Calterah Flash Downloader User Guide

Calterah Semiconductor

Date	Version	Description	Author
2019.05.15	V0.1.0	Draft.	Xudong Ran
2019.05.16	V0.2.0	Re-organize	Yingzhe Zhou
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2020.02.17	V1.0.6	Update for Alps MP	Xudong Ran
2020.03.05	V1.0.7	Update for Rhine MP	Xudong Ran
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2020.06.16	V1.1.0	Extract compiling procedure in separate user guide	Xudong Ran
2020.07.29	V1.1.1	Minor Update	Xudong Ran
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2020.11.26	V1.1.3	Support CAN OTA	Xudong Ran

Table of Contents

CHAPTER

ONE

INTRODUCTION

The purpose of this document is to explain the procedure about how to download firmware into external flash on Calterah Radar Development Platform using Calterah Flash Tool application. This document applies to Alps and Rhine series only.

Calterah Radar Development Platform (Calterah RDP board) provides three interfaces for firmware downloading, which are UART interface, SPI interface, and CAN interface. Different interface is selected using a 6-DIP switch on board. When Calterah SoC is booting, it checks the states of the DIP switch, and determine the interface used for downloading or debugging firmware. As shown in Figure 1, by using the Calterah Flash Downloader, the bootloader and firmware will be first uploaded into the SRAM on Calterah RDP board through any of the three interfaces, and then be downloaded to external flash through QSPI interface.

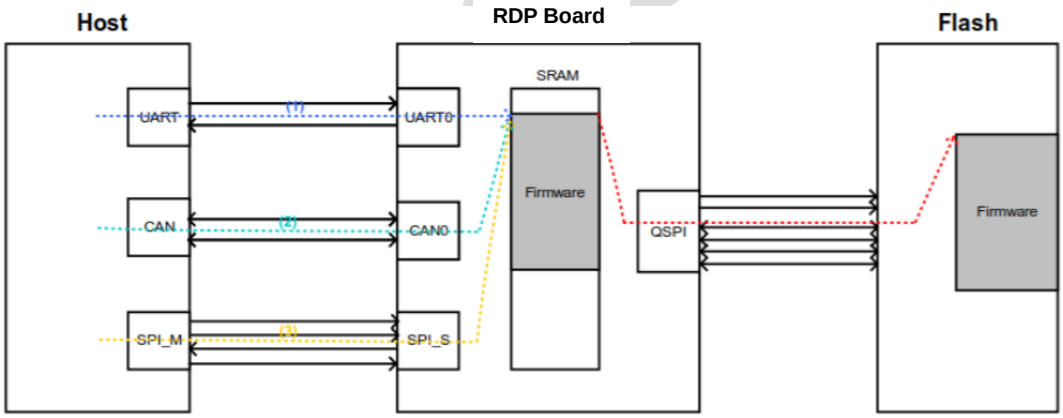


Figure 1: Interface Block Diagram

CHAPTER

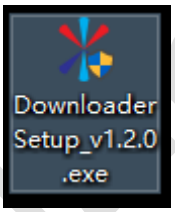
TWO

PREPARATION

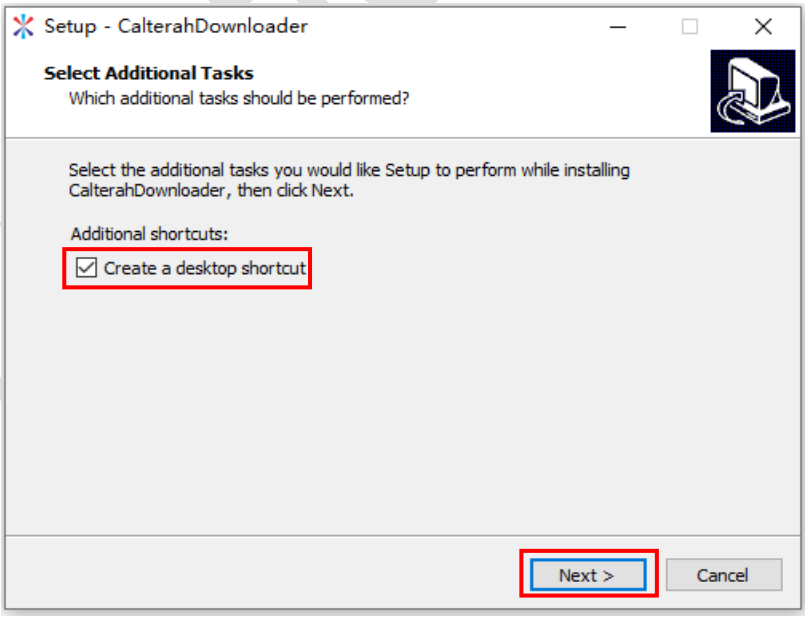
2.1 Installing Calterah Flash Downloader

Calterah provides a Java tool to download compiled binary firmware into external flash memory. Follow the instructions below to install Firmware Downloader.

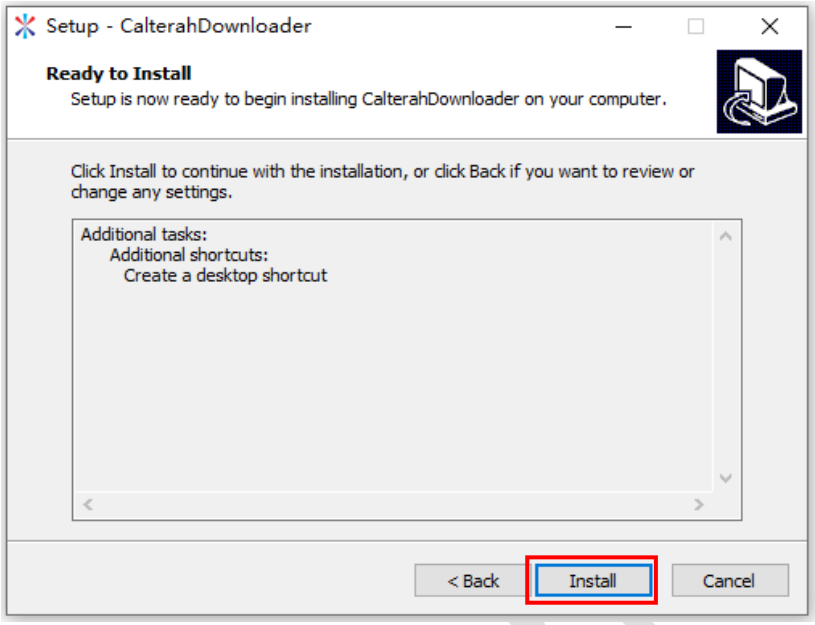
1) Find and open the executable file **DownloaderSetup.exe** in software package folder of **Tool/Downloader_Tool/**



2) Click **Create a desktop short** and click **Next**.



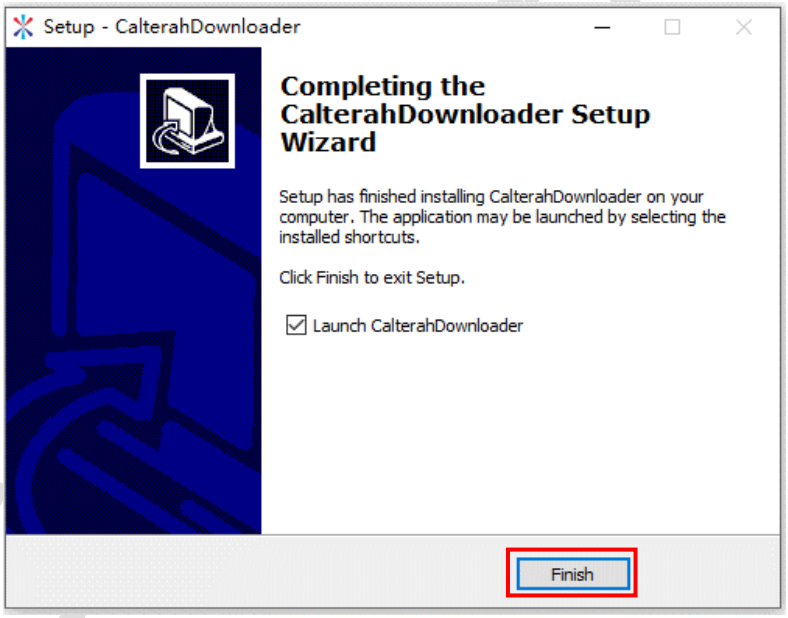
3) Click **Next** to start the installation. Calterah Downloader will be installed in the directory of **C:/Calterah_downloader/.**



4) Java Runtime Environment (JRE) is required for running Flash Downloader. Use the default settings, and click **Install**.

5) Click **Close** to finish installation of JRE.

6) Click **Finish** to finish installation and launch **CalterahDownloader.**



7) You can also find **CalterahDownloader** on the Desktop.

2.2 Setting Strapping Pins

The boot mode control is implemented using a 6-DIP switch on Calterah RDP board as shown in Figure 1 below.

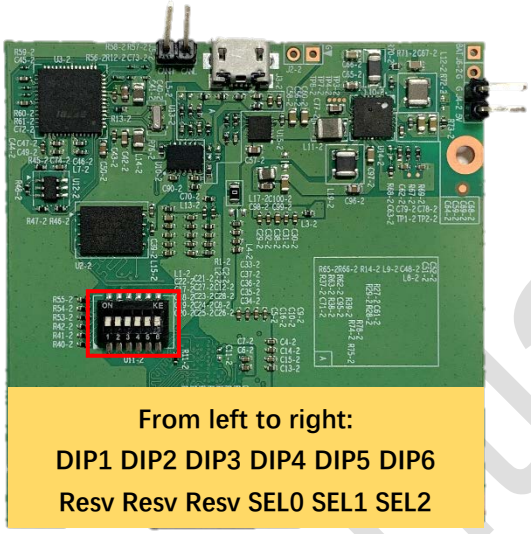


Figure 1: Calterah RDP Board with 6-position DIP Switch

The first three DIPs (DIP1, DIP2 & DIP 3) are reserved for functional safety control and EMU function, which need to be turned off. For more information about functional safety features, please check *Chapter 3: Error Management Unit in Alps Reference Manual*. The last three DIPs (DIP4, DIP5 & DIP6) are used for boot mode control. DIP status and corresponding functions are shown in Table 1 below.

DIP Switch						**Function**
DIP1	**DIP2**	**DIP3**	**DIP4**	**DIP5**	**DIP6**	
OFF	OFF	OFF	ON	ON	OFF	Download firmware into external flash through **UART** interface
			OFF	ON		Download firmware into external flash through **SPI** interface
			ON	OFF		Download firmware into external flash through **CAN** interface
			OFF	OFF		Debug through **JTAG** interface (Download firmware into internal RAM)
			ON	ON	ON	**Boot** from external flash or **OTA** mode

Table 1: DIP Status for Boot Mode Control

To make sure that you have the correct pin configuration, before setting the strapping pins, please first rotate the Calterah RDP board until the numbers on the DIP switch are in the right and readable direction as shown in figures below.

2.2.1 Download Mode

Calterah currently support radar firmware downloading through two interface, UART and CAN. Please follow the instructions below.

- UART Interface

According to Table 1 above, the DIP switch should be set to **OFF OFF OFF ON ON OFF** as shown in in Figure 2 below.

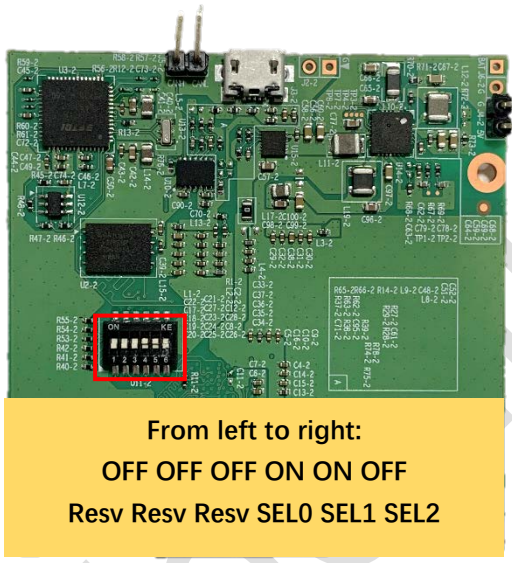


Figure 2: DIP Configuration for UART Interface

- CAN Interface

According to Table 1 above, the DIP switch should be set to **OFF OFF OFF ON OFF OFF** as shown in in Figure 3 below.

Figure 3: DIP Configuration for CAN Interface

2.2.2 OTA Upgrade Mode

Calterah supports both UART and CAN OTA mode. This function is only valid when firmware is compiling with OTA macro enabled. Please consult Calterah FAE for more information. The DIP switch should be set to **OFF OFF OFF ON ON ON**.

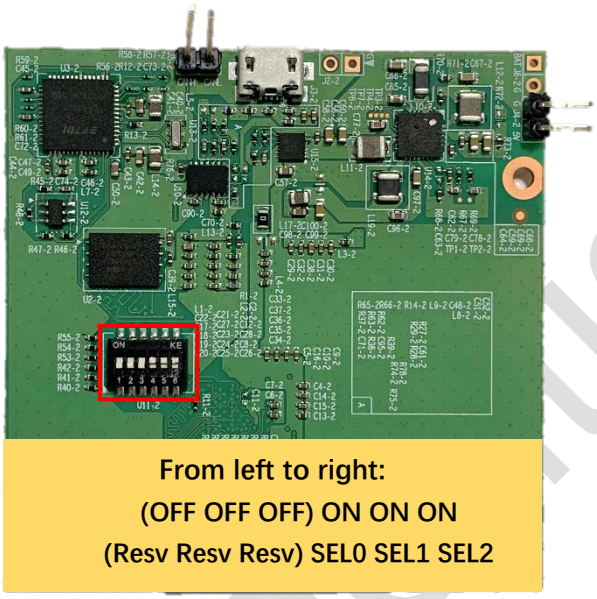


Figure 4: DIP Configuration for OTA Upgrade

CHAPTER

THREE

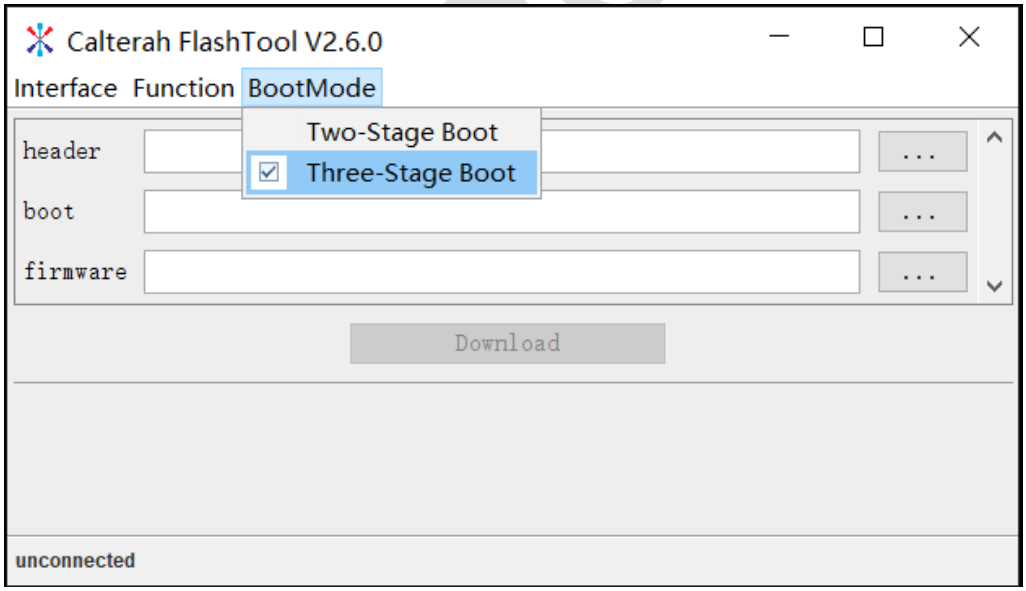
FIRMWARE DOWNLOAD AND OTA UPGRADE

3.1 Firmware Download

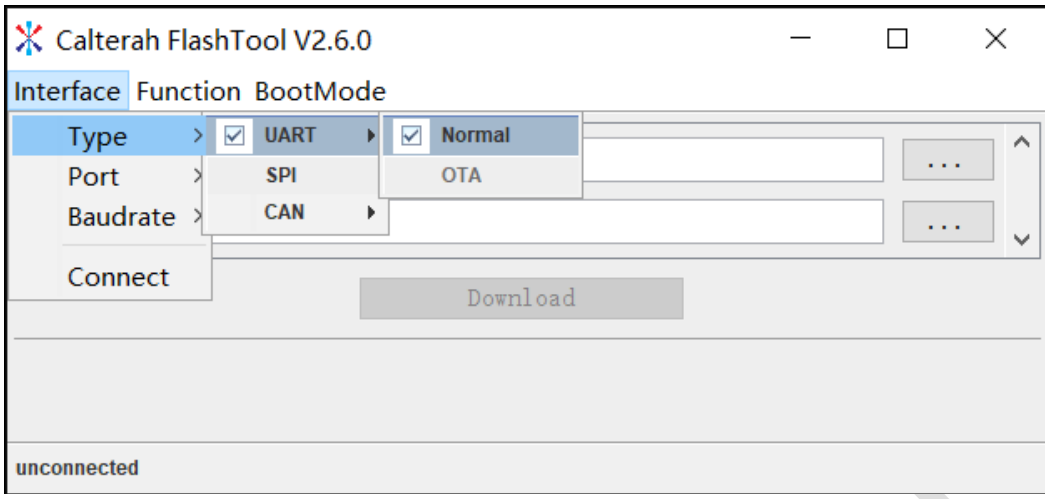
This section illustrates how to download firmware into external flash by using **Calterah Flash Downloader** application.

For two-stage boot, bootloader loads firmware into RAM and executes.

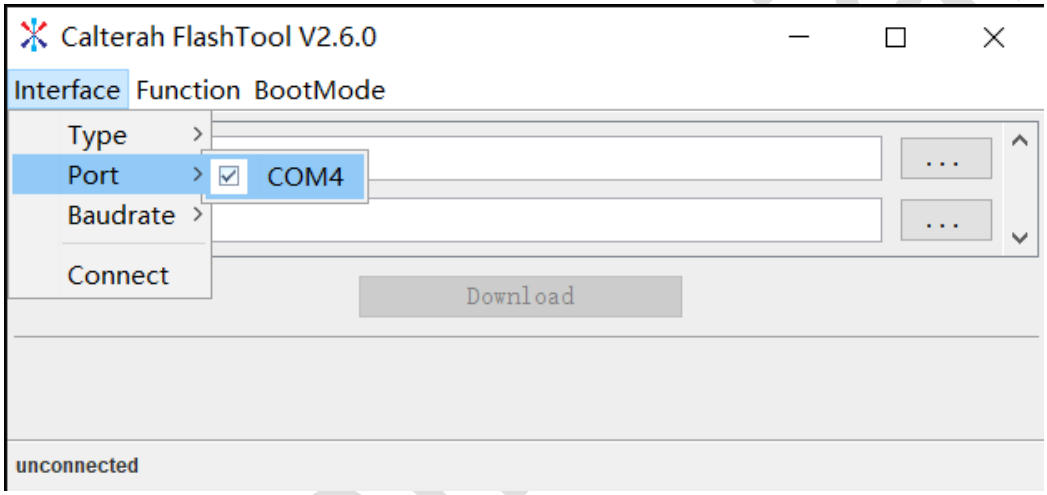
1) Compile firmware and generate binary files for downloading. You can refer to *Firmware Compiling User Guide* for help.
2) Change DIP switch according to Section 2.2.1 Download Mode.
3) Connect Calterah RDP board to the computer through the micro USB port.
4) Double click **Calterah Downloader** on desktop.
5) Go to **BootMode** and select **two-stage boot** or **three-stage boot**.



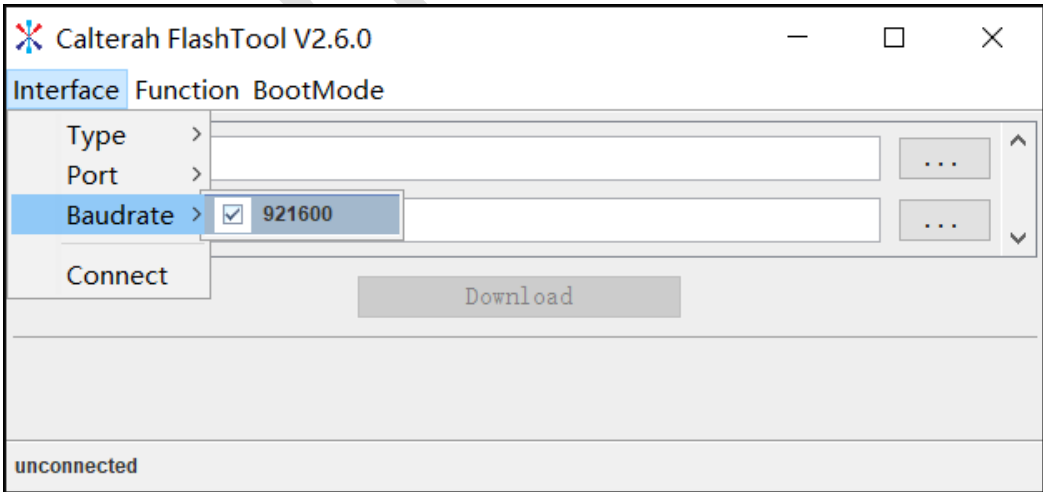
6) Choose the type of interface to download firmware.
   a) For UART interface,
   From the **Interface** menu, select **UART** as the **Type** of mode connected to Calterah RDP board. (UART for Micro-USB connection)



Check the port information in **Windows Device Manager**, and select the correct **Port** connected to Calterah RDP board.

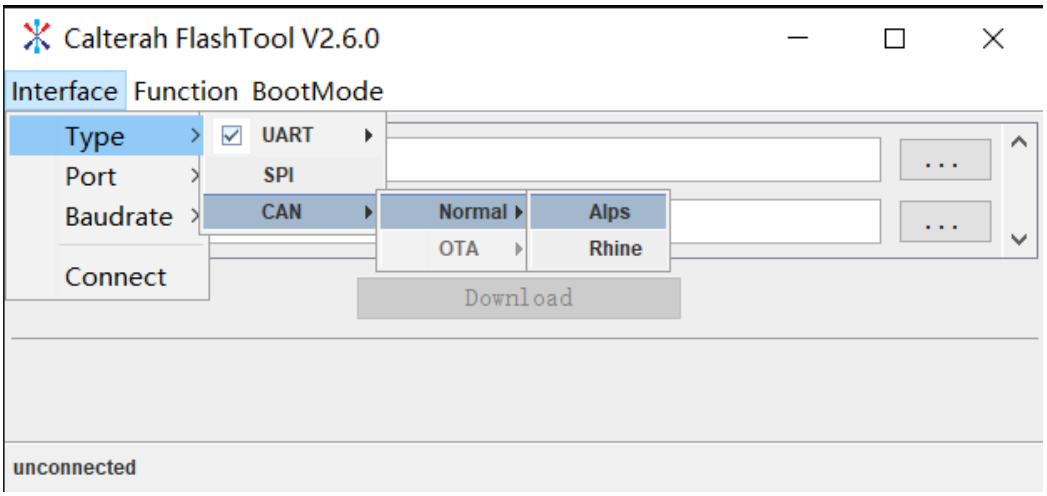


Set Baudrate to **921600**.

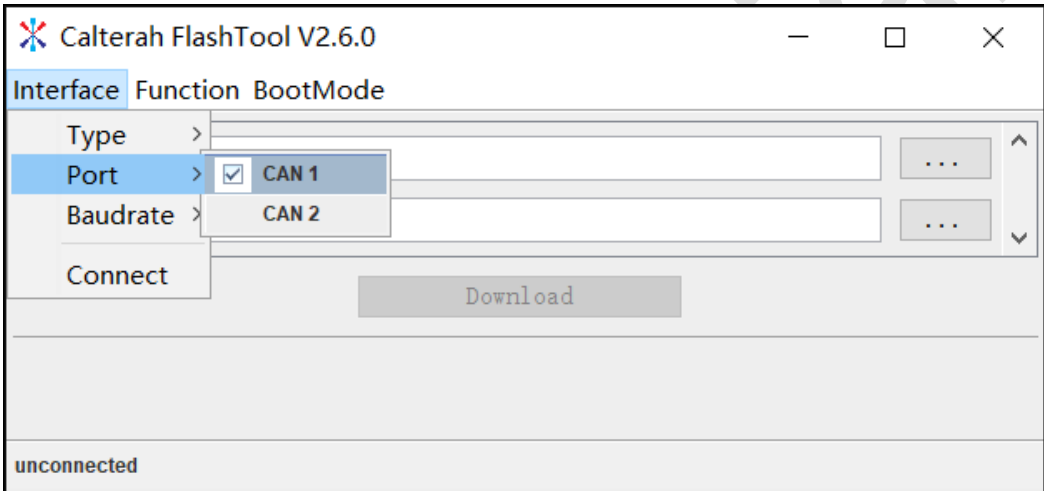


b) For CAN interface,

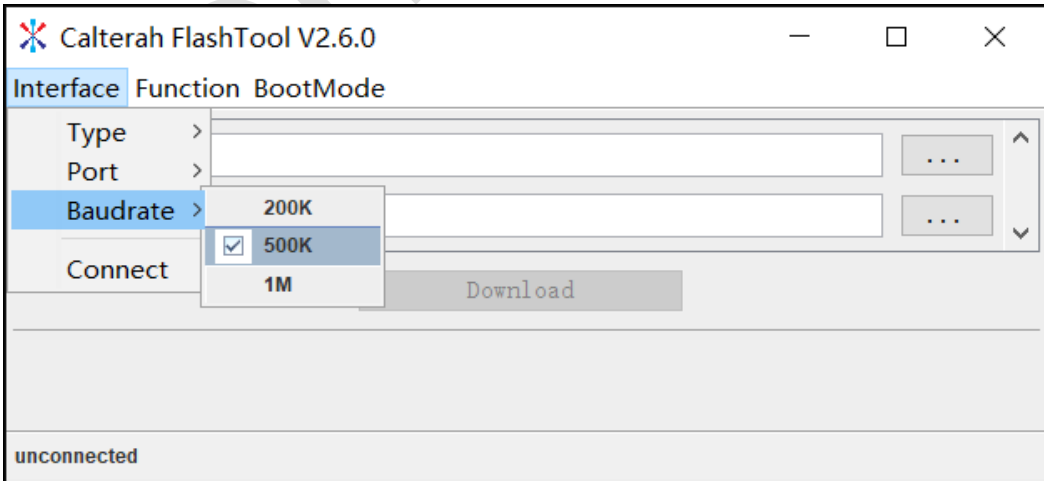
From the **Interface** menu, select **CAN** as the **Type** of mode connected to Calterah RDP board, and choose the board model. For 77G Alps, please select **Alps**, else please choose **Rhine**.



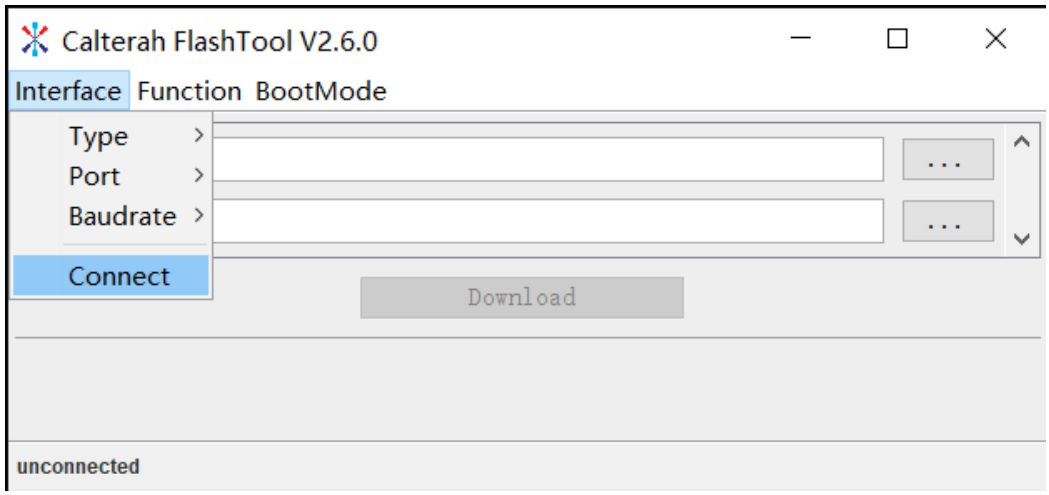
Choose the proper **CAN** port.



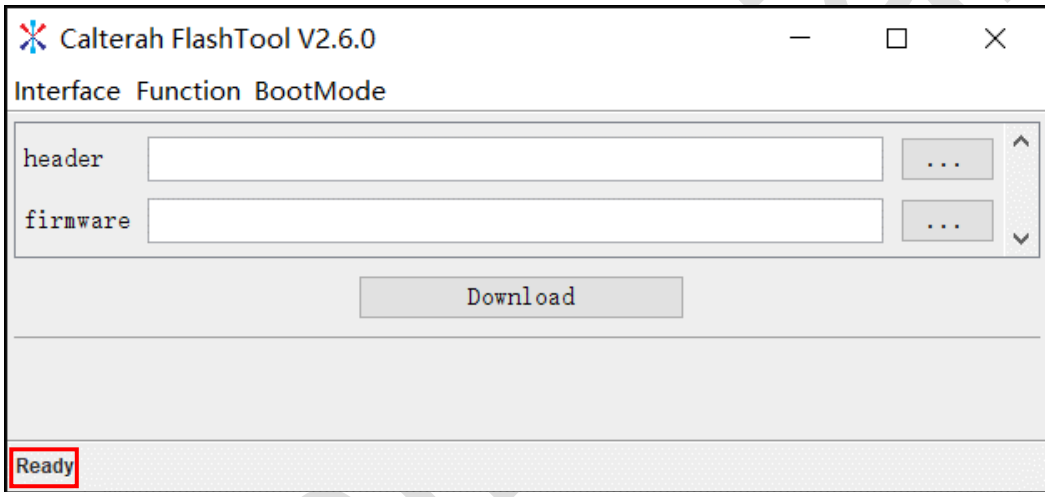
Set Baudrate to **500K**.



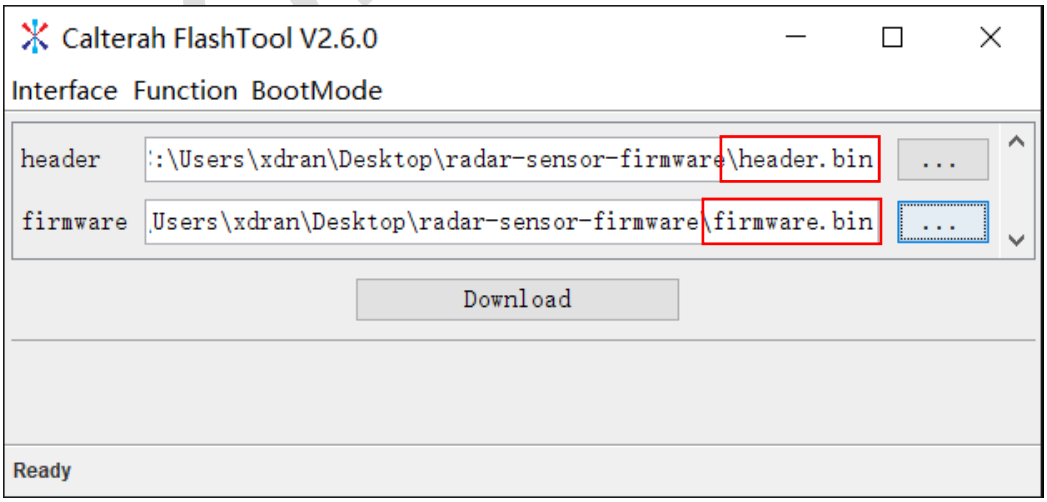
7) From the **Interface** menu, select **Connect** to make the connection with Calterah RDP board through UART.

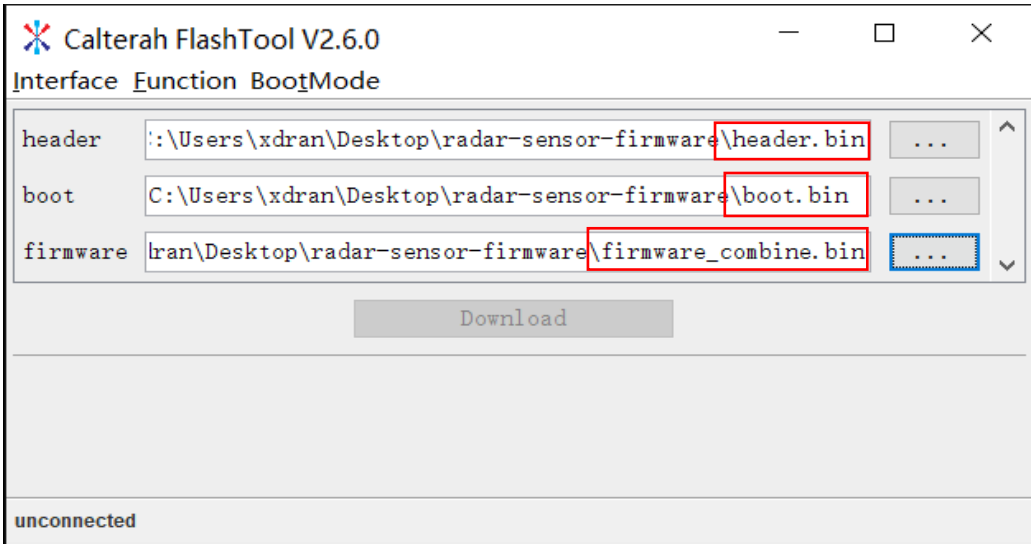


8) If the connection is established, Calterah Flash Tool will be in **Ready** status.

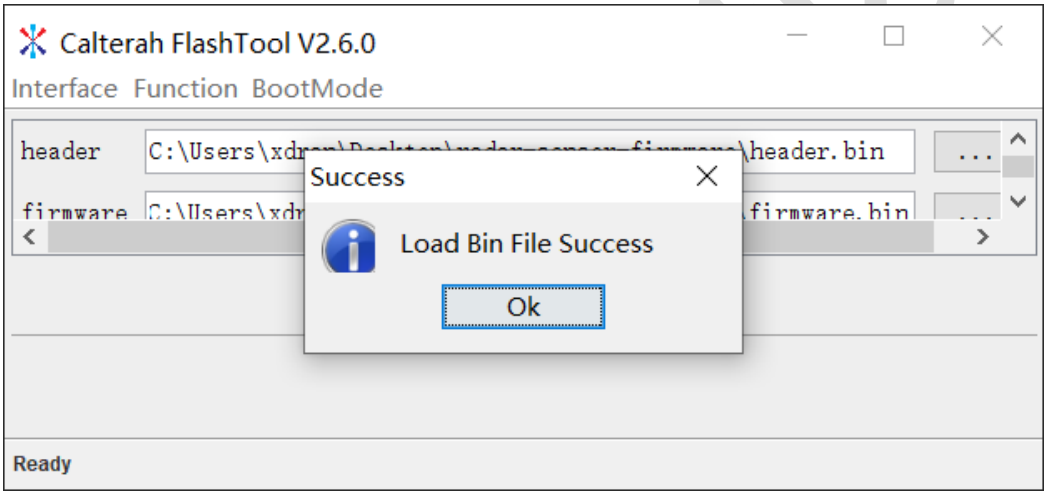


9) For **two-stage boot**, select firmware binary files "**header.bin**" and "**sensor_crc.bin**", for **three-stage boot**, select firmware binary files "**header.bin**", **"boot.bin"** and "**firmware_combine.bin**", and click **Download** button to start firmware downloading.



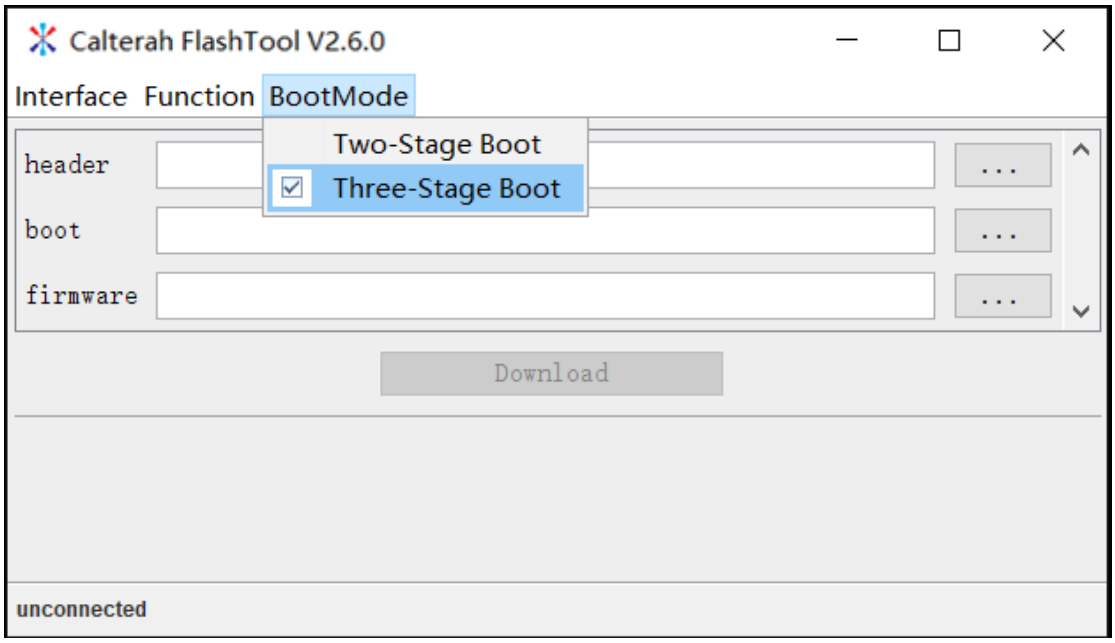


10) A **Success Message** will pop up if download succeeds.



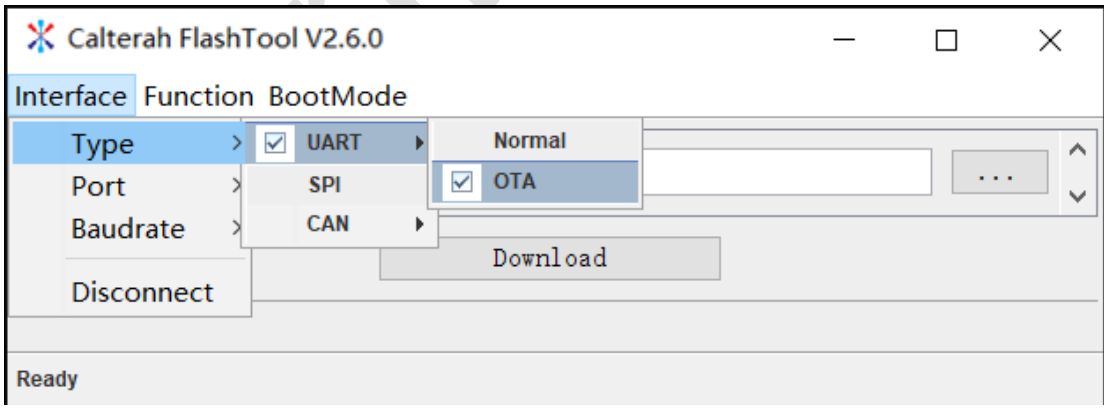
3.2 OTA Upgrade

1) Change DIP switch according to Section 2.2.2 OTA Upgrade Mode.
2) Connect Calterah RDP board to the computer through the micro USB port.
3) Double click **Calterah Downloader** on desktop.
4) Go to **BootMode** and select **Three-stage boot**.

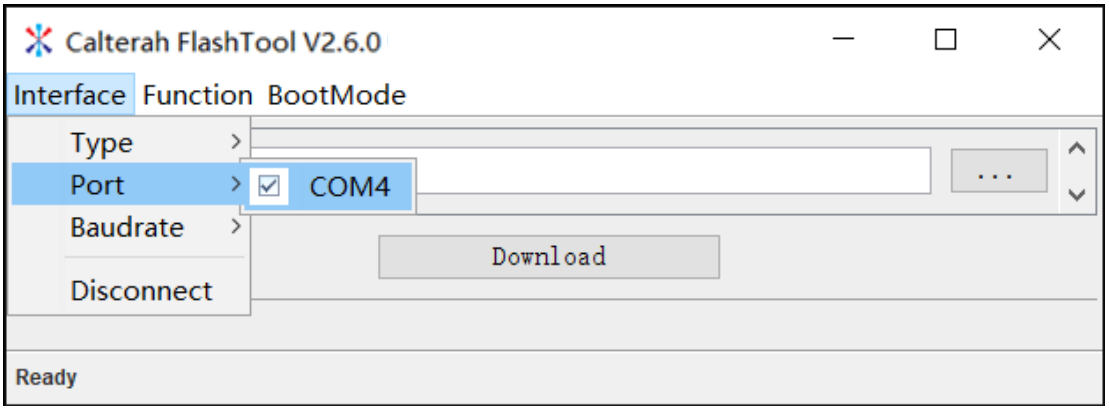


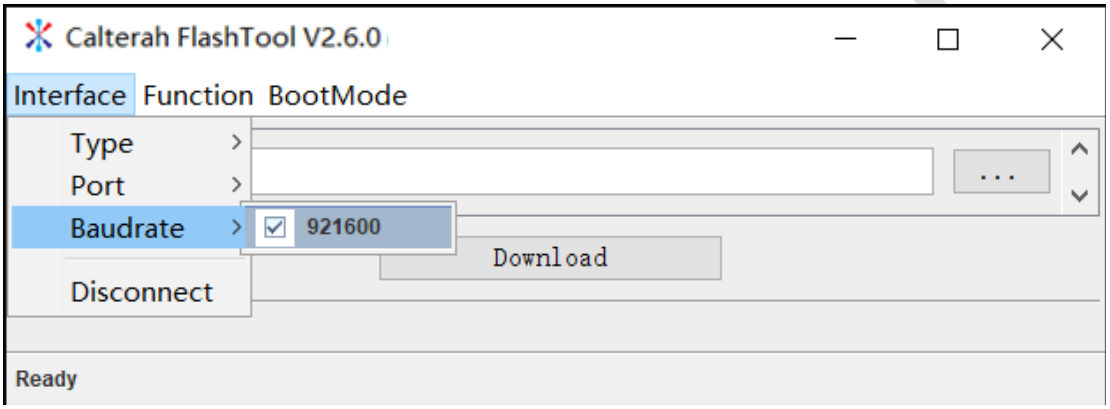
a) UART Interface

Select **Interface – Type – UART – OTA**



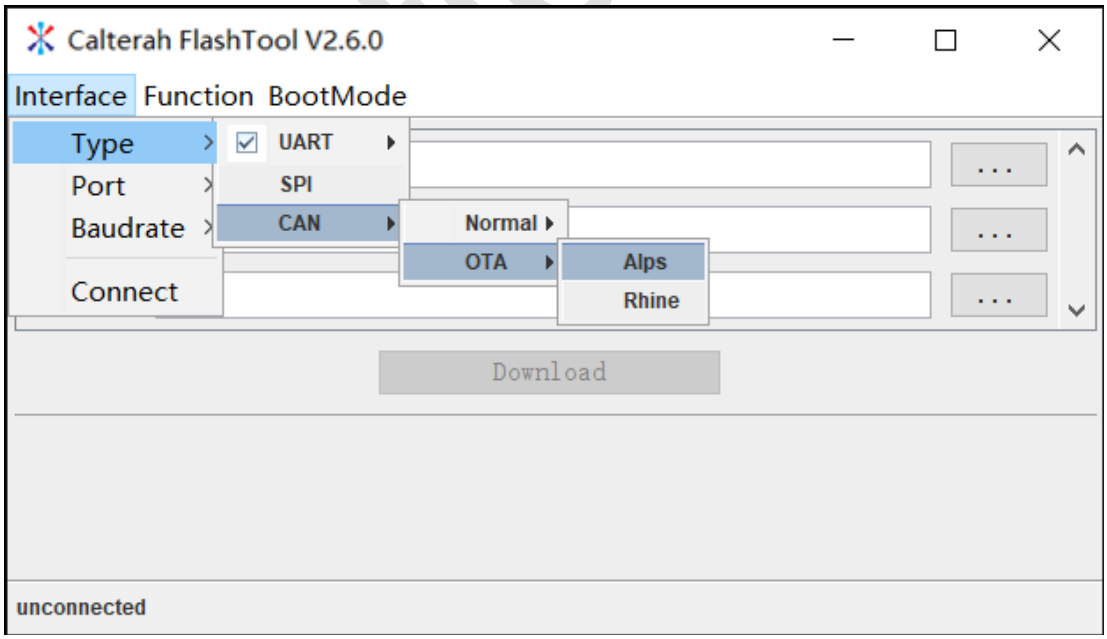
Choose correct **port** and **Baudrate**.



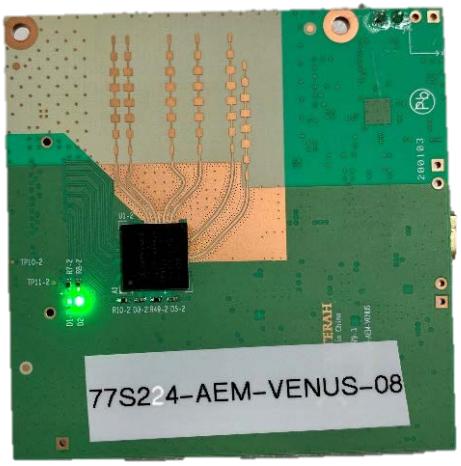


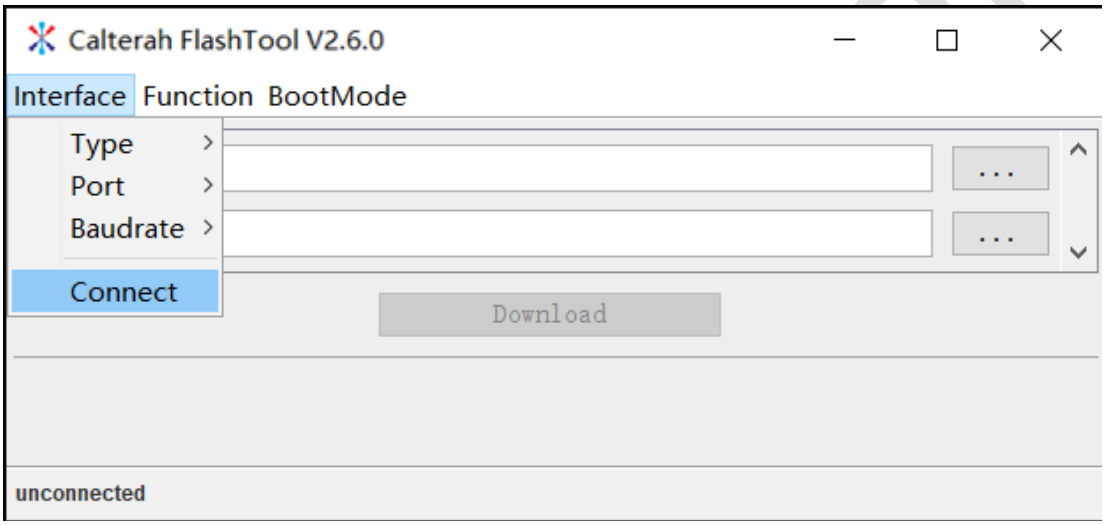
b) CAN Interface

Go to **Type – CAN – OTA**, and choose **Alps** or **Rhine** based on your chip version.

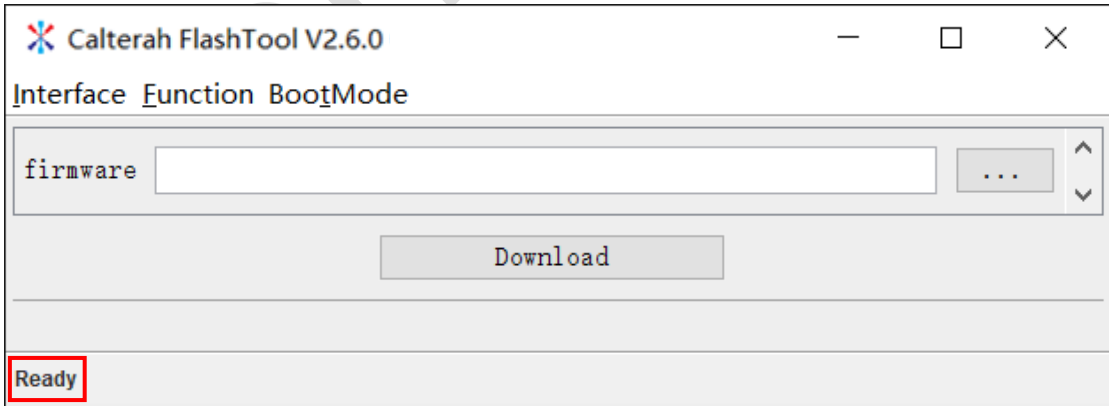


5) Wait until the LED on RDP board is blinking. Click **Connect** to make connection.

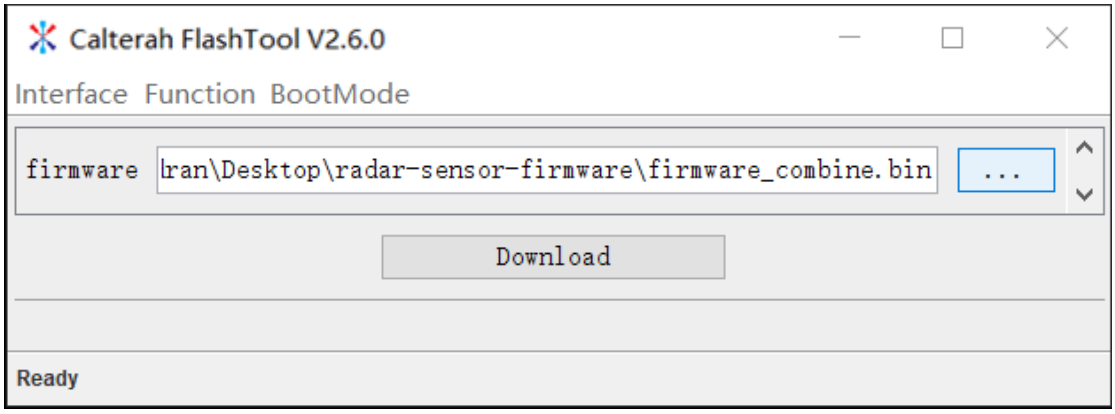




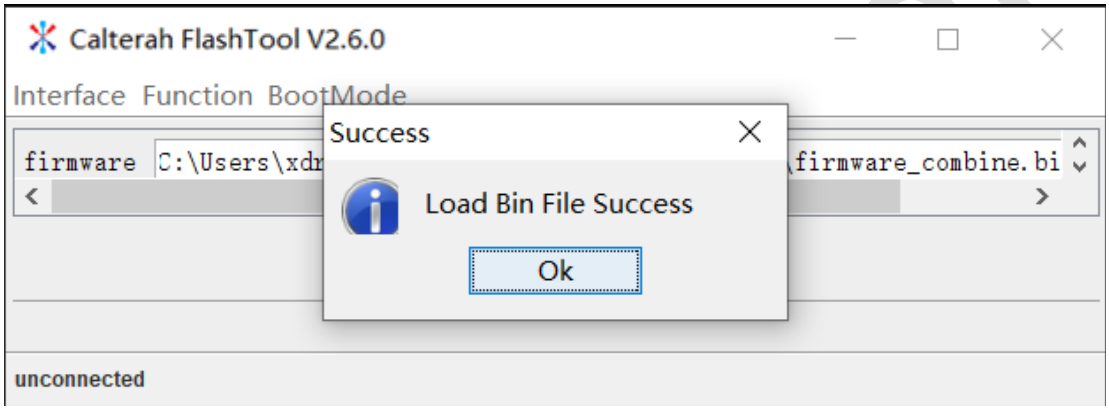
6) If the connection is established, Calterah Flash Tool will be in **Ready** status.



7) Select only the firmware compiled before and click **Download**.



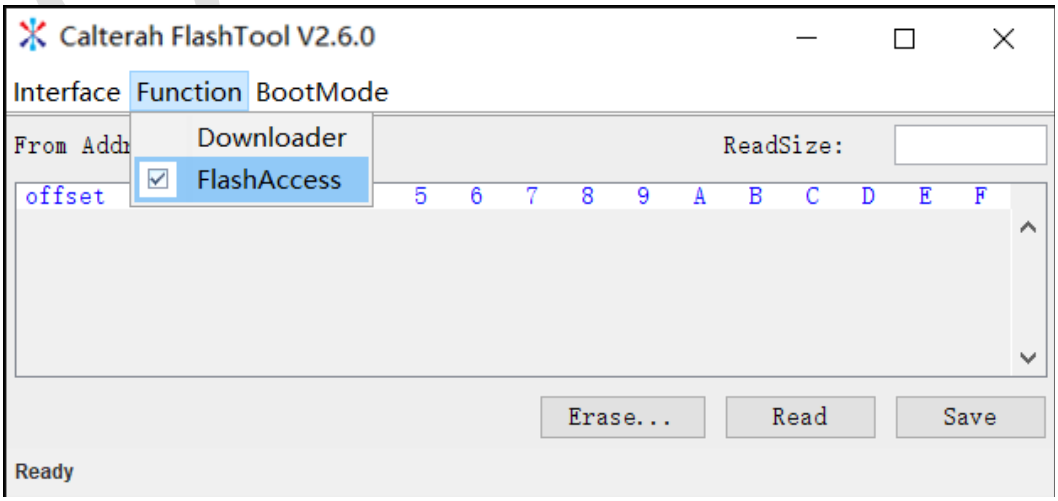
8) A **Success Message** will pop up if download succeeds.



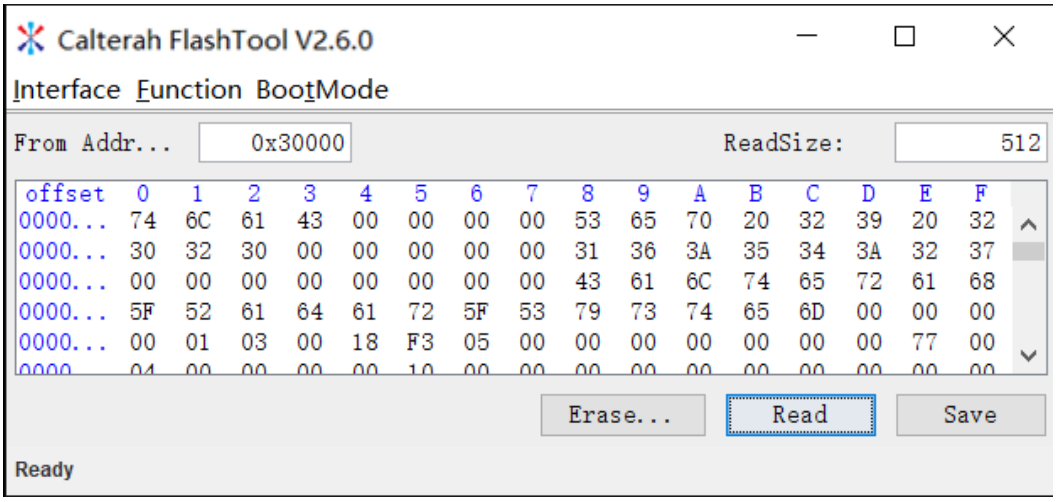
9) Alps SoC will restart automatically after OTA.

3.3 Verification

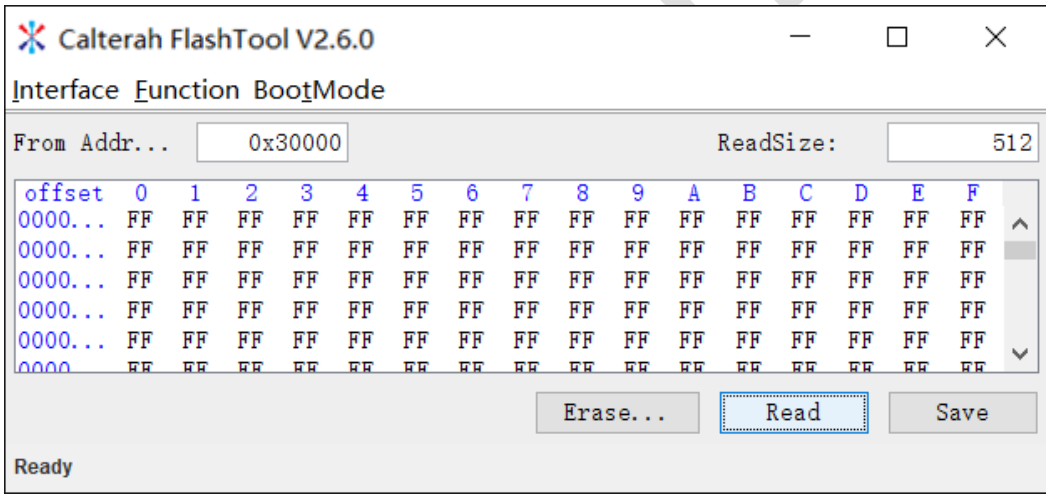
There is a simple way to verify whether the firmware has been downloaded into external flash on Calterah RDP board. Please first set DIP switch to download mode. Select **Function – FlashAccess**.



0x30000 is the address where the firmware has been stored in the external flash. Read data from the address of **0x30000** with a size of **512**. If it is not empty, it means download succeeds.



If all the data start from **0x30000** show **0xFF**, it means that there are no data in the external flash. Firmware downloading failed. Please repeat the process or contact Calterah FAE for help.



CHAPTER

FOUR

BOOT FROM FLASH

If radar firmware has already been downloaded into the on-board flash, power off Calterah RDP board, set DIP switch to **OFF OFF OFF ON ON ON** according to Table 2. Power on the board, and now the board is booting from external flash.

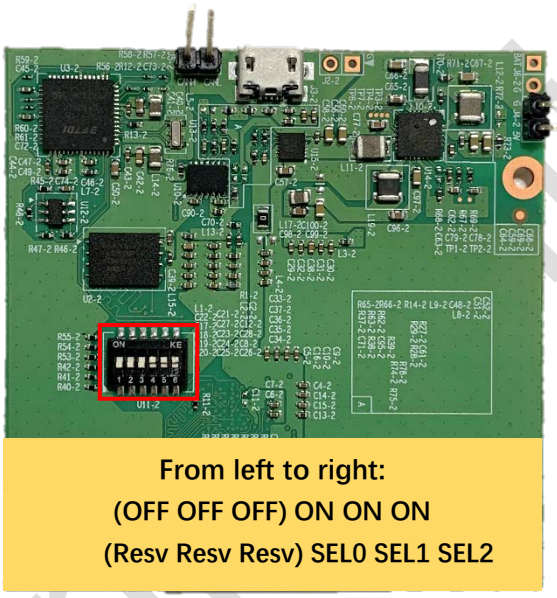


Figure 6: DIP State for Flash Boot