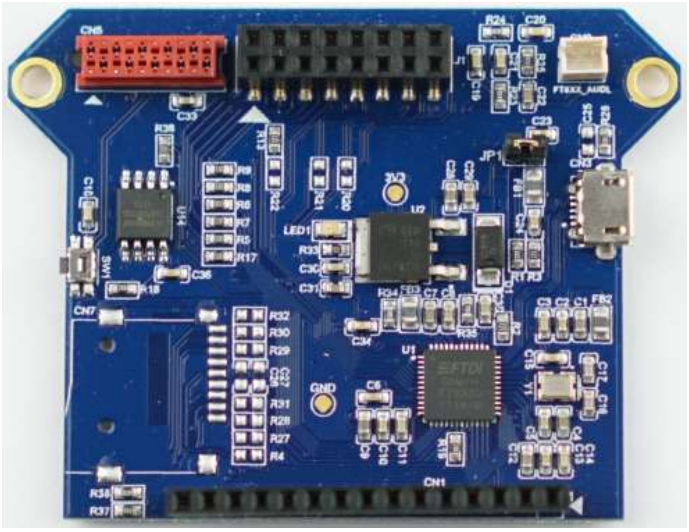
Bridgetek Pte Ltd MM932LC Development Module Datasheet



FT93x Family is a General Purpose 32-bit Microcontroller

1 Introduction

The MM932LC is a low cost development module for Bridgetek's 32-bit high performance FT93x Microcontroller family, which is used to develop and demonstrate the functionality of the FT932 Embedded Microcontroller.

This module is ideal for simple applications including USB capability products, embedded multimedia applications and other industrial control systems.

1.1 Features

For a full list of the FT93x features refer to the FT93x datasheet. In addition, the MM932LC module has the following features:

- FT932Q 48-pin QFN package microcontroller.
- In built 16M Byte Eflash memory.
- A Micro-B USB connector for connecting to a USB host or providing a power supply over USB for the board.
- 2x8 pins 2.54mm pitch dual entry female header for SPI master to support LCD display modules.
- 2x5 pins 1.27mm pitch female Micro-MaTch connector for software download.
- 1x15 pins 2.54mm pitch female header support for external feature expansions.
- Hardware Reset button provided.

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2 Ordering Information

Part No.	Description
MM932LC	FT932 module, a 32-bit microcontroller with 128kB flash memory, 32kB data RAM and 128kB program memory embedded. USB2.0 Device, 16MB Eflash, several interface pin headers and connectors included.

Table 2-1 – Ordering information

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3 Program Support

Example applications are provided for the MM932LC module by Bridgetek.

For other relevant documents and examples, please refer to the Bridgetek website.

Refer to BRT_AN_010_FT93x_User_Manual for system register information.

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4 Board Layout

The MM932LC development board is a 55 mm x 51 mm (Not including the 2 mounting holes) two-layer printed circuit board. The layout is as shown in Figure 4-1.

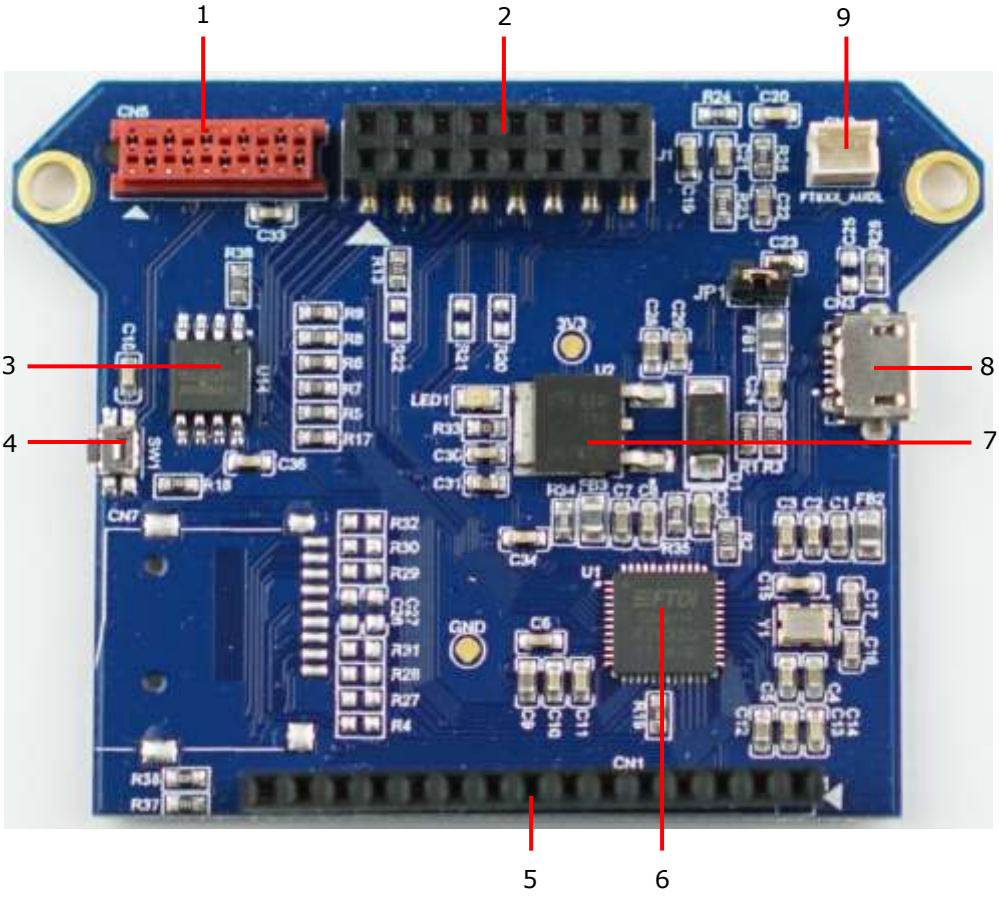


Figure 4-1 – MM932LC Board Layout

Key Features:

1. Micro-MaTch connector
2. Dual-entry female header
3. 16M Byte Eflash memory
4. H/W Reset button
5. External I/O bus female pin header
6. FT932Q QFN48 Microcontroller
7. LDO regulator
8. USB Micro-B connector
9. Audio PWM output from FT8xx (assumes FT8xx based LCD plugged in).

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4.1 Power Supply

The MM932LC development board is powered from a USB power supply source via the Micro-B USB **CN3** port. A power jumper **JP1** connects the USB power (VBUS_IN) to the input of an LDO regulator (VDD_5V).

A red LED (LED1) will illuminate after the +5V power supply is applied. This supply will also drive a fixed +3.3V LDO regulator which will provide power to all peripherals of the FT932 microcontroller.

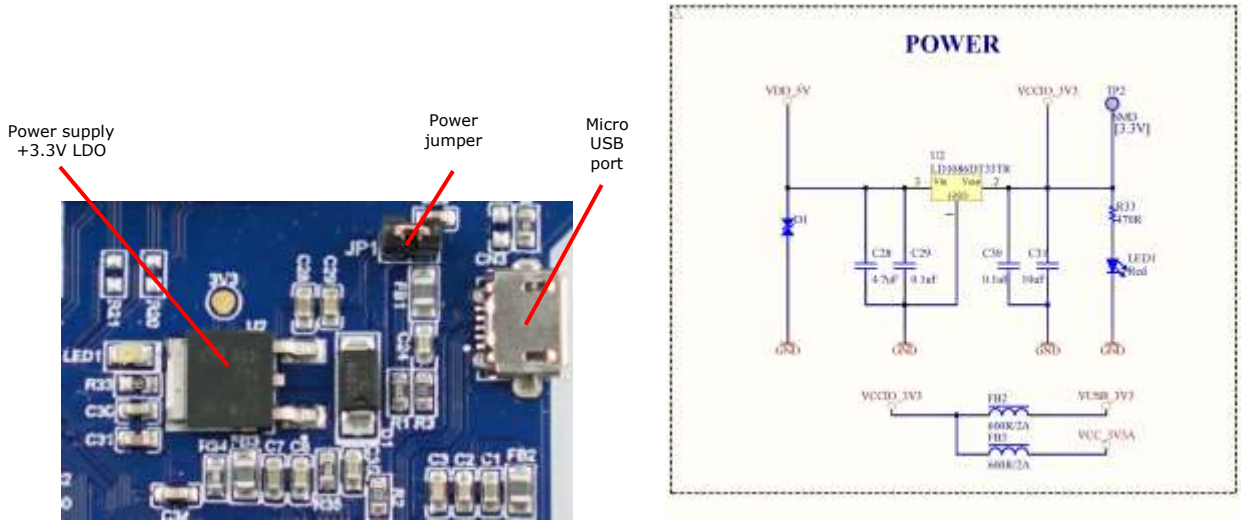


Figure 4-2 – Power supply

4.2 Microcontroller

The FT932Q 48-pin QFN microcontroller (U1) provided on the board belongs to the 32-bit FT93x Microcontroller family from Bridgetek. For details of the FT932 Microcontroller, refer to the FT93x datasheet.

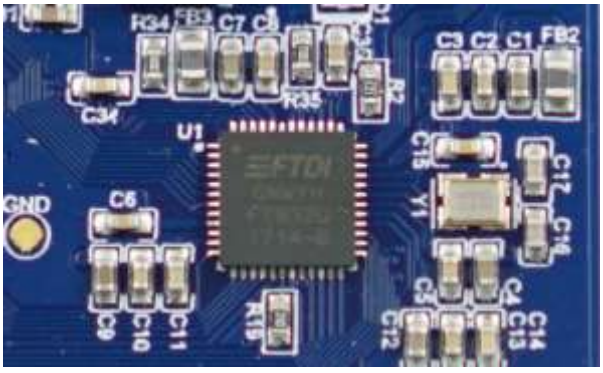


Figure 4-3 – FT932 Microcontroller

There is one crystal used on the MM932LC development board. The 12MHz crystal (Y1) is the primary system clock frequency supplying the FT932Q IC.

The FT932Q IC on this board is operated from a single supply of +3.3V. The power output pins have decoupling capacitors as specified in the datasheet.

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4.3 Flash Memory

The MM932LC module contains an on-board Winbond Serial Flash memory W25Q128FV (128M-bit/16Mbyte) with Dual/Quad SPI interface, which is ideal for code shadowing and storing voice, text and data.

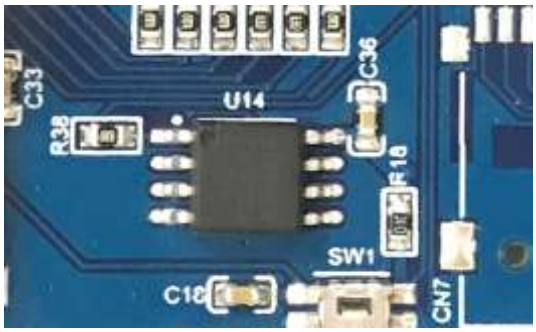


Figure 4-4 – Flash Memory

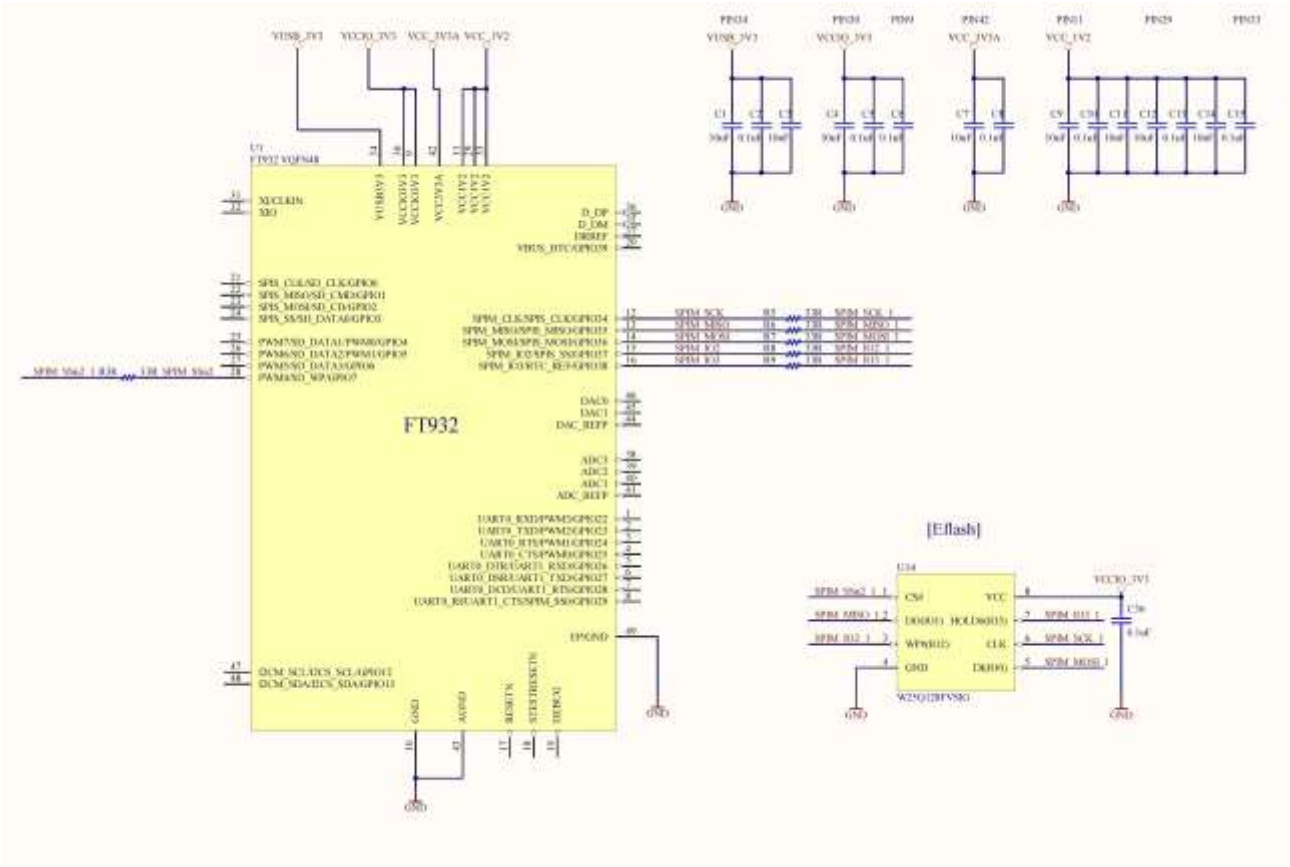


Figure 4-5 – Flash Memory Interface

4.4 USB Connector

There is a USB connector provided on the MM932LC board. **CN3** is a Micro-B type USB2.0 connector which is used for connecting the module to a USB host. This is for power and data transfer.

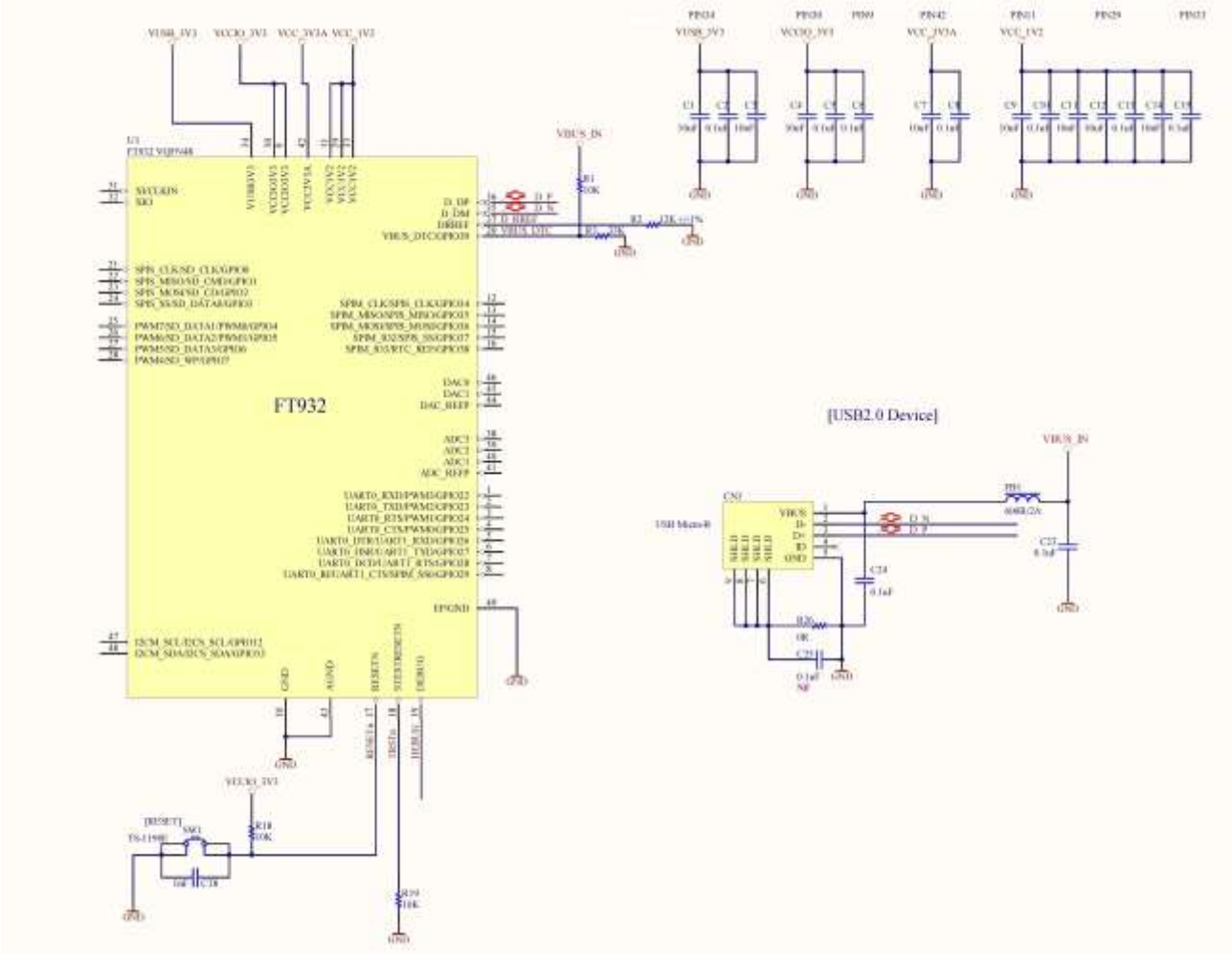


Figure 4-6 – USB Connectors Interface

4.5 Programmer Interface

The programmer interface **CN5,** 2x5 pins 1.27mm pitch female Micro-Match header supports software application download, GDB debugging on the MM932LC development board with the UMFTPD2A module.

4.5.1 CN5 – 10-pin Micro-Match Program Interface Signals

Pin No.	Name	Type	Description
1~6	-	-	-
7	GND	P	Ground
8	DEBUG	I/O	FT90x One-Wire Interface

Pin No.	Name	Type	Description
9	GDB_5V	P	External 5V power supply
10	RESETn	P	H/W Reset, active low

Table 4-1 – CN5 Pinout

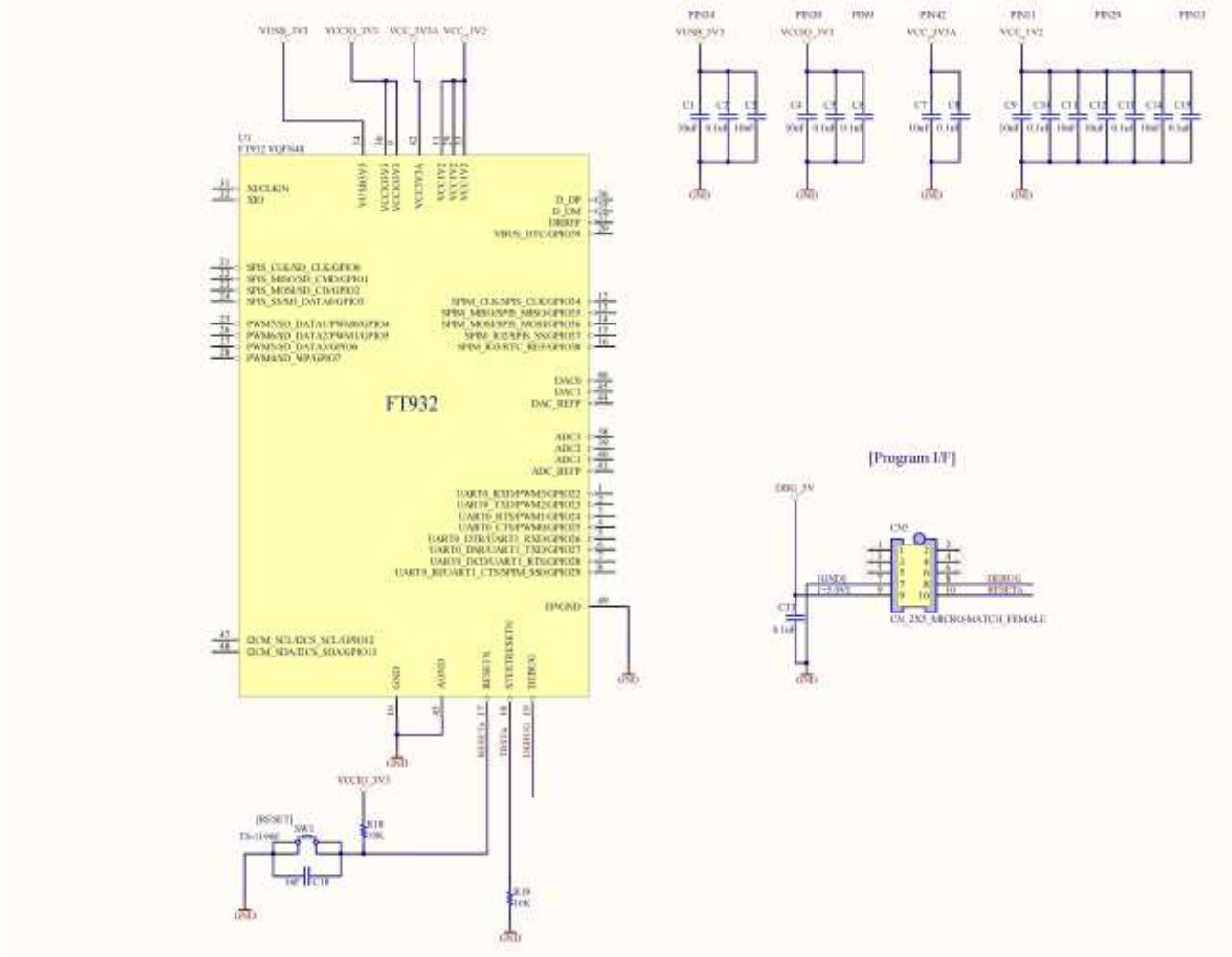


Figure 4-7 – Programmer Interface

4.6 SPI Master Interface

The FT932Q microcontroller has a SPI master interface that supports single, dual and quad SPI data transfer modes. There is a connector for supporting different FT8xx enabled LCD display modules as SPI slave devices.

- The **J1** dual-entry 2x8 pins 2.54mm pitch, female header is designed for FT80x and FT81x Embedded Video Engine (EVE) family LCD display modules. For example the ME810A-HV35R module, can connect directly to the MM932LC development board on the bottom side with a male pin header.

4.6.1 J1 – 16-pin Dual Entry Header, SPI Master and Control Signals

Pin No.	Name	Type	Description
1	SPIM_SCK	O	SPI Master clock output
2	SPIM_SSn0	O	SPI Master chip select 0, active low
3	SPIM_MISO	I/O	SPI Master input, Slave output Data 1 for Quad SPI
4	SPIM_MOSI	I/O	SPI Master output, Slave input Data 0 for Quad SPI
5	SPIM_IO3	I/O	General I/O, data 3 for Quad SPI
6	SPIM_IO2	I/O	General I/O, data 2 for Quad SPI
7	DCX	O	Data / command selection pin for LCD controller Low: Command High: Parameter
8	CS1#	O	SPI Master chip select 1, active low for LCD controller
9	VCCIO_3V3	P	+3.3V power supply
10	VDD_5V	P	+5V power supply
11	GND	P	Ground
12	GND	P	Ground
13	PWD#	O	FT8XX power down control, active low
14	INT#	I	Interrupt input from FT8XX, active low
15	AUD_LIN	I	Audio PWM output from FT8XX
16	DISP	O	LCD display enable

Table 4-2 – J1 Pinout

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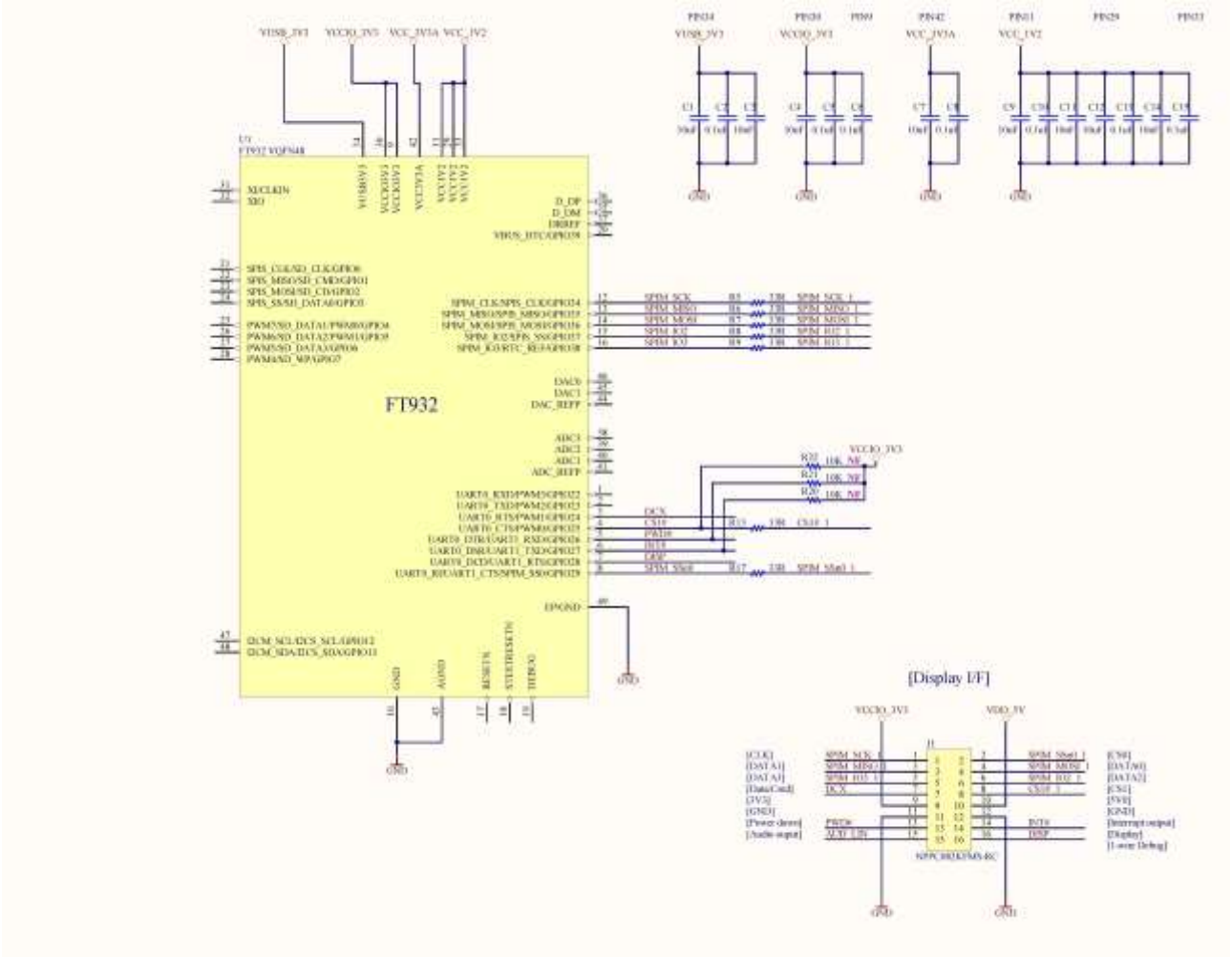


Figure 4-8 – SPI Master Interface

4.7 External I/O Bus

There are multiple interface signals provided on **CN1** 1x15 pins, 2.54mm pitch female header. External feature boards may connect via UART, PWM, ADC, DAC and I2C on these IO connectors.

Table 4-3 lists all features assigned for each pin.

4.7.1 CN1 – 15-pin Single Header, Multiple Interface Signals

Pin No.	Function 1	Function 2	Function 3	Description
1	VDD_5V	-	-	+5.0V supply voltage, output.
2	VCCIO_3V3	-	-	+3.3V supply voltage, output.
3	ADC1	-	-	8-bit Analog-to-Digital converter 1, input.
4	ADC2	-	-	8-bit Analog-to-Digital converter 2, input.
5	ADC3	-	-	8-bit Analog-to-Digital converter 3, input.

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Pin No.	Function 1	Function 2	Function 3	Description
6,9,12,15	GND	-	-	Ground.
7	DAC0	-	-	10-bit Digital-to-Analog converter 0, output.
8	DAC1	-	-	10-bit Digital-to-Analog converter 1, output.
10	I2CM_SDA	I2CS_SDA	GPIO13	I2C master data line input/output. I2C slave data line input/output. GPIO13 input/output.
11	I2CM_SCL	I2CS_SCL	GPIO12	I2C master serial clock input/output. I2C slave serial clock input/output. GPIO12 input/output.
13	UART0_RXD	PWM3	GPIO22	UART0 receiver input. PWM channel 3, output. GPIO22 input/output.
14	UART0_TXD	PWM2	GPIO23	UART0 transmitter output. PWM channel 2, output. GPIO23 input/output.

Table 4-3 – CN1 External I/O Bus

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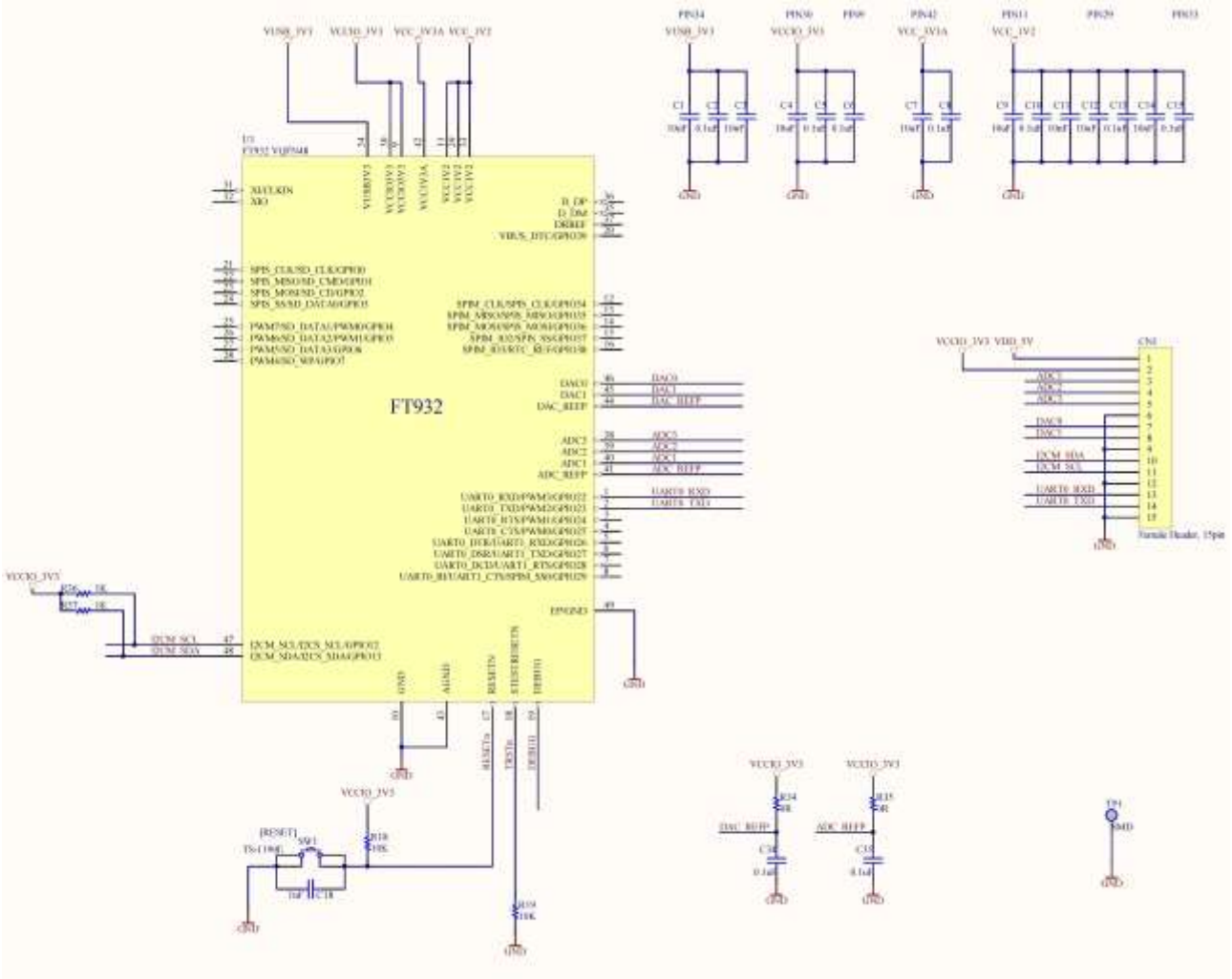


Figure 4-9 – External I/O Bus

5 Board Schematic

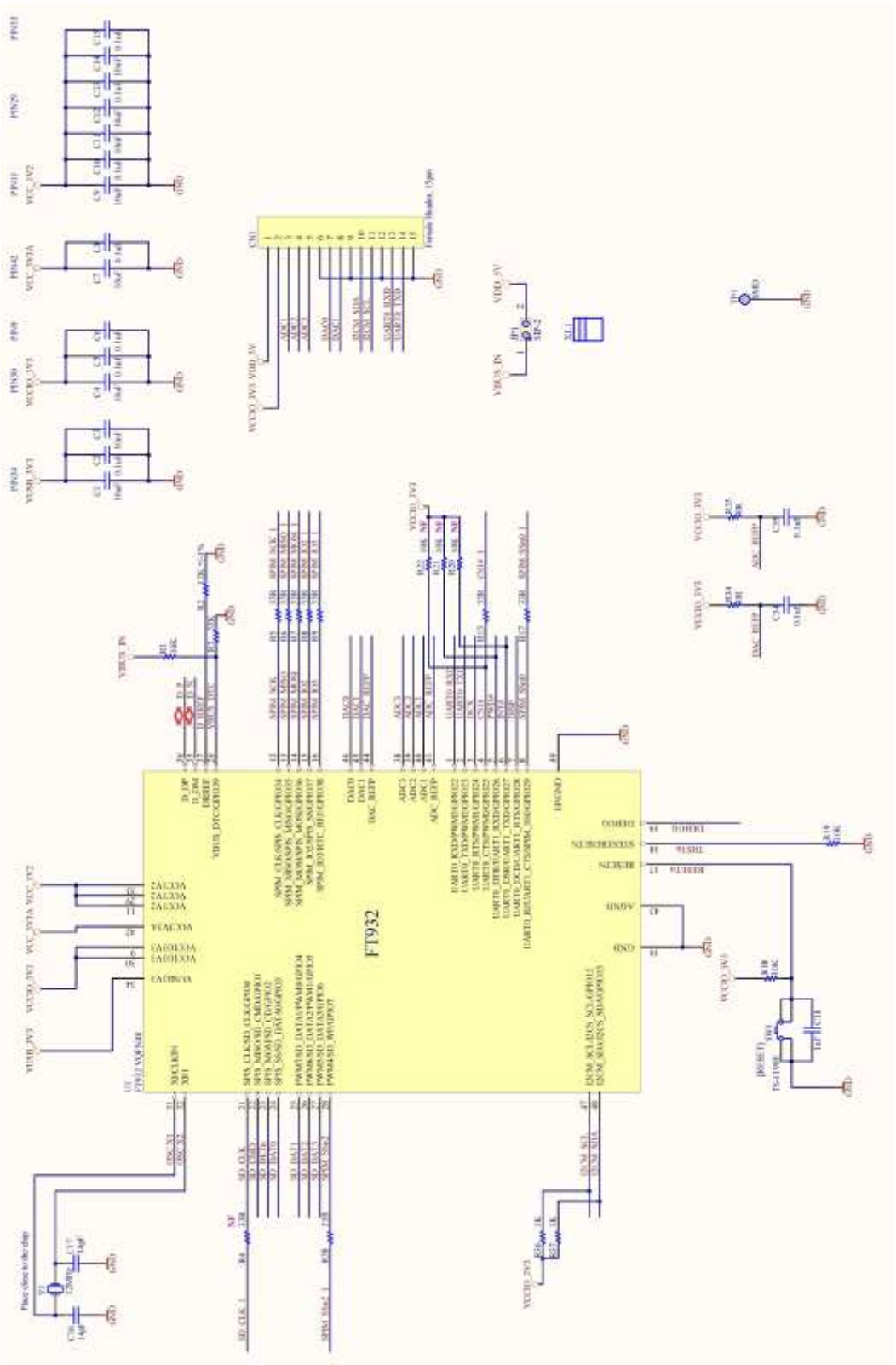


Figure 5-1 – MM932LC MCU and External I/O Bus

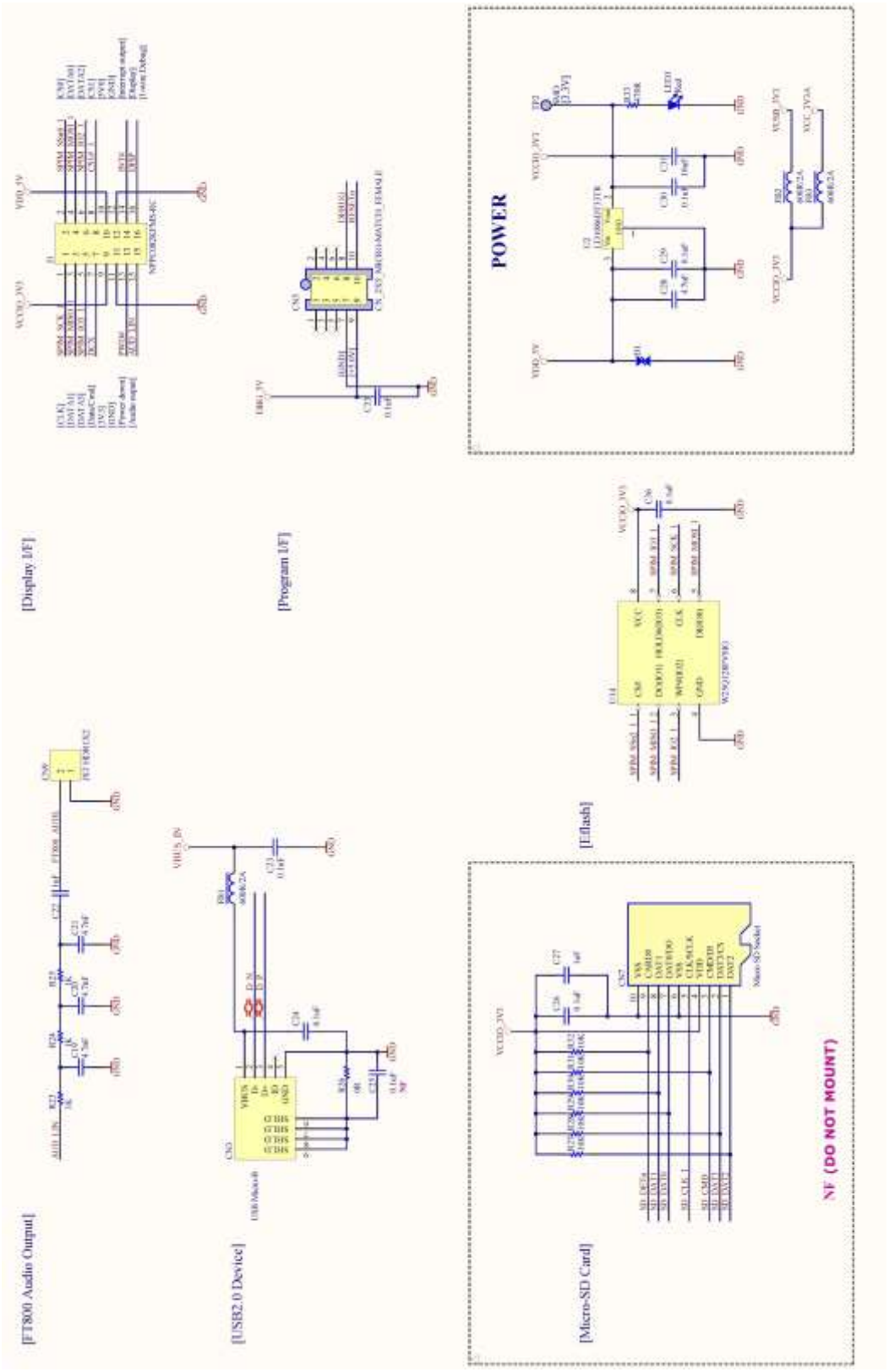


Figure 5-2 – MM932LC Interfaces and Connectors

6 Mechanical Dimensions

6.1 MM932LC PCB Dimensions

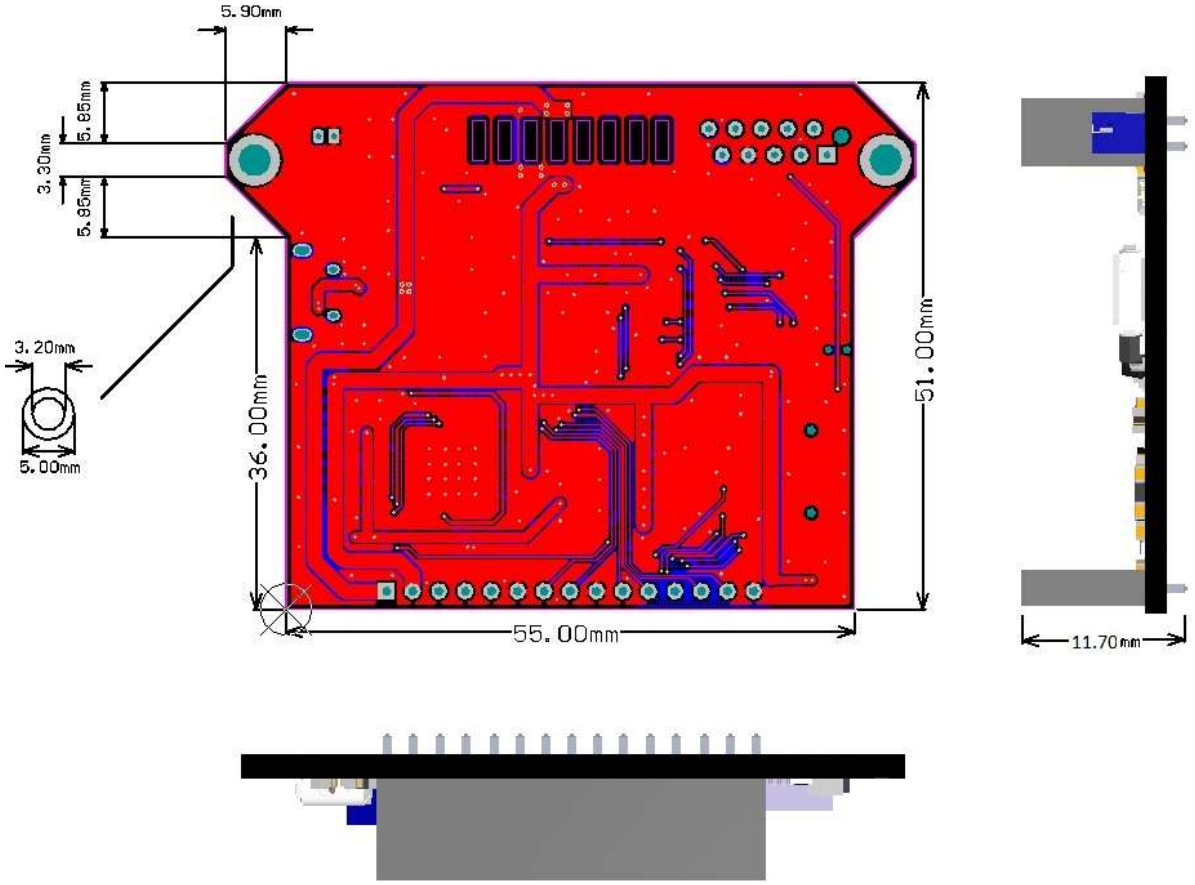


Figure 6-1 – MM932LC PCB Dimensions

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Appendix A - References

Document References

FT93X webpage: FT93x Webpage

FT93x datasheet: FT930/FT931/FT932/FT933 Datasheet

FT93x user manual: BRT_AN_010_FT93x_User_Manual

UMFTPD2A program module datasheet: DS_UMFTPD2A

ME810A-HV35R LCD display module document: DS_ME810A_HV35R

Acronyms and Abbreviations

Terms	Description
ADC	Analog-to-Digital Converter
DAC	Digital-to-Analog Converter
H/W	Hardware
I/O	Input/Output
I2C	Inter-Integrated Circuit
LCD	Liquid Crystal Display
LDO	Low Drop-Out
LED	Light-Emitting Diode
PWM	Pulse Width Modulation
QFN	Quad-Flat No-leads
RAM	Random Access Memory
SD	Secure Digital
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

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Appendix C – Revision History

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