
STM32
CubeMX

1. Description

1.1. Project

Project Name	I4_BCC
Board Name	NUCLEO-F411RE
Generated with:	STM32CubeMX 6.6.1
Date	01/21/2023

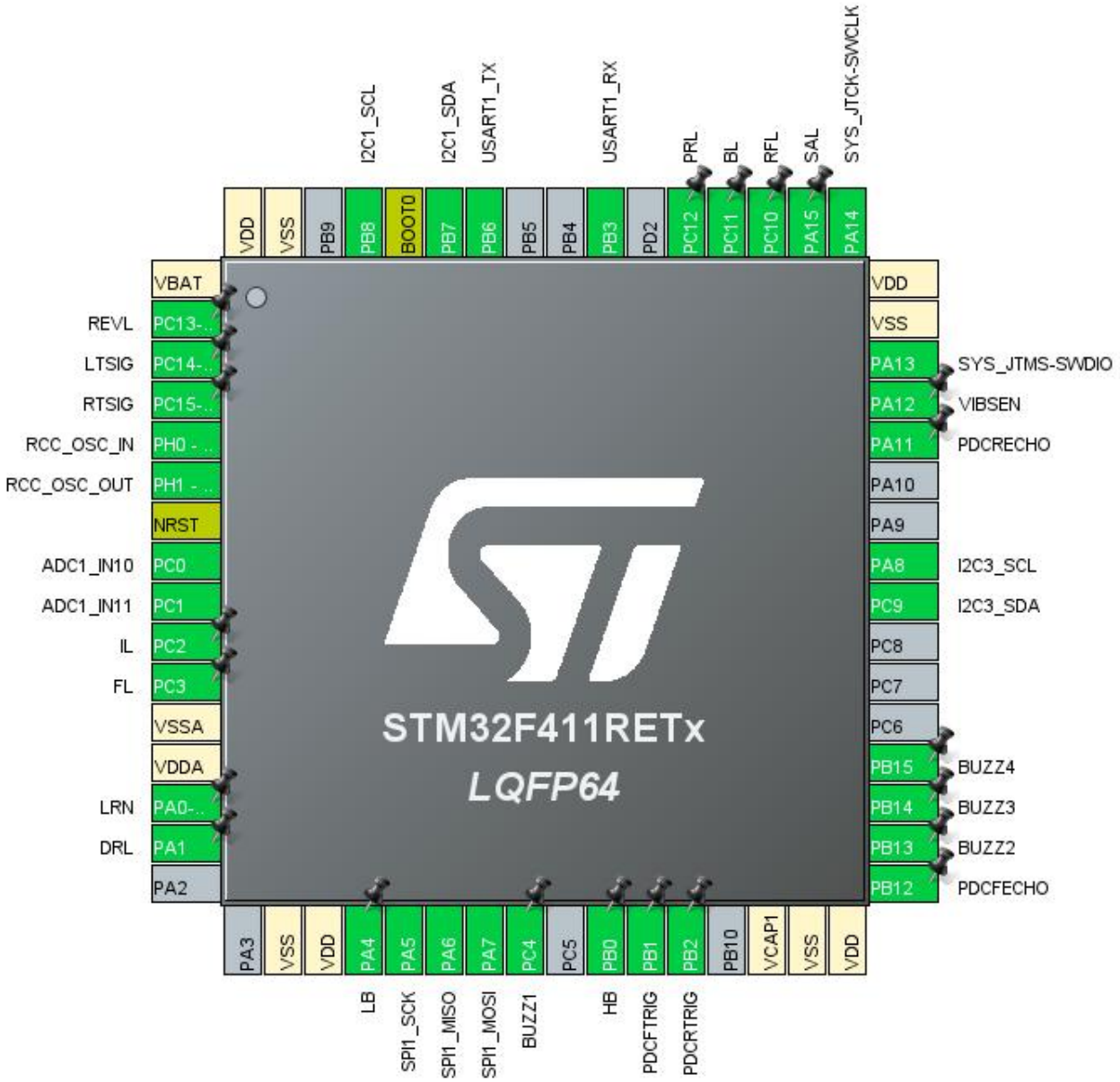
1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F411
MCU name	STM32F411RETx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration



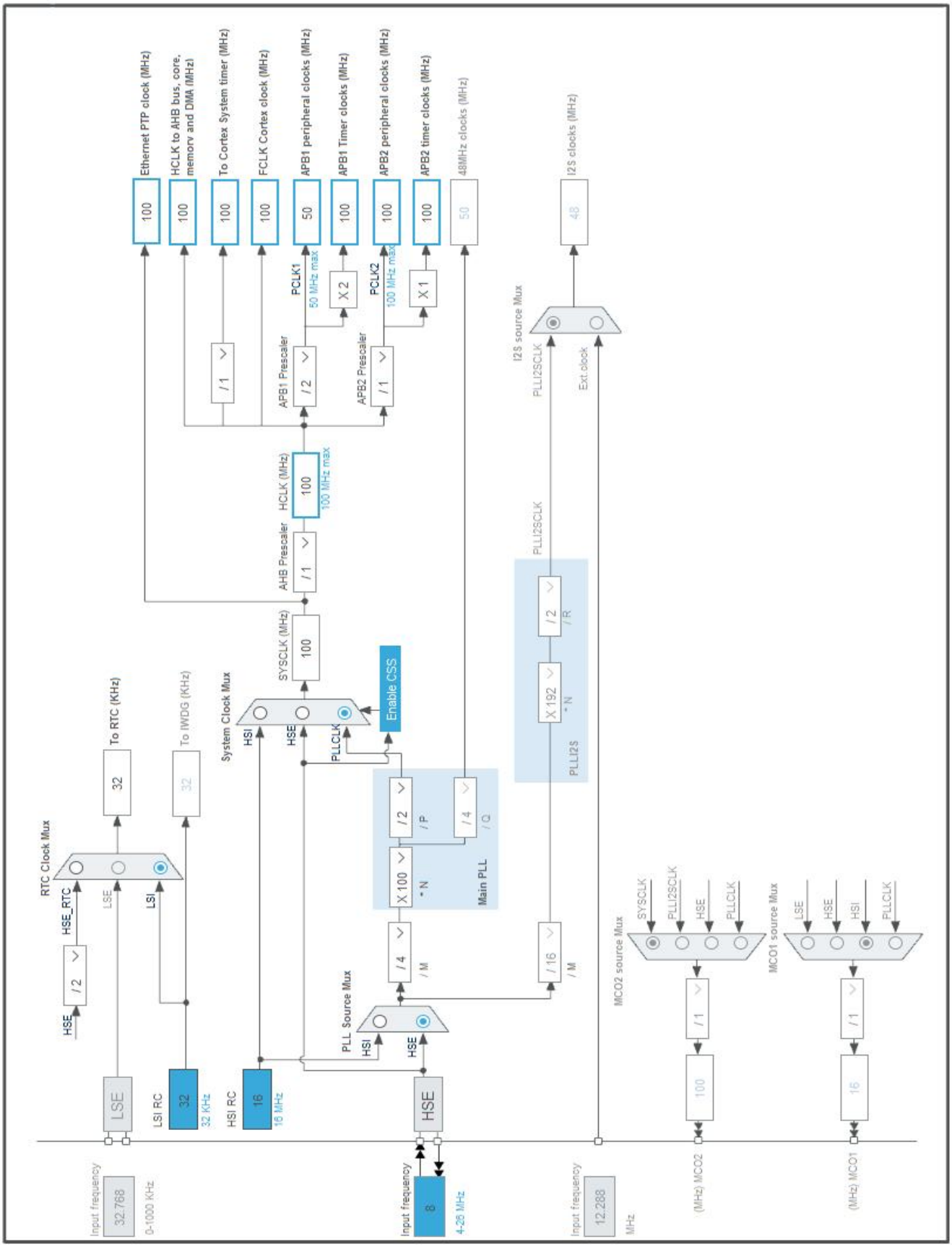
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-ANTI_TAMP *	I/O	GPIO_Output	REVL
3	PC14-OSC32_IN *	I/O	GPIO_Output	LTSIG
4	PC15-OSC32_OUT *	I/O	GPIO_Output	RTSIG
5	PH0 - OSC_IN	I/O	RCC_OSC_IN	
6	PH1 - OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	PC0	I/O	ADC1_IN10	
9	PC1	I/O	ADC1_IN11	
10	PC2 *	I/O	GPIO_Output	IL
11	PC3 *	I/O	GPIO_Output	FL
12	VSSA	Power		
13	VDDA	Power		
14	PA0-WKUP *	I/O	GPIO_Output	LRN
15	PA1 *	I/O	GPIO_Output	DRL
18	VSS	Power		
19	VDD	Power		
20	PA4 *	I/O	GPIO_Output	LB
21	PA5	I/O	SPI1_SCK	
22	PA6	I/O	SPI1_MISO	
23	PA7	I/O	SPI1_MOSI	
24	PC4 *	I/O	GPIO_Output	BUZZ1
26	PB0 *	I/O	GPIO_Output	HB
27	PB1 *	I/O	GPIO_Output	PDCFTRIG
28	PB2 *	I/O	GPIO_Output	PDCRTRIG
30	VCAP1	Power		
31	VSS	Power		
32	VDD	Power		
33	PB12 *	I/O	GPIO_Input	PDCFECHO
34	PB13 *	I/O	GPIO_Output	BUZZ2
35	PB14 *	I/O	GPIO_Output	BUZZ3
36	PB15 *	I/O	GPIO_Output	BUZZ4
40	PC9	I/O	I2C3_SDA	
41	PA8	I/O	I2C3_SCL	
44	PA11 *	I/O	GPIO_Input	PDCRECHO
45	PA12 *	I/O	GPIO_Input	VIBSEN

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VSS	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	
50	PA15 *	I/O	GPIO_Output	SAL
51	PC10 *	I/O	GPIO_Output	RFL
52	PC11 *	I/O	GPIO_Output	BL
53	PC12 *	I/O	GPIO_Output	PRL
55	PB3	I/O	USART1_RX	
58	PB6	I/O	USART1_TX	
59	PB7	I/O	I2C1_SDA	
60	BOOT0	Boot		
61	PB8	I/O	I2C1_SCL	
63	VSS	Power		
64	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	I4_BCC
Project Folder	C:\Users\Daniel\Documents\BMWI4\I4_BCC_WORKSPACE\I4_BCC
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.27.1
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	Add necessary library files as reference in the toolchain project configuration file
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	Yes

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_DMA_Init	DMA
4	MX_USART1_UART_Init	USART1
5	MX_TIM2_Init	TIM2
6	MX_TIM3_Init	TIM3
7	MX_TIM5_Init	TIM5
8	MX_TIM4_Init	TIM4
9	MX_ADC1_Init	ADC1
10	MX_CRC_Init	CRC
11	MX_RTC_Init	RTC

Rank	Function Name	Peripheral Instance Name
12	MX_I2C1_Init	I2C1
13	MX_TIM9_Init	TIM9
14	MX_TIM10_Init	TIM10
15	MX_I2C3_Init	I2C3
16	MX_SPI1_Init	SPI1
17	MX_MBEDTLS_Init	MBEDTLS

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F411
MCU	STM32F411RETx
Datasheet	DS10314_Rev6

6.2. Parameter Selection

Temperature	25
Vdd	1.7

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

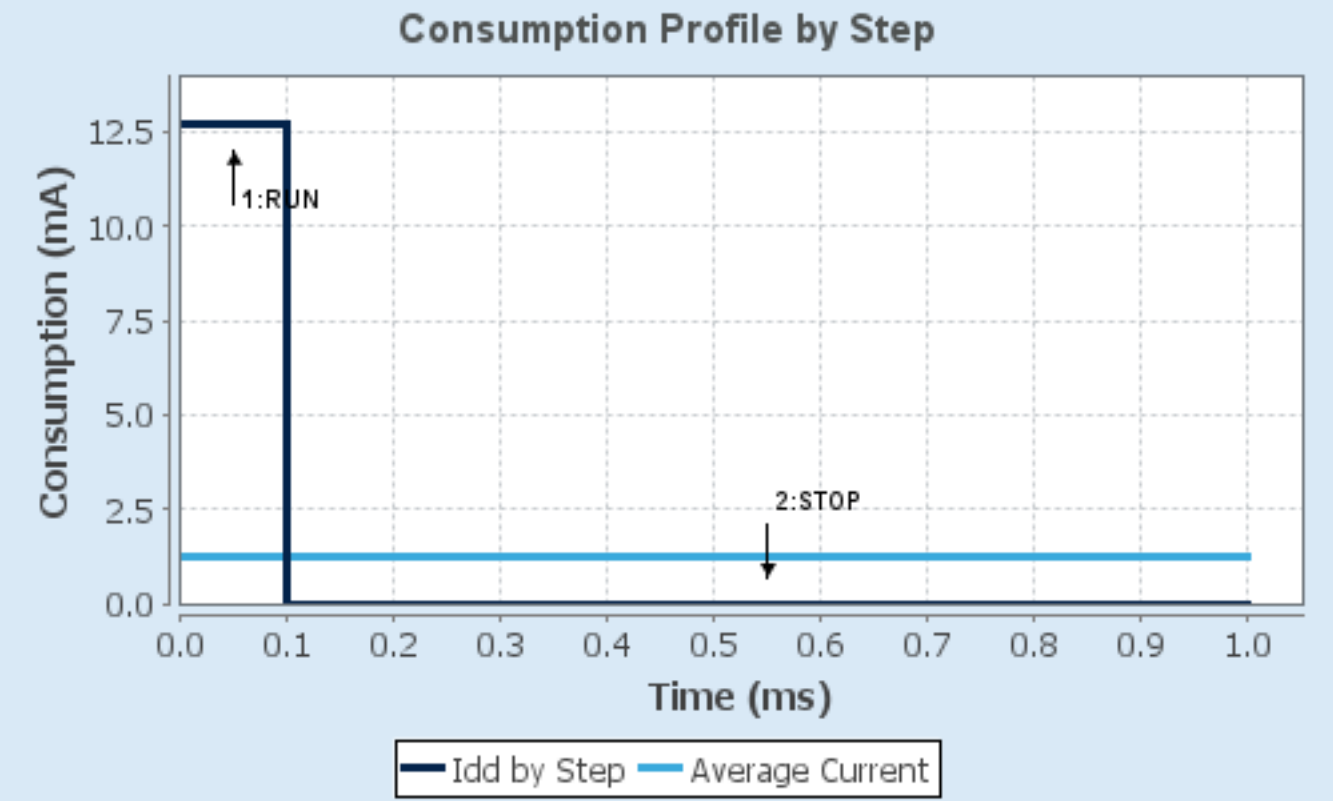
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	1.7	1.7
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	SRAM	n/a
CPU Frequency	100 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LPLV Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	12.7 mA	9 µA
Duration	0.1 ms	0.9 ms
DMIPS	125.0	0.0
Ta Max	103.99	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	1.28 mA
Battery Life	3 months, 19 days, 6 hours	Average DMIPS	125.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
12.5
10.0
7.5
5.0
2.5
0.0
1:RUN
2:STOP
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. Peripherals and Middlewares Configuration

7.1. ADC1

mode: IN10

mode: IN11

mode: Temperature Sensor Channel

mode: Vrefint Channel

7.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	PCLK2 divided by 4
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	**Enabled ***
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion	**3 ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 10
Sampling Time	3 Cycles
Rank	**2 ***
Channel	**Channel 11 ***
Sampling Time	3 Cycles
Rank	**3 ***
Channel	**Channel Temperature Sensor ***
Sampling Time	3 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

7.2. CRC

mode: Activated

7.3. I2C1

I2C: I2C

7.3.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

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. I2C3

I2C: I2C

7.4.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

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

7.5. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.5.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	3 WS (4 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	**Enabled ***
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.6. RTC

mode: Activate Clock Source

mode: Activate Calendar

Alarm A: Internal Alarm

Alarm B: Internal Alarm

WakeUp: Internal WakeUp

7.6.1. Parameter Settings:

General:

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

Calendar Time:

Data Format	BCD 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	0

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

Alarm B:

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

7.7. SPI1

Mode: Full-Duplex Master

7.7.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**50.0 MBits/s ***

Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	**Enabled ***
CRC Polynomial	X1+X3
NSS Signal Type	Software

7.8. SYS

Debug: Serial Wire

Timebase Source: TIM1

7.9. TIM2

Clock Source : Internal Clock

7.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**10000-1 ***
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)

7.10. TIM3

Clock Source : Internal Clock

7.10.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**10000-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**50000-1 ***
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)

7.11. TIM4
mode: Clock Source
7.11.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**10000-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 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)

7.12. TIM5
mode: Clock Source
7.12.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	4294967295
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)

7.13. TIM9
mode: Clock Source
7.13.1. Parameter Settings:

Counter Settings:

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

7.14. TIM10

mode: Activated

7.14.1. Parameter Settings:

Counter Settings:

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

7.15. USART1

Mode: Asynchronous

7.15.1. 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

7.16. FREERTOS

Interface: CMSIS_V2

7.16.1. 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	**255 ***
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	**Enabled ***
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	**Enabled ***
Memory management settings:	
Memory Allocation	Dynamic / Static
TOTAL_HEAP_SIZE	**40000 ***
Memory Management scheme	heap_4
Hook function related definitions:	
USE_IDLE_HOOK	**Enabled ***
USE_TICK_HOOK	**Enabled ***
USE_MALLOC_FAILED_HOOK	**Enabled ***
USE_DAEMON_TASK_STARTUP_HOOK	**Enabled ***
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	**Enabled ***
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	**Enabled ***

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

7.16.2. Include parameters:

Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled
vTaskDelete	Enabled
vTaskCleanUpResources	**Enabled ***
vTaskSuspend	Enabled
vTaskDelayUntil	Enabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Enabled
xSemaphoreGetMutexHolder	**Enabled ***

pcTaskGetTaskName	**Enabled ***
uxTaskGetStackHighWaterMark	Enabled
xTaskGetCurrentTaskHandle	Enabled
eTaskGetState	Enabled
xEventGroupSetBitFromISR	**Enabled ***
xTimerPendFunctionCall	Enabled
xTaskAbortDelay	**Enabled ***
xTaskGetHandle	**Enabled ***
uxTaskGetStackHighWaterMark2	**Enabled ***

7.16.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT	**Enabled ***

Project settings (see parameter description first):

Use FW pack heap file	Enabled

7.17. MBEDTLS
mode: Enabled

7.17.1. Version and modes:

Version:

MBEDTLS version	2.16.2

TCP/IP stack:

TCP/IP stack	None

RNG dependency:

RNG IP	SW RNG(no entropy)

Modes:

MBEDTLS_SSL_CLI_C	Not Defined
MBEDTLS_SSL_SRV_C	Not Defined

7.17.2. Feature support:

System support:

MBEDTLS_HAVE_ASM	Defined
MBEDTLS_NO_UDBL_DIVISION	Defined
MBEDTLS_HAVE_TIME	Defined

General:

MBEDTLS_AES_ROM_TABLES	Defined
MBEDTLS_ECP_NIST_OPTIM	Defined
MBEDTLS_NO_DEFAULT_ENTROPY_SOURCES	Defined
MBEDTLS_NO_PLATFORM_ENTROPY	Defined

Ciphering:

MBEDTLS_CIPHER_MODE_OFB	Defined
MBEDTLS_CIPHER_MODE_XTS	Defined
MBEDTLS_REMOVE_3DES_CIPHERSUITES	Defined

Elliptic curves:

MBEDTLS_ECP_DP_SECP256R1_ENABLED	Defined
MBEDTLS_ECP_DP_SECP384R1_ENABLED	Defined
MBEDTLS_ECP_DP_CURVE448_ENABLED	Defined

SSL:

MBEDTLS_SSL_ALL_ALERT_MESSAGES	Not Defined
MBEDTLS_SSL_ENCRYPT_THEN_MAC	Not Defined
MBEDTLS_SSL_EXTENDED_MASTER_SECRET	Not Defined
MBEDTLS_SSL_FALLBACK_SCSV	Not Defined
MBEDTLS_SSL_RENEGOTIATION	Not Defined
MBEDTLS_SSL_PROTO_TLS1	Not Defined
MBEDTLS_SSL_PROTO_TLS1_1	Not Defined
MBEDTLS_SSL_PROTO_DTLS	Not Defined
MBEDTLS_SSL_DTLS_ANTI_REPLAY	Not Defined
MBEDTLS_SSL_DTLS_HELLO_VERIFY	Not Defined
MBEDTLS_SSL_DTLS_CLIENT_PORT_REUSE	Not Defined
MBEDTLS_SSL_DTLS_BADMAC_LIMIT	Not Defined

7.17.3. Alternate implementation:

7.17.4. Modules:

General:

MBEDTLS_AES_C	Defined
MBEDTLS_ASN1_PARSE_C	Defined
MBEDTLS_ASN1_WRITE_C	Defined
MBEDTLS_BASE64_C	Defined
MBEDTLS_BIGNUM_C	Defined
MBEDTLS_CAMELLIA_C	Defined
MBEDTLS_CERTS_C	Defined
MBEDTLS_CIPHER_C	Defined

MBEDTLS_CHACHA20_C	Defined
MBEDTLS_CHACHAPOLY_C	Defined
MBEDTLS_CTR_DRBG_C	Defined
MBEDTLS_ECDH_C	Defined
MBEDTLS_ECDSA_C	Defined
MBEDTLS_ECP_C	Defined
MBEDTLS_ENTROPY_C	Defined
MBEDTLS_GCM_C	Defined
MBEDTLS_HKDF_C	Defined
MBEDTLS_MD_C	Defined
MBEDTLS_NIST_KW_C	Not Defined
MBEDTLS_OID_C	Defined
MBEDTLS_PEM_PARSE_C	Defined
MBEDTLS_PK_C	Defined
MBEDTLS_PK_PARSE_C	Defined
MBEDTLS_PLATFORM_C	Defined
MBEDTLS_POLY1305_C	Defined
MBEDTLS_SHA256_C	Defined
MBEDTLS_SHA512_C	Defined
MBEDTLS_SSL_TICKET_C	Not Defined
MBEDTLS_SSL_TLS_C	Not Defined
MBEDTLS_X509_USE_C	Defined
MBEDTLS_X509_CRT_PARSE_C	Defined

7.17.5. Modules Configuration:

Platform:

MBEDTLS_PLATFORM_PRINTF_MACRO	printf

MPI / BIGNUM:

MBEDTLS_MPI_MAX_SIZE_ENABLE	Enabled
MBEDTLS_MPI_MAX_SIZE	48

ECP:

MBEDTLS_ECP_MAX_BITS_ENABLE	Enabled
MBEDTLS_ECP_MAX_BITS	384
MBEDTLS_ECP_WINDOW_SIZE_ENABLE	Enabled
MBEDTLS_ECP_WINDOW_SIZE	2
MBEDTLS_ECP_FIXED_POINT_OPTIM_ENABLE	Enabled
MBEDTLS_ECP_FIXED_POINT_OPTIM	0

Entropy:

MBEDTLS_ENTROPY_MAX_SOURCES_ENABLE	Enabled
MBEDTLS_ENTROPY_MAX_SOURCES	2

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PC0	ADC1_IN10	Analog mode	No pull-up and no pull-down	n/a	
	PC1	ADC1_IN11	Analog mode	No pull-up and no pull-down	n/a	
I2C1	PB7	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	
	PB8	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	
I2C3	PC9	I2C3_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	
	PA8	I2C3_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	
RCC	PH0 - OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1 - OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USART1	PB3	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB6	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
GPIO	PC13-ANTI_TAMP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	REVL
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LTSIG
	PC15-OSC32_OUT	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RTSIG
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	IL

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	FL
	PA0-WKUP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LRN
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DRL
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LB
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BUZZ1
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	HB
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PDCFTRIG
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PDCRTRIG
	PB12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	PDCFECHO
	PB13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BUZZ2
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BUZZ3
	PB15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BUZZ4
	PA11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	PDCRECHO
	PA12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	VIBSEN
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SAL
	PC10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RFL
	PC11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BL
	PC12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PRL

8.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA2_Stream0	Peripheral To Memory	Low

ADC1: DMA2_Stream0 DMA request Settings:

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

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
PVD interrupt through EXTI line 16	true	5	0
RTC wake-up interrupt through EXTI line 22	true	5	0
Flash global interrupt	true	5	0
RCC global interrupt	true	5	0
ADC1 global interrupt	true	5	0
TIM1 break interrupt and TIM9 global interrupt	true	5	0
TIM1 update interrupt and TIM10 global interrupt	true	15	0
TIM2 global interrupt	true	5	0
TIM3 global interrupt	true	5	0
TIM4 global interrupt	true	5	0
I2C1 event interrupt	true	5	0
I2C1 error interrupt	true	5	0
SPI1 global interrupt	true	5	0
USART1 global interrupt	true	5	0
RTC alarms A and B interrupt through EXTI line 17	true	5	0
TIM5 global interrupt	true	5	0
DMA2 stream0 global interrupt	true	5	0
FPU global interrupt	true	5	0
I2C3 event interrupt	unused		
I2C3 error 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	false	true	false
Hard fault interrupt	false	true	false

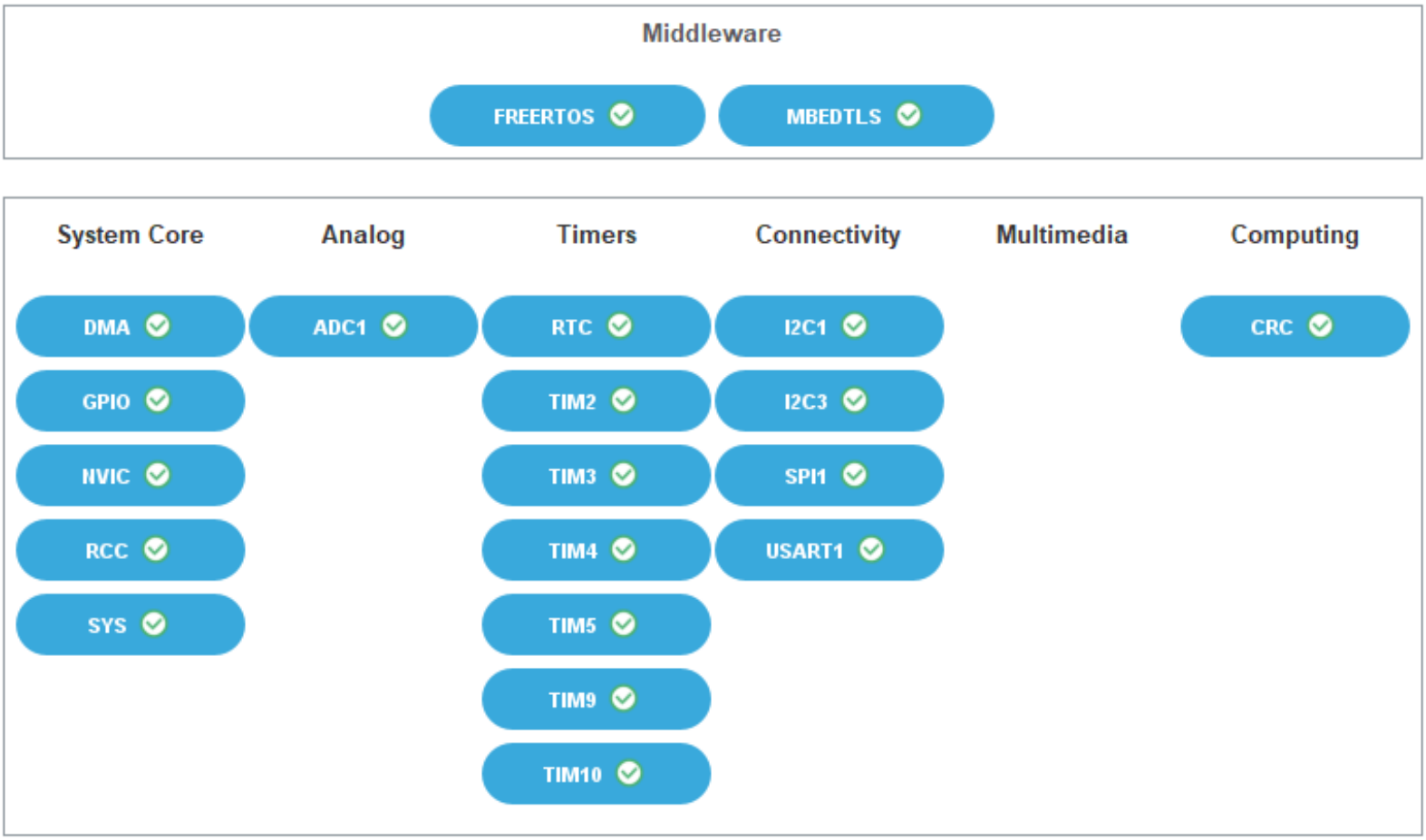
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	false	false
Debug monitor	false	true	false
Pendable request for system service	false	false	false
System tick timer	false	false	true
PVD interrupt through EXTI line 16	true	true	true
RTC wake-up interrupt through EXTI line 22	true	true	true
Flash global interrupt	true	true	true
RCC global interrupt	false	true	false
ADC1 global interrupt	false	true	true
TIM1 break interrupt and TIM9 global interrupt	false	true	true
TIM1 update interrupt and TIM10 global interrupt	false	true	true
TIM2 global interrupt	true	true	true
TIM3 global interrupt	true	true	true
TIM4 global interrupt	false	true	true
I2C1 event interrupt	false	true	true
I2C1 error interrupt	false	true	true
SPI1 global interrupt	false	true	true
USART1 global interrupt	false	true	true
RTC alarms A and B interrupt through EXTI line 17	false	true	true
TIM5 global interrupt	false	true	true
DMA2 stream0 global interrupt	false	true	true
FPU global interrupt	true	true	false

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32f411_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32f411_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f4_svd.zip
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32f411_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32f411_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f4_svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
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Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Training Material	https://www.st.com/resource/en/sales_guide/sg_sc2154.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32f4x1.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
Product Certifications	https://www.st.com/resource/en/certification_document/stm32_authentication_can.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/an2945-stm8s-and-stm32-mcus-a-consistent-832bit-product-line-for-painless-migration-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an3070-managing-the-driver-enable-signal-for-rs485-and-iolink-communications-with-the-stm32s-usart-stmicroelectronics.pdf
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	stm32f2-stm32f4-and-stm32f7-series-dma-controller-stmicroelectronics.pdf
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	hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-microcontrollers-stmicroelectronics.pdf
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Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4435-guidelines-for-obtaining-ulcsaiec-607301603351-class-b-certification-in-any-stm32-application-stmicroelectronics.pdf
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Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4502-stm32-smbuspmbus-embedded-software-expansion-for-stm32cube-stmicroelectronics.pdf
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Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4657-stm32-inapplication-programming-iap-using-the-usart-stmicroelectronics.pdf
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Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4701-proprietary-code-readout-protection-on-microcontrollers-of-the-stm32f4-series-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4739-stm32cube-firmware-examples-for-stm32f4-series-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4758-proprietary-code-readout-protection-on-stm32l4-stm32l4-stm32g4-and-stm32wb-series-mcus-stmicroelectronics.pdf
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Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4968-proprietary-code-read-out-protection-pcrop-on-stm32f72xxx-and-stm32f73xxx-microcontrollers-stmicroelectronics.pdf
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