



## 1. Description

### 1.1. Project

Project Name	SDMMC
Board Name	NUCLEO-L4A6ZG
Generated with:	STM32CubeMX 6.5.0
Date	04/04/2022

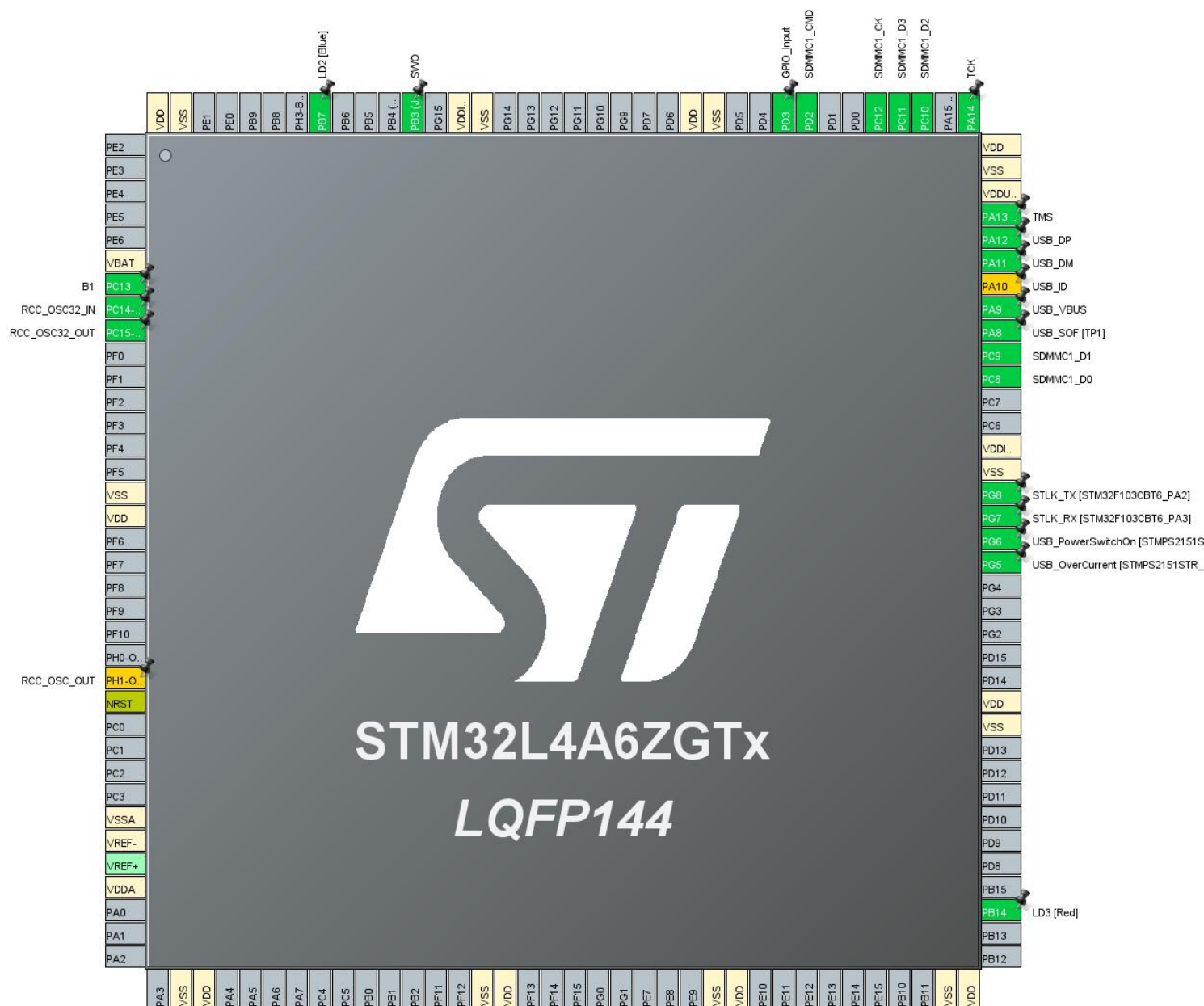
### 1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x6
MCU name	STM32L4A6ZGTx
MCU Package	LQFP144
MCU Pin number	144

### 1.3. Core(s) information

Core(s)	Arm Cortex-M4
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## 2. Pinout Configuration



### 3. Pins Configuration

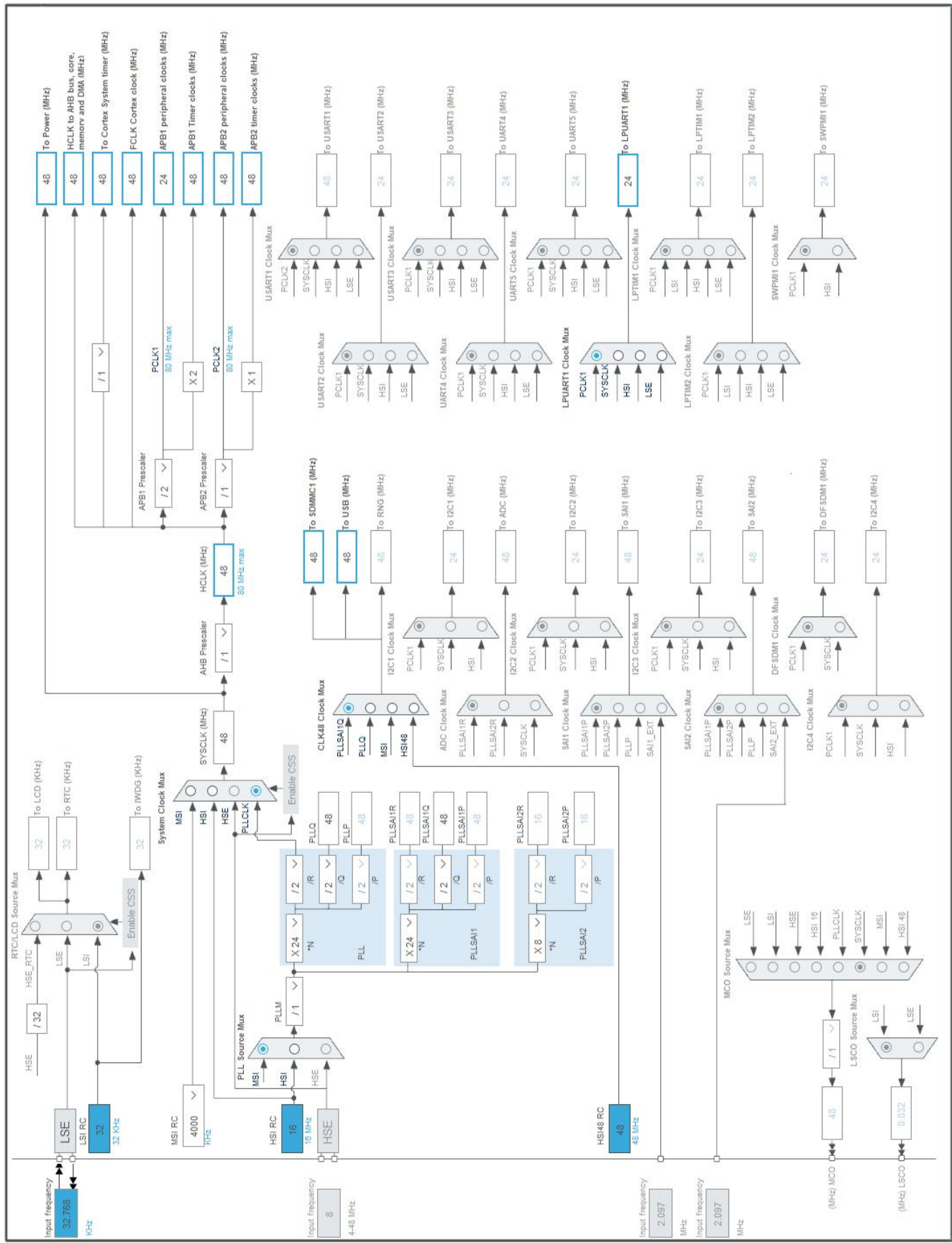
Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
7	PC13	I/O	GPIO_EXTI13	B1
8	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
16	VSS	Power		
17	VDD	Power		
24	PH1-OSC_OUT (PH1) *	I/O	RCC_OSC_OUT	
25	NRST	Reset		
30	VSSA	Power		
31	VREF-	Power		
33	VDDA	Power		
38	VSS	Power		
39	VDD	Power		
51	VSS	Power		
52	VDD	Power		
61	VSS	Power		
62	VDD	Power		
71	VSS	Power		
72	VDD	Power		
75	PB14 **	I/O	GPIO_Output	LD3 [Red]
83	VSS	Power		
84	VDD	Power		
90	PG5 **	I/O	GPIO_Input	USB_OverCurrent [STMPS2151STR_FAULT]
91	PG6 **	I/O	GPIO_Output	USB_PowerSwitchOn [STMPS2151STR_EN]
92	PG7	I/O	LPUART1_TX	STLK_RX [STM32F103CBT6_PA3]
93	PG8	I/O	LPUART1_RX	STLK_TX [STM32F103CBT6_PA2]
94	VSS	Power		
95	VDDIO2	Power		
98	PC8	I/O	SDMMC1_D0	
99	PC9	I/O	SDMMC1_D1	
100	PA8	I/O	USB_OTG_FS_SOF	USB_SOF [TP1]
101	PA9	I/O	USB_OTG_FS_VBUS	USB_VBUS

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
102	PA10 *	I/O	USB_OTG_FS_ID	USB_ID
103	PA11	I/O	USB_OTG_FS_DM	USB_DM
104	PA12	I/O	USB_OTG_FS_DP	USB_DP
105	PA13 (JTMS/SWDIO)	I/O	SYS_JTMS-SWDIO	TMS
106	VDDUSB	Power		
107	VSS	Power		
108	VDD	Power		
109	PA14 (JTCK/SWCLK)	I/O	SYS_JTCK-SWCLK	TCK
111	PC10	I/O	SDMMC1_D2	
112	PC11	I/O	SDMMC1_D3	
113	PC12	I/O	SDMMC1_CK	
116	PD2	I/O	SDMMC1_CMD	
117	PD3 **	I/O	GPIO_Input	
120	VSS	Power		
121	VDD	Power		
130	VSS	Power		
131	VDDIO2	Power		
133	PB3 (JTDO/TRACESWO)	I/O	SYS_JTDO-SWO	SWO
137	PB7 **	I/O	GPIO_Output	LD2 [Blue]
143	VSS	Power		
144	VDD	Power		

\*\* The pin is affected with an I/O function

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

## 4. Clock Tree Configuration



## 5. Software Project

### 5.1. Project Settings

Name	Value
Project Name	SDMMC
Project Folder	C:\Users\carlk\STM32CubeIDE\workspace_1.8.0\SDMMC
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L4 V1.17.1
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x400
Minimum Stack Size	0x800

### 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	Yes
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_LPUART1_UART_Init	LPUART1
4	MX_USB_OTG_FS_PCD_Init	USB_OTG_FS
5	MX_DMA_Init	DMA
6	MX_FATFS_Init	FATFS
7	MX_SDMMC1_SD_Init	SDMMC1

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x6
MCU	STM32L4A6ZGTx
Datasheet	DS11584_Rev2

### 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



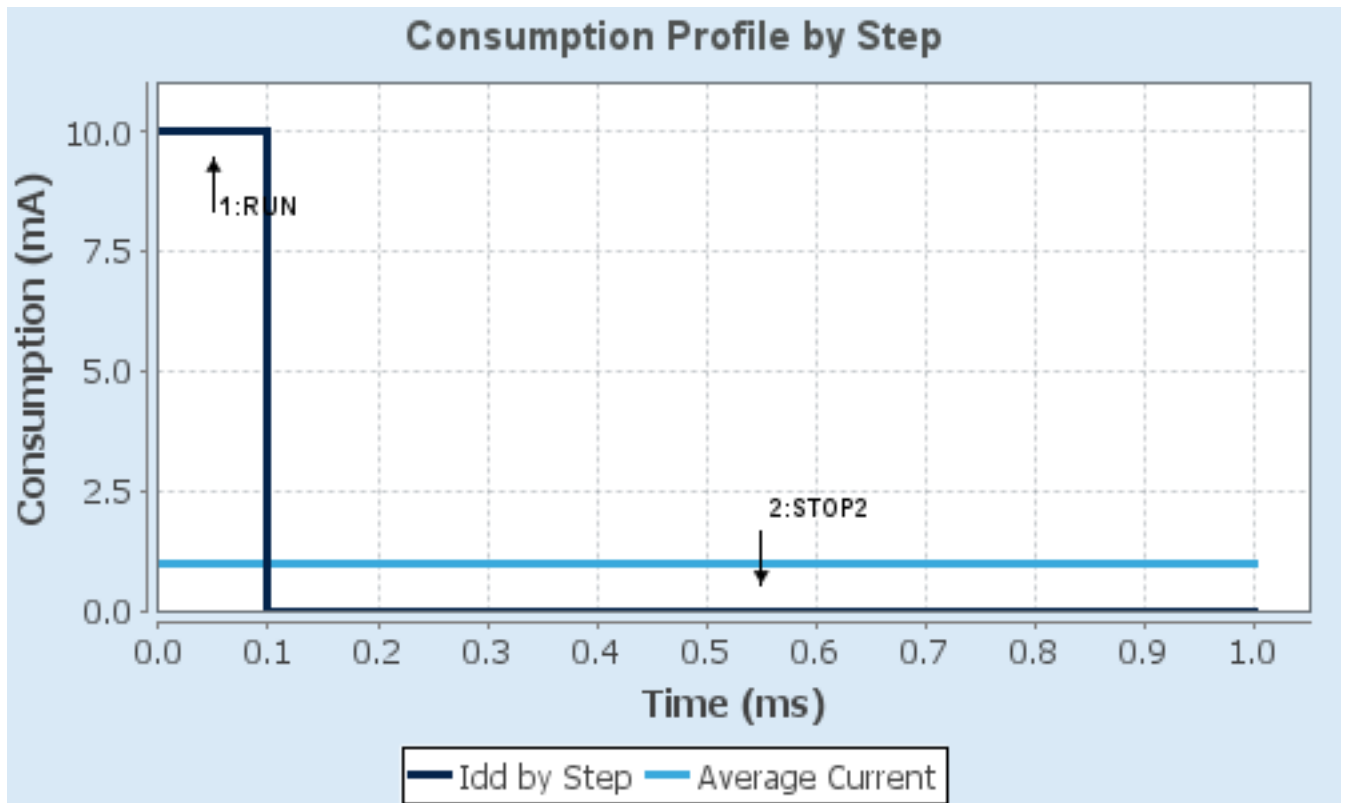
#### 6.4. Sequence

<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP2
<b>Vdd</b>	3.0	3.0
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	Range1-High	NoRange
<b>Fetch Type</b>	FLASH	n/a
<b>CPU Frequency</b>	80 MHz	0 Hz
<b>Clock Configuration</b>	HSE BYP PLL Flash-ON	ALL CLOCKS OFF
<b>Clock Source Frequency</b>	4 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	10 mA	2.69 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	100.0	0.0
<b>Ta Max</b>	104.04	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	1 mA
Battery Life	4 months, 19 days, 3 hours	Average DMIPS	100.0 DMIPS

#### 6.6. Chart



## 7. Peripherals and Middlewares Configuration

### 7.1. LPUART1

**Mode: Asynchronous**

#### 7.1.1. 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
Single Sample	Disable

##### **Advanced Features:**

Auto Baudrate Mode	Disable
TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

### 7.2. RCC

**Low Speed Clock (LSE) : Crystal/Ceramic Resonator**

#### 7.2.1. Parameter Settings:

##### **System Parameters:**

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
Data Cache	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

##### **RCC Parameters:**

HSI Calibration Value	64
MSI Calibration Value	0
MSI Auto Calibration	Enabled
HSE Startup Timeout Value (ms)	100

LSE Startup Timeout Value (ms)	5000
LSE Drive Capability	LSE oscillator low drive capability
<b>Power Parameters:</b>	
Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

### 7.3. SDMMC1

**Mode: SD 4 bits Wide bus**

#### 7.3.1. Parameter Settings:

**SDMMC parameters:**

Clock transition on which the bit capture is made	Rising transition
SDMMC Clock divider bypass	Disable
SDMMC Clock output enable when the bus is idle	Disable the power save for the clock
SDMMC hardware flow control	<b>The hardware control flow is enabled *</b>
SDMMCCLK clock divide factor	0

### 7.4. SYS

**Debug: Trace Asynchronous Sw**

**Timebase Source: TIM17**

### 7.5. USB\_OTG\_FS

**Mode: Device\_Only**

**Activate\_VBUS: VBUS sensing**

**mode: Activate\_SOF**

#### 7.5.1. Parameter Settings:

Speed	Full Speed 12MBit/s
Low power	Disabled
Battery charging	Enabled
Link Power Management	Disabled
Use dedicated end point 1 interrupt	Disabled
VBUS sensing	Enabled
Signal start of frame	Enabled

## 7.6. FATFS

### mode: SD Card

#### 7.6.1. Set Defines:

##### Version:

FATFS version R0.12c

##### Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	<b>Enabled *</b>
USE_MKFS (Make filesystem function)	Enabled
USE_FASTSEEK (Fast seek function)	Enabled
USE_EXPAND (Use f_expand function)	Disabled
USE_CHMOD (Change attributes function)	Disabled
USE_LABEL (Volume label functions)	Disabled
USE_FORWARD (Forward function)	Disabled

##### Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	Latin 1
USE_LFN (Use Long Filename)	<b>Enabled with dynamic working buffer on the STACK *</b>
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	<b>Enabled with f_getcwd *</b>

##### Physical Drive Parameters:

VOLUMES (Logical drives)	1
MAX_SS (Maximum Sector Size)	512
MIN_SS (Minimum Sector Size)	512
MULTI_PARTITION (Volume partitions feature)	Disabled
USE_TRIM (Erase feature)	Disabled
FS_NOFSINFO (Force full FAT scan)	0

##### System Parameters:

FS_TINY (Tiny mode)	Disabled
FS_EXFAT (Support of exFAT file system)	Disabled
FS_NORTC (Timestamp feature)	Dynamic timestamp
FS_REENTRANT (Re-Entrancy)	Disabled
FS_TIMEOUT (Timeout ticks)	1000
FS_LOCK (Number of files opened simultaneously)	2

### 7.6.2. Advanced Settings:

#### **SDIO/SDMMC:**

SDMMC instance	SDMMC1
Use dma template	<b>Enabled *</b>
BSP code for SD	Generic

### 7.6.3. Platform Settings:

Detect_SDIO	PD3
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**\* User modified value**

## 8. System Configuration

### 8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
LPUART1	PG7	LPUART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	STLK_RX [STM32F103CBT6_PA3]
	PG8	LPUART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	STLK_TX [STM32F103CBT6_PA2]
RCC	PC14-OSC32_IN (PC14)	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT (PC15)	RCC_OSC32_OUT	n/a	n/a	n/a	
SDMMC1	PC8	SDMMC1_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC9	SDMMC1_D1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC10	SDMMC1_D2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC11	SDMMC1_D3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC12	SDMMC1_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD2	SDMMC1_CMD	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
SYS	PA13 (JTMS/SWDIO)	SYS_JTMS-SWDIO	n/a	n/a	n/a	TMS
	PA14 (JTCK/SWCLK)	SYS_JTCK-SWCLK	n/a	n/a	n/a	TCK
	PB3 (JTDO/TRACESWO)	SYS_JTDO-SWO	n/a	n/a	n/a	SWO
USB_OTG_FS	PA8	USB_OTG_FS_SOF	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	USB_SOF [TP1]
	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	<b>n/a</b>	USB_VBUS
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	USB_DM
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	USB_DP
Single Mapped Signals	PH1-OSC_OUT (PH1)	RCC_OSC_OUT	n/a	n/a	n/a	
	PA10	USB_OTG_FS_ID	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	USB_ID

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
GPIO	PC13	GPIO_EXTI13	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	B1
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Red]
	PG5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	USB_OverCurrent [STMPS2151STR_FAULT]
	PG6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	USB_PowerSwitchOn [STMPS2151STR_EN]
	PD3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Blue]



## 8.2. DMA configuration

DMA request	Stream	Direction	Priority
SDMMC1_TX	DMA2_Channel4	Memory To Peripheral	<b>High *</b>
SDMMC1_RX	DMA2_Channel5	Peripheral To Memory	<b>High *</b>

### SDMMC1\_TX: DMA2\_Channel4 DMA request Settings:

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

### SDMMC1\_RX: DMA2\_Channel5 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	15	0
TIM1 trigger and commutation interrupts and TIM17 global interrupt	true	15	0
SDMMC1 global interrupt	true	0	0
DMA2 channel4 global interrupt	true	0	0
DMA2 channel5 global interrupt	true	0	0
LPUART1 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 line[15:10] interrupts	unused		
USB OTG FS global interrupt	unused		
FPU global 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
TIM1 trigger and commutation interrupts and TIM17 global interrupt	false	true	true
SDMMC1 global interrupt	false	true	true

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
DMA2 channel4 global interrupt	false	true	true
DMA2 channel5 global interrupt	false	true	true
LPUART1 global interrupt	false	true	true

\* User modified value

## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

#### Middleware

FATFS 

#### System Core

#### Analog

#### Timers

#### Connectivity

#### Multimedia

#### Security

#### Computing

DMA 

GPIO 

NVIC 

RCC 

SYS 

LPUART1 

SDMMC1 

USB\_FS 

## 10. Docs & Resources

Type	Link
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf">https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf">https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf</a>
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Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf">https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf</a>
Training Material	<a href="https://www.st.com/resource/en/sales_guide/sg_sc2157.pdf">https://www.st.com/resource/en/sales_guide/sg_sc2157.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flnucleolrwan.pdf">https://www.st.com/resource/en/flyer/flnucleolrwan.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstm32l4.pdf">https://www.st.com/resource/en/flyer/flstm32l4.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstm32nucleo.pdf">https://www.st.com/resource/en/flyer/flstm32nucleo.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstmcsuite.pdf">https://www.st.com/resource/en/flyer/flstmcsuite.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstm32trust.pdf">https://www.st.com/resource/en/flyer/flstm32trust.pdf</a>
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Magazine Articles	<a href="https://www.st.com/resource/en/magazine/design-elektronik_october2016.pdf">https://www.st.com/resource/en/magazine/design-elektronik_october2016.pdf</a>
Product Certifications	<a href="https://www.st.com/resource/en/certification_document/sesip-2000002-01-cert.pdf">https://www.st.com/resource/en/certification_document/sesip-2000002-01-cert.pdf</a>
Product Certifications	<a href="https://www.st.com/resource/en/certification_document/sesip-2000002-01-st2.pdf">https://www.st.com/resource/en/certification_document/sesip-2000002-01-st2.pdf</a>
Product Certifications	<a href="https://www.st.com/resource/en/certification_document/psa-certificate_stm32l4.pdf">https://www.st.com/resource/en/certification_document/psa-certificate_stm32l4.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an1709-emc-design-">https://www.st.com/resource/en/application_note/an1709-emc-design-</a>

guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf

Application Notes [https://www.st.com/resource/en/application\\_note/an2548-using-the-stm32f0f1f3gxl-series-dma-controller-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an2548-using-the-stm32f0f1f3gxl-series-dma-controller-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf](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](https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf)

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Application Notes [https://www.st.com/resource/en/application\\_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf)

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Application Notes [https://www.st.com/resource/en/application\\_note/an3236-increase-the-number-of-touchkeys-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf](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](https://www.st.com/resource/en/application_note/an3960-esd-considerations-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf)

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