successful or failed, read the DA16200 chip ID address of 50080200. See [Figure 5](#). It is a success if the chip ID is 0xFC905001 in CLI program. But if the SPI connect failed, then check the installation of the FT2232H driver on the test PC.

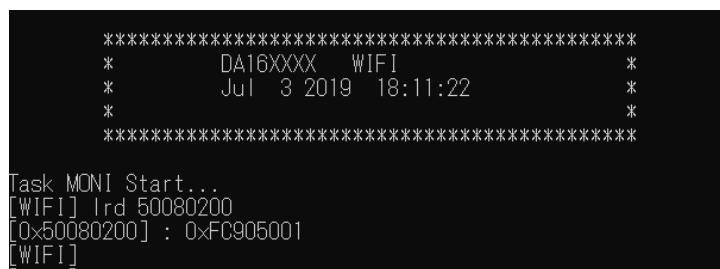


Figure 5: Read DA16200 Chip ID

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5 Run SPI SFlash Downloader

Figure 6 shows the SPI SFlash downloader tool (DA16xxxMultiLoader.exe). The Terminals show the number of USBs connected to the SPI interface. The Multi-Downloader GUI can directly control the FT2232H modules. After the CLI program (wifi_usb2spi_flash_dn.exe) is closed, start the SPI SFlash downloader tool to avoid any collisions.

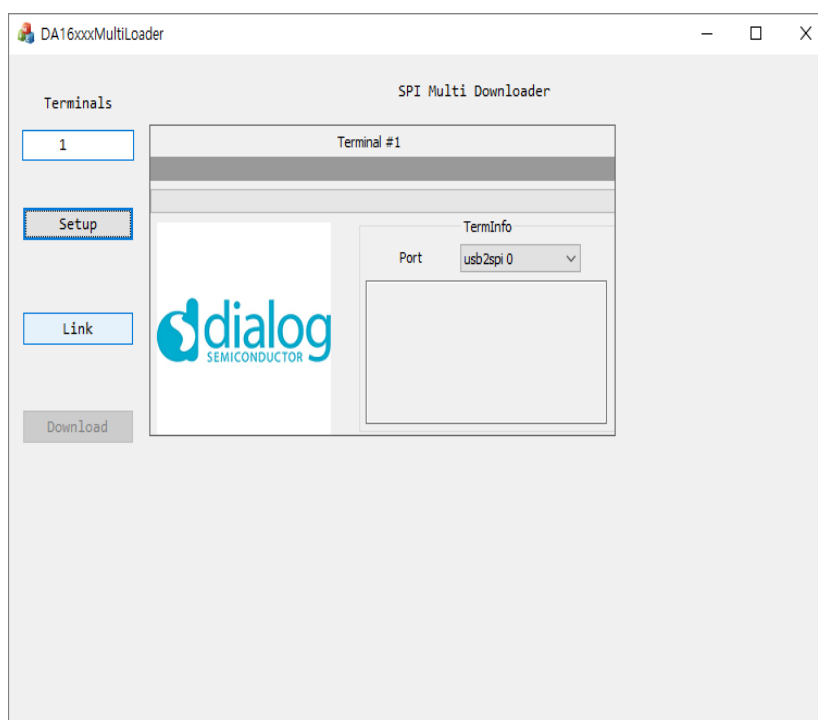


Figure 6: SPI SFlash Downloader

DA16200 SPI SFlash Downloader

5.1 Setup and Select Images

1. Click the Setup button to setup and select images.
 - [Figure 7](#) shows the Setup window to select image files to download
2. Click on a blank button to select the files.
 - BOOT: Select the Bootloader image that starts with DA16200_BOOT
 - RTOS: Select the Main RTOS image that starts with DA16200_RTOS
 - User Data: Select the User Data. (optional).
 - **SFLASH MAP**: Select serial flash memory size.
 - SPI pin: Select SPI pin mux.
3. After the file is selected, click **OK** to apply the changes. See [Figure 7](#).

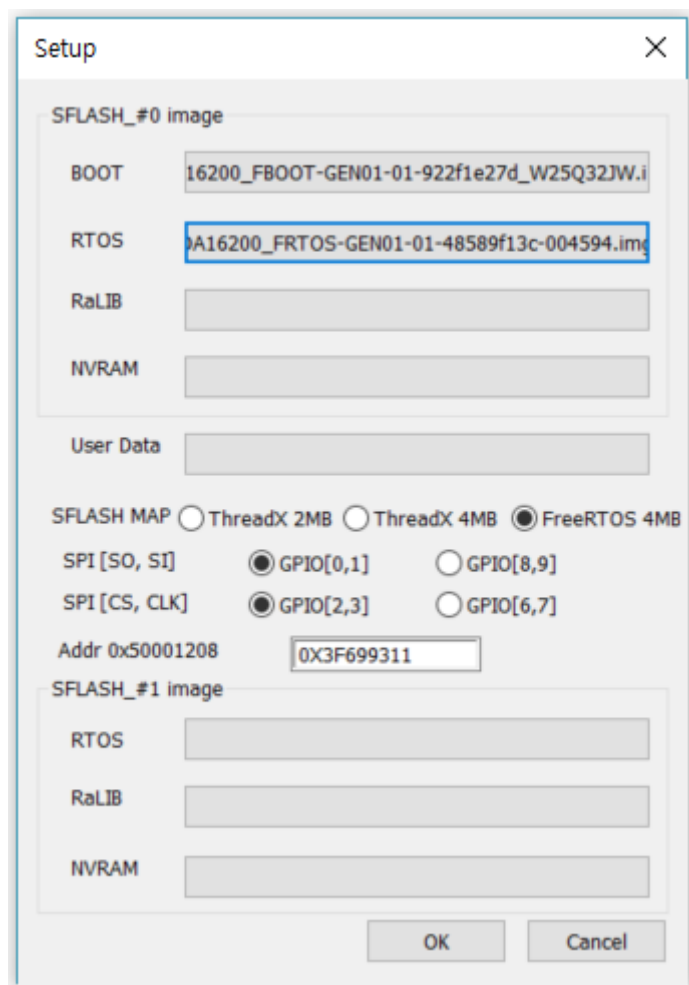


Figure 7: Setup and Select Image

DA16200 SPI SFlash Downloader

5.2 Link to PC

1. Click the **Link** button to setup a link between the test PC and the DA16200 via the SPI interface. The status changes as shown in [Figure 8](#).

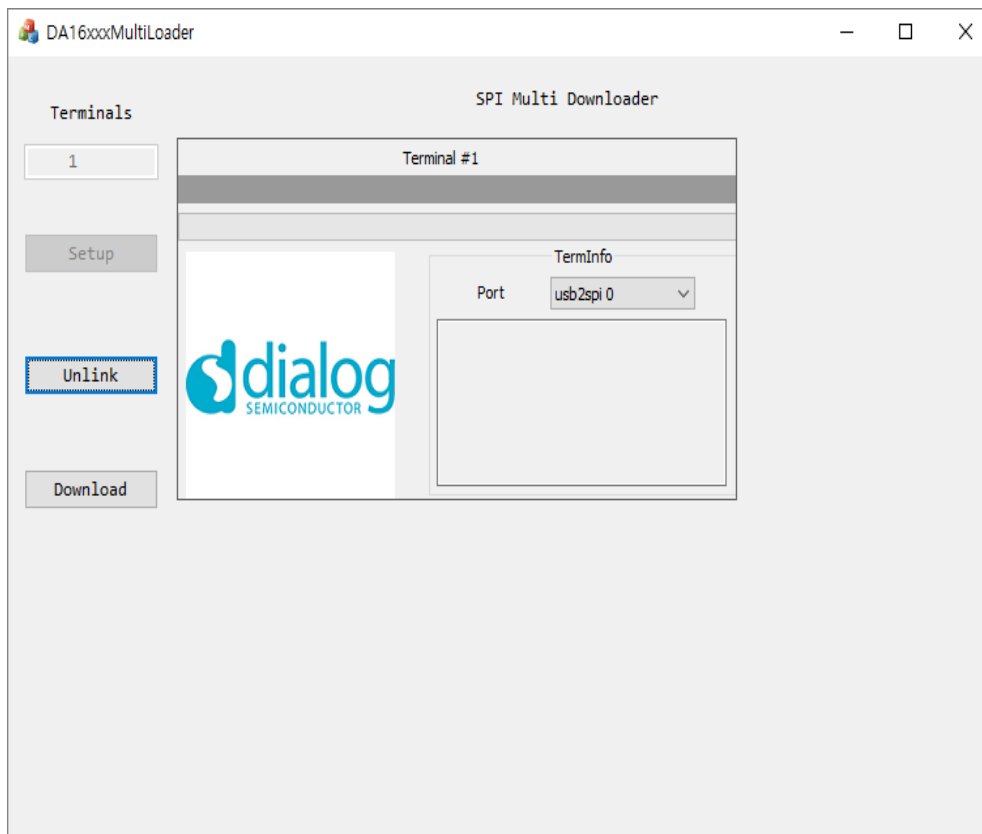


Figure 8: Link to PC

DA16200 SPI SFlash Downloader

5.3 Download Images

1. Click the **Download** button to start the download of DA16200 images.
When the status progress bar goes all the way, all downloads are complete.

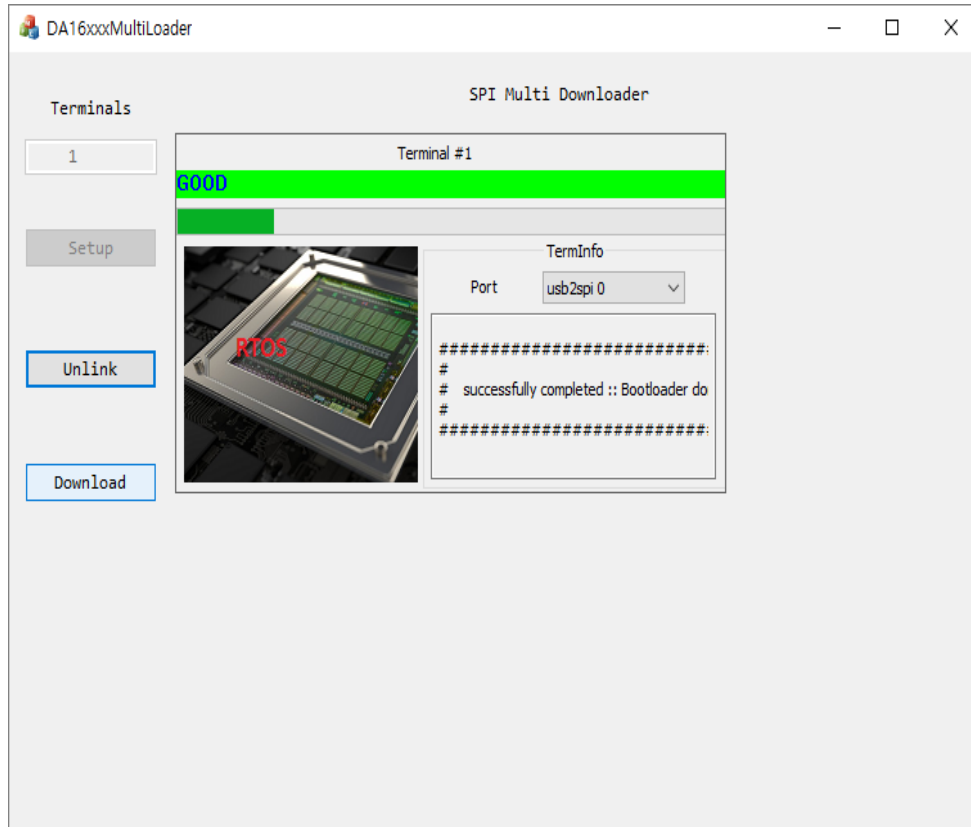


Figure 9: Download Images

5.4 Unlink from PC

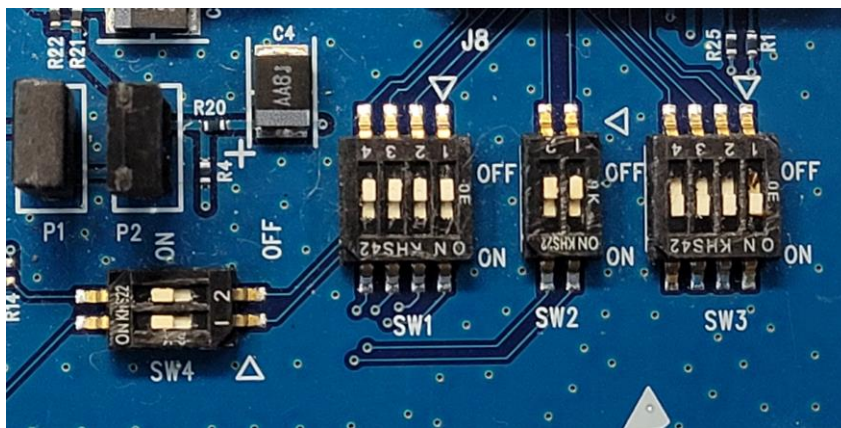
1. Click the **Unlink** button to reset and boot the DA16200 with the new image.
After the Unlink operation is done, the SPI connection depends on the new boot image.

Appendix A Setup Pin Configuration for SPI Slave on old EVK

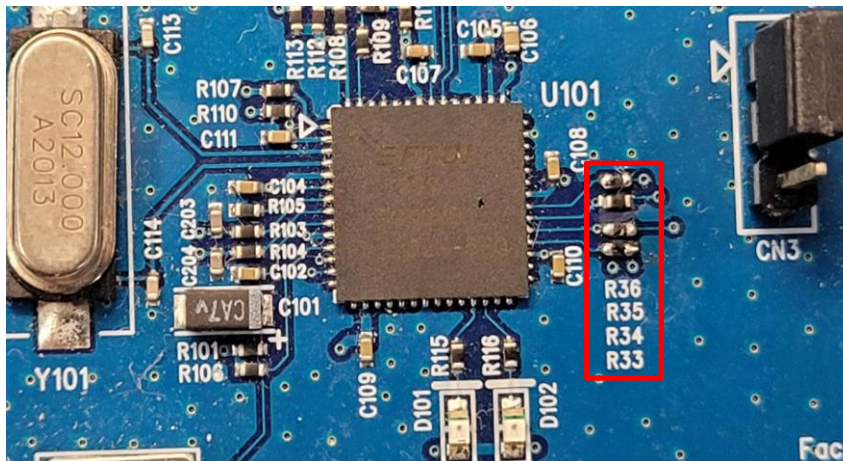
This appendix describes how to set up SPI slave pin configuration on the DA16200 Evaluation Kit, version 9.0 and lower. To use the SPI slave interface on the DA16200 EVK, SW1/SW3/SW2/SW4 should be set as [Table 4](#) and [Figure 10](#).

Table 4: SPI Slave Switch Setup on EVK v9.0 and lower

GPIOs for SPI Slave	DA16200 EVK Switch Setup	
	ON	OFF
GPIOA[3:0]	SW3	SW1, SW2
GPIOA[9:6]	SW1	SW3, SW2, SW4



SPI slave switch setup for GPIOA[3:0]



R33, R34, 35, and R36 with 0-ohm resistors

Figure 10: Setup Switch for SPI Slave on EVK v9.0 and lower

NOTE
 If each of R34, R35, R36, and R37 are not integrated, 0-ohm resistor should be added as shown in [Figure 10](#).

Revision History

Revision	Date	Description
1.8	06-Sep-2022	Update Section 3.4 and Appendix A.
1.7	04-Aug-2022	Added FreeRTOS image type in section 3.1 Updated setup pin configuration in section 3.3 and 3.4 Added SPI slave setup for EVK version 9 and lower in Appendix A.
1.6	12-Apr-2022	Support FreeRTOS flash map. Support User data write. Updated Setup Dialog. Updated logo, disclaimer, copyright.
1.5	26-Jun-2020	Update contents and figures for EVK board v7.0 in section 3.3
1.4	26-Nov-2019	Finalized for publication
1.3	19-Nov-2019	Editorial review
1.2	02-Aug-2019	Update the selection of SFlash size in section 5.1
1.1	24-Jul-2019	Update pin configuration in section 3.3 Update CLI program for SPI interface in chapter 0
1.0	05-Jul-2019	First Release.

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Status Definitions

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu

Koto-ku, Tokyo 135-0061, Japan

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