

STM32 CubeMX

1. Description

1.1. Project

Project Name	WB55-IHM03
Board Name	custom
Generated with:	STM32CubeMX 6.12.1
Date	12/12/2024

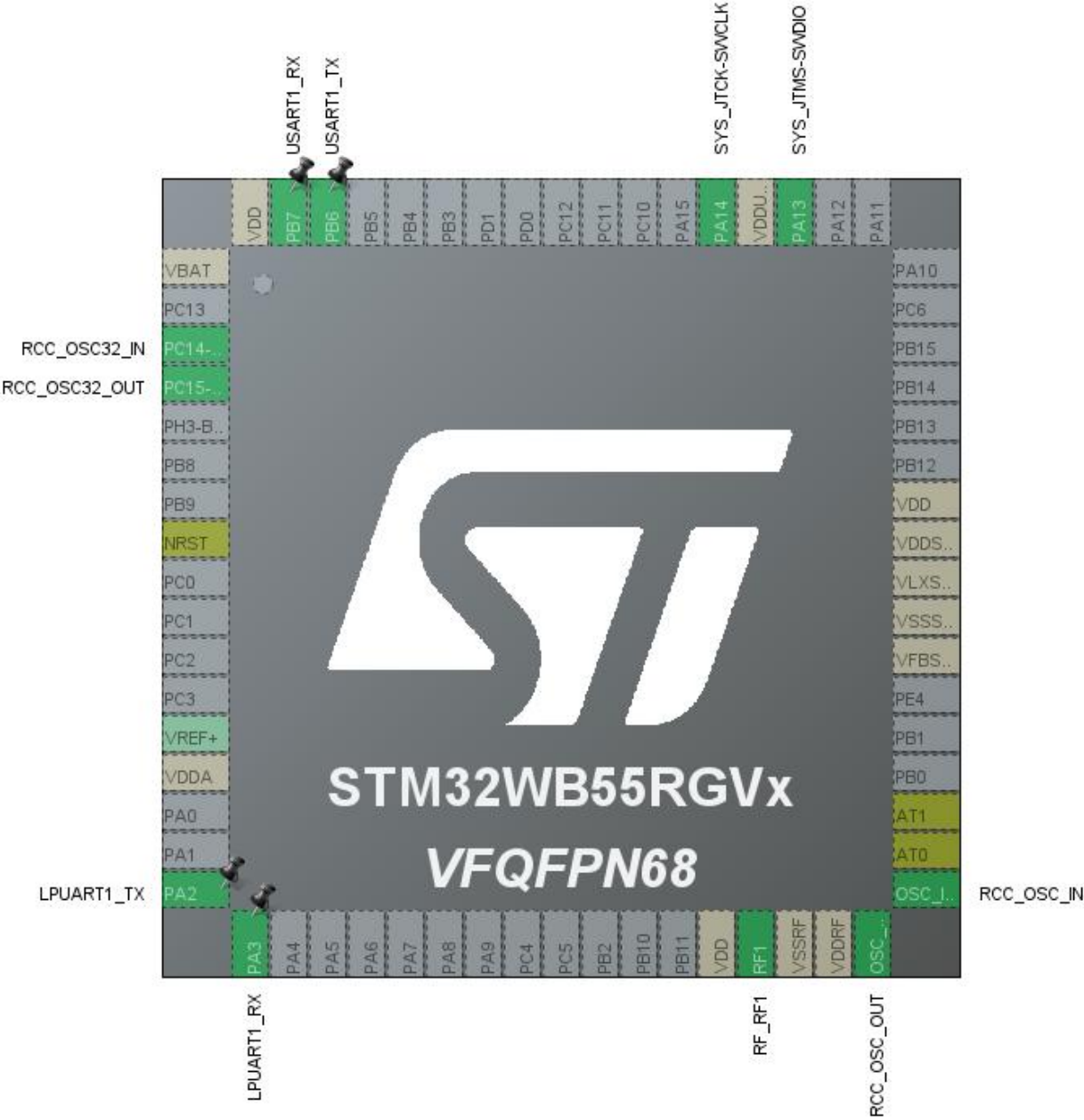
1.2. MCU

MCU Series	STM32WB
MCU Line	STM32WBx5
MCU name	STM32WB55RGVx
MCU Package	VFQFPN68
MCU Pin number	68

1.3. Core(s) information

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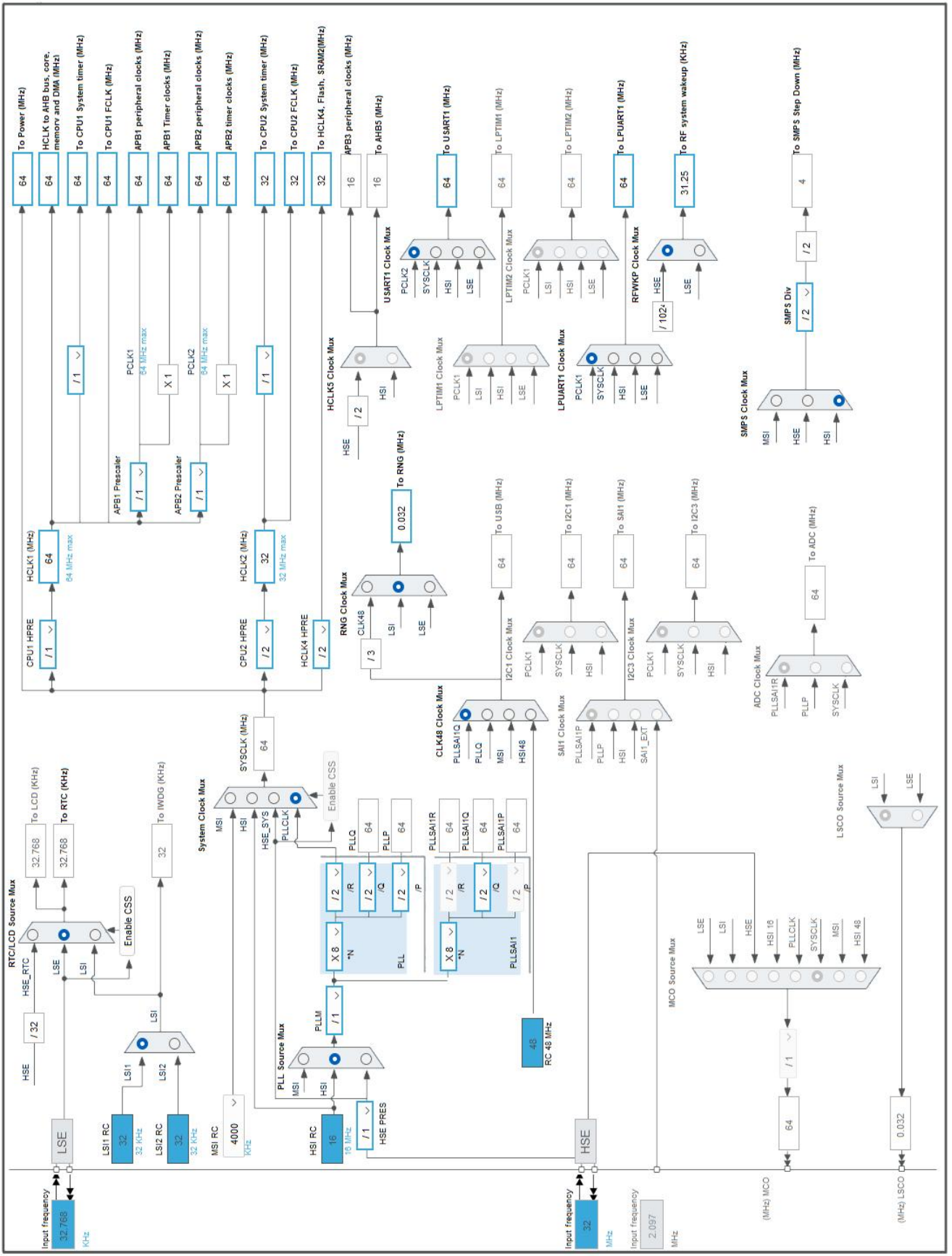
2. Pinout Configuration



3. Pins Configuration

Pin Number VFQFPN68	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
3	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
8	NRST	Reset		
14	VDDA	Power		
17	PA2	I/O	LPUART1_TX	
18	PA3	I/O	LPUART1_RX	
30	VDD	Power		
31	RF1	MonoIO	RF_RF1	
32	VSSRF	Power		
33	VDDRF	Power		
34	OSC_OUT	MonoIO	RCC_OSC_OUT	
35	OSC_IN	MonoIO	RCC_OSC_IN	
36	AT0	NC		
37	AT1	NC		
41	VFBSMPS	Power		
42	VSSMPS	Power		
43	VLXSMPS	Power		
44	VDDSMPS	Power		
45	VDD	Power		
54	PA13	I/O	SYS_JTMS-SWDIO	
55	VDDUSB	Power		
56	PA14	I/O	SYS_JTCK-SWCLK	
66	PB6	I/O	USART1_TX	
67	PB7	I/O	USART1_RX	
68	VDD	Power		

4. Clock Tree Configuration



1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32WB
Line	STM32WBx5
MCU	STM32WB55RGVx
Datasheet	DS11929_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

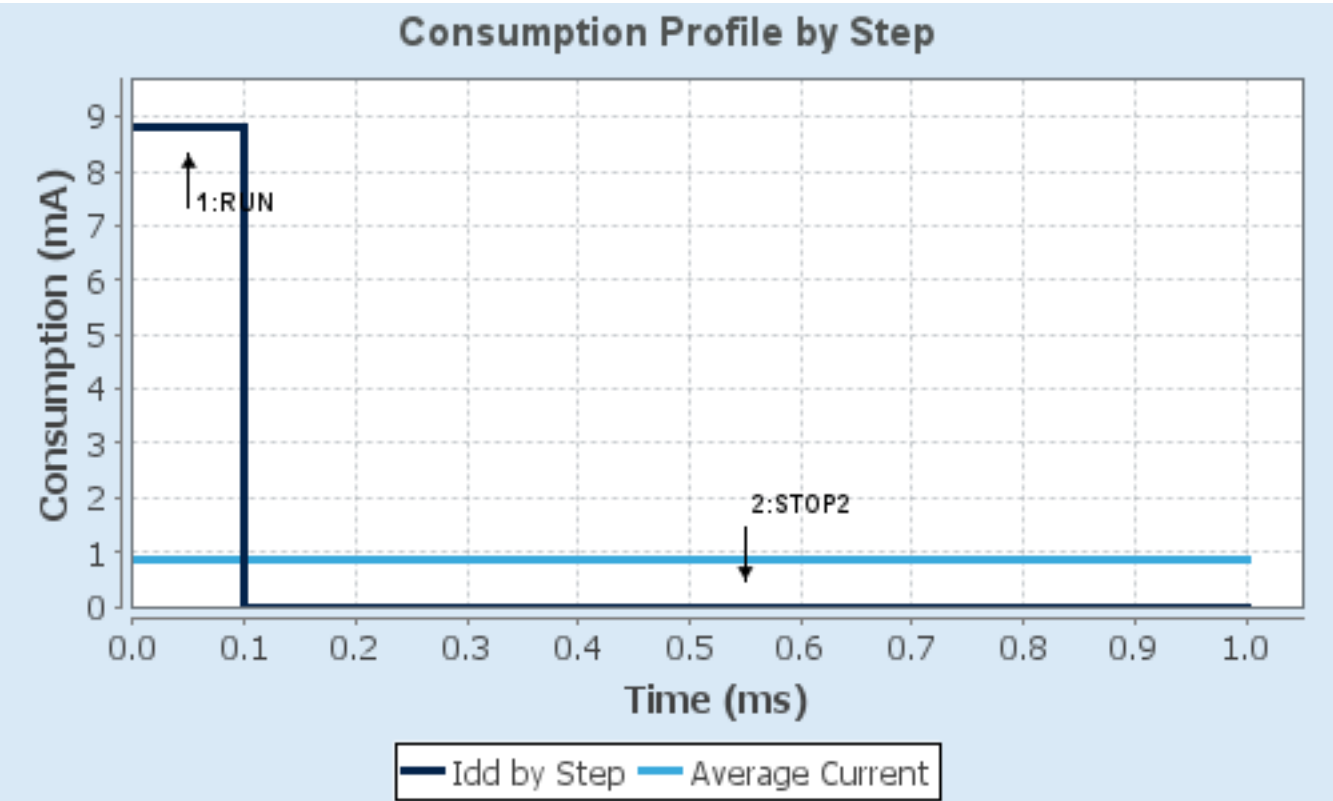
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP2
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-High	NoRange
Fetch Type	SRAM1/Flash-PowerDown	FLASH/ART/CACHE
CPU Frequency	64 MHz	0 Hz
Clock Configuration	HSI PLL Regulator_ON	ALL CLOCKS OFF Regulator ON
Clock Source Frequency	16 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	8.8 mA	1.85 μ A
Duration	0.1 ms	0.9 ms
DMIPS	80.0	0.0
Ta Max	103.76	105
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	881.66 μ A
Battery Life	5 months, 7 days, 21 hours	Average DMIPS	8.0 DMIPS

1.6. Chart



2. Software Project

2.1. Project Settings

Name	Value
Project Name	WB55-IHM03
Project Folder	C:\Tezla\STM32_FW\WB55-IHM03
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_WB V1.20.0
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x400
Minimum Stack Size	0x1000

2.2. 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	No
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

2.3. 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_IPCC_Init	IPCC
6	MX_RTC_Init	RTC
7	APPE_Init	STM32_WPAN
8	MX_RNG_Init	RNG
9	MX_LPUART1_UART_Init	LPUART1

3. Peripherals and Middlewares Configuration

3.1. HSEM

mode: Activated

3.2. IPCC

mode: Activated

3.3. LPUART1

Mode: Asynchronous

3.3.1. 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
Single Sample	Disable
ClockPrescaler	1
Fifo Mode	FIFO mode disable
Txfifo Threshold	1 eighth full configuration
Rxfifo Threshold	1 eighth full configuration

Advanced Features:

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

3.4. MEMORYMAP

mode: Activated

3.5. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

3.5.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Disabled
MSI State	Enabled
HSI State	Enabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000
LSE Drive Capability	LSE oscillator medium high drive capability

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
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Peripherals Clock Configuration:

Generate the peripherals clock configuration	TRUE
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3.6. RF

mode: Activate RF1

3.7. RNG

mode: Activated

3.7.1. Parameter Settings:

Clock Error Detection	Enable
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3.8. RTC

mode: Activate Clock Source

WakeUp: Internal WakeUp

3.8.1. Parameter Settings:

General:

Hour Format	Hourformat 24
Asynchronous Predivider value	CFG_RTC_ASYNCH_PRESCALER
Synchronous Predivider value	CFG_RTC_SYNCH_PRESCALER

Wake UP:

Wake Up Clock	RTCCLK / 16
Wake Up Counter	0

3.9. SEQUENCER

mode: Enabled

3.10. SYS

Debug: Serial Wire

Timebase Source: SysTick

3.11. TINY_LPM

mode: Enabled

3.12. USART1

Mode: Asynchronous

3.12.1. 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

3.13. STM32_WPAN

mode: BLE

3.13.1. BLE Applications and Services:

BLE Wireless Stack:

BLE Wireless Stack Full

BLE Application Type:

BLE Application Type Server profile

Server Mode:

BT SIG Beacon	Disabled
BT SIG Blood Pressure Sensor	Disabled
BT SIG Health Thermometer Sensor	Disabled
BT SIG Heart Rate Sensor	Disabled
Custom P2P Server	Disabled *
Custom Template	Enabled *

BLE Services Configuration:

The device needs to support the Peripheral Role	1
The device needs to support the Central Role	0
BLE_CFG_SVC_MAX_NBR_CB	7
BLE_CFG_CLT_MAX_NBR_CB	0

3.13.2. Configuration:

HW Timer Server:

CFG_HW_TS_MAX_NBR_CONCURRENT_TIMER	6
CFG_HW_TS_NVIC_RTC_WAKEUP_IT_PREEMPTPRIO	3
CFG_HW_TS_NVIC_RTC_WAKEUP_IT_SUBPRIO	0
CFG_HW_TS_USE_PRIMASK_AS_CRITICAL_SECTION	1

CFG_HW_TS_RTC_HANDLER_MAX_DELAY (10 * (LSI_VALUE/1000))
 CFG_HW_TS_RTC_WAKEUP_HANDLER_ID RTC_WKUP_IRQn

HW UART:

CFG_HW_LPUART1_ENABLED **Enabled ***
 CFG_HW_LPUART1_DMA_TX_SUPPORTED Enabled
 CFG_HW_USART1_ENABLED Disabled
 CFG_HW_USART1_DMA_TX_SUPPORTED Disabled

Generic parameters:

CFG_HW_RESET_BY_FW **Enabled ***
 CFG_USE_SMPS Disabled
 CFG_LPM_SUPPORTED Disabled
 CFG_DEBUGGER_SUPPORTED Enabled
 CFG_DEBUG_BLE_TRACE Disabled
 CFG_DEBUG_APP_TRACE Disabled
 CFG_DEBUG_TRACE_LIGHT Disabled
 CFG_DEBUG_TRACE_FULL Disabled
 DBG_TRACE_USE_CIRCULAR_QUEUE Enabled
 DBG_TRACE_MSG_QUEUE_SIZE 4096
 MAX_DBG_TRACE_MSG_SIZE 1024

Application parameters:

CFG_TX_POWER **0dBm (0x19) ***
 CFG_DEBUG_TRACE_UART You need to activate USART1
 CFG_CONSOLE_MENU **hw_lpuart1 ***
 CFG_ADV_BD_ADDRESS **0x11aabbccdee ***
 CFG_FAST_CONN_ADV_INTERVAL_MIN 80
 CFG_FAST_CONN_ADV_INTERVAL_MAX 100
 CFG_LP_CONN_ADV_INTERVAL_MIN 1000
 CFG_LP_CONN_ADV_INTERVAL_MAX 2500
 CFG_IO_CAPABILITY **No input, no output (0x03) ***
 CFG_MITM_PROTECTION MITM protection required (0x01)
 L2CAP_REQUEST_NEW_CONN_PARAM **1 ***
 CFG_RTCCLK_DIVIDER_CONF 0
 CFG_RTCCLK_DIV 16
 CFG_RTC_WUCKSEL_DIVIDER 0
 CFG_RTC_ASYNC_PRESCALER **0x0F ***
 CFG_RTC_SYNC_PRESCALER **0x7FFF ***
 CFG_BLE_NUM_LINK 2
 CFG_BLE_NUM_GATT_SERVICES 8
 CFG_BLE_NUM_GATT_ATTRIBUTES 68
 CFG_BLE_MAX_ATT_MTU 156
 CFG_BLE_ATT_VALUE_ARRAY_SIZE 1344

CFG_BLE_DATA_LENGTH_EXTENSION	Enabled
CFG_BLE_PERIPHERAL_SCA	500
CFG_BLE_CENTRAL_SCA	0
CFG_BLE_HSE_STARTUP_TIME	0x148 *
CFG_BLE_MAX_CONN_EVENT_LENGTH	0xFFFFFFFF *
CFG_BLE_VITERBI_MODE	Enabled
CFG_BLE_OPTIONS	BLE stack Options flags:
- CFG_BLE_OPTIONS_LL	SHCI_C2_BLE_INIT_OPTIONS_LL_HOST
- CFG_BLE_OPTIONS_SVC	SHCI_C2_BLE_INIT_OPTIONS_WITH_SVC_CHANGE_DESC
- CFG_BLE_OPTIONS_DEVICE_NAME	SHCI_C2_BLE_INIT_OPTIONS_DEVICE_NAME_RW
- CFG_BLE_OPTIONS_EXT_ADV	SHCI_C2_BLE_INIT_OPTIONS_NO_EXT_ADV
- CFG_BLE_OPTIONS_CS_ALGO	SHCI_C2_BLE_INIT_OPTIONS_NO_CS_ALGO2
- CFG_BLE_OPTIONS_GATTDB_NVM	SHCI_C2_BLE_INIT_OPTIONS_FULL_GATTDB_NVM
- CFG_BLE_OPTIONS_GATT_CACHING	SHCI_C2_BLE_INIT_OPTIONS_GATT_CACHING_NOTUSED
- CFG_BLE_OPTIONS_POWER_CLASS	SHCI_C2_BLE_INIT_OPTIONS_POWER_CLASS_2_3
- CFG_BLE_OPTIONS_APPEARANCE	SHCI_C2_BLE_INIT_OPTIONS_APPEARANCE_READONLY
- CFG_BLE_OPTIONS_ENHANCED_ATT	SHCI_C2_BLE_INIT_OPTIONS_ENHANCED_ATT_NOTSUPPORTED
CFG_BLE_MAX_COC_INITIATOR_NBR	32
CFG_BLE_MIN_TX_POWER	-40 *
CFG_BLE_MAX_TX_POWER	0
CFG_BLE_RX_MODEL_CONFIG	SHCI_C2_BLE_INIT_RX_MODEL_AGC_RSSI_LEGACY
CFG_BLE_MAX_ADV_SET_NBR	3
CFG_BLE_MAX_ADV_DATA_LEN	1650
CFG_BLE_TX_PATH_COMPENS	0
CFG_BLE_RX_PATH_COMPENS	0
CFG_BLE_CORE_VERSION	SHCI_C2_BLE_INIT_BLE_CORE_5_4
CFG_TLBLE_EVT_QUEUE_LENGTH	5
CFG_TLBLE_MOST_EVENT_PAYLOAD_SIZE	255
Debug options:	
BLE_DBG_APP_EN	Enabled *

3.13.3. BLE Advertising:

Advertising configuration:

Advertising Type	Undirected scannable and connectable(0x00)
CFG_IDENTITY_ADDRESS	GAP_PUBLIC_ADDR
CFG_PRIVACY	Disabled
Advertising Filter	No white list(0x00)
Peripheral: Advertise and connectable	Yes (0x01) *
Broadcaster: Advertise and non-connectable	No (0x00)
Central: Scan and connect	No (0x00)
Observer: Scan	No (0x00)
CFG_GAP_DEVICE_NAME	SUITCASE *
CFG_GAP_DEVICE_NAME_LENGTH	8

Advertising elements:

ad_data[] length	13
Include AD_TYPE_TX_POWER_LEVEL element	Yes *
AD_TYPE_TX_POWER_LEVEL_LENGTH	2
AD_TYPE_TX_POWER_LEVEL	(0x19) /* 0dBm */
Include AD_TYPE_COMPLETE_LOCAL_NAME element	No
Include AD_TYPE_SHORTENED_LOCAL_NAME element	Yes *
AD_TYPE_SHORTENED_LOCAL_NAME_LENGTH	4 *
AD_TYPE_SHORTENED_LOCAL_NAME	LUG *
Include AD_TYPE_APPEARANCE element	No
Include AD_TYPE_ADVERTISING_INTERVAL element	No
Include AD_TYPE_LE_ROLE element	No
Include AD_TYPE_16_BIT_SERV_UUID_CMPLT_LIST element	No
Include AD_TYPE_128_BIT_SERV_UUID_CMPLT_LIST element	No
Include AD_TYPE_SLAVE_CONN_INTERVAL element	No
Include AD_TYPE_URI element	No
Include AD_TYPE_MANUFACTURER_SPECIFIC_DATA element	Yes *
AD_TYPE_MANUFACTURER_SPECIFIC_DATA_LENGTH	4
Company identifier	30,00
Number of user defined data item(s)	1
User defined data 1	00
Comment data 1	

3.13.4. BLE Pairing:

Pairing parameters:

PAIRING_PARAMETERS	ON *
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CFG_BONDING_MODE	No-bonding mode(0x00)
CFG_USED_FIXED_PIN	Use a fixed pin (0x00)
CFG_FIXED_PIN	111111
CFG_ENCRYPTION_KEY_SIZE_MAX	16
CFG_ENCRYPTION_KEY_SIZE_MIN	8
CFG_SC_SUPPORT	Secure Connections Paring supported but optional (0x01)
CFG_BLE_IR	12, 34, 56, 78, 9A, BC, DE, F0, 12, 34, 56, 78, 9A, BC, DE, F0
CFG_BLE_ER	FE, DC, BA, 09, 87, 65, 43, 21, FE, DC, BA, 09, 87, 65, 43, 21
CFG_KEYPRESS_NOTIFICATION_SUPPORT	Keypress notification not supported (0x00)

3.13.5. BLE GATT:

Services configuration:

Number of services **1 ***

Service1:

Service long name **Motor_Speed ***
Service short name **Speed ***

3.13.6. Service1:

Service1:

Number of characteristics 1
UUID type **16 bits UUID(0x01) ***
UUID **18 13 ***
Type Primary Service(0x01)
Service max attributes record(s) 3

Characteristic1 general:

Characteristic long name **SPEED ***
Characteristic short name **S ***
UUID type 128 bits UUID(0x02)
UUID 128 input type reduced
UUID **FE 44 ***
Value length 1
Length characteristic Constant
Encryption Key Size **0x10 ***

Characteristic1 properties:

CHAR_PROP_BROADCAST	No
CHAR_PROP_READ	Yes *
CHAR_PROP_WRITE_WITHOUT_RESP	No
CHAR_PROP_WRITE	Yes *
CHAR_PROP_NOTIFY	No
CHAR_PROP_INDICATE	No
Characteristic1 permissions:	
ATTR_PERMISSION_AUTHEN_READ	No
ATTR_PERMISSION_AUTHOR_READ	No
ATTR_PERMISSION_ENCRY_READ	No
ATTR_PERMISSION_AUTHEN_WRITE	No
ATTR_PERMISSION_AUTHOR_WRITE	No
ATTR_PERMISSION_ENCRY_WRITE	No
Characteristic1 GATT events:	
GATT_NOTIFY_ATTRIBUTE_WRITE	Yes
GATT_NOTIFY_WRITE_REQ_AND_WAIT_FOR_APPL_RESP	Yes
GATT_NOTIFY_READ_REQ_AND_WAIT_FOR_APPL_RESP	Yes
GATT_NOTIFY_NOTIFICATION_COMPLETION	No

* User modified value

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
LPUART1	PA2	LPUART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA3	LPUART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
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	
	OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
	OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
RF	RF1	RF_RF1	n/a	n/a	n/a	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USART1	PB6	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB7	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	

4.2. DMA configuration

DMA request	Stream	Direction	Priority
USART1_RX	DMA1_Channel1	Peripheral To Memory	Low
LPUART1_TX	DMA1_Channel2	Memory To Peripheral	Low

USART1_RX: DMA1_Channel1 DMA request Settings:

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

LPUART1_TX: DMA1_Channel2 DMA request Settings:

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

4.3. NVIC configuration

4.3.1. 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	0	0
System tick timer	true	0	0
RTC wake-up interrupt through EXTI line 19	true	0	0
DMA1 channel1 global interrupt	true	0	0
DMA1 channel2 global interrupt	true	0	0
USART1 global interrupt	true	0	0
LPUART1 global interrupt	true	0	0
IPCC RX occupied interrupt	true	0	0
IPCC TX free interrupt	true	0	0
HSEM global interrupt	true	0	0
PVD/PVM0/PVM2 interrupts through EXTI lines 16/31/33		unused	
Flash global interrupt		unused	
RCC global interrupt		unused	
CPU2 SEV interrupt through EXTI line 40 and PWR CPU2 HOLD wake-up interrupt		unused	
PWR switching on the fly, end of BLE activity, end of 802.15.4 activity, end of critical radio phase interrupt		unused	
RNG global interrupt		unused	
FPU global interrupt		unused	

4.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	false	false
Hard fault interrupt	false	false	false
Memory management fault	false	false	false
Prefetch fault, memory access fault	false	false	false
Undefined instruction or illegal state	false	false	false
System service call via SWI instruction	false	true	false

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Debug monitor	false	false	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
RTC wake-up interrupt through EXTI line 19	false	true	true
DMA1 channel1 global interrupt	false	true	true
DMA1 channel2 global interrupt	false	true	true
USART1 global interrupt	false	true	true
LPUART1 global interrupt	false	true	true
IPCC RX occupied interrupt	false	true	true
IPCC TX free interrupt	false	true	true
HSEM global interrupt	false	true	true

* User modified value

5. System Views

5.1. Category view

5.1.1. Current

Middleware							
STM32_WPAN ✓							

System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing	Utilities	Other
DMA ✓		RTC ✓	LPUART1 ✓		RNG ✓		SEQUENCER ✓	
GPIO ✓			RF ✓				TINY_LPM ✓	
HSEM ✓			USART1 ✓					
IPCC ✓								
NVIC ✓								
RCC ✓								
SYS ✓								

6. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32wb_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32wb_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32wb_svd.zip
Board Manufacturing Specifications	https://www.st.com/resource/en/board_manufacturing_specification/stm32wb55rg_mb1479_ref_board.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/stm32-stm8_software_development_tools.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers_stm32wbxm_wireless-modules_product_overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-entry-level-graphics.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-graphics-solution-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-graphics-solutions-detailed.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32wb.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32wbvl.pdf

Flyers	https://www.st.com/resource/en/flyer/flstm32matter.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32wbxm.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32zigbee.pdf
White Papers	https://www.st.com/resource/en/white_paper/seamless-smart-home-connectivity-with-matter-whitepaper.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/stm32wb-rf-certificates.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/ble-thread-ftd-dynamic-thread-device-interoperability-certificate.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/full-thread-device-interoperability-certification.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/minimal-thread-device-interoperability-certification.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/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an3155-usart-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/an4221-i2c-protocol-used-in-the-stm32-bootloader-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/an4655-virtually-increasing-the-number-of-serial-communication-peripherals-in-stm32-

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