
STM32
CubeMX

1. Description

1.1. Project

Project Name	CustomSTM32H735
Board Name	custom
Generated with:	STM32CubeMX 6.11.1
Date	06/10/2024

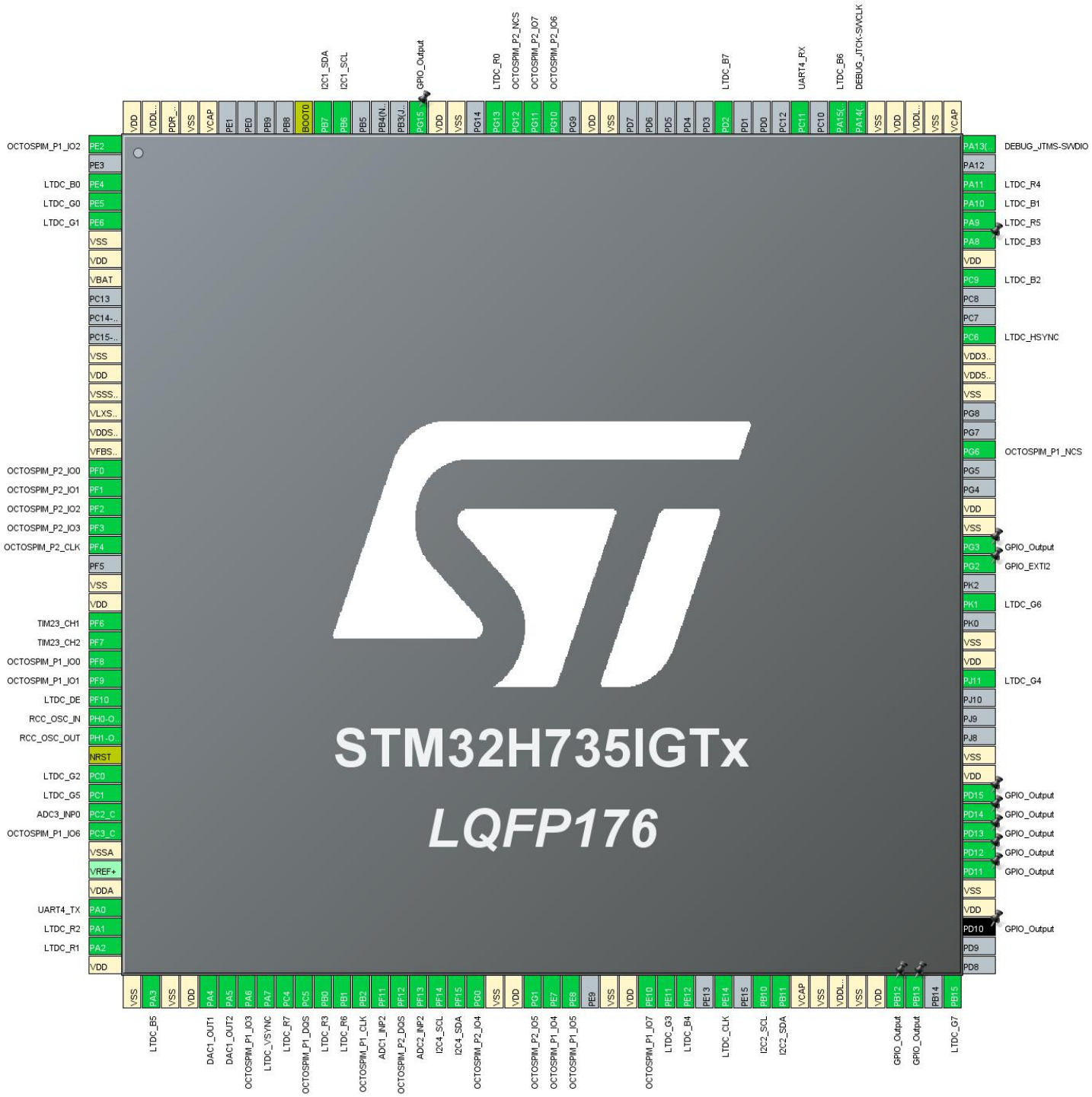
1.2. MCU

MCU Series	STM32H7
MCU Line	STM32H725/735
MCU name	STM32H735IGTx
MCU Package	LQFP176
MCU Pin number	176

1.3. Core(s) information

Core(s)	Arm Cortex-M7

2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2	I/O	OCTOSPIM_P1_IO2	
3	PE4	I/O	LTDC_B0	
4	PE5	I/O	LTDC_G0	
5	PE6	I/O	LTDC_G1	
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	PF0	I/O	OCTOSPIM_P2_IO0	
19	PF1	I/O	OCTOSPIM_P2_IO1	
20	PF2	I/O	OCTOSPIM_P2_IO2	
21	PF3	I/O	OCTOSPIM_P2_IO3	
22	PF4	I/O	OCTOSPIM_P2_CLK	
24	VSS	Power		
25	VDD	Power		
26	PF6	I/O	TIM23_CH1	
27	PF7	I/O	TIM23_CH2	
28	PF8	I/O	OCTOSPIM_P1_IO0	
29	PF9	I/O	OCTOSPIM_P1_IO1	
30	PF10	I/O	LTDC_DE	
31	PH0-OSC_IN	I/O	RCC_OSC_IN	
32	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
33	NRST	Reset		
34	PC0	I/O	LTDC_G2	
35	PC1	I/O	LTDC_G5	
36	PC2_C	I/O	ADC3_INP0	
37	PC3_C	I/O	OCTOSPIM_P1_IO6	
38	VSSA	Power		
40	VDDA	Power		
41	PA0	I/O	UART4_TX	
42	PA1	I/O	LTDC_R2	

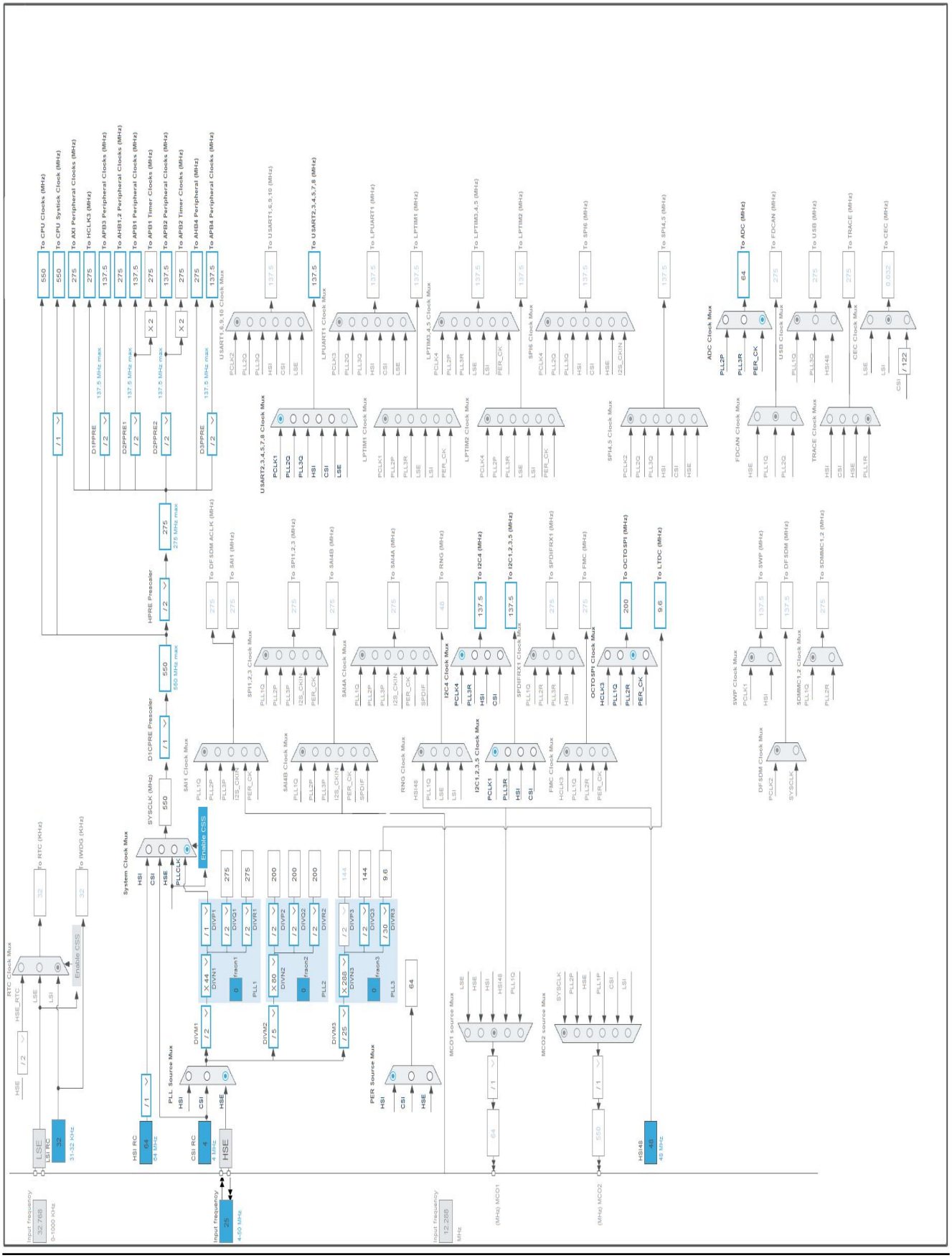
Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
43	PA2	I/O	LTDC_R1	
44	VDD	Power		
45	VSS	Power		
46	PA3	I/O	LTDC_B5	
47	VSS	Power		
48	VDD	Power		
49	PA4	I/O	DAC1_OUT1	
50	PA5	I/O	DAC1_OUT2	
51	PA6	I/O	OCTOSPIM_P1_IO3	
52	PA7	I/O	LTDC_VSYNC	
53	PC4	I/O	LTDC_R7	
54	PC5	I/O	OCTOSPIM_P1_DQS	
55	PB0	I/O	LTDC_R3	
56	PB1	I/O	LTDC_R6	
57	PB2	I/O	OCTOSPIM_P1_CLK	
58	PF11	I/O	ADC1_INP2	
59	PF12	I/O	OCTOSPIM_P2_DQS	
60	PF13	I/O	ADC2_INP2	
61	PF14	I/O	I2C4_SCL	
62	PF15	I/O	I2C4_SDA	
63	PG0	I/O	OCTOSPIM_P2_IO4	
64	VSS	Power		
65	VDD	Power		
66	PG1	I/O	OCTOSPIM_P2_IO5	
67	PE7	I/O	OCTOSPIM_P1_IO4	
68	PE8	I/O	OCTOSPIM_P1_IO5	
70	VSS	Power		
71	VDD	Power		
72	PE10	I/O	OCTOSPIM_P1_IO7	
73	PE11	I/O	LTDC_G3	
74	PE12	I/O	LTDC_B4	
76	PE14	I/O	LTDC_CLK	
78	PB10	I/O	I2C2_SCL	
79	PB11	I/O	I2C2_SDA	
80	VCAP	Power		
81	VSS	Power		
82	VDDLDO	Power		
83	VSS	Power		
84	VDD	Power		

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
85	PB12 *	I/O	GPIO_Output	
86	PB13 *	I/O	GPIO_Output	
88	PB15	I/O	LTDC_G7	
91	PD10 *	I/O	GPIO_Output	
92	VDD	Power		
93	VSS	Power		
94	PD11 *	I/O	GPIO_Output	
95	PD12 *	I/O	GPIO_Output	
96	PD13 *	I/O	GPIO_Output	
97	PD14 *	I/O	GPIO_Output	
98	PD15 *	I/O	GPIO_Output	
99	VDD	Power		
100	VSS	Power		
104	PJ11	I/O	LTDC_G4	
105	VDD	Power		
106	VSS	Power		
108	PK1	I/O	LTDC_G6	
110	PG2	I/O	GPIO_EXTI2	
111	PG3 *	I/O	GPIO_Output	
112	VSS	Power		
113	VDD	Power		
116	PG6	I/O	OCTOSPIM_P1_NCS	
119	VSS	Power		
120	VDD50USB	Power		
121	VDD33USB	Power		
122	PC6	I/O	LTDC_HSYNC	
125	PC9	I/O	LTDC_B2	
126	VDD	Power		
127	PA8	I/O	LTDC_B3	
128	PA9	I/O	LTDC_R5	
129	PA10	I/O	LTDC_B1	
130	PA11	I/O	LTDC_R4	
132	PA13(JTMS/SWDIO)	I/O	DEBUG_JTMS-SWDIO	
133	VCAP	Power		
134	VSS	Power		
135	VDDLDO	Power		
136	VDD	Power		
137	VSS	Power		
138	PA14(JTCK/SWCLK)	I/O	DEBUG_JTCK-SWCLK	

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
139	PA15(JTDI)	I/O	LTDC_B6	
141	PC11	I/O	UART4_RX	
145	PD2	I/O	LTDC_B7	
151	VSS	Power		
152	VDD	Power		
154	PG10	I/O	OCTOSPIM_P2_IO6	
155	PG11	I/O	OCTOSPIM_P2_IO7	
156	PG12	I/O	OCTOSPIM_P2_NCS	
157	PG13	I/O	LTDC_R0	
159	VSS	Power		
160	VDD	Power		
161	PG15 *	I/O	GPIO_Output	
165	PB6	I/O	I2C1_SCL	
166	PB7	I/O	I2C1_SDA	
167	BOOT0	Boot		
172	VCAP	Power		
173	VSS	Power		
174	PDR_ON	Power		
175	VDDLDO	Power		
176	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	CustomSTM32H735
Project Folder	C:\ProjectsOnC\PhasorRadio\CustomSTM32H735Board\CustomSTM32H735Co
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_H7 V1.11.2
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_BDMA_Init	BDMA
5	MX_DAC1_Init	DAC1
6	MX_I2C1_Init	I2C1
7	MX_I2C4_Init	I2C4
8	MX_OCTOSPI1_Init	OCTOSPI1
9	MX_OCTOSPI2_Init	OCTOSPI2
10	MX_TIM1_Init	TIM1
11	MX_TIM23_Init	TIM23

Rank	Function Name	Peripheral Instance Name
12	MX_UART4_Init	UART4
13	MX_ADC1_Init	ADC1
14	MX_CRC_Init	CRC
15	MX_DMA2D_Init	DMA2D
16	MX_ADC2_Init	ADC2
17	MX_LTDC_Init	LTDC
18	MX_ADC3_Init	ADC3
19	MX_I2C2_Init	I2C2

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32H7
Line	STM32H725/735
MCU	STM32H735IGTx
Datasheet	DS13312_Rev1

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

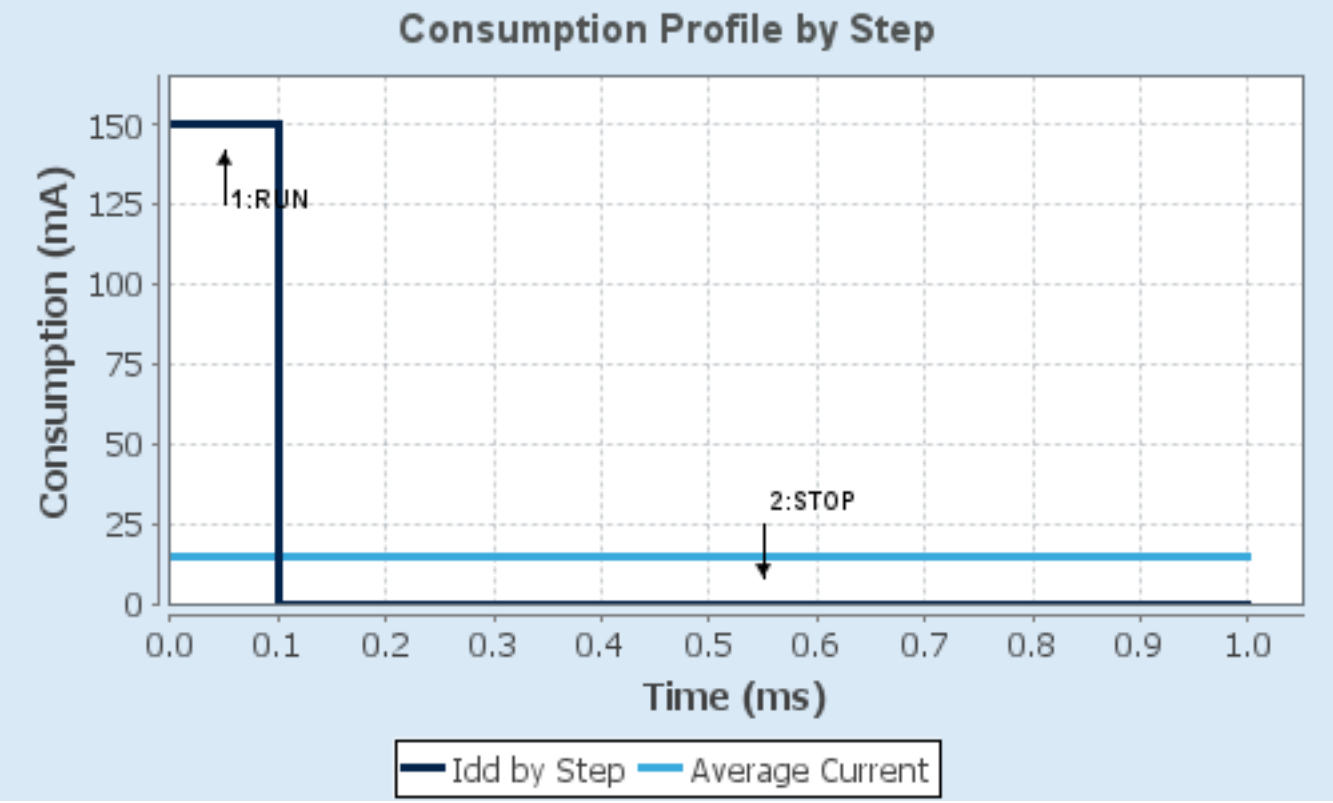
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	VOS0: Scale0/Boost	SVOS3: System-Scale3/SMPS-LDO
D1 Mode	DRUN	DSTANDBY
D2 Mode	DRUN	DSTANDBY
D3 Mode	DRUN	DSTOP
Fetch Type	SRAM1/FlashMode-ON/Cache	NA
CPU Frequency	550 MHz	0 Hz
Clock Configuration	HSE BYP PLL	LSE LowDrive RTC
Clock Source Frequency	8 MHz	32.768 kHz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	150 mA	2.5 µA
Duration	0.1 ms	0.9 ms
DMIPS	1177.0	0.0
Ta Max	105.65	125
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	15 mA
Battery Life	1 day, 17 hours	Average DMIPS	1177.0 DMIPS

1.6. Chart


Consumption Profile by Step
Consumption (mA)
150
125
100
75
50
25
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. Peripherals and Middlewares Configuration

2.1. ADC1

IN2: IN2 Single-ended

2.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	**Dual regular simultaneous mode only ***
DMA Access Mode	DMA access mode enabled
Delay between 2 sampling phases	1,5 Cycle

ADC_Settings:

Clock Prescaler	**Asynchronous clock mode divided by 4 ***
Resolution	**ADC 14-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 2
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. ADC2

IN2: IN2 Single-ended

2.2.1. Parameter Settings:

ADCs_Common_Settings:

Mode	**Dual regular simultaneous mode only ***
DMA Access Mode	DMA access mode enabled
Delay between 2 sampling phases	1,5 Cycle

ADC_Settings:

Clock Prescaler	**Asynchronous clock mode divided by 4 ***
Resolution	**ADC 14-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
Rank	1
Channel	Channel 2
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

2.3. ADC3

mode: IN0

2.3.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	Asynchronous clock mode divided by 1
Resolution	ADC 12-bit resolution
Scan Conversion Mode	Disabled
Data Alignment	Right alignment
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	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
Sampling Mode	Normal
Rank	1
Channel	Channel 0
Sampling Time	2.5 Cycles
Offset Number	No offset
Offset Sign	Offset Sign Negative

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

2.4. CORTEX_M7

2.4.1. 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

2.5. CRC

mode: Activated

2.5.1. Parameter Settings:

Basic Parameters:

Default Polynomial State	Enable
Default Init Value State	Enable

Advanced Parameters:

Input Data Inversion Mode	None
Output Data Inversion Mode	Disable
Input Data Format	Bytes

2.6. DAC1

OUT1 connected to: only external pin

OUT2 connected to: only external pin

2.6.1. Parameter Settings:

DAC Out1 Settings:

Mode selected	Normal Mode
Output Buffer	Enable
Trigger	None

User Trimming	Factory trimming

DAC Out2 Settings:

Mode selected	Normal Mode
Output Buffer	Enable
Trigger	None
User Trimming	Factory trimming

2.7. DEBUG

Debug: Serial Wire

2.8. DMA2D

mode: Activated

2.8.1. Parameter Settings:

Basic Parameters:

Transfer Mode	Memory to Memory
Color Mode	ARGB8888
Output Offset	0

Foreground layer Configuration:

DMA2D Input Color Mode	ARGB8888
DMA2D ALPHA MODE	No modification of the alpha channel value
Input Alpha	0
Input Offset	0
DMA2D ALPHA Inversion	Regular Alpha
DMA2D Red and Blue swap	Regular mode (RGB or ARGB)
DMA2D Chroma Sub-Sampling Mode	No chroma sub-sampling 4:4:4

2.9. I2C1

I2C: I2C

2.9.1. 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	**0x60404E72 ***

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

2.10. I2C2

I2C: I2C

2.10.1. 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	**0x60404E72 ***

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

2.11. I2C4

I2C: I2C

2.11.1. 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	**0x60404E72 ***

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

2.12. LTDC

Display Type: RGB888 (24 bits)

2.12.1. Parameter Settings:

Synchronization for Width:

Horizontal Synchronization Width	8
Horizontal Back Porch	7
Active Width	640
Horizontal Front Porch	6
HSync Width	7
Accumulated Horizontal Back Porch Width	14
Accumulated Active Width	654
Total Width	660

Synchronization for Height:

Vertical Synchronization Height	4
Vertical Back Porch	2
Active Height	480
Vertical Front Porch	2
VSync Height	3
Accumulated Vertical Back Porch Height	5
Accumulated Active Height	485
Total Height	487

Signal Polarity:

Horizontal Synchronization Polarity	Active Low
Vertical Synchronization Polarity	Active Low
Data Enable Polarity	Active Low
Pixel Clock Polarity	Normal Input

Layer Default Color:

Red	0
Green	0
Blue	0

2.12.2. Layer Settings:

Layer Default Color:

Layer 0 - Alpha	0
Layer 0 - Blue	0
Layer 0 - Green	0
Layer 0 - Red	0

Number of Layers:

Number of Layers	**1 layer ***

Windows Position:

Layer 0 - Window Horizontal Start	0
Layer 0 - Window Horizontal Stop	**480 ***
Layer 0 - Window Vertical Start	0
Layer 0 - Window Vertical Stop	**272 ***

Pixel Parameters:

Layer 0 - Pixel Format	**RGB888 ***

Blending:

Layer 0 - Alpha constant for blending	**255 ***
Layer 0 - Blending Factor1	Alpha constant
Layer 0 - Blending Factor2	Alpha constant

Frame Buffer:

Layer 0 - Color Frame Buffer Start Adress	**0x70000000 ***
Layer 0 - Color Frame Buffer Line Length (Image Width)	**480 ***
Layer 0 - Color Frame Buffer Number of Lines (Image Height)	**272 ***

2.13. OCTOSPI1

Mode: Octo SPI

Clock: Port1 CLK

Chip Select: Port1 NCS

Data Strobe: Port1 DQS (RWDS)

Data [3:0]: Port1 IO[3:0]
Data [7:4]: Port1 IO[7:4]

2.13.1. Parameter Settings:

Generic:

Fifo Threshold	**4 ***
Dual Quad mode	Disable
Memory Type	**Macronix ***
Device Size	32
Device Type	Not defined
Chip Select High Time	**2 ***
Free Running Clock	Disable
Clock Mode	Low
Wrap Size	Not Supported
Clock Prescaler	**2 ***
Sample Shifting	None
Delay Hold Quarter Cycle	Disable
Chip Select Boundary	0
Delay Block	Disable
Maximum Transfer	0
Refresh Rate	0

2.14. OCTOSPI2

Mode: HyperBus(TM)
Clock: Port2 CLK
Chip Select: Port2 NCS
Data Strobe: Port2 DQS (RWDS)
Data [3:0]: Port2 IO[3:0]
Data [7:4]: Port2 IO[7:4]

2.14.1. Parameter Settings:

Generic:

Fifo Threshold	**4 ***
Dual Quad mode	Disable
Memory Type	HyperBus(TM)
Device Size	**24 ***
Device Type	Not defined

Chip Select High Time	**4 ***
Free Running Clock	Disable
Clock Mode	Low
Wrap Size	Not Supported
Clock Prescaler	**2 ***
Sample Shifting	None
Delay Hold Quarter Cycle	**Enable ***
Chip Select Boundary	**23 ***
Delay Block	**Enable ***
Maximum Transfer	0
Refresh Rate	**400 ***

HyperBus(TM):

RW Recovery Time	**3 ***
Access Time	**6 ***
Write Access Latency	**Enable ***
Latency Mode	**Fixed ***

2.15. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

2.15.1. 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	64

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	3 WS (4 CPU cycle)

PLL range Parameters:

PLL1 input frequency range	Between 8 and 16 MHz
PLL2 input frequency range	Between 4 and 8 MHz
PLL3 input frequency range	Between 1 and 2 MHz
PLL1 clock Output range	Wide VCO range

PLL2 clock Output range	Wide VCO range
PLL3 clock Output range	MEDIUM VCO range

2.16. SYS

Timebase Source: TIM6

2.17. TIM1

Clock Source : Internal Clock

2.17.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**275-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10-1 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 16 bits value)	0
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection TRGO	**Update Event ***
Trigger Event Selection TRGO2	Reset (UG bit from TIMx_EGR)

2.18. TIM23

Combined Channels: Encoder Mode

2.18.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**400000 ***
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	**10 ***
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	**10 ***

2.19. UART4

Mode: Asynchronous

2.19.1. 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	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**

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PF11	ADC1_INP2	Analog mode	No pull-up and no pull-down	n/a	
ADC2	PF13	ADC2_INP2	Analog mode	No pull-up and no pull-down	n/a	
ADC3	PC2_C	ADC3_INP0	Analog mode	No pull-up and no pull-down	n/a	
DAC1	PA4	DAC1_OUT1	Analog mode	No pull-up and no pull-down	n/a	
	PA5	DAC1_OUT2	Analog mode	No pull-up and no pull-down	n/a	
DEBUG	PA13(JTMS/SWDIO)	DEBUG_JTMS-SWDIO	n/a	n/a	n/a	
	PA14(JTCK/SWCLK)	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	
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PB11	I2C2_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
I2C4	PF14	I2C4_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PF15	I2C4_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
LTDC	PE4	LTDC_B0	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PE5	LTDC_G0	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PE6	LTDC_G1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PF10	LTDC_DE	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC0	LTDC_G2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC1	LTDC_G5	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA1	LTDC_R2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA2	LTDC_R1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA3	LTDC_B5	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA7	LTDC_VSYNC	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC4	LTDC_R7	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB0	LTDC_R3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB1	LTDC_R6	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PE11	LTDC_G3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PE12	LTDC_B4	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PE14	LTDC_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB15	LTDC_G7	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
	PJ11	LTDC_G4	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PK1	LTDC_G6	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC6	LTDC_HSYNC	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC9	LTDC_B2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA8	LTDC_B3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA9	LTDC_R5	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA10	LTDC_B1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA11	LTDC_R4	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA15(JTDI)	LTDC_B6	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD2	LTDC_B7	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PG13	LTDC_R0	Alternate Function Push Pull	No pull-up and no pull-down	Low	
OCTOSPI1	PE2	OCTOSPIM_P1_IO2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF8	OCTOSPIM_P1_IO0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF9	OCTOSPIM_P1_IO1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC3_C	OCTOSPIM_P1_IO6	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PA6	OCTOSPIM_P1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC5	OCTOSPIM_P1_DQS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB2	OCTOSPIM_P1_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PE7	OCTOSPIM_P1_IO4	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PE8	OCTOSPIM_P1_IO5	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PE10	OCTOSPIM_P1_IO7	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PG6	OCTOSPIM_P1_NCS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
OCTOSPI2	PF0	OCTOSPIM_P2_IO0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF1	OCTOSPIM_P2_IO1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF2	OCTOSPIM_P2_IO2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF3	OCTOSPIM_P2_IO3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF4	OCTOSPIM_P2_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF12	OCTOSPIM_P2_	Alternate Function Push Pull	No pull-up and no pull-down	Very High	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
		DQS				
	PG0	OCTOSPIM_P2_IO4	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PG1	OCTOSPIM_P2_IO5	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PG10	OCTOSPIM_P2_IO6	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PG11	OCTOSPIM_P2_IO7	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PG12	OCTOSPIM_P2_NCS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
RCC	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
TIM23	PF6	TIM23_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PF7	TIM23_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
UART4	PA0	UART4_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC11	UART4_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PB13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PG2	GPIO_EXTI2	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	
	PG3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PG15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	

3.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA1_Stream0	Peripheral To Memory	**High ***
ADC2	DMA1_Stream1	Peripheral To Memory	**High ***

ADC1: DMA1_Stream0 DMA request Settings:

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

ADC2: DMA1_Stream1 DMA request Settings:

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

3.3. BDMA configuration

DMA request	Stream	Direction	Priority
ADC3	BDMA_Channel0	Peripheral To Memory	Low

ADC3: BDMA_Channel0 DMA request Settings:

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

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	15	0
DMA1 stream0 global interrupt	true	0	0
DMA1 stream1 global interrupt	true	0	0
TIM6 global interrupt, DAC1_CH1 and DAC1_CH2 underrun error interrupts	true	15	0
LTDC global interrupt	true	0	0
BDMA channel0 global interrupt	true	0	0
PVD/AVD through EXTI Line detection Interrupt	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line2 interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
TIM1 break interrupt	unused		
TIM1 update interrupt	unused		
TIM1 trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
UART4 global interrupt	unused		
FPU global interrupt	unused		
LTDC Error global Interrupt	unused		
DMA2D global interrupt	unused		
OCTOSPI1 global interrupt	unused		
I2C4 event interrupt	unused		
I2C4 error interrupt	unused		
HSEM1 global interrupt	unused		
ADC3 global interrupt	unused		
OCTOSPI2 global interrupt	unused		

Interrupt Table	Enable	Preenmption Priority	SubPriority
TIM23 global interrupt	unused		

3.5.2. NVIC Code generation

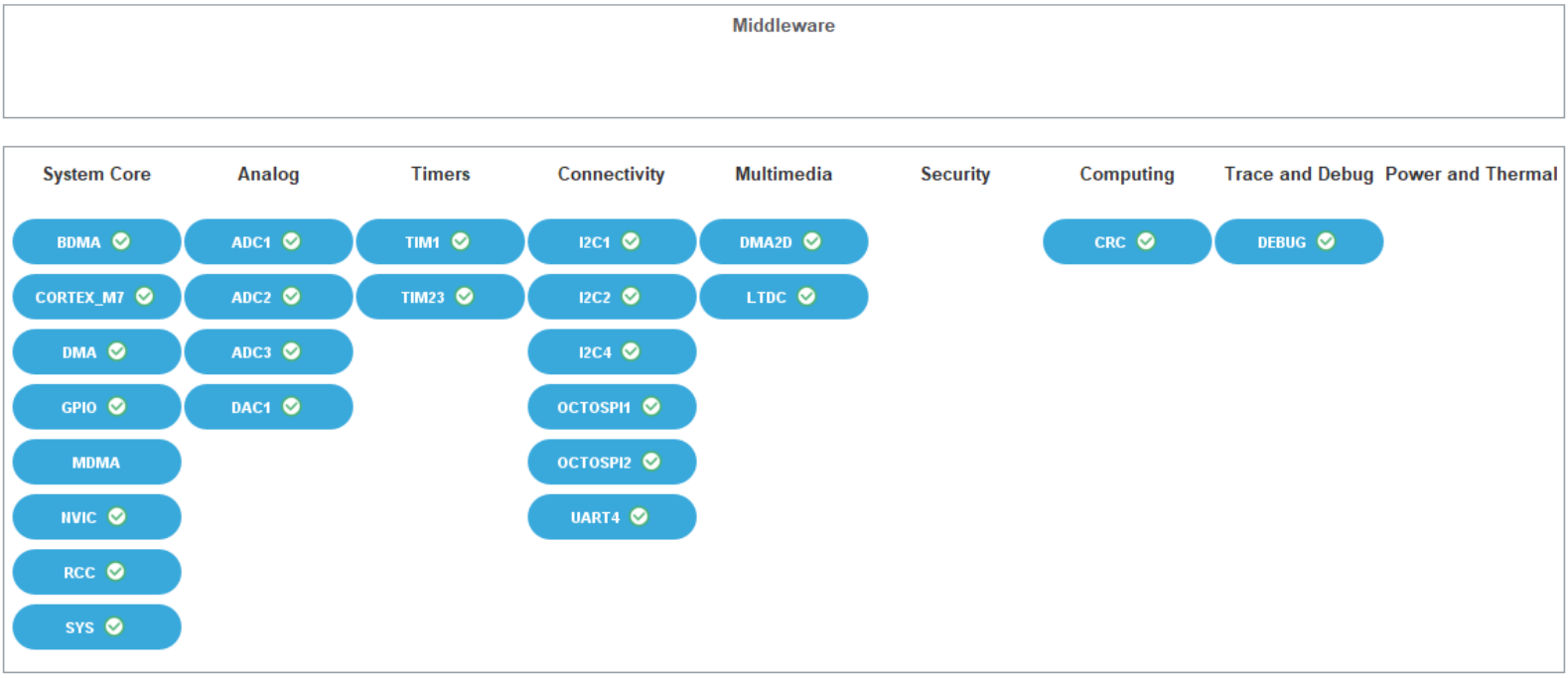
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
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
DMA1 stream1 global interrupt	false	true	true
TIM6 global interrupt, DAC1_CH1 and DAC1_CH2 underrun error interrupts	false	true	true
LTDC global interrupt	false	true	true
BDMA channel0 global interrupt	false	true	true

*** User modified value**

4. System Views

4.1. Category view

4.1.1. Current



5. 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
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Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32h7.pdf
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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/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/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-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/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/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-ltdc-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/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/an5200-getting-started-with-stm32h7-series-sdmmc-host-controller-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5224-stm32-dmamux-

	the-dma-request-router-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5281-how-to-use-otfdec-for-encryptiondecryption-in-trusted-environment-on-stm32h7bxxx-and-stm32h73xx-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5337-stm32h7-series-lifetime-estimates-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5419-getting-started-with-stm32h723733-stm32h725735-and-stm32h730-value-line-hardware-development-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5543-enhanced-methods-to-handle-spi-communication-on-stm32-devices-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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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/an5156-introduction-to-stm32-microcontrollers-security-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/an5325-how-to-use-the-cordic-to-perform-mathematical-functions-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5348-introduction-to-fdcan-peripherals-for-stm32-product-classes-stmicroelectronics.pdf

Application Notes	https://www.st.com/resource/en/application_note/an4230-random-number-generation-validation-using-nist-statistical-test-suite-for-stm32-microcontrollers-stmicroelectronics.pdf
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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-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2834-how-to-optimize-the-adc-accuracy-in-the-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5816-how-to-build-stm32-lpbam-application-using-stm32cubemx-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5537-how-to-use-adc-oversampling-techniques-to-improve-signaltonoise-ratio-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5036-guidelines-for-thermal-management-on-stm32-applications-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4992-introduction-to-secure-firmware-install-sfi-for-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5405-how-to-use-fdcan-bootloader-protocol-on-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an5690-how-to-use-vrefbuf-peripheral-on-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1202_freertos_guide-freertos-guide-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1602_semihosting_in_truestudio-how-to-do-semihosting-in-truestudio-stmicroelectronics.pdf

Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an1801_stm32cubeprogrammer_in_truestudio-installing-stm32cubeprogrammer-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/atollic_editing_keyboard_shortcuts-atollic-editing-keyboard-shortcuts-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/iar_to_atollic_truestudio_migration_guide-truestudio-for-arm-migration-guide-iar-embedded-workbench-to-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/stm32cubemx_installation_in_truestudio-stm32cubemx-installation-in-truestudio-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4323-getting-started-with-stemwin-library-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4435-guidelines-for-obtaining-ulcsaiec-607301603351-class-b-certification-in-any-stm32-application-stmicroelectronics.pdf
Application Notes for related Tools & Software	https://www.st.com/resource/en/application_note/an4635-minimization-of-power-consumption-using-lpuart-for-stm32-microcontrollers-stmicroelectronics.pdf
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Application Notes for related Tools & Software	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
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