



1. Description

1.1. Project

Project Name	F446RE_PIN_CONFIG
Board Name	custom
Generated with:	STM32CubeMX 6.5.0
Date	05/20/2022

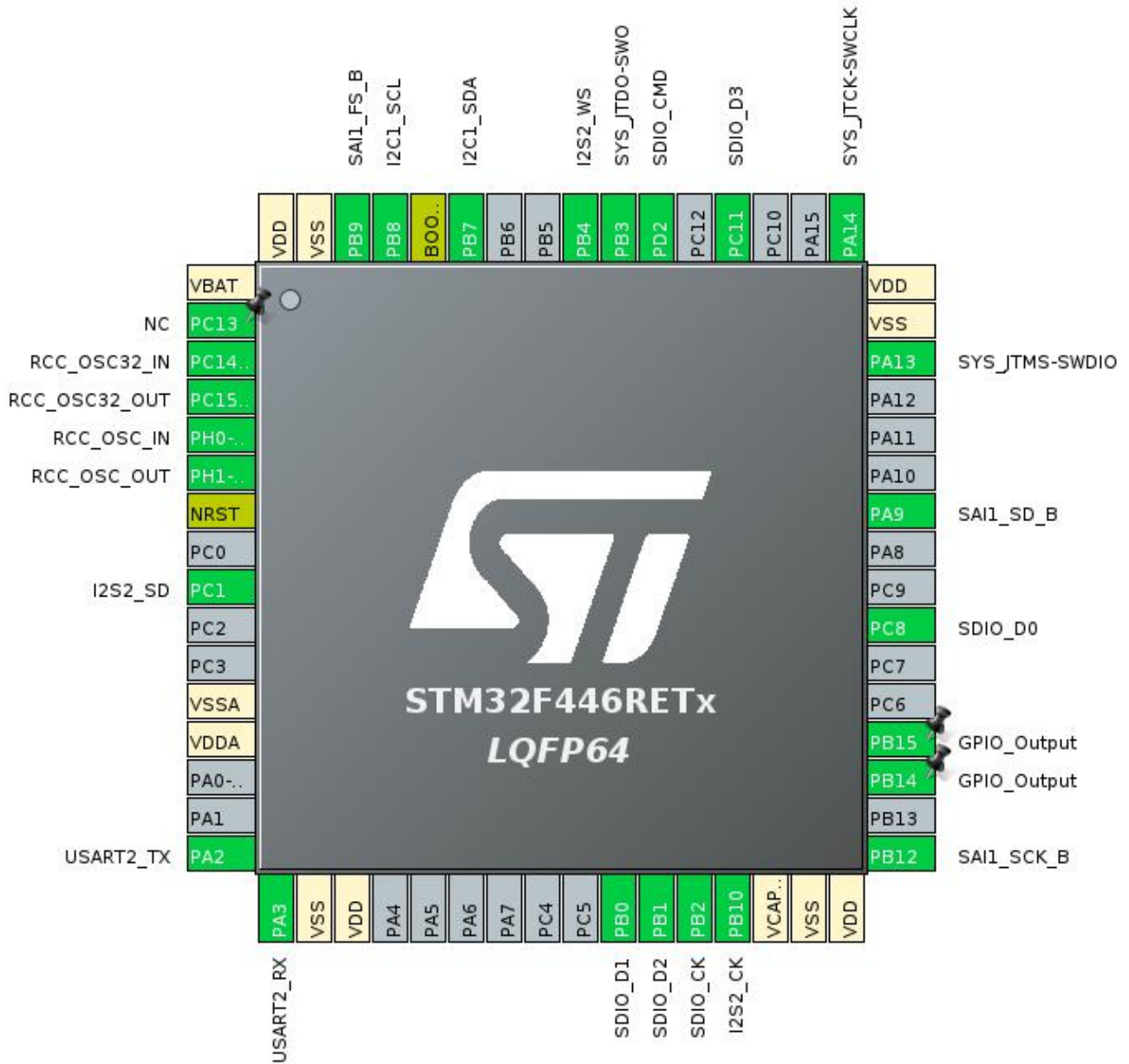
1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F446
MCU name	STM32F446RETx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	Arm Cortex-M4
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2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13 *	I/O	GPIO_Input	NC
3	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
5	PH0-OSC_IN	I/O	RCC_OSC_IN	
6	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
9	PC1	I/O	I2S2_SD	
12	VSSA	Power		
13	VDDA	Power		
16	PA2	I/O	USART2_TX	
17	PA3	I/O	USART2_RX	
18	VSS	Power		
19	VDD	Power		
26	PB0	I/O	SDIO_D1	
27	PB1	I/O	SDIO_D2	
28	PB2	I/O	SDIO_CK	
29	PB10	I/O	I2S2_CK	
30	VCAP_1	Power		
31	VSS	Power		
32	VDD	Power		
33	PB12	I/O	SAI1_SCK_B	
35	PB14 *	I/O	GPIO_Output	
36	PB15 *	I/O	GPIO_Output	
39	PC8	I/O	SDIO_D0	
42	PA9	I/O	SAI1_SD_B	
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VSS	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	
52	PC11	I/O	SDIO_D3	
54	PD2	I/O	SDIO_CMD	
55	PB3	I/O	SYS_JTDO-SWO	
56	PB4	I/O	I2S2_WS	
59	PB7	I/O	I2C1_SDA	
60	BOOT0	Boot		

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
61	PB8	I/O	I2C1_SCL	
62	PB9	I/O	SAI1_FS_B	
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

5. Software Project

5.1. Project Settings

Name	Value
Project Name	F446RE_PIN_CONFIG
Project Folder	/home/carlos/STM32CubeIDE/workspace_1.9.0/F446RE_PIN_CONFIG
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.27.0
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Copy only the necessary library files
Generate peripheral initialization as a pair of '.c/.h' files	No
Backup previously generated files when re-generating	No
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_SDIO_SD_Init	SDIO
4	MX_FATFS_Init	FATFS
5	MX_I2C1_Init	I2C1
6	MX_I2S2_Init	I2S2
7	MX_SAI1_Init	SAI1
8	MX_USART2_UART_Init	USART2

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F446
MCU	STM32F446RETx
Datasheet	DS10693_Rev6

6.2. Parameter Selection

Temperature	25
Vdd	3.3

6.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

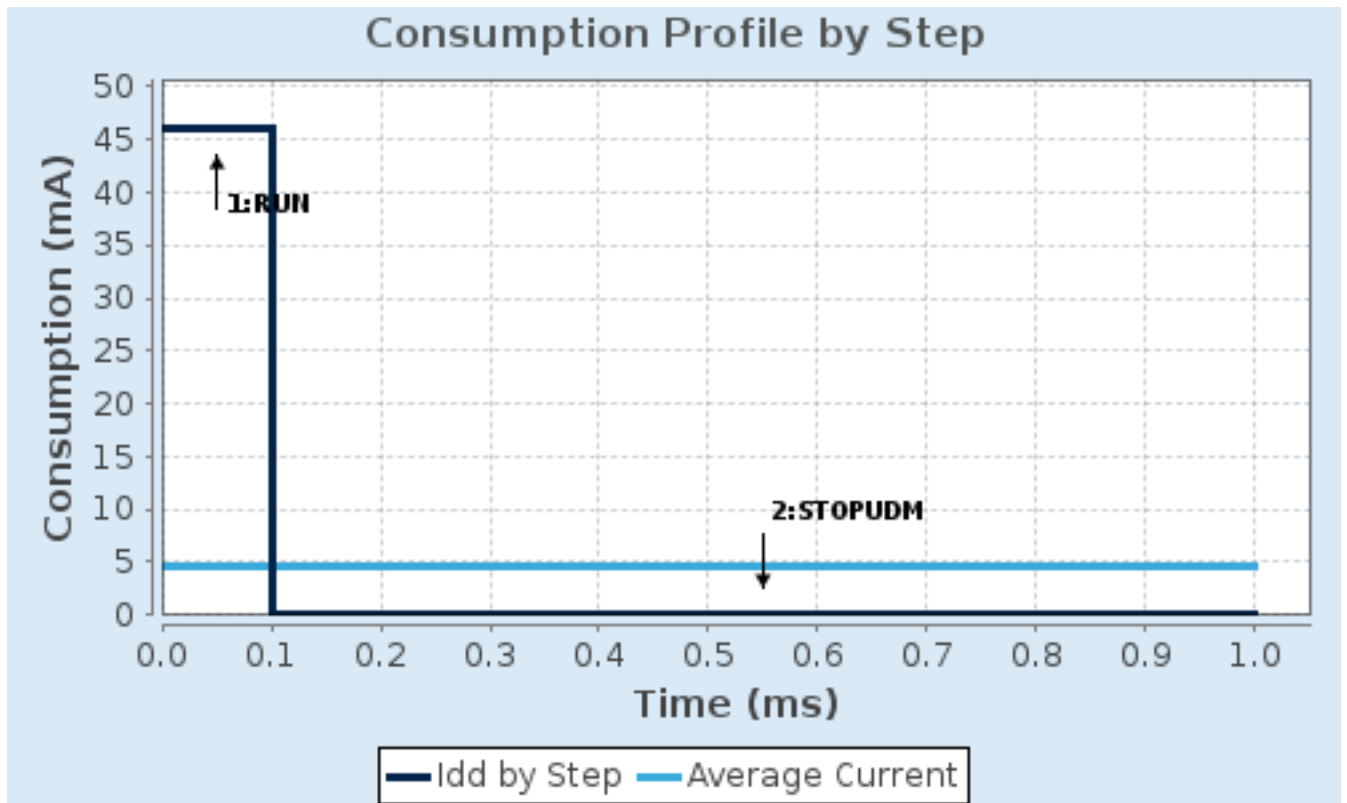
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP UDM (Under Drive)
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	RAM/FLASH/REGON/ART/P REFETCH	n/a
CPU Frequency	180 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator LP Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	46 mA	55 μ A
Duration	0.1 ms	0.9 ms
DMIPS	225.0	0.0
Ta Max	98.02	104.99
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	4.65 mA
Battery Life	1 month	Average DMIPS	225.0 DMIPS

6.6. Chart



7. Peripherals and Middlewares Configuration

7.1. I2C1

I2C: I2C

7.1.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

Slave Features:

Clock No Stretch Mode	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0
General Call address detection	Disabled

7.2. I2S2

Mode: Half-Duplex Master

7.2.1. Parameter Settings:

Generic Parameters:

Transmission Mode	Mode Master Receive *
Communication Standard	I2S Philips
Data and Frame Format	16 Bits Data on 16 Bits Frame
Selected Audio Frequency	8 KHz
Real Audio Frequency	8.012 KHz *
Error between Selected and Real	0.15 % *

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

7.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	3 WS (4 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 3
Power Over Drive	Disabled

7.4. SAI1

Mode: Master

7.4.1. Parameter Settings:

SAI B:

Synchronization Inputs	Asynchronous
Basic Parameters	
Protocol	Free
Audio Mode	Master Receive *
Frame Length	8 bits
Data Size	8 Bits
Slot Size	DataSize
Output Mode	Stereo
Companding Mode	No companding mode
Frame Parameters	
First Bit	MSB First
Frame Synchro Active Level Length	1
Frame Synchro Definition	Start Frame
Frame Synchro Polarity	Active Low
Frame Synchro Offset	First Bit
Slot Parameters	
First Bit Offset	0
Number of Slots	1
Slot Active Final Value	0x00000000

Slot Active	Neither
Clock Parameters	
Master Clock Divider	Enabled
Audio Frequency	192 KHz
Real Audio Frequency	187.5 KHz *
Error between Selected	-2.34 % *
Clock Strobing	Falling Edge
Advanced Parameters	
Fifo Threshold	Empty
Output Drive	Disabled

7.5. SDIO

Mode: SD 4 bits Wide bus

7.5.1. Parameter Settings:

SDIO parameters:

Clock transition on which the bit capture is made	Rising transition
SDIO Clock divider bypass	Disable
SDIO Clock output enable when the bus is idle	Disable the power save for the clock
SDIO hardware flow control	The hardware control flow is disabled
SDIOCLK clock divide factor	0

7.6. SYS

Debug: Trace Asynchronous Sw

Timebase Source: SysTick

7.7. USART2

Mode: Asynchronous

7.7.1. Parameter Settings:

Basic Parameters:

Baud Rate	115200
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
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Over Sampling

16 Samples

7.8. FATFS

mode: SD Card

7.8.1. Set Defines:

Version:

FATFS version R0.12c

Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	Disabled
USE_MKFS (Make filesystem function)	Enabled
USE_FASTSEEK (Fast seek function)	Enabled
USE_EXPAND (Use f_expand function)	Disabled
USE_CHMOD (Change attributes function)	Disabled
USE_LABEL (Volume label functions)	Disabled
USE_FORWARD (Forward function)	Disabled

Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	Latin 1
USE_LFN (Use Long Filename)	Disabled
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	Disabled

Physical Drive Parameters:

VOLUMES (Logical drives)	1
MAX_SS (Maximum Sector Size)	4096 *
MIN_SS (Minimum Sector Size)	512
MULTI_PARTITION (Volume partitions feature)	Disabled
USE_TRIM (Erase feature)	Disabled
FS_NOFSINFO (Force full FAT scan)	0

System Parameters:

FS_TINY (Tiny mode)	Disabled
FS_EXFAT (Support of exFAT file system)	Disabled
FS_NORTC (Timestamp feature)	Dynamic timestamp
FS_REENTRANT (Re-Entrancy)	Disabled
FS_TIMEOUT (Timeout ticks)	1000
FS_LOCK (Number of files opened simultaneously)	2

7.8.2. Advanced Settings:

SDIO/SDMMC:

SDIO instance	SDIO
Use dma template	Disabled
BSP code for SD	Generic

7.8.3. Platform Settings:

Detect_SDIO	PC13
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* **User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB7	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Very High *	
	PB8	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Very High *	
I2S2	PC1	I2S2_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB10	I2S2_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB4	I2S2_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SAI1	PB12	SAI1_SCK_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA9	SAI1_SD_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB9	SAI1_FS_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	
SDIO	PB0	SDIO_D1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB1	SDIO_D2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB2	SDIO_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC8	SDIO_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC11	SDIO_D3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD2	SDIO_CMD	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA3	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
GPIO	PC13	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	NC
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	

8.2. DMA configuration

nothing configured in DMA service

8.3. NVIC configuration

8.3.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
Memory management fault	true	0	0
Pre-fetch fault, memory access fault	true	0	0
Undefined instruction or illegal state	true	0	0
System service call via SWI instruction	true	0	0
Debug monitor	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	15	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI2 global interrupt	unused		
USART2 global interrupt	unused		
SDIO global interrupt	unused		
FPU global interrupt	unused		
SAI1 global interrupt	unused		

8.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true

* User modified value

9. System Views

9.1. Category view

9.1.1. Current

Middleware

FATFS 

System Core

Analog

Timers

Connectivity

Multimedia

Computing

DMA

I2C1 

I2S2 

GPIO 

SDIO 

SAI1 

NVIC 

USART2 

RCC 

SYS 

10. Docs & Resources

Type	Link
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval_tools_portfolio.pdf
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& Software

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