![Chipsmall logo]

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QS Series
Master Development System
User´s Guide

Wireless made simple®

⚠ Warning: Some customers may want Linx radio frequency ("RF") products to control machinery or devices remotely, including machinery or devices that can cause death, bodily injuries, and/or property damage if improperly or inadvertently triggered, particularly in industrial settings or other applications implicating life-safety concerns ("Life and Property Safety Situations").

NO OEM LINX REMOTE CONTROL OR FUNCTION MODULE SHOULD EVER BE USED IN LIFE AND PROPERTY SAFETY SITUATIONS. No OEM Linx Remote Control or Function Module should be modified for Life and Property Safety Situations. Such modification cannot provide sufficient safety and will void the product's regulatory certification and warranty.

Customers may use our (non-Function) Modules, Antenna and Connectors as part of other systems in Life Safety Situations, but only with necessary and industry appropriate redundancies and in compliance with applicable safety standards, including without limitation, ANSI and NFPA standards. It is solely the responsibility of any Linx customer who uses one or more of these products to incorporate appropriate redundancies and safety standards for the Life and Property Safety Situation application.

Do not use this or any Linx product to trigger an action directly from the data line or RSSI lines without a protocol or encoder/ decoder to validate the data. Without validation, any signal from another unrelated transmitter in the environment received by the module could inadvertently trigger the action.

All RF products are susceptible to RF interference that can prevent communication. RF products without frequency agility or hopping implemented are more subject to interference. This module does not have a frequency hopping protocol built in.

Do not use any Linx product over the limits in this data guide. Excessive voltage or extended operation at the maximum voltage could cause product failure. Exceeding the reflow temperature profile could cause product failure which is not immediately evident.

Do not make any physical or electrical modifications to any Linx product. This will void the warranty and regulatory and UL certifications and may cause product failure which is not immediately evident.
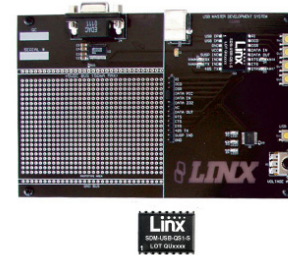
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Figure 1: QS Series Master Development System

Introduction

The Linx QS Series USB module allows the rapid addition of USB to virtually any device. The Master Development System is intended to give a designer all the tools necessary to incorporate the module into a product. This guide will show how to take full advantage of the development board included with the kit. Data guides for all of the Linx parts contained in the kit are included or may be downloaded from the Linx website. The Master Development System serves several important functions:

- Rapid Module Evaluation: It allows the module's performance and features to be quickly evaluated.

- Application Development: It comes with application software and source code that demonstrate how to interface the module with a computer. This source code can serve as a starting point for the development of the product's software.

- Design: It shows how to design with the module and how to interface with other components.

- Prototyping: It allows for additional circuitry to be placed directly on the board so that it can act as the first prototype of the product. All of the signals are available on a wire-wrap header for easy connection to external circuitry.

The Master Development System Includes 1 development board, 2 QS Series USB modules*, 1 software CD and full documentation.

*One part is soldered to the board, one extra is for use on your first prototype board

Ordering Information

Figure 2: Ordering Information
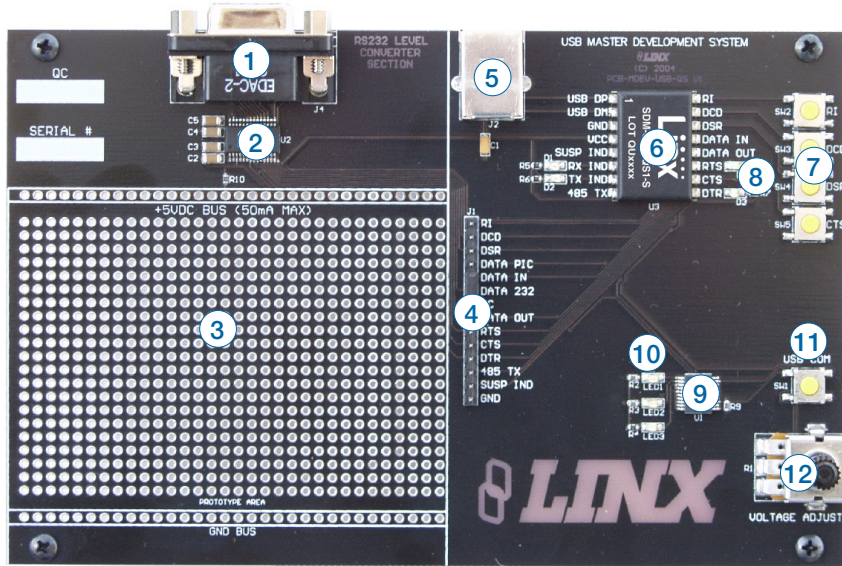
MDEV-USB-QS Development Board

Figure 3: The QS Series Development Board

1. DB9 Connector
2. RS-232 Level Converter Chip
3. Prototyping Area
4. Breakout Header
5. USB Jack
6. QS Module
7. Modem Line Buttons
8. Modem Line LEDs
9. Microcontroller
10. Microcontroller LEDs
11. Microcontroller Button
12. Voltage Adjust Potentiometer

Getting Started

There are four areas on the development board: the USB area, the RS-232 area, the Microcontroller area and the Prototyping area. The RS-232 area connects the QS module to a standard DB9 serial connector through a RS-232 level converter chip. This section allows for full handshaking so that a legacy device can be connected and tested. The microcontroller section connects the QS to a Microchip PIC microcontroller. The included software demonstrates how to interface the QS to the PIC for bi-directional communication with a custom processor. Much of the source code is documented in the software's help file.

The USB Area

This section demonstrates how to activate the modem outputs and read the modem inputs. Figure 4 shows the development board and Figure 5 shows the Modem Line section in the development software.
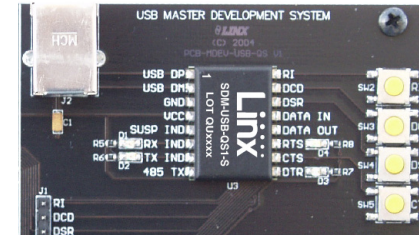

Figure 4: The USB Area

Figure 5: Development Software Modem Line Section

Pressing the RTS and DTR buttons in the software activates the RTS and DTR LEDs on the development board. Pressing the RI, DCD, DSR or CTS buttons on the board causes the appropriate indicator on the software screen to light up. The source code for this is in the software's Help File.

There are two LEDs to the left of the module, one marked TX IND and another marked RX IND. These flash when the module is sending and receiving data, respectively.

Note that the modem lines are designed to work with UARTs, so the states are inverted. The lines are at V_{CC} when off and at ground when on.

The RS-232 Area

The RS-232 area contains an RS-232 level converter that works with the QS Series module to create a USB-to-RS-232 converter. All of the modem lines are provided to allow for full handshaking, and power is provided by the USB bus. To use, plug the USB cable from the PC into the jack, a straight-through serial cable from the PC into the DB9 connector and place the jumper in the breakout header between "Data In" and "Data 232".

The development software is designed so that testing can be done with a single PC by sending data through the USB bus and receiving it back through the serial port and vice versa. This section can also be used to interface the PC with any RS-232 device. Custom software can be written to control the device directly, or the Virtual COM Port drivers can be used to make the USB module look like a serial port so that existing software can be used.
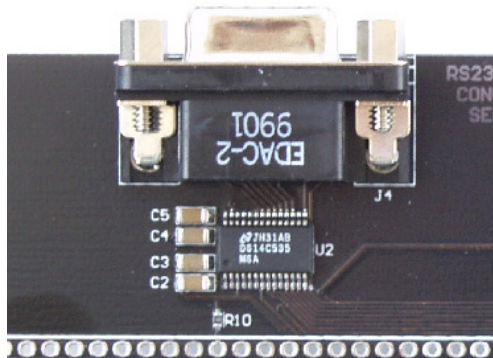

Figure 6: The RS-232 Section

The Microcontroller Area

The microcontroller area contains a PIC microcontroller from Microchip and demonstrates how to interface the QS Module with a processor. Figure 7 shows the Microcontroller area on the development board and Figure 8 shows the Send and Receive via USB section in the development software.
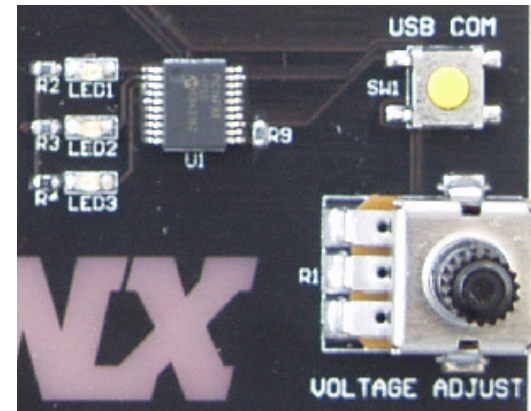

Figure 7: The Microcontroller Section

Figure 8: The Software Send and Receive via USB Section

The software sends data to the microcontroller to turn on LEDs when the user clicks the LED1, LED2 or LED3 buttons on the computer screen. The microcontroller sends data to the PC to light up the USB COM indicator on the screen when the USB COM button on the board is pressed. The microcontroller also sends data to control the A / D Voltage Adjust slider when the Voltage Adjust knob on the board is turned. Source code examples are provided with the software documentation to demonstrate the simplicity of interfacing the QS module with a processor and to aid in product development.

The USB bus provides all of the power for this section. To use, plug a USB cable into the jack and the PC, place the jumper in the breakout header between "Data In" and "Data PIC", and run the application software included with the kit.

The Prototyping Area

The prototyping area contains an area of plated through holes so that external circuitry can be placed on the board. This circuitry can be interfaced with the QS module through the breakout header to the right. At the bottom of this area is a row connected to ground and at the top is a row connected to the USB power supply. The circuitry on the development board draws approximately 40 to 50mA of current, so any circuitry added to the prototyping area cannot draw more than 50mA before enumeration, per the USB specification (please see the Power Supply Guidelines in the module's data guide for more information). If the circuitry requires more current, then an external power supply is required.Resistor R10 is a 0-ohm jumper that can be removed to isolate the power supply row from the USB supply so that an external supply can be attached to this row.

All of the module's control and data lines are connected to the header, allowing easy access from the prototyping area. A jumper is also included to route the data from the RS-232 Section or the Microcontroller section to the QS module. It must be appropriately set before the sections will work properly.
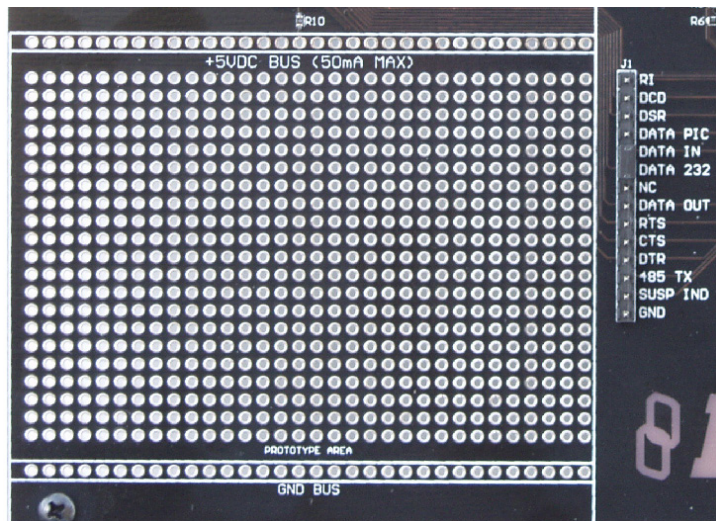

Figure 9: The Prototyping Area

Installing the Software and Drivers

The software included with the Master Development System uses the Direct Drivers and cannot be used with the Virtual COM Port Drivers. Both drivers are included on the CD with the software, so be sure to choose the appropriate one.

The first time a QS module is plugged into a computer, Windows displays the Found New Hardware Wizard, which guides the installation of the drivers. Application Note AN-00201 "Installing the SDM-USB-QS-S Drivers" describes the installation of the drivers in detail. The drivers should be installed before running the Development Software.

The QS Series Master Development System Software automatically starts when the CD is inserted and the player in the figure below appears.

Figure 10: Software Installer

Clicking the Install Software button starts the Installation Wizard, which guides the installation of the development software. The View Documentation button shows a list of the application notes and manuals related to the QS module. Selecting one of these opens the file in Adobe Acrobat. The Play Movie button plays a short video about Linx in the Player screen, which can be controlled with the Selection Keypad. Clicking the button on the bottom right of the player opens the Linx Technologies homepage in the computer's default browser.

Options listed in the View Documentation list allow for the installation of Adobe Acrobat Reader so that the documents may be viewed. There is also the option of installing Flash, which may be required if the Linx video does not play correctly.

QS Series Master Development System Software

When the software is first started, the screen in Figure 11 prompts the user to choose which area of the development board will be used with the QS module: the RS-232 or the PIC section.

Figure 11: The Choose Application Screen

The Control Panel then appears, setup for whichever section was selected. The area can be changed by going to the Window pull-down menu and clicking the appropriate selection.

Figure 12: The Control Panel for RS-232 Operation

Full documentation for the software and samples of the source code can be found in the help file, obtained by clicking on Help \ Help File and selecting either the .pdf file to be displayed in Adobe Acrobat or the .html file to be displayed in the default web browser.

If any problems are encountered, first unplug the module and plug it back in, then check the help file. If the problem is not corrected or addressed, then Linx contact information is under the Help \ Contact Us menu.

Helpful QS Resources

Below is a list of additional resources available on the development system CD or for download from the Linx website. These are intended to give the designer all of the tools needed to quickly and correctly implement the SDM-USB-QS-S module in a product.

Data Guides
- SDM-USB-QS-S USB Module Design Guide
- Application Note AN-00200, SDM-USB-QS-S Programmer's Guide
- Application Note AN-00201, Installing the Drivers for the SDM-USB-QS-S

Software
- SDM-USB-QS-S EEPROM Programmer
- SDM-USB-QS-S EEPROM Programmer Manual

Drivers
- SDM-USB-QS-S Direct Drivers
- SDM-USB-QS-S Virtual COM Port Drivers

Function Declarations for Custom Software
- SDM-USB-QS-S Visual Basic Header File
- SDM-USB-QS-S Header File

In Closing

Here at Linx, "Wireless Made Simple" is more than just our motto, it is our commitment, a commitment to the highest caliber of product, service, and support. That is why, should you have questions or encounter any difficulties using the Master Development System, you'll be glad to know many resources are available to assist you. First, check carefully for the obvious, then visit our website, www.linxtechnologies.com, e-mail techsupport@linxtechnologies.com, or call +1 800 736 6677 between 7AM and 5PM Pacific Time to speak with an application engineer.

Resources

Support
For technical support, product documentation, application notes, regulatory guidelines and software updates, visit www.linxtechnologies.com

RF Design Services
For customers who need help implementing Linx modules, Linx offers design services including board layout assistance, programming, certification advice and packaging design. For more complex RF solutions, Apex Wireless, a division of Linx Technologies, creates optimized designs with RF components and firmware selected for the customer's application. Call +1 800 736 6677 (+1 541 471 6256 if outside the United States) for more information.

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Notes

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