

## 1. Description

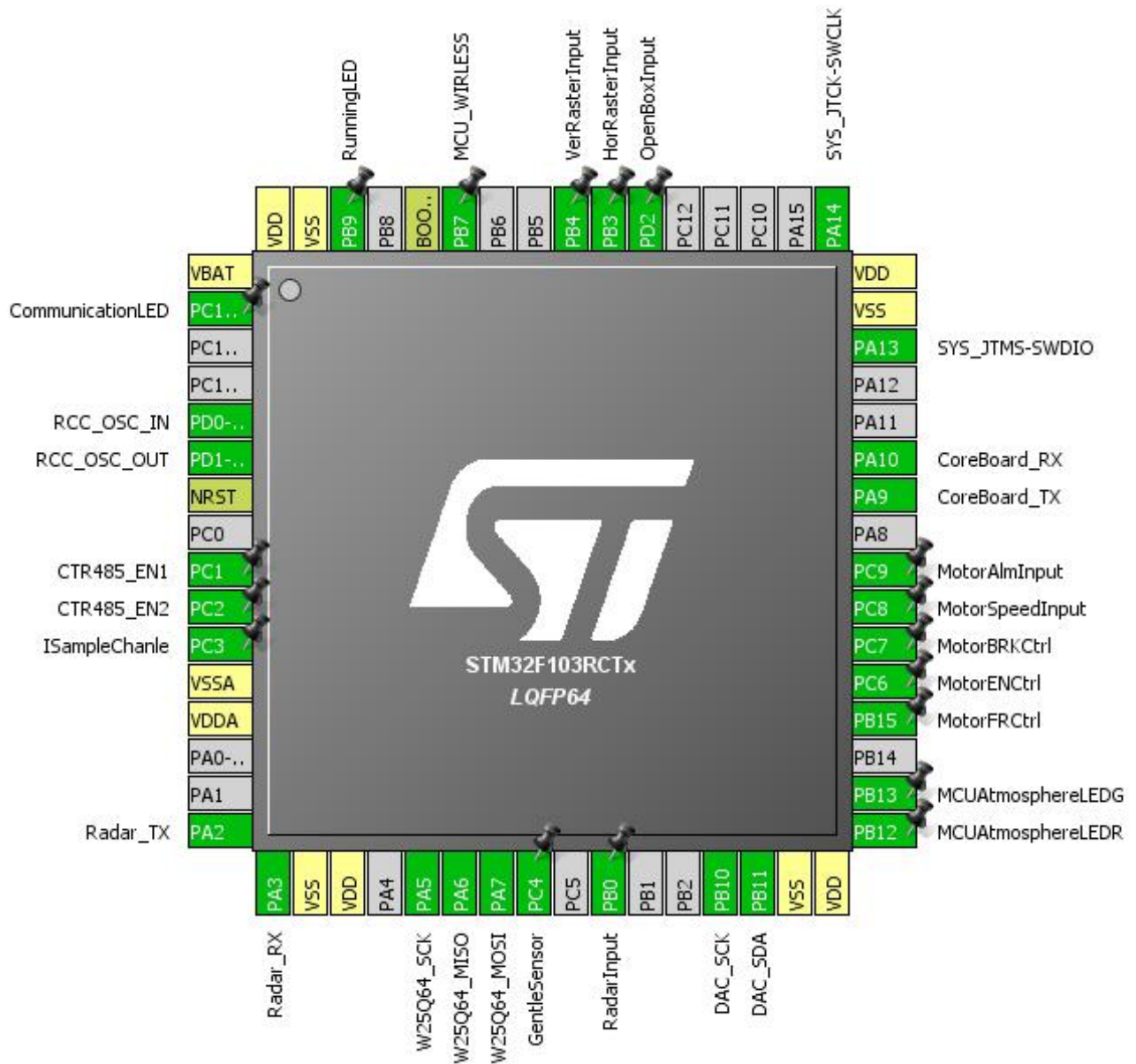
### 1.1. Project

Project Name	BSPv1
Board Name	BSPv1.4
Generated with:	STM32CubeMX 4.23.0
Date	01/04/2018

### 1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103RCTx
MCU Package	LQFP64
MCU Pin number	64

## 2. Pinout Configuration



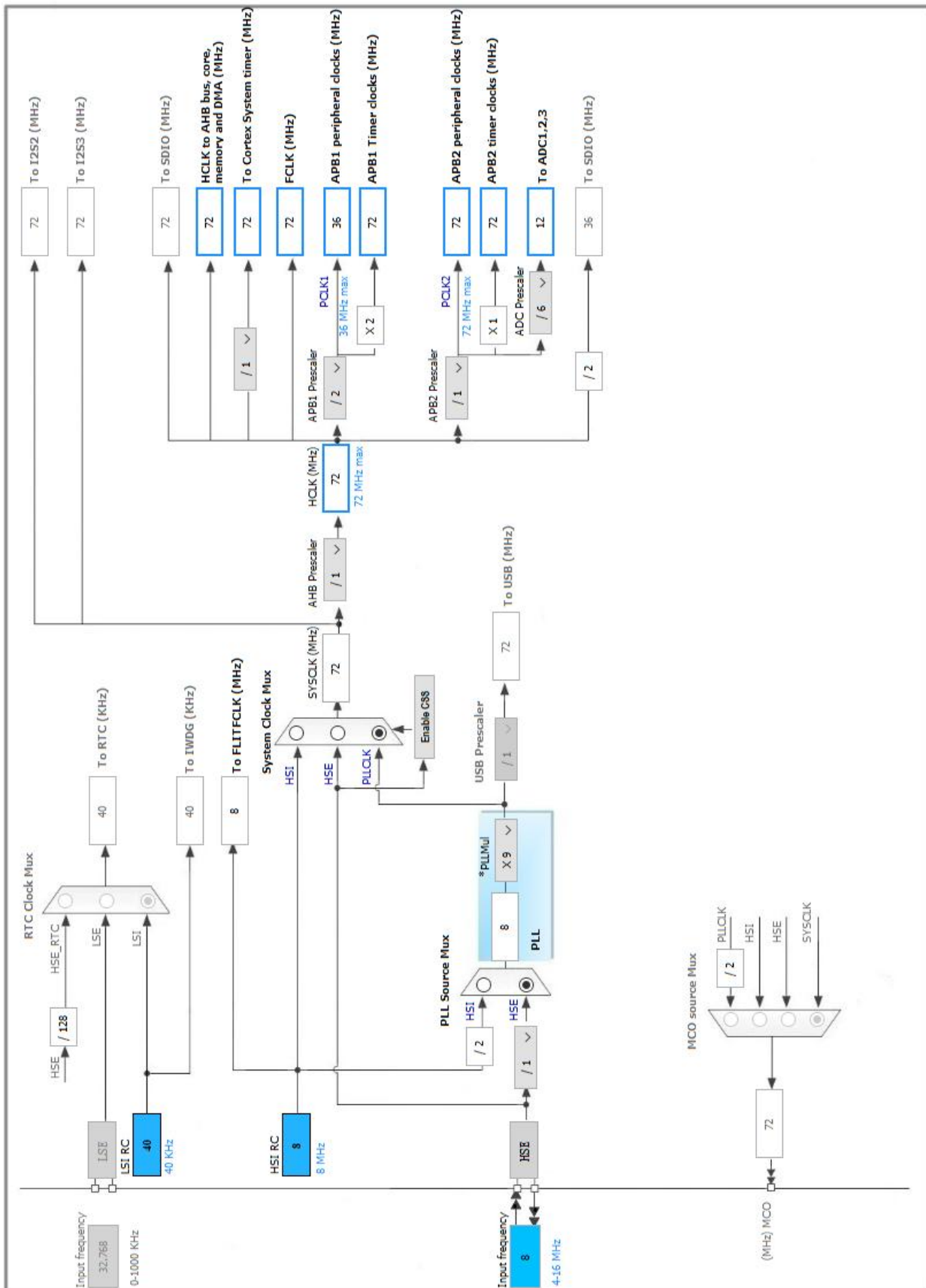
### 3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-TAMPER-RTC *	I/O	GPIO_Output	CommunicationLED
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
9	PC1 *	I/O	GPIO_Output	CTR485_EN1
10	PC2 *	I/O	GPIO_Output	CTR485_EN2
11	PC3	I/O	ADC1_IN13	ISampleChanle
12	VSSA	Power		
13	VDDA	Power		
16	PA2	I/O	USART2_TX	Radar_TX
17	PA3	I/O	USART2_RX	Radar_RX
18	VSS	Power		
19	VDD	Power		
21	PA5	I/O	SPI1_SCK	W25Q64_SCK
22	PA6	I/O	SPI1_MISO	W25Q64_MISO
23	PA7	I/O	SPI1_MOSI	W25Q64_MOSI
24	PC4 *	I/O	GPIO_Input	GentleSensor
26	PB0 *	I/O	GPIO_Input	RadarInput
29	PB10	I/O	I2C2_SCL	DAC_SCK
30	PB11	I/O	I2C2_SDA	DAC_SDA
31	VSS	Power		
32	VDD	Power		
33	PB12 *	I/O	GPIO_Output	MCUAtmosphereLEDR
34	PB13 *	I/O	GPIO_Output	MCUAtmosphereLEDG
36	PB15 *	I/O	GPIO_Output	MotorFRCtrl
37	PC6 *	I/O	GPIO_Output	MotorENCtrl
38	PC7 *	I/O	GPIO_Output	MotorBRKCtrl
39	PC8 *	I/O	GPIO_Input	MotorSpeedInput
40	PC9 *	I/O	GPIO_Input	MotorAlmInput
42	PA9	I/O	USART1_TX	CoreBoard_TX
43	PA10	I/O	USART1_RX	CoreBoard_RX
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VSS	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
54	PD2 *	I/O	GPIO_Input	OpenBoxInput
55	PB3 *	I/O	GPIO_Input	HorRasterInput
56	PB4 *	I/O	GPIO_Input	VerRasterInput
59	PB7 *	I/O	GPIO_Input	MCU_WIRELESS
60	BOOT0	Boot		
62	PB9 *	I/O	GPIO_Output	RunningLED
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: IN13

mode: Temperature Sensor Channel

#### 5.1.1. Parameter Settings:

##### ADCs\_Common\_Settings:

Mode Independent mode

##### ADC\_Settings:

Data Alignment Right alignment

Scan Conversion Mode Enabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode Disabled

##### ADC\_Regular\_ConversionMode:

Enable Regular Conversions Enable

Number Of Conversion **2 \***

External Trigger Conversion Source Regular Conversion launched by software

Rank 1

Channel Channel 13

Sampling Time **239.5 Cycles \***

Rank **2 \***

Channel **Channel Temperature Sensor \***

Sampling Time **239.5 Cycles \***

##### ADC\_Injected\_ConversionMode:

Number Of Conversions 0

##### WatchDog:

Enable Analog WatchDog Mode false

### 5.2. I2C2

I2C: I2C

#### 5.2.1. 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

## 5.3. RCC

### High Speed Clock (HSE): Crystal/Ceramic Resonator

#### 5.3.1. Parameter Settings:

**System Parameters:**

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

**RCC Parameters:**

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

## 5.4. SPI1

### Mode: Full-Duplex Master

#### 5.4.1. Parameter Settings:

**Basic Parameters:**

Frame Format	Motorola
Data Size	<b>16 Bits *</b>
First Bit	MSB First

**Clock Parameters:**

Prescaler (for Baud Rate)	<b>4 *</b>
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Baud Rate	<b>18.0 MBits/s *</b>
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge
<b>Advanced Parameters:</b>	
CRC Calculation	Disabled
NSS Signal Type	Software

## 5.5. SYS

**Debug: Serial Wire**

**Timebase Source: SysTick**

## 5.6. TIM4

**mode: Clock Source**

### 5.6.1. Parameter Settings:

#### Counter Settings:

Prescaler (PSC - 16 bits value)	<b>72 - 1 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>100-1 *</b>
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

#### 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)

## 5.7. TIM5

**mode: Clock Source**

### 5.7.1. Parameter Settings:

#### Counter Settings:

Prescaler (PSC - 16 bits value)	<b>72 - 1 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>1000-1 *</b>



Internal Clock Division (CKD)

No Division

auto-reload preload

Disable

**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. USART1

**Mode: Asynchronous**

### 5.8.1. Parameter Settings:

**Basic Parameters:**

Baud Rate

115200

Word Length

8 Bits (including Parity)

Parity

None

Stop Bits

1

**Advanced Parameters:**

Data Direction

Receive and Transmit

Over Sampling

16 Samples

## 5.9. USART2

**Mode: Asynchronous**

### 5.9.1. Parameter Settings:

**Basic Parameters:**

Baud Rate

115200

Word Length

8 Bits (including Parity)

Parity

None

Stop Bits

1

**Advanced Parameters:**

Data Direction

Receive and Transmit

Over Sampling

16 Samples

**\* 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	PC3	ADC1_IN13	Analog mode	n/a	n/a	ISampleChanle
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	n/a	High *	DAC_SCK
	PB11	I2C2_SDA	Alternate Function Open Drain	n/a	High *	DAC_SDA
RCC	PD0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	n/a	High *	W25Q64_SCK
	PA6	SPI1_MISO	Input mode	No pull-up and no pull-down	n/a	W25Q64_MISO
	PA7	SPI1_MOSI	Alternate Function Push Pull	n/a	High *	W25Q64_MOSI
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	High *	CoreBoard_TX
	PA10	USART1_RX	Input mode	Pull-up *	n/a	CoreBoard_RX
USART2	PA2	USART2_TX	Alternate Function Push Pull	n/a	High *	Radar_TX
	PA3	USART2_RX	Input mode	Pull-up *	n/a	Radar_RX
GPIO	PC13-TAMPER-RTC	GPIO_Output	Output Push Pull	n/a	Low	CommunicationLED
	PC1	GPIO_Output	Output Push Pull	n/a	Low	CTR485_EN1
	PC2	GPIO_Output	Output Push Pull	n/a	Low	CTR485_EN2
	PC4	GPIO_Input	Input mode	Pull-up *	n/a	GentleSensor
	PB0	GPIO_Input	Input mode	Pull-up *	n/a	RadarInput
	PB12	GPIO_Output	Output Push Pull	n/a	Low	MCUAtmosphereLEDR
	PB13	GPIO_Output	Output Push Pull	n/a	Low	MCUAtmosphereLEDG
	PB15	GPIO_Output	Output Push Pull	n/a	Low	MotorFRCtrl
	PC6	GPIO_Output	Output Push Pull	n/a	Low	MotorENCtrl
	PC7	GPIO_Output	Output Push Pull	n/a	Low	MotorBRKCtrl
	PC8	GPIO_Input	Input mode	Pull-up *	n/a	MotorSpeedInput

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC9	GPIO_Input	Input mode	<b>Pull-down *</b>	n/a	MotorAlmInput
	PD2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	OpenBoxInput
	PB3	GPIO_Input	Input mode	<b>Pull-up *</b>	n/a	HorRasterInput
	PB4	GPIO_Input	Input mode	<b>Pull-down *</b>	n/a	VerRasterInput
	PB7	GPIO_Input	Input mode	<b>Pull-up *</b>	n/a	MCU_WIRELESS
	PB9	GPIO_Output	Output Push Pull	<b>n/a</b>	Low	RunningLED

## 6.2. DMA configuration

DMA request	Stream	Direction	Priority
USART1_RX	DMA1_Channel5	Peripheral To Memory	Low
USART1_TX	DMA1_Channel4	Memory To Peripheral	Low
USART2_RX	DMA1_Channel6	Peripheral To Memory	Low
USART2_TX	DMA1_Channel7	Memory To Peripheral	Low
ADC1	DMA1_Channel1	Peripheral To Memory	Low

### USART1\_RX: DMA1\_Channel5 DMA request Settings:

Mode: Normal  
Peripheral Increment: Disable  
Memory Increment: **Enable \***  
Peripheral Data Width: Byte  
Memory Data Width: Byte

### USART1\_TX: DMA1\_Channel4 DMA request Settings:

Mode: Normal  
Peripheral Increment: Disable  
Memory Increment: **Enable \***  
Peripheral Data Width: Byte  
Memory Data Width: Byte

### USART2\_RX: DMA1\_Channel6 DMA request Settings:

Mode: Normal  
Peripheral Increment: Disable  
Memory Increment: **Enable \***  
Peripheral Data Width: Byte  
Memory Data Width: Byte

### USART2\_TX: DMA1\_Channel7 DMA request Settings:

Mode: Normal  
Peripheral Increment: Disable  
Memory Increment: **Enable \***  
Peripheral Data Width: Byte

Memory Data Width: Byte

ADC1: DMA1\_Channel1 DMA request Settings:

Mode: **Circular \***  
Peripheral Increment: Disable  
Memory Increment: **Enable \***  
Peripheral Data Width: **Word \***  
Memory Data Width: **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
Prefetch 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
DMA1 channel1 global interrupt	true	0	0
DMA1 channel4 global interrupt	true	0	0
DMA1 channel5 global interrupt	true	0	0
DMA1 channel6 global interrupt	true	0	0
DMA1 channel7 global interrupt	true	0	0
ADC1 and ADC2 global interrupts	true	0	0
TIM4 global interrupt	true	0	0
USART1 global interrupt	true	0	0
USART2 global interrupt	true	0	0
TIM5 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
SPI1 global interrupt	unused		

\* User modified value

## ***7. Power Consumption Calculator report***

### 7.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103RCTx
Datasheet	14611_Rev12

### 7.2. Parameter Selection

Temperature	25
Vdd	3.3



## 8. Software Project

### 8.1. Project Settings

Name	Value
Project Name	BSPv1.4
Project Folder	E:\Users\bertz\Documents\GitHub\BSPv1.4
Toolchain / IDE	EWARM
Firmware Package Name and Version	STM32Cube FW_F1 V1.6.0

### 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)	No