

FTDI Chip

VM800BU Datasheet

Embedded Video Engine

Basic USB module



General Purpose Multi Media Controller

1 Introduction

The VM800BU is a USB controlled development module for FTDI's FT800, which is used to develop and demonstrate the functionality of the FT800 Embedded Video Engine, EVE.

This module interfaces with a system controller via a USB port, accessing an on-board FT232H bridge chip to connect to the FT800 SPI port.

VM800BU modules support 3 different LCD panel size options and are designed for industrial or commercial environments with precision fitted bezels in either black (-BK) or pearl (-PL).

- VM800BU35A-xx is the 3.5" LCD
- VM800BU43A-xx is the 4.3" LCD
- VM800BU50A-xx is the 5.0" LCD

1.1 Features

The VM800BU utilises the FTDI FT800 Embedded Video Engine, EVE. Graphic, audio and touch features of the FT800 chip can be accessed with the VM800BU. For a full list of the FT800's features please see the [FT800 datasheet](#). The VM800BU has the following features:

- Integrated QVGA resolution (3.5") or WQVGA resolution (4.3"/5.0") LCD display
- Integrated resistive touch screen LCD panel
- On board LCD backlight LED Driver
- On board audio power amplifier and micro speaker
- FT232H USB interface controller
- Flexible 5V power supply. Powering the VM800BU using either a 2.1mm power jack or USB Micro-B port
- Precision fitted bezel in black(-BK) or pearl (-PL)

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2 Ordering Information

Part No.	Description
VM800BU35A-BK	VM800BU module, 3.5 inch TFT LCD display panel preinstalled, black bezel
VM800BU43A-BK	VM800BU module, 4.3 inch TFT LCD display panel preinstalled, black bezel
VM800BU50A-BK	VM800BU module, 5.0 inch TFT LCD display panel preinstalled, black bezel
VM800BU35A-PL	VM800BU module, 3.5 inch TFT LCD display panel preinstalled, pearl bezel
VM800BU43A-PL	VM800BU module, 4.3 inch TFT LCD display panel preinstalled, pearl bezel
VM800BU50A-PL	VM800BU module, 5.0 inch TFT LCD display panel preinstalled, pearl bezel
VA-FC-1M-BKW	Accessory - Flat USB A to Micro B Cable 1M- Black and White
VA-FC-1M-BLW	Accessory - Flat USB A to Micro B Cable 1M- Blue and White
VA-FC-STYLUS1	Accessory - Resistive Touch Screen Pen Stylus

Table 2-1 – Ordering information

Note: 3.5" display resolution is 320 x 240 (QVGA).

4.3"/5.0" display resolution is 480 x 272 (WQVGA)

Table of Contents

1	Introduction	1
1.1	Features.....	1
2	Ordering Information	2
3	Hardware Description	4
3.1	VM800BU module.....	4
3.2	Physical Descriptions	5
3.2.1	PCB layout.....	5
3.2.2	VM800BU Connectors.....	6
4	Board Schematics.....	8
5	Hardware Setup Guide	11
5.1	Power Configuration	11
5.2	MPSSE Setup.....	11
6	Assembling the Bezel and Panel Mounting	13
6.1	3.5" Dimensions.....	14
6.2	4.3" Dimensions.....	15
6.3	5.0" Dimensions.....	16
7	Specifications.....	17
7.1	Optical Specification	17
8	Contact Information.....	19
Appendix A - References		20
Document References		20
Appendix B - List of Figures and Tables		21
List of Figures		21
List of Tables.....		21
Appendix C – Revision History		22

3 Hardware Description

Please refer to section **3.2.2** for connector settings. Some VM800BU jumpers must be set to work properly with your system.

3.1 VM800BU module



Figure 3-1 - VM800BU module profile 3.5" display version



Figure 3-2 - VM800BU module profile 4.3" display version



Figure 3-3 - VM800BU module profile 5" display version

NOTE: Also available in pearl.

The VM800BU module is intended for direct use into existing applications that require a display. This module is suitable for interfacing with a system that has a USB Host port.

The VM800BU module is available in multiple options: 3.5, 4.3 or 5.0 inch display options.

The main functions of the VM800BU are as follows:

- Micro USB connector
- 2-pin connector for power supply
- 3.3V regulator: Takes 5V input and outputs 3.3V for on-board circuits
- LCD touch screen panel
- 3 stage audio filter and power amplifier
- 8Ω speaker
- Audio line out option
- FT232H enabled USB to SPI Bridge
- Precision fitted bezel

3.2 Physical Descriptions

3.2.1 PCB layout

The VM800BU module PCB layouts are illustrated in Figure 3-4 and Figure 3-5. Boards are four-layer, approximately 1.6 mm thickness.



Figure 3-4 - VM800BU module PCB view, 3.5" display version



Figure 3-5 - VM800BU module PCB view, 4.3" and 5" display version

3.2.2 VM800BU Connectors

Connectors and jumpers are described in the following sections.

- **CN1- Micro USB Receptacle**

This receptacle is for 5V input to power the board. This also has USB functionality.

Pin No.	Name	Type	Description
1	VBUS	P	5V power supply
2	DM	IO	Connected to FT232HQ
3	DP	IO	Connected to FT232HQ
4	NC	NA	No connection
5	GND	P	Ground

Table 3-1 – CN1 Pinout

- **CN2- 2-pin power connector**

2 pin connector for 5V/3.3V power input to the board. Alternative to Micro USB connector.

Pin No.	Name	Type	Description
1	VCC	P	5V or 3.3V DC power supply
2	GND	P	Ground

Table 3-2 – CN2 Pinout

- **J2 - Selection between Lineout and loop back into the power amplifier.**

Selection between audio lineout and loop back into the power amplifier.

Jumper position	Description
Short pin 1-2	Audio amp enabled (default)

Table 3-3 – J2 Pin Options

- **JP1- Audio Amplifier Power Select**

This jumper provides the option to select the power supply voltage for the on-board power amplifier.

Jumper position	Description
Short pin 1-2	3.3V selected (default)
Short pin 2-3	5V selected

Table 3-4 – JP1 Pin options

*This needs to be configured before audio can be heard. Default is 3.3V. Select 5V to increase the maximum volume for the speaker.

- **JP2 – On board amplifier enable**

Solder connection not fitted by default.

- **JP3 - On board amplifier mute**

Solder connection not fitted by default. Do not use.

- **JP4 – VBUS ON**

Jumper fitted by default.

- **SW1 – Power source select**

Jumper position	Description
Short pin 1-2	Board power from CN1 (default)
Short pin 2-3	Board power from CN2

Table 3-5 – SW1 jumper options

4 Board Schematics

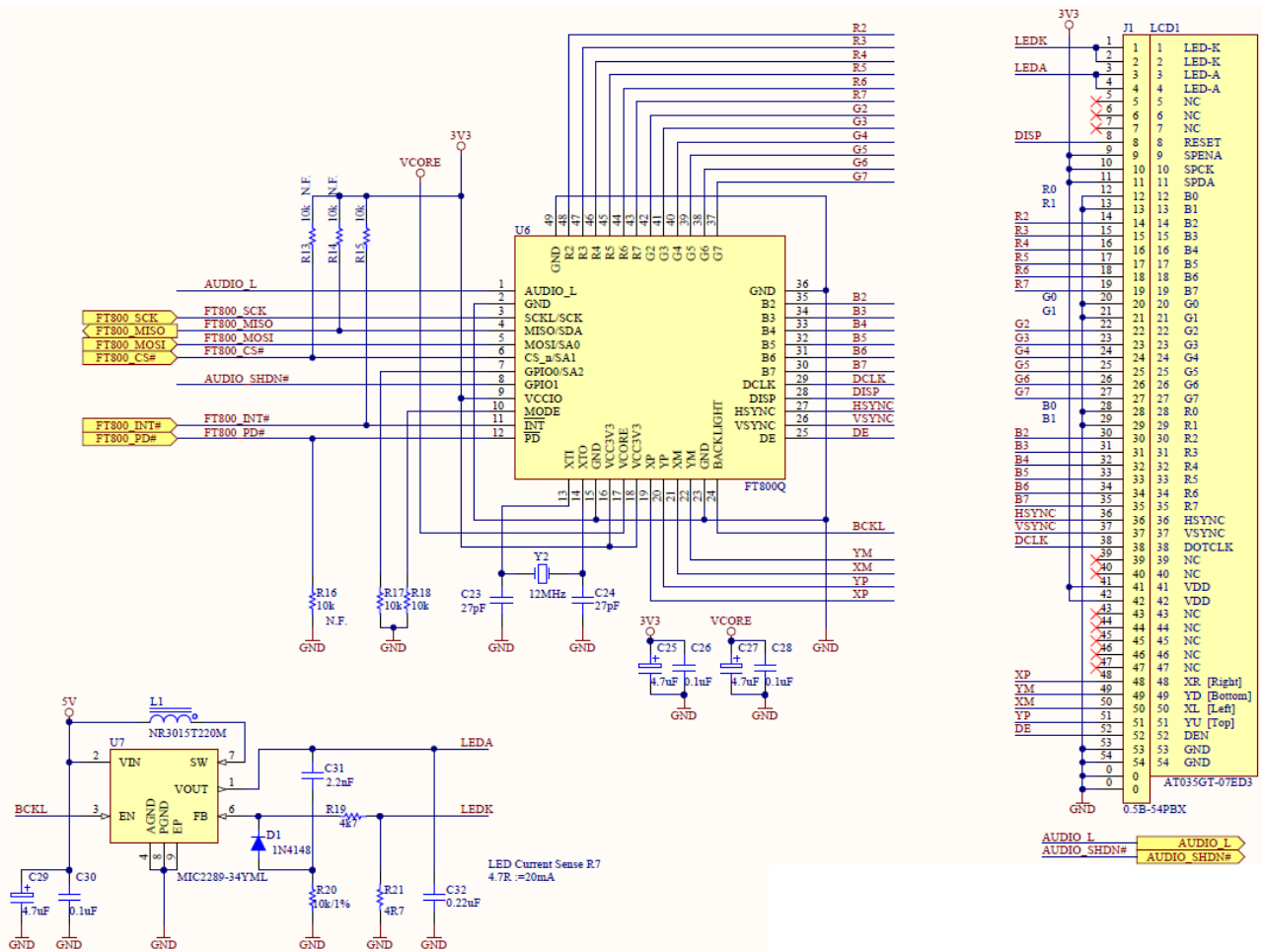


Figure 4-1 - VM800BU35A LCD Interface (3.5" Version)



Figure 4-2 - VM800BU43A/VM800BU50A LCD Interface (4.3"/5.0" Version)

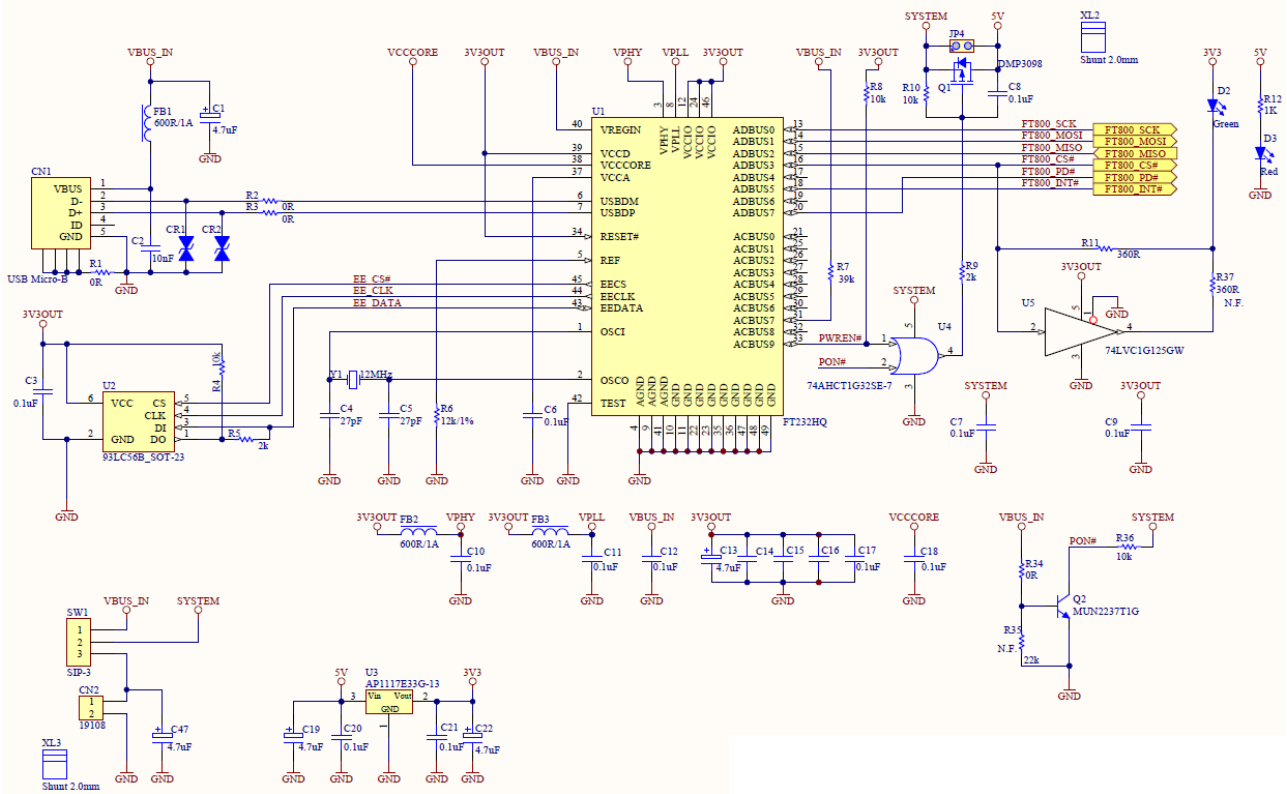


Figure 4-3 – VM800BU SPI Interface and Power Input

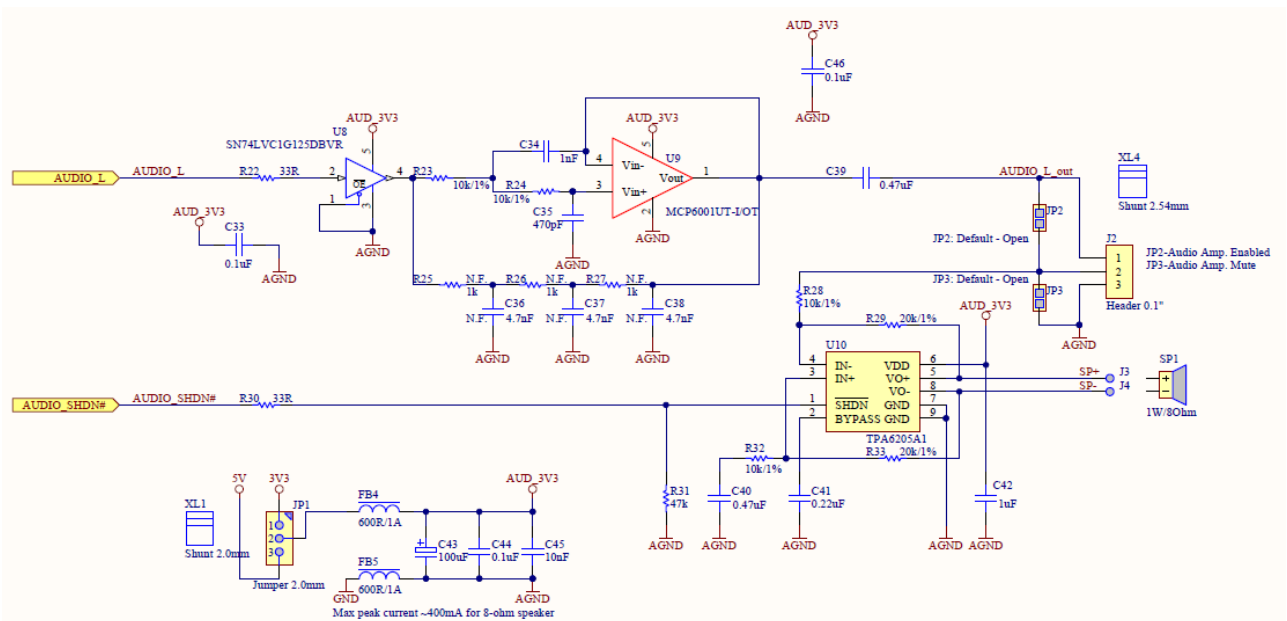


Figure 4-4 – VM800BU Audio Circuits

5 Hardware Setup Guide

5.1 Power Configuration

There are 2 methods of powering the VM800BU board.

- 1) USB Power(5V) - Connect USB power through micro-USB cable to CN1
- 2) DC IN(5V) - Connect 5V to CN2

The following table summarise how to power the VM800BU board using the various methods.

Power Method	CN1	CN2	SW1
USB Power	5V	N/C	Short pin 1-2
DC IN(5V)	N/C	5V	Short pin 2-3

Table 5-1 - Board power configuration

5.2 MPSSE Setup

To provide a quick start with the VM800BU development board, Windows based sample projects including source code are provided for users to get a touch and feel experience with the VM800BU. An overview of the process is provided in the following paragraphs with more details in [AN_245_VM800CB_SampleAPP_PC_Introduction](#).

MPSSE is a “multi-purpose synchronous serial engine” interface available in some FTDI devices (e.g. FT2232D, FT232H, FT2232H and FT4232H). This engine allows users to bridge from a USB port to an I²C or SPI interface. Sample code is available for driving the FT800 over this interface with a FT232H device.

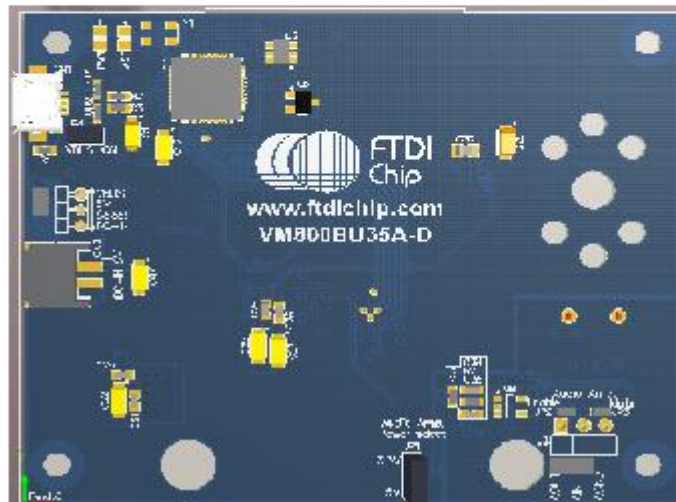


Figure 5-1 – VM800BU Connects to PC through USB

Hardware Setup

- Connect a USB cable (suggest FTDI accessory **VA-FC-1M-BKW** or **VA-FC-1M-BLW**) from the VM800BU USB port to the PC USB host port or self-powered hub port.
- The PC or hub will supply power to the VM800BU.

Software Setup

- Launch the demo application based on MPSSE from the PC.

The demo application notes can be found at following link:
[AN_245_VM800CB_SampleAPP_PC_Introduction](#)

The demo application examples can be downloaded at following link:
http://www.ftdichip.com/Support/SoftwareExamples/FT800_Projects.htm

6 Assembling the Bezel and Panel Mounting



Figure 6-1 - VM800BU Panel Mount (Front view)



Figure 6-2 - VM800BU Panel Mount (Rear view)

6.1 3.5" Dimensions

The TFT Touchscreen Mounting Frame is designed to mount to a 1.5mm thick Front Panel. If mounted to a Front Panel thicker than 1.5mm, longer mounting studs or screws should be used to accommodate the difference.

The Mounting Frame has been designed to work with projection welded studs or csk screws 'A' or press studs 'B'. For a 1.5mm thick Front Panel use -
M3 x 8 long weld studs,
M3 x 10 long countersunk screws or
M3 x 10 long pressed studs



When using countersunk screws to assemble the Mounting Frame, the screws should be located at the 'A' position



Figure 6-3 - VM800BU 3.5" panel mount dimensions

6.2 4.3" Dimensions

The TFT Touchscreen Mounting Frame is designed to mount to a 1.5mm thick Front Panel. If mounted to a Front Panel thicker than 1.5mm, longer mounting studs or screws should be used to accommodate the difference.

The Mounting Frame has been designed to work with projection welded studs or csk screws 'A' or press studs 'B'. For a 1.5mm thick Front Panel use -
M3 x 8 long weld studs,
M3 x 10 long countersunk screws or
M3 x 10 long pressed studs

When using countersunk screws to assemble the Mounting Frame, the screws should be located at the 'A' position



Figure 6-4 - VM800BU 4.3" panel mount dimensions

6.3 5.0" Dimensions

The TFT Touchscreen Mounting Frame is designed to mount to a 1.5mm thick Front Panel. If mounted to a Front Panel thicker than 1.5mm, longer mounting studs or screws should be used to accommodate the difference.

The Mounting Frame has been designed to work with projection welded studs or csk screws 'A' or press studs 'B'. For a 1.5mm thick Front Panel use -
M3 x 8 long weld studs,
M3 x 10 long countersunk screws or
M3 x 10 long pressed studs

When using countersunk screws to assemble the Mounting Frame, the screws should be located at the 'A' position

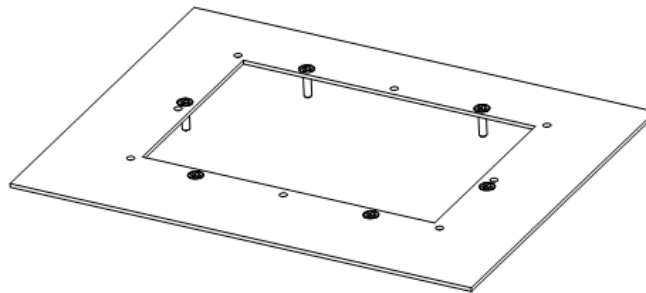
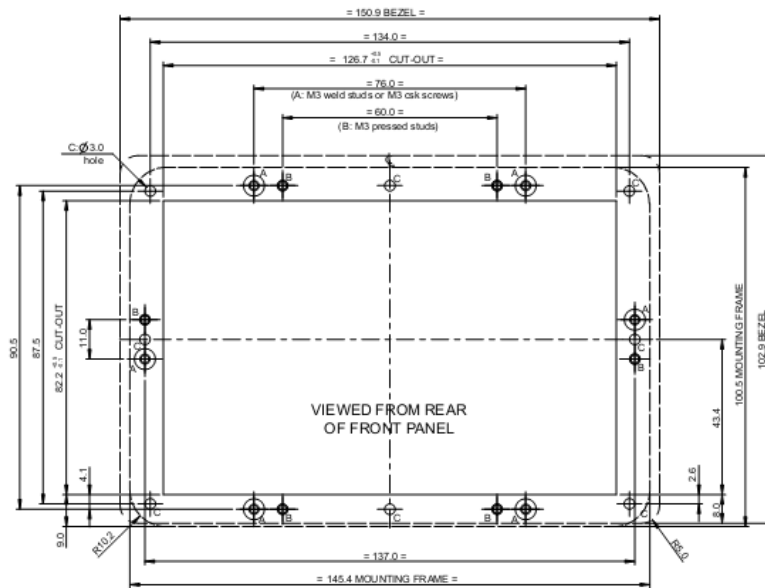


Figure 6-5 - VM800BU 5.0" panel mount dimensions

7 Specifications

7.1 Optical Specification

Item	Symbol	Condition	Min	Typ.	Max.	Unit
View Angles	ΘT	$CR \geq 10$	30	40		Degree
	ΘB		50	60		
	ΘL		50	60		
	ΘR		50	60		
Contrast Ratio	CR	$\theta = 0^\circ$		350		
Response Time	T_{on}	$25^\circ C$		25	40	ms
	T_{off}					
Chromaticity	White	x	0.260	0.310	0.360	
		y	0.283	0.333	0.383	
	RED	x	0.574	0.624	0.674	
		y	0.318	0.368	0.418	
	GREEN	x	0.300	0.350	0.400	
		y	0.500	0.550	0.600	
	BLUE	x	0.093	0.143	0.193	
		y	0.069	0.119	0.169	
Uniformity	U		75	80		%
NTSC				50		%
Luminance	L			500		cd/m ²

Table 7-1 - 3.5" TFT Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness	Bp	$\theta = 0^\circ$	-	350	-	Cd/m ²
Uniformity	ΔBp	$\Phi = 0^\circ$	70	80	-	%
Viewing Angle	3:00	$Cr \geq 10$	-	45	-	Deg
	6:00		-	20	-	
	9:00		-	45	-	
	12:00		-	40	-	
Contrast Ratio	Cr	$\theta = 0^\circ$	350	500		-
Response Time	T_r	$\Phi = 0^\circ$	-	10	-	ms
	T_f		-	10	-	ms
Color of CIE Coordinate	W	x		0.28		-
		y		0.33		-
	R	x		0.51		-
		y		0.34		-
	G	x		0.31		-
		y		0.56		-
	B	x		0.15		-
		y		0.14		-
NTSC Ratio	S	$\theta = 0^\circ$ $\Phi = 0^\circ$	50	60	-	%

Table 7-2 - 4.3" TFT Optical Specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness	Bp	$\theta=0^\circ$	200	250	-	Cd/m ²
Uniformity	Δ Bp	$\Phi=0^\circ$	70	80	-	%
Viewing Angle	3:00	Cr \geq 10	-	45	-	Deg
	6:00		-	25	-	
	9:00		-	45	-	
	12:00		-	45	-	
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	350	500		-
Response Time	T _r		-	10	-	ms
	T _f		-	10	-	ms
Color of CIE Coordinate	W	x	$\theta=0^\circ$ $\Phi=0^\circ$	0.28		-
		y		0.33		-
	R	x		0.51		-
		y		0.34		-
	G	x		0.31		-
		y		0.56		-
	B	x		0.15		-
		y		0.14		-
NTSC Ratio	S	50	60	-	%	

Table 7-3 - 5" TFT Optical Specification

8 Contact Information

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Appendix A - References

Document References

FT800 datasheet: [DS_FT800_Embedded_Video_Engine](#)

FT800 software programming guide: [FT800_Programmer_Guide](#)

FT800 sample application notes:

[AN_245_VM800CB_SampleAPP_PC_Introduction](#)

FT800 Software examples:

http://www.ftdichip.com/Support/SoftwareExamples/FT800_Projects.htm

D2xx Programmers Guide:

[http://www.ftdichip.com/Support/Documents/ProgramGuides/D2XX_Programmer's_Guide\(FT_000071\).pdf](http://www.ftdichip.com/Support/Documents/ProgramGuides/D2XX_Programmer's_Guide(FT_000071).pdf)

AN_108: Command Processor for MPSSE and MCU Host Bus Emulation Modes

http://www.ftdichip.com/Support/Documents/AppNotes/AN_108_Command_Processor_for_MPSSE_and_MCU_Host_Bus_Emulation_Modes.pdf

User Guide for libMPSSE – SPI

http://www.ftdichip.com/Support/Documents/AppNotes/AN_178_User_Guide_For_LibMPSSE-SPI.pdf

Appendix B - List of Figures and Tables

List of Figures

Figure 3-1 - VM800BU module profile 3.5" display version	4
Figure 3-2 - VM800BU module profile 4.3" display version	4
Figure 3-3 - VM800BU module profile 5" display version	4
Figure 3-4 - VM800BU module PCB view, 3.5" display version	5
Figure 3-5 - VM800BU module PCB view, 4.3" and 5" display version	6
Figure 4-1 - VM800BU35A LCD Interface (3.5" Version).....	8
Figure 4-2 - VM800BU43A/VM800BU50A LCD Interface (4.3"/5.0" Version)	9
Figure 4-3 - VM800BU SPI Interface and Power Input	10
Figure 4-4 - VM800BU Audio Circuits	10
Figure 5-1 - VM800BU Connects to PC through USB.....	12
Figure 6-1 - VM800BU Panel Mount (Front view).....	13
Figure 6-2 - VM800BU Panel Mount (Rear view).....	13
Figure 6-3 - VM800BU 3.5" panel mount dimensions.....	14
Figure 6-4 - VM800BU 4.3" panel mount dimensions.....	15
Figure 6-5 - VM800BU 5.0" panel mount dimensions.....	16

List of Tables

Table 2-1 - Ordering information.....	2
Table 3-1 - CN1 Pinout.....	6
Table 3-2 - CN2 Pinout.....	6
Table 3-3 - J2 Pin Options	7
Table 3-4 - JP1 Pin options	7
Table 3-5 - SW1 jumper options	7
Table 5-1 - Board power configuration.....	11
Table 7-1 - 3.5" TFT Optical specification	17
Table 7-2 - 4.3" TFT Optical Specification	17
Table 7-3 - 5" TFT Optical Specification	18

Appendix C – Revision History

Document Title: VM800BU Datasheet
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Document Feedback: [Send Feedback](#)

Revision	Changes	Date
Version 1.0	Initial Release	2014-07-14
Version 1.1	Dual branding to reflect the migration of the product to the Bridgetek name – logo changed, copyright changed, contact information changed	2016-09-13

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