1. Description

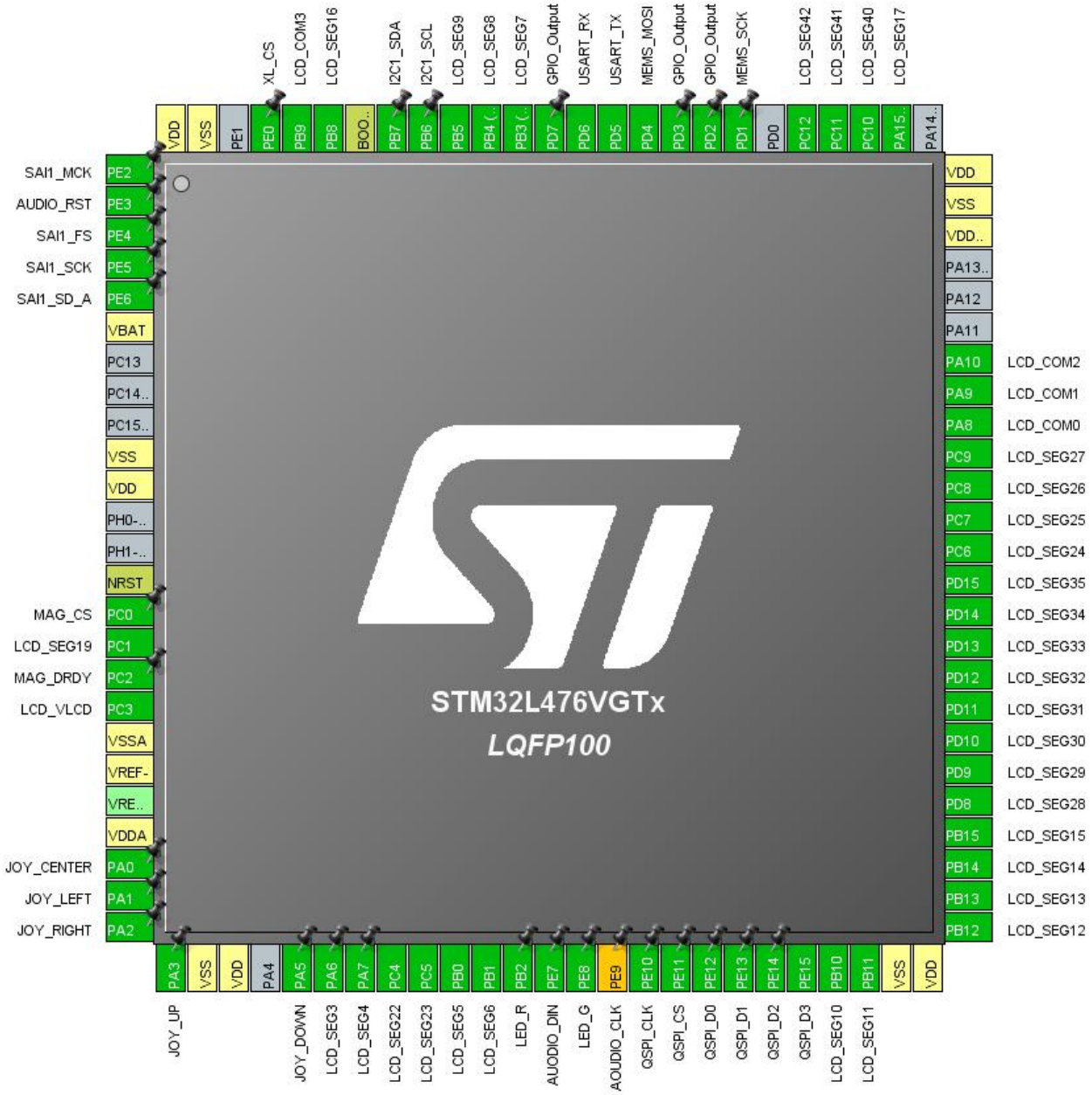
1.1. Project

Project Name	marged
Board Name	32L476GDISCOVERY
Generated with:	STM32CubeMX 5.1.0
Date	05/19/2019

1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x6
MCU name	STM32L476VGTx
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	SAI1_MCLK_A	SAI1_MCK
2	PE3 *	I/O	GPIO_Output	AUDIO_RST
3	PE4	I/O	SAI1_FS_A	SAI1_FS
4	PE5	I/O	SAI1_SCK_A	SAI1_SCK
5	PE6	I/O	SAI1_SD_A	
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Output	MAG_CS
16	PC1	I/O	LCD_SEG19	
17	PC2 *	I/O	GPIO_Input	MAG_DRDY
18	PC3	I/O	LCD_VLCD	
19	VSSA	Power		
20	VREF-	Power		
22	VDDA	Power		
23	PA0	I/O	GPIO_EXTI0	JOY_CENTER
24	PA1	I/O	GPIO_EXTI1	JOY_LEFT
25	PA2	I/O	GPIO_EXTI2	JOY_RIGHT
26	PA3	I/O	GPIO_EXTI3	JOY_UP
27	VSS	Power		
28	VDD	Power		
30	PA5	I/O	GPIO_EXTI5	JOY_DOWN
31	PA6	I/O	LCD_SEG3	
32	PA7	I/O	LCD_SEG4	
33	PC4	I/O	LCD_SEG22	
34	PC5	I/O	LCD_SEG23	
35	PB0	I/O	LCD_SEG5	
36	PB1	I/O	LCD_SEG6	
37	PB2 *	I/O	GPIO_Output	LED_R
38	PE7	I/O	SAI1_SD_B	AUODIO_DIN
39	PE8 *	I/O	GPIO_Output	LED_G
40	PE9 **	I/O	SAI1_FS_B	AOUDIO_CLK
41	PE10	I/O	QUADSPI_CLK	QSPI_CLK
42	PE11	I/O	QUADSPI_NCS	QSPI_CS
43	PE12	I/O	QUADSPI_BK1_IO0	QSPI_D0

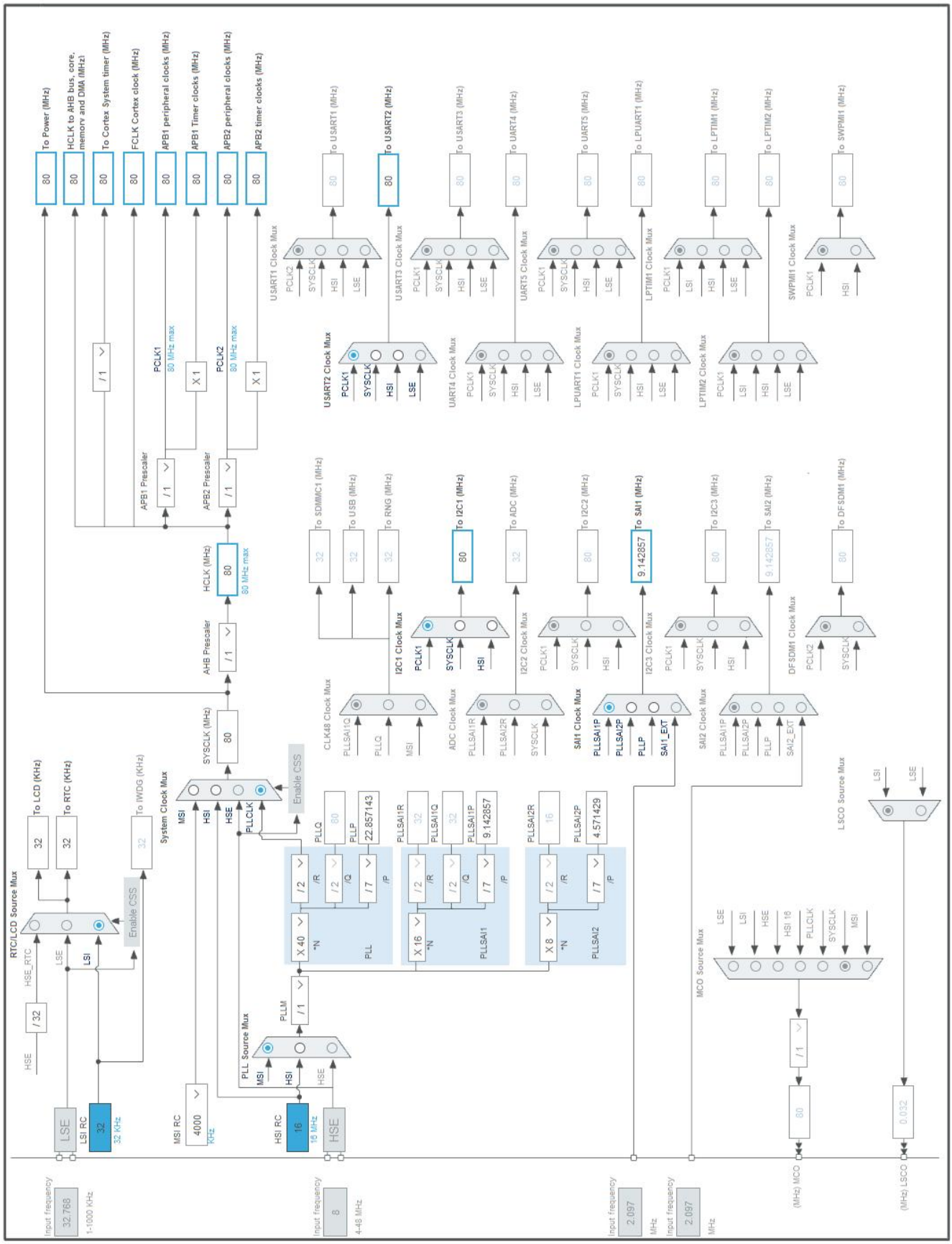
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
44	PE13	I/O	QUADSPI_BK1_IO1	QSPI_D1
45	PE14	I/O	QUADSPI_BK1_IO2	QSPI_D2
46	PE15	I/O	QUADSPI_BK1_IO3	QSPI_D3
47	PB10	I/O	LCD_SEG10	
48	PB11	I/O	LCD_SEG11	
49	VSS	Power		
50	VDD	Power		
51	PB12	I/O	LCD_SEG12	
52	PB13	I/O	LCD_SEG13	
53	PB14	I/O	LCD_SEG14	
54	PB15	I/O	LCD_SEG15	
55	PD8	I/O	LCD_SEG28	
56	PD9	I/O	LCD_SEG29	
57	PD10	I/O	LCD_SEG30	
58	PD11	I/O	LCD_SEG31	
59	PD12	I/O	LCD_SEG32	
60	PD13	I/O	LCD_SEG33	
61	PD14	I/O	LCD_SEG34	
62	PD15	I/O	LCD_SEG35	
63	PC6	I/O	LCD_SEG24	
64	PC7	I/O	LCD_SEG25	
65	PC8	I/O	LCD_SEG26	
66	PC9	I/O	LCD_SEG27	
67	PA8	I/O	LCD_COM0	
68	PA9	I/O	LCD_COM1	
69	PA10	I/O	LCD_COM2	
73	VDDUSB	Power		
74	VSS	Power		
75	VDD	Power		
77	PA15 (JTDI)	I/O	LCD_SEG17	
78	PC10	I/O	LCD_SEG40	
79	PC11	I/O	LCD_SEG41	
80	PC12	I/O	LCD_SEG42	
82	PD1	I/O	SPI2_SCK	MEMS_SCK
83	PD2 *	I/O	GPIO_Output	
84	PD3 *	I/O	GPIO_Output	
85	PD4	I/O	SPI2_MOSI	MEMS_MOSI
86	PD5	I/O	USART2_TX	USART_TX
87	PD6	I/O	USART2_RX	USART_RX

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
88	PD7 *	I/O	GPIO_Output	
89	PB3 (JTDO-TRACESWO)	I/O	LCD_SEG7	
90	PB4 (NJTRST)	I/O	LCD_SEG8	
91	PB5	I/O	LCD_SEG9	
92	PB6	I/O	I2C1_SCL	
93	PB7	I/O	I2C1_SDA	
94	BOOT0	Boot		
95	PB8	I/O	LCD_SEG16	
96	PB9	I/O	LCD_COM3	
97	PE0 *	I/O	GPIO_Output	XL_CS
99	VSS	Power		
100	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	marged
Project Folder	D:\Important_stuff\Studia\Semestr 6\KURSY Z AIRU\Sterowniki Robotów
Toolchain / IDE	TrueSTUDIO
Firmware Package Name and Version	STM32Cube FW_L4 V1.13.0

5.2. 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	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

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x6
MCU	STM32L476VGTx
Datasheet	025976_Rev4

6.2. Parameter Selection

Temperature	25
Vdd	null

7. IPs and Middleware Configuration

7.1. I2C1

I2C: I2C

7.1.1. Parameter Settings:

Timing configuration:

I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	0x10909CEC

Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

7.2. LCD

Mode: 1/4 Duty Cycle

mode: SEG3

mode: SEG4

mode: SEG5

mode: SEG6

mode: SEG7

mode: SEG8

mode: SEG9

mode: SEG10

mode: SEG11

mode: SEG12

mode: SEG13

mode: SEG14

mode: SEG15

mode: SEG16
mode: SEG17
mode: SEG19
mode: SEG22
mode: SEG23
mode: SEG24
mode: SEG25
mode: SEG26
mode: SEG27
mode: SEG28
mode: SEG29
mode: SEG30
mode: SEG31
mode: SEG32
mode: SEG33
mode: SEG34
mode: SEG35
mode: SEG40
mode: SEG41
mode: SEG42

7.2.1. Parameter Settings:

Clock Parameters:

Clock Prescaler	1
Clock Divider	16

Basic Parameters:

Duty Selection	1/4
Bias Selector	1/4
Multiplex mode	Disable

Advanced Parameters:

Voltage Source Selection	Internal
Contrast Control	2.60V
Dead Time Duration	No dead Time
High Drive	Disable
Pulse ON Duration	0 pulse
Blink Mode	Disabled
Blink Frequency	fLCD/8

7.3. QUADSPI

Single Bank: Quad SPI Line

7.3.1. Parameter Settings:

General Parameters:

Clock Prescaler	255
Fifo Threshold	1
Sample Shifting	No Sample Shifting
Flash Size	1
Chip Select High Time	1 Cycle
Clock Mode	Low

7.4. RCC

7.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	**Enabled ***
Data Cache	Enabled
Flash Latency(WS)	4 WS (5 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.5. RTC

mode: Activate Clock Source

mode: Activate Calendar

7.5.1. Parameter Settings:

General:

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

Calendar Time:

Data Format	BCD data format
Hours	**8 ***
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

7.6. SAI1

Mode: Master with Master Clock Out

mode: I2S/PCM Protocol

Mode: SPDIF TX Transmitter (IEC60958)

7.6.1. Parameter Settings:

SAI A:

Synchronization Inputs	Asynchronous
Basic Parameters	
Audio Mode	Master Transmit
Output Mode	Stereo
Companding Mode	No companding mode
SAI SD Line Output Mode	Driven
Protocol Parameters	
Protocol	I2S Standard
Data Size	16 Bits
Number of Slots (only Even Values)	2
Clock Parameters	
Master Clock Divider	Enabled
Audio Frequency	192 KHz

Real Audio Frequency	**35.714 KHz ***
Error between Selected	**-81.39 % ***
Advanced Parameters	
Fifo Threshold	Empty
Output Drive	Disabled

SAI B:

Synchronization Inputs	Asynchronous
Basic Parameters	
Protocol	SPDIF
Audio Mode	Master Transmit
Output Mode	Stereo
Companding Mode	No companding mode
Clock Parameters	
Audio Frequency	48 KHz
Real Audio Frequency	**142.857 KHz ***
Advanced Parameters	
Fifo Threshold	Empty
Output Drive	Disabled

7.7. SPI2

Mode: Half-Duplex Master

7.7.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**8 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**16 ***
Baud Rate	**5.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

7.8. SYS

Timebase Source: SysTick

7.9. USART2

Mode: Asynchronous

7.9.1. 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
Single Sample	Disable

Advanced Features:

Auto Baudrate	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

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
LCD	PC1	LCD_SEG19	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC3	LCD_VLCD	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA6	LCD_SEG3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA7	LCD_SEG4	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC4	LCD_SEG22	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC5	LCD_SEG23	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB0	LCD_SEG5	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB1	LCD_SEG6	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB10	LCD_SEG10	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB11	LCD_SEG11	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB12	LCD_SEG12	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB13	LCD_SEG13	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB14	LCD_SEG14	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB15	LCD_SEG15	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD8	LCD_SEG28	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD9	LCD_SEG29	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD10	LCD_SEG30	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD11	LCD_SEG31	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD12	LCD_SEG32	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD13	LCD_SEG33	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD14	LCD_SEG34	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD15	LCD_SEG35	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC6	LCD_SEG24	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC7	LCD_SEG25	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC8	LCD_SEG26	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC9	LCD_SEG27	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA8	LCD_COM0	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA9	LCD_COM1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA10	LCD_COM2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA15 (JTDI)	LCD_SEG17	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC10	LCD_SEG40	Alternate Function Push Pull	No pull-up and no pull-down	Low	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC11	LCD_SEG41	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC12	LCD_SEG42	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB3 (JTDO-TRACESWO)	LCD_SEG7	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB4 (NJTRST)	LCD_SEG8	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB5	LCD_SEG9	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB8	LCD_SEG16	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB9	LCD_COM3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
QUADSPI	PE10	QUADSPI_CLK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_CLK
	PE11	QUADSPI_NCS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_CS
	PE12	QUADSPI_BK1_IO0	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D0
	PE13	QUADSPI_BK1_IO1	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D1
	PE14	QUADSPI_BK1_IO2	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D2
	PE15	QUADSPI_BK1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D3
SAI1	PE2	SAI1_MCLK_A	Alternate Function Push Pull	No pull-up and no pull-down	Low	SAI1_MCK
	PE4	SAI1_FS_A	Alternate Function Push Pull	No pull-up and no pull-down	Low	SAI1_FS
	PE5	SAI1_SCK_A	Alternate Function Push Pull	No pull-up and no pull-down	Low	SAI1_SCK
	PE6	SAI1_SD_A	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PE7	SAI1_SD_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	AUODIO_DIN
SPI2	PD1	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	MEMS_SCK
	PD4	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	MEMS_MOSI
USART2	PD5	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USART_TX
	PD6	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USART_RX
Single Mapped Signals	PE9	SAI1_FS_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	AOUDIO_CLK
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	AUDIO_RST

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MAG_CS
	PC2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	MAG_DRDY
	PA0	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	**Pull-up ***	n/a	JOY_CENTER
	PA1	GPIO_EXTI1	External Interrupt Mode with Rising edge trigger detection	**Pull-down ***	n/a	JOY_LEFT
	PA2	GPIO_EXTI2	External Interrupt Mode with Rising edge trigger detection	**Pull-down ***	n/a	JOY_RIGHT
	PA3	GPIO_EXTI3	External Interrupt Mode with Rising edge trigger detection	**Pull-down ***	n/a	JOY_UP
	PA5	GPIO_EXTI5	External Interrupt Mode with Rising edge trigger detection	**Pull-down ***	n/a	JOY_DOWN
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_R
	PE8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_G
	PD2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High ***	
	PE0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	XL_CS

8.2. DMA configuration

DMA request	Stream	Direction	Priority
USART2_RX	DMA1_Channel6	Peripheral To Memory	Low
USART2_TX	DMA1_Channel7	Memory To Peripheral	Low

USART2_RX: DMA1_Channel6 DMA request Settings:

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

USART2_TX: DMA1_Channel7 DMA request Settings:

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

8.3. 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
EXTI line0 interrupt	true	0	0
EXTI line1 interrupt	true	0	0
EXTI line2 interrupt	true	0	0
EXTI line3 interrupt	true	0	0
DMA1 channel6 global interrupt	true	0	0
DMA1 channel7 global interrupt	true	0	0
EXTI line[9:5] interrupts	true	0	0
USART2 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		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI2 global interrupt	unused		
QUADSPI global interrupt	unused		
SAI1 global interrupt	unused		
LCD global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Software Pack Report