
STM32
CubeMX

1. Description

1.1. Project

Project Name	Disco_L4P5_DCMI_PSRAM_ST7735_v2
Board Name	STM32L4P5G-DK
Generated with:	STM32CubeMX 6.7.0
Date	03/17/2023

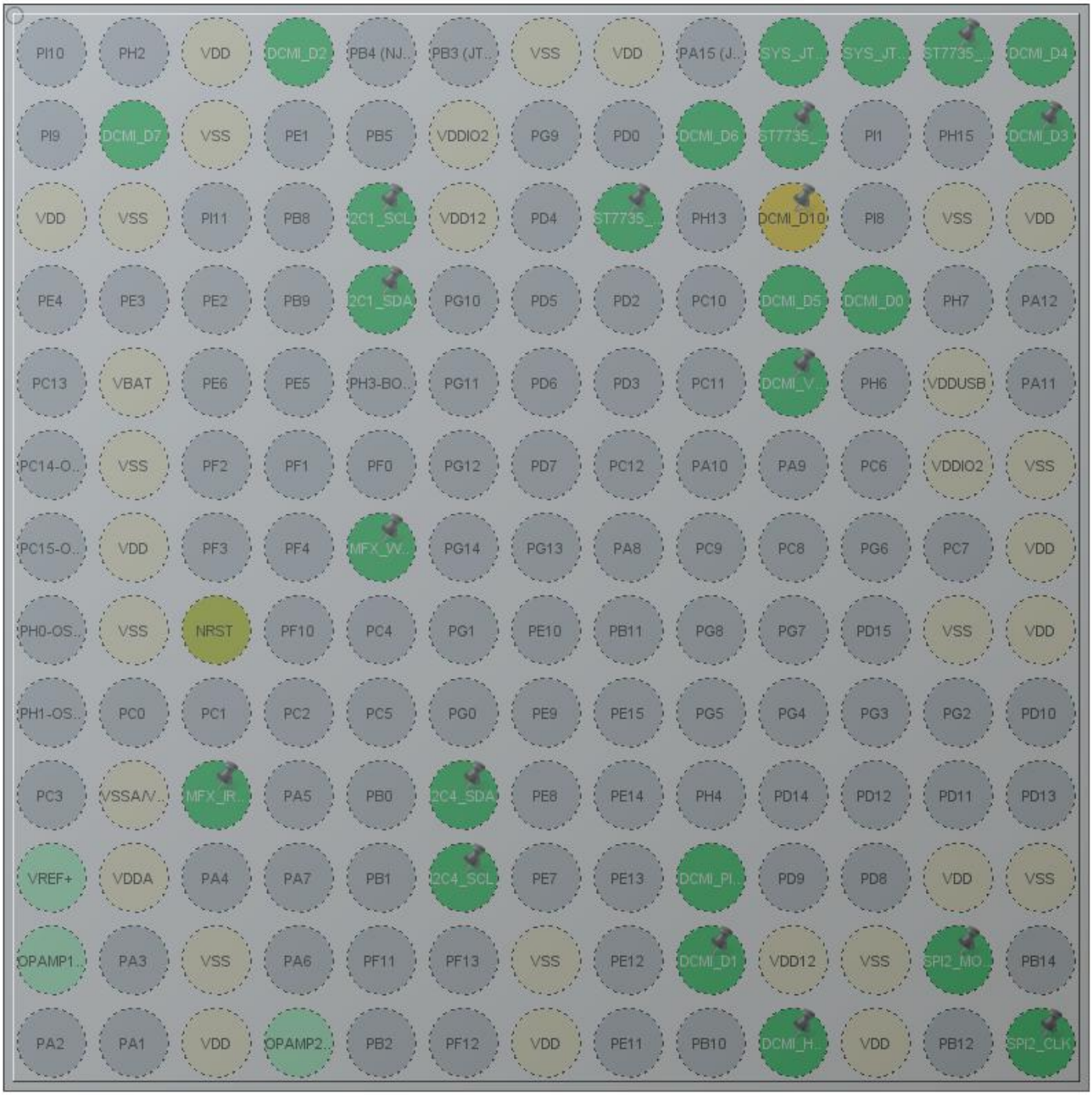
1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4P5/Q5
MCU name	STM32L4P5AGIxP
MCU Package	UFBGA169
MCU Pin number	169

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration



UFBGA169 (Top view)

3. Pins Configuration

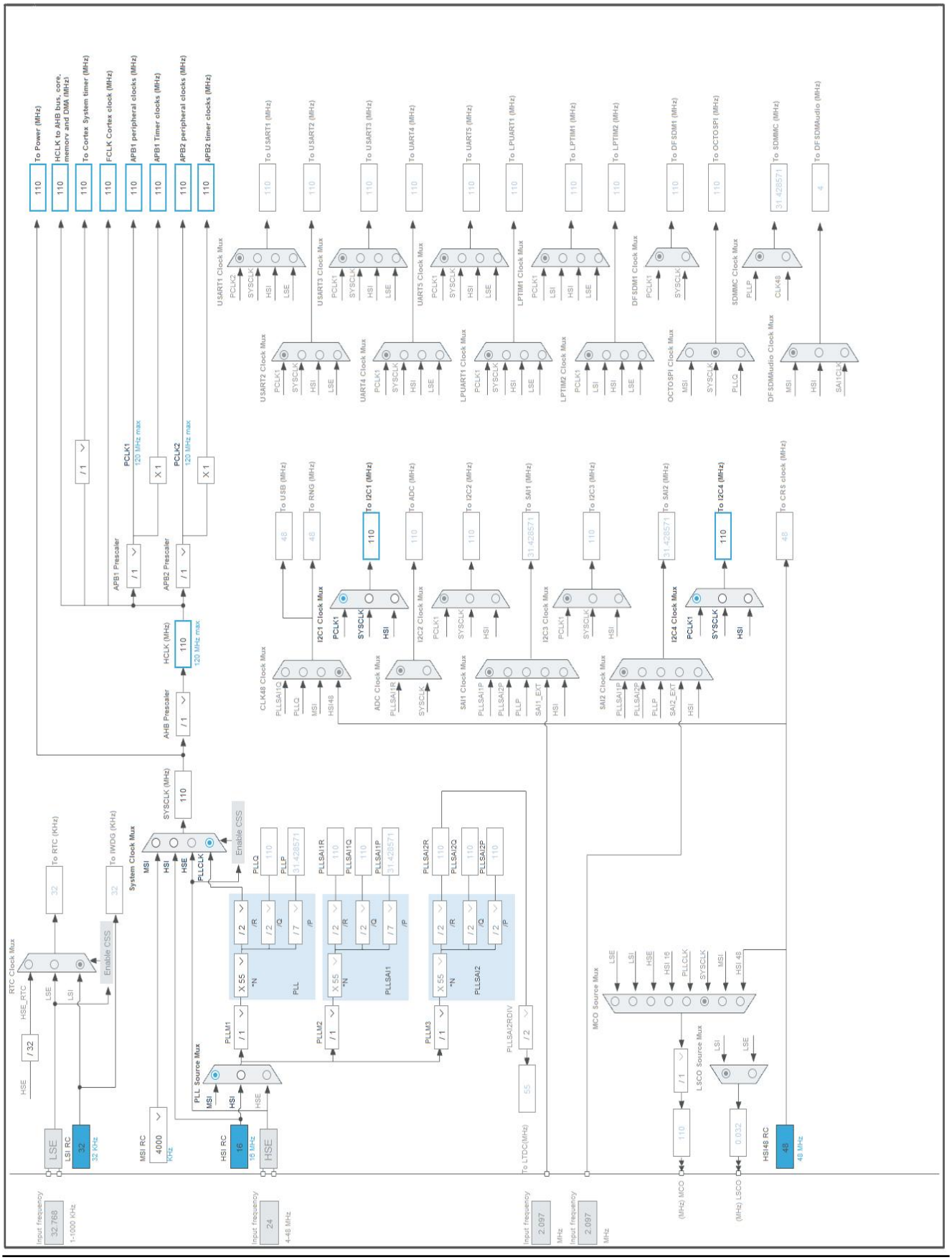
Pin Number UFBGA169	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
A3	VDD	Power		
A4	PE0	I/O	DCMI_D2	DCMI_D2
A7	VSS	Power		
A8	VDD	Power		
A10	PA14 (JTCK/SWCLK)	I/O	SYS_JTCK-SWCLK	
A11	PA13 (JTMS/SWDIO)	I/O	SYS_JTMS-SWDIO	
A12	PI0 *	I/O	GPIO_Output	ST7735_CS
A13	PH14	I/O	DCMI_D4	DCMI_D4
B2	PI7	I/O	DCMI_D7	DCMI_D7
B3	VSS	Power		
B6	VDDIO2	Power		
B9	PI6	I/O	DCMI_D6	DCMI_D6
B10	PI2 *	I/O	GPIO_Output	ST7735_RES
B13	PH12	I/O	DCMI_D3	DCMI_D3
C1	VDD	Power		
C2	VSS	Power		
C5	PB6	I/O	I2C1_SCL	I2C1_SCL
C6	VDD12	Power		
C8	PD1 *	I/O	GPIO_Output	ST7735_DC
C10	PI3 **	I/O	DCMI_D10	DCMI_D10
C12	VSS	Power		
C13	VDD	Power		
D5	PB7	I/O	I2C1_SDA	I2C1_SDA
D10	PI4	I/O	DCMI_D5	DCMI_D5
D11	PH9	I/O	DCMI_D0	DCMI_D0
E2	VBAT	Power		
E10	PI5	I/O	DCMI_VSYNC	DCMI_VSYNC
E12	VDDUSB	Power		
F2	VSS	Power		
F12	VDDIO2	Power		
F13	VSS	Power		
G2	VDD	Power		
G5	PF5	I/O	GPIO_EXTI5	MFX_WAKEUP
G13	VDD	Power		
H2	VSS	Power		
H3	NRST	Reset		

Pin Number UFBGA169	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
H12	VSS	Power		
H13	VDD	Power		
K2	VSSA/VREF-	Power		
K3	PA0	I/O	GPIO_EXTI0	MFX_IRQ_OUT
K6	PF15	I/O	I2C4_SDA	I2C4_SDA
L2	VDDA	Power		
L6	PF14	I/O	I2C4_SCL	I2C4_SCL
L9	PH5	I/O	DCMI_PIXCLK	DCMI_PIXCLK
L12	VDD	Power		
L13	VSS	Power		
M3	VSS	Power		
M7	VSS	Power		
M9	PH10	I/O	DCMI_D1	DCMI_D1
M10	VDD12	Power		
M11	VSS	Power		
M12	PB15	I/O	SPI2_MOSI	SPI2_MOSI
N3	VDD	Power		
N7	VDD	Power		
N10	PH8	I/O	DCMI_HSYNC	DCMI_HSYNC
N11	VDD	Power		
N13	PB13	I/O	SPI2_SCK	SPI2_CLK

* The pin is affected with an I/O function

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

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	Disco_L4P5_DCMI_PSRAM_ST7735_v2
Project Folder	C:\Users\toussaij\Documents\STM32dev\Disco_L4P5_DCMI_PSRAM_ST7735_v
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L4 V1.17.2
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)	Yes
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_I2C1_Init	I2C1
5	MX_I2C4_Init	I2C4
6	MX_SPI2_Init	SPI2
7	MX_DCMI_Init	DCMI

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4P5/Q5
MCU	STM32L4P5AGIxP
Datasheet	DS12903_Rev0

6.2. Parameter Selection

Temperature	25
Vdd	3.0

6.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

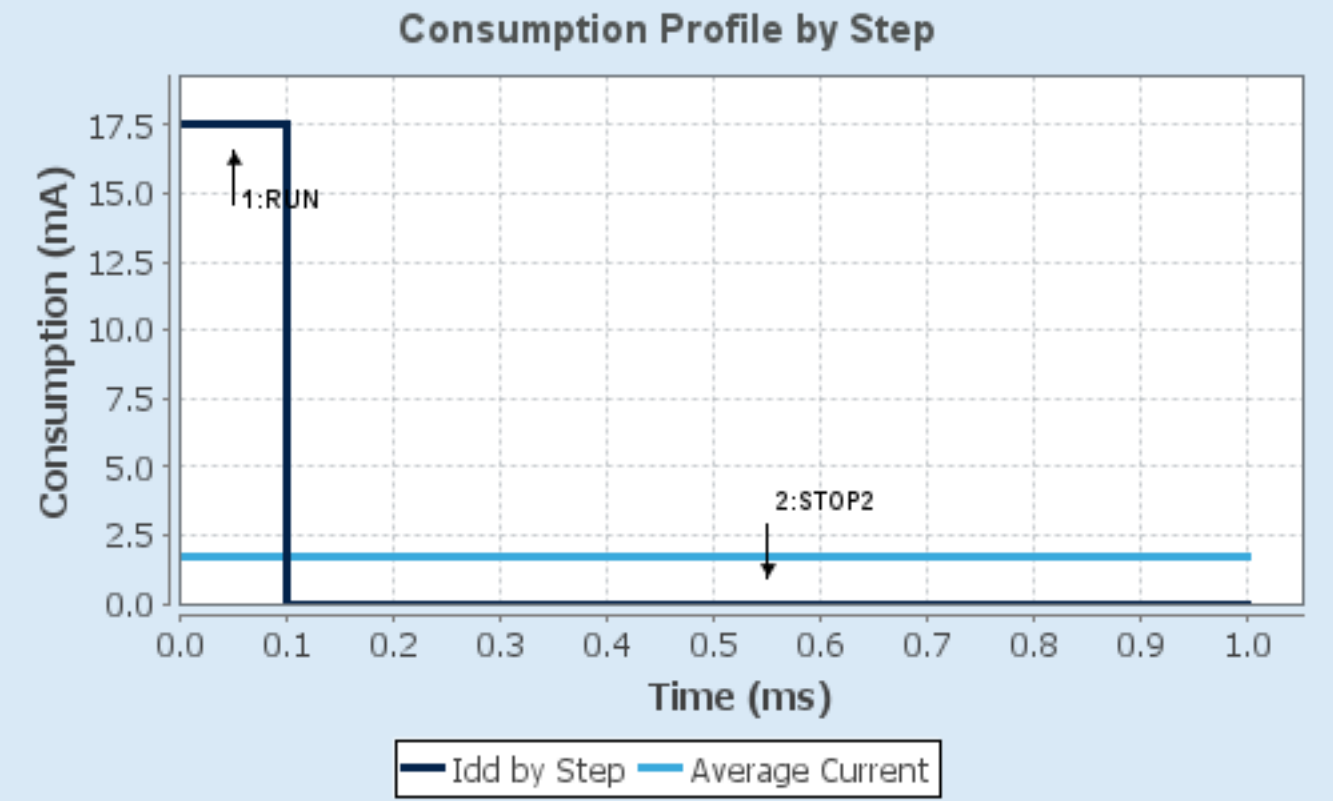
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP2
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-High	NoRange
Fetch Type	FLASH/SingleBank	NA
CPU Frequency	120 MHz	0 Hz
Clock Configuration	HSE BYP PLL ART	ALL CLOCKS OFF
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	17.5 mA	2.95 µA
Duration	0.1 ms	0.9 ms
DMIPS	150.0	0.0
Ta Max	102.27	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	1.75 mA
Battery Life	2 months, 19 days, 19 hours	Average DMIPS	150.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1:RUN
2:STOP2
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

7. Peripherals and Middlewares Configuration

7.1. DCMI

DCMI: Slave 8 bits External Synchro

7.1.1. Parameter Settings:

Mode Config:

Pixel clock polarity	**Active on Rising edge ***
Vertical synchronization polarity	**Active High ***
Horizontal synchronization polarity	**Active High ***
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

7.2. I2C1

I2C: I2C

7.2.1. 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	**0x40505681 ***

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

7.3. I2C4

I2C: I2C

7.3.1. 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	**0x40505681 ***

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

7.4. RCC

7.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
Data Cache	Enabled
Flash Latency(WS)	5 WS (6 CPU cycle)

RCC Parameters:

HSI Calibration Value	64
MSI Calibration Value	0
MSI Auto Calibration	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1 boost

7.5. SPI2

Mode: Half-Duplex Master

7.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**8 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**8 ***
Baud Rate	**13.75 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

7.6. SYS

Debug: Serial Wire

Timebase Source: SysTick

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
DCMI	PE0	DCMI_D2	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D2
	PH14	DCMI_D4	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D4
	PI7	DCMI_D7	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D7
	PI6	DCMI_D6	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D6
	PH12	DCMI_D3	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D3
	PI4	DCMI_D5	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D5
	PH9	DCMI_D0	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D0
	PI5	DCMI_VSYNC	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_VSYNC
	PH5	DCMI_PIXCLK	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_PIXCLK
	PH10	DCMI_D1	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D1
	PH8	DCMI_HSYNC	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_HSYNC
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	I2C1_SCL
	PB7	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	I2C1_SDA
I2C4	PF15	I2C4_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	I2C4_SDA
	PF14	I2C4_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**Very High ***	I2C4_SCL
SPI2	PB15	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI2_MOSI
	PB13	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	SPI2_CLK
SYS	PA14 (JTCK/SWCLK)	SYS_JTCK-SWCLK	n/a	n/a	n/a	
	PA13 (JTMS/SWDIO)	SYS_JTMS-SWDIO	n/a	n/a	n/a	
Single Mapped Signals	PI3	DCMI_D10	Alternate Function Push Pull	No pull-up and no pull-down	Low	DCMI_D10
GPIO	PI0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ST7735_CS
	PI2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ST7735_RES
	PD1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ST7735_DC
	PF5	GPIO_EXTI5	External Interrupt Mode with	No pull-up and no pull-down	n/a	MFX_WAKEUP

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
			Rising edge trigger detection			
	PA0	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	MFX_IRQ_OUT

8.2. DMA configuration

DMA request	Stream	Direction	Priority
MEMTOMEM	DMA1_Channel1	Memory To Memory	**High ***
DCMI	DMA2_Channel6	Peripheral To Memory	**High ***

MEMTOMEM: DMA1_Channel1 DMA request Settings:

Mode:	Normal
Src Memory Increment:	**Enable ***
Dst Memormy Increment:	**Enable ***
Src Memory Data Width:	Byte
Dst Memormy Data Width:	Byte

DCMI: DMA2_Channel6 DMA request Settings:

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

8.3. NVIC configuration

8.3.1. 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
Prefetch fault, memory access fault	true	0	0
Undefined instruction or illegal state	true	0	0
System service call via SWI instruction	true	0	0
Debug monitor	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
DMA1 channel1 global interrupt	true	0	0
DMA2 channel6 global interrupt	true	0	0
DCMI and PSSI global interrupt	true	0	0
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line0 interrupt	unused		
EXTI line[9:5] interrupts	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI2 global interrupt	unused		
FPU global interrupt	unused		
I2C4 event interrupt	unused		
I2C4 error interrupt	unused		

8.3.2. 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
Prefetch 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

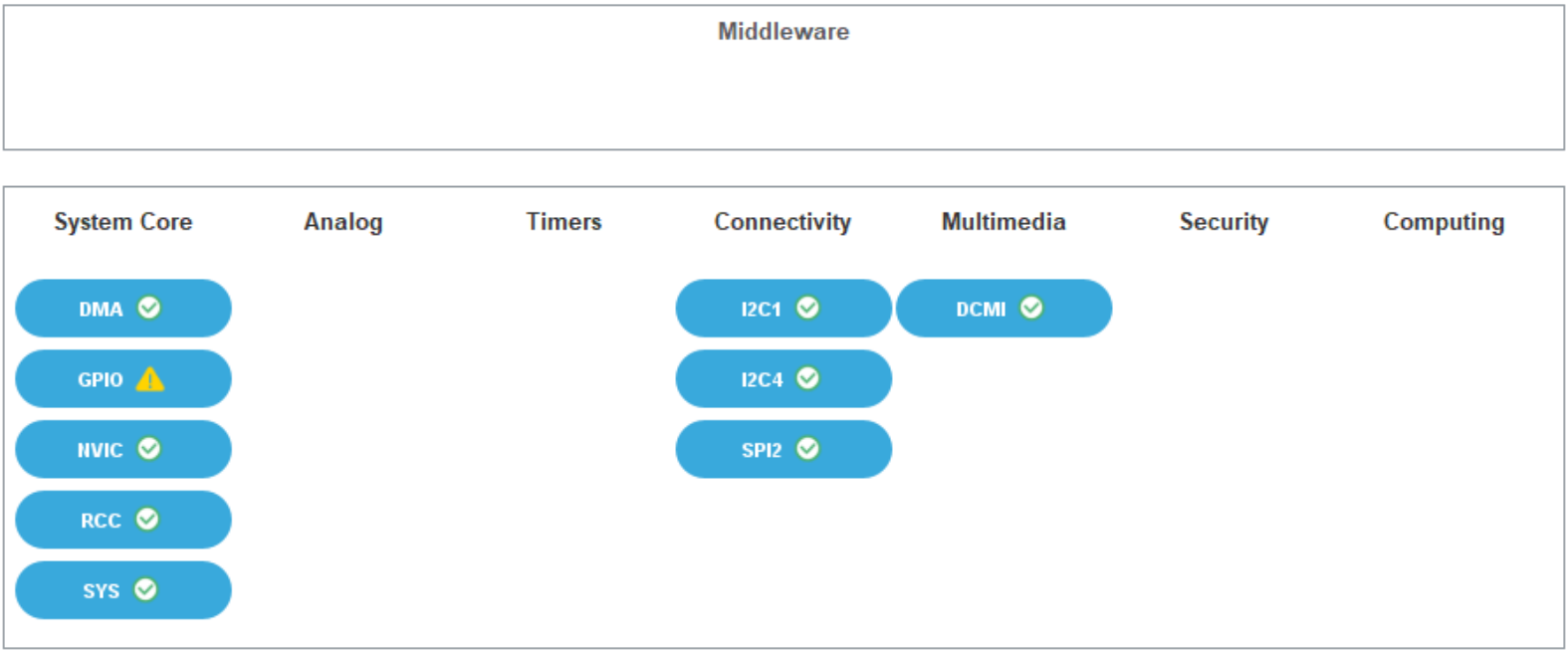
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
DMA1 channel1 global interrupt	false	true	true
DMA2 channel6 global interrupt	false	true	true
DCMI and PSSI global interrupt	false	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32l4plus_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32l4plus_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32l4plus_svd.zip
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32l4plus_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32l4plus_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32l4plus_svd.zip
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/stm32l4plus_pres.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Training Material	https://www.st.com/resource/en/marketing_training/smpres_stm32l4plus_er.pdf
Training Material	https://www.st.com/resource/en/sales_guide/sg_sc2157.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32ulp.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32l4plus.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/psa-certificate_stm32l4.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf

Application Notes	https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2834-how-to-get-the-best-adc-accuracy-in-stm32-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2867-oscillator-design-guide-for-stm8afals-stm32-mcus-and-mpus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an3236-increase-the-number-of-touchkeys-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an3960-esd-considerations-for-touch-sensing-applications-on-mcus-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/an4230-stm32-microcontroller-random-number-generation-validation-using-the-nist-statistical-test-suite-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4299-improve-conducted-noise-robustness-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4310-sampling-capacitor-selection-guide-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4312-design-with-surface-sensors-for-touch-sensing-applications-on-mcus-

	stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4316-tuning-a-touch-sensing-application-on-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4555-getting-started-with-stm32l4-series-and-stm32l4-series-hardware-development-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/an4612-migrating-from-stm32l1-series-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4616-migrating-from-stm32f401-and-stm32f411-lines-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4621-stm32l4-and-stm32l4-ultralowpower-features-overview-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/an4649-migrating-from-stm32f1-series-to-stm32l4-series--stm32l4-series-microntrollers-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/an4726-stm32cube-firmware-examples-for-stm32l4-series-and-stm32l4-series-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4730-using-the-firewall-embedded-in-stm32l0l4l4-series-mcus-for-secure-access-to-sensitive-parts-of-code-and-data-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4746-optimizing-power-and-performance-with-stm32l4-and-stm32l4-series-microcontrollers-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/an4809-migrating-between-stm32l0-series-and-stm32l4-series--stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4821-migrating-from-stm32f405415-line-and-stm32f407417-line-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4831-migrating-from-stm32f2x5-line-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4832-migrating-from-stm32f303-line-to-stm32l4-series-and-stm32l4-series-microcontrollers-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4838-managing-memory-protection-unit-in-stm32-mcus-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/an4879-usb-hardware-and-pcb-guidelines-using-stm32-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an4894-eeprom-emulation-techniques-and-software-for-stm32-microcontrollers-stmicroelectronics.pdf
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