1. Description

1.1. Project

Project Name	bluepill_tester
Board Name	bluepill_tester
Generated with:	STM32CubeMX 4.25.0
Date	06/20/2018

1.2. MCU

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

2. Pinout Configuration
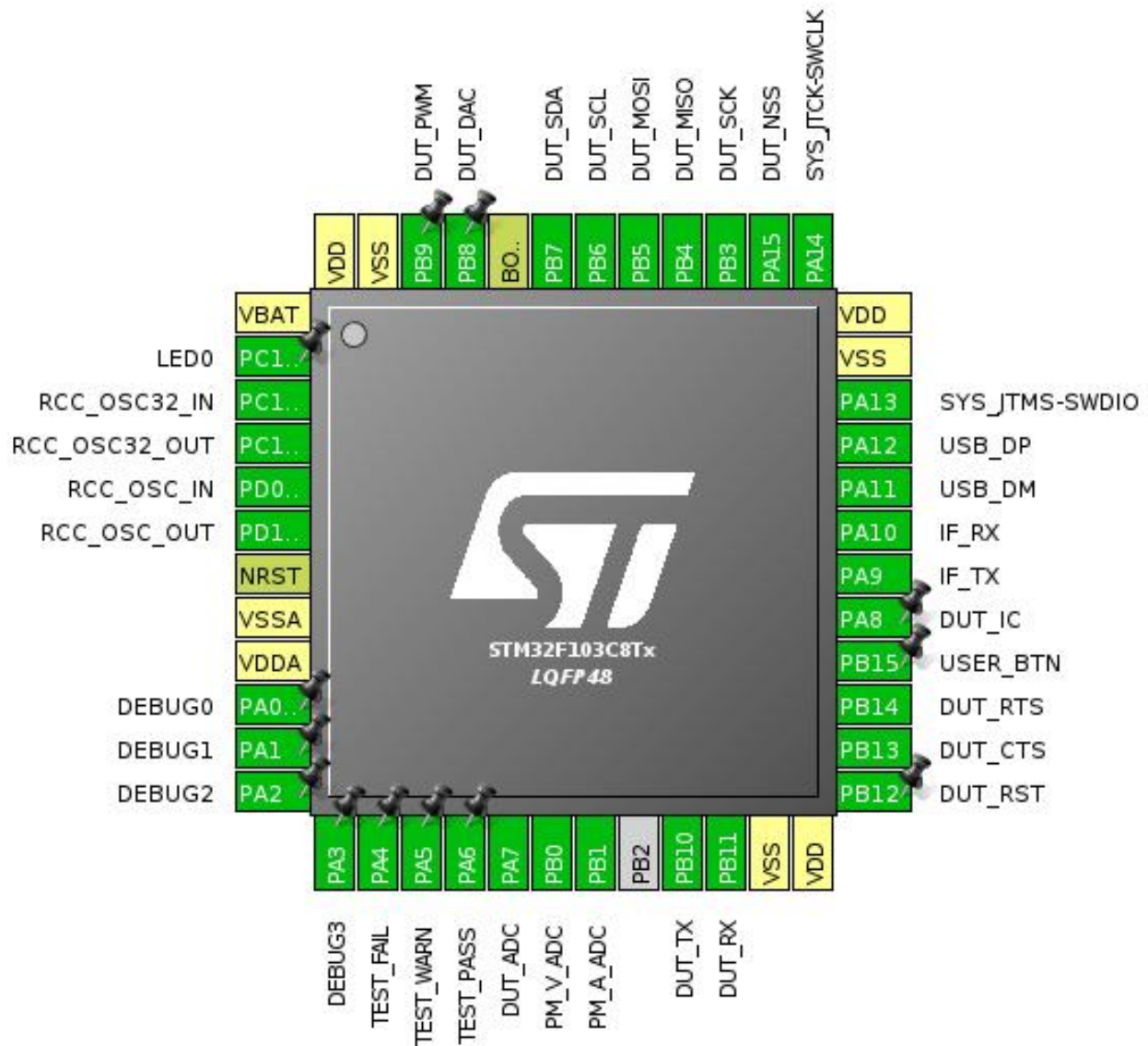
3. Pins Configuration

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	LED0
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		
10	PA0-WKUP *	I/O	GPIO_Output	DEBUG0
11	PA1 *	I/O	GPIO_Output	DEBUG1
12	PA2 *	I/O	GPIO_Output	DEBUG2
13	PA3 *	I/O	GPIO_Output	DEBUG3
14	PA4 *	I/O	GPIO_Output	TEST_FAIL
15	PA5 *	I/O	GPIO_Output	TEST_WARN
16	PA6 *	I/O	GPIO_Output	TEST_PASS
17	PA7	I/O	ADC2_IN7	DUT_ADC
18	PB0	I/O	ADC1_IN8	PM_V_ADC
19	PB1	I/O	ADC1_IN9	PM_A_ADC
21	PB10	I/O	USART3_TX	DUT_TX
22	PB11	I/O	USART3_RX	DUT_RX
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	DUT_RST
26	PB13	I/O	USART3_CTS	DUT_CTS
27	PB14	I/O	USART3_RTS	DUT_RTS
28	PB15 *	I/O	GPIO_Input	USER_BTN
29	PA8	I/O	TIM1_CH1	DUT_IC
30	PA9	I/O	USART1_TX	IF_TX
31	PA10	I/O	USART1_RX	IF_RX
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
38	PA15	I/O	SPI1_NSS	DUT_NSS
39	PB3	I/O	SPI1_SCK	DUT_SCK
40	PB4	I/O	SPI1_MISO	DUT_MISO
41	PB5	I/O	SPI1_MOSI	DUT_MOSI
42	PB6	I/O	I2C1_SCL	DUT_SCL
43	PB7	I/O	I2C1_SDA	DUT_SDA
44	BOOT0	Boot		
45	PB8	I/O	TIM4_CH3	DUT_DAC
46	PB9	I/O	TIM4_CH4	DUT_PWM
47	VSS	Power		
48	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration
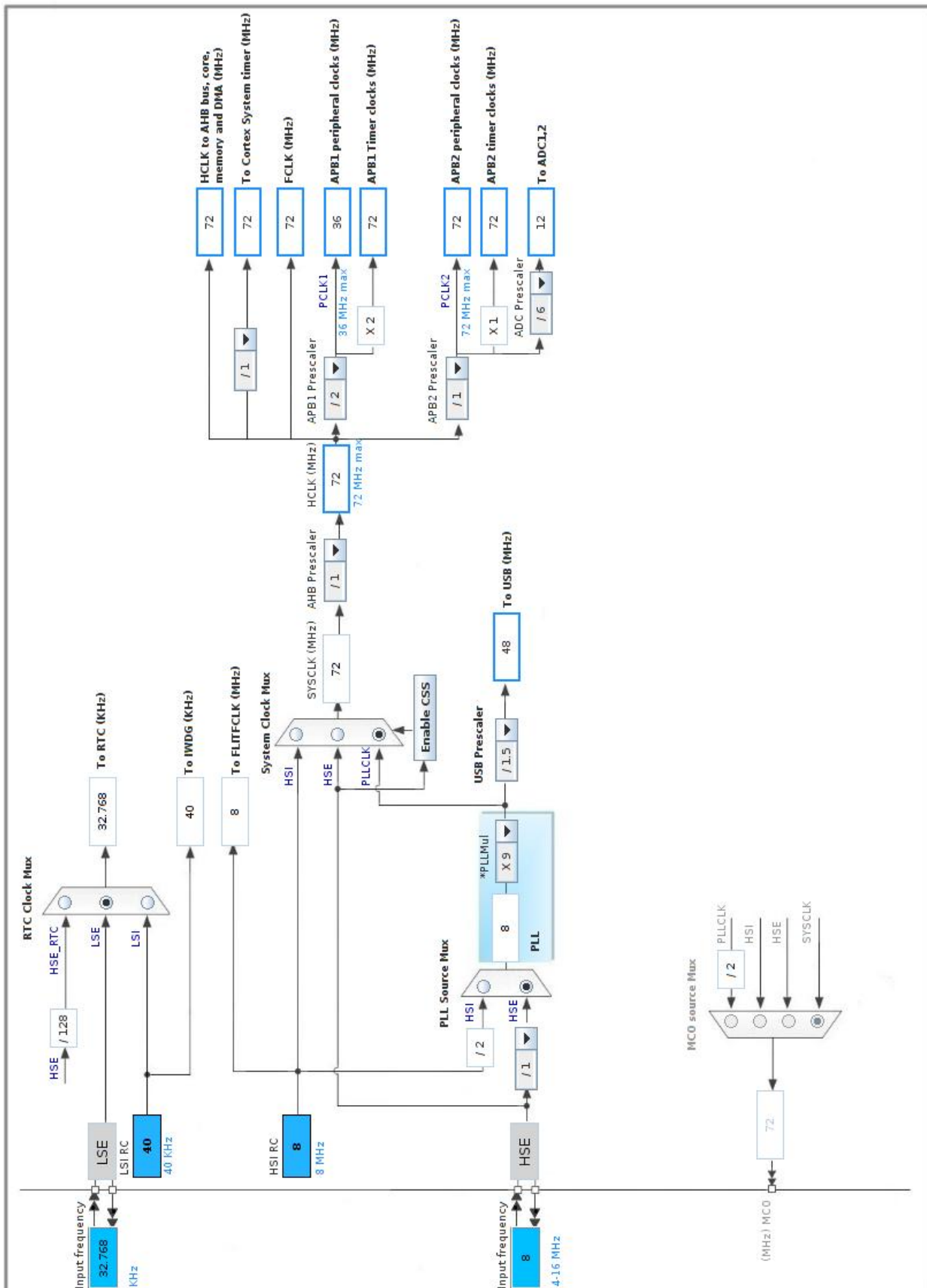
5. IPs and Middleware Configuration

5.1. ADC1

mode: IN8

mode: IN9

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	**Enabled ***
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 9 ***
Sampling Time	1.5 Cycles
Rank	**2 ***
Channel	Channel 8
Sampling Time	1.5 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.2. ADC2

mode: IN7

5.2.1. Parameter Settings:

ADCs_Common_Settings:

Mode   Independent mode

ADC_Settings:

Data Alignment   Right alignment

Scan Conversion Mode   Disabled

Continuous Conversion Mode   **Enabled ***

Discontinuous Conversion Mode   Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions   Enable

Number Of Conversion   1

External Trigger Conversion Source   Regular Conversion launched by software

Rank   1

Channel   Channel 7

Sampling Time   1.5 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions   0

WatchDog:

Enable Analog WatchDog Mode   false

5.3. I2C1

I2C: I2C

5.3.1. Parameter Settings:

Master Features:

I2C Speed Mode   **Fast Mode ***

I2C Clock Speed (Hz)   400000

Fast Mode Duty Cycle   Duty cycle Tlow/Thigh = 2

Slave Features:

Clock No Stretch Mode   Disabled

Primary Address Length selection   7-bit

Dual Address Acknowledged   **Enabled ***

Primary slave address   **85 ***

Secondary slave address   **64 ***

General Call address detection   **Enabled ***

Secondary Address Mask   No mask

5.4. IWDG

mode: Activated

5.4.1. Parameter Settings:

Clocking:

IWDG counter clock prescaler	**32 ***
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
Prefetch Buffer	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

RCC Parameters:

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

5.6. RTC

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

5.6.1. Parameter Settings:

Calendar Time:

Data Format

	Binary 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	**18 ***

5.7. SPI1

Mode: Full-Duplex Slave
Hardware NSS Signal: Hardware NSS Input Signal

5.7.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**4 ***
Baud Rate	**18.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Input Hardware

5.8. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.9. TIM1

Channel1: Input Capture direct mode

5.9.1. 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 (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Input Capture Channel 1:

Polarity Selection	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

5.10. TIM4

Channel3: PWM Generation CH3
Channel4: PWM Generation CH4

5.10.1. 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
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 3:

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

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	**32768 ***
Fast Mode	Disable
CH Polarity	High

5.11. USART1

Mode: Asynchronous

5.11.1. 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

5.12. USART3

Mode: Asynchronous
Hardware Flow Control (RS232): CTS/RTS

5.12.1. 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

5.13. USB

mode: Device (FS)

5.13.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s
Endpoint 0 Max Packet size	**64 Bytes ***

Power Parameters:

Low Power	Disabled
Link Power Management	Disabled
Battery Charging	Disabled

5.14. USB_DEVICE

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

5.14.1. 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:

USB CDC Rx Buffer Size	**512 ***
USB CDC Tx Buffer Size	**512 ***

5.14.2. Device Descriptor:

Page 13

Device Descriptor:

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

Device Descriptor FS:

PID (Product IDentifier)	22336
PRODUCT_STRING (Product Identifier)	**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
ADC1	PB0	ADC1_IN8	Analog mode	n/a	n/a	PM_V_ADC
	PB1	ADC1_IN9	Analog mode	n/a	n/a	PM_A_ADC
ADC2	PA7	ADC2_IN7	Analog mode	n/a	n/a	DUT_ADC
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	n/a	**High ***	DUT_SCL
	PB7	I2C1_SDA	Alternate Function Open Drain	n/a	**High ***	DUT_SDA
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	
SPI1	PA15	SPI1_NSS	Input mode	No pull-up and no pull-down	n/a	DUT_NSS
	PB3	SPI1_SCK	Input mode	No pull-up and no pull-down	n/a	DUT_SCK
	PB4	SPI1_MISO	Alternate Function Push Pull	n/a	**High ***	DUT_MISO
	PB5	SPI1_MOSI	Input mode	No pull-up and no pull-down	**n/a**	DUT_MOSI
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM1	PA8	TIM1_CH1	Input mode	**Pull-up ***	n/a	DUT_IC
TIM4	PB8	TIM4_CH3	Alternate Function Push Pull	n/a	Low	DUT_DAC
	PB9	TIM4_CH4	Alternate Function Push Pull	n/a	Low	DUT_PWM
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	**High ***	IF_TX
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	**n/a**	IF_RX
USART3	PB10	USART3_TX	Alternate Function Push Pull	n/a	**High ***	DUT_TX
	PB11	USART3_RX	Input mode	No pull-up and no pull-down	**n/a**	DUT_RX
	PB13	USART3_CTS	Input mode	No pull-up and no pull-down	**n/a**	DUT_CTS
	PB14	USART3_RTS	Alternate Function Push Pull	n/a	**High ***	DUT_RTS
USB	PA11	USB_DM	n/a	n/a	n/a	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PC13-TAMPER-RTC	GPIO_Output	Output Push Pull	n/a	Low	LED0
	PA0-WKUP	GPIO_Output	Output Push Pull	n/a	Low	DEBUG0
	PA1	GPIO_Output	Output Push Pull	n/a	Low	DEBUG1
	PA2	GPIO_Output	Output Push Pull	n/a	Low	DEBUG2
	PA3	GPIO_Output	Output Push Pull	n/a	Low	DEBUG3
	PA4	GPIO_Output	Output Push Pull	n/a	Low	TEST_FAIL
	PA5	GPIO_Output	Output Push Pull	n/a	Low	TEST_WARN
	PA6	GPIO_Output	Output Push Pull	n/a	Low	TEST_PASS
	PB12	GPIO_Output	Output Push Pull	n/a	Low	DUT_RST
	PB15	GPIO_Input	Input mode	**Pull-up ***	n/a	USER_BTN

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
USART3_RX	DMA1_Channel3	Peripheral To Memory	Low
USART3_TX	DMA1_Channel2	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

USART3_RX: DMA1_Channel3 DMA request Settings:

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

USART3_TX: DMA1_Channel2 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: 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
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 channel2 global interrupt	true	0	0
DMA1 channel3 global interrupt	true	0	0
DMA1 channel4 global interrupt	true	0	0
DMA1 channel5 global interrupt	true	0	0
ADC1 and ADC2 global interrupts	true	0	0
USB low priority or CAN RX0 interrupts	true	0	0
TIM1 update interrupt	true	0	0
I2C1 event interrupt	true	0	0
I2C1 error interrupt	true	0	0
SPI1 global interrupt	true	0	0
USART3 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
RTC global interrupt	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
USB high priority or CAN TX interrupts	unused		
TIM1 break interrupt	unused		
TIM1 trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
TIM4 global interrupt	unused		
USART1 global 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

8. Software Project

8.1. Project Settings

Name	Value
Project Name	bluepill_tester
Project Folder	/home/kevinweiss/WorkingDirectory/Testing/bluepill_tester/bluepill_tester
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_F1 V1.6.1

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	Yes
Set all free pins as analog (to optimize the power consumption)	No

9. Software Pack Report