1. Description

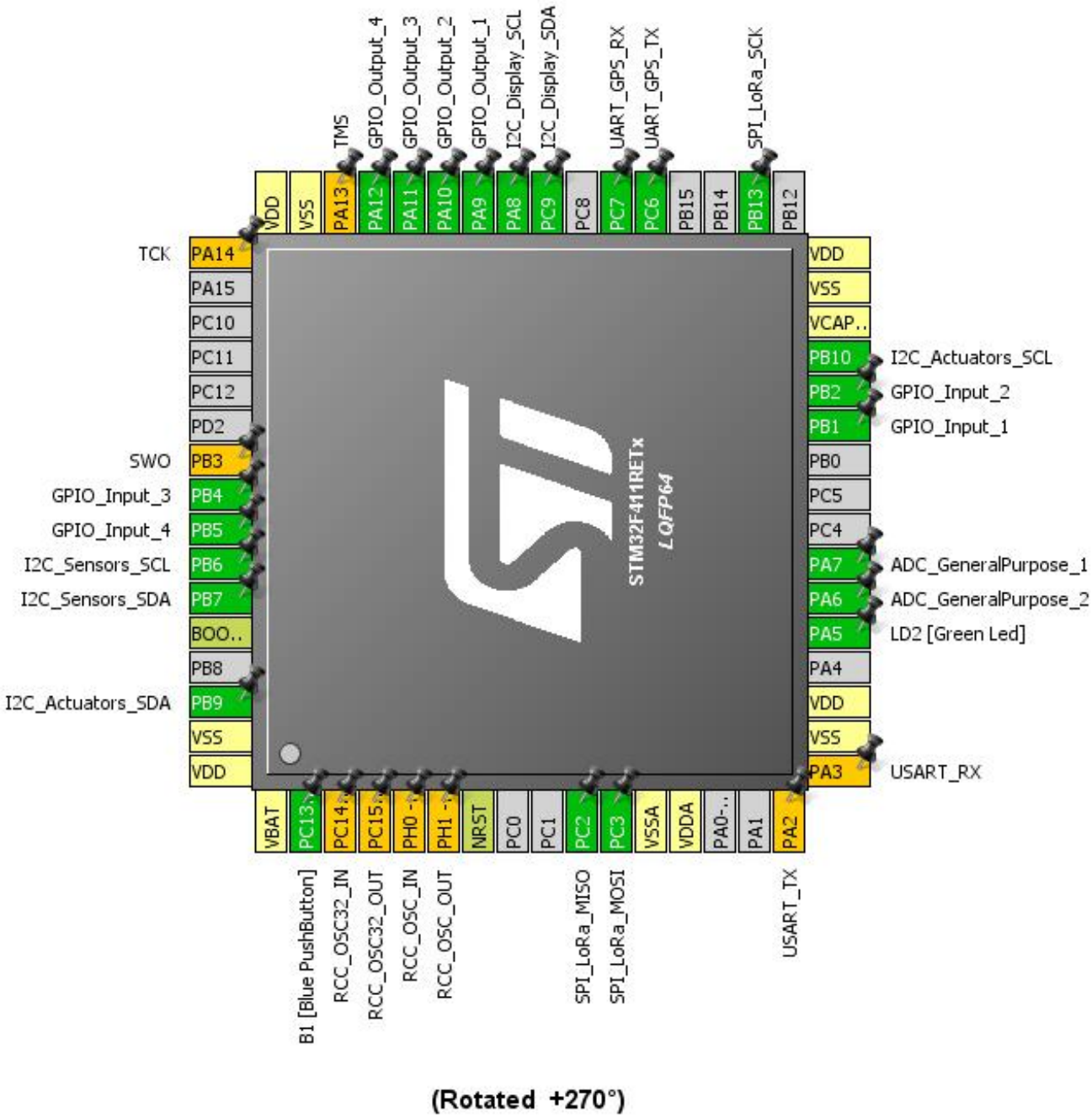
1.1. Project

Project Name	eLSA_Robot
Board Name	NUCLEO-F411RE
Generated with:	STM32CubeMX 4.27.0
Date	11/18/2018

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F411
MCU name	STM32F411RETx
MCU Package	LQFP64
MCU Pin number	64

2. Pinout Configuration



(Rotated +270°)

3. Pins Configuration

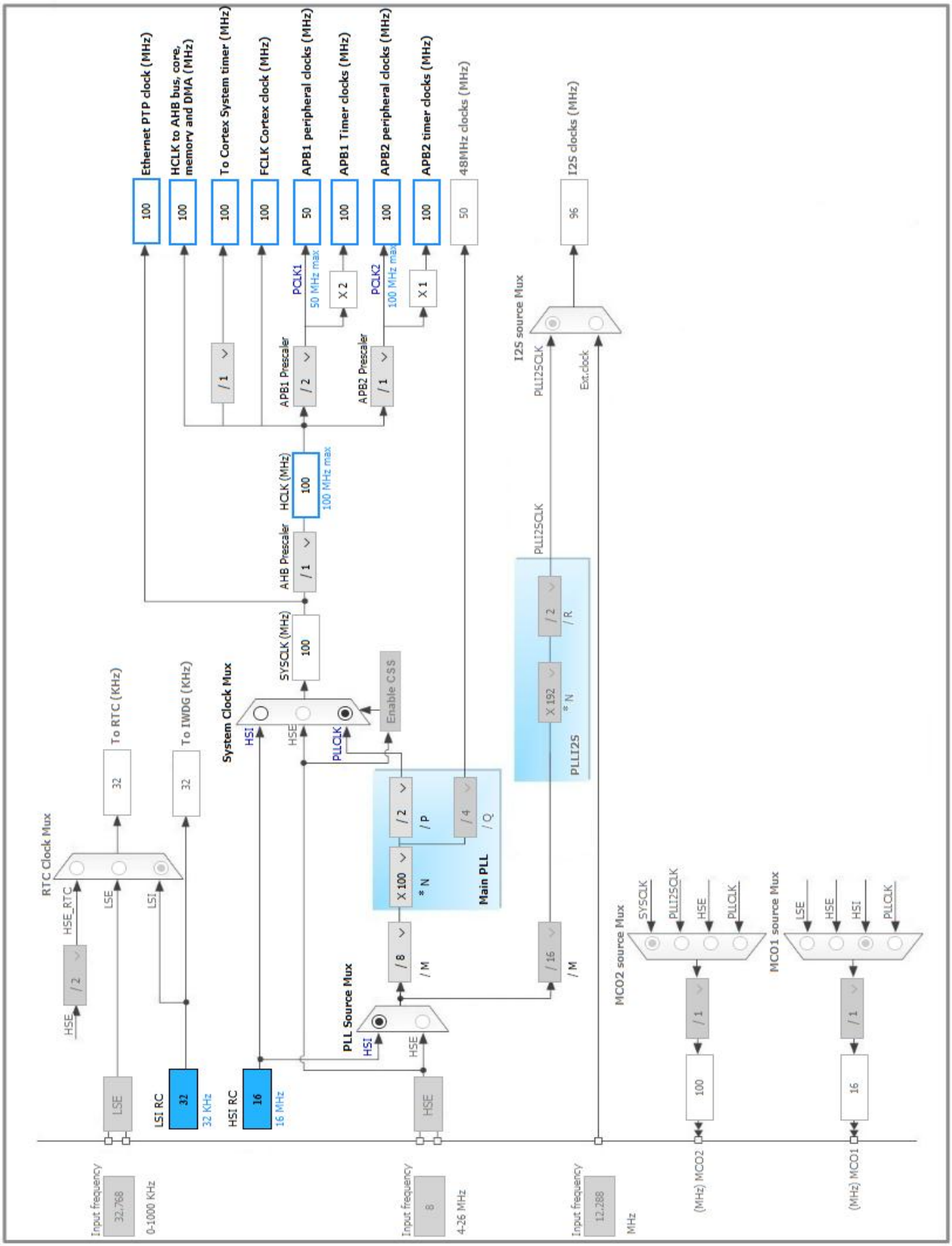
Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-ANTI_TAMP	I/O	GPIO_EXTI13	B1 [Blue PushButton]
3	PC14-OSC32_IN *	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT *	I/O	RCC_OSC32_OUT	
5	PH0 - OSC_IN *	I/O	RCC_OSC_IN	
6	PH1 - OSC_OUT *	I/O	RCC_OSC_OUT	
7	NRST	Reset		
10	PC2	I/O	SPI2_MISO	SPI_LoRa_MISO
11	PC3	I/O	SPI2_MOSI	SPI_LoRa_MOSI
12	VSSA	Power		
13	VDDA	Power		
16	PA2 *	I/O	USART2_TX	USART_TX
17	PA3 *	I/O	USART2_RX	USART_RX
18	VSS	Power		
19	VDD	Power		
21	PA5 **	I/O	GPIO_Output	LD2 [Green Led]
22	PA6	I/O	ADC1_IN6	ADC_GeneralPurpose_2
23	PA7	I/O	ADC1_IN7	ADC_GeneralPurpose_1
27	PB1 **	I/O	GPIO_Input	GPIO_Input_1
28	PB2 **	I/O	GPIO_Input	GPIO_Input_2
29	PB10	I/O	I2C2_SCL	I2C_Actuators_SCL
30	VCAP1	Power		
31	VSS	Power		
32	VDD	Power		
34	PB13	I/O	SPI2_SCK	SPI_LoRa_SCK
37	PC6	I/O	USART6_TX	UART_GPS_TX
38	PC7	I/O	USART6_RX	UART_GPS_RX
40	PC9	I/O	I2C3_SDA	I2C_Display_SDA
41	PA8	I/O	I2C3_SCL	I2C_Display_SCL
42	PA9 **	I/O	GPIO_Output	GPIO_Output_1
43	PA10 **	I/O	GPIO_Output	GPIO_Output_2
44	PA11 **	I/O	GPIO_Output	GPIO_Output_3
45	PA12 **	I/O	GPIO_Output	GPIO_Output_4
46	PA13 *	I/O	SYS_JTMS-SWDIO	TMS
47	VSS	Power		
48	VDD	Power		

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
49	PA14 *	I/O	SYS_JTCK-SWCLK	TCK
55	PB3 *	I/O	SYS_JTDO-SWO	SWO
56	PB4 **	I/O	GPIO_Input	GPIO_Input_3
57	PB5 **	I/O	GPIO_Input	GPIO_Input_4
58	PB6	I/O	I2C1_SCL	I2C_Sensors_SCL
59	PB7	I/O	I2C1_SDA	I2C_Sensors_SDA
60	BOOT0	Boot		
62	PB9	I/O	I2C2_SDA	I2C_Actuators_SDA
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. ADC1

mode: IN6

mode: IN7

5.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	PCLK2 divided by 4
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	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 6
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	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. I2C2

I2C: I2C

5.3.1. 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

5.4. I2C3

I2C: I2C

5.4.1. 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

5.5. SPI2

Mode: Full-Duplex Master

5.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**25.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

5.6. SYS

Timebase Source: SysTick

5.7. USART6

Mode: Asynchronous

5.7.1. 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	PA6	ADC1_IN6	Analog mode	No pull-up and no pull-down	n/a	ADC_GeneralPurpose_2
	PA7	ADC1_IN7	Analog mode	No pull-up and no pull-down	n/a	ADC_GeneralPurpose_1
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	I2C_Sensors_SCL
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	I2C_Sensors_SDA
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	I2C_Actuators_SCL
	PB9	I2C2_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	I2C_Actuators_SDA
I2C3	PC9	I2C3_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	I2C_Display_SDA
	PA8	I2C3_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	I2C_Display_SCL
SPI2	PC2	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI_LoRa_MISO
	PC3	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI_LoRa_MOSI
	PB13	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI_LoRa_SCK
USART6	PC6	USART6_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_GPS_TX
	PC7	USART6_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_GPS_RX
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	
	PH0 - OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1 - OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High**	USART_TX

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
	PA3	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USART_RX
	PA13	SYS_JTMS-SWDIO	n/a	n/a	**n/a**	TMS
	PA14	SYS_JTCK-SWCLK	n/a	n/a	**n/a**	TCK
	PB3	SYS_JTDO-SWO	n/a	n/a	**n/a**	SWO
GPIO	PC13-ANTI_TAMP	GPIO_EXTI13	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	B1 [Blue PushButton]
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Green Led]
	PB1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_Input_1
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_Input_2
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_Output_1
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_Output_2
	PA11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_Output_3
	PA12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_Output_4
	PB4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_Input_3
	PB5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_Input_4

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
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		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
SPI2 global interrupt	unused		
EXTI line[15:10] interrupts	unused		
USART6 global interrupt	unused		
I2C3 event interrupt	unused		
I2C3 error interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F411
MCU	STM32F411RETx
Datasheet	026289_Rev6

7.2. Parameter Selection

Temperature	25
Vdd	null

8. Software Project

8.1. Project Settings

Name	Value
Project Name	eLSA_Robot
Project Folder	D:\programming\embedded\eLSA_Robot
Toolchain / IDE	TrueSTUDIO
Firmware Package Name and Version	STM32Cube FW_F4 V1.21.0

8.2. 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	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

9. Software Pack Report