

1. Description

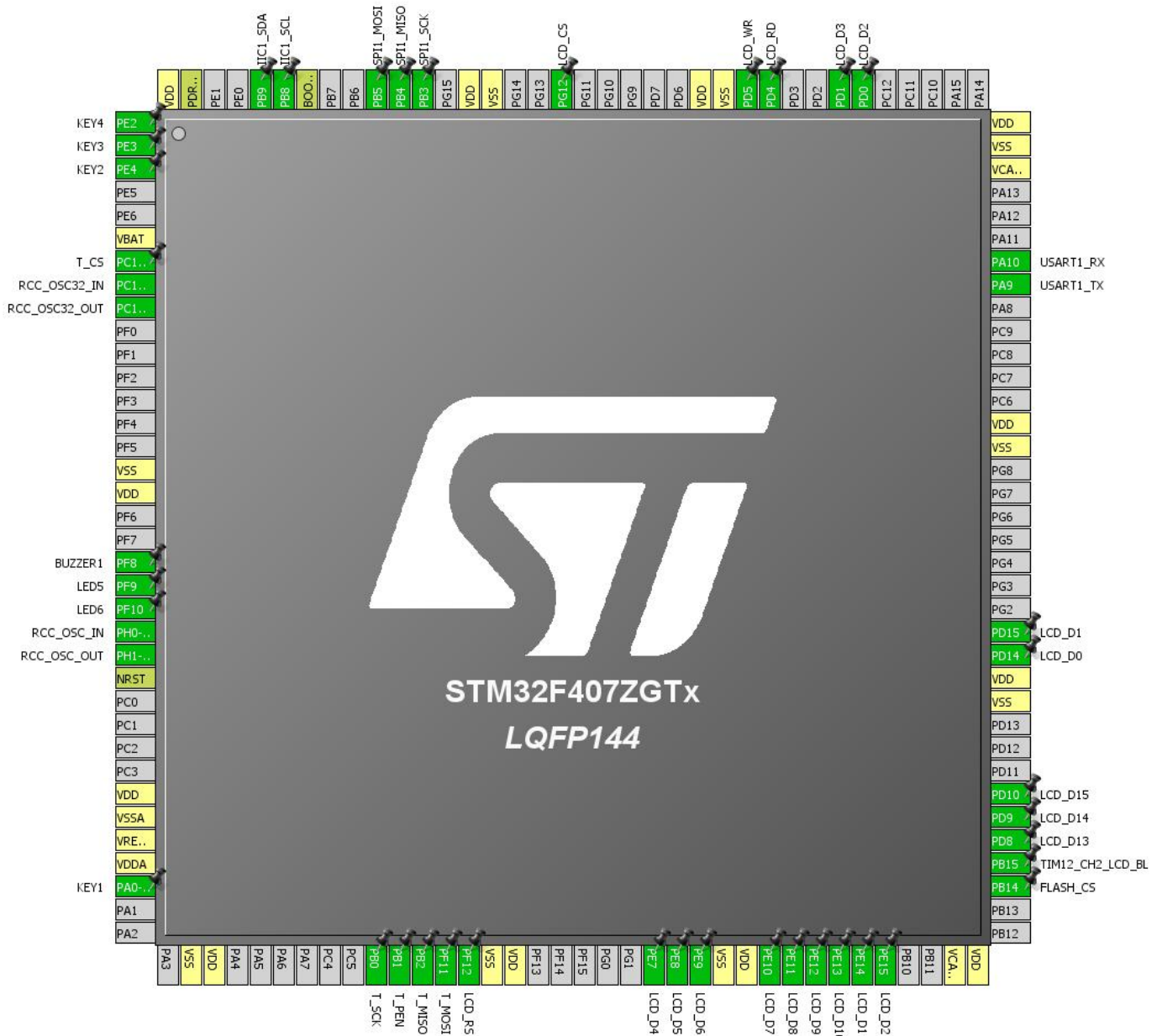
1.1. Project

Project Name	test
Board Name	test
Generated with:	STM32CubeMX 4.18.0
Date	01/01/2017

1.2. MCU

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

2. Pinout Configuration



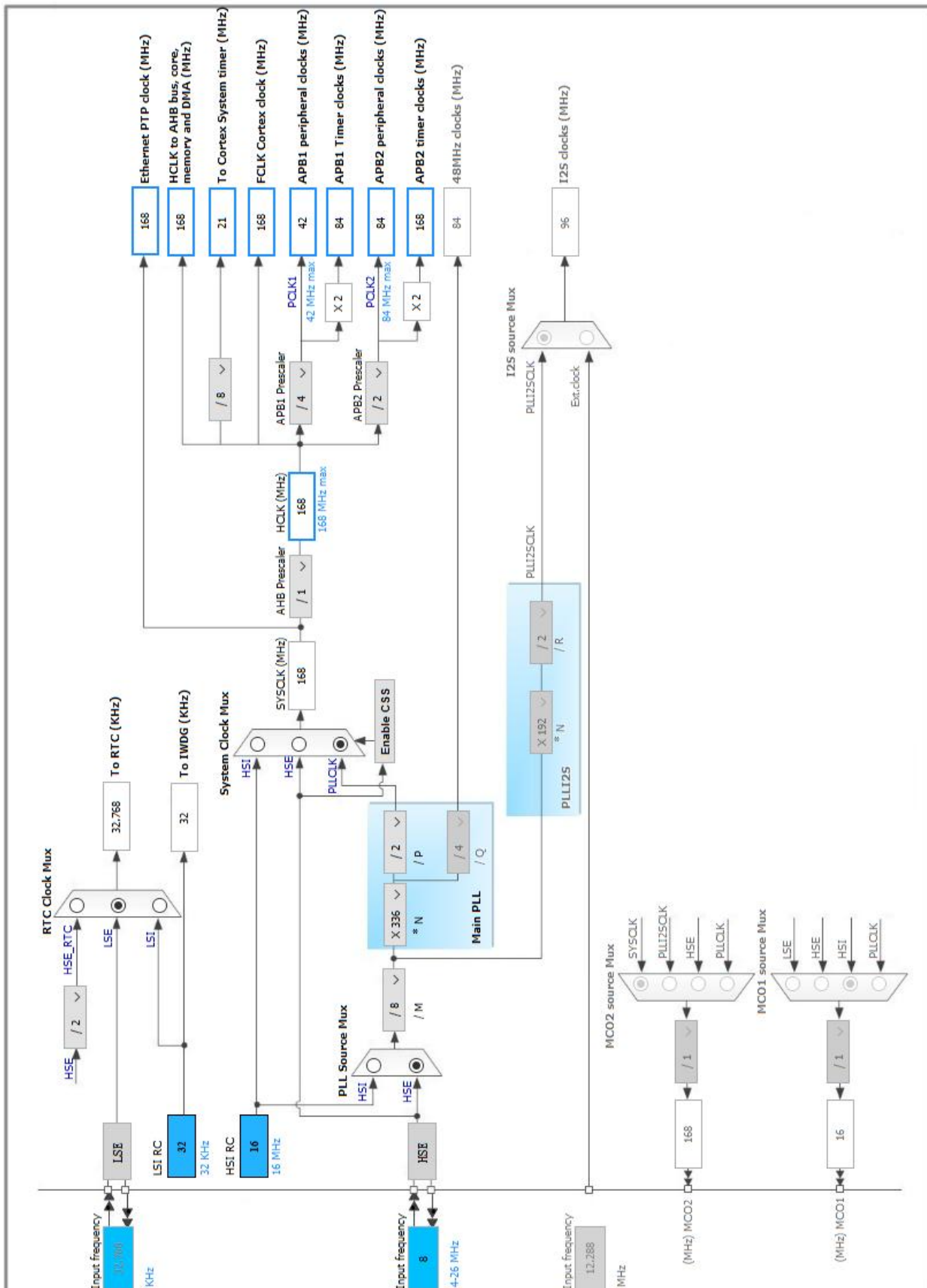
3. Pins Configuration

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		
7	PC13-ANTI_TAMP *	I/O	GPIO_Output	T_CS
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		
46	PB0 *	I/O	GPIO_Output	T_SCK
47	PB1 *	I/O	GPIO_Input	T_PEN
48	PB2 *	I/O	GPIO_Input	T_MISO
49	PF11 *	I/O	GPIO_Output	T_MOSI
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

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
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		
72	VDD	Power		
75	PB14 *	I/O	GPIO_Output	FLASH_CS
76	PB15	I/O	TIM12_CH2	TIM12_CH2_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		
139	PB8 *	I/O	GPIO_Output	IIC1_SCL
140	PB9 *	I/O	GPIO_Output	IIC1_SDA
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. IWDG

mode: Activated

5.1.1. Parameter Settings:

Clocking:

IWDG counter clock prescaler	256 *
IWDG down-counter reload value	125 *

5.2. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.2.1. 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 Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
-------------------------------	---------------------------------

5.3. RTC

mode: Activate Clock Source

mode: Activate Calendar

Alarm A: Internal Alarm

WakeUp: Internal WakeUp

5.3.1. Parameter Settings:

General:

Hour Format	Hourformat 24
Asynchronous Predivider value	127
Synchronous Predivider value	255

Calendar Time:

Data Format	BCD data format
Hours	10 *
Minutes	55 *
Seconds	0
Day Light Saving: value of hour adjustment	Daylightsaving None
Store Operation	Storeoperation Reset

Calendar Date:

Week Day	Sunday *
Month	December *
Date	18 *
Year	16 *

Alarm A:

Hours	10 *
Minutes	58 *
Seconds	0
Sub Seconds	0
Alarm Mask Date Week day	Disable
Alarm Mask Hours	Disable
Alarm Mask Minutes	Disable
Alarm Mask Seconds	Disable
Alarm Sub Second Mask	All Alarm SS fields are masked.
Alarm Date Week Day Sel	Date
Alarm Date	1

Wake UP:

Wake Up Clock	1 Hz *
Wake Up Counter	0

5.4. SPI1

Mode: Full-Duplex Master

5.4.1. 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

5.5. SYS

Timebase Source: SysTick

5.6. TIM6

mode: Activated

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	8399 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	99 *

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)
-------------------------	------------------------------

5.7. TIM7

mode: Activated

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	8399 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	10000 *

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)
-------------------------	------------------------------

5.8. TIM12

mode: Clock Source

Channel2: PWM Generation CH2

5.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	83 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	999 *
Internal Clock Division (CKD)	No Division

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	500 *
Fast Mode	Disable
CH Polarity	High

5.9. USART1

Mode: Asynchronous

5.9.1. 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 *	
TIM12	PB15	TIM12_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	TIM12_CH2_LCD_BL
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
	PC13-ANTI_TAMP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	T_CS
	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
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	T_SCK
	PB1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	T_PEN
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	T_MISO
	PF11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	T_MOSI
	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

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
	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
	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
	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

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PG12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Very High *	LCD_CS
	PB8	GPIO_Output	Output Open Drain *	No pull-up and no pull-down	Low	IIC1_SCL
	PB9	GPIO_Output	Output Open Drain *	No pull-up and no pull-down	Low	IIC1_SDA

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
RTC wake-up interrupt through EXTI line 22	true	0	0
USART1 global interrupt	true	0	0
RTC alarms A and B interrupt through EXTI line 17	true	0	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	0	0
TIM7 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
SPI1 global interrupt	unused		
TIM8 break interrupt and TIM12 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	test
Project Folder	D:\Git_Repository\GitHub\M4_HAL_Works\ex8-2 timer PWM
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