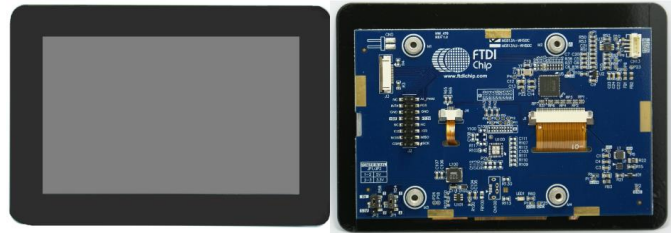


Future Technology Devices International

Datasheet

ME813A-WH50C Display Module



General Purpose Multi Media Controller

1 Introduction

The ME813A-WH50C is a development module for FTDI's FT813, Embedded Video Engine (EVE) graphics controller IC. This module behaves as an SPI slave, and requires a SPI Master for proper micro-controller interface and system integration.

The ME813A-WH50C module includes a 5.0 inch 800*480 TFT LCD panel with capacitive touch screen, and an audio amplifier to drive an 8Ω / 1W speaker.

1.1 Features

The ME813A-WH50C module utilises the FT813, FTDI's 2nd generation EVE chip. Graphic, audio and touch functions of the FT813 can be accessed with the ME813A-WH50C. For a full list of the FT813's features, refer to the [FT81x datasheet](#).

The ME813A-WH50C has the following features:

- Ready to use 5 inch WVGA LCD module.
- Supports portrait and landscape display mode.
- Bright backlight LED with dimming.
- Supports capacitive touch up to 5 simultaneous points.
- Supports mono audio from FT813 or external source.
- On board audio amplifier for driving an external 8Ω /1W speaker.
- +5.0V single power supply.
- Support direct connectivity to MM900EV series modules as a display add-on.

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2 Ordering Information

| Part No. | Description |
|--------------|---|
| ME813A-WH50C | FT813 module, with Quad SPI host connector, 5.0 inch 800*480 TFT LCD capacitive touch panel preinstalled. |
| CleO-SPK1 | An 8Ω 1W speaker enclosure with connecting wires to ME813A-WH50C. |

Table 2-1 – Ordering information

Note: This module is recommended as an accessory to the MM900EV series for development purposes.

For more information on the MM900EV series, refer to:
<http://www.ftdichip.com/Products/Modules/MCUModules.htm>.

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3 Board Interface Description

The ME813A-WH50C module is intended for direct use into existing applications that require a display.

This module is suitable for interfacing with an external microcontroller (e.g. MM900EV series) that has a SPI Master channel (single, dual or quad data bus).

3.1 Board Profile

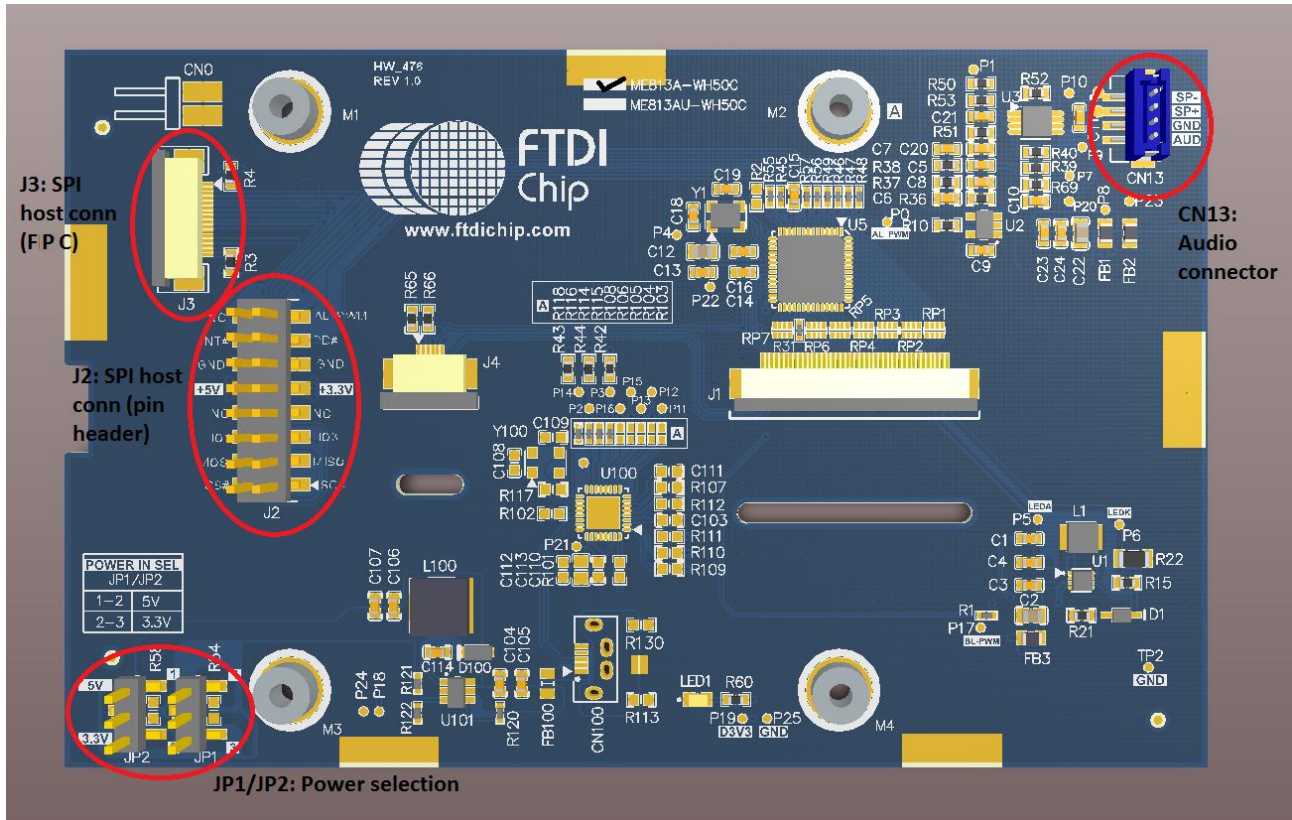


Figure 3-1 – ME813A-WH50C board connectors

3.2 JP1/JP2- power selection

JP1 and JP2 are used for power source selection. The board can take either 5V input power, or 3.3V input power. It is recommended to use a 5V power source for better power efficiency of the backlight LED and larger audio output power.

Table 3-1 shows the jumper position for power selection.

| Power | JP1 | JP2 | Description |
|---------|---------------|---------------|---------------------------------|
| 5V_IN | 1-2 (default) | 1-2 (default) | Select 5V single power source |
| 3.3V_IN | 2-3 | 2-3 | Select 3.3V single power source |

Table 3-1 – JP1/JP2 power selection

3.3 J2/J3- SPI slave interface

J2 is an 8x2 pin header which provides power inputs and SPI slave interface signals. J3 is an alternative FPC connector which has the same power and signals as J2. An MCU board with an SPI master can easily add a display panel by connecting to the ME813A-WH50C through J2 or J3. If an MM900EV series module is used, it can be directly plugged into J2 and secured with 4 screws at the mounting holes locations.

| Pin No (J2) | Pin No (J3) | Name | Type | Description |
|-------------|-------------|---------|------|--|
| 1 | 3 | MA_SCK | I | SPI clock input |
| 2 | 8 | MA_CS# | I | SPI chip select, active low |
| 3 | 6 | MA_MISO | I/O | SPI master input, slave output or Quad SPI IO1 |
| 4 | 7 | MA_MOSI | I/O | SPI master output, slave input or Quad SPI IO0 |
| 5 | 4 | MA_IO3 | I/O | GPIO1 or Quad SPI IO3 |
| 6 | 5 | MA_IO2 | I/O | GPIO0 or Quad SPI IO2 |
| 7 | - | - | - | NC |
| 8 | - | - | - | NC |
| 9 | 1,2 | 3.3V_IN | P | 3.3V power supply input |
| 10 | 15,16 | MB_VBUS | P | 5V power supply input |
| 11 | 11 | GND | P | Ground |
| 12 | 12,14 | GND | P | Ground |
| 13 | 10 | MA_PD# | I | Power down input, active low. Connect to 3.3V if not used. |
| 14 | 9 | MA_INT# | O | Interrupts output, active low. On board 4.7kΩ pull-up to 3.3V. |
| 15 | 13 | AL_PWM | O | PWM audio output from FT813 |
| 16 | - | - | - | NC |

Table 3-2 – J2 pin description

3.4 CN13- Audio connector

The ME813A-WH50C supports a mono speaker output through CN13. A PWM audio signal from the FT813 goes through a 3-stage RC filter and the audio amplifier, to drive the 8Ω speaker if connected. Maximum output power to the speaker is 1 Watt. A speaker module accessory (CleO-SPR1) is available from FTDI.

An alternative, mono line-in audio input is also provided on CN13. Users can drive in their own audio source to the on board power amplifier.

| Pin No. | Name | Type | Description |
|---------|--------|------|---------------------------|
| 1 | SP- | O | 8Ω speaker minus terminal |
| 2 | SP+ | O | 8Ω speaker plus terminal |
| 3 | AGND | P | Audio ground |
| 4 | AUD_IN | I | Audio Line IN |

Table 3-3 – CN13 pin description

4 Specifications

4.1 Electrical Specification

| Parameter | Description | Minimum | Typical | Maximum | Units | Notes |
|-----------|----------------------------|---------|---------|---------|-------|-------------------------------|
| VCC_5V | 5V supply voltage | 4.75 | 5.0 | 5.25 | V | J2 pin 9 or J3 pin 1,2 |
| VCC_3.3V | 3.3V supply voltage | 3.0 | 3.3 | 3.6 | V | J2 pin 8 or J3 pin 15,16 |
| Icc1_5V | VCC=5V operating current | - | 350 | - | mA | With LCD and Backlight LED on |
| Icc2_5V | VCC=5V operating current | - | 750 | - | mA | Add 1W speaker |
| Icc1_3.3V | VCC=3.3V operating current | - | 460 | - | mA | With LCD and Backlight LED on |
| Icc2_3.3V | VCC=3.3V operating current | - | 750 | - | mA | Add 1W speaker |
| Voh | Output Voltage High | 2.4 | - | - | V | |
| Vol | Output Voltage Low | - | - | 0.4 | V | |
| Vih | Input High Voltage | 2.0 | - | - | V | |
| Vil | Input Low Voltage | - | - | 0.8 | V | |
| T | Operating temperature | -20 | - | +70 | °C | |

Table 4-1 - Operating Voltage and Current

4.2 Display Specification

| Item | Spec | Units | Notes |
|---------------------|---------------------------|-------|-------------------|
| LCD Type | TFT active matrix | - | |
| Display Colours | 16.7M | - | |
| Display active area | 108.0(H) * 64.8(V) | mm | 5.0 inch diagonal |
| Number of Pixels | 800(RGB)*480 | dots | |
| Pixel pitch | 0.135(H) * 0.135(V) | mm | |
| Backlight | 18 white LEDs | - | |
| Touch screen | 5-finger capacitive touch | - | |

Table 4-2 - LCD and Touch Information

4.3 Optical Specification

| Item | Symbol | Condition | Min | Typ | Max | Unit | |
|---------------------------|------------|------------------|--------------------|-------|-------|-------------------|---|
| View Angles | θ_T | $CR \geq 9$ | | 65 | -- | Degree | |
| | θ_B | | | 55 | -- | | |
| | θ_L | | | 65 | -- | | |
| | θ_R | | | 65 | -- | | |
| Contrast Ratio | CR | $\theta=0^\circ$ | 400 | 500 | -- | | |
| Response Time | Tr | 25°C | -- | 20 | 30 | ms | |
| | Tf | | | | | | |
| Chromaticity (CIE1931) | White | x | Backlight is on | 0.274 | 0.324 | 0.374 | - |
| | | y | | 0.295 | 0.345 | 0.395 | |
| | Red | x | | 0.544 | 0.594 | 0.644 | |
| | | y | | 0.301 | 0.351 | 0.401 | |
| | Green | x | | 0.299 | 0.349 | 0.399 | |
| | | y | | 0.531 | 0.581 | 0.631 | |
| | Blue | x | | 0.92 | 0.152 | 0.202 | |
| | | y | | 0.053 | 0.93 | 0.153 | |
| Uniformity | U | - | 75 | 80 | -- | % | |
| NTSC ratio | - | - | 45 | 50 | -- | % | |
| Luminance | L | - | 350 | 420 | -- | cd/m ² | |

Table 4-3 - 5.0" TFT Optical specification

Note: The definition of viewing angle: refer to the figures below (if looking at the reverse side of the module the FTDI logo on the PCB is facing down).

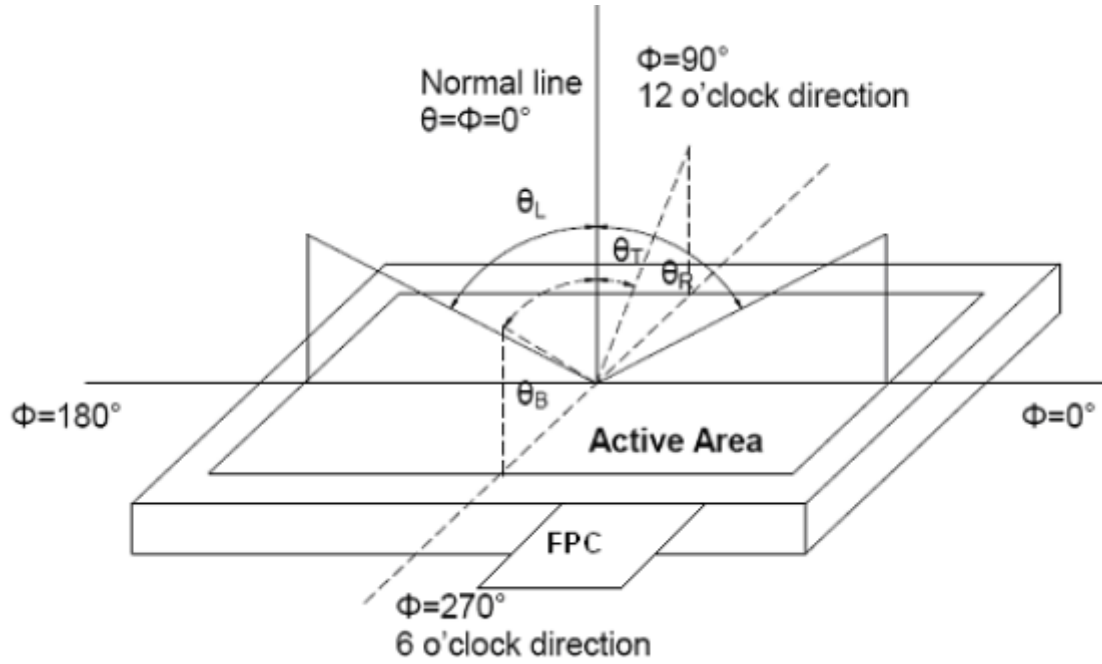


Figure 4-1 – Viewing Angle definition



Figure 4-2 – Module orientation for viewing angle

5 Board Schematics

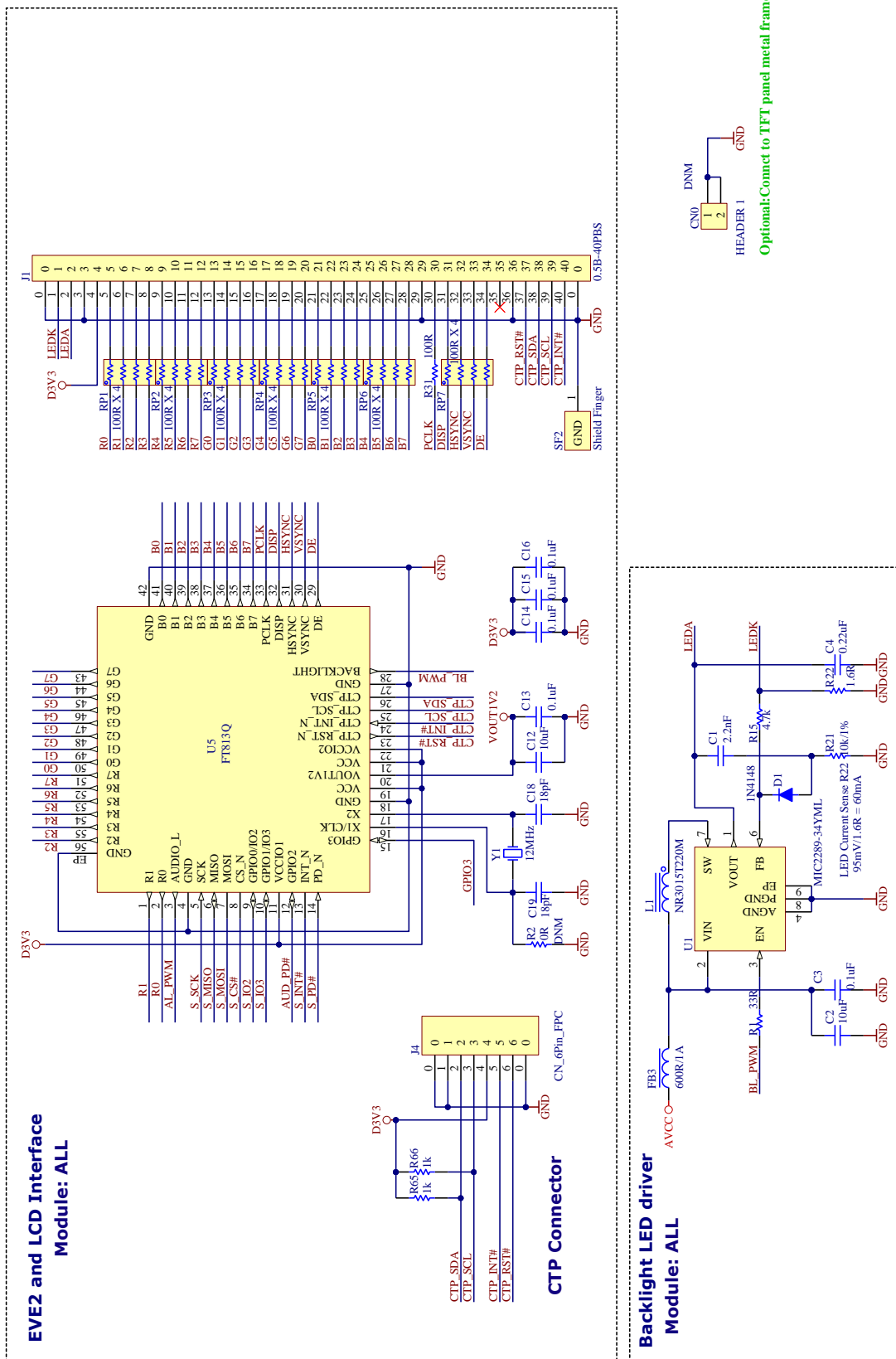


Figure 5-1 – Board Schematic (page 1)

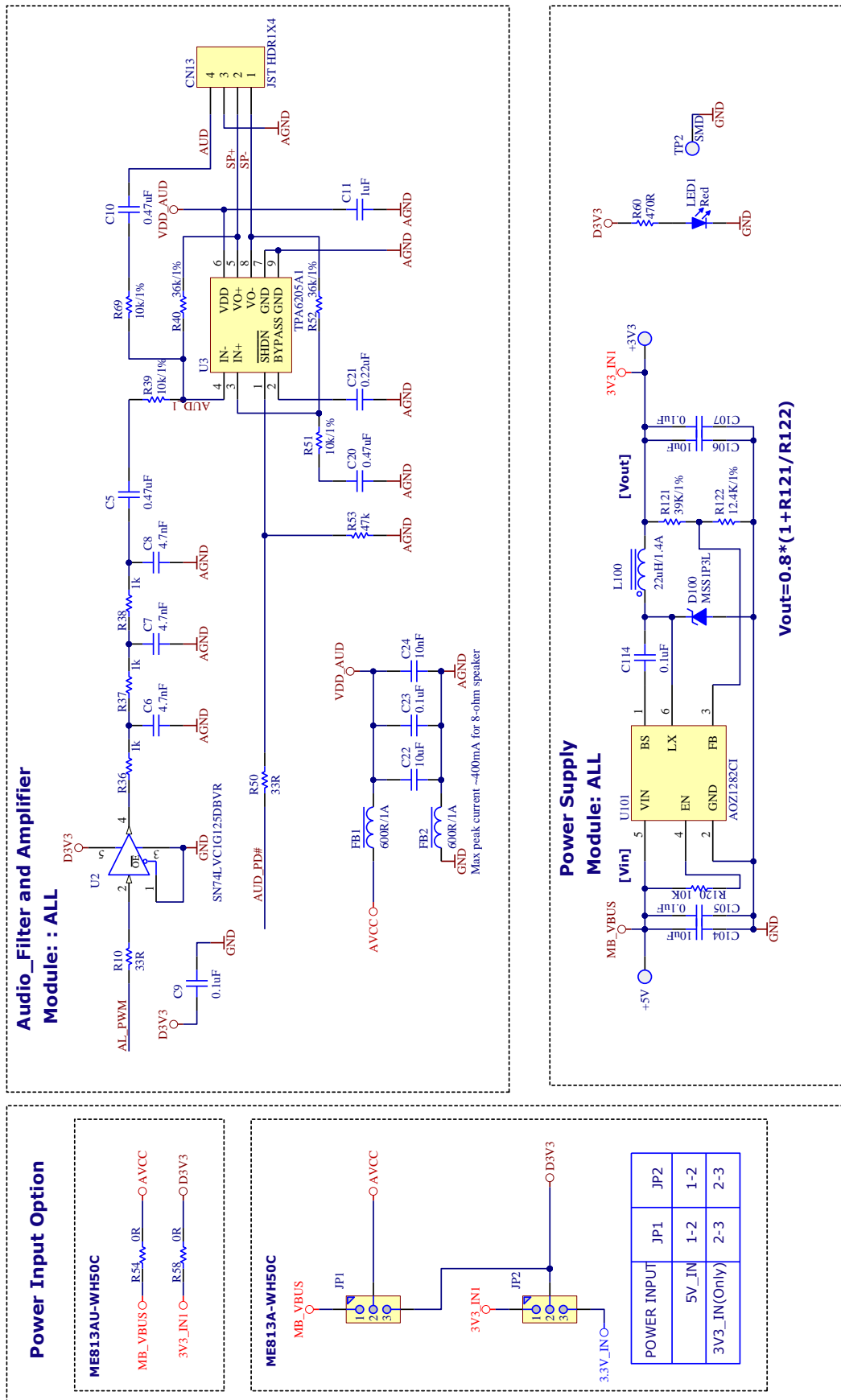
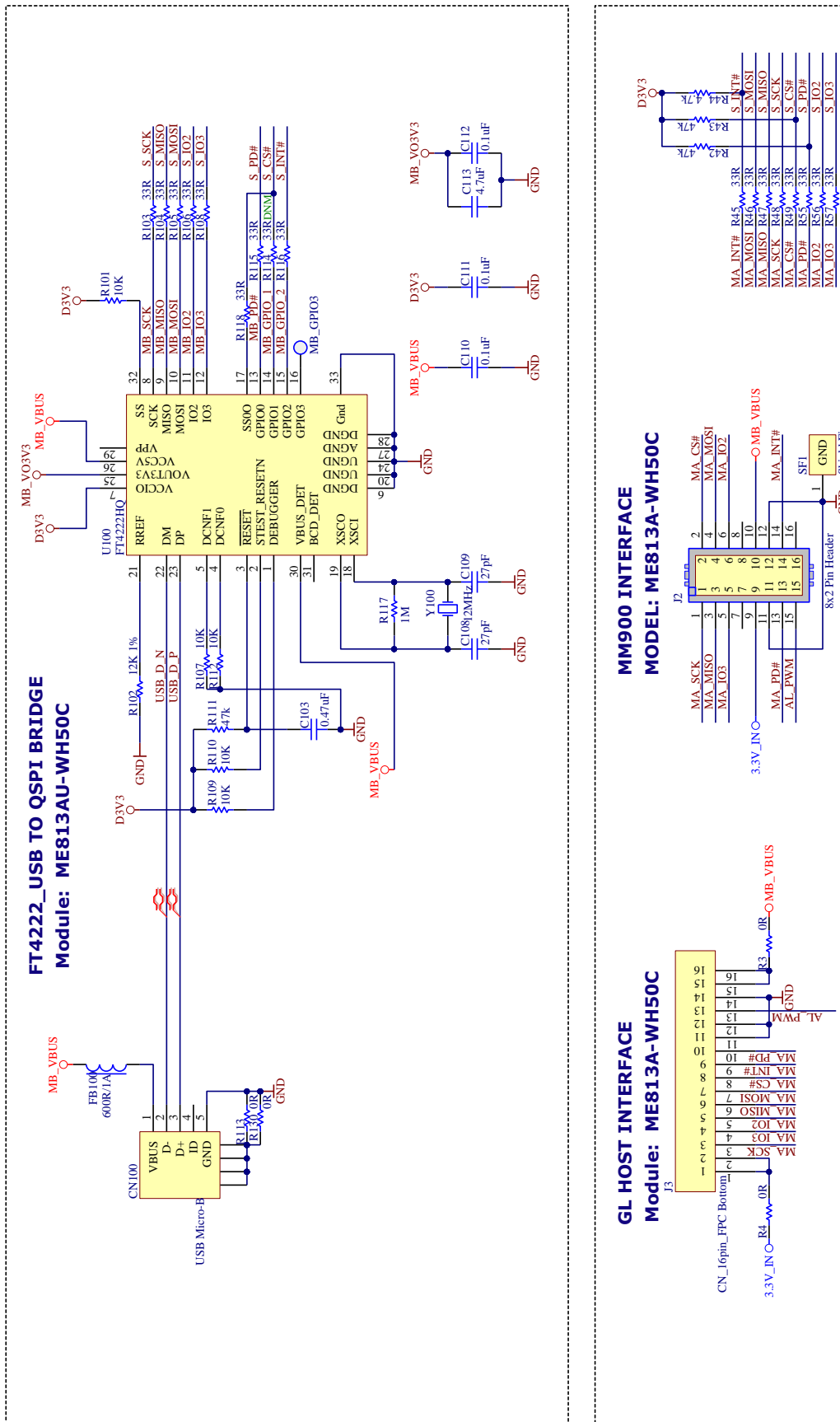


Figure 5-2 – Board Schematic (page 2)



6 Mechanical Dimensions

6.1 Module Dimensions

All units are in millimeters (mm).

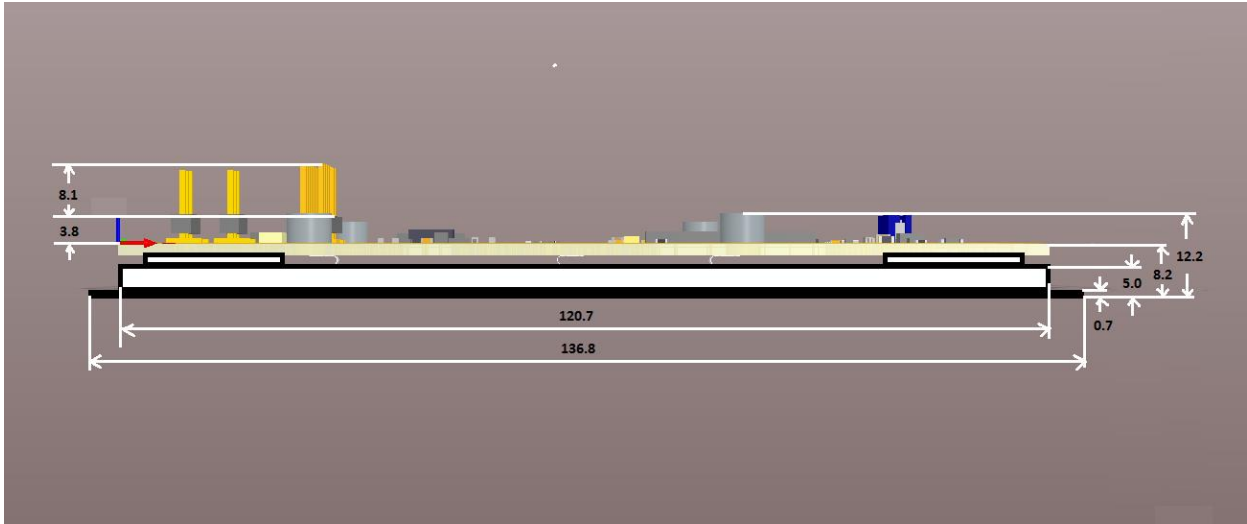


Figure 6-1 – Module Dimensions

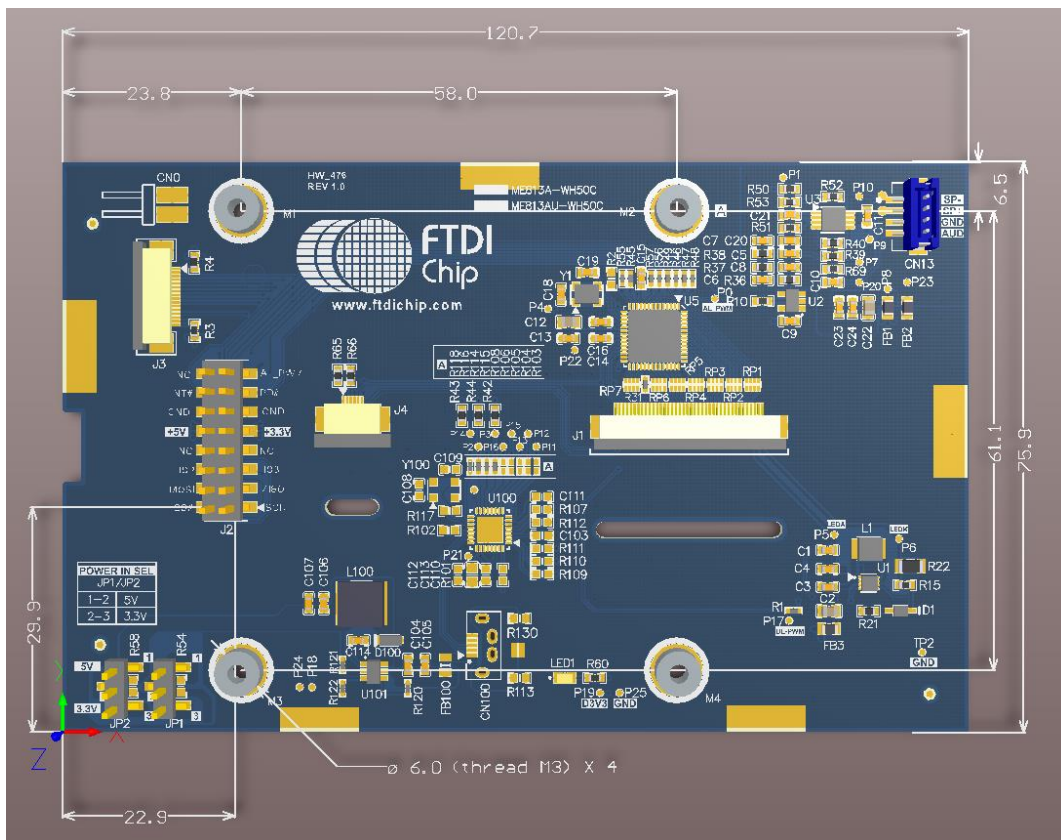


Figure 6-2 – PCB Dimensions

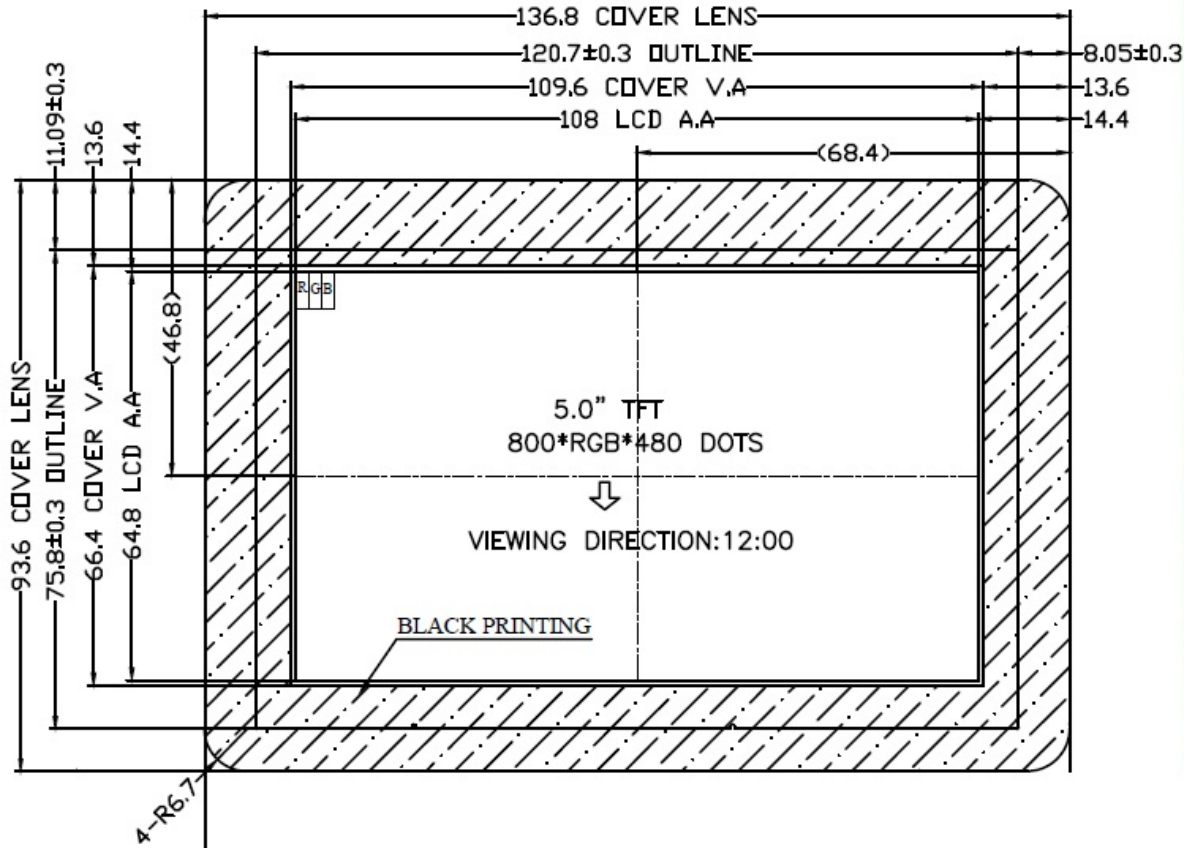


Figure 6-3 – Touch and Display Dimensions

7 Application Example

7.1 Getting Start With an MM900EV Module

For a quick start with the ME813A-WH50C development board, connecting to an MM900EV module development platform is recommended. Demo applications are provided for users to experiment and experience the FT813 in the MM900EV+ME813A system. The following paragraphs provide a short description of the development procedures.

The MM900EV series of FT900 MCU evaluation platforms allows users to develop various applications with rich peripheral interfaces. The following MM900EV modules are compatible:

- **MM900EV1A:** FT90x development module. Fitted with a 32-bit high performance FT900 MCU, 10/100Mbps Ethernet, USB2.0 Host, USB2.0 Device, SD3.0, Audio Codec, SPI Master Quad Interface, and 40-pin external GPIOs.
- **MM900EV-Lite:** Lite version of the FT90x development module with a 32-bit high performance FT900 MCU, USB2.0 Device, SD3.0, SPI Master Quad Interface, and 40-pin external GPIOs.

Detailed information of MM900EV module can be found at:
<http://www.ftdichip.com/Products/Modules/MCUModules.htm>

7.2 Hardware Setup

Figure 7-1 shows the ME813A-WH50C module connected to an MM900EV1A module.



Figure 7-1 – ME813A-WH50C connects to MM900EV1A Module

The ME813A-WH50C **J2** pin header connects to the MM900EV module **J2** dual-enter socket (See **Error! Reference source not found.** for pin mapping).

- Connect a USB cable or Power Supply to the MM900EV module to power the system.

| Pin number | ME813A J2 Signal | MM900EV J2 Signal |
|------------|------------------|-------------------|
| 1 | MA_SCK | SPIM_SCK |
| 2 | MA_CS# | SPIM_SS0 |
| 3 | MA_MISO | SPIM_MISO |
| 4 | MA_MOSI | SPIM_MOSI |
| 5 | MA_IO3 | SPIM_IO3 |
| 6 | MA_IO2 | SPIM_IO2 |
| 7 | - | DCX |
| 8 | - | CS1# |
| 9 | 3.3V_IN | VDD_3V3 |
| 10 | MB_VBUS | VDD_5V |
| 11 | GND | GND |
| 12 | GND | GND |
| 13 | MA_PD# | PWD# |
| 14 | MA_INT# | INT# |
| 15 | AL_PWM | AUD_LIN |
| 16 | - | DISP |

Table 7-1 – ME813A-WH50C J2 and MM900EV J2 pin mapping

7.3 Software Setup

- Download the FT90x toolchain and sample application for ME813A-WH50C from the FTDI website at <http://www.ftdichip.com/Products/ICs/FT90x.html>.
- Install the FT90x toolchain on a Windows PC.
- Download the sample application binary file to the MM900EV module.

The sample applications will demonstrate display, touch and audio functions of the ME813A-WH50C module. Refer to http://www.ftdichip.com/Support/SoftwareExamples/FT800_Projects.htm for more details.

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Appendix A – References

Document References

For module related documentations, please refer to URL below:

FT81x datasheet: [DS_FT81x](#)

FT81x software programming guide: [FT81x Programmer Guide](#)

FT90x Toolchain: <http://www.ftdichip.com/Firmware/FT90xToolchain.htm>

FT81x sample applications: http://www.ftdichip.com/Support/SoftwareExamples/FT800_Projects.htm

Acronyms and Abbreviations

| Terms | Description |
|-------|-----------------------------|
| EVE | Embedded Video Engine |
| IC | Integrated Circuit |
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| MCU | Micro-Controller Unit |
| PC | Personal Computer |
| PCB | Printed Circuit Board |
| PWM | Pulse Width Modulation |
| SPI | Serial Peripheral Interface |
| TFT | Thin Film Transistor |

Appendix B - List of Figures and Tables

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Appendix C – Revision History

Document Title: ME813A-WH50C Module
Document Reference No.: FT_001347
Clearance No.: BRT#044
Product Page: <http://www.ftdichip.com/eve.htm>
Document Feedback: [Send Feedback](#)

| Revision | Changes | Date |
|----------|-----------------|------------|
| 1.0 | Initial Release | 2016-10-18 |

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