1. Description

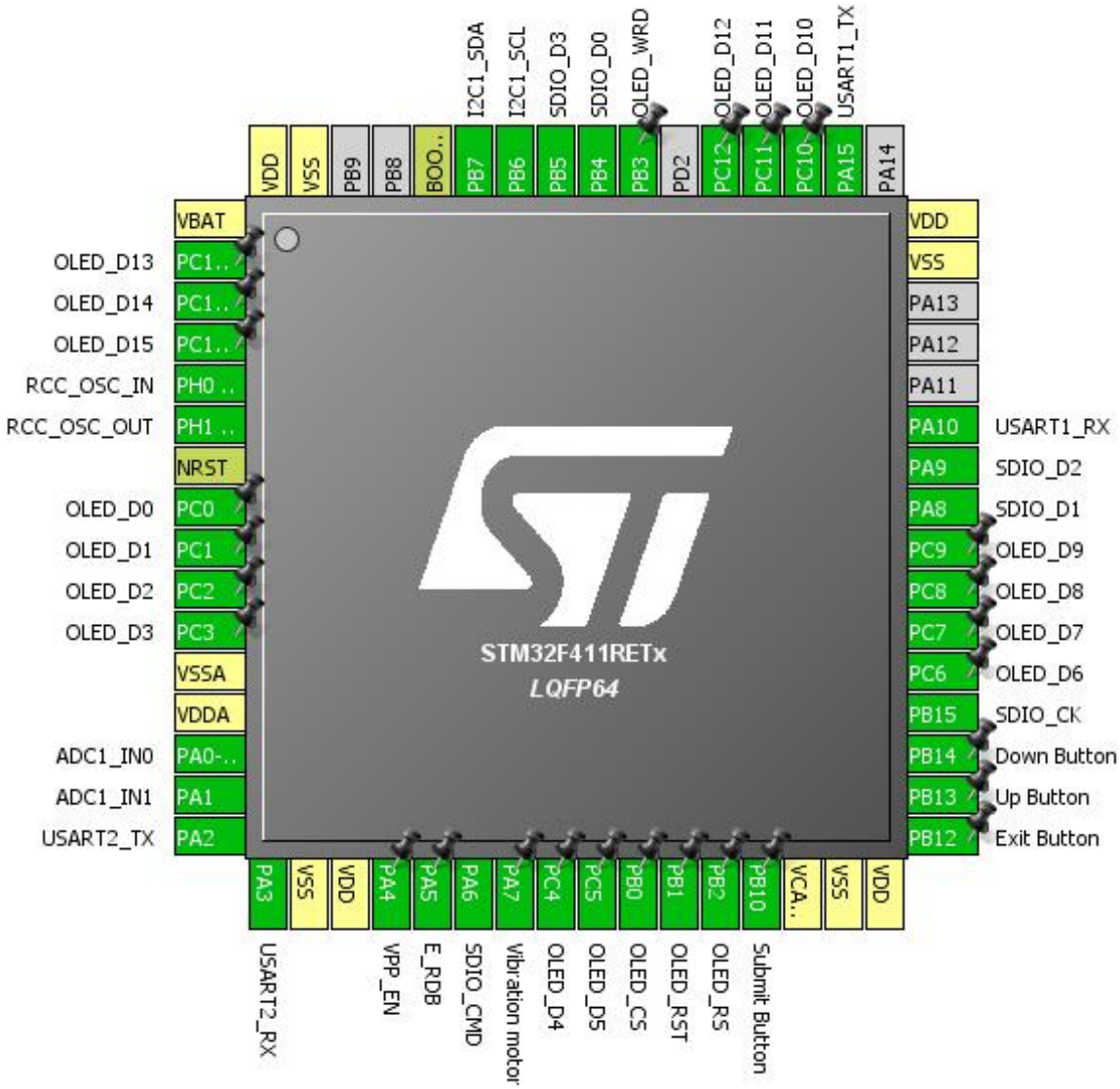
1.1. Project

Project Name	Handheld terminal code v1
Board Name	Handheld terminal code v1.1
Generated with:	STM32CubeMX 4.16.0
Date	11/09/2016

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F411
MCU name	STM32F411RETx
MCU Package	LQFP64
MCU Pin number	64

2. Pinout Configuration



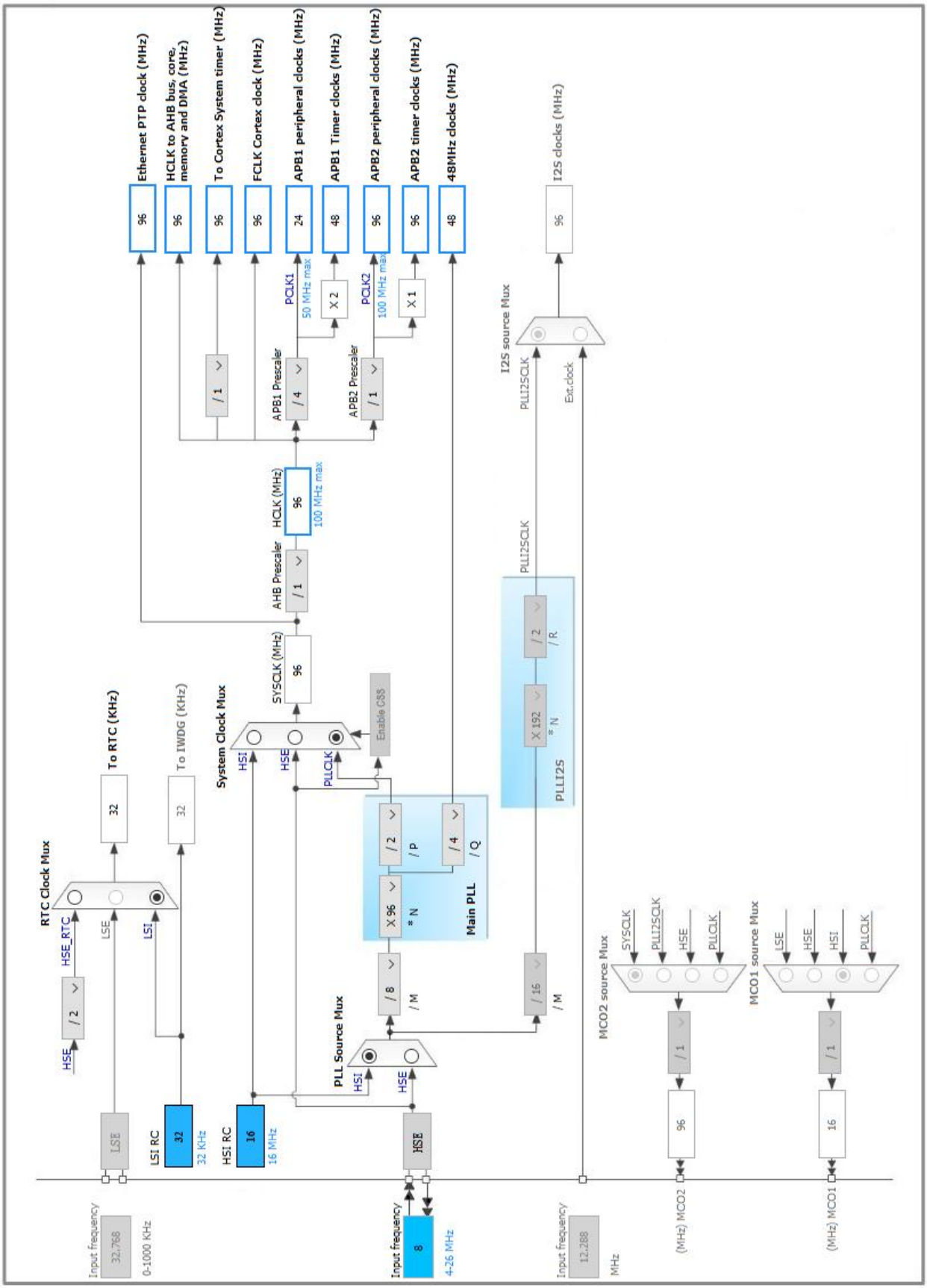
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-ANTI_TAMP *	I/O	GPIO_Output	OLED_D13
3	PC14-OSC32_IN *	I/O	GPIO_Output	OLED_D14
4	PC15-OSC32_OUT *	I/O	GPIO_Output	OLED_D15
5	PH0 - OSC_IN	I/O	RCC_OSC_IN	
6	PH1 - OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	PC0 *	I/O	GPIO_Output	OLED_D0
9	PC1 *	I/O	GPIO_Output	OLED_D1
10	PC2 *	I/O	GPIO_Output	OLED_D2
11	PC3 *	I/O	GPIO_Output	OLED_D3
12	VSSA	Power		
13	VDDA	Power		
14	PA0-WKUP	I/O	ADC1_IN0	
15	PA1	I/O	ADC1_IN1	
16	PA2	I/O	USART2_TX	
17	PA3	I/O	USART2_RX	
18	VSS	Power		
19	VDD	Power		
20	PA4 *	I/O	GPIO_Output	VPP_EN
21	PA5 *	I/O	GPIO_Output	E_RDB
22	PA6	I/O	SDIO_CMD	
23	PA7 *	I/O	GPIO_Output	Vibration motor
24	PC4 *	I/O	GPIO_Output	OLED_D4
25	PC5 *	I/O	GPIO_Output	OLED_D5
26	PB0 *	I/O	GPIO_Output	OLED_CS
27	PB1 *	I/O	GPIO_Output	OLED_RST
28	PB2 *	I/O	GPIO_Output	OLED_RS
29	PB10	I/O	GPIO_EXTI10	Submit Button
30	VCAP1	Power		
31	VSS	Power		
32	VDD	Power		
33	PB12	I/O	GPIO_EXTI12	Exit Button
34	PB13	I/O	GPIO_EXTI13	Up Button
35	PB14	I/O	GPIO_EXTI14	Down Button
36	PB15	I/O	SDIO_CK	

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
37	PC6 *	I/O	GPIO_Output	OLED_D6
38	PC7 *	I/O	GPIO_Output	OLED_D7
39	PC8 *	I/O	GPIO_Output	OLED_D8
40	PC9 *	I/O	GPIO_Output	OLED_D9
41	PA8	I/O	SDIO_D1	
42	PA9	I/O	SDIO_D2	
43	PA10	I/O	USART1_RX	
47	VSS	Power		
48	VDD	Power		
50	PA15	I/O	USART1_TX	
51	PC10 *	I/O	GPIO_Output	OLED_D10
52	PC11 *	I/O	GPIO_Output	OLED_D11
53	PC12 *	I/O	GPIO_Output	OLED_D12
55	PB3 *	I/O	GPIO_Output	OLED_WRD
56	PB4	I/O	SDIO_D0	
57	PB5	I/O	SDIO_D3	
58	PB6	I/O	I2C1_SCL	
59	PB7	I/O	I2C1_SDA	
60	BOOT0	Boot		
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN0

mode: IN1

5.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	PCLK2 divided by 4
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion	1
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 0
Sampling Time	3 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
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	3 WS (4 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.4. RTC

WakeUp: Internal WakeUp

5.4.1. Parameter Settings:

General:

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

Calendar Time:

Data Format	BCD data format

Hours	0
Minutes	0
Seconds	0
Day Light Saving: value of hour adjustment	Daylightsaving None
Store Operation	Storeoperation Reset

Calendar Date:

Week Day	Monday
Month	January
Date	1
Year	0

Wake UP:

Wake Up Clock	RTCCLK / 16
Wake Up Counter	0

5.5. SDIO

Mode: SD 4 bits Wide bus

5.5.1. Parameter Settings:

SDIO parameters:

SDIOCLK clock divide factor	0

5.6. SYS

Timebase Source: SysTick

5.7. TIM2

Clock Source : Internal Clock

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	0
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	**57600 ***
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

5.10. FATFS

mode: SD Card

5.10.1. Set Defines:

Version:

FATFS version	R0.11

Function Parameters:

FS_TINY (Tiny mode)	Disabled
FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	Disabled
USE_MKFS (Make filesystem function)	Enabled
USE_FORWARD (Forward function)	Disabled
USE_LABEL (Volume label functions)	Disabled
USE_FASTSEEK (Fast seek function)	Enabled

Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	Latin 1 (Windows)
USE_LFN (Use Long Filename)	Disabled
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	Disabled

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_NORTC (Timestamp feature)	Dynamic timestamp
NORTC_YEAR (Year for timestamp)	2015
NORTC_MON (Month for timestamp)	6
NORTC_MDAY (Day for timestamp)	4
WORD_ACCESS (Platform dependent access option)	Byte access
FS_REENTRANT (Re-Entrancy)	Disabled
FS_TIMEOUT (Timeout ticks)	1000
SYNC_t (O/S sync object)	osSemaphoreId
FS_LOCK (Number of files opened simultaneously)	2

5.10.2. IPs instances:

SDIO/SDMMC:

SDIO instance	SDIO

*** 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	PA0-WKUP	ADC1_IN0	Analog mode	No pull-up and no pull-down	n/a	
	PA1	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
RCC	PH0 - OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1 - OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SDIO	PA6	SDIO_CMD	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB15	SDIO_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PA8	SDIO_D1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PA9	SDIO_D2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB4	SDIO_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PB5	SDIO_D3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
USART1	PA10	USART1_RX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PA15	USART1_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
USART2	PA2	USART2_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PA3	USART2_RX	Alternate Function Push Pull	Pull-up	**Very High ***	
GPIO	PC13-ANTI_TAMP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D13
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D14
	PC15-OSC32_OUT	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D15
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D0
	PC1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D1
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D2

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D3
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	VPP_EN
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	E_RDB
	PA7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Vibration motor
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D4
	PC5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D5
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_CS
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_RST
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_RS
	PB10	GPIO_EXTI10	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Submit Button
	PB12	GPIO_EXTI12	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Exit Button
	PB13	GPIO_EXTI13	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Up Button
	PB14	GPIO_EXTI14	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Down Button
	PC6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D6
	PC7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D7
	PC8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D8
	PC9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D9
	PC10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D10
	PC11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D11
	PC12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_D12
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OLED_WRD

6.2. DMA configuration

DMA request	Stream	Direction	Priority
I2C1_RX	DMA1_Stream0	Peripheral To Memory	Low
I2C1_TX	DMA1_Stream1	Memory To Peripheral	Low
SDIO_RX	DMA2_Stream3	Peripheral To Memory	Low
SDIO_TX	DMA2_Stream6	Memory To Peripheral	Low
USART2_RX	DMA1_Stream5	Peripheral To Memory	Low
USART2_TX	DMA1_Stream6	Memory To Peripheral	Low
ADC1	DMA2_Stream0	Peripheral To Memory	Low
USART1_RX	DMA2_Stream2	Peripheral To Memory	Low
USART1_TX	DMA2_Stream7	Memory To Peripheral	Low

I2C1_RX: DMA1_Stream0 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

I2C1_TX: DMA1_Stream1 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

SDIO_RX: DMA2_Stream3 DMA request Settings:

Mode:	**Peripheral Flow Control ***
Use fifo:	**Enable ***
FIFO Threshold:	Full
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	**Word ***

Memory Data Width:	Word
Peripheral Burst Size:	**4 Increment ***
Memory Burst Size:	4 Increment

SDIO_TX: DMA2_Stream6 DMA request Settings:

Mode:	**Peripheral Flow Control ***
Use fifo:	**Enable ***
FIFO Threshold:	Full
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	**Word ***
Memory Data Width:	Word
Peripheral Burst Size:	**4 Increment ***
Memory Burst Size:	4 Increment

USART2_RX: DMA1_Stream5 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

USART2_TX: DMA1_Stream6 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

ADC1: DMA2_Stream0 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable

Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

USART1_RX: DMA2_Stream2 DMA request Settings:

Mode:	**Circular ***
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

USART1_TX: DMA2_Stream7 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

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
DMA1 stream0 global interrupt	true	0	0
DMA1 stream1 global interrupt	true	0	0
DMA1 stream5 global interrupt	true	0	0
DMA1 stream6 global interrupt	true	0	0
USART1 global interrupt	true	0	0
DMA2 stream0 global interrupt	true	0	0
DMA2 stream2 global interrupt	true	0	0
DMA2 stream3 global interrupt	true	0	0
DMA2 stream6 global interrupt	true	0	0
DMA2 stream7 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
RTC wake-up interrupt through EXTI line 22	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 global interrupt	unused		
TIM2 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
USART2 global interrupt	unused		
EXTI line[15:10] interrupts	unused		
SDIO global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F411
MCU	STM32F411RETx
Datasheet	026289_Rev4

7.2. Parameter Selection

Temperature	25
Vdd	null

8. Software Project

8.1. Project Settings

Name	Value
Project Name	Handheld terminal code v1.1
Project Folder	C:\Users\WXZ\Desktop\Handheld terminal code v1.1
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F4 V1.13.1

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