

VM800B EVE Basic Module Datasheet



General Purpose Multi Media Controller

1 Introduction

The VM800B is a development module for Bridgetek's FT800, which is used to develop and demonstrate the functionality of the FT800 Embedded Video Engine, EVE.

This module behaves as an SPI slave, and requires an SPI Master for proper micro-controller interfacing and system integration.

VM800B modules support 3 different LCD panel size options and are designed for industrial or commercial environments with precision fitted bezel in black (-BK).

- VM800B35A-BK has the 3.5" LCD
- VM800B43A-BK has the 4.3" LCD
- VM800B50A-BK has the 5.0" LCD

1.1 Features

The VM800B utilises Bridgetek's FT800 Embedded Video Engine, EVE. Graphic, audio and touch features of the FT800 chip can be accessed with the VM800B. For a full list of the FT800's features please see the FT800 datasheet. The VM800B has the following features:

- Ready to use LCD module.
- Integrated with resistive touch screen LCD panel
- On board LCD backlight LED Driver
- On board audio power amplifier and micro speaker
- Flexible power supply. Powering the VM800B using SPI host connector, or via USB Micro-B port, or via a 2.0mm JST connector
- 5V tolerant buffers when used with a 5V SPI Master
- Precision fitted bezel in black (-BK)

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2 Ordering Information

Part No.	Description
VM800B35A-BK	VM800B module, supports 3.3/5v MCU Adapter Board, 3.5-inch TFT LCD display panel preinstalled, black bezel
VM800B43A-BK	VM800B module, supports 3.3/5v MCU Adapter Board, 4.3-inch TFT LCD display panel preinstalled, black bezel
VM800B50A-BK	VM800B module, supports 3.3/5v MCU Adapter Board, 5.0-inch TFT LCD display panel preinstalled, black bezel
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)

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3 Hardware Description

Please refer to section **3.2.2** for connector settings. Some VM800B jumpers must be set to work properly with your system.

3.1 VM800B module



Figure 3-1 – VM800B Module Profile 3.5" Display Version



Figure 3-2 - VM800B Module Profile 4.3" Display Version



Figure 3-3 - VM800B Module Profile 5" Display Version

The VM800B module is intended for direct use into existing applications that require a display. This module is suitable for interfacing with an external microcontroller that has an SPI Master channel.

The VM800B module is available in multiple options: 3.5-, 4.3- or 5.0-inch display options.

The main functions of the VM800B are as follows:

- Micro USB connector
- SPI 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
- 5V tolerant buffers between the SPI master interface and the Slave interface of the FT800
Note: SPI timing requirements can be found in the FT800 datasheet. The on-board level converter buffers introduce additional delay. The actual maximum SPI clock frequency depends on the host system timing and connection cable length to the VM800B PCB.
- 3 stage audio filter and power amplifier
- 8Ω speaker
- Audio line out option
- Precision fitted bezel

3.2 Physical Descriptions

3.2.1 PCB layout

The VM800B module PCB layouts are illustrated in Figure 3-4 and Figure 3-5. Boards are four-layer, approximately 1.6 mm thickness.

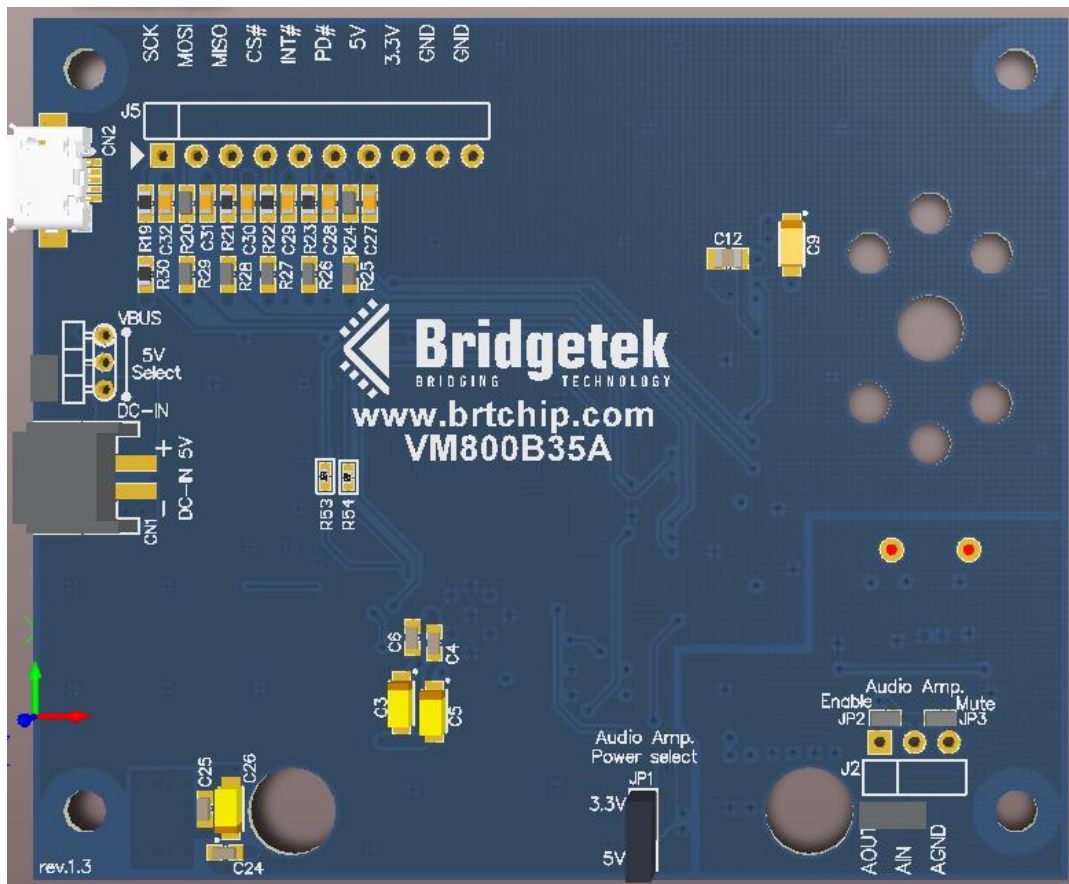


Figure 3-4 - VM800B Module PCB View, 3.5-inch Display Version

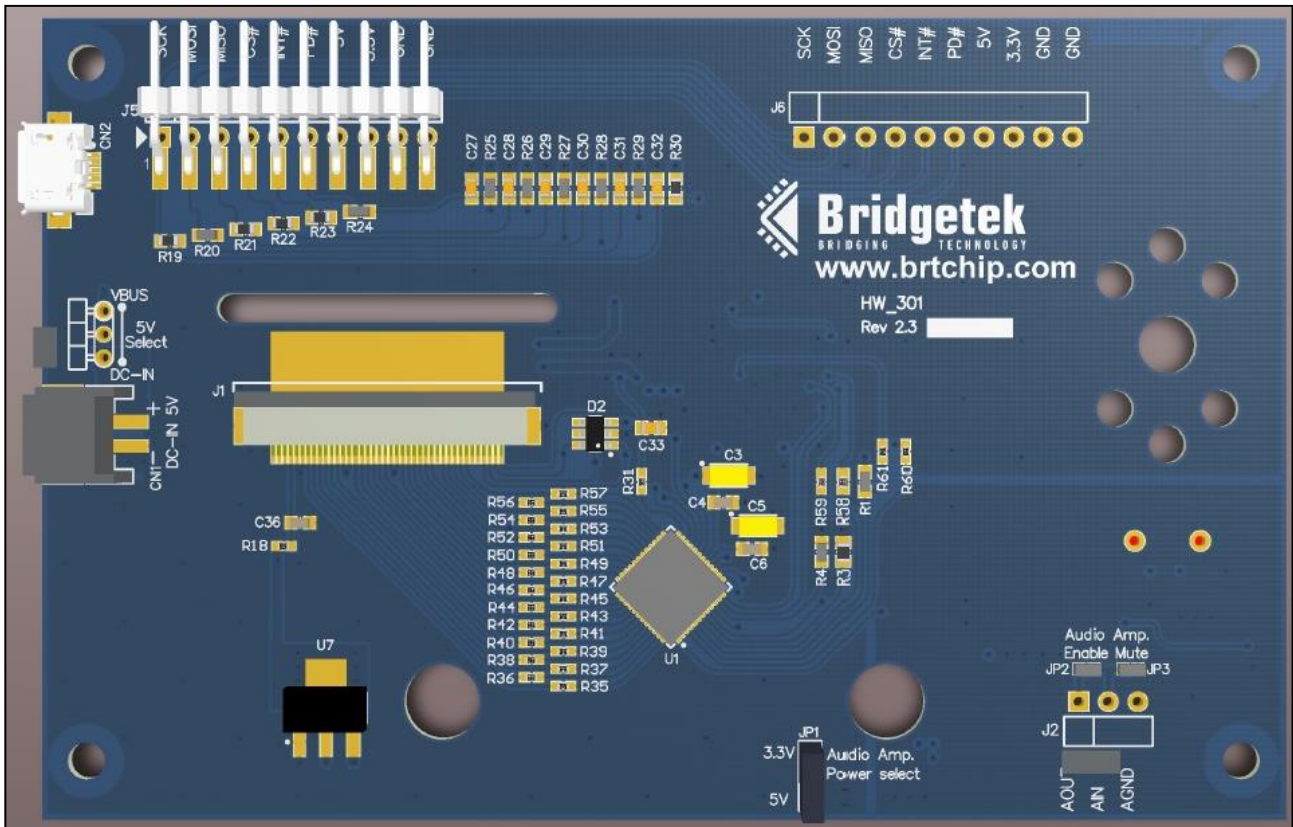


Figure 3-5 - VM800B module PCB view, 4.3- and 5-inch display version

3.2.2 VM800B Connectors

Connectors and jumpers are described in the following sections.

- **CN1- 2-pin power connector**

2 pin connectors 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 3-1 – CN1 Pinout

- **CN2- Micro USB Receptacle**

This receptacle is strictly for 5V input to power the board. There is no USB Functionality

Pin No.	Name	Type	Description
1	VBUS	P	5V power supply
2	NC	NA	No connection
3	NC	NA	No connection
4	NC	NA	No connection
5	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)
Short pin 2-3	Audio amp mute, Audio lineout on pin 1

Table 3-3 – J2 Pin Options

- **J5- SPI Interface**

This is the interface where the SPI control and data signals are routed too. There are also power and ground pins on this interface.

Pin No.	Name	Type	Description
1	SCLK	I	SPI Clock input, 3.3V (5V tolerant)
2	MOSI	I	Master Out Slave in, 3.3V (5V tolerant)
3	MISO	O	Master In Slave out, 3.3V
4	CS#	I	Chip select, active low, 3.3V (5V tolerant)
5	INT#	O	Interrupt output active low, 3.3V
6	PD#	I	Power down control input, active low, 3.3V (5V tolerant)
7	5V	P	5V power supply
8	3.3V	P	3.3V power supply
9	GND	P	Ground
10	GND	P	Ground

Table 3-4 – J5 Pinout

- **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 3-5 – JP1 Pin options

*This needs to be configured before audio can be heard. Default is 3.3V. Selecting 5V will 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.

- **SW1 – Power source select**

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

Table 3-6 – SW1 jumper options

4 Board Schematics

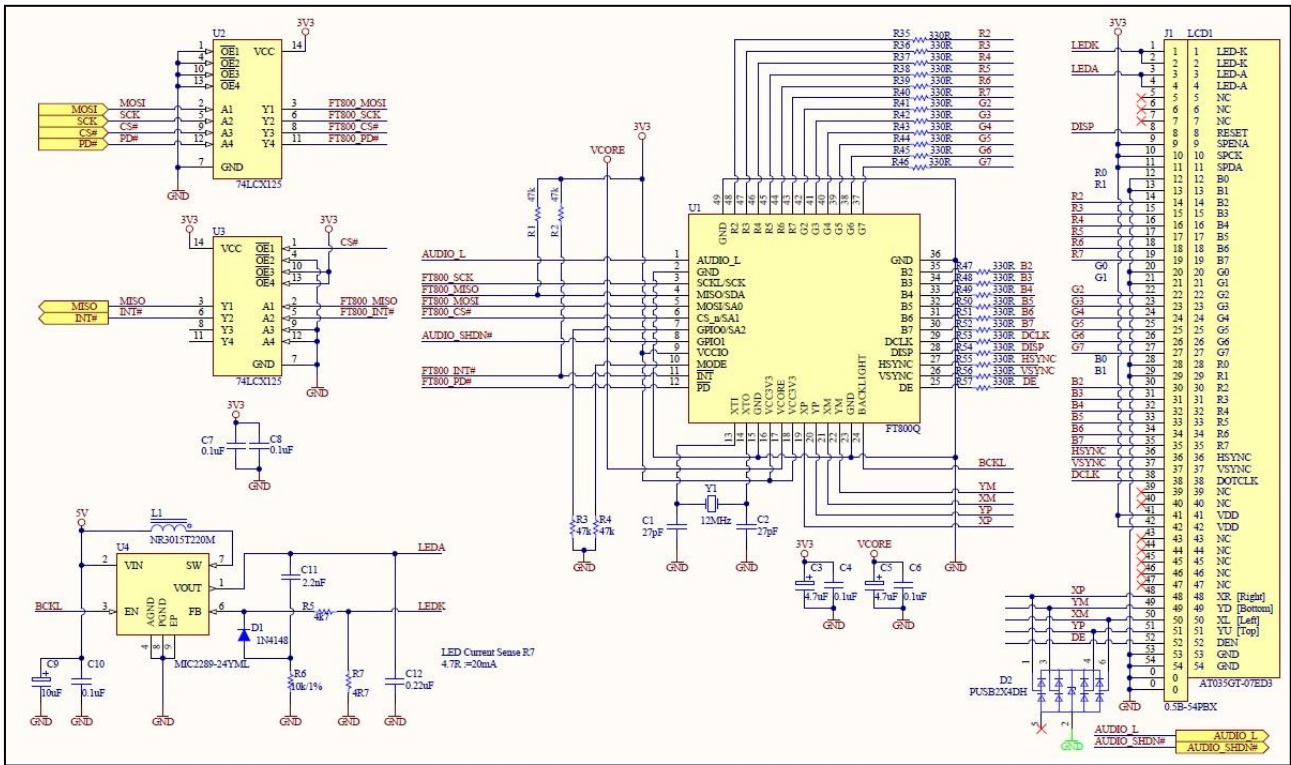


Figure 4-1 - VM800B35A (3.5" Version)

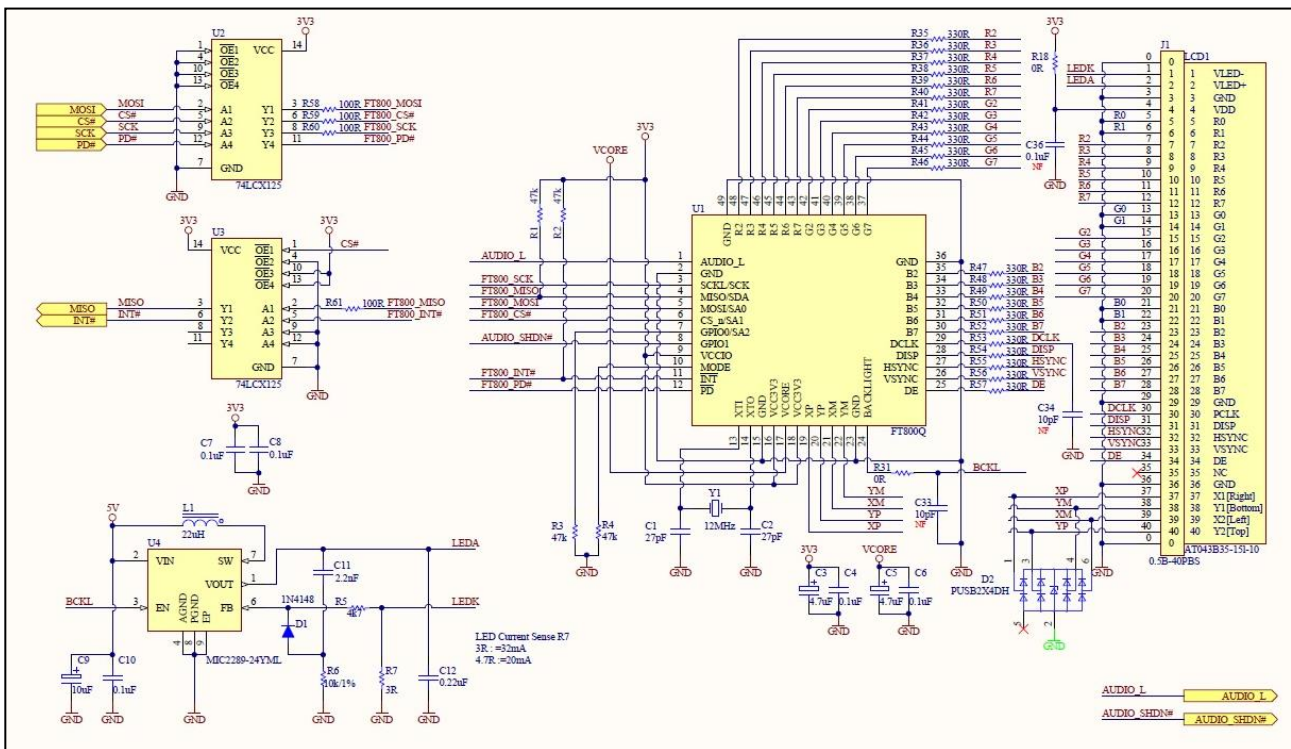
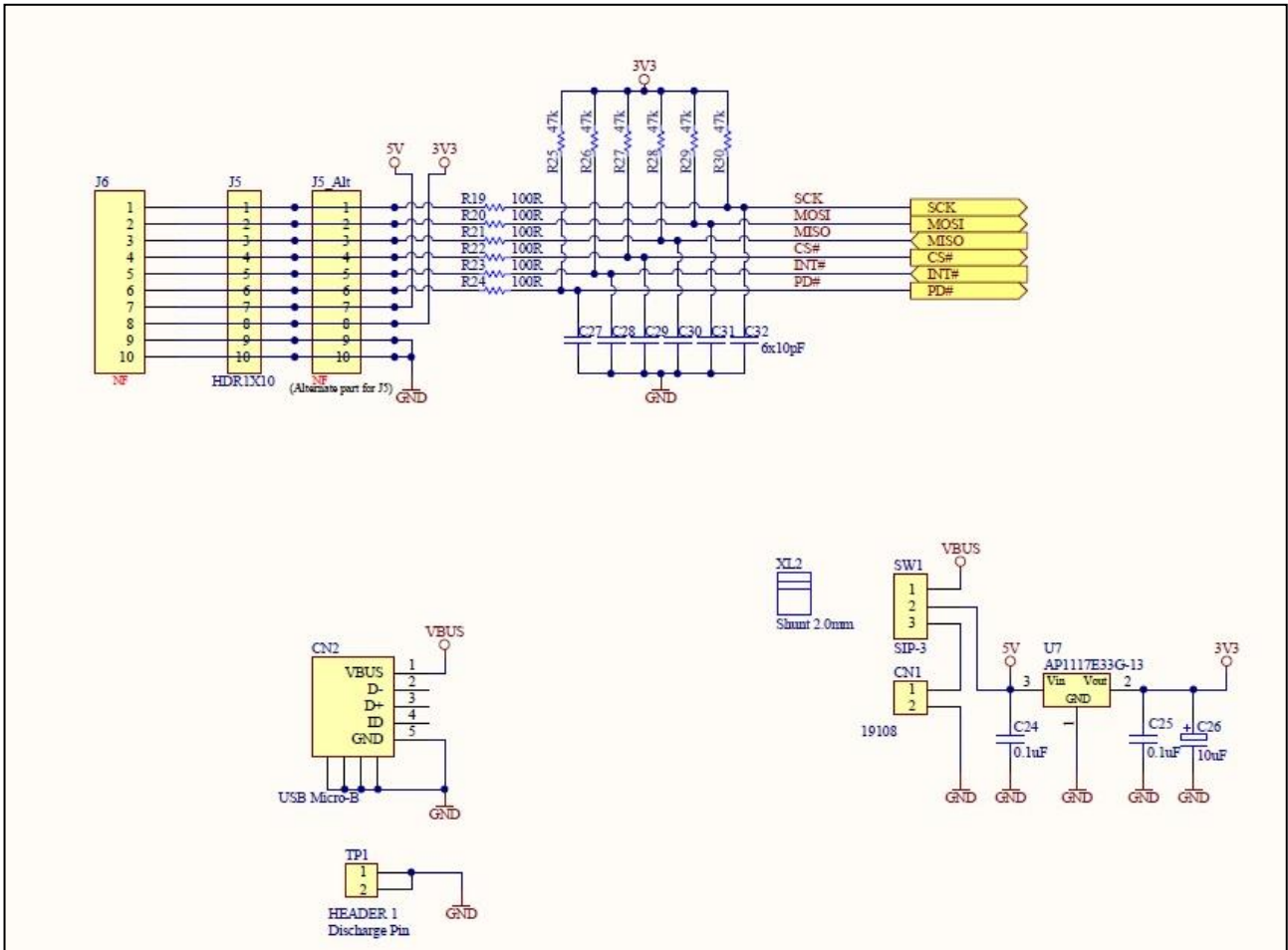
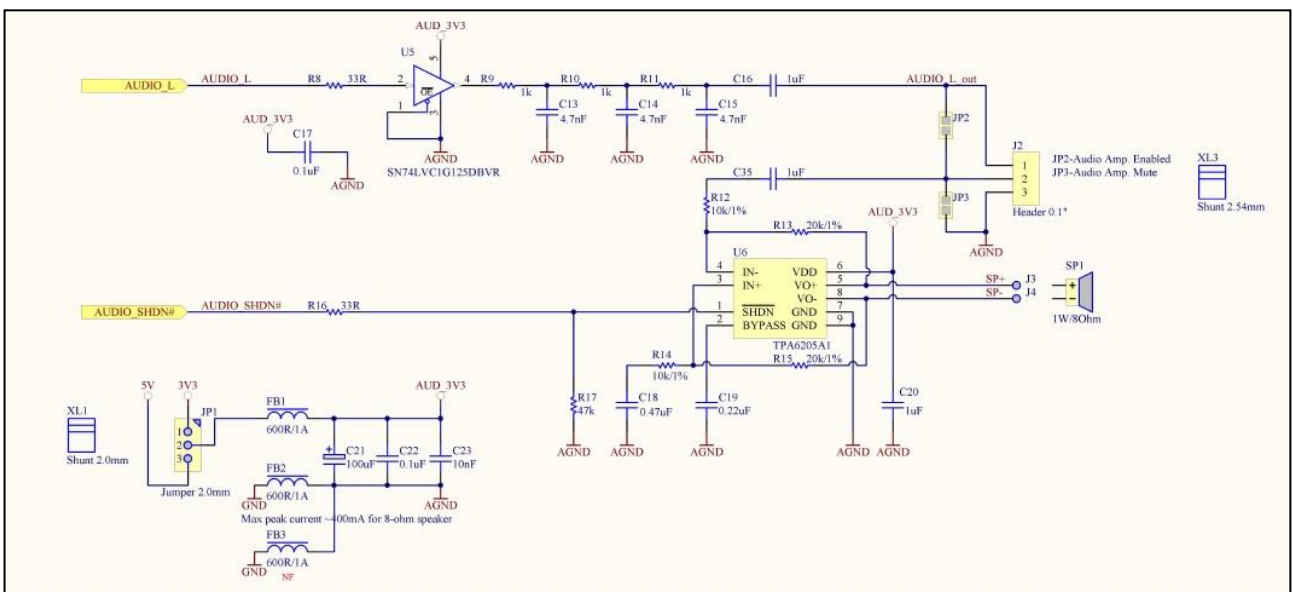


Figure 4-2 - VM800B43A/VM800B50A (4.3"/5.0" Version)


Figure 4-3 – VM800B SPI Interface and IO

Figure 4-4 – VM800B Audio

5 Hardware Setup Guide

5.1 Power Configuration

There are 5 methods of powering the VM800B board.

- 1) USB Power(5V) - Connect USB power through micro-USB cable to CN2
- 2) DC IN (5V) - Connect 5V to CN1
- 3) DC IN (3.3V) - Connect 3.3V to CN1 and short J5 pin 7 and 8
- 4) J5 Power(5V) - Connect 5V to J5 pin 7
- 5) *J5 Power (3.3V) - Connect 3.3V to J5 pin 7 and 8

Warning: * Applying 5 V accidently in this mode may cause permanent damage to the VM800B module.

The following table summarises how to power the VM800B board using the various methods.

Power Method	CN2	CN1	J5 Pin 7	J5 Pin 8	SW1
USB Power	5V	N/C	N/C	N/C	Short pin 2-3
DC IN (5V)	N/C	5V	N/C	N/C	Short pin 1-2
DC IN (3.3V)	N/C	3.3V	SHORT		Short pin 1-2
J5 Power (5V)	N/C	N/C	5V	N/C	Any Position
J5 Power (3.3V)	N/C	N/C	3.3V		Any Position

Table 5-1 - Board power configuration

5.2 MPSSE Setup

To give a quick start with the VM800B development module, a Windows based sample application and demo applications are provided for users to experiment and experience the FT800 in the VM800B system. The following paragraphs provide a short description for development procedures.

MPSSE is a "multi-purpose synchronous serial engine" interface available in some FTDI devices (e.g., FT232H, FT2232H and FT4232H). This engine allows users to bridge from a USB port on a PC to an SPI interface. Sample code is available for driving the FT800 over this interface with a FT232H device. This device is available in the VA800A-SPI board, or USBC-HS-MPSSE-xxx cable or CH232HM-xxx cable.

More information about MPSSE cables may be found at:

USBC-HS-MPSSE-xxx

<https://connectiveperipherals.com/products/usb-type-c-high-speed-mpsse?variant=37184462487703>

CH232HM-xxx

http://www.ftdichip.com/Support/Documents/DataSheets/Cables/DS_C232HM_MPSSE_CABLE.pdf

In this section it is assumed the 5V version of the MPSSE cable (FTDI part no. C232HM-EDHSL-0) is used. If the VM800B is connected to an SPI interface with a 3.3 V power supply, refer to table 5-1 for the board power configuration. Note, improper power supply and/or IO voltage connection may damage the VM800B module.

Hardware Setup

- Connect MPSSE leads to VM800B board's J5 (SPI interface) in accordance with **Error! Reference source not found.**
- Plug MPSSE cable to PC USB host port

J5 Pin number	J5 Signal	MPSSE pin number	MPSSE Signal	MPSSE Cable Lead Colour
1	SCK	2	SK	ORANGE
2	MOSI	3	DO	YELLOW
3	MISO	4	DI	GREEN
4	CS#	5	CS	BROWN
5	INT#	7	GPIOL1	PURPLE
6	PD#	9	GPIOL3	BLUE
7	5V	1	VCC	RED
8	3.3V	-	-	-
9	GND	10	GND	Black
10	GND	-	-	-

Table 5-2 – MPSSE cable (C232HM-EDHSL-0) connection

Software Setup

- Download PC based MPSSE software libraries. MPSSE cable and driver information can be found at <http://www.ftdichip.com/Products/Cables/USBMPSSE.htm>.
- Launch the Sample Application based on MPSSE from the PC
- For more information on utilizing the VM800B modules with the MPSSE cable and Sample Application, refer to <https://github.com/Bridgetek/EveApps/>.

The sample application notes can be found at following link:

[AN_245_VM800CB_SampleAPP_PC_Introduction](#).

Sample applications can be found at:

<https://brtchip.com/software-examples/eve-examples/> or <https://github.com/Bridgetek/EveApps/>.

5.3 Arduino® Setup

Sample code and demo applications are provided to users who want to connect the VM800B to an MCU. Bridgetek provides sample source code, sample application notes and a ready to run demo based on the Arduino® platform. Detailed information can be found at:

<https://brtchip.com/software-examples/eve-examples/> or <https://github.com/Bridgetek/EveApps/>.

6 Assembling the Bezel and Panel Mounting

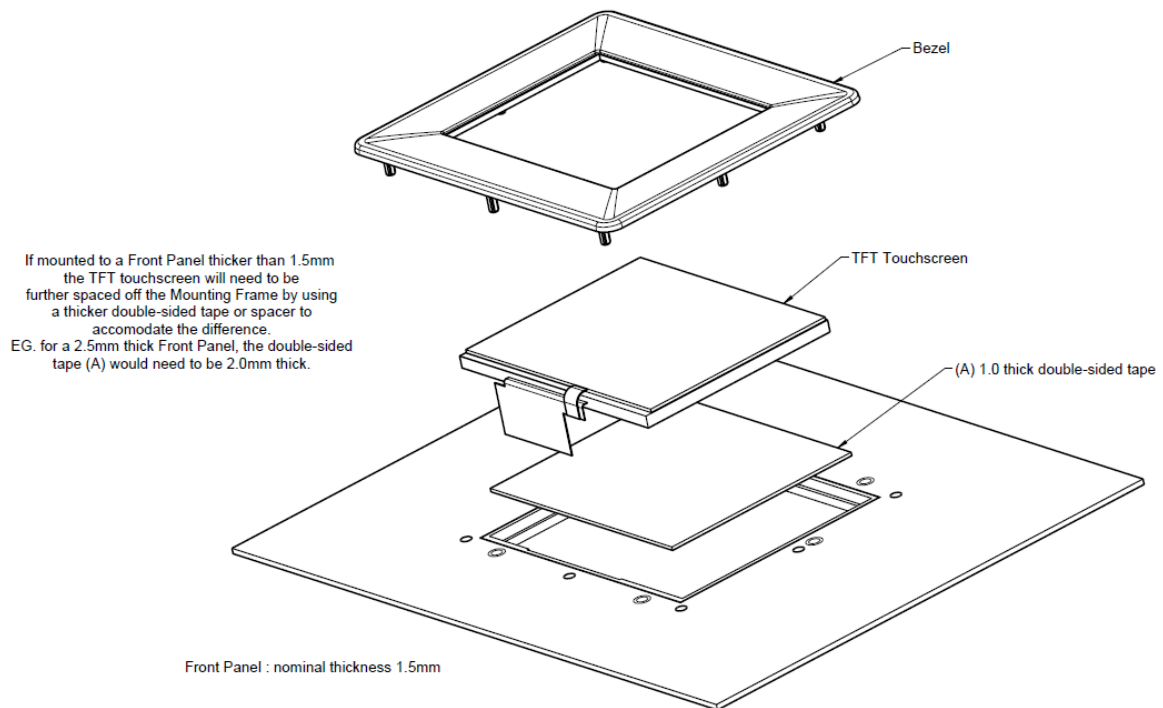


Figure 6-1 - VM800B Panel Mount (Front view)

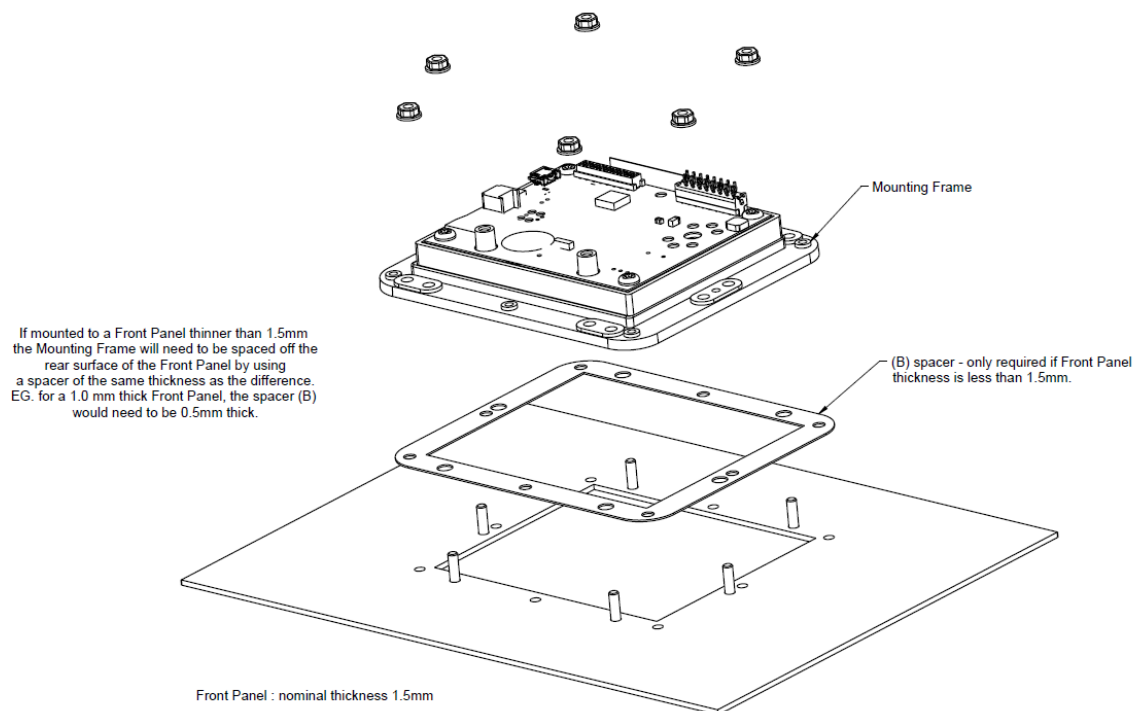
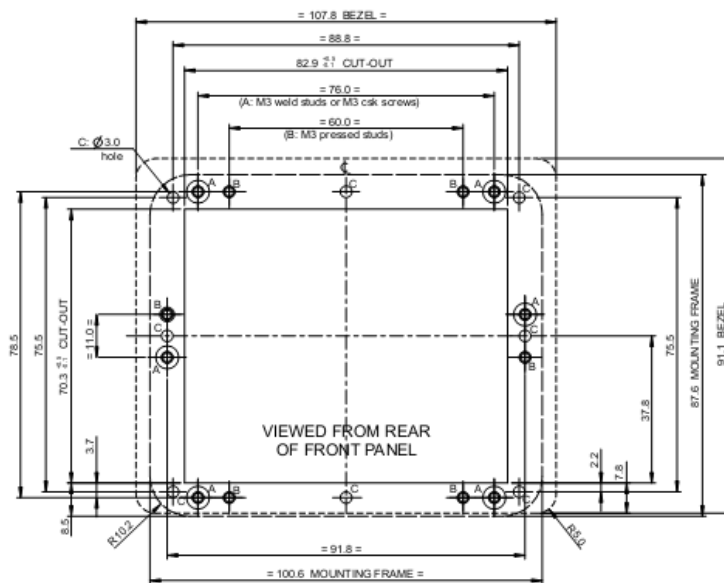


Figure 6-2 - VM800B Panel Mount (Rear view)

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

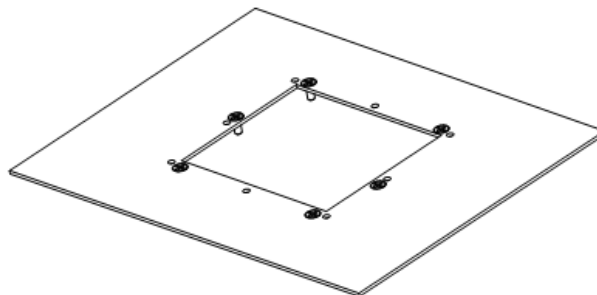


Figure 6-3 - VM800B 3.5" Panel Mount Dimensions

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

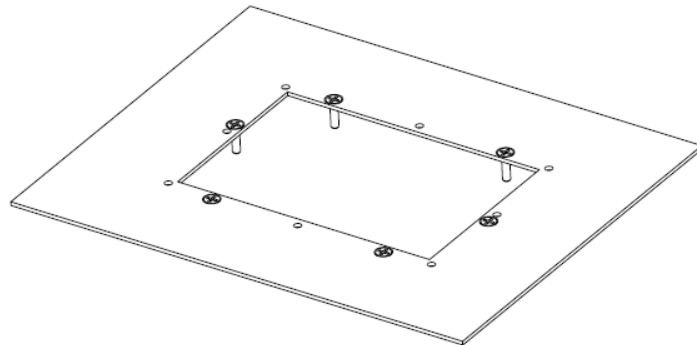
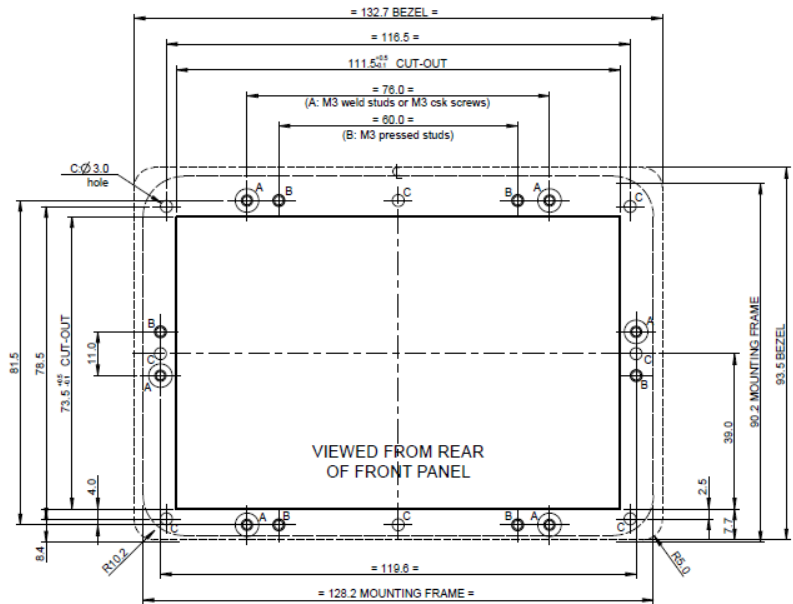


Figure 6-4 - VM800B 4.3" Panel Mount Dimensions

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

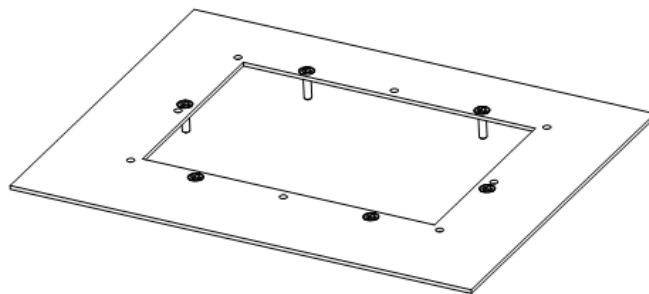
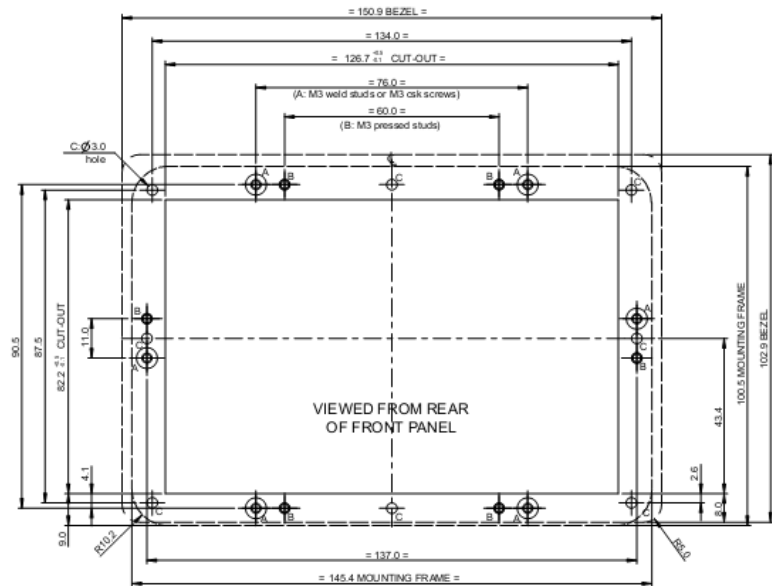


Figure 6-5 - VM800B 5.0" Panel Mount Dimensions

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	Ton	25°C		25	40	ms
	Toff					
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 6:00 9:00 12:00	$Cr \geq 10$	-	45	-	Deg	
			-	20	-		
			-	45	-		
			-	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	$\theta = 0^\circ$ $\Phi = 0^\circ$		0.31		-
		y			0.56		-
	B	x			0.15		-
		y			0.14		-
NTSC Ratio	S			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		0.28		-	
		y		0.33		-	
	R	x		0.51		-	
		y		0.34		-	
	G	x	$\theta=0^\circ$ $\Phi=0^\circ$		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

For module documentations, please refer to URL below:

<https://brtchip.com/product-category/products/modules/eve/>

FT800 datasheet:

[DS_FT800 Embedded Video Engine](#)

FT800 software programming guide:

[FT800 Programmer Guide](#)

FT800 software examples:

<https://brtchip.com/software-examples/eve-examples/>

<https://github.com/Bridgetek/EveApps/>

FT800 sample application notes:

[AN_245_VM800CB_SampleAPP_PC_Introduction](#)

C232HM-EDHSL-0 datasheet:

http://www.ftdichip.com/Support/Documents/DataSheets/Cables/DS_C232HM_MPSSE_CABLE.pdf

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)

Appendix B - List of Figures and Tables

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Appendix C – Revision History

Document Title: VM800B EVE Basic Module Datasheet
 Document Reference No.: BRT_000004
 Clearance No.: BRT #006
 Product Page: <https://brtchip.com/product-category/products/>
 Document Feedback: [Send Feedback](#)

Revision	Changes	Date
Version 1.0	Initial Release	28-08-2013
Version 1.1	Corrected dimensions for 4.3" mounting in section 6.2	25-03-2014
Version 1.2	Updated the optical characteristics for the 4.3" and 5" displays	12-06-2014
Version 1.3	Dual branding to reflect the migration of the product to the Bridgetek name – logo changed, copyright changed, contact information changed	13-09-2016
Version 1.4	Migrated the document from dual branding to Bridgetek. Links, Logo, copyright, contact information changed. Updated with the Rev2.3 schematics & the PCB prints	14-07-2023