1. Description

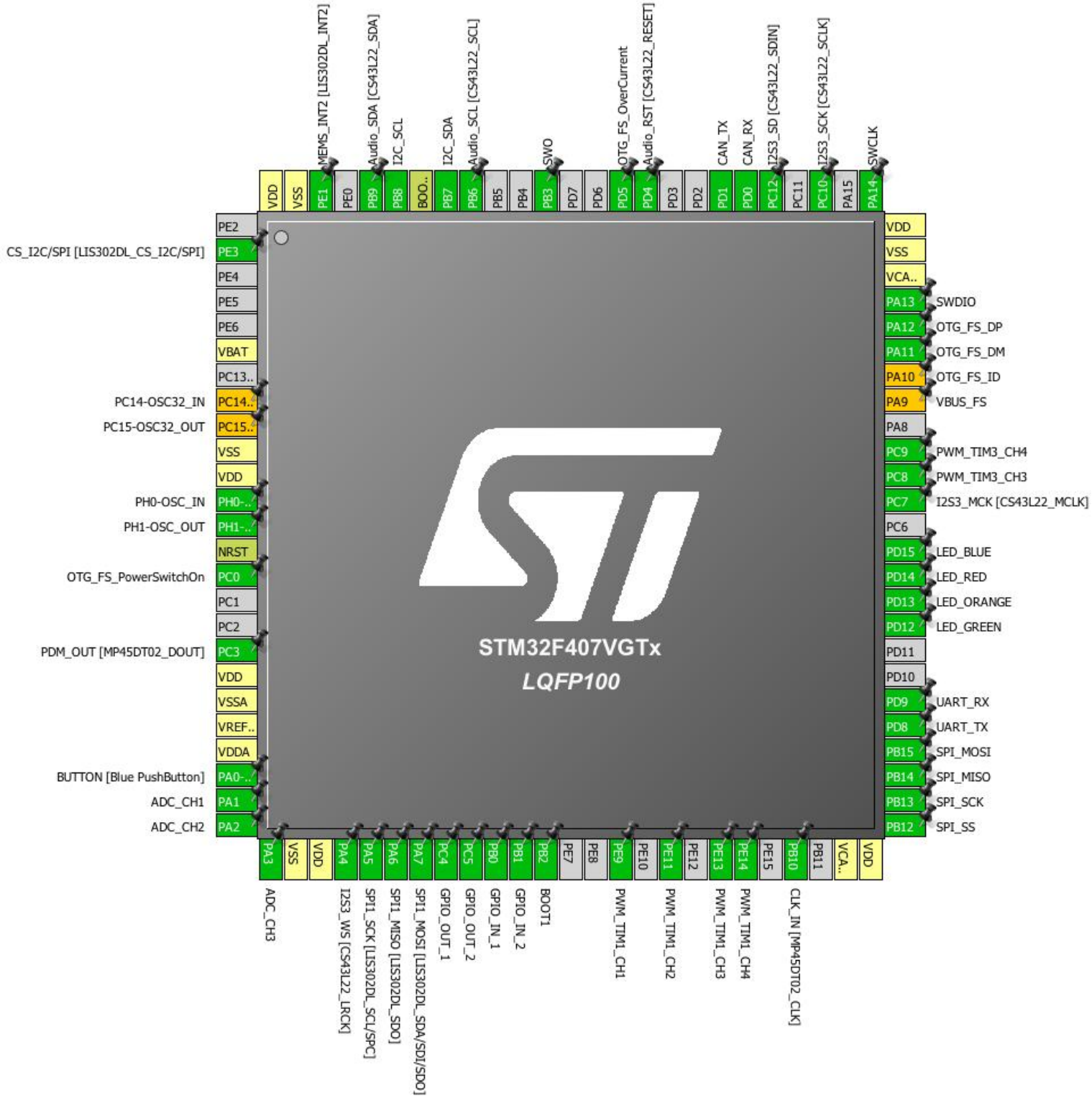
1.1. Project

Project Name	discoveryf4
Board Name	STM32F4DISCOVERY
Generated with:	STM32CubeMX 4.14.0
Date	05/06/2016

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VGTx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
2	PE3 *	I/O	GPIO_Output	CS_I2C/SPI [LIS302DL_CS_I2C/SPI]
6	VBAT	Power		
8	PC14-OSC32_IN **	I/O	RCC_OSC32_IN	PC14-OSC32_IN
9	PC15-OSC32_OUT **	I/O	RCC_OSC32_OUT	PC15-OSC32_OUT
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	PH0-OSC_IN
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	PH1-OSC_OUT
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Output	OTG_FS_PowerSwitchOn
18	PC3 *	I/O	GPIO_Output	PDM_OUT [MP45DT02_DOUT]
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	GPIO_EXTI0	BUTTON [Blue PushButton]
24	PA1	I/O	ADC1_IN1	ADC_CH1
25	PA2	I/O	ADC1_IN2	ADC_CH2
26	PA3	I/O	ADC1_IN3	ADC_CH3
27	VSS	Power		
28	VDD	Power		
29	PA4 *	I/O	GPIO_Output	I2S3_WS [CS43L22_LRCK]
30	PA5 *	I/O	GPIO_Output	SPI1_SCK [LIS302DL_SCL/SPC]
31	PA6 *	I/O	GPIO_Output	SPI1_MISO [LIS302DL_SDO]
32	PA7 *	I/O	GPIO_Output	SPI1_MOSI [LIS302DL_SDA/SDI/SDO]
33	PC4 *	I/O	GPIO_Output	GPIO_OUT_1
34	PC5 *	I/O	GPIO_Output	GPIO_OUT_2
35	PB0 *	I/O	GPIO_Input	GPIO_IN_1
36	PB1 *	I/O	GPIO_Input	GPIO_IN_2
37	PB2 *	I/O	GPIO_Input	BOOT1
40	PE9	I/O	TIM1_CH1	PWM_TIM1_CH1
42	PE11	I/O	TIM1_CH2	PWM_TIM1_CH2

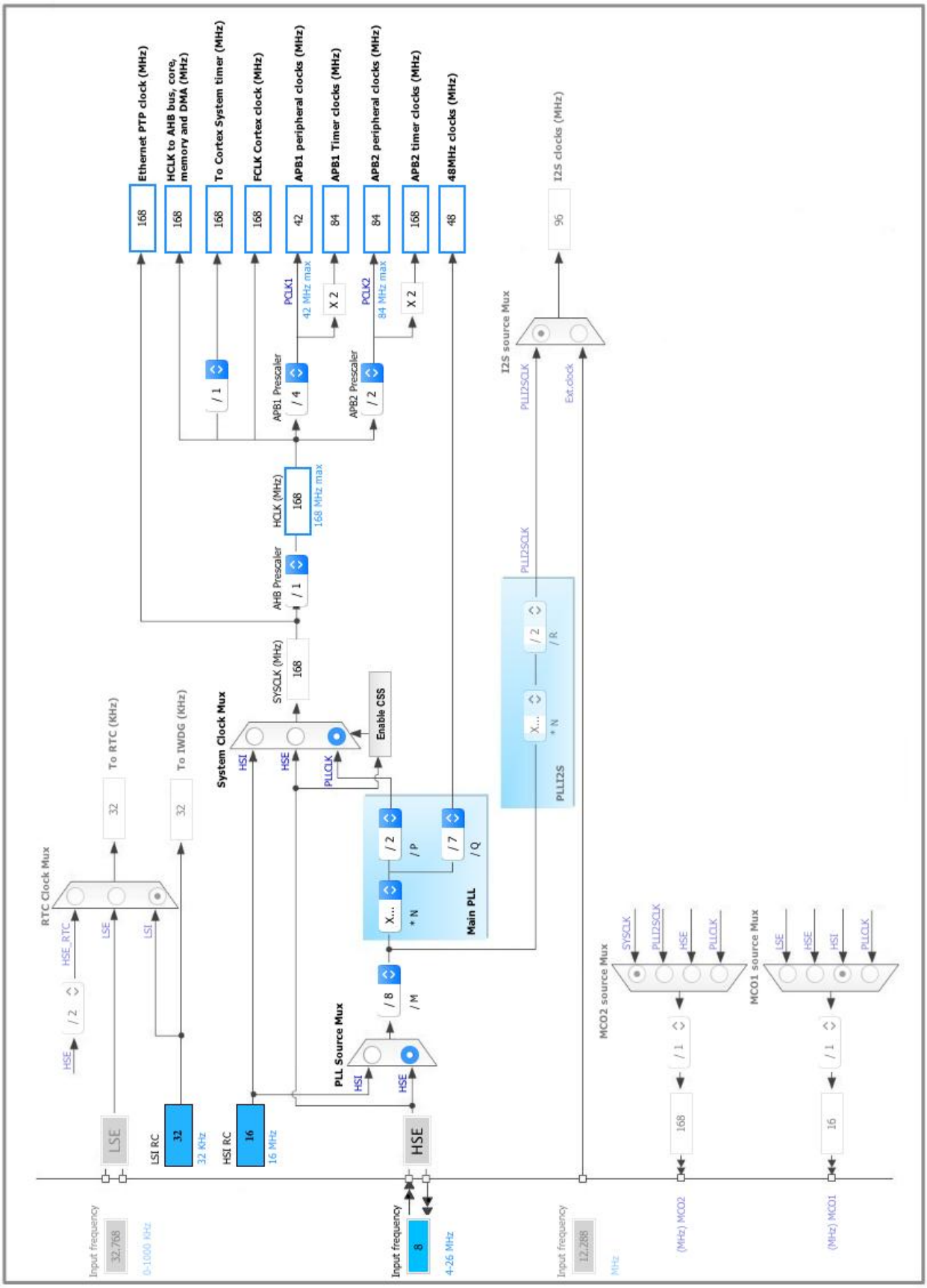
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
44	PE13	I/O	TIM1_CH3	PWM_TIM1_CH3
45	PE14	I/O	TIM1_CH4	PWM_TIM1_CH4
47	PB10 *	I/O	GPIO_Output	CLK_IN [MP45DT02_CLK]
49	VCAP_1	Power		
50	VDD	Power		
51	PB12 *	I/O	GPIO_Output	SPI_SS
52	PB13	I/O	SPI2_SCK	SPI_SCK
53	PB14	I/O	SPI2_MISO	SPI_MISO
54	PB15	I/O	SPI2_MOSI	SPI_MOSI
55	PD8	I/O	USART3_TX	UART_TX
56	PD9	I/O	USART3_RX	UART_RX
59	PD12 *	I/O	GPIO_Output	LED_GREEN
60	PD13 *	I/O	GPIO_Output	LED_ORANGE
61	PD14 *	I/O	GPIO_Output	LED_RED
62	PD15 *	I/O	GPIO_Output	LED_BLUE
64	PC7 *	I/O	GPIO_Output	I2S3_MCK [CS43L22_MCLK]
65	PC8	I/O	TIM3_CH3	PWM_TIM3_CH3
66	PC9	I/O	TIM3_CH4	PWM_TIM3_CH4
68	PA9 **	I/O	USB_OTG_FS_VBUS	VBUS_FS
69	PA10 **	I/O	USB_OTG_FS_ID	OTG_FS_ID
70	PA11	I/O	USB_OTG_FS_DM	OTG_FS_DM
71	PA12	I/O	USB_OTG_FS_DP	OTG_FS_DP
72	PA13	I/O	SYS_JTMS-SWDIO	SWDIO
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	SWCLK
78	PC10 *	I/O	GPIO_Output	I2S3_SCK [CS43L22_SCLK]
80	PC12 *	I/O	GPIO_Output	I2S3_SD [CS43L22_SDIN]
81	PD0	I/O	CAN1_RX	CAN_RX
82	PD1	I/O	CAN1_TX	CAN_TX
85	PD4 *	I/O	GPIO_Output	Audio_RST [CS43L22_RESET]
86	PD5 *	I/O	GPIO_Input	OTG_FS_OverCurrent
89	PB3	I/O	SYS_JTDO-SWO	SWO
92	PB6 *	I/O	GPIO_Output	Audio_SCL [CS43L22_SCL]
93	PB7	I/O	I2C1_SDA	I2C_SDA
94	BOOT0	Boot		

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
95	PB8	I/O	I2C1_SCL	I2C_SCL
96	PB9 *	I/O	GPIO_Output	Audio_SDA [CS43L22_SDA]
98	PE1	I/O	GPIO_EXTI1	MEMS_INT2 [LIS302DL_INT2]
99	VSS	Power		
100	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. ADC1

mode: IN1

mode: IN2

mode: IN3

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	**PCLK2 divided by 8 ***
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	**Enabled ***
Continuous Conversion Mode	**Enabled ***
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	**Enabled ***
End Of Conversion Selection	EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion	**3 ***
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 1
Sampling Time	**480 Cycles ***
Rank	**2 ***
Channel	**Channel 2 ***
Sampling Time	**480 Cycles ***
Rank	**3 ***
Channel	**Channel 3 ***
Sampling Time	**480 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.2. CAN1

mode: Mode

5.2.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum)	16
Time Quantum	**380.95238095238096 ***
Time Quanta in Bit Segment 1	1 Time
Time Quanta in Bit Segment 2	1 Time
Time for one Bit	**1142 ***
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:

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	Disabled

Primary slave address	0
General Call address detection	Disabled

5.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.4.1. 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

Power Parameters:

Power Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.5. SPI2

Mode: Full-Duplex Master

5.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**64 ***
Baud Rate	**656.25 KBits/s ***
Clock Polarity (CPOL)	**High ***
Clock Phase (CPHA)	**2 Edge ***

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

5.6. SYS

Debug: SWD and Asynchronous Trace

Timebase Source: SysTick

5.7. TIM1

Clock Source : Internal Clock

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**167 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**3000 ***
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	Reset (UG bit from TIMx_EGR)

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

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

5.8. TIM3

Channel3: PWM Generation CH3
Channel4: PWM Generation CH4

5.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**50000 ***
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	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 3:

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

PWM Generation Channel 4:

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

5.9. TIM5

mode: Clock Source

Channel1: Output Compare No Output

5.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**83 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**4294967295 ***
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	Reset (UG bit from TIMx_EGR)

Output Compare No Output Channel 1:

Mode	Frozen (used for Timing base)
Pulse (32 bits value)	0
CH Polarity	High

5.10. USART3

Mode: Asynchronous

5.10.1. 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

5.11. USB_OTG_FS

Mode: Device_Only

5.11.1. 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	Enabled

5.12. USB_DEVICE

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

5.12.1. 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)	**Enabled ***
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

5.12.2. 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
ADC1	PA1	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	ADC_CH1
	PA2	ADC1_IN2	Analog mode	No pull-up and no pull-down	n/a	ADC_CH2
	PA3	ADC1_IN3	Analog mode	No pull-up and no pull-down	n/a	ADC_CH3
CAN1	PD0	CAN1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	CAN_RX
	PD1	CAN1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	CAN_TX
I2C1	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**High ***	I2C_SDA
	PB8	I2C1_SCL	Alternate Function Open Drain	Pull-up	**High ***	I2C_SCL
RCC	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	PH0-OSC_IN
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	PH1-OSC_OUT
SPI2	PB13	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	SPI_SCK
	PB14	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	SPI_MISO
	PB15	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	SPI_MOSI
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	SWDIO
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	SWCLK
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	SWO
TIM1	PE9	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_TIM1_CH1
	PE11	TIM1_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_TIM1_CH2
	PE13	TIM1_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_TIM1_CH3
	PE14	TIM1_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_TIM1_CH4
TIM3	PC8	TIM3_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_TIM3_CH3
	PC9	TIM3_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_TIM3_CH4
USART3	PD8	USART3_TX	Alternate Function Push Pull	Pull-up	**High ***	UART_TX
	PD9	USART3_RX	Alternate Function Push Pull	Pull-up	**High ***	UART_RX
USB_OTG_FS	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_FS_DM
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_FS_DP

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
Single Mapped Signals	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	PC14-OSC32_IN
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	PC15-OSC32_OUT
	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	n/a	VBUS_FS
	PA10	USB_OTG_FS_ID	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_FS_ID
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CS_I2C/SPI [LIS302DL_CS_I2C/SPI]
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OTG_FS_PowerSwitchOn
	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PDM_OUT [MP45DT02_DOUT]
	PA0-WKUP	GPIO_EXTI0	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	BUTTON [Blue PushButton]
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	I2S3_WS [CS43L22_LRCK]
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_SCK [LIS302DL_SCL/SPC]
	PA6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_MISO [LIS302DL_SDO]
	PA7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_MOSI [LIS302DL_SDA/SDI/SDO]
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_OUT_1
	PC5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_OUT_2
	PB0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_IN_1
	PB1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_IN_2
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOOT1
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CLK_IN [MP45DT02_CLK]
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI_SS
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_GREEN
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_ORANGE
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_RED
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_BLUE
	PC7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	I2S3_MCK [CS43L22_MCLK]
	PC10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	I2S3_SCK [CS43L22_SCLK]
	PC12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	I2S3_SD [CS43L22_SDIN]
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Audio_RST [CS43L22_RESET]

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PD5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	OTG_FS_OverCurrent
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Audio_SCL [CS43L22_SCL]
	PB9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Audio_SDA [CS43L22_SDA]
	PE1	GPIO_EXTI1	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	MEMS_INT2 [LIS302DL_INT2]

6.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA2_Stream0	Peripheral To Memory	Low

ADC1: DMA2_Stream0 DMA request Settings:

Mode:	**Circular ***
Use fifo:	Disable
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
Pre-fetch fault, memory access fault	true	0	0
Undefined instruction or illegal state	true	0	0
Debug monitor	true	0	0
System tick timer	true	0	0
ADC1, ADC2 and ADC3 global interrupts	true	0	0
I2C1 event interrupt	true	0	0
I2C1 error interrupt	true	0	0
SPI2 global interrupt	true	0	0
USART3 global interrupt	true	0	0
DMA2 stream0 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		
CAN1 TX interrupts	unused		
CAN1 RX0 interrupts	unused		
CAN1 RX1 interrupt	unused		
CAN1 SCE interrupt	unused		
TIM1 break interrupt and TIM9 global interrupt	unused		
TIM1 update interrupt and TIM10 global interrupt	unused		
TIM1 trigger and commutation interrupts and TIM11 global interrupt	unused		
TIM1 capture compare interrupt	unused		
TIM3 global interrupt	unused		
TIM5 global interrupt	unused		

*** User modified value**

7. Power Plugin report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev6

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	discoveryf4
Project Folder	/Users/bode/Projects/Phoenix/GitHub/tum-phoenix/firmware-template-discoveryf4
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_F4 V1.11.0

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