Tone2 MCU Quick Start

Contents

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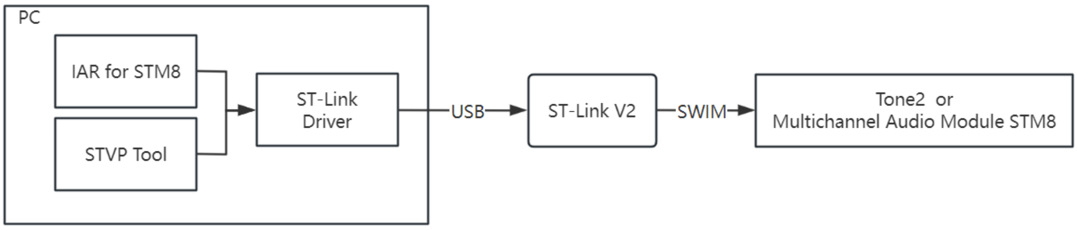
Tone2 MCU development tool instructions

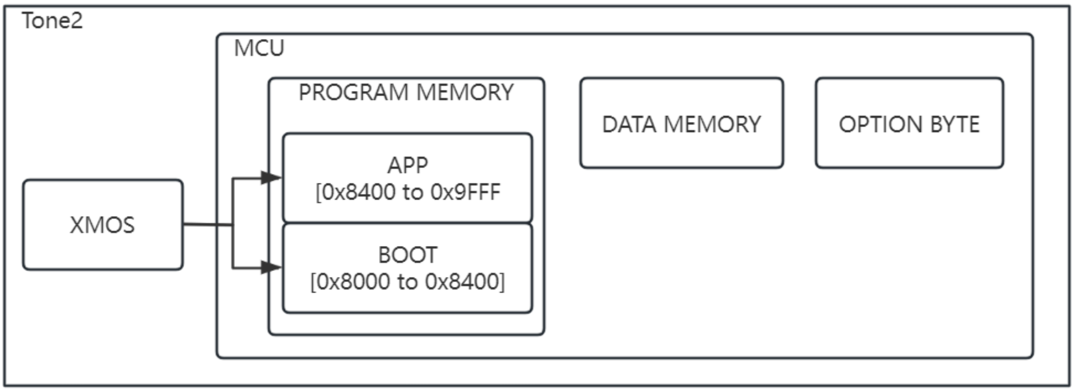
Both the Tone2 and Multichannel Audio Module use the STM8S003F3 controller. The Windows development tools for this MCU are as follows:



1. Download IAR EWSTM8-2104 and install (use the 2104 version to avoid boot compile problems)
2. Download STVP(ST Visual Programmer) and install.
3. Download ST-Link Driver and install.
4. Download Gvim and install.
5. Purchase ST-Link V2 debugging tool and 2.54mm "through-hole straight" pin header.

Note: Other development tools can be used, but they will not be explained in detail here.

Tone2 MCU framework description



MCU firmware is divided into 3 parts:

1、 PROGRAM MEMORY: The main logic program of the MCU. Upgrade file:
tone2-mcu-boot-prog-v1.2-220816.hex

2、 DATA MEMORY: The MCU's EEPROM file, used to save data when power is off. Such as: volume, input source, filter, THD+N calibration data, serial number, and other settings of the Tone2 device. Upgrade file:
tone2-mcu-boot-data-v1.2-220816.hex

3、 OPTION BYTE: MCU hardware configuration information. Upgrade file:
tone2-mcu-boot-optb-v1.2-220816.hex

Tone2 MCU PROGRAM MEMORY is divided in two parts: ‘boot’ and ‘app’ (published version).
The STM8S003F3 has 8k bytes of flash memory, ‘boot’ uses 1k (0x8000~0x8400), and ‘app’ uses 7k (0x8400~0x9FFF).

1、 boot: upgrades logic processing with XMOS UART communication.

2、 app: controls Tone2’s logic processing. The app will be packaged into XMOS, and the MCU will interact with XMOS through the UART to determine the version and upgrade it. (If you don’t want to upgrade the MCU with the XMOS, modify the ‘app’ upgrade code, modifying the lnkstm8s003f3_app.icf file, so that the MCU can upgrade the prog file via the ST-Link V2 debugging tool, and there will be no need to flash the boot file)

Tone2’s MCU can be upgraded in two ways:

1、 Upgrade without using XMOS.
This is useful for debugging and it can be upgraded with the ST-Link V2 tool.

2、 Upgrade using XMOS.
Used for shipped firmware, reducing end-users’ cumbersome upgrade operations. Convert the firmware into an array file and package it into XMOS. When the MCU is turned on, it will determine the firmware versions and automatically upgrade itself.

The following content explains these two methods respectively. It is assumed that users have already installed the required software tools, as stated in the introduction.

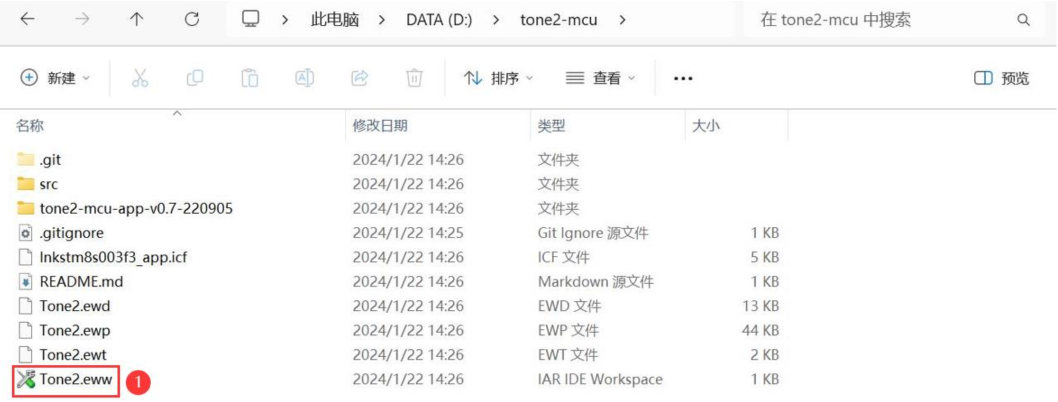
Method 1: Upgrade without using XMOS

1.Download code

Tone2 MCU contains 2 branches: app and boot. This method only uses the app branch. Please switch to the app branch.

2.Open the Tone2.eww project

Compilation tools need to be installed in advance: IAR EWSTM8-2104



名称	修改日期	类型	大小
.git	2024/1/22 14:26	文件夹	
src	2024/1/22 14:26	文件夹	
tone2-mcu-app-v0.7-220905	2024/1/22 14:26	文件夹	
.gitignore	2024/1/22 14:25	Git Ignore 源文件	1 KB
lnkstm8s003f3_app.icf	2024/1/22 14:26	ICF 文件	5 KB
README.md	2024/1/22 14:26	Markdown 源文件	1 KB
Tone2.ewd	2024/1/22 14:26	EWD 文件	13 KB
Tone2.ewp	2024/1/22 14:26	EWP 文件	44 KB
Tone2.ewt	2024/1/22 14:26	EWT 文件	2 KB
Tone2.eww	2024/1/22 14:26	IAR IDE Workspace	1 KB

3.Modify code

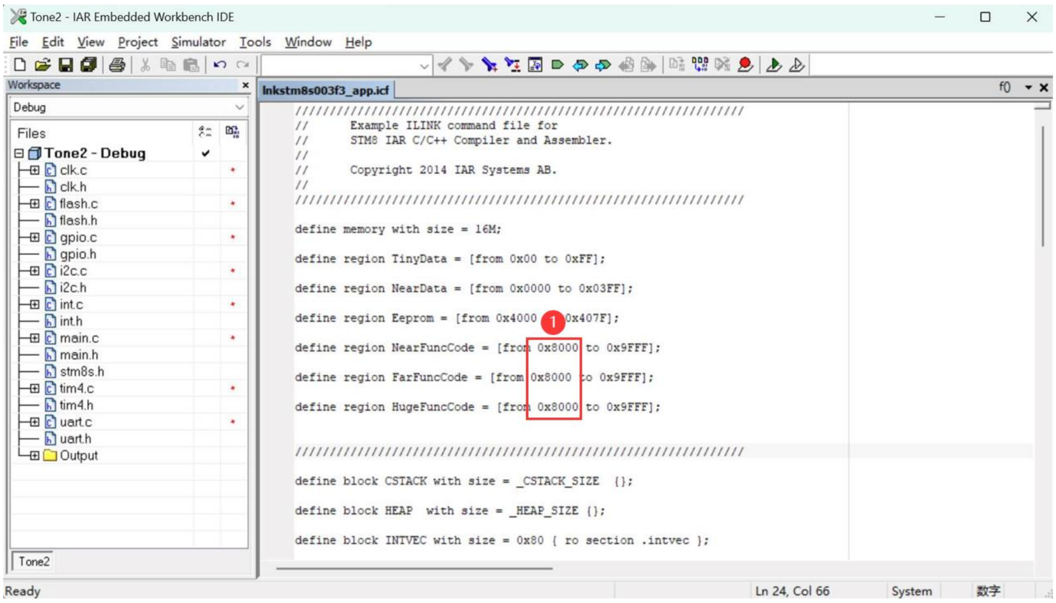
The default app code contains 2 files that need to be modified (default code uses XMOS):

a) Modify the lnkstm8s003f3_app.icf file as follows:

define region NearFuncCode = [from **0x8000** to 0x9FFF];

define region FarFuncCode = [from **0x8000** to 0x9FFF];

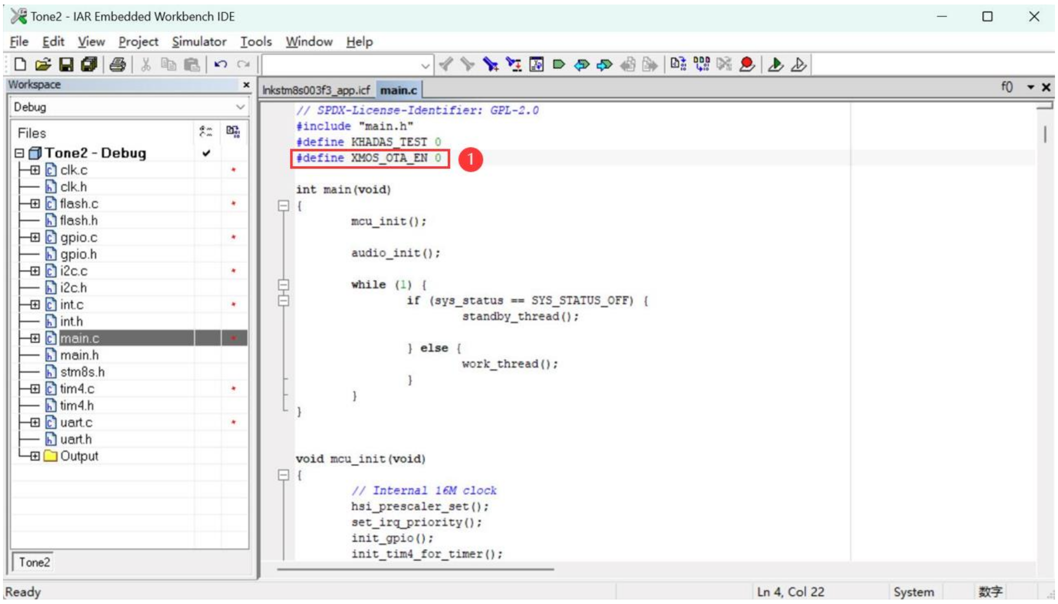
define region HugeFuncCode = [from **0x8000** to 0x9FFF];



```
///////////////////////////////////////////////////////////////////
//      Example ILINK command file for
//      STM8 IAR C/C++ Compiler and Assembler.
//
//      Copyright 2014 IAR Systems AB.
//
///////////////////////////////////////////////////////////////////

define memory with size = 16M;

define region TinyData = [from 0x00 to 0xFF];

define region NearData = [from 0x0000 to 0x03FF];

define region Eeprom = [from 0x4000 to 0x407F];

define region NearFuncCode = [from 0x8000 to 0x9FFF];

define region FarFuncCode = [from 0x8000 to 0x9FFF];

define region HugeFuncCode = [from 0x8000 to 0x9FFF];


///////////////////////////////////////////////////////////////////

define block CSTACK with size = _CSTACK_SIZE  {};

define block HEAP  with size = _HEAP_SIZE {};

define block INTVEC with size = 0x80 { ro section .intvec };
```

b) Modify the macro definition of src\main.c as:

#define XMOS_OTA_EN 0

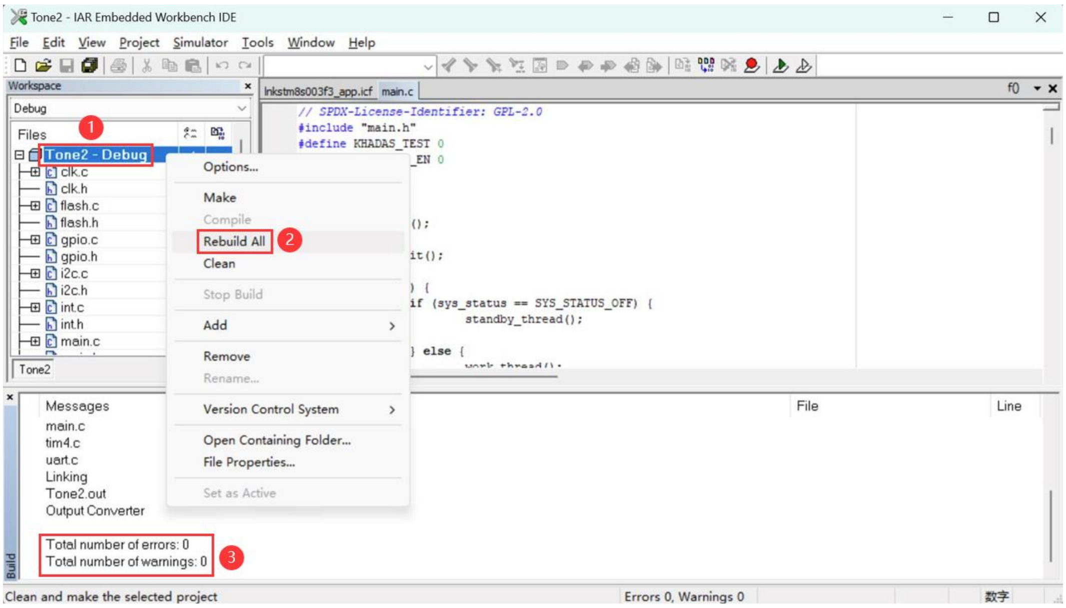


```
// SPDX-License-Identifier: GPL-2.0
#include "main.h"
#define KHADAS_TEST 0
#define XMOS_OTA_EN 0

int main(void)
{
        mcu_init();

        audio_init();

        while (1) {
                if (sys_status == SYS_STATUS_OFF) {
                        standby_thread();

                } else {
                        work_thread();
                }
        }
}


void mcu_init(void)
{
        // Internal 16M clock
        hsi_prescaler_set();
        set_irq_priority();
        init_gpio();
        init_tim4_for_timer();
```

After modification, please recompile.

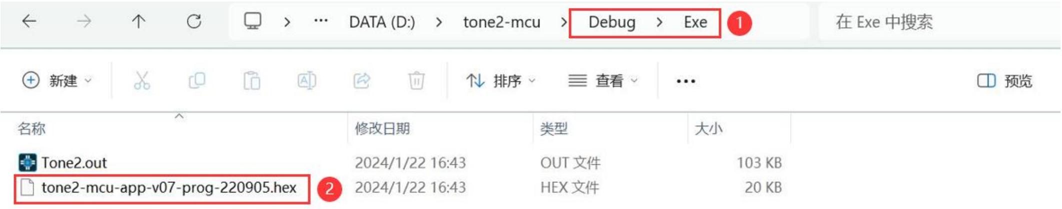
4.Compile

Right-click on the project, then click ‘Rebuild All’. You can view the current compilation information and status through the ‘Build’ window at the bottom of your screen.



```
Messages
main.c
tim4.c
uart.c
Linking
Tone2.out
Output Converter

Total number of errors: 0
Total number of warnings: 0
```

After compilation has completed, the firmware will be generated in this directory:



DATA (D:) > tone2-mcu > Debug > Exe 1

在 Exe 中搜索

名称	修改日期	类型	大小
Tone2.out	2024/1/22 16:43	OUT 文件	103 KB
tone2-mcu-app-v07-prog-220905.hex 2	2024/1/22 16:43	HEX 文件	20 KB

5. Connect Tone2 to PC

Connect Tone2 to your PC with the ST-Link V2 (ST-Link driver needs to be installed in advance)

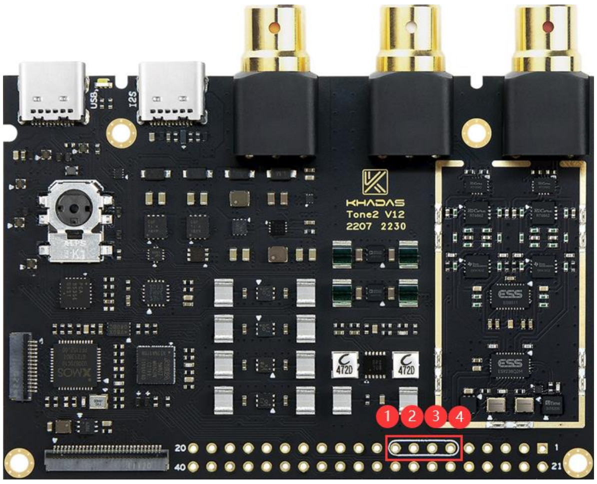
Tone2 pin show as below

① GND

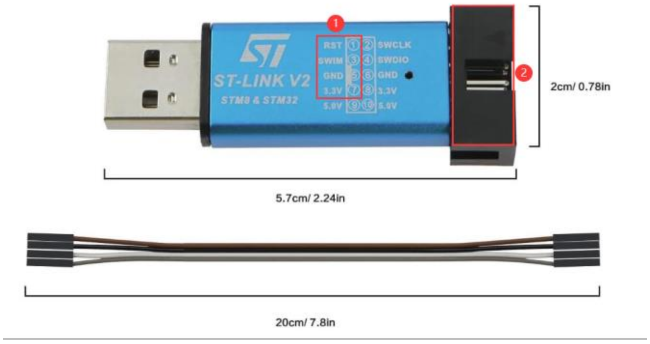
② SWIM

③ RST

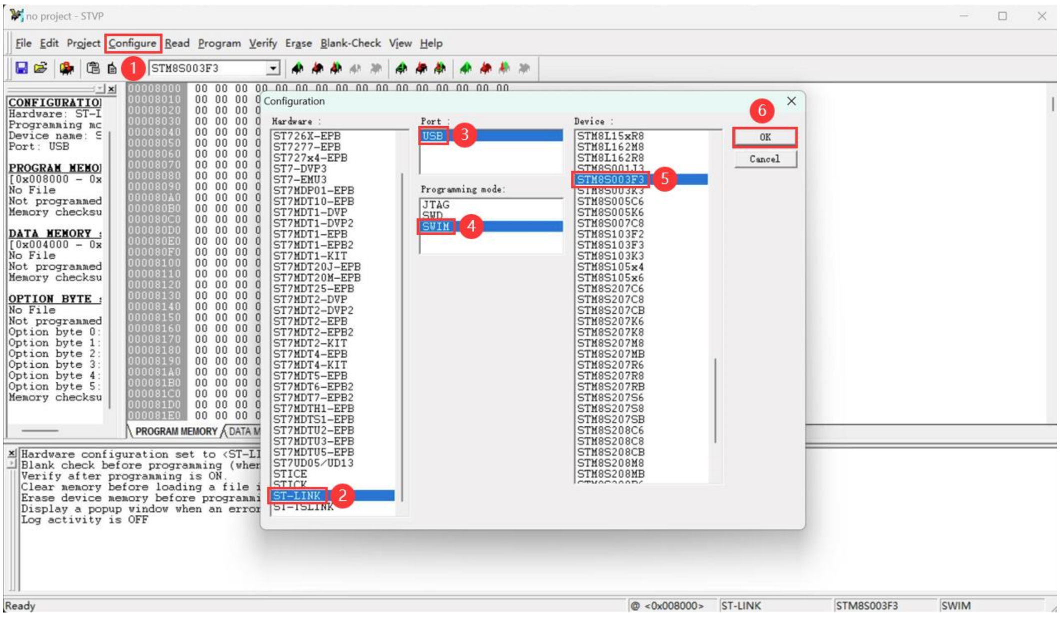
④ 3.3V



ST-Link V2 pin show as below:



6. STVP upgrade tool (ST Visual Programmer) configuration



```
CONFIGURATIO
Hardware: ST-L
Programming mc
Device name: S
Port: USB

PROGRAM MEMO
[0x008000 - 0x
No File
Not programmed
Memory checksu

DATA MEMORY :
[0x004000 - 0x
No File
Not programmed
Memory checksu

OPTION BYTE :
No File
Not programmed
Option byte 0:
Option byte 1:
Option byte 2:
Option byte 3:
Option byte 4:
Option byte 5:
Memory checksu
```

```
Hardware configuration set to <ST-LI
Blank check before programming (wher
Verify after programming is ON.
Clear memory before loading a file i
Erase device memory before programmi
Display a popup window when an error
Log activity is OFF
```

Hardware: ST726X-EPB, ST7277-EPB, ST727x4-EPB, ST7-DVP3, ST7-EMU3, ST7MDP01-EPB, ST7MDT10-EPB, ST7MDT1-DVP, ST7MDT1-DVP2, ST7MDT1-EPB, ST7MDT1-EPB2, ST7MDT1-KIT, ST7MDT20J-EPB, ST7MDT20M-EPB, ST7MDT25-EPB, ST7MDT2-DVP, ST7MDT2-DVP2, ST7MDT2-EPB, ST7MDT2-EPB2, ST7MDT2-KIT, ST7MDT4-EPB, ST7MDT4-KIT, ST7MDT5-EPB, ST7MDT6-EPB2, ST7MDT7-EPB2, ST7MDTH1-EPB, ST7MDTS1-EPB, ST7MDTU2-EPB, ST7MDTU3-EPB, ST7MDTU5-EPB, ST7UD05/UD13, STICE, STICK, ST-LINK, ST-TSLINK

Port: USB

Programming mode: JTAG, SWD, SWIM

Device: STM8L15xR8, STM8L162M8, STM8L162R8, STM8S001J3, STM8S003F3, STM8S003K3, STM8S005C6, STM8S005K6, STM8S007C8, STM8S103F2, STM8S103F3, STM8S103K3, STM8S105x4, STM8S105x6, STM8S207C6, STM8S207C8, STM8S207CB, STM8S207K6, STM8S207K8, STM8S207M8, STM8S207MB, STM8S207R6, STM8S207R8, STM8S207RB, STM8S207S6, STM8S207S8, STM8S207SB, STM8S208C6, STM8S208C8, STM8S208CB, STM8S208M8, STM8S208MB

Ready | @ <0x008000> | ST-LINK | STM8S003F3 | SWIM

7. Description of files required for upgrading

3 files are needed for the upgrade:

a) prog file: which we compiled just now: tone2-mcu-app-v07-prog-220905.hex

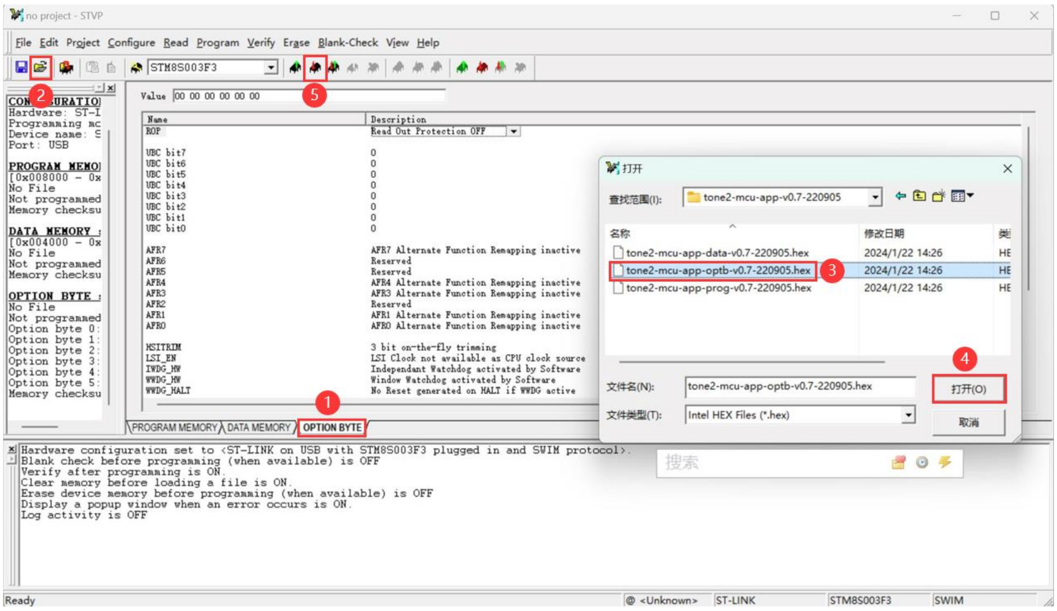
b) The data and optb files are located in the shipped firmware folder: tone2-mcu-app-v0.7-220905

c) After upgrading with the data file, Tone2 will be restored to the default settings, and the serial number will be lost. Read the data file in advance to backup the serial number, then manually modify the data file and upgrade it again.

d) MCU upgrade sequence: The shipped firmware is set to ‘read protect’ by default. Upgrade the optb file first to remove the read protection, and then upgrade the data and prog files.

8. Upgrading

c) optb file



no project - STVP
File Edit Project Configure Read Program Verify Erase Blank-Check View Help
STM8S003F3
1
2
3
4
5
PROGRAM MEMORY
DATA MEMORY
OPTION BYTE
打开

Value 00 00 00 00 00 00

Name	Description
ROP	Read Out Protection OFF
UBC bit7	0
UBC bit6	0
UBC bit5	0
UBC bit4	0
UBC bit3	0
UBC bit2	0
UBC bit1	0
UBC bit0	0
AFR7	AFR7 Alternate Function Remapping inactive
AFR6	Reserved
AFR5	Reserved
AFR4	AFR4 Alternate Function Remapping inactive
AFR3	AFR3 Alternate Function Remapping inactive
AFR2	Reserved
AFR1	AFR1 Alternate Function Remapping inactive
AFR0	AFR0 Alternate Function Remapping inactive
HSITRIM	3 bit on-the-fly trimming
LSI_EN	LSI Clock not available as CPU clock source
IWDG_HW	Independant Watchdog activated by Software
WWDG_HW	Window Watchdog activated by Software
WWDG_HALT	No Reset generated on HALT if WWDG active

查找范围(I): tone2-mcu-app-v0.7-220905

名称	修改日期	类
tone2-mcu-app-data-v0.7-220905.hex	2024/1/22 14:26	HE
tone2-mcu-app-optb-v0.7-220905.hex	2024/1/22 14:26	HE
tone2-mcu-app-prog-v0.7-220905.hex	2024/1/22 14:26	HE

文件名(N): tone2-mcu-app-optb-v0.7-220905.hex

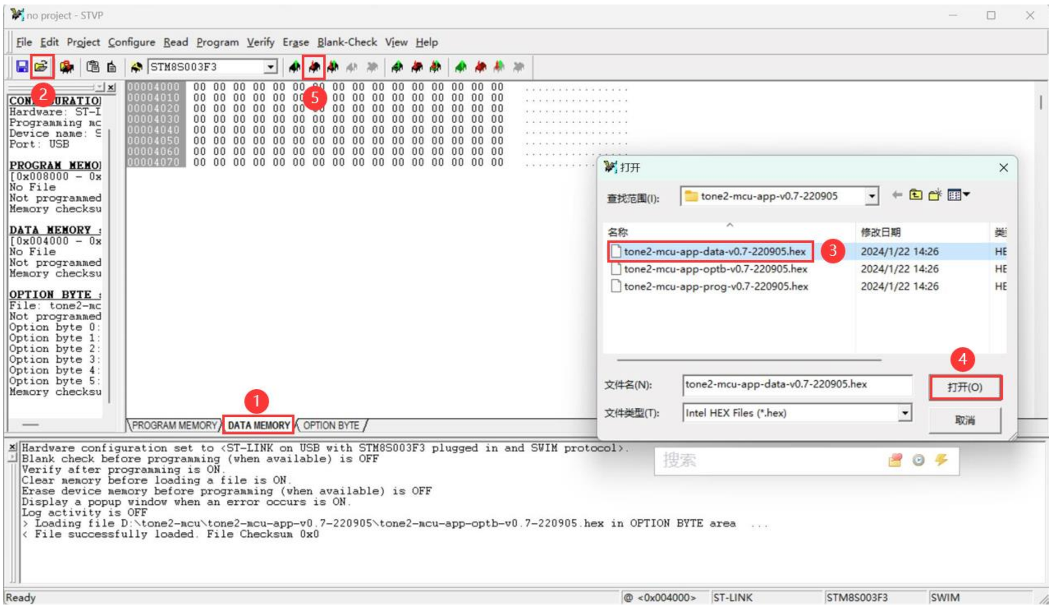
文件类型(T): Intel HEX Files (*.hex)

打开(O) 取消

```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
```

Ready @ <Unknown> ST-LINK STM8S003F3 SWIM

a) data file



no project - STVP
File Edit Project Configure Read Program Verify Erase Blank-Check View Help
STM8S003F3
1
2
3
4
5
PROGRAM MEMORY
DATA MEMORY
OPTION BYTE
打开

```
00004000  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004030  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004040  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004050  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004060  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004070  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
```

查找范围(I): tone2-mcu-app-v0.7-220905

名称	修改日期	类
tone2-mcu-app-data-v0.7-220905.hex	2024/1/22 14:26	HE
tone2-mcu-app-optb-v0.7-220905.hex	2024/1/22 14:26	HE
tone2-mcu-app-prog-v0.7-220905.hex	2024/1/22 14:26	HE

文件名(N): tone2-mcu-app-data-v0.7-220905.hex

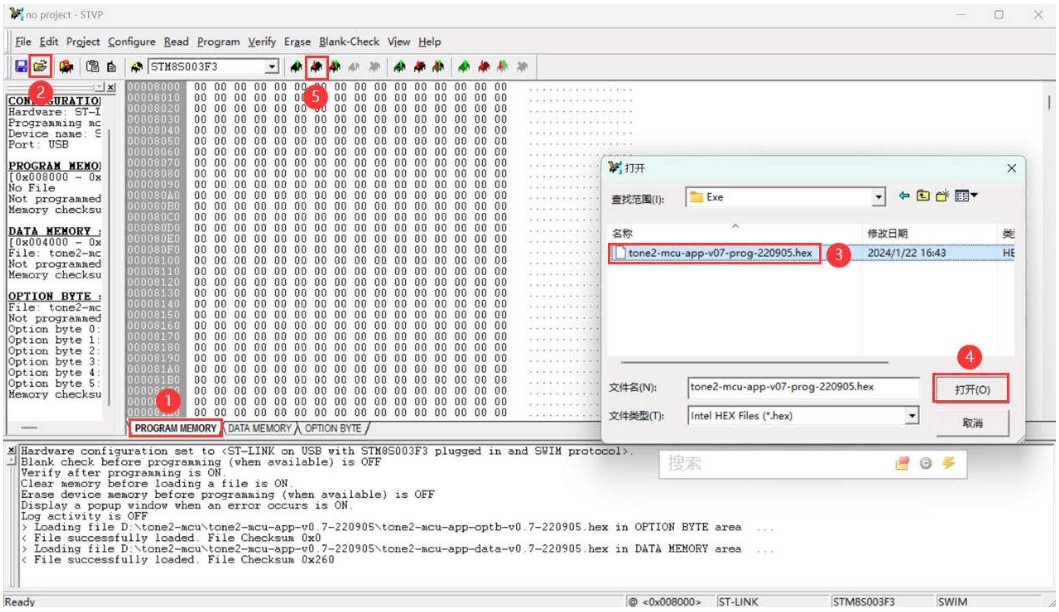
文件类型(T): Intel HEX Files (*.hex)

打开(O) 取消

```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
> Loading file D:\tone2-mcu\tone2-mcu-app-v0.7-220905\tone2-mcu-app-optb-v0.7-220905.hex in OPTION BYTE area  ...
< File successfully loaded. File Checksum 0x0
```

Ready @ <0x004000> ST-LINK STM8S003F3 SWIM

d) prog file.



tone2-mcu-app-v07-prog-220905.hex 2024/1/22 16:43

文件名(N): tone2-mcu-app-v07-prog-220905.hex

文件类型(T): Intel HEX Files (*.hex)

```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
> Loading file D:\tone2-mcu\tone2-mcu-app-v0.7-220905\tone2-mcu-app-optb-v0.7-220905.hex in OPTION BYTE area  ...
< File successfully loaded. File Checksum 0x0
> Loading file D:\tone2-mcu\tone2-mcu-app-v0.7-220905\tone2-mcu-app-data-v0.7-220905.hex in DATA MEMORY area  ...
< File successfully loaded. File Checksum 0x260
```

After the MCU upgrade, remove ST-Link and power-cycle Tone2 to initialize the new code.

Method 2: Upgrade via XMOS (shipped firmware method)

The XMOS upgrade method is divided into two stages. In the first stage, the boot code is compiled and burned into the Tone2 MCU as the basic device startup control. Phase two implements app code compilation and packaging into XMOS to implement complete control logic.

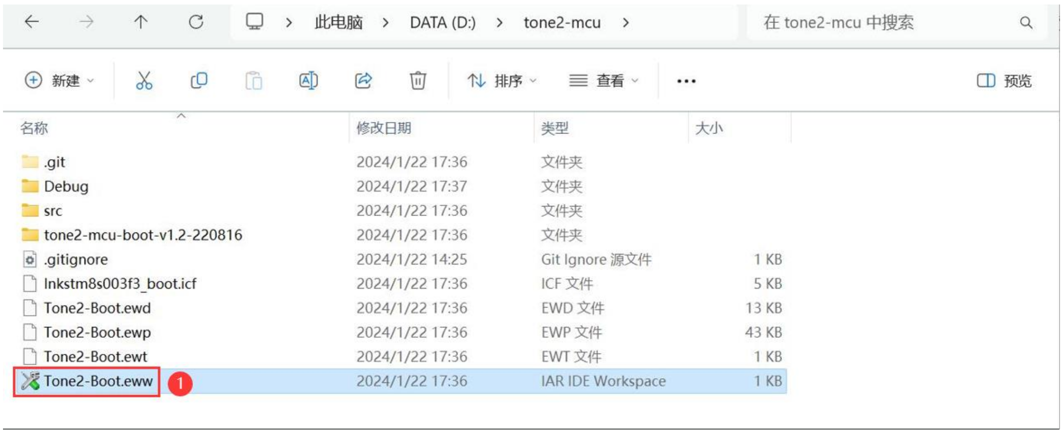
Stage1: boot branch code compilation and upgrade.

1.Download code

Tone2 MCU contains two branches, app and boot. First compile and upgrade the boot. Now please switch to the boot branch after downloading.

2.Open the Tone2-Boot.eww project

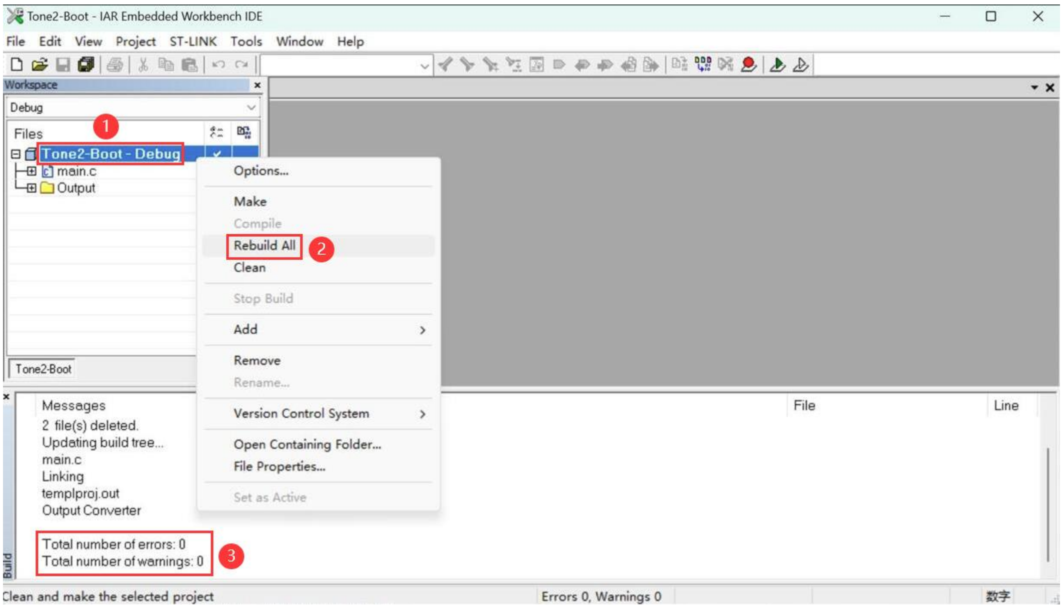
Compilation tools need to be installed in advance: IAR EWSTM8-2104



名称	修改日期	类型	大小
.git	2024/1/22 17:36	文件夹	
Debug	2024/1/22 17:37	文件夹	
src	2024/1/22 17:36	文件夹	
tone2-mcu-boot-v1.2-220816	2024/1/22 17:36	文件夹	
.gitignore	2024/1/22 14:25	Git Ignore 源文件	1 KB
lnkstm8s003f3_boot.icf	2024/1/22 17:36	ICF 文件	5 KB
Tone2-Boot.ewd	2024/1/22 17:36	EWD 文件	13 KB
Tone2-Boot.ewp	2024/1/22 17:36	EWP 文件	43 KB
Tone2-Boot.ewt	2024/1/22 17:36	EWT 文件	1 KB
Tone2-Boot.eww	2024/1/22 17:36	IAR IDE Workspace	1 KB

3.Compile boot code

Right-click on the project, then click 'Rebuild All'. You can view the current compilation information and status through the 'Build' window at the bottom of your screen.



Messages
2 file(s) deleted.
Updating build tree...
main.c
Linking
templproj.out
Output Converter

Total number of errors: 0
Total number of warnings: 0

Clean and make the selected project
Errors 0, Warnings 0

4. Connect Tone2 to PC

Connect Tone2 to your PC with the ST-Link V2 (ST-Link driver needs to be installed in advance)

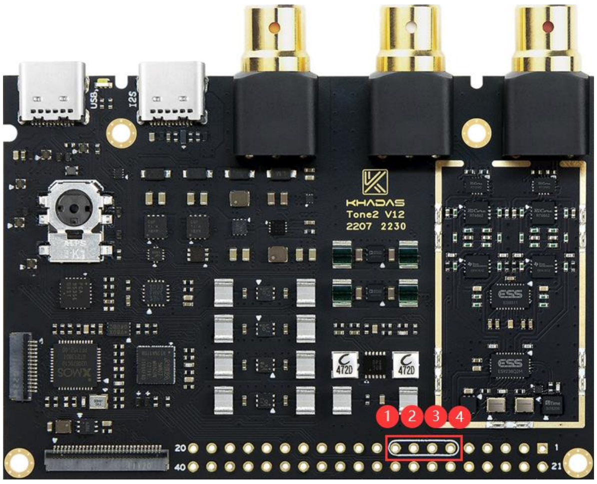
Tone2 pin show as below

① GND

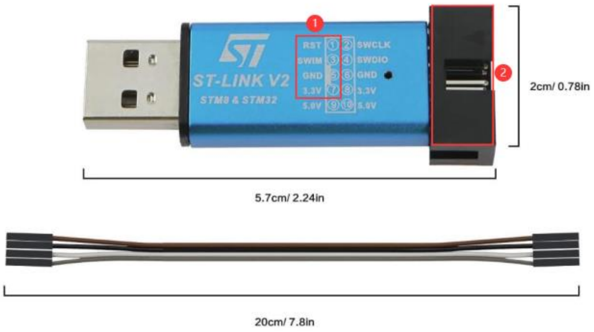
② SWIM

③ RST

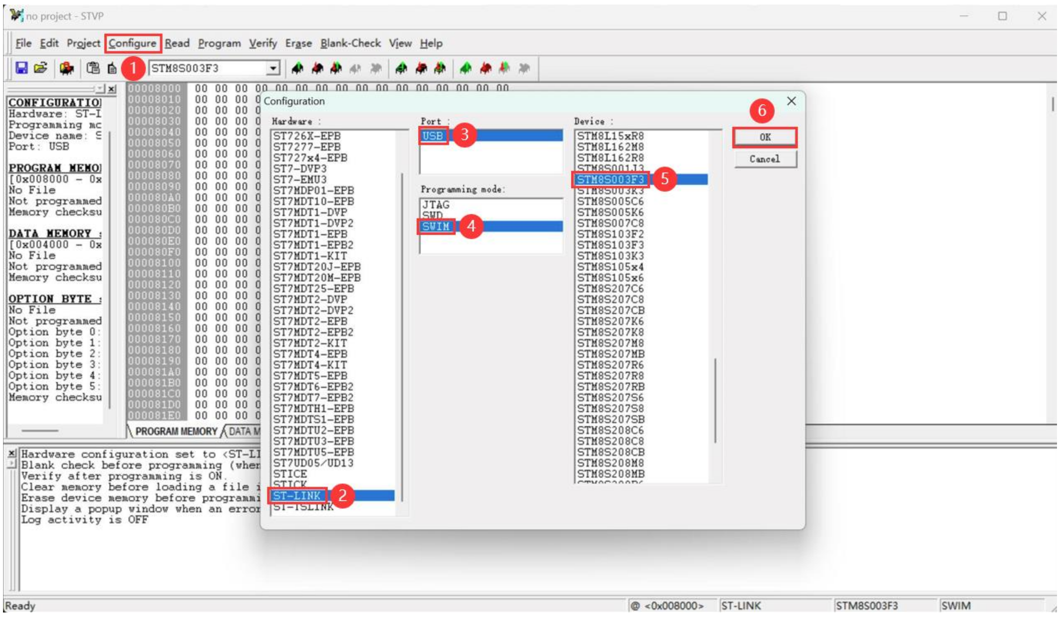
④ 3.3V



ST-Link V2 pin show as below:



5. STVP upgrade tool (ST Visual Programmer) configuration



```
CONFIGURATIO
Hardware: ST-L
Programming mc
Device name: S
Port: USB

PROGRAM MEMO
[0x008000 – 0x
No File
Not programmed
Memory checksu

DATA MEMORY :
[0x004000 – 0x
No File
Not programmed
Memory checksu

OPTION BYTE :
No File
Not programmed
Option byte 0:
Option byte 1:
Option byte 2:
Option byte 3:
Option byte 4:
Option byte 5:
Memory checksu
```

```
Hardware configuration set to <ST-LI
Blank check before programming (when
Verify after programming is ON.
Clear memory before loading a file i
Erase device memory before programmi
Display a popup window when an error
Log activity is OFF
```

```
Ready          @ <0x008000>   ST-LINK   STM8S003F3   SWIM
```

6.Description of upgrade files

3 files need to be upgraded:

a) prog file: which was compiled just now: tone2-mcu-boot-prog-220816.hex

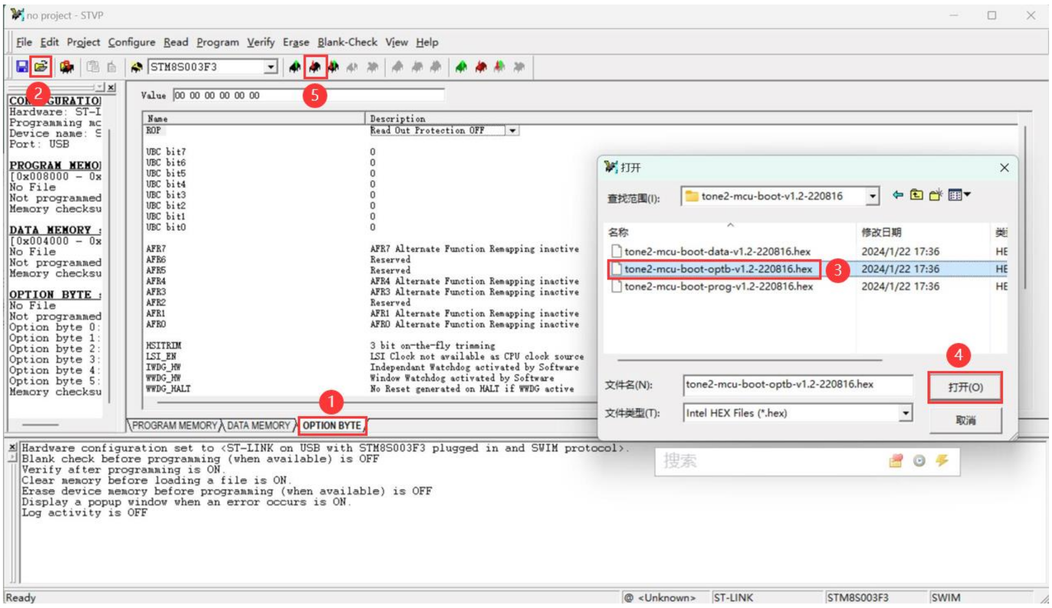
b) The data and optb files are located in the shipped firmware folder: tone2-mcu-boot-v1.2-220816.

c) After upgrading the data file, Tone2 will revert to default settings, and the serial number will be lost. Read the data file in advance to backup the serial number, or manually modify the data file and upgrade it again.

d) MCU upgrade sequence: The shipped firmware is set to read protect by default. Upgrade the optb file first to remove the read protection, and then upgrade the data and prog files.

7. Upgrading

a) optb file



```
CONFIGURATIO
Hardware: ST-L
Programming mc
Device name: S
Port: USB

PROGRAM MEMO
[0x008000 - 0x
No File
Not programmed
Memory checksu

DATA MEMORY :
[0x004000 - 0x
No File
Not programmed
Memory checksu

OPTION BYTE :
No File
Not programmed
Option byte 0:
Option byte 1:
Option byte 2:
Option byte 3:
Option byte 4:
Option byte 5:
Memory checksu
```

Value 00 00 00 00 00 00

Name	Description
ROP	Read Out Protection OFF
UBC bit7	0
UBC bit6	0
UBC bit5	0
UBC bit4	0
UBC bit3	0
UBC bit2	0
UBC bit1	0
UBC bit0	0
AFR7	AFR7 Alternate Function Remapping inactive
AFR6	Reserved
AFR5	Reserved
AFR4	AFR4 Alternate Function Remapping inactive
AFR3	AFR3 Alternate Function Remapping inactive
AFR2	Reserved
AFR1	AFR1 Alternate Function Remapping inactive
AFR0	AFR0 Alternate Function Remapping inactive
HSITRIM	3 bit on-the-fly trimming
LSI_EN	LSI Clock not available as CPU clock source
IWDG_HW	Independant Watchdog activated by Software
WWDG_HW	Window Watchdog activated by Software
WWDG_HALT	No Reset generated on HALT if WWDG active

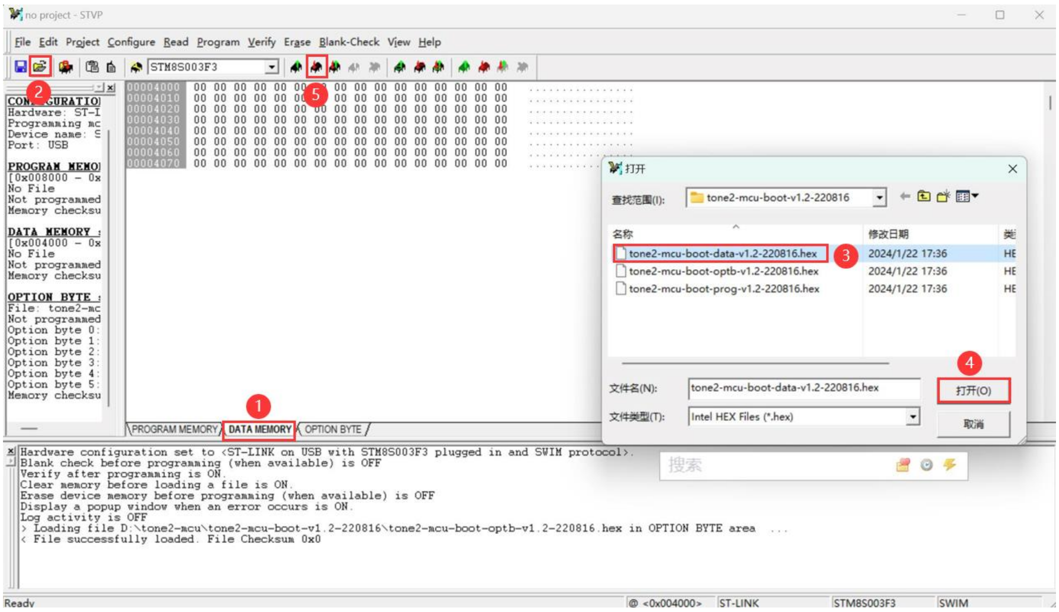
名称	修改日期	类
tone2-mcu-boot-data-v1.2-220816.hex	2024/1/22 17:36	HE
tone2-mcu-boot-optb-v1.2-220816.hex	2024/1/22 17:36	HE
tone2-mcu-boot-prog-v1.2-220816.hex	2024/1/22 17:36	HE

文件名(N): tone2-mcu-boot-optb-v1.2-220816.hex

文件类型(T): Intel HEX Files (*.hex)

```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
```

b) data file



```
CONFIGURATIO
Hardware: ST-L
Programming mc
Device name: S
Port: USB

PROGRAM MEMO
[0x008000 - 0x
No File
Not programmed
Memory checksu

DATA MEMORY :
[0x004000 - 0x
No File
Not programmed
Memory checksu

OPTION BYTE :
File: tone2-mc
Not programmed
Option byte 0:
Option byte 1:
Option byte 2:
Option byte 3:
Option byte 4:
Option byte 5:
Memory checksu
```

```
00004000  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004030  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004040  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004050  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004060  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00004070  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
```

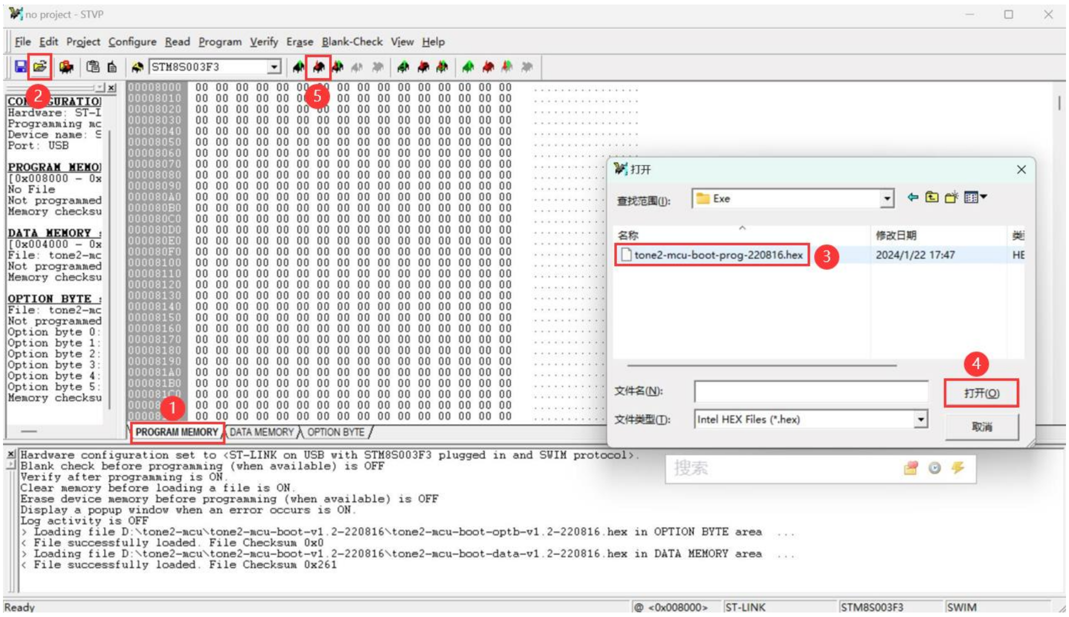
名称	修改日期	类
tone2-mcu-boot-data-v1.2-220816.hex	2024/1/22 17:36	HE
tone2-mcu-boot-optb-v1.2-220816.hex	2024/1/22 17:36	HE
tone2-mcu-boot-prog-v1.2-220816.hex	2024/1/22 17:36	HE

文件名(N): tone2-mcu-boot-data-v1.2-220816.hex

文件类型(T): Intel HEX Files (*.hex)

```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
> Loading file D:\tone2-mcu\tone2-mcu-boot-v1.2-220816\tone2-mcu-boot-optb-v1.2-220816.hex in OPTION BYTE area  ...
< File successfully loaded. File Checksum 0x0
```

c) prog file



```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
> Loading file D:\tone2-mcu\tone2-mcu-boot-v1.2-220816\tone2-mcu-boot-optb-v1.2-220816.hex in OPTION BYTE area  ...
< File successfully loaded. File Checksum 0x0
> Loading file D:\tone2-mcu\tone2-mcu-boot-v1.2-220816\tone2-mcu-boot-data-v1.2-220816.hex in DATA MEMORY area  ...
< File successfully loaded. File Checksum 0x261
```

We have completed stage one, the compilation and upgrading of ‘boot’ is done. However, to achieve a complete firmware upgrade, stage two requires packaging the app into XMOS. In the next steps, app compilation, the production of upgrade array files, etc will be explained.

Stage 2: Compile and package the app branch code into XMOS

1.Switch the code to the app branch

2.Compile

The MCU firmware version needs to be modified before compiling; the MCU will not perform the upgrade if it reads the same version value.

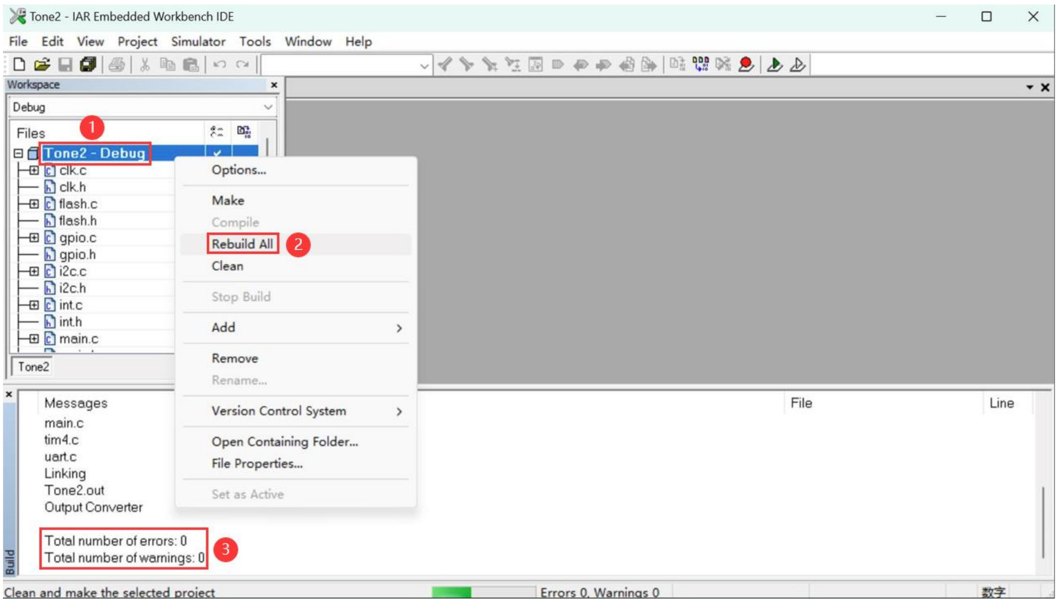
MCU firmware version is defined at：\src\main.h

```
#define UD_VER_LOCAL          0x07      // MCU firmware version
```

Modify to:

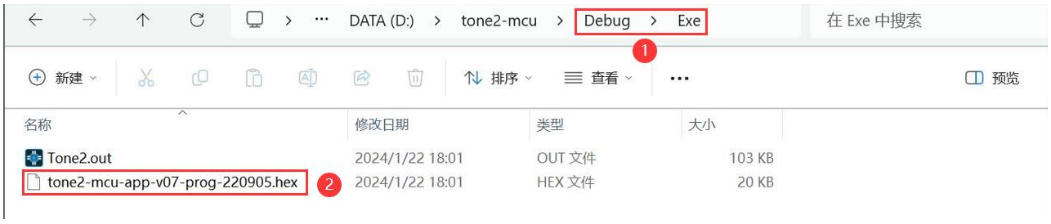
```
#define UD_VER_LOCAL          0x08      // MCU firmware version
```

Open the Tone2.eww project, right-click on the project, and then click ‘Rebuild All’. You can view the current compilation information and status through the Build window at the bottom of your screen:



```
Messages
main.c
tim4.c
uart.c
Linking
Tone2.out
Output Converter

Total number of errors: 0
Total number of warnings: 0
```

After compilation is complete, the firmware file will be generated in this directory:

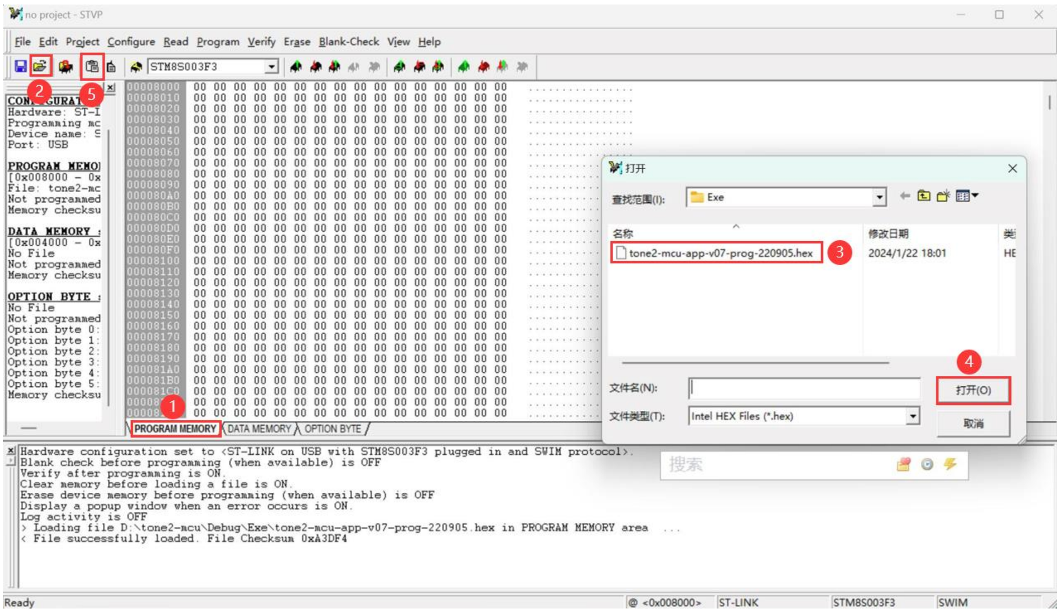


名称	修改日期	类型	大小
Tone2.out	2024/1/22 18:01	OUT 文件	103 KB
tone2-mcu-app-v07-prog-220905.hex	2024/1/22 18:01	HEX 文件	20 KB

After the code is compiled, instead of using the ST-Link flashing method, the firmware needs to be converted into array data and packaged into the XMOS.

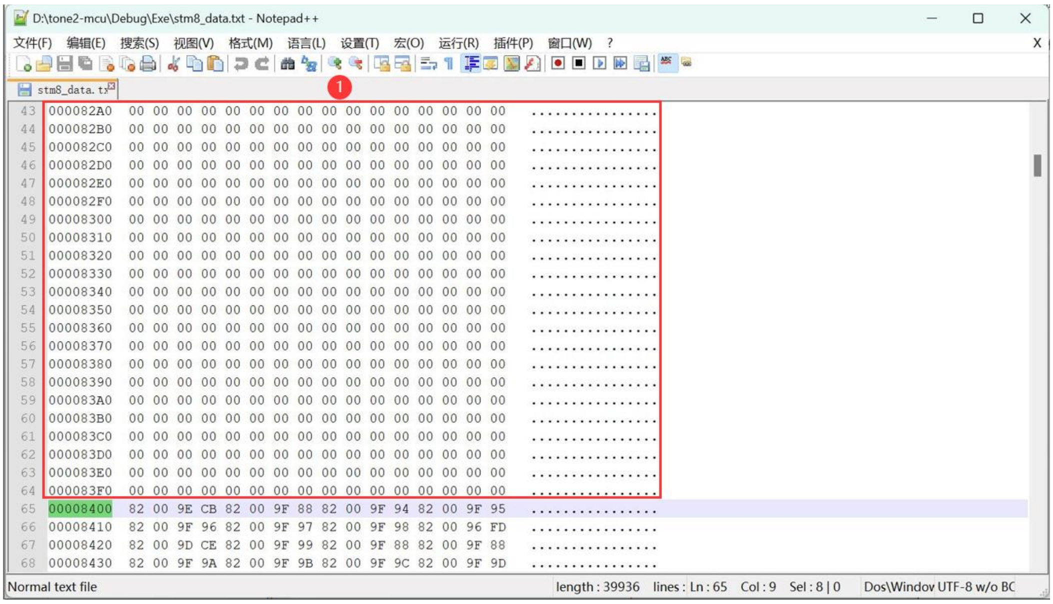
3.Firmware array file generation

a) Use the STVP (ST Visual Programmer) tool to open tone2-mcu-app-v07-prog-220905.hex, copy the firmware data, create a new blank .txt file, and paste the copied data into the .txt file.



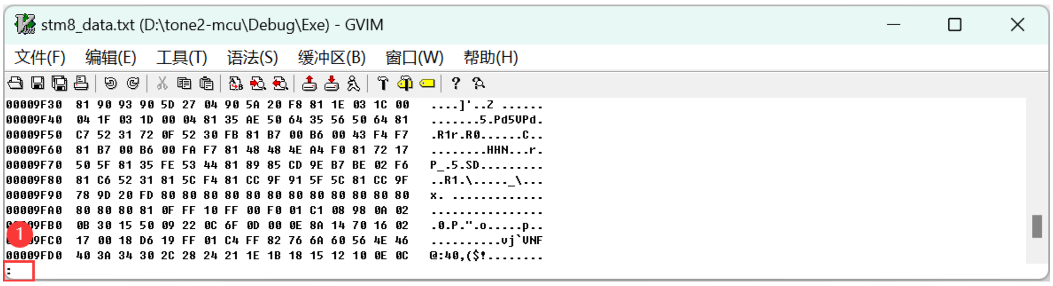
```
Hardware configuration set to <ST-LINK on USB with STM8S003F3 plugged in and SWIM protocol>.
Blank check before programming (when available) is OFF
Verify after programming is ON.
Clear memory before loading a file is ON.
Erase device memory before programming (when available) is OFF
Display a popup window when an error occurs is ON.
Log activity is OFF
> Loading file D:\tone2-mcu\Debug\Exe\tone2-mcu-app-v07-prog-220905.hex in PROGRAM MEMORY area  ...
< File successfully loaded. File Checksum 0xA3DF4
```

b) Open the .txt file containing the firmware data, delete all rows before 00008400 and save it.


D:\tone2-mcu\Debug\Exe\stm8_data.txt - Notepad++
文件(F) 编辑(E) 搜索(S) 视图(V) 格式(M) 语言(L) 设置(T) 宏(O) 运行(R) 插件(P) 窗口(W) ?
stm8_data.txt
1
Normal text file
length : 39936 lines : Ln : 65 Col : 9 Sel : 8 | 0
Dos\Windov UTF-8 w/o BC

```
000082A0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000082B0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000082C0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000082D0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000082E0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000082F0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008300  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008310  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008320  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008330  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008340  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008350  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008360  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008370  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008380  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008390  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000083A0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000083B0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000083C0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000083D0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000083E0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000083F0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00008400  82 00 9E CB 82 00 9F 88 82 00 9F 94 82 00 9F 95  ................
00008410  82 00 9F 96 82 00 9F 97 82 00 9F 98 82 00 96 FD  ................
00008420  82 00 9D CE 82 00 9F 99 82 00 9F 88 82 00 9F 88  ................
00008430  82 00 9F 9A 82 00 9F 9B 82 00 9F 9C 82 00 9F 9D  ................
```

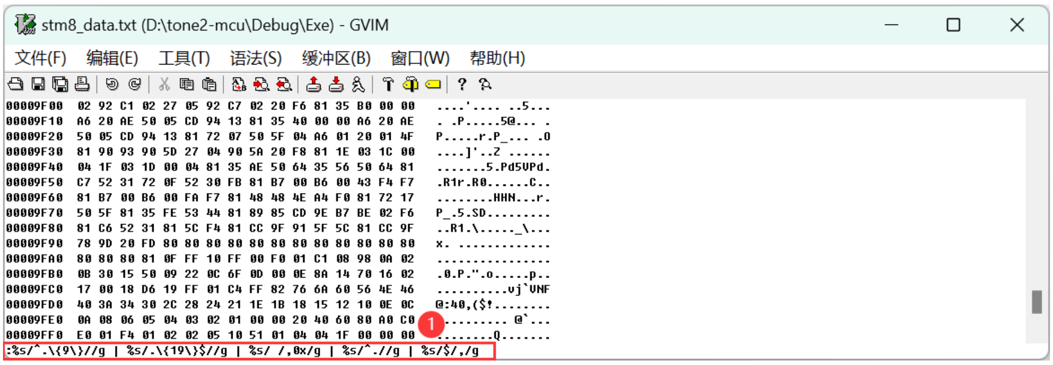
c) Use Gvim to open the .txt file and enter command mode: "Esc" ==>"shift + ;" At this time, ":" will be displayed at the bottom.


stm8_data.txt (D:\tone2-mcu\Debug\Exe) - GVIM
文件(F) 编辑(E) 工具(T) 语法(S) 缓冲区(B) 窗口(W) 帮助(H)
1

```
00009F30  81 90 93 90 5D 27 04 90 5A 20 F8 81 1E 03 1C 00   ....]'..Z ......
00009F40  04 1F 03 1D 00 04 81 35 AE 50 64 35 56 50 64 81   .......5.Pd5VPd.
00009F50  C7 52 31 72 0F 52 30 FB 81 B7 00 B6 00 43 F4 F7   .R1r.R0......C..
00009F60  81 B7 00 B6 00 FA F7 81 48 48 4E A4 F0 81 72 17   ........HHN...r.
00009F70  50 5F 81 35 FE 53 44 81 89 85 CD 9E B7 BE 02 F6   P_.5.SD.........
00009F80  81 C6 52 31 81 5C F4 81 CC 9F 91 5F 5C 81 CC 9F   ..R1.\....._\...
00009F90  78 9D 20 FD 80 80 80 80 80 80 80 80 80 80 80 80   x. .............
00009FA0  80 80 80 81 0F FF 10 FF 00 F0 01 C1 08 98 0A 02   ................
00009FB0  0B 30 15 50 09 22 0C 6F 0D 00 0E 8A 14 70 16 02   .0.P.".o.....p..
00009FC0  17 00 18 D6 19 FF 01 C4 FF 82 76 6A 60 56 4E 46   ..........vj`VNF
00009FD0  40 3A 34 30 2C 28 24 21 1E 1B 18 15 12 10 0E 0C   @:40,($!........
:
```

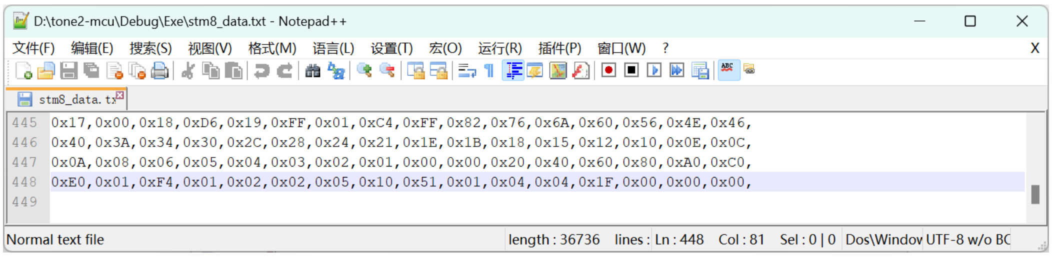
d) Then enter the following command and press Enter to confirm and save the file.

%s/^.\{9\}//g | %s/.\{19\}$//g | %s/ /,0x/g | %s/^.//g | %s/$/,/g


stm8_data.txt (D:\tone2-mcu\Debug\Exe) - GVIM
文件(F) 编辑(E) 工具(T) 语法(S) 缓冲区(B) 窗口(W) 帮助(H)
1

```
00009F00  02 92 C1 02 27 05 92 C7 02 20 F6 81 35 B0 00 00   ....'.... ..5...
00009F10  A6 20 AE 50 05 CD 94 13 81 35 40 00 00 A6 20 AE   . .P.....5@... .
00009F20  50 05 CD 94 13 81 72 07 50 5F 04 A6 01 20 01 4F   P.....r.P_.... .O
00009F30  81 90 93 90 5D 27 04 90 5A 20 F8 81 1E 03 1C 00   ....]'..Z ......
00009F40  04 1F 03 1D 00 04 81 35 AE 50 64 35 56 50 64 81   .......5.Pd5VPd.
00009F50  C7 52 31 72 0F 52 30 FB 81 B7 00 B6 00 43 F4 F7   .R1r.R0......C..
00009F60  81 B7 00 B6 00 FA F7 81 48 48 4E A4 F0 81 72 17   ........HHN...r.
00009F70  50 5F 81 35 FE 53 44 81 89 85 CD 9E B7 BE 02 F6   P_.5.SD.........
00009F80  81 C6 52 31 81 5C F4 81 CC 9F 91 5F 5C 81 CC 9F   ..R1.\....._\...
00009F90  78 9D 20 FD 80 80 80 80 80 80 80 80 80 80 80 80   x. .............
00009FA0  80 80 80 81 0F FF 10 FF 00 F0 01 C1 08 98 0A 02   ................
00009FB0  0B 30 15 50 09 22 0C 6F 0D 00 0E 8A 14 70 16 02   .0.P.".o.....p..
00009FC0  17 00 18 D6 19 FF 01 C4 FF 82 76 6A 60 56 4E 46   ..........vj`VNF
00009FD0  40 3A 34 30 2C 28 24 21 1E 1B 18 15 12 10 0E 0C   @:40,($!........
00009FE0  0A 08 06 05 04 03 02 01 00 00 20 40 60 80 A0 C0   .......... @`...
00009FF0  E0 01 F4 01 02 02 05 10 51 01 04 04 1F 00 00 00   ........Q.......
:%s/^.\{9\}//g | %s/.\{19\}$//g | %s/ /,0x/g | %s/^.//g | %s/$/,/g
```

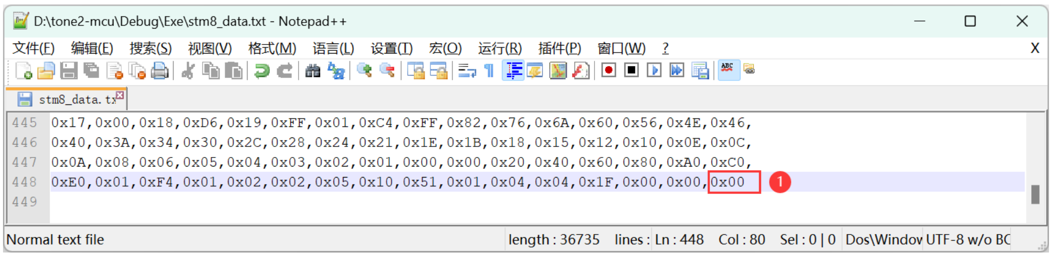
You will now see 448 rows of data.


D:\tone2-mcu\Debug\Exe\stm8_data.txt - Notepad++
文件(F) 编辑(E) 搜索(S) 视图(V) 格式(M) 语言(L) 设置(T) 宏(O) 运行(R) 插件(P) 窗口(W) ?
X
stm8_data.txt

```
445 0x17,0x00,0x18,0xD6,0x19,0xFF,0x01,0xC4,0xFF,0x82,0x76,0x6A,0x60,0x56,0x4E,0x46,
446 0x40,0x3A,0x34,0x30,0x2C,0x28,0x24,0x21,0x1E,0x1B,0x18,0x15,0x12,0x10,0x0E,0x0C,
447 0x0A,0x08,0x06,0x05,0x04,0x03,0x02,0x01,0x00,0x00,0x20,0x40,0x60,0x80,0xA0,0xC0,
448 0xE0,0x01,0xF4,0x01,0x02,0x02,0x05,0x10,0x51,0x01,0x04,0x04,0x1F,0x00,0x00,0x00,
449
```

Normal text file   length : 36736   lines : Ln : 448   Col : 81   Sel : 0 | 0   Dos\Windov UTF-8 w/o BC

Delete the last ","

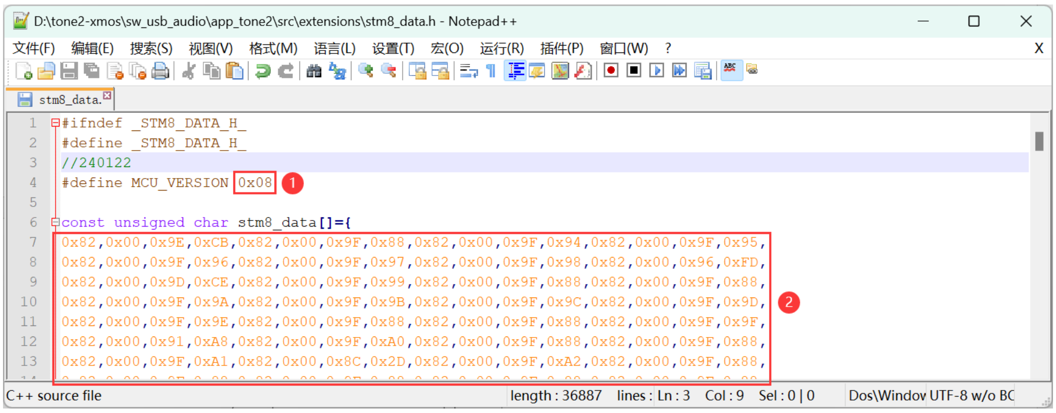

D:\tone2-mcu\Debug\Exe\stm8_data.txt - Notepad++
文件(F) 编辑(E) 搜索(S) 视图(V) 格式(M) 语言(L) 设置(T) 宏(O) 运行(R) 插件(P) 窗口(W) ?
X
stm8_data.txt
1

```
445 0x17,0x00,0x18,0xD6,0x19,0xFF,0x01,0xC4,0xFF,0x82,0x76,0x6A,0x60,0x56,0x4E,0x46,
446 0x40,0x3A,0x34,0x30,0x2C,0x28,0x24,0x21,0x1E,0x1B,0x18,0x15,0x12,0x10,0x0E,0x0C,
447 0x0A,0x08,0x06,0x05,0x04,0x03,0x02,0x01,0x00,0x00,0x20,0x40,0x60,0x80,0xA0,0xC0,
448 0xE0,0x01,0xF4,0x01,0x02,0x02,0x05,0x10,0x51,0x01,0x04,0x04,0x1F,0x00,0x00,0x00
449
```

Normal text file   length : 36735   lines : Ln : 448   Col : 80   Sel : 0 | 0   Dos\Windov UTF-8 w/o BC

e) Change the MCU's version variable to 0x08. Replace these 448 lines of array data with the array in the XMOS firmware.

XMOS array file path: sw_usb_audio\app_tone2\src\extensions\stm8_data.h



D:\tone2-xmos\sw_usb_audio\app_tone2\src\extensions\stm8_data.h - Notepad++

文件(F) 编辑(E) 搜索(S) 视图(V) 格式(M) 语言(L) 设置(T) 宏(O) 运行(R) 插件(P) 窗口(W) ?
stm8_data.
1
2

```
#ifndef _STM8_DATA_H_
#define _STM8_DATA_H_
//240122
#define MCU_VERSION 0x08

const unsigned char stm8_data[]={
0x82,0x00,0x9E,0xCB,0x82,0x00,0x9F,0x88,0x82,0x00,0x9F,0x94,0x82,0x00,0x9F,0x95,
0x82,0x00,0x9F,0x96,0x82,0x00,0x9F,0x97,0x82,0x00,0x9F,0x98,0x82,0x00,0x96,0xFD,
0x82,0x00,0x9D,0xCE,0x82,0x00,0x9F,0x99,0x82,0x00,0x9F,0x88,0x82,0x00,0x9F,0x88,
0x82,0x00,0x9F,0x9A,0x82,0x00,0x9F,0x9B,0x82,0x00,0x9F,0x9C,0x82,0x00,0x9F,0x9D,
0x82,0x00,0x9F,0x9E,0x82,0x00,0x9F,0x88,0x82,0x00,0x9F,0x88,0x82,0x00,0x9F,0x9F,
0x82,0x00,0x91,0xA8,0x82,0x00,0x9F,0xA0,0x82,0x00,0x9F,0x88,0x82,0x00,0x9F,0x88,
0x82,0x00,0x9F,0xA1,0x82,0x00,0x8C,0x2D,0x82,0x00,0x9F,0xA2,0x82,0x00,0x9F,0x88,
```

C++ source file   length : 36887   lines : Ln : 3   Col : 9   Sel : 0 | 0   Dos\Windov UTF-8 w/o BC

f) After saving the file, compile the XMOS firmware and flash it to Tone2. After restarting the Tone2, you can update the MCU using the XMOS.