



1. Description

1.1. Project

Project Name	STM32_EMB
Board Name	NUCLEO-H743ZI2
Generated with:	STM32CubeMX 6.9.1
Date	09/16/2023

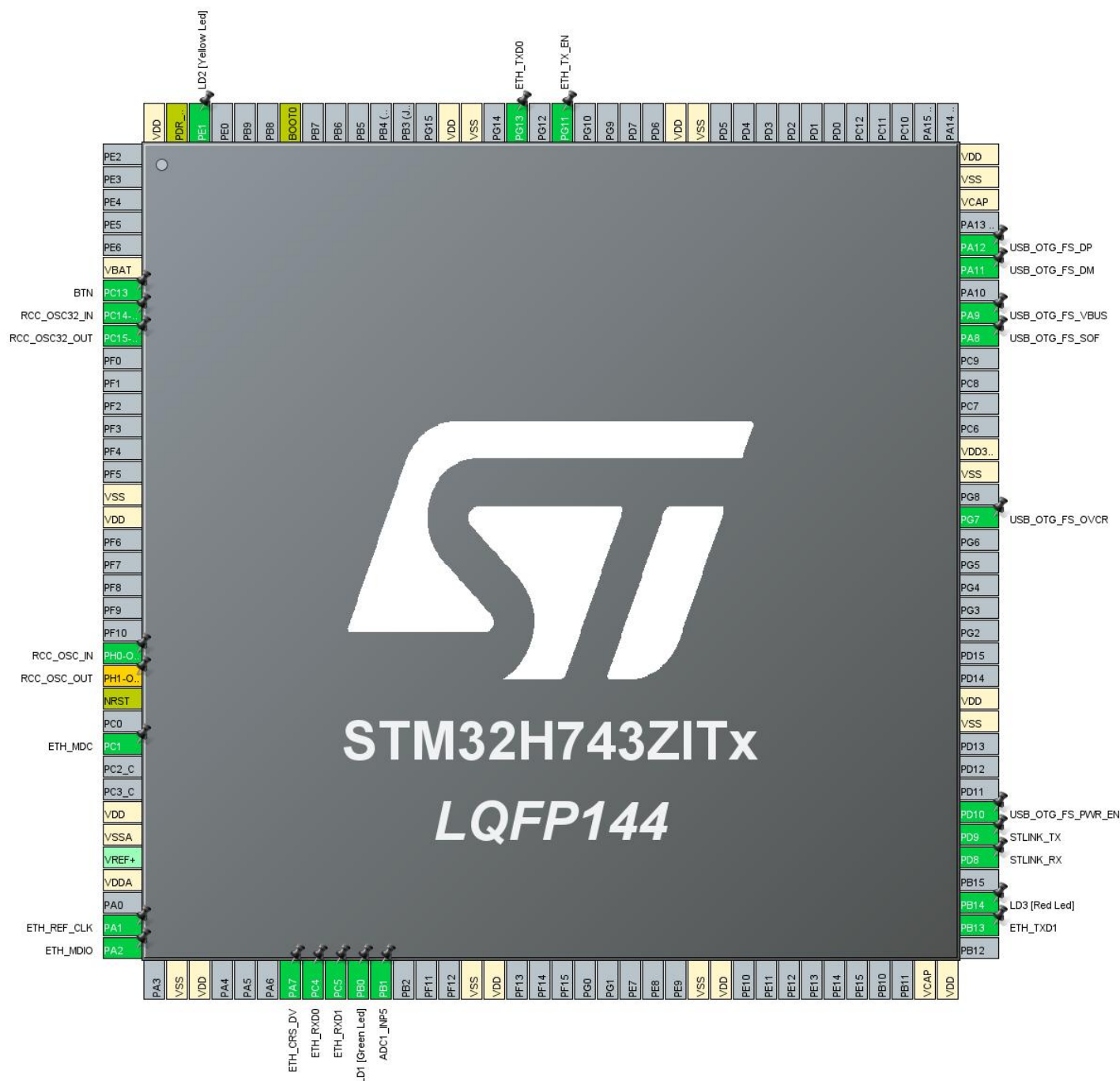
1.2. MCU

MCU Series	STM32H7
MCU Line	STM32H743/753
MCU name	STM32H743ZITx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	ARM Cortex-M7
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2. Pinout Configuration



3. Pins Configuration

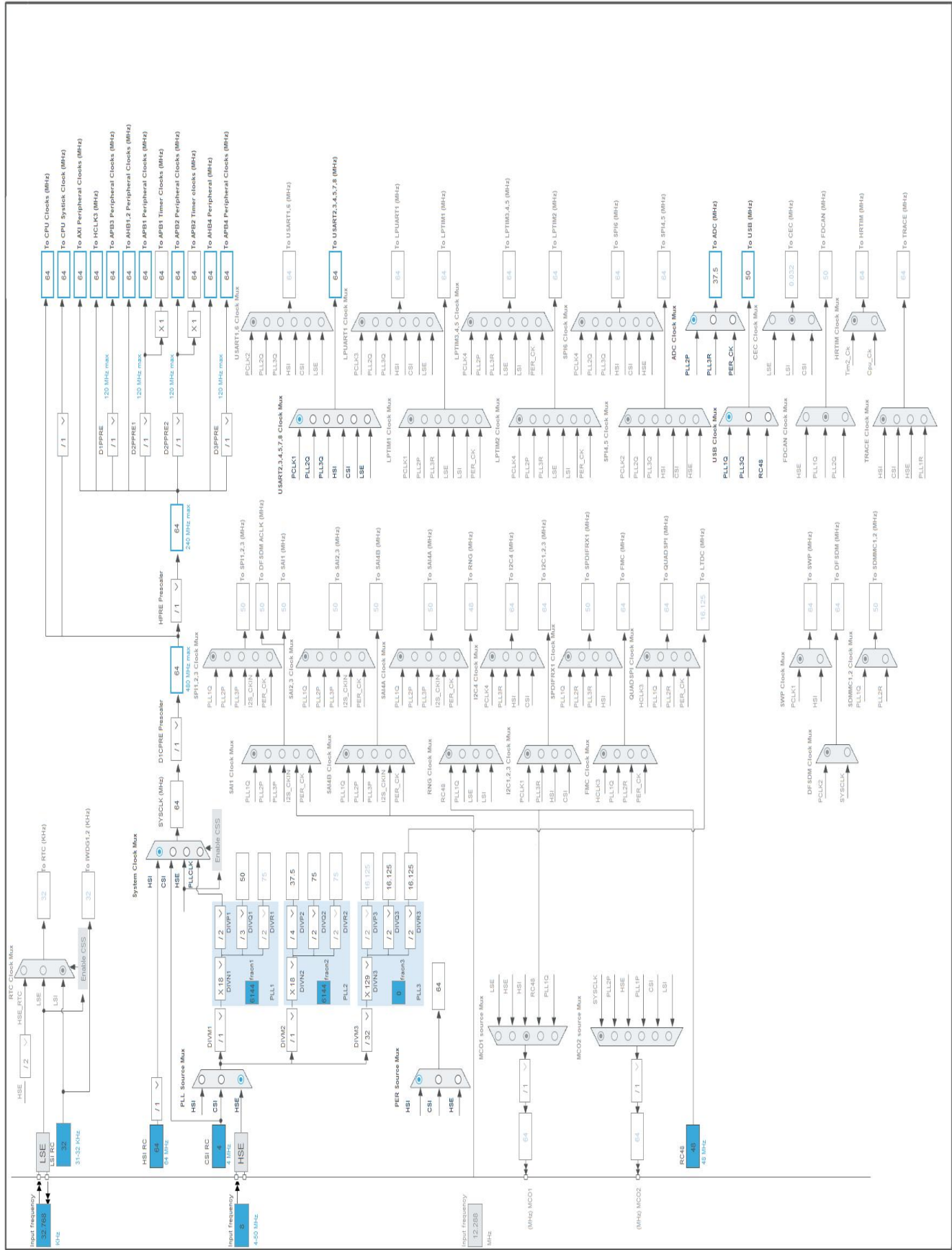
Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
7	PC13	I/O	GPIO_EXTI13	BTN
8	PC14-OSC32_IN (OSC32_IN)	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT (OSC32_OUT)	I/O	RCC_OSC32_OUT	
16	VSS	Power		
17	VDD	Power		
23	PH0-OSC_IN (PH0)	I/O	RCC_OSC_IN	
24	PH1-OSC_OUT (PH1) *	I/O	RCC_OSC_OUT	
25	NRST	Reset		
27	PC1	I/O	ETH_MDC	
30	VDD	Power		
31	VSSA	Power		
33	VDDA	Power		
35	PA1	I/O	ETH_REF_CLK	
36	PA2	I/O	ETH_MDIO	
38	VSS	Power		
39	VDD	Power		
43	PA7	I/O	ETH_CRS_DV	
44	PC4	I/O	ETH_RXD0	
45	PC5	I/O	ETH_RXD1	
46	PB0 **	I/O	GPIO_Output	LD1 [Green Led]
47	PB1	I/O	ADC1_INP5	
51	VSS	Power		
52	VDD	Power		
61	VSS	Power		
62	VDD	Power		
71	VCAP	Power		
72	VDD	Power		
74	PB13	I/O	ETH_TXD1	
75	PB14 **	I/O	GPIO_Output	LD3 [Red Led]
77	PD8	I/O	USART3_TX	STLINK_RX
78	PD9	I/O	USART3_RX	STLINK_TX
79	PD10 **	I/O	GPIO_Output	USB_OTG_FS_PWR_EN
83	VSS	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
84	VDD	Power		
92	PG7	I/O	GPIO_EXTI7	USB_OTG_FS_OVCR
94	VSS	Power		
95	VDD33_USB	Power		
100	PA8	I/O	USB_OTG_FS_SOF	
101	PA9	I/O	USB_OTG_FS_VBUS	
103	PA11	I/O	USB_OTG_FS_DM	
104	PA12	I/O	USB_OTG_FS_DP	
106	VCAP	Power		
107	VSS	Power		
108	VDD	Power		
120	VSS	Power		
121	VDD	Power		
126	PG11	I/O	ETH_TX_EN	
128	PG13	I/O	ETH_TXD0	
130	VSS	Power		
131	VDD	Power		
138	BOOT0	Boot		
142	PE1 **	I/O	GPIO_Output	LD2 [Yellow Led]
143	PDR_ON	Reset		
144	VDD	Power		

** The pin is affected with an I/O function

* The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	STM32_EMB
Project Folder	C:\Users\Felipe\STM32CubeIDE\workspace_1.0.2\STM32_EMB
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_H7 V1.11.1
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_DMA_Init	DMA
4	MX_USART3_UART_Init	USART3
5	MX_USB_OTG_FS_PCD_Init	USB_OTG_FS
6	MX_TIM3_Init	TIM3
7	MX_ETH_Init	ETH
8	MX_ADC1_Init	ADC1

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32H7
Line	STM32H743/753
MCU	STM32H743ZITx
Datasheet	DS12110_Rev8

1.2. Parameter Selection

Temperature	25
Vdd	3.0

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

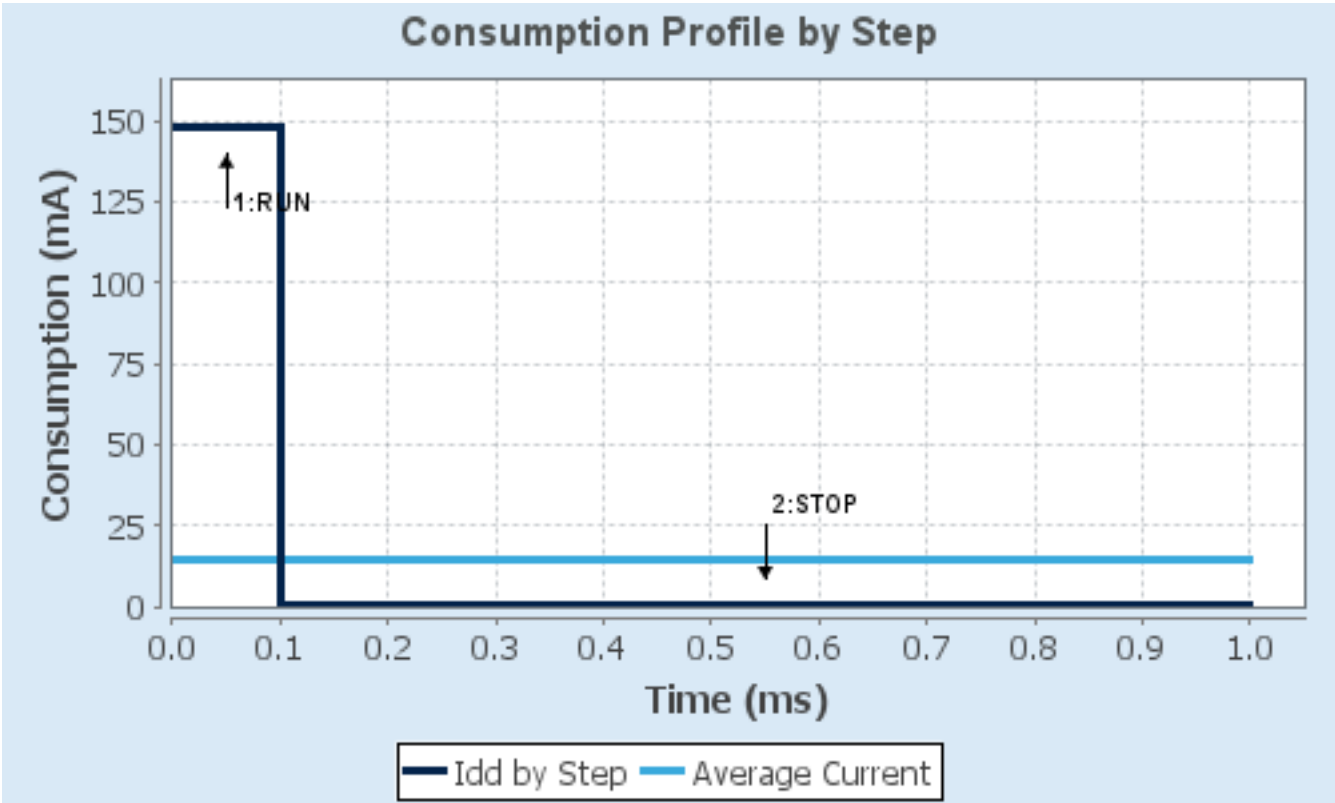
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	VOS0: Scale0-High	SVOS5: System-Scale5
D1 Mode	DRUN/CRUN	DSTANDBY
D2 Mode	DRUN	DSTANDBY
D3 Mode	DRUN	DSTOP
Fetch Type	ITCM	NA
CPU Frequency	480 MHz	0 Hz
Clock Configuration	HSE BYP PLL	Flash-OFF
Clock Source Frequency	24 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	148 mA	150 μ A
Duration	0.1 ms	0.9 ms
DMIPS	1027.0	0.0
Ta Max	105.46	124.98
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	14.94 mA
Battery Life	1 day, 17 hours	Average DMIPS	1027.2001 DMIPS

1.6. Chart



2. Peripherals and Middlewares Configuration

2.1. ADC1

IN5: IN5 Single-ended

2.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Clock Prescaler

Asynchronous clock mode divided by 2 *

Resolution

ADC 12-bit resolution *

Scan Conversion Mode

Enabled

Continuous Conversion Mode

Enabled *

Discontinuous Conversion Mode

Disabled

End Of Conversion Selection

End of single conversion

Overrun behaviour

Overrun data preserved

Left Bit Shift

No bit shift

Conversion Data Management Mode

DMA Circular Mode *

Low Power Auto Wait

Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions

Enable

Enable Regular Oversampling

Disable

Number Of Conversion

10 *

External Trigger Conversion Source

Regular Conversion launched by software

External Trigger Conversion Edge

None

Rank

1

Channel

Channel 5

Sampling Time

1.5 Cycles

Offset Number

No offset

Rank

2 *

Channel

Channel 5

Sampling Time

1.5 Cycles

Offset Number

No offset

Rank

3 *

Channel

Channel 5

Sampling Time

1.5 Cycles

Offset Number

No offset

Rank

4 *

Channel

Channel 5

Sampling Time

1.5 Cycles

Offset Number	No offset
<u>Rank</u>	5 *
Channel	Channel 5
Sampling Time	1.5 Cycles
Offset Number	No offset
<u>Rank</u>	6 *
Channel	Channel 5
Sampling Time	1.5 Cycles
Offset Number	No offset
<u>Rank</u>	7 *
Channel	Channel 5
Sampling Time	1.5 Cycles
Offset Number	No offset
<u>Rank</u>	8 *
Channel	Channel 5
Sampling Time	1.5 Cycles
Offset Number	No offset
<u>Rank</u>	9 *
Channel	Channel 5
Sampling Time	1.5 Cycles
Offset Number	No offset
<u>Rank</u>	10 *
Channel	Channel 5
Sampling Time	1.5 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. ETH

Mode: RMII

2.2.1. Parameter Settings:

General : Ethernet Configuration:

Warning	The ETH can work only when RAM is pointing at 0x24000000
Ethernet MAC Address	00:80:E1:00:00:00
Tx Descriptor Length	4
First Tx Descriptor Address	0x30000200 *
Rx Descriptor Length	4
First Rx Descriptor Address	0x30000000 *
Rx Buffers Length	1524

2.3. RCC

High Speed Clock (HSE): BYPASS Clock Source

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

2.3.1. Parameter Settings:

Power Parameters:

SupplySource	PWR_LDO_SUPPLY
Power Regulator Voltage Scale	Power Regulator Voltage Scale 2 *

RCC Parameters:

TIM Prescaler Selection	Disabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000
CSI Calibration Value	16
HSI Calibration Value	32

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	1 WS (2 CPU cycle)
Product revision	rev.Y

PLL range Parameters:

PLL1 clock Input range	Between 8 and 16 MHz
PLL2 input frequency range	Between 8 and 16 MHz
PLL1 clock Output range	MEDIUM VCO range
PLL2 clock Output range	MEDIUM VCO range

2.4. SYS

Timebase Source: SysTick

2.5. TIM3

Clock Source : Internal Clock

2.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	6399 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	1500 *
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)

2.6. USART3

Mode: Asynchronous

2.6.1. 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

2.7. USB_OTG_FS

Mode: Device_Only

Activate_VBUS: VBUS sensing

mode: Activate_SOF

2.7.1. Parameter Settings:

Speed	Full Speed 12MBit/s
Enable internal IP DMA	Disabled
Low power	Disabled
Battery charging	Enabled
Link Power Management	Disabled
Use dedicated end point 1 interrupt	Disabled
VBUS sensing	Enabled
Signal start of frame	Enabled

*** 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	PB1	ADC1_INP5	Analog mode	No pull-up and no pull-down	n/a	
ETH	PC1	ETH_MDC	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA1	ETH_REF_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA2	ETH_MDIO	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA7	ETH_CRS_DV	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC4	ETH_RXD0	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC5	ETH_RXD1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB13	ETH_TXD1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PG11	ETH_TX_EN	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PG13	ETH_TXD0	Alternate Function Push Pull	No pull-up and no pull-down	Low	
RCC	PC14-OSC32_IN (OSC32_IN)	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PH0-OSC_IN (PH0)	RCC_OSC_IN	n/a	n/a	n/a	
USART3	PD8	USART3_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	STLINK_RX
	PD9	USART3_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	STLINK_TX
USB_OTG_FS	PA8	USB_OTG_FS_SOF	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	n/a	
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	
Single Mapped Signals	PH1-OSC_OUT (PH1)	RCC_OSC_OUT	n/a	n/a	n/a	
GPIO	PC13	GPIO_EXTI13	External Interrupt Mode with Falling edge trigger detection	No pull-up and no pull-down	n/a	BTN
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD1 [Green Led]
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Red Led]
	PD10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	USB_OTG_FS_PWR_EN

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PG7	GPIO_EXTI7	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	USB_OTG_FS_OVCR
	PE1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Yellow Led]

3.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA2_Stream0	Peripheral To Memory	Low

ADC1: DMA2_Stream0 DMA request Settings:

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

3.3. BDMA configuration

nothing configured in DMA service

3.4. MDMA configuration

nothing configured in DMA service

3.5. NVIC configuration

3.5.1. 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	0	0
System tick timer	true	0	0
TIM3 global interrupt	true	0	0
EXTI line[15:10] interrupts	true	0	0
DMA2 stream0 global interrupt	true	0	0
PVD and AVD interrupts through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
EXTI line[9:5] interrupts	unused		
USART3 global interrupt	unused		
Ethernet global interrupt	unused		
Ethernet wake-up interrupt through EXTI line 86	unused		
FPU global interrupt	unused		
USB On The Go FS End Point 1 Out global interrupt	unused		
USB On The Go FS End Point 1 In global interrupt	unused		
USB On The Go FS global interrupt	unused		
HSEM1 global interrupt	unused		

3.5.2. 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	true	false

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
TIM3 global interrupt	false	true	true
EXTI line[15:10] interrupts	false	true	true
DMA2 stream0 global interrupt	false	true	true

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

Category view

Power Domain view

Choose filters ...

... by Power Domain

D1

D2

D3

None

Middleware

System Core

Analog

Timers

Connectivity

Multimedia

Security

Computing

Trace and Debug

Power and Thermal

BDMA

CORTEX_M7

DMA

GPIO

MDMA

IVIC

RCC

SYS

ADC1

TIM3

ETH

USART3

USB_FS

Page 20

4.1.2. Without filters

Category view

Power Domain view

Choose filters ...

... by Power Domain

D1

D2

D3

None

Middleware

System Core

Analog

Timers

Connectivity

Multimedia

Security

Computing

Trace and Debug

Power and Thermal

BDMA

CORTEX_M7

DMA

GPIO

MDMA

NVIC

RCC

SYS

ADC1

TIM3

ETH

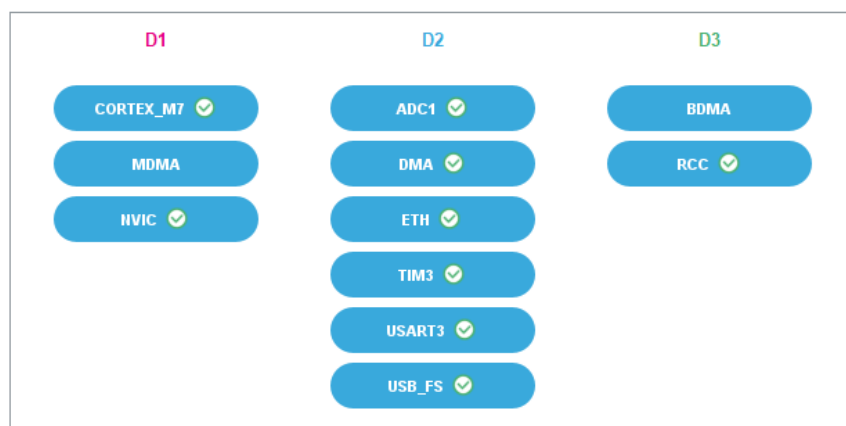
USART3

USB_FS

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4.2. Power Domain view

Category view Power Domain view



5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32h7_bsd1.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32h7_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32h7-svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers_stm32h7_series_product_overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32h7.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32h7vl.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
Flyers	https://www.st.com/resource/en/flyer/flpowerstbd.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus

and-mpus-stmicroelectronics.pdf

- Application Notes https://www.st.com/resource/en/application_note/an2834-how-to-get-the-best-adc-accuracy-in-stm32-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an2867-oscillator-design-guide-for-stm8afals-stm32-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-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/an4013-stm32-crossseries-timer-overview-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/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4286-spi-protocol-used-in-the-stm32-bootloader-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
- Application Notes https://www.st.com/resource/en/application_note/an4635-minimization-of-power-consumption-using-lpuart-for-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/an4759-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-microcontrollers-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/an4861-lcdtft-display-controller-ltcd-on-stm32-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4891-stm32h72x-stm32h73x-and-singlecore-stm32h74x75x-system-architecture-and-performance-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4908-stm32-usart-automatic-baud-rate-detection-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/an4938-getting-started-with-stm32h74xig-and-stm32h75xig-hardware-development-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/an4996-hardware-jpeg-codec-peripheral-in-stm32f7677xxx-and-

stm32h743534555475750a3b3b0xx-microcontrollers-
stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an5020-digital-camera-interface-dcml-on-stm32-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf

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