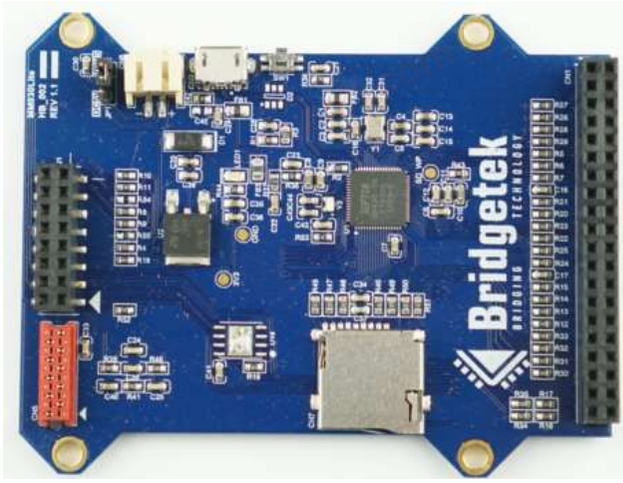
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# Bridgetek Pte Ltd

## Datasheet

## MM930Lite Development Module



*FT93x Family is a General Purpose 32-bit Microcontroller*

# 1 Introduction

The MM930Lite is a development module for Bridgetek's 32-bit high performance FT93x Microcontroller family, which is used to develop and demonstrate the functionality of the FT930 Embedded Microcontroller.

This module is ideal for applications including home security systems, home automation systems, USB capability products, embedded multimedia application and other industrial control systems.

## 1.1 Features

For a full list of the FT93x features refer to the FT93x datasheet.
In addition, the MM930Lite module has the following features:

- FT930Q 68-pin QFN package microcontroller.
- Micro SD card socket support.
- In built 8M Byte Eflash memory.
- A Micro-B USB 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 and 16 pins 0.5mm pitch FFC/FPC connectors for SPI master to support LCD display modules.
- 2x5 pins 1.27mm pitch female Micro-MaTch connector for software download.
- 2x20 pins 2.54mm pitch female header support for external feature expansions.
- +5V alternative power supply DC connector.
- Hardware Reset button provided.

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# 2 Ordering Information

| Part No. | Description |
|---|---|
| **MM930Lite** | FT930 module, a FT32, 32-bit microcontroller with 128kB flash memory, 32kB data RAM and 128kB program memory embedded. SD3.0, USB2.0 Device, 8MB Eflash, several interface pin headers and connectors included. |

**Table 2-1 – Ordering information**

# 3 Program Support

Example applications are provided for the MM930Lite module by Bridgetek.

The following documents provide further details for software development.

Other relevant documents and examples exist so please see the Bridgetek website for further information.

Refer to BRT_AN_010_FT93x_User_Manual for system register information.

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# 4 Board Layout

The MM930Lite development board is a 55 mm x 85 mm (Not including the 4 mounting holes) four-layer printed circuit board. The layout is as shown in Figure 4-1.

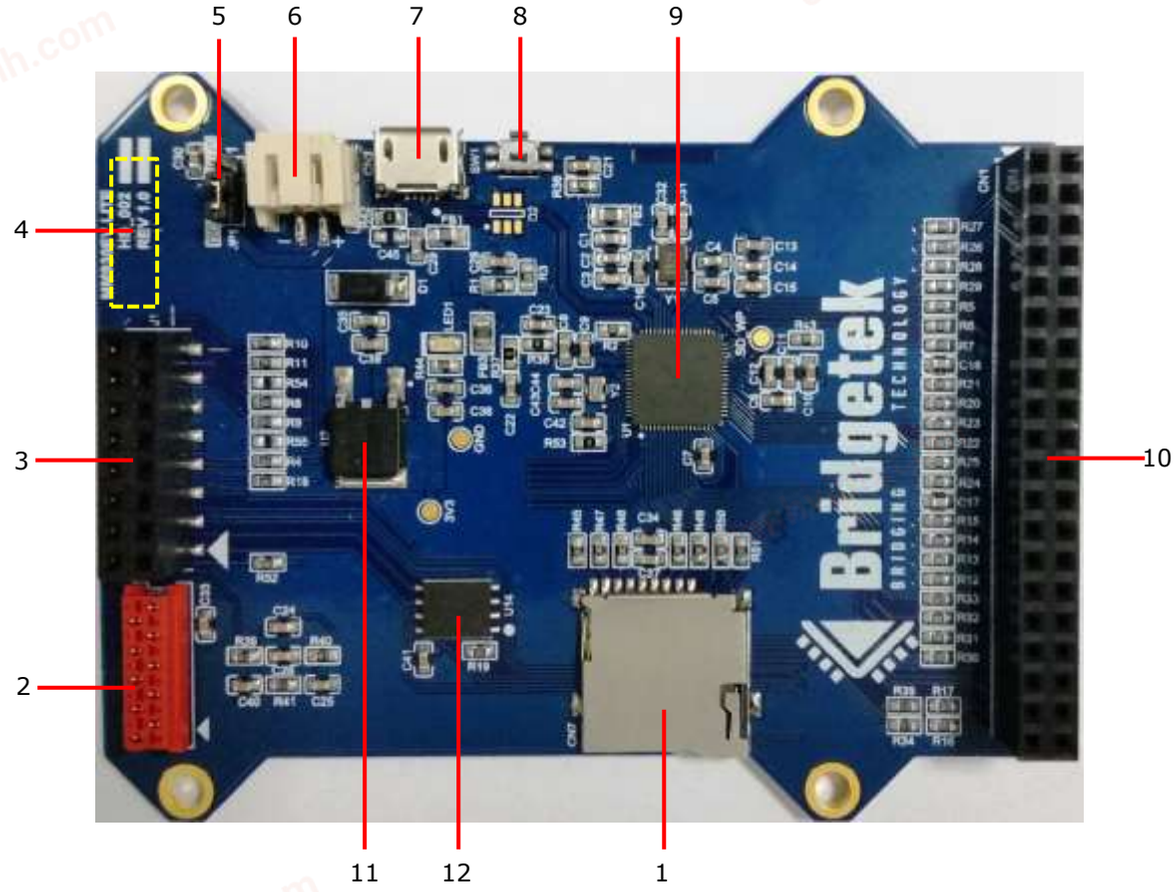



**Figure 4-1 – MM930Lite Board Layout**

Key Features:

1. Micro SD card socket
2. Micro-MaTch connector
3. Dual-entry female header
4. FPC/FFC connector (located beneath board)
5. Alternative power supply jumper
6. +5V DC power socket
7. USB Micro-B connector
8. H/W Reset button
9. FT930Q QFN68 Microcontroller
10. External I/O bus female pin header
11. LDO regulator
12. 8M Byte Eflash memory

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## 4.1 Power Supply

The MM930Lite development board provides optional power supply sources with **JP1** jumper:

1. +5V DC power supply, **CN6** right angle connector.
2. Over USB via the Micro-B USB **CN3** port.

| Pin No. | Name |
|---|---|
| 1-2 | USB VBUS power supply |
| 2-3 | +5V DC power supply |

**Table 4-1 – JP1 Pinout**

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 FT930 microcontroller.

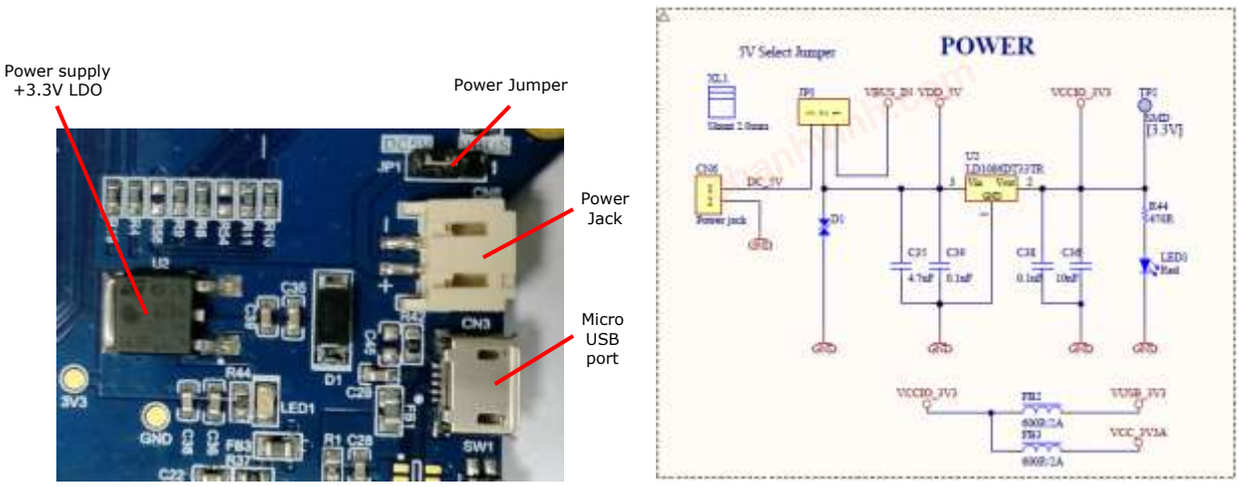



**Figure 4-2– Power supply**

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## 4.2 Microcontroller

The FT930Q 68-pin QFN microcontroller (U1) provided on the board belongs to the 32-bit FT93x Microcontroller family from Bridgetek. For details of the FT930 Microcontroller, refer to the FT93x datasheet.




**Figure 4-3– FT930 Microcontroller**

There are two crystals used on the MM930Lite development board. The 12MHz crystal (Y1) is the primary system clock frequency supplying the FT930Q IC. The 32.768 KHz crystal (Y2) is the system clock frequency supporting the internal RTC.

The FT930Q IC on this board is operated with a single supply of +3.3V. The FT9xx Core +1.2V from internal regulator is used as power source for internal RTC. These power output pins have decoupling capacitors as specified in the datasheet.

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## 4.3 Micro SD Connector

The FT930Q Microcontroller has a SD3.0 controller to support different speed classes, physical sizes and capacities of Secure Digital (SD) cards. There is a Micro SD connector on the MM930Lite development module for inserting Micro SD cards (11 x15 x1.0 mm).

There are three standard capacity cards supported:

- Secure Digital (SD) standard – Up to 2GB SD memory card
- Secure Digital High Capacity (SDHC) standard – Over 2GB-32GB SDHC memory card
- Secure Digital eXtended Capacity (SDXC) standard – Over 32GB-2TB SDXC memory card

Standard class speeds 2, 4, 6, 10, and Ultra High Speed (UHS) classes U1 and U3 are all supported. The design of the physical interface supports 4-bit SD bus mode and card detection.

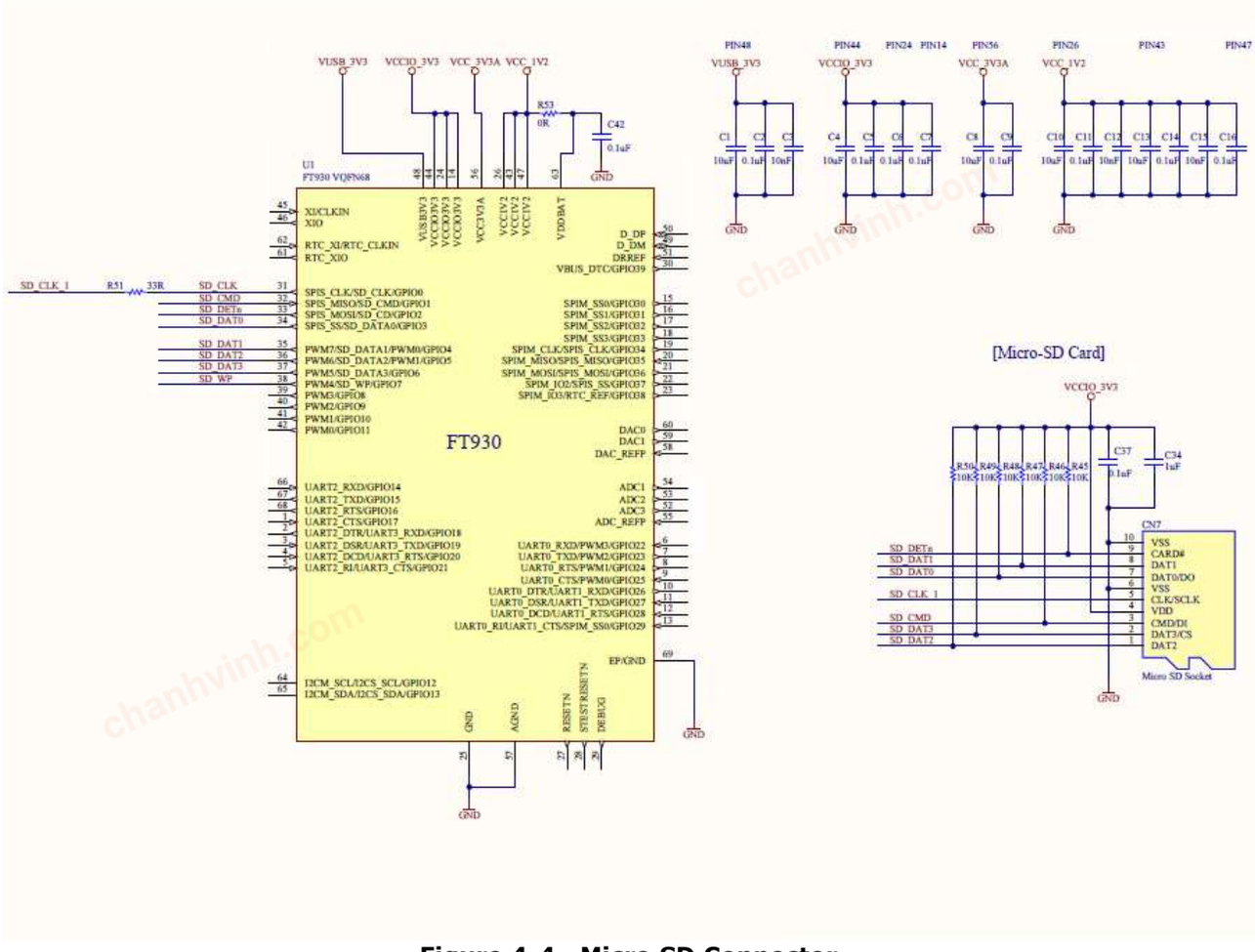



**Figure 4-4– Micro SD Connector**

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## 4.4 USB Connector

There is a USB connector provided on the MM930Lite board. **CN3** is a Micro-B type USB2.0 connector which is used for connecting the module to a USB host.

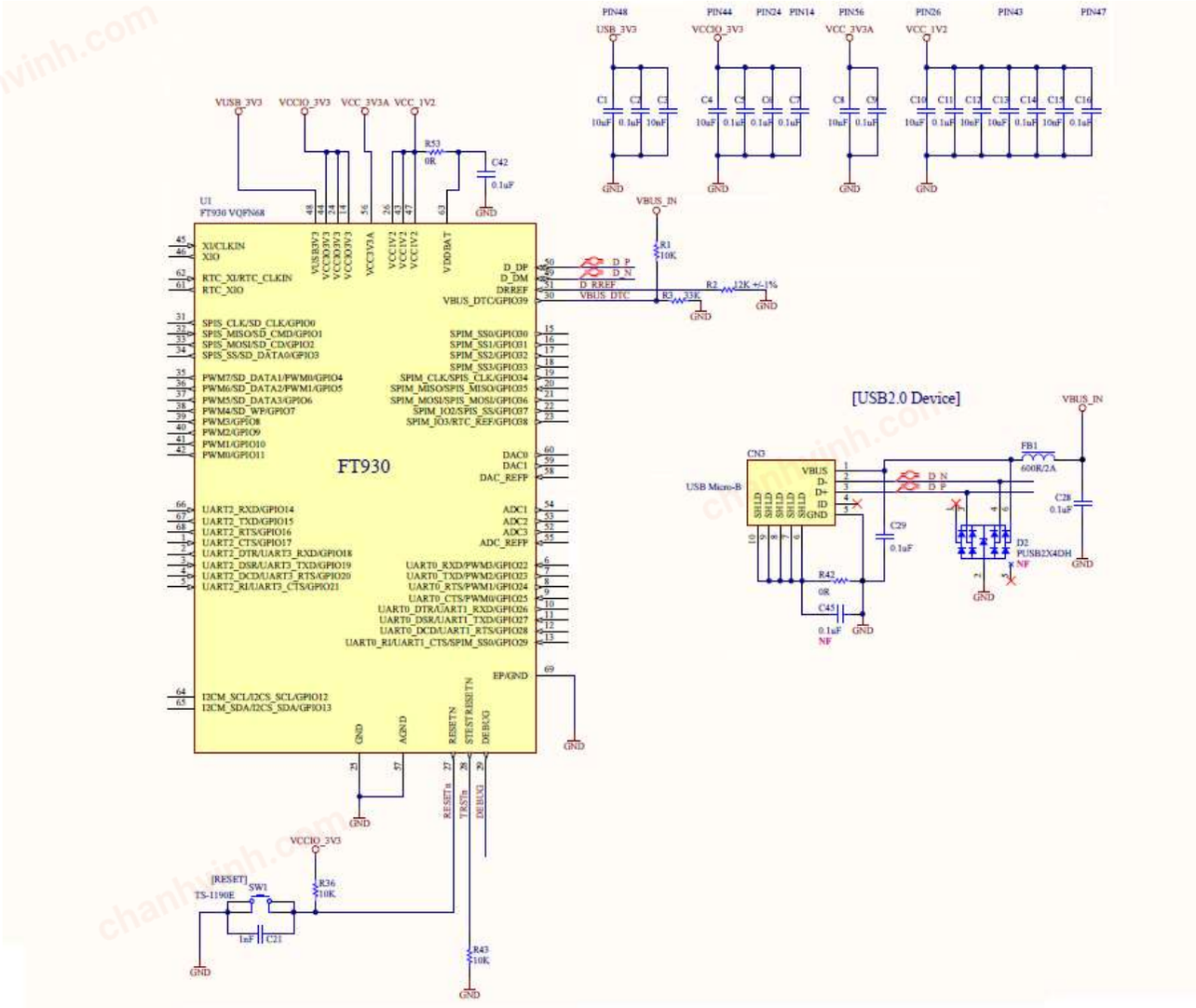



**Figure 4-5– USB Connectors**

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## 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 MM930Lite 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 |
| 9 | GDB_5V | P | External 5V power supply |
| 10 | RESETn | P | H/W Reset, active low |

**Table 4-2 – CN5 Pinout**

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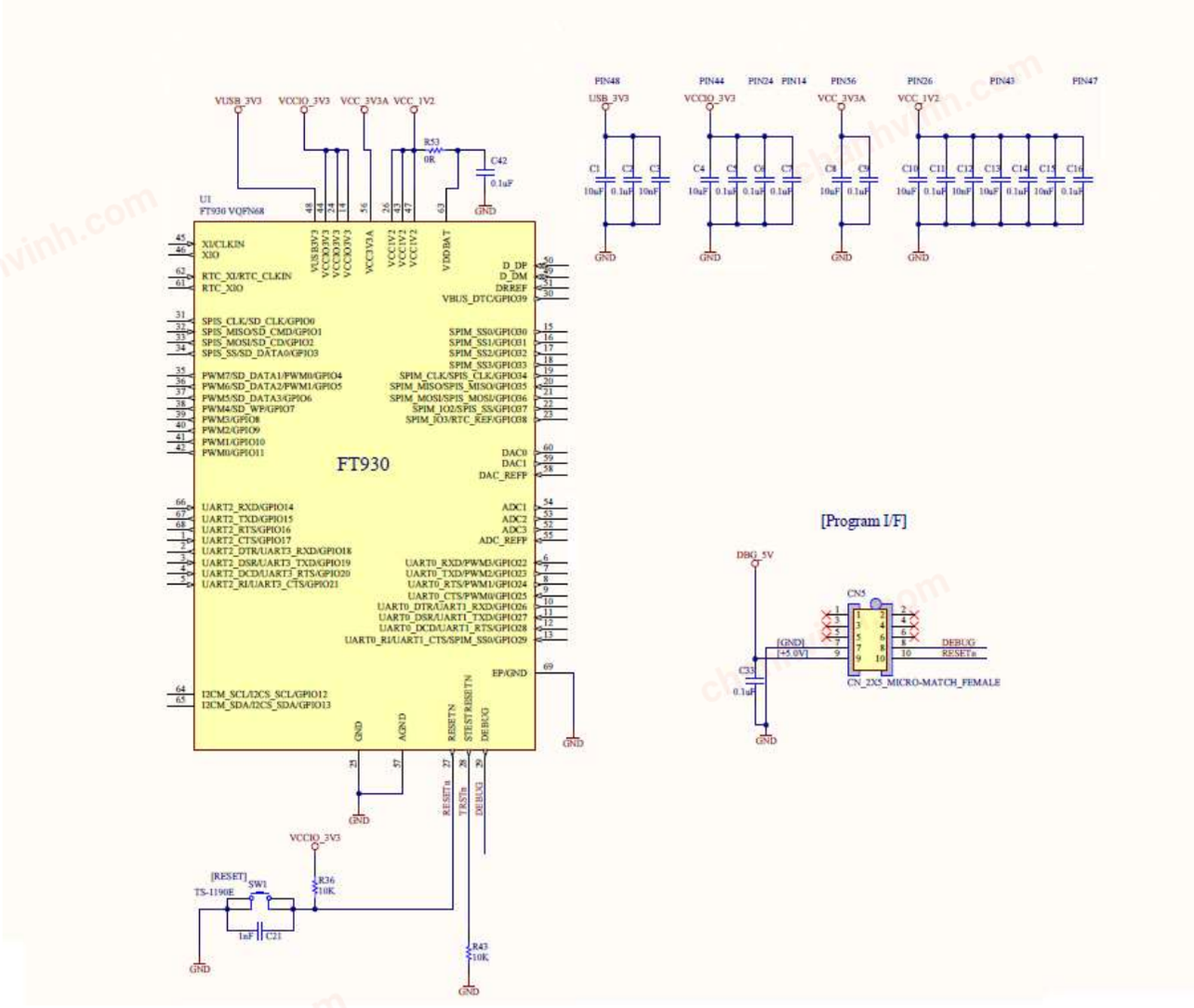



**Figure 4-6 – Programmer Interface**

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## 4.6 SPI Master Interface

The FT930Q microcontroller has a SPI master interface that supports single, dual and quad SPI data transfer modes. There are two alternative connectors for supporting different LCD display modules as SPI slave devices.

- The **J1** dual-entry 2x8 pins 2.54mm pitch, female header (located on top of board**Error! Reference source not found.**) is designed for FT80x and FT81x Embedded Video Engine (EVE) family LCD display modules. As an example the ME810A-HV35R module, can connect directly to the MM930Lite development board on the bottom side with a male pin header.

- The **CN4** 16 pins 0.5mm pitch, bottom contact FFC/FPC connector (located beneath board**Error! Reference source not found.**) provides an alternative connection for LCD display modules that meet FT80x or FT81X chip technical specifications and use a 16-pin 0.5mm pitch flexible flat cable to link to the board.

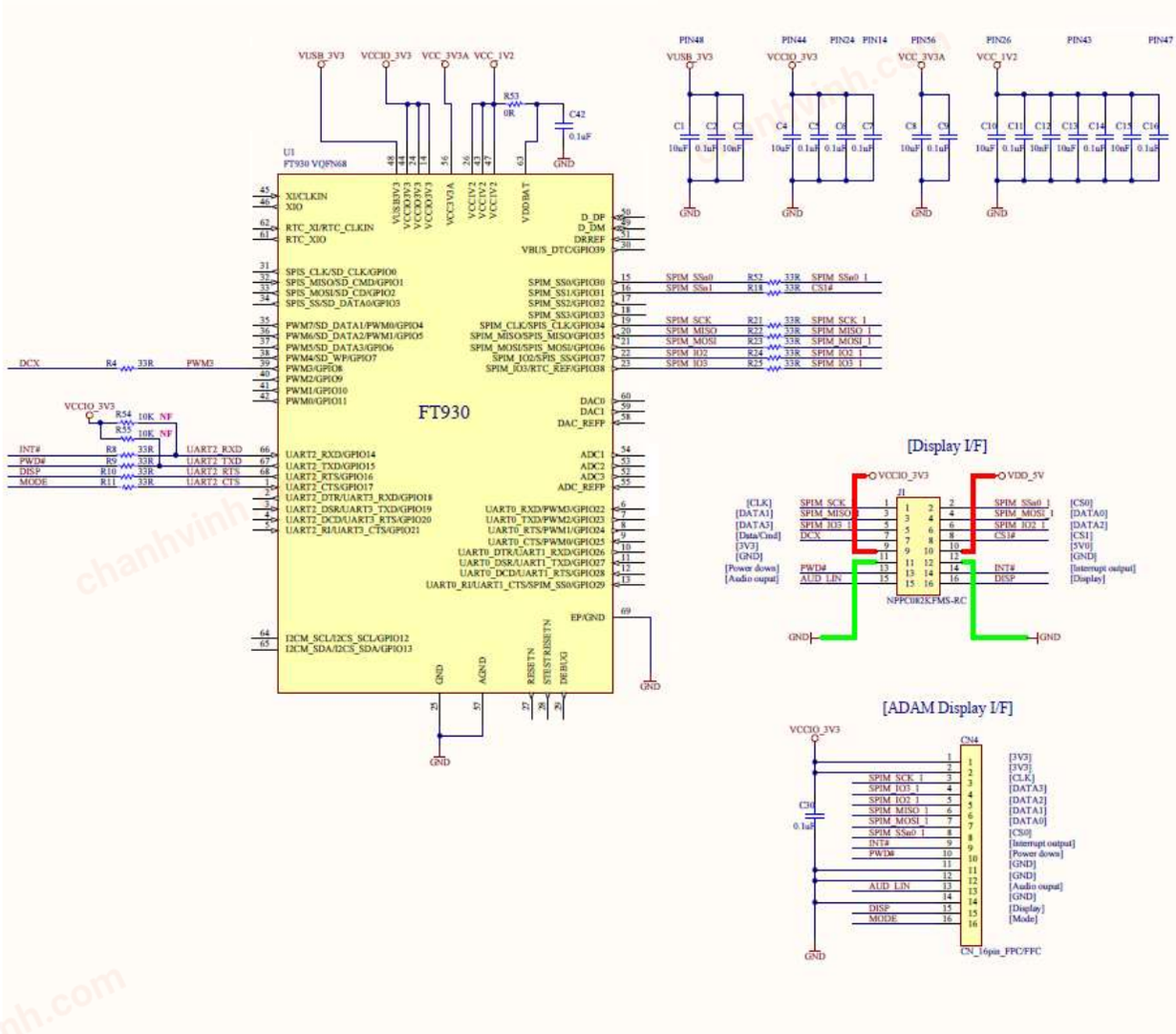



**Figure 4-7– SPI Master Interface**

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### 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<br>Data 1 for Quad SPI |
| 4 | SPIM_MOSI | I/O | SPI Master output, Slave input<br>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<br>Low: Command<br>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 | FT80X power down control, active low |
| 14 | INT# | I | Interrupt input from FT80X, active low |
| 15 | AUD_LIN | I | Audio PWM input from FT80X |
| 16 | DISP | O | LCD display enable |

**Table 4-3 – J1 Pinout**

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### 4.6.2 CN4 – 16-pin FPC/FFC connector

| Pin No. | Name | Type | Description |
|---|---|---|---|
| 1,2 | VCCIO_3V3 | P | +3.3V Power supply |
| 3 | SPIM_SCK | O | SPI Master clock output |
| 4 | SPIM_IO3 | I/O | General I/O, data 3 for Quad SPI |
| 5 | SPIM_IO2 | I/O | General I/O, data 2 for Quad SPI |
| 6 | SPIM_MISO | I/O | SPI Master input, Slave output<br>Data 1 for Quad SPI |
| 7 | SPIM_MOSI | I/O | SPI Master output, Slave input<br>Data 0 for Quad SPI |
| 8 | SPIM_SSn0 | O | SPI Master chip select 0, active low |
| 9 | INT# | I | Interrupt input from FT80X, active low |
| 10 | PWD# | O | FT80X power down control, active low |
| 11,12,14 | GND | P | Ground |
| 13 | AUD_LIN | I | Audio PWM input from FT80X |
| 15 | DISP | O | LCD display enable |
| 16 | MODE | O | Serial interface selection for FT80X<br>Low: SPI interface<br>High: I2C interface |

**Table 4-4 – CN4 Pinout**

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## 4.7 External I/O Bus

There are 23 multiple function GPIOs provided on **CN1** 2x20 pins, 2.54mm pitch female header. External feature boards may connect via UART, PWM, ADC, DAC, SPI and I2C on these IO connectors.

Table 4-5 lists all features assigned for each pin.

### 4.7.1 CN1 – 40-pin Dual Entry Header, Multiple function GPIO & Control Signals

| Pin No. | Function 1 | Function 2 | Function 3 | Function 4 |
|---|---|---|---|---|
| 1,3,5,15,24 | GND | - | - | - |
| 2 | FT800_AUDL | - | - | - |
| 4 | GPIO23 | UART0_TXD | PWM2 | - |
| 6 | GPIO22 | UART0_RXD | PWM3 | - |
| 7 | DAC1 | - | - | - |
| 8 | GPIO24 | UART0_RTS | PWM1 | - |
| 9 | DAC0 | - | - | - |
| 10 | GPIO25 | UART0_CTS | PWM0 | - |
| 11,25,26 | - | - | - | - |
| 12 | GPIO9 | PWM2 | - | - |
| 13 | GPIO11 | PWM0 | - | - |
| 14 | GPIO10 | PWM1 | - | - |
| 16 | VDD_5V | - | - | - |
| 17 | GPIO33 | SPIM_SSn3 | - | - |
| 18 | GPIO34 | SPIM_SCK | SPIS_SCK | - |
| 19 | GPIO35 | SPIM_MISO | SPIS_MISO | - |
| 20 | GPIO36 | SPIM_MOSI | SPIS_MOSI | - |
| 21 | GPIO38 | SPIM_IO3 | RTC_REF | - |
| 22 | GPIO37 | SPIM_IO2 | SPIS_SS | - |
| 23 | VCCIO_3V3 | - | - | - |
| 27 | GPIO20 | UART3_RTS | - | - |
| 28 | GPIO21 | UART3_CTS | - | - |
| 29 | GPIO18 | UART3_RXD | - | - |
| 30 | GPIO19 | UART3_TXD | - | - |
| 31 | GPIO29 | UART0_RI | UART1_CTS | - |
| 32 | GPIO28 | UART0_DCD | UART1_RTS | - |
| 33 | GPIO27 | UART0_DSR | UART1_TXD | - |
| 34 | GPIO26 | UART0_DTR | UART1_RXD | - |
| 35 | ADC2 | - | - | - |
| 36 | ADC1 | - | - | - |

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| Pin No. | Function 1 | Function 2 | Function 3 | Function 4 |
|---|---|---|---|---|
| 37 | ADC3 | - | - | - |
| 38 | GPIO17 | I2CM_SDA | I2CS_SDA | - |
| 39 | RESETn | - | - | - |
| 40 | GPIO18 | I2CM_SCL | I2CS_SCL | - |

**Table 4-5 – CN1 External I/O Bus**

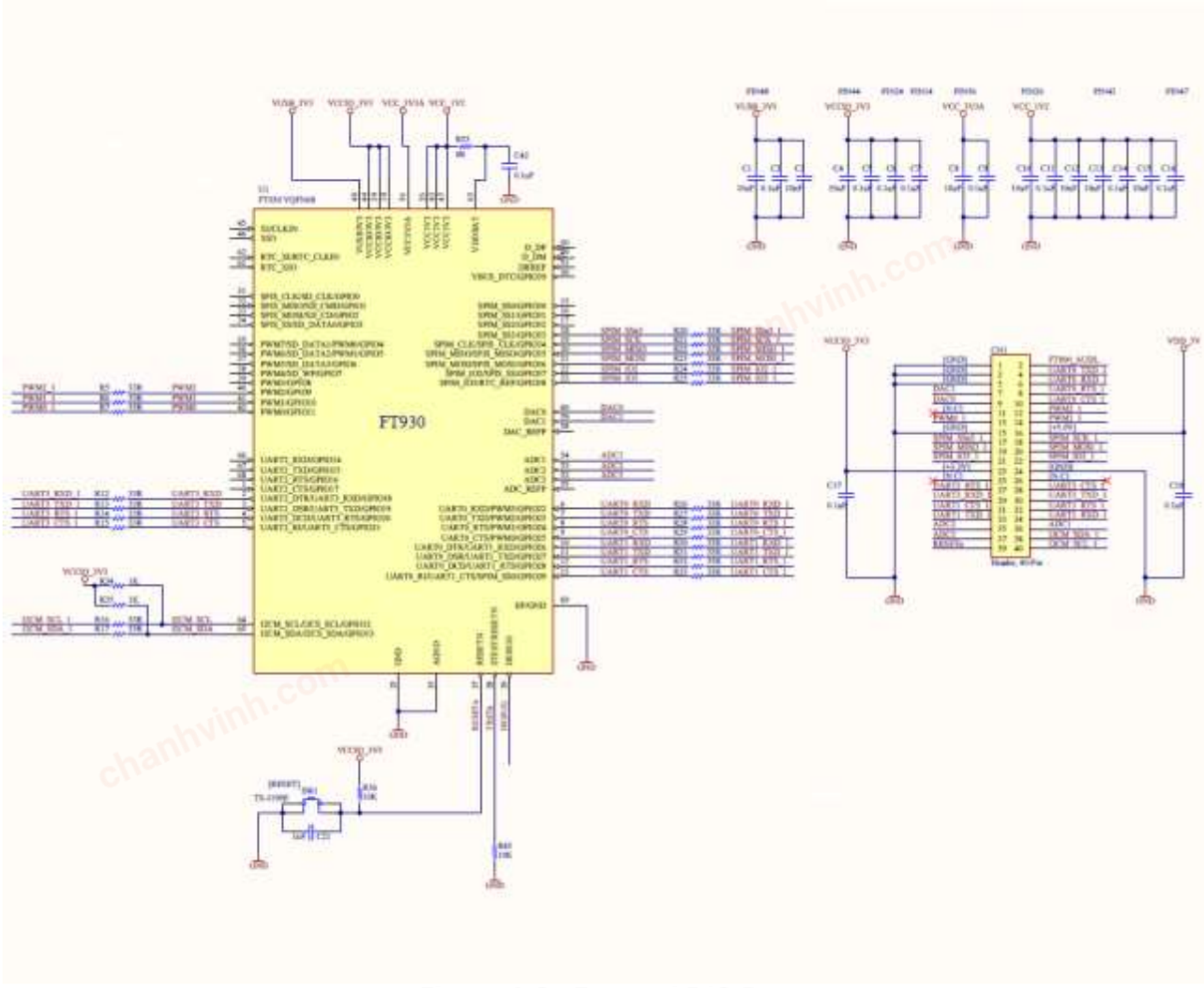



**Figure 4-8– External I/O Bus**

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# 5 Board Schematic

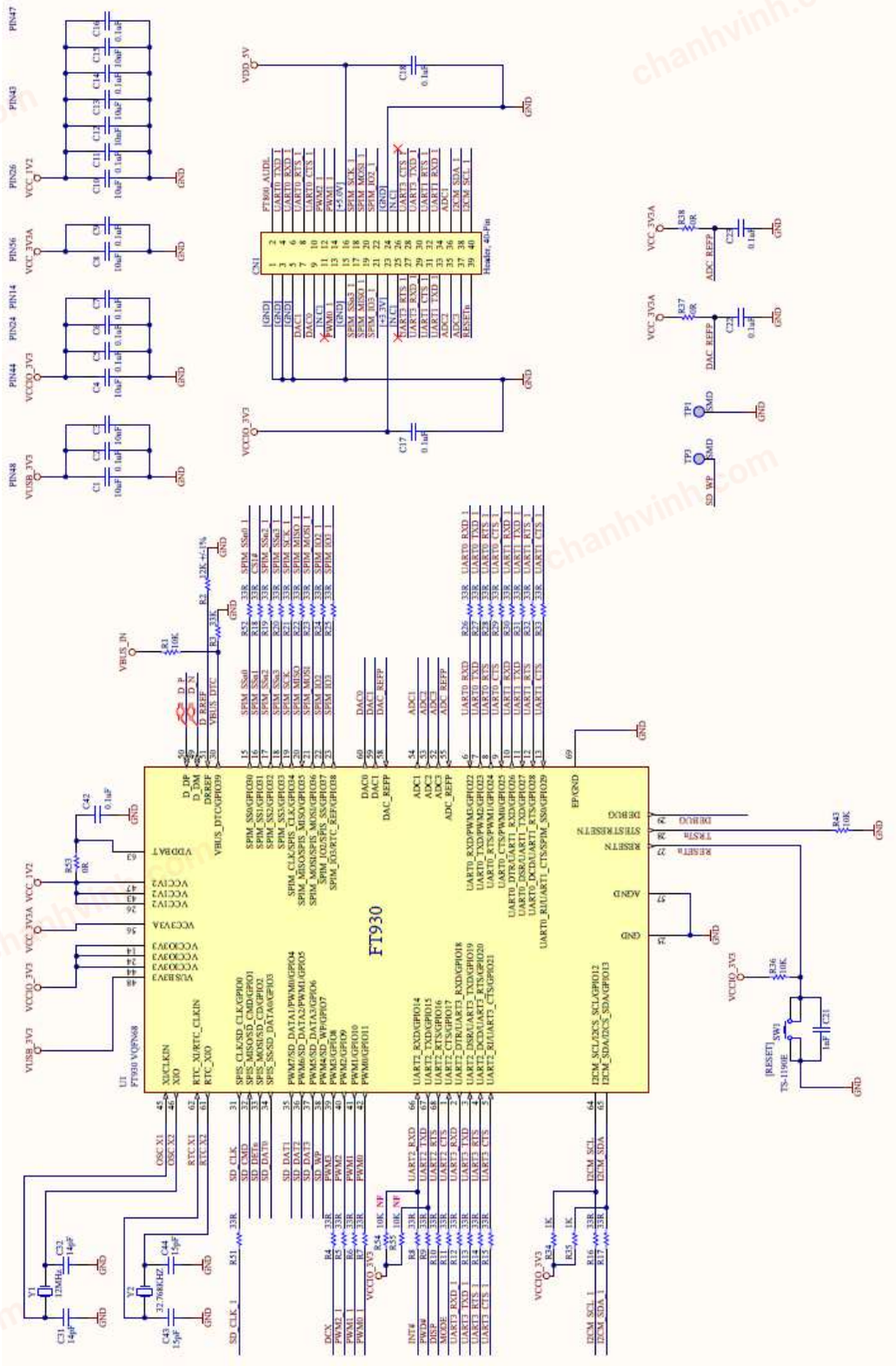



**Figure 5-1 – MM930Lite MCU and External I/O Bus**

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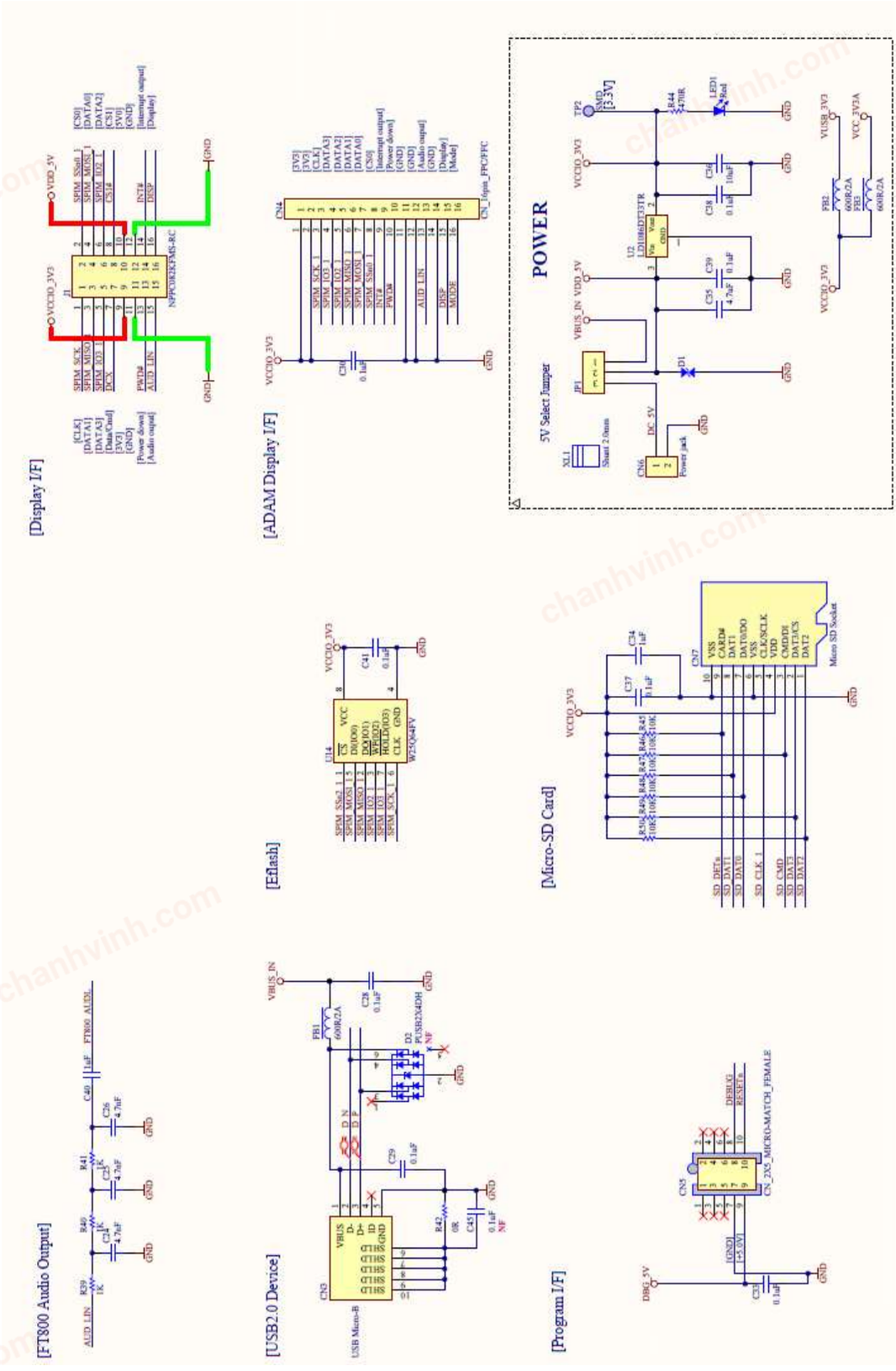



**Figure 5-2 – MM930Lite Interfaces and Connectors**

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# 6 Mechanical Dimensions

## 6.1 MM930Lite PCB Dimensions

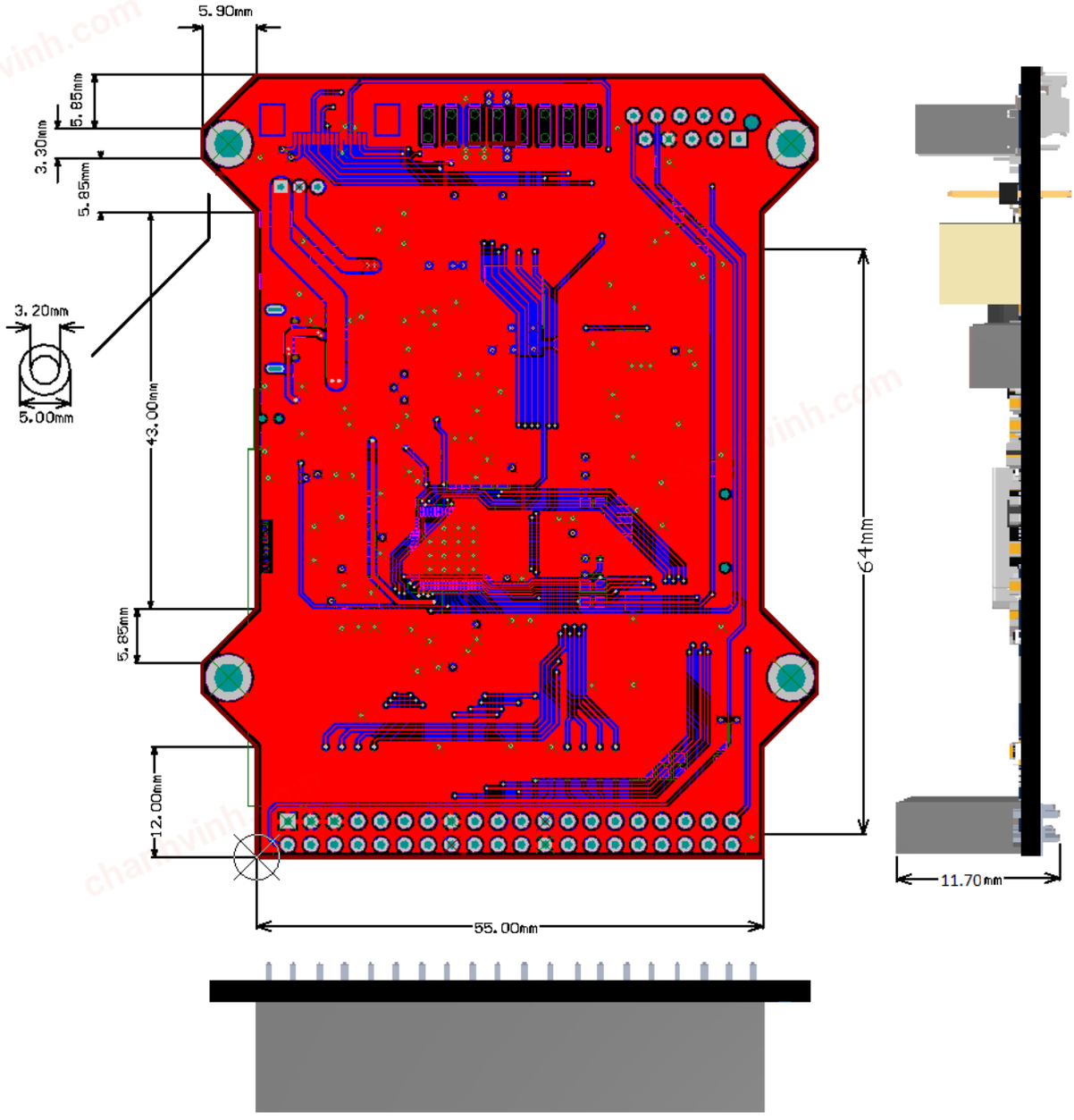



**Figure 6-1 – MM930Lite PCB Dimensions**

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# Appendix A - References

## Document References

FT93X webpage: http://brtchip.com/product/

FT93x datasheet: FT930/FT931/FT932/FT933 Datasheet

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 |
|---|---|
| USB | Universal Serial Bus |
| QFN | Quad-Flat No-leads |
| FFC/FPC | Flexible Flat Cable/Flexible Printed Circuit |
| LCD | Liquid Crystal Display |
| DC | Direct Current |
| RAM | Random Access Memory |
| SD | Secure Digital |
| H/W | Hardware |
| LDO | Low Drop-Out |
| LED | Light-Emitting Diode |
| RTC | Real-Time Clock |
| I/O | Input/Output |
| I2C | Inter-Integrated Circuit |
| SPI | Serial Peripheral Interface |
| UART | Universal Asynchronous Receiver/Transmitter |
| PWM | Pulse Width Modulation |
| ADC | Analog-to-Digital Converter |
| DAC | Digital-to-Analog Converter |

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# Appendix C – Revision History

Document Title: MM930Lite Datasheet
Document Reference No.: BRT_000085
Clearance No.: BRT#069
Product Page: http://brtchip.com/product/
Document Feedback: Send Feedback

| Revision | Changes | Date |
|---|---|---|
| Version 1.0 | Initial Release | 2017-06-08 |

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