1. Description

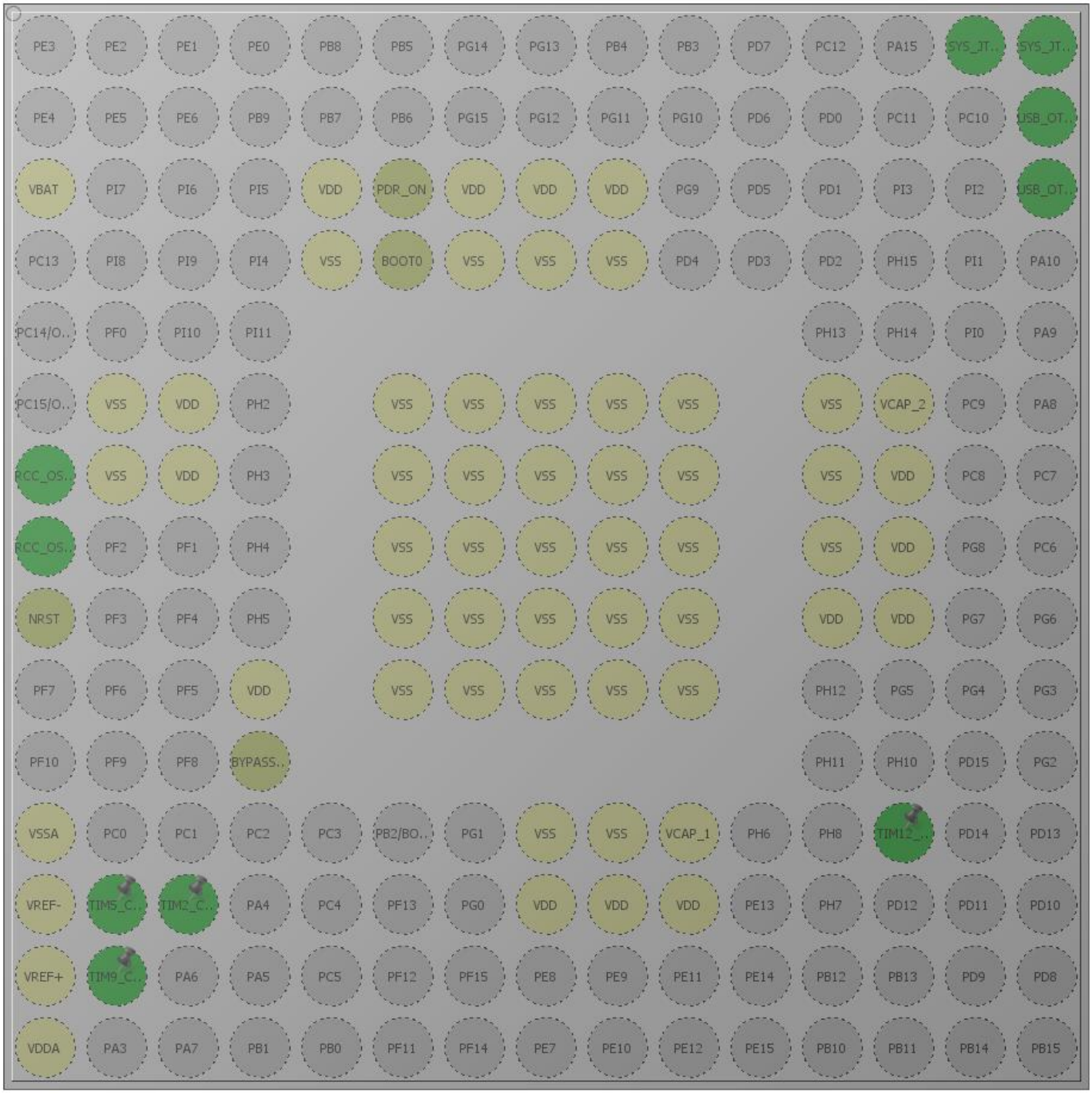
1.1. Project

Project Name	pwm2usb
Board Name	custom
Generated with:	STM32CubeMX 4.27.0
Date	11/21/2018

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F427/437
MCU name	STM32F427IIHx
MCU Package	UFBGA176
MCU Pin number	201

2. Pinout Configuration



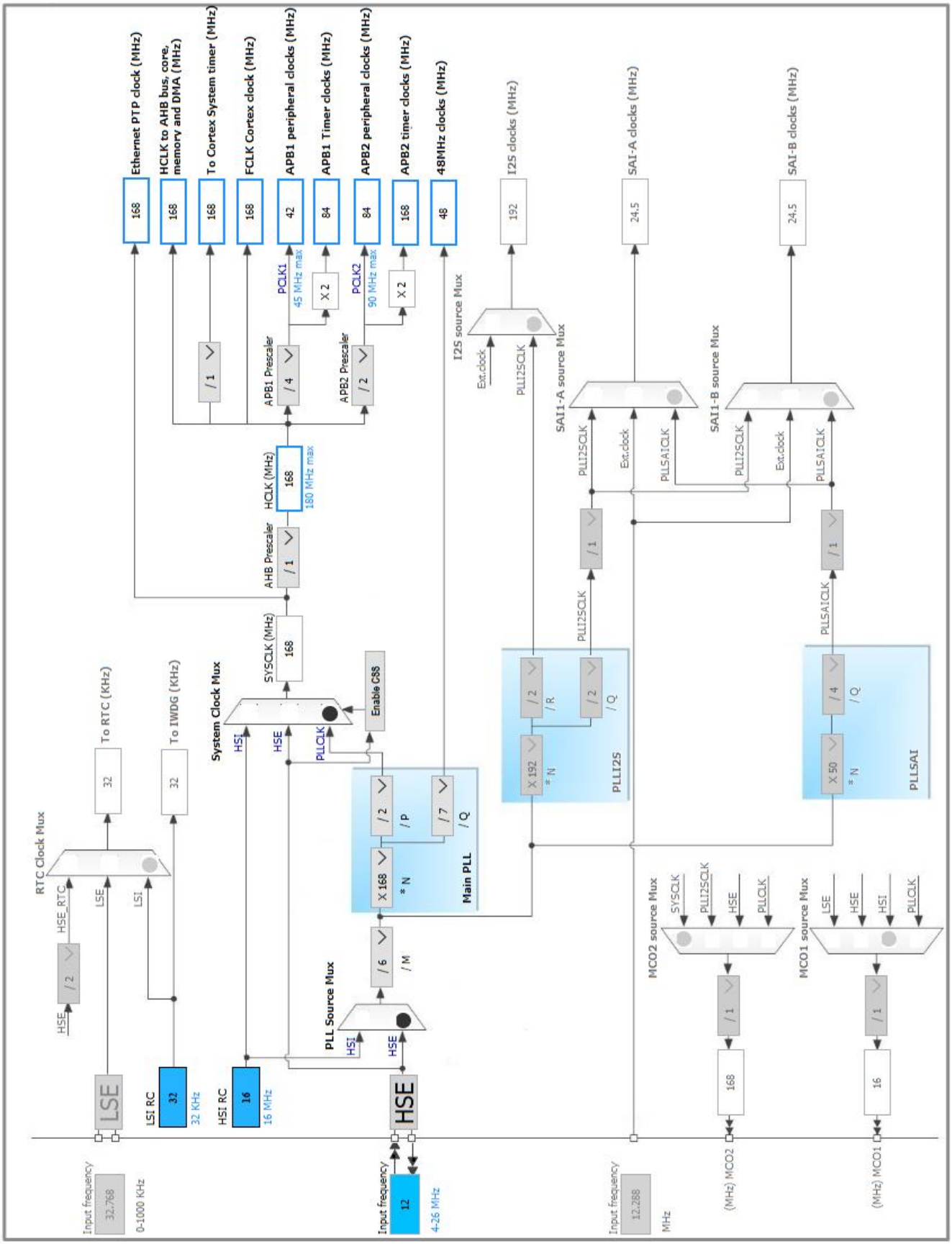
STM32F427IIHx
UFBGA176 +25 (Top view)

3. Pins Configuration

Pin Number UFBGA176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
A14	PA14	I/O	SYS_JTCK-SWCLK	
A15	PA13	I/O	SYS_JTMS-SWDIO	
B15	PA12	I/O	USB_OTG_FS_DP	
C1	VBAT	Power		
C5	VDD	Power		
C6	PDR_ON	Reset		
C7	VDD	Power		
C8	VDD	Power		
C9	VDD	Power		
C15	PA11	I/O	USB_OTG_FS_DM	
D5	VSS	Power		
D6	BOOT0	Boot		
D7	VSS	Power		
D8	VSS	Power		
D9	VSS	Power		
F2	VSS	Power		
F3	VDD	Power		
F6	VSS	Power		
F7	VSS	Power		
F8	VSS	Power		
F9	VSS	Power		
F10	VSS	Power		
F12	VSS	Power		
F13	VCAP_2	Power		
G1	PH0/OSC_IN	I/O	RCC_OSC_IN	
G2	VSS	Power		
G3	VDD	Power		
G6	VSS	Power		
G7	VSS	Power		
G8	VSS	Power		
G9	VSS	Power		
G10	VSS	Power		
G12	VSS	Power		
G13	VDD	Power		
H1	PH1/OSC_OUT	I/O	RCC_OSC_OUT	
H6	VSS	Power		

Pin Number UFBGA176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
H7	VSS	Power		
H8	VSS	Power		
H9	VSS	Power		
H10	VSS	Power		
H12	VSS	Power		
H13	VDD	Power		
J1	NRST	Reset		
J6	VSS	Power		
J7	VSS	Power		
J8	VSS	Power		
J9	VSS	Power		
J10	VSS	Power		
J12	VDD	Power		
J13	VDD	Power		
K4	VDD	Power		
K6	VSS	Power		
K7	VSS	Power		
K8	VSS	Power		
K9	VSS	Power		
K10	VSS	Power		
L4	BYPASS_REG	Reset		
M1	VSSA	Power		
M8	VSS	Power		
M9	VSS	Power		
M10	VCAP_1	Power		
M13	PH9	I/O	TIM12_CH2	
N1	VREF-	Power		
N2	PA1	I/O	TIM5_CH2	
N3	PA0/WKUP	I/O	TIM2_CH1	
N8	VDD	Power		
N9	VDD	Power		
N10	VDD	Power		
P1	VREF+	Power		
P2	PA2	I/O	TIM9_CH1	
R1	VDDA	Power		

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.1.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	5 WS (6 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulatror Voltage Scale	Power Regulator Voltage Scale 1
Power Over Drive	Disabled

5.2. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.3. TIM2

Slave Mode: Reset Mode

Trigger Source: TI1FP1

Clock Source : Internal Clock

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

5.3.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**83 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**10000 ***

Internal Clock Division (CKD)	No Division
Slave Mode Controller	Reset Mode

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

Input Capture Channel 2:

Polarity Selection	**Falling Edge ***
IC Selection	Indirect
Prescaler Division Ratio	No division

5.4. TIM5

Slave Mode: Reset Mode
Trigger Source: TI2FP2
mode: Clock Source
Channel1: Input Capture indirect mode
Channel2: Input Capture direct mode

5.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**83 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**10000 ***
Internal Clock Division (CKD)	No Division
Slave Mode Controller	Reset Mode

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	**Falling Edge ***
IC Selection	Indirect
Prescaler Division Ratio	No division

Input Capture Channel 2:

Polarity Selection	Rising Edge

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

5.5. TIM9

Slave Mode: Reset Mode
Trigger Source: TI1FP1
mode: Clock Source
Channel1: Input Capture direct mode
Channel2: Input Capture indirect mode

5.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**167 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10000 ***
Internal Clock Division (CKD)	No Division
Slave Mode Controller	Reset Mode

Input Capture Channel 1:

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

Input Capture Channel 2:

Polarity Selection	**Falling Edge ***
IC Selection	Indirect
Prescaler Division Ratio	No division

5.6. TIM12

Slave Mode: Reset Mode
Trigger Source: TI2FP2
mode: Clock Source
Channel1: Input Capture indirect mode
Channel2: Input Capture direct mode

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**83 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10000 ***
Internal Clock Division (CKD)	No Division
Slave Mode Controller	Reset Mode

Input Capture Channel 1:

Polarity Selection	**Falling Edge ***
IC Selection	Indirect
Prescaler Division Ratio	No division

Input Capture Channel 2:

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

5.7. USB_OTG_FS

Mode: Device_Only

5.7.1. Parameter Settings:

Speed	Device Full Speed 12MBit/s
Endpoint 0 Max Packet size	64 Bytes
Enable internal IP DMA	Disabled
Low power	Disabled
Link Power Management	Disabled
VBUS sensing	Disabled
Signal start of frame	Disabled

5.8. USB_DEVICE

Class For FS IP: Custom Human Interface Device Class (HID)

5.8.1. 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_CUSTOM_HID_REPORT_DESC_SIZE (Total length for Report descriptor (IN ENDPOINT))	**32 ***
USBD_CUSTOMHID_OUTREPORT_BUF_SIZE (Maximum report buffer size (OUT ENDPOINT))	**8 ***

5.8.2. 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)	**22352 ***
PRODUCT_STRING (Product Identifier)	STM32 Custom Human interface
SERIALNUMBER_STRING (Serial number)	00000000001A
CONFIGURATION_STRING (Configuration Identifier)	Custom HID Config
INTERFACE_STRING (Interface Identifier)	Custom HID 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
RCC	PH0/OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1/OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SYS	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
TIM2	PA0/WKUP	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM5	PA1	TIM5_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM9	PA2	TIM9_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM12	PH9	TIM12_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USB_OTG_FS	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	

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
TIM1 break interrupt and TIM9 global interrupt	true	0	0
TIM2 global interrupt	true	0	0
TIM8 break interrupt and TIM12 global interrupt	true	0	0
TIM5 global interrupt	true	0	0
USB On The Go FS global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F427/437
MCU	STM32F427IIHx
Datasheet	024030_Rev9

7.2. Parameter Selection

Temperature	25
Vdd	null

8. Software Project

8.1. Project Settings

Name	Value
Project Name	pwm2usb
Project Folder	C:\Users\alvin\Desktop\stm-rc-usb
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F4 V1.21.0

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

9. Software Pack Report