1. Description

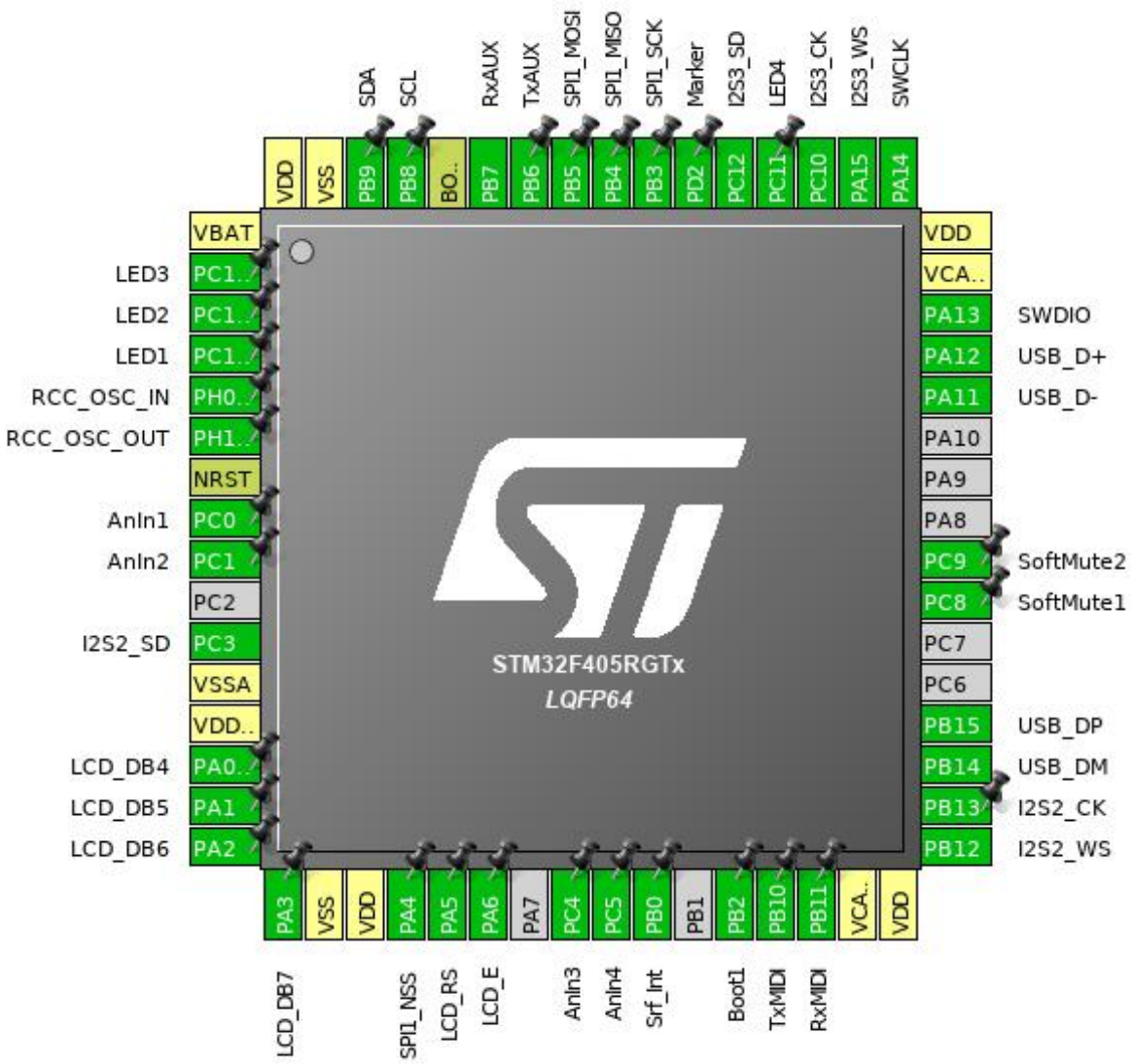
1.1. Project

Project Name	FMSynth_F405
Board Name	FMSynth_F405
Generated with:	STM32CubeMX 4.24.0
Date	02/01/2018

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F405/415
MCU name	STM32F405RGTx
MCU Package	LQFP64
MCU Pin number	64

2. Pinout Configuration



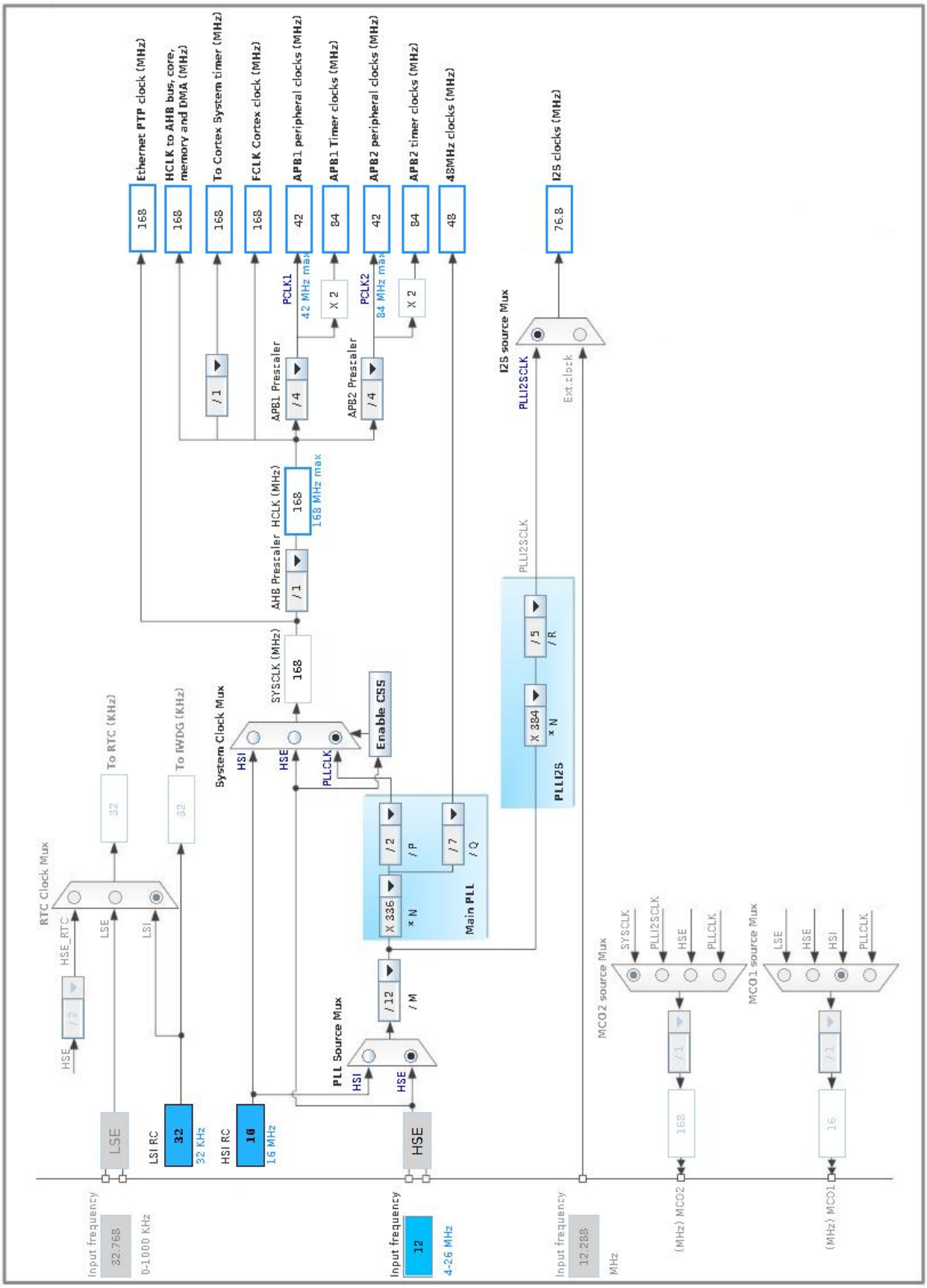
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-ANTI_TAMP *	I/O	GPIO_Output	LED3
3	PC14-OSC32_IN *	I/O	GPIO_Output	LED2
4	PC15-OSC32_OUT *	I/O	GPIO_Output	LED1
5	PH0-OSC_IN	I/O	RCC_OSC_IN	
6	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	PC0	I/O	ADC1_IN10	AnIn1
9	PC1	I/O	ADC1_IN11	AnIn2
11	PC3	I/O	I2S2_SD	
12	VSSA	Power		
13	VDDA	Power		
14	PA0-WKUP *	I/O	GPIO_Output	LCD_DB4
15	PA1 *	I/O	GPIO_Output	LCD_DB5
16	PA2 *	I/O	GPIO_Output	LCD_DB6
17	PA3 *	I/O	GPIO_Output	LCD_DB7
18	VSS	Power		
19	VDD	Power		
20	PA4	I/O	SPI1_NSS	
21	PA5 *	I/O	GPIO_Output	LCD_RS
22	PA6 *	I/O	GPIO_Output	LCD_E
24	PC4	I/O	ADC1_IN14	AnIn3
25	PC5	I/O	ADC1_IN15	AnIn4
26	PB0	I/O	GPIO_EXTI0	Srf_Int
28	PB2 *	I/O	GPIO_Input	Boot1
29	PB10	I/O	USART3_TX	TxMIDI
30	PB11	I/O	USART3_RX	RxMIDI
31	VCAP_1	Power		
32	VDD	Power		
33	PB12	I/O	I2S2_WS	
34	PB13	I/O	I2S2_CK	
35	PB14	I/O	USB_OTG_HS_DM	USB_DM
36	PB15	I/O	USB_OTG_HS_DP	USB_DP
39	PC8 *	I/O	GPIO_Output	SoftMute1
40	PC9 *	I/O	GPIO_Output	SoftMute2
44	PA11	I/O	USB_OTG_FS_DM	USB_D-

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
45	PA12	I/O	USB_OTG_FS_DP	USB_D+
46	PA13	I/O	SYS_JTMS-SWDIO	SWDIO
47	VCAP_2	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	SWCLK
50	PA15	I/O	I2S3_WS	
51	PC10	I/O	I2S3_CK	
52	PC11 *	I/O	GPIO_Output	LED4
53	PC12	I/O	I2S3_SD	
54	PD2 *	I/O	GPIO_Analog	Marker
55	PB3	I/O	SPI1_SCK	
56	PB4	I/O	SPI1_MISO	
57	PB5	I/O	SPI1_MOSI	
58	PB6	I/O	USART1_TX	TxAUX
59	PB7	I/O	USART1_RX	RxAUX
60	BOOT0	Boot		
61	PB8	I/O	I2C1_SCL	SCL
62	PB9	I/O	I2C1_SDA	SDA
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN10

mode: IN11

mode: IN14

mode: IN15

5.1.1. Parameter Settings:

ADCs_Common_Settings:	
Mode	Independent mode
ADC_Settings:	
Clock Prescaler	PCLK2 divided by 2
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	EOC flag at the end of single channel conversion
ADC_Regular_ConversionMode:	
Number Of Conversion	**4 ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 10
Sampling Time	3 Cycles
Rank	**2 ***
Channel	**Channel 11 ***
Sampling Time	3 Cycles
Rank	**3 ***
Channel	**Channel 14 ***
Sampling Time	3 Cycles
Rank	**4 ***
Channel	**Channel 15 ***
Sampling Time	3 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.2. I2C1

I2C: I2C

5.2.1. Parameter Settings:

Master Features:

I2C Speed Mode	**Fast Mode ***
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

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

5.3. I2S2

Mode: Half-Duplex Master

5.3.1. Parameter Settings:

Generic Parameters:

Transmission Mode	Mode Master Transmit
Communication Standard	I2S Philips
Data and Frame Format	**24 Bits Data on 32 Bits Frame ***
Selected Audio Frequency	**48 KHz ***
Real Audio Frequency	**48.0 KHz ***
Error between Selected and Real	**0.0 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

5.4. I2S3

Mode: Half-Duplex Master

5.4.1. Parameter Settings:

Generic Parameters:

Transmission Mode	Mode Master Transmit
Communication Standard	I2S Philips
Data and Frame Format	**24 Bits Data on 32 Bits Frame ***
Selected Audio Frequency	**48 KHz ***
Real Audio Frequency	**48.0 KHz ***
Error between Selected and Real	**0.0 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

5.5. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.5.1. 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 Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.6. SPI1

Mode: Full-Duplex Master

Hardware NSS Signal: Hardware NSS Output Signal

5.6.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**16 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**32 ***
Baud Rate	**1.3125 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Output Hardware

5.7. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.8. USART1

Mode: Asynchronous

5.8.1. Parameter Settings:

Basic Parameters:

Baud Rate	**31250 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit

Over Sampling	16 Samples

5.9. USART3

Mode: Asynchronous

5.9.1. Parameter Settings:

Basic Parameters:

Baud Rate	**31250 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

5.10. USB_OTG_FS

Mode: Device_Only

5.10.1. Parameter Settings:

Speed	Device Full Speed 12MBit/s
Endpoint 0 Max Packet size	64 Bytes
Enable internal IP DMA	Disabled
Low power	Disabled
Link Power Management	Disabled
VBUS sensing	Disabled
Signal start of frame	Disabled

5.11. USB_OTG_HS

Internal FS Phy: Host_Only

5.11.1. Parameter Settings:

Speed	Host Full Speed 12MBit/s
Enable internal IP DMA	Disabled
Physical interface	Internal Phy
Signal start of frame	Disabled

5.12. USB_DEVICE

Class For FS IP: Communication Device Class (Virtual Port Com)

5.12.1. Parameter Settings:

Basic Parameters:

USBD_MAX_NUM_INTERFACES (Maximum number of supported interfaces)	1
USBD_MAX_NUM_CONFIGURATION (Maximum number of supported configuration)	1
USBD_MAX_STR_DESC_SIZ (Maximum size for the string descriptors)	512
USBD_SUPPORT_USER_STRING (Enable user string descriptor)	Disabled
USBD_SELF_POWERED (Enabled self power)	Enabled
USBD_DEBUG_LEVEL (USBD Debug Level)	0: No debug message

Class Parameters:

USB CDC Rx Buffer Size	2048
USB CDC Tx Buffer Size	2048

5.12.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	STMicroelectronics

Device Descriptor FS:

PID (Product IDentifier)	22336
PRODUCT_STRING (Product Identifier)	STM32 Virtual ComPort
SERIALNUMBER_STRING (Serial number)	00000000001A
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

*** User modified value**

6. System Configuration

6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PC0	ADC1_IN10	Analog mode	No pull-up and no pull-down	n/a	AnIn1
	PC1	ADC1_IN11	Analog mode	No pull-up and no pull-down	n/a	AnIn2
	PC4	ADC1_IN14	Analog mode	No pull-up and no pull-down	n/a	AnIn3
	PC5	ADC1_IN15	Analog mode	No pull-up and no pull-down	n/a	AnIn4
I2C1	PB8	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	SCL
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	SDA
I2S2	PC3	I2S2_SD	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	
	PB13	I2S2_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
I2S3	PA15	I2S3_WS	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	
SPI1	PA4	SPI1_NSS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB3	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB4	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB5	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	SWDIO
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	SWCLK
USART1	PB6	USART1_TX	Alternate Function Push Pull	Pull-up	**Very High ***	TxAUX
	PB7	USART1_RX	Alternate Function Push Pull	Pull-up	**Very High**	RxAUX

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
USART3	PB10	USART3_TX	Alternate Function Push Pull	Pull-up	**Very High** *	TxMIDI
	PB11	USART3_RX	Alternate Function Push Pull	Pull-up	**Very High** *	RxMIDI
USB_OTG_FS	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USB_D-
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USB_D+
USB_OTG_HS	PB14	USB_OTG_HS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USB_DM
	PB15	USB_OTG_HS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USB_DP
GPIO	PC13-ANTI_TAMP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED3
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED2
	PC15-OSC32_OUT	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED1
	PA0-WKUP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_DB4
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_DB5
	PA2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_DB6
	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_DB7
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_RS
	PA6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_E
	PB0	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Srf_Int
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Boot1
	PC8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SoftMute1
	PC9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SoftMute2
	PC11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED4
	PD2	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	Marker

6.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI3_TX	DMA1_Stream5	Memory To Peripheral	Low
SPI2_TX	DMA1_Stream4	Memory To Peripheral	Low
SPI1_RX	DMA2_Stream0	Peripheral To Memory	Low
SPI1_TX	DMA2_Stream3	Memory To Peripheral	Low

SPI3_TX: DMA1_Stream5 DMA request Settings:

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

SPI2_TX: DMA1_Stream4 DMA request Settings:

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

SPI1_RX: DMA2_Stream0 DMA request Settings:

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

SPI1_TX: DMA2_Stream3 DMA request Settings:

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

6.3. NVIC configuration

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	5	0
EXTI line0 interrupt	true	3	0
DMA1 stream4 global interrupt	true	1	0
DMA1 stream5 global interrupt	true	1	0
ADC1, ADC2 and ADC3 global interrupts	true	6	0
SPI1 global interrupt	true	4	0
USART1 global interrupt	true	7	0
USART3 global interrupt	true	7	0
DMA2 stream0 global interrupt	true	2	0
DMA2 stream3 global interrupt	true	2	0
USB On The Go FS global interrupt	true	1	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		
SPI3 global interrupt	unused		
USB On The Go HS End Point 1 Out global interrupt	unused		
USB On The Go HS End Point 1 In global interrupt	unused		
USB On The Go HS global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F405/415
MCU	STM32F405RGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Pack Report

9. Software Project

9.1. Project Settings

Name	Value
Project Name	FMSynth_F405
Project Folder	/home/emil/Projects/OrCAD/Files/E37-PreenFM2/ARM/FMSynth_F405
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F4 V1.19.0

9.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	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
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	Yes