1. Description

1.1. Project

Project Name	cube_ide
Board Name	custom
Generated with:	STM32CubeMX 6.8.1
Date	05/29/2023

1.2. MCU

MCU Series	STM32H7
MCU Line	STM32H750 Value line
MCU name	STM32H750VBTx
MCU Package	LQFP100
MCU Pin number	100

1.3. Core(s) information

Core(s)	ARM Cortex-M7

2. Pinout Configuration
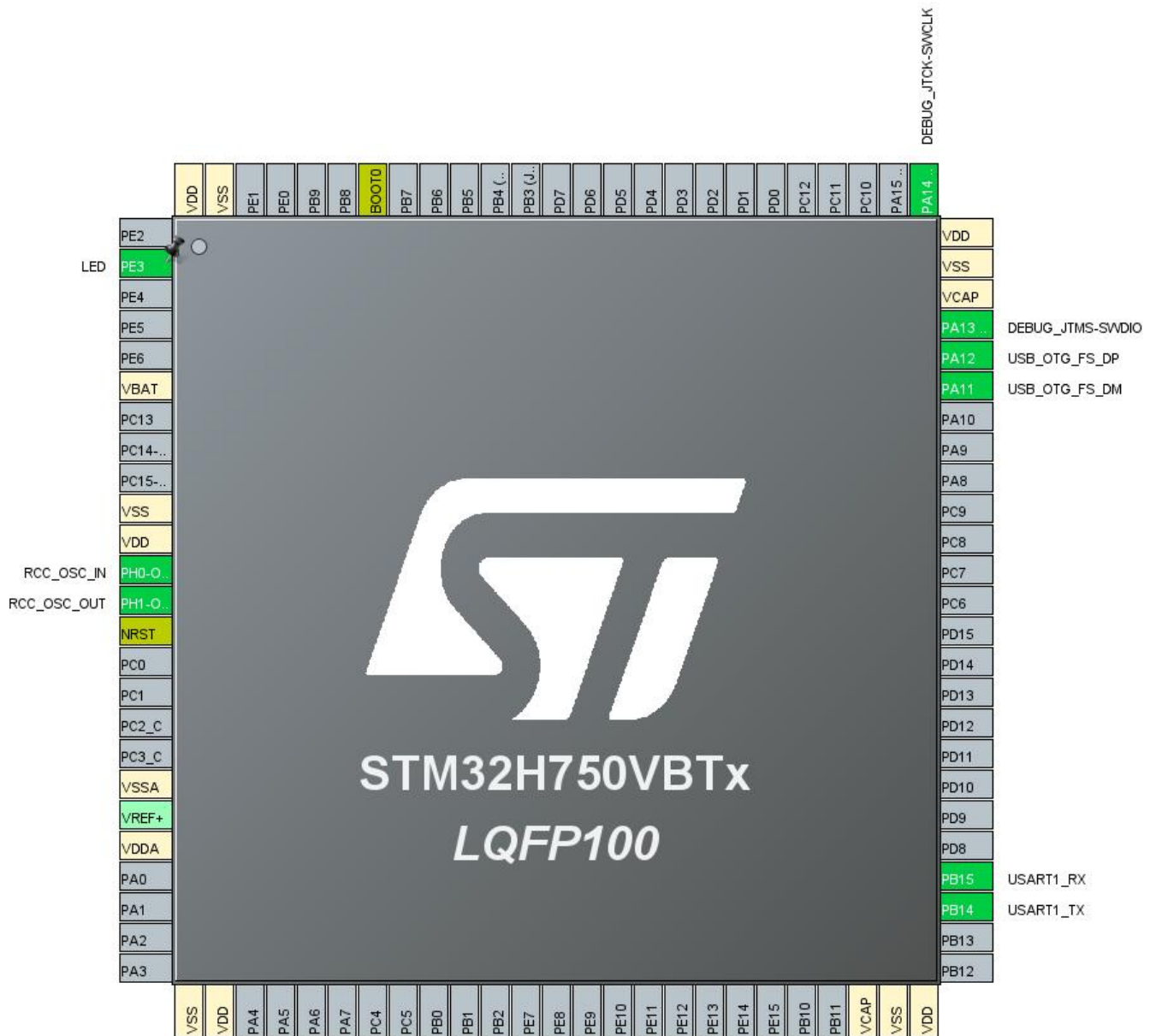
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
2	PE3 *	I/O	GPIO_Output	LED
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN (PH0)	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT (PH1)	I/O	RCC_OSC_OUT	
14	NRST	Reset		
19	VSSA	Power		
21	VDDA	Power		
26	VSS	Power		
27	VDD	Power		
48	VCAP	Power		
49	VSS	Power		
50	VDD	Power		
53	PB14	I/O	USART1_TX	
54	PB15	I/O	USART1_RX	
70	PA11	I/O	USB_OTG_FS_DM	
71	PA12	I/O	USB_OTG_FS_DP	
72	PA13 (JTMS/SWDIO)	I/O	DEBUG_JTMS-SWDIO	
73	VCAP	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14 (JTCK/SWCLK)	I/O	DEBUG_JTCK-SWCLK	
94	BOOT0	Boot		
99	VSS	Power		
100	VDD	Power		

 * The pin is affected with an I/O function

4. Clock Tree Configuration
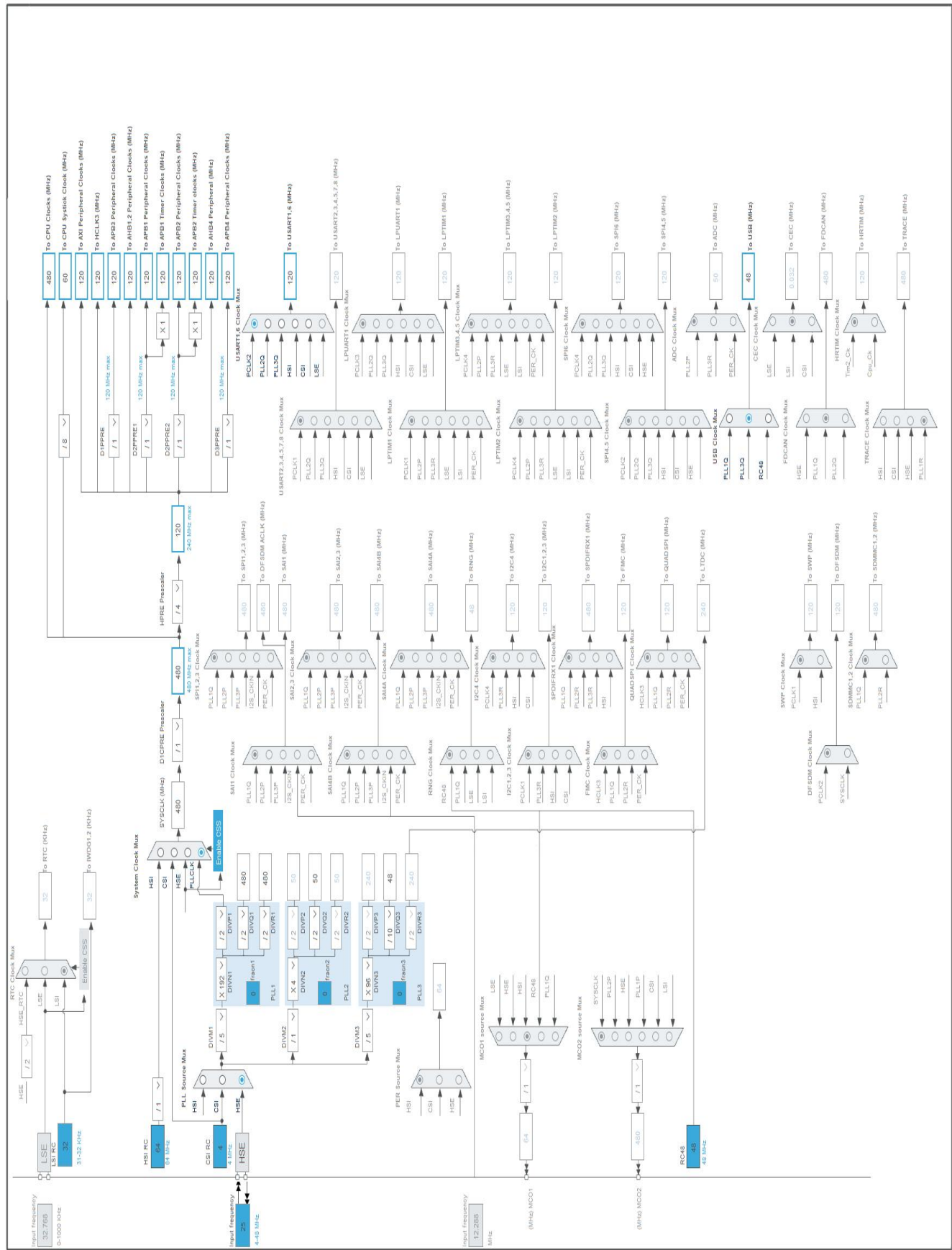
5. Software Project

5.1. Project Settings

Name	Value
Project Name	cube_ide
Project Folder	C:\Users\user\projects\daq\repo\controller\cube_ide2
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_H7 V1.11.0
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x1000
Minimum Stack Size	0x400

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	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
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_USB_DEVICE_Init	USB_DEVICE
4	MX_USART1_UART_Init	USART1

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32H7
Line	STM32H750 Value line
MCU	STM32H750VBTx
Datasheet	DS12556_Rev6

6.2. Parameter Selection

Temperature	25
Vdd	3.0

6.3. Battery Selection

Battery	Alkaline(9V)
Capacity	625.0 mAh
Self Discharge	0.3 %/month
Nominal Voltage	9.0 V
Max Cont Current	200.0 mA
Max Pulse Current	0.0 mA
Cells in series	1
Cells in parallel	1

6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	VOS0: Scale0-High	SVOS5: System-Scale5
D1 Mode	DRUN/CRUN	DSTANDBY
D2 Mode	DRUN	DSTANDBY
D3 Mode	DRUN	DSTOP
Fetch Type	ITCM	NA
CPU Frequency	480 MHz	0 Hz
Clock Configuration	HSE BYP PLL	Flash-OFF
Clock Source Frequency	24 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	148 mA	150 µA
Duration	0.1 ms	0.9 ms
DMIPS	1027.0	0.0
Ta Max	105.02	124.98
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	14.94 mA
Battery Life	1 day, 17 hours	Average DMIPS	1027.2001 DMIPS

6.6. Chart

Consumption Profile by Step
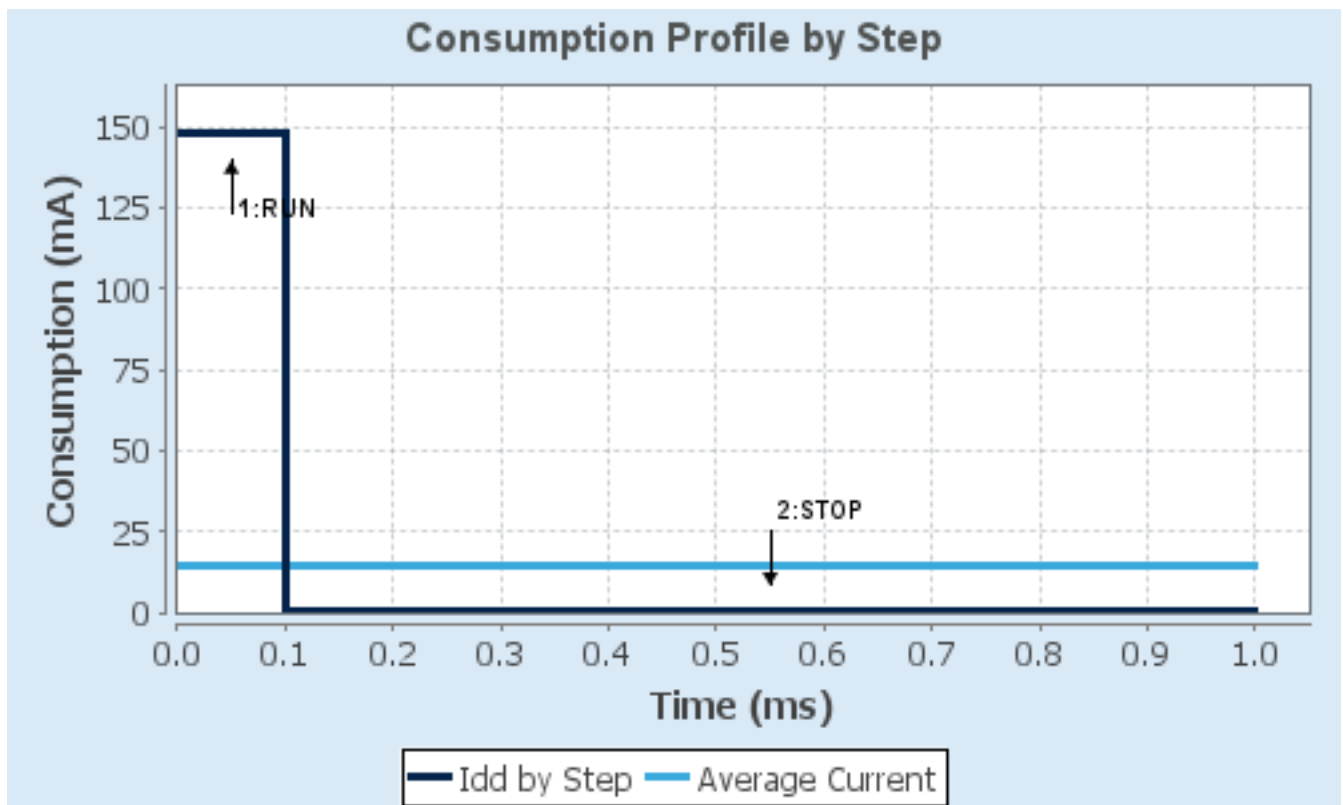
7. Peripherals and Middlewares Configuration

7.1. DEBUG

Debug: Serial Wire

7.2. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.2.1. Parameter Settings:

Power Parameters:

SupplySource	PWR_LDO_SUPPLY
Power Regulator Voltage Scale	Power Regulator Voltage Scale 0

RCC Parameters:

TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000
CSI Calibration Value	32
HSI Calibration Value	64

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	1 WS (2 CPU cycle)
Product revision	**rev.V ***

PLL range Parameters:

PLL1 clock Input range	Between 4 and 8 MHz
PLL3 input frequency range	Between 4 and 8 MHz
PLL1 clock Output range	Wide VCO range
PLL3 clock Output range	Wide VCO range

7.3. USART1

Mode: Asynchronous

7.3.1. 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
ClockPrescaler	1
Fifo Mode	Disable
Txfifo Threshold	1 eighth full configuration
Rxfifo Threshold	1 eighth full configuration

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	Enable
DMA on RX Error	Enable
MSB First	Disable

7.4. USB_OTG_FS
Mode: Device_Only
7.4.1. Parameter Settings:

Speed	Full Speed 12MBit/s
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

7.5. FREERTOS
Interface: CMSIS_V2
7.5.1. Config parameters:

API:

FreeRTOS API	CMSIS v2

Versions:

FreeRTOS version	10.3.1

CMSIS-RTOS version	2.00

MPU/FPU:

ENABLE_MPU	Disabled
ENABLE_FPU	Disabled

Kernel settings:

USE_PREEMPTION	Enabled
CPU_CLOCK_HZ	SystemCoreClock
TICK_RATE_HZ	1000
MAX_PRIORITIES	56
MINIMAL_STACK_SIZE	**256 ***
MAX_TASK_NAME_LEN	16
USE_16_BIT_TICKS	Disabled
IDLE_SHOULD_YIELD	Enabled
USE_MUTEXES	Enabled
USE_RECURSIVE_MUTEXES	Enabled
USE_COUNTING_SEMAPHORES	Enabled
QUEUE_REGISTRY_SIZE	8
USE_APPLICATION_TASK_TAG	Disabled
ENABLE_BACKWARD_COMPATIBILITY	Enabled
USE_PORT_OPTIMISED_TASK_SELECTION	Disabled
USE_TICKLESS_IDLE	Disabled
USE_TASK_NOTIFICATIONS	Enabled
RECORD_STACK_HIGH_ADDRESS	Disabled

Memory management settings:

Memory Allocation	Dynamic / Static
TOTAL_HEAP_SIZE	15360
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	Enabled
USE_STATS_FORMATTING_FUNCTIONS	Disabled

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	10
TIMER_TASK_STACK_DEPTH	512

Interrupt nesting behaviour configuration:

LIBRARY_LOWEST_INTERRUPT_PRIORITY	15
LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY	5

Added with 10.2.1 support:

MESSAGE_BUFFER_LENGTH_TYPE	size_t
USE_POSIX_ERRNO	Disabled

CMSIS-RTOS V2 flags:

USE_OS2_THREAD_SUSPEND_RESUME	Enabled
USE_OS2_THREAD_ENUMERATE	Enabled
USE_OS2_EVENTFLAGS_FROM_ISR	Enabled
USE_OS2_THREAD_FLAGS	Enabled
USE_OS2_TIMER	Enabled
USE_OS2_MUTEX	Enabled

7.5.2. Include parameters:

Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled
vTaskDelete	Enabled
vTaskCleanUpResources	Disabled
vTaskSuspend	Enabled
vTaskDelayUntil	Enabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Enabled
xSemaphoreGetMutexHolder	Disabled
pcTaskGetTaskName	Disabled
uxTaskGetStackHighWaterMark	Enabled
xTaskGetCurrentTaskHandle	Enabled
eTaskGetState	Enabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Enabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled
uxTaskGetStackHighWaterMark2	Disabled

7.5.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT **Enabled ***

Project settings (see parameter description first):

Use FW pack heap file Enabled

7.6. USB_DEVICE
Class For FS IP: Communication Device Class (Virtual Port Com)
7.6.1. 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_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

7.6.2. 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
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

* User modified value

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
DEBUG	PA13 (JTMS/SWDIO)	DEBUG_JTMS-SWDIO	n/a	n/a	n/a	
	PA14 (JTCK/SWCLK)	DEBUG_JTCK-SWCLK	n/a	n/a	n/a	
RCC	PH0-OSC_IN (PH0)	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT (PH1)	RCC_OSC_OUT	n/a	n/a	n/a	
USART1	PB14	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB15	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USB_OTG_FS	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED

8.2. DMA configuration

nothing configured in DMA service

8.3. BDMA configuration

nothing configured in DMA service

8.4. MDMA configuration

nothing configured in DMA service

8.5. NVIC configuration

8.5.1. NVIC

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	15	0
System tick timer	true	15	0
USB On The Go FS global interrupt	true	5	0
PVD and AVD interrupts through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
USART1 global interrupt	unused		
FPU global interrupt	unused		
USB On The Go FS End Point 1 Out global interrupt	unused		
USB On The Go FS End Point 1 In global interrupt	unused		
HSEM1 global interrupt	unused		

8.5.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	false	false
Debug monitor	false	true	false
Pendable request for system service	false	false	false
System tick timer	false	true	true
USB On The Go FS global interrupt	false	true	true

* User modified value

9. System Views

9.1. Category view

9.1.1. Current

Category view   Power Domain view

... by Power Domain

Choose filters ..

○ D1   ○ D2   ○ D3   ◉ None

Middleware

FREERTOS ✓   USB_DEVICE ✓

System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing	Trace and Debug	Power and Therma
BDMA			USART1 ✓				DEBUG ✓	
CORTEX_M7 ✓			USB_FS ✓					
DMA								
GPIO ✓								
MDMA								
NVIC ✓								
RCC ✓								

9.1.2. Without filters

9.2. Power Domain view

Category view   **Power Domain view**

D1	D2	D3
CORTEX_M7 ✓	DMA	BDMA
MDMA	USART1 ✓	RCC ✓
NVIC ✓	USB_FS ✓	
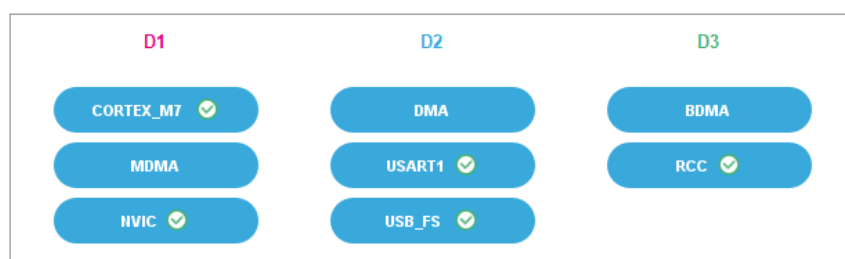
10. Docs & Resources

Type   Link