1. Description

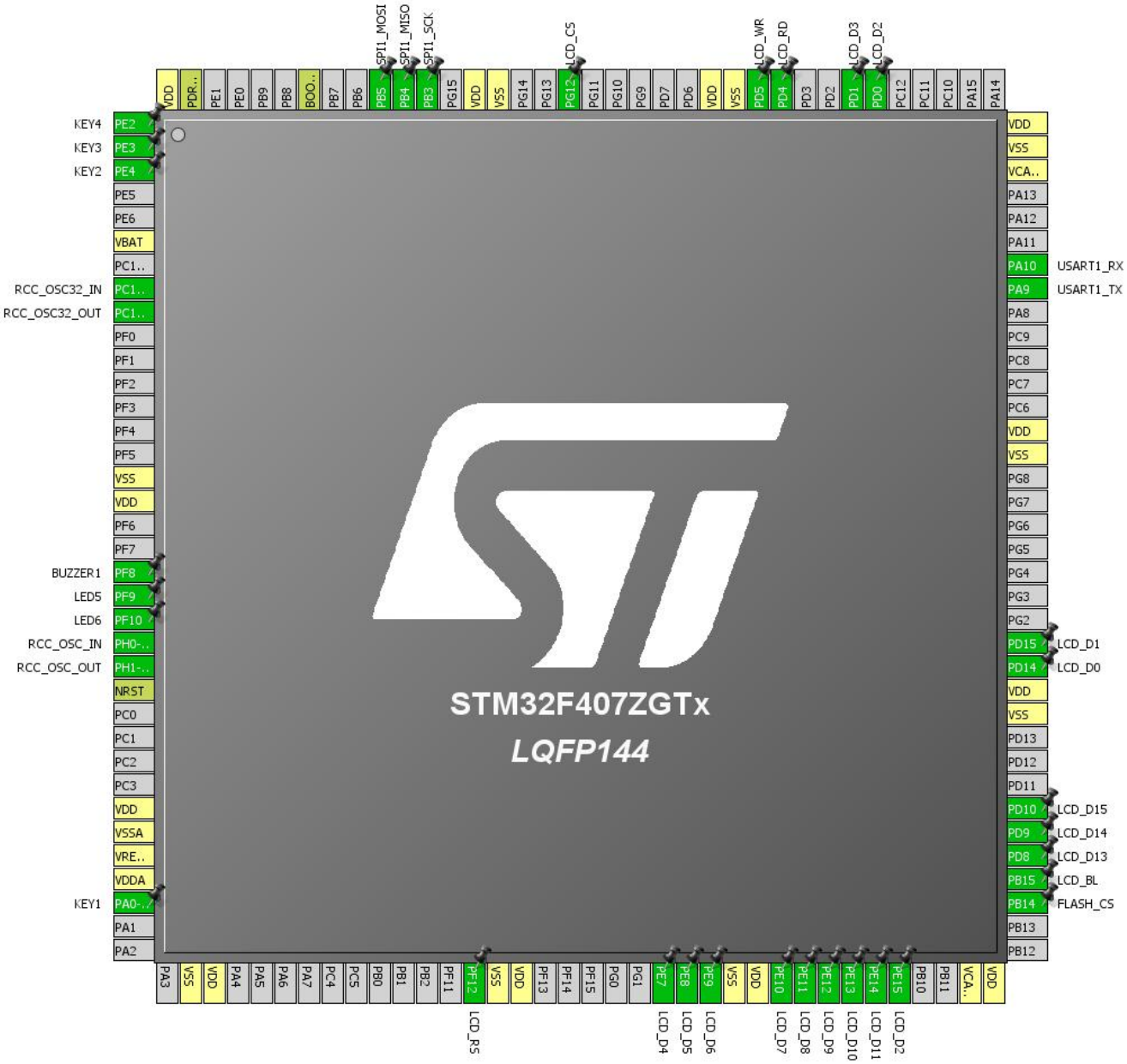
1.1. Project

Project Name	ex5-1 lcd
Board Name	ex5-1 lcd
Generated with:	STM32CubeMX 4.18.0
Date	12/12/2016

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407ZGTx
MCU Package	LQFP144
MCU Pin number	144

2. Pinout Configuration



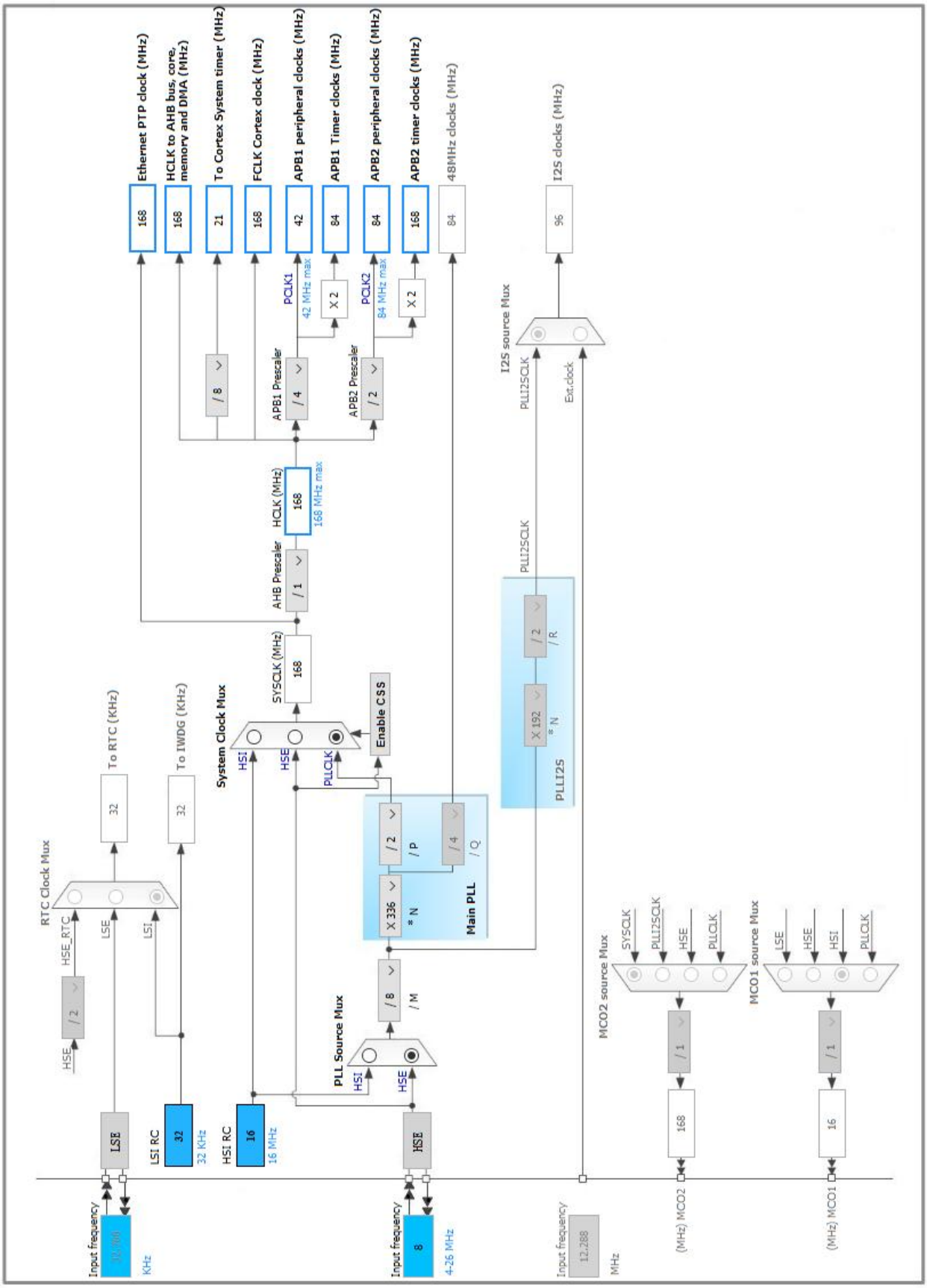
3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Input	KEY4
2	PE3 *	I/O	GPIO_Input	KEY3
3	PE4 *	I/O	GPIO_Input	KEY2
6	VBAT	Power		
8	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
16	VSS	Power		
17	VDD	Power		
20	PF8 *	I/O	GPIO_Output	BUZZER1
21	PF9 *	I/O	GPIO_Output	LED5
22	PF10 *	I/O	GPIO_Output	LED6
23	PH0-OSC_IN	I/O	RCC_OSC_IN	
24	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
25	NRST	Reset		
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
34	PA0-WKUP *	I/O	GPIO_Input	KEY1
38	VSS	Power		
39	VDD	Power		
50	PF12 *	I/O	GPIO_Output	LCD_RS
51	VSS	Power		
52	VDD	Power		
58	PE7 *	I/O	GPIO_Output	LCD_D4
59	PE8 *	I/O	GPIO_Output	LCD_D5
60	PE9 *	I/O	GPIO_Output	LCD_D6
61	VSS	Power		
62	VDD	Power		
63	PE10 *	I/O	GPIO_Output	LCD_D7
64	PE11 *	I/O	GPIO_Output	LCD_D8
65	PE12 *	I/O	GPIO_Output	LCD_D9
66	PE13 *	I/O	GPIO_Output	LCD_D10
67	PE14 *	I/O	GPIO_Output	LCD_D11
68	PE15 *	I/O	GPIO_Output	LCD_D2
71	VCAP_1	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
72	VDD	Power		
75	PB14 *	I/O	GPIO_Output	FLASH_CS
76	PB15 *	I/O	GPIO_Output	LCD_BL
77	PD8 *	I/O	GPIO_Output	LCD_D13
78	PD9 *	I/O	GPIO_Output	LCD_D14
79	PD10 *	I/O	GPIO_Output	LCD_D15
83	VSS	Power		
84	VDD	Power		
85	PD14 *	I/O	GPIO_Output	LCD_D0
86	PD15 *	I/O	GPIO_Output	LCD_D1
94	VSS	Power		
95	VDD	Power		
101	PA9	I/O	USART1_TX	
102	PA10	I/O	USART1_RX	
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
114	PD0 *	I/O	GPIO_Output	LCD_D2
115	PD1 *	I/O	GPIO_Output	LCD_D3
118	PD4 *	I/O	GPIO_Output	LCD_RD
119	PD5 *	I/O	GPIO_Output	LCD_WR
120	VSS	Power		
121	VDD	Power		
127	PG12 *	I/O	GPIO_Output	LCD_CS
130	VSS	Power		
131	VDD	Power		
133	PB3	I/O	SPI1_SCK	
134	PB4	I/O	SPI1_MISO	
135	PB5	I/O	SPI1_MOSI	
138	BOOT0	Boot		
143	PDR_ON	Reset		
144	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator
Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.1.1. Parameter Settings:

System Parameters:

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

RCC Parameters:

HSI Calibration Value	16
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.2. SPI1

Mode: Full-Duplex Master

5.2.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**42.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

5.3. SYS

Timebase Source: SysTick

5.4. USART1

Mode: Asynchronous

5.4.1. 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

*** User modified value**

6. System Configuration

6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PB3	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB4	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB5	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
USART1	PA9	USART1_TX	Alternate Function Push Pull	Pull-up	Low	
	PA10	USART1_RX	Alternate Function Push Pull	Pull-up	Low	
GPIO	PE2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY4
	PE3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY3
	PE4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY2
	PF8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BUZZER1
	PF9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED5
	PF10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED6
	PA0-WKUP	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY1
	PF12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High ***	LCD_RS
	PE7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High ***	LCD_D4
	PE8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High ***	LCD_D5
	PE9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High ***	LCD_D6
	PE10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High**	LCD_D7

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
	PE11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D8
	PE12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D9
	PE13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D10
	PE14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D11
	PE15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D2
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	FLASH_CS
	PB15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LCD_BL
	PD8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D13
	PD9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D14
	PD10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D15
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D0
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D1
	PD0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D2
	PD1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_D3
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_RD
	PD5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_WR
	PG12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High** *	LCD_CS

6.2. DMA configuration

nothing configured in DMA service

6.3. NVIC configuration

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	0	0
USART1 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
SPI1 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407ZGTx
Datasheet	022152_Rev7

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	ex5-1 lcd
Project Folder	D:\Git_Repository\GitHub\M4_HAL_Works\ex5-1 lcd
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F4 V1.14.0

8.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	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
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No