
STM32
CubeMX

1. Description

1.1. Project

Project Name	Automatyczna_Sekretarka
Board Name	custom
Generated with:	STM32CubeMX 6.2.1
Date	06/07/2021

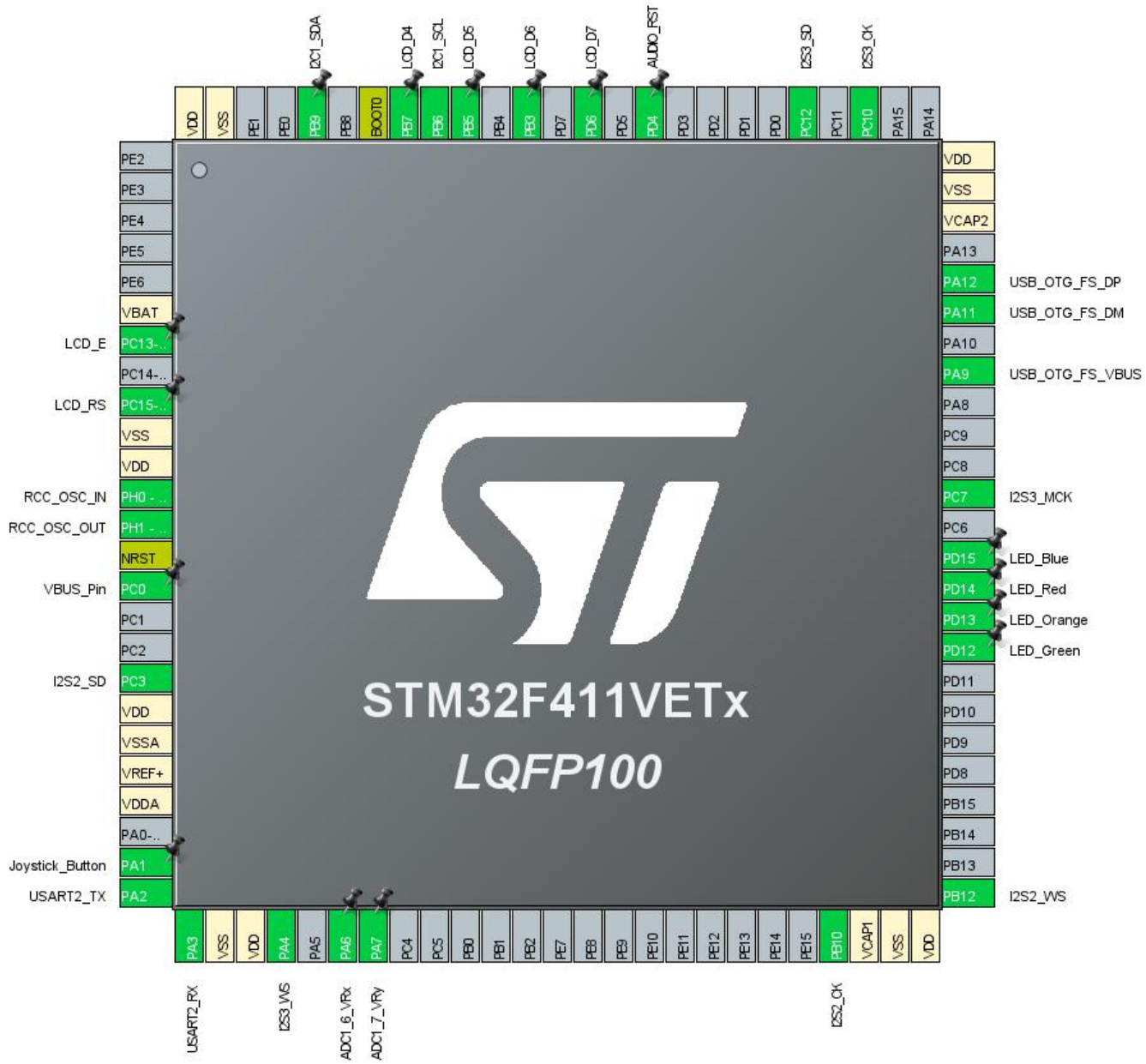
1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F411
MCU name	STM32F411VETx
MCU Package	LQFP100
MCU Pin number	100

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration



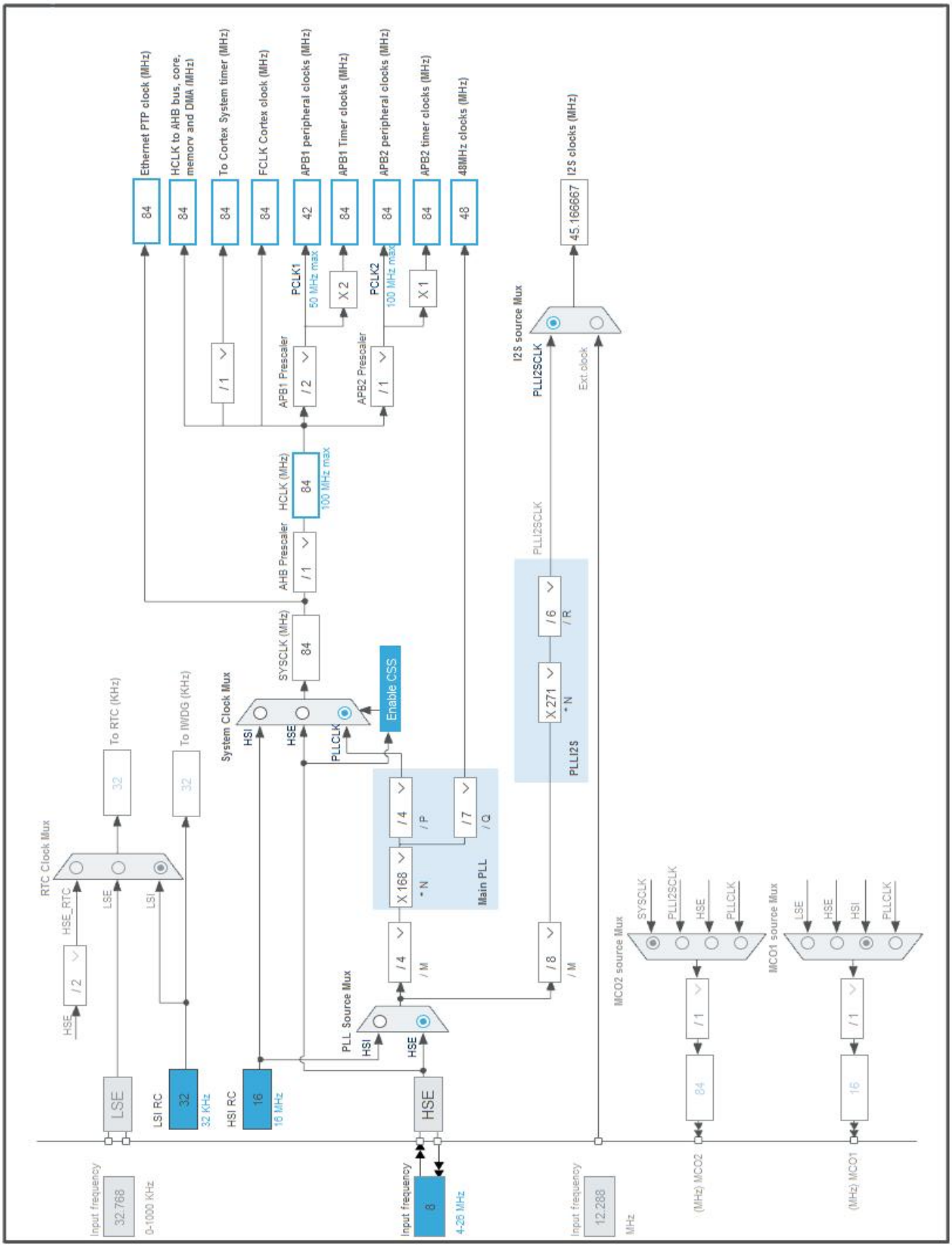
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
7	PC13-ANTI_TAMP *	I/O	GPIO_Output	LCD_E
9	PC15-OSC32_OUT *	I/O	GPIO_Output	LCD_RS
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	VBUS_Pin
18	PC3	I/O	I2S2_SD	
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
24	PA1	I/O	GPIO_EXTI1	Joystick_Button
25	PA2	I/O	USART2_TX	
26	PA3	I/O	USART2_RX	
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	I2S3_WS	
31	PA6	I/O	ADC1_IN6	ADC1_6_VRx
32	PA7	I/O	ADC1_IN7	ADC1_7_VRy
47	PB10	I/O	I2S2_CK	
48	VCAP1	Power		
49	VSS	Power		
50	VDD	Power		
51	PB12	I/O	I2S2_WS	
59	PD12 *	I/O	GPIO_Output	LED_Green
60	PD13 *	I/O	GPIO_Output	LED_Orange
61	PD14 *	I/O	GPIO_Output	LED_Red
62	PD15 *	I/O	GPIO_Output	LED_Blue
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	
73	VCAP2	Power		

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
74	VSS	Power		
75	VDD	Power		
78	PC10	I/O	I2S3_CK	
80	PC12	I/O	I2S3_SD	
85	PD4 *	I/O	GPIO_Output	AUDIO_RST
87	PD6 *	I/O	GPIO_Output	LCD_D7
89	PB3 *	I/O	GPIO_Output	LCD_D6
91	PB5 *	I/O	GPIO_Output	LCD_D5
92	PB6	I/O	I2C1_SCL	
93	PB7 *	I/O	GPIO_Output	LCD_D4
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	Automatyczna_Sekretarka
Project Folder	C:\Users\Admin\STM32CubeIDE\workspace_1.4.0\Automatyczna_Sekretarka\Au
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.26.1
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	MX_GPIO_Init	GPIO
2	MX_DMA_Init	DMA
3	SystemClock_Config	RCC
4	MX_I2S2_Init	I2S2
5	MX_CRC_Init	CRC
6	MX_FATFS_Init	FATFS
7	MX_PDM2PCM_Init	PDM2PCM
8	MX_USB_HOST_Init	USB_HOST
9	MX_USART2_UART_Init	USART2
10	MX_I2C1_Init	I2C1
11	MX_I2S3_Init	I2S3

Rank	Function Name	Peripheral Instance Name
12	MX_ADC1_Init	ADC1

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F411
MCU	STM32F411VETx
Datasheet	DS10314_Rev6

6.2. Parameter Selection

Temperature	25
Vdd	1.7

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

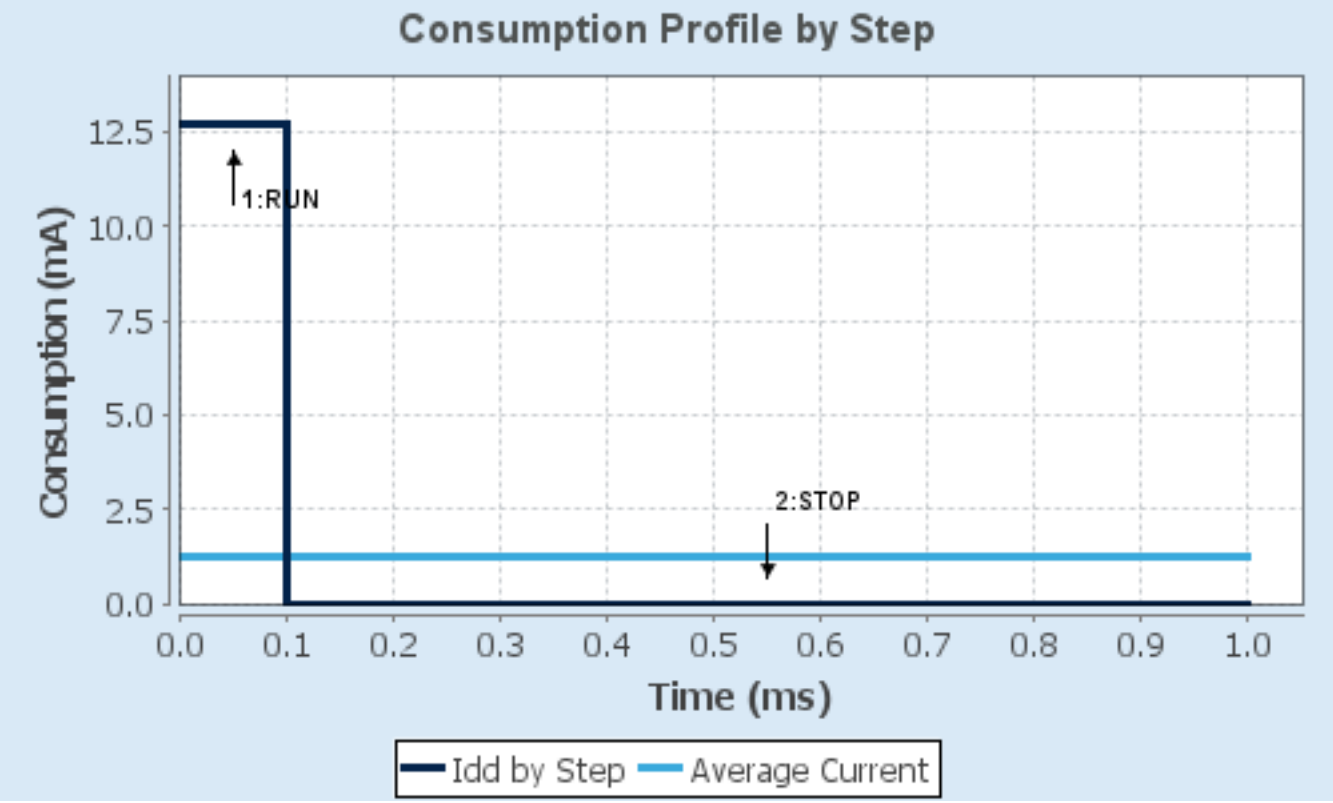
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	1.7	1.7
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	SRAM	n/a
CPU Frequency	100 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LPLV Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	12.7 mA	9 µA
Duration	0.1 ms	0.9 ms
DMIPS	125.0	0.0
Ta Max	104.07	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	1.28 mA
Battery Life	3 months, 19 days, 6 hours	Average DMIPS	125.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
12.5
10.0
7.5
5.0
2.5
0.0
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. ADC1

mode: IN6

mode: IN7

7.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	**PCLK2 divided by 8 ***
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	**Enabled ***
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	**Enabled ***
End Of Conversion Selection	EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion	**2 ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	**Channel 7 ***
Sampling Time	**480 Cycles ***
Rank	**2 ***
Channel	Channel 6
Sampling Time	**480 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

7.2. CRC

mode: Activated

7.3. I2C1

I2C: I2C

7.3.1. 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

7.4. I2S2

Mode: Half-Duplex Slave

7.4.1. Parameter Settings:

Generic Parameters:

Transmission Mode	**Mode Slave Receive ***
Communication Standard	I2S Philips
Data and Frame Format	16 Bits Data on 16 Bits Frame
Selected Audio Frequency	**16 KHz ***
Real Audio Frequency	**16.039 KHz ***
Error between Selected and Real	**0.24 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

7.5. I2S3

Mode: Half-Duplex Master

mode: Master Clock Output

7.5.1. 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	**44.108 KHz ***
Error between Selected and Real	**0.24 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

7.6. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.6.1. Parameter Settings:

System Parameters:

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

RCC Parameters:

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

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.7. SYS

Timebase Source: SysTick

7.8. USART2

Mode: Asynchronous

7.8.1. Parameter Settings:

Basic Parameters:

Baud Rate	**9600 ***

Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

7.9. USB_OTG_FS
Mode: Host_Only
mode: Activate_VBUS

7.9.1. Parameter Settings:

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

7.10. FATFS
mode: USB Disk

7.10.1. 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

7.10.2. Advanced Settings:

USBH:

USBH instance	USB Host MSC FS
Use dma template	Disabled

7.11. PDM2PCM
mode: Enabled

7.11.1. Parameter Settings:

Version:

PDM2PCM version	3.3.0

PDM2PCM:

How many channel do you use ?	1

7.11.2. CHANNEL1:

PDM2PCM_Channel:

Initialisation

bit_order (define the bit order)	PDM_FILTER_BIT_ORDER_LSB
endianness (define the byte order)	PDM_FILTER_ENDIANNESS_BE
high_pass_tap (the high pass filter alpha)	2104533974

in_ptr_channels (the channels number in the input PDM stream)	2
out_ptr_channels (the channels number in the output PCM stream)	2
Initial Configuration	
decimation_factor (the factor to adapt PDM frequency to PCM frequency)	PDM_FILTER_DEC_FACTOR_64
output_samples_number (the number of samples by request)	16
mic_gain (the microphone gain in dB)	0

7.12. USB_HOST

Class for FS IP: Mass Storage Host Class

7.12.1. 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

7.12.2. 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
ADC1	PA6	ADC1_IN6	Analog mode	No pull-up and no pull-down	n/a	ADC1_6_VRx
	PA7	ADC1_IN7	Analog mode	No pull-up and no pull-down	n/a	ADC1_7_VRy
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
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	
I2S3	PA4	I2S3_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC7	I2S3_MCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC10	I2S3_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC12	I2S3_SD	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	
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 ***	
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	**Very High ***	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
GPIO	PC13-ANTI_TAMP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_E
	PC15-OSC32_OUT	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_RS
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	VBUS_Pin
	PA1	GPIO_EXTI1	External Interrupt Mode with Rising edge trigger detection	**Pull-up ***	n/a	Joystick_Button
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Green

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Orange
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Red
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Blue
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	AUDIO_RST
	PD6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_D7
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_D6
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_D5
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_D4

8.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI2_RX	DMA1_Stream3	Peripheral To Memory	**High ***
SPI3_TX	DMA1_Stream5	Memory To Peripheral	**High ***
ADC1	DMA2_Stream0	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 ***

SPI3_TX: DMA1_Stream5 DMA request Settings:

Mode:	**Circular ***
Use fifo:	**Enable ***
FIFO Threshold:	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

ADC1: DMA2_Stream0 DMA request Settings:

Mode:	**Circular ***
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

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	0	0
EXTI line1 interrupt	true	15	0
DMA1 stream3 global interrupt	true	0	0
DMA1 stream5 global interrupt	true	0	0
DMA2 stream0 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		
ADC1 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI2 global interrupt	unused		
USART2 global interrupt	unused		
SPI3 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

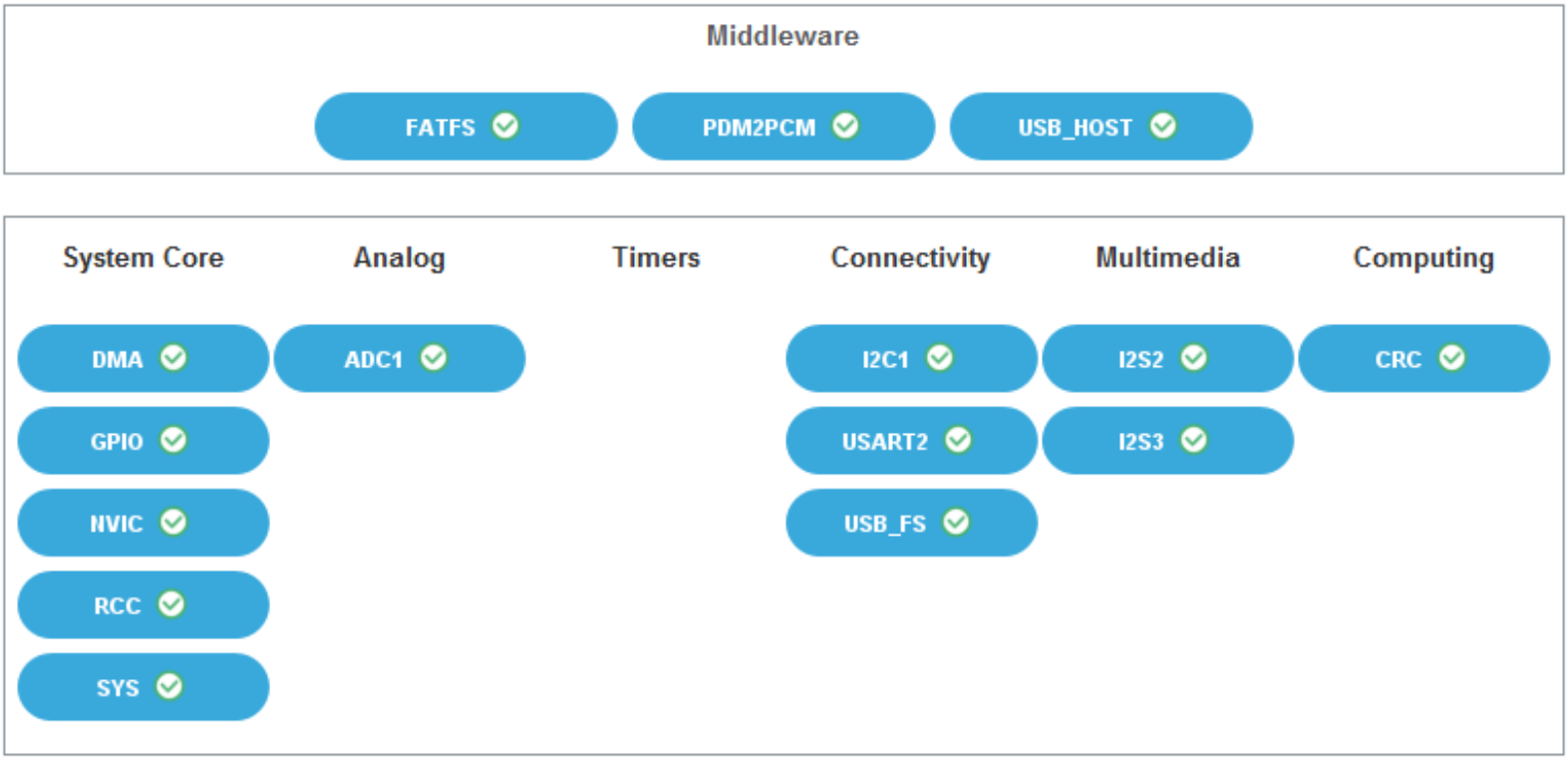
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
EXTI line1 interrupt	false	true	true
DMA1 stream3 global interrupt	false	true	true
DMA1 stream5 global interrupt	false	true	true
DMA2 stream0 global interrupt	false	true	true
USB On The Go FS global interrupt	false	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link
Datasheet	http://www.st.com/resource/en/datasheet/DM00115249.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/DM00119316.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/DM00046982.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/DM00137034.pdf
Application note	http://www.st.com/resource/en/application_note/CD00167594.pdf
Application note	http://www.st.com/resource/en/application_note/CD00211314.pdf
Application note	http://www.st.com/resource/en/application_note/CD00249778.pdf
Application note	http://www.st.com/resource/en/application_note/CD00259245.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00072315.pdf
Application note	http://www.st.com/resource/en/application_note/DM00073742.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00080497.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00226326.pdf
Application note	http://www.st.com/resource/en/application_note/DM00236305.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00296349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00325582.pdf
Application note	http://www.st.com/resource/en/application_note/DM00327191.pdf
Application note	http://www.st.com/resource/en/application_note/DM00354244.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00493651.pdf
Application note	http://www.st.com/resource/en/application_note/DM00536349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00725181.pdf