1. Description

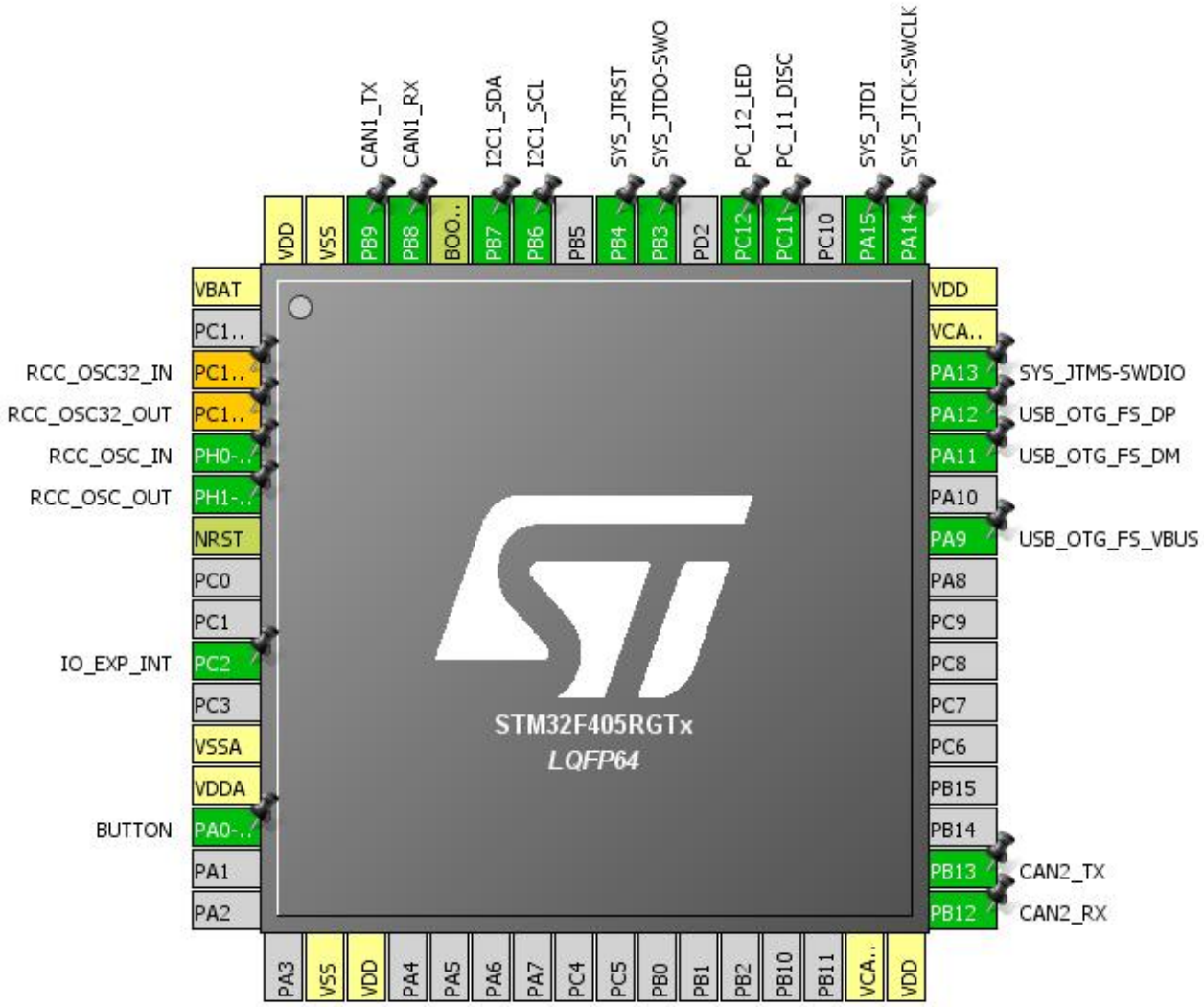
1.1. Project

Project Name	F4_BSP
Board Name	F4_BSP
Generated with:	STM32CubeMX 4.23.0
Date	03/22/2018

1.2. MCU

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

2. Pinout Configuration

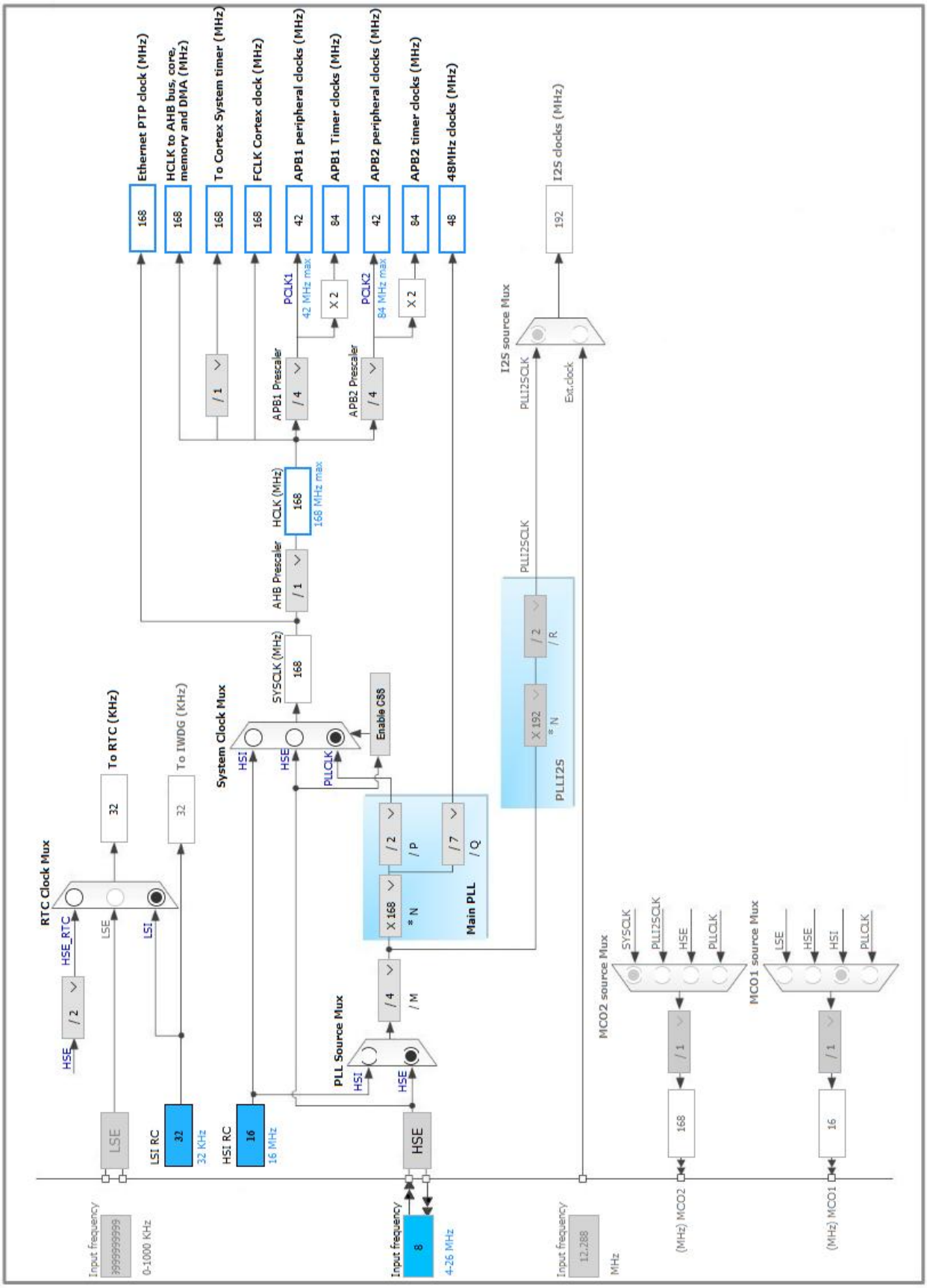


3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
3	PC14-OSC32_IN *	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT *	I/O	RCC_OSC32_OUT	
5	PH0-OSC_IN	I/O	RCC_OSC_IN	
6	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
10	PC2	I/O	GPIO_EXTI2	IO_EXP_INT
12	VSSA	Power		
13	VDDA	Power		
14	PA0-WKUP	I/O	GPIO_EXTI0	BUTTON
18	VSS	Power		
19	VDD	Power		
31	VCAP_1	Power		
32	VDD	Power		
33	PB12	I/O	CAN2_RX	CAN2_RX
34	PB13	I/O	CAN2_TX	CAN2_TX
42	PA9	I/O	USB_OTG_FS_VBUS	
44	PA11	I/O	USB_OTG_FS_DM	
45	PA12	I/O	USB_OTG_FS_DP	
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VCAP_2	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	
50	PA15	I/O	SYS_JTDI	
52	PC11 **	I/O	GPIO_Output	PC_11_DISC
53	PC12 **	I/O	GPIO_Output	PC_12_LED
55	PB3	I/O	SYS_JTDO-SWO	
56	PB4	I/O	SYS_JTRST	
58	PB6	I/O	I2C1_SCL	I2C1_SCL
59	PB7	I/O	I2C1_SDA	I2C1_SDA
60	BOOT0	Boot		
61	PB8	I/O	CAN1_RX	CAN1_RX
62	PB9	I/O	CAN1_TX	CAN1_TX
63	VSS	Power		
64	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. CAN1

mode: Mode

5.1.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum)	**32 ***
Time Quantum	**761.9047619047619 ***
Time Quanta in Bit Segment 1	**3 Times ***
Time Quanta in Bit Segment 2	**5 Times ***
Time for one Bit	**6857 ***
ReSynchronization Jump Width	1 Time

Basic Parameters:

Time Triggered Communication Mode	Disable
Automatic Bus-Off Management	Disable
Automatic Wake-Up Mode	Disable
No-Automatic Retransmission	Disable
Receive Fifo Locked Mode	Disable
Transmit Fifo Priority	Disable

Advanced Parameters:

Operating Mode	Normal

5.2. CAN2

mode: Mode

5.2.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum)	**32 ***
Time Quantum	**761.9047619047619 ***
Time Quanta in Bit Segment 1	**3 Times ***
Time Quanta in Bit Segment 2	**5 Times ***
Time for one Bit	**6857 ***

ReSynchronization Jump Width	1 Time

Basic Parameters:

Time Triggered Communication Mode	Disable
Automatic Bus-Off Management	Disable
Automatic Wake-Up Mode	Disable
No-Automatic Retransmission	Disable
Receive Fifo Locked Mode	Disable
Transmit Fifo Priority	Disable

Advanced Parameters:

Operating Mode	Normal

5.3. I2C1

I2C: I2C

5.3.1. 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

5.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.4.1. 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 Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.5. RTC

mode: Activate Clock Source

5.5.1. Parameter Settings:

General:

Hour Format	Hourformat 24
Asynchronous Predivider value	127
Synchronous Predivider value	255

5.6. SYS

Debug: JTAG (5 pins)

Timebase Source: SysTick

5.7. TIM2

Clock Source : Internal Clock

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**42000 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**9999 ***
Internal Clock Division (CKD)	No Division

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.8. TIM3

Clock Source : Internal Clock

5.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**42000 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**9999 ***
Internal Clock Division (CKD)	No Division

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.9. USB_OTG_FS

Mode: Device_Only

mode: Activate_VBUS

5.9.1. 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	Enabled
Signal start of frame	Disabled

5.10. USB_DEVICE

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

5.10.1. 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	**64 ***
USB CDC Tx Buffer Size	**64 ***

5.10.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	**Italian (Standard) ***
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
CAN1	PB8	CAN1_RX	Alternate Function Push Pull	**Pull-up ***	**Very High ***	CAN1_RX
	PB9	CAN1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	CAN1_TX
CAN2	PB12	CAN2_RX	Alternate Function Push Pull	**Pull-up ***	**Very High ***	CAN2_RX
	PB13	CAN2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	CAN2_TX
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	I2C1_SCL
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	I2C1_SDA
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	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
	PA15	SYS_JTDI	n/a	n/a	n/a	
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	
	PB4	SYS_JTRST	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	**Very High ***	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
Single Mapped Signals	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	T					
GPIO	PC2	GPIO_EXTI2	External Interrupt Mode with Rising edge trigger detection	**Pull-up ***	n/a	IO_EXP_INT
	PA0-WKUP	GPIO_EXTI0	**External Interrupt Mode with Rising/Falling edge**	No pull-up and no pull-down	n/a	BUTTON
	PC11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PC_11_DISC
	PC12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PC_12_LED

6.2. DMA configuration

DMA request	Stream	Direction	Priority
I2C1_TX	DMA1_Stream6	Memory To Peripheral	Low
I2C1_RX	DMA1_Stream5	Peripheral To Memory	Low

I2C1_TX: DMA1_Stream6 DMA request Settings:

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

I2C1_RX: DMA1_Stream5 DMA request Settings:

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

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
RCC global interrupt	true	0	0
EXTI line0 interrupt	true	4	0
EXTI line2 interrupt	true	2	0
DMA1 stream5 global interrupt	true	0	0
DMA1 stream6 global interrupt	true	0	0
CAN1 RX0 interrupts	true	0	0
TIM2 global interrupt	true	3	0
TIM3 global interrupt	true	5	0
I2C1 event interrupt	true	0	0
CAN2 RX0 interrupts	true	0	0
USB On The Go FS global interrupt	true	1	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
CAN1 TX interrupts	unused		
CAN1 RX1 interrupt	unused		
CAN1 SCE interrupt	unused		
I2C1 error interrupt	unused		
CAN2 TX interrupts	unused		
CAN2 RX1 interrupt	unused		
CAN2 SCE 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 Project

8.1. Project Settings

Name	Value
Project Name	F4_BSP
Project Folder	C:\Users\Fabio\Documents\Develop\SRM32\workspace\F4_BSP
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_F4 V1.18.0

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	Yes
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