1. Description

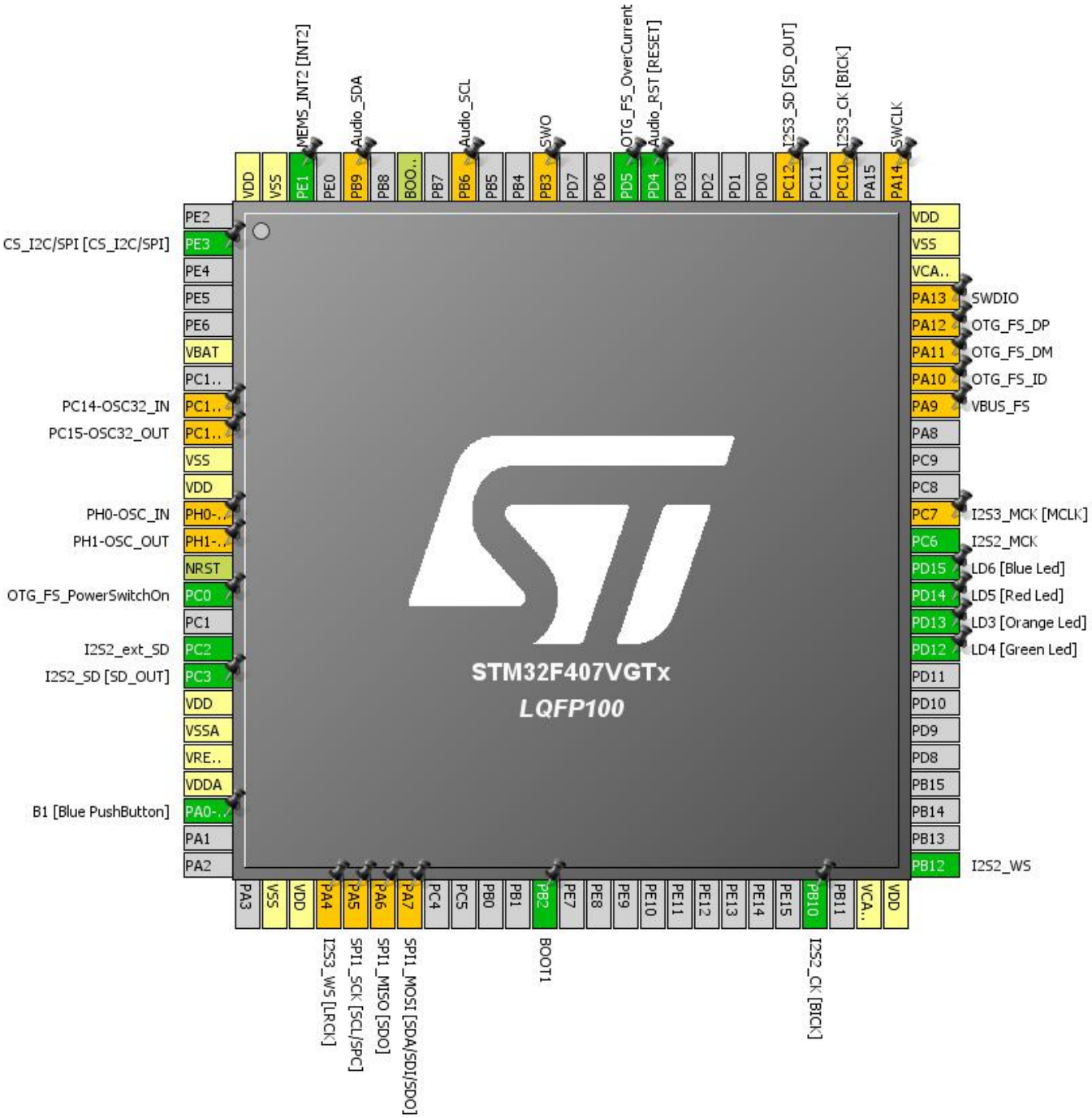
1.1. Project

Project Name	FM_transmitter
Board Name	STM32F4DISCOVERY
Generated with:	STM32CubeMX 4.16.0
Date	10/13/2016

1.2. MCU

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

2. Pinout Configuration



3. Pins Configuration

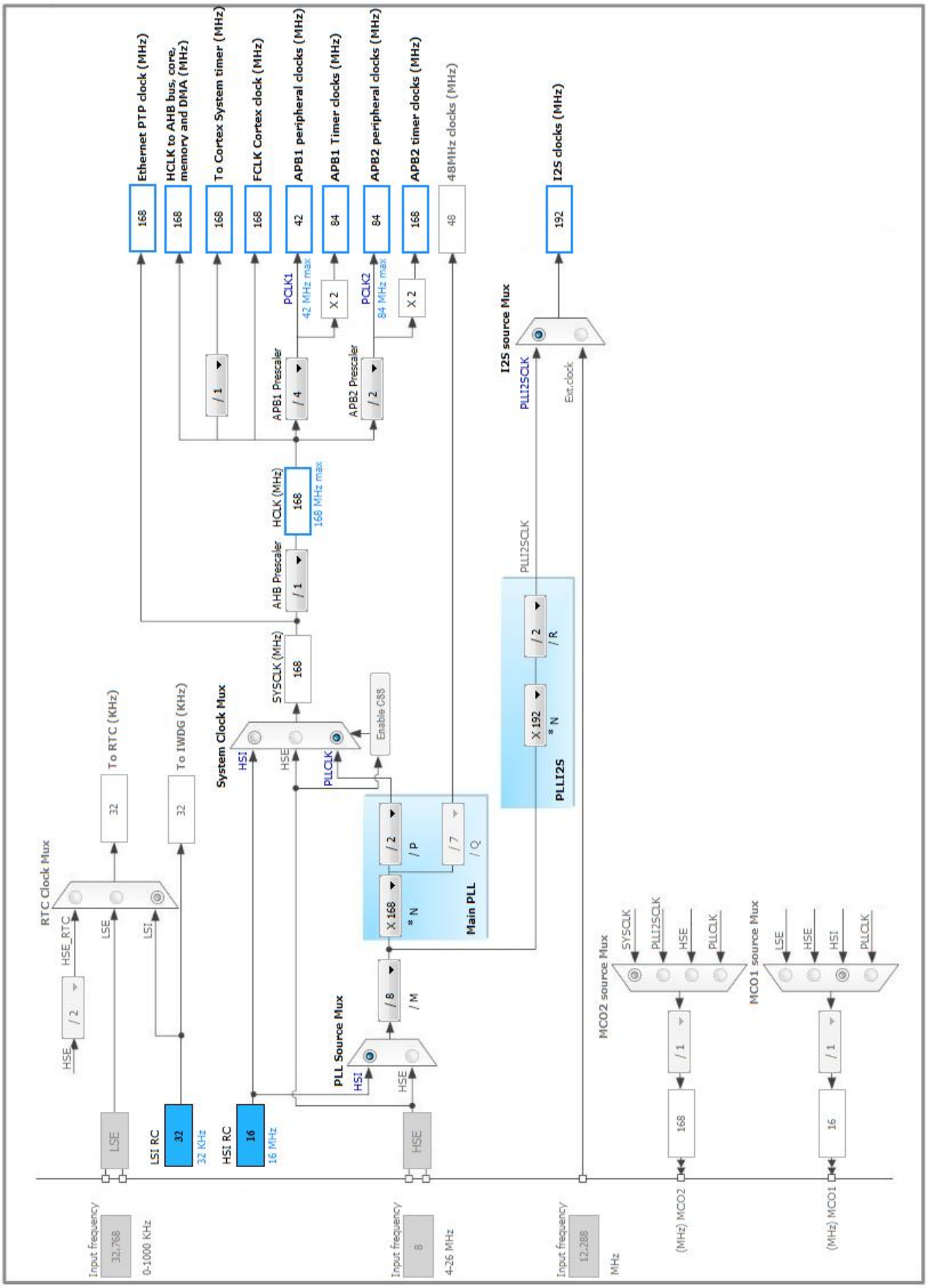
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
2	PE3 *	I/O	GPIO_Output	CS_I2C/SPI [CS_I2C/SPI]
6	VBAT	Power		
8	PC14-OSC32_IN **	I/O	RCC_OSC32_IN	PC14-OSC32_IN
9	PC15-OSC32_OUT **	I/O	RCC_OSC32_OUT	PC15-OSC32_OUT
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN **	I/O	RCC_OSC_IN	PH0-OSC_IN
13	PH1-OSC_OUT **	I/O	RCC_OSC_OUT	PH1-OSC_OUT
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Output	OTG_FS_PowerSwitchOn
17	PC2	I/O	I2S2_ext_SD	
18	PC3	I/O	I2S2_SD	I2S2_SD [SD_OUT]
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		
29	PA4 **	I/O	I2S3_WS	I2S3_WS [LRCK]
30	PA5 **	I/O	SPI1_SCK	SPI1_SCK [SCL/SPC]
31	PA6 **	I/O	SPI1_MISO	SPI1_MISO [SDO]
32	PA7 **	I/O	SPI1_MOSI	SPI1_MOSI [SDA/SDI/SDO]
37	PB2 *	I/O	GPIO_Input	BOOT1
47	PB10	I/O	I2S2_CK	I2S2_CK [BICK]
49	VCAP_1	Power		
50	VDD	Power		
51	PB12	I/O	I2S2_WS	
59	PD12 *	I/O	GPIO_Output	LD4 [Green Led]
60	PD13 *	I/O	GPIO_Output	LD3 [Orange Led]
61	PD14 *	I/O	GPIO_Output	LD5 [Red Led]
62	PD15 *	I/O	GPIO_Output	LD6 [Blue Led]
63	PC6	I/O	I2S2_MCK	
64	PC7 **	I/O	I2S3_MCK	I2S3_MCK [MCLK]
68	PA9 **	I/O	USB_OTG_FS_VBUS	VBUS_FS
69	PA10 **	I/O	USB_OTG_FS_ID	OTG_FS_ID

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
70	PA11 **	I/O	USB_OTG_FS_DM	OTG_FS_DM
71	PA12 **	I/O	USB_OTG_FS_DP	OTG_FS_DP
72	PA13 **	I/O	SYS_JTMS-SWDIO	SWDIO
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14 **	I/O	SYS_JTCK-SWCLK	SWCLK
78	PC10 **	I/O	I2S3_CK	I2S3_CK [BICK]
80	PC12 **	I/O	I2S3_SD	I2S3_SD [SD_OUT]
85	PD4 *	I/O	GPIO_Output	Audio_RST [RESET]
86	PD5 *	I/O	GPIO_Input	OTG_FS_OverCurrent
89	PB3 **	I/O	SYS_JTDO-SWO	SWO
92	PB6 **	I/O	I2C1_SCL	Audio_SCL
94	BOOT0	Boot		
96	PB9 **	I/O	I2C1_SDA	Audio_SDA
98	PE1	I/O	GPIO_EXTI1	MEMS_INT2 [INT2]
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

** The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. I2S2

Mode: Full-Duplex Master

mode: Master Clock Output

5.1.1. 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	192 KHz
Real Audio Frequency	**187.5 KHz ***
Error between Selected and Real	**-2.34 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

5.2. SYS

Timebase Source: SysTick

*** User modified value**

6. System Configuration

6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2S2	PC2	I2S2_ext_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC3	I2S2_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	I2S2_SD [SD_OUT]
	PB10	I2S2_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	I2S2_CK [BICK]
	PB12	I2S2_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC6	I2S2_MCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
Single Mapped Signals	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	PC14-OSC32_IN
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	PC15-OSC32_OUT
	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	PH0-OSC_IN
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	PH1-OSC_OUT
	PA4	I2S3_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	I2S3_WS [LRCK]
	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	SPI1_SCK [SCL/SPC]
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Low	SPI1_MISO [SDO]
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Low	SPI1_MOSI [SDA/SDI/SDO]
	PC7	I2S3_MCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	I2S3_MCK [MCLK]
	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	n/a	VBUS_FS
	PA10	USB_OTG_FS_ID	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_FS_ID
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_FS_DM
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_FS_DP
	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	SWDIO
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	SWCLK
	PC10	I2S3_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	I2S3_CK [BICK]
	PC12	I2S3_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	I2S3_SD [SD_OUT]
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	SWO
	PB6	I2C1_SCL	Alternate Function Open	Pull-up	Low	Audio_SCL

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
			Drain			
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	Low	Audio_SDA
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CS_I2C/SPI [CS_I2C/SPI]
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OTG_FS_PowerSwitchOn
	PA0-WKUP	GPIO_EXTI0	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	B1 [Blue PushButton]
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOOT1
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD4 [Green Led]
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Orange Led]
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD5 [Red Led]
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD6 [Blue Led]
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Audio_RST [RESET]
	PD5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	OTG_FS_OverCurrent
	PE1	GPIO_EXTI1	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	MEMS_INT2 [INT2]

6.2. DMA configuration

nothing configured in DMA service

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	0	0
SPI2 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev7

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	FM_transmitter
Project Folder	C:\Users\Agustin\Documents\Workspace_STM\FM_transmitter
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F4 V1.13.0

8.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	Copy all used libraries into the project folder
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)	No