



## 1. Description

### 1.1. Project

Project Name	STM32_Cat1
Board Name	NUCLEO-L476RG
Generated with:	STM32CubeMX 6.1.1
Date	12/21/2020

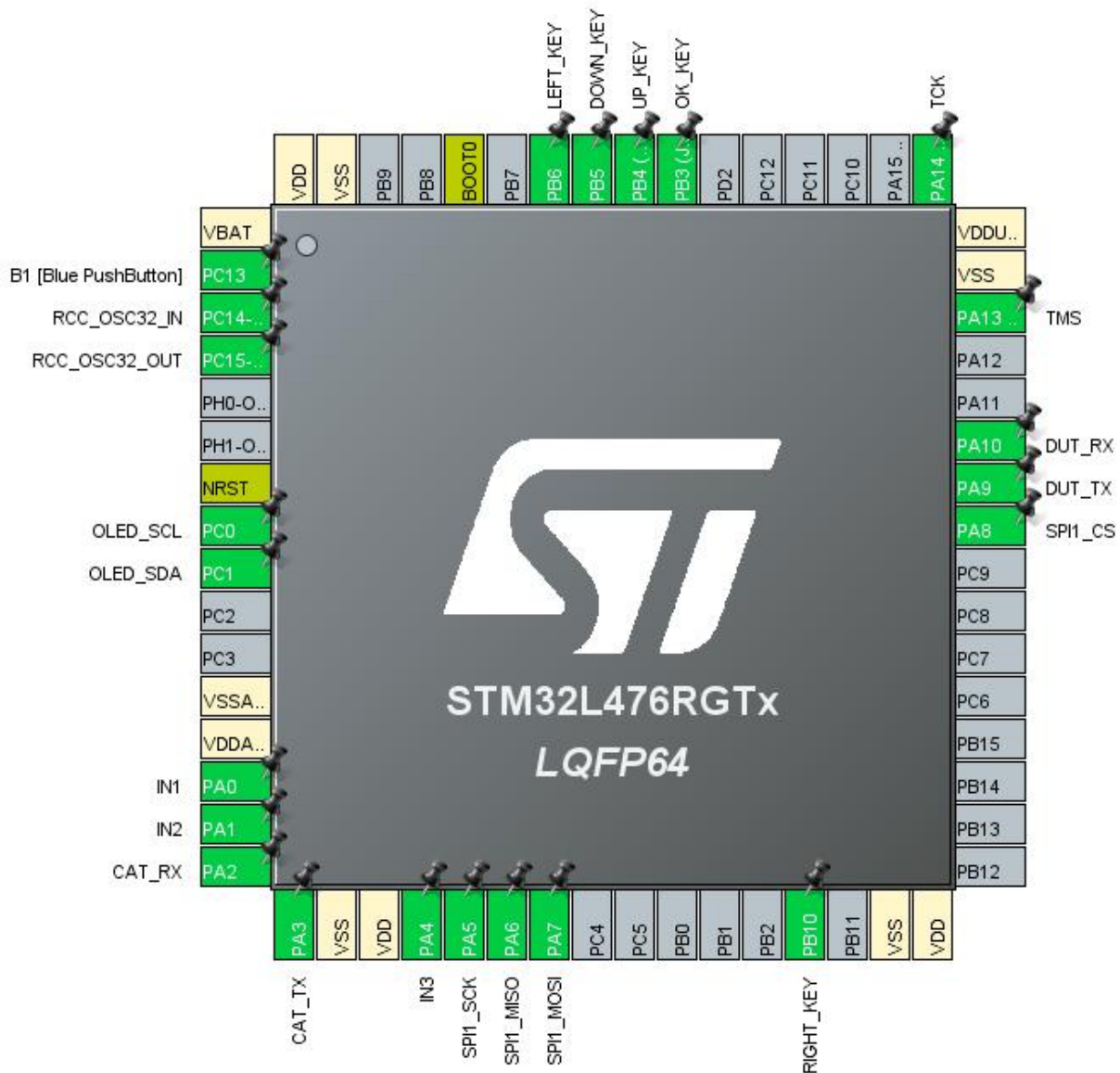
### 1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x6
MCU name	STM32L476RGTx
MCU Package	LQFP64
MCU Pin number	64

### 1.3. Core(s) information

Core(s)	Arm Cortex-M4
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## 2. Pinout Configuration

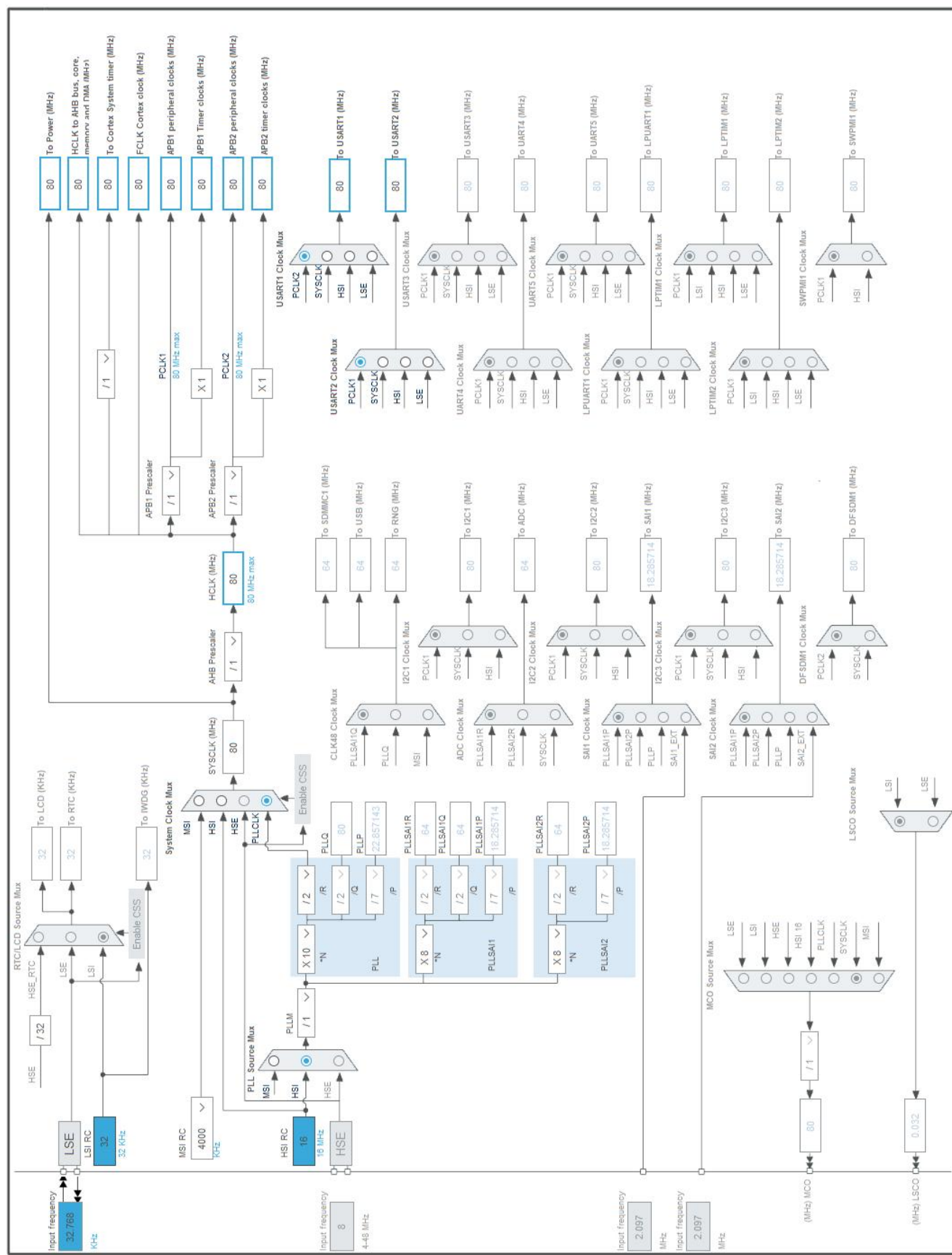


### 3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13	I/O	GPIO_EXTI13	B1 [Blue PushButton]
3	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
7	NRST	Reset		
8	PC0 *	I/O	GPIO_Output	OLED_SCL
9	PC1 *	I/O	GPIO_Output	OLED_SDA
12	VSSA/VREF-	Power		
13	VDDA/VREF+	Power		
14	PA0 *	I/O	GPIO_Output	IN1
15	PA1 *	I/O	GPIO_Output	IN2
16	PA2	I/O	USART2_TX	CAT_RX
17	PA3	I/O	USART2_RX	CAT_TX
18	VSS	Power		
19	VDD	Power		
20	PA4 *	I/O	GPIO_Output	IN3
21	PA5	I/O	SPI1_SCK	
22	PA6	I/O	SPI1_MISO	
23	PA7	I/O	SPI1_MOSI	
29	PB10	I/O	GPIO_EXTI10	RIGHT_KEY
31	VSS	Power		
32	VDD	Power		
41	PA8 *	I/O	GPIO_Output	SPI1_CS
42	PA9	I/O	USART1_TX	DUT_TX
43	PA10	I/O	USART1_RX	DUT_RX
46	PA13 (JTMS-SWDIO)	I/O	SYS_JTMS-SWDIO	TMS
47	VSS	Power		
48	VDDUSB	Power		
49	PA14 (JTCK-SWCLK)	I/O	SYS_JTCK-SWCLK	TCK
55	PB3 (JTDO-TRACESWO)	I/O	GPIO_EXTI3	OK_KEY
56	PB4 (NJTRST)	I/O	GPIO_EXTI4	UP_KEY
57	PB5	I/O	GPIO_EXTI5	DOWN_KEY
58	PB6	I/O	GPIO_EXTI6	LEFT_KEY
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	STM32_Cat1
Project Folder	D:\huimeng\newtimeda\dut\STM32_Cat1
Toolchain / IDE	EWARM V7
Firmware Package Name and Version	STM32Cube FW_L4 V1.16.0
Application Structure	Basic
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 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	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_SPI1_Init	SPI1
4	MX_USART1_UART_Init	USART1
5	MX_USART2_UART_Init	USART2

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x6
MCU	STM32L476RGTx
Datasheet	DS10198_Rev4

### 6.2. Parameter Selection

Temperature	25
Vdd	3.0

### 6.3. 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



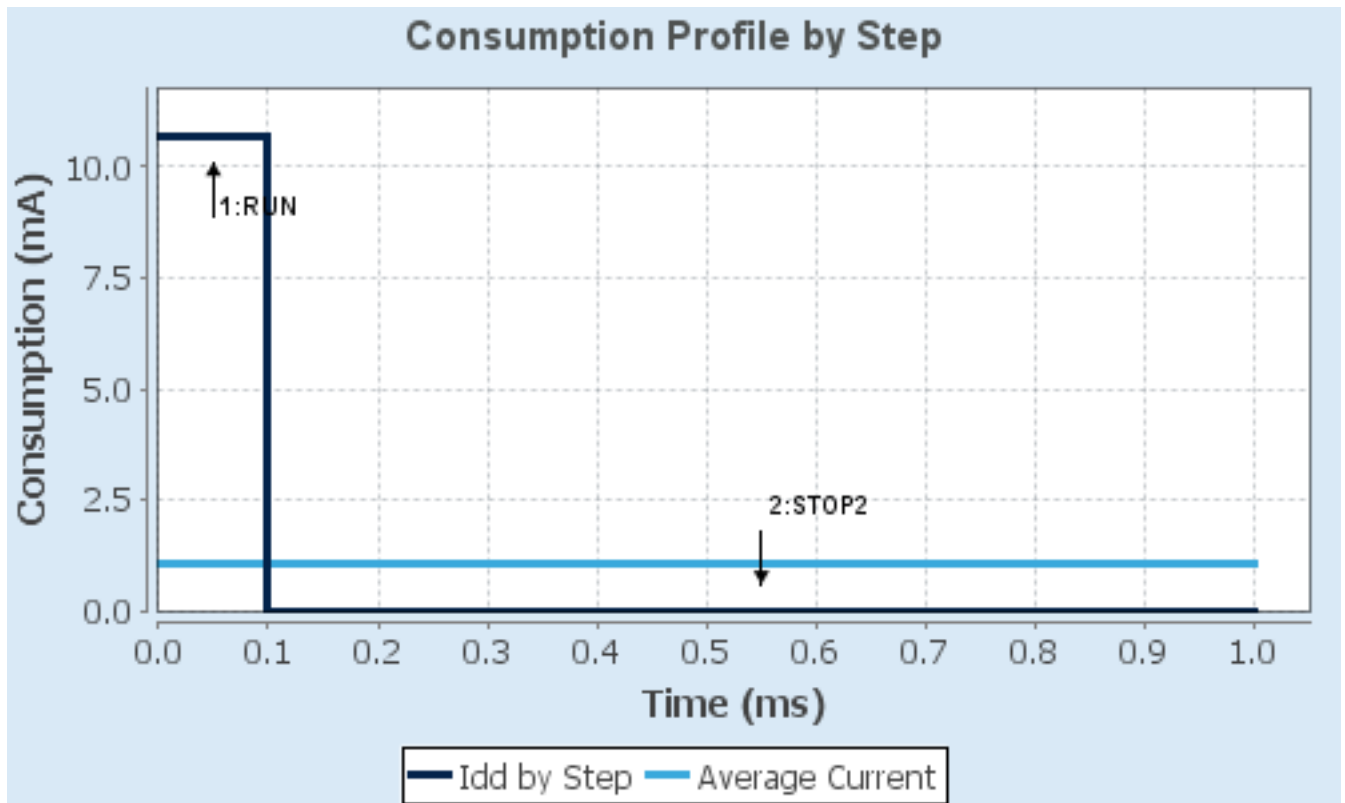
#### 6.4. Sequence

<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP2
<b>Vdd</b>	3.0	3.0
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	Range1-High	NoRange
<b>Fetch Type</b>	SRAM2	n/a
<b>CPU Frequency</b>	80 MHz	0 Hz
<b>Clock Configuration</b>	HSE PLL	ALL CLOCKS OFF
<b>Clock Source Frequency</b>	4 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	10.7 mA	1.18 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	100.0	0.0
<b>Ta Max</b>	103.56	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	1.07 mA
Battery Life	4 months, 10 days, 3 hours	Average DMIPS	100.0 DMIPS

#### 6.6. Chart



## 7. Peripherals and Middlewares Configuration

### 7.1. RCC

#### Low Speed Clock (LSE) : Crystal/Ceramic Resonator

##### 7.1.1. Parameter Settings:

###### System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	<b>Enabled *</b>
Data Cache	Enabled
Flash Latency(WS)	4 WS (5 CPU cycle)

###### RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Disabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

###### Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
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### 7.2. SPI1

#### Mode: Full-Duplex Master

##### 7.2.1. Parameter Settings:

###### Basic Parameters:

Frame Format	Motorola
Data Size	<b>8 Bits *</b>
First Bit	MSB First

###### Clock Parameters:

Prescaler (for Baud Rate)	<b>128 *</b>
Baud Rate	<b>625.0 KBits/s *</b>
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

###### Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

### 7.3. SYS

**Debug: Serial Wire**

**Timebase Source: SysTick**

### 7.4. USART1

**Mode: Asynchronous**

#### 7.4.1. 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

### 7.5. USART2

**Mode: Asynchronous**

#### 7.5.1. 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
RCC	PC14-OSC32_IN (PC14)	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT (PC15)	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 *	
	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 (JTMS-SWDIO)	SYS_JTMS-SWDIO	n/a	n/a	n/a	TMS
	PA14 (JTCK-SWCLK)	SYS_JTCK-SWCLK	n/a	n/a	n/a	TCK
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	DUT_TX
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	DUT_RX
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	CAT_RX
	PA3	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	CAT_TX
GPIO	PC13	GPIO_EXTI13	<b>External Interrupt Mode with Falling edge trigger detection</b>	No pull-up and no pull-down	n/a	B1 [Blue PushButton]
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_SCL
	PC1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_SDA
	PA0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	IN1
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	IN2
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	IN3
	PB10	GPIO_EXTI10	External Interrupt Mode with Rising edge trigger detection	<b>Pull-up *</b>	n/a	RIGHT_KEY
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_CS

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB3 (JTDO-TRACESWO)	GPIO_EXTI3	External Interrupt Mode with Rising edge trigger detection	<b>Pull-up *</b>	n/a	OK_KEY
	PB4 (NJTRST)	GPIO_EXTI4	External Interrupt Mode with Rising edge trigger detection	<b>Pull-up *</b>	n/a	UP_KEY
	PB5	GPIO_EXTI5	External Interrupt Mode with Rising edge trigger detection	<b>Pull-up *</b>	n/a	DOWN_KEY
	PB6	GPIO_EXTI6	External Interrupt Mode with Rising edge trigger detection	<b>Pull-up *</b>	n/a	LEFT_KEY

## 8.2. DMA configuration

nothing configured in DMA service

### 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
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
EXTI line3 interrupt	true	1	0
EXTI line4 interrupt	true	1	0
EXTI line[9:5] interrupts	true	1	0
USART1 global interrupt	true	2	0
USART2 global interrupt	true	3	0
EXTI line[15:10] interrupts	true	1	0
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
SPI1 global interrupt	unused		
FPU global interrupt	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
Memory management fault	false	true	false
Prefetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
EXTI line3 interrupt	false	true	true
EXTI line4 interrupt	false	true	true
EXTI line[9:5] interrupts	false	true	true



Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
USART1 global interrupt	false	true	true
USART2 global interrupt	false	true	true
EXTI line[15:10] interrupts	false	true	true

\* User modified value

## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

#### Middleware

#### System Core

#### Analog

#### Timers

#### Connectivity

#### Multimedia

#### Security

#### Computing

DMA

GPIO ✓

NVIC ✓

RCC ✓

SYS ✓

SP1 ✓

USART1 ✓

USART2 ✓

## 10. Docs & Resources

Type	Link
Datasheet	<a href="http://www.st.com/resource/en/datasheet/DM00108832.pdf">http://www.st.com/resource/en/datasheet/DM00108832.pdf</a>
Reference manual	<a href="http://www.st.com/resource/en/reference_manual/DM00083560.pdf">http://www.st.com/resource/en/reference_manual/DM00083560.pdf</a>
Programming manual	<a href="http://www.st.com/resource/en/programming_manual/DM00046982.pdf">http://www.st.com/resource/en/programming_manual/DM00046982.pdf</a>
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Application note	<a href="http://www.st.com/resource/en/application_note/CD00160362.pdf">http://www.st.com/resource/en/application_note/CD00160362.pdf</a>
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