



1. Description

1.1. Project

Project Name	cygnet
Board Name	custom
Generated with:	STM32CubeMX 6.9.2
Date	10/17/2023

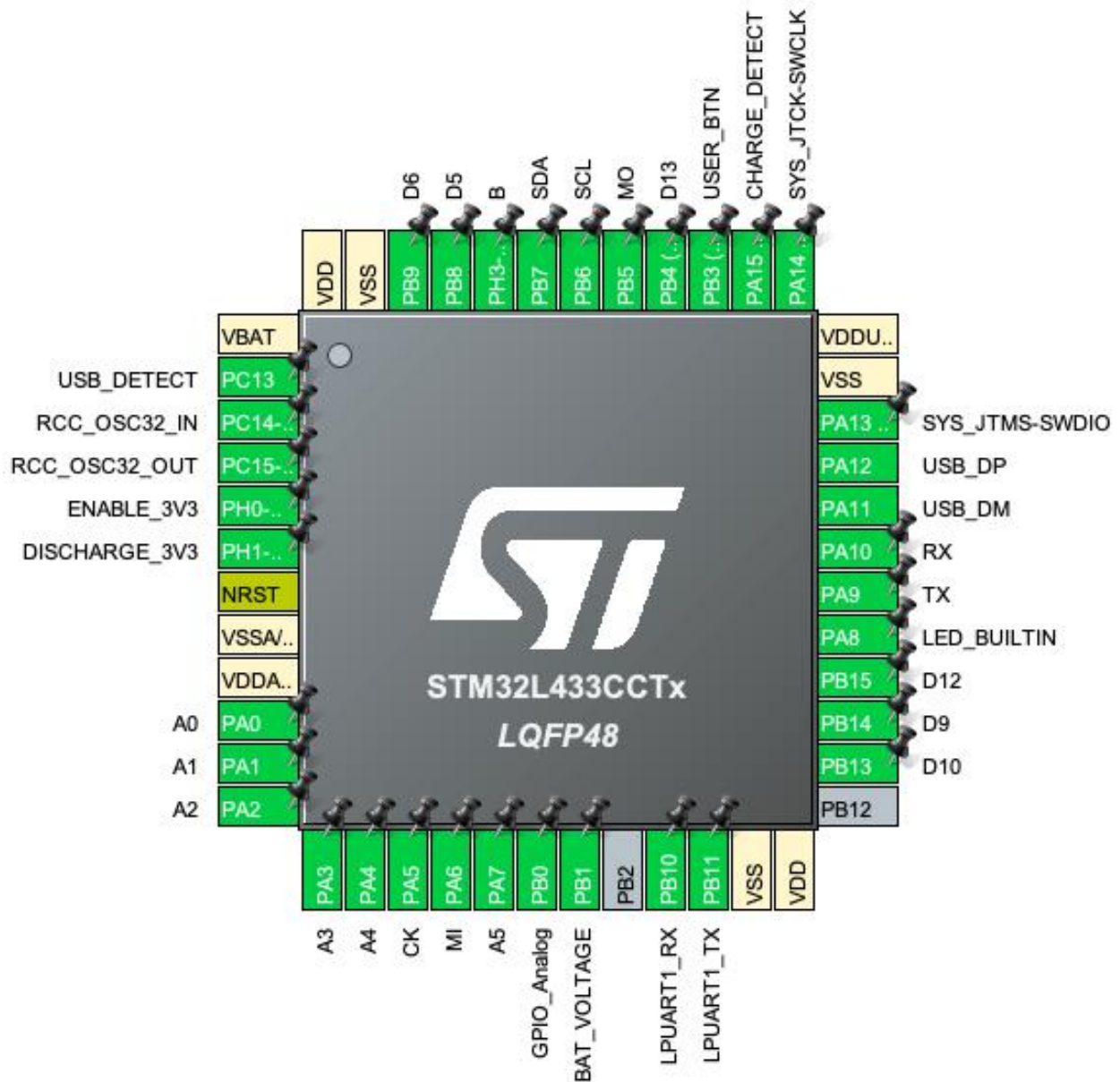
1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x3
MCU name	STM32L433CCTx
MCU Package	LQFP48
MCU Pin number	48

1.3. Core(s) information

Core(s)	Arm Cortex-M4
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2. Pinout Configuration



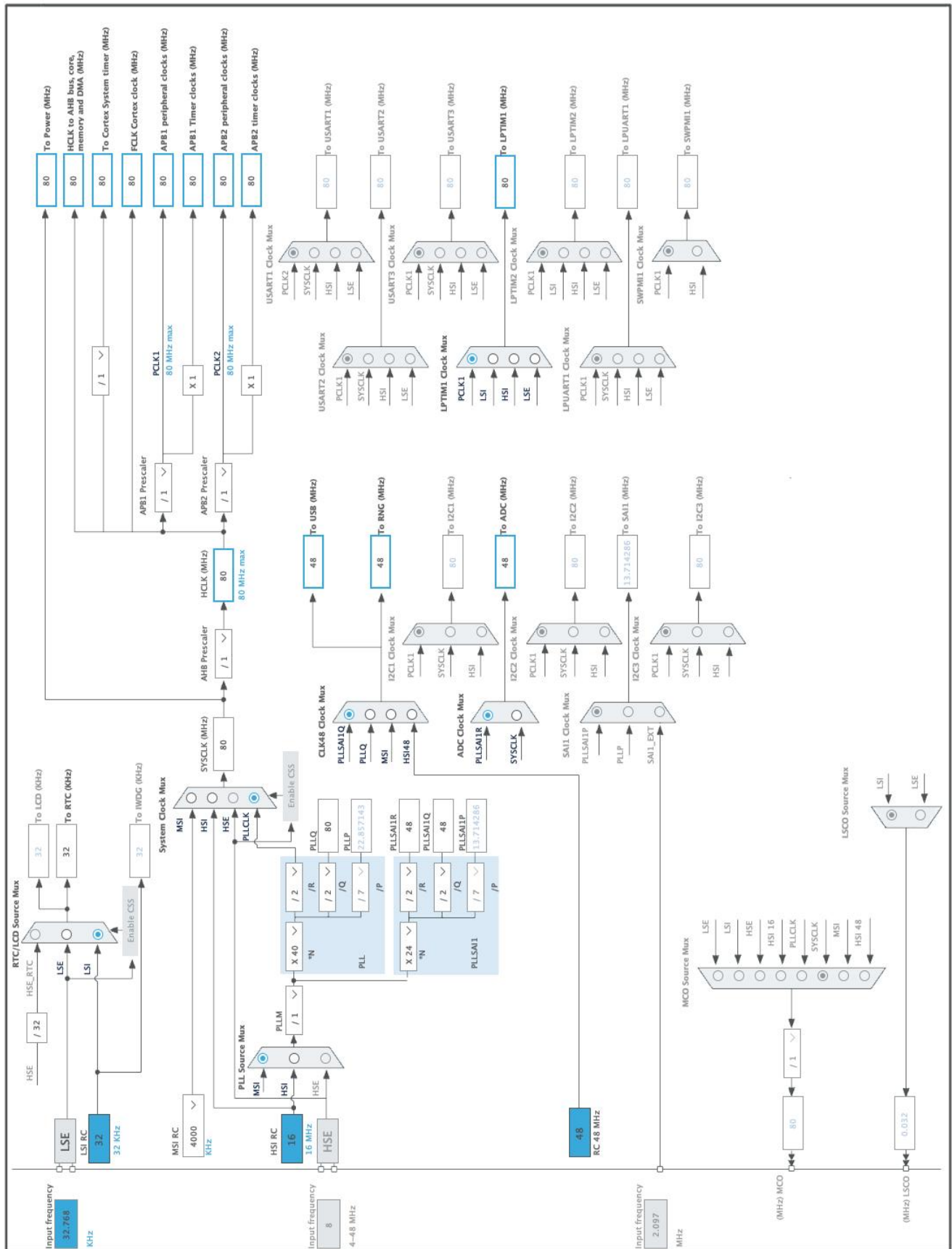
3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13 *	I/O	GPIO_Analog	USB_DETECT
3	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
5	PH0-OSC_IN (PH0) *	I/O	GPIO_Analog	ENABLE_3V3
6	PH1-OSC_OUT (PH1) *	I/O	GPIO_Analog	DISCHARGE_3V3
7	NRST	Reset		
8	VSSA/VREF-	Power		
9	VDDA/VREF+	Power		
10	PA0	I/O	GPIO_Analog, ADC1_IN5	A0
11	PA1	I/O	GPIO_Analog, ADC1_IN6	A1
12	PA2	I/O	GPIO_Analog, ADC1_IN7	A2
13	PA3	I/O	GPIO_Analog, ADC1_IN8	A3
14	PA4	I/O	GPIO_Analog, ADC1_IN9	A4
15	PA5 *	I/O	GPIO_Analog	CK
16	PA6 *	I/O	GPIO_Analog	MI
17	PA7 *	I/O	GPIO_Analog	A5
18	PB0 *	I/O	GPIO_Analog	
19	PB1	I/O	GPIO_Analog, ADC1_IN16	BAT_VOLTAGE
21	PB10 *	I/O	GPIO_Analog	LPUART1_RX
22	PB11 *	I/O	GPIO_Analog	LPUART1_TX
23	VSS	Power		
24	VDD	Power		
26	PB13 *	I/O	GPIO_Analog	D10
27	PB14 *	I/O	GPIO_Analog	D9
28	PB15 *	I/O	GPIO_Analog	D12
29	PA8 *	I/O	GPIO_Analog	LED_BUILTIN
30	PA9 *	I/O	GPIO_Analog	TX
31	PA10 *	I/O	GPIO_Analog	RX
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
34	PA13 (JTMS-SWDIO)	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDDUSB	Power		
37	PA14 (JTCK-SWCLK)	I/O	SYS_JTCK-SWCLK	
38	PA15 (JTDI) *	I/O	GPIO_Analog	CHARGE_DETECT

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
39	PB3 (JTDO-TRACESWO) *	I/O	GPIO_Analog	USER_BTN
40	PB4 (NJTRST) *	I/O	GPIO_Analog	D13
41	PB5 *	I/O	GPIO_Analog	MO
42	PB6 *	I/O	GPIO_Analog	SCL
43	PB7 *	I/O	GPIO_Analog	SDA
44	PH3-BOOT0 *	I/O	GPIO_Analog	B
45	PB8 *	I/O	GPIO_Analog	D5
46	PB9 *	I/O	GPIO_Analog	D6
47	VSS	Power		
48	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	cygnet
Project Folder	/Users/rozzie/dev/blues/cygnet
Toolchain / IDE	EWARM V8.32
Firmware Package Name and Version	STM32Cube FW_L4 V1.18.0
Application Structure	Advanced
Generate Under Root	No
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Copy all used libraries into the project folder
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	No
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	Yes
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_RTC_Init	RTC
4	MX_RNG_Init	RNG
5	MX_WWDG_Init	WWDG
6	MX_LPTIM1_Init	LPTIM1
7	MX_ADC1_Init	ADC1
8	MX_USB_PCD_Init	USB

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x3
MCU	STM32L433CCTx
Datasheet	DS11449_Rev3

1.2. Parameter Selection

Temperature	25
Vdd	3.0

1.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

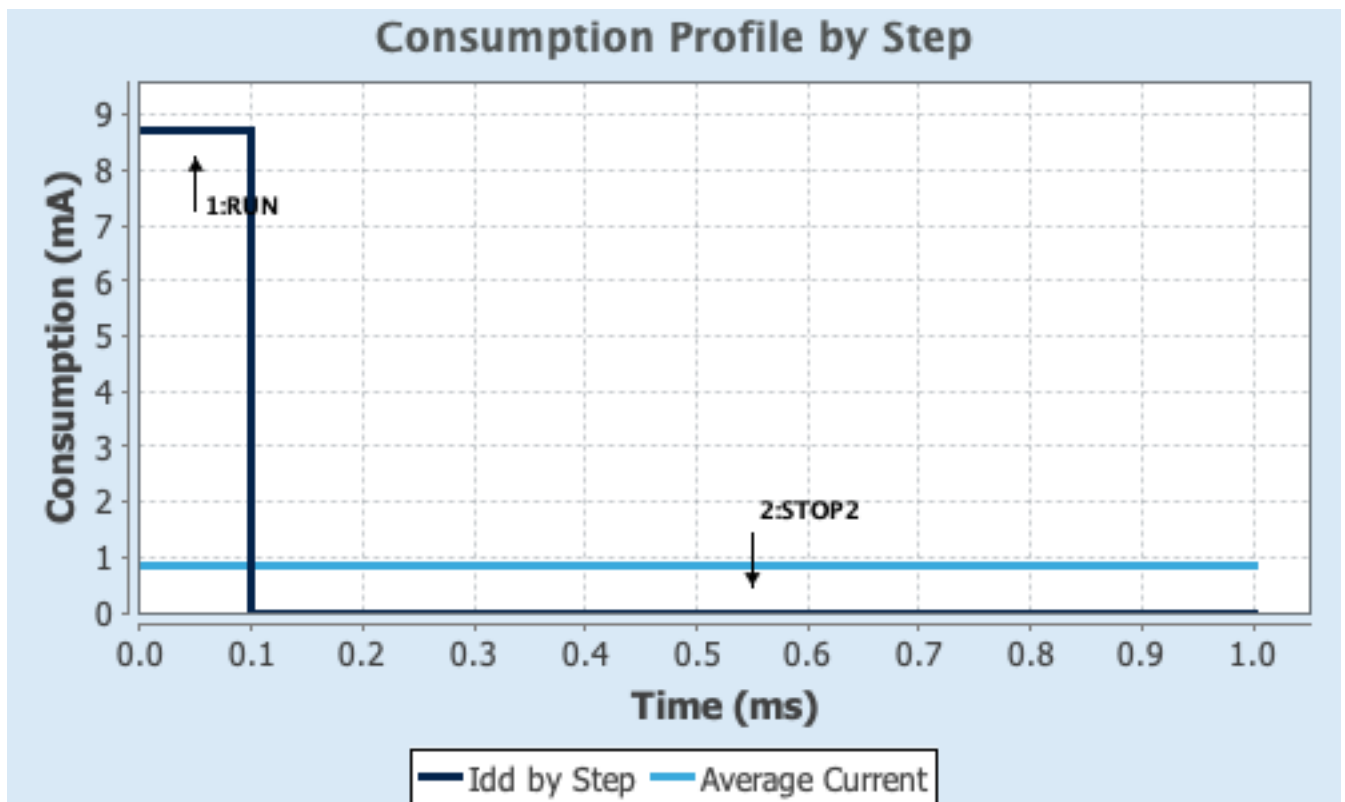
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP2
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-High	NoRange
Fetch Type	SRAM2	n/a
CPU Frequency	80 MHz	0 Hz
Clock Configuration	HSE BYP PLL	ALL CLOCKS OFF
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	8.71 mA	1.06 μ A
Duration	0.1 ms	0.9 ms
DMIPS	100.0	0.0
Ta Max	103.51	105
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	871.95 μ A
Battery Life	5 months, 9 days, 16 hours	Average DMIPS	100.0 DMIPS

1.6. Chart



2. Peripherals and Middlewares Configuration

2.1. ADC1

mode: IN16 Single-ended

IN17: Temperature Sensor Channel

IN18: Vbat Channel

mode: Vrefint Channel

2.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	Asynchronous clock mode divided by 1
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	End of single conversion
Overrun behaviour	Overrun data preserved
Low Power Auto Wait	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Enable Regular Oversampling	Disable
Number Of Conversion	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
<u>Rank</u>	1
Channel	Channel 16
Sampling Time	2.5 Cycles
Offset Number	No offset

ADC_Injected_ConversionMode:

Enable Injected Conversions	Disable
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Analog Watchdog 1:

Enable Analog WatchDog1 Mode	false
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Analog Watchdog 2:

Enable Analog WatchDog2 Mode	false
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Analog Watchdog 3:

Enable Analog WatchDog3 Mode	false
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2.2. LPTIM1

Mode: Counts internal clock events

2.2.1. Parameter Settings:

Clock:

Clock Prescaler	Prescaler Div1
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Preload:

Update Mode	Update Immediate
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Trigger:

Trigger Source	Software Trigger
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2.3. RCC

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

2.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
Data Cache	Enabled
Flash Latency(WS)	4 WS (5 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
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
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2.4. RNG

mode: Activated

2.5. RTC

mode: Activate Clock Source

2.5.1. Parameter Settings:

General:

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

2.6. SYS

Debug: Serial Wire

Timebase Source: TIM2

2.7. USB

mode: Device (FS)

2.7.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s
Physical interface	Internal Phy
Sof Enable	Disabled

Power Parameters:

Low Power	Disabled
Link Power Management	Disabled
Battery Charging	Disabled

2.8. WWDG

mode: Activated

2.8.1. Parameter Settings:

Watchdog Clocking:

WWDG counter clock prescaler	1
WWDG window value	64
WWDG free-running downcounter value	64

Watchdog Interrupt:

Early wakeup interrupt	Disable
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2.9. FREERTOS

Interface: CMSIS_V2

2.9.1. 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 **Enabled ***

Kernel settings:

USE_PREEMPTION Enabled

CPU_CLOCK_HZ SystemCoreClock

TICK_RATE_HZ 1000

MAX_PRIORITIES 56

MINIMAL_STACK_SIZE 128

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 **Built in functionality enabled ***

USE_TASK_NOTIFICATIONS Enabled

RECORD_STACK_HIGH_ADDRESS Disabled

Memory management settings:

Memory Allocation Dynamic / Static

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	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	256

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

2.9.2. 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

2.9.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT	Disabled
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Project settings (see parameter description first):

Use FW pack heap file	Enabled
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* User modified value

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA0	ADC1_IN5	Analog mode	No pull-up and no pull-down	n/a	A0
	PA1	ADC1_IN6	Analog mode	No pull-up and no pull-down	n/a	A1
	PA2	ADC1_IN7	Analog mode	No pull-up and no pull-down	n/a	A2
	PA3	ADC1_IN8	Analog mode	No pull-up and no pull-down	n/a	A3
	PA4	ADC1_IN9	Analog mode	No pull-up and no pull-down	n/a	A4
	PB1	ADC1_IN16	Analog mode for ADC conversion	No pull-up and no pull-down	n/a	BAT_VOLTAGE
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	
SYS	PA13 (JTMS-SWDIO)	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14 (JTCK-SWCLK)	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PC13	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	USB_DETECT
	PH0-OSC_IN (PH0)	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	ENABLE_3V3
	PH1-OSC_OUT (PH1)	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	DISCHARGE_3V3
	PA0	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A0
	PA1	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A1
	PA2	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A2
	PA3	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A3
	PA4	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A4
	PA5	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	CK
	PA6	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	MI
	PA7	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A5
	PB0	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	
	PB1	GPIO_Analog	Analog mode for ADC conversion	No pull-up and no pull-down	n/a	BAT_VOLTAGE
	PB10	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	LPUART1_RX

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB11	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	LPUART1_TX
	PB13	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	D10
	PB14	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	D9
	PB15	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	D12
	PA8	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	LED_BUILTIN
	PA9	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	TX
	PA10	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	RX
	PA15 (JTDI)	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	CHARGE_DETECT
	PB3 (JTDO-TRACESWO)	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	USER_BTN
	PB4 (NJTRST)	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	D13
	PB5	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	MO
	PB6	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	SCL
	PB7	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	SDA
	PH3-BOOT0	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	B
	PB8	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	D5
	PB9	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	D6

3.2. DMA configuration

nothing configured in DMA service

3.3. NVIC configuration

3.3.1. 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
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
TIM2 global interrupt	true	15	0
LPTIM1 global interrupt	true	5	0
USB event interrupt through EXTI line 17	true	5	0
Window watchdog interrupt	unused		
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 global interrupt	unused		
RNG global interrupt	unused		
FPU global interrupt	unused		

3.3.2. 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
Prefetch 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	false	true
TIM2 global interrupt	false	true	true
LPTIM1 global interrupt	false	true	true
USB event interrupt through EXTI line 17	false	true	true

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

Middleware						
FREERTOS						
System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing
DMA	ADC1	LPTIM1	USB		RNG	
GPIO		RTC				
NVIC						
RCC						
SYS						
WWDG						

5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32l4_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32l4_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32l4_svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32l4_marketing-pres.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32ulp.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32l4.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstmcsuite.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
Magazine Articles	https://www.st.com/resource/en/magazine/design-elektronik_august2017.pdf
Magazine Articles	https://www.st.com/resource/en/magazine/design-elektronik_october2016.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/sesip-2000002-01-cert.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/sesip-2000002-01-st2.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/psa-certificate_stm32l4.pdf

Application Notes https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2834-how-to-get-the-best-adc-accuracy-in-stm32-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2867-oscillator-design-guide-for-stm8afals-stm32-mcus-and-mpus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3155-uart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3156-usb-dfu-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3236-increase-the-number-of-touchkeys-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3960-esd-considerations-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4221-i2c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4229-how-to-

implement-a-vocoder-solution-using-stm32-microcontrollers-
stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4286-spi-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4299-improve-conducted-noise-robustness-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4310-sampling-capacitor-selection-guide-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4312-design-with-surface-sensors-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4316-tuning-a-touch-sensing-application-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4555-getting-started-with-stm32l4-series-and-stm32l4-series-hardware-development-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4566-extending-the-dac-performance-of-stm32-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4612-migrating-from-stm32l1-series-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4616-migrating-from-stm32f401-and-stm32f411-lines-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4621-stm32l4-and-stm32l4-ultralowpower-features-overview-stmicroelectronics.pdf

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