
STM32
CubeMX

1. Description

1.1. Project

Project Name	CPPTEST
Board Name	NUCLEO-F429ZI
Generated with:	STM32CubeMX 6.0.0
Date	08/08/2020

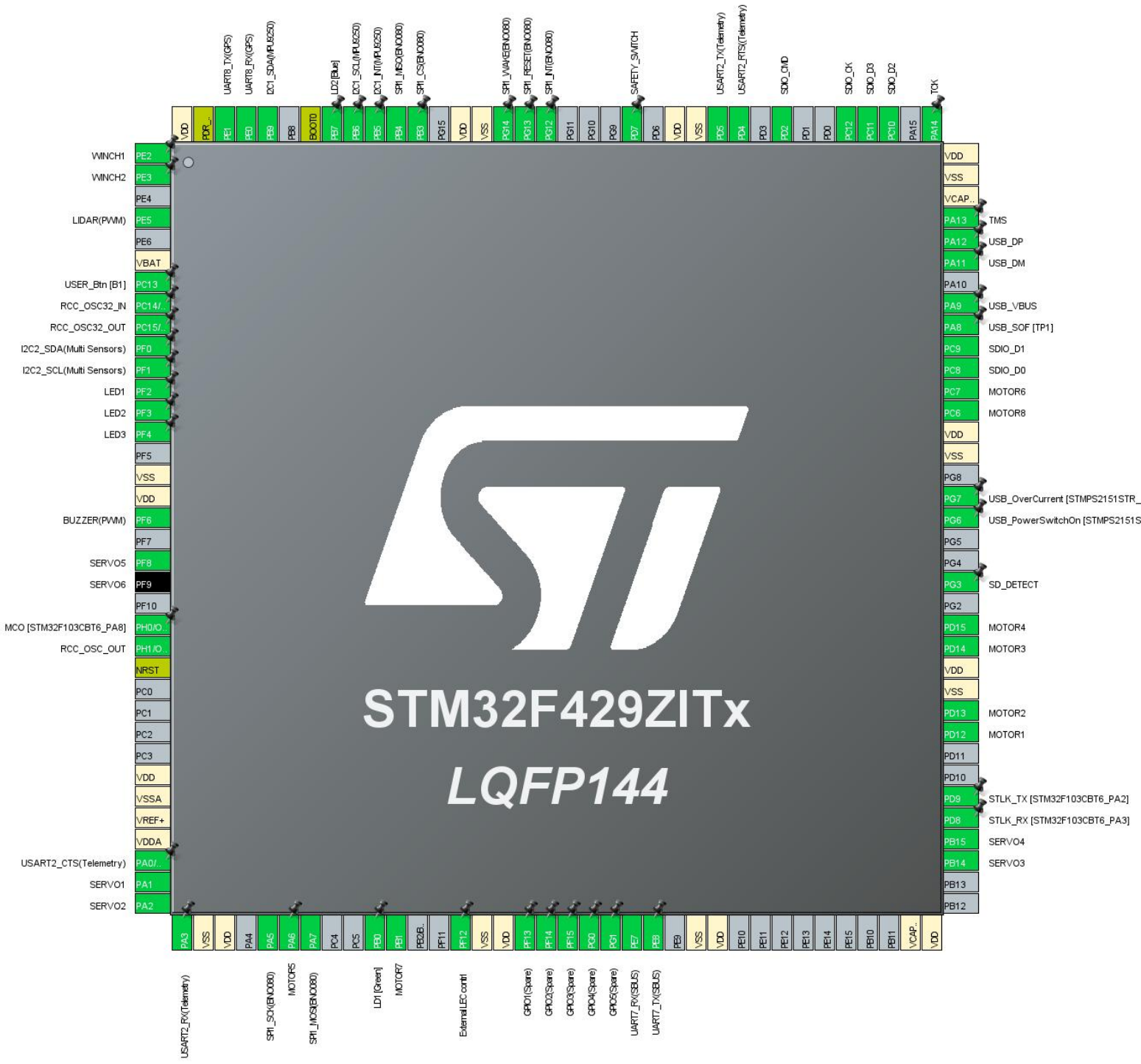
1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F429/439
MCU name	STM32F429ZITx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration



3. Pins Configuration

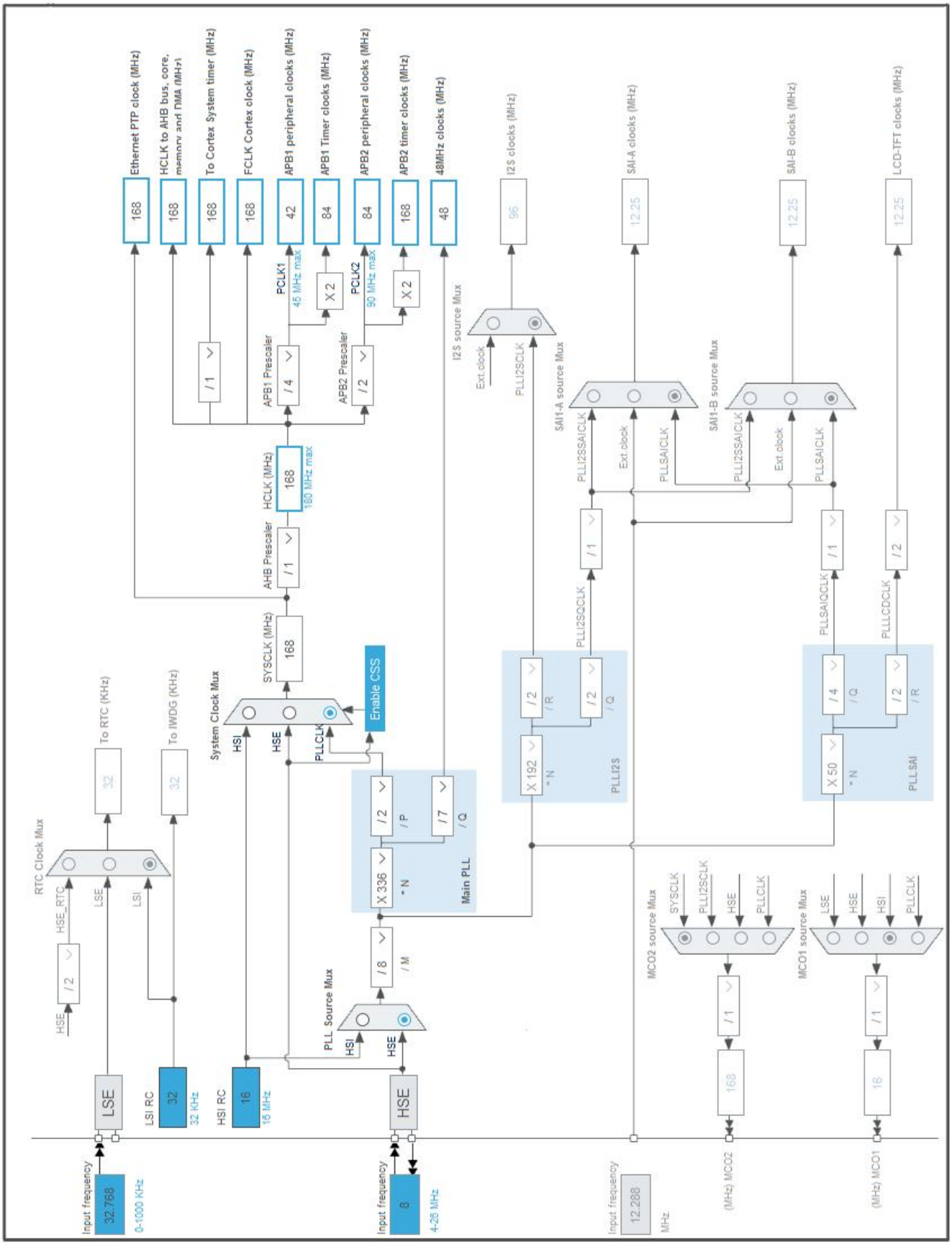
Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Output	WINCH1
2	PE3 *	I/O	GPIO_Output	WINCH2
4	PE5	I/O	TIM9_CH1	LIDAR(PWM)
6	VBAT	Power		
7	PC13	I/O	GPIO_EXTI13	USER_Btn [B1]
8	PC14/OSC32_IN	I/O	RCC_OSC32_IN	
9	PC15/OSC32_OUT	I/O	RCC_OSC32_OUT	
10	PF0	I/O	I2C2_SDA	I2C2_SDA(Multi Sensors)
11	PF1	I/O	I2C2_SCL	I2C2_SCL(Multi Sensors)
12	PF2 *	I/O	GPIO_Output	LED1
13	PF3 *	I/O	GPIO_Output	LED2
14	PF4 *	I/O	GPIO_Output	LED3
16	VSS	Power		
17	VDD	Power		
18	PF6	I/O	TIM10_CH1	BUZZER(PWM)
20	PF8	I/O	TIM13_CH1	SERVO5
21	PF9	I/O	TIM14_CH1	SERVO6
23	PH0/OSC_IN	I/O	RCC_OSC_IN	MCO [STM32F103CBT6_PA8]
24	PH1/OSC_OUT	I/O	RCC_OSC_OUT	
25	NRST	Reset		
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
34	PA0/WKUP	I/O	USART2_CTS	USART2_CTS(Telemetry)
35	PA1	I/O	TIM5_CH2	SERVO1
36	PA2	I/O	TIM5_CH3	SERVO2
37	PA3	I/O	USART2_RX	USART2_RX(Telemetry)
38	VSS	Power		
39	VDD	Power		
41	PA5	I/O	SPI1_SCK	SPI1_SCK(BNO080)
42	PA6	I/O	TIM3_CH1	MOTOR5
43	PA7	I/O	SPI1_MOSI	SPI1_MOSI(BNO080)
46	PB0 *	I/O	GPIO_Output	LD1 [Green]
47	PB1	I/O	TIM3_CH4	MOTOR7

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
50	PF12 *	I/O	GPIO_Output	External LEC contrl
51	VSS	Power		
52	VDD	Power		
53	PF13 *	I/O	GPIO_Output	GPIO1(Spare)
54	PF14 *	I/O	GPIO_Output	GPIO2(Spare)
55	PF15 *	I/O	GPIO_Output	GPIO3(Spare)
56	PG0 *	I/O	GPIO_Output	GPIO4(Spare)
57	PG1 *	I/O	GPIO_Output	GPIO5(Spare)
58	PE7	I/O	UART7_RX	UART7_RX(SBUS)
59	PE8	I/O	UART7_TX	UART7_TX(SBUS)
61	VSS	Power		
62	VDD	Power		
71	VCAP_1	Power		
72	VDD	Power		
75	PB14	I/O	TIM12_CH1	SERVO3
76	PB15	I/O	TIM12_CH2	SERVO4
77	PD8	I/O	USART3_TX	STLK_RX [STM32F103CBT6_PA3]
78	PD9	I/O	USART3_RX	STLK_TX [STM32F103CBT6_PA2]
81	PD12	I/O	TIM4_CH1	MOTOR1
82	PD13	I/O	TIM4_CH2	MOTOR2
83	VSS	Power		
84	VDD	Power		
85	PD14	I/O	TIM4_CH3	MOTOR3
86	PD15	I/O	TIM4_CH4	MOTOR4
88	PG3 *	I/O	GPIO_Input	SD_DETECT
91	PG6 *	I/O	GPIO_Output	USB_PowerSwitchOn [STMPS2151STR_EN]
92	PG7 *	I/O	GPIO_Input	USB_OverCurrent [STMPS2151STR_FAULT]
94	VSS	Power		
95	VDD	Power		
96	PC6	I/O	TIM8_CH1	MOTOR8
97	PC7	I/O	TIM3_CH2	MOTOR6
98	PC8	I/O	SDIO_D0	
99	PC9	I/O	SDIO_D1	
100	PA8	I/O	USB_OTG_FS_SOF	USB_SOF [TP1]
101	PA9	I/O	USB_OTG_FS_VBUS	USB_VBUS
103	PA11	I/O	USB_OTG_FS_DM	USB_DM

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
104	PA12	I/O	USB_OTG_FS_DP	USB_DP
105	PA13	I/O	SYS_JTMS-SWDIO	TMS
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
109	PA14	I/O	SYS_JTCK-SWCLK	TCK
111	PC10	I/O	SDIO_D2	
112	PC11	I/O	SDIO_D3	
113	PC12	I/O	SDIO_CK	
116	PD2	I/O	SDIO_CMD	
118	PD4	I/O	USART2_RTS	USART2_RTS((Telemetry)
119	PD5	I/O	USART2_TX	USART2_TX(Telemetry)
120	VSS	Power		
121	VDD	Power		
123	PD7	I/O	GPIO_EXTI7	SAFETY_SWITCH
127	PG12 *	I/O	GPIO_Input	SPI1_INT(BNO080)
128	PG13 *	I/O	GPIO_Output	SPI1_RESET(BNO080)
129	PG14 *	I/O	GPIO_Output	SPI1_WAKE(BNO080)
130	VSS	Power		
131	VDD	Power		
133	PB3 *	I/O	GPIO_Output	SPI1_CS(BNO080)
134	PB4	I/O	SPI1_MISO	SPI1_MISO(BNO080)
135	PB5 *	I/O	GPIO_Input	I2C1_INT(MPU9250)
136	PB6	I/O	I2C1_SCL	I2C1_SCL(MPU9250)
137	PB7 *	I/O	GPIO_Output	LD2 [Blue]
138	BOOT0	Boot		
140	PB9	I/O	I2C1_SDA	I2C1_SDA(MPU9250)
141	PE0	I/O	UART8_RX	UART8_RX(GPS)
142	PE1	I/O	UART8_TX	UART8_TX(GPS)
143	PDR_ON	Reset		
144	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	CPPTEST
Project Folder	C:\STM\CPPTEST
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.25.0
Application Structure	Advanced
Generate Under Root	Yes
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 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	IP Instance Name
1	MX_GPIO_Init	GPIO
2	MX_DMA_Init	DMA
3	SystemClock_Config	RCC
4	MX_USART3_UART_Init	USART3
5	MX_USB_OTG_FS_PCD_Init	USB_OTG_FS
6	MX_I2C1_Init	I2C1
7	MX_TIM3_Init	TIM3
8	MX_TIM4_Init	TIM4
9	MX_UART7_Init	UART7
10	MX_USART2_UART_Init	USART2
11	MX_I2C2_Init	I2C2

Rank	Function Name	IP Instance Name
12	MX_TIM2_Init	TIM2
13	MX_TIM10_Init	TIM10
14	MX_UART8_Init	UART8
15	MX_SDIO_SD_Init	SDIO
16	MX_FATFS_Init	FATFS
17	MX_TIM9_Init	TIM9
18	MX_TIM13_Init	TIM13
19	MX_TIM14_Init	TIM14
20	MX_TIM5_Init	TIM5
21	MX_TIM8_Init	TIM8
22	MX_TIM12_Init	TIM12
23	MX_SPI1_Init	SPI1

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F429/439
MCU	STM32F429ZITx
Datasheet	DS9405_Rev9

6.2. Parameter Selection

Temperature	25
Vdd	3.3

6.3. 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

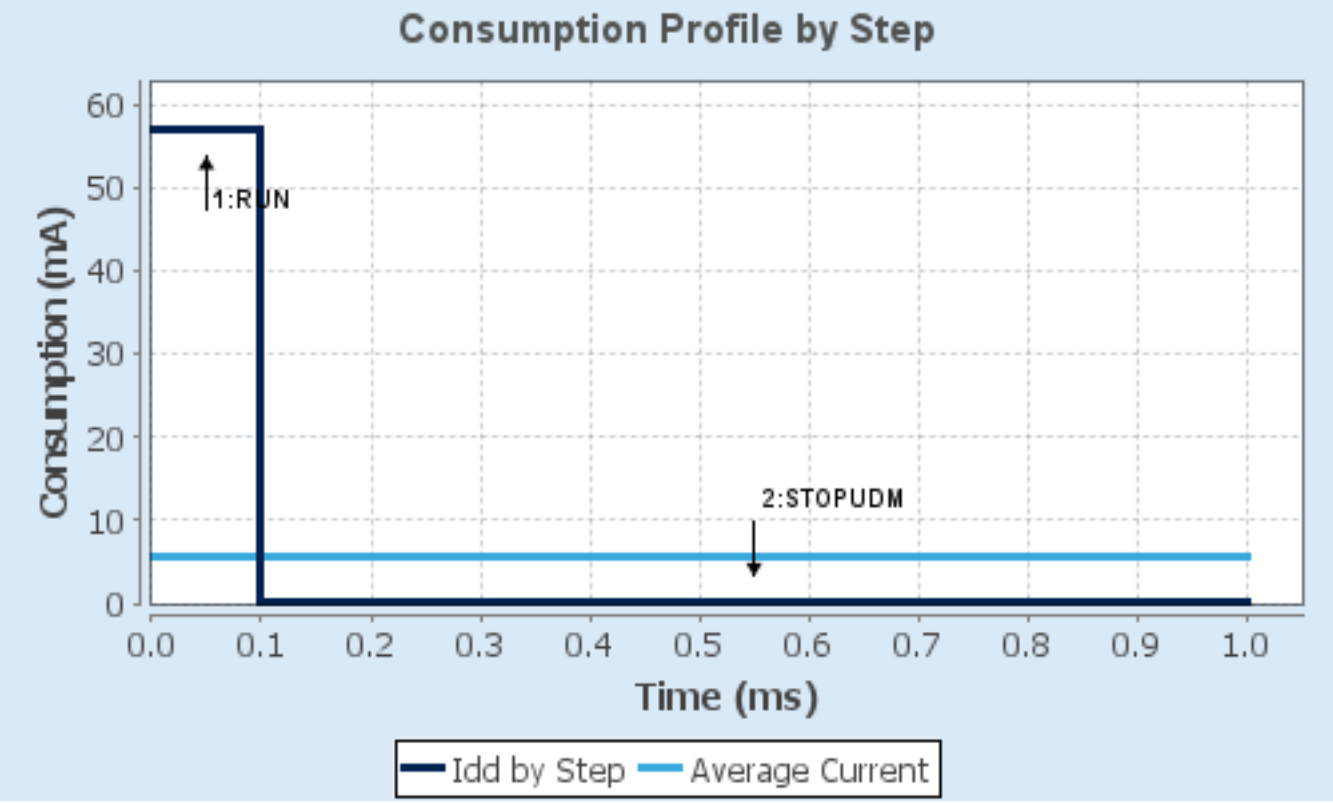
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP_UDM (Under Drive)
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	180 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	57 mA	100 µA
Duration	0.1 ms	0.9 ms
DMIPS	225.0	0.0
Ta Max	97.48	104.99
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	5.79 mA
Battery Life	24 days, 10 hours	Average DMIPS	225.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
60
50
40
30
20
10
0
1:RUN
2:STOPUDM
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

7. IPs and Middleware Configuration

7.1. GPIO

7.2. I2C1

I2C: I2C

7.2.1. Parameter Settings:

Master Features:

I2C Speed Mode	**Fast Mode ***
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

Timing configuration:

Coefficient of Digital Filter	0
Analog Filter	Enabled

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

7.3. I2C2

I2C: I2C

7.3.1. Parameter Settings:

Master Features:

I2C Speed Mode	**Fast Mode ***
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

Timing configuration:

Coefficient of Digital Filter	0
Analog Filter	Enabled

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

7.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : BYPASS Clock Source

7.4.1. 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
TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
Power Over Drive	Disabled

7.5. SDIO

Mode: SD 4 bits Wide bus

7.5.1. Parameter Settings:

SDIO parameters:

Clock transition on which the bit capture is made	Rising transition
SDIO Clock divider bypass	Disable
SDIO Clock output enable when the bus is idle	Disable the power save for the clock
SDIO hardware flow control	The hardware control flow is disabled
SDIOCLK clock divide factor	0

7.6. SPI1

Mode: Full-Duplex Master

7.6.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**32 ***
Baud Rate	**2.625 MBits/s ***
Clock Polarity (CPOL)	**High ***
Clock Phase (CPHA)	**2 Edge ***

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.7. SYS

Debug: Serial Wire

Timebase Source: TIM6

7.8. TIM2

Clock Source : Internal Clock

7.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**84-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	4294967296-1
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	Reset (UG bit from TIMx_EGR)

7.9. TIM3

Clock Source : Internal Clock

Channel1: PWM Generation CH1
Channel2: PWM Generation CH2
Channel4: PWM Generation CH4

7.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**42-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**40000-1 ***
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	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.10. TIM4

Clock Source : Internal Clock
Channel1: PWM Generation CH1
Channel2: PWM Generation CH2

Channel3: PWM Generation CH3
Channel4: PWM Generation CH4

7.10.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**42-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**40000-1 ***
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	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.11. TIM5

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

7.11.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**10000-1 ***
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	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.12. TIM8

Channel1: PWM Generation CH1

7.12.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Run Mode (OSSR)	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

7.13. TIM9

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

7.13.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65536-1
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Input Capture Channel 1:

Polarity Selection	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	**15 ***

Input Capture Channel 2:

Polarity Selection	**Falling Edge ***
IC Selection	Indirect
Prescaler Division Ratio	No division

7.14. TIM10

mode: Activated

Channel1: PWM Generation CH1

7.14.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1000-1 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	**500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.15. TIM12

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

7.15.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.16. TIM13
mode: Activated
Channel1: PWM Generation CH1

7.16.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10000-1 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	**450 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.17. TIM14
mode: Activated
Channel1: PWM Generation CH1

7.17.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10000-1 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	**450 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.18. UART7

Mode: Asynchronous

7.18.1. Parameter Settings:

Basic Parameters:

Baud Rate	**100000 ***
Word Length	**9 Bits (including Parity) ***
Parity	**Even ***
Stop Bits	**2 ***

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

7.19. UART8

Mode: Asynchronous

7.19.1. Parameter Settings:

Basic Parameters:

Baud Rate	**38400 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

7.20. USART2

Mode: Asynchronous

Hardware Flow Control (RS232): CTS/RTS

7.20.1. 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

7.21. USART3

Mode: Asynchronous

7.21.1. Parameter Settings:

Basic Parameters:

Baud Rate	**921600 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

7.22. USB_OTG_FS

Mode: Device_Only

mode: Activate_SOF

mode: Activate_VBUS

7.22.1. Parameter Settings:

Speed	Device Full Speed 12MBit/s
Low power	Disabled
Link Power Management	Disabled
VBUS sensing	Enabled
Signal start of frame	Enabled

7.23. FATFS

mode: SD Card

7.23.1. Set Defines:

Version:

FATFS version	R0.12c

Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	Disabled
USE_MKFS (Make filesystem function)	Enabled
USE_FASTSEEK (Fast seek function)	Enabled
USE_EXPAND (Use f_expand function)	Disabled
USE_CHMOD (Change attributes function)	Disabled
USE_LABEL (Volume label functions)	Disabled
USE_FORWARD (Forward function)	Disabled

Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	**ASCII only ***
USE_LFN (Use Long Filename)	Disabled
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	Disabled

Physical Drive Parameters:

VOLUMES (Logical drives)	1
MAX_SS (Maximum Sector Size)	**4096 ***
MIN_SS (Minimum Sector Size)	512
MULTI_PARTITION (Volume partitions feature)	Disabled
USE_TRIM (Erase feature)	Disabled
FS_NOFSINFO (Force full FAT scan)	0

System Parameters:

FS_TINY (Tiny mode)	Disabled
FS_EXFAT (Support of exFAT file system)	Disabled
FS_NORTC (Timestamp feature)	Dynamic timestamp
FS_REENTRANT (Re-Entrancy)	Enabled
FS_TIMEOUT (Timeout ticks)	1000
USE_MUTEX	Disabled

SYNC_t (O/S sync object)	osSemaphoreId_t
FS_LOCK (Number of files opened simultaneously)	2

7.23.2. Advanced Settings:

SDIO/SDMMC:

SDIO instance	SDIO
Use dma template	Enabled
BSP code for SD	Generic

7.24. FREERTOS

Interface: CMSIS_V2

7.24.1. Config parameters:

API:

FreeRTOS API	CMSIS v2

Versions:

FreeRTOS version	10.2.1
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	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	**10 ***
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

7.24.2. 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	Disabled
eTaskGetState	Enabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Enabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled
uxTaskGetStackHighWaterMark2	Disabled

7.24.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT	Disabled

Project settings (see parameter description first):

Use FW pack heap file	Enabled

*** User modified value**

8. System Configuration

8.1. 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(MPU9250)
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	I2C1_SDA(MPU9250)
I2C2	PF0	I2C2_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	I2C2_SDA(Multi Sensors)
	PF1	I2C2_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	I2C2_SCL(Multi Sensors)
RCC	PC14/OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15/OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PH0/OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	MCO [STM32F103CBT6_PA8]
	PH1/OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SDIO	PC8	SDIO_D0	Alternate Function Push Pull	**Pull-up ***	Very High	
	PC9	SDIO_D1	Alternate Function Push Pull	**Pull-up ***	Very High	
	PC10	SDIO_D2	Alternate Function Push Pull	**Pull-up ***	Very High	
	PC11	SDIO_D3	Alternate Function Push Pull	**Pull-up ***	Very High	
	PC12	SDIO_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD2	SDIO_CMD	Alternate Function Push Pull	**Pull-up ***	Very High	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI1_SCK(BNO080)
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI1_MOSI(BNO080)
	PB4	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI1_MISO(BNO080)
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	TMS
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	TCK
TIM3	PA6	TIM3_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR5
	PB1	TIM3_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR7
	PC7	TIM3_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR6

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
TIM4	PD12	TIM4_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR1
	PD13	TIM4_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR2
	PD14	TIM4_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR3
	PD15	TIM4_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR4
TIM5	PA1	TIM5_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO1
	PA2	TIM5_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO2
TIM8	PC6	TIM8_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOTOR8
TIM9	PE5	TIM9_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	LIDAR(PWM)
TIM10	PF6	TIM10_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	BUZZER(PWM)
TIM12	PB14	TIM12_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO3
	PB15	TIM12_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO4
TIM13	PF8	TIM13_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO5
TIM14	PF9	TIM14_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO6
UART7	PE7	UART7_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART7_RX(SBUS)
	PE8	UART7_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART7_TX(SBUS)
UART8	PE0	UART8_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART8_RX(GPS)
	PE1	UART8_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART8_TX(GPS)
USART2	PA0/WKUP	USART2_CTS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USART2_CTS(Telemetry)
	PA3	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USART2_RX(Telemetry)
	PD4	USART2_RTS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USART2_RTS((Telemetry)
	PD5	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USART2_TX(Telemetry)
USART3	PD8	USART3_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	STLK_RX [STM32F103CBT6_PA3]
	PD9	USART3_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	STLK_TX [STM32F103CBT6_PA2]
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

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	USB_DP
GPIO	PE2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	WINCH1
	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	WINCH2
	PC13	GPIO_EXTI13	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	USER_Btn [B1]
	PF2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED1
	PF3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED2
	PF4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED3
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD1 [Green]
	PF12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	External LEC contrl
	PF13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO1(Spare)
	PF14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO2(Spare)
	PF15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO3(Spare)
	PG0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO4(Spare)
	PG1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO5(Spare)
	PG3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SD_DETECT
	PG6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	USB_PowerSwitchOn [STMPS2151STR_EN]
	PG7	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	USB_OverCurrent [STMPS2151STR_FAULT]
	PD7	GPIO_EXTI7	External Interrupt Mode with Rising edge trigger detection	**Pull-down ***	n/a	SAFETY_SWITCH
	PG12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SPI1_INT(BNO080)
	PG13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_RESET(BNO080)
	PG14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_WAKE(BNO080)
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_CS(BNO080)
	PB5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	I2C1_INT(MPU9250)
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Blue]

8.2. DMA configuration

DMA request	Stream	Direction	Priority
UART7_RX	DMA1_Stream3	Peripheral To Memory	Low
I2C1_RX	DMA1_Stream5	Peripheral To Memory	Low
UART8_RX	DMA1_Stream6	Peripheral To Memory	Low
SDIO_RX	DMA2_Stream3	Peripheral To Memory	Low
SDIO_TX	DMA2_Stream6	Memory To Peripheral	Low

UART7_RX: DMA1_Stream3 DMA request Settings:

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

I2C1_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

UART8_RX: DMA1_Stream6 DMA request Settings:

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

SDIO_RX: DMA2_Stream3 DMA request Settings:

Mode:	**Peripheral Flow Control ***

Use fifo:	**Enable ***
FIFO Threshold:	Full
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	**Word ***
Memory Data Width:	Word
Peripheral Burst Size:	**4 Increment ***
Memory Burst Size:	4 Increment

SDIO_TX: DMA2_Stream6 DMA request Settings:

Mode:	**Peripheral Flow Control ***
Use fifo:	**Enable ***
FIFO Threshold:	Full
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	**Word ***
Memory Data Width:	Word
Peripheral Burst Size:	**4 Increment ***
Memory Burst Size:	4 Increment

8.3. NVIC configuration

8.3.1. 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
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
DMA1 stream3 global interrupt	true	5	0
DMA1 stream5 global interrupt	true	1	0
DMA1 stream6 global interrupt	true	5	0
TIM1 break interrupt and TIM9 global interrupt	true	5	0
TIM2 global interrupt	true	5	0
I2C1 event interrupt	true	1	0
I2C1 error interrupt	true	1	0
I2C2 event interrupt	true	5	0
I2C2 error interrupt	true	5	0
USART2 global interrupt	true	5	0
TIM8 capture compare interrupt	true	0	0
SDIO global interrupt	true	5	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	0	0
DMA2 stream3 global interrupt	true	5	0
DMA2 stream6 global interrupt	true	5	0
UART7 global interrupt	true	5	0
UART8 global interrupt	true	5	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line[9:5] interrupts	unused		
TIM1 update interrupt and TIM10 global interrupt	unused		
TIM3 global interrupt	unused		
TIM4 global interrupt	unused		
SPI1 global interrupt	unused		
USART3 global interrupt	unused		
EXTI line[15:10] interrupts	unused		

Interrupt Table	Enable	Preenmption Priority	SubPriority
TIM8 break interrupt and TIM12 global interrupt	unused		
TIM8 update interrupt and TIM13 global interrupt	unused		
TIM8 trigger and commutation interrupts and TIM14 global interrupt	unused		
TIM5 global interrupt	unused		
USB On The Go FS global interrupt	unused		
FPU global interrupt	unused		

8.3.2. NVIC Code generation

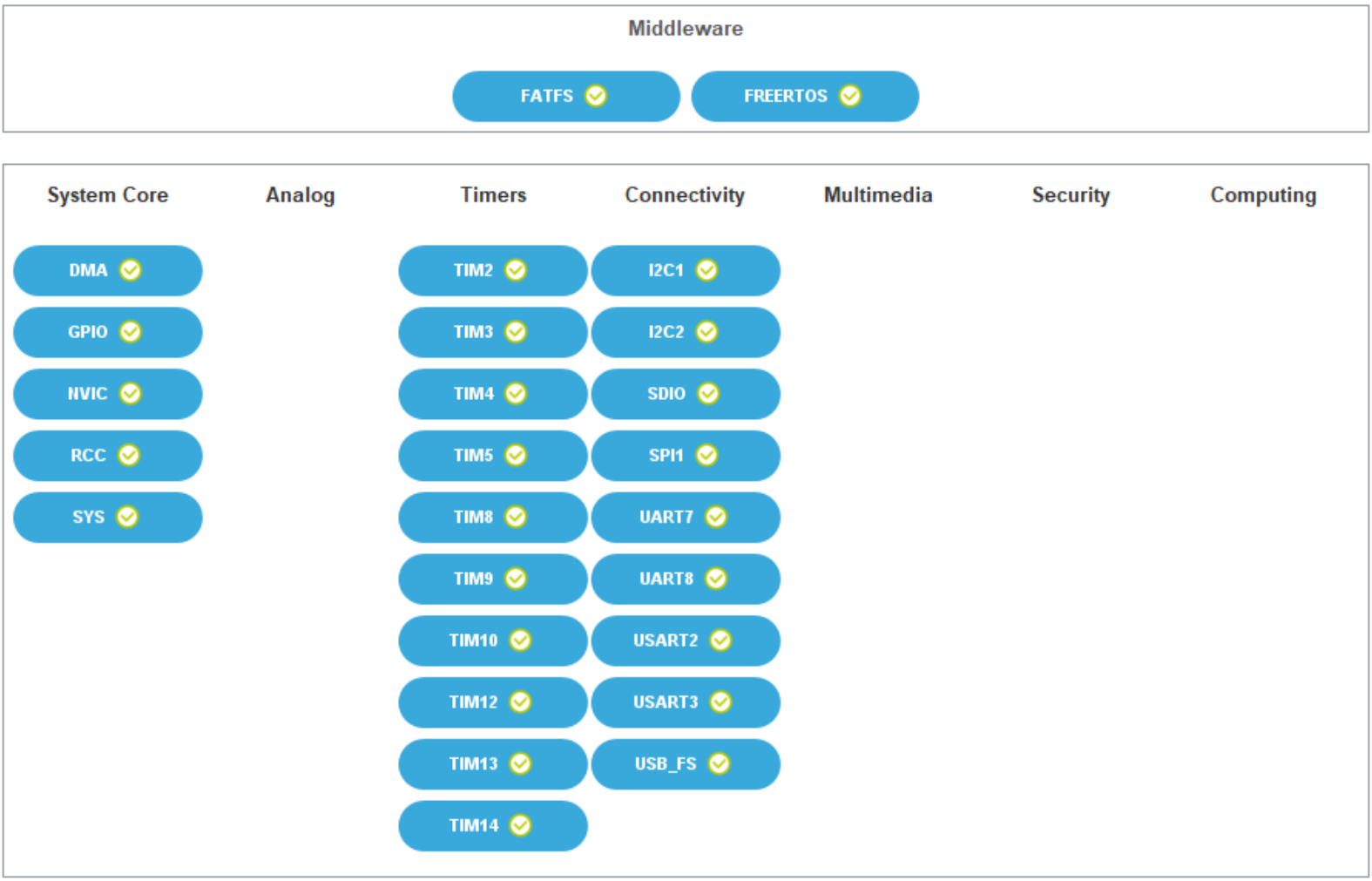
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	true	true	false
Hard fault interrupt	true	true	false
Memory management fault	true	true	false
Pre-fetch fault, memory access fault	true	true	false
Undefined instruction or illegal state	true	true	false
System service call via SWI instruction	true	false	false
Debug monitor	true	true	false
Pendable request for system service	true	false	false
System tick timer	true	false	false
DMA1 stream3 global interrupt	true	true	true
DMA1 stream5 global interrupt	true	true	true
DMA1 stream6 global interrupt	true	true	true
TIM1 break interrupt and TIM9 global interrupt	true	true	true
TIM2 global interrupt	true	true	true
I2C1 event interrupt	true	true	true
I2C1 error interrupt	true	true	true
I2C2 event interrupt	true	true	true
I2C2 error interrupt	true	true	true
USART2 global interrupt	true	true	true
TIM8 capture compare interrupt	true	true	true
SDIO global interrupt	true	true	true
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	true	true
DMA2 stream3 global interrupt	true	true	true
DMA2 stream6 global interrupt	true	true	true
UART7 global interrupt	true	true	true
UART8 global interrupt	true	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Software Pack Report

10.1. Software Pack selected

Vendor	Name	Version	Component
STMicroelectronics	FreeRTOS	0.0.1	Class : CMSIS Group : RTOS2 SubGroup : FreeRTOS Version : 10.2.0 Class : RTOS Group : Core Version : 10.2.0

11. Docs & Resources

Type	Link
Datasheet	http://www.st.com/resource/en/datasheet/DM00071990.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/DM00031020.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/DM00046982.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/DM00068628.pdf
Application note	http://www.st.com/resource/en/application_note/CD00167594.pdf
Application note	http://www.st.com/resource/en/application_note/CD00211314.pdf
Application note	http://www.st.com/resource/en/application_note/CD00249778.pdf
Application note	http://www.st.com/resource/en/application_note/CD00259245.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264321.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264342.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264379.pdf
Application note	http://www.st.com/resource/en/application_note/DM00024853.pdf
Application note	http://www.st.com/resource/en/application_note/DM00040802.pdf
Application note	http://www.st.com/resource/en/application_note/DM00040808.pdf
Application note	http://www.st.com/resource/en/application_note/DM00042534.pdf
Application note	http://www.st.com/resource/en/application_note/DM00046011.pdf
Application note	http://www.st.com/resource/en/application_note/DM00050879.pdf
Application note	http://www.st.com/resource/en/application_note/DM00072315.pdf
Application note	http://www.st.com/resource/en/application_note/DM00073742.pdf
Application note	http://www.st.com/resource/en/application_note/DM00073853.pdf
Application note	http://www.st.com/resource/en/application_note/DM00080497.pdf
Application note	http://www.st.com/resource/en/application_note/DM00081379.pdf
Application note	http://www.st.com/resource/en/application_note/DM00115714.pdf
Application note	http://www.st.com/resource/en/application_note/DM00123028.pdf
Application note	http://www.st.com/resource/en/application_note/DM00129215.pdf

Application note	http://www.st.com/resource/en/application_note/DM00154959.pdf
Application note	http://www.st.com/resource/en/application_note/DM00160482.pdf
Application note	http://www.st.com/resource/en/application_note/DM00161778.pdf
Application note	http://www.st.com/resource/en/application_note/DM00164538.pdf
Application note	http://www.st.com/resource/en/application_note/DM00172465.pdf
Application note	http://www.st.com/resource/en/application_note/DM00213525.pdf
Application note	http://www.st.com/resource/en/application_note/DM00220769.pdf
Application note	http://www.st.com/resource/en/application_note/DM00257177.pdf
Application note	http://www.st.com/resource/en/application_note/DM00272912.pdf
Application note	http://www.st.com/resource/en/application_note/DM00226326.pdf
Application note	http://www.st.com/resource/en/application_note/DM00236305.pdf
Application note	http://www.st.com/resource/en/application_note/DM00281138.pdf
Application note	http://www.st.com/resource/en/application_note/DM00296349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00327191.pdf
Application note	http://www.st.com/resource/en/application_note/DM00287603.pdf
Application note	http://www.st.com/resource/en/application_note/DM00354244.pdf
Application note	http://www.st.com/resource/en/application_note/DM00373474.pdf
Application note	http://www.st.com/resource/en/application_note/DM00315319.pdf
Application note	http://www.st.com/resource/en/application_note/DM00380469.pdf
Application note	http://www.st.com/resource/en/application_note/DM00395696.pdf
Application note	http://www.st.com/resource/en/application_note/DM00431633.pdf
Application note	http://www.st.com/resource/en/application_note/DM00493651.pdf
Application note	http://www.st.com/resource/en/application_note/DM00536349.pdf