

# 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
<b>MM930Lite</b>	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.

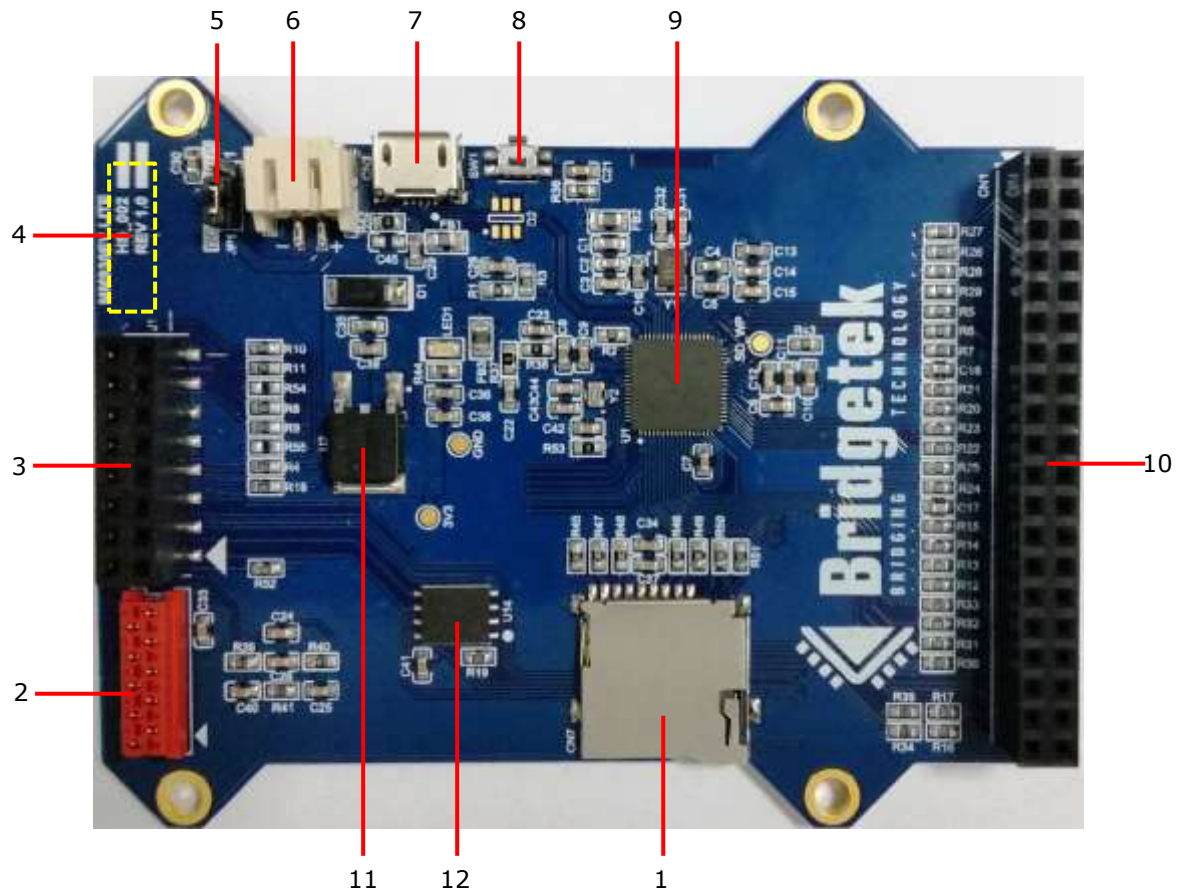
Refer to [BRT\\_AN\\_010\\_FT93x\\_User\\_Manual](#) for system register information.

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

## 4.1 Power Supply

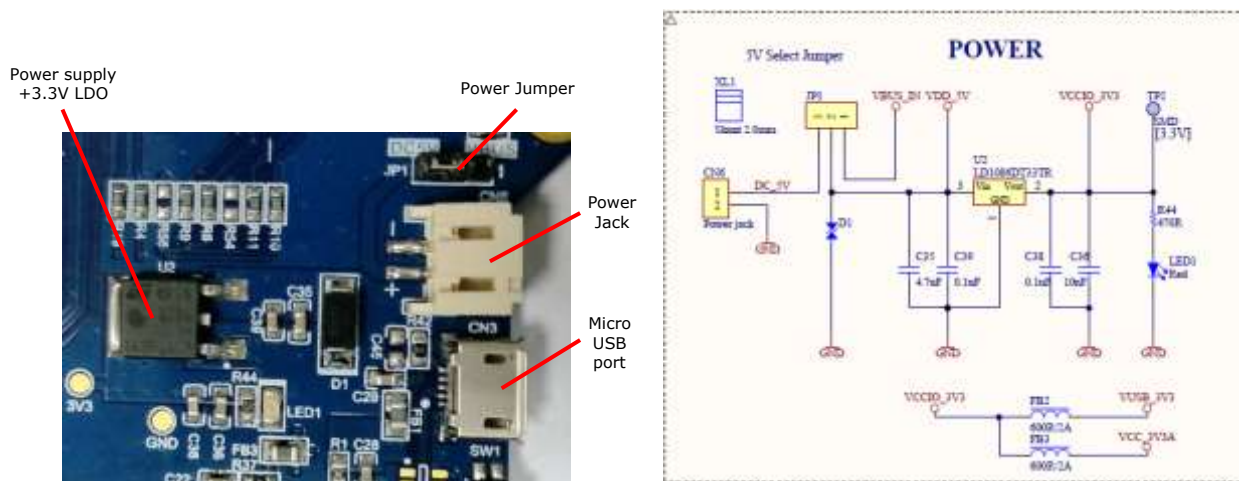
The MM930Lite development board provides optional power supply sources with **JP1** jumper:

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**

## 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.



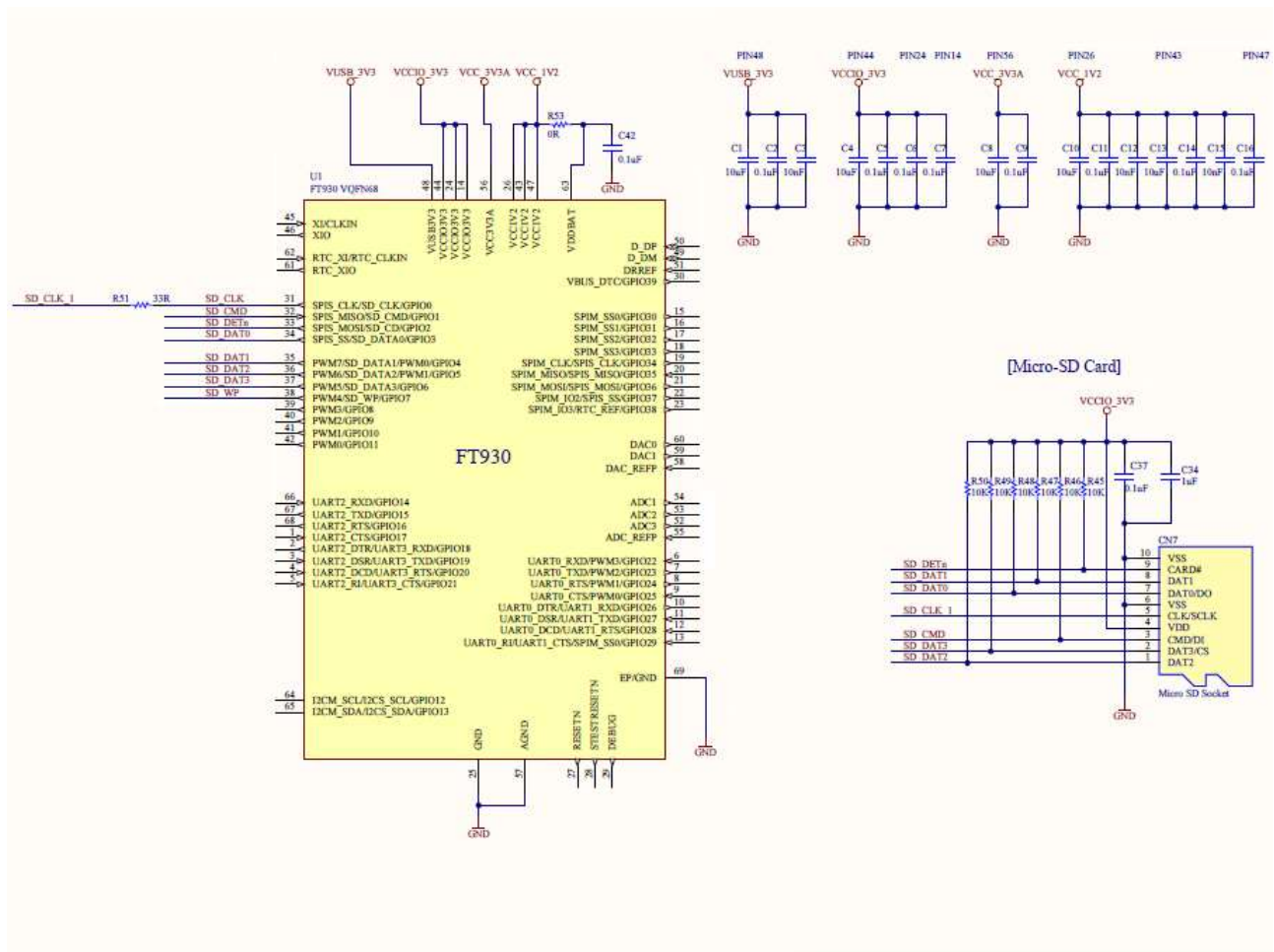
### 4.3 Micro SD Connector

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

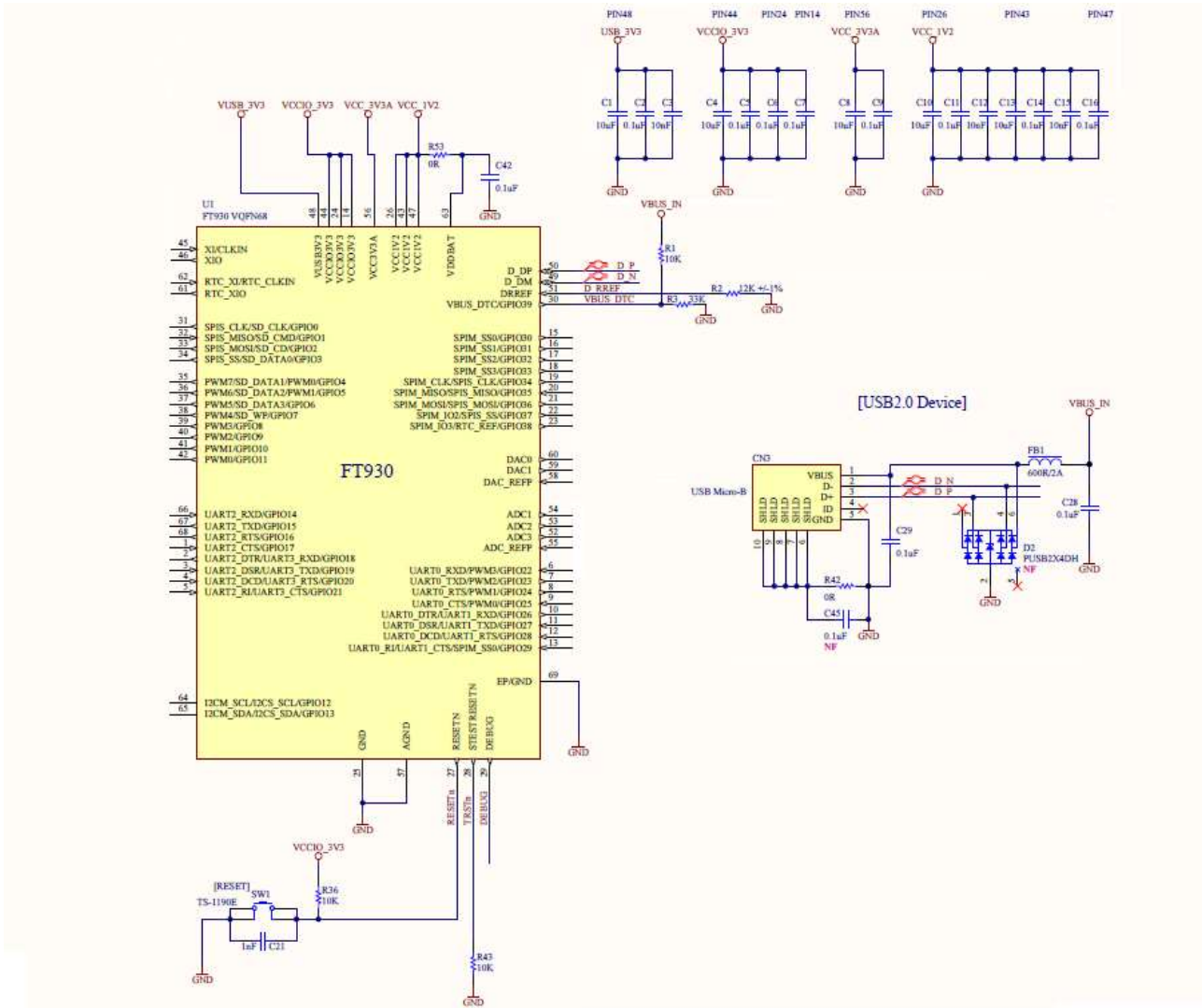
Standard class speeds 2, 4, 6, 10, and Ultra High Speed (UHS) classes U1 and U3 are all supported. The design of the physical interface supports 4-bit SD bus mode and card detection.



**Figure 4-4– Micro SD Connector**

## 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**



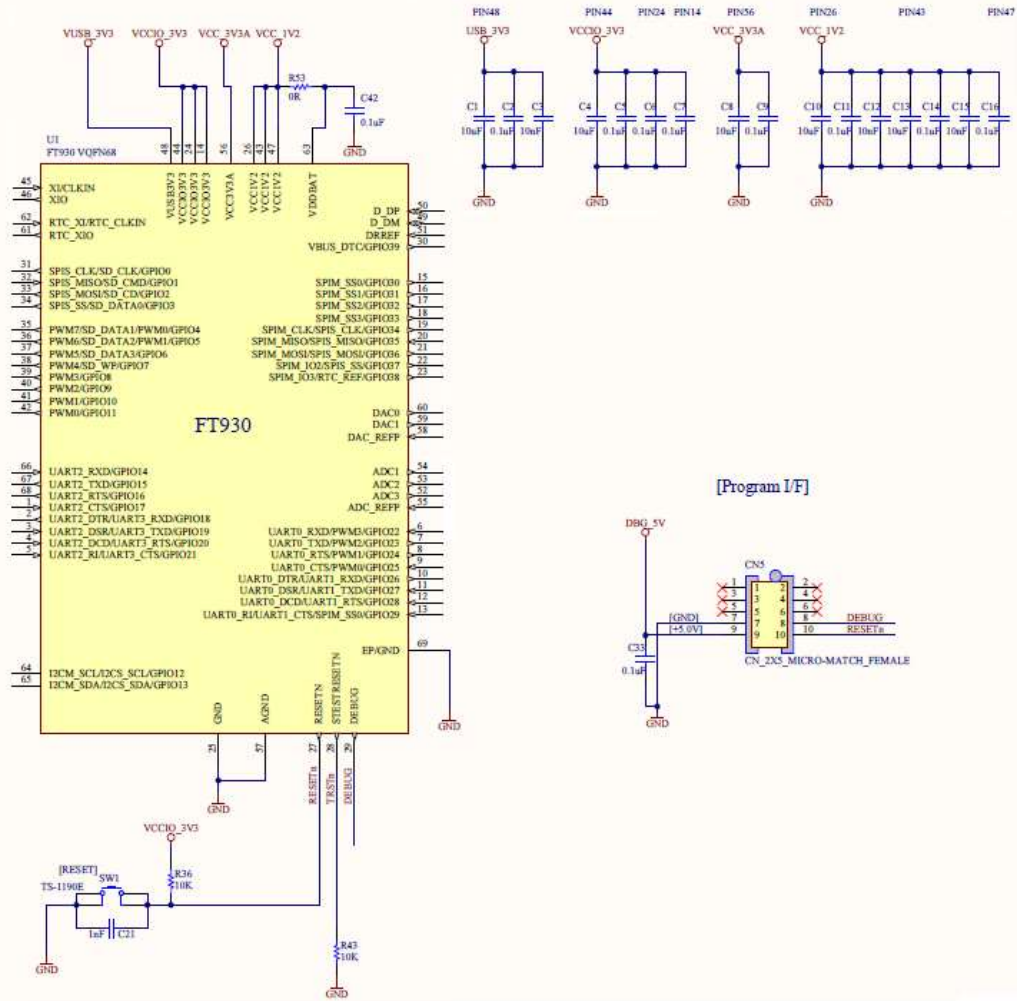
## 4.5 Programmer Interface

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**



**Figure 4-6 – Programmer Interface**

## 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.

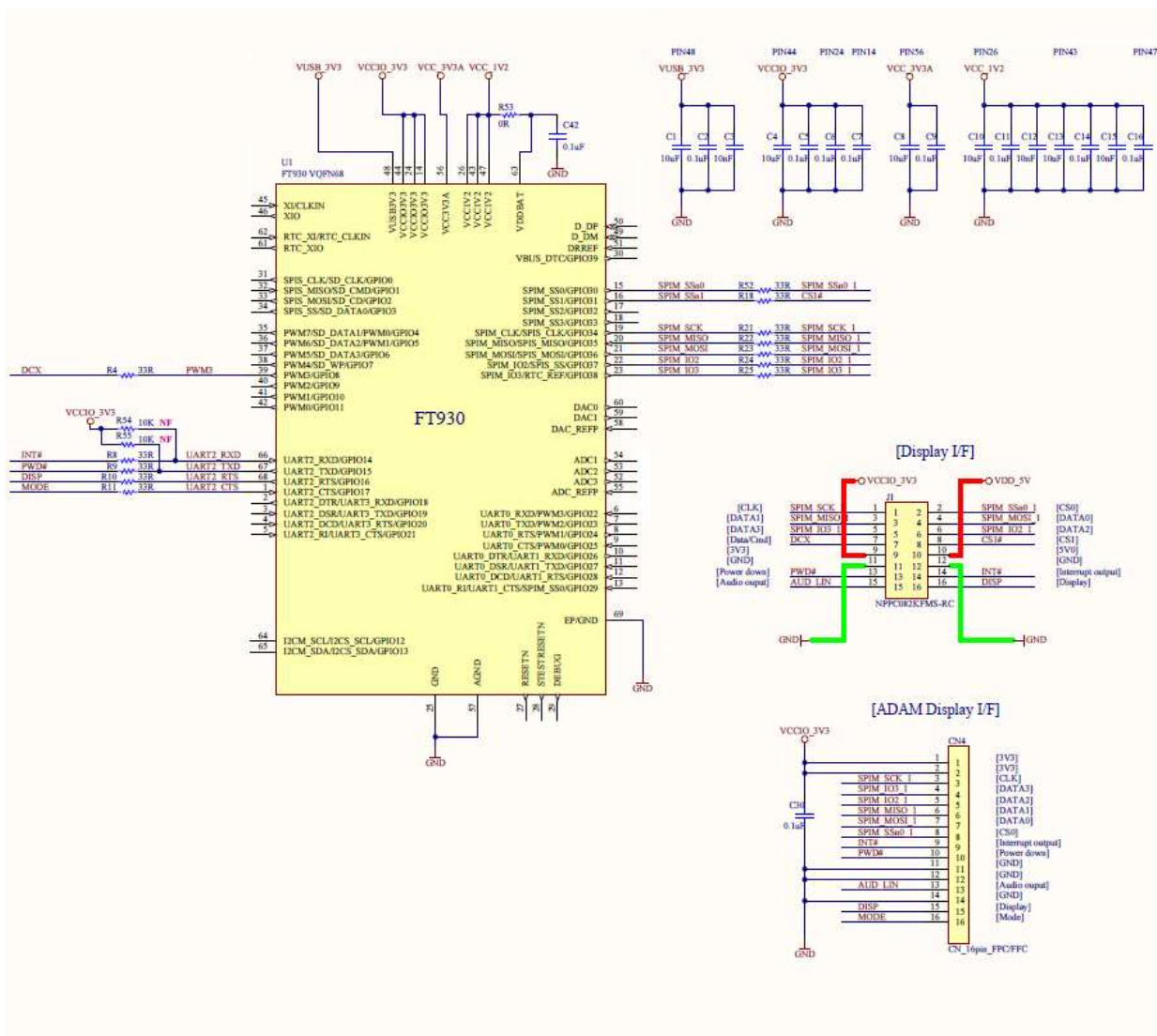


Figure 4-7– SPI Master Interface

#### 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_SS <sub>n</sub> 0	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	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**

#### 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 Data 1 for Quad SPI
7	SPIM_MOSI	I/O	SPI Master output, Slave input 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 Low: SPI interface High: I2C interface

**Table 4-4 – CN4 Pinout**

## 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.

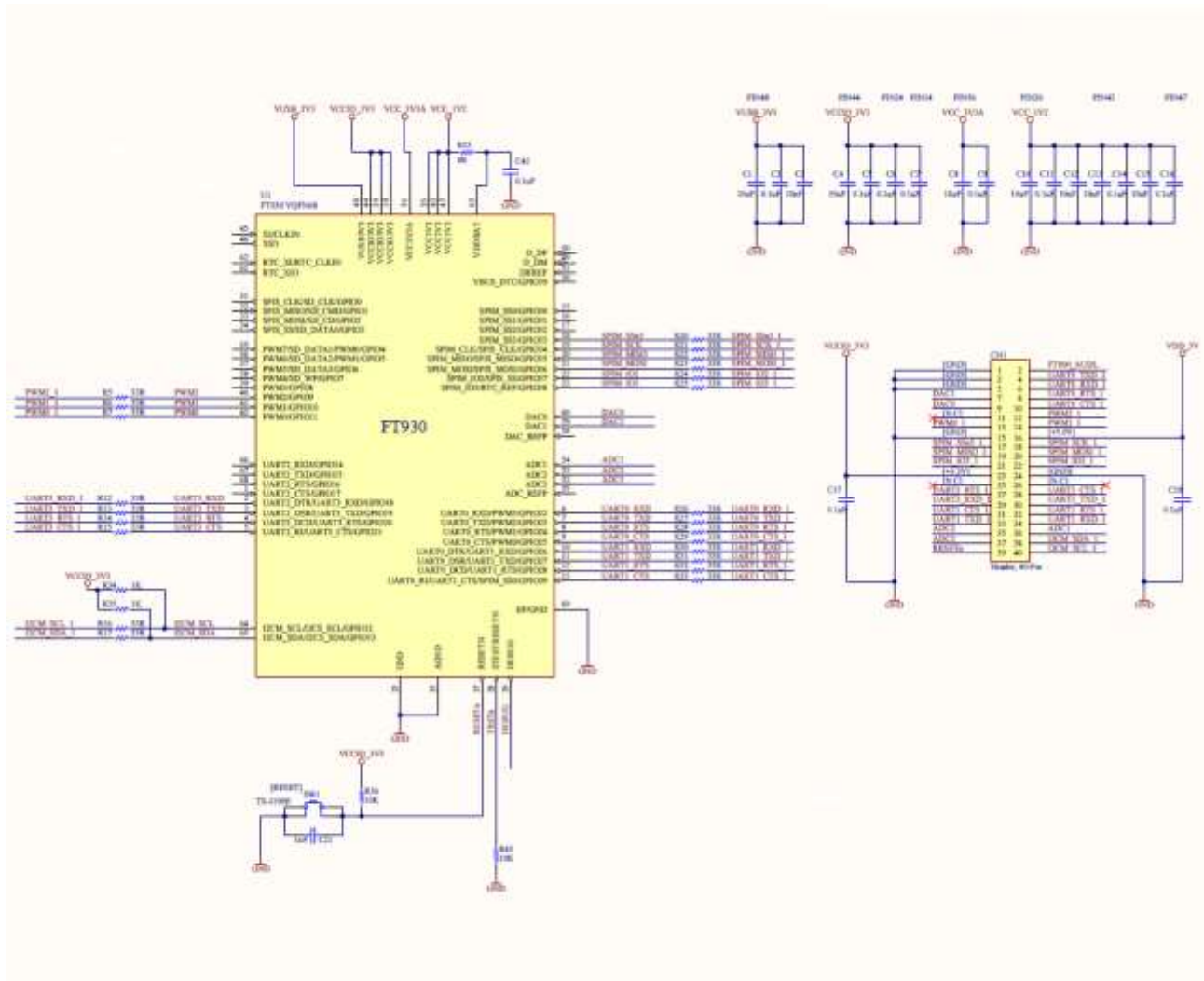
### 4.7.1 CN1 – 40-pin Dual Entry Header, Multiple function GPIO & Control Signals

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	-	-	-



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**

## 5 Board Schematic

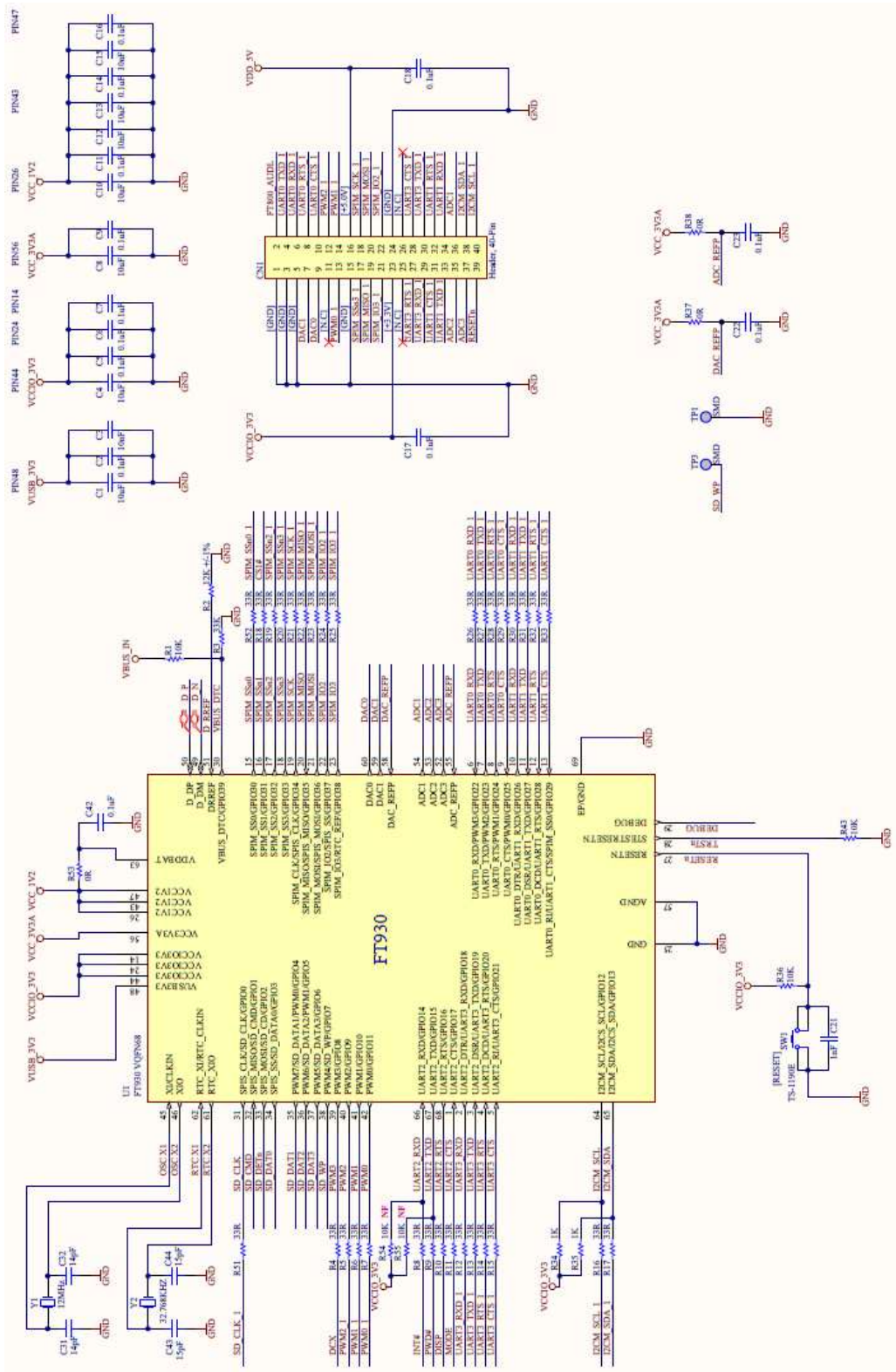
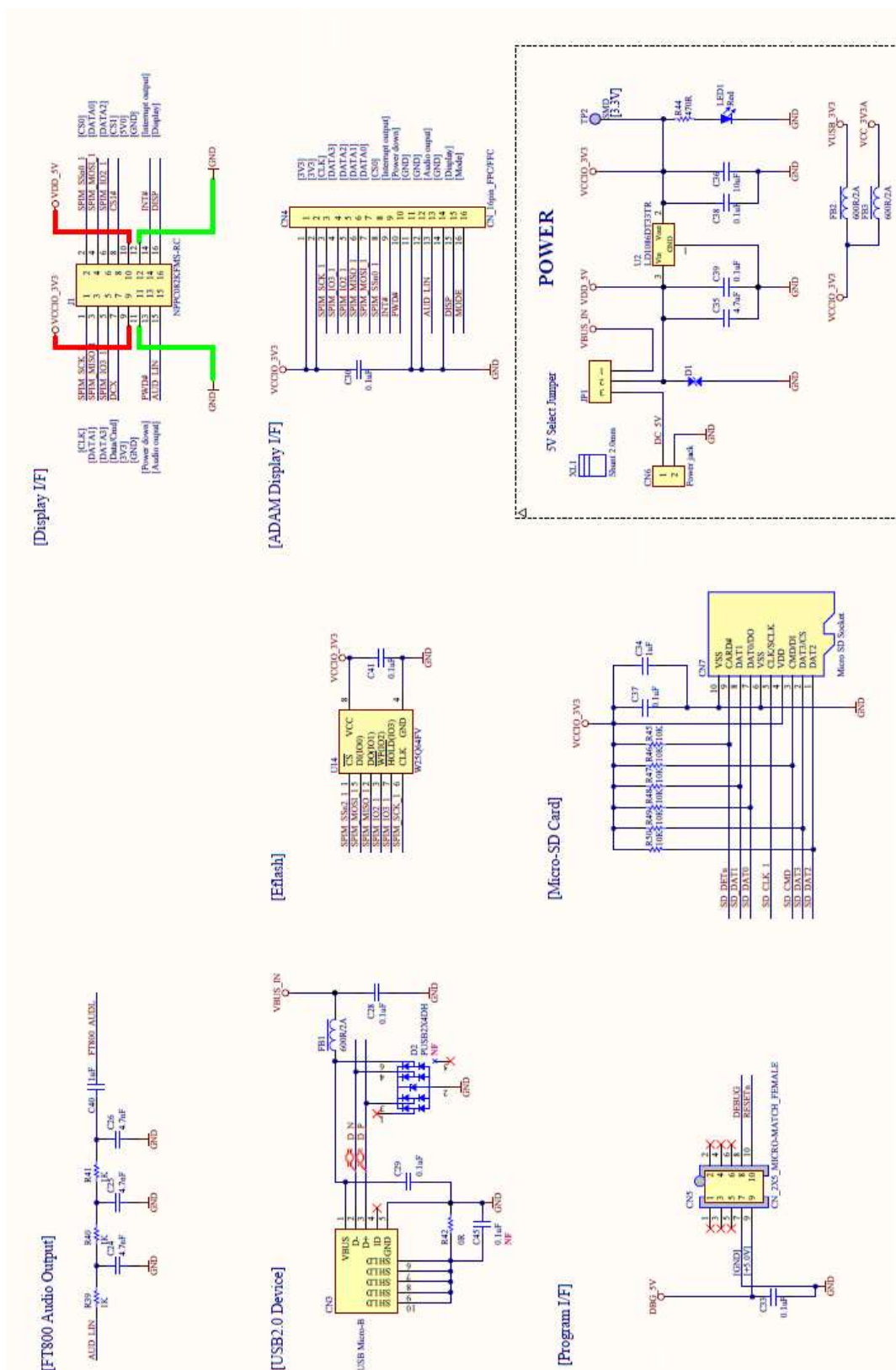


Figure 5-1 – MM930Lite MCU and External I/O Bus



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



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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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