
STM32
CubeMX

1. Description

1.1. Project

Project Name	mcu-test1
Board Name	custom
Generated with:	STM32CubeMX 6.5.0
Date	05/06/2022

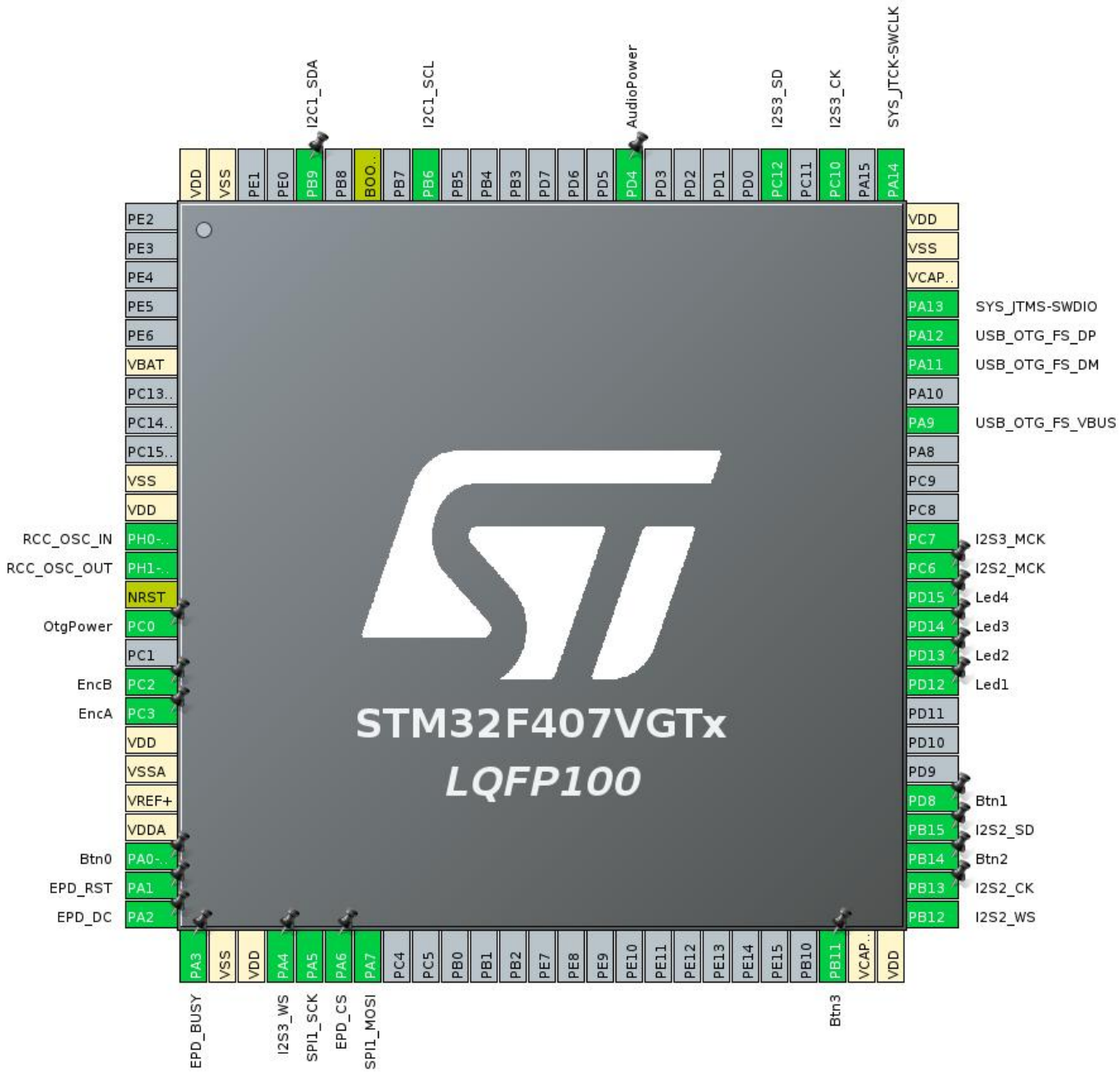
1.2. MCU

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

2. Pinout Configuration



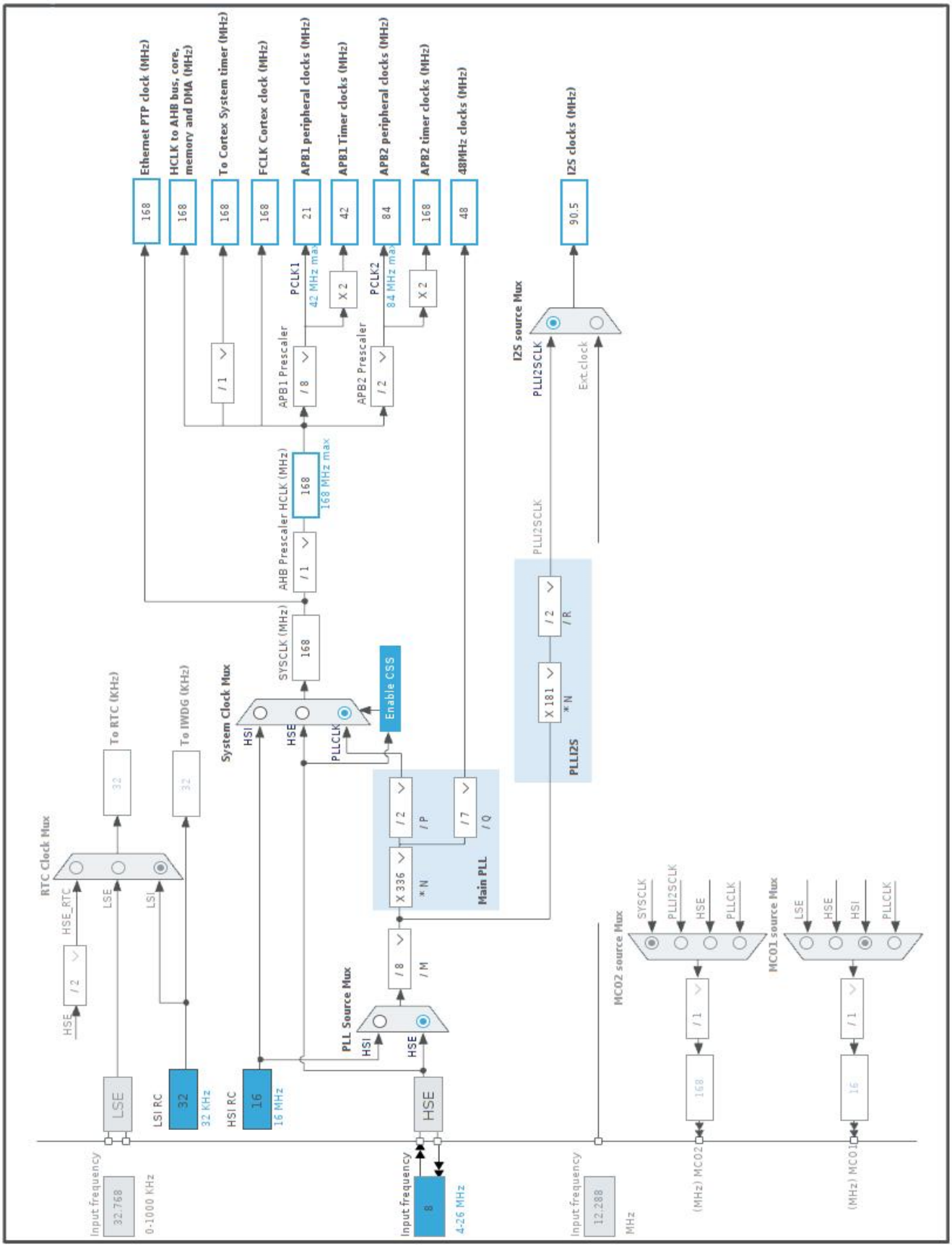
3. Pins Configuration

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		
15	PC0 *	I/O	GPIO_Output	OtgPower
17	PC2 *	I/O	GPIO_Input	EncB
18	PC3 *	I/O	GPIO_Input	EncA
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP *	I/O	GPIO_Input	Btn0
24	PA1 *	I/O	GPIO_Output	EPD_RST
25	PA2 *	I/O	GPIO_Output	EPD_DC
26	PA3 *	I/O	GPIO_Input	EPD_BUSY
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	I2S3_WS	
30	PA5	I/O	SPI1_SCK	
31	PA6 *	I/O	GPIO_Output	EPD_CS
32	PA7	I/O	SPI1_MOSI	
48	PB11 *	I/O	GPIO_Input	Btn3
49	VCAP_1	Power		
50	VDD	Power		
51	PB12	I/O	I2S2_WS	
52	PB13	I/O	I2S2_CK	
53	PB14 *	I/O	GPIO_Input	Btn2
54	PB15	I/O	I2S2_SD	
55	PD8 *	I/O	GPIO_Input	Btn1
59	PD12 *	I/O	GPIO_Output	Led1
60	PD13 *	I/O	GPIO_Output	Led2
61	PD14 *	I/O	GPIO_Output	Led3
62	PD15 *	I/O	GPIO_Output	Led4
63	PC6	I/O	I2S2_MCK	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
64	PC7	I/O	I2S3_MCK	
68	PA9	I/O	USB_OTG_FS_VBUS	
70	PA11	I/O	USB_OTG_FS_DM	
71	PA12	I/O	USB_OTG_FS_DP	
72	PA13	I/O	SYS_JTMS-SWDIO	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	
78	PC10	I/O	I2S3_CK	
80	PC12	I/O	I2S3_SD	
85	PD4 *	I/O	GPIO_Output	AudioPower
92	PB6	I/O	I2C1_SCL	
94	BOOT0	Boot		
96	PB9	I/O	I2C1_SDA	
99	VSS	Power		
100	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	mcu-test1
Project Folder	/home/asky/Desktop/digital-pedal/mcu-test1
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.26.2
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_I2C1_Init	I2C1
5	MX_I2S2_Init	I2S2
6	MX_I2S3_Init	I2S3
7	MX_USB_HOST_Init	USB_HOST
8	MX_FATFS_Init	FATFS
9	MX_SPI1_Init	SPI1

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	DS8626_Rev8

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

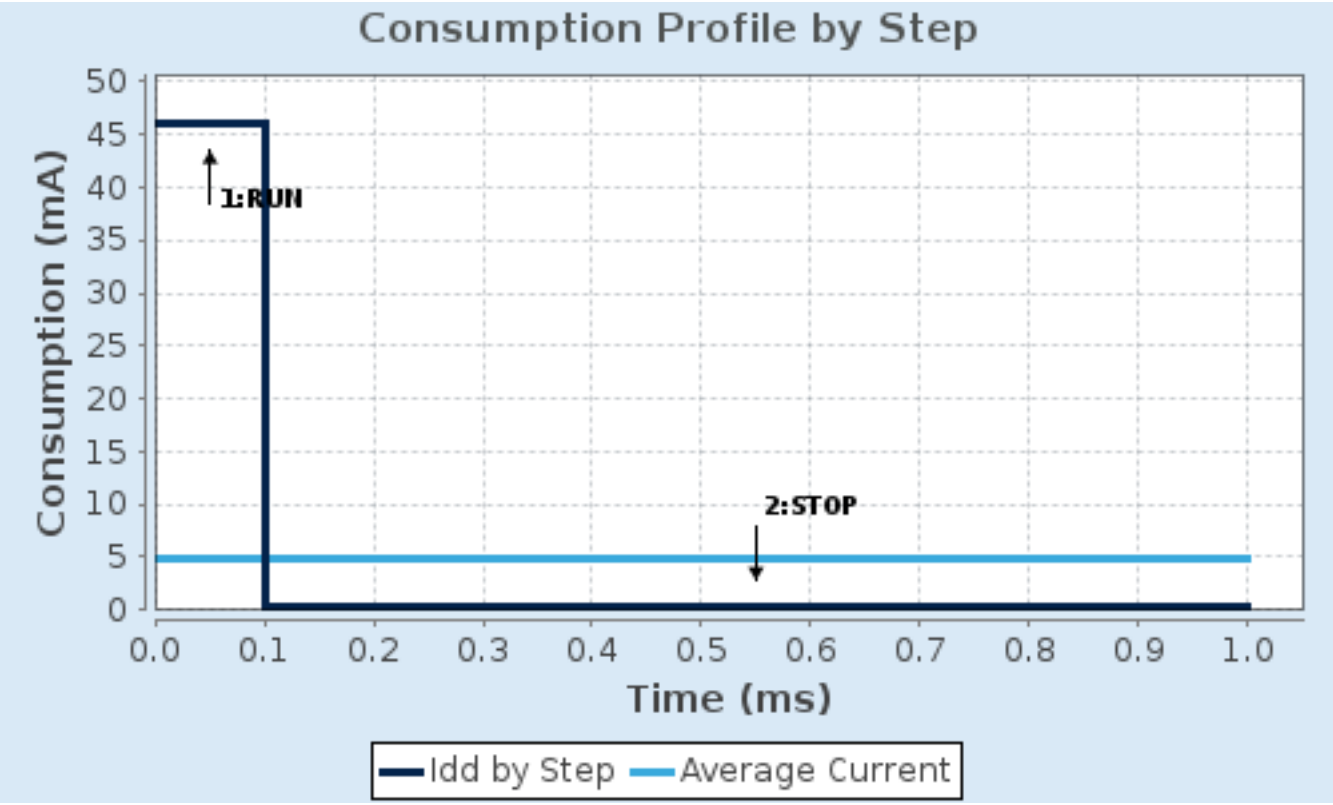
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
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 µA
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

6.5. Results

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

6.6. Chart


Consumption Profile by Step
Consumption (mA)
50
45
40
35
30
25
20
15
10
5
0
1:RUN
2:STOP
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

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

mode: Master Clock Output

7.2.1. Parameter Settings:

Generic Parameters:

Transmission Mode	**Mode Master Receive ***
Communication Standard	I2S Philips
Data and Frame Format	**24 Bits Data on 32 Bits Frame ***
Selected Audio Frequency	**44 KHz ***
Real Audio Frequency	**44.189 KHz ***
Error between Selected and Real	**0.42 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

7.3. I2S3

Mode: Half-Duplex Master

mode: Master Clock Output

7.3.1. Parameter Settings:

Generic Parameters:

Transmission Mode	Mode Master Transmit
Communication Standard	I2S Philips
Data and Frame Format	16 Bits Data on 16 Bits Frame
Selected Audio Frequency	**44 KHz ***
Real Audio Frequency	**44.189 KHz ***
Error between Selected and Real	**0.42 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

7.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	5 WS (6 CPU cycle)

RCC Parameters:

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

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.5. SPI1

Mode: Half-Duplex Master

7.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola

Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**64 ***
Baud Rate	**1.3125 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.6. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.7. USB_OTG_FS

Mode: Host_Only

mode: Activate_VBUS

7.7.1. Parameter Settings:

Speed	Host Full Speed 12MBit/s
Signal start of frame	Disabled

7.8. FATFS

mode: USB Disk

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)	**Disabled ***
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:

USBH:

USBH instance	USB Host MSC FS
Use dma template	Disabled

7.9. USB_HOST

Class for FS IP: Mass Storage Host Class

7.9.1. Parameter Settings:

Host Configuration:

USBH_MAX_NUM_ENDPOINTS (Maximum number of endpoints)	2
USBH_MAX_NUM_INTERFACES (Maximun number of interfaces)	2

USBH_MAX_NUM_SUPPORTED_CLASS (Maximun number of supported class)	1
USBH_MAX_NUM_CONFIGURATION (Maximun number of supported configuration)	1
USBH_KEEP_CFG_DESCRIPTOR (Keep the configuration into RAM)	Enabled
USBH_MAX_SIZE_CONFIGURATION (Maximun size in bytes for the Configuration Descriptor)	256
USBH_MAX_DATA_BUFFER (Maximun size of temporary data)	512
USBH_DEBUG_LEVEL (USBH Debug Level)	0: No debug message

CMSIS_RTOS:

USBH_USE_OS (Enable the support of an RTOS)	Disabled

7.9.2. Platform Settings:

Drive_VBUS_FS	PC0

*** 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	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	
	PB9	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	
I2S2	PB12	I2S2_WS	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
	PB13	I2S2_CK	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
	PB15	I2S2_SD	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
	PC6	I2S2_MCK	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
I2S3	PA4	I2S3_WS	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
	PC7	I2S3_MCK	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
	PC10	I2S3_CK	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
	PC12	I2S3_SD	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
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	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA7	SPI1_MOSI	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	
USB_OTG_FS	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	n/a	
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OtgPower
	PC2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	EncB
	PC3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	EncA
	PA0-WKUP	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Btn0
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	EPD_RST

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	EPD_DC
	PA3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	EPD_BUSY
	PA6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	EPD_CS
	PB11	GPIO_Input	Input mode	**Pull-up ***	n/a	Btn3
	PB14	GPIO_Input	Input mode	**Pull-up ***	n/a	Btn2
	PD8	GPIO_Input	Input mode	**Pull-up ***	n/a	Btn1
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Led1
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Led2
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Led3
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Led4
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	AudioPower

8.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI2_RX	DMA1_Stream3	Peripheral To Memory	Low
SPI3_TX	DMA1_Stream5	Memory To Peripheral	Low

SPI2_RX: DMA1_Stream3 DMA request Settings:

Mode:	**Circular ***
Use fifo:	**Enable ***
FIFO Threshold:	**One Quarter Full ***
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	**Half Word ***
Memory Data Width:	**Word ***
Peripheral Burst Size:	Single
Memory Burst Size:	Single

SPI3_TX: DMA1_Stream5 DMA request Settings:

Mode:	**Circular ***
Use fifo:	**Enable ***
FIFO Threshold:	**One Quarter Full ***
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	**Half Word ***
Memory Data Width:	**Half Word ***
Peripheral Burst Size:	Single
Memory Burst Size:	Single

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
DMA1 stream3 global interrupt	true	0	0
DMA1 stream5 global interrupt	true	0	0
SPI2 global interrupt	true	0	0
SPI3 global interrupt	true	0	0
USB On The Go FS global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		
FPU 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
DMA1 stream3 global interrupt	false	true	true
DMA1 stream5 global interrupt	false	true	true
SPI2 global interrupt	false	true	true

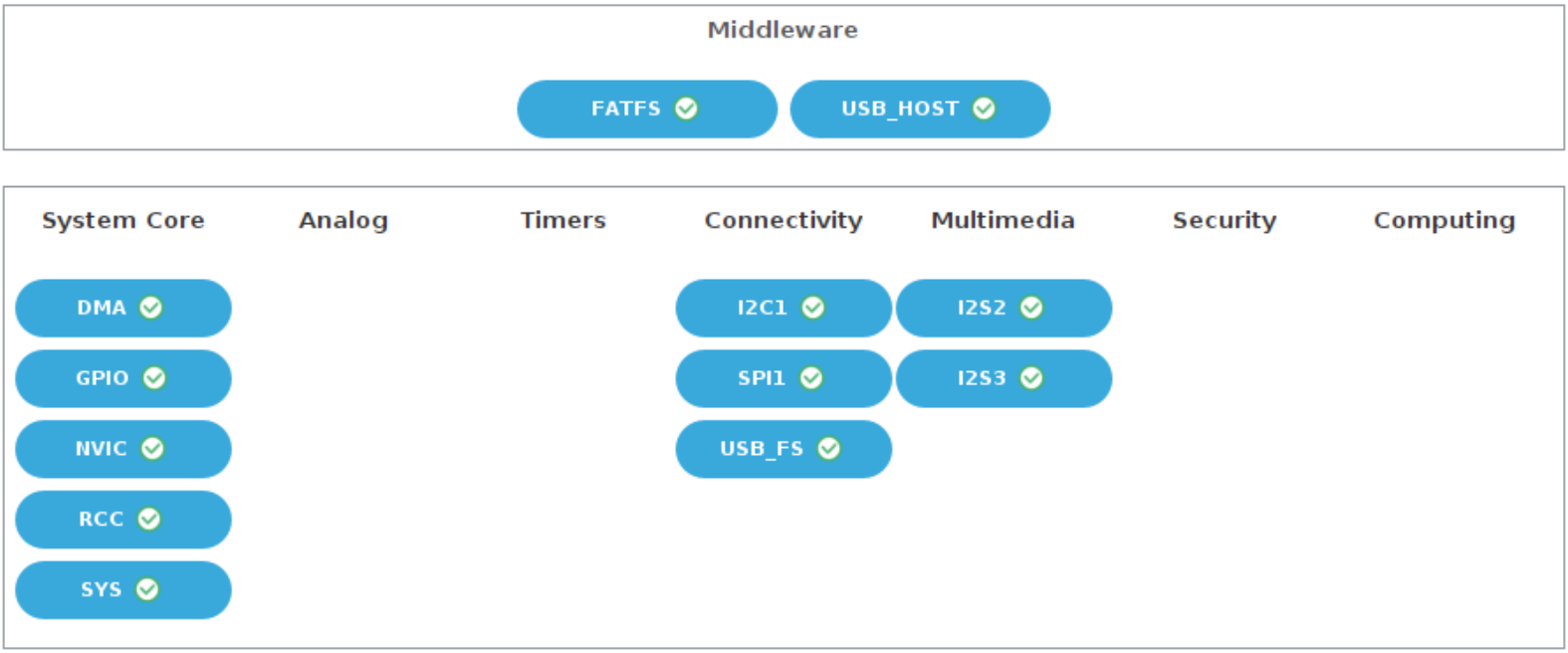
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
SPI3 global interrupt	false	true	true
USB On The Go FS global interrupt	false	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link