



1. Description

1.1. Project

Project Name	DAC_GenerateWaveform_TriggerHW_Init
Board Name	NUCLEO-G474RE
Generated with:	STM32CubeMX 6.14.1
Date	05/08/2025

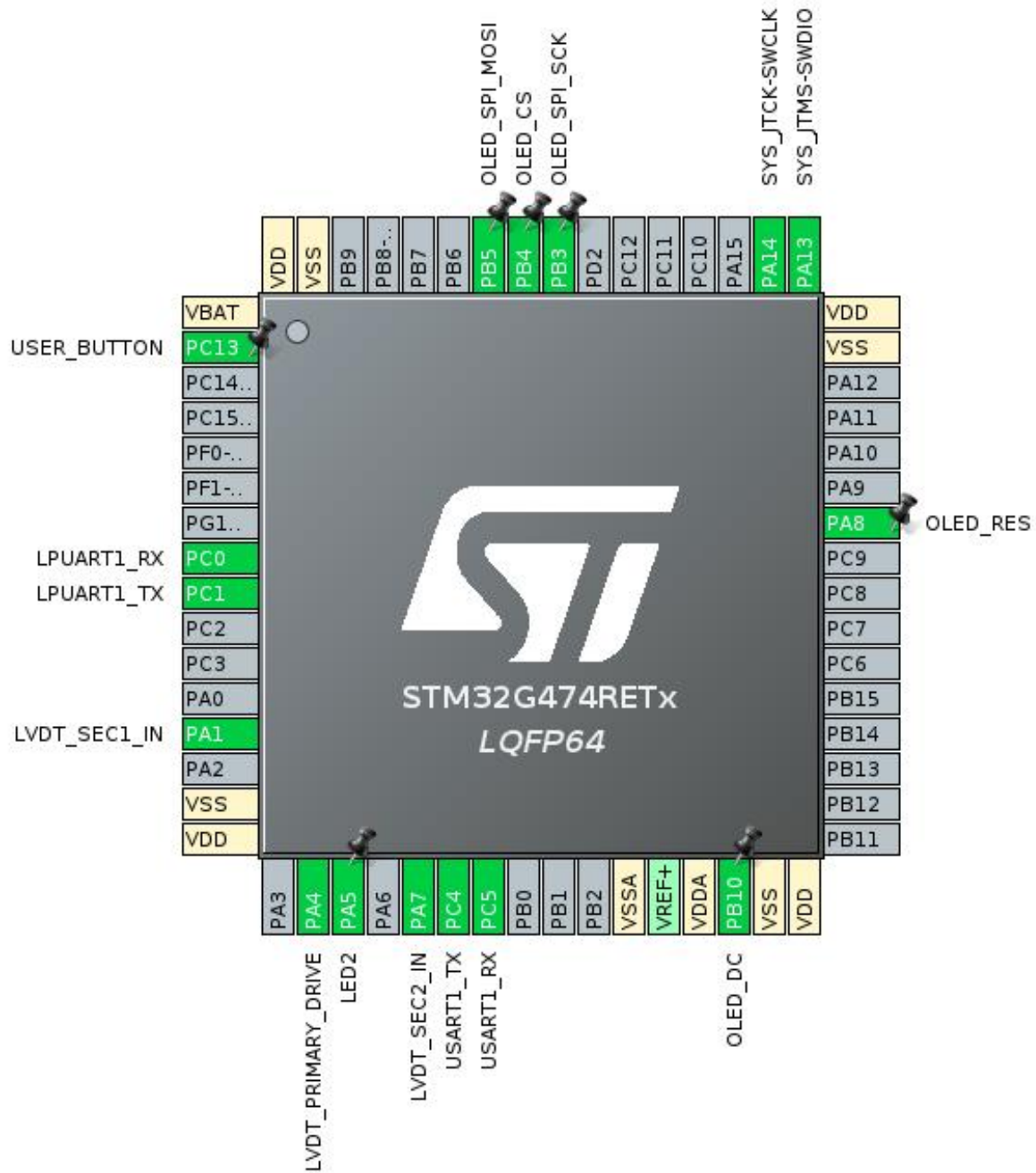
1.2. MCU

MCU Series	STM32G4
MCU Line	STM32G4x4
MCU name	STM32G474RETx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	ARM Cortex-M4
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2. Pinout Configuration

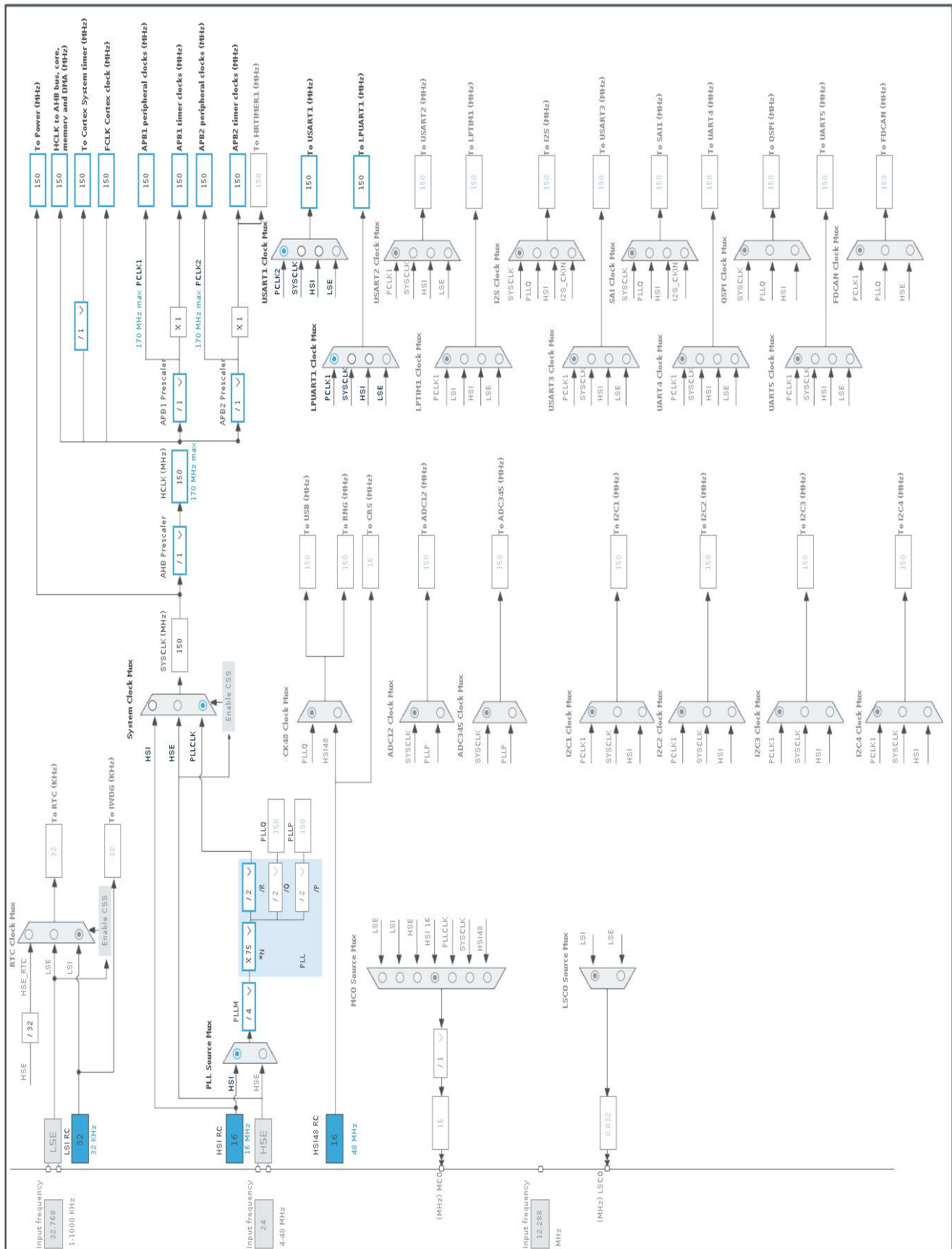


3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13	I/O	GPIO_EXTI13	USER_BUTTON
8	PC0	I/O	LPUART1_RX	
9	PC1	I/O	LPUART1_TX	
13	PA1	I/O	OPAMP1_VINP	LVDT_SEC1_IN
15	VSS	Power		
16	VDD	Power		
18	PA4	I/O	DAC1_OUT1	LVDT_PRIMARY_DRIVE
19	PA5 *	I/O	GPIO_Output	LED2
21	PA7	I/O	OPAMP2_VINP	LVDT_SEC2_IN
22	PC4	I/O	USART1_TX	
23	PC5	I/O	USART1_RX	
27	VSSA	Power		
29	VDDA	Power		
30	PB10 *	I/O	GPIO_Output	OLED_DC
31	VSS	Power		
32	VDD	Power		
42	PA8 *	I/O	GPIO_Output	OLED_RES
47	VSS	Power		
48	VDD	Power		
49	PA13	I/O	SYS_JTMS-SWDIO	
50	PA14	I/O	SYS_JTCK-SWCLK	
56	PB3 *	I/O	GPIO_Output	OLED_SPI_SCK
57	PB4 *	I/O	GPIO_Output	OLED_CS
58	PB5 *	I/O	GPIO_Output	OLED_SPI_MOSI
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32G4
Line	STM32G4x4
MCU	STM32G474RETx
Datasheet	DS12288_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

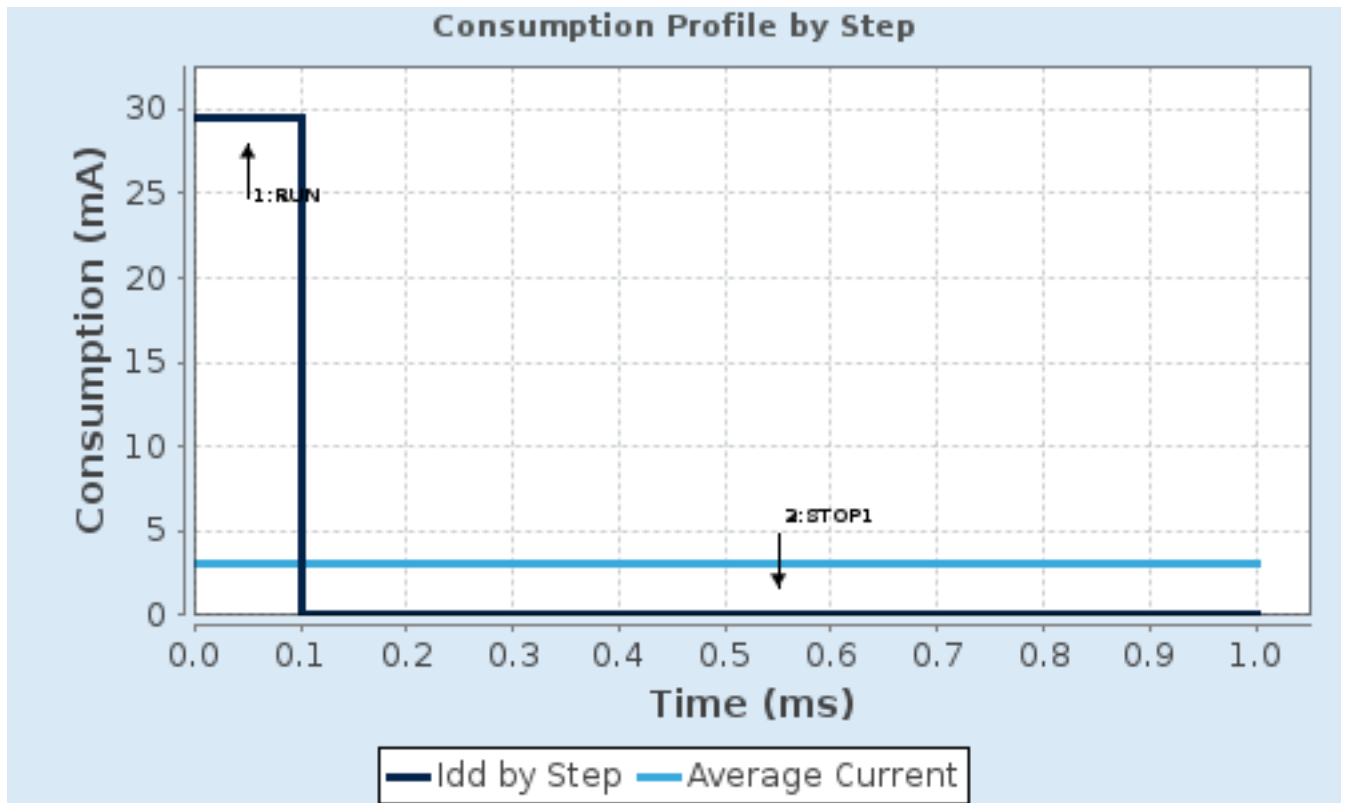
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP1
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-Boost	NoRange
Fetch Type	FLASH/DualBank/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	29.5 mA	80.5 μ A
Duration	0.1 ms	0.9 ms
DMIPS	213.0	0.0
Ta Max	124.25	129.98
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	3.02 mA
Battery Life	1 month, 16 days, 9 hours	Average DMIPS	212.5 DMIPS

1.6. Chart



2. Software Project

2.1. Project Settings

Name	Value
Project Name	DAC_GenerateWaveform_TriggerHW_Init
Project Folder	/home/patrik/2024-FEL-B3-LS/SME/semestralka/full_project_try1-
Toolchain / IDE	CMake
Firmware Package Name and Version	STM32Cube FW_G4 V1.6.1
Application Structure	Basic
Generate Under Root	No
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

2.2. 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

2.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	MX_GPIO_Init	GPIO
2	MX_DMA_Init	DMA
3	SystemClock_Config	RCC
4	MX_DAC1_Init	DAC1
5	MX_TIM6_Init	TIM6
6	MX_ADC1_Init	ADC1
7	MX_ADC2_Init	ADC2
8	MX_OPAMP1_Init	OPAMP1
9	MX_OPAMP2_Init	OPAMP2
10	MX_USART1_UART_Init	USART1
11	MX_LPUART1_UART_Init	LPUART1

Rank	Function Name	Peripheral Instance Name
12	MX_TIM7_Init	TIM7

3. Peripherals and Middlewares Configuration

3.1. ADC1

mode: VOPAMP1 Channel

3.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode

Dual regular simultaneous mode only *

DMA Access Mode

DMA access mode enabled

Delay between 2 sampling phases

1 Cycle

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

Enabled *

Overrun behaviour

Overrun data preserved

ADC_Regular_ConversionMode:

Enable Regular Conversions

Enable

Enable Regular Oversampling

Disable

Number Of Conversion

1

External Trigger Conversion Source

Timer 7 Trigger Out event *

External Trigger Conversion Edge

Trigger detection on the rising edge

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

3.2. ADC2

mode: VOPAMP2 Channel

3.2.1. Parameter Settings:

ADCs_Common_Settings:

Mode

Dual regular simultaneous mode only *

DMA Access Mode

DMA access mode enabled

Delay between 2 sampling phases

1 Cycle

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

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

3.3. DAC1

OUT1 mode: Connected to external pin only

3.3.1. Parameter Settings:

DAC Out1 Settings:

Mode selected	Normal Mode
Output Buffer	Enable
DAC High Frequency	Mode Automatic
DMA Double Data	Disable
Signed Format	Disable
Trigger	Timer 6 Trigger Out event *
Trigger2	None
Wave generation mode	Disabled
User Trimming	Factory trimming

3.4. LPUART1

Mode: Asynchronous

3.4.1. 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
Single Sample	Disable
ClockPrescaler	1
Fifo Mode	FIFO mode disable
Txfifo Threshold	1 eighth full configuration
Rxfifo Threshold	1 eighth full configuration

Advanced Features:

TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable

Generate the peripherals clock configuration	TRUE
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3.8. SYS

Debug: Serial Wire

Timebase Source: SysTick

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

3.9. TIM6

mode: Activated

3.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	(timer_prescaler - 1) *
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	65535
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Update Event *
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3.10. TIM7

mode: Activated

3.10.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	tim7_prescaler
Counter Mode	Up
Dithering	Disable
Counter Period (AutoReload Register - 16 bits value)	tim7_period *
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Update Event *
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3.11. USART1

Mode: Asynchronous

3.11.1. 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

* User modified value

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
DAC1	PA4	DAC1_OUT1	Analog mode	No pull-up and no pull-down	n/a	LVDT_PRIMARY_DRIVE
LPUART1	PC0	LPUART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC1	LPUART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
OPAMP1	PA1	OPAMP1_VINP	Analog mode	No pull-up and no pull-down	n/a	LVDT_SEC1_IN
OPAMP2	PA7	OPAMP2_VINP	Analog mode	No pull-up and no pull-down	n/a	LVDT_SEC2_IN
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USART1	PC4	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC5	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PC13	GPIO_EXTI13	External Interrupt Mode with Falling edge trigger detection	No pull-up and no pull-down	n/a	USER_BUTTON
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED2
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_DC
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_RES
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_SPI_SCK
	PB4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_CS
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_SPI_MOSI

4.2. DMA configuration

DMA request	Stream	Direction	Priority
DAC1_CH1	DMA1_Channel3	Memory To Peripheral	High *
ADC1	DMA1_Channel1	Peripheral To Memory	High *

DAC1_CH1: DMA1_Channel3 DMA request Settings:

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

ADC1: DMA1_Channel1 DMA request Settings:

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

4.3. NVIC configuration

4.3.1. 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
DMA1 channel1 global interrupt	true	0	0
DMA1 channel3 global interrupt	true	0	0
EXTI line[15:10] interrupts	true	0	0
TIM6 global interrupt, DAC1 and DAC3 channel underrun error interrupts	true	0	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		
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	unused		
TIM7 global interrupt, DAC2 and DAC4 channel underrun error interrupts	unused		
FPU global interrupt	unused		
LPUART1 global interrupt	unused		

4.3.2. 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
System tick timer	false	true	true

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
DMA1 channel1 global interrupt	false	true	true
DMA1 channel3 global interrupt	false	true	true
EXTI line[15:10] interrupts	false	true	true
TIM6 global interrupt, DAC1 and DAC3 channel underrun error interrupts	false	true	true

* User modified value

5. System Views

5.1. Category view

5.1.1. Current

Middleware								
System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing	Utilities	Bsp
DMA ✓	ADC1 ✓	TIM6 ✓	LPUART1 ✓					
GPIO ✓	ADC2 ✓	TIM7 ✓	USART1 ✓					
NVIC ✓	DAC1 ✓							
RCC ✓	OPAMP1 ✓							
STS ✓	OPAMP2 ✓							

6. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32g4_bsd.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/flpowerstbd.pdf
Flyers	https://www.st.com/resource/en/flyer/fldpstpf11120.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/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3155-uart-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/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/an4539-hrtim-cookbook-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4566-extending-the-dac-performance-of-stm32-microcontrollers-stmicroelectronics.pdf
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- Application Notes https://www.st.com/resource/en/application_note/an4989-stm32-

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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

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Application Notes https://www.st.com/resource/en/application_note/an4760-quadspi-interface-on-stm32-microcontrollers-and-microprocessors--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

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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

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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

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