# User Manual

# DA16200 SPI SFlash Downloader

## UM-WI-012


### Abstract

*This User Manual explains how to setup and use the DA16200 SPI Sflash Downloader.*

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## 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 |

## References

[1] DA16200, Datasheet, Dialog Semiconductor
[2] DA16200, SDK Programmer Guide, Dialog Semiconductor
[3] DA16200, EVK User Manual, Dialog Semiconductor
[4] DA16200, AT Command User Manual, Dialog Semiconductor

# 1 Preparation

The Multi-Downloader GUI can download the images to SFLASH with the use of function SPI_SLAVE. The Multi-Downloader GUI needs to use the FT2232H module for the USB to SPI interface.

## 1.1 Images to Download

There are three types of images needed to operate DA16200 in a normal way:

- BOOT: This image has the important SFlash type information known as SFDP
- RTOS: This image contains Wi-Fi libraries and system/user applications
- SLIB: This image includes system libraries: RF drivers and libraries for DPM operation

## 1.2 PC Preparation

The DA16200 EVK supports the use of an USB port. The user just has to connect with a micro-USB cable and then two COM ports will be detected automatically.

- Please install the FT2232 Driver for windows. In most cases, the driver will be installed automatically. If not installed automatically, use the following URL to download and install the driver: http://www.ftdichip.com/Drivers/CDM/CDM21224_Setup.zip.

## 1.3 HW Preparation

The DA16200 SoC has two SPI Slave sets with GPIO pin mux setting: GPIOA0 ~ GPIOA3 and GPIOA6 ~ GPIOA9. The DA16200 EVK supports SPI download if GPIOA0 ~ GPIOA3 are used, because the DA16200 EVK already uses GPIOA6 ~ GPIOA9 for other functions. But if you like to use GPIOA6 ~ GPIOA9 on your own module and your own USB driver chipset board, then see Table 1 for the SPI slave mux.

**Table 1: DA16200 SPI Slave GPIO Mux**

| SPI Slave | GPIO set #1 | GPIO set #2 |
|---|---|---|
| SPI_MISO | GPIOA0 | GPIOA8 |
| SPI_MOSI | GPIOA1 | GPIOA9 |
| SPI_CS | GPI0A2 | GPIOA6 |
| SPI_CLK | GPIOA3 | GPIOA7 |

### 1.3.1 Hardware Modification on DA16200 EVK

On the DA16200 EVK you need to wire and install a resistor for the SPI interface. Do the following steps:

1. Make a jumper between 12pin of CON7 and Pin #2 of R33. See Figure 1 and Table 2.
2. Make a jumper between 11pin of CON7 and Pin #1 of R35. See Figure 1 and Table 2.
3. Install a 0 Ohm resistor at R36 and R38. See Figure 1.

**Table 2: Pin Configuration on DA16200 EVK**

| SPI Slave | DA16200 Pin | Con17 Pin | FT2232H-56Q |
|---|---|---|---|
| SPI_MISO | GPIOA0 | #11 | #34 TDO/DI |
| SPI_MOSI | GPIOA1 | #14 | #33 TDI/DO |
| SPI_CS | GPI0A2 | #10 | #35 TMS/CS |
| SPI_CLK | GPIOA3 | #12 | #32 TCK/SK |

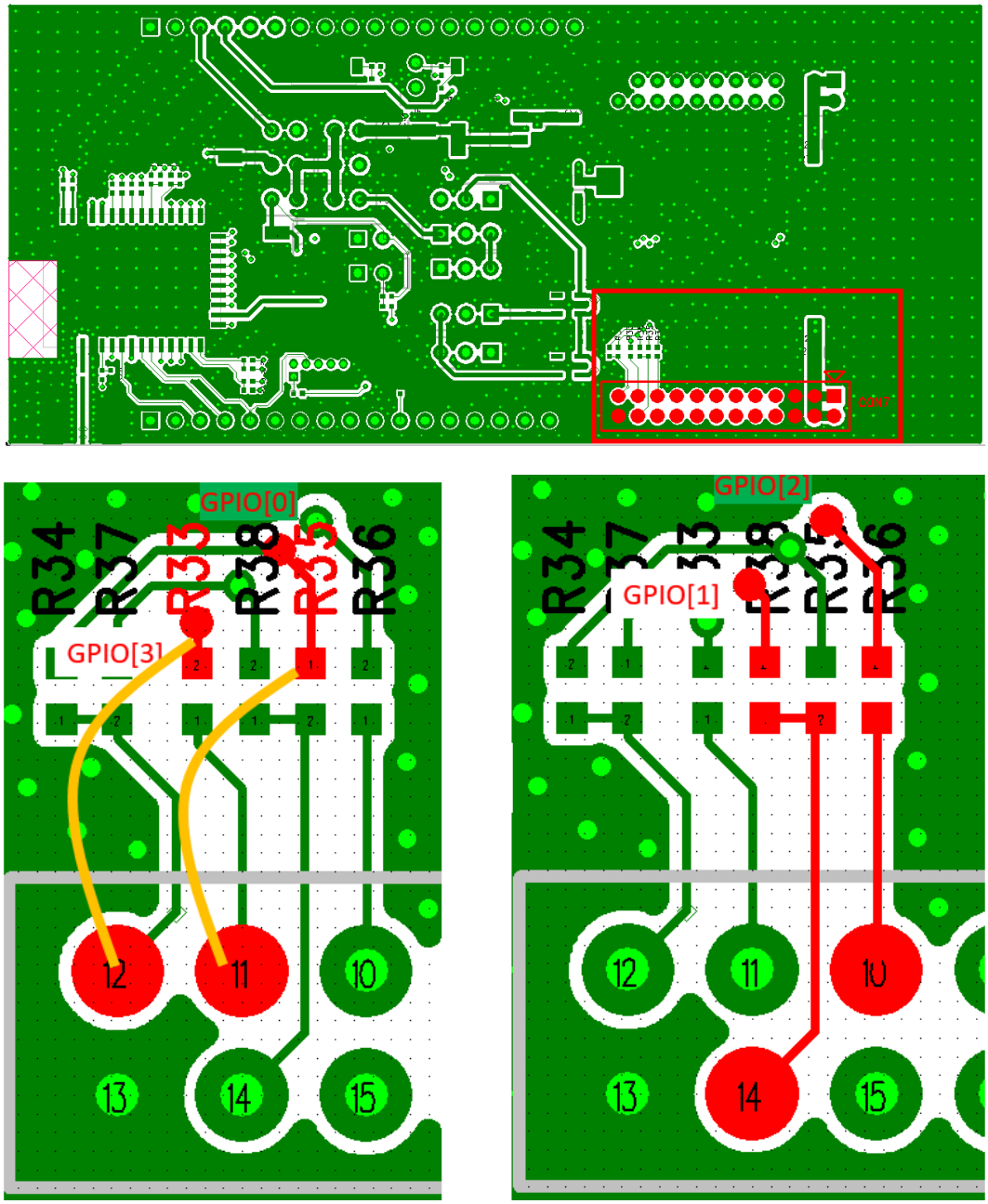


**Figure 1: DA16200 EVK, Top**

4. Install a 0 Ohm resistor at R6, R7, R8 and R9. See Figure 2.

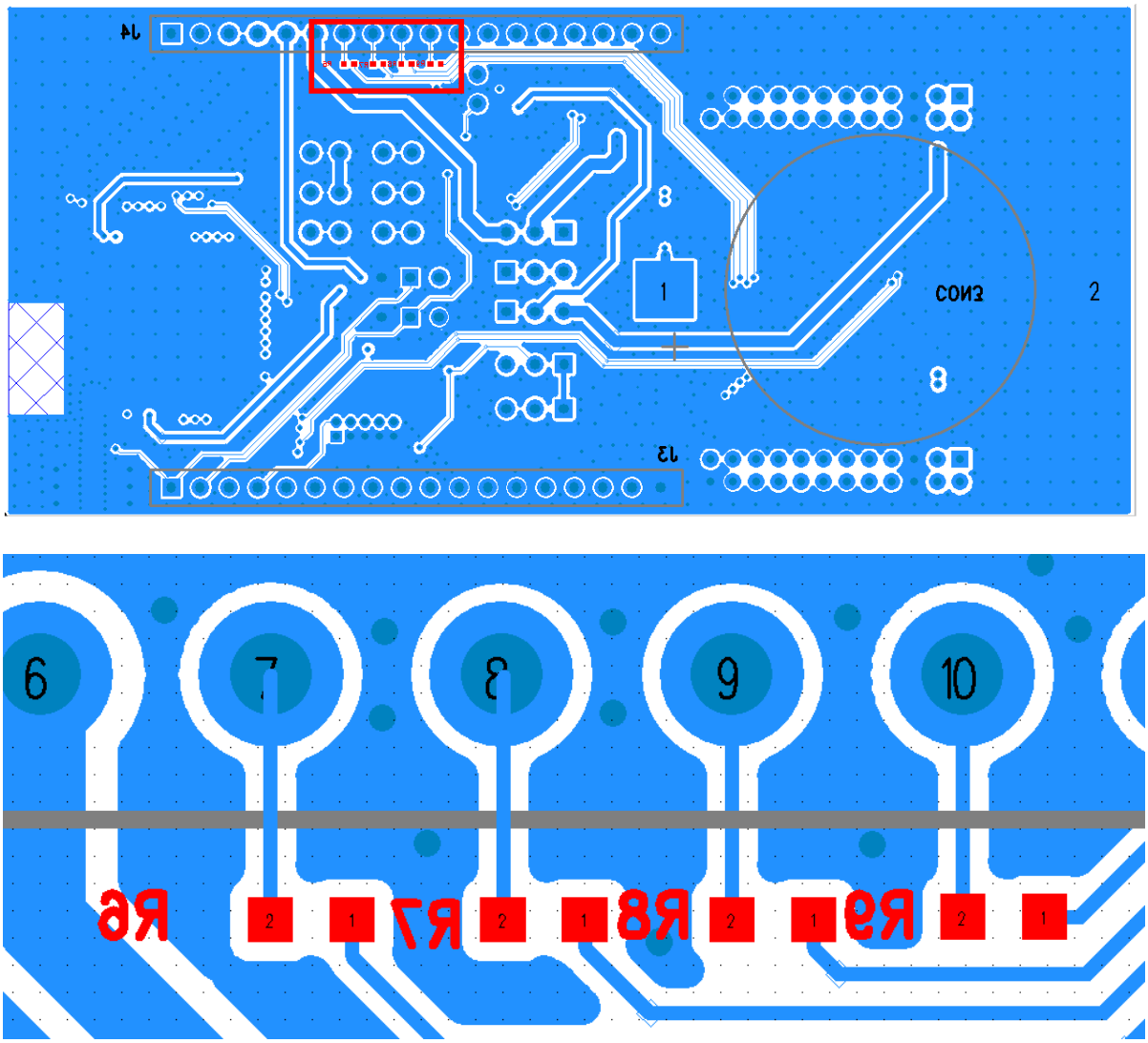


**Figure 2: DA16200 EVK, Bottom**

# 2 Run the Multi-Downloader GUI

This GUI consist of five files:

- DA16xxxMultiLoader.exe - this is the Graphical User Interface
- Dior_main_libndk.bin – the default setting to use is GPIOA0~3
- libMPSSE.dll
- libMPSSE.lib
- wifi_usb2spi_flash_dn.exe – this is a CLI program to check the SPI connection

To select the pin configuration of the SPI slave interface, there are two files names, of which part of the name is `Dior_main_libndk` and each of these files support a specific GPIO pin number. The user is asked to use the correct file for GPIO pins.

- `Dior_main_libndk_MUX_AB.bin`
  Remove existing `Dior_main_libndk.bin`
  Please modify file name to `Dior_main_libndk.bin` if GPIOA0~3 is used for SPI download
- `Dior_main_libndk_MUX_DE.bin`
  Remove existing `Dior_main_libndk.bin`
  Please modify file name to `Dior_main_libndk.bin` if GPIOA6~9 is used for SPI download

## 2.1 SPI Connect Check

### 2.1.1 Check MROM State and Set GPIO MUX According to Hardware Configuration

#### 2.1.1.1 Check MROM State Using Serial Terminal Utility

This procedure is not needed with an empty SFlash.

To be able to load an image, at `[/DA16200]` prompt, type `reset` to go to the `[MROM]` prompt.

```
[/DA16200] # reset
        ******************************************
        *      DIALOG SEMICONDUCTOR   FC9K MaskROM BootLoader
        *  Cortex-M4 (XTAL 40000 KHz, SYS 120000 KHz)
        *  Console Baud Rate : 0 (00000000)
        *  HW Version Num.   : DA1620010
        *  Build Option      : RomALL
        *  RoSDK Date & Time : Mar 13 2019 13:05:45
        *  Build Date & Time : Mar 13 2019 13:11:24
        *           http://www.Dialog Semiconductor.co.kr
        ******************************************
[MROM]
```

#### 2.1.1.2 Set GPIO MUX According to Hardware

If GPIOA0~GPIOA3 is used, change the Pin mux setting as follows:

```
[MROM] lrd 50001208
[0x50001208] : 0x3F611389
```

```
[MROM] lwr 50001208 3f699311
[MROM] lrd 50001208
[0x50001208] : 0x3F699311
```

To use GPIOA6~GPIOA9, change the Pin mux setting as follows:

```
[MROM] lrd 50001208
[0x50001208] : 0x3F688689
[MROM] lwr 50001208 3f611689
[MROM] lrd 50001208
[0x50001208] : 0x3F611689
```

### 2.1.2 SPI Connection Check

Execute wifi_usb2spi_flash_dn.exe file to check the SPI connection.

```
Number of available SPI channels = 1   // found SPI channel
Information on channel number 0:
        Flags=0x2
        Type=0x6
        ID=0x4036010
        LocId=0x11432
        SerialNumber=B
        Description=Dual RS232-HS B
        ftHandle=0x0
handle=0x597858 status=0x0
        ******************************************
        *         DA16XXXX   WIFI                *
        *         Jul  3 2019  18:11:22          *
        *                                        *
        ******************************************
Task MONI Start...
[WIFI] lrd 50080200
[0x50080200] : 0xFC905001  // DA16200 Chip ID, If FC905001 read well, communication is ok
```

If there is no available SPI channel information, then check the installation of the FT2232H driver on your PC. And then type "`lrd 50080200`", which means that the register value of `0x50080200` address is read per 4 bytes. It is possible to check value `0xFC905001`, which is the chip ID when the connection is normal. Please check the GPIO mux settings when the chip ID cannot be checked.

## 2.2 Execute Multi-Downloader

The CLI tool (wifi_usb2spi_flash_dn.exe) must be exited before the Multi-Downloader GUI can be started. To open the Multi-Downloader GUI, execute file DA16xxxMultiLoader.exe. See Figure 3.

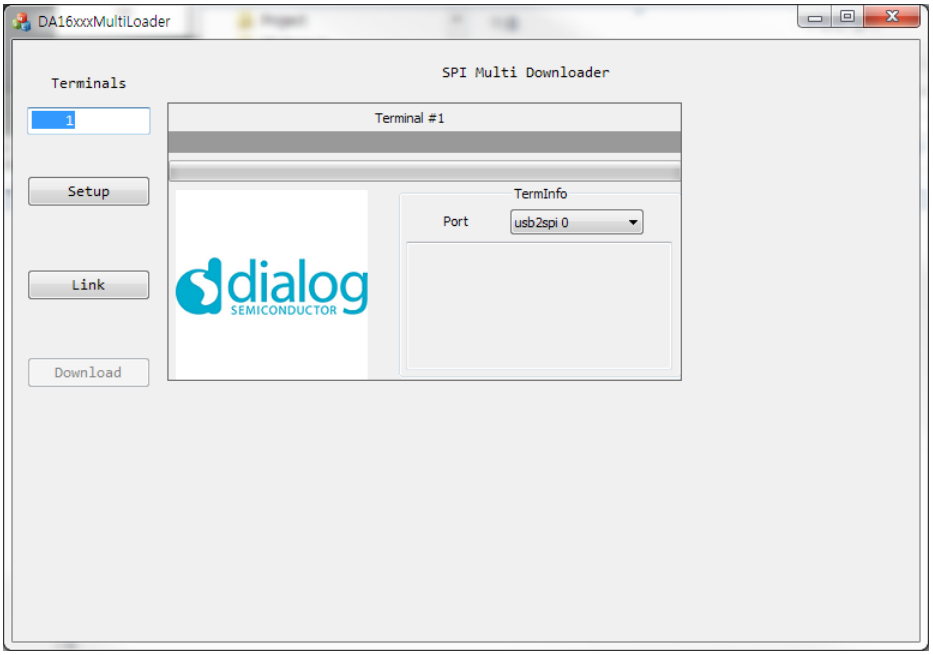


**Figure 3: Multi Downloader**

The Terminals shows the number of USBs connected to the SPI interface.

The Multi-Downloader GUI can control multi-FT2232H modules at once.

### 2.2.1 Setup Button and Assign the Files to Download

Click the Setup button (Figure 3) to show the setup dialog. With the Setup button the user can assign which files to download. See Figure 4.

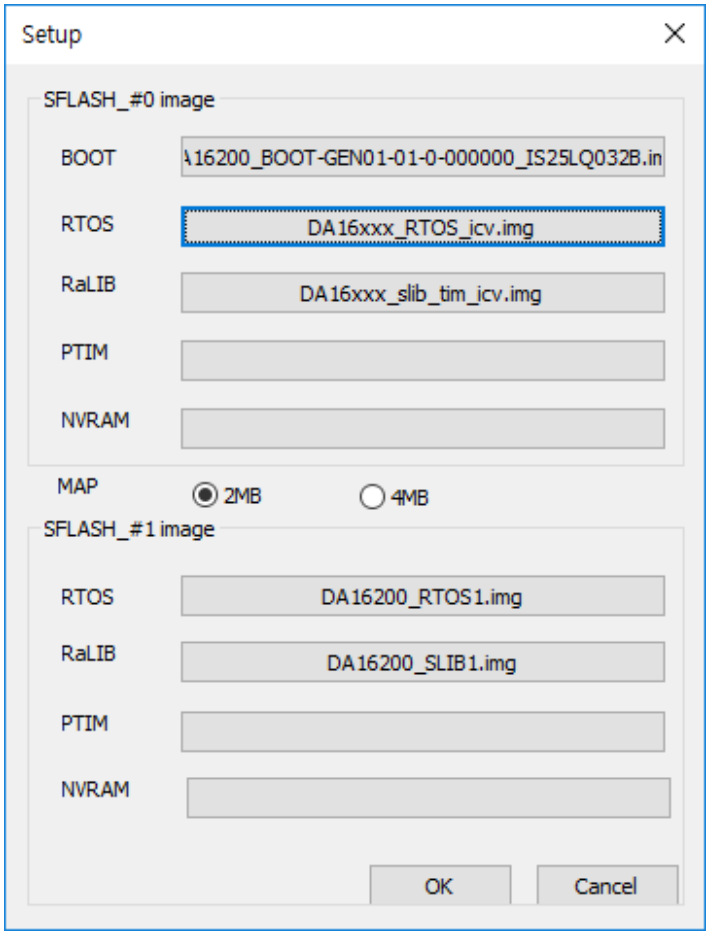


**Figure 4: Setup Windows**

Please press a blank button to assign the files.

**BOOT**: Select the Bootloader image that starts with DA16200_BOOT

**RTOS**: Select the Main RTOS image that starts with DA16200_RTOS

**RaLIB**: Select the System Library image that starts with DA16200_SLIB

**MAP**: Select Sflash memory size

After the files are assigned, click the **OK** button for the changes to take effect.

### 2.2.2 Link Button

To setup a link between the GUI and the DA16200 via SPI, click the **Link** button. You can find the status changes as shown in Figure 5.

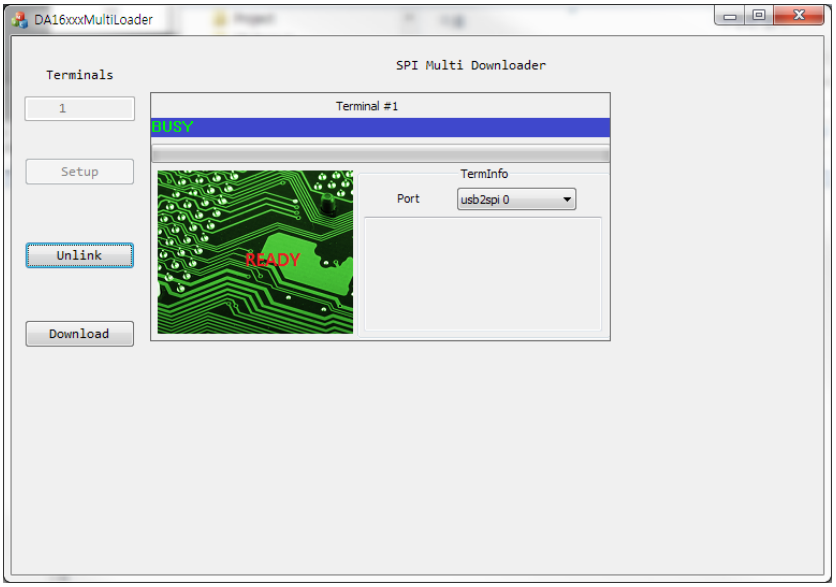


**Figure 5: Ready Status**

And in the DA16200 console the printed information is as shown below. If the READY status cannot be reached, then check if the SPI connection is correct.

```
[MROM] init_mem_profiler_step1 is skipped due to SRAM overflow !!

        ******************************************
        *      FCI   FC9K Project
        *  Cortex-M4 (XTAL 40000 KHz, SYS 120000 KHz)
        *  Console Baud Rate : 0 (00000000)
        *  OS : ThreadX 5.7  , IAR
        *  HW Version Num.   : fc905010
        *  Build Option      : LibNDK (SRAM)
        *  RoSDK Date & Time : Mar 13 2019 13:05:45
        *  SVN Revision      : 6804
        *  SVN Repository    : ^/FC9050/trunk/2.%20Software/FC9050_SLR/trunk
        *  RaLIB Version     : FC9K-20190705:145540:SVN7140
        *  Build Date & Time : Jul  2 2019 17:38:29
        *           http://www.fci.co.kr
        ******************************************
               CODE/RO   : 0008B800 , size 00037800
               RWDATA    : 000C3000 , size 00006000
               FREE(POOL): 000C9000 , size 00037000

gpio num: 6
BUF Address = 0xcaa98
AT Address = 0xcbaa0
```

### 2.2.3 Download Button

Click the **Download** button to start the download of the images.

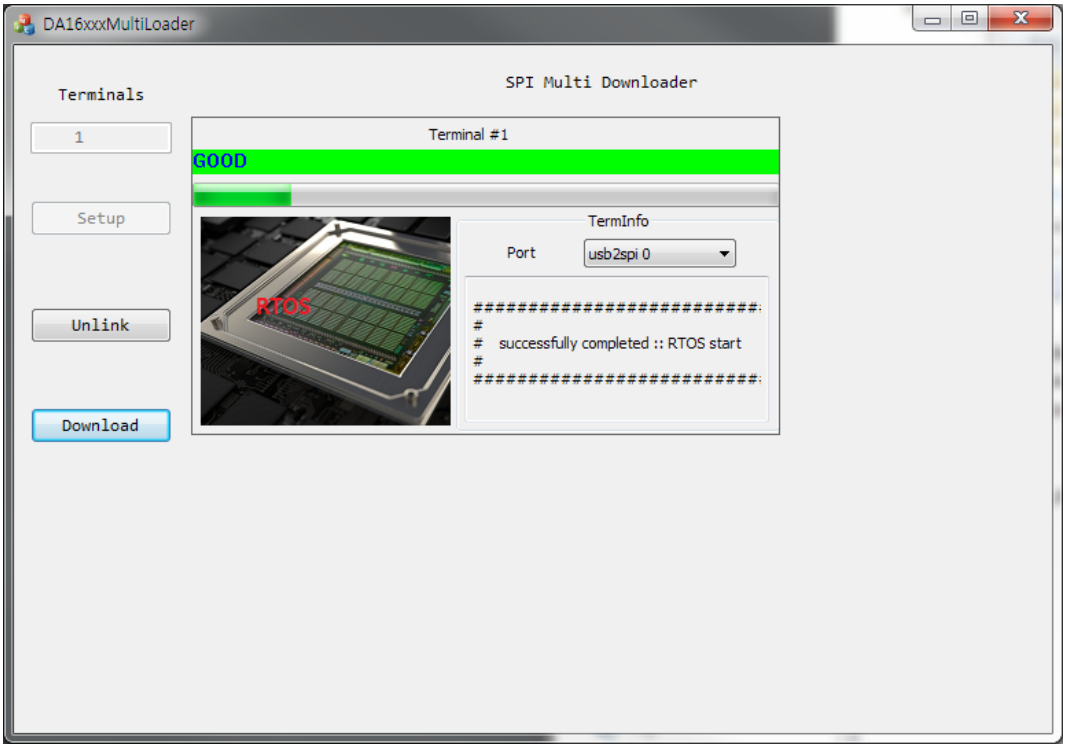


**Figure 6: Images Download**

The user can check the progress in the Multi-Downloader GUI. And the DA16200 log prints the download status as shown below.

```
gpio num: 6
BUF Address = 0xcaa98
AT Address = 0xcbaa0
addr=0xf81000, dst0x0, length=28784 issfdpinclude=1
addr=0xf81000, dst0xa000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x12000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x1a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x22000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x2a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x32000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x3a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x42000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x4a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x52000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x5a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x62000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x6a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x72000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x7a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x82000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x8a000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x92000, length=32768 issfdpinclude=0
addr=0xf81000, dst0x9a000, length=32768 issfdpinclude=0
```

```
addr=0xf81000, dst0xa2000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xaa000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xb2000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xba000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xc2000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xca000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xd2000, length=32768 issfdpinclude=0
addr=0xf81000, dst0xda000, length=18704 issfdpinclude=0
addr=0xf81000, dst0xf1000, length=29344 issfdpinclude=0
RaLIB is relocated to RETMEM (20f815c0, 566, 7306952, 7306952)
P.TIM is relocated to RETMEM (20f835c0, 2)
```

After the download is done correctly, the message **GOOD** is shown. See Figure 7.

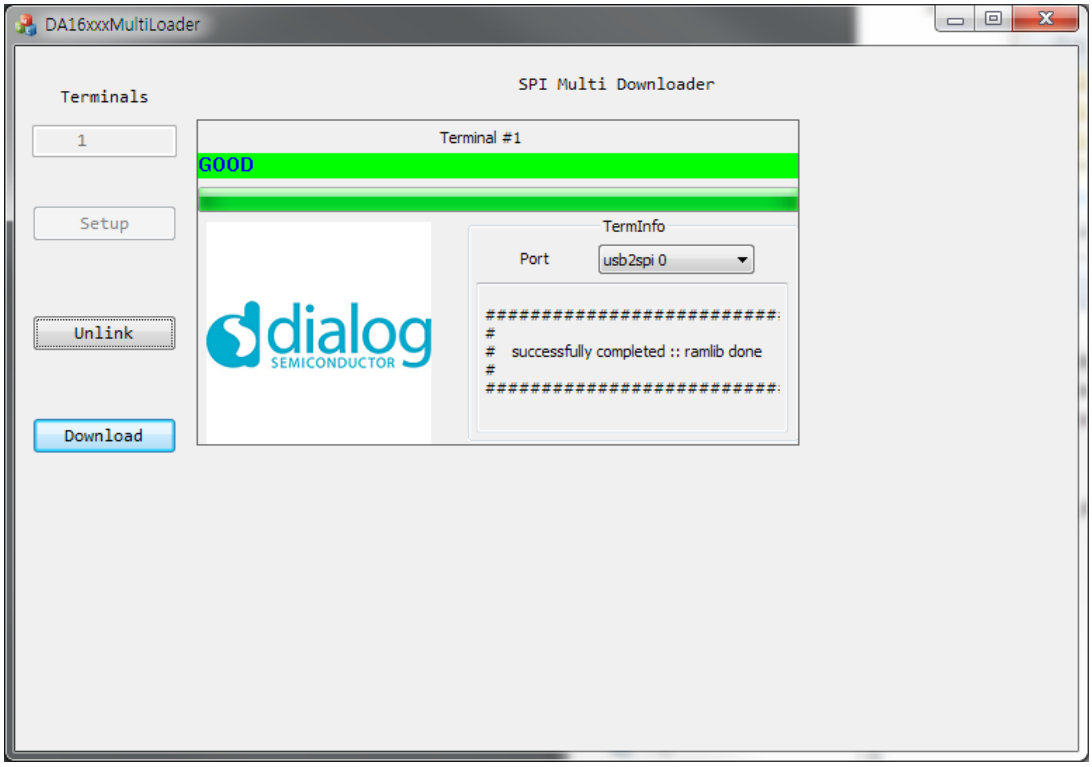


**Figure 7: Download Done**

### 2.2.4 Unlink Button

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

# 3 Revision History

| Revision | Date | Description |
|---|---|---|
| 1.4 | 26-Nov-2019 | Finalized for publication |
| 1.3 | 19-Nov-2019 | Editorial review |
| 1.2 | 02-Aug-2019 | Add selection of Sflash size in setup windows in page 10 |
| 1.1 | 24-Jul-2019 | Add H/W modification on DA16200 EVK for choosing GPIOs<br>Add description on Dior_main_libndk for GPIOs |
| 1.0 | 05-Jul-2019 | Preliminary DRAFT release |

## 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. |

## Disclaimer



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