
STM32
CubeMX

1. Description

1.1. Project

Project Name	DigitalPowerNew
Board Name	custom
Generated with:	STM32CubeMX 6.9.1
Date	02/11/2025

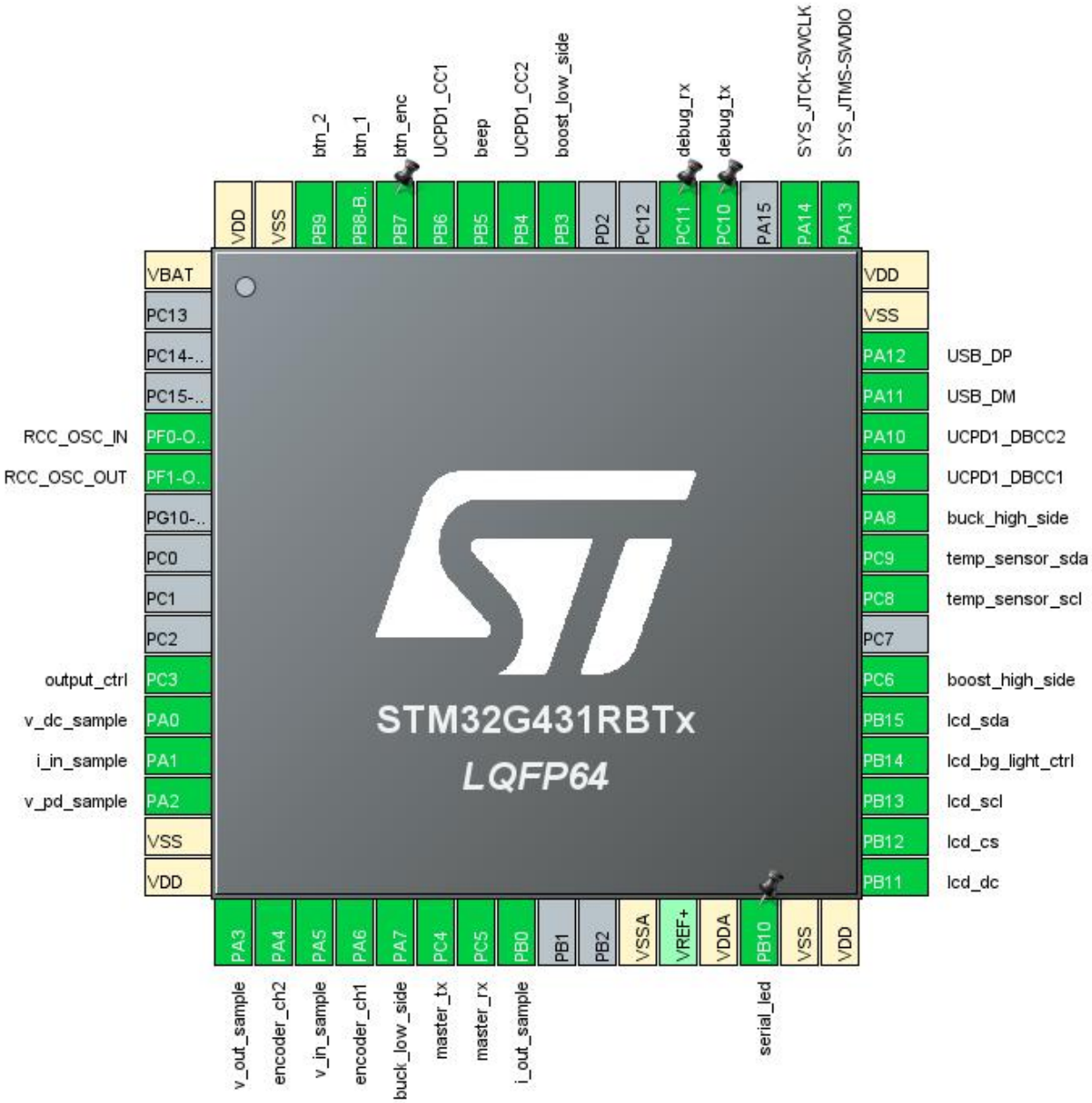
1.2. MCU

MCU Series	STM32G4
MCU Line	STM32G4x1
MCU name	STM32G431RBTx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	ARM Cortex-M4

2. Pinout Configuration



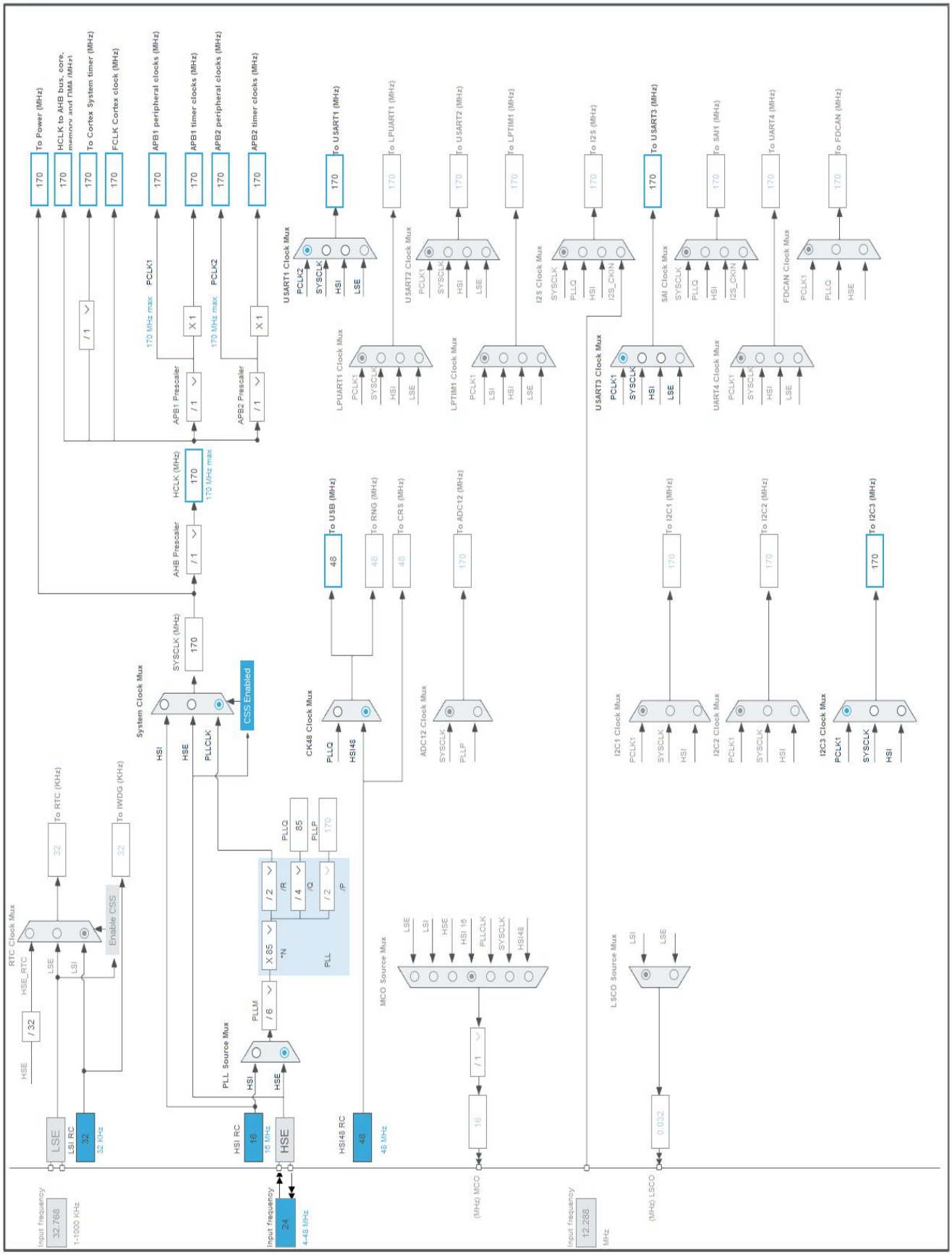
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
5	PF0-OSC_IN	I/O	RCC_OSC_IN	
6	PF1-OSC_OUT	I/O	RCC_OSC_OUT	
11	PC3 *	I/O	GPIO_Output	output_ctrl
12	PA0	I/O	ADC1_IN1	v_dc_sample
13	PA1	I/O	OPAMP3_VINP, COMP1_INP	i_in_sample
14	PA2	I/O	ADC1_IN3	v_pd_sample
15	VSS	Power		
16	VDD	Power		
17	PA3	I/O	OPAMP1_VINP, COMP2_INP	v_out_sample
18	PA4	I/O	TIM3_CH2	encoder_ch2
19	PA5	I/O	ADC2_IN13	v_in_sample
20	PA6	I/O	TIM3_CH1	encoder_ch1
21	PA7	I/O	TIM1_CH1N	buck_low_side
22	PC4	I/O	USART1_TX	master_tx
23	PC5	I/O	USART1_RX	master_rx
24	PB0	I/O	OPAMP2_VINP, COMP4_INP	i_out_sample
27	VSSA	Power		
29	VDDA	Power		
30	PB10	I/O	TIM2_CH3	serial_led
31	VSS	Power		
32	VDD	Power		
33	PB11 *	I/O	GPIO_Output	lcd_dc
34	PB12	I/O	SPI2_NSS	lcd_cs
35	PB13	I/O	SPI2_SCK	lcd_scl
36	PB14	I/O	TIM15_CH1	lcd_bg_light_ctrl
37	PB15	I/O	SPI2_MOSI	lcd_sda
38	PC6	I/O	TIM8_CH1	boost_high_side
40	PC8	I/O	I2C3_SCL	temp_sensor_scl
41	PC9	I/O	I2C3_SDA	temp_sensor_sda
42	PA8	I/O	TIM1_CH1	buck_high_side
43	PA9	I/O	UCPD1_DBCC1	
44	PA10	I/O	UCPD1_DBCC2	

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
45	PA11	I/O	USB_DM	
46	PA12	I/O	USB_DP	
47	VSS	Power		
48	VDD	Power		
49	PA13	I/O	SYS_JTMS-SWDIO	
50	PA14	I/O	SYS_JTCK-SWCLK	
52	PC10	I/O	USART3_TX	debug_tx
53	PC11	I/O	USART3_RX	debug_rx
56	PB3	I/O	TIM8_CH1N	boost_low_side
57	PB4	I/O	UCPD1_CC2	
58	PB5	I/O	TIM17_CH1	beep
59	PB6	I/O	UCPD1_CC1	
60	PB7	I/O	GPIO_EXTI7	btn_enc
61	PB8-BOOT0 *	I/O	GPIO_Input	btn_1
62	PB9 *	I/O	GPIO_Input	btn_2
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	DigitalPowerNew
Project Folder	C:\Users\CHALLENGER\Documents\KeXieData\Project\DigitalPowerNew
Toolchain / IDE	MDK-ARM V5.32
Firmware Package Name and Version	STM32Cube FW_G4 V1.5.2
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 all used libraries into the project folder
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	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_DMA_Init	DMA
4	MX_ADC1_Init	ADC1
5	MX_ADC2_Init	ADC2
6	MX_COMP1_Init	COMP1
7	MX_COMP2_Init	COMP2
8	MX_COMP4_Init	COMP4
9	MX_DAC1_Init	DAC1
10	MX_DAC3_Init	DAC3
11	MX_I2C3_Init	I2C3

Rank	Function Name	Peripheral Instance Name
12	MX_OPAMP1_Init	OPAMP1
13	MX_OPAMP2_Init	OPAMP2
14	MX_OPAMP3_Init	OPAMP3
15	MX_SPI2_Init	SPI2
16	MX_TIM1_Init	TIM1
17	MX_TIM2_Init	TIM2
18	MX_TIM3_Init	TIM3
19	MX_TIM8_Init	TIM8
20	MX_TIM15_Init	TIM15
21	MX_TIM17_Init	TIM17
22	MX_UCPD1_Init	UCPD1
23	MX_USART1_UART_Init	USART1
24	MX_USART3_UART_Init	USART3
25	MX_USBPD_Init	USBPD
26	MX_USB_Device_Init	USB_DEVICE

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32G4
Line	STM32G4x1
MCU	STM32G431RBTx
Datasheet	DS12589_Rev0

1.2. Parameter Selection

Temperature	25
Vdd	3.0

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

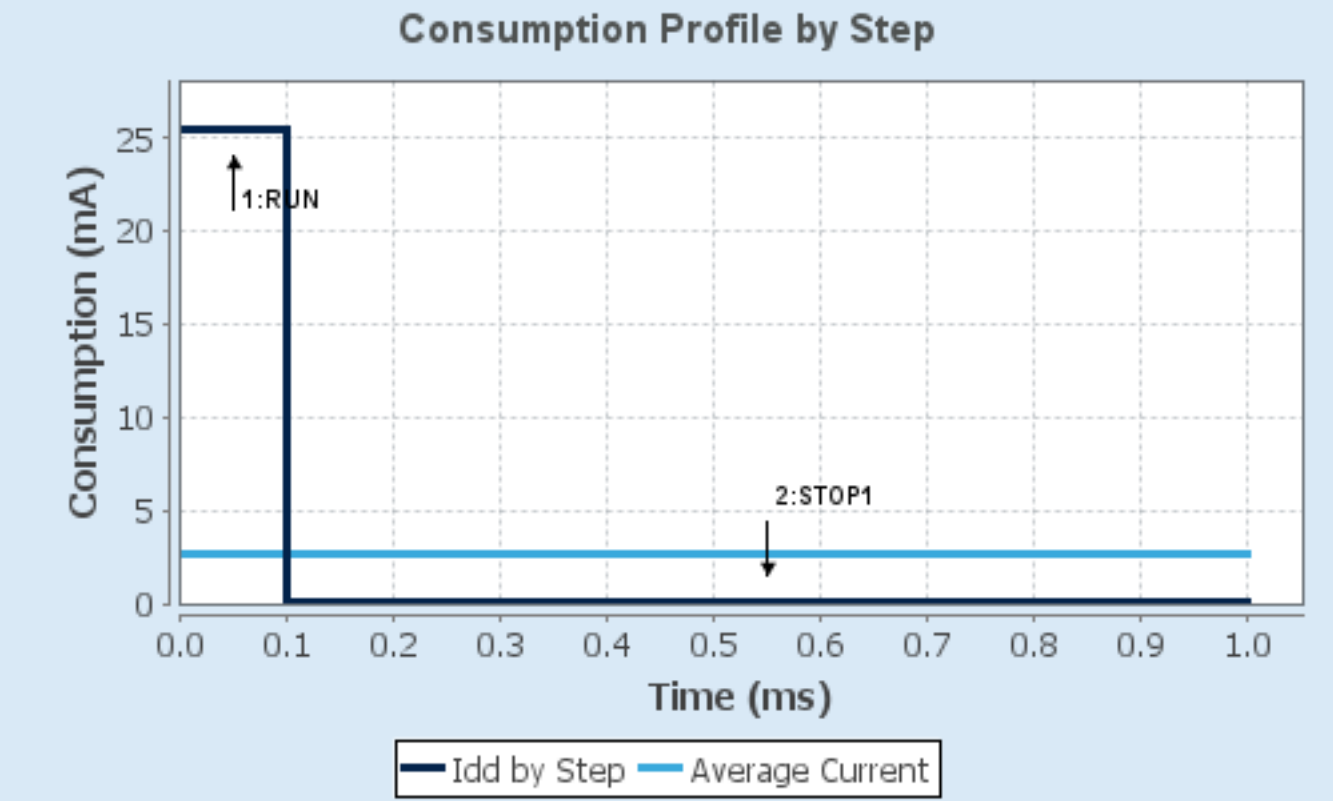
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP1
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-Boost	NoRange
Fetch Type	FLASH/ART	NA
CPU Frequency	170 MHz	0 Hz
Clock Configuration	HSE BYP PLL	ALL CLOCKS OFF
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	25.5 mA	59 µA
Duration	0.1 ms	0.9 ms
DMIPS	213.0	0.0
Ta Max	125.03	129.99
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	2.6 mA
Battery Life	1 month, 23 days, 22 hours	Average DMIPS	212.5 DMIPS

1.6. Chart


Consumption Profile by Step
Consumption (mA)
25
20
15
10
5
0
1:RUN
2:STOP1
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

2. Peripherals and Middlewares Configuration

2.1. ADC1

IN1: IN1 Single-ended

IN3: IN3 Single-ended

mode: VOPAMP1 Channel

2.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	Synchronous clock mode divided by 4
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Gain Compensation	0
Scan Conversion Mode	Disabled
End Of Conversion Selection	End of single conversion
Low Power Auto Wait	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
Overrun behaviour	Overrun data preserved

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Enable Regular Oversampling	Disable
Number Of Conversion	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	**Channel Vopamp1 ***
Sampling Time	2.5 Cycles
Offset Number	No offset

ADC_Injected_ConversionMode:

Enable Injected Conversions	Disable

Analog Watchdog 1:

Enable Analog WatchDog1 Mode	false

Analog Watchdog 2:

Enable Analog WatchDog2 Mode	false

Analog Watchdog 3:

Enable Analog WatchDog3 Mode	false

2.2. ADC2

IN13: IN13 Single-ended

mode: VOPAMP2 Channel

mode: VOPAMP3 Channel

2.2.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	Synchronous clock mode divided by 4
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Gain Compensation	0
Scan Conversion Mode	Disabled
End Of Conversion Selection	End of single conversion
Low Power Auto Wait	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
Overrun behaviour	Overrun data preserved

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Enable Regular Oversampling	Disable
Number Of Conversion	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	**Channel Vopamp2 ***
Sampling Time	2.5 Cycles
Offset Number	No offset

ADC_Injected_ConversionMode:

Enable Injected Conversions	Disable

Analog Watchdog 1:

Enable Analog WatchDog1 Mode	false

Analog Watchdog 2:

Enable Analog WatchDog2 Mode	false

Analog Watchdog 3:

Enable Analog WatchDog3 Mode	false

2.3. COMP1

mode: Input [+]

Input [-]: DAC1 OUT1

2.3.1. Parameter Settings:

Basic Parameters:

Trigger Mode	None
Hysteresis Level	None

Output Configuration:

Blanking Source	None
Output Polarity	COMP output on GPIO isn't inverted

2.4. COMP2

mode: Input [+]

Input [-]: DAC1 OUT2

2.4.1. Parameter Settings:

Basic Parameters:

Trigger Mode	None
Hysteresis Level	None

Output Configuration:

Blanking Source	None
Output Polarity	COMP output on GPIO isn't inverted

2.5. COMP4

mode: Input [+]

Input [-]: DAC3 OUT2

2.5.1. Parameter Settings:

Basic Parameters:

Trigger Mode	None
Hysteresis Level	None

Output Configuration:

Blanking Source	None

Output Polarity	COMP output on GPIO isn't inverted

2.6. DAC1

OUT1 mode: OUT1 Connected to on chip-peripherals only

OUT2 mode: OUT2 Connected to on chip-peripherals only

2.6.1. Parameter Settings:

DAC Out1 Settings:

Mode selected	Normal Mode
Output Buffer	Disable
DAC High Frequency	Mode Automatic
DMA Double Data	Disable
Signed Format	Disable
Trigger	None
Trigger2	None
User Trimming	Factory trimming

DAC Out2 Settings:

Mode selected	Normal Mode
Output Buffer	Disable
DAC High Frequency	Mode Automatic
DMA Double Data	Disable
Signed Format	Disable
Trigger	None
Trigger2	None
User Trimming	Factory trimming

2.7. DAC3

mode: OUT2 mode

2.7.1. Parameter Settings:

DAC Out2 Settings:

Mode selected	Normal Mode
Output Buffer	Disable
DAC High Frequency	Mode Automatic
DMA Double Data	Disable
Signed Format	Disable
Trigger	None
Trigger2	None

User Trimming	Factory trimming

2.8. I2C3

I2C: I2C

2.8.1. Parameter Settings:

Timing configuration:

Custom Timing	Disabled
I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	**0x30A0A7FB ***

Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

2.9. OPAMP1

Mode: PGA Internally Connected

2.9.1. Parameter Settings:

Basic Parameters:

Power Mode	Normal
PGA Gain	2 or -1
User Trimming	Disable

2.10. OPAMP2

Mode: PGA Internally Connected

2.10.1. Parameter Settings:

Basic Parameters:

Power Mode	Normal
PGA Gain	2 or -1
User Trimming	Disable

2.11. OPAMP3

Mode: PGA Internally Connected

2.11.1. Parameter Settings:

Basic Parameters:

Power Mode	Normal
PGA Gain	2 or -1
User Trimming	Disable

2.12. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

2.12.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
Data Cache	Enabled
Flash Latency(WS)	4 WS (5 CPU cycle)

RCC Parameters:

HSI Calibration Value	64
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1 boost

Peripherals Clock Configuration:

Generate the peripherals clock configuration	TRUE

2.13. SPI2

Mode: Transmit Only Master

Hardware NSS Signal: Hardware NSS Output Signal

2.13.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**8 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**4 ***
Baud Rate	**42.5 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Output Hardware

2.14. SYS

Debug: Serial Wire

Timebase Source: TIM7

mode: save power of non-active UCPD - deactive Dead Battery pull-up

2.15. TIM1

Channel1: Output Compare CH1 CH1N

2.15.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 16 bits value)	0
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection TRGO	Reset (UG bit from TIMx_EGR)
Trigger Event Selection TRGO2	Reset (UG bit from TIMx_EGR)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High
BRK Filter (4 bits value)	0
BRK Sources Configuration	
- Digital Input	Disable
- COMP1	Disable
- COMP2	Disable
- COMP3	Disable
- COMP4	Disable

Break And Dead Time management - BRK2 Configuration:

BRK2 State	Disable
BRK2 Polarity	High
BRK2 Filter (4 bits value)	0
BRK2 Sources Configuration	
- Digital Input	Disable
- COMP1	Disable
- COMP2	Disable
- COMP3	Disable
- COMP4	Disable

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
DeadTime Preload	Disable
Dead Time	0
Asymmetrical DeadTime	Disable
Falling Dead Time	0

Clear Input:

Clear Input Source	Disable

Output Compare Channel 1 and 1N:

Mode	Frozen (used for Timing base)
Pulse (16 bits value)	0
Output compare preload	Disable
CH Polarity	High
CHN Polarity	High
CH Idle State	Reset
CHN Idle State	Reset

2.16. TIM2

Channel3: PWM Generation CH3

2.16.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 32 bits value)	4294967295
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 TRGO	Reset (UG bit from TIMx_EGR)

Clear Input:

Clear Input Source	Disable

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

2.17. TIM3

Combined Channels: Encoder Mode

2.17.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	65535
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 TRGO	Reset (UG bit from TIMx_EGR)

Encoder:

Encoder Mode	Encoder Mode TI1
Slave Mode Preload Activation	Disable
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

2.18. TIM8

Channel1: Output Compare CH1 CH1N

2.18.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 16 bits value)	0
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection TRGO	Reset (UG bit from TIMx_EGR)
Trigger Event Selection TRGO2	Reset (UG bit from TIMx_EGR)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High
BRK Filter (4 bits value)	0
BRK Sources Configuration	
- Digital Input	Disable
- COMP1	Disable
- COMP2	Disable
- COMP3	Disable

- COMP4	Disable

Break And Dead Time management - BRK2 Configuration:

BRK2 State	Disable
BRK2 Polarity	High
BRK2 Filter (4 bits value)	0
BRK2 Sources Configuration	
- Digital Input	Disable
- COMP1	Disable
- COMP2	Disable
- COMP3	Disable
- COMP4	Disable

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
DeadTime Preload	Disable
Dead Time	0
Asymmetrical DeadTime	Disable
Falling Dead Time	0

Clear Input:

Clear Input Source	Disable

Output Compare Channel 1 and 1N:

Mode	Frozen (used for Timing base)
Pulse (16 bits value)	0
Output compare preload	Disable
CH Polarity	High
CHN Polarity	High
CH Idle State	Reset
CHN Idle State	Reset

2.19. TIM15

Channel1: PWM Generation CH1

2.19.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	65535

Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
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)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High
BRK Filter (4 bits value)	0
BRK Sources Configuration	
- Digital Input	Disable
- COMP1	Disable
- COMP2	Disable
- COMP3	Disable
- COMP4	Disable

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	High
CH Idle State	Reset

2.20. TIM17

mode: Activated

Channel1: Output Compare CH1

2.20.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division

Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	Disable

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High
BRK Filter (4 bits value)	0
BRK Sources Configuration	
- Digital Input	Disable
- COMP1	Disable
- COMP2	Disable
- COMP3	Disable
- COMP4	Disable

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

Output Compare Channel 1:

Mode	Frozen (used for Timing base)
Pulse (16 bits value)	0
Output compare preload	Disable
CH Polarity	High
CH Idle State	Reset

2.21. UCPD1

UCPD Mode: Sink

mode: Dead Battery Signals

2.21.1. Parameter Settings:

Version	1.0

2.22. USART1

Mode: Asynchronous

2.22.1. 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
ClockPrescaler	1
Fifo Mode	Disable
Txfifo Threshold	1 eighth full configuration
Rxfifo Threshold	1 eighth full configuration

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

2.23. USART3

Mode: Asynchronous

2.23.1. 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
ClockPrescaler	1
Fifo Mode	Disable
Txfifo Threshold	1 eighth full configuration
Rxfifo Threshold	1 eighth full configuration

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

2.24. USB
mode: Device (FS)
2.24.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s
Physical interface	Internal Phy
Sof Enable	Disabled

Power Parameters:

Low Power	Disabled
Link Power Management	Disabled
Battery Charging	Disabled

2.25. FREERTOS
Interface: CMSIS_V2
2.25.1. Config parameters:

API:

FreeRTOS API	CMSIS v2

Versions:

FreeRTOS version	10.3.1
CMSIS-RTOS version	2.00

MPU/FPU:

ENABLE_MPU	Disabled
ENABLE_FPU	Disabled

Kernel settings:

USE_PREEMPTION	Enabled
CPU_CLOCK_HZ	SystemCoreClock
TICK_RATE_HZ	1000
MAX_PRIORITIES	56

MINIMAL_STACK_SIZE	128
MAX_TASK_NAME_LEN	16
USE_16_BIT_TICKS	Disabled
IDLE_SHOULD_YIELD	Enabled
USE_MUTEXES	Enabled
USE_RECURSIVE_MUTEXES	Enabled
USE_COUNTING_SEMAPHORES	Enabled
QUEUE_REGISTRY_SIZE	8
USE_APPLICATION_TASK_TAG	Disabled
ENABLE_BACKWARD_COMPATIBILITY	Enabled
USE_PORT_OPTIMISED_TASK_SELECTION	Disabled
USE_TICKLESS_IDLE	Disabled
USE_TASK_NOTIFICATIONS	Enabled
RECORD_STACK_HIGH_ADDRESS	Disabled

Memory management settings:

Memory Allocation	Dynamic / Static
TOTAL_HEAP_SIZE	3072
Memory Management scheme	heap_4

Hook function related definitions:

USE_IDLE_HOOK	Disabled
USE_TICK_HOOK	Disabled
USE_MALLOC_FAILED_HOOK	Disabled
USE_DAEMON_TASK_STARTUP_HOOK	Disabled
CHECK_FOR_STACK_OVERFLOW	Disabled

Run time and task stats gathering related definitions:

GENERATE_RUN_TIME_STATS	Disabled
USE_TRACE_FACILITY	Enabled
USE_STATS_FORMATTING_FUNCTIONS	Disabled

Co-routine related definitions:

USE_CO_ROUTINES	Disabled
MAX_CO_ROUTINE_PRIORITIES	2

Software timer definitions:

USE_TIMERS	Enabled
TIMER_TASK_PRIORITY	2
TIMER_QUEUE_LENGTH	10
TIMER_TASK_STACK_DEPTH	256

Interrupt nesting behaviour configuration:

LIBRARY_LOWEST_INTERRUPT_PRIORITY	15
LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY	5

Added with 10.2.1 support:

MESSAGE_BUFFER_LENGTH_TYPE	size_t
USE_POSIX_ERRNO	Disabled

CMSIS-RTOS V2 flags:

USE_OS2_THREAD_SUSPEND_RESUME	Enabled
USE_OS2_THREAD_ENUMERATE	Enabled
USE_OS2_EVENTFLAGS_FROM_ISR	Enabled
USE_OS2_THREAD_FLAGS	Enabled
USE_OS2_TIMER	Enabled
USE_OS2_MUTEX	Enabled

2.25.2. Include parameters:

Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled
vTaskDelete	Enabled
vTaskCleanUpResources	Disabled
vTaskSuspend	Enabled
vTaskDelayUntil	Enabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Enabled
xSemaphoreGetMutexHolder	Disabled
pcTaskGetTaskName	Disabled
uxTaskGetStackHighWaterMark	Enabled
xTaskGetCurrentTaskHandle	Enabled
eTaskGetState	Enabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Enabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled
uxTaskGetStackHighWaterMark2	Disabled

2.25.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT	Disabled

Project settings (see parameter description first):

Use FW pack heap file	Enabled

2.26. USBPD
mode: Port Configuration
Stack Configuration: Full Stack
Timer service Source: TIM4

2.26.1. Parameter Settings:

USBPD Versions:

Core	3.3.0
Device	5.0.0

USBPD needs:

USBPD request UCPD1 NVIC	enabled
USBPD request UCPD1 DMA	enabled

2.26.2. DPM Core Parameters:

USB IF and Manufacturer ID:

Vendor ID	0x0483
Product ID	0x0002
XID	0xF0000003

2.26.3. PDO Sink:

Number of PDO Sink:

Number of PDO to define	1

Generic Source Parameters:

Fast Role Swap	Not supported
Dual-Role Data	Supported
USB Communication Capable	Not supported
Unconstrained Power	Not supported
Higher Capability	Not supported
Dual Role Power	Not supported

PDO 0:

PDO type	Fixed Supply (Vmin=Vmax)
Voltage (mV)	5000
Current (mA)	0

2.26.4. Stack Port 0 Parameters:

Port Configuration:

UCPD Instance	UCPD1
DMA Request RX for UCPD Port 0	UCPD1_RX_DMA1_Channel_4
DMA Request TX for UCPD Port 0	UCPD1_TX_DMA1_Channel_5

Start of Packet Parameters:

SOP	Supported
SOP'	Not supported
SOP''	Not supported
SOP' debug	Not supported
SOP'' debug	Not supported

Port 0 Parameters:

Specification revision value	Revision 3 (PD3)
Default port role	Sink
Port role swap	Not supported
Data role swap to DFP	Supported
Data role swap to UFP	Supported
Vendor defined messages	Not supported
Discover Identity response	Not supported
Discover Identity sent	Not supported
Caps counter	Not supported

PD Revision 3 specific parameters:

Unchunk mode	Not supported
Fast role swap	Not supported
Higher Capability	Not supported
USB Communication Capable	Not supported
Unconstrained Power	Not supported
USB Suspend Supported	Not supported
PPS message	Not supported
Source Capabilities Extended message	Not supported
Alert message	Not supported
Status message	Not supported
Manufacturer Info message	Not supported
Country Codes message	Not supported
Country Info message	Not supported
Security Response message	Not supported
Firmware update Response message	Not supported
Get Battery Capabitity and Status messages	Not supported

Cable Detection Parameters:

CAD accessory	Not supported

2.26.5. User Port 0 Parameters:

Port 0 Parameters:

Data role swap	Not supported
VCONN swap	Not supported

2.27. USB_DEVICE

Class For FS IP: Human Interface Device Class (HID)

2.27.1. Parameter Settings:

Class Parameters:

HID_FS_BINTERVAL	**0xA ***

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
USBD_LPM_ENABLED (Link Power Management)	1: Link Power Management supported

2.27.2. 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)	22315
PRODUCT_STRING (Product Identifier)	STM32 Human interface
CONFIGURATION_STRING (Configuration Identifier)	HID Config
INTERFACE_STRING (Interface Identifier)	HID 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	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	v_dc_sample
	PA2	ADC1_IN3	Analog mode	No pull-up and no pull-down	n/a	v_pd_sample
ADC2	PA5	ADC2_IN13	Analog mode	No pull-up and no pull-down	n/a	v_in_sample
COMP1	PA1	COMP1_INP	Analog mode	No pull-up and no pull-down	n/a	i_in_sample
COMP2	PA3	COMP2_INP	Analog mode	No pull-up and no pull-down	n/a	v_out_sample
COMP4	PB0	COMP4_INP	Analog mode	No pull-up and no pull-down	n/a	i_out_sample
I2C3	PC8	I2C3_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	temp_sensor_scl
	PC9	I2C3_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	temp_sensor_sda
OPAMP1	PA3	OPAMP1_VINP	Analog mode	No pull-up and no pull-down	n/a	v_out_sample
OPAMP2	PB0	OPAMP2_VINP	Analog mode	No pull-up and no pull-down	n/a	i_out_sample
OPAMP3	PA1	OPAMP3_VINP	Analog mode	No pull-up and no pull-down	n/a	i_in_sample
RCC	PF0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PF1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI2	PB12	SPI2_NSS	Alternate Function Push Pull	No pull-up and no pull-down	Low	lcd_cs
	PB13	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	lcd_scl
	PB15	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Low	lcd_sda
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM1	PA7	TIM1_CH1N	Alternate Function Push Pull	No pull-up and no pull-down	Low	buck_low_side
	PA8	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	buck_high_side
TIM2	PB10	TIM2_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	serial_led
TIM3	PA4	TIM3_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	encoder_ch2
	PA6	TIM3_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	encoder_ch1
TIM8	PC6	TIM8_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	boost_high_side
	PB3	TIM8_CH1N	Alternate Function Push Pull	No pull-up and no pull-down	Low	boost_low_side
TIM15	PB14	TIM15_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	lcd_bg_light_ctrl
TIM17	PB5	TIM17_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	beep
UCPD1	PA9	UCPD1_DBCC1	n/a	n/a	n/a	
	PA10	UCPD1_DBCC2	n/a	n/a	n/a	
	PB4	UCPD1_CC2	Analog mode	No pull-up and no pull-down	n/a	
	PB6	UCPD1_CC1	Analog mode	No pull-up and no pull-down	n/a	
USART1	PC4	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	master_tx

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC5	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	master_rx
USART3	PC10	USART3_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	debug_tx
	PC11	USART3_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	debug_rx
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	output_ctrl
	PB11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	lcd_dc
	PB7	GPIO_EXTI7	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	btn_enc
	PB8-BOOT0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	btn_1
	PB9	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	btn_2

3.2. DMA configuration

DMA request	Stream	Direction	Priority
TIM2_CH3	DMA1_Channel1	Memory To Peripheral	Low
ADC1	DMA1_Channel2	Peripheral To Memory	Low
ADC2	DMA1_Channel3	Peripheral To Memory	Low
UCPD1_RX	DMA1_Channel4	Peripheral To Memory	Low
UCPD1_TX	DMA1_Channel5	Memory To Peripheral	Low

TIM2_CH3: DMA1_Channel1 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Word
Memory Data Width:	Word

ADC1: DMA1_Channel2 DMA request Settings:

Mode:	**Circular ***
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

ADC2: DMA1_Channel3 DMA request Settings:

Mode:	**Circular ***
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

UCPD1_RX: DMA1_Channel4 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte

Memory Data Width:	Byte

UCPD1_TX: DMA1_Channel5 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

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	15	0
System tick timer	true	15	0
DMA1 channel1 global interrupt	true	5	0
DMA1 channel2 global interrupt	true	5	0
DMA1 channel3 global interrupt	true	5	0
DMA1 channel4 global interrupt	true	5	0
DMA1 channel5 global interrupt	true	5	0
USB low priority interrupt remap	true	5	0
TIM7 global interrupt	true	15	0
UCPD1 interrupt / UCPD1 wake-up interrupt through EXTI line 43	true	5	0
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/38/39/40/41	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupt	unused		
USB high priority interrupt remap	unused		
EXTI line[9:5] interrupts	unused		
TIM1 break interrupt and TIM15 global interrupt	unused		
TIM1 update interrupt and TIM16 global interrupt	unused		
TIM1 trigger and commutation interrupts and TIM17 global interrupt	unused		
TIM1 capture compare interrupt	unused		
TIM2 global interrupt	unused		
TIM3 global interrupt	unused		
SPI2 global interrupt	unused		
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	unused		
USART3 global interrupt / USART3 wake-up interrupt through EXTI line 28	unused		
TIM8 break interrupt	unused		

Interrupt Table	Enable	Preenmption Priority	SubPriority
TIM8 update interrupt	unused		
TIM8 trigger and commutation interrupts	unused		
TIM8 capture compare interrupt	unused		
TIM6 global interrupt, DAC1 and DAC3 channel underrun error interrupts	unused		
COMP1, COMP2 and COMP3 interrupts through EXTI lines 21, 22 and 29	unused		
COMP4 interrupt through EXTI line 30	unused		
FPU global interrupt	unused		
I2C3 event interrupt / I2C3 wake-up interrupt through EXTI line 27	unused		
I2C3 error 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	true
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	false	false
Debug monitor	false	true	false
Pendable request for system service	false	false	false
System tick timer	false	false	true
DMA1 channel1 global interrupt	false	true	true
DMA1 channel2 global interrupt	false	true	true
DMA1 channel3 global interrupt	false	true	true
DMA1 channel4 global interrupt	false	true	true
DMA1 channel5 global interrupt	false	true	true
USB low priority interrupt remap	false	true	true
TIM7 global interrupt	false	true	true
UCPD1 interrupt / UCPD1 wake-up interrupt through EXTI line 43	false	true	false

*** User modified value**

4. System Views

4.1. Category view

4.1.1. Current

5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32g4_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32g4_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32g4_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-usb-c-pd-solutions-presentation.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32g4-series-product-overview.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/flstm32g4.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
Flyers	https://www.st.com/resource/en/flyer/fldpstpfc11120.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/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/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-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/an4221-i2c-protocol-used-in-the-stm32-bootloader-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/an4232-getting-started-with-analog-comparators-for-stm32f3-series-and-stm32g4-series-devices-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4286-spi-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4296-use-stm32f3stm32g4-ccm-sram-with-iar-embedded-workbench-keil-mdkarm-stmicroelectronics-stm32cubeide-and-other-gnubased-toolchains-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/an4655-virtually-increasing-the-number-of-serial-communication-peripherals-in-stm32-applications-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4750-handling-of-soft-errors-in-stm32-applications-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4776-generalpurpose-timer-cookbook-for-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4803-highspeed-si-

	simulations-using-ibis-and-boardlevel-simulations-using-hyperlynx-si-on-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4989-stm32-microcontroller-debug-toolbox-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5093-getting-started-with-stm32g4-series--hardware-development-boards-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5306-operational-amplifier-opamp-usage-in-stm32g4-series-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5310-guideline-for-using-analog-features-of-stm32g4-series-versus-stm32f3-series-devices-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5315-stm32cube-firmware-examples-for-stm32g4-series-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5346-stm32g4-adc-use-tips-and-recommendations-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5094-migrating-between-stm32f334303-lines-and-stm32g431xxg474xxg491xx-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5738-stm32g4-series-lifetime-estimates-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4899-stm32-microcontroller-gpio-hardware-settings-and-lowpower-consumption-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4991-how-to-wake-up-an-stm32-microcontroller-from-lowpower-mode-with-the-usart-or-the-lpuart-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4838-introduction-to-memory-protection-unit-management-on-stm32-mcus-

	stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5325-how-to-use-the-cordic-to-perform-mathematical-functions-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5348-introduction-to-fdcan-peripherals-for-stm32-product-classes-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4894-how-to-use-eeprom-emulation-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2834-how-to-optimize-the-adc-accuracy-in-the-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5537-how-to-use-adc-oversampling-techniques-to-improve-signaltonoise-ratio-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5036-guidelines-for-thermal-management-on-stm32-applications-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5405-how-to-use-fdcan-bootloader-protocol-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5978-introduction-to-mb1971-llc-hat-12-v-to-75-v1-a-for-f334-g474-nucleo-board-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5690-how-to-use-vrefbuf-peripheral-on-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4230-introduction-to-random-number-generation-validation-using-the-nist-statistical-test-suite-for-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2548-introduction-to-dma-controller-for-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4013-introduction-to-timers-for-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4277-how-to-use-

	pwm-shutdown-for-motor-control-and-digital-power-conversion-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4635-how-to-optimize-lpuart-power-consumption-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4759-introduction-to-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4908-getting-started-with-usart-automatic-baud-rater-detection-for-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5156-introduction-to-security-for-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5224-introduction-to-dmamux-for-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5543-guidelines-for-enhanced-spi-communication-on-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1202_freertos_guide-freertos-guide-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1602_semihosting_in_truestudio-how-to-do-semihosting-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1801_stm32cubeprogrammer_in_truestudio-installing-stm32cubeprogrammer-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/atollic_editing_keyboard_shortcuts-atollic-editing-keyboard-shortcuts-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/iar_to_atollic_truestudio_migration_guide-truestudio-for-arm-migration-guide-iar-embedded-workbench-to-truestudio-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/stm32cubemx_installatio

for related Tools & Software	n_in_truestudio-stm32cubemx-installation-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4435-guidelines-for-obtaining-ulcsaiec-607301603351-class-b-certification-in-any-stm32-application-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4657-stm32-inapplication-programming-iap-using-the-usart-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4841-digital-signal-processing-for-stm32-microcontrollers-using-cmsis-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an5056-integration-guide-for-the-xcubesbsfu-stm32cube-expansion-package-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an5305-digital-filter-implementation-with-the-fmac-using-stm32cubeg4-mcu-package-stmicroelectronics.pdf
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