



1. Description

1.1. Project

Project Name	SDIO_test5
Board Name	custom
Generated with:	STM32CubeMX 6.10.0
Date	06/06/2024

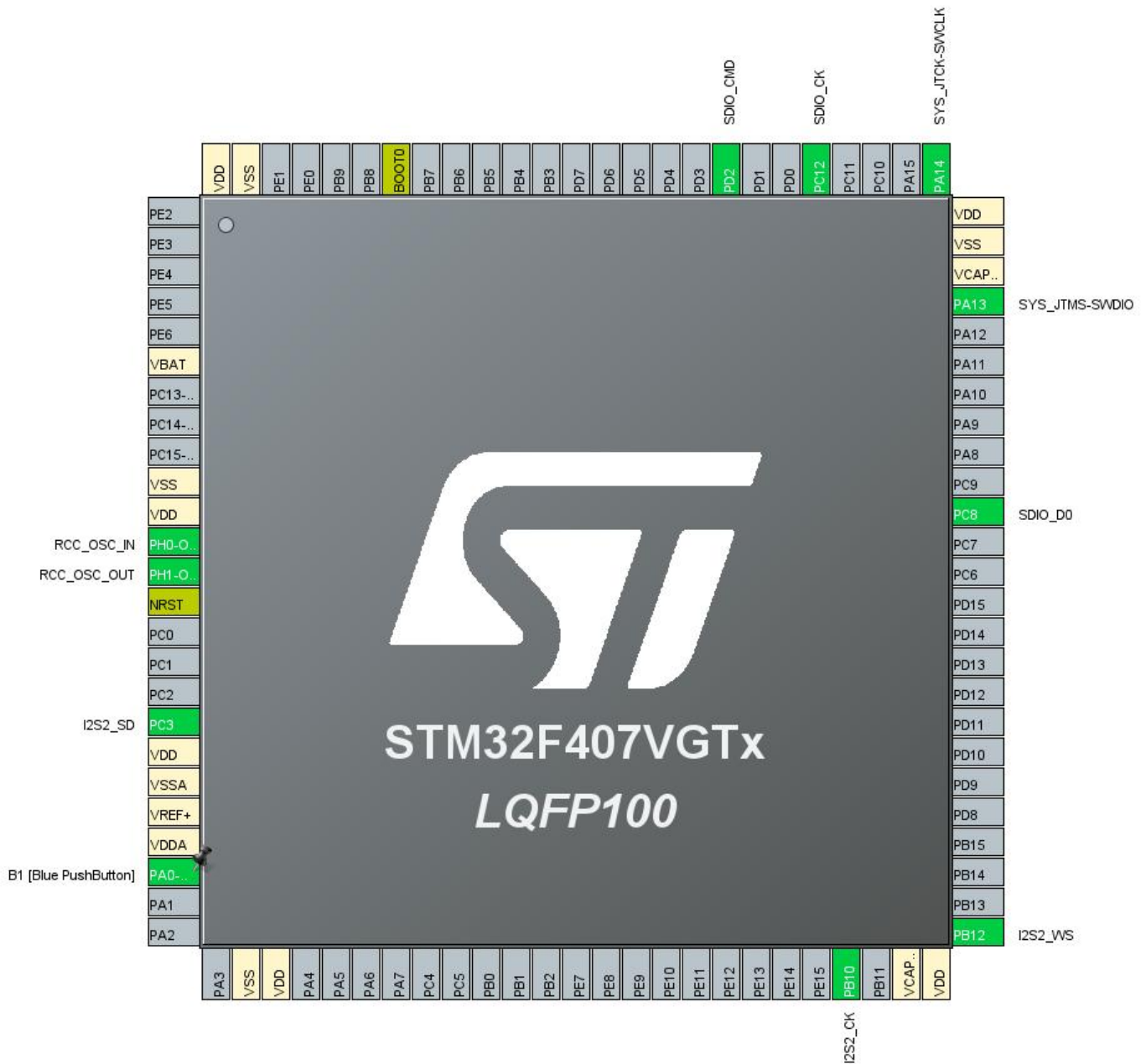
1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VGTx
MCU Package	LQFP100
MCU Pin number	100

1.3. Core(s) information

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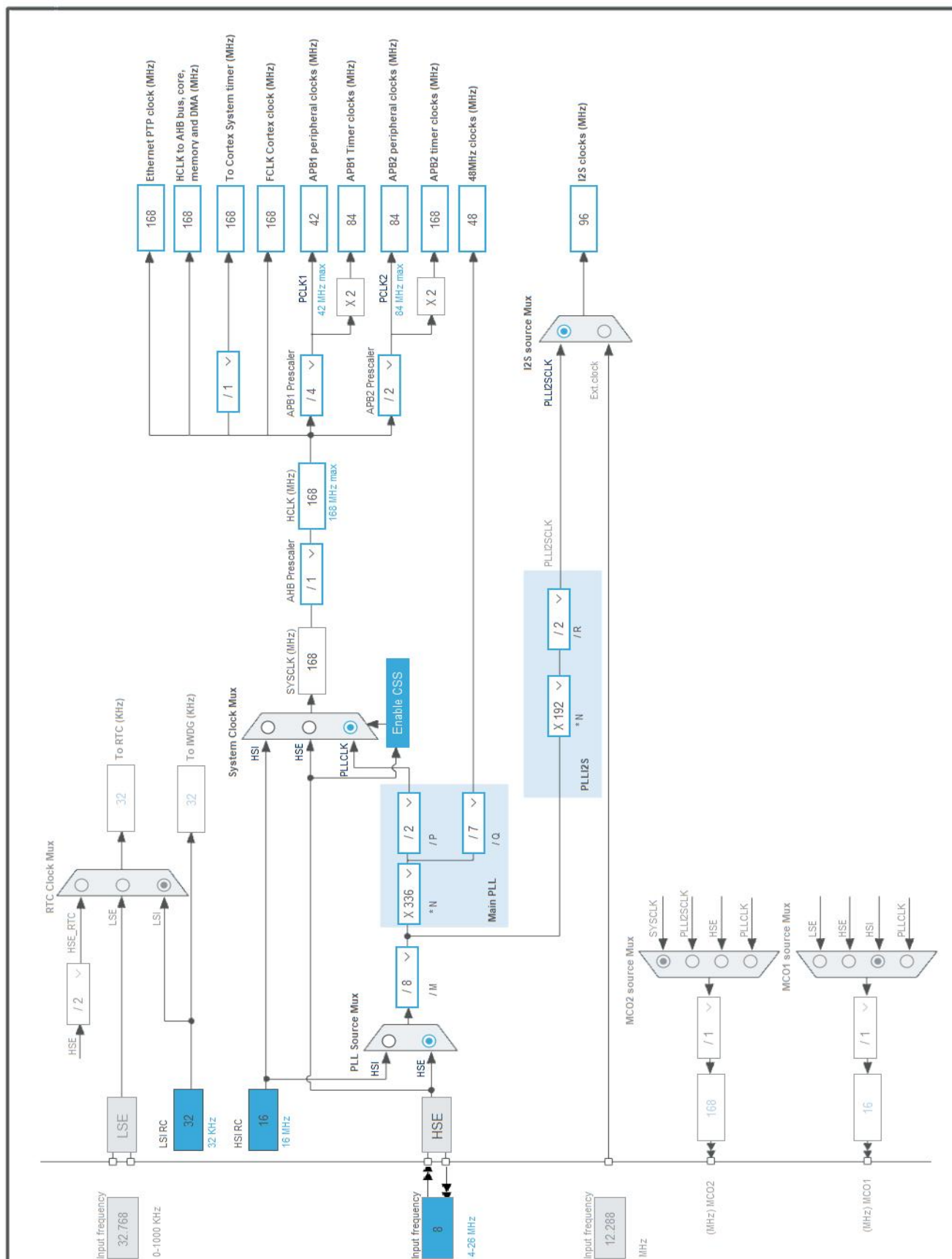
2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
18	PC3	I/O	I2S2_SD	
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	GPIO_EXTI0	B1 [Blue PushButton]
27	VSS	Power		
28	VDD	Power		
47	PB10	I/O	I2S2_CK	
49	VCAP_1	Power		
50	VDD	Power		
51	PB12	I/O	I2S2_WS	
65	PC8	I/O	SDIO_D0	
72	PA13	I/O	SYS_JTMS-SWDIO	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	
80	PC12	I/O	SDIO_CK	
83	PD2	I/O	SDIO_CMD	
94	BOOT0	Boot		
99	VSS	Power		
100	VDD	Power		

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	SDIO_test5
Project Folder	C:\Users\ASUS\Downloads\STM32CubeIDE\workspace_1.14.1\SDIO_test5
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.28.0
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x2000
Minimum Stack Size	0x4000

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_SDIO_SD_Init	SDIO
5	MX_FATFS_Init	FATFS
6	MX_I2S2_Init	I2S2

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	DS8626_Rev8

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

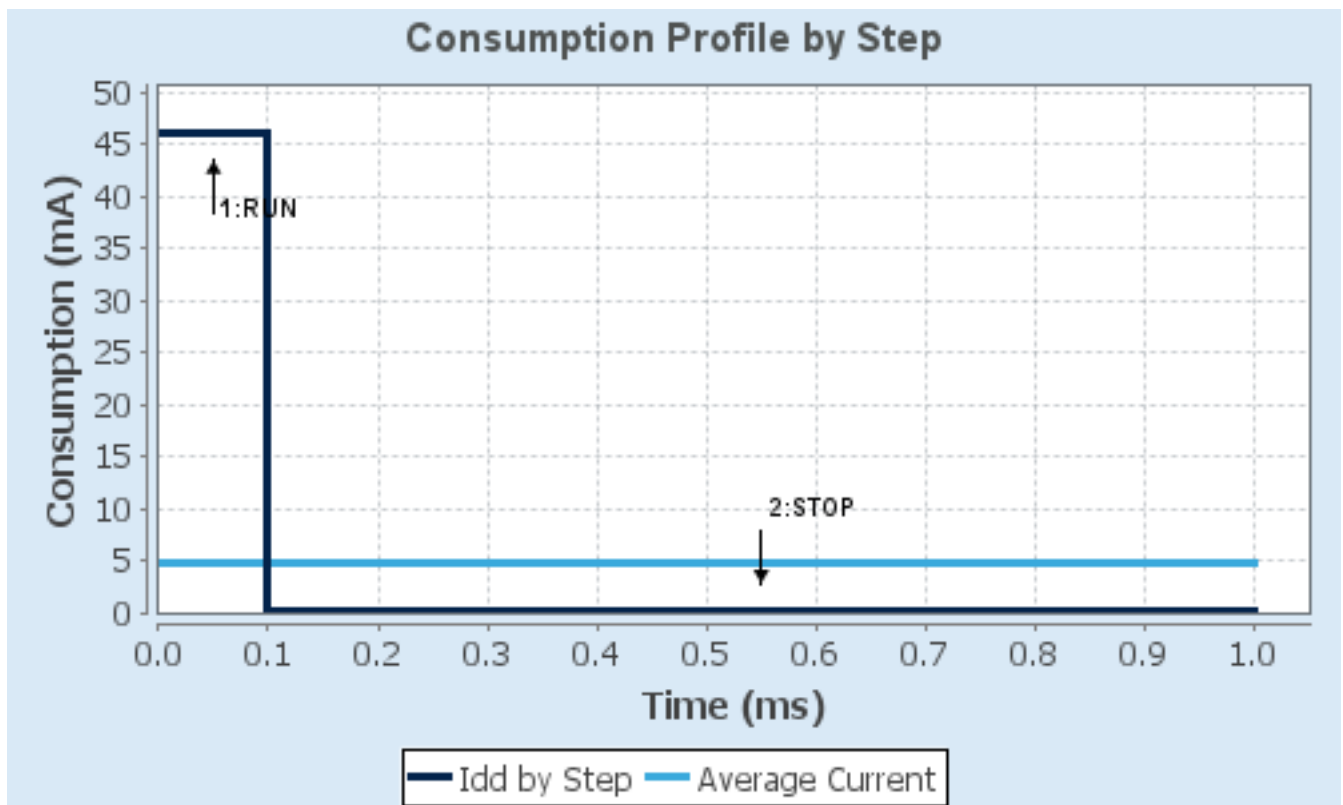
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	168 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	280 μ A
Duration	0.1 ms	0.9 ms
DMIPS	210.0	0.0
Ta Max	98.47	104.96
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	4.85 mA
Battery Life	29 days, 4 hours	Average DMIPS	210.0 DMIPS

1.6. Chart



2. Peripherals and Middlewares Configuration

2.1. I2S2

Mode: Half-Duplex Master

2.1.1. Parameter Settings:

Generic Parameters:

Transmission Mode

Communication Standard

Data and Frame Format

Selected Audio Frequency

Real Audio Frequency

Error between Selected and Real

Mode Master Receive *

I2S Philips

16 Bits Data on 32 Bits Frame *

32 KHz *

31.914 KHz *

-0.26 % *

Clock Parameters:

Clock Source

Clock Polarity

I2S PLL Clock

Low

2.2. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

2.2.1. Parameter Settings:

System Parameters:

VDD voltage (V)

Instruction Cache

Prefetch Buffer

Data Cache

Flash Latency(WS)

3.3

Enabled

Enabled

Enabled

5 WS (6 CPU cycle)

RCC Parameters:

HSI Calibration Value

HSE Startup Timeout Value (ms)

LSE Startup Timeout Value (ms)

16

100

5000

Power Parameters:

Power Regulator Voltage Scale

Power Regulator Voltage Scale 1

2.3. SDIO

Mode: SD 1 bit

2.3.1. 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

2.4. SYS

Debug: Serial Wire

Timebase Source: SysTick

2.5. FATFS

mode: SD Card

2.5.1. Set Defines:

Version:

FATFS version	R0.12c
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Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled without 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)	Enabled with static working buffer on the BSS *
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)	512
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

2.5.2. Advanced Settings:

SDIO/SDMMC:

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

* User modified value

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2S2	PC3	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	
	PB12	I2S2_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
RCC	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SDIO	PC8	SDIO_D0	Alternate Function Push Pull	Pull-up *	Very High	
	PC12	SDIO_CK	Alternate Function Push Pull	Pull-down *	Very High	
	PD2	SDIO_CMD	Alternate Function Push Pull	Pull-up *	Very High	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
GPIO	PA0-WKUP	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	B1 [Blue PushButton]

3.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI2_RX	DMA1_Stream3	Peripheral To Memory	Low

SPI2_RX: DMA1_Stream3 DMA request Settings:

Mode: **Circular ***
Use fifo: Disable
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
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
EXTI line0 interrupt	true	0	0
DMA1 stream3 global interrupt	true	0	0
SDIO global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
SPI2 global interrupt	unused		
FPU 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
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
EXTI line0 interrupt	false	true	true
DMA1 stream3 global interrupt	false	true	true
SDIO global interrupt	false	true	true

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

Middleware

FATFS 

System Core

Analog

Timers

Connectivity

Multimedia

Security

Computing

DMA 

GPIO 

NVIC 

RCC 

SYS 

SDIO 

I2S2 

5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32f405-415_407-417_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32f405-415_407-417_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f4_svd.zip
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
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Brochures	https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstmcsuite.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/stm32_authentication_can.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf

- Application Notes https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an2867-oscillator-design-guide-for-stm8afals-stm32-mcus-and-mpus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an2945-stm8s-and-stm32-mcus-a-consistent-832bit-product-line-for-painless-migration-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3070-managing-the-driver-enable-signal-for-rs485-and-iolink-communications-with-the-stm32s-usart-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3155-usart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3156-usb-dfu-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3364-migration-and-compatibility-guidelines-for-stm32-microcontroller-applications-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3371-using-the-hardware-realtime-clock-rtc-in-stm32-f0-f2-f3-f4-and-l1-series-of-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3997-audio-playback-and-recording-using-the-stm32f4discovery-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3998-pdm-audio-software-decoding-on-stm32-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4031-using-the-

stm32f2-stm32f4-and-stm32f7-series-dma-controller-
stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an4076-two-or-three-shunt-resistor-based-current-sensing-circuit-design-in-3phase-inverters-stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an4229-how-to-implement-a-vocoder-solution-using-stm32-microcontrollers-stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an4640-peripherals-interconnections-on-stm32f4057xx-stm32f4157xx-stm32f42xxx-stm32f43xxx-stm32f446xx-and-stm32f469479xx-stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an4821-migrating-from-stm32f405415-line-and-stm32f407417-line-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf

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& Software [stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an1801_stm32cubeprog)

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for related Tools [_shortcuts-atoilic-editing-keyboard-shortcuts-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/atoilic_editing_keyboard)
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for related Tools [_migration_guide-truestudio-for-arm-migration-guide-iar-embedded-](https://www.st.com/resource/en/application_note/iar_to_atoilic_truestudio)
& Software [workbench-to-truestudio-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/iar_to_atoilic_truestudio)

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& Software [stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/stm32cubemx_installatio)

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Application Notes https://www.st.com/resource/en/application_note/an3174-implementing-
for related Tools [receivers-for-infrared-remote-control-protocols-using-stm32f10xxx-](https://www.st.com/resource/en/application_note/an3174-implementing-)
& Software [microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3174-implementing-)

Application Notes https://www.st.com/resource/en/application_note/an3241-qvga-tftlcd-
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