1. Description

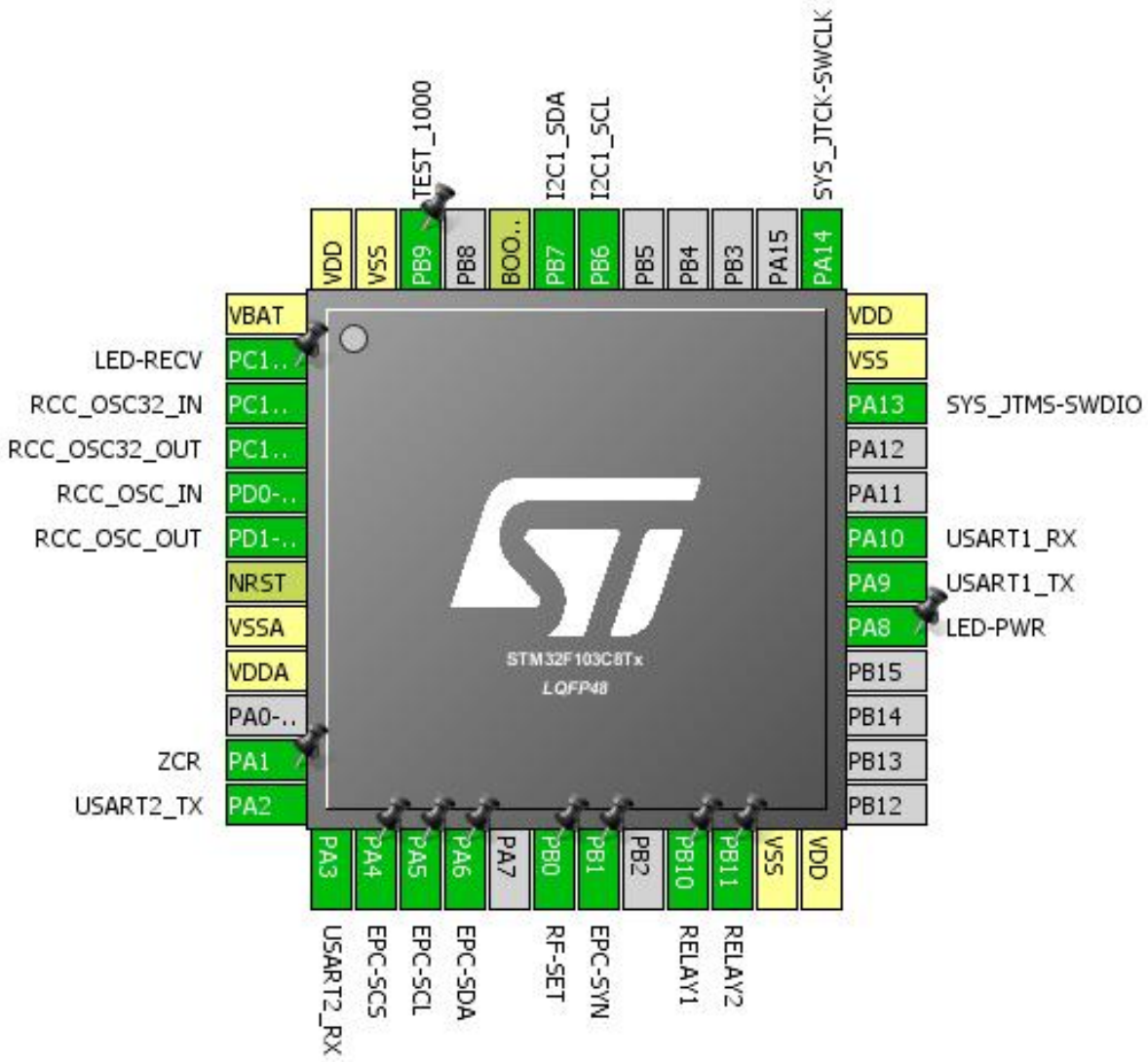
1.1. Project

Project Name	EPC
Board Name	EPC
Generated with:	STM32CubeMX 4.19.0
Date	07/24/2017

1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103C8Tx
MCU Package	LQFP48
MCU Pin number	48

2. Pinout Configuration

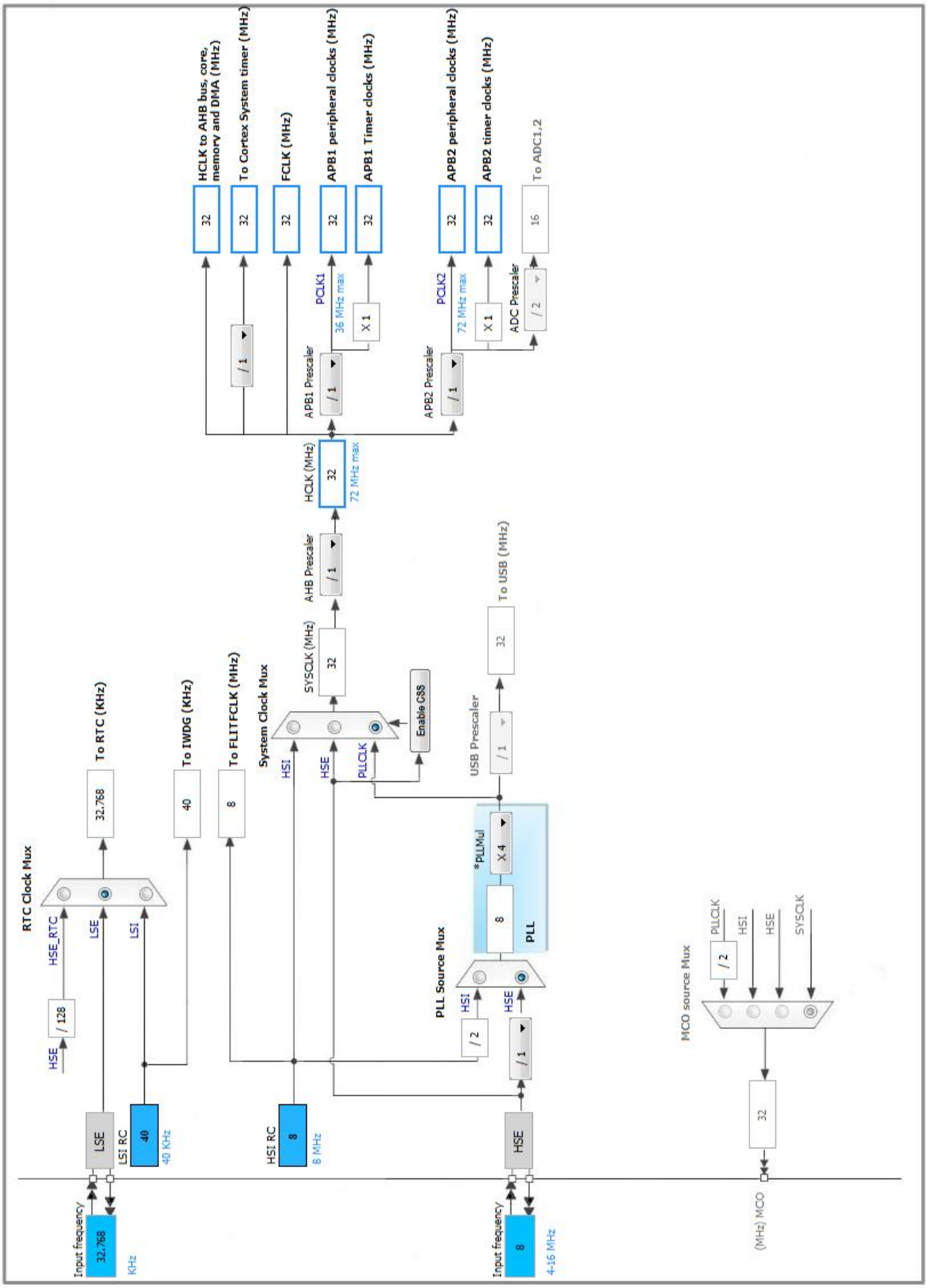


3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-TAMPER-RTC *	I/O	GPIO_Output	LED-RECV
3	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
11	PA1	I/O	GPIO_EXTI1	ZCR
12	PA2	I/O	USART2_TX	
13	PA3	I/O	USART2_RX	
14	PA4 *	I/O	GPIO_Output	EPC-SCS
15	PA5 *	I/O	GPIO_Output	EPC-SCL
16	PA6 *	I/O	GPIO_Input	EPC-SDA
18	PB0 *	I/O	GPIO_Output	RF-SET
19	PB1 *	I/O	GPIO_Output	EPC-SYN
21	PB10 *	I/O	GPIO_Output	RELAY1
22	PB11 *	I/O	GPIO_Output	RELAY2
23	VSS	Power		
24	VDD	Power		
29	PA8	I/O	GPIO_EXTI8	LED-PWR
30	PA9	I/O	USART1_TX	
31	PA10	I/O	USART1_RX	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
42	PB6	I/O	I2C1_SCL	
43	PB7	I/O	I2C1_SDA	
44	BOOT0	Boot		
46	PB9 *	I/O	GPIO_Output	TEST_1000
47	VSS	Power		
48	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. CRC

mode: Activated

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. IWDG

mode: Activated

5.3.1. Parameter Settings:

Clocking:	
IWDG counter clock prescaler	**64 ***
IWDG down-counter reload value	4095

5.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

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

5.5. RTC

mode: Activate Clock Source
mode: Activate Calendar
RTC OUT: No RTC Output

5.5.1. Parameter Settings:

Calendar Time:

Data Format	BCD data format
Hours	1
Minutes	0
Seconds	0

General:

Auto Predivider Calculation	Enabled
Asynchronous Predivider value	Automatic Predivider Calculation Enabled
Output	No output on the TAMPER pin

Calendar Date:

Week Day	Monday
Month	January
Date	1
Year	0

5.6. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.7. TIM1

Clock Source : Internal Clock

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**319 ***
Counter Mode	**Down ***
Counter Period (AutoReload Register - 16 bits value)	**98 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	**Update Event ***

5.8. TIM2

Clock Source : Internal Clock

5.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**319 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**7 ***
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	**Update Event ***

5.9. USART1

Mode: Asynchronous

5.9.1. Parameter Settings:

Basic Parameters:

Baud Rate	**19200 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

5.10. USART2

Mode: Asynchronous

5.10.1. Parameter Settings:

Basic Parameters:

Baud Rate	**9600 ***
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
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	n/a	**High ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	n/a	**High ***	
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PD0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1-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	
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	**High ***	
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	**n/a**	
USART2	PA2	USART2_TX	Alternate Function Push Pull	n/a	**High ***	
	PA3	USART2_RX	Input mode	No pull-up and no pull-down	**n/a**	
GPIO	PC13-TAMPER-RTC	GPIO_Output	Output Push Pull	n/a	Low	LED-RECV
	PA1	GPIO_EXTI1	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	ZCR
	PA4	GPIO_Output	Output Push Pull	n/a	**Medium ***	EPC-SCS
	PA5	GPIO_Output	Output Push Pull	n/a	**Medium ***	EPC-SCL
	PA6	GPIO_Input	Input mode	No pull-up and no pull-down	**n/a**	EPC-SDA
	PB0	GPIO_Output	Output Push Pull	n/a	Low	RF-SET
	PB1	GPIO_Output	Output Push Pull	n/a	**Medium ***	EPC-SYN
	PB10	GPIO_Output	Output Push Pull	n/a	Low	RELAY1
	PB11	GPIO_Output	Output Push Pull	n/a	Low	RELAY2
	PA8	GPIO_EXTI8	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	LED-PWR

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB9	GPIO_Output	Output Push Pull	n/a	Low	TEST_1000

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
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
TIM1 update interrupt	true	0	0
TIM2 global interrupt	true	0	0
USART1 global interrupt	true	0	0
USART2 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
RTC global interrupt	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line1 interrupt	unused		
EXTI line[9:5] interrupts	unused		
TIM1 break interrupt	unused		
TIM1 trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
RTC alarm interrupt through EXTI line 17	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	13587_Rev17

7.2. Parameter Selection

Temperature	25
Vdd	3.3

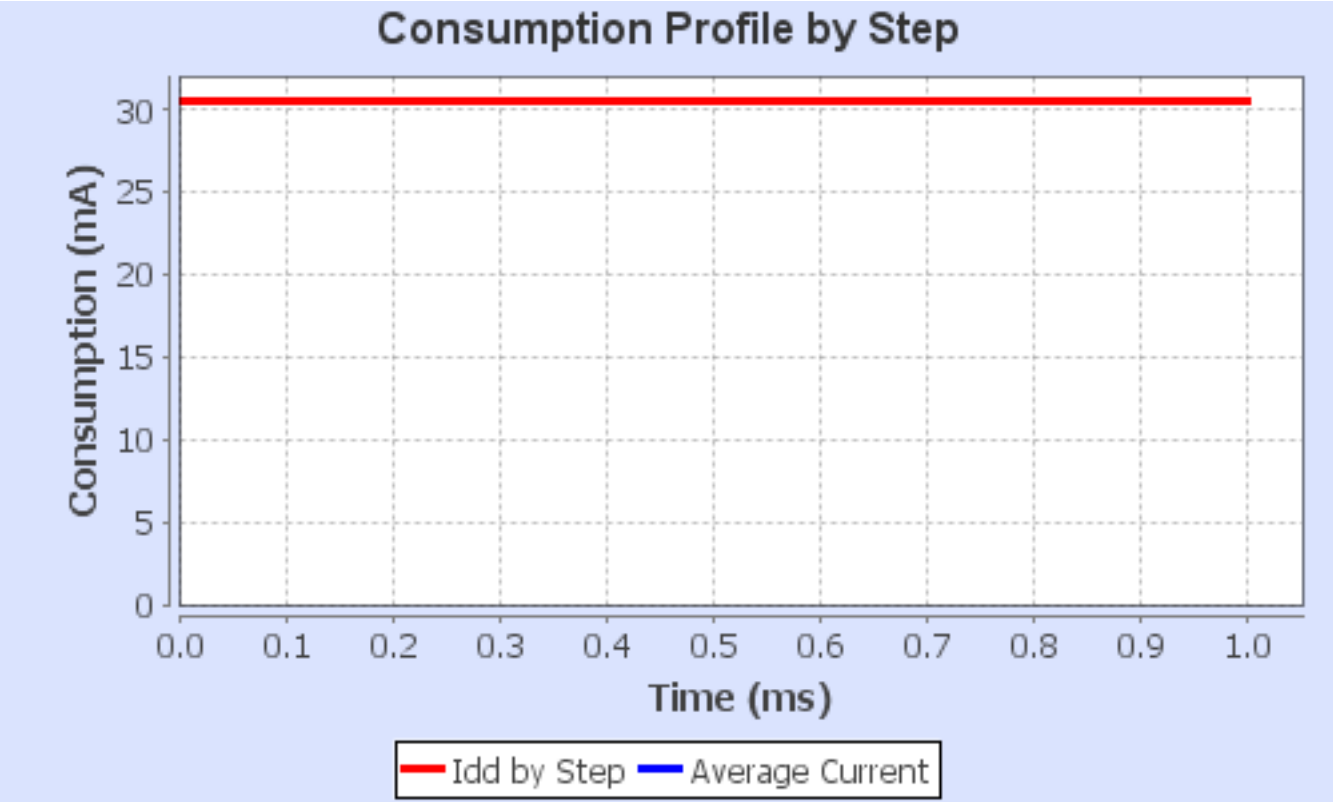
7.3. Sequence

Step	Step1
Mode	RUN
Vdd	3.3
Voltage Source	Vbus
Range	No Scale
Fetch Type	FLASH
Clock Configuration	HSI PLL
Clock Source Frequency	8.0 MHz
CPU Frequency	64.0 MHz
Peripherals	APB1-Bridge APB2-Bridge GPIOA GPIOB I2C1 IWDG PVD/BOR PWR RTC SPI1 TIM1 USART1 USART2
Additional Cons.	0 mA
Average Current	30.48 mA
Duration	1 ms
DMIPS	61.0
Ta Max	99.47
Category	In DS Table

7.4. RESULTS

Sequence Time	1 ms	Average Current	30.48 mA
Battery Life	0	Average DMIPS	61.0 DMIPS

7.5. Chart



8. Software Project

8.1. Project Settings

Name	Value
Project Name	EPC
Project Folder	C:\EmbeddedProject\EnergyCounter\EPC\FirmWare\EPC
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F1 V1.4.0

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	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No