PHYCHIPS

RED FDM
2020-03-10

Firmware Download and Debug
User Manual

Rev.1.0.3 2020-03-10

Contents

1 Revision History

Version	Date	Description
1.0.0	2015.03.05	Initial Release (based on PR9200 APU)
1.0.1	2015.06.08	Modified some image
1.0.2	2016.05.31	Modified section in 3.3 IAP-UART
1.0.3	2020.03.10	Deleted Colink-Ex related content

2 Firmware Development Process

Firmware development Process is shown at Figure 1. The suitable tools and devices are required to each development state such as compile, download, debugging system.

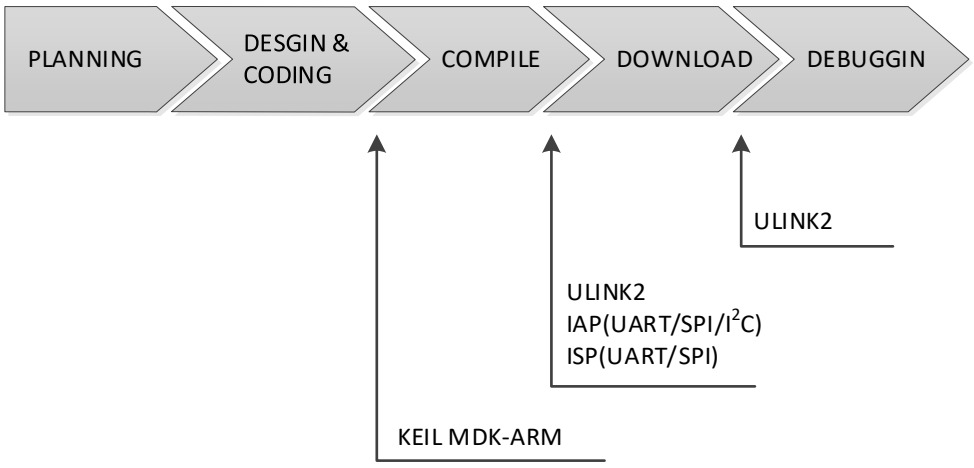


Figure 1 firmware development process

2.1 Development Tool (KEIL MDK-ARM)

The MDK-ARM is embedded development tool for Cortex-M microcontroller. MDK-ARM includes ARM C/C++ Compilation Tool chain, µVision4 IDE, debugger, and simulation environment. PHYCHIPS does not support KEIL MDK-ARM. For more details, please refer to http://www.keil.com

2.2 Firmware Programming

PR9200 support two ways to firmware download. One is method using ULINK2 debug adapter through SWD (Serial Wire Debug). The other is method using IAP (In-Application Programming). IAP can use three type of interface, UART, SPI and I²C without any hardware debugger.

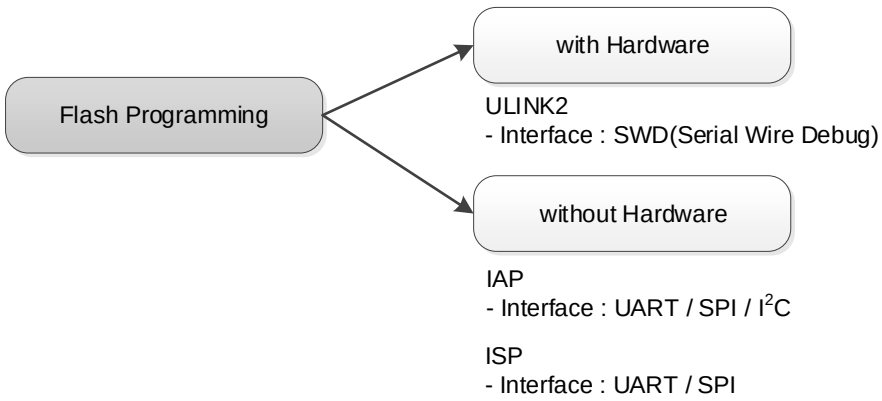


Figure 2 Methods to firmware programming

2.3 Debugging

Firmware debugging uses ULINK2. Using two debuggers with Keil µVision IDE can debug embedded application of PR9200 and trace firmware.

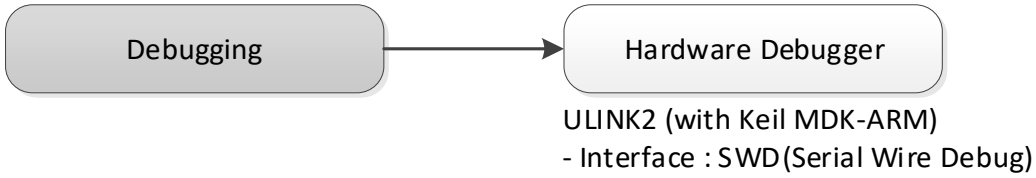


Figure 3

2.4 Alternative solution

PR9200 supports alternative solution besides ULINK2 + KEIL MDK-ARM.

IDE	Debugging Adopter	Port	Note
KEIL MDK-ARM	ULINK2	SWD	

3 Flash Download

This section describes four method for flash download, ULINK2, ISP and IAP

3.1 ULINK2

ULINK2 debug adapter connects your PC's USB port to SWD (Serial Wire Debug) of PR9200 and allows you to programming and debug embedded programs on PR9200. In order to download firmware, Keil µVision IDE is required. After connecting ULINK2 to PR9200, follow next step to success to flash download using ULINK2.

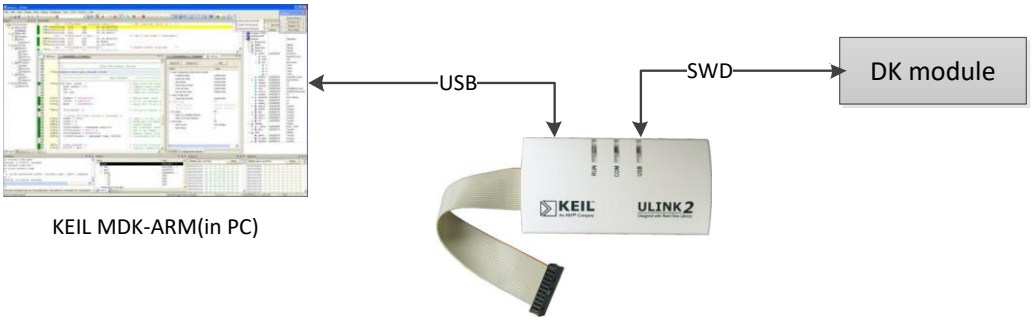


Figure 4

3.1.1 Flash Download Configuration on KEIL µVision IDE

1. Select or ***Flash → Configure Flash Tools...*** of pull-down menu.

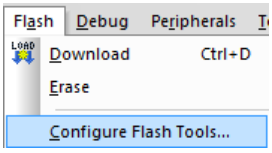


Figure 5

2. At Utilities tab, select command "Use Target Device for Flash Programming" and choose debugger "ULINK Cortex Debugger". And open Cortex-M Target Driver setup to click "settings"

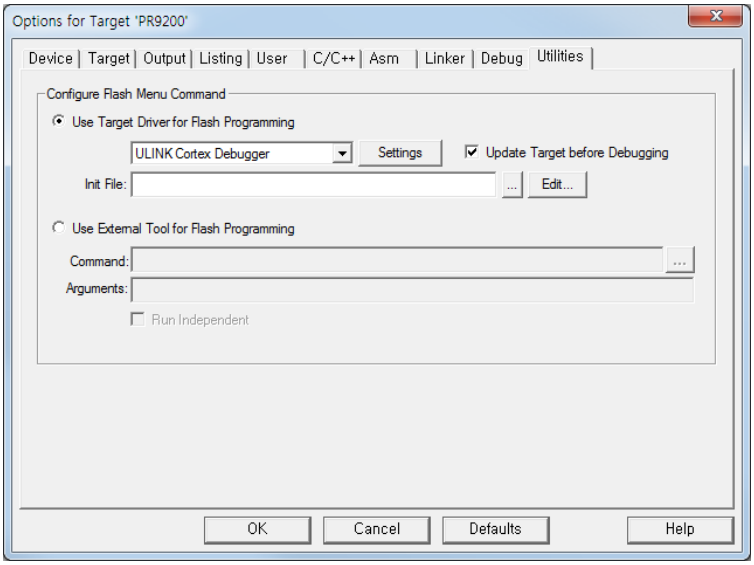


Figure 6

3. Set "Download Function" as follow

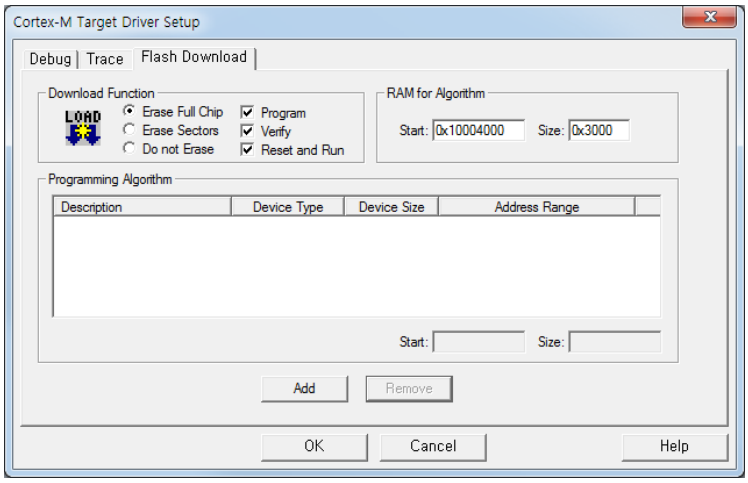


Figure 7

4. Click “Add” button and select “PR9200_EFLASH_63KB.FLM”.

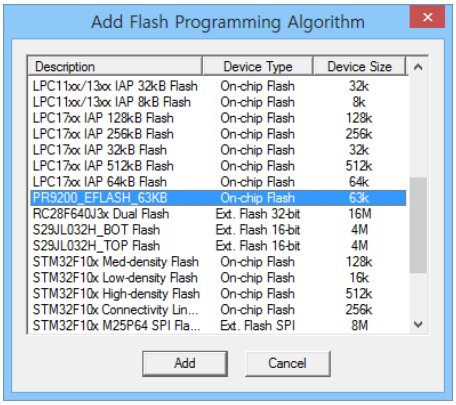


Figure 8

[NOTICE]
First of all, copy “PR9200_EFLASH_63KB.FLM” to directory KEIL_INSTALL\ARM\FLASH.
Flash algorithm file is included in [DK_DATA]\Firmware\Flash_algorithm

5. Make sure that programming algorithm is added.

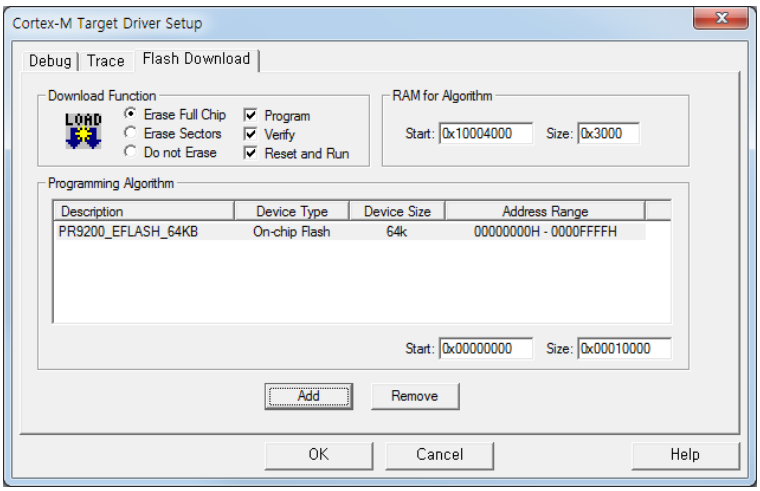


Figure 9

6. At Debug tab, set driver setup as below Figure 10.

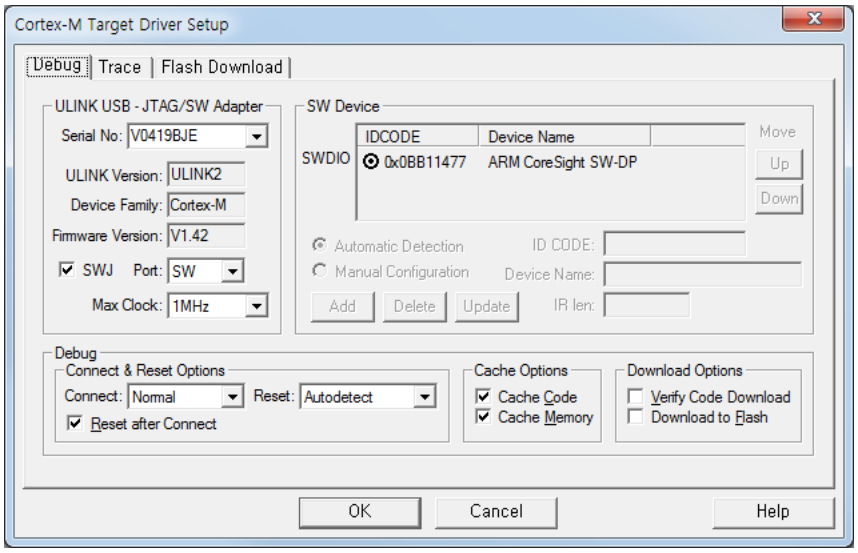


Figure 10

3.1.2 Flash Erase

1. Select ***Flash → Erase*** at main windows.

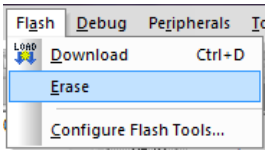


Figure 11

2. Check chip erase result at Build output window.

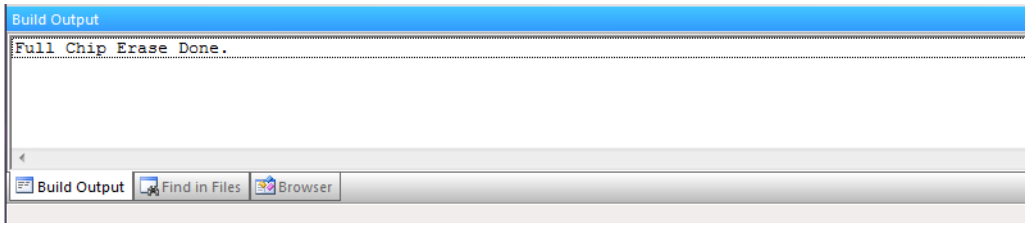


Figure 12

3.1.3 Flash Download

1. Select LOAD or ***Flash → Download to Flash***

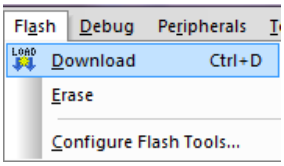


Figure 13

2. Check download result from output window.

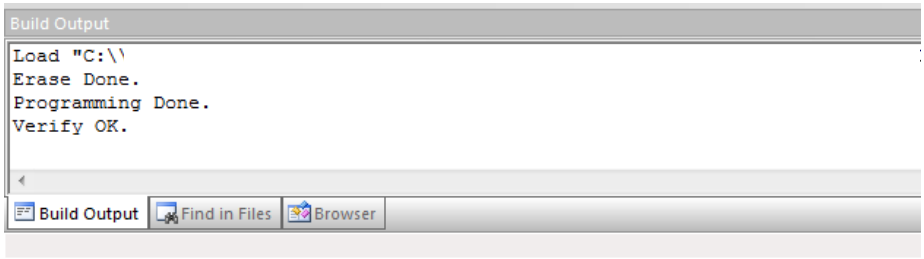


Figure 14

3.2 IAP and Bootloader– UART

PR9200DK support IAP (In-application Programming) using UART.
UART IAP help user download flash program without any extra hardware like ULINK2.

UART IAP are similar to ISP but help user download flash program without any extra hardware like ULINK2 and mode transition. User does not need any configuration for IAP.

[notice] PR9200DK's GUI does not support SPI IAP. If you want IAP using SPI, refer to Protocol manual of DK.

3.2.1 UART Download

Connect PC's USB to PR9200DK and execute RED utility.
Open "download" window and select firmware binary file (*.hex) you want.
Click "update" button and flash downloading is executed.

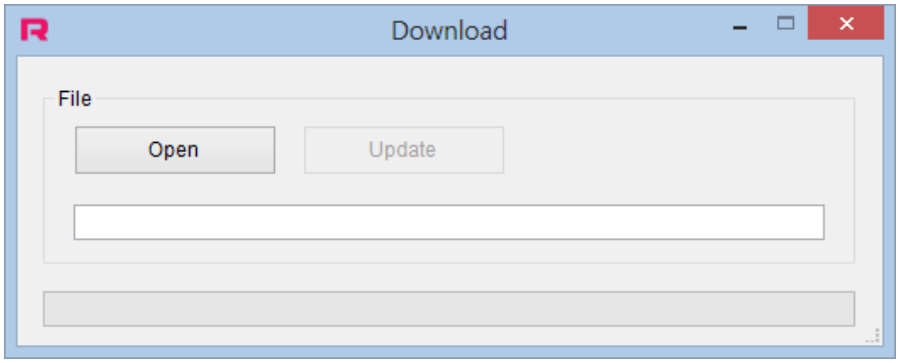


Figure 15

After download is completed, reset PR9200 or module.

[Notice]
If the firmware is abnormally deleted, IAP download do not work properly.
In this case, ISP mode can help you download as well as SWD.
In order to enter this mode, set PR9200 pin as below table

ISP_MODEb	P17	P16	P15
Low	Low	Low	Low

Table

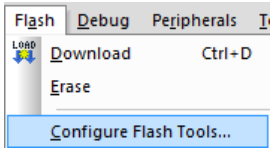
Restart or reset PR9200 after this set is changed. And execute "download" as IAP download
After download is completed, change ISP mode to normal mode as set ISP_MODEb to high.
Don't forget resetting PR9200.
When PR9200 operation mode is changed Normal mode to ISP mode, user must reset the chip and vice versa.

4 Debugging

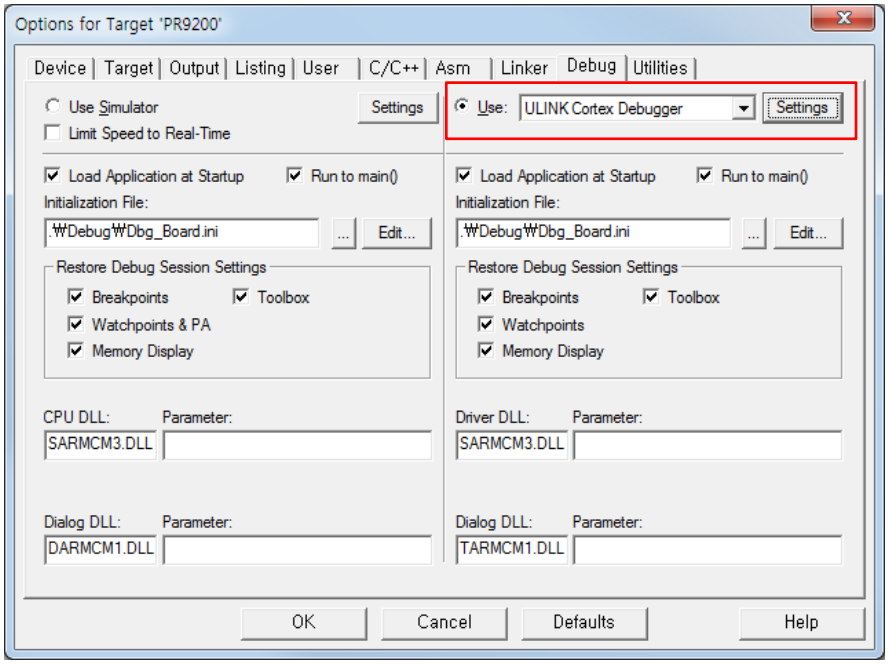
This chapter describes how to debug PR9200 firmware with ULINK2.

4.1 Configuration for ULINK2

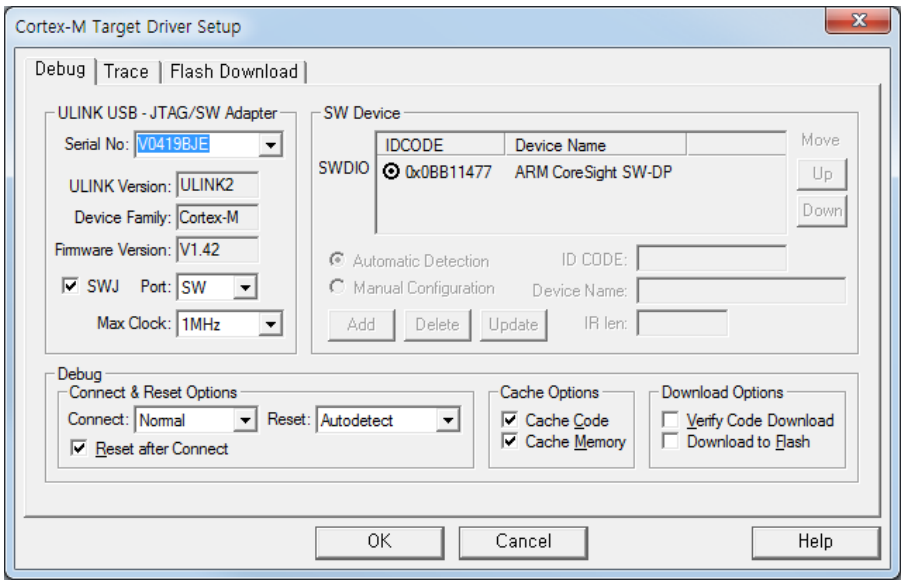
1. Select or ***Flash*** → ***Configure Flash Tools…*** at Keil µVision IDE main window



2. Select debugger to “ULINK Cortex Debugger” .



3. Click “Settings” button and setup ULINK USB-JTAG/SW Adapter as shown figure.



4.2 Debugging

1. Click or ***Debug → Start/Stop Debug Session*** to start debug.

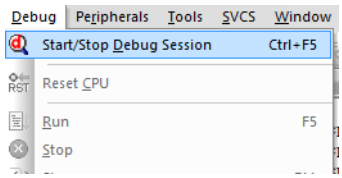


Figure 16

2. When user want to stop debugging, click ***Debug → Start/Stop Debug Session*** again.

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