
STM32
CubeMX

1. Description

1.1. Project

Project Name	ProjectObelisk
Board Name	custom
Generated with:	STM32CubeMX 6.13.0
Date	12/17/2024

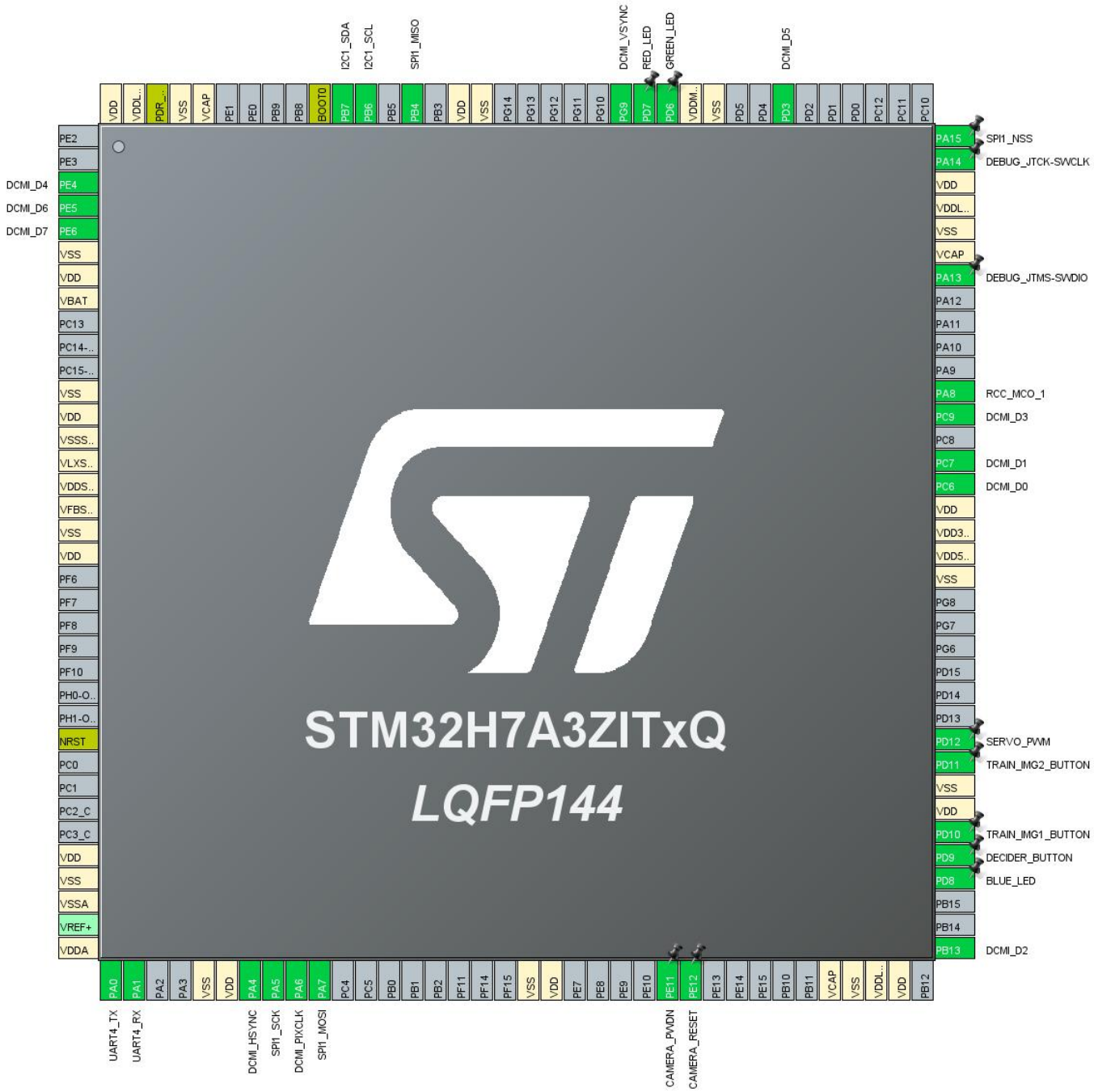
1.2. MCU

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



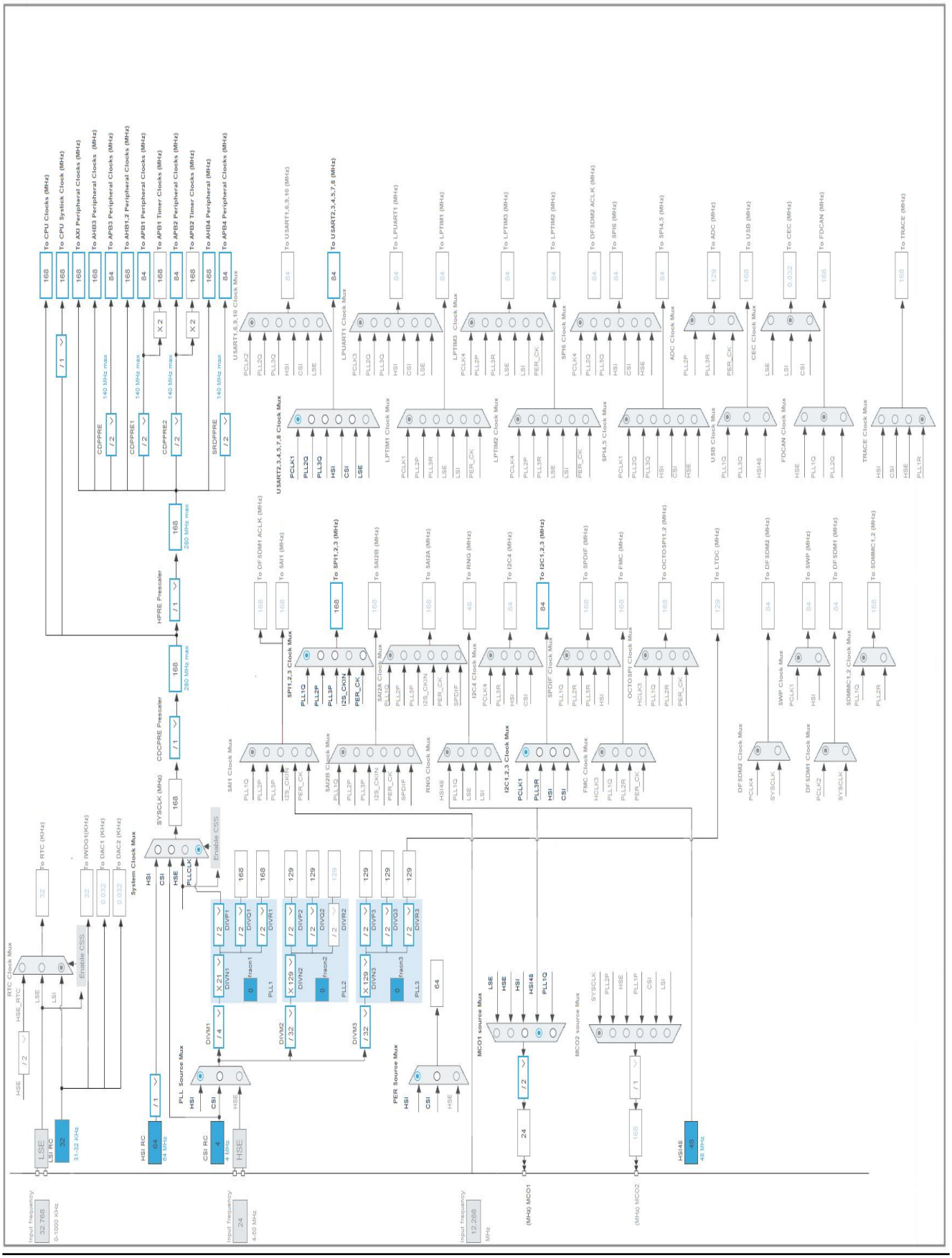
3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
3	PE4	I/O	DCMI_D4	
4	PE5	I/O	DCMI_D6	
5	PE6	I/O	DCMI_D7	
6	VSS	Power		
7	VDD	Power		
8	VBAT	Power		
12	VSS	Power		
13	VDD	Power		
14	VSSSMPS	Power		
15	VLXSMPS	Power		
16	VDDSMPS	Power		
17	VFBSMPS	Power		
18	VSS	Power		
19	VDD	Power		
27	NRST	Reset		
32	VDD	Power		
33	VSS	Power		
34	VSSA	Power		
36	VDDA	Power		
37	PA0	I/O	UART4_TX	
38	PA1	I/O	UART4_RX	
41	VSS	Power		
42	VDD	Power		
43	PA4	I/O	DCMI_HSYNC	
44	PA5	I/O	SPI1_SCK	
45	PA6	I/O	DCMI_PIXCLK	
46	PA7	I/O	SPI1_MOSI	
55	VSS	Power		
56	VDD	Power		
61	PE11 *	I/O	GPIO_Output	CAMERA_PWDN
62	PE12 *	I/O	GPIO_Output	CAMERA_RESET
68	VCAP	Power		
69	VSS	Power		
70	VDDLDO	Power		
71	VDD	Power		
73	PB13	I/O	DCMI_D2	

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
76	PD8 *	I/O	GPIO_Output	BLUE_LED
77	PD9 *	I/O	GPIO_Input	DECIDER_BUTTON
78	PD10 *	I/O	GPIO_Input	TRAIN_IMG1_BUTTON
79	VDD	Power		
80	VSS	Power		
81	PD11 *	I/O	GPIO_Input	TRAIN_IMG2_BUTTON
82	PD12	I/O	TIM4_CH1	SERVO_PWM
89	VSS	Power		
90	VDD50_USB	Power		
91	VDD33_USB	Power		
92	VDD	Power		
93	PC6	I/O	DCMI_D0	
94	PC7	I/O	DCMI_D1	
96	PC9	I/O	DCMI_D3	
97	PA8	I/O	RCC_MCO_1	
102	PA13	I/O	DEBUG_JTMS-SWDIO	
103	VCAP	Power		
104	VSS	Power		
105	VDDLDO	Power		
106	VDD	Power		
107	PA14	I/O	DEBUG_JTCK-SWCLK	
108	PA15	I/O	SPI1_NSS	
115	PD3	I/O	DCMI_D5	
118	VSS	Power		
119	VDDMMC	Power		
120	PD6 *	I/O	GPIO_Output	GREEN_LED
121	PD7 *	I/O	GPIO_Output	RED_LED
122	PG9	I/O	DCMI_VSYNC	
128	VSS	Power		
129	VDD	Power		
131	PB4	I/O	SPI1_MISO	
133	PB6	I/O	I2C1_SCL	
134	PB7	I/O	I2C1_SDA	
135	BOOT0	Boot		
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

4. Clock Tree Configuration



1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32H7
Line	STM32H7A3/7B3
MCU	STM32H7A3ZITxQ
Datasheet	DS13139_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

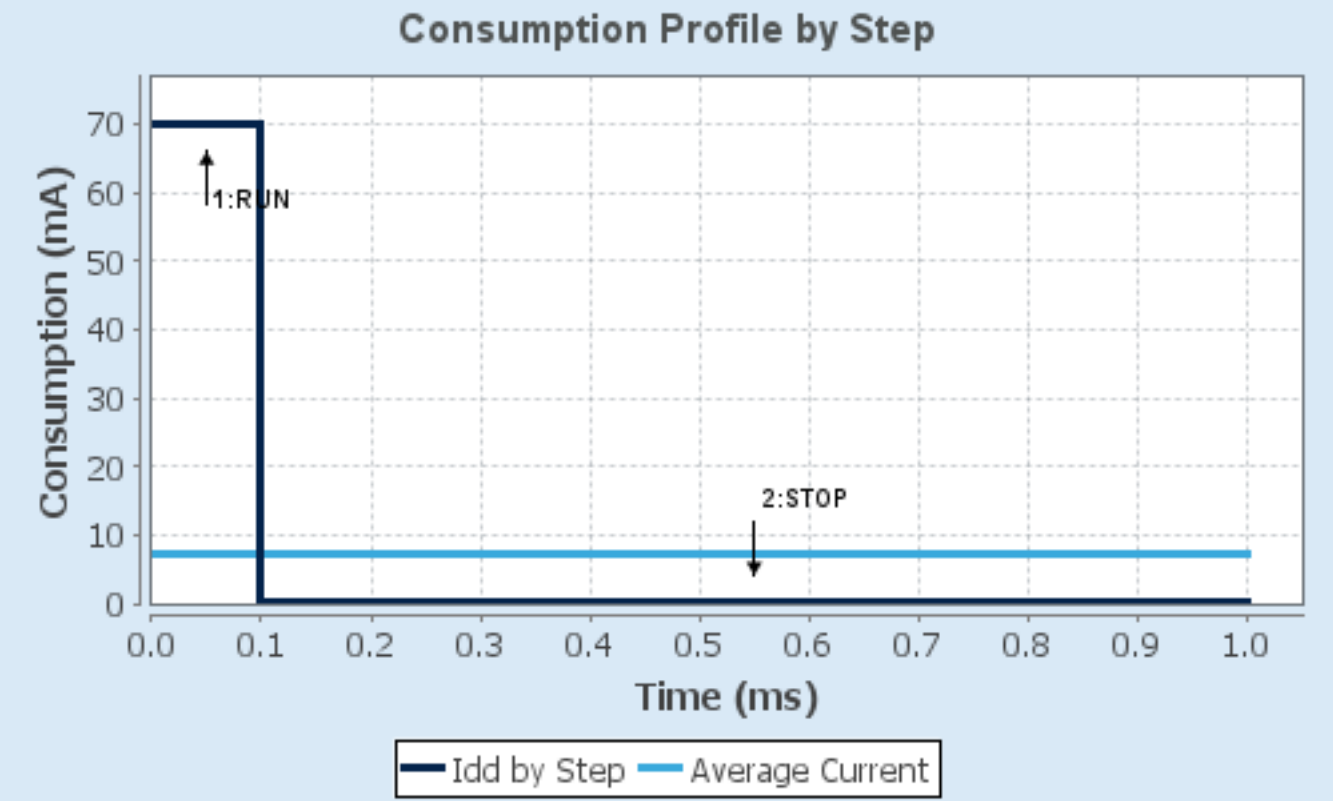
1.4. Sequence

Step	Step1	Step2
Mode	RUN	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

1.5. Results

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

1.6. 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

2. Software Project

2.1. Project Settings

Name	Value
Project Name	ProjectObelisk
Project Folder	C:\Users\BRADE\ECE395\ProjectObelisk
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_H7 V1.12.0
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	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

2.3. 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_DCMI_Init	DCMI
5	MX_I2C1_Init	I2C1
6	MX_SPI1_Init	SPI1
7	MX_UART4_Init	UART4
8	MX_TIM4_Init	TIM4

3. Peripherals and Middlewares Configuration

3.1. CORTEX_M7

3.1.1. Parameter Settings:

Speculation default mode Settings:

Speculation default mode	**Enabled ***

Cortex Interface Settings:

CPU ICache	Disabled
CPU DCache	Disabled

Cortex Memory Protection Unit Control Settings:

MPU Control Mode	Background Region Privileged accesses only + MPU Disabled during hard fault, NMI and FAULTMASK handlers

Cortex Memory Protection Unit Region 0 Settings:

MPU Region	Enabled
MPU Region Base Address	**0x0 ***
MPU Region Size	4GB
MPU SubRegion Disable	**0x87 ***
MPU TEX field level	level 0
MPU Access Permission	ALL ACCESS NOT PERMITTED
MPU Instruction Access	DISABLE
MPU Shareability Permission	ENABLE
MPU Cacheable Permission	DISABLE
MPU Bufferable Permission	DISABLE

Cortex Memory Protection Unit Region 1 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 2 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 3 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 4 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 5 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 6 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 7 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 8 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 9 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 10 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 11 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 12 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 13 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 14 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 15 Settings:

MPU Region	Disabled

3.2. DCMI

DCMI: Slave 8 bits External Synchro

3.2.1. Parameter Settings:

Mode Config:

Pixel clock polarity	**Active on Rising edge ***
Vertical synchronization polarity	**Active High ***
Horizontal synchronization polarity	Active Low
Frequency of frame capture	All frames are captured
JPEG mode	Disabled

Interface Capture Config:

Byte Select Mode	Interface captures all received bytes
Line Select Mode	Interface captures all received lines

3.3. DEBUG

Debug: Serial Wire

3.4. I2C1

I2C: I2C

3.4.1. Parameter Settings:

Timing configuration:

Custom Timing	Disabled
I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	**0x10A0A4F8 ***

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

3.5. MEMORYMAP
mode: Activated

3.6. RCC
mode: Master Clock Output 1
3.6.1. Parameter Settings:

Power Parameters:

SupplySource	PWR_DIRECT_SMPS_SUPPLY
Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

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	64

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	4 WS (5 CPU cycle)

PLL range Parameters:

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

3.7. SPI1

Mode: Full-Duplex Master

Hardware NSS Signal: Hardware NSS Input Signal

3.7.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	4 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**84.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Input Hardware
Fifo Threshold	Fifo Threshold 01 Data
Tx Crc Initialization Pattern	All Zero Pattern
Rx Crc Initialization Pattern	All Zero Pattern
Nss Polarity	Nss Polarity Low
Master Ss Idleness	00 Cycle
Master Inter Data Idleness	00 Cycle
Master Receiver Auto Susp	Disable
Master Keep Io State	Master Keep Io State Disable
IO Swap	Disabled

3.8. SYS

Timebase Source: SysTick

3.9. TIM4

Clock Source : Internal Clock

Channel1: PWM Generation CH1

3.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**168-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**20-1 ***
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)

Clear Input:

Clear Input Source	Disable

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

3.10. UART4

Mode: Asynchronous

3.10.1. Parameter Settings:

Basic Parameters:

Baud Rate	**19200 ***
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	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
DCMI	PE4	DCMI_D4	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PE5	DCMI_D6	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PE6	DCMI_D7	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PA4	DCMI_HSYNC	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PA6	DCMI_PIXCLK	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PB13	DCMI_D2	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PC6	DCMI_D0	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PC7	DCMI_D1	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PC9	DCMI_D3	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PD3	DCMI_D5	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
	PG9	DCMI_VSYNC	Alternate Function Push Pull	**Pull-down ***	**Very High ***	
DEBUG	PA13	DEBUG_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	DEBUG_JTCK-SWCLK	n/a	n/a	n/a	
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PB7	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
RCC	PA8	RCC_MCO_1	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA15	SPI1_NSS	Alternate Function Push Pull	No pull-up and no pull-down	Low	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB4	SPI1_MISO	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	SERVO_PWM
UART4	PA0	UART4_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA1	UART4_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PE11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CAMERA_PWDN
	PE12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CAMERA_RESET
	PD8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BLUE_LED
	PD9	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	DECIDER_BUTTON
	PD10	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	TRAIN_IMG1_BUTTON
	PD11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	TRAIN_IMG2_BUTTON
	PD6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GREEN_LED
	PD7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RED_LED

4.2. DMA configuration

DMA request	Stream	Direction	Priority
DCMI	DMA1_Stream0	Peripheral To Memory	Low

DCMI: DMA1_Stream0 DMA request Settings:

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

4.3. BDMA1 configuration

nothing configured in DMA service

4.4. BDMA2 configuration

nothing configured in DMA service

4.5. MDMA configuration

nothing configured in DMA service

4.6. NVIC configuration

4.6.1. 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	15	0
DMA1 stream0 global interrupt	true	0	0
DCMI and PSSI global interrupt	true	0	0
PVD and PVM interrupts through EXTI line	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
TIM4 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		
UART4 global interrupt	unused		
FPU global interrupt	unused		
HSEM1 global interrupt	unused		

4.6.2. 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
DMA1 stream0 global interrupt	false	true	true
DCMI and PSSI 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/stm32h7_bsdl.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
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers_stm32h7a3-b3_line_product-overview.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-stm32h7rs-lines-overview.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32h7.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/flstm32h7rs.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/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-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/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/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/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/an5020-digital-camera-interface-dcmi-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
Application Notes	https://www.st.com/resource/en/application_note/an5033-stm32cube-mcu-package-examples-for-stm32h7-series-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/an5307-getting-started-with-stm32h7a37b3-line-and-stm32h7b0-value-line-microcontroller-hardware-development-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/an5450-stm32h7a37b3-lines-and-stm32h7b0-value-line-smart-power-management-expansion-package-for-stm32cube-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5293-migration-guide-from-stm32f7-series-to-stmh74x75x-stm32h72x73x-and-stmh7a37bx-devices-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/an5927-i3c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5342--how-to-use-error-correction-code-ecc-management-for-internal-memories-protection-

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