1. Description

1.1. Project

Project Name	CanSerialBreakout
Board Name	CanSerialBreakout
Generated with:	STM32CubeMX 4.22.0
Date	11/13/2017

1.2. MCU

MCU Series	STM32F0
MCU Line	STM32F0x2
MCU name	STM32F042C6Tx
MCU Package	LQFP48
MCU Pin number	48

2. Pinout Configuration
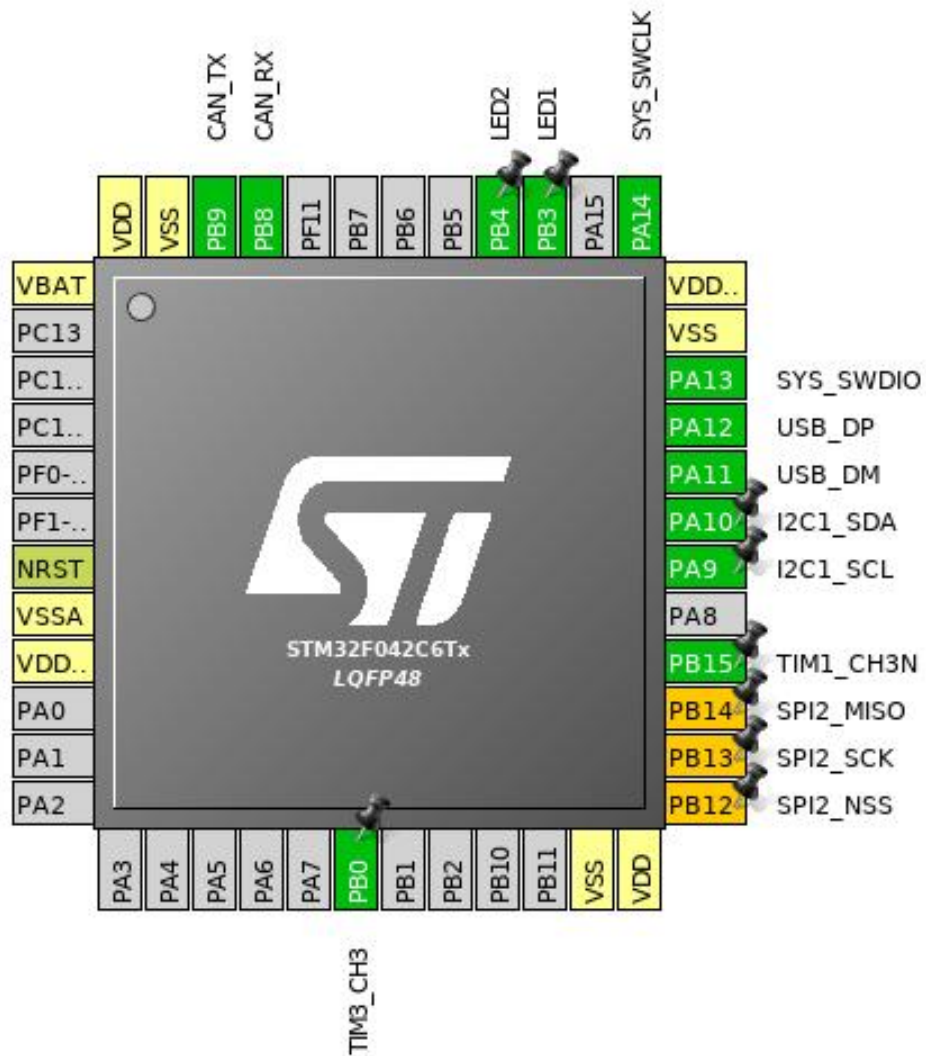
3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
18	PB0	I/O	TIM3_CH3	
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	SPI2_NSS	
26	PB13 *	I/O	SPI2_SCK	
27	PB14 *	I/O	SPI2_MISO	
28	PB15	I/O	TIM1_CH3N	
30	PA9	I/O	I2C1_SCL	
31	PA10	I/O	I2C1_SDA	
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
34	PA13	I/O	SYS_SWDIO	
35	VSS	Power		
36	VDDIO2	Power		
37	PA14	I/O	SYS_SWCLK	
39	PB3 **	I/O	GPIO_Output	LED1
40	PB4 **	I/O	GPIO_Output	LED2
45	PB8	I/O	CAN_RX	
46	PB9	I/O	CAN_TX	
47	VSS	Power		
48	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. CAN
mode: Mode

5.1.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum)	**12 ***
Time Quantum	**750.0 ***
Time Quanta in Bit Segment 1	**4 Times ***
Time Quanta in Bit Segment 2	**3 Times ***
Time for one Bit	**6000 ***
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. I2C1
I2C: I2C

5.2.1. Parameter Settings:

Timing configuration:

I2C Speed Mode	**Fast Mode ***
I2C Speed Frequency (KHz)	400
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled

Timing	**0x0000020B ***

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

5.3. SYS

mode: Debug Serial Wire
Timebase Source: SysTick

5.4. TIM1

Clock Source   : Internal Clock
Channel3: Output Compare CH3N

5.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	**Output Compare (OC3REF) ***

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Run Mode (OSSR)	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

Output Compare Channel 3N:

Mode	

Toggle on match *

Pulse (16 bits value)	0
CHN Polarity	High
CHN Idle State	Reset

5.5. TIM3

Channel3: PWM Generation CH3

5.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**40 ***
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)

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	**Enable ***
CH Polarity	High

5.6. USB

mode: Device (FS)

5.6.1. 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

5.7. USB_DEVICE

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

5.7.1. 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

5.7.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	**Cedarville University ***

Device Descriptor FS:

PID (Product IDentifier)	22336
PRODUCT_STRING (Product Identifier)	**CanNode CAN Device ***
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
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 ***	
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	
	PA14	SYS_SWCLK	n/a	n/a	n/a	
TIM1	PB15	TIM1_CH3N	Alternate Function Push Pull	No pull-up and no pull-down	**Medium ***	
TIM3	PB0	TIM3_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
Single Mapped Signals	PB12	SPI2_NSS	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PB13	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PB14	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
GPIO	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED1
	PB4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED2

6.2. DMA configuration

DMA request	Stream	Direction	Priority
TIM1_CH3/UP	DMA1_Channel5	Peripheral To Memory	Low
TIM3_CH3	DMA1_Channel2	Memory To Peripheral	Low

TIM1_CH3/UP: DMA1_Channel5 DMA request Settings:

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

TIM3_CH3: DMA1_Channel2 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
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
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 2 and 3 interrupts	true	0	0
DMA1 channel 4 and 5 interrupts	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		
TIM1 break, update, trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
TIM3 global interrupt	unused		
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	unused		

* User modified value

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F0
Line	STM32F0x2
MCU	STM32F042C6Tx
Datasheet	025832_Rev4

7.2. Parameter Selection

Temperature	25
Vdd	3.6

7.3. Sequence

Step	Step1
Mode	RUN
Vdd	3.6
Voltage Source	Battery
Range	No Scale
Fetch Type	FLASH
Clock Configuration	HSI
Clock Source Frequency	8.0 MHz
CPU Frequency	8.0 MHz
Peripherals	ADC APB-Bridge CAN GPIOA GPIOB USB
Additional Cons.	0 mA
Average Current	3.93 mA
Duration	1 ms
DMIPS	0.0
Ta Max	104.22
Category	In DS Table

7.4. RESULTS

Sequence Time	1 ms	Average Current	3.93 mA

| Battery Life | 0 | Average DMIPS | 0.0 DMIPS |

7.5. Chart

Consumption Profile by Step
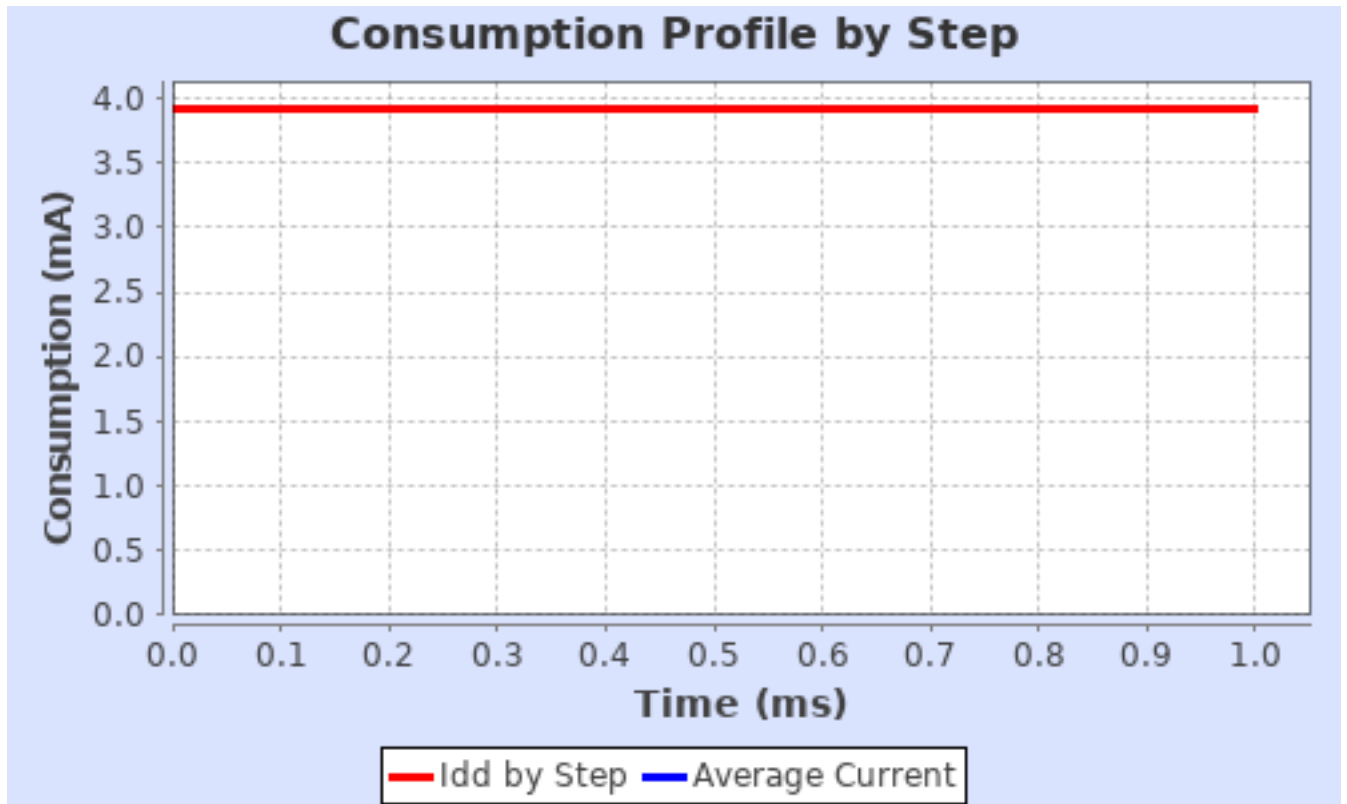
8. Software Project

8.1. Project Settings

Name	Value
Project Name	CanSerialBreakout
Project Folder	/home/nebk/Documents/arm_devel/spi-i2c-project
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F0 V1.8.0

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