



1. Description

1.1. Project

Project Name	F413ZH_ReguladorTemperatura_TXRX
Board Name	custom
Generated with:	STM32CubeMX 6.6.1
Date	12/01/2022

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F413/423
MCU name	STM32F413ZHTx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	Arm Cortex-M4
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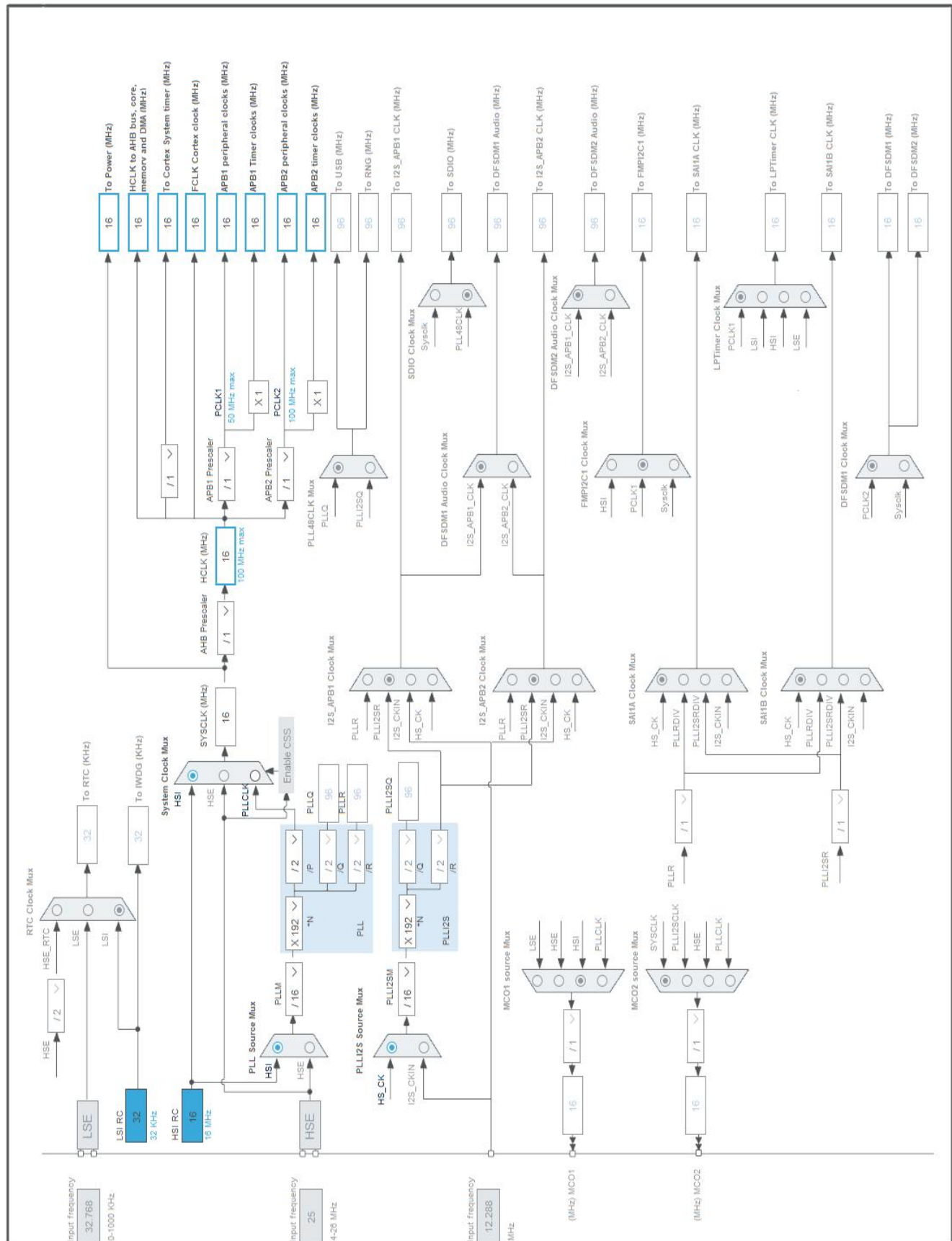


3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
16	VSS	Power		
17	VDD	Power		
25	NRST	Reset		
26	PC0	I/O	ADC1_IN10	
27	PC1	I/O	ADC1_IN11	
29	PC3	I/O	ADC1_IN13	
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
37	PA3	I/O	ADC1_IN3	
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		
77	PD8	I/O	USART3_TX	
78	PD9	I/O	USART3_RX	
83	VSS	Power		
84	VDD	Power		
94	VSS	Power		
95	VDDUSB	Power		
105	PA13	I/O	SYS_JTMS-SWDIO	
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
109	PA14	I/O	SYS_JTCK-SWCLK	
120	VSS	Power		
121	VDD	Power		
130	VSS	Power		
131	VDD	Power		
138	BOOT0	Boot		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
143	PDR_ON	Power		
144	VDD	Power		

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	F413ZH_ReguladorTemperatura_TXRX
Project Folder	C:\Users\Usuario\Documents\Universidad\Semestre5\OS\ProyectosSTM32\F413
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.27.1
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Copy only the necessary library files
Generate peripheral initialization as a pair of '.c/.h' files	No
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_ADC1_Init	ADC1
4	MX_USART3_UART_Init	USART3

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F413/423
MCU	STM32F413ZHTx
Datasheet	DS11581_Rev5

6.2. Parameter Selection

Temperature	25
Vdd	1.7

6.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

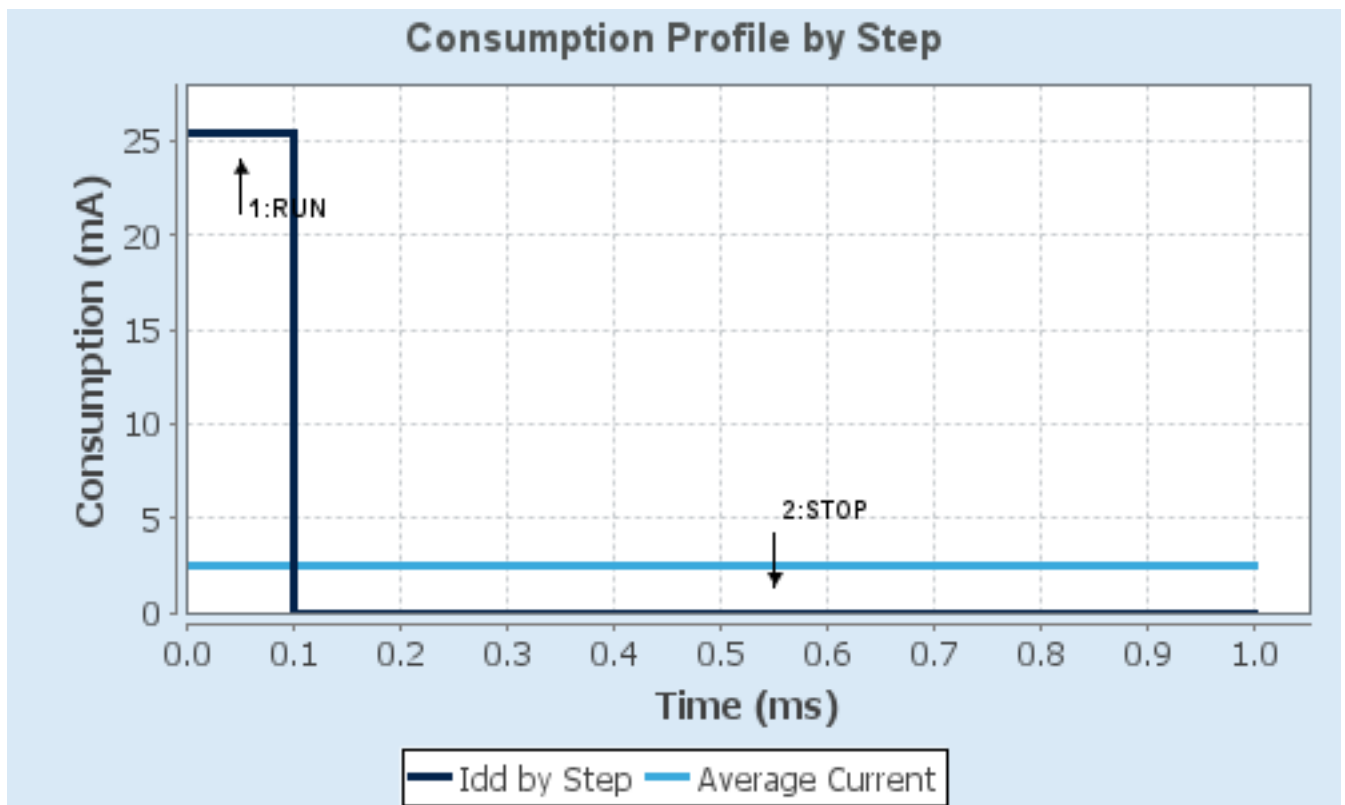
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	1.7	1.7
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	FLASH/ART/PREFETCH	n/a
CPU Frequency	100 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LPLV Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	25.4 mA	15.3 μ A
Duration	0.1 ms	0.9 ms
DMIPS	125.0	0.0
Ta Max	103.49	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	2.55 mA
Battery Life	1 month, 24 days, 23 hours	Average DMIPS	125.0 DMIPS

6.6. Chart



7. Peripherals and Middlewares Configuration

7.1. ADC1

mode: IN3

mode: IN10

mode: IN11

mode: IN13

7.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Clock Prescaler PCLK2 divided by 2

Resolution 12 bits (15 ADC Clock cycles)

Data Alignment Right alignment

Scan Conversion Mode Enabled

Continuous Conversion Mode **Enabled ***

Discontinuous Conversion Mode Disabled

DMA Continuous Requests Disabled

End Of Conversion Selection EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion **4 ***

External Trigger Conversion Source Regular Conversion launched by software

External Trigger Conversion Edge None

Rank 1

Channel Channel 3

Sampling Time 3 Cycles

Rank **2 ***

Channel **Channel 10 ***

Sampling Time 3 Cycles

Rank **3 ***

Channel **Channel 13 ***

Sampling Time 3 Cycles

Rank **4 ***

Channel **Channel 11 ***

Sampling Time 3 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions 0

WatchDog:

Enable Analog WatchDog Mode false

7.2. RCC

7.2.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
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7.3. SYS

Debug: Serial Wire

Timebase Source: TIM1

7.4. USART3

Mode: Asynchronous

7.4.1. 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
Over Sampling	16 Samples

7.5. FREERTOS

Interface: CMSIS_V1

7.5.1. Config parameters:

API:

FreeRTOS API CMSIS v1

Versions:

FreeRTOS version 10.3.1

CMSIS-RTOS version 1.02

MPU/FPU:

ENABLE_MPU Disabled

ENABLE_FPU Disabled

Kernel settings:

USE_PREEMPTION Enabled

CPU_CLOCK_HZ SystemCoreClock

TICK_RATE_HZ 1000

MAX_PRIORITIES 7

MINIMAL_STACK_SIZE 128

MAX_TASK_NAME_LEN 16

USE_16_BIT_TICKS Disabled

IDLE_SHOULD_YIELD Enabled

USE_MUTEXES Enabled

USE_RECURSIVE_MUTEXES Disabled

USE_COUNTING_SEMAPHORES Disabled

QUEUE_REGISTRY_SIZE 8

USE_APPLICATION_TASK_TAG Disabled

ENABLE_BACKWARD_COMPATIBILITY Enabled

USE_PORT_OPTIMISED_TASK_SELECTION Enabled

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 Disabled

USE_STATS_FORMATTING_FUNCTIONS Disabled

Co-routine related definitions:

USE_CO_ROUTINES Disabled

MAX_CO_ROUTINE_PRIORITIES 2

Software timer definitions:

USE_TIMERS Disabled

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

7.5.2. Include parameters:

Include definitions:

vTaskPrioritySet Enabled

uxTaskPriorityGet Enabled

vTaskDelete Enabled

vTaskCleanUpResources Disabled

vTaskSuspend Enabled

vTaskDelayUntil Disabled

vTaskDelay Enabled

xTaskGetSchedulerState Enabled

xTaskResumeFromISR Enabled

xQueueGetMutexHolder Disabled

xSemaphoreGetMutexHolder Disabled

pcTaskGetTaskName Disabled

uxTaskGetStackHighWaterMark Disabled

xTaskGetCurrentTaskHandle Disabled

eTaskGetState Disabled

xEventGroupSetBitFromISR Disabled

xTimerPendFunctionCall Disabled

xTaskAbortDelay Disabled

xTaskGetHandle Disabled

uxTaskGetStackHighWaterMark2 Disabled

7.5.3. 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**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PC0	ADC1_IN10	Analog mode	No pull-up and no pull-down	n/a	
	PC1	ADC1_IN11	Analog mode	No pull-up and no pull-down	n/a	
	PC3	ADC1_IN13	Analog mode	No pull-up and no pull-down	n/a	
	PA3	ADC1_IN3	Analog mode	No pull-up and no pull-down	n/a	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USART3	PD8	USART3_TX	Alternate Function Push Pull	No pull-up and no pull-down	High *	
	PD9	USART3_RX	Alternate Function Push Pull	No pull-up and no pull-down	High *	

8.2. DMA configuration

nothing configured in DMA service

8.3. NVIC configuration

8.3.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
Memory management fault	true	0	0
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
ADC1 global interrupt	true	5	0
TIM1 update interrupt and TIM10 global interrupt	true	15	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
USART3 global interrupt	unused		
FPU global interrupt	unused		

8.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
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
ADC1 global interrupt	false	true	true
TIM1 update interrupt and TIM10 global interrupt	false	true	true

* User modified value

9. System Views

9.1. Category view

9.1.1. Current

Middleware

FREERTOS 

System Core

Analog

Timers

Connectivity

Multimedia

Security

Computing

DMA

ADC1 

USART3 

GPIO 

NVIC 

RCC 

SYS 

10. Docs & Resources

Type	Link
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