

## 1. Description

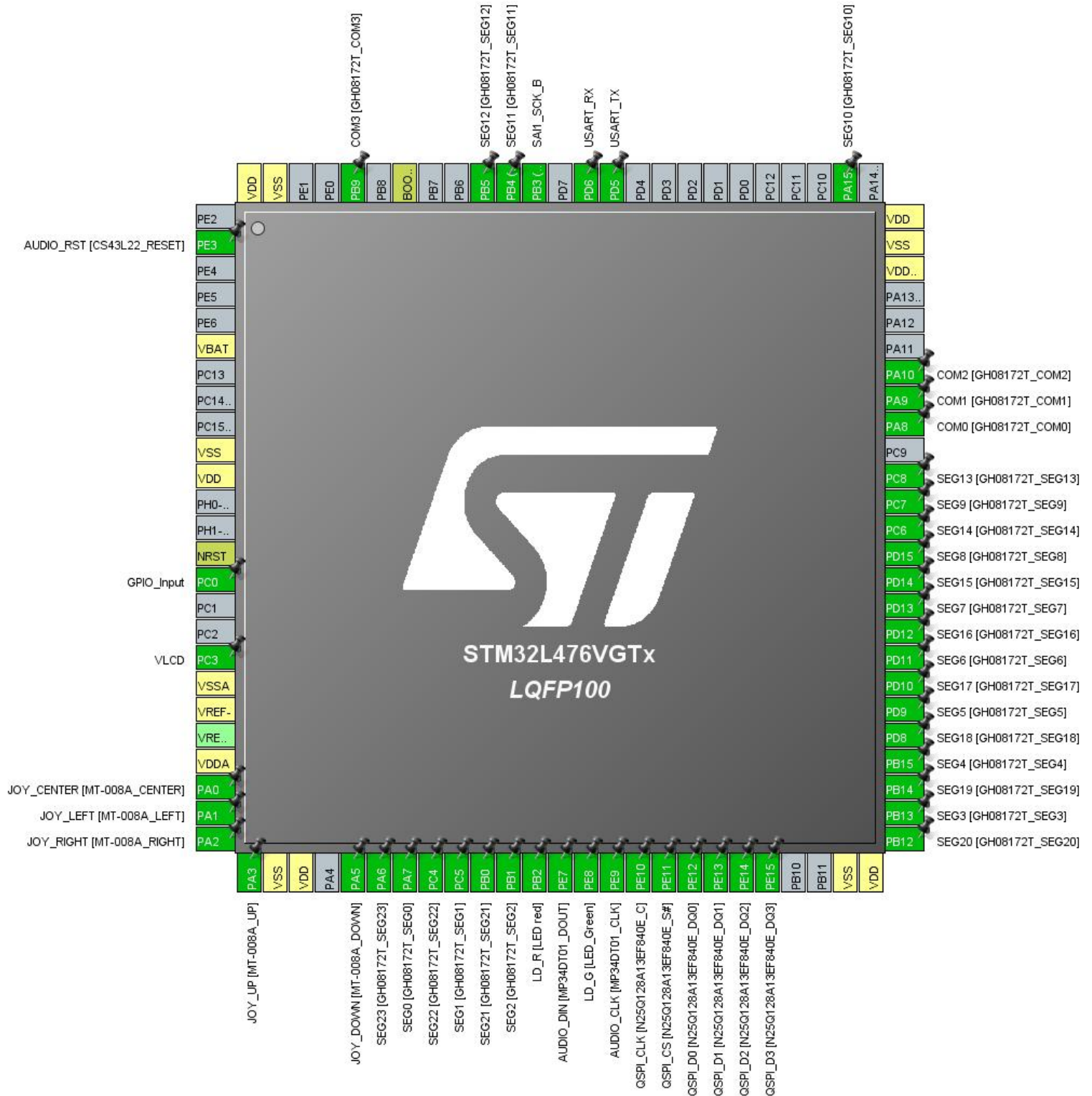
### 1.1. Project

Project Name	MonHa_LCD
Board Name	32L476GDISCOVERY
Generated with:	STM32CubeMX 5.1.0
Date	04/24/2019

### 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

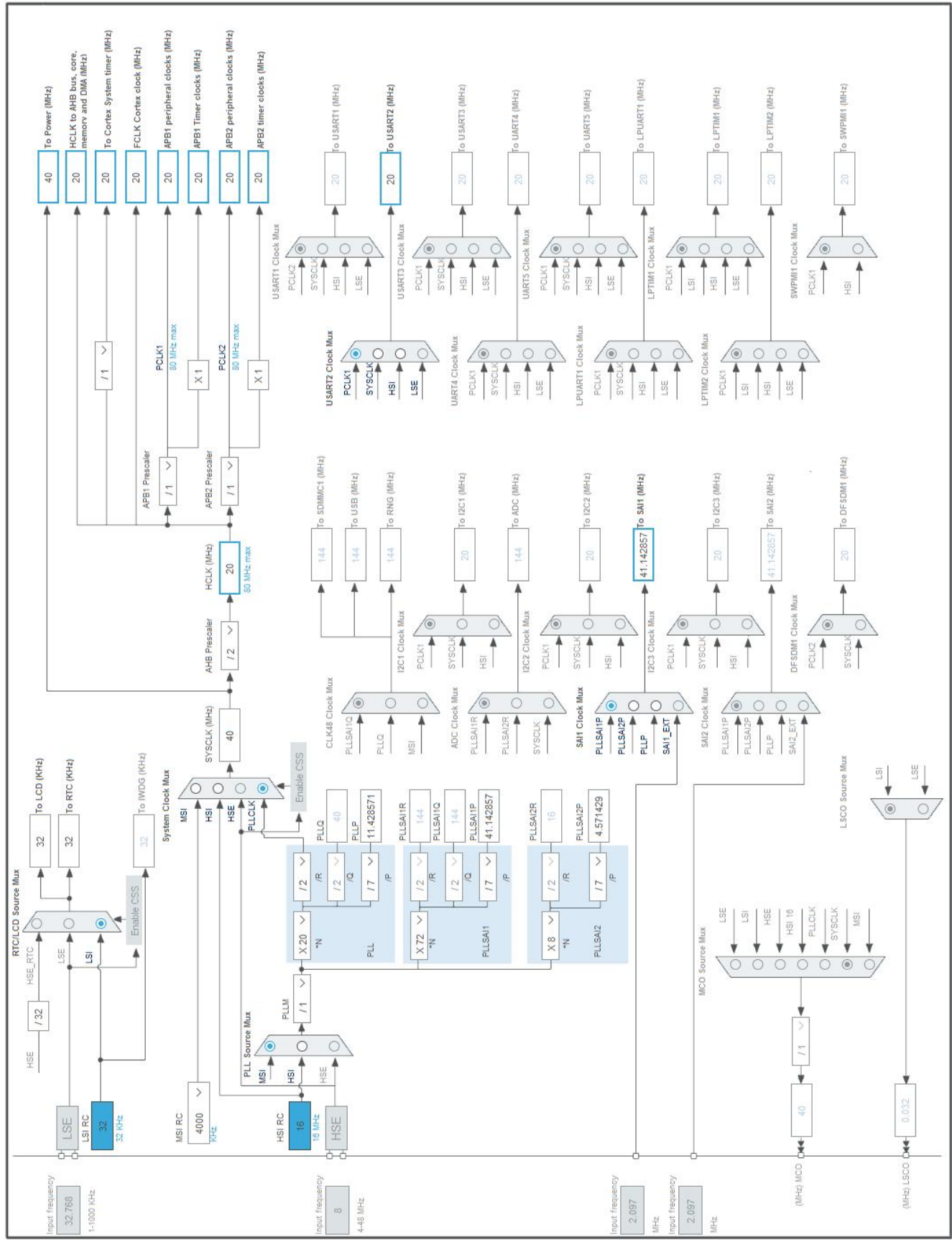
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
2	PE3 *	I/O	GPIO_Output	AUDIO_RST [CS43L22_RESET]
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Input	
18	PC3	I/O	LCD_VLCD	VLCD
19	VSSA	Power		
20	VREF-	Power		
22	VDDA	Power		
23	PA0 *	I/O	GPIO_Input	JOY_CENTER [MT-008A_CENTER]
24	PA1 *	I/O	GPIO_Input	JOY_LEFT [MT-008A_LEFT]
25	PA2 *	I/O	GPIO_Input	JOY_RIGHT [MT-008A_RIGHT]
26	PA3 *	I/O	GPIO_Input	JOY_UP [MT-008A_UP]
27	VSS	Power		
28	VDD	Power		
30	PA5 *	I/O	GPIO_Input	JOY_DOWN [MT-008A_DOWN]
31	PA6	I/O	LCD_SEG3	SEG23 [GH08172T_SEG23]
32	PA7	I/O	LCD_SEG4	SEG0 [GH08172T_SEG0]
33	PC4	I/O	LCD_SEG22	SEG22 [GH08172T_SEG22]
34	PC5	I/O	LCD_SEG23	SEG1 [GH08172T_SEG1]
35	PB0	I/O	LCD_SEG5	SEG21 [GH08172T_SEG21]
36	PB1	I/O	LCD_SEG6	SEG2 [GH08172T_SEG2]
37	PB2 *	I/O	GPIO_Output	LD_R [LED red]
38	PE7	I/O	SAI1_SD_B	AUDIO_DIN [MP34DT01_DOUT]
39	PE8 *	I/O	GPIO_Output	LD_G [LED_Green]
40	PE9	I/O	SAI1_FS_B	AUDIO_CLK [MP34DT01_CLK]
41	PE10	I/O	QUADSPI_CLK	QSPI_CLK [N25Q128A13EF840E_C]

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
42	PE11	I/O	QUADSPI_NCS	QSPI_CS [N25Q128A13EF840E_S#]
43	PE12	I/O	QUADSPI_BK1_IO0	QSPI_D0 [N25Q128A13EF840E_DQ0 ]
44	PE13	I/O	QUADSPI_BK1_IO1	QSPI_D1 [N25Q128A13EF840E_DQ1 ]
45	PE14	I/O	QUADSPI_BK1_IO2	QSPI_D2 [N25Q128A13EF840E_DQ2 ]
46	PE15	I/O	QUADSPI_BK1_IO3	QSPI_D3 [N25Q128A13EF840E_DQ3 ]
49	VSS	Power		
50	VDD	Power		
51	PB12	I/O	LCD_SEG12	SEG20 [GH08172T_SEG20]
52	PB13	I/O	LCD_SEG13	SEG3 [GH08172T_SEG3]
53	PB14	I/O	LCD_SEG14	SEG19 [GH08172T_SEG19]
54	PB15	I/O	LCD_SEG15	SEG4 [GH08172T_SEG4]
55	PD8	I/O	LCD_SEG28	SEG18 [GH08172T_SEG18]
56	PD9	I/O	LCD_SEG29	SEG5 [GH08172T_SEG5]
57	PD10	I/O	LCD_SEG30	SEG17 [GH08172T_SEG17]
58	PD11	I/O	LCD_SEG31	SEG6 [GH08172T_SEG6]
59	PD12	I/O	LCD_SEG32	SEG16 [GH08172T_SEG16]
60	PD13	I/O	LCD_SEG33	SEG7 [GH08172T_SEG7]
61	PD14	I/O	LCD_SEG34	SEG15 [GH08172T_SEG15]
62	PD15	I/O	LCD_SEG35	SEG8 [GH08172T_SEG8]
63	PC6	I/O	LCD_SEG24	SEG14 [GH08172T_SEG14]
64	PC7	I/O	LCD_SEG25	SEG9 [GH08172T_SEG9]
65	PC8	I/O	LCD_SEG26	SEG13 [GH08172T_SEG13]
67	PA8	I/O	LCD_COM0	COM0 [GH08172T_COM0]
68	PA9	I/O	LCD_COM1	COM1 [GH08172T_COM1]
69	PA10	I/O	LCD_COM2	COM2 [GH08172T_COM2]
73	VDDUSB	Power		
74	VSS	Power		
75	VDD	Power		
77	PA15 (JTDI)	I/O	LCD_SEG17	SEG10 [GH08172T_SEG10]
86	PD5	I/O	USART2_TX	USART_TX
87	PD6	I/O	USART2_RX	USART_RX
89	PB3 (JTDO-TRACESWO)	I/O	SAI1_SCK_B	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
90	PB4 (NJTRST)	I/O	LCD_SEG8	SEG11 [GH08172T_SEG11]
91	PB5	I/O	LCD_SEG9	SEG12 [GH08172T_SEG12]
94	BOOT0	Boot		
96	PB9	I/O	LCD_COM3	COM3 [GH08172T_COM3]
99	VSS	Power		
100	VDD	Power		

\* The pin is affected with an I/O function

## 4. Clock Tree Configuration



## 5. Software Project

### 5.1. Project Settings

Name	Value
Project Name	MonHa_LCD
Project Folder	C:\Users\Sztryms\workspacestm\MonHa_LCD
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	Add necessary library files as reference in the toolchain project configuration file
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. LCD

**Mode: 1/4 Duty Cycle**

**mode: SEG3**

**mode: SEG4**

**mode: SEG5**

**mode: SEG6**

**mode: SEG8**

**mode: SEG9**

**mode: SEG12**

**mode: SEG13**

**mode: SEG14**

**mode: SEG15**

**mode: SEG17**

**mode: SEG22**

**mode: SEG23**

**mode: SEG24**

**mode: SEG25**

**mode: SEG26**

**mode: SEG28**

**mode: SEG29**

**mode: SEG30**

**mode: SEG31**

**mode: SEG32**

**mode: SEG33**

**mode: SEG34**

**mode: SEG35**

#### 7.1.1. 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

## 7.2. QUADSPI

### Single Bank: Quad SPI Line

#### 7.2.1. 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

## 7.3. RCC

#### 7.3.1. Parameter Settings:

##### System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	<b>Enabled *</b>
Data Cache	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

##### RCC Parameters:

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

##### Power Parameters:

Power Regulator Voltage Scale

Power Regulator Voltage Scale 1

## 7.4. RTC

**mode: Activate Clock Source**

**mode: Activate Calendar**

### 7.4.1. Parameter Settings:

#### General:

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

#### Calendar Time:

Data Format	<b>Binary data format *</b>
Hours	<b>23 *</b>
Minutes	<b>59 *</b>
Seconds	<b>50 *</b>
Day Light Saving: value of hour adjustment	Daylightsaving None
Store Operation	Storeoperation Reset

#### Calendar Date:

Week Day	<b>Wednesday *</b>
Month	<b>April *</b>
Date	<b>23 *</b>
Year	<b>19 *</b>

## 7.5. SAI1

**Mode: Master**

### 7.5.1. Parameter Settings:

#### SAI B:

Synchronization Inputs	Asynchronous
Basic Parameters	
Protocol	Free
Audio Mode	Master Transmit
Frame Length	<b>64 bits *</b>
Data Size	<b>16 Bits *</b>

Slot Size	DataSize
Output Mode	Stereo
Companding Mode	No companding mode
SAI SD Line Output Mode	Driven
Frame Parameters	
First Bit	MSB First
Frame Synchro Active Level Length	<b>32 *</b>
Frame Synchro Definition	<b>Channel Identification *</b>
Frame Synchro Polarity	Active Low
Frame Synchro Offset	First Bit
Slot Parameters	
First Bit Offset	0
Number of Slots (only Even Values)	<b>4 *</b>
Slot Active Final Value	<b>0x0000FFFF *</b>
Slot Active	<b>All *</b>
Clock Parameters	
Master Clock Divider	Enabled
Audio Frequency	<b>16 KHz *</b>
Real Audio Frequency	<b>16.071 KHz *</b>
Error between Selected	<b>0.44 % *</b>
Clock Strobing	Falling Edge
Advanced Parameters	
Fifo Threshold	Empty
Output Drive	Disabled

## 7.6. SYS

**Timebase Source: SysTick**

## 7.7. USART2

**Mode: Asynchronous**

### 7.7.1. 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
LCD	PC3	LCD_VLCD	Alternate Function Push Pull	No pull-up and no pull-down	Low	VLCD
	PA6	LCD_SEG3	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG23 [GH08172T_SEG23]
	PA7	LCD_SEG4	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG0 [GH08172T_SEG0]
	PC4	LCD_SEG22	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG22 [GH08172T_SEG22]
	PC5	LCD_SEG23	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG1 [GH08172T_SEG1]
	PB0	LCD_SEG5	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG21 [GH08172T_SEG21]
	PB1	LCD_SEG6	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG2 [GH08172T_SEG2]
	PB12	LCD_SEG12	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG20 [GH08172T_SEG20]
	PB13	LCD_SEG13	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG3 [GH08172T_SEG3]
	PB14	LCD_SEG14	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG19 [GH08172T_SEG19]
	PB15	LCD_SEG15	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG4 [GH08172T_SEG4]
	PD8	LCD_SEG28	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG18 [GH08172T_SEG18]
	PD9	LCD_SEG29	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG5 [GH08172T_SEG5]
	PD10	LCD_SEG30	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG17 [GH08172T_SEG17]
	PD11	LCD_SEG31	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG6 [GH08172T_SEG6]
	PD12	LCD_SEG32	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG16 [GH08172T_SEG16]
	PD13	LCD_SEG33	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG7 [GH08172T_SEG7]
	PD14	LCD_SEG34	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG15 [GH08172T_SEG15]
	PD15	LCD_SEG35	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG8 [GH08172T_SEG8]
	PC6	LCD_SEG24	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG14 [GH08172T_SEG14]
	PC7	LCD_SEG25	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG9 [GH08172T_SEG9]
	PC8	LCD_SEG26	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG13 [GH08172T_SEG13]
	PA8	LCD_COM0	Alternate Function Push Pull	No pull-up and no pull-down	Low	COM0 [GH08172T_COM0]
	PA9	LCD_COM1	Alternate Function Push Pull	No pull-up and no pull-down	Low	COM1 [GH08172T_COM1]
	PA10	LCD_COM2	Alternate Function Push Pull	No pull-up and no pull-down	Low	COM2 [GH08172T_COM2]
	PA15 (JTDI)	LCD_SEG17	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG10 [GH08172T_SEG10]

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB4 (NJTRST)	LCD_SEG8	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG11 [GH08172T_SEG11]
	PB5	LCD_SEG9	Alternate Function Push Pull	No pull-up and no pull-down	Low	SEG12 [GH08172T_SEG12]
	PB9	LCD_COM3	Alternate Function Push Pull	No pull-up and no pull-down	Low	COM3 [GH08172T_COM3]
QUADSPI	PE10	QUADSPI_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	QSPI_CLK [N25Q128A13EF840E_C]
	PE11	QUADSPI_NCS	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	QSPI_CS [N25Q128A13EF840E_S#]
	PE12	QUADSPI_BK1_IO0	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	QSPI_D0 [N25Q128A13EF840E_DQ0]
	PE13	QUADSPI_BK1_IO1	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	QSPI_D1 [N25Q128A13EF840E_DQ1]
	PE14	QUADSPI_BK1_IO2	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	QSPI_D2 [N25Q128A13EF840E_DQ2]
	PE15	QUADSPI_BK1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	QSPI_D3 [N25Q128A13EF840E_DQ3]
SAI1	PE7	SAI1_SD_B	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	AUDIO_DIN [MP34DT01_DOUT]
	PE9	SAI1_FS_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	AUDIO_CLK [MP34DT01_CLK]
	PB3 (JTDO-TRACESWO)	SAI1_SCK_B	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USART2	PD5	USART2_TX	Alternate Function Push Pull	Pull-up *	Very High *	USART_TX
	PD6	USART2_RX	Alternate Function Push Pull	Pull-up *	Very High *	USART_RX
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	AUDIO_RST [CS43L22_RESET]
	PC0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PA0	GPIO_Input	Input mode	Pull-down *	n/a	JOY_CENTER [MT-008A_CENTER]
	PA1	GPIO_Input	Input mode	Pull-down *	n/a	JOY_LEFT [MT-008A_LEFT]
	PA2	GPIO_Input	Input mode	Pull-down *	n/a	JOY_RIGHT [MT-008A_RIGHT]
	PA3	GPIO_Input	Input mode	Pull-down *	n/a	JOY_UP [MT-008A_UP]

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA5	GPIO_Input	Input mode	<b>Pull-down *</b>	<b>n/a</b>	JOY_DOWN [MT-008A_DOWN]
	PB2	GPIO_Output	Output Push Pull	<b>Pull-up *</b>	<b>Very High *</b>	LD_R [LED red]
	PE8	GPIO_Output	Output Push Pull	<b>Pull-up *</b>	<b>Very High *</b>	LD_G [LED_Green]



## 8.2. DMA configuration

DMA request	Stream	Direction	Priority
SAI1_B	DMA2_Channel2	Memory To Peripheral	<b>High *</b>

### SAI1\_B: DMA2\_Channel2 DMA request Settings:

Mode: **Circular \***  
Peripheral Increment: Disable  
Memory Increment: **Enable \***  
Peripheral Data Width: **Half Word \***  
Memory Data Width: **Half Word \***

### 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
DMA2 channel2 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		
USART2 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***