



1. Description

1.1. Project

Project Name	FW
Board Name	custom
Generated with:	STM32CubeMX 6.1.0
Date	02/18/2021

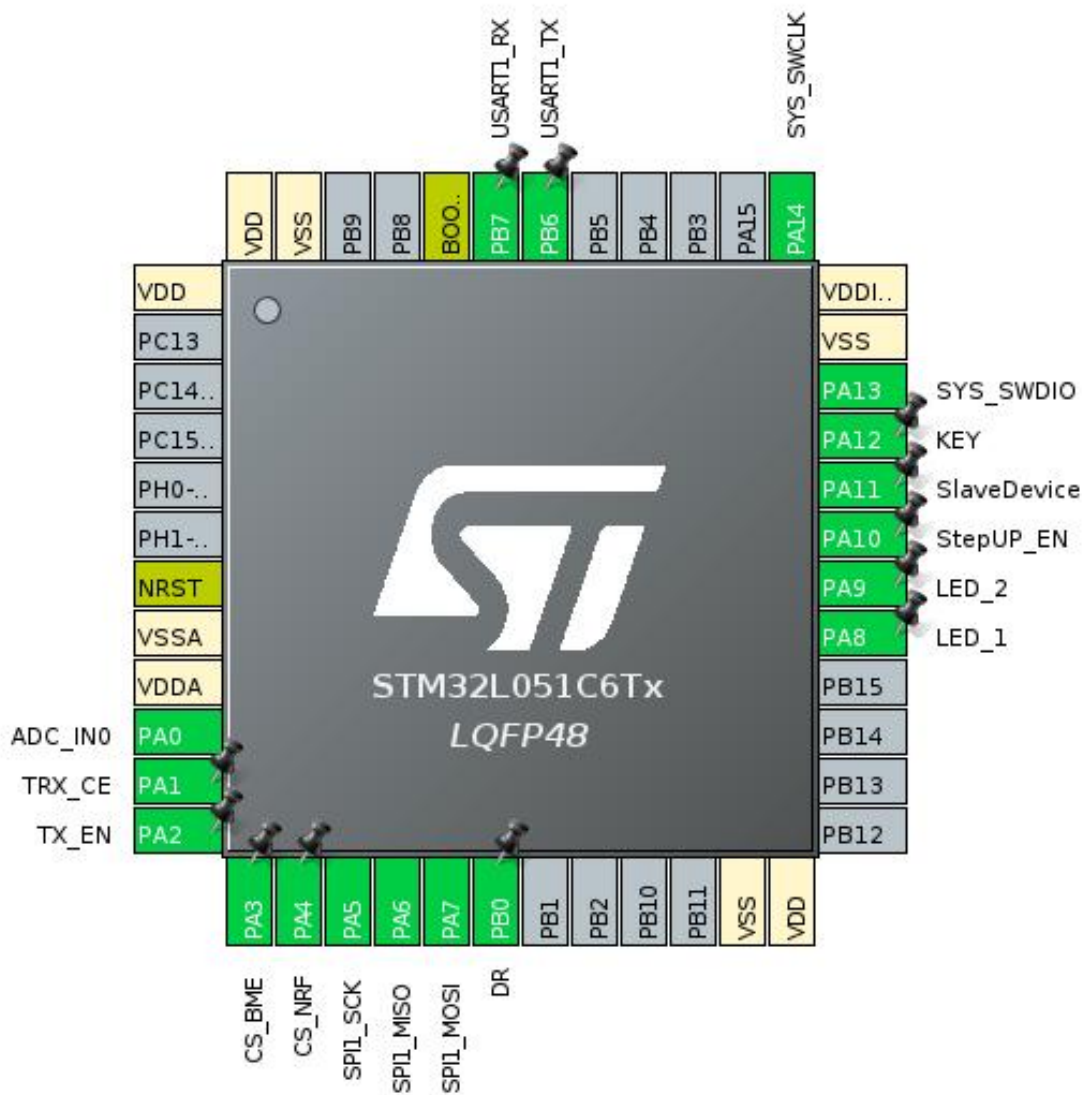
1.2. MCU

MCU Series	STM32L0
MCU Line	STM32L0x1
MCU name	STM32L051C6Tx
MCU Package	LQFP48
MCU Pin number	48

1.3. Core(s) information

Core(s)	Arm Cortex-M0+
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2. Pinout Configuration

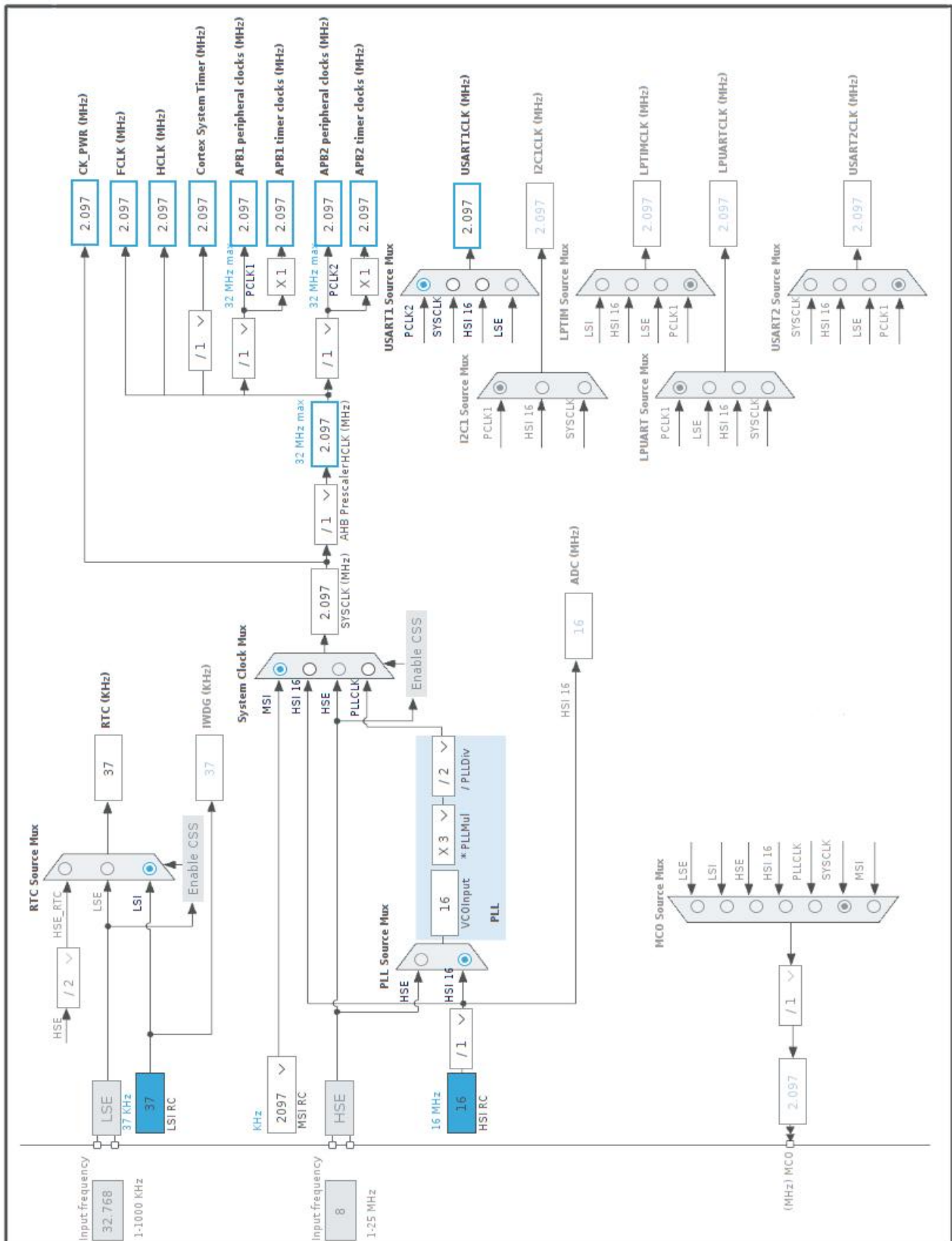


3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VDD	Power		
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
10	PA0	I/O	ADC_IN0	
11	PA1 *	I/O	GPIO_Output	TRX_CE
12	PA2 *	I/O	GPIO_Output	TX_EN
13	PA3 *	I/O	GPIO_Output	CS_BME
14	PA4 *	I/O	GPIO_Output	CS_NRF
15	PA5	I/O	SPI1_SCK	
16	PA6	I/O	SPI1_MISO	
17	PA7	I/O	SPI1_MOSI	
18	PB0	I/O	GPIO_EXTI0	DR
23	VSS	Power		
24	VDD	Power		
29	PA8 *	I/O	GPIO_Output	LED_1
30	PA9 *	I/O	GPIO_Output	LED_2
31	PA10 *	I/O	GPIO_Output	StepUP_EN
32	PA11 *	I/O	GPIO_Output	SlaveDevice
33	PA12 *	I/O	GPIO_Input	KEY
34	PA13	I/O	SYS_SWDIO	
35	VSS	Power		
36	VDDIO2	Power		
37	PA14	I/O	SYS_SWCLK	
42	PB6	I/O	USART1_TX	
43	PB7	I/O	USART1_RX	
44	BOOT0	Boot		
47	VSS	Power		
48	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	FW
Project Folder	/home/max/Project/NRF905_SENDER/NRF905_SENDER/FW
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_L0 V1.12.0
Application Structure	Advanced
Generate Under Root	No
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 all used libraries into the project folder
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_RTC_Init	RTC
6	MX_SPI1_Init	SPI1
7	MX_USART1_UART_Init	USART1

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L0
Line	STM32L0x1
MCU	STM32L051C6Tx
Datasheet	DS10184_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

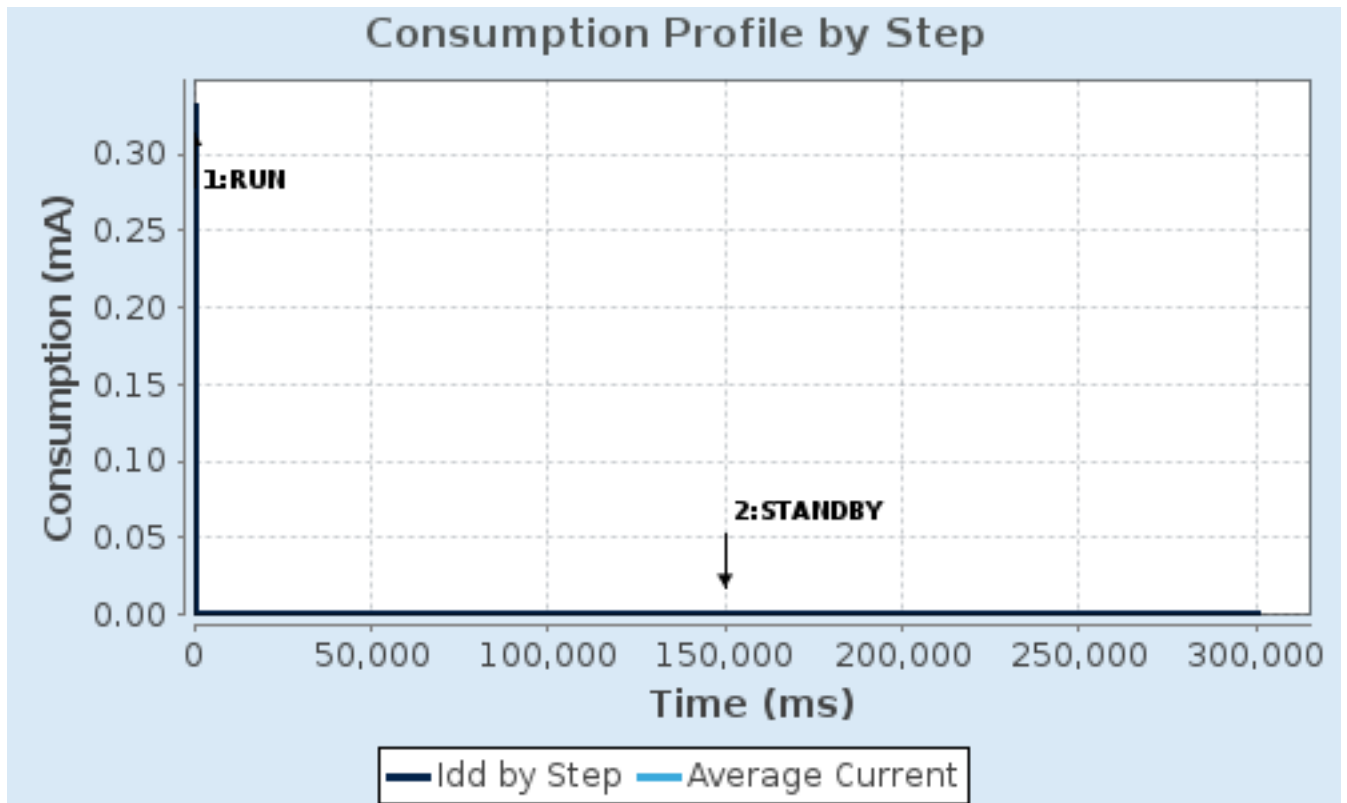
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STANDBY
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range3-Low	NoRange
Fetch Type	RAM	n/a
CPU Frequency	2 MHz	0 Hz
Clock Configuration	HSEBYP	ALL CLOCKS OFF
Clock Source Frequency	2 MHz	0 Hz
Peripherals	ADC:10KSPS DMA GPIOA GPIOB GPIOC RTC SPI1 SYS	RTC
Additional Cons.	0 mA	0 mA
Average Current	331.48 μ A	770 nA
Duration	1 ms	300 s
DMIPS	1.9	0.0
Ta Max	104.95	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	300 s	Average Current	771.1 nA
Battery Life	51 years, 7 months, 2 days, 21 hours	Average DMIPS	1.9 DMIPS

6.6. Chart



7. Peripherals and Middlewares Configuration

7.1. ADC

mode: IN0

mode: Vrefint Channel

7.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	Synchronous clock mode divided by 1
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Direction	Forward
Continuous Conversion Mode	Disabled
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	Enabled
Auto Off	Disabled
Oversampling Mode	Disabled

ADC_Regular_ConversionMode:

Sampling Time	1.5 Cycles
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None

WatchDog:

Enable Analog WatchDog Mode	false
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7.2. RCC

7.2.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Buffer Cache	Enabled
Prefetch	Disabled
Preread	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
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MSI Calibration Value	0
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000
Power Parameters:	
Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.3. RTC

mode: Activate Clock Source

WakeUp: Internal WakeUp

7.3.1. Parameter Settings:

General:

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

Wake UP:

Wake Up Clock	1 Hz *
Wake Up Counter	300 *

7.4. SPI1

Mode: Full-Duplex Master

7.4.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	1.0485 MBits/s *
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.5. SYS

mode: Debug Serial Wire

Timebase Source: SysTick

7.6. USART1

Mode: Asynchronous

7.6.1. 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

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

* User modified value

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC	PA0	ADC_IN0	Analog mode	No pull-up and no pull-down	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_SWDIO	n/a	n/a	n/a	
	PA14	SYS_SWCLK	n/a	n/a	n/a	
USART1	PB6	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PB7	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
GPIO	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	TRX_CE
	PA2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	TX_EN
	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CS_BME
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CS_NRF
	PB0	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	DR
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_1
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_2
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	StepUP_EN
	PA11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SlaveDevice
	PA12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY

8.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC	DMA1_Channel1	Peripheral To Memory	Low

ADC: DMA1_Channel1 DMA request Settings:

Mode: Normal
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
EXTI line 0 and line 1 interrupts	true	0	0
DMA1 channel 1 interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash and EEPROM global interrupt	unused		
RCC global interrupt	unused		
ADC, COMP1 and COMP2 interrupts (COMP interrupts through EXTI lines 21 and 22)	unused		
SPI1 global interrupt	unused		
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	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
EXTI line 0 and line 1 interrupts	false	true	true
DMA1 channel 1 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/DM00108219.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/DM00114897.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
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/DM00042534.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/DM00081379.pdf
Application note	http://www.st.com/resource/en/application_note/DM00085385.pdf
Application note	http://www.st.com/resource/en/application_note/DM00087593.pdf
Application note	http://www.st.com/resource/en/application_note/DM00108286.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00129215.pdf
Application note	http://www.st.com/resource/en/application_note/DM00145318.pdf
Application note	http://www.st.com/resource/en/application_note/DM00151811.pdf
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

Application note http://www.st.com/resource/en/application_note/DM00395696.pdf

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