
STM32
CubeMX

1. Description

1.1. Project

Project Name	h7a3zi_combine2
Board Name	NUCLEO-H7A3ZI-Q
Generated with:	STM32CubeMX 6.6.1
Date	05/29/2023

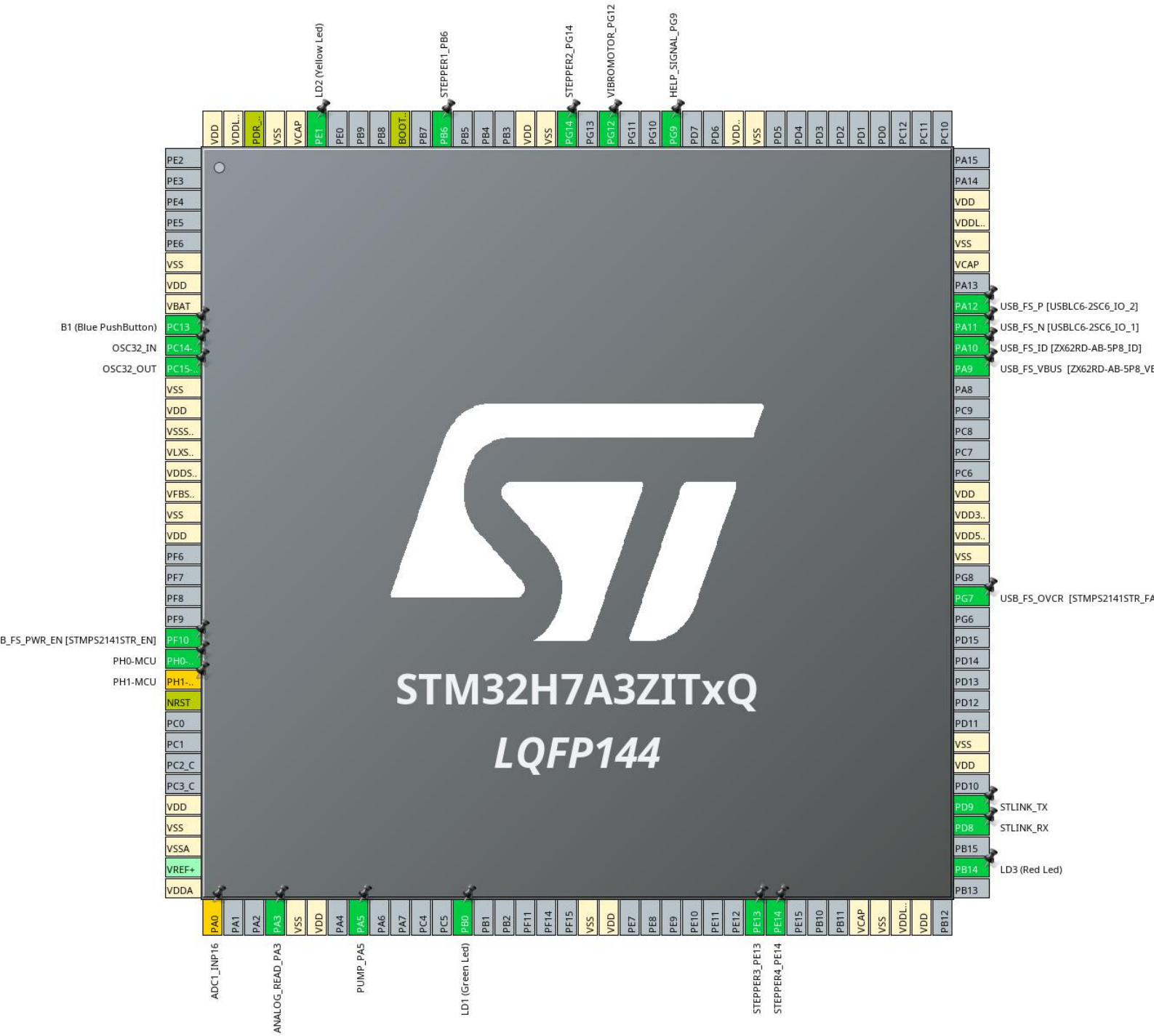
1.2. MCU

MCU Series	STM32H7
MCU Line	STM32H7A3/7B3
MCU name	STM32H7A3ZITxQ
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	Arm Cortex-M7

2. Pinout Configuration



3. Pins Configuration

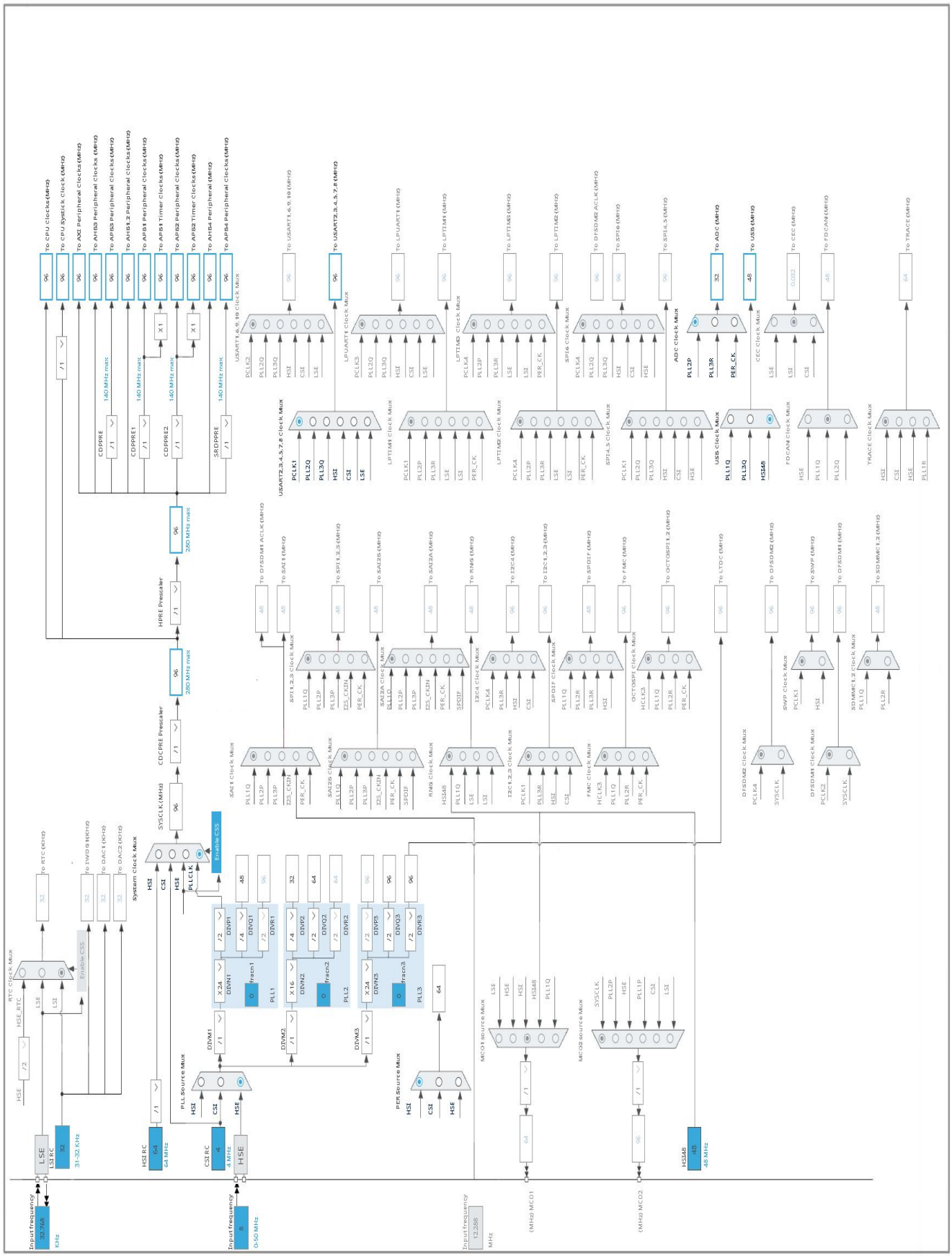
Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VSS	Power		
7	VDD	Power		
8	VBAT	Power		
9	PC13 *	I/O	GPIO_Input	B1 (Blue PushButton)
10	PC14-OSC32_IN	I/O	RCC_OSC32_IN	OSC32_IN
11	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	OSC32_OUT
12	VSS	Power		
13	VDD	Power		
14	VSSSMPS	Power		
15	VLXSMPS	Power		
16	VDDSMPS	Power		
17	VFBSMPS	Power		
18	VSS	Power		
19	VDD	Power		
24	PF10 *	I/O	GPIO_Output	USB_FS_PWR_EN [STMPS2141STR_EN]
25	PH0-OSC_IN	I/O	RCC_OSC_IN	PH0-MCU
26	PH1-OSC_OUT **	I/O	RCC_OSC_OUT	PH1-MCU
27	NRST	Reset		
32	VDD	Power		
33	VSS	Power		
34	VSSA	Power		
36	VDDA	Power		
37	PA0 **	I/O	ADC1_INP16	
40	PA3	I/O	ADC1_INP15	ANALOG_READ_PA3
41	VSS	Power		
42	VDD	Power		
44	PA5 *	I/O	GPIO_Output	PUMP_PA5
49	PB0 *	I/O	GPIO_Output	LD1 (Green Led)
55	VSS	Power		
56	VDD	Power		
63	PE13 *	I/O	GPIO_Output	STEPPER3_PE13
64	PE14 *	I/O	GPIO_Output	STEPPER4_PE14
68	VCAP	Power		
69	VSS	Power		
70	VDDLDO	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
71	VDD	Power		
74	PB14 *	I/O	GPIO_Output	LD3 (Red Led)
76	PD8	I/O	USART3_TX	STLINK_RX
77	PD9	I/O	USART3_RX	STLINK_TX
79	VDD	Power		
80	VSS	Power		
87	PG7	I/O	GPIO_EXTI7	USB_FS_OVCR [STMPS2141STR_FAULT]
89	VSS	Power		
90	VDD50_USB	Power		
91	VDD33_USB	Power		
92	VDD	Power		
98	PA9	I/O	USB_OTG_HS_VBUS	USB_FS_VBUS [ZX62RD-AB-5P8_VBUS]
99	PA10	I/O	USB_OTG_HS_ID	USB_FS_ID [ZX62RD-AB-5P8_ID]
100	PA11	I/O	USB_OTG_HS_DM	USB_FS_N [USBLC6-2SC6_IO_1]
101	PA12	I/O	USB_OTG_HS_DP	USB_FS_P [USBLC6-2SC6_IO_2]
103	VCAP	Power		
104	VSS	Power		
105	VDDLDO	Power		
106	VDD	Power		
118	VSS	Power		
119	VDDMMC	Power		
122	PG9 *	I/O	GPIO_Output	HELP_SIGNAL_PG9
125	PG12 *	I/O	GPIO_Output	VIBROMOTOR_PG12
127	PG14 *	I/O	GPIO_Output	STEPPER2_PG14
128	VSS	Power		
129	VDD	Power		
133	PB6 *	I/O	GPIO_Output	STEPPER1_PB6
135	BOOT0	Boot		
139	PE1 *	I/O	GPIO_Output	LD2 (Yellow Led)
140	VCAP	Power		
141	VSS	Power		
142	PDR_ON	Reset		
143	VDDLDO	Power		
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	h7a3zi_combine2
Project Folder	/home/mangust/mangust@sic_backup/dev/stm32/h7a3zi_combine1
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_H7 V1.10.0
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_USART3_UART_Init	USART3
4	MX_USB_OTG_HS_USB_Init	USB_OTG_HS
5	MX_ADC1_Init	ADC1
6	MX_TIM16_Init	TIM16
7	MX_TIM17_Init	TIM17

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32H7
Line	STM32H7A3/7B3
MCU	STM32H7A3ZITxQ
Datasheet	DS13139_Rev0

6.2. Parameter Selection

Temperature	25
Vdd	3.0

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

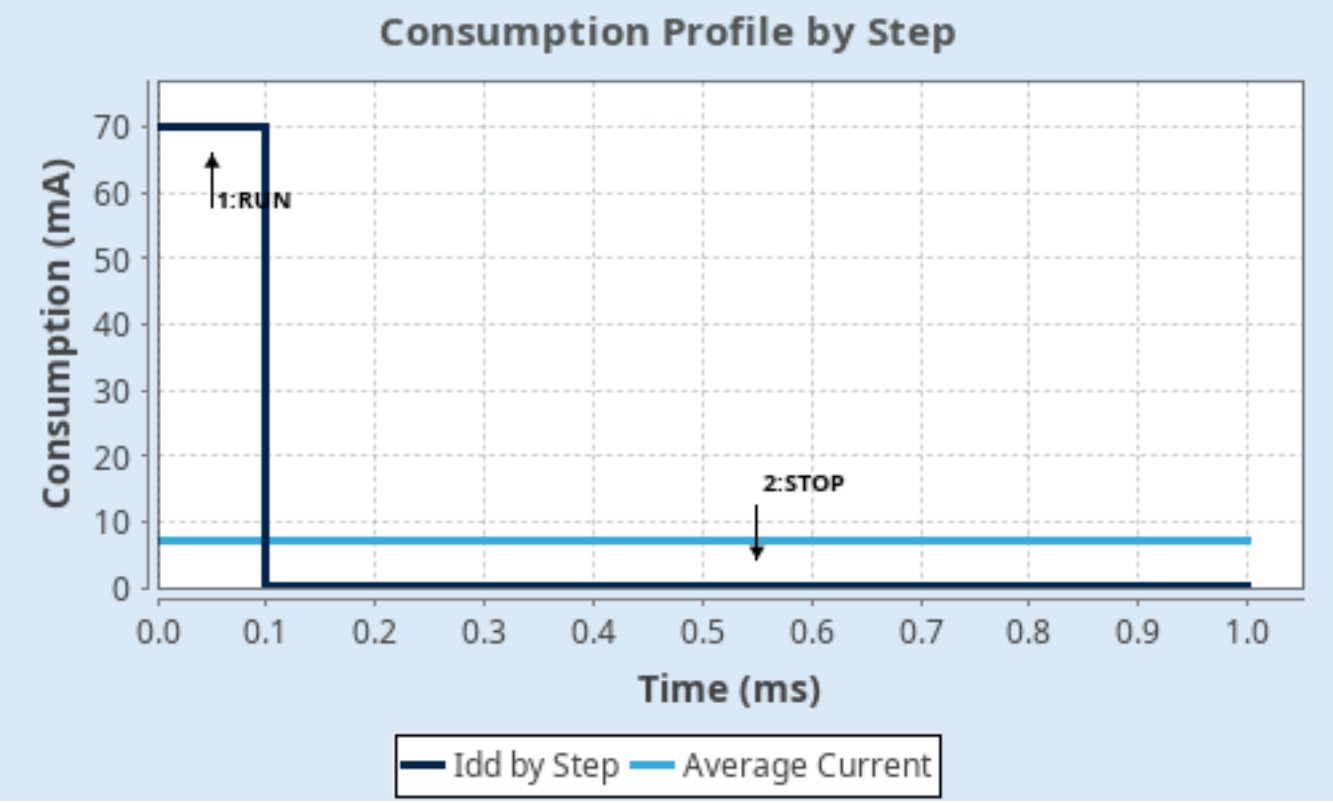
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	VOS0	SVOS5
SRDomain	DRUN	DSTOP
n/a	SRDRUN	SRDSTOP
Fetch Type	ITCM/DTCM/Cache	NA
CPU Frequency	280 MHz	64 MHz
Clock Configuration	HSE PLL	HSI Flash-ON
Clock Source Frequency	16 MHz	64 MHz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	69.92 mA	263.82 µA
Duration	0.1 ms	0.9 ms
DMIPS	599.0	0.0
Ta Max	115.77	124.97
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	7.23 mA
Battery Life	19 days, 14 hours	Average DMIPS	599.2 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
70
60
50
40
30
20
10
0
1:RUN
2:STOP
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

7. Peripherals and Middlewares Configuration

7.1. ADC1

mode: IN15

7.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	Asynchronous clock mode divided by 1
Resolution	ADC 16-bit resolution
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
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	Regular Conversion data stored in DR register only
Low Power Auto Wait	Disabled

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 15
Sampling Time	1.5 Cycles
Offset Number	No offset
Offset Signed Saturation	Disable

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

7.2. RCC

High Speed Clock (HSE): BYPASS Clock Source

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.2.1. Parameter Settings:

Power Parameters:

SupplySource	PWR_DIRECT_SMPS_SUPPLY
Power Regulator Voltage Scale	**Power Regulator Voltage Scale 0 ***

RCC Parameters:

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

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	2 WS (3 CPU cycle)

PLL range Parameters:

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

7.3. SYS

Timebase Source: SysTick

7.4. TIM16

mode: Activated

7.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**9600-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**20000-1 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0

auto-reload preload	Disable

7.5. TIM17

mode: Activated

7.5.1. 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 - 8 bits value)	0
auto-reload preload	Disable

7.6. USART3

Mode: Asynchronous

7.6.1. 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

7.7. USB_OTG_HS
Internal FS Phy: OTG/Dual_Role_Device
Activate_VBUS: Activate-VBUS

*** 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	PA3	ADC1_INP15	Analog mode	No pull-up and no pull-down	n/a	ANALOG_READ_PA3
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	OSC32_IN
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	OSC32_OUT
	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	PH0-MCU
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_HS	PA9	USB_OTG_HS_VBUS	Input mode	No pull-up and no pull-down	n/a	USB_FS_VBUS [ZX62RD-AB-5P8_VBUS]
	PA10	USB_OTG_HS_ID	Alternate Function Push Pull	No pull-up and no pull-down	Low	USB_FS_ID [ZX62RD-AB-5P8_ID]
	PA11	USB_OTG_HS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	USB_FS_N [USBLC6-2SC6_IO_1]
	PA12	USB_OTG_HS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	USB_FS_P [USBLC6-2SC6_IO_2]
Single Mapped Signals	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	PH1-MCU
	PA0	ADC1_INP16	Analog mode	No pull-up and no pull-down	n/a	
GPIO	PC13	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	B1 (Blue PushButton)
	PF10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	USB_FS_PWR_EN [STMPS2141STR_EN]
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PUMP_PA5
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD1 (Green Led)
	PE13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	STEPPER3_PE13
	PE14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	STEPPER4_PE14
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 (Red Led)
	PG7	GPIO_EXTI7	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	USB_FS_OVCR [STMPS2141STR_FAULT]
	PG9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	HELP_SIGNAL_PG9
	PG12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	VIBROMOTOR_PG12
	PG14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	STEPPER2_PG14
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	STEPPER1_PB6
	PE1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 (Yellow Led)

8.2. DMA configuration

nothing configured in DMA service

8.3. BDMA1 configuration

nothing configured in DMA service

8.4. BDMA2 configuration

nothing configured in DMA service

8.5. MDMA configuration

nothing configured in DMA service

8.6. NVIC configuration

8.6.1. 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
TIM17 global interrupt	true	0	0
PVD and PVM interrupts through EXTI line	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		
FPU global interrupt	unused		
TIM16 global interrupt	unused		
HSEM1 global interrupt	unused		
ECC diagnostic Global Interrupt	unused		

8.6.2. NVIC Code generation

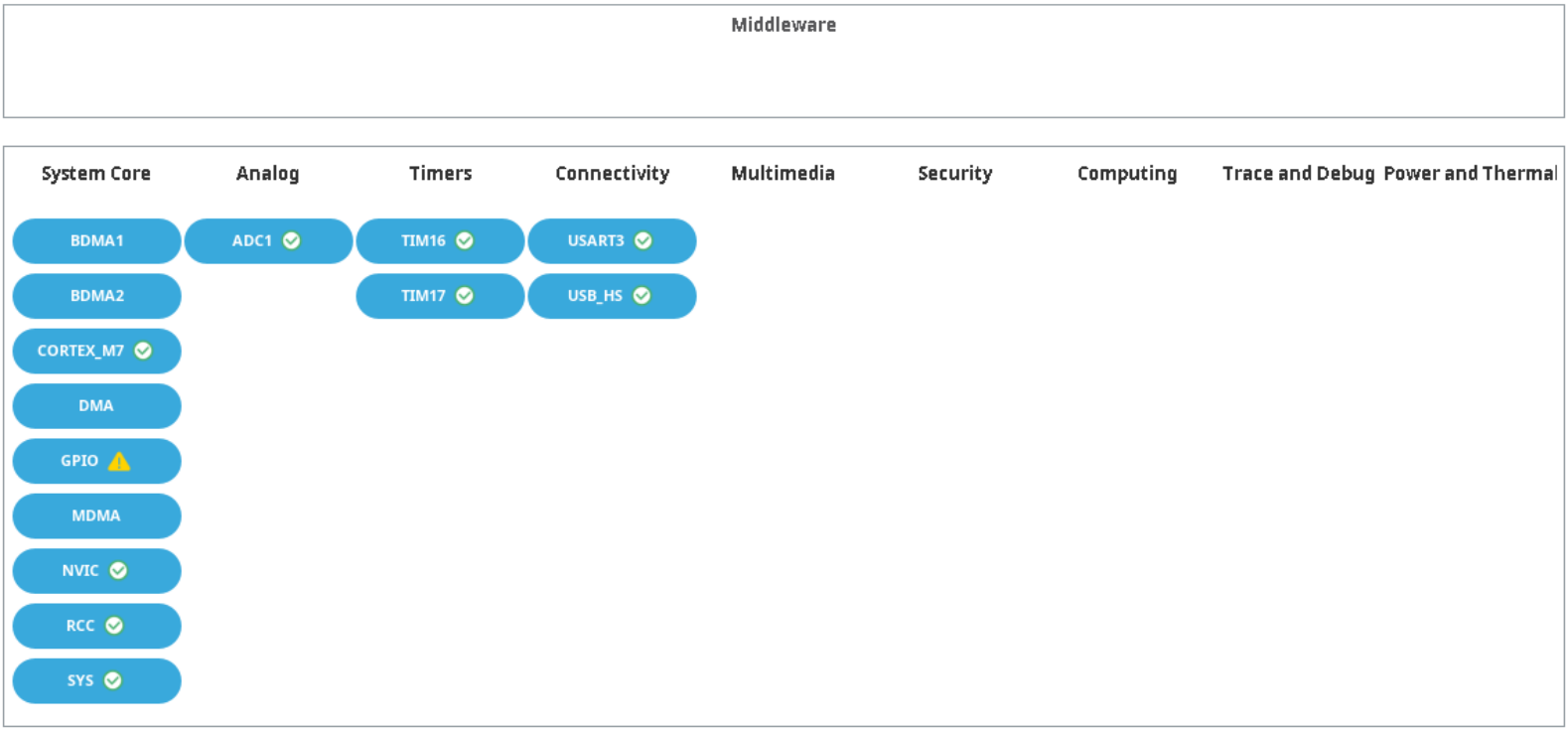
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
TIM17 global interrupt	false	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link