
STM32
CubeMX

1. Description

1.1. Project

Project Name	Writing_Tool_Prototype
Board Name	custom
Generated with:	STM32CubeMX 6.10.0
Date	04/13/2024

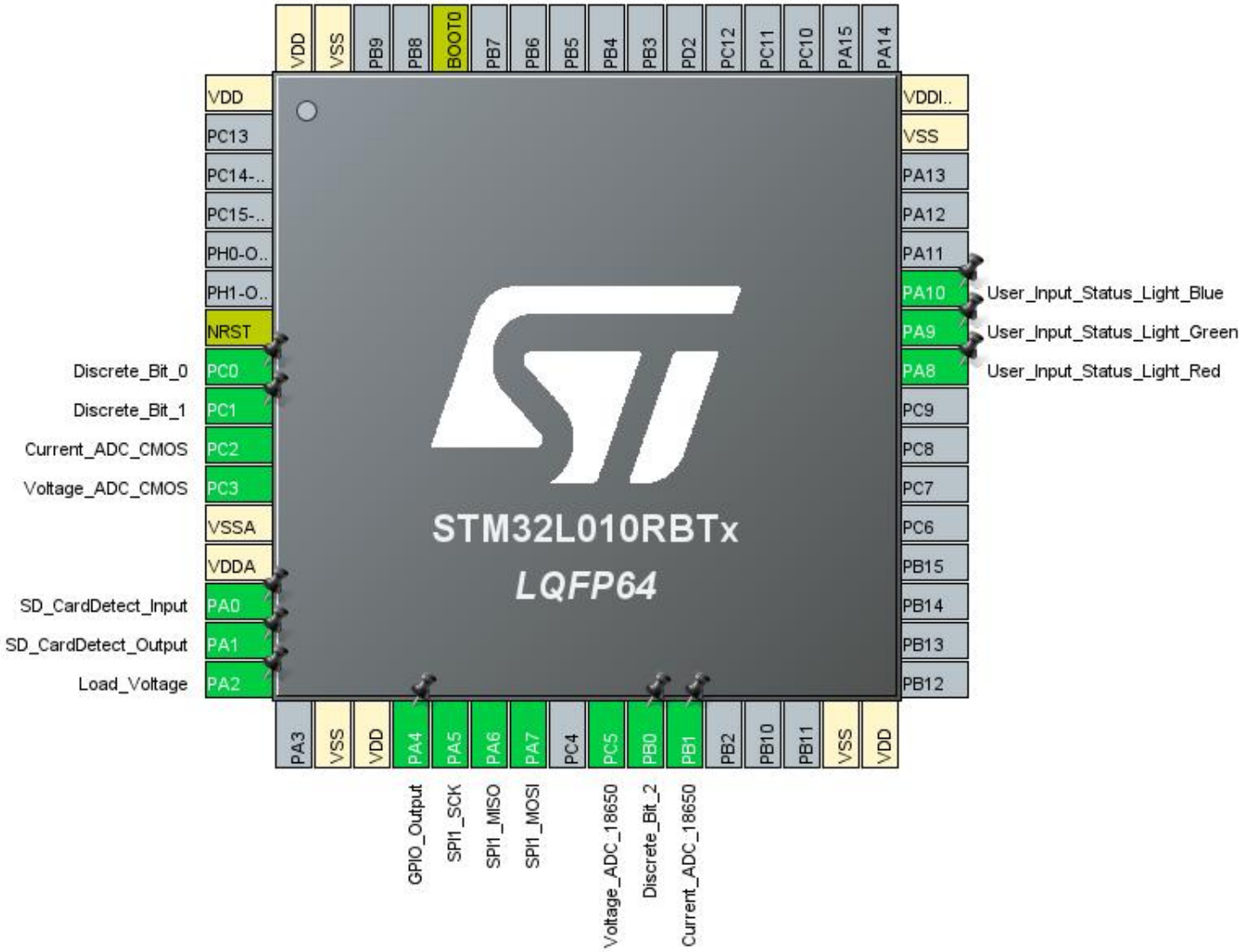
1.2. MCU

MCU Series	STM32L0
MCU Line	STM32L0x0 Value Line
MCU name	STM32L010RBTx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	Arm Cortex-M0+

2. Pinout Configuration

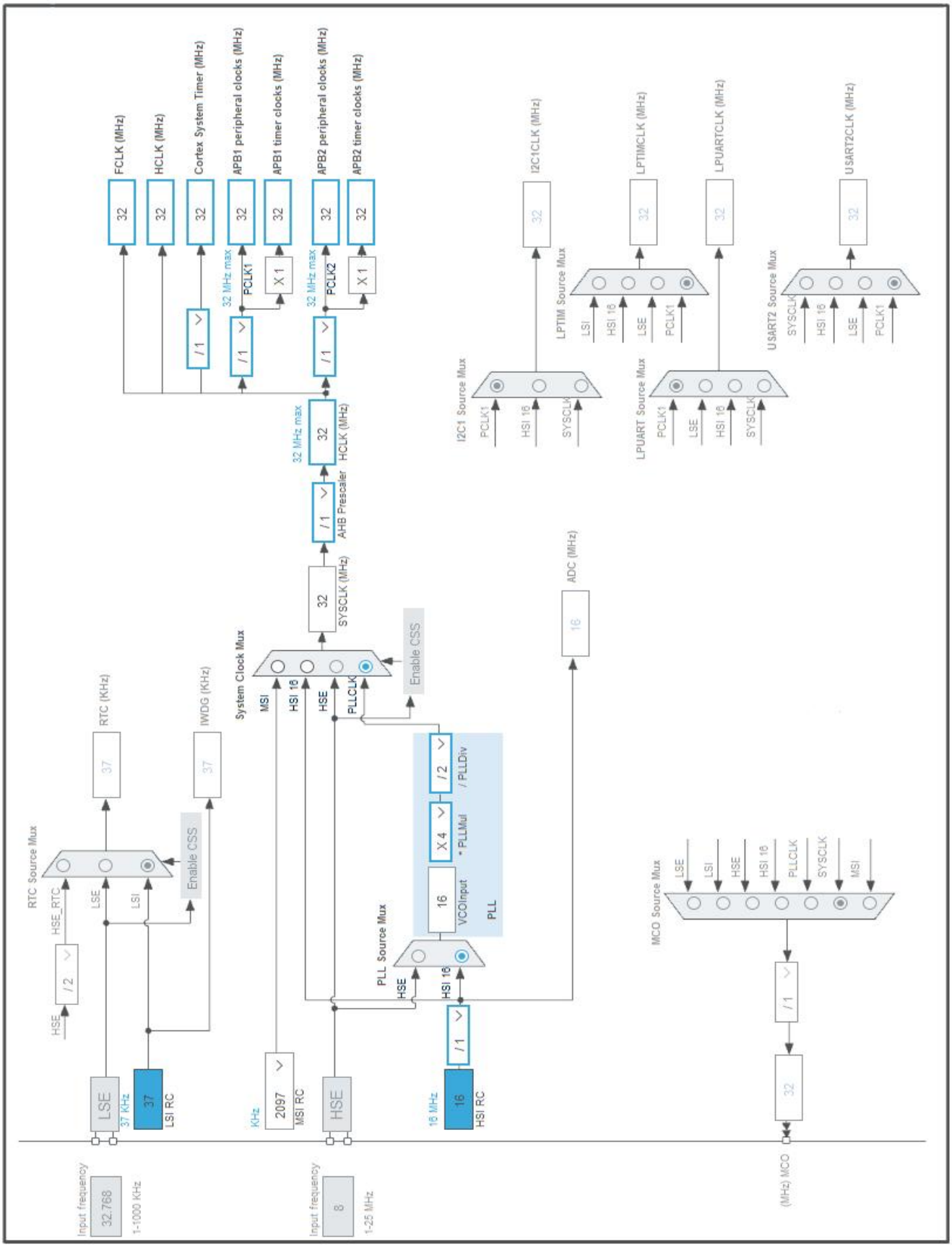


3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VDD	Power		
7	NRST	Reset		
8	PC0 *	I/O	GPIO_Input	Discrete_Bit_0
9	PC1 *	I/O	GPIO_Input	Discrete_Bit_1
10	PC2	I/O	ADC_IN12	Current_ADC_CMOS
11	PC3	I/O	ADC_IN13	Voltage_ADC_CMOS
12	VSSA	Power		
13	VDDA	Power		
14	PA0 *	I/O	GPIO_Input	SD_CardDetect_Input
15	PA1 *	I/O	GPIO_Output	SD_CardDetect_Output
16	PA2	I/O	ADC_IN2	Load_Voltage
18	VSS	Power		
19	VDD	Power		
20	PA4 *	I/O	GPIO_Output	
21	PA5	I/O	SPI1_SCK	
22	PA6	I/O	SPI1_MISO	
23	PA7	I/O	SPI1_MOSI	
25	PC5	I/O	ADC_IN15	Voltage_ADC_18650
26	PB0 *	I/O	GPIO_Input	Discrete_Bit_2
27	PB1	I/O	ADC_IN9	Current_ADC_18650
31	VSS	Power		
32	VDD	Power		
41	PA8 *	I/O	GPIO_Output	User_Input_Status_Light_Red
42	PA9 *	I/O	GPIO_Output	User_Input_Status_Light_Green
43	PA10 *	I/O	GPIO_Output	User_Input_Status_Light_Blue
47	VSS	Power		
48	VDDIO2	Power		
60	BOOT0	Boot		
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	Writing_Tool_Prototype
Project Folder	C:\Users\zlink\OneDrive\Documents\GitHub\Low_Powered_STM32_Project\Writi
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L0 V1.12.2
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	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

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_SPI1_Init	SPI1
4	MX_FATFS_Init	FATFS
5	MX_ADC_Init	ADC

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32L0
Line	STM32L0x0 Value Line
MCU	STM32L010RBTx
Datasheet	DS12319_Rev1

1.2. Parameter Selection

Temperature	25
Vdd	3.0

1.3. Battery Selection

Battery	Li-SOCL2(AAA700)
Capacity	700.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	10.0 mA
Max Pulse Current	30.0 mA
Cells in series	1
Cells in parallel	1

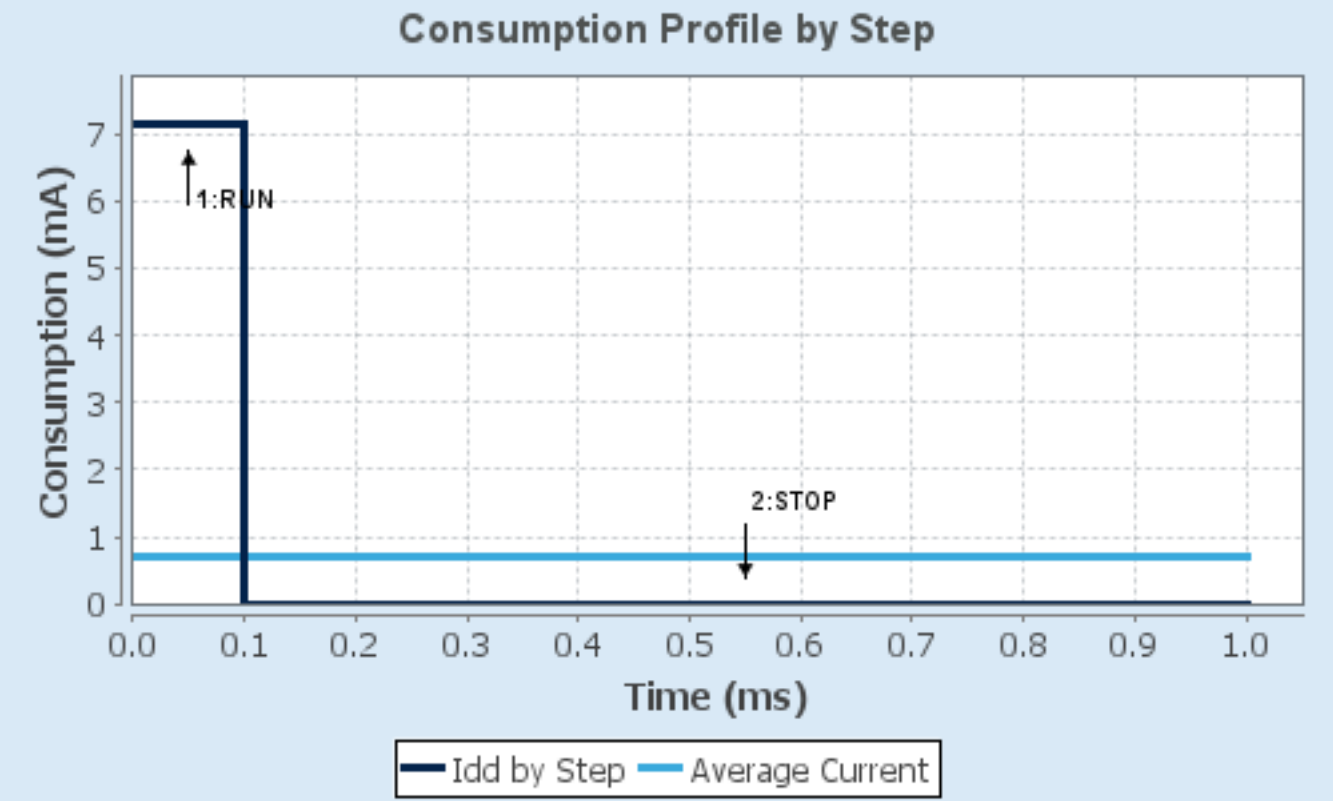
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-High	NoRange
Fetch Type	FLASH	n/a
CPU Frequency	32 MHz	0 Hz
Clock Configuration	HSI PLL	ALL CLOCKS OFF
Clock Source Frequency	16 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	7.15 mA	430 nA
Duration	0.1 ms	0.9 ms
DMIPS	30.0	0.0
Ta Max	104.01	105
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	715.39 µA
Battery Life	1 month, 10 days, 7 hours	Average DMIPS	30.4 DMIPS

1.6. Chart


Consumption Profile by Step
Consumption (mA)
0
1
2
3
4
5
6
7
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

2. Peripherals and Middlewares Configuration

2.1. ADC

mode: IN2

mode: IN9

mode: IN12

mode: IN13

mode: IN15

2.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	**Synchronous clock mode divided by 4 ***
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Direction	Forward
Continuous Conversion Mode	**Enabled ***
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
Low Frequency Mode	Disabled
Auto Off	Disabled
Oversampling Mode	Disabled

ADC_Regular_ConversionMode:

Sampling Time	**160.5 Cycles ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None

WatchDog:

Enable Analog WatchDog Mode	false

2.2. RCC

2.2.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Buffer Cache	Enabled
Prefetch	Disabled

Preread	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

2.3. SPI1

Mode: Full-Duplex Master

2.3.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**16.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

2.4. SYS

Timebase Source: SysTick

2.5. FATFS

mode: User-defined

2.5.1. 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)	Latin 1
USE_LFN (Use Long Filename)	**Enabled with static working buffer on the BSS ***
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)	Disabled
FS_TIMEOUT (Timeout ticks)	1000
FS_LOCK (Number of files opened simultaneously)	2

*** User modified value**

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC	PC2	ADC_IN12	Analog mode	No pull-up and no pull-down	n/a	Current_ADC_CMOS
	PC3	ADC_IN13	Analog mode	No pull-up and no pull-down	n/a	Voltage_ADC_CMOS
	PA2	ADC_IN2	Analog mode	No pull-up and no pull-down	n/a	Load_Voltage
	PC5	ADC_IN15	Analog mode	No pull-up and no pull-down	n/a	Voltage_ADC_18650
	PB1	ADC_IN9	Analog mode	No pull-up and no pull-down	n/a	Current_ADC_18650
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 ***	
GPIO	PC0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Discrete_Bit_0
	PC1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Discrete_Bit_1
	PA0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SD_CardDetect_Input
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SD_CardDetect_Output
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PB0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Discrete_Bit_2
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	User_Input_Status_Light_Red
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	User_Input_Status_Light_Green
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	User_Input_Status_Light_Blue

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
System service call via SWI instruction	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	3	0
Flash and EEPROM global interrupt	unused		
RCC global interrupt	unused		
ADC global interrupt	unused		
SPI1 global interrupt	unused		

3.3.2. NVIC Code generation

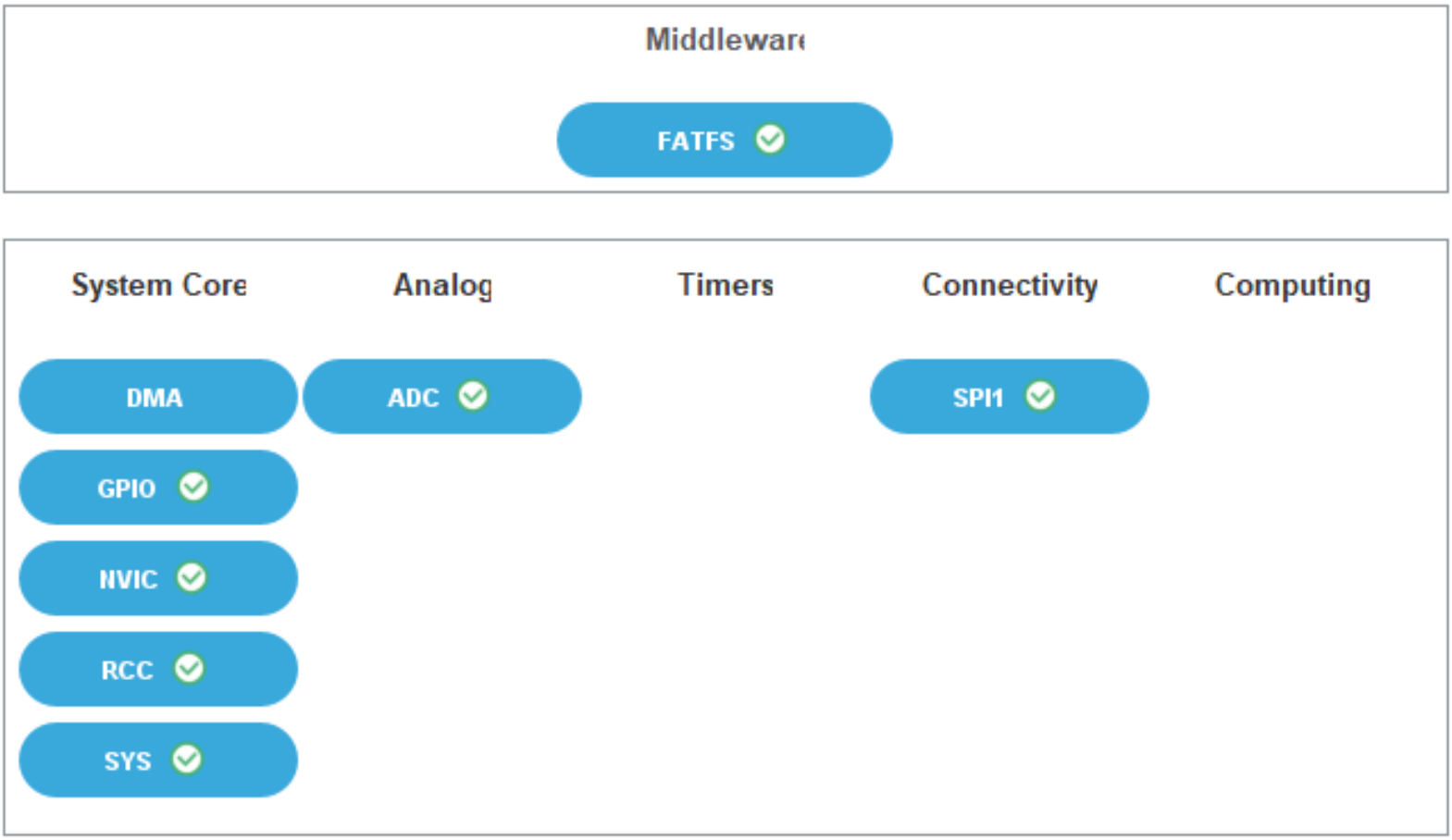
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable Interrupt	false	true	false
Hard fault interrupt	false	true	false
System service call via SWI instruction	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true

*** User modified value**

4. System Views

4.1. Category view

4.1.1. Current



5. Docs & Resources

Type	Link
IBIS models	https://www.st.com/resource/en/ibis_model/stm32l0_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32l0-svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/gt_stm32f0-l0.pdf
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-stm32-family-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32l0-series-overview.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32l0.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32ulp.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32l0vline.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
Magazine Articles	https://www.st.com/resource/en/magazine/design-elektronik_october2016.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/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/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/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/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/an4445-stm32l0xx-ultralow-power-features-overview-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4467-getting-started-with-stm32l0xx-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/an4617-migrating-between-stm32f0-and-stm32l0-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4629-adc-hardware-oversampling-for-microcontrollers-of-the-stm32-l0-and-l4-series-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4635-minimization-of-power-consumption-using-lpuart-for-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4654-migrating-between-stm32l1-and-stm32l0-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4655-virtually-increasing-the-number-of-serial-communication-peripherals-in-stm32-applications-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4718-how-to-design-a-vbat-system-based-on-stm32l0l1-series-with-external-components-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4725-stm32cube-mcu-package-examples-for-stm32l0-series-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4729-stm32l0l4-firewall-overview-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4730-using-the-

	firewall-embedded-in-stm32l0l4l4-series-mcus-for-secure-access-to-sensitive-parts-of-code-and-data-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4750-handling-of-soft-errors-in-stm32-applications-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4759-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4776-generalpurpose-timer-cookbook-for-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4803-highspeed-si-simulations-using-ibis-and-boardlevel-simulations-using-hyperlynx-si-on-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4809-migrating-between-stm32l0-series-and-stm32l4-series--stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4908-stm32-usart-automatic-baud-rate-detection-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4989-stm32-microcontroller-debug-toolbox-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5086-i2s-protocol-emulation-on-stm32l0-series-microcontrollers-using-a-standard-spi-peripheral-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5105-getting-started-with-touch-sensing-control-on-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5408-migrating-from-stm32l0-stm32l1-and-stm32l4-series-associated-with-sx12xx-transceivers-to-stm32wl-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5543-enhanced-methods-to-handle-spi-communication-on-stm32-devices-stmicroelectronics.pdf

Application Notes	https://www.st.com/resource/en/application_note/an4899-stm32-microcontroller-gpio-hardware-settings-and-lowpower-consumption-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf
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Application Notes	https://www.st.com/resource/en/application_note/an2548-using-the-stm32f0f1f3cxgxlx-series-dma-controller-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4991-how-to-wake-up-an-stm32-microcontroller-from-lowpower-mode-with-the-usart-or-the-lpuart-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4838-introduction-to-memory-protection-unit-management-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4230-random-number-generation-validation-using-nist-statistical-test-suite-for-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2834-how-to-optimize-the-adc-accuracy-in-the-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5816-how-to-build-stm32-lpbam-application-using-stm32cubemx-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5537-how-to-use-adc-oversampling-techniques-to-improve-signaltonoise-ratio-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5036-guidelines-for-thermal-management-on-stm32-applications-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1202_freertos_guide-freertos-guide-stmicroelectronics.pdf

Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1602_semihosting_in_truestudio-how-to-do-semihosting-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1801_stm32cubeprogrammer_in_truestudio-installing-stm32cubeprogrammer-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/atollic_editing_keyboard_shortcuts-atollic-editing-keyboard-shortcuts-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/iar_to_atollic_truestudio_migration_guide-truestudio-for-arm-migration-guide-iar-embedded-workbench-to-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/stm32cubemx_installation_in_truestudio-stm32cubemx-installation-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an2592-achieving-32bit-timer-resolution-with-software-expansion-for-stm32cube-and-standard-peripheral-library-stmicroelectronics.pdf
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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