8.4 Inch Enclosed Unit
Hardware Manual

06/01/2012

Note: The software included with this product is subject to a license agreement as described in this Manual.

Reach Technology, Inc.

www.reachtech.com

Sales: 510-770-1417 x112
sales@reachtech.com

Technical Support: 503-675-6464
techsupport@reachtech.com

Table of Contents

Figures

Hardware Limited Warranty and Software License Agreement

0.1. *Hardware Limited Warranty*

REACH TECHNOLOGY, Inc. warrants its hardware products to be free from manufacturing defects in materials and workmanship under normal use for a period of one (1) year from the date of purchase from REACH. This warranty extends to products purchased directly from REACH or an authorized REACH distributor. Purchasers should inquire of the distributor regarding the nature and extent of the distributor's warranty, if any. REACH shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed. This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall REACH be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. REACH is not liable for any claim made by a third party or made by the purchaser for a third party. REACH shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty. Except as expressly set forth in this warranty, REACH makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supercedes all previous warranties, and covers only the Reach hardware. The unit's software is covered by a separate license agreement.

0.2. *Returns and Repair Policy*

No merchandise may be returned for credit, exchange, or service without prior authorization from REACH. To obtain warranty service, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.

Authorized returns must be shipped freight prepaid to Reach Technology Inc., 4575 Cushing Parkway, Fremont, California 94538 with the RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. REACH reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.

Return freight charges following repair of items under warranty shall be paid by REACH, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

0.3. *Software License Agreement*

PLEASE READ THIS SOFTWARE LICENSE AGREEMENT CAREFULLY BEFORE DOWNLOADING OR USING THE SOFTWARE.

This License Agreement ("Agreement") is a legal contract between you (either an individual or a single business entity) and Reach Technology Inc. ("Reach") for software referenced in this guide, which includes computer software and, as applicable, associated media, printed materials, and "online" or electronic documentation (the "Software").

BY INSTALLING, COPYING, OR OTHERWISE USING THE SOFTWARE, YOU AGREE TO BE BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, DO NOT INSTALL OR USE THE SOFTWARE. IF YOU HAVE PAID A FEE FOR THIS LICENSE AND DO NOT ACCEPT THE TERMS OF THIS AGREEMENT, REACH WILL REFUND THE FEE TO YOU PROVIDED YOU (1) DO NOT INSTALL THE SOFTWARE AND (2) RETURN ALL SOFTWARE, MEDIA AND OTHER DOCUMENTATION AND MATERIALS PROVIDED WITH THE SOFTWARE TO REACH TECHNOLOGY INC AT: REACH TECHNOLOGY INC., 4575 CUSHING PARKWAY, FREMONT, CALIFORNIA 94538.

Reach Technology Inc. ("Reach") and its suppliers grant to Customer ("Customer") a nonexclusive and nontransferable license to use the Reach software ("Software") in object code form on one or more central processing units owned or leased by Customer or otherwise embedded in equipment provided by Reach.

EXCEPT AS EXPRESSLY AUTHORIZED ABOVE, CUSTOMER SHALL NOT: COPY, IN WHOLE OR IN PART, SOFTWARE OR DOCUMENTATION; MODIFY THE SOFTWARE; REVERSE COMPILE OR REVERSE ASSEMBLE ALL OR ANY PORTION OF THE SOFTWARE; OR RENT, LEASE, DISTRIBUTE, SELL, OR CREATE DERIVATIVE WORKS OF THE SOFTWARE.

Customer agrees that aspects of the licensed materials, including the specific design and structure of individual programs, constitute trade secrets and/or copyrighted material of Reach. Customer agrees not to disclose, provide, or otherwise make available such trade secrets or copyrighted material in any form to any third party without the prior written consent of Reach. Customer agrees to implement reasonable security measures to protect such trade secrets and copyrighted material. Title to Software and documentation shall remain solely with Reach.

SOFTWARE LIMITED WARRANTY. Reach warrants that for a period of ninety (90) days from the date of shipment from Reach: (i) the media on which the Software is furnished will be free of defects in materials and workmanship under normal use; and (ii) the Software substantially conforms to its published specifications. Except for the foregoing, the Software is provided AS IS. This limited warranty extends only to Customer as the original licensee. Customer's exclusive remedy and the entire liability of Reach and its suppliers under this limited warranty will be, at Reach's option, repair, replacement, or refund of the Software. In no event does Reach warrant that the Software is error free or that Customer will be able to operate the Software without problems or interruptions.

This warranty does not apply if the software (a) has been altered, except by Reach, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Reach, (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident, or (d) is used in ultrahazardous activities.

DISCLAIMER. EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW.

IN NO EVENT WILL REACH OR ITS SUPPLIERS BE LIABLE FOR ANY LOST REVENUE, PROFIT, OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY ARISING OUT OF THE USE OF OR INABILITY TO USE THE SOFTWARE EVEN IF REACH OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

 In no event shall Reach's or its suppliers' liability to Customer, whether in contract, tort (including negligence), or otherwise, exceed the price paid by Customer. The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose. SOME STATES DO NOT ALLOW LIMITATION OR EXCLUSION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES.

The above warranty DOES NOT apply to any beta software, any software made available for testing or demonstration purposes, any temporary software modules or any software for which Reach does not receive a license fee. All such software products are provided AS IS without any warranty whatsoever.

This License is effective until terminated. Customer may terminate this License at any time by destroying all copies of Software including any documentation. This License will terminate immediately without notice from Reach if Customer fails to comply with any provision of this License. Upon termination, Customer must destroy all copies of Software.

Software, including technical data, is subject to U.S. export control laws, including the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. Customer agrees to comply strictly with all such regulations and acknowledges that it has the responsibility to obtain licenses to export, re-export, or import Software.

This License shall be governed by and construed in accordance with the laws of the State of California, United States of America, as if performed wholly within the state and without giving effect to the principles of conflict of law. If any portion hereof is found to be void or unenforceable, the remaining provisions of this License shall remain in full force and effect. This License constitutes the entire License between the parties with respect to the use of the Software.

1. Introduction

1.1. *Overview*

The 8.4 inch Enclosed Unit provides a complete enclosed color touch interface for your embedded system. A polycarbonate overlay covers the entire surface, making it completely sealed; the display window is optically bonded to the touch screen for bright, clear performance. When mounted in a NEMA 4 enclosure, the unit's die-cut rear gasket ensures protection from water and dust. Rear connectors are two-part "Phoenix" type for easy wiring. The Display Controller is Reach's SLCD5+. Using the SLCD family of controllers is simply the quickest way to generate a user interface without a lot of graphical programming. It has a small size to fit in space-constrained applications.
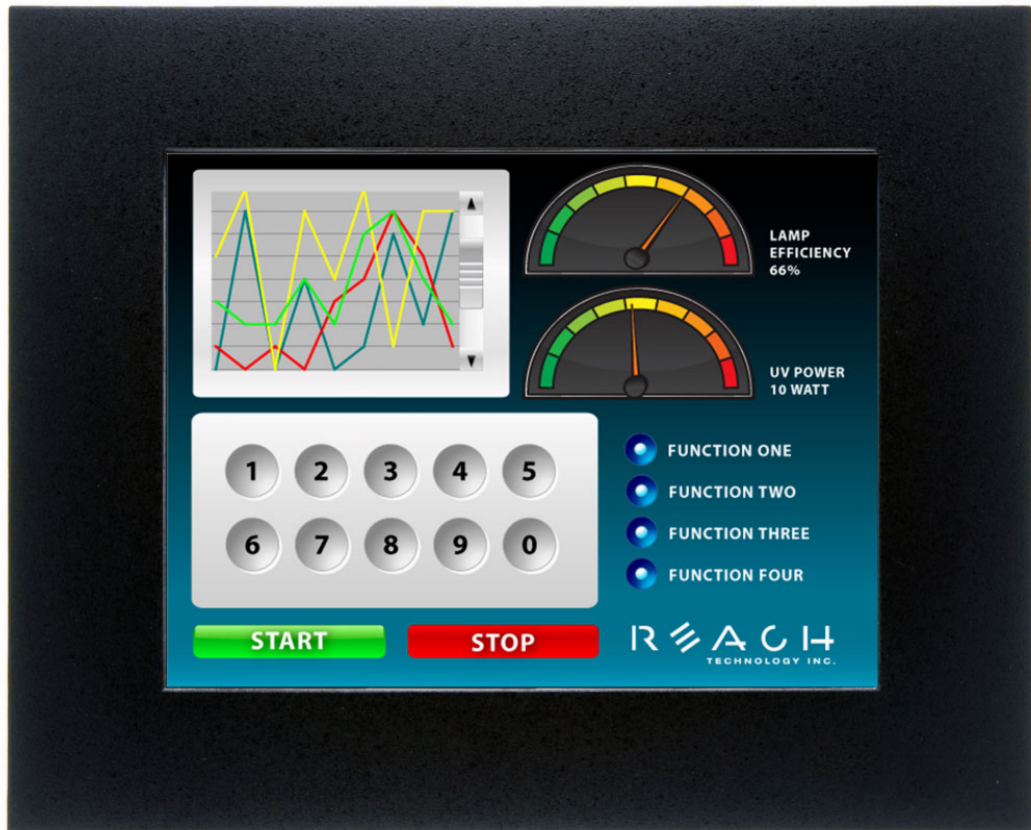
1.2. *Features*

- Product Number: 50-0105-0X
- Reach Board Model: SLCD5+
- Display Manufacturer: NEC
- Display Type: TFT
- Colors: 65,536
- Display Viewing Area (mm): 128.2(H) x 170.9(W)
- Horizontal Viewing Angle (degrees): 160 (typ.)
- Vertical Viewing Angle (degrees): 80 (Top) 60 (Bottom) (typ.)
- Screen Resolution: 640x480 (VGA)
- Display Brightness (cd/m2): 640 (typ.), with touch
- LCD Panel Contrast Ratio: 1000:1 (typ.)
- Touch Panel Type: Resistive
- Operating Temperature: -20°C to 70°C
- Storage Temperature: -30°C to 80°C
- Supply Voltage: 12-24VDC±10%
- Supply Power: 12W max
- Interface Connector: two part Phoenix type
- Serial Interface: RS232 / RS485
- Backlight Display: LED
- Number of Serial Ports: 2
- SD Card Slot
- User Flash Memory: 28M
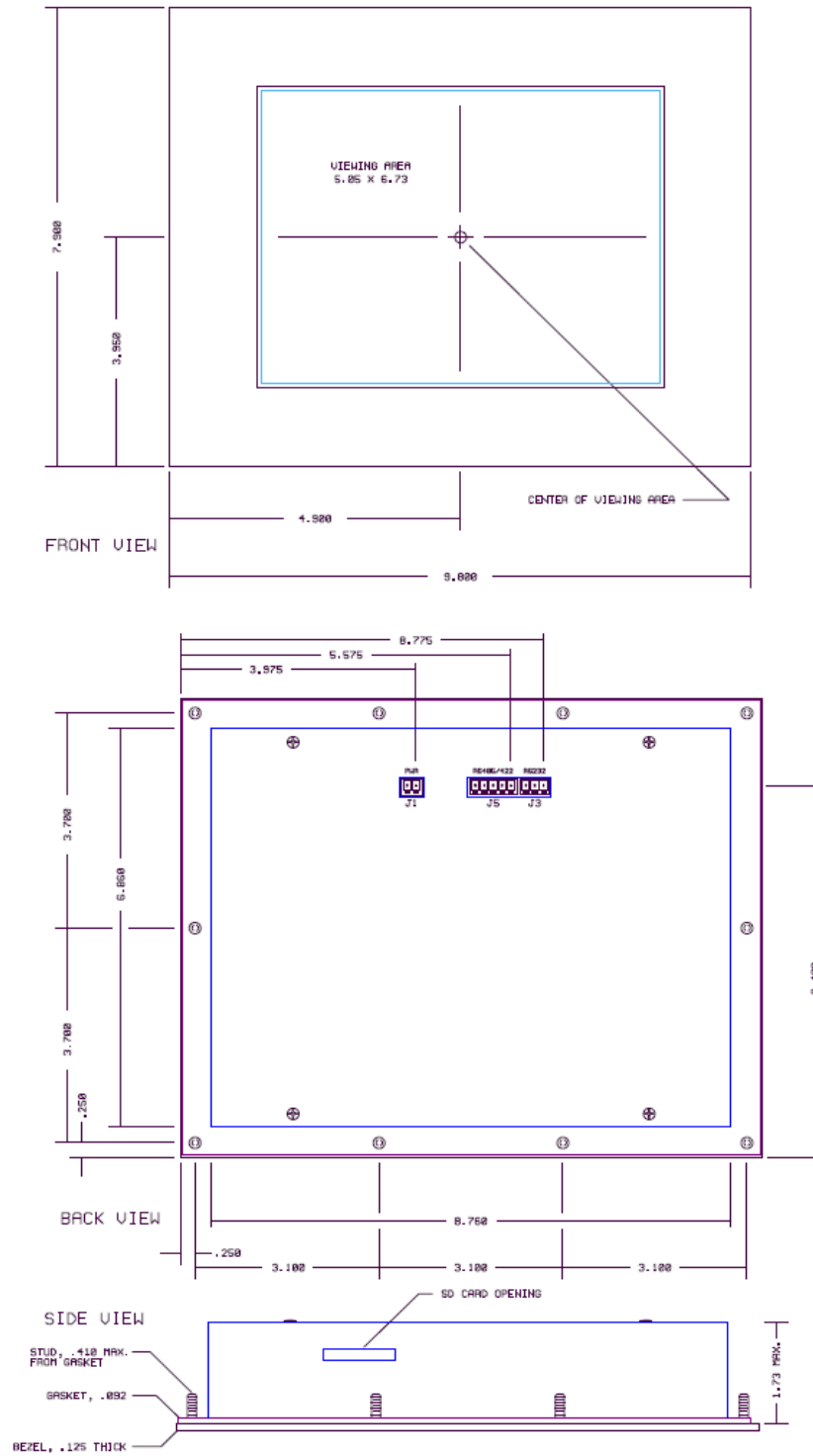- RoHS: Yes

1.3. *Electrical Characteristics*

The 8.4 inch Enclosed Unit requires 12-24V DC. The Enclosed Unit draws a maximum of 12 Watts.

1.4. *Environmental*

The 8.4 inch Enclosed Unit is rated for commercial temperature operation of -20ºC to 70ºC.

1.5. *Enclosure dimensional drawing*

Figure 1: Enclosure Physical Dimensions (inches)

(Mounting studs are 8-32)

2.   System Overview

2.1. *General - Enclosed Unit*

The Enclosed Unit acts as a "smart terminal" and is generally connected to a "host" processor that implements the desired Graphical User Interface (GUI). The host can be any kind of processor from an eight bit microcontroller to a PC. The host issues commands to the Unit and receives button press responses from the Unit. In this manual, the term "host" is used to describe the device connected to the Unit

The Unit contains flash memory that is used for bitmap and macro storage. (This is sometimes referred to as "external" flash to distinguish it from the processor's internal flash memory that stores the Unit processor firmware.) A bitmap is equivalent to a Windows™ bitmap file – it is a rectangular image. Macros are a sequence of Unit commands and are described in the SLCD5/SLCD5+ Reference Manual.

The Unit is connected to the host processor via a serial port (RS232 or RS485). There are several reasons for having multiple ports:

a) Host program development and debugging. One port is connected to the host and another to a PC. The PC is used to download images and macros that the host uses. The two ports allow both the host and PC to be connected without having to switch cables. The PC can also be used for interactive command execution / testing.

b) The Unit supports serial pass-through via the "aout" and "ain" commands. This allows serial peripherals to be attached to the Unit and accessed by the host.

2.2. *Demo (shipped with unit)*

The kit comes shipped with a demo installed. This tutorial will uninstall the demo. To run the demo afterwards, place the supplied SLCD.BIN and RUNDEMO.INI files in the root directory of an empty SD card, install the card, and reset the board or cycle power. This will run the demo. Note that it may be slow to load because it is big, but in production on the SLCD5+, it will be loaded into flash for fast startup.

2.3. *Connectors and Power*

Back Side Connections

There are three sets of connectors (pictured on the following page) on the back of the unit for serial communications and power. Here is a description of each:

1. **"RS-232" Connection: Standard RS-232-C serial connection**
    1.1. "R" - Received Data (IN direction)
    1.2. "T" - Transmitted Data (OUT direction)
    1.3. "G" - Signal Ground
    1.4. Male Connector: Manufacturer: Phoenix Contact; P/N: 1803439; Other Name: MCV 1.5/3-G-3.81
    1.5. Female Connector Manufacturer: Phoenix Contact; P/N: 1803581, Other Name: MC 1.5/3-ST-3.81

2. **"RS-485" Connection**
    2.1. "R+" - RS-422 / RS-485 receive +
    2.2. "R-" - RS-422 / RS-485 receive -
    2.3. "T+" - RS-422 / RS-485 transmit +
    2.4. "T-" - RS-422 / RS-485 transmit -
    2.5. "100 ohms to GND" - Connect to shield / drain wire of RS422 / RS485 cable
    2.6. Male Connector: Manufacturer: Phoenix Contact; P/N: 1803455; Other Name: MCV 1.5/5-G-3.81
    2.7. Female Connector: Manufacturer: Phoenix Contact; P/N: 1803604, Other Name: MC 1.5/5-ST-3.81
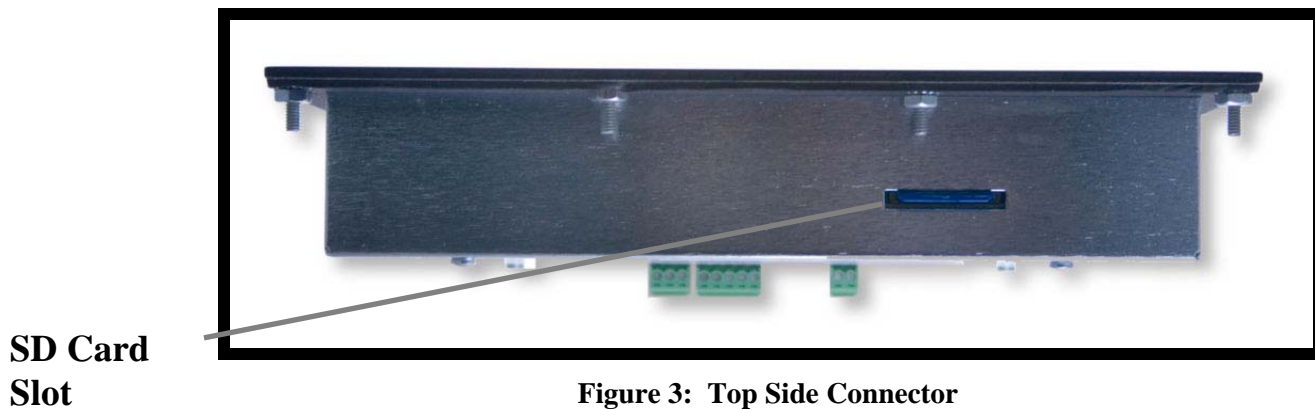
3. **"Power" Connection**
    3.1. "+12 to +24V" - Positive 7.5-24 volts DC.
    3.2. "GND" - Electrical Ground.
    3.3. Male Connector: Manufacturer: Phoenix Contact; P/N: 1803426; Other Name: MCV 1.5/2-G-3.81
    3.4. Female Connector: Manufacturer: Phoenix Contact; P/N: 1803578, Other Name: MC 1.5/2-ST-3.81

COM0

COM1
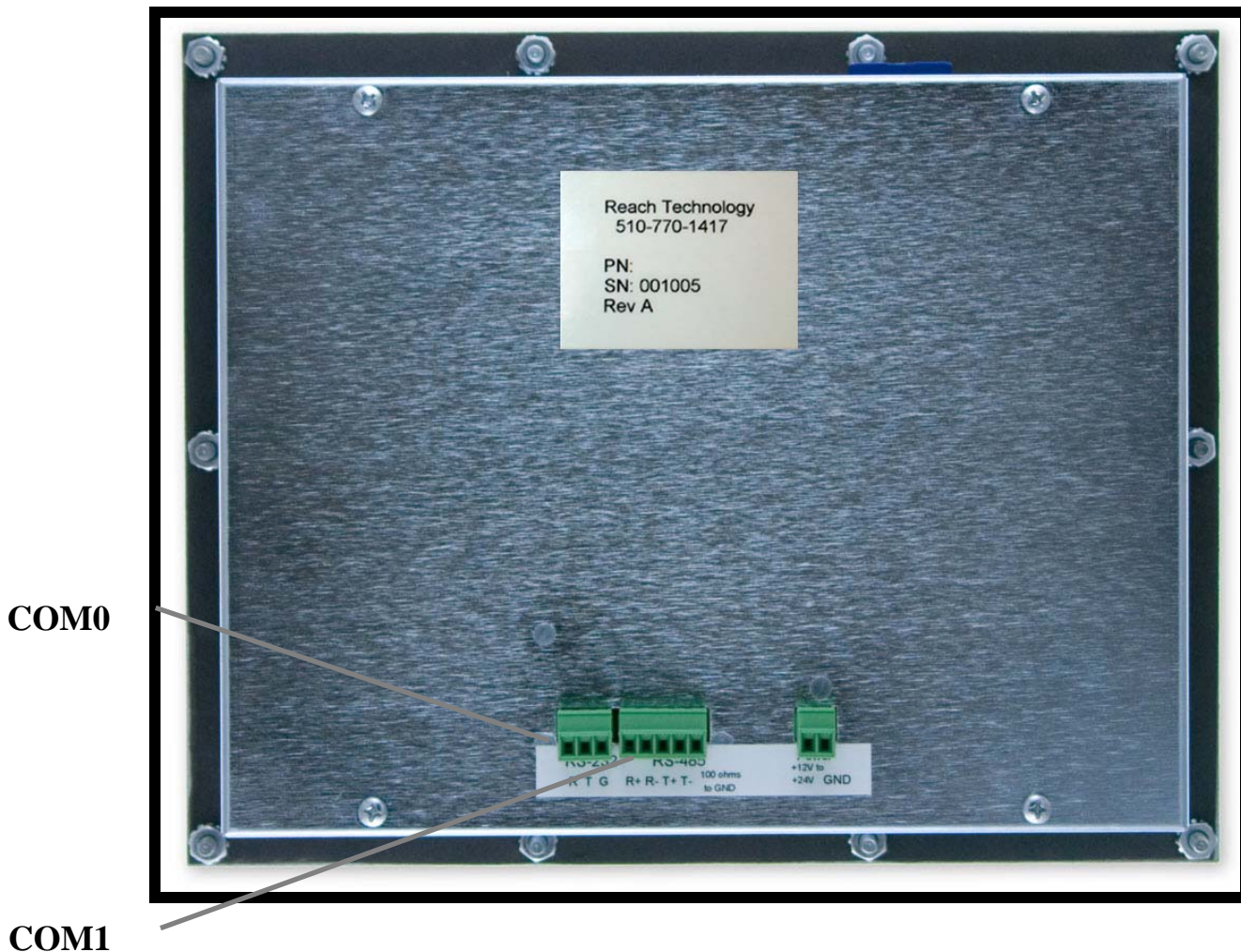
Figure 2: Back Side Connectors

Top Side Connectors

On the top side of the Enclosure Unit is a SD Card Slot.

SD Card Slot

Figure 3: Top Side Connector

2.4. Connector-Display Controller Interface Electronics

This product supports both RS232-C and RS-485 communication interfaces. An electronics interface board (PowerCom2) inside the Enclosed Unit provides the electrical support between the external connectors and the Display Controller Board. This board also provides a physical interface between external and internal (Display Controller) connectors. As a matter of convenience and improved understanding, the schematic is provided. Details of the Display Controller Board can be found in the SLCD5/SLCD5+ Reference Manual.
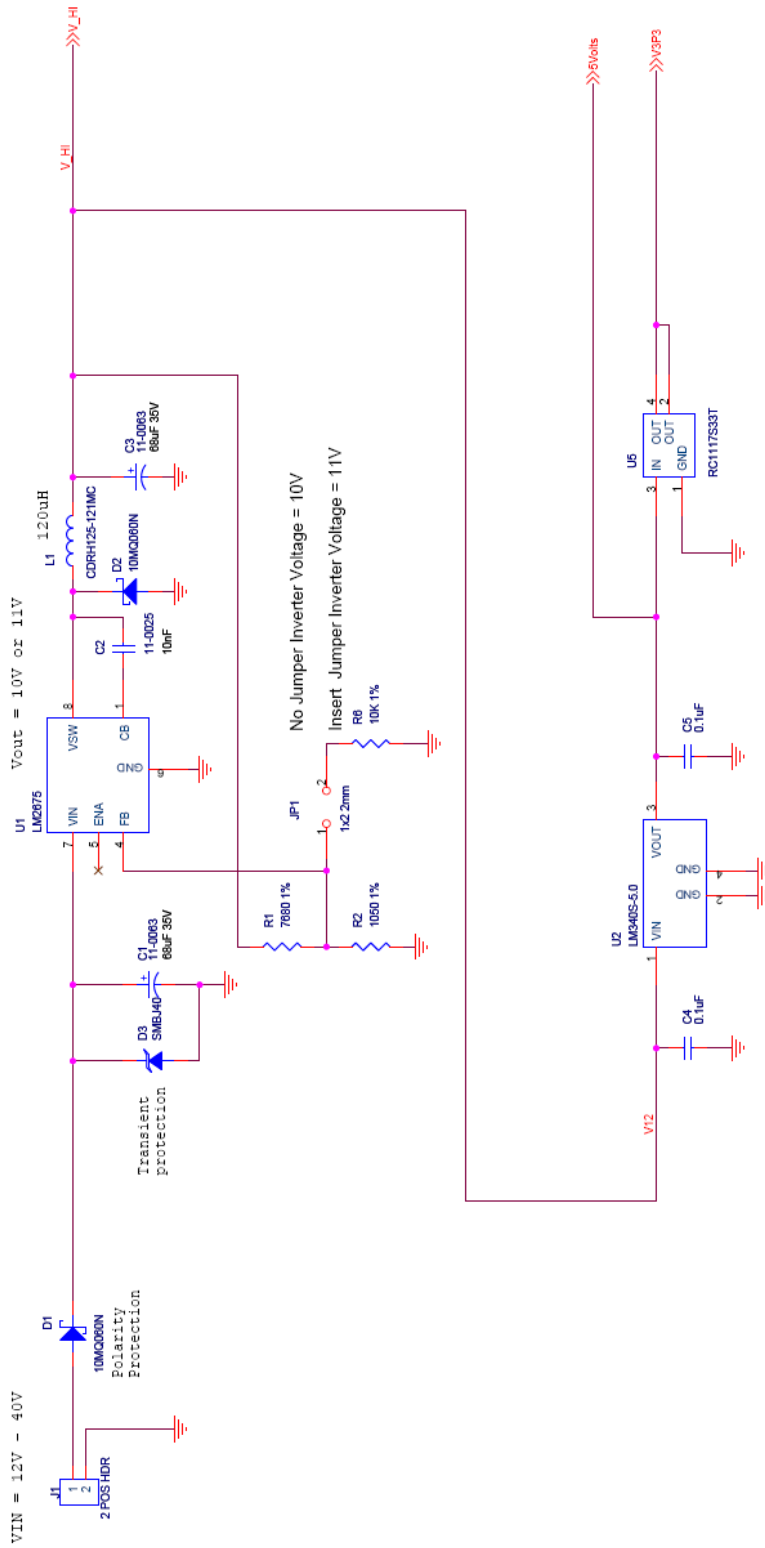
PowerCom2 Schematic
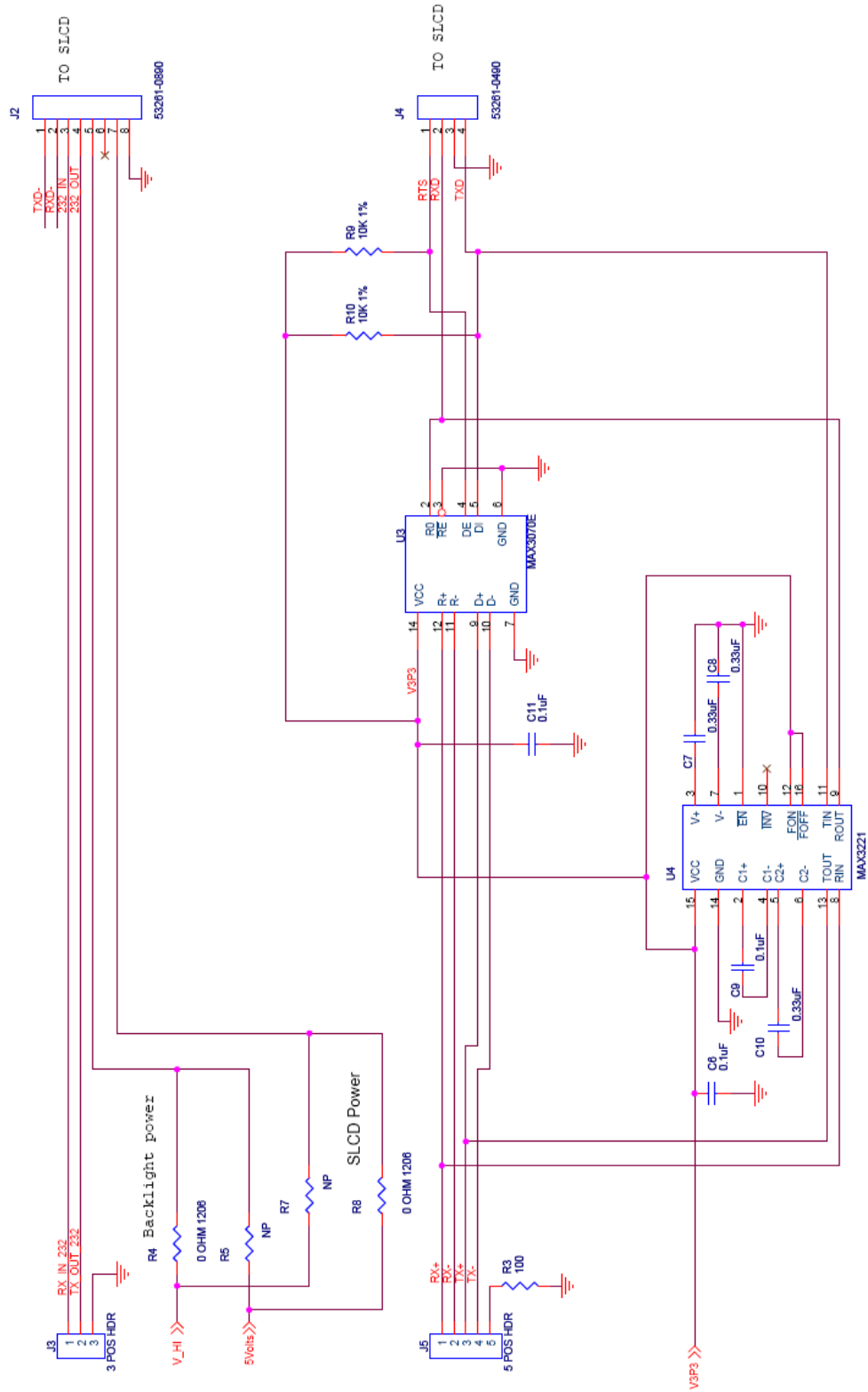

Figure 4: PowerCom2 Schematic (Page 1)

Figure 5: PowerCom2 Schematic (Page 2)

2.1. *Developing the GUI Application*

The host sends commands to create buttons and display data on the screen and also responds to button presses. See the separate SLCD5/SLCD5+ Reference Manual for the command protocol and command syntax, and for a description of the BMPload program used to store bitmaps and other data into the unit. Connect one of the Unit's serial ports to an available serial port on the host. Typically, this will be the "com0" port on the unit which is the default main control port. As shipped, the RS-232 Connection is set to 115,200 baud, 8 bit, 1 start, 1 stop, no parity.

In order to easily download bitmaps and test out commands to see what they do before coding them into the host, the Unit should also be connected to a PC. This can be done via the other RS-232 port.

How this dual port connection (host on one port, PC on another) works is as follows. Only one port is the active or "main" at any time. When any other port receives three <return> characters in a row, it auto switches to become the main port. This way, the PC can take control of the unit to download new bitmaps or send commands. The BMPload program automatically auto switches and then restores the active port. The reset button, "*RESET" command, or a power cycle also restores the previously active main port. The active port is also displayed on the power-on screen if no power-on macro is defined.

Once a PC is connected, use HyperTerminal or similar terminal emulator to send and receive commands from the unit. HyperTerminal has limitations that can cause problems; specifically, some versions cannot send the "escape" character. We recommend the RealTerm (http://sourceforge.net/projects/realterm) open source program. Remember to issue three returns, and on the fourth you will get the ">" prompt from the unit.

Note: the protocol is full duplex, but the unit does not echo received characters and terminates return data with a <return> only instead of <return><linefeed>. You will need to set "half duplex" or "echo characters locally" and "add newline to return" options on the terminal emulator. Received characters are not echoed because in a real application the host can be sending a command at the same time the unit is sending a button press notification. Also, it is more efficient to terminate unit responses with just a <return> instead of a <return><linefeed>.

Also note that the "*prevCons" command will also restore the previously active main port after an auto switch. Also, the control port autoswitch character is <return> by default but can be set to a different value with the "*auxEsc" command.

The Enclosed Unit has non-volatile memory that remembers which port is the main control port. This allows any of the Enclosed Unit serial ports to be the main port on power-on. See the SET CONTROL PORT command in the SLCD5/SLCD5+ Reference Manual.

3. Software Command Reference

The software commands and utilities are described in a separate document, SLCD5/SLCD5+ Reference Manual.

Appendix A - Parts and suppliers for Enclosed Unit controller connections

A.1   DB9 Connector

Reach provides an optional serial cable (P/N: 23-0056) that has a DB9 female on one end and a three pin screw terminal mating connector on the other. This cable is designed to be connected one-to-one to the male DB9 serial port on a PC. The wiring diagram of this cable is shown below:
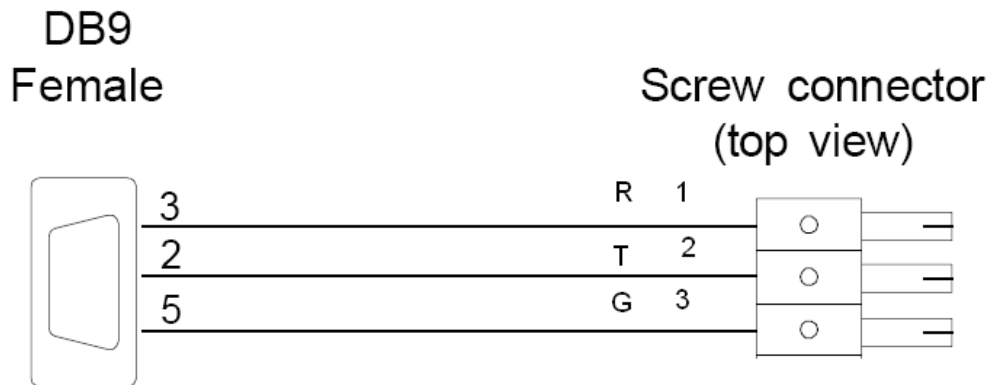

Figure 6: PC Compatible DB9 Serial Cable (P/N: 23-0056)

Appendix B - Ordering information

B.1   Contact Reach directly for ordering information.

Reach Technology Inc
4575 Cushing Parkway
Fremont, California 94538
www.reachtech.com
(510) 770-1417 x112
sales@reachtech.com

Order Number: 50-0105-0X, Description: 8.4 NEC Enclosed Unit

Appendix C - Troubleshooting

C.1   *Touch unreliable or non-operative*

If the touch screen is unreliable or non-operative, do the following:

Run the TOUCH CALIBRATE command, "tc." This will reset the calibration values and allow you to recalibrate the touch screen.

To determine the accuracy and sensitivity of the touch, you can use the "debug" command as follows:

*debug 1<return>

This puts an "X" on the screen whenever a valid touch is recognized. To turn off, use:

*debug 0<return>