1. Description

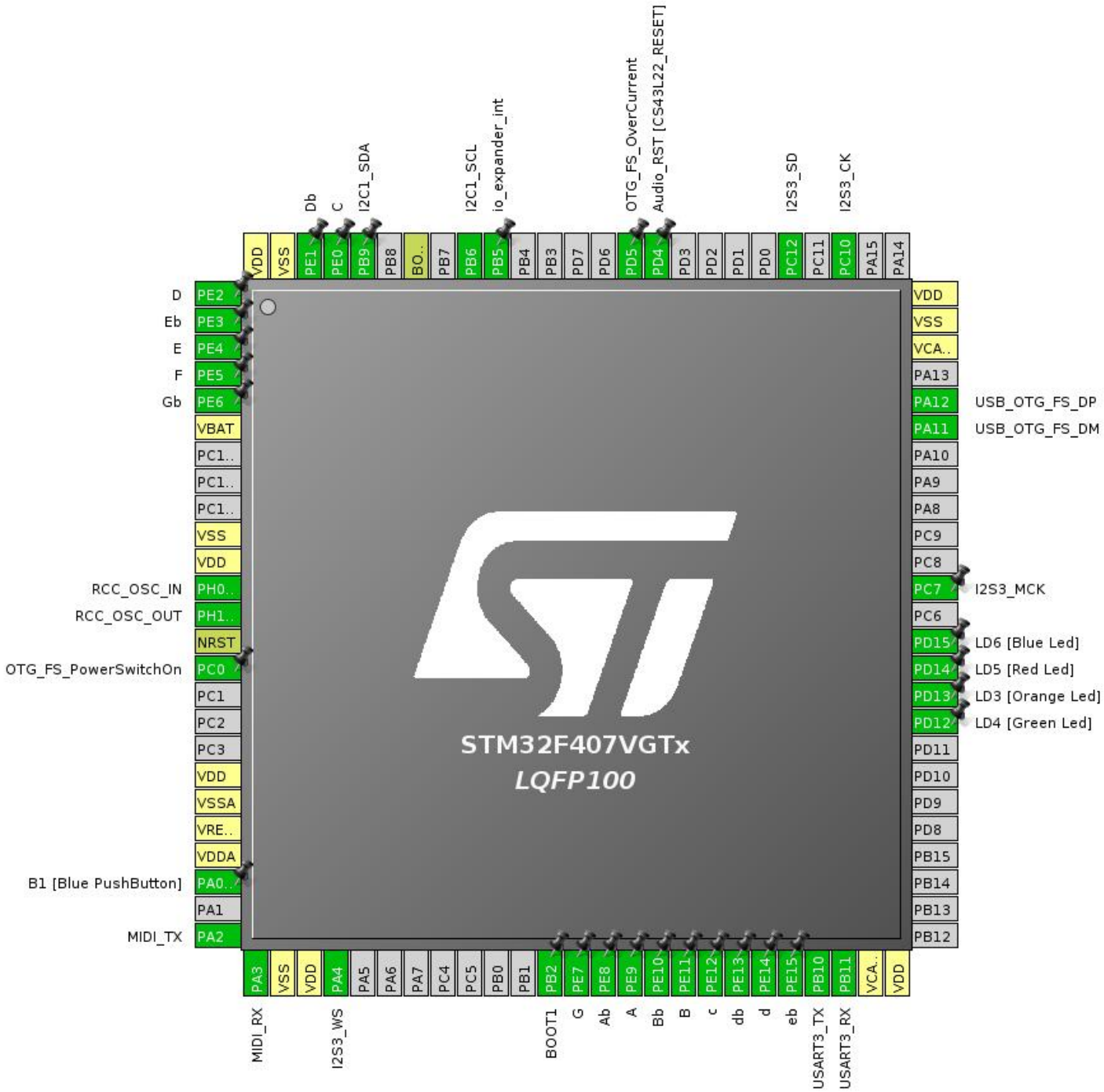
1.1. Project

Project Name	hjalmar
Board Name	STM32F4DISCOVERY
Generated with:	STM32CubeMX 4.23.0
Date	01/07/2018

1.2. MCU

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

2. Pinout Configuration



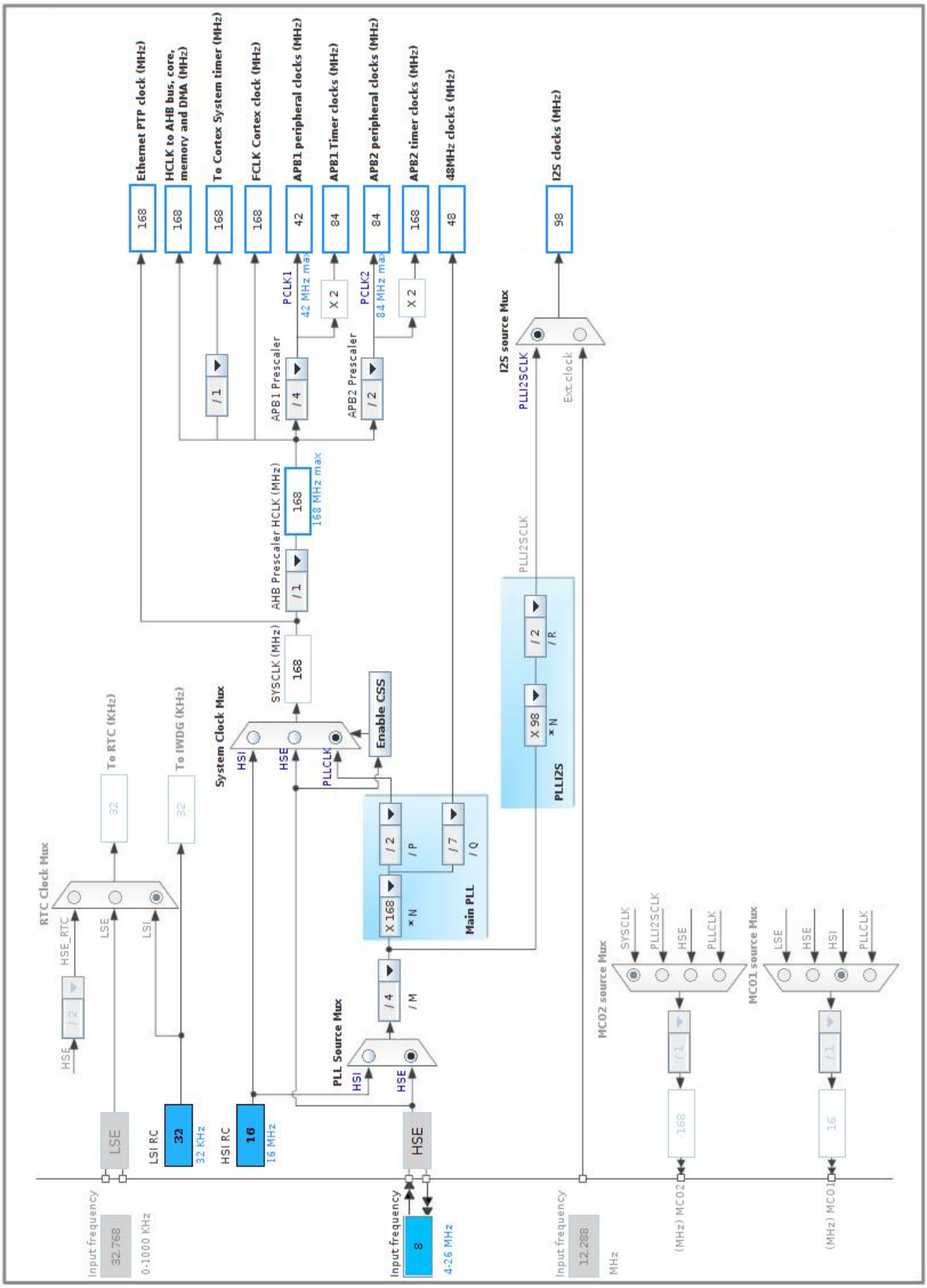
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Input	D
2	PE3 *	I/O	GPIO_Input	Eb
3	PE4 *	I/O	GPIO_Input	E
4	PE5 *	I/O	GPIO_Input	F
5	PE6 *	I/O	GPIO_Input	Gb
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Output	OTG_FS_PowerSwitchOn
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	GPIO_EXTI0	B1 [Blue PushButton]
25	PA2	I/O	USART2_TX	MIDI_TX
26	PA3	I/O	USART2_RX	MIDI_RX
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	I2S3_WS	
37	PB2 *	I/O	GPIO_Input	BOOT1
38	PE7 *	I/O	GPIO_Input	G
39	PE8 *	I/O	GPIO_Input	Ab
40	PE9 *	I/O	GPIO_Input	A
41	PE10 *	I/O	GPIO_Input	Bb
42	PE11 *	I/O	GPIO_Input	B
43	PE12 *	I/O	GPIO_Input	c
44	PE13 *	I/O	GPIO_Input	db
45	PE14 *	I/O	GPIO_Input	d
46	PE15 *	I/O	GPIO_Input	eb
47	PB10	I/O	USART3_TX	
48	PB11	I/O	USART3_RX	
49	VCAP_1	Power		
50	VDD	Power		

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
59	PD12 *	I/O	GPIO_Output	LD4 [Green Led]
60	PD13 *	I/O	GPIO_Output	LD3 [Orange Led]
61	PD14 *	I/O	GPIO_Output	LD5 [Red Led]
62	PD15 *	I/O	GPIO_Output	LD6 [Blue Led]
64	PC7	I/O	I2S3_MCK	
70	PA11	I/O	USB_OTG_FS_DM	
71	PA12	I/O	USB_OTG_FS_DP	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
78	PC10	I/O	I2S3_CK	
80	PC12	I/O	I2S3_SD	
85	PD4 *	I/O	GPIO_Output	Audio_RST [CS43L22_RESET]
86	PD5 *	I/O	GPIO_Input	OTG_FS_OverCurrent
91	PB5	I/O	GPIO_EXTI5	io_expander_int
92	PB6	I/O	I2C1_SCL	
94	BOOT0	Boot		
96	PB9	I/O	I2C1_SDA	
97	PE0 *	I/O	GPIO_Input	C
98	PE1 *	I/O	GPIO_Input	Db
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. I2C1

I2C: I2C

5.1.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

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

5.2. I2S3

Mode: Half-Duplex Master

mode: Master Clock Output

5.2.1. Parameter Settings:

Generic Parameters:

Transmission Mode	Mode Master Transmit
Communication Standard	I2S Philips
Data and Frame Format	16 Bits Data on 16 Bits Frame
Selected Audio Frequency	**96 KHz ***
Real Audio Frequency	**95.703 KHz ***
Error between Selected and Real	**-0.3 % ***

Clock Parameters:

Clock Source	I2S PLL Clock
Clock Polarity	Low

5.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.3.1. 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
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.4. SYS

Timebase Source: SysTick

5.5. TIM6

mode: Activated

5.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**(uint32_t) (SystemCoreClock/8000) - 1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1 ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.6. TIM7

mode: Activated

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**(uint32_t) (SystemCoreClock/800) - 1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1 ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.7. USART2

Mode: Asynchronous

5.7.1. Parameter Settings:

Basic Parameters:

Baud Rate	**31250 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

5.8. USART3

Mode: Asynchronous

5.8.1. Parameter Settings:

Basic Parameters:

Baud Rate	115200
Word Length	8 Bits (including Parity)
Parity	None

Stop Bits	1

Advanced Parameters:

Data Direction	**Transmit Only ***
Over Sampling	16 Samples

5.9. USB_OTG_FS

Mode: Device_Only

5.9.1. 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

5.10. USB_DEVICE

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

5.10.1. 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	2048
USB CDC Tx Buffer Size	2048

5.10.2. 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
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
I2S3	PA4	I2S3_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC7	I2S3_MCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC10	I2S3_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC12	I2S3_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	
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	
USART2	PA2	USART2_TX	Alternate Function Push Pull	Pull-up	**Very High ***	MIDI_TX
	PA3	USART2_RX	Alternate Function Push Pull	Pull-up	**Very High ***	MIDI_RX
USART3	PB10	USART3_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PB11	USART3_RX	Alternate Function Push Pull	Pull-up	**Very High ***	
USB_OTG_FS	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
GPIO	PE2	GPIO_Input	Input mode	**Pull-up ***	n/a	D
	PE3	GPIO_Input	Input mode	**Pull-up ***	n/a	Eb
	PE4	GPIO_Input	Input mode	**Pull-up ***	n/a	E
	PE5	GPIO_Input	Input mode	**Pull-up ***	n/a	F
	PE6	GPIO_Input	Input mode	**Pull-up ***	n/a	Gb
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OTG_FS_PowerSwitchOn
	PA0-WKUP	GPIO_EXTI0	**External Event Mode with Rising edge**	No pull-up and no pull-down	n/a	B1 [Blue PushButton]

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
			trigger detection *			
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOOT1
	PE7	GPIO_Input	Input mode	**Pull-up ***	n/a	G
	PE8	GPIO_Input	Input mode	**Pull-up ***	n/a	Ab
	PE9	GPIO_Input	Input mode	**Pull-up ***	n/a	A
	PE10	GPIO_Input	Input mode	**Pull-up ***	n/a	Bb
	PE11	GPIO_Input	Input mode	**Pull-up ***	n/a	B
	PE12	GPIO_Input	Input mode	**Pull-up ***	n/a	c
	PE13	GPIO_Input	Input mode	**Pull-up ***	n/a	db
	PE14	GPIO_Input	Input mode	**Pull-up ***	n/a	d
	PE15	GPIO_Input	Input mode	**Pull-up ***	n/a	eb
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD4 [Green Led]
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Orange Led]
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD5 [Red Led]
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD6 [Blue Led]
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Audio_RST [CS43L22_RESET]
	PD5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	OTG_FS_OverCurrent
	PB5	GPIO_EXTI5	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	io_expander_int
	PE0	GPIO_Input	Input mode	**Pull-up ***	n/a	C
	PE1	GPIO_Input	Input mode	**Pull-up ***	n/a	Db

6.2. DMA configuration

DMA request	Stream	Direction	Priority
USART3_TX	DMA1_Stream3	Memory To Peripheral	Low
USART2_RX	DMA1_Stream5	Peripheral To Memory	**Very High ***
USART2_TX	DMA1_Stream6	Memory To Peripheral	Low
SPI3_TX	DMA1_Stream7	Memory To Peripheral	Low

USART3_TX: DMA1_Stream3 DMA request Settings:

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

USART2_RX: DMA1_Stream5 DMA request Settings:

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

USART2_TX: DMA1_Stream6 DMA request Settings:

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

SPI3_TX: DMA1_Stream7 DMA request Settings:

Mode:	Normal
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
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 stream3 global interrupt	true	0	0
DMA1 stream5 global interrupt	true	0	0
DMA1 stream6 global interrupt	true	0	0
USART2 global interrupt	true	0	0
USART3 global interrupt	true	0	0
DMA1 stream7 global interrupt	true	0	0
SPI3 global interrupt	true	0	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	0	0
TIM7 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		
EXTI line[9:5] interrupts	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	hjalmar
Project Folder	/home/jaxc/workspace/hjalmar
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F4 V1.18.0

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