
STM32
CubeMX

1. Description

1.1. Project

Project Name	stx-fw
Board Name	custom
Generated with:	STM32CubeMX 6.1.1
Date	02/11/2021

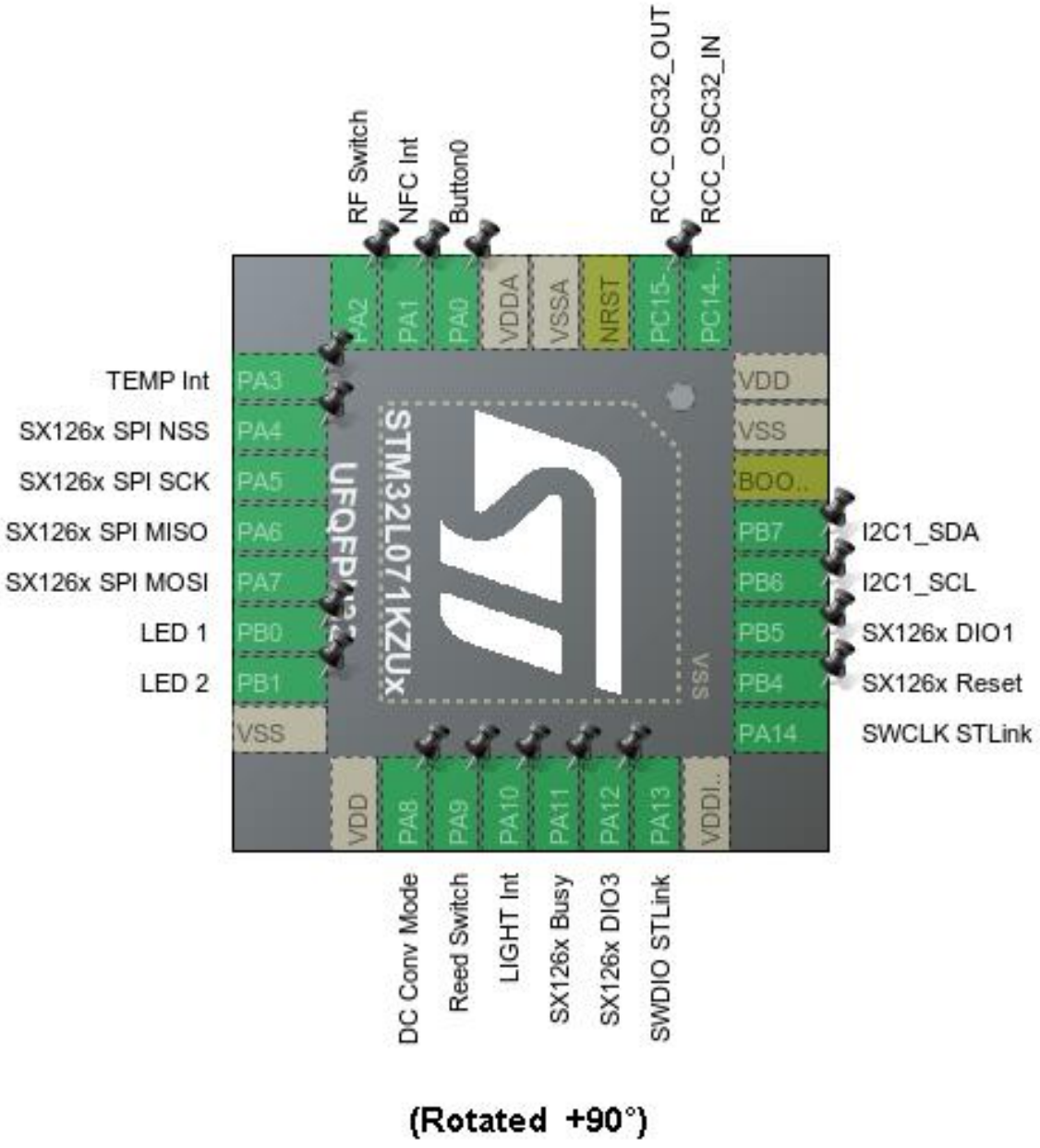
1.2. MCU

MCU Series	STM32L0
MCU Line	STM32L0x1
MCU name	STM32L071KZUx
MCU Package	UFQFPN32
MCU Pin number	32

1.3. Core(s) information

Core(s)	Arm Cortex-M0+

2. Pinout Configuration



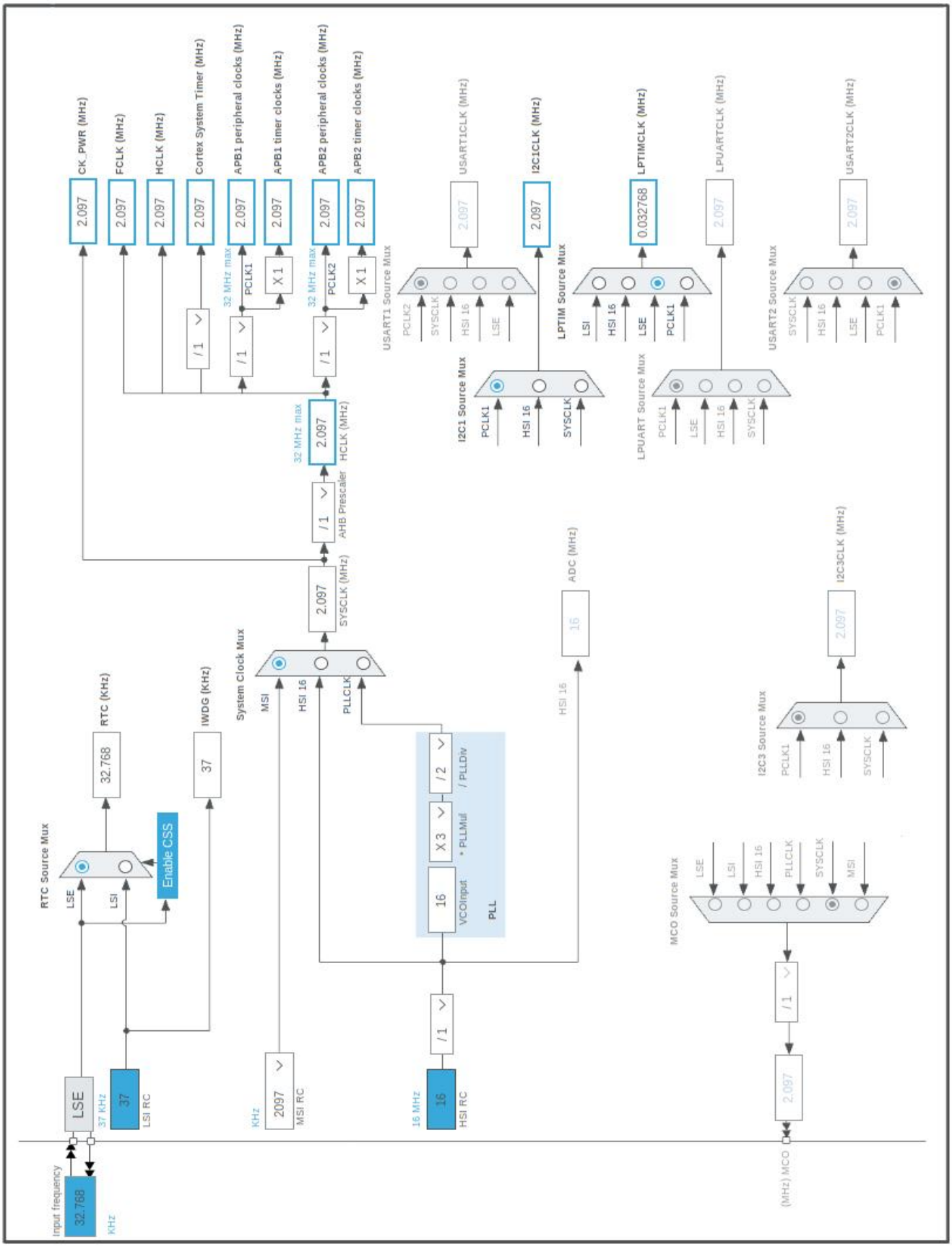
(Rotated +90°)

3. Pins Configuration

Pin Number UFQFPN32	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
2	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
3	NRST	Reset		
4	VSSA	Power		
5	VDDA	Power		
6	PA0	I/O	GPIO_EXTI0	Button0
7	PA1	I/O	GPIO_EXTI1	NFC Int
8	PA2 *	I/O	GPIO_Output	RF Switch
9	PA3	I/O	GPIO_EXTI3	TEMP Int
10	PA4 *	I/O	GPIO_Output	SX126x SPI NSS
11	PA5	I/O	SPI1_SCK	SX126x SPI SCK
12	PA6	I/O	SPI1_MISO	SX126x SPI MISO
13	PA7	I/O	SPI1_MOSI	SX126x SPI MOSI
14	PB0 *	I/O	GPIO_Output	LED 1
15	PB1 *	I/O	GPIO_Output	LED 2
16	VSS	Power		
17	VDD	Power		
18	PA8 *	I/O	GPIO_Output	DC Conv Mode
19	PA9	I/O	GPIO_EXTI9	Reed Switch
20	PA10	I/O	GPIO_EXTI10	LIGHT Int
21	PA11 *	I/O	GPIO_Input	SX126x Busy
22	PA12 *	I/O	GPIO_Output	SX126x DIO3
23	PA13	I/O	SYS_SWDIO	SWDIO STLink
24	VDDIO2	Power		
25	PA14	I/O	SYS_SWCLK	SWCLK STLink
26	PB4 *	I/O	GPIO_Output	SX126x Reset
27	PB5	I/O	GPIO_EXTI5	SX126x DIO1
28	PB6	I/O	I2C1_SCL	
29	PB7	I/O	I2C1_SDA	
30	BOOT0	Boot		
31	VSS	Power		
32	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	stx-fw
Project Folder	/hw/ibt-1-fw
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L0 V1.12.0
Application Structure	Basic
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)	Yes
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	MX_GPIO_Init	GPIO
2	MX_DMA_Init	DMA
3	SystemClock_Config	RCC
4	MX_ADC_Init	ADC
5	MX_I2C1_Init	I2C1
6	MX_IWDG_Init	IWDG
7	MX_LPTIM1_Init	LPTIM1
8	MX_RTC_Init	RTC
9	MX_SPI1_Init	SPI1

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L0
Line	STM32L0x1
MCU	STM32L071KZUx
Datasheet	DS10690_Rev7

6.2. Parameter Selection

Temperature	25
Vdd	3.0

6.3. 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

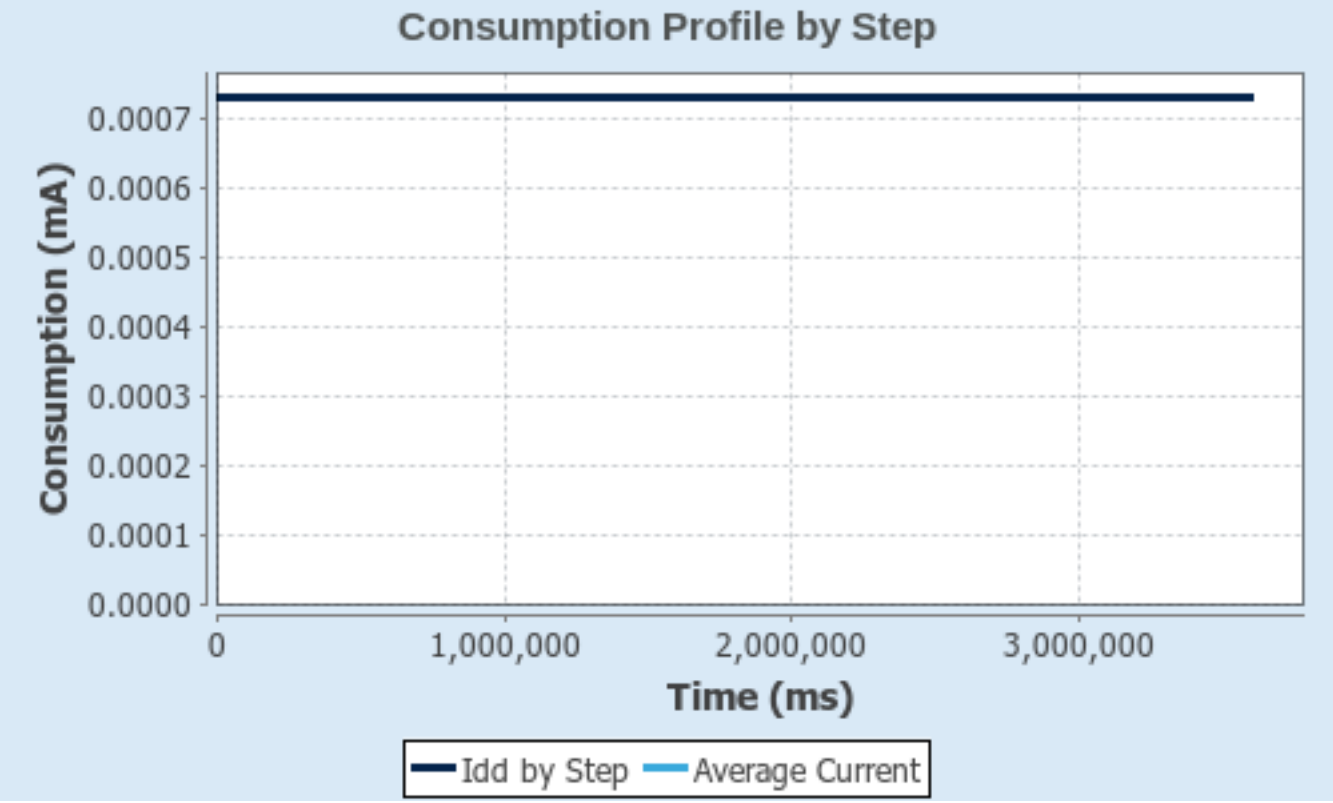
6.4. Sequence

Step	Step1
Mode	STOP
Vdd	3.0
Voltage Source	Battery
Range	NoRange
Fetch Type	n/a
CPU Frequency	0 Hz
Clock Configuration	ALL CLOCKS OFF
Clock Source Frequency	0 Hz
Peripherals	GPIOA* GPIOB* GPIOC* RTC
Additional Cons.	0 mA
Average Current	730 nA
Duration	3600 s
DMIPS	0.0
Ta Max	105
Category	In DS Table

6.5. Results

Sequence Time	3,600 s	Average Current	730 nA
Battery Life	52 years, 11 months, 29 days, 13 hours	Average DMIPS	0.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
0
1,000,000
2,000,000
3,000,000
Time (ms)
Idd by Step
Average Current

7. Peripherals and Middlewares Configuration

7.1. ADC

mode: Vrefint Channel

7.1.1. 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	**Enabled ***
End Of Conversion Selection	**End of sequence of conversion ***
Overrun behaviour	**Overrun data overwritten ***
Low Power Auto Wait	**Enabled ***
Low Frequency Mode	Enabled
Auto Off	**Enabled ***
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

7.2. I2C1

I2C: I2C

7.2.1. Parameter Settings:

Timing configuration:

I2C Speed Mode	**Fast Mode Plus ***
I2C Speed Frequency (KHz)	1000
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled

Timing	**0x00000000 ***

Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

7.3. IWDG

mode: Activated

7.3.1. Parameter Settings:

Watchdog Clocking:

IWDG counter clock prescaler	**256 ***
IWDG window value	4095
IWDG down-counter reload value	4095

7.4. LPTIM1

Mode: Counts internal clock events

7.4.1. Parameter Settings:

Clock:

Clock Prescaler	**Prescaler Div128 ***

Preload:

Update Mode	Update Immediate

Trigger:

Trigger Source	Software Trigger

7.5. RCC

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.5.1. Parameter Settings:

System Parameters:

VDD voltage (V)	**2.8 ***

Buffer Cache	Enabled
Prefetch	Disabled
Preread	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000
LSE Drive Capability	LSE oscillator low drive capability

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.6. RTC

mode: Activate Clock Source

mode: WakeUp

7.6.1. Parameter Settings:

General:

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

Wake UP:

Wake Up Clock	**1 Hz with 1 bit added to Wake Up Counter ***
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)	**16 ***
Baud Rate	**131.062 KBits/s ***

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

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.8. SYS

mode: Debug Serial Wire

Timebase Source: SysTick

*** 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 ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
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	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SX126x SPI SCK
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SX126x SPI MISO
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SX126x SPI MOSI
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	SWDIO STLink
	PA14	SYS_SWCLK	n/a	n/a	n/a	SWCLK STLink
GPIO	PA0	GPIO_EXTI0	**External Interrupt Mode with Rising/Falling edge**	**Pull-down ***	n/a	Button0
	PA1	GPIO_EXTI1	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	NFC Int
	PA2	GPIO_Output	Output Push Pull	**Pull-down ***	Low	RF Switch
	PA3	GPIO_EXTI3	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	TEMP Int
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**High ***	SX126x SPI NSS
	PB0	GPIO_Output	Output Push Pull	**Pull-down ***	Low	LED 1
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 2
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DC Conv Mode
	PA9	GPIO_EXTI9	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Reed Switch
	PA10	GPIO_EXTI10	External Interrupt Mode with Rising edge trigger detection	**Pull-up ***	n/a	LIGHT Int
	PA11	GPIO_Input	Input mode	**Pull-up ***	n/a	SX126x Busy

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**High ***	SX126x DIO3
	PB4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SX126x Reset
	PB5	GPIO_EXTI5	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	SX126x DIO1

8.2. DMA configuration

DMA request	Stream	Direction	Priority
I2C1_RX	DMA1_Channel3	Peripheral To Memory	Low
ADC	DMA1_Channel1	Peripheral To Memory	Low

I2C1_RX: DMA1_Channel3 DMA request Settings:

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

ADC: DMA1_Channel1 DMA request Settings:

Mode:	**Circular ***
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half 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
System service call via SWI instruction	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
RTC global interrupt through EXTI lines 17, 19 and 20 and LSE CSS interrupt through EXTI line 19	true	0	0
RCC global interrupt	true	0	0
EXTI line 0 and line 1 interrupts	true	2	0
EXTI line 2 and line 3 interrupts	true	0	0
EXTI line 4 to 15 interrupts	true	0	0
DMA1 channel 1 interrupt	true	0	0
DMA1 channel 2 and channel 3 interrupts	true	0	0
LPTIM1 global interrupt / LPTIM1 wake-up interrupt through EXTI line 29	true	1	0
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	true	0	0
SPI1 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash and EEPROM global interrupt	unused		
ADC, COMP1 and COMP2 interrupts (COMP interrupts through EXTI lines 21 and 22)	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
System service call via SWI instruction	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
RTC global interrupt through EXTI lines 17, 19 and 20 and LSE CSS interrupt through EXTI line 19	false	true	true
RCC global interrupt	false	true	false
EXTI line 0 and line 1 interrupts	false	true	true
EXTI line 2 and line 3 interrupts	false	true	true

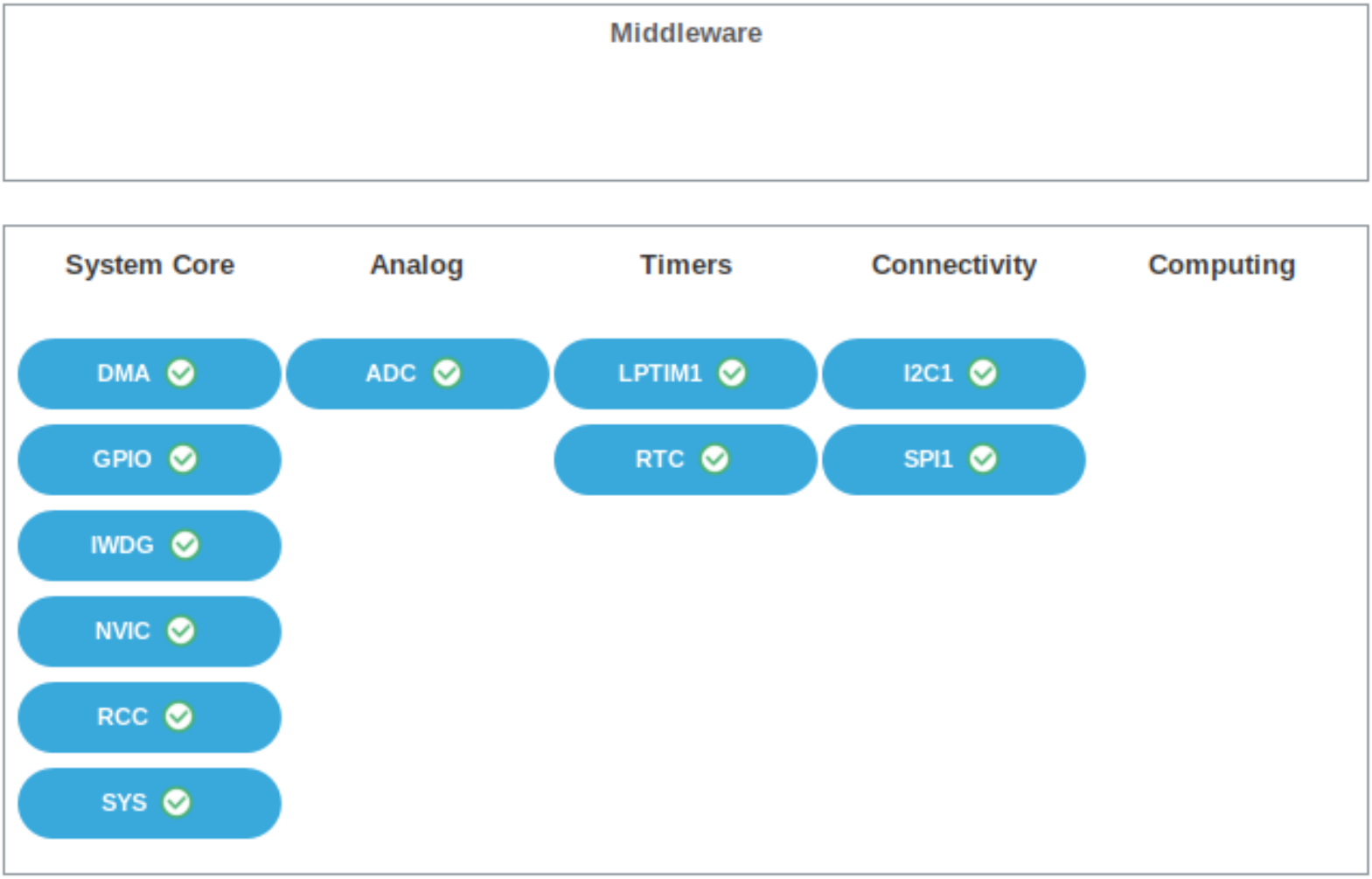
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
EXTI line 4 to 15 interrupts	false	true	true
DMA1 channel 1 interrupt	false	true	true
DMA1 channel 2 and channel 3 interrupts	false	true	true
LPTIM1 global interrupt / LPTIM1 wake-up interrupt through EXTI line 29	false	true	true
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	false	true	true
SPI1 global interrupt	false	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link
Datasheet	http://www.st.com/resource/en/datasheet/DM00141136.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/DM00108282.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/DM00104451.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/DM00148860.pdf
Application note	http://www.st.com/resource/en/application_note/CD00160362.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/CD00259245.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00158601.pdf
Application note	http://www.st.com/resource/en/application_note/DM00160482.pdf
Application note	http://www.st.com/resource/en/application_note/DM00150423.pdf

Application note	http://www.st.com/resource/en/application_note/DM00209725.pdf
Application note	http://www.st.com/resource/en/application_note/DM00209768.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00206898.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/DM00260952.pdf
Application note	http://www.st.com/resource/en/application_note/DM00327191.pdf
Application note	http://www.st.com/resource/en/application_note/DM00355687.pdf
Application note	http://www.st.com/resource/en/application_note/DM00354244.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/DM00436604.pdf
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