
STM32
CubeMX

1. Description

1.1. Project

Project Name	Clock_cpp
Board Name	custom
Generated with:	STM32CubeMX 6.2.1
Date	05/09/2021

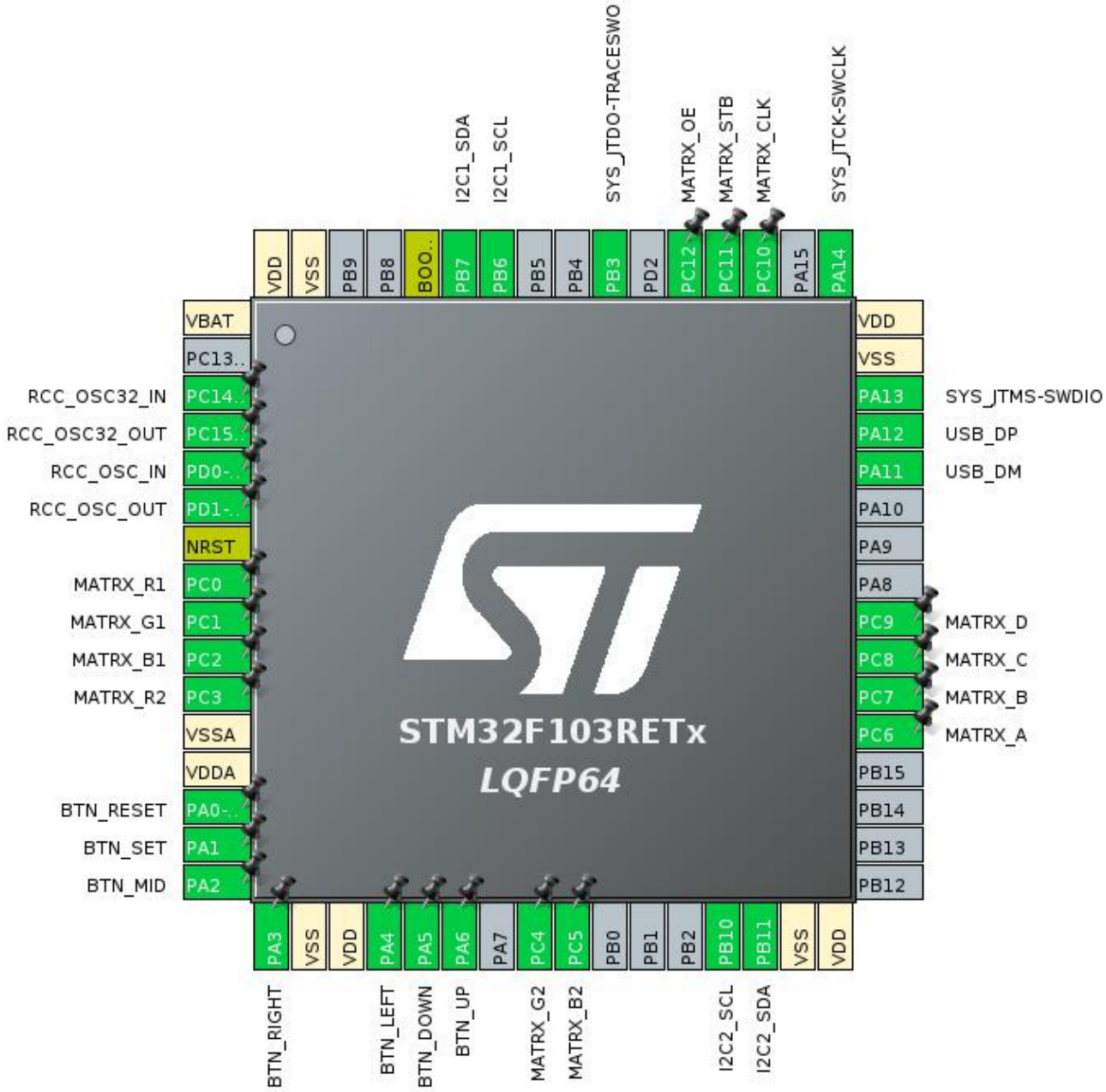
1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103RETx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	Arm Cortex-M3

2. Pinout Configuration



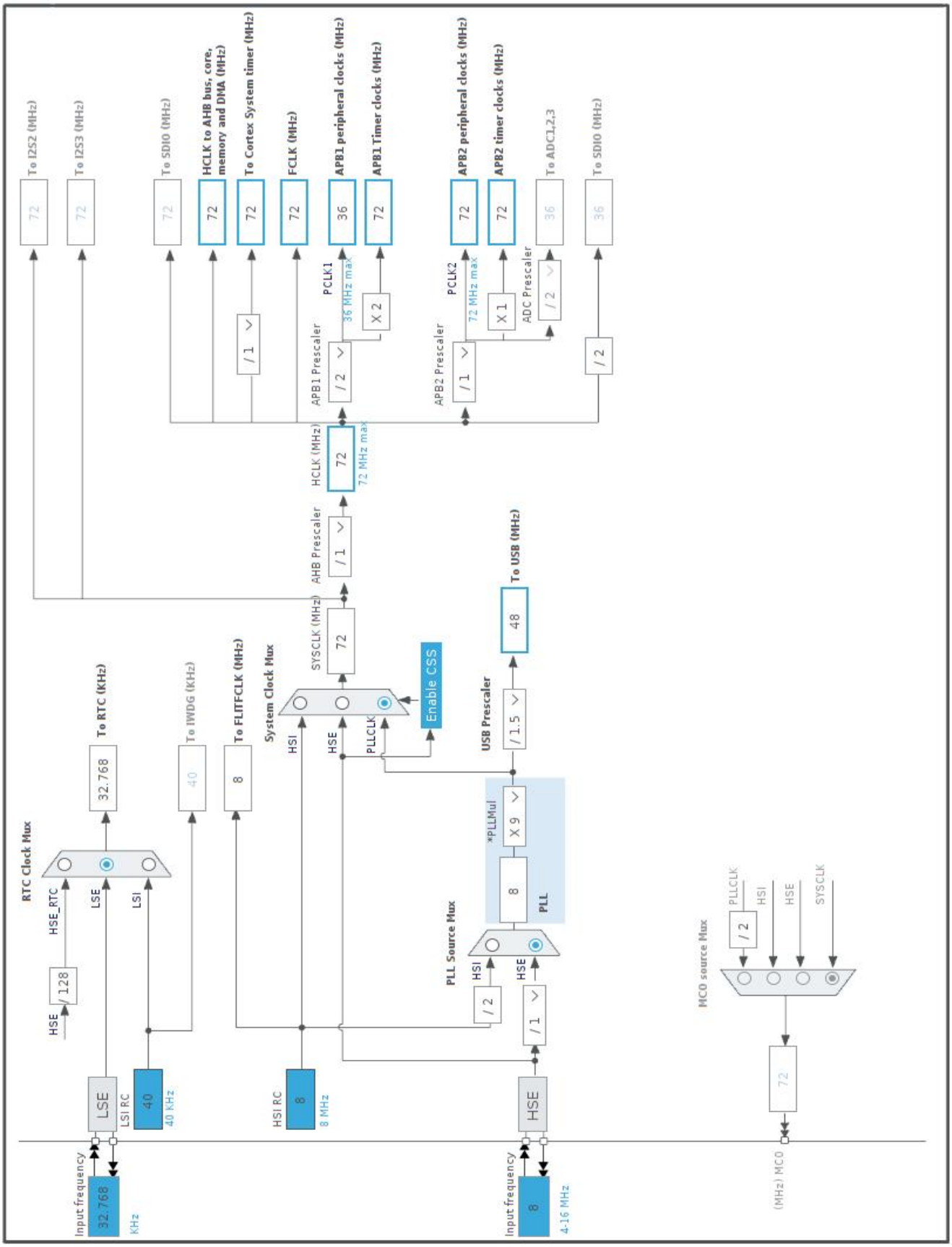
3. Pins Configuration

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		
8	PC0 *	I/O	GPIO_Output	MATRX_R1
9	PC1 *	I/O	GPIO_Output	MATRX_G1
10	PC2 *	I/O	GPIO_Output	MATRX_B1
11	PC3 *	I/O	GPIO_Output	MATRX_R2
12	VSSA	Power		
13	VDDA	Power		
14	PA0-WKUP	I/O	GPIO_EXTI0	BTN_RESET
15	PA1	I/O	GPIO_EXTI1	BTN_SET
16	PA2	I/O	GPIO_EXTI2	BTN_MID
17	PA3	I/O	GPIO_EXTI3	BTN_RIGHT
18	VSS	Power		
19	VDD	Power		
20	PA4	I/O	GPIO_EXTI4	BTN_LEFT
21	PA5	I/O	GPIO_EXTI5	BTN_DOWN
22	PA6	I/O	GPIO_EXTI6	BTN_UP
24	PC4 *	I/O	GPIO_Output	MATRX_G2
25	PC5 *	I/O	GPIO_Output	MATRX_B2
29	PB10	I/O	I2C2_SCL	
30	PB11	I/O	I2C2_SDA	
31	VSS	Power		
32	VDD	Power		
37	PC6 *	I/O	GPIO_Output	MATRX_A
38	PC7 *	I/O	GPIO_Output	MATRX_B
39	PC8 *	I/O	GPIO_Output	MATRX_C
40	PC9 *	I/O	GPIO_Output	MATRX_D
44	PA11	I/O	USB_DM	
45	PA12	I/O	USB_DP	
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VSS	Power		
48	VDD	Power		

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
49	PA14	I/O	SYS_JTCK-SWCLK	
51	PC10 *	I/O	GPIO_Output	MATRX_CLK
52	PC11 *	I/O	GPIO_Output	MATRX_STB
53	PC12 *	I/O	GPIO_Output	MATRX_OE
55	PB3	I/O	SYS_JTDO-TRACESWO	
58	PB6	I/O	I2C1_SCL	
59	PB7	I/O	I2C1_SDA	
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	Clock_cpp
Project Folder	/home/lex/STM32CubeIDE/Clock_cpp
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F1 V1.8.3
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	Peripheral Instance Name
1	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_RTC_Init	RTC
4	MX_USB_DEVICE_Init	USB_DEVICE
5	MX_I2C1_Init	I2C1
6	MX_I2C2_Init	I2C2
7	MX_TIM2_Init	TIM2
8	MX_TIM3_Init	TIM3
9	MX_TIM4_Init	TIM4

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103RETx
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

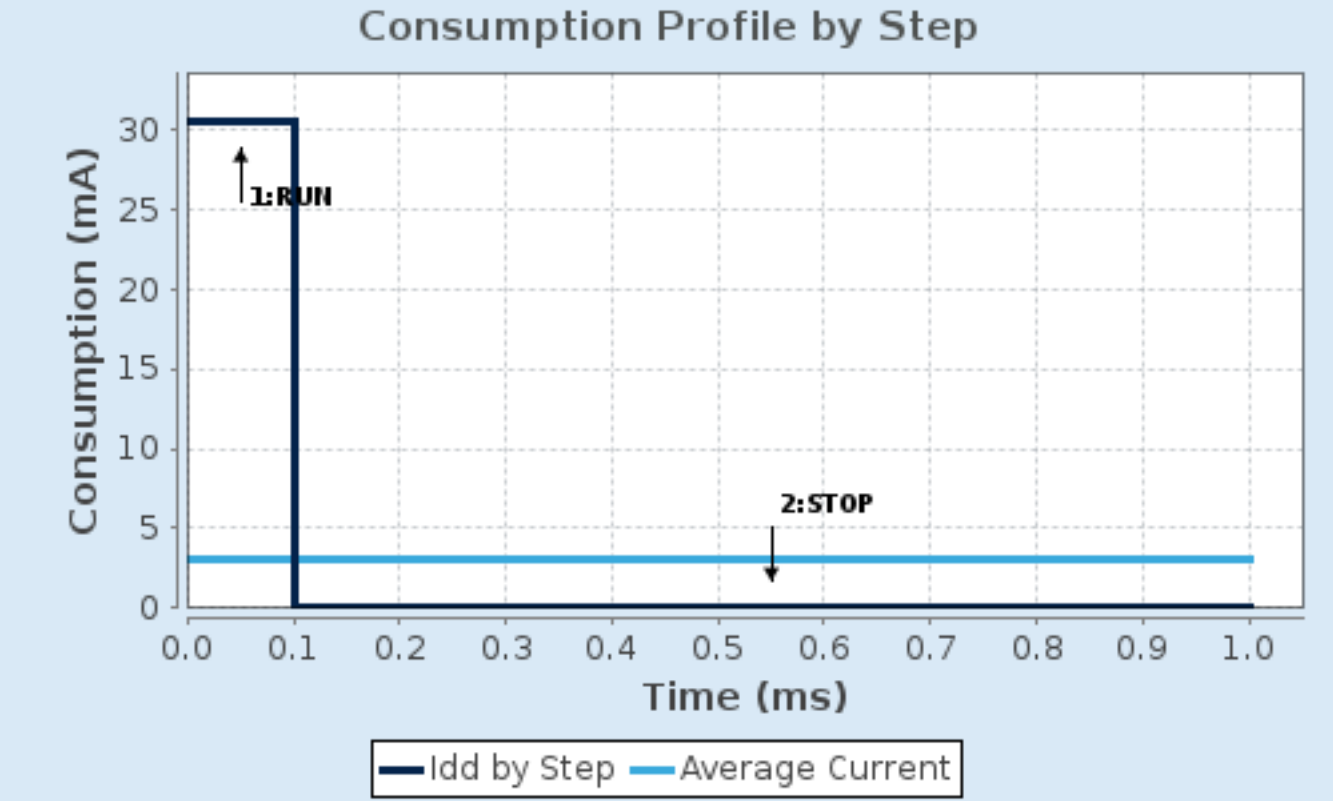
6.4. Sequence

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


Consumption Profile by Step
Consumption (mA)
30
25
20
15
10
5
0
1:RUN
2:STOP
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

7. Peripherals and Middlewares Configuration

7.1. I2C1

I2C: I2C

7.1.1. 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

7.2. I2C2

I2C: I2C

7.2.1. 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

7.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.3.1. 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

7.4. RTC

mode: Activate Clock Source

mode: Activate Calendar

7.4.1. Parameter Settings:

Calendar Time:

Data Format	**Binary data format ***
Hours	0
Minutes	0
Seconds	0

General:

Auto Predivider Calculation	Enabled
Asynchronous Predivider value	Automatic Predivider Calculation Enabled
Output	Alarm pulse signal on the TAMPER pin

Calendar Date:

Week Day	Monday
Month	January
Date	1
Year	0

7.5. SYS

Debug: Trace Asynchronous Sw

Timebase Source: SysTick

7.6. TIM2

Clock Source : Internal Clock

7.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**71 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**249 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

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. TIM3

Clock Source : Internal Clock

mode: One Pulse Mode

7.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**7200 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**20000 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

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. TIM4

mode: Clock Source

7.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**7200 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**5000 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.9. USB

mode: Device (FS)

7.9.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s

Power Parameters:

Low Power	**Enabled ***
Link Power Management	**Enabled ***
Battery Charging	Disabled

7.10. USB_DEVICE

Class For FS IP: Communication Device Class (Virtual Port Com)

7.10.1. Parameter Settings:

Basic Parameters:

USBD_MAX_NUM_INTERFACES (Maximum number of supported interfaces)	1
USBD_MAX_NUM_CONFIGURATION (Maximum number of supported configuration)	1
USBD_MAX_STR_DESC_SIZ (Maximum size for the string descriptors)	512
USBD_SELF_POWERED (Enabled self power)	Enabled
USBD_DEBUG_LEVEL (USBD Debug Level)	**3: All messages and internal debug messages are shown ***

Class Parameters:

USB CDC Rx Buffer Size	1000
USB CDC Tx Buffer Size	1000

7.10.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	STMicroelectronics

Device Descriptor FS:

PID (Product IDentifier)	22336

PRODUCT_STRING (Product Identifier)	STM32 Virtual ComPort
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	n/a	**High ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	n/a	**High ***	
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	n/a	**High ***	
	PB11	I2C2_SDA	Alternate Function Open Drain	n/a	**High ***	
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	
	PB3	SYS_JTDO-TRACESWO	n/a	n/a	n/a	
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PC0	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_R1
	PC1	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_G1
	PC2	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_B1
	PC3	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_R2
	PA0-WKUP	GPIO_EXTI0	**External Interrupt Mode with Rising/Falling edge**	**Pull-up ***	**n/a**	BTN_RESET
	PA1	GPIO_EXTI1	**External Interrupt Mode with Rising/Falling edge**	**Pull-up ***	**n/a**	BTN_SET
	PA2	GPIO_EXTI2	**External Interrupt Mode with**	**Pull-up ***	**n/a**	BTN_MID

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
			Rising/Falling edge			
	PA3	GPIO_EXTI3	**External Interrupt Mode with Rising/Falling edge**	**Pull-up ***	**n/a**	BTN_RIGHT
	PA4	GPIO_EXTI4	**External Interrupt Mode with Rising/Falling edge**	**Pull-up ***	**n/a**	BTN_LEFT
	PA5	GPIO_EXTI5	**External Interrupt Mode with Rising/Falling edge**	**Pull-up ***	**n/a**	BTN_DOWN
	PA6	GPIO_EXTI6	**External Interrupt Mode with Rising/Falling edge**	**Pull-up ***	**n/a**	BTN_UP
	PC4	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_G2
	PC5	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_B2
	PC6	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_A
	PC7	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_B
	PC8	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_C
	PC9	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_D
	PC10	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_CLK
	PC11	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_STB
	PC12	GPIO_Output	Output Push Pull	**Pull-down ***	**Medium ***	MATRX_OE

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
RTC global interrupt	true	1	0
EXTI line0 interrupt	true	0	0
EXTI line1 interrupt	true	0	0
EXTI line2 interrupt	true	0	0
EXTI line3 interrupt	true	0	0
EXTI line4 interrupt	true	0	0
USB high priority or CAN TX interrupts	true	0	0
USB low priority or CAN RX0 interrupts	true	0	0
EXTI line[9:5] interrupts	true	0	0
TIM2 global interrupt	true	0	0
TIM3 global interrupt	true	1	0
TIM4 global interrupt	true	1	0
I2C1 event interrupt	true	0	0
I2C1 error interrupt	true	0	0
I2C2 event interrupt	true	0	0
I2C2 error interrupt	true	0	0
RTC alarm interrupt through EXTI line 17	true	0	0
USB wake-up interrupt through EXTI line 18	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC 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

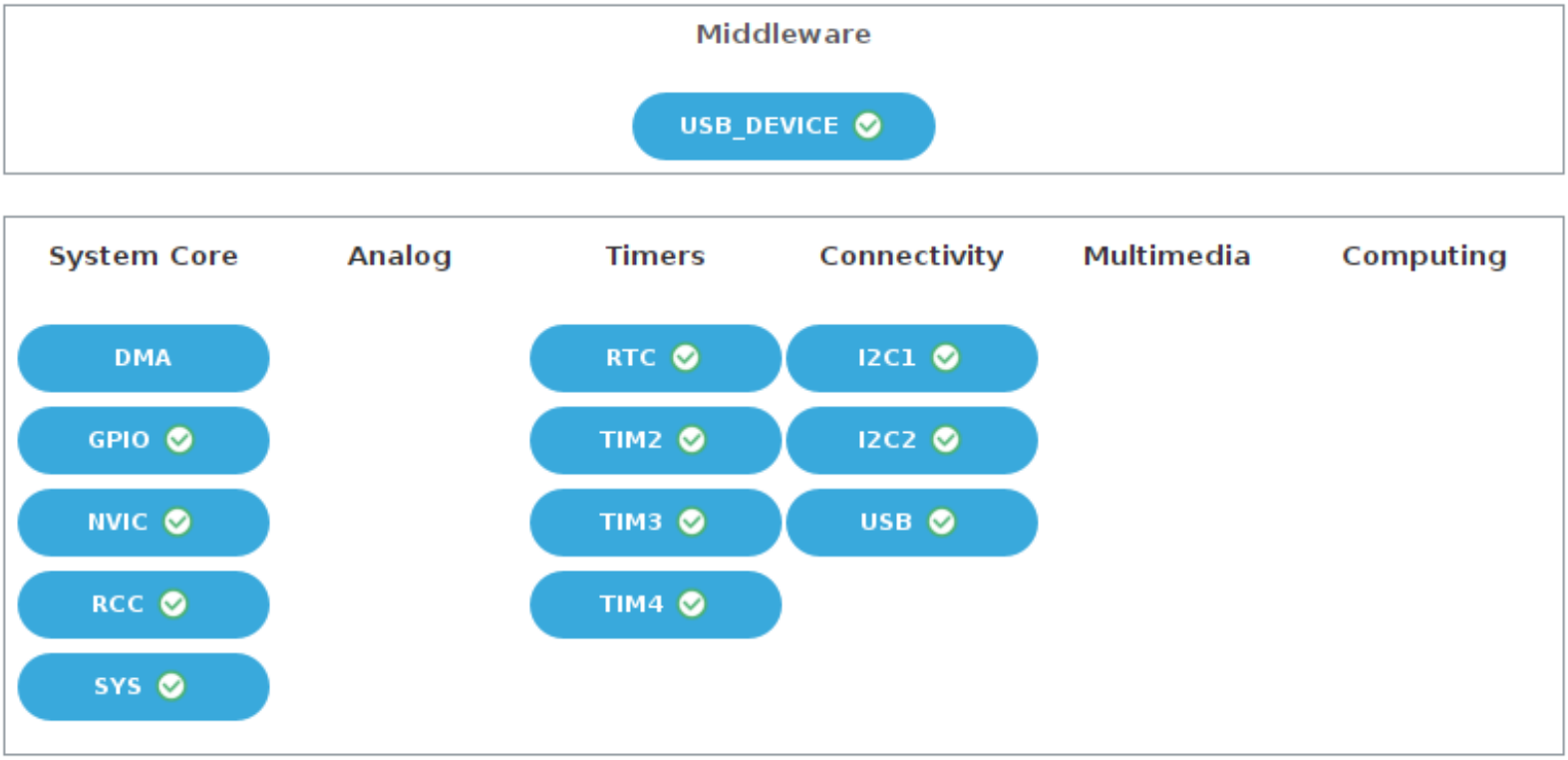
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Prefetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
RTC global interrupt	false	true	true
EXTI line0 interrupt	false	true	true
EXTI line1 interrupt	false	true	true
EXTI line2 interrupt	false	true	true
EXTI line3 interrupt	false	true	true
EXTI line4 interrupt	false	true	true
USB high priority or CAN TX interrupts	false	true	true
USB low priority or CAN RX0 interrupts	false	true	true
EXTI line[9:5] interrupts	false	true	true
TIM2 global interrupt	false	true	true
TIM3 global interrupt	false	true	true
TIM4 global interrupt	false	true	true
I2C1 event interrupt	false	true	true
I2C1 error interrupt	false	true	true
I2C2 event interrupt	false	true	true
I2C2 error interrupt	false	true	true
RTC alarm interrupt through EXTI line 17	false	true	true
USB wake-up interrupt through EXTI line 18	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/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
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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
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Application note	http://www.st.com/resource/en/application_note/DM00160482.pdf
Application note	http://www.st.com/resource/en/application_note/DM00156964.pdf
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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
Application note	http://www.st.com/resource/en/application_note/DM00725181.pdf