



1. Description

1.1. Project

Project Name	EVO_Main_STM32
Board Name	custom
Generated with:	STM32CubeMX 6.9.1
Date	10/24/2023

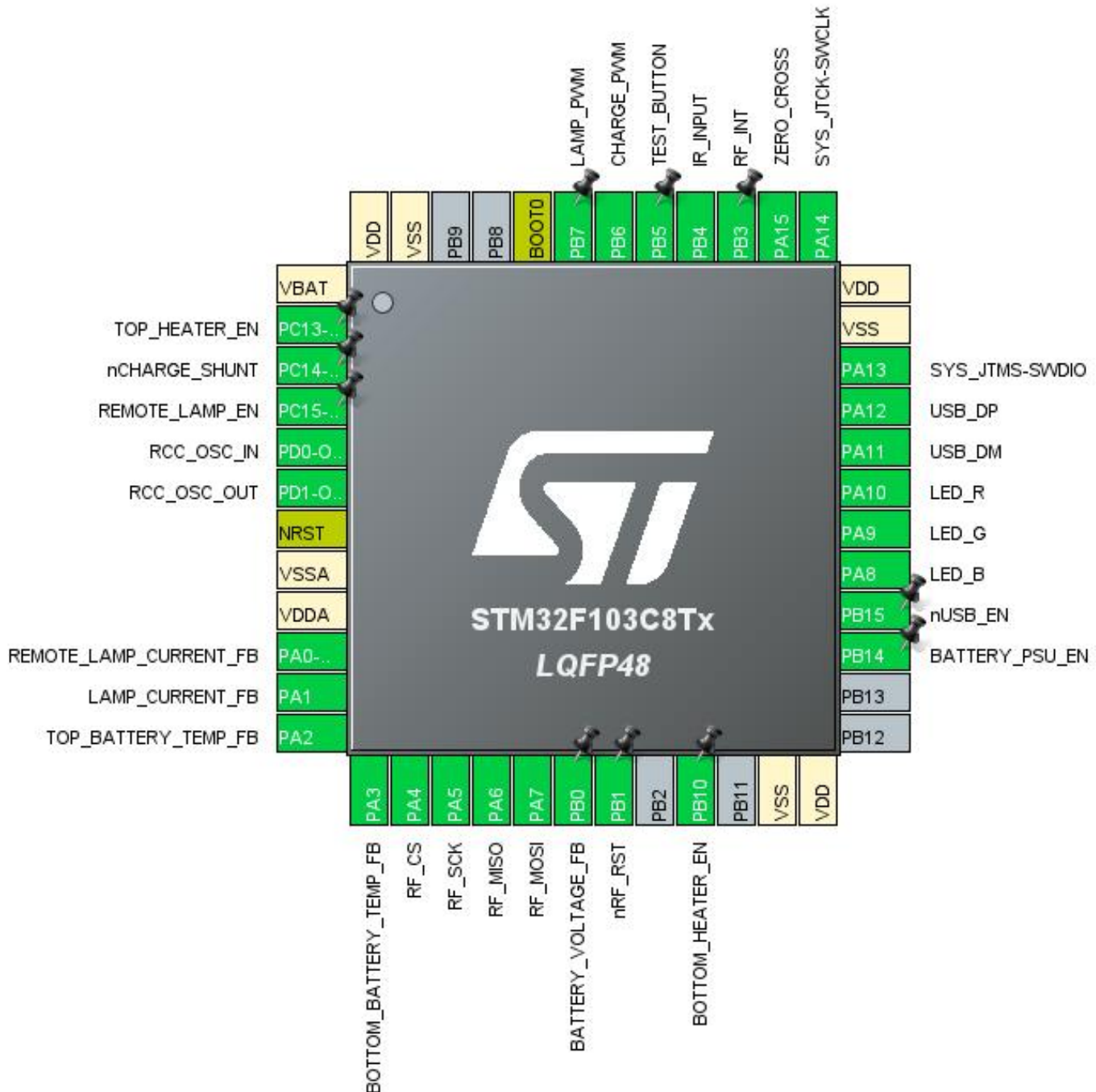
1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103C8Tx
MCU Package	LQFP48
MCU Pin number	48

1.3. Core(s) information

Core(s)	Arm Cortex-M3
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2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-TAMPER-RTC *	I/O	GPIO_Output	TOP_HEATER_EN
3	PC14-OSC32_IN *	I/O	GPIO_Output	nCHARGE_SHUNT
4	PC15-OSC32_OUT *	I/O	GPIO_Output	REMOTE_LAMP_EN
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
10	PA0-WKUP	I/O	ADC1_IN0	REMOTE_LAMP_CURREN T_FB
11	PA1	I/O	ADC1_IN1	LAMP_CURRENT_FB
12	PA2	I/O	ADC1_IN2	TOP_BATTERY_TEMP_FB
13	PA3	I/O	ADC1_IN3	BOTTOM_BATTERY_TEMP _FB
14	PA4	I/O	SPI1_NSS	RF_CS
15	PA5	I/O	SPI1_SCK	RF_SCK
16	PA6	I/O	SPI1_MISO	RF_MISO
17	PA7	I/O	SPI1_MOSI	RF_MOSI
18	PB0	I/O	ADC1_IN8	BATTERY_VOLTAGE_FB
19	PB1 *	I/O	GPIO_Output	nRF_RST
21	PB10 *	I/O	GPIO_Output	BOTTOM_HEATER_EN
23	VSS	Power		
24	VDD	Power		
27	PB14 *	I/O	GPIO_Output	BATTERY_PSU_EN
28	PB15 *	I/O	GPIO_Output	nUSB_EN
29	PA8	I/O	TIM1_CH1	LED_B
30	PA9	I/O	TIM1_CH2	LED_G
31	PA10	I/O	TIM1_CH3	LED_R
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
38	PA15	I/O	TIM2_CH1	ZERO_CROSS

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
39	PB3	I/O	GPIO_EXTI3	RF_INT
40	PB4	I/O	TIM3_CH1	IR_INPUT
41	PB5	I/O	GPIO_EXTI5	TEST_BUTTON
42	PB6	I/O	TIM4_CH1	CHARGE_PWM
43	PB7	I/O	TIM4_CH2	LAMP_PWM
44	BOOT0	Boot		
47	VSS	Power		
48	VDD	Power		

* The pin is affected with an I/O function

5. Software Project

5.1. Project Settings

Name	Value
Project Name	EVO_Main_STM32
Project Folder	C:\Nan work place\Projects\EVO\Firmware\EVO_Main_VerB_STM32
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F1 V1.8.5
Application Structure	Advanced
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	Yes
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	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_ADC1_Init	ADC1
4	MX_SPI1_Init	SPI1
5	MX_TIM1_Init	TIM1
6	MX_TIM2_Init	TIM2
7	MX_TIM3_Init	TIM3
8	MX_TIM4_Init	TIM4
9	MX_USB_DEVICE_Init	USB_DEVICE

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	DS5319_Rev17

1.2. Parameter Selection

Temperature	25
Vdd	3.3

1.3. 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

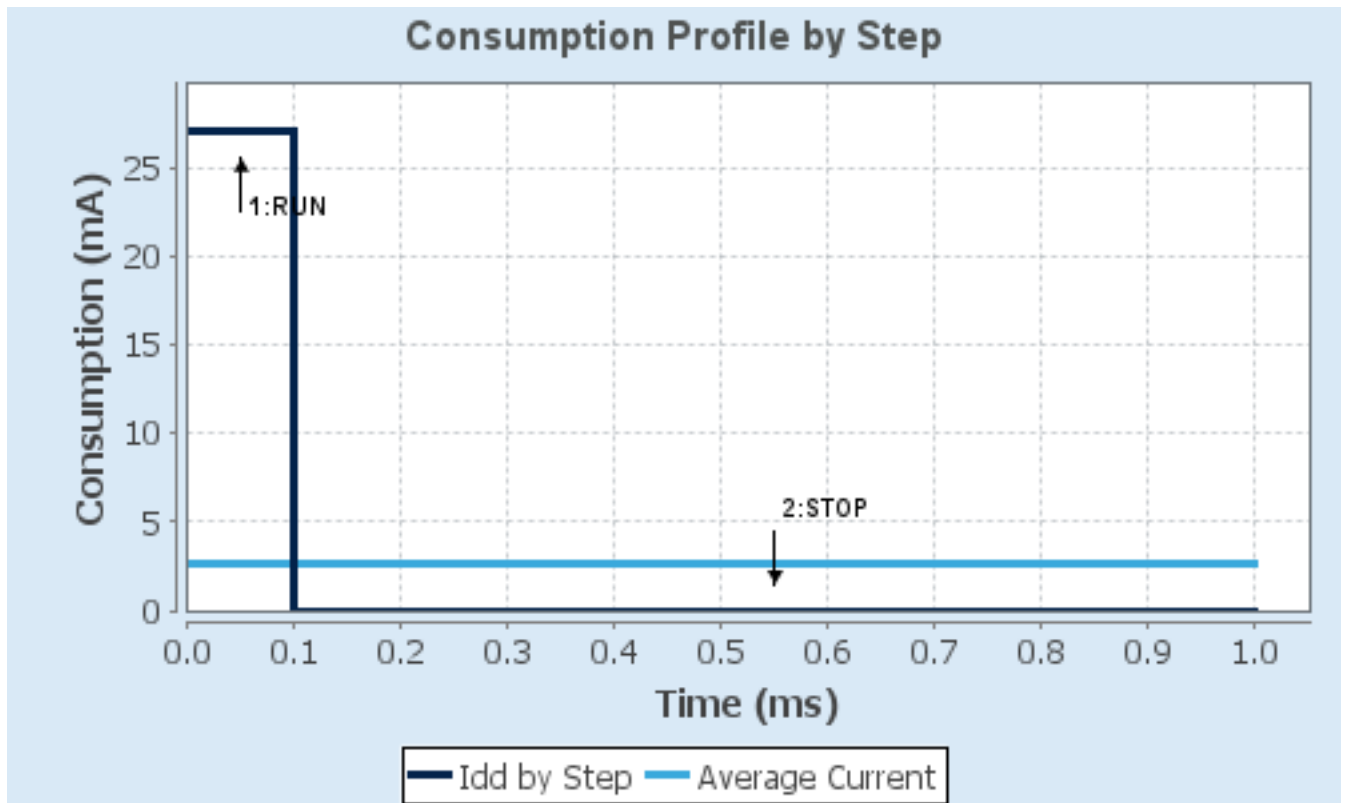
1.4. Sequence

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	27 mA	14 μ A
Duration	0.1 ms	0.9 ms
DMIPS	90.0	0.0
Ta Max	100.1	105
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	2.71 mA
Battery Life	1 month, 21 days, 17 hours	Average DMIPS	61.0 DMIPS

1.6. Chart



2. Peripherals and Middlewares Configuration

2.1. ADC1

mode: IN0

mode: IN1

mode: IN2

mode: IN3

mode: IN8

2.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Data Alignment Right alignment

Scan Conversion Mode Enabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode **Enabled ***

Number Of Discontinuous Conversions 1

ADC_Regular_ConversionMode:

Enable Regular Conversions Enable

Number Of Conversion **5 ***

External Trigger Conversion Source Regular Conversion launched by software

Rank 1

Channel Channel 0

Sampling Time **239.5 Cycles ***

Rank **2 ***

Channel **Channel 1 ***

Sampling Time **239.5 Cycles ***

Rank **3 ***

Channel **Channel 2 ***

Sampling Time **239.5 Cycles ***

Rank **4 ***

Channel **Channel 3 ***

Sampling Time **239.5 Cycles ***

Rank **5 ***

Channel **Channel 8 ***

Sampling Time **239.5 Cycles ***

ADC_Injected_ConversionMode:

Enable Injected Conversions Disable

WatchDog:

Enable Analog WatchDog Mode false

2.2. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

2.2.1. 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 Timeout Value (ms) 100
LSE Startup Timeout Value (ms) 5000

2.3. SPI1

Mode: Full-Duplex Master

Hardware NSS Signal: Hardware NSS Output Signal

2.3.1. Parameter Settings:

Basic Parameters:

Frame Format Motorola
Data Size 8 Bits
First Bit MSB First

Clock Parameters:

Prescaler (for Baud Rate) **8 ***
Baud Rate **9.0 MBits/s ***
Clock Polarity (CPOL) Low
Clock Phase (CPHA) 1 Edge

Advanced Parameters:

CRC Calculation Disabled
NSS Signal Type Output Hardware

2.4. SYS

Debug: Serial Wire

Timebase Source: SysTick

2.5. TIM1

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

2.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	17999 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	15 *
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
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)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Run Mode (OSSR)	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	Low *
CH Idle State	Set *

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0

Output compare preload	Disable *
Fast Mode	Disable
CH Polarity	Low *
CH Idle State	Set *
PWM Generation Channel 3:	
Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Disable *
Fast Mode	Disable
CH Polarity	Low *
CH Idle State	Set *

2.6. TIM2

Slave Mode: Reset Mode

Trigger Source: TI1FP1

Clock Source : Internal Clock

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

2.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	71 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	59999 *
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable
Slave Mode Controller	Reset Mode

Trigger Output (TRGO) Parameters:

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

Input Capture Channel 1:

Polarity Selection	Falling Edge *
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

Input Capture Channel 2:

Polarity Selection	Rising Edge
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IC Selection	Indirect
Prescaler Division Ratio	No division

2.7. TIM3

Slave Mode: Reset Mode

Trigger Source: TI1FP1

mode: Clock Source

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

2.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	71 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable
Slave Mode Controller	Reset Mode

Trigger Output (TRGO) Parameters:

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

Input Capture Channel 1:

Polarity Selection	Falling Edge *
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

Input Capture Channel 2:

Polarity Selection	Rising Edge
IC Selection	Indirect
Prescaler Division Ratio	No division

2.8. TIM4

mode: Clock Source

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

2.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	359 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	99 *
Internal Clock Division (CKD)	No Division
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)

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

2.9. USB

mode: Device (FS)

2.9.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s
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Power Parameters:

Low Power	Disabled
Link Power Management	Disabled
Battery Charging	Disabled

2.10. USB_DEVICE

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

2.10.1. 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)	0: No debug message

Class Parameters:

USB CDC Rx Buffer Size	1024
USB CDC Tx Buffer Size	1024

2.10.2. Device Descriptor:

Device Descriptor:

VID (Vendor Identifier)	0x483
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	STMicroelectronics

Device Descriptor FS:

PID (Product Identifier)	0x5740
PRODUCT_STRING (Product Identifier)	STM32 Virtual ComPort
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

* User modified value

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA0-WKUP	ADC1_IN0	Analog mode	n/a	n/a	REMOTE_LAMP_CURRE NT_FB
	PA1	ADC1_IN1	Analog mode	n/a	n/a	LAMP_CURRENT_FB
	PA2	ADC1_IN2	Analog mode	n/a	n/a	TOP_BATTERY_TEMP_F B
	PA3	ADC1_IN3	Analog mode	n/a	n/a	BOTTOM_BATTERY_TEM P_FB
	PB0	ADC1_IN8	Analog mode	n/a	n/a	BATTERY_VOLTAGE_FB
RCC	PD0- OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1- OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA4	SPI1_NSS	Alternate Function Push Pull	n/a	High *	RF_CS
	PA5	SPI1_SCK	Alternate Function Push Pull	n/a	High *	RF_SCK
	PA6	SPI1_MISO	Input mode	No pull-up and no pull-down	n/a	RF_MISO
	PA7	SPI1_MOSI	Alternate Function Push Pull	n/a	High *	RF_MOSI
SYS	PA13	SYS_JTMS- SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK- SWCLK	n/a	n/a	n/a	
TIM1	PA8	TIM1_CH1	Alternate Function Push Pull	n/a	High *	LED_B
	PA9	TIM1_CH2	Alternate Function Push Pull	n/a	High *	LED_G
	PA10	TIM1_CH3	Alternate Function Push Pull	n/a	High *	LED_R
TIM2	PA15	TIM2_CH1	Input mode	No pull-up and no pull-down	n/a	ZERO_CROSS
TIM3	PB4	TIM3_CH1	Input mode	No pull-up and no pull-down	n/a	IR_INPUT
TIM4	PB6	TIM4_CH1	Alternate Function Push Pull	n/a	Medium *	CHARGE_PWM
	PB7	TIM4_CH2	Alternate Function Push Pull	n/a	Medium *	LAMP_PWM
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PC13- TAMPER- RTC	GPIO_Output	Output Push Pull	Pull-down *	Low	TOP_HEATER_EN
	PC14- OSC32_IN	GPIO_Output	Output Push Pull	Pull-down *	Low	nCHARGE_SHUNT
	PC15- OSC32_OU T	GPIO_Output	Output Push Pull	Pull-down *	Low	REMOTE_LAMP_EN

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB1	GPIO_Output	Output Push Pull	Pull-up *	Medium *	nRF_RST
	PB10	GPIO_Output	Output Push Pull	Pull-down *	Low	BOTTOM_HEATER_EN
	PB14	GPIO_Output	Output Push Pull	Pull-down *	Low	BATTERY_PSU_EN
	PB15	GPIO_Output	Output Push Pull	Pull-up *	Low	nUSB_EN
	PB3	GPIO_EXTI3	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	RF_INT
	PB5	GPIO_EXTI5	External Interrupt Mode with Falling edge trigger detection	No pull-up and no pull-down	n/a	TEST_BUTTON

3.2. DMA configuration

nothing configured in DMA service

3.3. NVIC configuration

3.3.1. 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
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	2	0
TIM2 global interrupt	true	0	0
TIM3 global interrupt	true	0	0
SPI1 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
TIM1 break interrupt	unused		
TIM1 update interrupt	unused		
TIM1 trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
TIM4 global interrupt	unused		

3.3.2. 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

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
System tick timer	false	true	true
EXTI line3 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
SPI1 global interrupt	false	true	true

* User modified value

4. System Views

- 4.1. Category view
- 4.1.1. Current

Middleware

USB_DEVICE ✓

System Core

DMA

GPIO ✓

IVIC ✓

RCC ✓

SYS ✓

Analog

ADC1 ✓

Timers

TIM1 ✓

TIM2 ✓

TIM3 ✓

TIM4 ✓

Connectivity

SPI1 ✓

USB ✓

Computing

5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32f1_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f1_svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Brochures	https://www.st.com/resource/en/brochure/breveco0518.pdf
Brochures	https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstmcsuite.pdf
Flyers	https://www.st.com/resource/en/flyer/fldpstpfc11120.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/1239988349.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/stm32_authentication_can.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2586-getting-started-with-stm32f10xxx-hardware-development-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2604-stm32f101xx-

and-stm32f103xx-rtc-calibration-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2834-how-to-get-the-best-adc-accuracy-in-stm32-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2945-stm8s-and-stm32-mcus-a-consistent-832bit-product-line-for-painless-migration-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3070-managing-the-driver-enable-signal-for-rs485-and-iolink-communications-with-the-stm32s-usart-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3095-stevalisv002v1-stevalisv002v2-3-kw-gridconnected-pv-system-based-on-the-stm32f103xx-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3108-stlm75-firmware-library-for-the-stm32f10x-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3128-stm32-embedded-graphic-objectstouchscreen-library-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3155-usart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3156-usb-dfu-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3364-migration-and-compatibility-guidelines-for-stm32-microcontroller-applications-stmicroelectronics.pdf

- Application Notes https://www.st.com/resource/en/application_note/an3422-migration-of-microcontroller-applications-from-stm32f1-to-stm32l1-series-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3427-migrating-a-microcontroller-application-from-stm32f1-to-stm32f2-series-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3429-stm32-proprietary-code-protection-overview-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3961-stevalime003v1-demonstration-board-based-on-the-sthv748-ultrasound-pulser-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4070-250-w-grid-connected-microinverter-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4076-two-or-three-shunt-resistor-based-current-sensing-circuit-design-in-3phase-inverters-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4088-migrating-between-stm32f1-and-stm32f0-series-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4228-migrating-from-stm32f1-series-to-stm32f3-series-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4229-how-to-implement-a-vocoder-solution-using-stm32-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4566-extending-the-dac-performance-of-stm32-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4649-migrating-from-stm32f1-series-to-stm32l4-series--stm32l4-series-microntrrollers-stmicroelectronics.pdf

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