STM32
CubeMX

1. Description

1.1. Project

Project Name	Traffic_Signal_Lights
Board Name	custom
Generated with:	STM32CubeMX 6.0.0
Date	08/24/2020

1.2. MCU

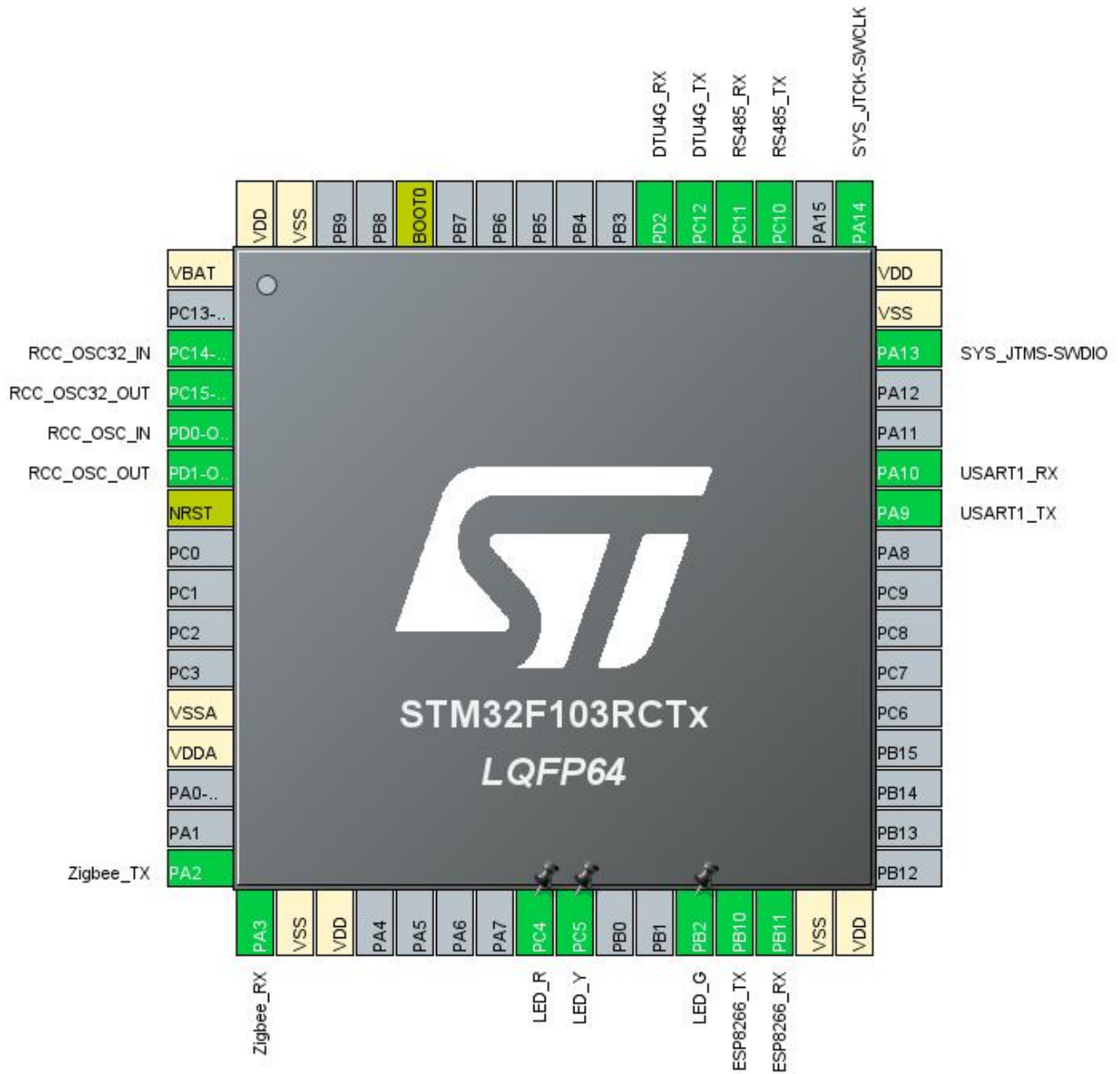|	
MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103RCTx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

|	
Core(s)	Arm Cortex-M3

2. Pinout Configuration

3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
3	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
12	VSSA	Power		
13	VDDA	Power		
16	PA2	I/O	USART2_TX	Zigbee_TX
17	PA3	I/O	USART2_RX	Zigbee_RX
18	VSS	Power		
19	VDD	Power		
24	PC4 *	I/O	GPIO_Output	LED_R
25	PC5 *	I/O	GPIO_Output	LED_Y
28	PB2 *	I/O	GPIO_Output	LED_G
29	PB10	I/O	USART3_TX	ESP8266_TX
30	PB11	I/O	USART3_RX	ESP8266_RX
31	VSS	Power		
32	VDD	Power		
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	
51	PC10	I/O	UART4_TX	RS485_TX
52	PC11	I/O	UART4_RX	RS485_RX
53	PC12	I/O	UART5_TX	DTU4G_TX
54	PD2	I/O	UART5_RX	DTU4G_RX
60	BOOT0	Boot		
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration
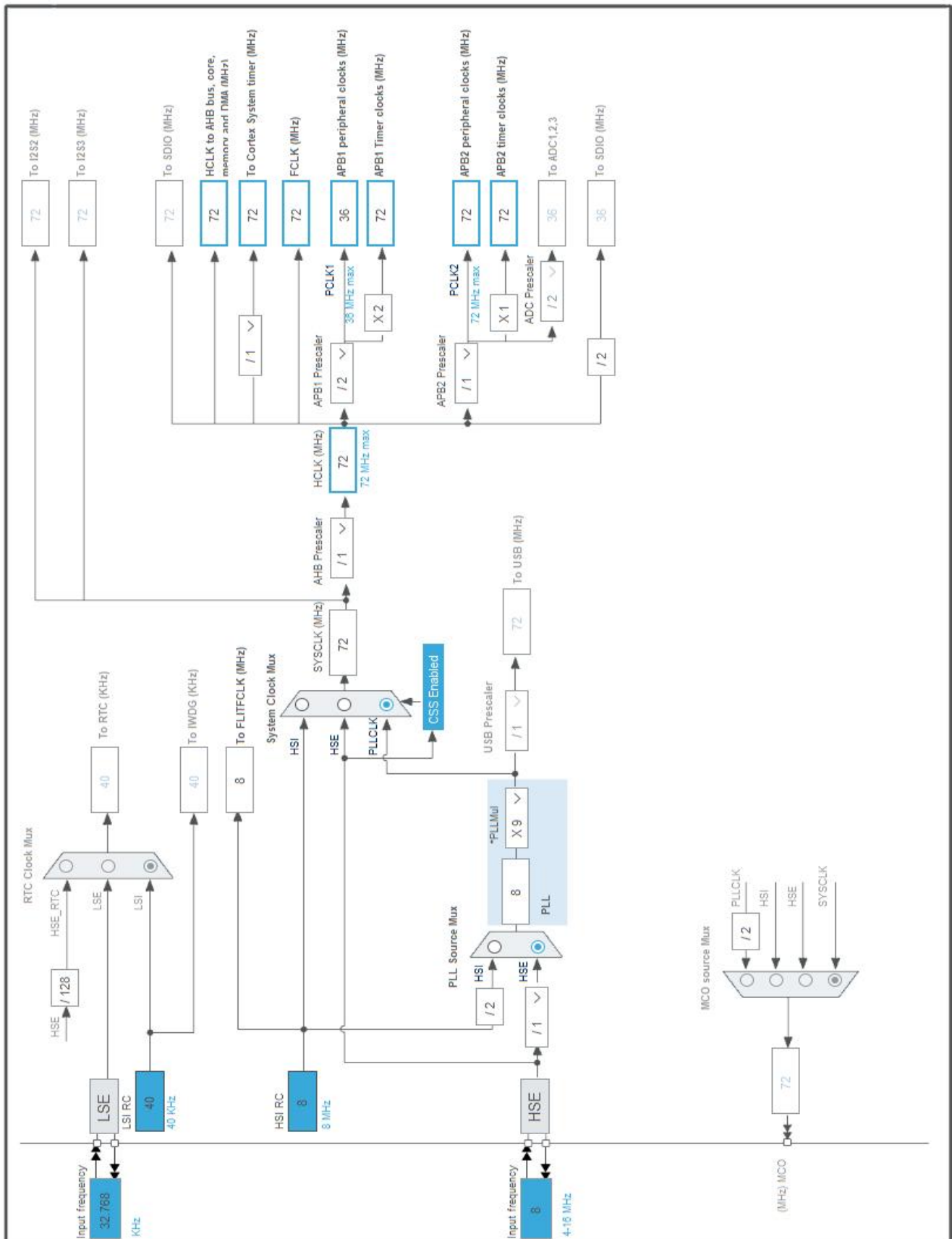
5. Software Project

5.1. Project Settings

Name	Value
Project Name	Traffic_Signal_Lights
Project Folder	D:\Code\Traffic_Signal_Lights
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F1 V1.8.0
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	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)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	IP Instance Name
1	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_TIM6_Init	TIM6
4	MX_UART4_Init	UART4
5	MX_UART5_Init	UART5
6	MX_USART1_UART_Init	USART1
7	MX_USART2_UART_Init	USART2
8	MX_USART3_UART_Init	USART3

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103RCTx
Datasheet	DS5792_Rev12

6.2. Parameter Selection

Temperature	25
Vdd	3.3

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

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	No Scale	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	72 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP
Clock Source Frequency	8 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	30.5 mA	25 µA
Duration	0.1 ms	0.9 ms
DMIPS	90.0	0.0
Ta Max	100.47	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	3.07 mA
Battery Life	1 month, 15 days, 15 hours	Average DMIPS	61.0 DMIPS

6.6. Chart
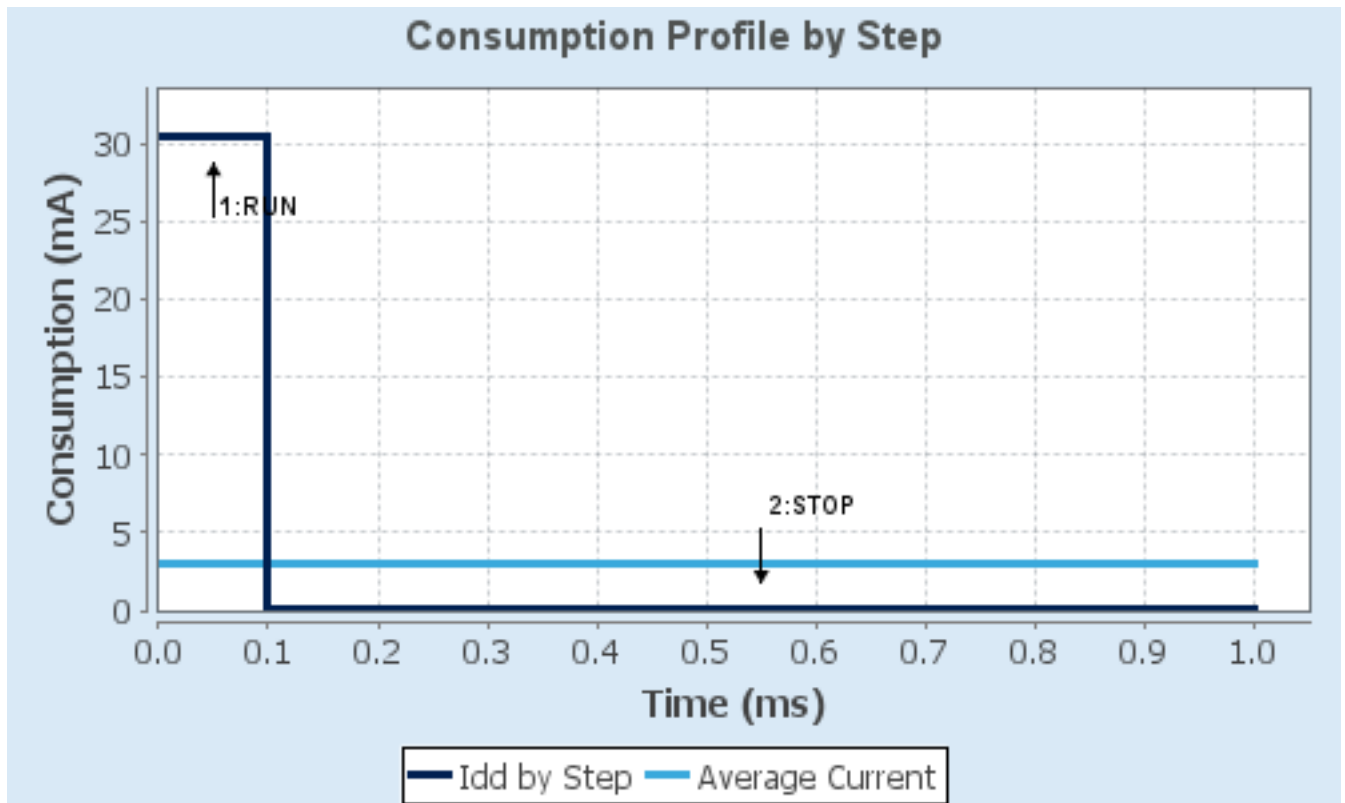
7. IPs and Middleware Configuration

7.1. GPIO

7.2. RCC
High Speed Clock (HSE): Crystal/Ceramic Resonator
Low Speed Clock (LSE) : Crystal/Ceramic Resonator
7.2.1. Parameter Settings:

System Parameters:

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

RCC Parameters:

HSI Calibration Value	16
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

7.3. SYS
Debug: Serial Wire
Timebase Source: TIM7

7.4. TIM6
mode: Activated
7.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**7200-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10000-1 ***
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.5. UART4

Mode: Asynchronous

7.5.1. Parameter Settings:

Basic Parameters:

Baud Rate	**9600 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

7.6. UART5

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

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. USART2

Mode: Asynchronous

7.8.1. Parameter Settings:

Basic Parameters:

Baud Rate	**384000 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

7.9. USART3

Mode: Asynchronous

7.9.1. 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
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	
	PD0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
UART4	PC10	UART4_TX	Alternate Function Push Pull	n/a	**High ***	RS485_TX
	PC11	UART4_RX	Input mode	No pull-up and no pull-down	**n/a**	RS485_RX
UART5	PC12	UART5_TX	Alternate Function Push Pull	n/a	**High ***	DTU4G_TX
	PD2	UART5_RX	Input mode	No pull-up and no pull-down	**n/a**	DTU4G_RX
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	**High ***	
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	**n/a**	
USART2	PA2	USART2_TX	Alternate Function Push Pull	n/a	**High ***	Zigbee_TX
	PA3	USART2_RX	Input mode	No pull-up and no pull-down	**n/a**	Zigbee_RX
USART3	PB10	USART3_TX	Alternate Function Push Pull	n/a	**High ***	ESP8266_TX
	PB11	USART3_RX	Input mode	No pull-up and no pull-down	**n/a**	ESP8266_RX
GPIO	PC4	GPIO_Output	Output Push Pull	**Pull-down ***	Low	LED_R
	PC5	GPIO_Output	Output Push Pull	**Pull-down ***	Low	LED_Y
	PB2	GPIO_Output	Output Push Pull	**Pull-down ***	Low	LED_G

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
TIM6 global interrupt	true	0	0
TIM7 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
USART1 global interrupt	unused		
USART2 global interrupt	unused		
USART3 global interrupt	unused		
UART4 global interrupt	unused		
UART5 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	true	true	true
Hard fault interrupt	true	true	false
Memory management fault	true	true	false
Prefetch fault, memory access fault	true	true	false
Undefined instruction or illegal state	true	true	false
System service call via SWI instruction	true	true	false
Debug monitor	true	true	false
Pendable request for system service	true	true	false
System tick timer	true	true	false
TIM6 global interrupt	true	true	true
TIM7 global interrupt	true	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/CD00191185.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/CD00171190.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/CD00228163.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/CD00283419.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/CD00197763.pdf
Application note	http://www.st.com/resource/en/application_note/CD00160362.pdf
Application note	http://www.st.com/resource/en/application_note/CD00164185.pdf
Application note	http://www.st.com/resource/en/application_note/CD00167594.pdf
Application note	http://www.st.com/resource/en/application_note/CD00200423.pdf
Application note	http://www.st.com/resource/en/application_note/CD00211314.pdf
Application note	http://www.st.com/resource/en/application_note/CD00249778.pdf
Application note	http://www.st.com/resource/en/application_note/CD00259245.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264321.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/DM00024853.pdf
Application note	http://www.st.com/resource/en/application_note/DM00032987.pdf
Application note	http://www.st.com/resource/en/application_note/DM00033267.pdf
Application note	http://www.st.com/resource/en/application_note/DM00033344.pdf
Application note	http://www.st.com/resource/en/application_note/DM00042534.pdf
Application note	http://www.st.com/resource/en/application_note/DM00052530.pdf
Application note	http://www.st.com/resource/en/application_note/DM00073742.pdf
Application note	http://www.st.com/resource/en/application_note/DM00080497.pdf
Application note	http://www.st.com/resource/en/application_note/DM00129215.pdf

Application note   http://www.st.com/resource/en/application_note/DM00160482.pdf

Application note   http://www.st.com/resource/en/application_note/DM00156964.pdf

Application note   http://www.st.com/resource/en/application_note/DM00209695.pdf

Application note   http://www.st.com/resource/en/application_note/DM00220769.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/DM00236305.pdf

Application note   http://www.st.com/resource/en/application_note/DM00296349.pdf

Application note   http://www.st.com/resource/en/application_note/DM00325582.pdf

Application note   http://www.st.com/resource/en/application_note/DM00327191.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/DM00395696.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