1. Description

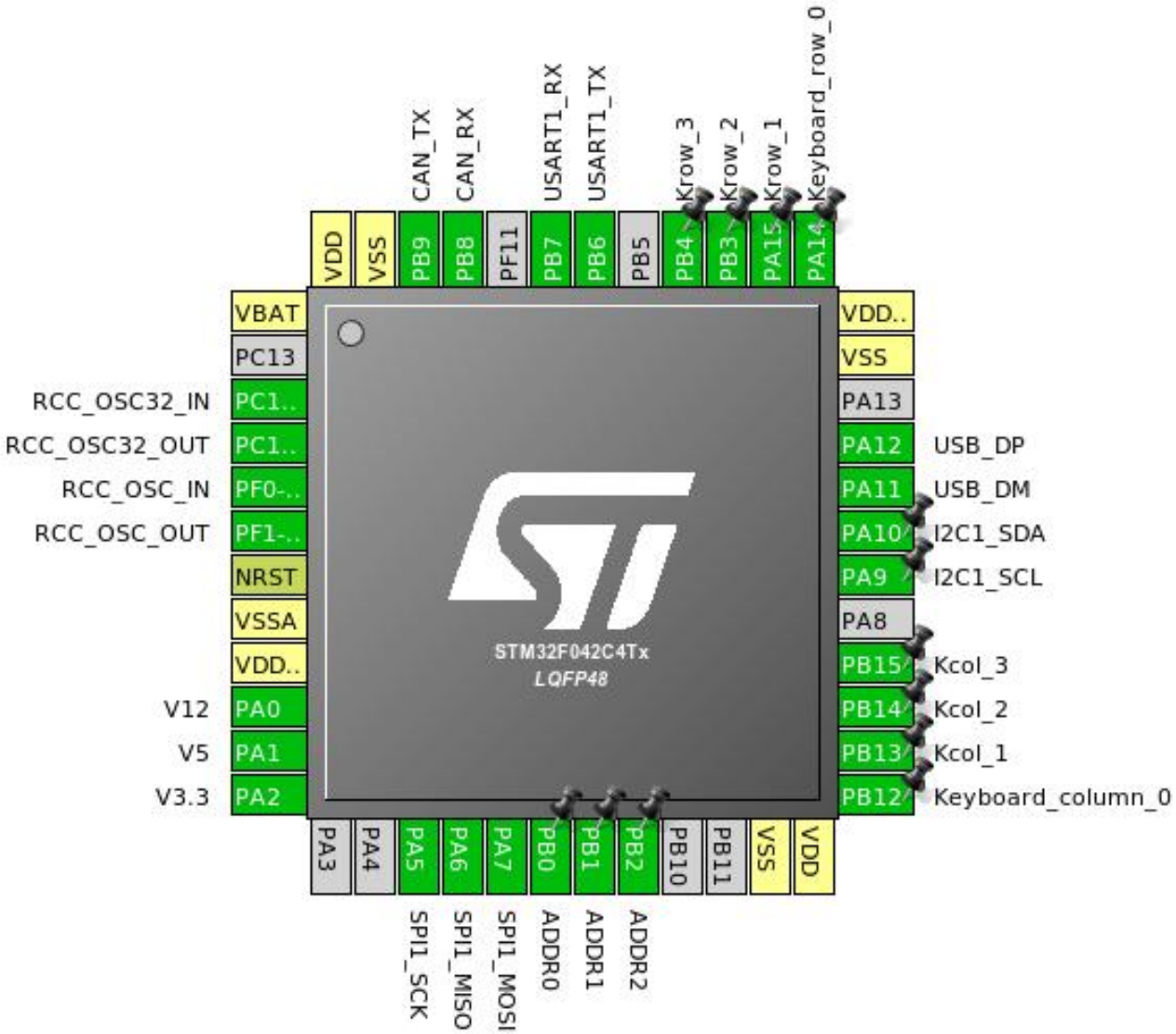
1.1. Project

Project Name	TSYS01
Board Name	TSYS01
Generated with:	STM32CubeMX 4.18.0
Date	03/16/2017

1.2. MCU

MCU Series	STM32F0
MCU Line	STM32F0x2
MCU name	STM32F042C4Tx
MCU Package	LQFP48
MCU Pin number	48

2. Pinout Configuration



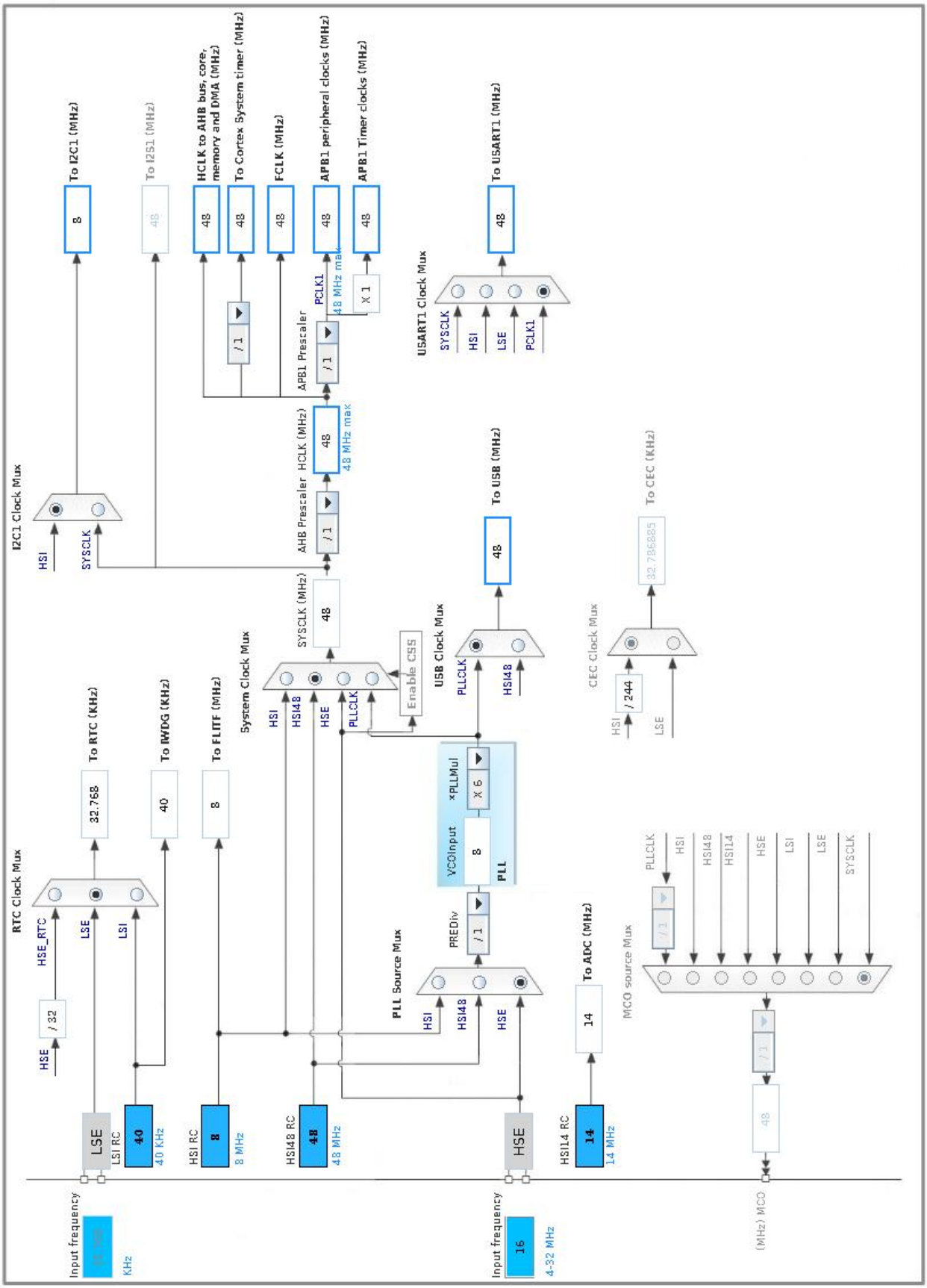
3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
3	PC14OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15OSC32_OUT	I/O	RCC_OSC32_OUT	
5	PF0-OSC_IN	I/O	RCC_OSC_IN	
6	PF1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
10	PA0	I/O	ADC_IN0	V12
11	PA1	I/O	ADC_IN1	V5
12	PA2	I/O	ADC_IN2	V3.3
15	PA5	I/O	SPI1_SCK	
16	PA6	I/O	SPI1_MISO	
17	PA7	I/O	SPI1_MOSI	
18	PB0 *	I/O	GPIO_Output	ADDR0
19	PB1 *	I/O	GPIO_Output	ADDR1
20	PB2 *	I/O	GPIO_Output	ADDR2
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	Keyboard_column_0
26	PB13 *	I/O	GPIO_Output	Kcol_1
27	PB14 *	I/O	GPIO_Output	Kcol_2
28	PB15 *	I/O	GPIO_Output	Kcol_3
30	PA9	I/O	I2C1_SCL	
31	PA10	I/O	I2C1_SDA	
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
35	VSS	Power		
36	VDDIO2	Power		
37	PA14 *	I/O	GPIO_Input	Keyboard_row_0
38	PA15 *	I/O	GPIO_Input	Krow_1
39	PB3 *	I/O	GPIO_Input	Krow_2
40	PB4 *	I/O	GPIO_Input	Krow_3
42	PB6	I/O	USART1_TX	
43	PB7	I/O	USART1_RX	
45	PB8	I/O	CAN_RX	

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
46	PB9	I/O	CAN_TX	
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. ADC

mode: IN0

mode: IN1

mode: IN2

mode: Temperature Sensor Channel

mode: Vrefint Channel

mode: Vbat Channel

5.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	Asynchronous clock mode
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Conversion Mode	Forward
Continuous Conversion Mode	**Enabled ***
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	**Enabled ***
End Of Conversion Selection	**End of sequence of conversion ***
Overrun behaviour	Overrun data preserved
Low Power Auto Wait	Disabled
Low Power Auto Power Off	Disabled

ADC_Regular_ConversionMode:

Sampling Time	1.5 Cycles
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None

WatchDog:

Enable Analog WatchDog Mode	false

5.2. CAN

mode: Mode

5.2.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum)	16
Time Quantum	**333.3333333333333 ***
Time Quanta in Bit Segment 1	1 Time
Time Quanta in Bit Segment 2	1 Time
Time for one Bit	1000
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:

Timing configuration:

I2C Speed Mode	**Fast Mode ***
I2C Speed Frequency (KHz)	**200 ***
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	**0x00000A17 ***

Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

5.4. IWDG

mode: Activated

5.4.1. Parameter Settings:

Watchdog Clocking:

IWDG counter clock prescaler	**16 ***
IWDG window value	4095
IWDG down-counter reload value	4095

5.5. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.5.1. Parameter Settings:

System Parameters:

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

RCC Parameters:

HSI Calibration Value	16
HSI14 Calibration Value	16
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

5.6. RTC

mode: Activate Clock Source

5.6.1. Parameter Settings:

General:

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

5.7. SPI1

Mode: Full-Duplex Master

5.7.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**8 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**32 ***
Baud Rate	**1.5 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

5.8. SYS

Timebase Source: SysTick

5.9. USART1

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
Single Sample	Disable

Advanced Features:

Auto Baudrate	Disable
TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX Pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

5.10. USB

mode: Device (FS)

5.10.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s
Endpoint 0 Max Packet size	64 Bytes
Physical interface	Internal Phy

Power Parameters:

Low Power	Disabled
Link Power Management	Disabled

5.11. USB_DEVICE

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

5.11.1. 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:

USBD_CDC_INTERVAL (Number of micro-frames interval)	1000

5.11.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
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
ADC	PA0	ADC_IN0	Analog mode	No pull-up and no pull-down	n/a	V12
	PA1	ADC_IN1	Analog mode	No pull-up and no pull-down	n/a	V5
	PA2	ADC_IN2	Analog mode	No pull-up and no pull-down	n/a	V3.3
CAN	PB8	CAN_RX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PB9	CAN_TX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
I2C1	PA9	I2C1_SCL	Alternate Function Open Drain	Pull-up	**High ***	
	PA10	I2C1_SDA	Alternate Function Open Drain	Pull-up	**High ***	
RCC	PC14OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PF0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PF1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
USART1	PB6	USART1_TX	Alternate Function Push Pull	Pull-up	**High ***	
	PB7	USART1_RX	Alternate Function Push Pull	Pull-up	**High ***	
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ADDR0
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ADDR1
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ADDR2
	PB12	GPIO_Output	**Output Open Drain ***	No pull-up and no pull-down	Low	Keyboard_column_0
	PB13	GPIO_Output	**Output Open Drain ***	No pull-up and no pull-down	Low	Kcol_1
	PB14	GPIO_Output	**Output Open Drain ***	No pull-up and no pull-down	Low	Kcol_2
	PB15	GPIO_Output	**Output Open Drain ***	No pull-up and no pull-down	Low	Kcol_3
	PA14	GPIO_Input	Input mode	**Pull-up ***	n/a	Keyboard_row_0
	PA15	GPIO_Input	Input mode	**Pull-up ***	n/a	Krow_1

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB3	GPIO_Input	Input mode	**Pull-up ***	n/a	Krow_2
	PB4	GPIO_Input	Input mode	**Pull-up ***	n/a	Krow_3

6.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI1_RX	DMA1_Channel2	Peripheral To Memory	Low
SPI1_TX	DMA1_Channel3	Memory To Peripheral	Low
USART1_TX	DMA1_Channel4	Memory To Peripheral	Low
ADC	DMA1_Channel1	Peripheral To Memory	Low

SPI1_RX: DMA1_Channel2 DMA request Settings:

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

SPI1_TX: DMA1_Channel3 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

ADC: DMA1_Channel1 DMA request Settings:

Mode: Normal
Peripheral Increment: Disable
Memory Increment: **Enable ***
Peripheral Data Width: Half Word
Memory Data Width: Half Word

6.3. NVIC configuration

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
System service call via SWI instruction	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
DMA1 channel 1 interrupt	true	0	0
DMA1 channel 2 and 3 interrupts	true	0	0
DMA1 channel 4 and 5 interrupts	true	0	0
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	true	0	0
HDMI-CEC and CAN global interrupts / HDMI-CEC wake-up interrupt through EXTI line 27	true	0	0
USB global Interrupt / USB wake-up interrupt through EXTI line 18	true	0	0
PVD and VDDIO2 supply comparator interrupts through EXTI lines 16 and 31	unused		
Flash global interrupt	unused		
RCC and CRS global interrupts	unused		
ADC interrupt	unused		
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	unused		
SPI1 global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F0
Line	STM32F0x2
MCU	STM32F042C4Tx
Datasheet	025832_Rev4

7.2. Parameter Selection

Temperature	25
Vdd	3.6

8. Software Project

8.1. Project Settings

Name	Value
Project Name	TSYS01
Project Folder	/Big/Data/00__Electronics/STM32/TSYS01/git/CubeMX/TSYS01
Toolchain / IDE	EWARM
Firmware Package Name and Version	STM32Cube FW_F0 V1.7.0

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