

# 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 2<sup>nd</sup> 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>.

## Table of Contents

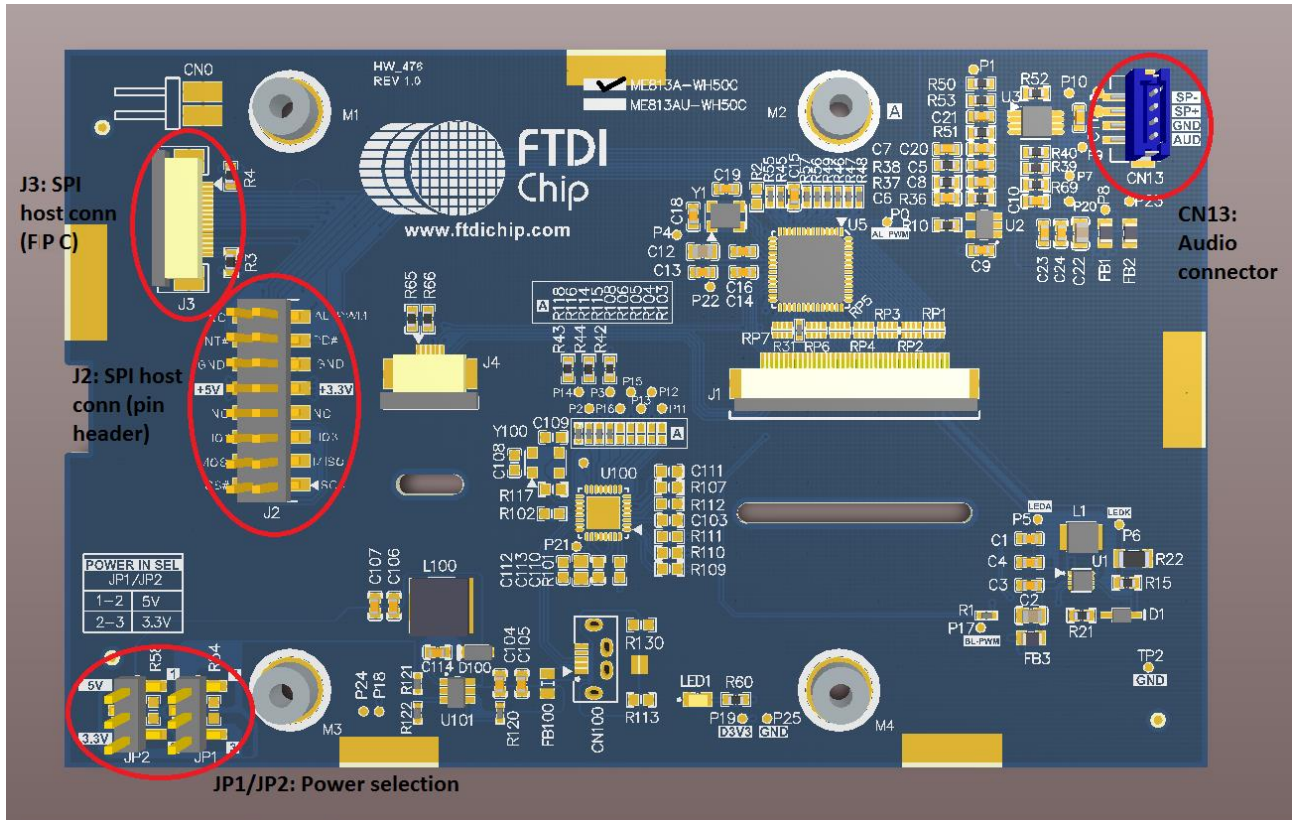
<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Features.....	1
<b>2</b>	<b>Ordering Information .....</b>	<b>2</b>
<b>3</b>	<b>Board Interface Description .....</b>	<b>4</b>
3.1	Board Profile.....	4
3.2	JP1/JP2- power selection .....	4
3.3	J2/J3- SPI slave interface.....	5
3.4	CN13- Audio connector .....	5
<b>4</b>	<b>Specifications.....</b>	<b>6</b>
4.1	Electrical Specification .....	6
4.2	Display Specification .....	6
4.3	Optical Specification .....	7
<b>5</b>	<b>Board Schematics.....</b>	<b>9</b>
<b>6</b>	<b>Mechanical Dimensions .....</b>	<b>12</b>
6.1	Module Dimensions .....	12
<b>7</b>	<b>Application Example.....</b>	<b>14</b>
7.1	Getting Start With an MM900EV Module.....	14
7.2	Hardware Setup .....	14
7.3	Software Setup .....	15
<b>8</b>	<b>Contact Information.....</b>	<b>16</b>
<b>Appendix A – References .....</b>		<b>17</b>
Document References .....		17
Acronyms and Abbreviations .....		17
<b>Appendix B - List of Figures and Tables .....</b>		<b>18</b>
List of Figures .....		18
List of Tables .....		18
<b>Appendix C – Revision History .....</b>		<b>19</b>

### 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	-	

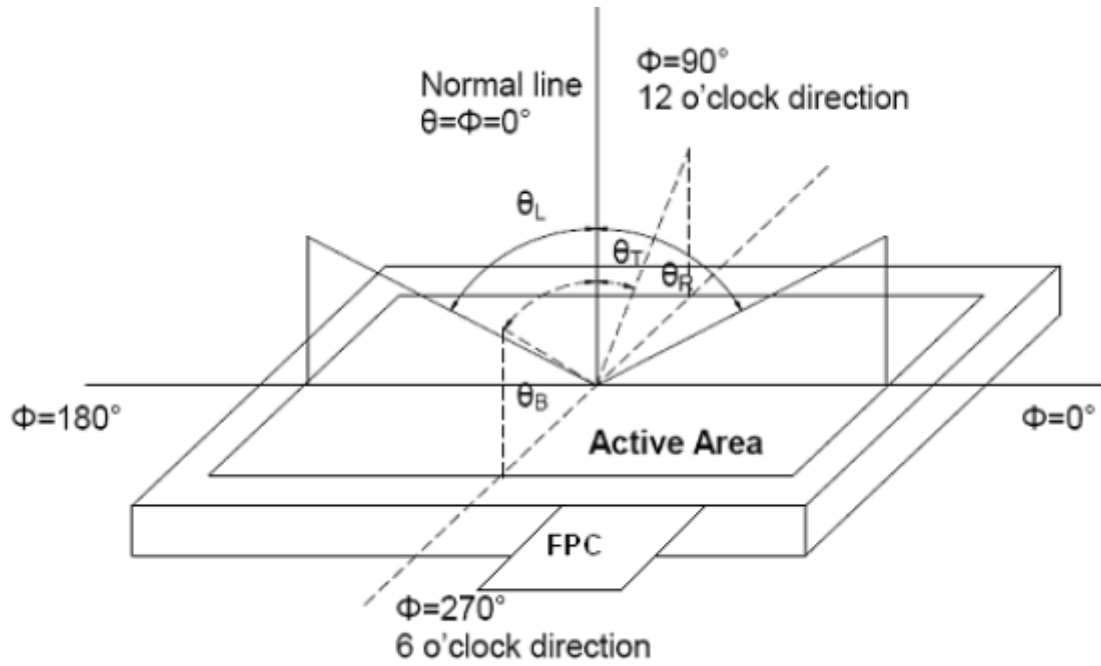
**Table 4-2 - LCD and Touch Information**

### 4.3 Optical Specification

Item	Symbol	Condition	Min	Typ	Max	Unit	
View Angles	$\theta_T$	$CR \geq 9$		65	--	Degree	
	$\theta_B$			55	--		
	$\theta_L$			65	--		
	$\theta_R$			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 <sup>2</sup>	

**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

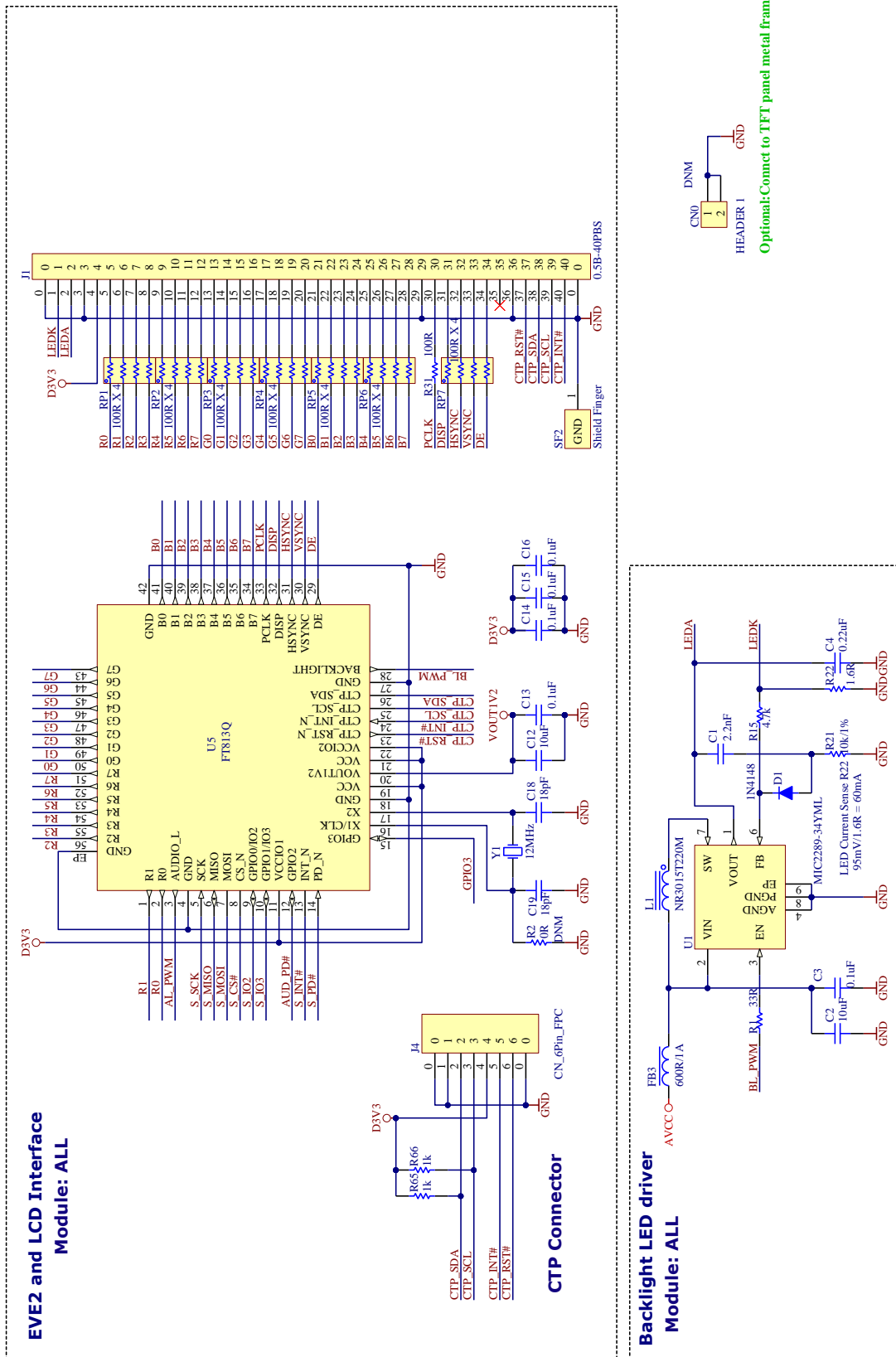


Figure 5-1 – Board Schematic (page 1)

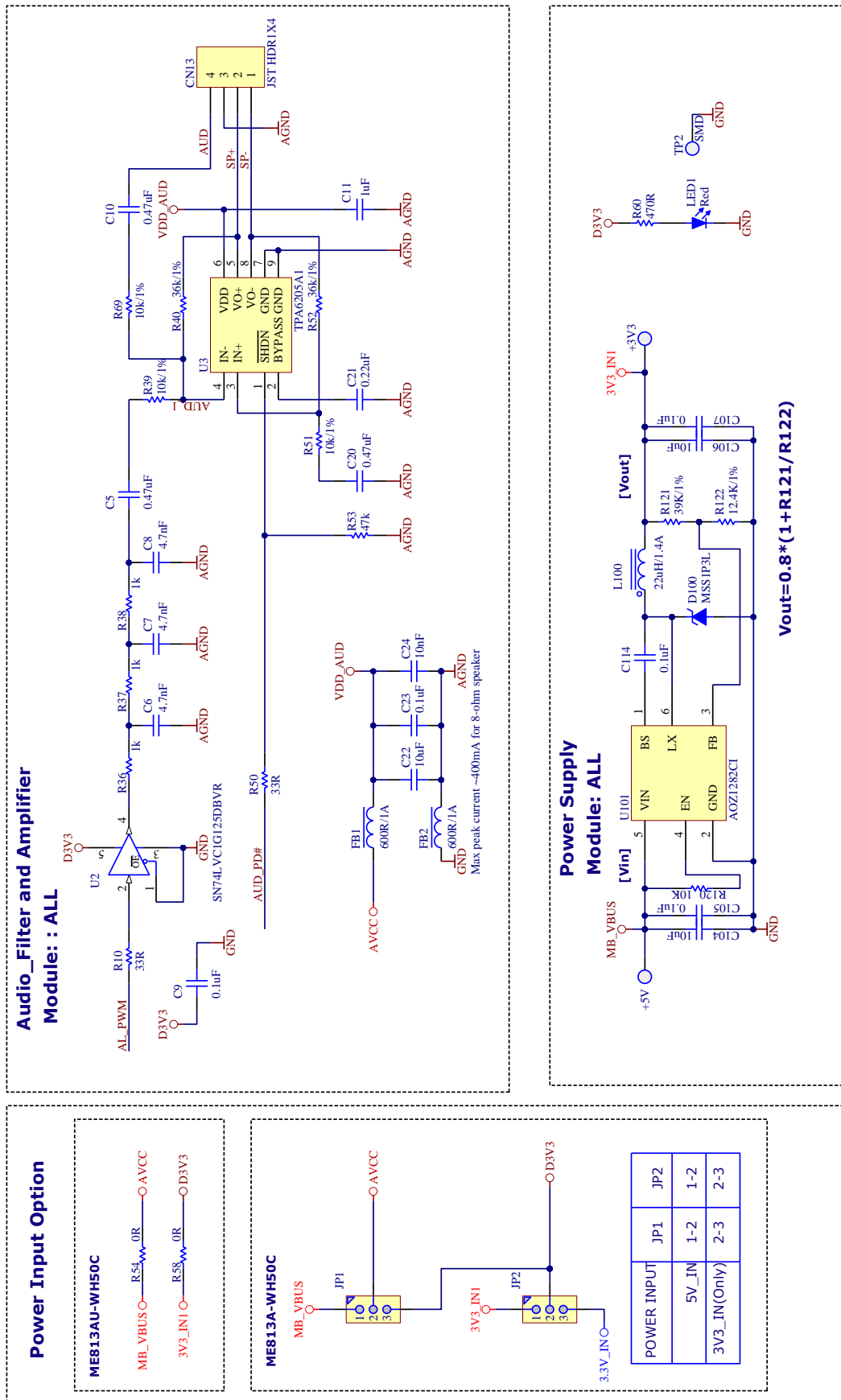


Figure 5-2 – Board Schematic (page 2)

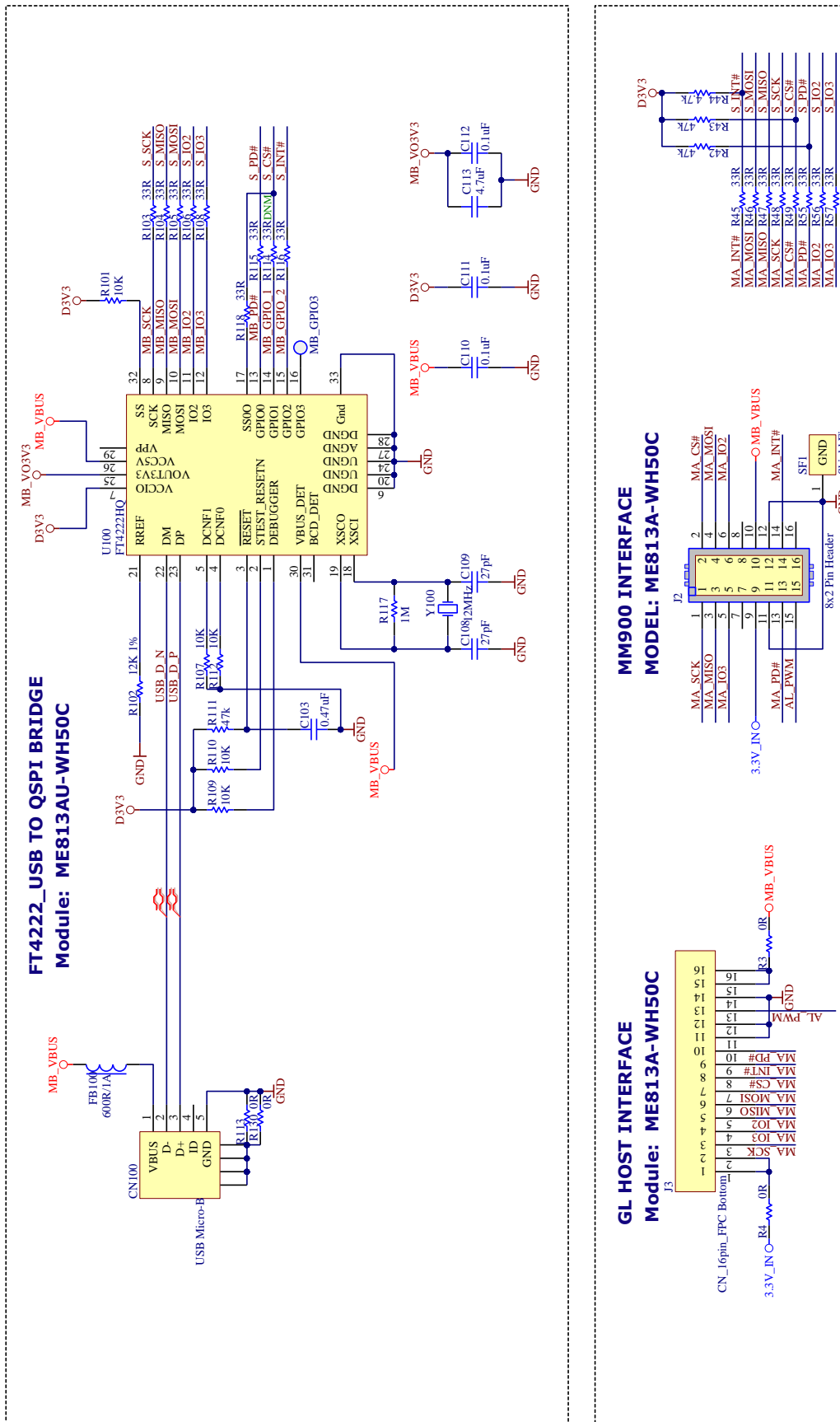
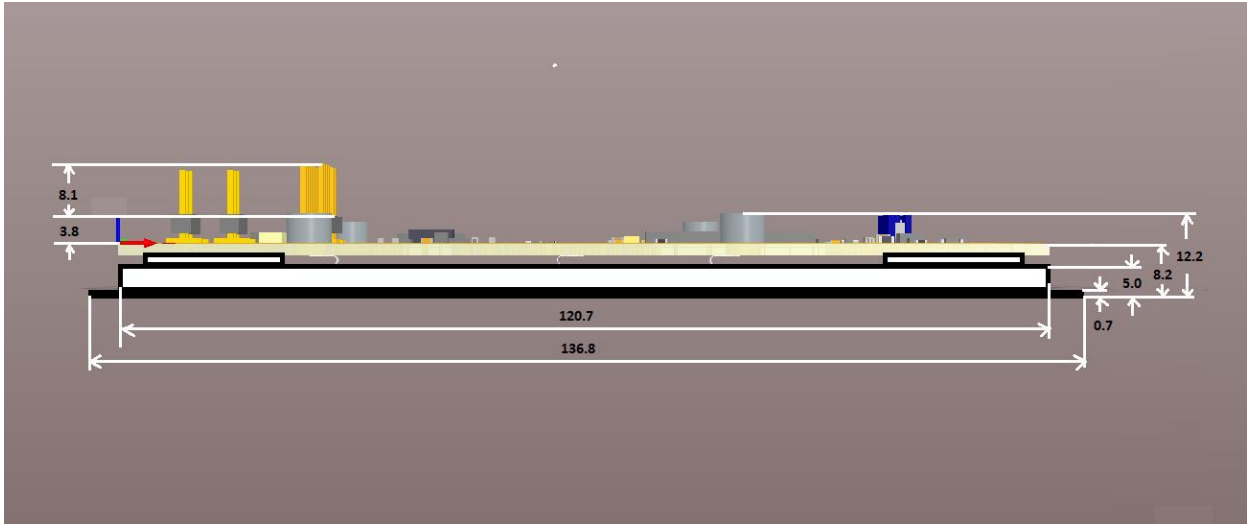


Figure 5-3 – Board Schematic (page 3)

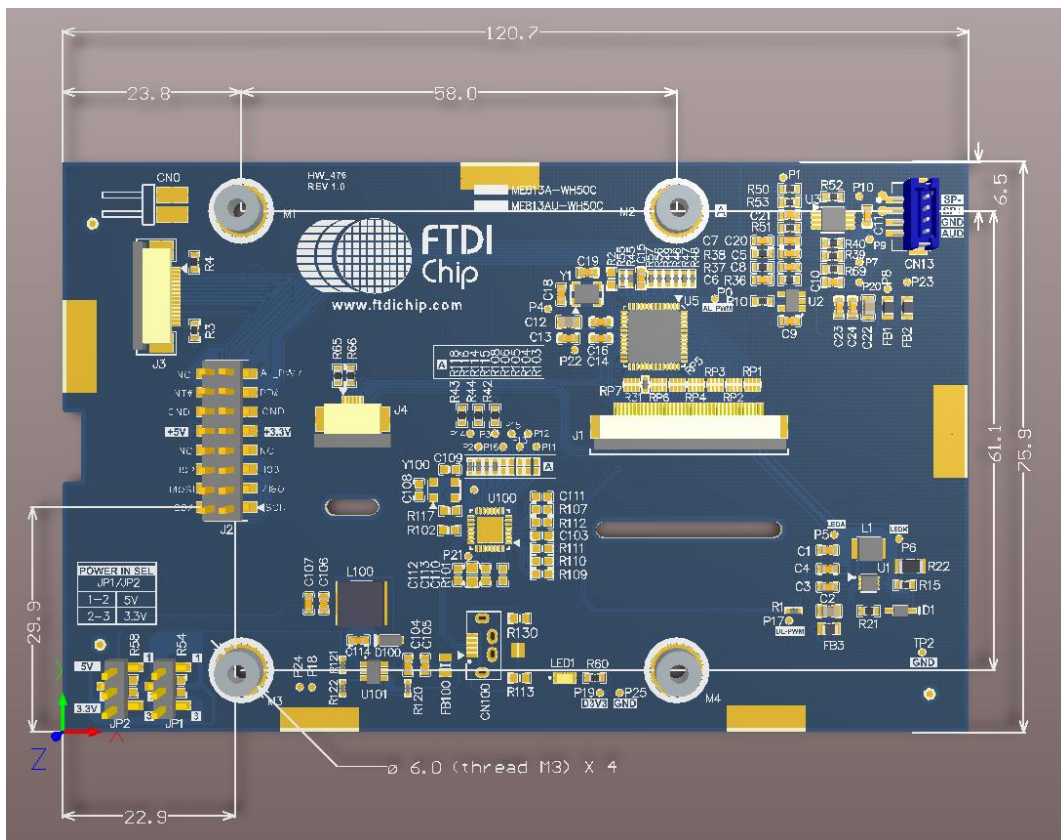
## 6 Mechanical Dimensions

### 6.1 Module Dimensions

All units are in millimeters (mm).



**Figure 6-1 – Module Dimensions**



**Figure 6-2 – PCB Dimensions**

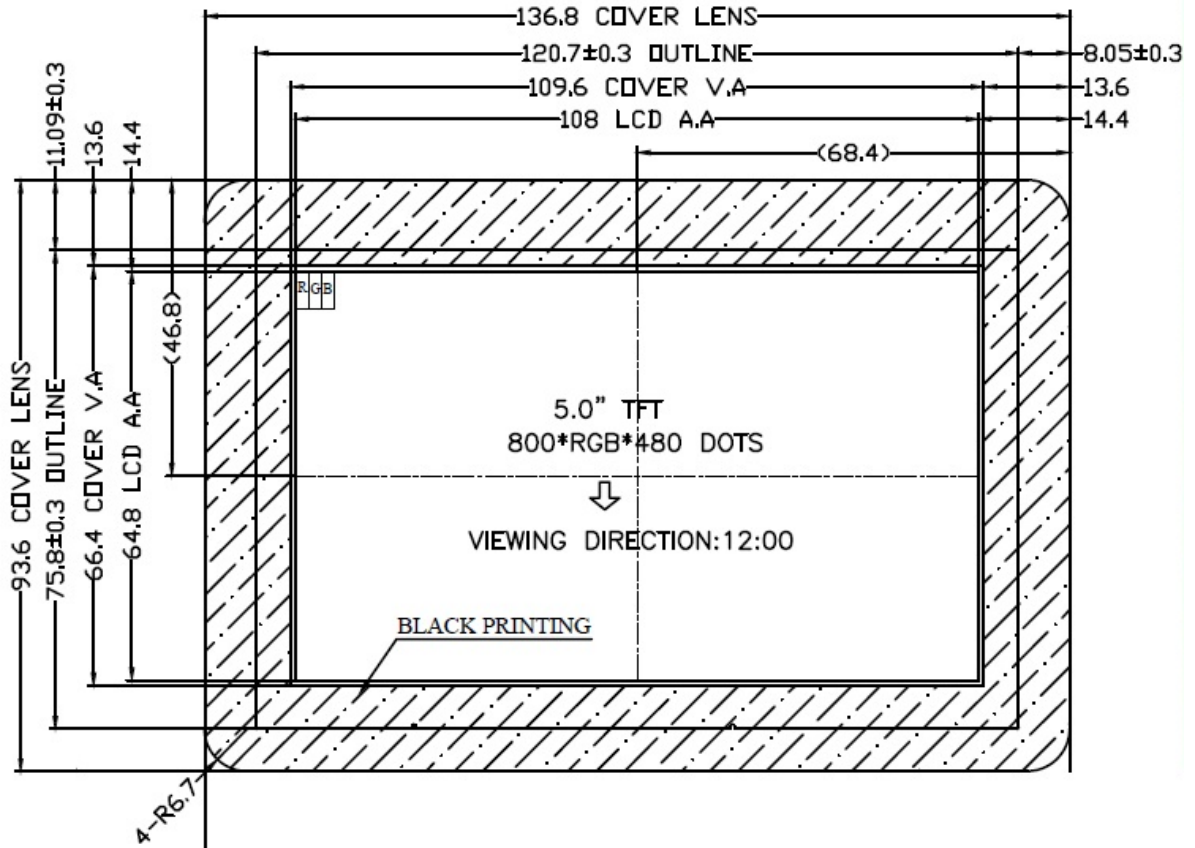


Figure 6-3 – Touch and Display Dimensions

## 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](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](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

### List of Figures

Figure 3-1 – ME813A-WH50C board connectors .....	4
Figure 4-1 – Viewing Angle definition .....	8
Figure 4-2 – Module orientation for viewing angle .....	8
Figure 5-1 – Board Schematic (page 1) .....	9
Figure 5-2 – Board Schematic (page 2) .....	10
Figure 5-3 – Board Schematic (page 3) .....	11
Figure 6-1 – Module Dimensions .....	12
Figure 6-2 – PCB Dimensions .....	12
Figure 6-3 – Touch and Display Dimensions .....	13
Figure 7-1 – ME813A-WH50C connects to MM900EV1A Module .....	14

### List of Tables

Table 2-1 – Ordering information .....	2
Table 3-1 – JP1/JP2 power selection .....	4
Table 3-2 – J2 pin description .....	5
Table 3-3 – CN13 pin description .....	5
Table 4-1 - Operating Voltage and Current .....	6
Table 4-2 - LCD and Touch Information .....	6
Table 4-3 - 5.0" TFT Optical specification .....	7
Table 7-1 – ME813A-WH50C J2 and MM900EV J2 pin mapping .....	15

## Appendix C – Revision History

Document Title: ME813A-WH50C Module  
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Clearance No.: BRT#044  
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Document Feedback: [Send Feedback](#)

Revision	Changes	Date
1.0	Initial Release	2016-10-18