1. Description

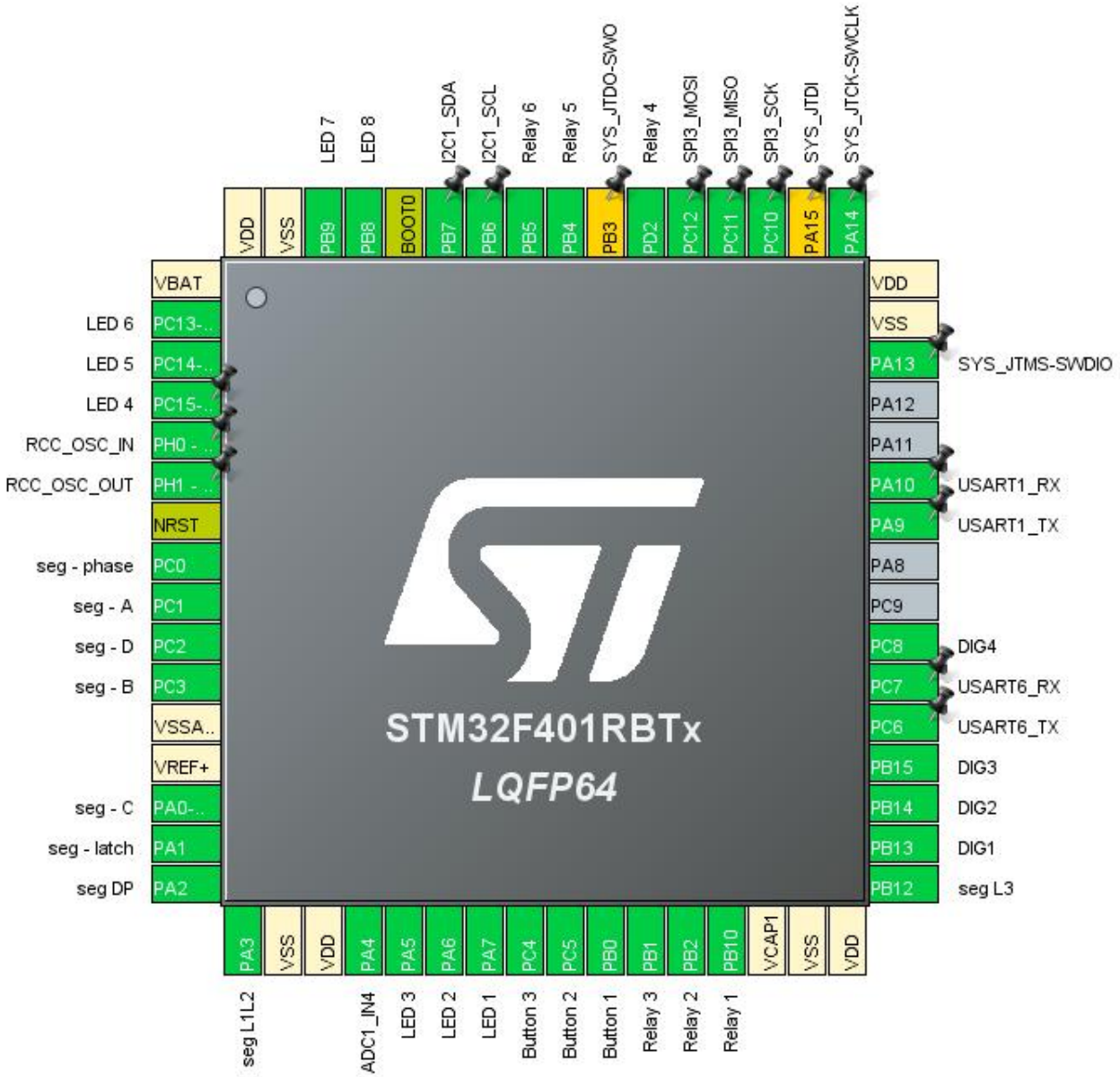
1.1. Project

Project Name	SW
Board Name	custom
Generated with:	STM32CubeMX 5.4.0
Date	06/16/2020

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F401
MCU name	STM32F401RBTx
MCU Package	LQFP64
MCU Pin number	64

2. Pinout Configuration



3. Pins Configuration

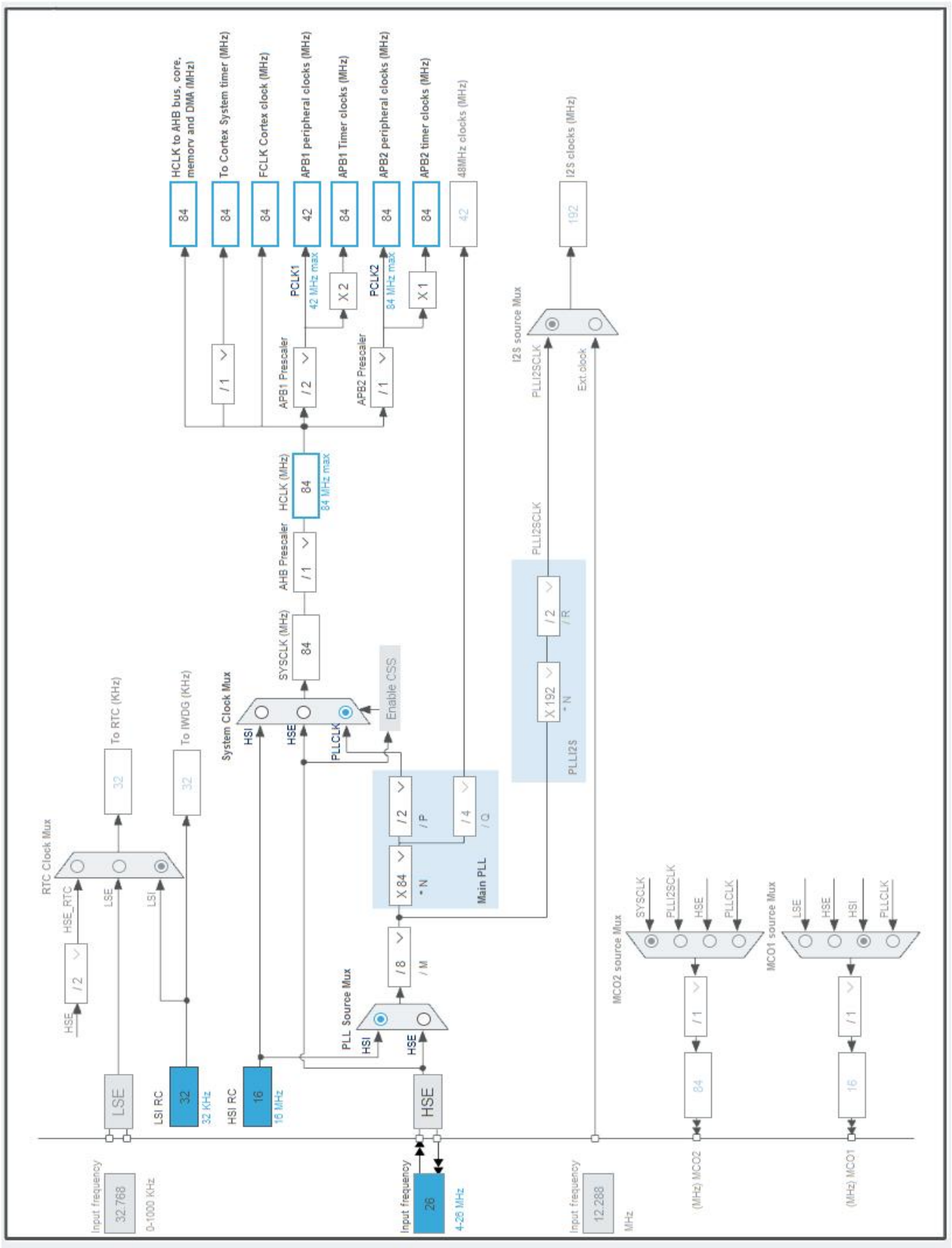
Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-ANTI_TAMP *	I/O	GPIO_Output	LED 6
3	PC14-OSC32_IN *	I/O	GPIO_Output	LED 5
4	PC15-OSC32_OUT *	I/O	GPIO_Output	LED 4
5	PH0 - OSC_IN	I/O	RCC_OSC_IN	
6	PH1 - OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	PC0 *	I/O	GPIO_Output	seg - phase
9	PC1 *	I/O	GPIO_Output	seg - A
10	PC2 *	I/O	GPIO_Output	seg - D
11	PC3 *	I/O	GPIO_Output	seg - B
12	VSSA/VREF-	Power		
13	VREF+	Power		
14	PA0-WKUP *	I/O	GPIO_Output	seg - C
15	PA1 *	I/O	GPIO_Output	seg - latch
16	PA2 *	I/O	GPIO_Output	seg DP
17	PA3 *	I/O	GPIO_Output	seg L1L2
18	VSS	Power		
19	VDD	Power		
20	PA4	I/O	ADC1_IN4	
21	PA5 *	I/O	GPIO_Output	LED 3
22	PA6 *	I/O	GPIO_Output	LED 2
23	PA7 *	I/O	GPIO_Output	LED 1
24	PC4 *	I/O	GPIO_Input	Button 3
25	PC5 *	I/O	GPIO_Input	Button 2
26	PB0 *	I/O	GPIO_Input	Button 1
27	PB1 *	I/O	GPIO_Output	Relay 3
28	PB2 *	I/O	GPIO_Output	Relay 2
29	PB10 *	I/O	GPIO_Output	Relay 1
30	VCAP1	Power		
31	VSS	Power		
32	VDD	Power		
33	PB12 *	I/O	GPIO_Output	seg L3
34	PB13 *	I/O	GPIO_Output	DIG1
35	PB14 *	I/O	GPIO_Output	DIG2
36	PB15 *	I/O	GPIO_Output	DIG3

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
37	PC6	I/O	USART6_TX	
38	PC7	I/O	USART6_RX	
39	PC8 *	I/O	GPIO_Output	DIG4
42	PA9	I/O	USART1_TX	
43	PA10	I/O	USART1_RX	
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VSS	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	
50	PA15 **	I/O	SYS_JTDI	
51	PC10	I/O	SPI3_SCK	
52	PC11	I/O	SPI3_MISO	
53	PC12	I/O	SPI3_MOSI	
54	PD2 *	I/O	GPIO_Output	Relay 4
55	PB3 **	I/O	SYS_JTDO-SWO	
56	PB4 *	I/O	GPIO_Output	Relay 5
57	PB5 *	I/O	GPIO_Output	Relay 6
58	PB6	I/O	I2C1_SCL	
59	PB7	I/O	I2C1_SDA	
60	BOOT0	Boot		
61	PB8 *	I/O	GPIO_Output	LED 8
62	PB9 *	I/O	GPIO_Output	LED 7
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

** The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	SW
Project Folder	D:\Onedrive\TBZ\OneDrive - TBZ\node-red\extensionv1.0\SW
Toolchain / IDE	MDK-ARM V5.27
Firmware Package Name and Version	STM32Cube FW_F4 V1.24.2

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	No
Backup previously generated files when re-generating	No
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F401
MCU	STM32F401RBTx
Datasheet	024738_Rev8

6.2. Parameter Selection

Temperature	25
Vdd	3.3

7. IPs and Middleware Configuration

7.1. ADC1

mode: IN4

7.1.1. Parameter Settings:

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	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 4
Sampling Time	3 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

7.2. GPIO

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. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

RCC Parameters:

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

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 2

7.5. SPI3

Mode: Full-Duplex Master

7.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**21.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.6. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.7. USART1

Mode: Asynchronous

7.7.1. 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

7.8. USART6

Mode: Asynchronous

7.8.1. 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

*** 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	PA4	ADC1_IN4	Analog mode	No pull-up and no pull-down	n/a	
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**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	
SPI3	PC10	SPI3_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PC11	SPI3_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PC12	SPI3_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	PA9	USART1_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PA10	USART1_RX	Alternate Function Push Pull	Pull-up	**Very High ***	
USART6	PC6	USART6_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PC7	USART6_RX	Alternate Function Push Pull	Pull-up	**Very High ***	
Single Mapped Signals	PA15	SYS_JTDI	n/a	n/a	n/a	
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	
GPIO	PC13-ANTI_TAMP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 6
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 5
	PC15-OSC32_OU	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 4

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	T					
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg - phase
	PC1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg - A
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg - D
	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg - B
	PA0-WKUP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg - C
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg - latch
	PA2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg DP
	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg L1L2
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 3
	PA6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 2
	PA7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 1
	PC4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Button 3
	PC5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Button 2
	PB0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Button 1
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Relay 3
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Relay 2
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Relay 1
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	seg L3
	PB13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DIG1
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DIG2
	PB15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DIG3
	PC8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DIG4
	PD2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Relay 4
	PB4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Relay 5
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Relay 6
	PB8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 8
	PB9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED 7

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

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	0	0
System tick timer	true	0	0
USART1 global interrupt	true	0	0
DMA2 stream0 global interrupt	true	0	0
USART6 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI3 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Software Pack Report