

1. Description

1.1. Project

Project Name	rover
Board Name	NUCLEO-F767ZI
Generated with:	STM32CubeMX 6.12.1
Date	09/15/2025

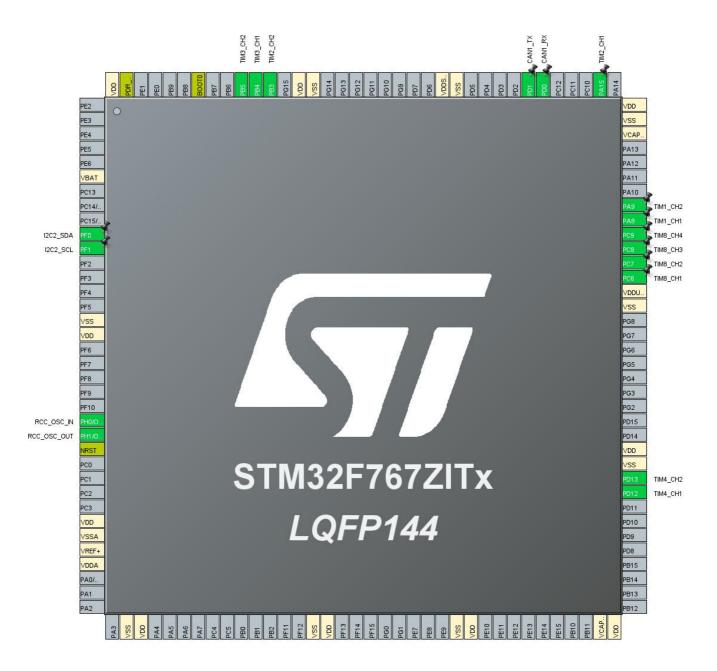
1.2. MCU

MCU Series	STM32F7
MCU Line	STM32F7x7
MCU name	STM32F767ZITx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	Arm Cortex-M7

2. Pinout Configuration

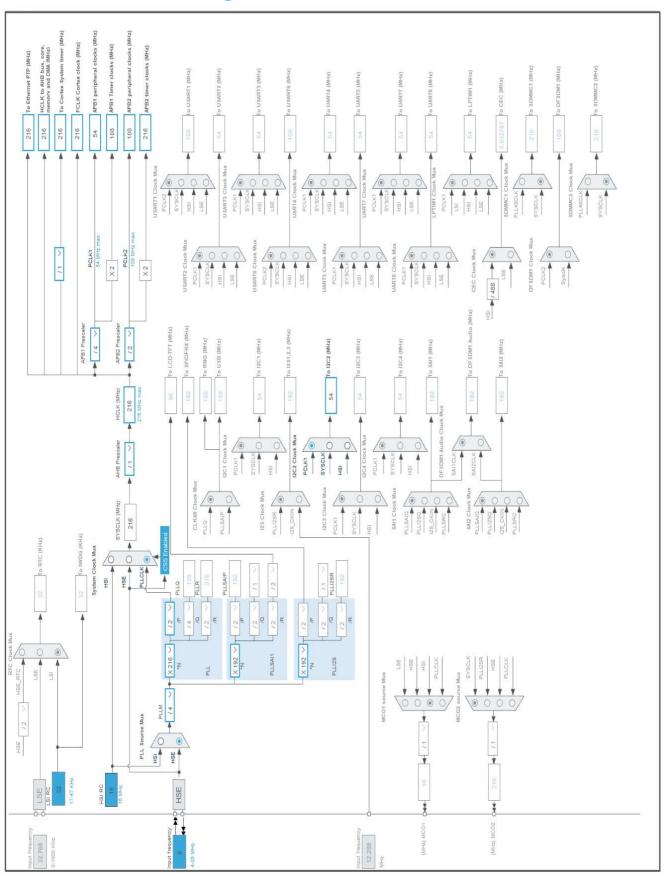


3. Pins Configuration

Pin Number LQFP144	Pin Name (function after	Pin Type	Alternate Function(s)	Label
2011111	reset)		r unotion(o)	
6	VBAT	Power		
10	PF0	I/O	I2C2_SDA	
11	PF1	I/O	I2C2_SCL	
16	VSS	Power		
17	VDD	Power		
23	PH0/OSC_IN	I/O	RCC_OSC_IN	
24	PH1/OSC_OUT	I/O	RCC_OSC_OUT	
25	NRST	Reset		
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
38	VSS	Power		
39	VDD	Power		
51	VSS	Power		
52	VDD	Power		
61	VSS	Power		
62	VDD	Power		
71	VCAP_1	Power		
72	VDD	Power		
81	PD12	I/O	TIM4_CH1	
82	PD13	I/O	TIM4_CH2	
83	VSS	Power		
84	VDD	Power		
94	VSS	Power		
95	VDDUSB	Power		
96	PC6	I/O	TIM8_CH1	
97	PC7	I/O	TIM8_CH2	
98	PC8	I/O	TIM8_CH3	
99	PC9	I/O	TIM8_CH4	
100	PA8	I/O	TIM1_CH1	
101	PA9	I/O	TIM1_CH2	
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
110	PA15	I/O	TIM2_CH1	

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
114	PD0	I/O	CAN1_RX	
115	PD1	I/O	CAN1_TX	
120	VSS	Power		
121	VDDSDMMC	Power		
130	VSS	Power		
131	VDD	Power		
133	PB3	I/O	TIM2_CH2	
134	PB4	I/O	TIM3_CH1	
135	PB5	I/O	TIM3_CH2	
138	воото	Boot		
143	PDR_ON	Reset		
144	VDD	Power		

4. Clock Tree Configuration



1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F7
Line	STM32F7x7
мси	STM32F767ZITx
Datasheet	DS11532_Rev4

1.2. Parameter Selection

Temperature	25
Vdd	3.3

1.3. Battery Selection

Battery	Alkaline(9V)	
Capacity	625.0 mAh	
Self Discharge	0.3 %/month	
Nominal Voltage	9.0 V	
Max Cont Current	200.0 mA	
Max Pulse Current	0.0 mA	
Cells in series	1	
Cells in parallel	1	

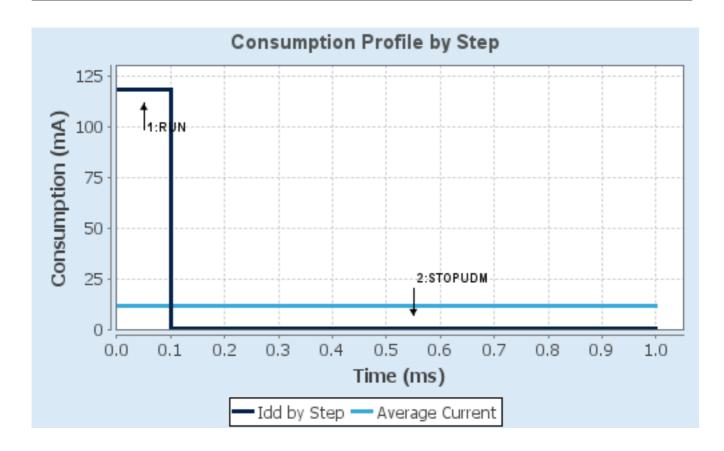
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP UDM (Under Drive)
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	ICTM FLASH-SingleBank REGON	n/a
CPU Frequency	216 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator LP Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	118 mA	130 µA
Duration	0.1 ms	0.9 ms
DMIPS	462.0	0.0
Ta Max	89.42	104.98
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	11.92 mA
Battery Life	2 days, 4 hours	Average DMIPS	462.24005
			DMIPS

1.6. Chart



2. Software Project

2.1. Project Settings

Name	Value
Project Name	rover
Project Folder	C:\Users\miria\STM32CubeIDE\workspace_1.16.1\rover
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F7 V1.17.3
Application Structure	Advanced
Generate Under Root	Yes
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	No
consumption)	
Enable Full Assert	No

2.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name	
1	SystemClock_Config	RCC	
2	MX_GPIO_Init	GPIO	
3	MX_TIM2_Init	TIM2	
4	MX_TIM3_Init	TIM3	
5	MX_TIM4_Init	TIM4	
6	MX_TIM8_Init	TIM8	
7	MX_CAN1_Init	CAN1	
8	MX_I2C2_Init	I2C2	
9	MX_TIM1_Init	TIM1	

rover Project
Configuration Report

3. Peripherals and Middlewares Configuration

3.1. CAN1

mode: Activated

3.1.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum) 3 *

Time Quantum 55.555555555556 *

Time Quanta in Bit Segment 1 15 Times *
Time Quanta in Bit Segment 2 2 Times *

Time for one Bit 1000

Baud Rate 1000000 *

ReSynchronization Jump Width 1 Time

Basic Parameters:

Time Triggered Communication Mode

Automatic Bus-Off Management

Automatic Wake-Up Mode

Automatic Retransmission

Receive Fifo Locked Mode

Transmit Fifo Priority

Disable

Advanced Parameters:

Operating Mode Normal

3.2. I2C2 I2C: I2C

3.2.1. Parameter Settings:

Timing configuration:

I2C Speed Mode Standard Mode

I2C Speed Frequency (KHz)100Rise Time (ns)0Fall Time (ns)0Coefficient of Digital Filter0

Analog Filter Enabled

Timing 0x20404768 *

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

3.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

3.3.1. Parameter Settings:

System Parameters:

VDD voltage (V) 3.3

Flash Latency(WS) 7 WS (8 CPU cycle)

RCC Parameters:

HSI Calibration Value 16

TIM Prescaler Selection Disabled

HSE Startup Timout Value (ms) 100

LSE Startup Timout Value (ms) 5000

Power Parameters:

Power Over Drive Enabled

Power Regulator Voltage Scale Power Regulator Voltage Scale 1

3.4. SYS

Timebase Source: TIM12

3.5. TIM1

Combined Channels: Encoder Mode

3.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value) 0

Counter Mode Up

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)
Encoder:	
Encoder Mode	Encoder Mode TI1 and TI2 *
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
3.6. TIM2	
Combined Channels: Encoder Mod	de
3.6.1. Parameter Settings:	
<u> </u>	
Counter Settings:	
Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
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)
Encoder:	,
Encoder Mode	Encoder Mode TI1 and TI2 *
Parameters for Channel 1	Encoder wode 111 and 112
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
•	

3.7. TIM3

Combined Channels: Encoder Mode

3.7.1. Parameter Settings:

Counter Settings:		
Prescaler (PSC - 16 bits value)	0	
Counter Mode	Up	
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 and TI2 *	
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	

3.8. TIM4

Combined Channels: Encoder Mode

3.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value) 0
Counter Mode Up
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 and TI2 *
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
3.9. TIM8	
Channel1: PWM Generation CH1	

Channel1: PWM Generation CH1 Channel2: PWM Generation CH2 Channel3: PWM Generation CH3 Channel4: PWM Generation CH4

3.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value) 0

Counter Mode Up

Counter Period (AutoReload Register - 16 bits value) 5000 *

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- DFSDMDisable

Break And Dead Time management - BRK2 Configuration:

BRK2 State Disable
BRK2 Polarity High
BRK2 Filter (4 bits value) 0

BRK2 Sources Configuration

- Digital Input- DFSDMDisable

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

PWM Generation Channel 2:

Mode PWM mode 1

Pulse (16 bits value) 0

Output compare preload Enable

Fast Mode Disable

CH Polarity High

CH Idle State Reset

PWM Generation Channel 3:

Mode PWM mode 1

Pulse (16 bits value) 0

Output compare preload Enable

Fast Mode Disable

CH Polarity High

CH Idle State Reset

PWM Generation Channel 4:

Mode PWM mode 1

Pulse (16 bits value) 0

Output compare preload Enable
Fast Mode Disable
CH Polarity High
CH Idle State Reset

3.10. FREERTOS

Interface: CMSIS_V2

3.10.1. Config parameters:

API:

FreeRTOS API CMSIS v2

Versions:

FreeRTOS version 10.2.1 CMSIS-RTOS version 2.00

MPU/FPU:

ENABLE_MPU Disabled ENABLE_FPU Enabled *

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 15360

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

3.10.2. Include parameters:

Include definitions:

vTaskPrioritySet Enabled Enabled uxTaskPriorityGet vTaskDelete Enabled vTaskCleanUpResources Disabled vTaskSuspend Enabled vTaskDelayUntil Enabled Enabled vTaskDelay xTaskGetSchedulerState Enabled xTaskResumeFromISR Enabled xQueueGetMutexHolder Enabled xSemaphoreGetMutexHolder Disabled pcTaskGetTaskName Disabled uxTaskGetStackHighWaterMarkEnabled xTaskGetCurrentTaskHandle Disabled eTaskGetState Enabled xEventGroupSetBitFromISR Disabled

xTimerPendFunctionCallEnabledxTaskAbortDelayDisabledxTaskGetHandleDisableduxTaskGetStackHighWaterMark2Disabled

3.10.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT Enabled *

Project settings (see parameter description first):

Use FW pack heap file Enabled

^{*} User modified value

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
CAN1	PD0	CAN1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD1	CAN1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
I2C2	PF0	I2C2_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Very High	
	PF1	I2C2_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Very High	
RCC	PH0/OSC_I	RCC_OSC_IN	n/a	n/a	n/a	
	PH1/OSC_O UT	RCC_OSC_OUT	n/a	n/a	n/a	
TIM1	PA8	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA9	TIM1_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM2	PA15	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB3	TIM2_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM3	PB4	TIM3_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB5	TIM3_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM4	PD12	TIM4_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD13	TIM4_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM8	PC6	TIM8_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC7	TIM8_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC8	TIM8_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC9	TIM8_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	

4.2. DMA configuration

nothing configured in DMA service

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			
Pre-fetch 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			
CAN1 RX0 interrupts	true	5	0			
TIM8 break interrupt and TIM12 global interrupt	true	15	0			
PVD interrupt through EXTI line 16		unused				
Flash global interrupt		unused				
RCC global interrupt	unused					
CAN1 TX interrupts		unused	unused			
CAN1 RX1 interrupt	unused					
CAN1 SCE interrupt		unused				
TIM1 break interrupt and TIM9 global interrupt	unused					
TIM1 update interrupt and TIM10 global interrupt	unused					
TIM1 trigger and commutation interrupts and TIM11 global interrupt	unused					
TIM1 capture compare interrupt		unused				
TIM2 global interrupt	unused					
TIM3 global interrupt		unused				
TIM4 global interrupt	unused					
I2C2 event interrupt	unused					
I2C2 error interrupt	unused					
TIM8 update interrupt and TIM13 global interrupt	unused					
TIM8 trigger and commutation interrupts and TIM14 global interrupt	unused					
TIM8 capture compare interrupt	unused					
FPU global interrupt		unused				

4.3.2. NVIC Code generation

Enabled interrupt Table	Select for init	Generate IRQ	Call HAL handler
	sequence ordering	handler	

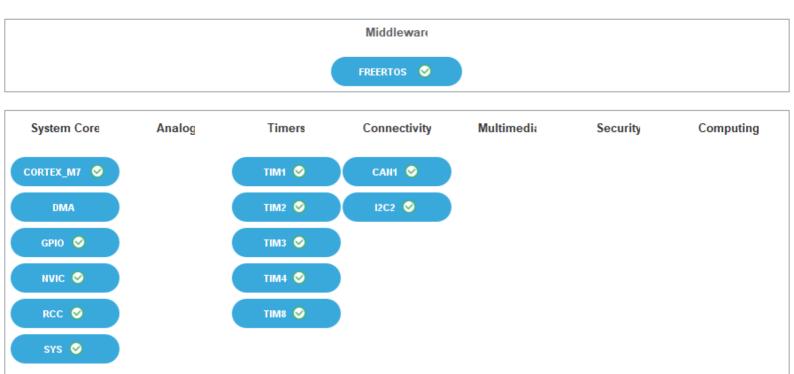
Enabled interrupt Table	Select for init	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	true
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
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
CAN1 RX0 interrupts	false	true	true
TIM8 break interrupt and TIM12 global interrupt	false	true	true

^{*} User modified value

5. System Views

5.1. Category view

5.1.1. Current



6. Docs & Resources

Type Link

BSDL files https://www.st.com/resource/en/bsdl_model/stm32f7_bsdl.zip

IBIS models https://www.st.com/resource/en/ibis_model/stm32f7_ibis.zip

System View https://www.st.com/resource/en/svd/stm32f7-svd.zip

Description

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_functi

onal-safety-packages.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

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/flstm32trust.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/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/an4031-using-the-stm32f2-stm32f4-and-stm32f7-series-dma-controller-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/an4286-spi-protocol-used-in-the-stm32-bootloader-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/an4660-migration-of-microcontroller-applications-from-stm32f42xxxf43xxx-devices-to-stm32f7-series-devices-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4661-getting-startedwith-stm32f7-series-mcu-hardware-development-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4676-stm32f7-series-peripheral-interconnections-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4731-stm32cube-mcu-package-examples-for-stm32f7-series-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/an4839-level-1-cache-on-stm32f7-series-and-stm32h7-series-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4850-stm32-mcus-

- spreadspectrum-clock-generation-principles-properties-and-implementation-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4936-migration-of-microcontroller-applications-from-stm32f7-series-to-stm32h743753-line-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/an4990-getting-started-with-sigmadelta-digital-interface-on-applicable-stm32-microcontrollers-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/an5073-receiving-spdif-audio-stream-with-the-stm32f4f7h7-series-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4760-quadspiinterface-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
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