

1. Description

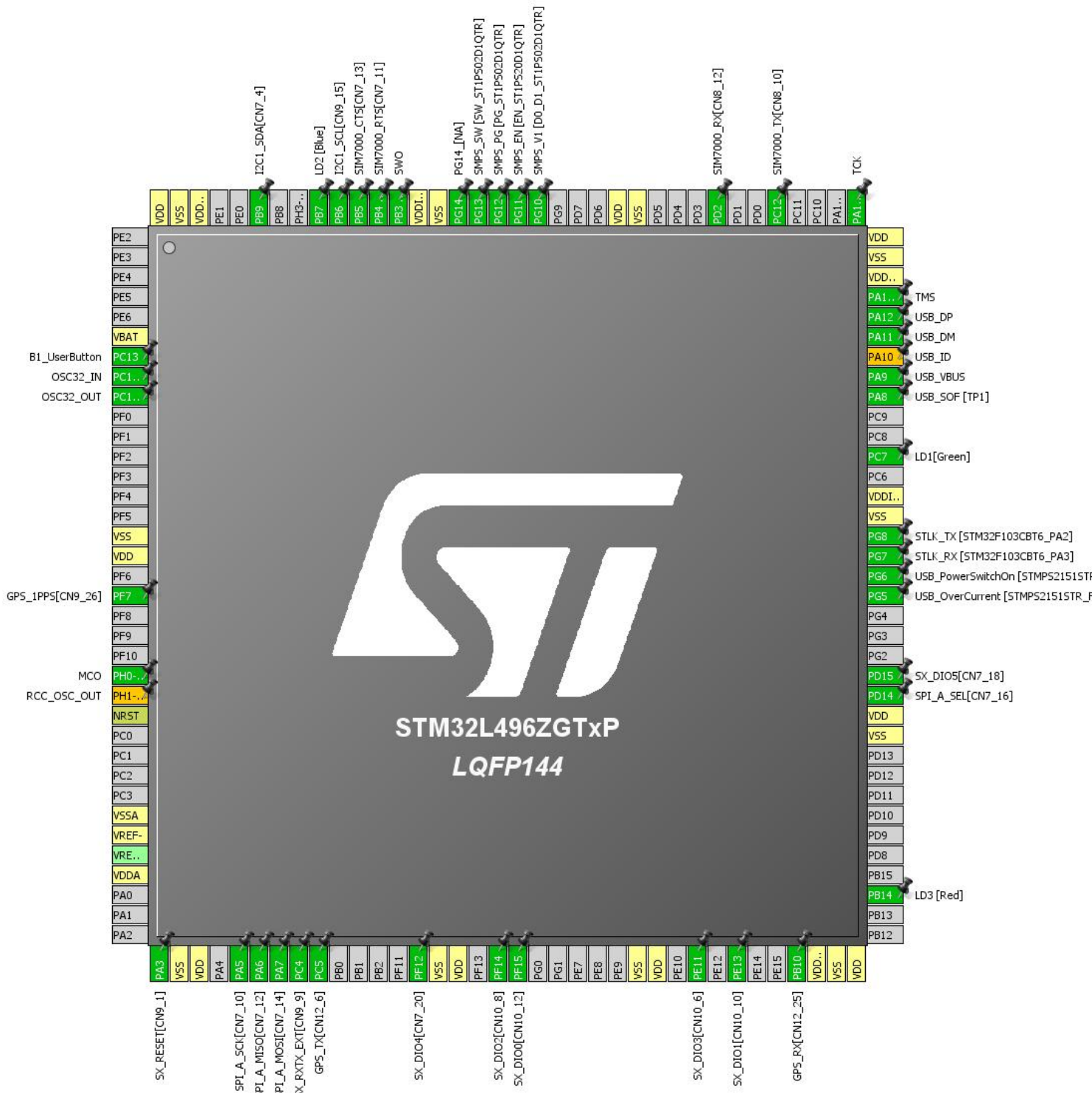
1.1. Project

| | |
|-----------------|--------------------|
| Project Name | FindMeSAT_V2 |
| Board Name | NUCLEO-L496ZG-P |
| Generated with: | STM32CubeMX 4.25.0 |
| Date | 07/13/2018 |

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_Input | B1_UserButton |
| 8 | PC14-OSC32_IN (PC14) | I/O | RCC_OSC32_IN | OSC32_IN |
| 9 | PC15-OSC32_OUT (PC15) | I/O | RCC_OSC32_OUT | 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 | | |
| 30 | VSSA | Power | | |
| 31 | VREF- | Power | | |
| 33 | VDDA | Power | | |
| 37 | PA3 * | I/O | GPIO_Input | SX_RESET[CN9_1] |
| 38 | VSS | Power | | |
| 39 | VDD | Power | | |
| 41 | PA5 | I/O | SPI1_SCK | SPI_A_SCK[CN7_10] |
| 42 | PA6 | I/O | SPI1_MISO | SPI_A_MISO[CN7_12] |
| 43 | PA7 | I/O | SPI1_MOSI | SPI_A_MOSI[CN7_14] |
| 44 | PC4 * | I/O | GPIO_Output | SX_RXTX_EXT[CN9_9] |
| 45 | PC5 | I/O | USART3_RX | GPS_TX[CN12_6] |
| 50 | PF12 | I/O | GPIO_EXTI12 | SX_DIO4[CN7_20] |
| 51 | VSS | Power | | |
| 52 | VDD | Power | | |
| 54 | PF14 | I/O | GPIO_EXTI14 | SX_DIO2[CN10_8] |
| 55 | PF15 | I/O | GPIO_EXTI15 | SX_DIO0[CN10_12] |
| 61 | VSS | Power | | |
| 62 | VDD | Power | | |
| 64 | PE11 | I/O | GPIO_EXTI11 | SX_DIO3[CN10_6] |
| 66 | PE13 | I/O | GPIO_EXTI13 | SX_DIO1[CN10_10] |
| 69 | PB10 | I/O | USART3_TX | GPS_RX[CN12_25] |
| 70 | VDD12 | Power | | |
| 71 | VSS | Power | | |
| 72 | VDD | Power | | |
| 75 | PB14 * | I/O | GPIO_Output | LD3 [Red] |
| 83 | VSS | Power | | |

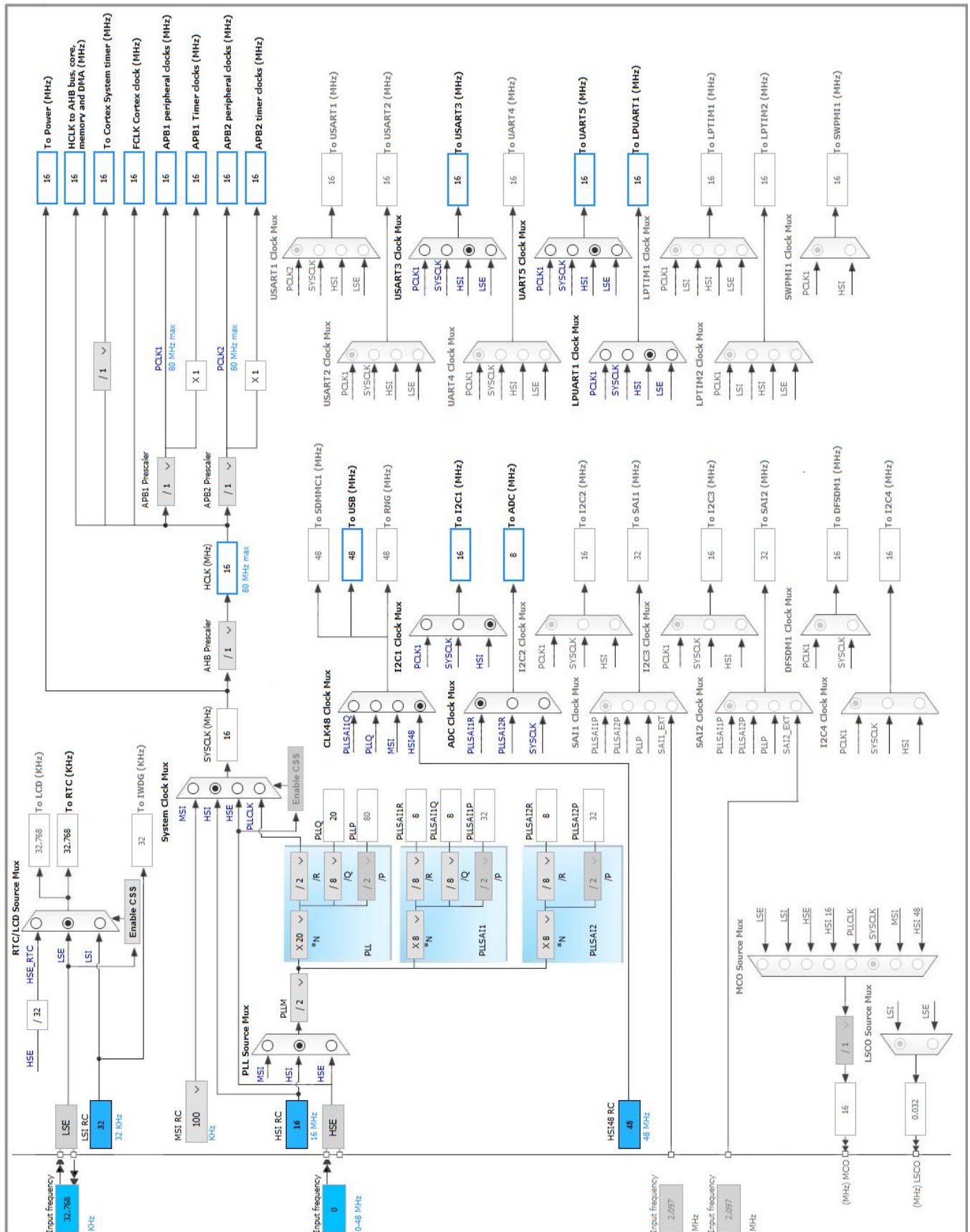
| Pin Number LQFP144 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|-----------------------|---------------------------------------|----------|--------------------------|---|
| 84 | VDD | Power | | |
| 85 | PD14 * | I/O | GPIO_Output | SPI_A_SEL[CN7_16] |
| 86 | PD15 * | I/O | GPIO_Input | SX_DIO5[CN7_18] |
| 90 | PG5 * | I/O | GPIO_Input | USB_OverCurrent [STMP52151STR_FAULT] |
| 91 | PG6 * | I/O | GPIO_Output | USB_PowerSwitchOn [STMP52151STR_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 | PG14_[NA] |
| 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] |

| Pin Number LQFP144 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|-----------------------|---------------------------------------|----------|--------------------------|---------------------|
| 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 | | |
| 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. ADC1

mode: Temperature Sensor Channel

mode: Vbat Channel

mode: Vrefint Channel

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Clock Prescaler Asynchronous clock mode divided by 1

Resolution ADC 12-bit resolution

Data Alignment Right alignment

Scan Conversion Mode Enabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode Disabled

DMA Continuous Requests **Enabled ***

End Of Conversion Selection **End of sequence of conversion ***

Overrun behaviour **Overrun data overwritten ***

Low Power Auto Wait Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions Enable

Enable Regular Oversampling **Enable ***

Oversampling Right Shift **4 bit shift for oversampling ***

Oversampling Ratio **Oversampling ratio 256x ***

Regular Oversampling Mode Oversampling Continued Mode

Triggered Regular Oversampling Single trigger for all oversampled conversions

Number Of Conversion **3 ***

External Trigger Conversion Source Regular Conversion launched by software

External Trigger Conversion Edge None

Rank 1

Channel **Channel Vrefint ***

Sampling Time **92.5 Cycles ***

Offset Number No offset

Rank **2 ***

| | |
|-------------------------------------|----------------------------|
| Channel | Channel Vbat * |
| Sampling Time | 92.5 Cycles * |
| Offset Number | No offset |
| <u>Rank</u> | 3 * |
| Channel | Channel Temperature Sensor |
| Sampling Time | 92.5 Cycles * |
| Offset Number | No offset |
| ADC_Injected_ConversionMode: | |
| Enable Injected Conversions | Disable |
| Analog Watchdog 1: | |
| Enable Analog WatchDog1 Mode | false |
| Analog Watchdog 2: | |
| Enable Analog WatchDog2 Mode | false |
| Analog Watchdog 3: | |
| Enable Analog WatchDog3 Mode | false |

5.2. CRC

mode: Activated

5.2.1. Parameter Settings:

Basic Parameters:

| | |
|--------------------------|--------|
| Default Polynomial State | Enable |
| Default Init Value State | Enable |

Advanced Parameters:

| | |
|----------------------------|----------------|
| Input Data Inversion Mode | None |
| Output Data Inversion Mode | Disable |
| Input Data Format | Words * |

5.3. I2C1

I2C: I2C

5.3.1. Parameter Settings:

Timing configuration:

| | |
|-------------------------------|---------------------|
| I2C Speed Mode | Fast Mode * |
| I2C Speed Frequency (KHz) | 400 |
| Rise Time (ns) | 0 |
| Fall Time (ns) | 0 |
| Coefficient of Digital Filter | 0 |
| Analog Filter | Enabled |
| Timing | 0x0010061A * |

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 |

5.4. LPUART1

Mode: Asynchronous

5.4.1. Parameter Settings:

Basic Parameters:

| | |
|-------------|------------------------------------|
| Baud Rate | 9600 * |
| Word Length | 8 Bits (including Parity) * |
| Parity | None |
| Stop Bits | 1 |

Advanced Parameters:

| | |
|----------------|----------------------|
| Data Direction | Receive and Transmit |
| Single Sample | Enable * |

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 | Disable * |
| DMA on RX Error | Disable * |
| MSB First | Disable |

5.5. RCC

High Speed Clock (HSE): BYPASS Clock Source

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.5.1. Parameter Settings:

System Parameters:

| | |
|-------------------|--------------------|
| VDD voltage (V) | 3.3 |
| Instruction Cache | Enabled |
| Prefetch Buffer | Enabled * |
| 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 Timeout Value (ms) | 100 |
| LSE Startup Timeout Value (ms) | 5000 |
| LSE Drive Capability | LSE oscillator low drive capability |

Power Parameters:

| | |
|-------------------------------|---------------------------------|
| Power Regulator Voltage Scale | Power Regulator Voltage Scale 1 |
|-------------------------------|---------------------------------|

5.6. RTC

mode: Activate Clock Source

mode: Activate Calendar

Alarm A: Internal Alarm A

WakeUp: Internal WakeUp

5.6.1. Parameter Settings:

General:

| | |
|-------------------------------|---------------|
| Hour Format | Hourformat 24 |
| Asynchronous Predivider value | 127 |
| Synchronous Predivider value | 255 |

Calendar Time:

| | |
|-------------|-----------------------------|
| Data Format | Binary data format * |
|-------------|-----------------------------|

| | |
|--|----------------------|
| Hours | 0 |
| Minutes | 0 |
| Seconds | 0 |
| Day Light Saving: value of hour adjustment | Daylightsaving None |
| Store Operation | Storeoperation Reset |

Calendar Date:

| | |
|----------|-------------|
| Week Day | Monday |
| Month | January |
| Date | 1 |
| Year | 18 * |

Alarm A:

| | |
|--------------------------|---------------------------------|
| Hours | 0 |
| Minutes | 0 |
| Seconds | 0 |
| Sub Seconds | 0 |
| Alarm Mask Date Week day | Disable |
| Alarm Mask Hours | Disable |
| Alarm Mask Minutes | Disable |
| Alarm Mask Seconds | Disable |
| Alarm Sub Second Mask | All Alarm SS fields are masked. |
| Alarm Date Week Day Sel | Date |
| Alarm Date | 1 |

Wake UP:

| | |
|-----------------|-------------|
| Wake Up Clock | RTCCLK / 16 |
| Wake Up Counter | 0 |

5.7. SPI1

Mode: Full-Duplex Master

5.7.1. Parameter Settings:

Basic Parameters:

| | |
|--------------|-----------------|
| Frame Format | Motorola |
| Data Size | 8 Bits * |
| First Bit | MSB First |

Clock Parameters:

| | |
|---------------------------|----------------------|
| Prescaler (for Baud Rate) | 8 * |
| Baud Rate | 2.0 MBits/s * |
| Clock Polarity (CPOL) | Low |

| | |
|-----------------------------|-------------------|
| Clock Phase (CPHA) | 1 Edge |
| Advanced Parameters: | |
| CRC Calculation | Disabled |
| NSSP Mode | Disabled * |
| NSS Signal Type | Software |

5.8. SYS

Debug: Trace Asynchronous Sw

Timebase Source: TIM2

5.9. TIM5

Clock Source : Internal Clock

Channel2: Input Capture direct mode

5.9.1. Parameter Settings:

Counter Settings:

| | |
|---|-------------------|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 32 bits value) | 16000000 * |
| 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 |

5.10. UART5

Mode: Asynchronous

Hardware Flow Control (RS232): CTS/RTS

5.10.1. Parameter Settings:

Basic Parameters:

| | |
|-------------|---------------------------|
| Baud Rate | 19200 * |
| Word Length | 8 Bits (including Parity) |
| Parity | None |
| Stop Bits | 1 |

Advanced Parameters:

| | |
|----------------|----------------------|
| Data Direction | Receive and Transmit |
| Over Sampling | 16 Samples |
| Single Sample | Enable * |

Advanced Features:

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

5.11. USART3

Mode: Asynchronous

5.11.1. Parameter Settings:

Basic Parameters:

| | |
|-------------|------------------------------------|
| Baud Rate | 9600 * |
| Word Length | 8 Bits (including Parity) * |
| Parity | None |
| Stop Bits | 1 |

Advanced Parameters:

| | |
|----------------|----------------------|
| Data Direction | Receive and Transmit |
| Over Sampling | 16 Samples |
| Single Sample | Enable * |

Advanced Features:

| | |
|-------------------------------|---------|
| Auto Baudrate | Disable |
| TX Pin Active Level Inversion | Disable |

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

5.12. USB_OTG_FS

Mode: Device_Only

Activate_VBUS: VBUS sensing

mode: Activate_SOF

5.12.1. 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 | Enabled * |
| Use dedicated end point 1 interrupt | Disabled |
| VBUS sensing | Enabled |
| Signal start of frame | Enabled |

5.13. FREERTOS

mode: Enabled

5.13.1. 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 | Enabled * |
| QUEUE_REGISTRY_SIZE | 32 * |
| USE_APPLICATION_TASK_TAG | Enabled * |
| ENABLE_BACKWARD_COMPATIBILITY | Disabled * |
| USE_PORT_OPTIMISED_TASK_SELECTION | Enabled |
| USE_TICKLESS_IDLE | Disabled |
| USE_TASK_NOTIFICATIONS | Enabled |
| Memory management settings: | |
| Memory Allocation | Dynamic |
| TOTAL_HEAP_SIZE | 32768 * |
| Memory Management scheme | heap_4 |
| Hook function related definitions: | |
| USE_IDLE_HOOK | Enabled * |
| USE_TICK_HOOK | Disabled |
| USE_MALLOC_FAILED_HOOK | Enabled * |
| USE_DAEMON_TASK_STARTUP_HOOK | Disabled |
| CHECK_FOR_STACK_OVERFLOW | Option2 * |
| Run time and task stats gathering related definitions: | |
| GENERATE_RUN_TIME_STATS | Enabled * |
| USE_TRACE_FACILITY | Enabled * |
| USE_STATS_FORMATTING_FUNCTIONS | Enabled * |
| Co-routine related definitions: | |
| USE_CO_ROUTINES | Disabled |
| MAX_CO_ROUTINE_PRIORITIES | 2 |
| Software timer definitions: | |
| USE_TIMERS | Enabled |
| TIMER_TASK_PRIORITY | 2 |
| TIMER_QUEUE_LENGTH | 8 * |
| TIMER_TASK_STACK_DEPTH | 256 |
| Interrupt nesting behaviour configuration: | |
| LIBRARY_LOWEST_INTERRUPT_PRIORITY | 15 |
| LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY | 5 |

5.13.2. Include parameters:

Include definitions:

| | |
|-----------------------------|-------------------|
| vTaskPrioritySet | Enabled |
| uxTaskPriorityGet | Enabled |
| vTaskDelete | Disabled * |
| vTaskCleanUpResources | Disabled |
| vTaskSuspend | Enabled |
| vTaskDelayUntil | Enabled * |
| vTaskDelay | Enabled |
| xTaskGetSchedulerState | Enabled |
| xTaskResumeFromISR | Enabled |
| xQueueGetMutexHolder | Disabled |
| xSemaphoreGetMutexHolder | Disabled |
| pcTaskGetTaskName | Enabled * |
| uxTaskGetStackHighWaterMark | Enabled * |
| xTaskGetCurrentTaskHandle | Enabled * |
| eTaskGetState | Enabled * |
| xEventGroupSetBitFromISR | Enabled * |
| xTimerPendFunctionCall | Enabled * |
| xTaskAbortDelay | Enabled * |
| xTaskGetHandle | Enabled * |

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) | Disabled * |
| 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 |

5.14.2. Device Descriptor:

Device Descriptor:

| | |
|---|---------------------------|
| VID (Vendor Identifier) | 1155 |
| LANGID_STRING (Language Identifier) | English(United States) |
| MANUFACTURER_STRING (Manufacturer Identifier) | DF4IAH Solutions * |

Device Descriptor FS:

| | |
|---|-----------------------|
| PID (Product Identifier) | 22336 |
| PRODUCT_STRING (Product Identifier) | FindMeSAT V2 * |
| 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 | No pull-up and no pull-down | Medium * | STLK_RX [STM32F103CBT6_PA3] |
| | PG8 | LPUART1_RX | Alternate Function Push Pull | Pull-up * | Medium * | STLK_TX [STM32F103CBT6_PA2] |
| RCC | PC14-OSC32_IN (PC14) | RCC_OSC32_IN | n/a | n/a | n/a | OSC32_IN |
| | PC15-OSC32_OUT (PC15) | RCC_OSC32_OUT | n/a | n/a | n/a | OSC32_OUT |
| | PH0-OSC_IN (PH0) | RCC_OSC_IN | n/a | n/a | n/a | MCO |
| SPI1 | PA5 | SPI1_SCK | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | SPI_A_SCK[CN7_10] |
| | PA6 | SPI1_MISO | Alternate Function Push Pull | Pull-down * | Very High * | SPI_A_MISO[CN7_12] |
| | PA7 | SPI1_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | SPI_A_MOSI[CN7_14] |
| SYS | PA13 (JTMS/SWDIO) | SYS_JTMS-SWDIO | n/a | n/a | n/a | TMS |
| | 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 | Pull-down * | High * | GPS_1PPS[CN9_26] |
| UART5 | PC12 | UART5_TX | Alternate Function Push Pull | No pull-up and no pull-down | Medium * | SIM7000_TX[CN8_10] |
| | PD2 | UART5_RX | Alternate Function Push Pull | Pull-up * | Medium * | SIM7000_RX[CN8_12] |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|-----------------------|-------------------|-----------------|--|-----------------------------|--------------------|--------------------------------------|
| | PB4 (NJTRST) | UART5_RTS | Alternate Function Push Pull | No pull-up and no pull-down | Medium * | SIM7000_RTS[CN7_11] |
| | PB5 | UART5_CTS | Alternate Function Push Pull | Pull-up * | Medium * | SIM7000_CTS[CN7_13] |
| USART3 | PC5 | USART3_RX | Alternate Function Push Pull | Pull-up * | Medium * | GPS_TX[CN12_6] |
| | PB10 | USART3_TX | Alternate Function Push Pull | No pull-up and no pull-down | Medium * | GPS_RX[CN12_25] |
| USB_OTG_FS | 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 | Input mode | No pull-up and no pull-down | n/a | USB_VBUS |
| | 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 | PH1-OSC_OUT (PH1) | RCC_OSC_OUT | n/a | n/a | n/a | |
| | PA10 | USB_OTG_FS_ID | Alternate Function Push Pull | No pull-up and no pull-down | Low | USB_ID |
| GPIO | PC13 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | B1_UserButton |
| | PA3 | GPIO_Input | Input mode | Pull-up * | n/a | SX_RESET[CN9_1] |
| | PC4 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | SX_RXTX_EXT[CN9_9] |
| | PF12 | GPIO_EXTI12 | External Interrupt Mode with Rising edge trigger detection | Pull-down * | n/a | SX_DIO4[CN7_20] |
| | PF14 | GPIO_EXTI14 | External Interrupt Mode with Rising edge trigger detection | Pull-down * | n/a | SX_DIO2[CN10_8] |
| | PF15 | GPIO_EXTI15 | External Interrupt Mode with Rising edge trigger detection | Pull-down * | n/a | SX_DIO0[CN10_12] |
| | PE11 | GPIO_EXTI11 | External Interrupt Mode with Rising edge trigger detection | Pull-down * | n/a | SX_DIO3[CN10_6] |
| | PE13 | GPIO_EXTI13 | External Interrupt Mode with Rising edge trigger detection | Pull-down * | n/a | SX_DIO1[CN10_10] |
| | 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 | High * | SPI_A_SEL[CN7_16] |
| | PD15 | GPIO_Input | Input mode | Pull-down * | n/a | SX_DIO5[CN7_18] |
| | 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 [D0_D1_ST1PS02D1QTR] |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|----|------|-------------|------------------|-----------------------------|-----------|------------------------------|
| | 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 | PG14_[NA] |
| | PB7 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LD2 [Blue] |

6.2. DMA configuration

| DMA request | Stream | Direction | Priority |
|-------------|---------------|----------------------|---------------|
| ADC1 | DMA1_Channel1 | Peripheral To Memory | Low |
| SPI1_TX | DMA2_Channel4 | Memory To Peripheral | Low |
| SPI1_RX | DMA2_Channel3 | Peripheral To Memory | Low |
| USART3_TX | DMA1_Channel2 | Memory To Peripheral | High * |
| USART3_RX | DMA1_Channel3 | Peripheral To Memory | High * |
| UART5_TX | DMA2_Channel1 | Memory To Peripheral | High * |
| UART5_RX | DMA2_Channel2 | Peripheral To Memory | High * |
| LPUART_TX | DMA2_Channel6 | Memory To Peripheral | High * |
| LPUART_RX | DMA2_Channel7 | Peripheral To Memory | High * |

ADC1: DMA1_Channel1 DMA request Settings:

Mode: **Circular ***
Peripheral Increment: Disable
Memory Increment: **Enable ***
Peripheral Data Width: Half Word
Memory Data Width: Half Word

SPI1_TX: DMA2_Channel4 DMA request Settings:

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

SPI1_RX: DMA2_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

USART3_RX: DMA1_Channel3 DMA request Settings:

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

UART5_TX: DMA2_Channel1 DMA request Settings:

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

UART5_RX: DMA2_Channel2 DMA request Settings:

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

LPUART_TX: DMA2_Channel6 DMA request Settings:

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

LPUART_RX: DMA2_Channel7 DMA request Settings:

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

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 |
| RTC wake-up interrupt through EXTI line 20 | true | 0 | 0 |
| RCC global interrupt | true | 5 | 0 |
| DMA1 channel1 global interrupt | true | 5 | 0 |
| DMA1 channel2 global interrupt | true | 5 | 0 |
| DMA1 channel3 global interrupt | true | 5 | 0 |
| ADC1 and ADC2 interrupts | true | 5 | 0 |
| TIM2 global interrupt | true | 0 | 0 |
| I2C1 event interrupt | true | 5 | 0 |
| I2C1 error interrupt | true | 5 | 0 |
| SPI1 global interrupt | true | 5 | 0 |
| USART3 global interrupt | true | 5 | 0 |
| EXTI line[15:10] interrupts | true | 5 | 0 |
| RTC alarm interrupt through EXTI line 18 | true | 0 | 0 |
| TIM5 global interrupt | true | 5 | 0 |
| UART5 global interrupt | true | 5 | 0 |
| DMA2 channel1 global interrupt | true | 5 | 0 |
| DMA2 channel2 global interrupt | true | 5 | 0 |
| DMA2 channel3 global interrupt | true | 5 | 0 |
| DMA2 channel4 global interrupt | true | 5 | 0 |
| USB OTG FS global interrupt | true | 5 | 0 |
| DMA2 channel6 global interrupt | true | 5 | 0 |
| DMA2 channel7 global interrupt | true | 5 | 0 |
| PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38 | unused | | |
| Flash 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 | 3.0 |

7.3. SMPS Selection

| | |
|------------|------------|
| SMPS | SMPS1_User |
| Vin | 3.3 V |
| Vout | 1.2 V |
| OffCurrent | 250.0 nA |
| QCurrent | 500.0 nA |
| Efficiency | 85 % |

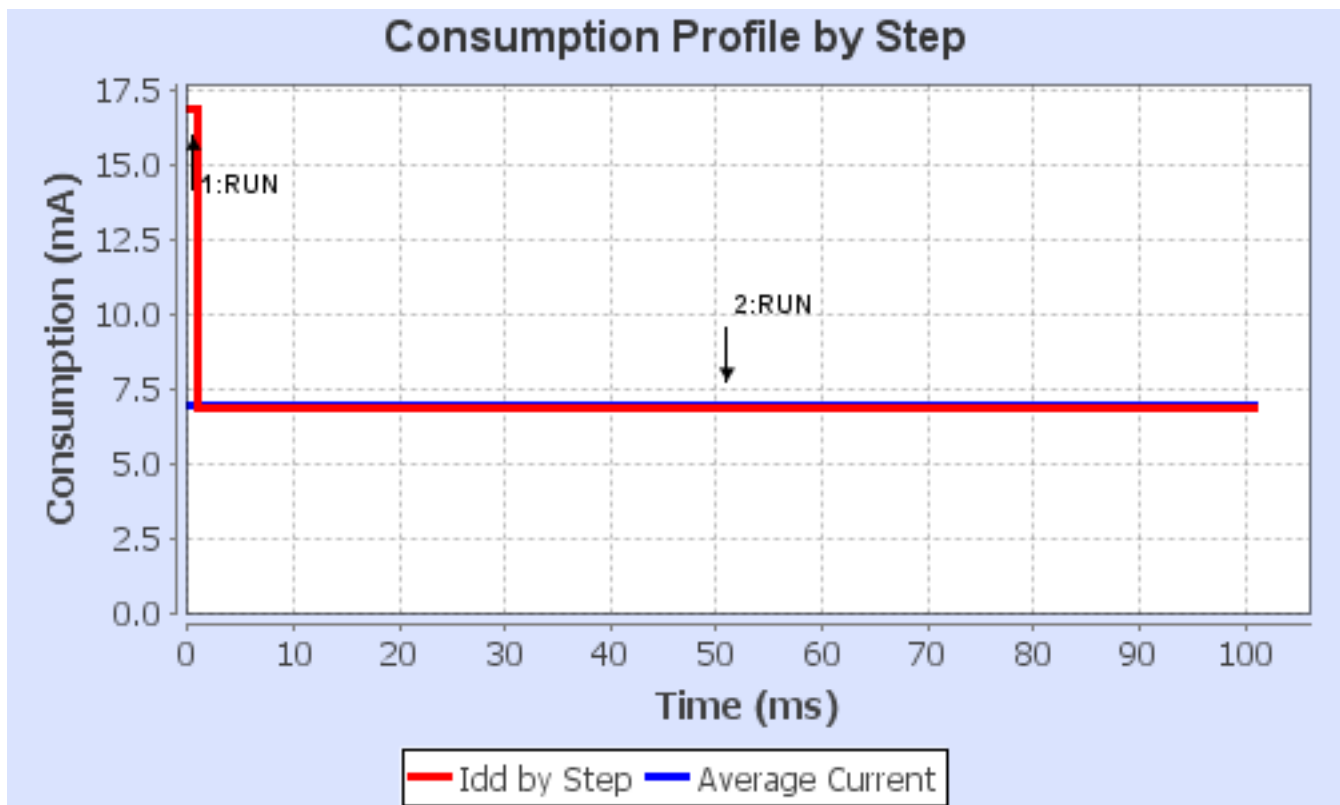
7.4. Sequence

| | | |
|-------------------------------|--|---|
| Step | Step1 | Step2 |
| Mode | RUN | RUN |
| SMPS | DISCONNECTED | CONNECTED |
| Vdd | 3.0 | 3.0 |
| Voltage Source | Vbus | Vbus |
| Range | Range1-High | Range1-High |
| Fetch Type | FLASH | FLASH |
| Clock Configuration | HSE BYP PLL Flash-ON | HSE BYP PLL Flash-ON |
| Clock Source Frequency | 4 MHz | 4 MHz |
| CPU Frequency | 80 MHz | 80 MHz |
| Peripherals | GPIOA GPIOB GPIOC GPIOD GPIOE GPIOF GPIOG GPIOH I2C1 LPTIM1 LPUART1 PWR RTC SPI1 SPI2 SPI3 TIM2 TIM5 UART5 USB_OTG_FS | GPIOA GPIOB GPIOC GPIOD GPIOE GPIOF GPIOG GPIOH I2C1 LPUART1 TIM2 TIM5 UART5 USB_OTG_FS |
| Additional Cons. | 0 mA | 0 mA |
| Average Current | 16.81 mA | 6.85 mA |
| Duration | 1 ms | 100 ms |
| DMIPS | 0.0 | 0.0 |
| Ta Max | 103.39 | 104.34 |
| Category | In DS Table | In DS Table |

7.5. RESULTS

| | | | |
|---------------|--------|-----------------|-------------|
| Sequence Time | 101 ms | Average Current | 6.95 mA |
| Battery Life | 0 | Average DMIPS | 100.0 DMIPS |

7.6. Chart



8. Software Project

8.1. Project Settings

| Name | Value |
|-----------------------------------|--|
| Project Name | FindMeSAT_V2 |
| Project Folder | Z:\nfs_ds_nfs\git\FindMeSAT__SW\FindMeSAT_V2_SW\TrueSTUDIO |
| Toolchain / IDE | TrueSTUDIO |
| Firmware Package Name and Version | STM32Cube FW_L4 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) | Yes |

9. Software Pack Report