1. Description

1.1. Project

Project Name	_hf_pa_control_stm32f103c8t6
Board Name	custom
Generated with:	STM32CubeMX 6.10.0
Date	01/07/2024

1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103C8Tx
MCU Package	LQFP48
MCU Pin number	48

1.3. Core(s) information

Core(s)	Arm Cortex-M3

2. Pinout Configuration
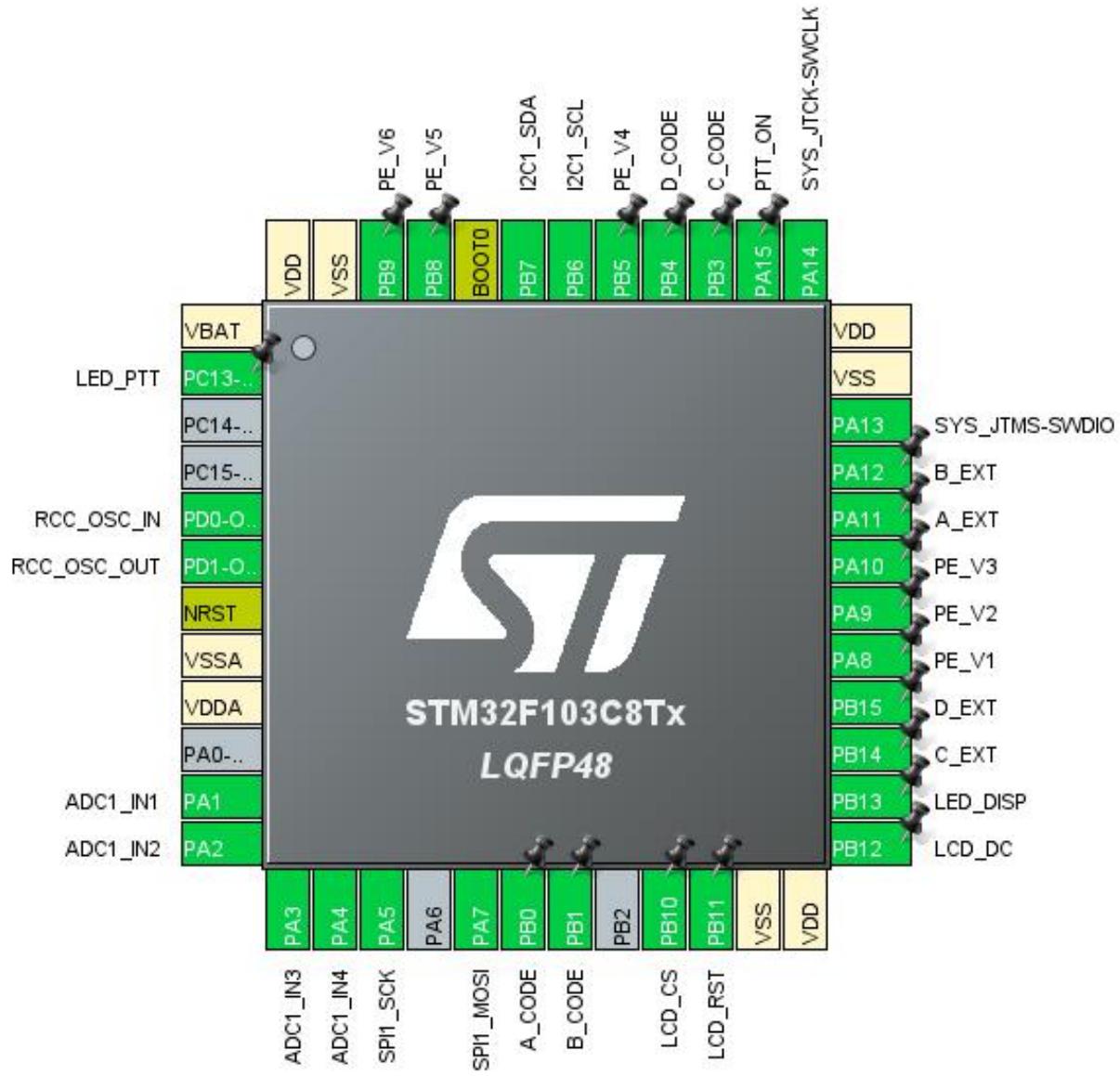
3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-TAMPER-RTC *	I/O	GPIO_Output	LED_PTT
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
11	PA1	I/O	ADC1_IN1	
12	PA2	I/O	ADC1_IN2	
13	PA3	I/O	ADC1_IN3	
14	PA4	I/O	ADC1_IN4	
15	PA5	I/O	SPI1_SCK	
17	PA7	I/O	SPI1_MOSI	
18	PB0 *	I/O	GPIO_Output	A_CODE
19	PB1 *	I/O	GPIO_Output	B_CODE
21	PB10 *	I/O	GPIO_Output	LCD_CS
22	PB11 *	I/O	GPIO_Output	LCD_RST
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	LCD_DC
26	PB13 *	I/O	GPIO_Output	LED_DISP
27	PB14 *	I/O	GPIO_Input	C_EXT
28	PB15 *	I/O	GPIO_Input	D_EXT
29	PA8 *	I/O	GPIO_Output	PE_V1
30	PA9 *	I/O	GPIO_Output	PE_V2
31	PA10 *	I/O	GPIO_Output	PE_V3
32	PA11 *	I/O	GPIO_Input	A_EXT
33	PA12 *	I/O	GPIO_Input	B_EXT
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
38	PA15	I/O	GPIO_EXTI15	PTT_ON
39	PB3 *	I/O	GPIO_Output	C_CODE
40	PB4 *	I/O	GPIO_Output	D_CODE
41	PB5 *	I/O	GPIO_Output	PE_V4

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
42	PB6	I/O	I2C1_SCL	
43	PB7	I/O	I2C1_SDA	
44	BOOT0	Boot		
45	PB8 *	I/O	GPIO_Output	PE_V5
46	PB9 *	I/O	GPIO_Output	PE_V6
47	VSS	Power		
48	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration
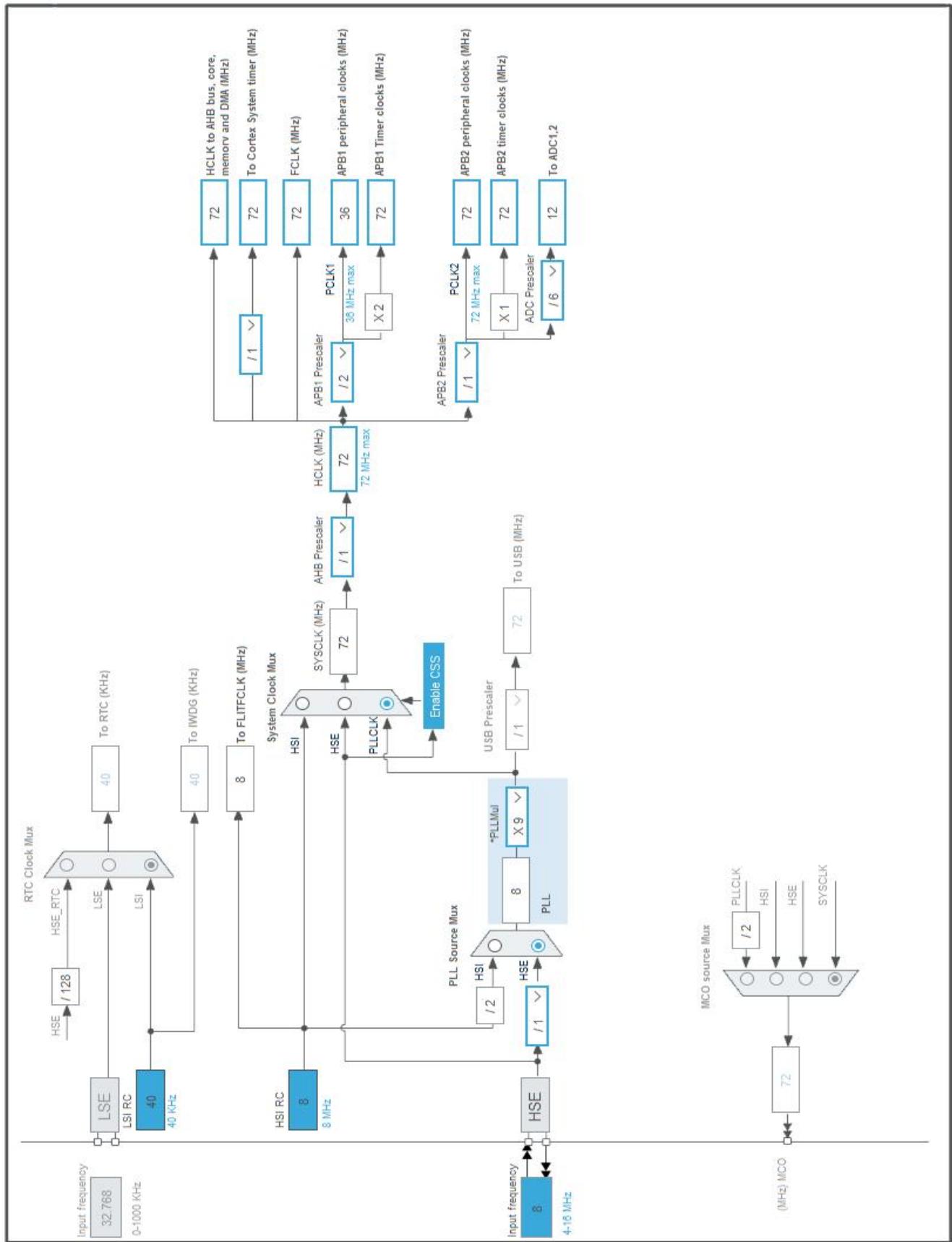
5. Software Project

5.1. Project Settings

Name	Value
Project Name	_hf_pa_control_stm32f103c8t6
Project Folder	D:\Radio\Microcontrollers\STM32\WorkSpace_hf_pa_control_stm32f103c8t6
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F1 V1.8.5
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_DMA_Init	DMA
4	MX_ADC1_Init	ADC1
5	MX_I2C1_Init	I2C1
6	MX_SPI1_Init	SPI1

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	DS5319_Rev17

1.2. Parameter Selection

Temperature	25
Vdd	3.3

1.3. 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

1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	No Scale	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	72 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP
Clock Source Frequency	8 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	27 mA	14 µA
Duration	0.1 ms	0.9 ms
DMIPS	90.0	0.0
Ta Max	100.1	105
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	2.71 mA
Battery Life	1 month, 21 days, 17 hours	Average DMIPS	61.0 DMIPS

1.6. Chart

Consumption Profile by Step
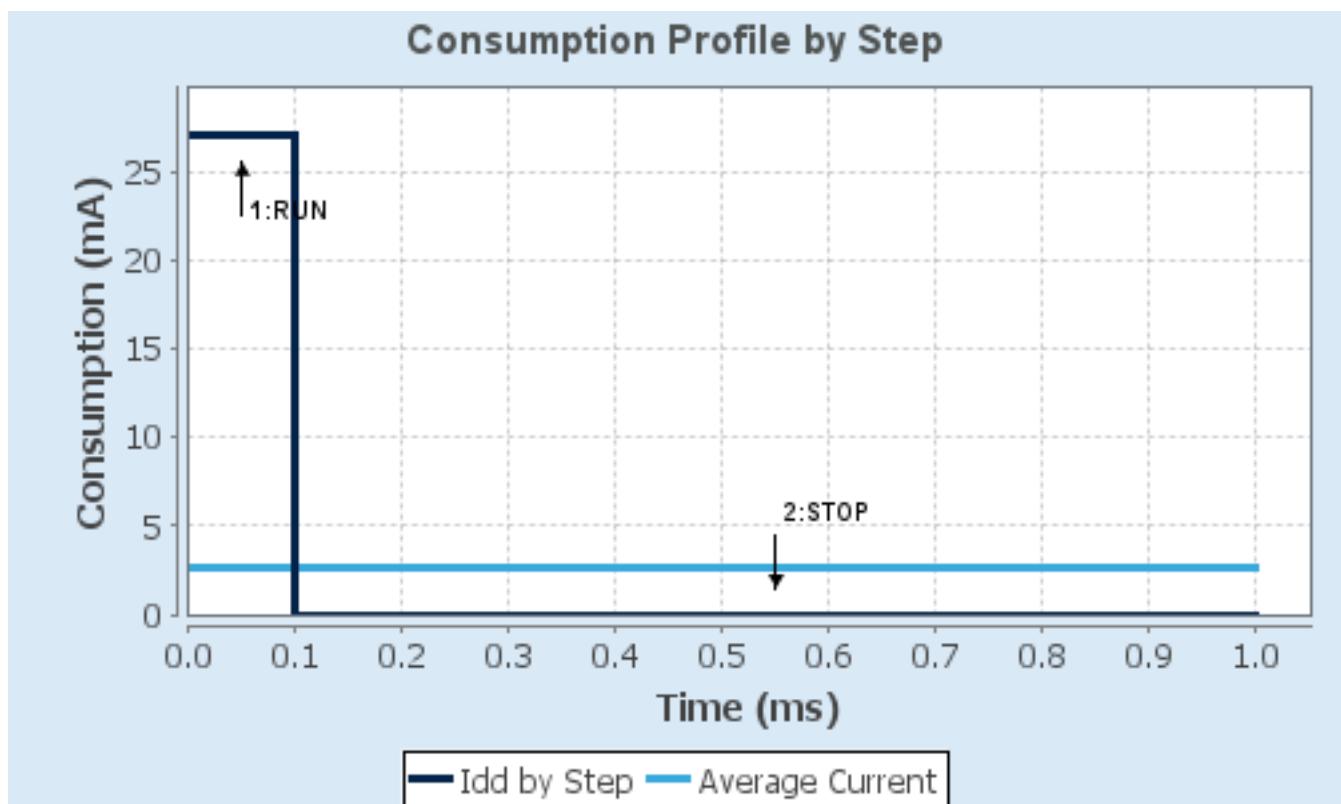
2. Peripherals and Middlewares Configuration

2.1. ADC1

mode: IN1

mode: IN2

mode: IN3

mode: IN4

2.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Number Of Conversion	**4 ***
External Trigger Conversion Source	Regular Conversion launched by software
Rank	1
Channel	Channel 1
Sampling Time	**41.5 Cycles ***
Rank	**2 ***
Channel	**Channel 2 ***
Sampling Time	**41.5 Cycles ***
Rank	**3 ***
Channel	**Channel 3 ***
Sampling Time	**41.5 Cycles ***
Rank	**4 ***
Channel	**Channel 4 ***
Sampling Time	**41.5 Cycles ***

ADC_Injected_ConversionMode:

Enable Injected Conversions	Disable

WatchDog:

Enable Analog WatchDog Mode	false

2.2. I2C1
I2C: I2C
2.2.1. 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

2.3. RCC
High Speed Clock (HSE): Crystal/Ceramic Resonator
2.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

2.4. SPI1
Mode: Transmit Only Master
2.4.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)   **4 ***

Baud Rate   **18.0 MBits/s ***

Clock Polarity (CPOL)   Low

Clock Phase (CPHA)   1 Edge

Advanced Parameters:

CRC Calculation   Disabled

NSS Signal Type   Software

2.5. SYS
Debug: Serial Wire
Timebase Source: SysTick

* User modified value

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA1	ADC1_IN1	Analog mode	n/a	n/a	
	PA2	ADC1_IN2	Analog mode	n/a	n/a	
	PA3	ADC1_IN3	Analog mode	n/a	n/a	
	PA4	ADC1_IN4	Analog mode	n/a	n/a	
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	n/a	**High ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	n/a	**High ***	
RCC	PD0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	n/a	**High ***	
	PA7	SPI1_MOSI	Alternate Function Push Pull	n/a	**High ***	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
GPIO	PC13-TAMPER-RTC	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_PTT
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	A_CODE
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	B_CODE
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_CS
	PB11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_RST
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_DC
	PB13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_DISP
	PB14	GPIO_Input	Input mode	**Pull-down ***	n/a	C_EXT
	PB15	GPIO_Input	Input mode	**Pull-down ***	n/a	D_EXT
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PE_V1
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PE_V2
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PE_V3
	PA11	GPIO_Input	Input mode	**Pull-down ***	n/a	A_EXT
	PA12	GPIO_Input	Input mode	**Pull-down ***	n/a	B_EXT
	PA15	GPIO_EXTI15	**External Interrupt Mode with**	No pull-up and no pull-down	n/a	PTT_ON

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
			Rising/Falling edge			
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	C_CODE
	PB4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D_CODE
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PE_V4
	PB8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PE_V5
	PB9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PE_V6

3.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA1_Channel1	Peripheral To Memory	Low

ADC1: DMA1_Channel1 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

3.3. NVIC configuration

3.3.1. 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
Prefetch 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
DMA1 channel1 global interrupt	true	0	0
EXTI line[15:10] interrupts	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		

3.3.2. 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
Prefetch 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
DMA1 channel1 global interrupt	false	true	true
EXTI line[15:10] interrupts	false	true	true

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

Middleware

System Core	Analog	Timers	Connectivity	Computing
DMA ✓	ADC1 ✓		I2C1 ✓	
GPIO ✓			SPI1 ✓	
NVIC ✓				
RCC ✓				
SYS ✓				

5. Docs & Resources

Type   Link