STM32
CubeMX

1. Description

1.1. Project

Project Name	CustomSTM32H735_V2_BoardBringUp
Board Name	custom
Generated with:	STM32CubeMX 6.12.0
Date	08/14/2024

1.2. MCU

MCU Series	STM32H7
MCU Line	STM32H725/735
MCU name	STM32H735IGKx
MCU Package	UFBGA176
MCU Pin number	201

1.3. Core(s) information

Core(s)	Arm Cortex-M7

2. Pinout Configuration
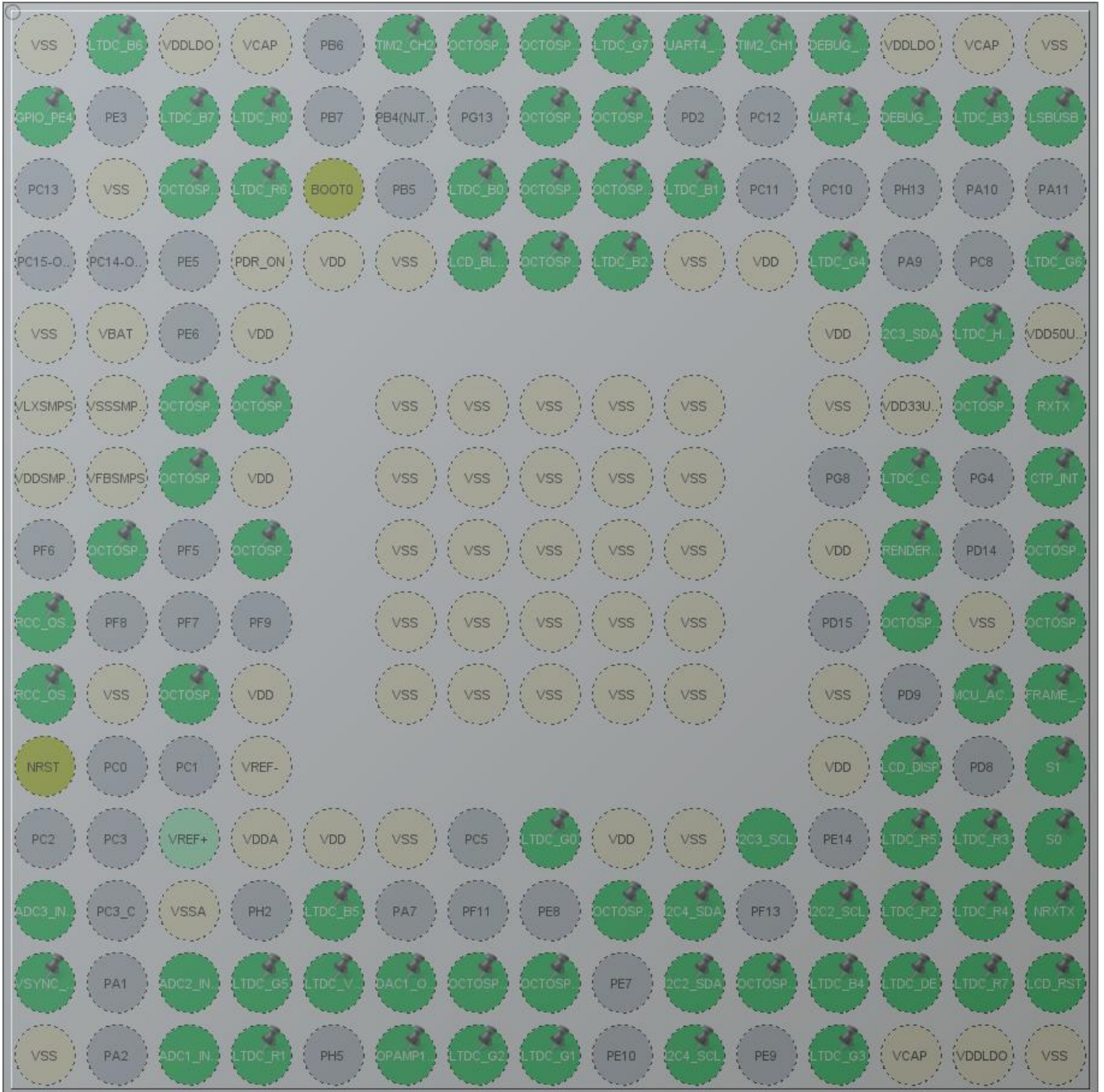
UFBGA176 +25 (Top view)

3. Pins Configuration

Pin Number UFBGA176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
A1	VSS	Power		
A2	PB8	I/O	LTDC_B6	
A3	VDDLDO	Power		
A4	VCAP	Power		
A6	PB3(JTDO/TRACESWO)	I/O	TIM2_CH2	
A7	PG11	I/O	OCTOSPIM_P2_IO7	
A8	PG9	I/O	OCTOSPIM_P1_IO6	
A9	PD3	I/O	LTDC_G7	
A10	PD1	I/O	UART4_TX	
A11	PA15(JTDI)	I/O	TIM2_CH1	
A12	PA14(JTCK/SWCLK)	I/O	DEBUG_JTCK-SWCLK	
A13	VDDLDO	Power		
A14	VCAP	Power		
A15	VSS	Power		
B1	PE4 *	I/O	GPIO_Output	GPIO_PE4
B3	PB9	I/O	LTDC_B7	
B4	PE0	I/O	LTDC_R0	
B8	PD7	I/O	OCTOSPIM_P1_IO7	
B9	PD5	I/O	OCTOSPIM_P1_IO5	
B12	PH14	I/O	UART4_RX	
B13	PA13(JTMS/SWDIO)	I/O	DEBUG_JTMS-SWDIO	
B14	PA8	I/O	LTDC_B3	
B15	PA12 *	I/O	GPIO_Output	LSBUSB
C2	VSS	Power		
C3	PE2	I/O	OCTOSPIM_P1_IO2	
C4	PE1	I/O	LTDC_R6	
C5	BOOT0	Boot		
C7	PG14	I/O	LTDC_B0	
C8	PG10	I/O	OCTOSPIM_P2_IO6	
C9	PD4	I/O	OCTOSPIM_P1_IO4	
C10	PD0	I/O	LTDC_B1	
D4	PDR_ON	Power		
D5	VDD	Power		
D6	VSS	Power		
D7	PG15 *	I/O	GPIO_Output	LCD_BL_CTRL
D8	PG12	I/O	OCTOSPIM_P2_NCS	

Pin Number UFBGA176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
D9	PD6	I/O	LTDC_B2	
D10	VSS	Power		
D11	VDD	Power		
D12	PH15	I/O	LTDC_G4	
D15	PC7	I/O	LTDC_G6	
E1	VSS	Power		
E2	VBAT	Power		
E4	VDD	Power		
E12	VDD	Power		
E13	PC9	I/O	I2C3_SDA	
E14	PC6	I/O	LTDC_HSYNC	
E15	VDD50USB	Power		
F1	VLXSMPS	Power		
F2	VSSSMPS	Power		
F3	PF1	I/O	OCTOSPIM_P2_IO1	
F4	PF0	I/O	OCTOSPIM_P2_IO0	
F6	VSS	Power		
F7	VSS	Power		
F8	VSS	Power		
F9	VSS	Power		
F10	VSS	Power		
F12	VSS	Power		
F13	VDD33USB	Power		
F14	PG6	I/O	OCTOSPIM_P1_NCS	
F15	PG5 *	I/O	GPIO_Output	RXTX
G1	VDDSMPS	Power		
G2	VFBSMPS	Power		
G3	PF2	I/O	OCTOSPIM_P2_IO2	
G4	VDD	Power		
G6	VSS	Power		
G7	VSS	Power		
G8	VSS	Power		
G9	VSS	Power		
G10	VSS	Power		
G13	PG7	I/O	LTDC_CLK	
G15	PG2	I/O	GPIO_EXTI2	CTP_INT
H2	PF4	I/O	OCTOSPIM_P2_CLK	
H4	PF3	I/O	OCTOSPIM_P2_IO3	
H6	VSS	Power		

Pin Number UFBGA176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
H7	VSS	Power		
H8	VSS	Power		
H9	VSS	Power		
H10	VSS	Power		
H12	VDD	Power		
H13	PG3 *	I/O	GPIO_Output	RENDER_TIME
H15	PD13	I/O	OCTOSPIM_P1_IO3	
J1	PH0-OSC_IN	I/O	RCC_OSC_IN	
J6	VSS	Power		
J7	VSS	Power		
J8	VSS	Power		
J9	VSS	Power		
J10	VSS	Power		
J13	PD11	I/O	OCTOSPIM_P1_IO0	
J14	VSS	Power		
J15	PD12	I/O	OCTOSPIM_P1_IO1	
K1	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
K2	VSS	Power		
K3	PF10	I/O	OCTOSPIM_P1_CLK	
K4	VDD	Power		
K6	VSS	Power		
K7	VSS	Power		
K8	VSS	Power		
K9	VSS	Power		
K10	VSS	Power		
K12	VSS	Power		
K14	PB15 *	I/O	GPIO_Output	MCU_ACTIVE
K15	PB14 *	I/O	GPIO_Output	FRAME_RATE
L1	NRST	Reset		
L4	VREF-	Power		
L12	VDD	Power		
L13	PD10 *	I/O	GPIO_Output	LCD_DISP
L15	PB13 *	I/O	GPIO_Output	S1
M4	VDDA	Power		
M5	VDD	Power		
M6	VSS	Power		
M8	PB1	I/O	LTDC_G0	
M9	VDD	Power		
M10	VSS	Power		

Pin Number UFBGA176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
M11	PH7	I/O	I2C3_SCL	
M13	PH11	I/O	LTDC_R5	
M14	PH9	I/O	LTDC_R3	
M15	PB12 *	I/O	GPIO_Output	S0
N1	PC2_C	I/O	ADC3_INP0	
N3	VSSA	Power		
N5	PA3	I/O	LTDC_B5	
N9	PG1	I/O	OCTOSPIM_P2_IO5	
N10	PF15	I/O	I2C4_SDA	
N12	PB10	I/O	I2C2_SCL	
N13	PH8	I/O	LTDC_R2	
N14	PH10	I/O	LTDC_R4	
N15	PH12 *	I/O	GPIO_Output	NRXTX
P1	PA0 *	I/O	GPIO_Output	VSYNC_FREQ
P3	PA1_C	I/O	ADC2_INP1	
P4	PH4	I/O	LTDC_G5	
P5	PA4	I/O	LTDC_VSYNC	
P6	PA5	I/O	DAC1_OUT2	
P7	PB2	I/O	OCTOSPIM_P1_DQS	
P8	PG0	I/O	OCTOSPIM_P2_IO4	
P10	PB11	I/O	I2C2_SDA	
P11	PF12	I/O	OCTOSPIM_P2_DQS	
P12	PE12	I/O	LTDC_B4	
P13	PE13	I/O	LTDC_DE	
P14	PE15	I/O	LTDC_R7	
P15	PH6 *	I/O	GPIO_Output	LCD_RST
R1	VSS	Power		
R3	PA0_C	I/O	ADC1_INP0	
R4	PH3	I/O	LTDC_R1	
R6	PC4	I/O	OPAMP1_VOUT	
R7	PA6	I/O	LTDC_G2	
R8	PB0	I/O	LTDC_G1	
R10	PF14	I/O	I2C4_SCL	
R12	PE11	I/O	LTDC_G3	
R13	VCAP	Power		
R14	VDDLDO	Power		
R15	VSS	Power		

 * The pin is affected with an I/O function

4. Clock Tree Configuration
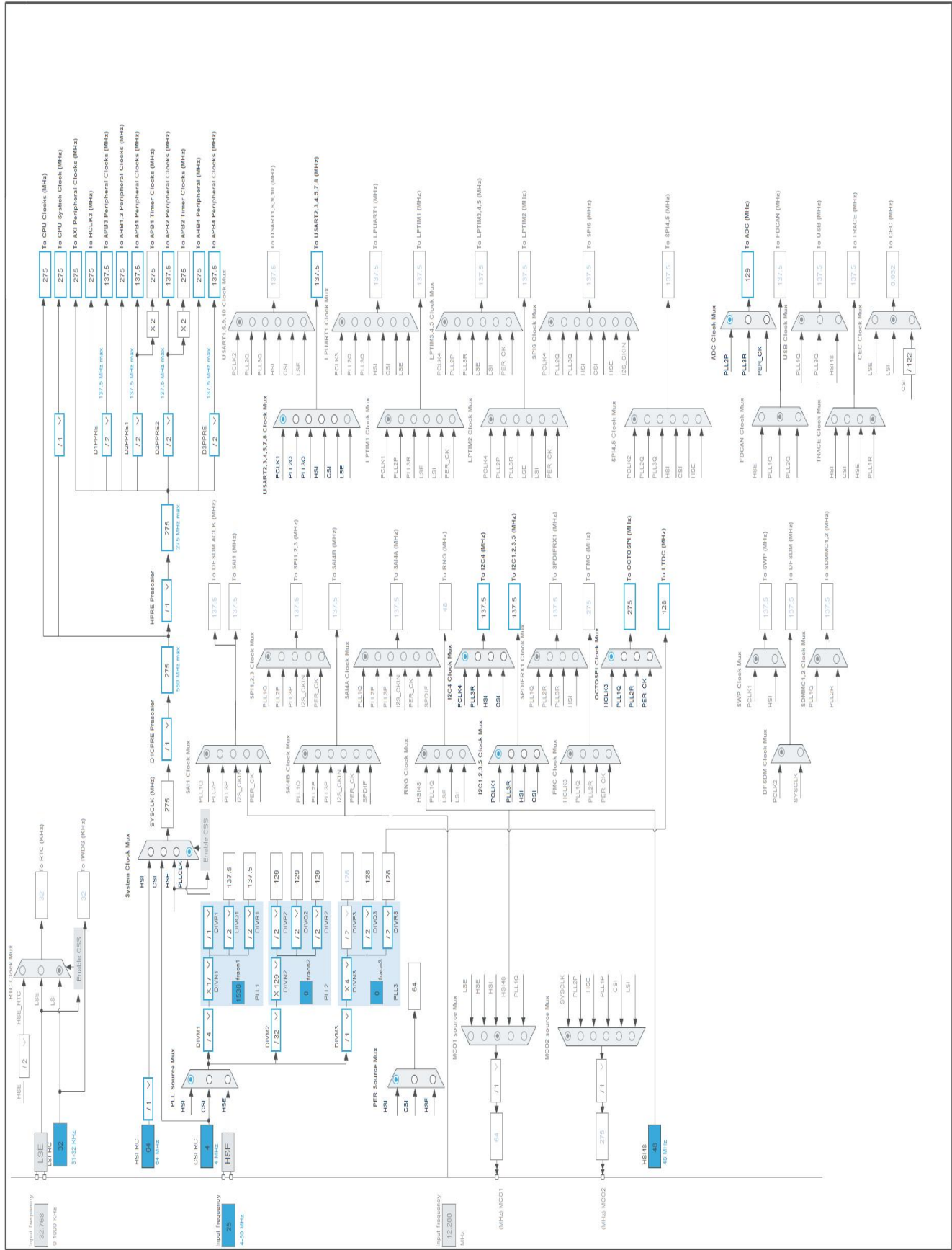
1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32H7
Line	STM32H725/735
MCU	STM32H735IGKx
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	107.9	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

1:RUN

2:STOP

Consumption (mA)

Time (ms)

Idd by Step — Average Current
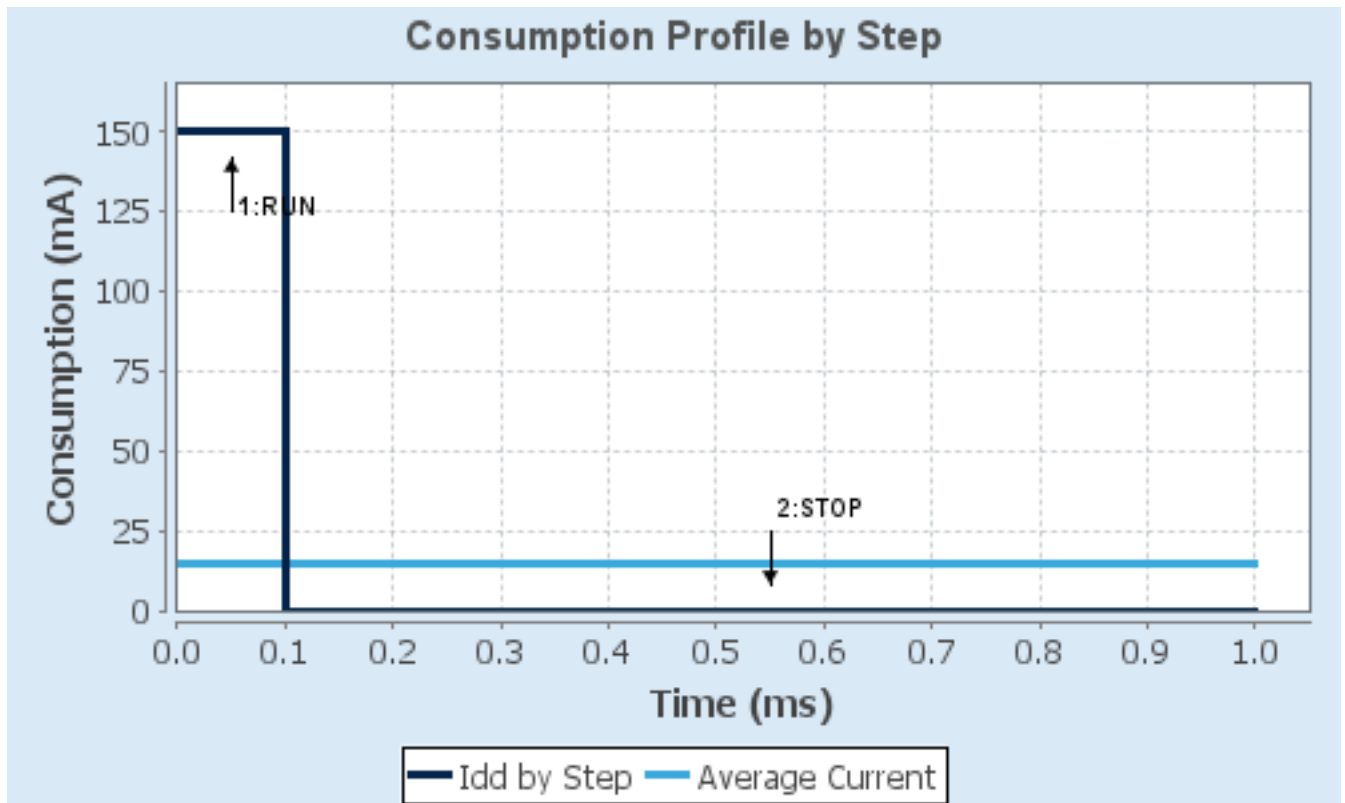
2. Software Project

2.1. Project Settings

Name	Value
Project Name	CustomSTM32H735_V2_BoardBringUp
Project Folder	C:\ProjectsOnC\PhasorRadio\CustomSTM32H735Board\CustomSTM32H735_V2
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	0x1000
Minimum Stack Size	0x1000

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	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_CRC_Init	CRC
4	MX_DMA2D_Init	DMA2D
5	MX_LTDC_Init	LTDC
6	MX_OCTOSPI1_Init	OCTOSPI1
7	MX_OCTOSPI2_Init	OCTOSPI2
8	MX_LIBJPEG_Init	LIBJPEG
9	MX_ADC1_Init	ADC1
10	MX_ADC2_Init	ADC2
11	MX_ADC3_Init	ADC3

Rank	Function Name	Peripheral Instance Name
12	MX_DAC1_Init	DAC1
13	MX_I2C2_Init	I2C2
14	MX_OPAMP1_Init	OPAMP1
15	MX_TIM2_Init	TIM2
16	MX_UART4_Init	UART4
17	MX_I2C3_Init	I2C3
18	MX_I2C4_Init	I2C4
21	MX_TouchGFX_Init	STMicroelectronics.X-CUBE-TOUCHGFX.4.24.0
22	MX_TouchGFX_Process	STMicroelectronics.X-CUBE-TOUCHGFX.4.24.0

3. Peripherals and Middlewares Configuration

3.1. ADC1

mode: IN0

3.1.1. 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
Oversampling Ratio	1
Number Of Conversion	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 0
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

3.2. ADC2

IN1: IN1 Single-ended

3.2.1. 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
Oversampling Ratio	1
Number Of Conversion	1
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 1
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

3.3. ADC3
mode: IN0

3.3.1. 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
Oversampling Ratio	Oversampling ratio 2x
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

3.4. CORTEX_M7

3.4.1. Parameter Settings:

Speculation default mode Settings:

Speculation default mode   Disabled

Cortex Interface Settings:

CPU ICache   **Enabled ***

CPU DCache   **Enabled ***

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   Disabled

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

3.5. CRC

mode: Activated

3.5.1. 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

3.6. DAC1

OUT1 connected to: only on chip analog peripherals

OUT2 connected to: only external pin

3.6.1. Parameter Settings:

DAC Out1 Settings:

Mode selected	Normal Mode
Output Buffer	Disable
Trigger	None
User Trimming	Factory trimming
On chip peripheral(s)	connected

DAC Out2 Settings:

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

3.7. DEBUG
Debug: Serial Wire

3.8. DMA2D
mode: Activated
3.8.1. Parameter Settings:

Basic Parameters:

Transfer Mode	**Register to Memory ***
Color Mode	**RGB888 ***
Output Offset	0

3.9. I2C2
I2C: I2C
3.9.1. 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

3.10. I2C3

I2C: I2C
3.10.1. 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

3.11. I2C4
I2C: I2C
3.11.1. 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

3.12. LTDC

Display Type: RGB888 (24 bits)

3.12.1. Parameter Settings:

Synchronization for Width:

Horizontal Synchronization Width	**41 ***
Horizontal Back Porch	**13 ***
Active Width	**480 ***
Horizontal Front Porch	**32 ***
HSync Width	40
Accumulated Horizontal Back Porch Width	53
Accumulated Active Width	533
Total Width	565

Synchronization for Height:

Vertical Synchronization Height	**10 ***
Vertical Back Porch	2
Active Height	**272 ***
Vertical Front Porch	2
VSync Height	9
Accumulated Vertical Back Porch Height	11
Accumulated Active Height	283
Total Height	285

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

3.12.2. 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 ***

3.13. MEMORYMAP
mode: Activated

3.14. 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]
3.14.1. 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

3.15. 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]

3.15.1. 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 ***

3.16. OPAMP1
Mode: Follower-DAC_OUT1-INP
3.16.1. Parameter Settings:

Basic Parameters:

Power Mode	Normal
User Trimming	Disable

3.17. RCC
High Speed Clock (HSE): Crystal/Ceramic Resonator
3.17.1. 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 2 and 4 MHz

PLL3 input frequency range   Between 8 and 16 MHz

PLL1 clock Output range   Wide VCO range

PLL2 clock Output range   Wide VCO range

PLL3 clock Output range   Wide VCO range

3.18. SYS
Timebase Source: TIM6

3.19. TIM2
Combined Channels: Encoder Mode
3.19.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	4294967295
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
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

3.20. UART4
Mode: Asynchronous

3.20.1. 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

3.21. VREFBUF
VREFBUF Mode: External voltage reference

3.22. FREERTOS
Interface: CMSIS_V2
3.22.1. Config parameters:

API:

FreeRTOS API	CMSIS v2

Versions:

FreeRTOS version	10.3.1
CMSIS-RTOS version	2.00

MPU/FPU:

ENABLE_MPU	Disabled

ENABLE_FPU	Disabled

Kernel settings:

USE_PREEMPTION	Enabled
CPU_CLOCK_HZ	SystemCoreClock
TICK_RATE_HZ	1000
MAX_PRIORITIES	56
MINIMAL_STACK_SIZE	128
MAX_TASK_NAME_LEN	16
USE_16_BIT_TICKS	Disabled
IDLE_SHOULD_YIELD	Enabled
USE_MUTEXES	Enabled
USE_RECURSIVE_MUTEXES	Enabled
USE_COUNTING_SEMAPHORES	Enabled
QUEUE_REGISTRY_SIZE	8
USE_APPLICATION_TASK_TAG	**Enabled ***
ENABLE_BACKWARD_COMPATIBILITY	Enabled
USE_PORT_OPTIMISED_TASK_SELECTION	Disabled
USE_TICKLESS_IDLE	Disabled
USE_TASK_NOTIFICATIONS	Enabled
RECORD_STACK_HIGH_ADDRESS	Disabled

Memory management settings:

Memory Allocation	Dynamic / Static
TOTAL_HEAP_SIZE	**75000 ***
Memory Management scheme	heap_4

Hook function related definitions:

USE_IDLE_HOOK	**Enabled ***
USE_TICK_HOOK	Disabled
USE_MALLOC_FAILED_HOOK	Disabled
USE_DAEMON_TASK_STARTUP_HOOK	Disabled
CHECK_FOR_STACK_OVERFLOW	Disabled

Run time and task stats gathering related definitions:

GENERATE_RUN_TIME_STATS	Disabled
USE_TRACE_FACILITY	Enabled
USE_STATS_FORMATTING_FUNCTIONS	Disabled

Co-routine related definitions:

USE_CO_ROUTINES	Disabled
MAX_CO_ROUTINE_PRIORITIES	2

Software timer definitions:

USE_TIMERS	Enabled
TIMER_TASK_PRIORITY	2
TIMER_QUEUE_LENGTH	10

TIMER_TASK_STACK_DEPTH	256

Interrupt nesting behaviour configuration:

LIBRARY_LOWEST_INTERRUPT_PRIORITY	15
LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY	5

Added with 10.2.1 support:

MESSAGE_BUFFER_LENGTH_TYPE	size_t
USE_POSIX_ERRNO	Disabled

CMSIS-RTOS V2 flags:

USE_OS2_THREAD_SUSPEND_RESUME	Enabled
USE_OS2_THREAD_ENUMERATE	Enabled
USE_OS2_EVENTFLAGS_FROM_ISR	Enabled
USE_OS2_THREAD_FLAGS	Enabled
USE_OS2_TIMER	Enabled
USE_OS2_MUTEX	Enabled

3.22.2. Include parameters:

Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled
vTaskDelete	Enabled
vTaskCleanUpResources	Disabled
vTaskSuspend	Enabled
vTaskDelayUntil	Enabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Enabled
xSemaphoreGetMutexHolder	Disabled
pcTaskGetTaskName	Disabled
uxTaskGetStackHighWaterMark	Enabled
xTaskGetCurrentTaskHandle	Enabled
eTaskGetState	Enabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Enabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled
uxTaskGetStackHighWaterMark2	Disabled

3.22.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT	**Enabled ***

Project settings (see parameter description first):

Use FW pack heap file	Enabled

3.23. LIBJPEG
mode: Enabled
3.23.1. Config parameters:

Version:

LIBJPEG version	8d

MW configuration:

Data Stream management type	Stdio
FREERTOS	Enabled
HAVE_BOOLEAN	Undefined

General Settings:

Use FREERTOS Memory Allocator	Enabled

RGB scanline format:

RGB_ORDERING	**BGR ***

3.24. STMicroelectronics.X-CUBE-TOUCHGFX.4.24.0
mode: GraphicsJjApplication
3.24.1. TouchGFX Generator:

Display:

Interface	**Parallel RGB (LTDC) ***
Framebuffer Pixel Format (LTDC)	RGB888
Width (LTDC)	480
Height (LTDC)	272
Use Larger Framebuffer Stride	No
Framebuffer Strategy	**Double Buffer ***
Buffer Location	By Allocation

Driver:

Application Tick Source	**LTDC ***
Use DMA2D Accelerator (ChromART)	**Yes ***

Real-Time Operating System   CMSIS_RTOS_V2

Additional Features:

Vector Rendering   **Software ***

Vector Font Rendering   **Enabled ***

Video Decoding:

Type   Disabled

* User modified value

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA0_C	ADC1_INP0	Analog mode	No pull-up and no pull-down	n/a	
ADC2	PA1_C	ADC2_INP1	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	PA5	DAC1_OUT2	Analog mode	No pull-up and no pull-down	n/a	
DEBUG	PA14(JTCK/SWCLK)	DEBUG_JTCK-SWCLK	n/a	n/a	n/a	
	PA13(JTMS/SWDIO)	DEBUG_JTMS-SWDIO	n/a	n/a	n/a	
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	
I2C3	PC9	I2C3_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PH7	I2C3_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
I2C4	PF15	I2C4_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PF14	I2C4_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
LTDC	PB8	LTDC_B6	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PD3	LTDC_G7	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PB9	LTDC_B7	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PE0	LTDC_R0	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PA8	LTDC_B3	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PE1	LTDC_R6	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PG14	LTDC_B0	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PD0	LTDC_B1	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
	PD6	LTDC_B2	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH15	LTDC_G4	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PC7	LTDC_G6	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PC6	LTDC_HSYNC	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PG7	LTDC_CLK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PB1	LTDC_G0	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH11	LTDC_R5	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH9	LTDC_R3	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PA3	LTDC_B5	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH8	LTDC_R2	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH10	LTDC_R4	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH4	LTDC_G5	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PA4	LTDC_VSYNC	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PE12	LTDC_B4	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PE13	LTDC_DE	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PE15	LTDC_R7	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PH3	LTDC_R1	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PA6	LTDC_G2	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PB0	LTDC_G1	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
					*	
	PE11	LTDC_G3	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
OCTOSPI1	PG9	OCTOSPIM_P1_IO6	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD7	OCTOSPIM_P1_IO7	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD5	OCTOSPIM_P1_IO5	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PE2	OCTOSPIM_P1_IO2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD4	OCTOSPIM_P1_IO4	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	
	PD13	OCTOSPIM_P1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD11	OCTOSPIM_P1_IO0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD12	OCTOSPIM_P1_IO1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PF10	OCTOSPIM_P1_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB2	OCTOSPIM_P1_DQS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
OCTOSPI2	PG11	OCTOSPIM_P2_IO7	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	
	PG12	OCTOSPIM_P2_NCS	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	
	PF0	OCTOSPIM_P2_IO0	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	
	PF4	OCTOSPIM_P2_CLK	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	
	PG1	OCTOSPIM_P2_IO5	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PG0	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
		IO4				
	PF12	OCTOSPIM_P2_DQS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
OPAMP1	PC4	OPAMP1_VOUT	Analog mode	No pull-up and no pull-down	n/a	
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	
TIM2	PB3(JTDO/TRACESWO)	TIM2_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA15(JTDI)	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
UART4	PD1	UART4_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PH14	UART4_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PE4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_PE4
	PA12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LSBUSB
	PG15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_BL_CTRL
	PG5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RXTX
	PG2	GPIO_EXTI2	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	CTP_INT
	PG3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	RENDER_TIME
	PB15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	MCU_ACTIVE
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	FRAME_RATE
	PD10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_DISP
	PB13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	S1
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	S0
	PH12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NRXTX
	PA0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	VSYNC_FREQ
	PH6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_RST

4.2. DMA configuration

nothing configured in DMA service

4.3. BDMA configuration

nothing configured in DMA service

4.4. MDMA configuration

nothing configured in DMA service

4.5. NVIC configuration

4.5.1. 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	15	0
System tick timer	true	15	0
TIM6 global interrupt, DAC1_CH1 and DAC1_CH2 underrun error interrupts	true	15	0
DMA2D global interrupt	true	5	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		
TIM2 global interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
UART4 global interrupt	unused		
I2C3 event interrupt	unused		
I2C3 error interrupt	unused		
FPU global interrupt	unused		
LTDC global interrupt	unused		
LTDC Error 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		

4.5.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	false	false
Debug monitor	false	true	false
Pendable request for system service	false	false	false
System tick timer	false	false	true
TIM6 global interrupt, DAC1_CH1 and DAC1_CH2 underrun error interrupts	false	true	true
DMA2D global interrupt	false	true	true

* User modified value

5. System Views

5.1. Category view

5.1.1. Current

Middleware

FREERTOS ✓   LIBJPEG ✓

Software Packs

X-CUBE-TOUCHGFX ✓

System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing	Trace and Debug	Power and Thermal	Other
BDMA	ADC1 ✓	TIM2 ✓	I2C2 ✓	DMA2D ✓		CRC ✓	DEBUG ✓		
CORTEX_M7 ✓	ADC2 ✓		I2C3 ✓	LTDC ✓					
DMA	ADC3 ✓		I2C4 ✓						
GPIO ✓	DAC1 ✓		OCTOSPI1 ✓						
MDMA	OPAMP1 ✓		OCTOSPI2 ✓						
NVIC ✓	VREFBUF ✓		UART4 ✓						
RCC ✓									
SYS ✓									

6. Software Pack Report

6.1. Software Pack selected

Vendor	Name	Version	Component
STMicroelectronics	X-CUBE-TOUCHGFX	4.24.0	Class : Graphics Group : Application Variant : TouchGFX Generator Version : 4.24.0

7. 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
System View Description	https://www.st.com/resource/en/svd/stm32h7rs-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_stm32h72x-3x_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/an4229-how-to-
implement-a-vocoder-solution-using-stm32-microcontrollers-
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/an4891-stm32h72x-stm32h73x-and-singlecore-stm32h74x75x-system-architecture-and-performance-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/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/an4899-stm32-microcontroller-gpio-hardware-settings-and-lowpower-consumption-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf

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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

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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/an5537-how-to-use-adc-oversampling-techniques-to-improve-signaltonoise-ratio-on-stm32-mcus-stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an5405-how-to-use-fdcan-bootloader-protocol-on-stm32-mcus-stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an2867-guidelines-for-

oscillator-design-on-stm8afals-and-stm32-mcusmpus-
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