1. Description

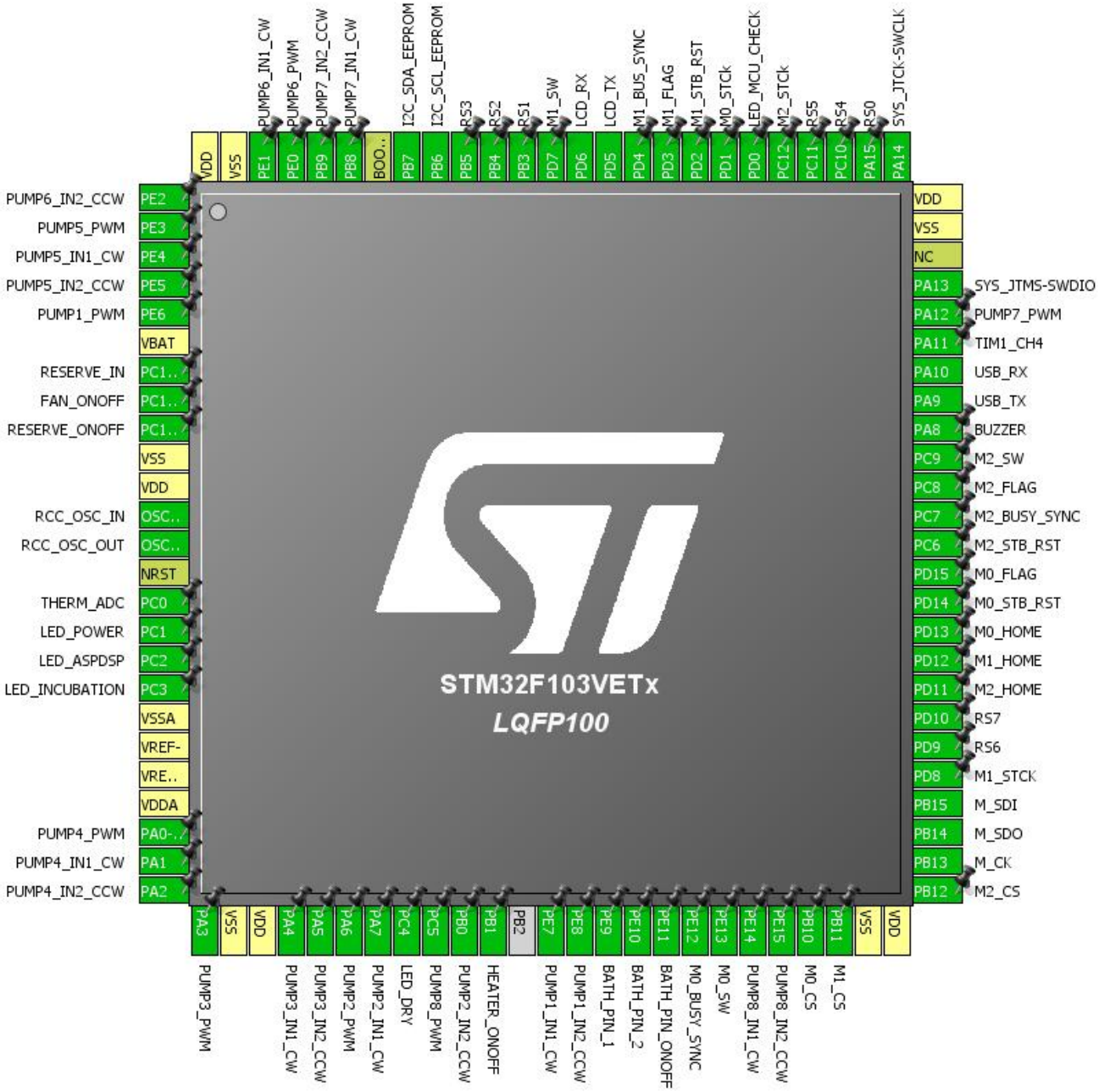
1.1. Project

Project Name	K-Blot_Light
Board Name	K-Blot_Light
Generated with:	STM32CubeMX 4.17.0
Date	01/20/2017

1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103VETx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration



3. Pins Configuration

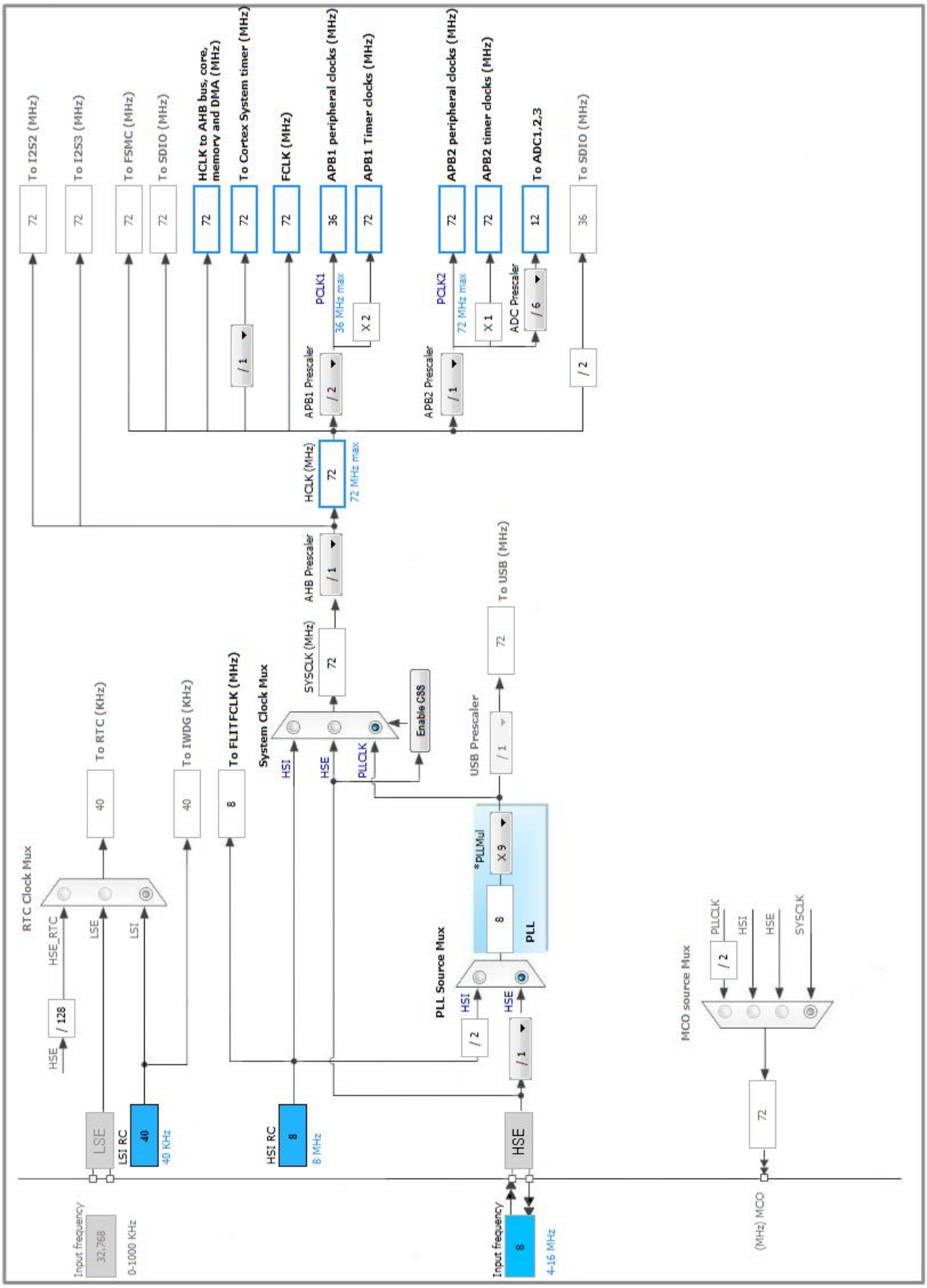
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Output	PUMP6_IN2_CCW
2	PE3 *	I/O	GPIO_Output	PUMP5_PWM
3	PE4 *	I/O	GPIO_Output	PUMP5_IN1_CW
4	PE5 *	I/O	GPIO_Output	PUMP5_IN2_CCW
5	PE6 *	I/O	GPIO_Output	PUMP1_PWM
6	VBAT	Power		
7	PC13-TAMPER-RTC *	I/O	GPIO_Input	RESERVE_IN
8	PC14-OSC32_IN *	I/O	GPIO_Output	FAN_ONOFF
9	PC15-OSC32_OUT *	I/O	GPIO_Output	RESERVE_ONOFF
10	VSS	Power		
11	VDD	Power		
12	OSC_IN	I/O	RCC_OSC_IN	
13	OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
15	PC0	I/O	ADC1_IN10	THERM_ADC
16	PC1 *	I/O	GPIO_Output	LED_POWER
17	PC2 *	I/O	GPIO_Output	LED_ASPDSP
18	PC3 *	I/O	GPIO_Output	LED_INCUBATION
19	VSSA	Power		
20	VREF-	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP *	I/O	GPIO_Output	PUMP4_PWM
24	PA1 *	I/O	GPIO_Output	PUMP4_IN1_CW
25	PA2 *	I/O	GPIO_Output	PUMP4_IN2_CCW
26	PA3 *	I/O	GPIO_Output	PUMP3_PWM
27	VSS	Power		
28	VDD	Power		
29	PA4 *	I/O	GPIO_Output	PUMP3_IN1_CW
30	PA5 *	I/O	GPIO_Output	PUMP3_IN2_CCW
31	PA6 *	I/O	GPIO_Output	PUMP2_PWM
32	PA7 *	I/O	GPIO_Output	PUMP2_IN1_CW
33	PC4 *	I/O	GPIO_Output	LED_DRY
34	PC5 *	I/O	GPIO_Output	PUMP8_PWM
35	PB0 *	I/O	GPIO_Output	PUMP2_IN2_CCW
36	PB1 *	I/O	GPIO_Output	HEATER_ONOFF

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
38	PE7 *	I/O	GPIO_Output	PUMP1_IN1_CW
39	PE8 *	I/O	GPIO_Output	PUMP1_IN2_CCW
40	PE9 *	I/O	GPIO_Input	BATH_PIN_1
41	PE10 *	I/O	GPIO_Input	BATH_PIN_2
42	PE11 *	I/O	GPIO_Output	BATH_PIN_ONOFF
43	PE12 *	I/O	GPIO_Input	M0_BUSY_SYNC
44	PE13 *	I/O	GPIO_Output	M0_SW
45	PE14 *	I/O	GPIO_Output	PUMP8_IN1_CW
46	PE15 *	I/O	GPIO_Output	PUMP8_IN2_CCW
47	PB10 *	I/O	GPIO_Output	M0_CS
48	PB11 *	I/O	GPIO_Output	M1_CS
49	VSS	Power		
50	VDD	Power		
51	PB12 *	I/O	GPIO_Output	M2_CS
52	PB13	I/O	SPI2_SCK	M_CK
53	PB14	I/O	SPI2_MISO	M_SDO
54	PB15	I/O	SPI2_MOSI	M_SDI
55	PD8 *	I/O	GPIO_Output	M1_STCK
56	PD9 *	I/O	GPIO_Output	RS6
57	PD10 *	I/O	GPIO_Output	RS7
58	PD11 *	I/O	GPIO_Input	M2_HOME
59	PD12 *	I/O	GPIO_Input	M1_HOME
60	PD13 *	I/O	GPIO_Input	M0_HOME
61	PD14 *	I/O	GPIO_Output	M0_STB_RST
62	PD15 *	I/O	GPIO_Input	M0_FLAG
63	PC6 *	I/O	GPIO_Output	M2_STB_RST
64	PC7 *	I/O	GPIO_Input	M2_BUSY_SYNC
65	PC8 *	I/O	GPIO_Input	M2_FLAG
66	PC9 *	I/O	GPIO_Output	M2_SW
67	PA8 *	I/O	GPIO_Output	BUZZER
68	PA9	I/O	USART1_TX	USB_TX
69	PA10	I/O	USART1_RX	USB_RX
70	PA11	I/O	TIM1_CH4	
71	PA12 *	I/O	GPIO_Output	PUMP7_PWM
72	PA13	I/O	SYS_JTMS-SWDIO	
73	NC	NC		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
77	PA15 *	I/O	GPIO_Output	RS0
78	PC10 *	I/O	GPIO_Output	RS4
79	PC11 *	I/O	GPIO_Output	RS5
80	PC12 *	I/O	GPIO_Output	M2_STCk
81	PD0 *	I/O	GPIO_Output	LED_MCU_CHECK
82	PD1 *	I/O	GPIO_Output	M0_STCk
83	PD2 *	I/O	GPIO_Output	M1_STB_RST
84	PD3 *	I/O	GPIO_Input	M1_FLAG
85	PD4 *	I/O	GPIO_Input	M1_BUS_SYNC
86	PD5	I/O	USART2_TX	LCD_TX
87	PD6	I/O	USART2_RX	LCD_RX
88	PD7 *	I/O	GPIO_Output	M1_SW
89	PB3 *	I/O	GPIO_Output	RS1
90	PB4 *	I/O	GPIO_Output	RS2
91	PB5 *	I/O	GPIO_Output	RS3
92	PB6	I/O	I2C1_SCL	I2C_SCL_EEPROM
93	PB7	I/O	I2C1_SDA	I2C_SDA_EEPROM
94	BOOT0	Boot		
95	PB8 *	I/O	GPIO_Output	PUMP7_IN1_CW
96	PB9 *	I/O	GPIO_Output	PUMP7_IN2_CCW
97	PE0 *	I/O	GPIO_Output	PUMP6_PWM
98	PE1 *	I/O	GPIO_Output	PUMP6_IN1_CW
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN10

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Data Alignment	Right alignment
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Number Of Conversion	1
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 10
Sampling Time	1.5 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.2. I2C1

I2C: I2C

5.2.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

Slave Features:

Clock No Stretch Mode	Disabled

Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0
General Call address detection	Disabled

5.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.3.1. Parameter Settings:

System Parameters:

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

RCC Parameters:

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

5.4. SPI2

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	**18.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

5.5. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.6. TIM1

Channel4: PWM Generation CH4

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

5.7. TIM2

Clock Source : Internal Clock

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**72 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**999 ***
Internal Clock Division (CKD)	No Division

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.8. USART1

Mode: Asynchronous

5.8.1. 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

5.9. USART2

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
ADC1	PC0	ADC1_IN10	Analog mode	n/a	n/a	THERM_ADC
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	n/a	**High ***	I2C_SCL_EEPROM
	PB7	I2C1_SDA	Alternate Function Open Drain	n/a	**High ***	I2C_SDA_EEPROM
RCC	OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI2	PB13	SPI2_SCK	Alternate Function Push Pull	n/a	**High ***	M_CK
	PB14	SPI2_MISO	Input mode	No pull-up and no pull-down	**n/a**	M_SDO
	PB15	SPI2_MOSI	Alternate Function Push Pull	n/a	**High ***	M_SDI
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM1	PA11	TIM1_CH4	Alternate Function Push Pull	n/a	Low	
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	**High ***	USB_TX
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	**n/a**	USB_RX
USART2	PD5	USART2_TX	Alternate Function Push Pull	n/a	**High ***	LCD_TX
	PD6	USART2_RX	Input mode	No pull-up and no pull-down	**n/a**	LCD_RX
GPIO	PE2	GPIO_Output	Output Push Pull	n/a	Low	PUMP6_IN2_CCW
	PE3	GPIO_Output	Output Push Pull	n/a	Low	PUMP5_PWM
	PE4	GPIO_Output	Output Push Pull	n/a	Low	PUMP5_IN1_CW
	PE5	GPIO_Output	Output Push Pull	n/a	Low	PUMP5_IN2_CCW
	PE6	GPIO_Output	Output Push Pull	n/a	Low	PUMP1_PWM
	PC13-TAMPER-RTC	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	RESERVE_IN
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	n/a	Low	FAN_ONOFF
	PC15-OSC32_OUT	GPIO_Output	Output Push Pull	n/a	Low	RESERVE_ONOFF
	PC1	GPIO_Output	Output Push Pull	n/a	Low	LED_POWER
	PC2	GPIO_Output	Output Push Pull	n/a	Low	LED_ASPDSP

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC3	GPIO_Output	Output Push Pull	n/a	Low	LED_INCUBATION
	PA0-WKUP	GPIO_Output	Output Push Pull	n/a	Low	PUMP4_PWM
	PA1	GPIO_Output	Output Push Pull	n/a	Low	PUMP4_IN1_CW
	PA2	GPIO_Output	Output Push Pull	n/a	Low	PUMP4_IN2_CCW
	PA3	GPIO_Output	Output Push Pull	n/a	Low	PUMP3_PWM
	PA4	GPIO_Output	Output Push Pull	n/a	Low	PUMP3_IN1_CW
	PA5	GPIO_Output	Output Push Pull	n/a	Low	PUMP3_IN2_CCW
	PA6	GPIO_Output	Output Push Pull	n/a	Low	PUMP2_PWM
	PA7	GPIO_Output	Output Push Pull	n/a	Low	PUMP2_IN1_CW
	PC4	GPIO_Output	Output Push Pull	n/a	Low	LED_DRY
	PC5	GPIO_Output	Output Push Pull	n/a	Low	PUMP8_PWM
	PB0	GPIO_Output	Output Push Pull	n/a	Low	PUMP2_IN2_CCW
	PB1	GPIO_Output	Output Push Pull	n/a	Low	HEATER_ONOFF
	PE7	GPIO_Output	Output Push Pull	n/a	Low	PUMP1_IN1_CW
	PE8	GPIO_Output	Output Push Pull	n/a	Low	PUMP1_IN2_CCW
	PE9	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BATH_PIN_1
	PE10	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BATH_PIN_2
	PE11	GPIO_Output	Output Push Pull	n/a	Low	BATH_PIN_ONOFF
	PE12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M0_BUSY_SYNC
	PE13	GPIO_Output	Output Push Pull	n/a	Low	M0_SW
	PE14	GPIO_Output	Output Push Pull	n/a	Low	PUMP8_IN1_CW
	PE15	GPIO_Output	Output Push Pull	n/a	Low	PUMP8_IN2_CCW
	PB10	GPIO_Output	Output Push Pull	n/a	Low	M0_CS
	PB11	GPIO_Output	Output Push Pull	n/a	Low	M1_CS
	PB12	GPIO_Output	Output Push Pull	n/a	Low	M2_CS
	PD8	GPIO_Output	Output Push Pull	n/a	Low	M1_STCK
	PD9	GPIO_Output	Output Push Pull	n/a	Low	RS6
	PD10	GPIO_Output	Output Push Pull	n/a	Low	RS7
	PD11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M2_HOME
	PD12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M1_HOME
	PD13	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M0_HOME
	PD14	GPIO_Output	Output Push Pull	n/a	Low	M0_STB_RST
	PD15	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M0_FLAG
	PC6	GPIO_Output	Output Push Pull	n/a	Low	M2_STB_RST
	PC7	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M2_BUSY_SYNC
	PC8	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M2_FLAG
	PC9	GPIO_Output	Output Push Pull	n/a	Low	M2_SW
	PA8	GPIO_Output	Output Push Pull	n/a	Low	BUZZER
	PA12	GPIO_Output	Output Push Pull	n/a	Low	PUMP7_PWM
	PA15	GPIO_Output	Output Push Pull	n/a	Low	RS0

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC10	GPIO_Output	Output Push Pull	n/a	Low	RS4
	PC11	GPIO_Output	Output Push Pull	n/a	Low	RS5
	PC12	GPIO_Output	Output Push Pull	n/a	Low	M2_STCk
	PD0	GPIO_Output	Output Push Pull	n/a	Low	LED_MCU_CHECK
	PD1	GPIO_Output	Output Push Pull	n/a	Low	M0_STCk
	PD2	GPIO_Output	Output Push Pull	n/a	Low	M1_STB_RST
	PD3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M1_FLAG
	PD4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	M1_BUS_SYNC
	PD7	GPIO_Output	Output Push Pull	n/a	Low	M1_SW
	PB3	GPIO_Output	Output Push Pull	n/a	Low	RS1
	PB4	GPIO_Output	Output Push Pull	n/a	Low	RS2
	PB5	GPIO_Output	Output Push Pull	n/a	Low	RS3
	PB8	GPIO_Output	Output Push Pull	n/a	Low	PUMP7_IN1_CW
	PB9	GPIO_Output	Output Push Pull	n/a	Low	PUMP7_IN2_CCW
	PE0	GPIO_Output	Output Push Pull	n/a	Low	PUMP6_PWM
	PE1	GPIO_Output	Output Push Pull	n/a	Low	PUMP6_IN1_CW

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
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
TIM2 global interrupt	true	5	0
USART1 global interrupt	true	4	0
USART2 global interrupt	true	3	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
TIM1 break interrupt	unused		
TIM1 update interrupt	unused		
TIM1 trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI2 global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103VETx
Datasheet	14611_Rev12

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	K-Blot_Light
Project Folder	C:\sm_kang\K_Blot_Light\FW\K-Blot_Light_v1.1.0
Toolchain / IDE	EWARM
Firmware Package Name and Version	STM32Cube FW_F1 V1.4.0

8.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	Copy all used libraries into the project folder
Generate peripheral initialization as a pair of '.c/.h' files	No
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