
STM32
CubeMX

1. Description

1.1. Project

Project Name	hiveScale
Board Name	NUCLEO-L031K6
Generated with:	STM32CubeMX 6.1.1
Date	03/24/2021

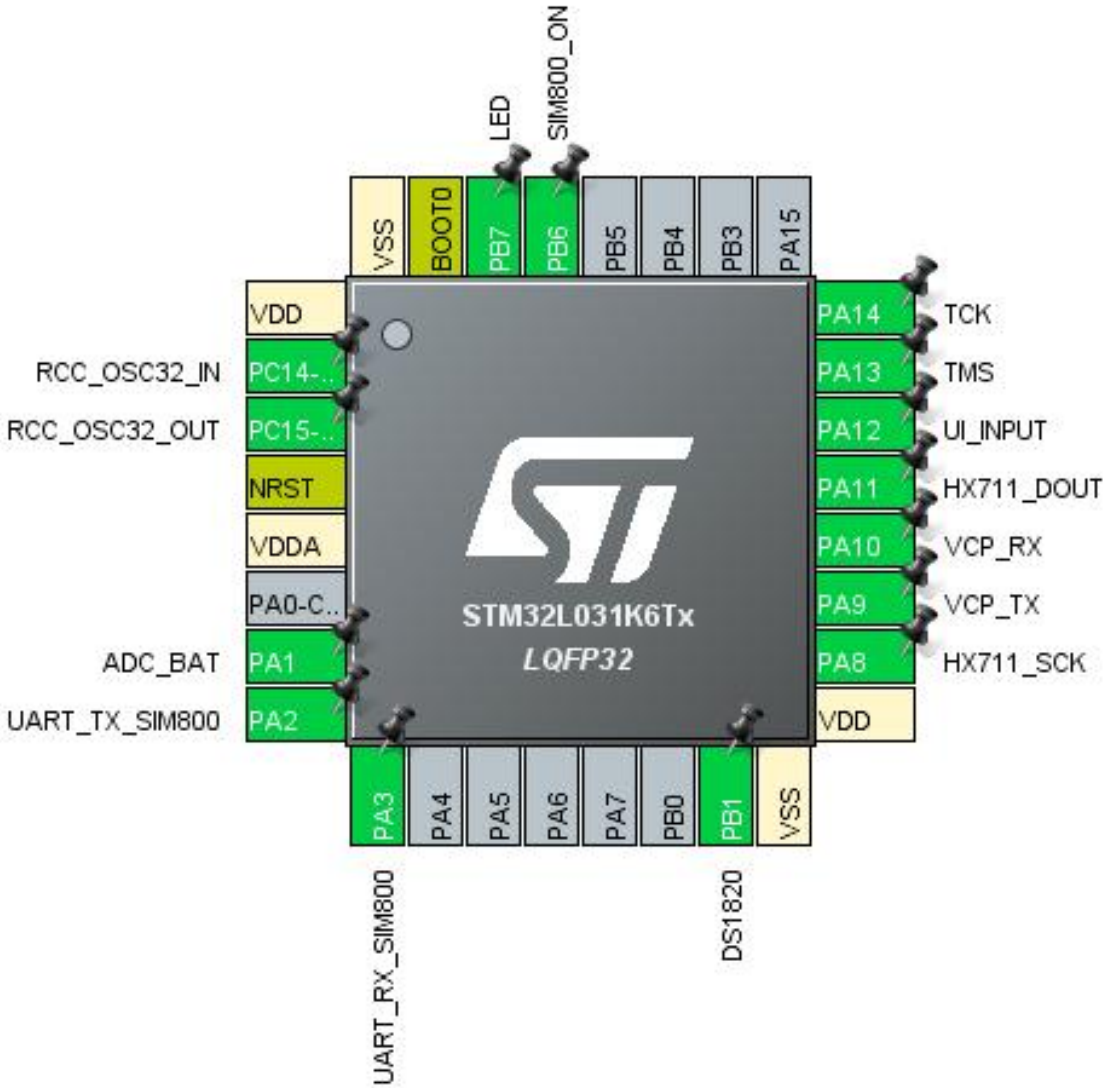
1.2. MCU

MCU Series	STM32L0
MCU Line	STM32L0x1
MCU name	STM32L031K6Tx
MCU Package	LQFP32
MCU Pin number	32

1.3. Core(s) information

Core(s)	Arm Cortex-M0+

2. Pinout Configuration

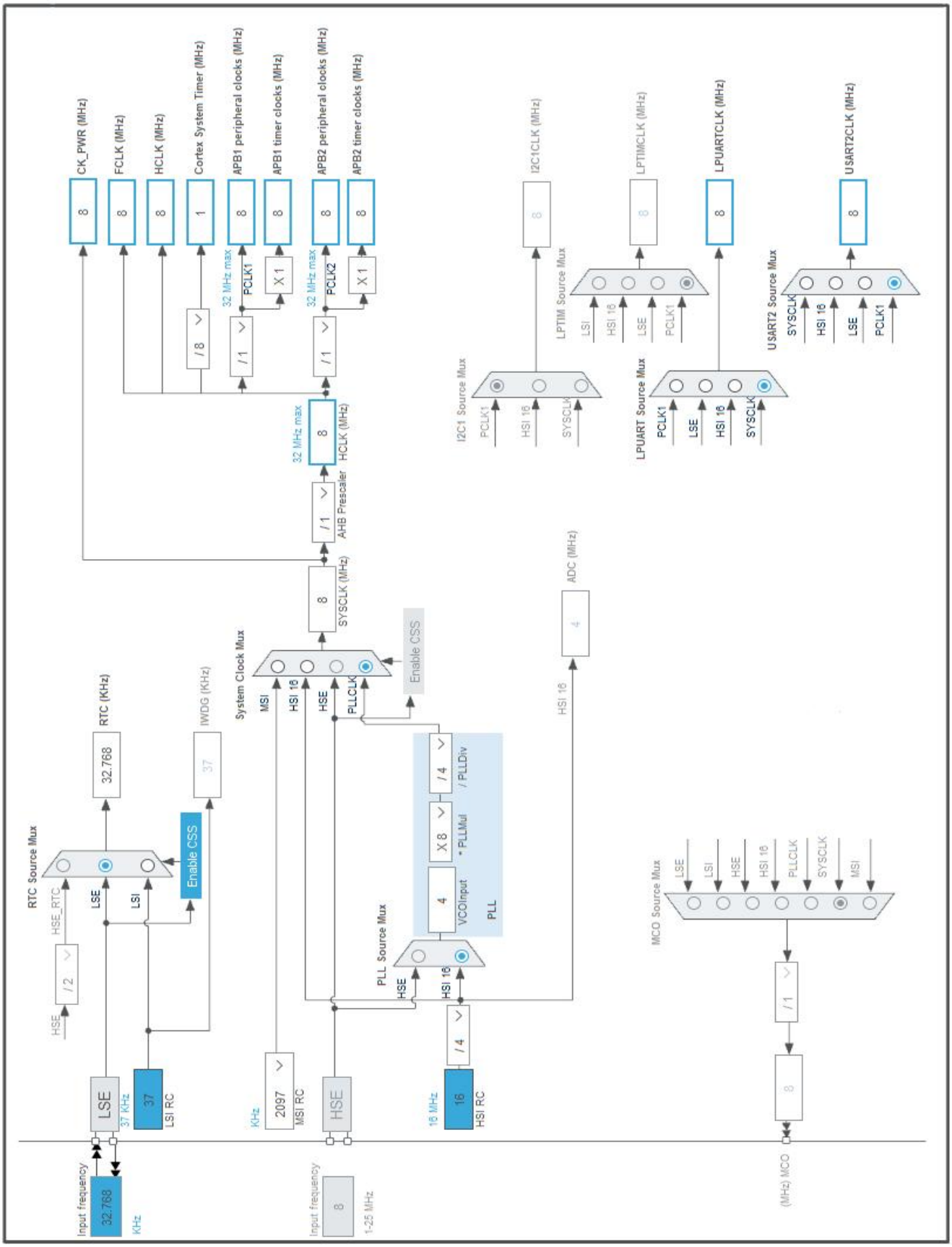


3. Pins Configuration

Pin Number LQFP32	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VDD	Power		
2	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
3	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
4	NRST	Reset		
5	VDDA	Power		
7	PA1	I/O	ADC_IN1	ADC_BAT
8	PA2	I/O	LPUART1_TX	UART_TX_SIM800
9	PA3	I/O	LPUART1_RX	UART_RX_SIM800
15	PB1 *	I/O	GPIO_Input	DS1820
16	VSS	Power		
17	VDD	Power		
18	PA8 *	I/O	GPIO_Output	HX711_SCK
19	PA9	I/O	USART2_TX	VCP_TX
20	PA10	I/O	USART2_RX	VCP_RX
21	PA11 *	I/O	GPIO_Input	HX711_DOUT
22	PA12	I/O	GPIO_EXTI12	UI_INPUT
23	PA13	I/O	SYS_SWDIO	TMS
24	PA14	I/O	SYS_SWCLK	TCK
29	PB6 *	I/O	GPIO_Output	SIM800_ON
30	PB7 *	I/O	GPIO_Output	LED
31	BOOT0	Boot		
32	VSS	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	hiveScale
Project Folder	C:\Users\dirk\GitHub\hiveScale
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L0 V1.12.0
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)	Yes
Enable Full Assert	Yes

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_LPUART1_UART_Init	LPUART1
4	MX_USART2_UART_Init	USART2
5	MX_RTC_Init	RTC
6	MX_TIM2_Init	TIM2
7	MX_ADC_Init	ADC
8	MX_TIM21_Init	TIM21

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L0
Line	STM32L0x1
MCU	STM32L031K6Tx
Datasheet	DS10668_Rev4

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

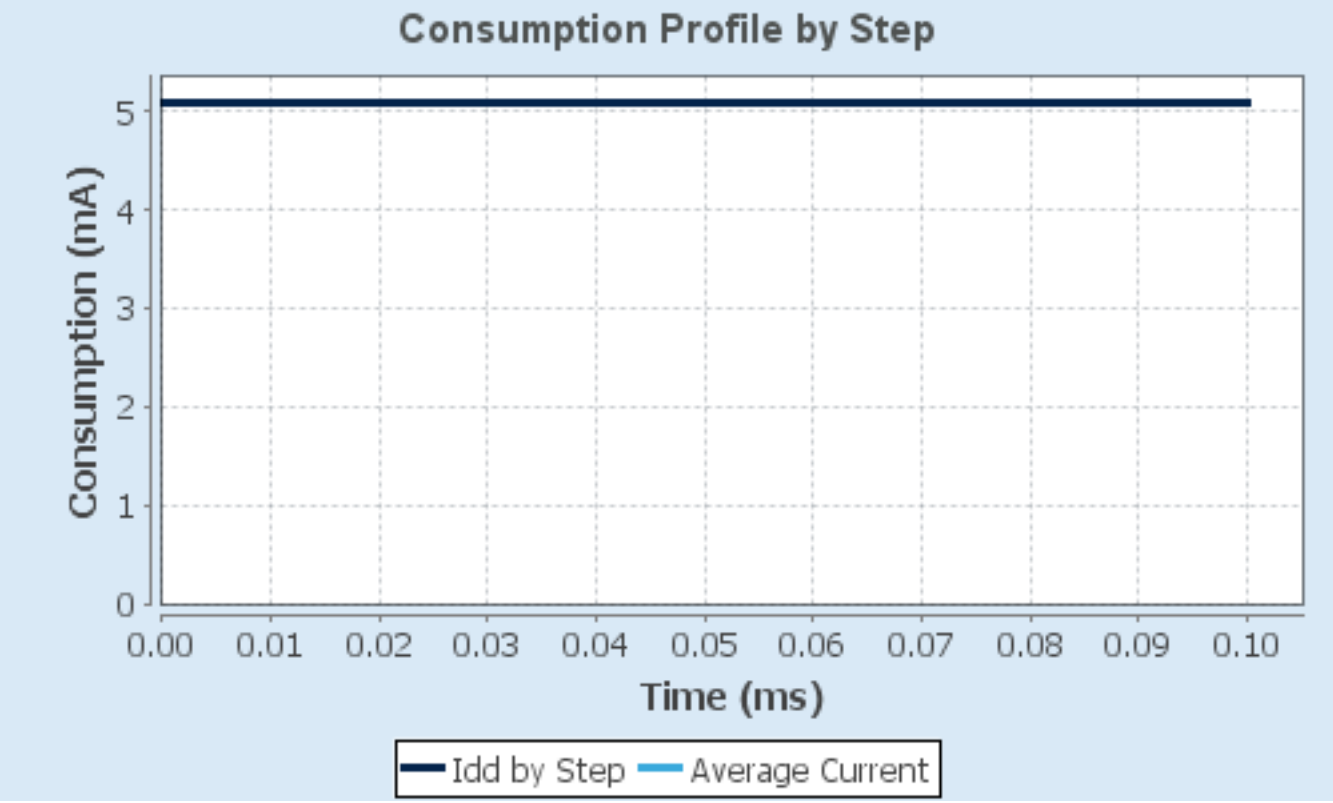
6.4. Sequence

Step	Step1
Mode	RUN
Vdd	3.0
Voltage Source	Battery
Range	Range1-High
Fetch Type	FLASH
CPU Frequency	32 MHz
Clock Configuration	HSI PLL
Clock Source Frequency	16 MHz
Peripherals	
Additional Cons.	0 mA
Average Current	5.1 mA
Duration	0.1 ms
DMIPS	30.0
Ta Max	104.08
Category	In DS Table

6.5. Results

Sequence Time	100 µs	Average Current	5.1 mA
Battery Life	5 days, 17 hours	Average DMIPS	30.4 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
0
1
2
3
4
5
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
Time (ms)
Idd by Step
Average Current

7. Peripherals and Middlewares Configuration

7.1. ADC

mode: IN1

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	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

7.2. LPUART1

Mode: Asynchronous

7.2.1. Parameter Settings:

Basic Parameters:

Baud Rate	**19200 ***
Word Length	**8 Bits (including Parity) ***
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Single Sample	Disable

Advanced Features:

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

7.3. RCC

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	**3 ***
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

7.4. RTC

mode: Activate Clock Source

mode: Activate Calendar

Alarm A: Internal Alarm A

WakeUp: Internal WakeUp

7.4.1. Parameter Settings:

General:

Hour Format	Hourformat 24

Asynchronous Predivider value	127
Synchronous Predivider value	255

Calendar Time:

Data Format	**Binary data format ***
Hours	0
Minutes	0
Seconds	0
Day Light Saving: value of hour adjustment	Daylightsaving None
Store Operation	Storeoperation Reset

Calendar Date:

Week Day	**Saturday ***
Month	January
Date	**23 ***
Year	**21 ***

Alarm A:

Hours	**23 ***
Minutes	**55 ***
Seconds	0
Sub Seconds	0
Alarm Mask Date Week day	**Enable ***
Alarm Mask Hours	Disable
Alarm Mask Minutes	Disable
Alarm Mask Seconds	Disable
Alarm Sub Second Mask	All Alarm SS fields are masked.
Alarm Date Week Day Sel	**Weekday ***
Alarm Week Day	**Saturday ***

Wake UP:

Wake Up Clock	**1 Hz ***
Wake Up Counter	**MODULE_SLEEPTIME ***

7.5. SYS

mode: Debug Serial Wire

Timebase Source: SysTick

7.6. TIM2

Clock Source : Internal Clock

7.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**TIM_PRESCALER_1MSEC_AT_8MHZ ***
Counter Mode	**Down ***
Counter Period (AutoReload Register - 16 bits value)	**TIM_PERIOD_200MSEC ***
Internal Clock Division (CKD)	**Division by 4 ***
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.7. TIM21

Clock Source : Internal Clock

7.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**TIM_PRESCALER_1MSEC_AT_8MHZ ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**TIM_PERIOD_3MSEC ***
Internal Clock Division (CKD)	**Division by 4 ***
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.8. USART2

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
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	PA1	ADC_IN1	Analog mode	No pull-up and no pull-down	n/a	ADC_BAT
LPUART1	PA2	LPUART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	UART_TX_SIM800
	PA3	LPUART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	UART_RX_SIM800
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	
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	TMS
	PA14	SYS_SWCLK	n/a	n/a	n/a	TCK
USART2	PA9	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	VCP_TX
	PA10	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	VCP_RX
GPIO	PB1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	DS1820
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	HX711_SCK
	PA11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	HX711_DOUT
	PA12	GPIO_EXTI12	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	UI_INPUT
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SIM800_ON
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED

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
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 4 to 15 interrupts	true	0	0
TIM2 global interrupt	true	0	0
TIM21 global interrupt	true	0	0
USART2 global interrupt / USART2 wake-up interrupt through EXTI line 26	true	0	0
LPUART1 global interrupt / LPUART1 wake-up interrupt through EXTI line 28	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		

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 4 to 15 interrupts	false	true	true
TIM2 global interrupt	false	true	true
TIM21 global interrupt	false	true	true
USART2 global interrupt / USART2 wake-up interrupt through EXTI line 26	false	true	true
LPUART1 global interrupt / LPUART1 wake-up interrupt through EXTI line 28	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/DM00140359.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/DM00182885.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
Application note	http://www.st.com/resource/en/application_note/DM00112257.pdf
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
Application note	http://www.st.com/resource/en/application_note/DM00220769.pdf
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
Application note	http://www.st.com/resource/en/application_note/DM00445657.pdf
Application note	http://www.st.com/resource/en/application_note/DM00493651.pdf
Application note	http://www.st.com/resource/en/application_note/DM00536349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00209772.pdf
Application note	http://www.st.com/resource/en/application_note/DM00660597.pdf
Application note	http://www.st.com/resource/en/application_note/DM00725181.pdf