1. Description

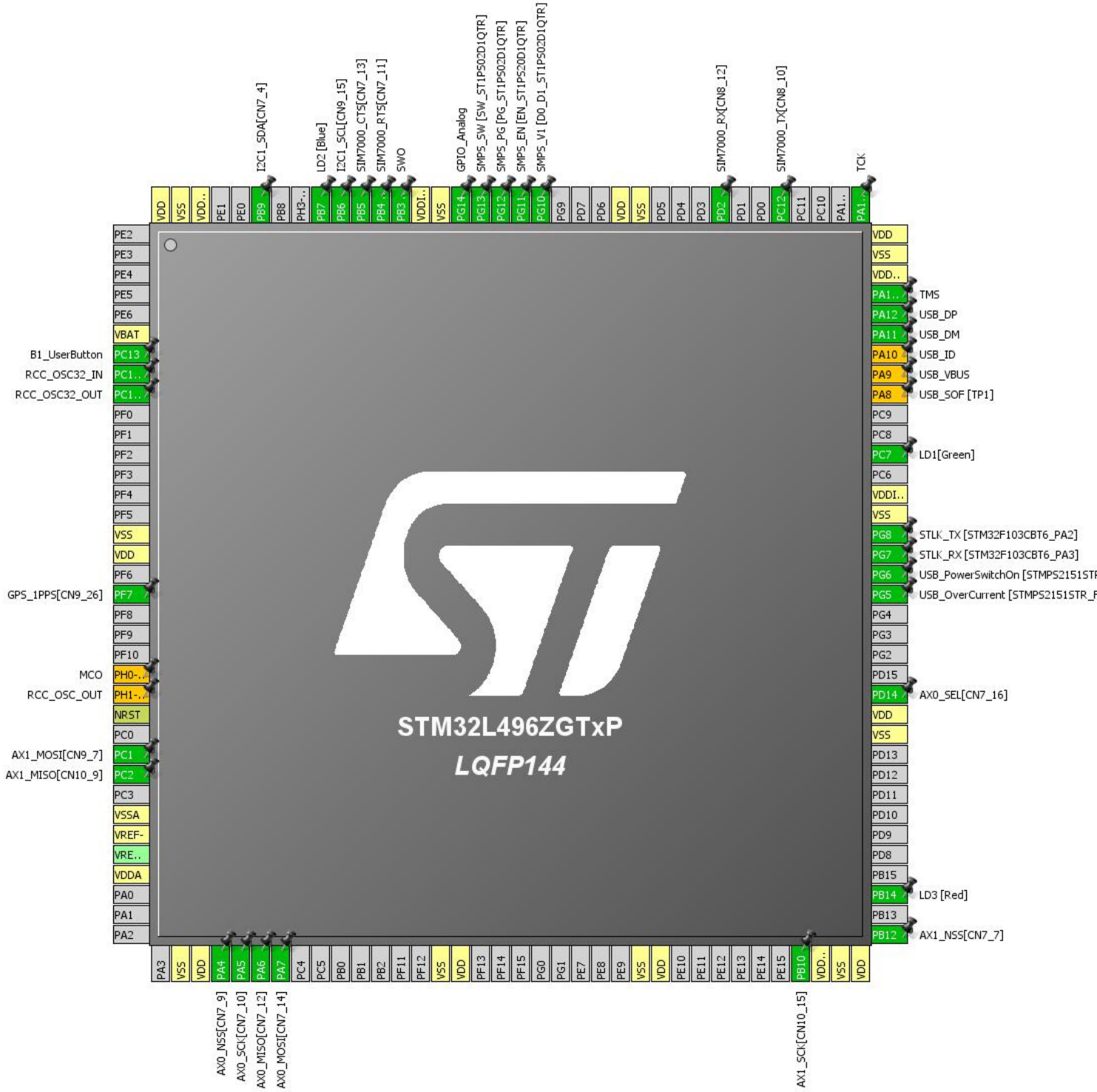
1.1. Project

Project Name	FindMeSAT_V2
Board Name	NUCLEO-L496ZG-P
Generated with:	STM32CubeMX 4.24.0
Date	04/21/2018

1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x6
MCU name	STM32L496ZGTxP
MCU Package	LQFP144
MCU Pin number	144

2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
7	PC13	I/O	GPIO_EXTI13	B1_UserButton
8	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
16	VSS	Power		
17	VDD	Power		
19	PF7	I/O	TIM5_CH2	GPS_1PPS[CN9_26]
23	PH0-OSC_IN (PH0) *	I/O	RCC_OSC_IN	MCO
24	PH1-OSC_OUT (PH1) *	I/O	RCC_OSC_OUT	
25	NRST	Reset		
27	PC1	I/O	SPI2_MOSI	AX1_MOSI[CN9_7]
28	PC2	I/O	SPI2_MISO	AX1_MISO[CN10_9]
30	VSSA	Power		
31	VREF-	Power		
33	VDDA	Power		
38	VSS	Power		
39	VDD	Power		
40	PA4	I/O	SPI1_NSS	AX0_NSS[CN7_9]
41	PA5	I/O	SPI1_SCK	AX0_SCK[CN7_10]
42	PA6	I/O	SPI1_MISO	AX0_MISO[CN7_12]
43	PA7	I/O	SPI1_MOSI	AX0_MOSI[CN7_14]
51	VSS	Power		
52	VDD	Power		
61	VSS	Power		
62	VDD	Power		
69	PB10	I/O	SPI2_SCK	AX1_SCK[CN10_15]
70	VDD12	Power		
71	VSS	Power		
72	VDD	Power		
73	PB12	I/O	SPI2_NSS	AX1_NSS[CN7_7]
75	PB14 **	I/O	GPIO_Output	LD3 [Red]
83	VSS	Power		
84	VDD	Power		
85	PD14 **	I/O	GPIO_Output	AX0_SEL[CN7_16]
90	PG5 **	I/O	GPIO_Input	USB_OverCurrent [STMPS2151STR_FAULT]

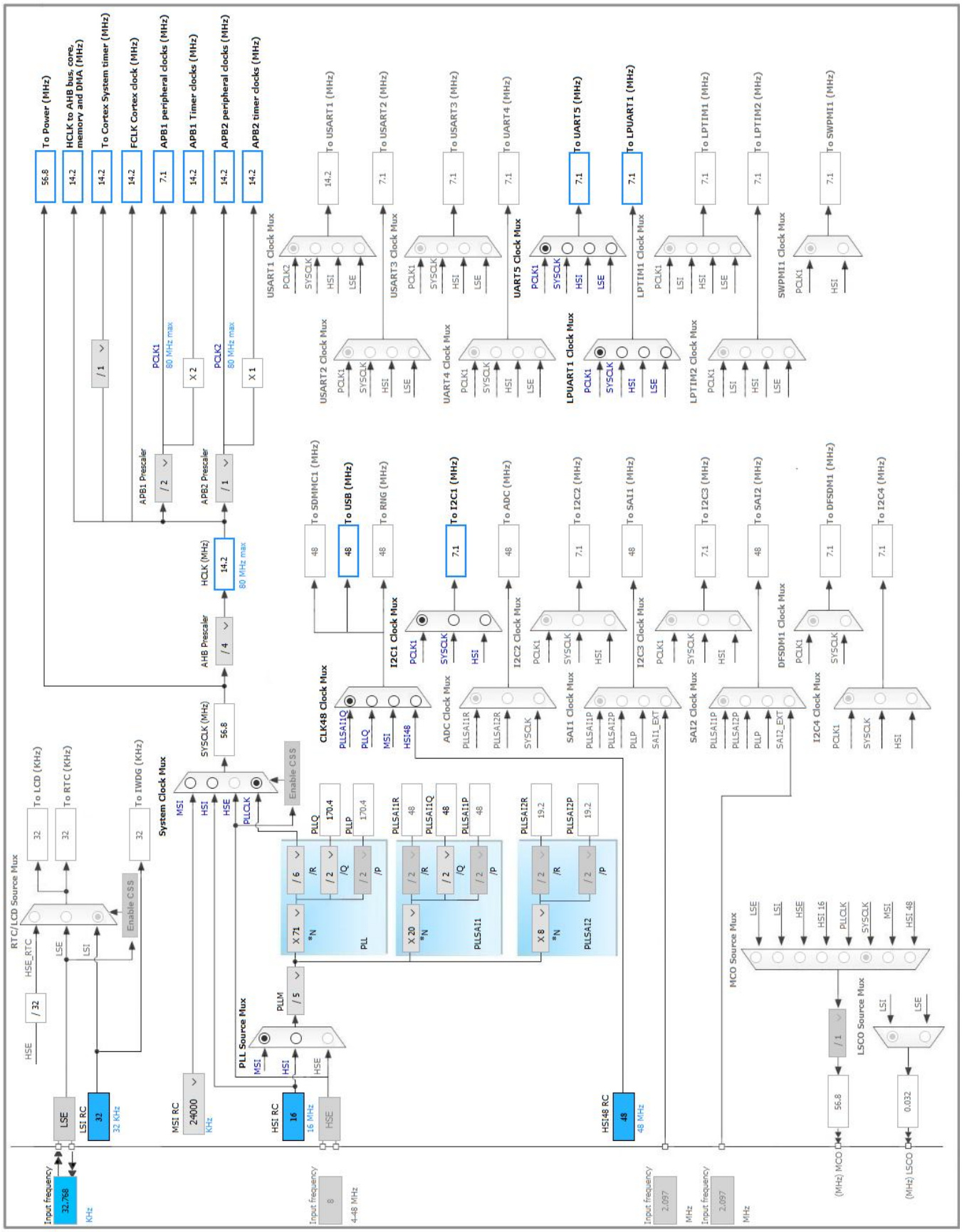
Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
91	PG6 **	I/O	GPIO_Output	USB_PowerSwitchOn [STMPS2151STR_EN]
92	PG7	I/O	LPUART1_TX	STLK_RX [STM32F103CBT6_PA3]
93	PG8	I/O	LPUART1_RX	STLK_TX [STM32F103CBT6_PA2]
94	VSS	Power		
95	VDDIO2	Power		
97	PC7 **	I/O	GPIO_Output	LD1[Green]
100	PA8 *	I/O	USB_OTG_FS_SOF	USB_SOF [TP1]
101	PA9 *	I/O	USB_OTG_FS_VBUS	USB_VBUS
102	PA10 *	I/O	USB_OTG_FS_ID	USB_ID
103	PA11	I/O	USB_OTG_FS_DM	USB_DM
104	PA12	I/O	USB_OTG_FS_DP	USB_DP
105	PA13 (JTMS/SWDIO)	I/O	SYS_JTMS-SWDIO	TMS
106	VDDUSB	Power		
107	VSS	Power		
108	VDD	Power		
109	PA14 (JTCK/SWCLK)	I/O	SYS_JTCK-SWCLK	TCK
113	PC12	I/O	UART5_TX	SIM7000_TX[CN8_10]
116	PD2	I/O	UART5_RX	SIM7000_RX[CN8_12]
120	VSS	Power		
121	VDD	Power		
125	PG10 **	I/O	GPIO_Output	SMPS_V1 [D0_D1_ST1PS02D1QTR]
126	PG11 **	I/O	GPIO_Output	SMPS_EN [EN_ST1PS20D1QTR]
127	PG12 **	I/O	GPIO_Input	SMPS_PG [PG_ST1PS02D1QTR]
128	PG13 **	I/O	GPIO_Output	SMPS_SW [SW_ST1PS02D1QTR]
129	PG14 **	I/O	GPIO_Analog	
130	VSS	Power		
131	VDDIO2	Power		
132	PB3 (JTDO/TRACESWO)	I/O	SYS_JTDO-SWO	SWO
133	PB4 (NJTRST)	I/O	UART5_RTS	SIM7000_RTS[CN7_11]
134	PB5	I/O	UART5_CTS	SIM7000_CTS[CN7_13]
135	PB6	I/O	I2C1_SCL	I2C1_SCL[CN9_15]
136	PB7 **	I/O	GPIO_Output	LD2 [Blue]
139	PB9	I/O	I2C1_SDA	I2C1_SDA[CN7_4]
142	VDD12	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
143	VSS	Power		
144	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. I2C1

I2C: I2C

5.1.1. Parameter Settings:

Timing configuration:

I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	0x00000E14

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

5.2. LPUART1

Mode: Asynchronous

5.2.1. Parameter Settings:

Basic Parameters:

Baud Rate	209700
Word Length	7 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Single Sample	Disable

Advanced Features:

Auto Baudrate Mode	Disable

TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

5.3. RCC

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
Data Cache	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

RCC Parameters:

HSI Calibration Value	64
MSI Calibration Value	0
MSI Auto Calibration	Enabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000
LSE Drive Capability	LSE oscillator low drive capability

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

5.4. SPI1

Mode: Full-Duplex Master

Hardware NSS Signal: Hardware NSS Output Signal

5.4.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola

Data Size	4 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**7.1 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Output Hardware

5.5. SPI2

Mode: Full-Duplex Master

Hardware NSS Signal: Hardware NSS Output Signal

5.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	4 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**3.55 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Output Hardware

5.6. SYS

Debug: Trace Asynchronous Sw

Timebase Source: SysTick

5.7. TIM5

Clock Source : Internal Clock

Channel2: Input Capture direct mode

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 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 TRGO	Reset (UG bit from TIMx_EGR)

Input Capture Channel 2:

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

5.8. UART5

Mode: Asynchronous

Hardware Flow Control (RS232): CTS/RTS

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	Receive and Transmit
Over Sampling	16 Samples
Single Sample	Disable

Advanced Features:

TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX Pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

5.9. USB_OTG_FS

Mode: Device_Only

5.9.1. Parameter Settings:

Speed	Full Speed 12MBit/s
Endpoint 0 Max Packet size	64 Bytes
Enable internal IP DMA	Disabled
Low power	Disabled
Battery charging	Disabled
Link Power Management	Disabled
Use dedicated end point 1 interrupt	Disabled
VBUS sensing	Disabled
Signal start of frame	Disabled

5.10. FREERTOS

mode: Enabled

5.10.1. Config parameters:

Versions:

FreeRTOS version	9.0.0
CMSIS-RTOS version	1.02

Kernel settings:

USE_PREEMPTION	Enabled
CPU_CLOCK_HZ	SystemCoreClock
TICK_RATE_HZ	1000
MAX_PRIORITIES	7

MINIMAL_STACK_SIZE	128
MAX_TASK_NAME_LEN	16
USE_16_BIT_TICKS	Disabled
IDLE_SHOULD_YIELD	Enabled
USE_MUTEXES	Enabled
USE_RECURSIVE_MUTEXES	Disabled
USE_COUNTING_SEMAPHORES	Disabled
QUEUE_REGISTRY_SIZE	8
USE_APPLICATION_TASK_TAG	Disabled
ENABLE_BACKWARD_COMPATIBILITY	Enabled
USE_PORT_OPTIMISED_TASK_SELECTION	Enabled
USE_TICKLESS_IDLE	Disabled
USE_TASK_NOTIFICATIONS	Enabled

Memory management settings:

Memory Allocation	Dynamic
TOTAL_HEAP_SIZE	3000
Memory Management scheme	heap_4

Hook function related definitions:

USE_IDLE_HOOK	Disabled
USE_TICK_HOOK	Disabled
USE_MALLOC_FAILED_HOOK	Disabled
USE_DAEMON_TASK_STARTUP_HOOK	Disabled
CHECK_FOR_STACK_OVERFLOW	Disabled

Run time and task stats gathering related definitions:

GENERATE_RUN_TIME_STATS	Disabled
USE_TRACE_FACILITY	Disabled
USE_STATS_FORMATTING_FUNCTIONS	Disabled

Co-routine related definitions:

USE_CO_ROUTINES	Disabled
MAX_CO_ROUTINE_PRIORITIES	2

Software timer definitions:

USE_TIMERS	Disabled

Interrupt nesting behaviour configuration:

LIBRARY_LOWEST_INTERRUPT_PRIORITY	15
LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY	5

5.10.2. Include parameters:

Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled

vTaskDelete	Enabled
vTaskCleanUpResources	Disabled
vTaskSuspend	Enabled
vTaskDelayUntil	Disabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Disabled
xSemaphoreGetMutexHolder	Disabled
pcTaskGetTaskName	Disabled
uxTaskGetStackHighWaterMark	Disabled
xTaskGetCurrentTaskHandle	Disabled
eTaskGetState	Disabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Disabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled

5.11. USB_DEVICE

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

5.11.1. 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
USBD_LPM_ENABLED (Link Power Management)	1: Link Power Management supported

Class Parameters:

USB CDC Rx Buffer Size	2048
USB CDC Tx Buffer Size	2048

5.11.2. 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** *	I2C1_SCL[CN9_15]
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High** *	I2C1_SDA[CN7_4]
LPUART1	PG7	LPUART1_TX	Alternate Function Push Pull	Pull-up	**Very High** *	STLK_RX [STM32F103CBT6_PA3]
	PG8	LPUART1_RX	Alternate Function Push Pull	Pull-up	**Very High** *	STLK_TX [STM32F103CBT6_PA2]
RCC	PC14-OSC32_IN (PC14)	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT (PC15)	RCC_OSC32_OUT	n/a	n/a	n/a	
SPI1	PA4	SPI1_NSS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX0_NSS[CN7_9]
	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX0_SCK[CN7_10]
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX0_MISO[CN7_12]
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX0_MOSI[CN7_14]
SPI2	PC1	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX1_MOSI[CN9_7]
	PC2	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX1_MISO[CN10_9]
	PB10	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX1_SCK[CN10_15]
	PB12	SPI2_NSS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	AX1_NSS[CN7_7]
SYS	PA13 (JTMS/SWDIO)	SYS_JTMS-SWDIO	n/a	n/a	n/a	TMS

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA14 (JTCK/SWCLK)	SYS_JTCK-SWCLK	n/a	n/a	n/a	TCK
	PB3 (JTDO/TRACESWO)	SYS_JTDO-SWO	n/a	n/a	n/a	SWO
TIM5	PF7	TIM5_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	GPS_1PPS[CN9_26]
UART5	PC12	UART5_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SIM7000_TX[CN8_10]
	PD2	UART5_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SIM7000_RX[CN8_12]
	PB4 (NJTRST)	UART5_RTS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SIM7000_RTS[CN7_11]
	PB5	UART5_CTS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SIM7000_CTS[CN7_13]
USB_OTG_FS	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USB_DM
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USB_DP
Single Mapped Signals	PH0-OSC_IN (PH0)	RCC_OSC_IN	n/a	n/a	n/a	MCO
	PH1-OSC_OUT (PH1)	RCC_OSC_OUT	n/a	n/a	n/a	
	PA8	USB_OTG_FS_SOF	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USB_SOF [TP1]
	PA9	USB_OTG_FS_VBUS	n/a	n/a	**n/a**	USB_VBUS
	PA10	USB_OTG_FS_ID	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USB_ID
GPIO	PC13	GPIO_EXTI13	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	B1_UserButton
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Red]
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	AX0_SEL[CN7_16]
	PG5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	USB_OverCurrent [STMPS2151STR_FAULT]
	PG6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	USB_PowerSwitchOn [STMPS2151STR_EN]
	PC7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD1[Green]
	PG10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SMPS_V1

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
						[D0_D1_ST1PS02D1QTR]
	PG11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SMPS_EN [EN_ST1PS20D1QTR]
	PG12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SMPS_PG [PG_ST1PS02D1QTR]
	PG13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SMPS_SW [SW_ST1PS02D1QTR]
	PG14	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Blue]

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
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	15	0
System tick timer	true	15	0
USB OTG FS global interrupt	true	5	0
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		
SPI2 global interrupt	unused		
EXTI line[15:10] interrupts	unused		
TIM5 global interrupt	unused		
UART5 global interrupt	unused		
LPUART1 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x6
MCU	STM32L496ZGTxP
Datasheet	029173_Rev2

7.2. Parameter Selection

Temperature	25
Vdd	null

8. Software Pack Report