



RM024 DVK

USER GUIDE
VERSION 1.2

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REVISION HISTORY

Version	Revision Date	Change Description	Approved By
1.0	20 Dec 2012	Initial Release	Chris Downey
1.1	15 Apr 2014	Added RM024 DVK PCB Layout and Hardware Schematic .	Chris Downey
1.2	29 Apr 2014	Updated Jumper Set J9 to reflect Disable Drivers and Normal Operation variants.	Chris Downey

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OVERVIEW

This document contains information about the hardware included as part of the Laird Technologies OEM RM024 family Developer Kit (DVK).

The RM024 DVK is designed to allow flexibility at the hardware interface level so that the RM024 DVK can be easily interfaced to the OEM product, to a PC for performance testing, or to any other device that supports RS232 or USB serial interfaces.

The RM024 DVK is a complete, integrated package that contains all of the hardware, software, and documentation needed to integrate an OEM transceiver quickly and effortlessly.

There are many Development Kits to choose from based on your needs; the complete list is in Table 1.

Table 1: RM024 Development Kits

Part Number	Description
DVK-RM024-S125-C	(2) RM024 SMT 125mW transceivers w/U.FL connector (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. (2) 2.4GHz 1/2 dipole antennas Laird Technologies Reference Card
DVK-RM024-S125-M	(2) RM024 SMT 125mW transceivers w/integrated antenna (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. Laird Technologies Reference Card
DVK-RM024-S50-C	(2) RM024 SMT 50mW transceivers w/U.FL connector (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. (2) 2.4GHz 1/2 dipole antennas Laird Technologies Reference Card
DVK-RM024-S50-M	(2) RM024 SMT 50mW transceivers w/integrated antenna (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. Laird Technologies Reference Card
DVK-RM024-P125-C	(2) RM024 Pluggable 125mW transceivers w/U.FL connector (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. (2) 2.4GHz 1/2 dipole antennas Laird Technologies Reference Card
DVK-RM024-P125-M	(2) RM024 Pluggable 125mW transceivers w/integrated antenna (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. Laird Technologies Reference Card

Part Number	Description
DVK-RM024-P50-C	(2) RM024 Pluggable 50mW transceivers w/U.FL connector (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. (2) 2.4GHz 1/2 dipole antennas Laird Technologies Reference Card
DVK-RM024-P50-M	(2) RM024 Pluggable 50mW transceivers w/integrated antenna (1) RS232 serial adapter board (1) USB serial adapter board (1) DB9 (F) to DB9 (F) RS232 cable (1) USB cable 6 ft. Laird Technologies Reference Card

HARDWARE

The RM024 DVK board is provided so the developer can use a standard PC interface to operate the transceivers and to aid in system integration. It uses an RS232 or USB data format to interface to the transceiver. This document provides a [Hardware Schematic](#) for the RM024 Development Board.

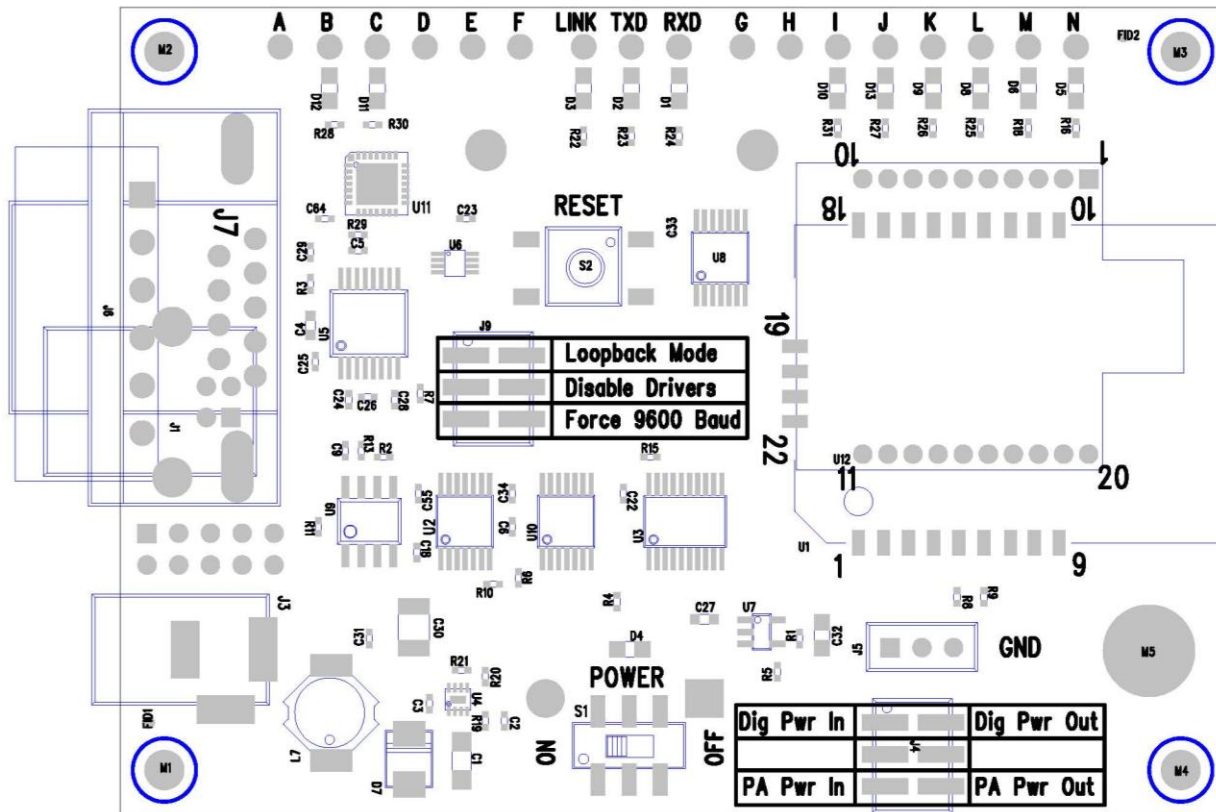


Figure 1: RM024 DVK PCB Layout

The RM024 Development Board may be ordered with either a USB or DB9 interface to the PC. [Figure 2](#) and [Figure 3](#) illustrate the two connector variants.

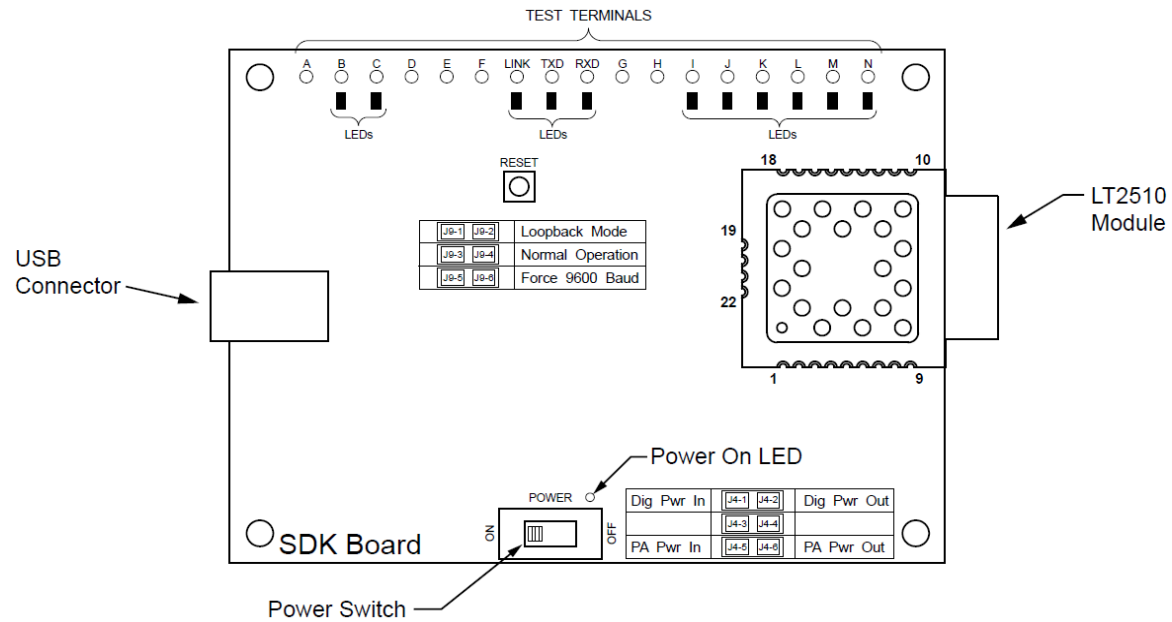


Figure 2: DVK Board with USB Connector

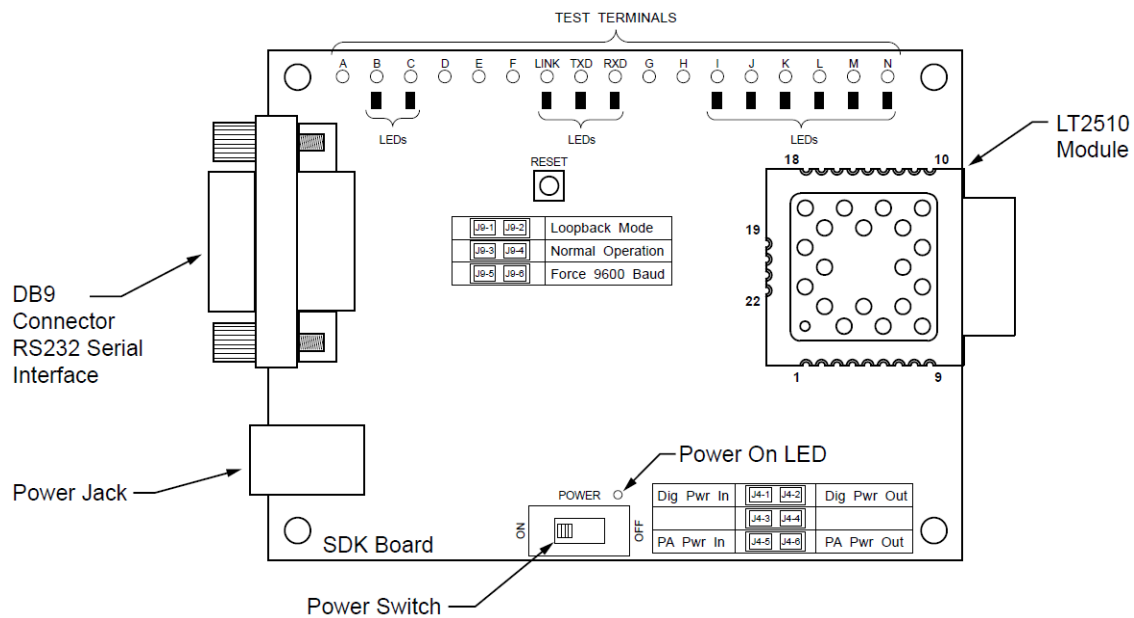


Figure 3: DVK Board with DB9 Connector

The LEDs located on the front edge of the board continuously show the configuration and operation of the RM024 DVK board. Refer to Table 2 for definitions of the LEDs, and Table 3 for DB9 connector pin assignments.

Table 2: RM024 DVK LEDs

LED	LED Color	Purpose
B	Green	This LED illuminates when GIO_6 is low.
C	Red	This LED illuminates when GIO_4 is low.
I	Green	This LED illuminates when 9600_BAUD is high.
J	Red	This LED illuminates when GIO_7 is low.
K	Red	This LED illuminates when GIO_3 is low.
L	Green	This LED illuminates when GIO_2 is low.
M	Red	This LED illuminates when GIO_1 is low.
N	Green	This LED illuminates when GIO_0 is low.
LINK	Red	This LED illuminates when In_Range is high.
TXD	Green	This LED illuminates when TXD is low.
RXD	Red	This LED illuminates when RXD is low.
Power	Green	This LED illuminates when the POWER switch is turned on and the module is powered.

Table 3: DB9 Pins

DB9 Pin	Signal Name	Description	Direction
1	DCD	Data Carrier Detect	I
2	RXD	Received Data	I
3	TXD	Transmitted Data	O
4	DTR	Data Terminal Ready	O
5	GND	Signal Ground	
6	DSR	Data Set Ready	I
7	RTS	Request to Send	O
8	CTS	Clear to Send	I
9	RI	Ring Indicator	I

Note: I/O direction is relative to the PC.

Power Switch

The RM024 DVK board is equipped with a power switch. Use this switch to turn the power to the board on and off. This power switch should be turned OFF when the USB or power supply cable is connected or disconnected to prevent possible damage to the board.

Switch	Description
Power	When set to the OFF position, power is removed from the DVK board and the RM024 transceiver.

Jumper Usage

The RM024 DVK board utilizes a set of jumpers to accomplish certain tasks. There are two sets of jumpers, the [J4](#) set and the [J9](#) set.

Jumper Set J4

Use the J4 set of jumpers to complete the circuits that supply power to the radio. There are two jumpers and BOTH JUMPERS MUST BE PROPERLY INSTALLED for the module to operate. A jumper MUST be installed on J4-1 and J4-2 to supply power to the radio itself. Another jumper MUST also be installed on J4-5 and J4-6 to supply power to the power amplifier.

Jumper Set J9

Use the J9 set of jumpers to control how the development kit board operates. Only one jumper is used with this jumper set. There are three operational modes:

- Loopback – Install the jumper on pins J9-1 and J9-2 to operate the unit in loopback mode. This means that the radio receives data and then transmits the same data. The loop is on the serial interface of the module and points back to the radio. This jumper is useful for range testing.
- Normal Operation OR Disable Drivers – On older revisions of the DVK board, J9 pins 3 and 4 are labeled Normal Operation. In newer revisions, these pins are labeled Disable Drivers and have different functionality. These are detailed below:
 - **Normal Operation:** Install the jumper on pins J9-3 and J9-4, to operate the unit in its normal mode. This means that the radio operates however it is configured using the DVK software application.
 - **Disable Drivers:** When these pins are bridged, the DVK board disables the drivers for the RX and RTS input pins to the module. By disabling the RS232 or USB driver, you can connect directly to the embedded microprocessor.

Note: If you disable drivers and connect directly to your microprocessor using the TXD and RXD through-hole connections on the evaluation board, you CANNOT simultaneously “sniff” the communications through the board’s DB9 or USB connector. This will cause the communications to be unreliable or completely non-functional.

- Force 9600 Baud – Install the jumper on pins J9-5 and J9-6 to operate the unit only at 9600 Baud. This is a recovery mode that is used when the user is unable to communicate with the radio. This mode places the unit in a known operating state so the user can go in and access the programmed data via the development software.

Table 4: J4 and J9 Jumper Pins

Jumper ID	Label	Usage
J4-1	Dig Pwr In	A jumper MUST be connected to these two pins for operation. This is the power supply circuit for the radio.
J4-2	Dig Pwr Out	
J4-3	Not Used	Not Used
J4-4	Not Used	Not Used
J4-5	PA Pwr In	A jumper MUST be connected to these two pins for operation. This is the power supply circuit for the power amplifier.
J4-6	PA Pwr Out	
J9-1	Loopback	To configure the radio for loopback operation, connect a jumper to these two pins. Note: You MAY NOT connect a jumper to the Normal Operation or Force 9600 Baud pins at the same time.
J9-2	Loopback	
J9-3	Normal Operation OR Disable Drivers	Depending on board variant, either connect for normal operation or to disable the board drivers and interface directly with the microprocessor. See Jumper Set J9 for details. Note: You MAY NOT connect to the Loopback or Force 9600 Baud pins at the same time.
J9-4	Normal Operation OR Disable Drivers	

J9-5	Force 9600 Baud	To force the radio to operate at 9600 Baud, connect a jumper to these two pins. Note: You MAY NOT connect to the Loopback or Normal Operation pins at the same time.
J9-6	Force 9600 Baud	

Interfacing the RM024 DVK to other RS232 hardware

The development kit serial board is a DCE (Data Communications Equipment) device. A DCE device is wired to the interface directly with a DTE (Data Terminal Equipment) device. Typically, a DTE device is a PC, while a DCE device is a peripheral. To interface a DCE device to other DCE device, or a DTE device to another DTE device, a null modem is required. The null modem simply swaps pins to convert a DCE device to a DTE device, and vice-versa. Normally, a null modem consists of a female and a male DB9 connector. A typical null modem configuration is shown in Table 5.

Table 5: Interfacing over RS232 - Hardware Configurations

DB9 Pin	Signal Name	DCE Direction	DTE Pin	Signal Name	DTE Direction	Null Modem Female DB9
1	DCD	O	1	I	1	4 or NC
2	RXD	O	2	I	2	3
3	TXD	I	3	O	3	2
4	DTR	I	4	O	4	6 & 1 or NC
5	GND	5	GND	5		
6	DSR	O	6	I	6	4 or NC
7	RTS	I	7	O	7	8
8	CTS	O	8	I	8	7
9	RI	O	9	I	9	NC

Hardware Schematic

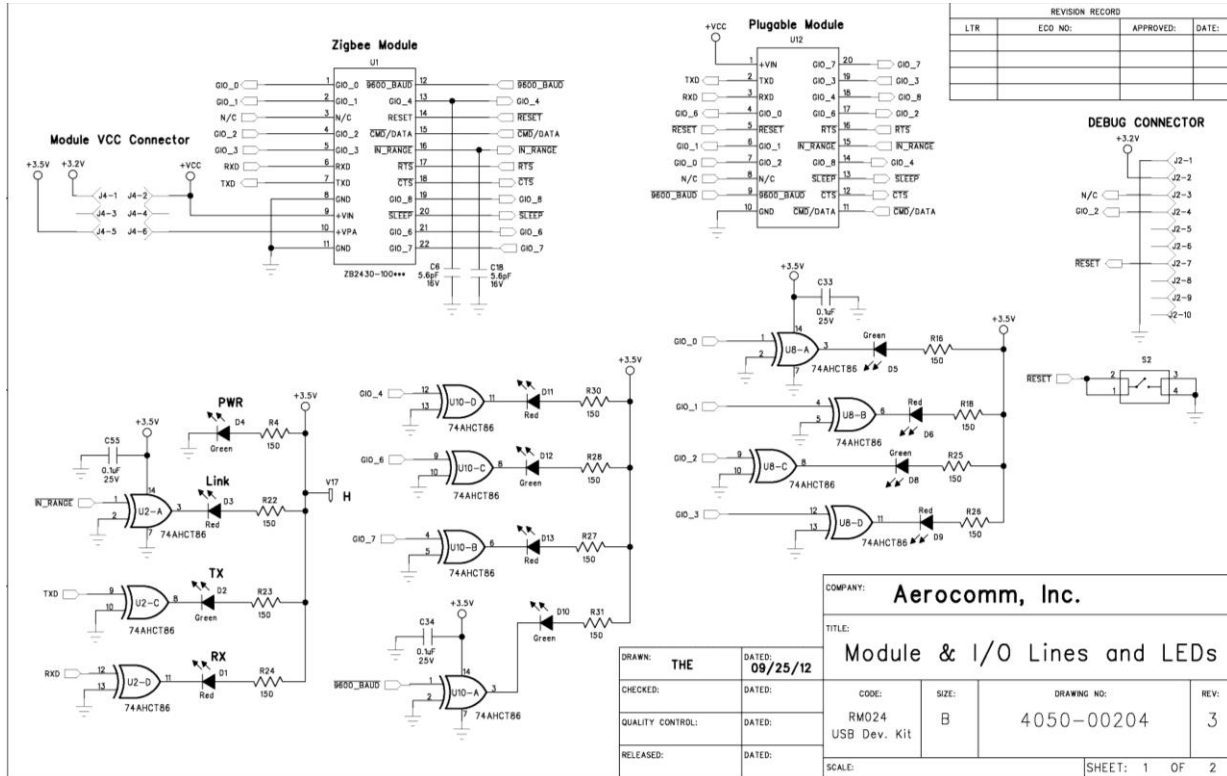


Figure 4: RM024 DVK Schematic - Module and I/O Lines and LEDs

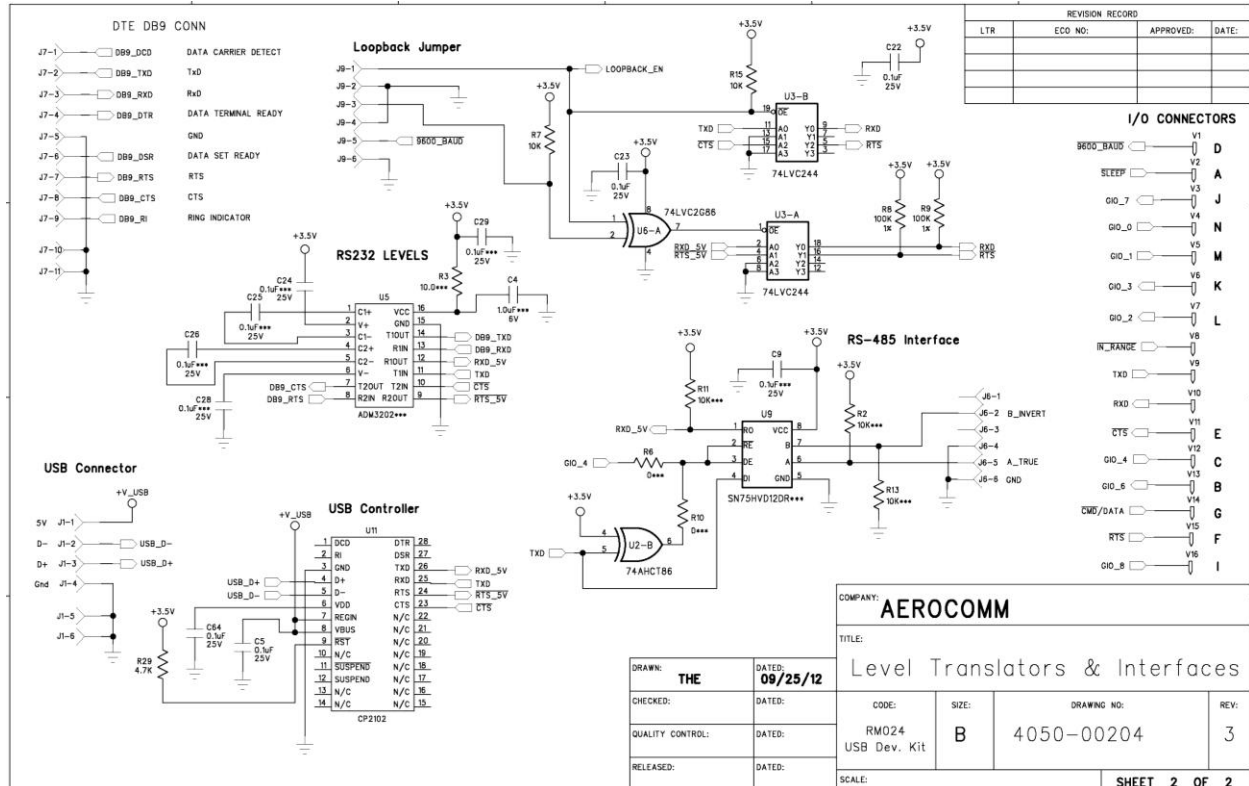


Figure 5: RM024 DVK Schematic - Level Translators and Interfaces

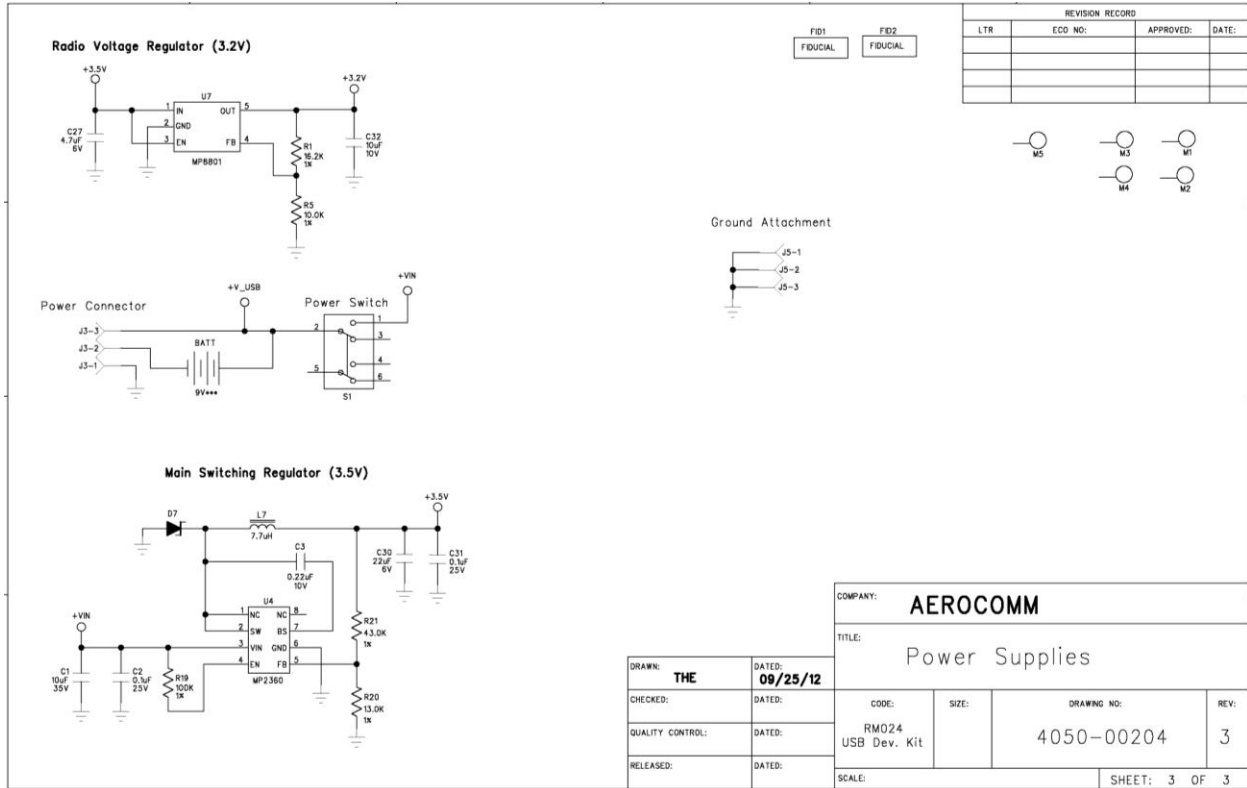


Figure 6: RM024 DVK Schematic - Power Supplies

SOFTWARE

DVK Software Installation

Locate the OEM software folder on the Laird Technologies Website (<http://www.lairdtech.com/wireless> RAMP->Product Information) as directed by the enclosed Reference Card. To install the software, run **Setup.exe** and follow the installation prompts. During the installation, the software prompts the user to install the Laird Technologies USB Driver.

Note: Installing the driver the same time as the software is recommended.

The first time the software is run, the message in [Figure 7](#) displays:



Figure 7: First-time run of Laird DVK Software

Click **OK**. The software attempts to open COM1 of the PC. If there is a conflict or the port does not exist, the software shows the port as unavailable. This error displays when one of the following conditions exists:

- There is other software running that has control over the COM1 port. Locate this software and shut it down while running "Laird OEM.exe" software.
- The PC does not have a COM1 port or the port is disabled.

PC Settings Tab

The PC Settings tab is shown in [Figure 8](#) as it appears the first time the program runs.

Select the RM024 in the Product pull-down menu. Doing this automatically selects the default baud rate of 115200. Use the **Find Ports** button to search Windows for existing COM ports. The ports are then available in the drop-down for the Port1 Settings. If the desired COM port is not found, you can manually add it with the **Add Ports** button. If the COM port is unavailable, you may select a different COM port can be selected in the Port dropdown menu. TO use two serial ports, check the Enabled checkbox under Port 2 settings.

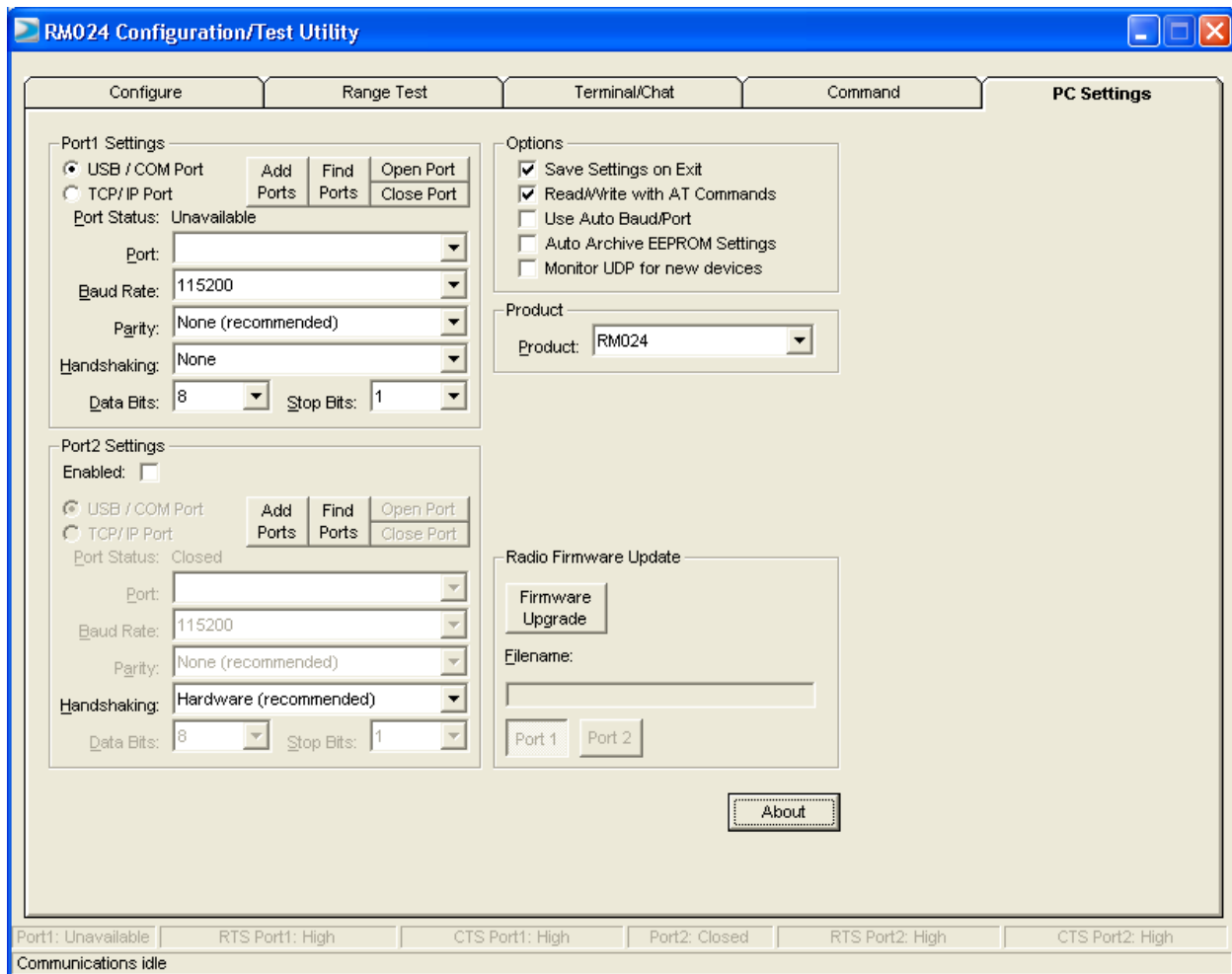


Figure 8: PC Settings Window

Port 1/Port 2 Options

The application can control up to (2) COM ports, including virtual COM ports, which physically map to USB or Ethernet ports. The Port dropdown menu allows selection of COM1 through COM16. An error message displays if a port is selected that is either non-existent or already occupied by another program. When a port selection is made, the application attempts to open the port and list its status as:

- Unavailable
- Open
- Closed

The Port Status is located just above the Port dropdown menu and also in the status bar at the bottom of the screen. The software may communicate with a radio if the Port Status is **Open**.

Although menus are shown for Baud Rate, Parity, Handshaking, Data Bits, and Stop Bits, only the Baud Rate, Parity and Handshaking menu selections can be changed.

Options

The application also provides the following options:

Table 6: Configurable options

Option	Description
Save Settings On Exit	When this option is enabled, the application automatically loads all changes made to the Settings tab the next time the application is run. Otherwise, any changes made are discarded.
Read/Write With AT Commands	When this option is enabled, the application uses AT Commands for its read/write EEPROM functions instead of the standard configuration commands. This checkbox should be checked at all times unless Pin 15 (CMD/DATA) is pulled Logic Low.
Auto Baud	When this option is enabled, the application scans all available COM Ports using the most common baud rates until a radio is found. If no radio is found or the application cannot open the port, an error message displays. The application only uses Auto Baud when prompted by the user after an unsuccessful read process.
Auto Archive	When this option is enabled, the application archives the EEPROM settings for each radio after a successful write process. Although not required, the application prompts the user to type a description of the changes made. Auto Archive can be used to restore the radio to a previously known working configuration.
Monitor UDP For New Devices	This option is used for legacy ConnexNet products and does not apply to the LT2510.

Status Bar

Located at the bottom of the application window, the status bar gives the state of Port 1, RTS Port 1, CTS Port 1, Port 2, RTS Port 2, and CTS Port 2 lines. When the text appears black, the current state is displayed. When the text appears gray, the current state is not displayed. The text shown in the bottom status bar gives a simplified status of the current pending software process. The software has no pending process when "Communications Idle" is shown. On the right side of the status bar, a progress bar indicates the progress of longer commands, such as a Find Ports or Write Radio.

About Button

Click the **About** button to determine the revision number of the application and the contact information for Laird Technologies.

Configure Tab

The configure tab is used to display the 256 byte EEPROM contents. The screen is able to do this in two formats:

- GUI
- Hexadecimal

The GUI format is the default display. The user may change the display by using buttons located in the lower left corner of the application window. Click **GUI View** to display the data in GUI format; click **EEPROM Editor View** to display the data in hexadecimal.

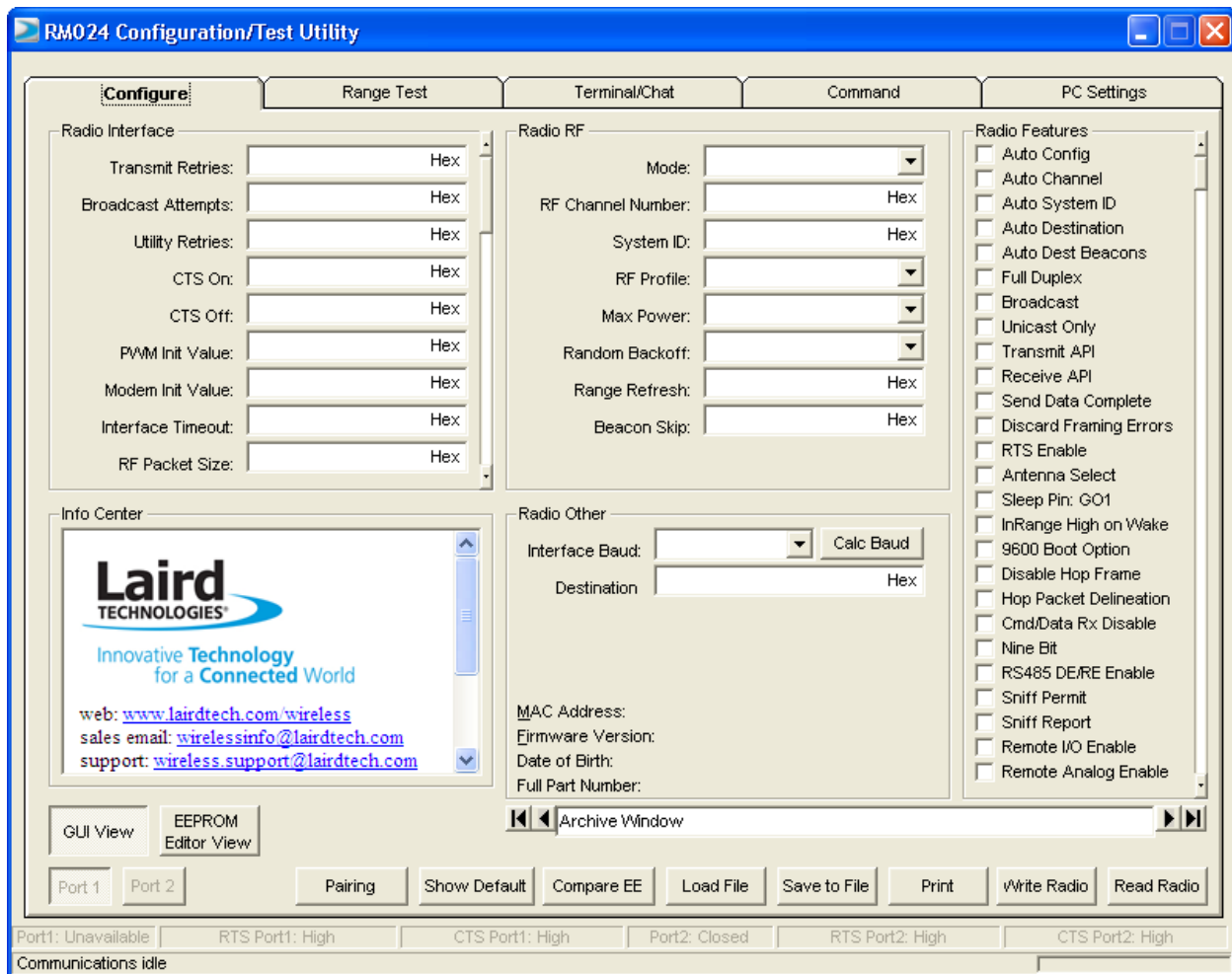


Figure 9: Configure Tab

Read Radio Button

To update the Configure and EEPROM Editor View pages with the EEPROM contents of a radio currently connected to the proper port on the PC, click **Read Radio**. When the radio is successfully read, a confirmation displays as shown in Figure 10.

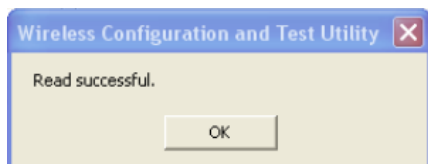


Figure 10: Successful Read Radio

Write Radio Button

After making changes to the controls on the Configure tab, click **Write Radio** to save those changes to the radio EEPROM.

Port 1/Port 2 Buttons

Click **Port 1** for the Write Radio and Read Radio buttons to communicate through Port 1. Click **Port 2** for the Write Radio and Read Radio buttons to communicate through Port 2.

Calc Baud Button

The Baud dropdown menu includes all standard PC baud rates. In rare cases, a user may want to use a non-standard baud rate. To do this, click on the **Calc Baud** button. The Calculate Baud Rate dialog box appears.

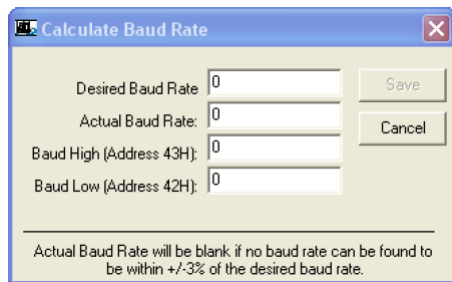


Figure 11: Calc Baud window

To calculate the settings for a particular baud rate, type the baud rate into the Desired Baud Rate text field. If the number in the Desired Baud Rate text field is $\pm 3\%$ of an acceptable baud rate, the rest of the fields in the Calculate Baud Rate dialog automatically populate. If the baud rate is not supported by the radio, the remaining text fields remain blank.

An example of an acceptable non-standard baud rate is shown in Figure 12. A non-standard rate being rejected is shown in Figure 13.

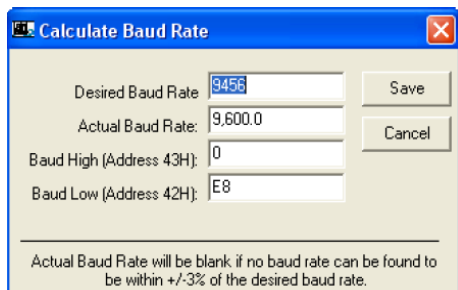


Figure 12: Successful Baud Rate

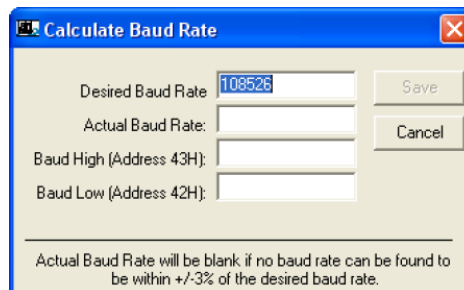


Figure 13: Unsuccessful Baud Rate

Click **Save** to display the Actual Baud Rate in the Baud window on the Configure tab of the application. Click **Cancel** to ignore these changes. The Actual Baud Rate does not always match the Desired Baud Rate. However, the program verifies that the Desired Baud Rate is within 3% of the Actual Baud Rate (as required by the radio).

Hex/Decimal Button

All of the text entry type boxes found on the Configure tab indicate whether the value is presented in Hexadecimal (Hex) or Decimal (Dec). Click the indicator (Hex or Dec) to toggle between the Hexadecimal and Decimal notation.

GUI View Button

Click the **GUI View** button to display a GUI representation of the 256 byte EEPROM contents of the radio.

EEPROM Editor View Button

Click the **EEPROM Editor View** button to display a hexadecimal dump of the full 256 byte EEPROM resident on the radio. The EEPROM Editor View is shown in Figure 14 as it appears after successfully reading a radio.

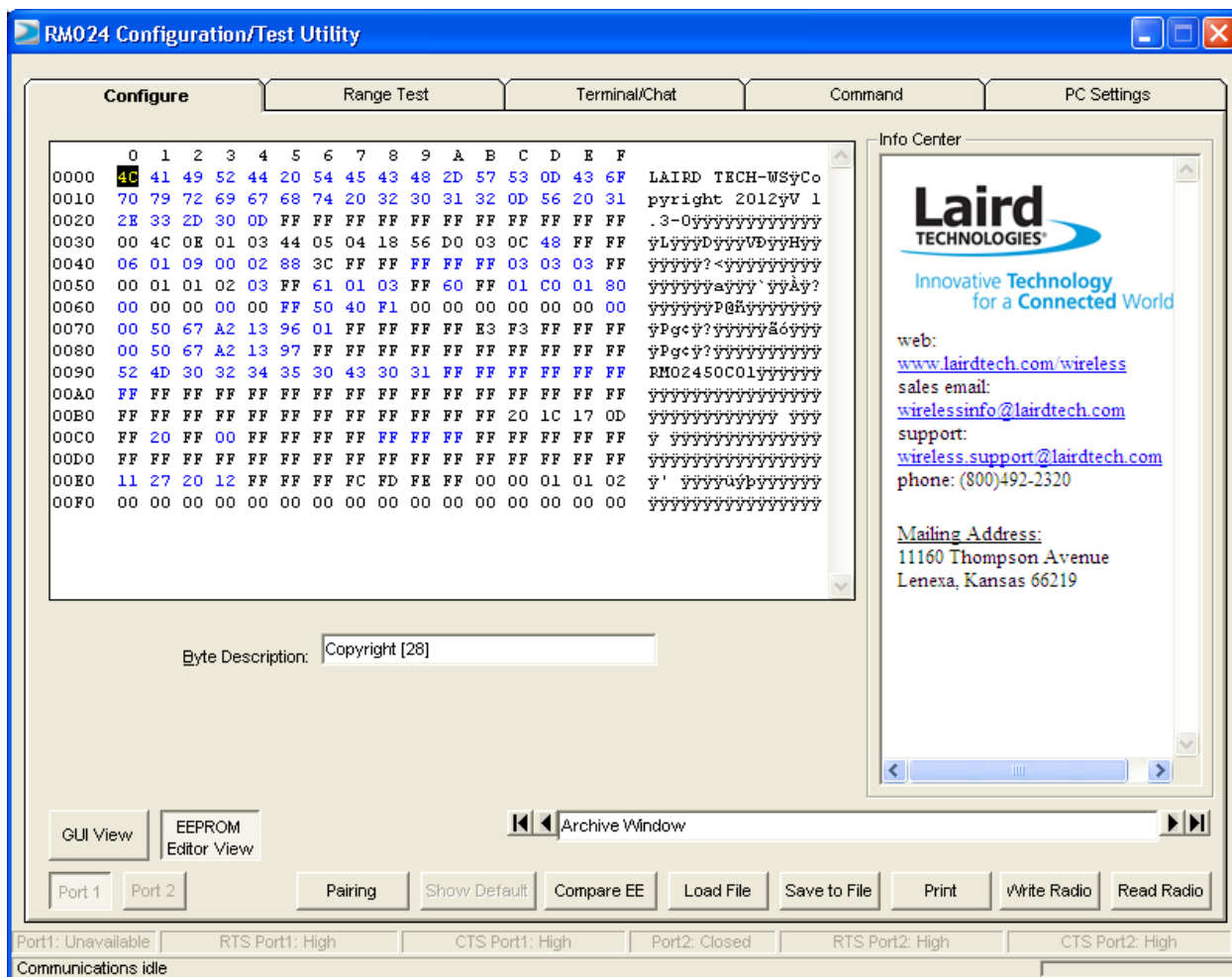


Figure 14: EEPROM Editor View after successfully reading radio

Load File Button

Click the **Load File** button to load a file previously created by this application. It can also be loaded to restore an EEPROM to a former state.

Save to File Button

Click the **Save to File** button to save an EEPROM program to a file. It also allows for the current state of the EEPROM to be restored at a later time.

Compare EE Button

Click the **Compare EE** button to compare two or more saved EEPROM files. This can be a very useful tool when analyzing performance of two or more transceivers. An example is shown in [Figure 15](#).

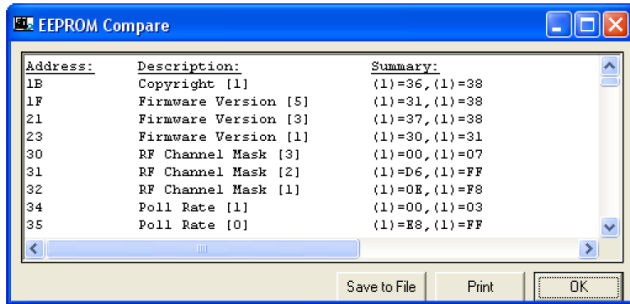


Figure 15: Compare EE Window

Range Test Tab

The Range Test tab allows you to send packets of data between two radios and report the number of successes and errors. An example is shown in Figure 16.

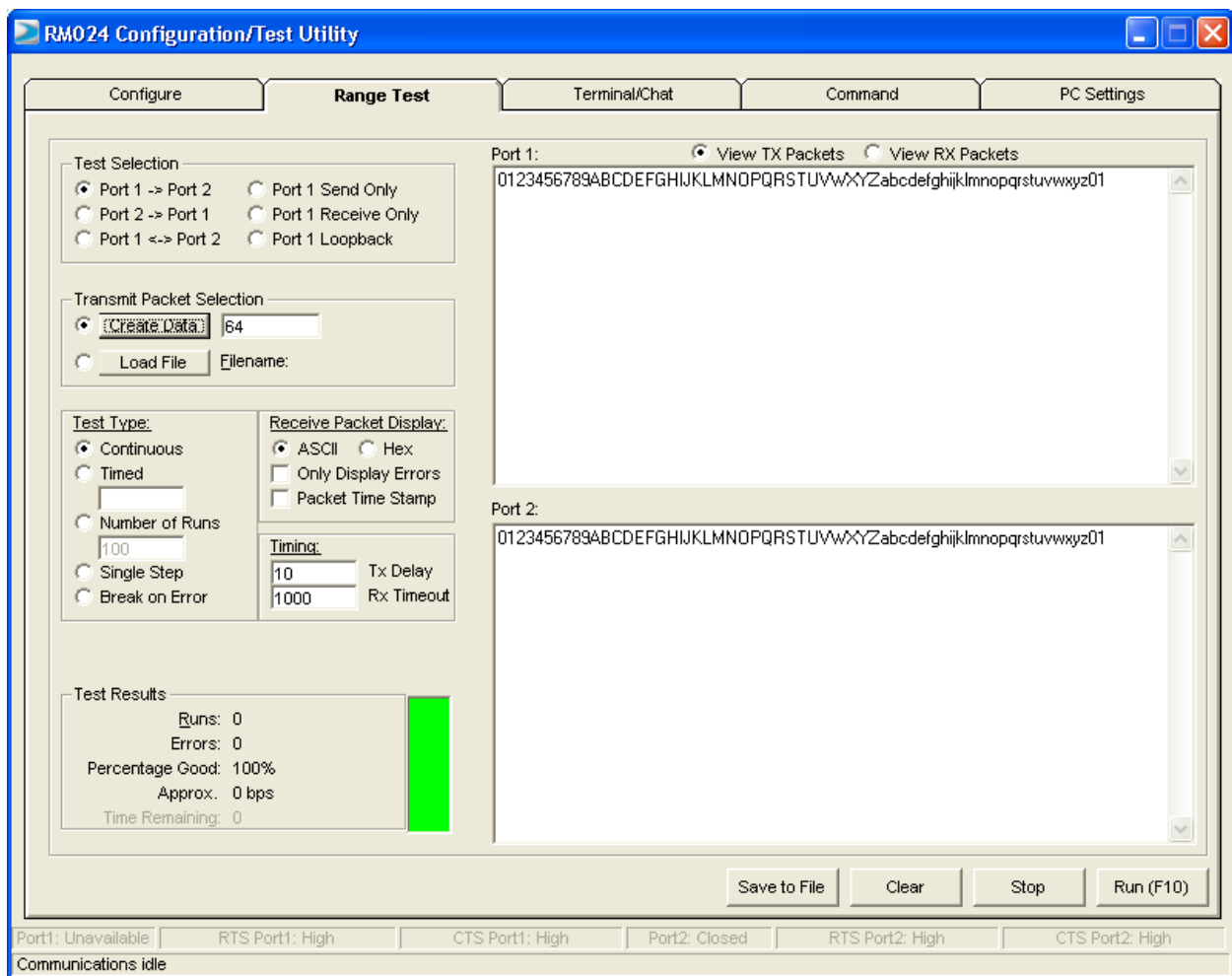


Figure 16: Range Test Tab

Test Selection

There are six test options that can be selected. For each of these options, excluding Port 1 Send Only, the DVK application performs data verification as part of the test. This means that the application sends specific data out and the application expects a specific response to that transmission. If it does not get that specific response, it reports an error.

Important: The ports referred to are Ports for the application, NOT the Windows communication ports.

The available selections are:

- Port 1 -> Port 2 – This test selection is used when two development kits are connected to one PC. This selection is used to send data from the radio connected to Port 1 to the radio connected to Port 2.
- Port 2 -> Port 1 – This test selection is used when two development kits are connected to one PC. This selection is used to send data from the radio connected to Port 2 to the radio connected to Port 1.
- Port 1 <-> Port 2 – This test selection is used when two development kits are connected to one PC. This selection is used to send bidirectional data from both radios connected to the PC.
- Port 1 Send Only – This test selection is used when one development kit is connected to a PC. This selection is used only to send data from the radio connected to Port 1. This would most often be used when the remote radio is connected to a second PC and is running the Port 1 Receive Only test. There is no data verification with this option.
- Port 1 Receive Only – This test selection is used when two PCs are used with two development kits. One development kit is connected to each PC. When this selection is made, the radio attached to the port of PC 1 receives data sent from the radio attached to PC 2, which is set to Port 1 Send Only. Both PCs should be set up with the same number of bytes in the Create Data field.

Note: Initiate the test on both computers at the same time. If this is not done, there may be some errors reported until the two radios synchronize with each other.

- Port 1 Loopback – This test selection is used with two development kits and one PC. The PC is connected to one development kit and runs the development software. The second development kit is powered on. The radio attached to the second development kit is set up in loopback mode, using a jumper to connect jumper pins J9-1 and J9-2. The radio attached to PC 1 transmits data to the remote radio. The remote radio receives the data and retransmits it back to the radio attached to PC 1.

There are three typical hardware setups:

1. One radio is plugged into a serial or USB port on a PC. The second radio is plugged into a separate power supply with a loopback adapter connected.
2. One radio is plugged into a serial or USB port on a PC. The other radio is plugged into a different serial or USB port on the same computer.
3. One radio is plugged into a serial or USB port on a PC. The other radio is connected to a serial or USB port on another PC.

If using two PCs for the test, the application run on both sides should have the second COM port disabled on the PC Settings tab.

Table 7: Example Hardware Setups

Test Selection	Port 1 Action	Port 2 Action	Hardware Setup
Port 1 -> Port 2	TX	RX	2
Port 2 -> Port 1	RX	TX	2
Port 1 <-> Port 2	TX/RX	TX/RX	2
Port 1 Send Only	TX	N/A	3
Port 1 Receive Only	RX	N/A	3
Port 1 Loopback	TX/RX	N/A	1

Transmit Packet Selection

This section allows you to select the data packet used to perform the Range Test. You may either create data of a specified byte length or load your own text or configuration file.

Test Type

The test type allows you to select how long the test is performed. The choices are shown in [Table 8](#):

Table 8: Test Types

Test Type	Description
Continuous	Test runs until stopped.
Timed	Test runs for a specified time period.
Number of Runs	Test runs for a specified number of runs.
Single Step	Test runs for a single step.
Break on Error	Test runs until an error occurs.

Received Packet Display

This section allows you to select how the received packets are displayed. The user is provided the following options:

- ASCII or Hexadecimal format
- Packet Time Stamp
- Only Display Errors

Timing

This section allows you to modify the TX and RX timing of the test.

TX Delay	This field allows the operator to change the amount of delay between transmissions (in milliseconds {ms}).
RX Timeout	This field allows the operator to change the amount of time to allow for a packet to be displayed.

Test Results

The Test Results area is used to display the results of the test.

Runs	The run number is incremented every time a test is completed, whether errors occurred or not.
Errors	This is the number of errors that occurred while the test was performed.
Percentage Good	This is the percentage of test results that were successful. $\frac{\text{Runs} - \text{Errors}}{\text{Runs}} \times 100 = \text{Percent Good}$
Approx	This is a display of the approximate throughput of the radio. The application uses a rough calculation to display the amount of data transferred in bits per second (bps).
Time Remaining	This field is used to indicate how much longer the test will run. Depending on the initial setup of the test, this field may display time or, if the test was set to run a specific number of runs, it displays the number of runs that remain.

Port 1/Port 2

Displays the Tx or Rx activity for Port 1 and Port 2.

View Tx Packets/View Rx Packets

Allows you to switch between Tx or Rx packets in the Port 1/Port 2 display.

Clear Button

Click the **Clear** button to set all of the statistics and errors back to zero. This can be used while a test is running.

Terminal/Chat Tab

The Terminal/Chat tab is used to send small data packets between two COM ports. As data is received it is appended to the appropriate Port window. An example of the Terminal/Chat tab is shown in [Figure 17](#).

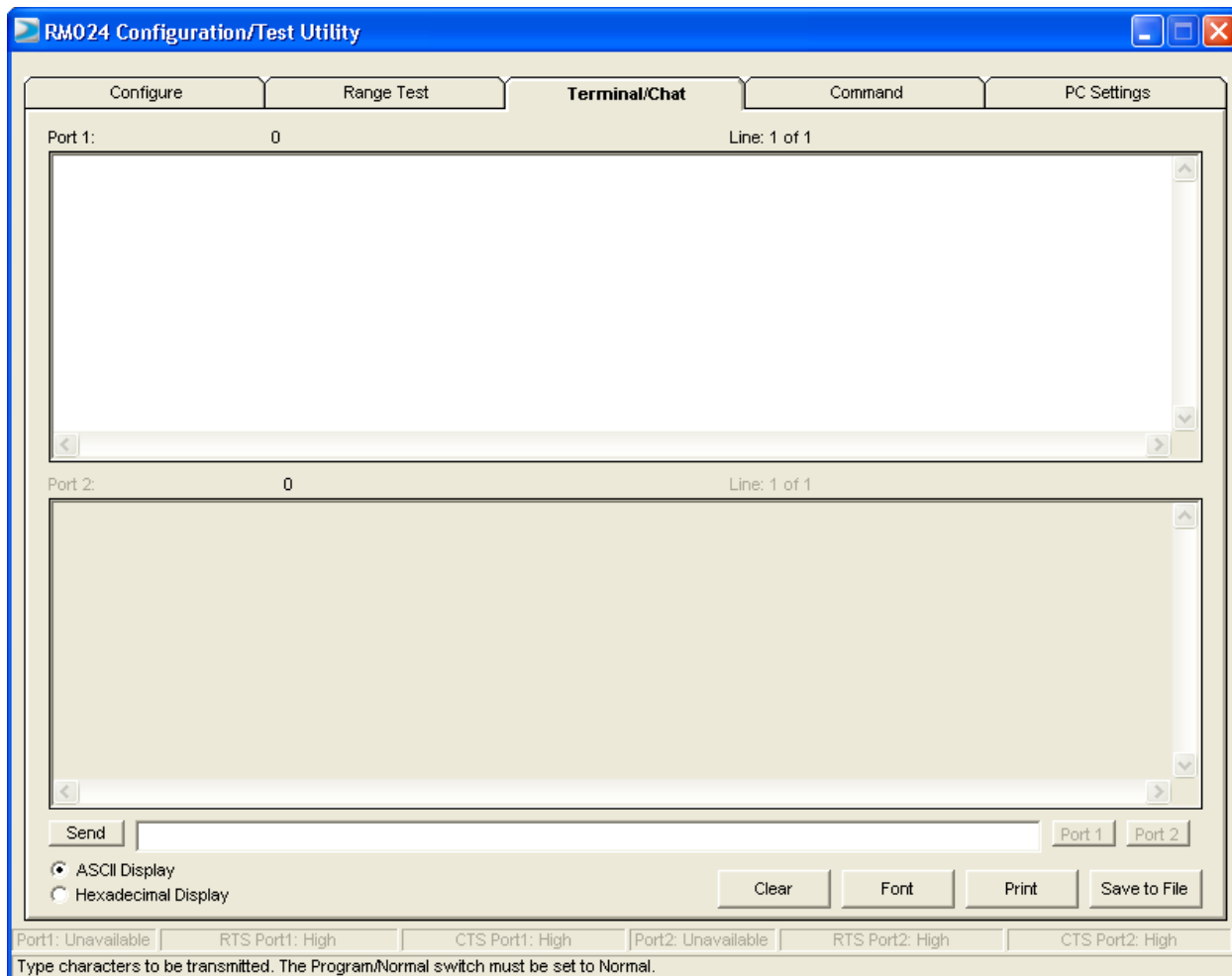


Figure 17: Terminal / Chat Tab

Send Button

Click the **Send** button to send the data in the textbox out of the selected port(s). The current user's Windows username is also sent with the data.

ASCII Display

When selected, newly received data is displayed in ASCII format.

Hexadecimal Display

When selected, newly received data is displayed in Hexadecimal format.

Clear Button

Click the **Clear** button to erases all of the text displayed in both text windows.

Font Button

Click the **Font** button to open a font selection window allowing the font used in the text boxes for both terminals to be changed. Both terminals will use the same font.

Command Tab

The Command tab is used to send configuration, CC (product family dependent) and AT commands (product family dependent) to the radio on the selected port. [Figure 18](#) is an example of the Command tab for the RM024 product family:

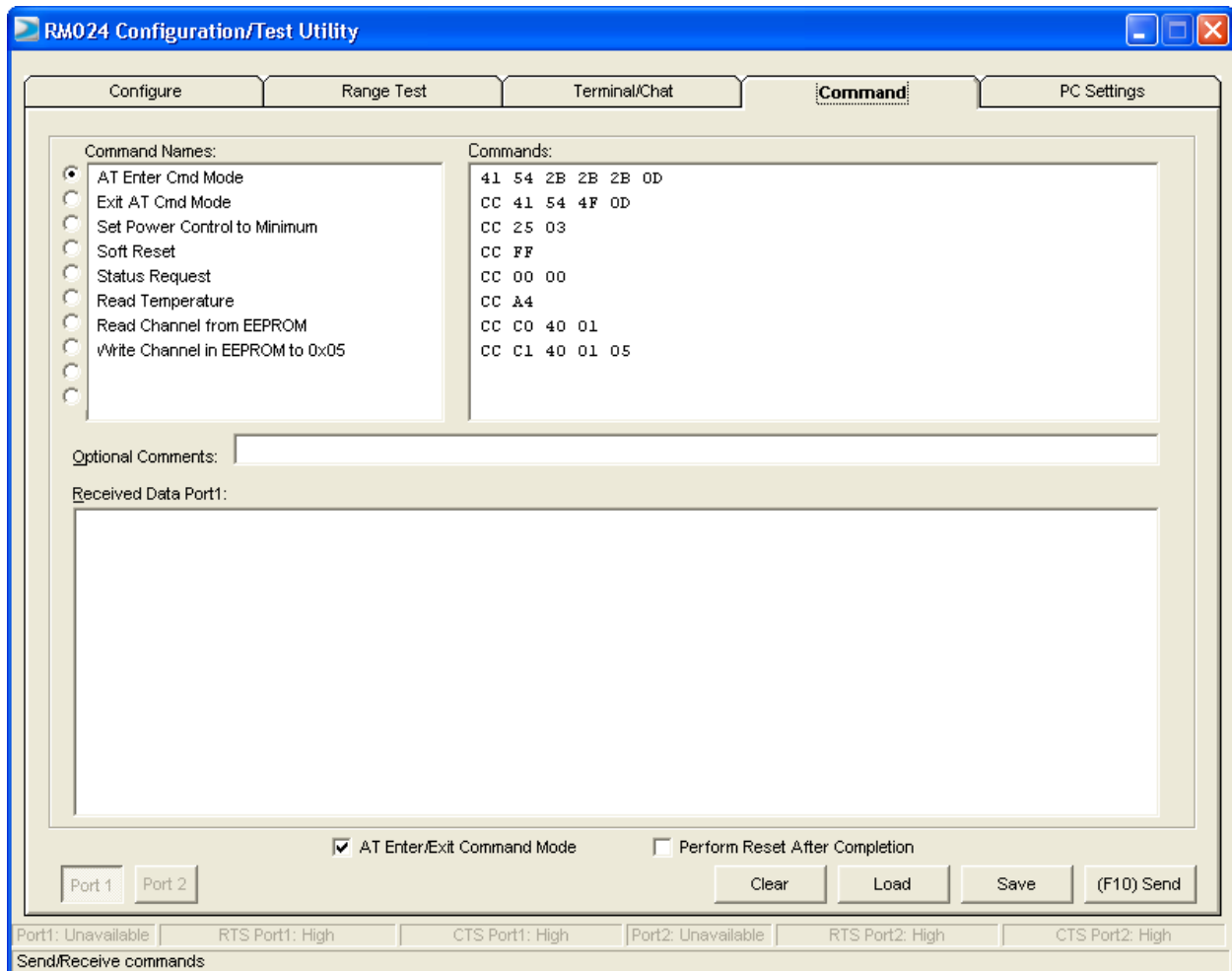


Figure 18: Command Tab

Radio Buttons

The application sends one command at a time. To select a command, click the **Radio** button next to it.

Command Name Field

The Command Name field consists of a list of the most commonly used commands for the module. Additional commands may be added to the list. The length of the Command Name is not restricted and is not required by the application.

Command Field

The Command field contains a list of the commands for each of the command names in the Command Name field. When a command name is selected in the Command Name field, the command that is in the same position in the adjacent Command field is the command that is sent to the radio.

Optional Comments Field

The Optional Comments field is where the user may enter any comments that they would like to accompany the command information. This field is not restricted in length and is not required by the application. The description for a particular command displays when that commands radio button is selected.

Received Data Port 1/Port 2 Window

Data received over the serial port while on the Command tab (whether in response to a command or not) displays in the Received Data window in hexadecimal format.

AT Enter/Exit Command Mode

When selected, the radio enters/exits AT Command mode as required to complete the selected command by creating a virtual version of the Command/Data Line.

Perform Reset After Completion

When enabled, the radio resets after the selected command has completed. This is useful when writing EEPROM changes, which only take affect after a reset.

Port 1/Port 2 Buttons

Click the **Port 1** button to display received data for Port 1. Click the **Port 2** button to display received data for Port 2.

Send Comm

Click the **Send Comm button** to send the selected command out of the selected serial port.

TROUBLESHOOTING

Problem	Solution
No lights on DVK Board.	<ol style="list-style-type: none"> 1. Check the power connection. The VCC LED should be lit when power is applied to the serial board. 2. Make sure there is nothing shorting VCC to GND and that the radio is seated into its interconnect board properly. 3. Make sure that the Power switch is in the On Position.
Radio EEPROM cannot be read by Laird Technologies OEM.exe.	<ol style="list-style-type: none"> 1. Verify that power is applied and that the serial/USB cable is connected to the serial board and the PC. 2. Verify that the correct serial/USB port is selected in the software (Port 1 or Port 2). 3. Verify baud rate and port address on the PC Settings page. 4. Verify the Port Status is Open in the Status bar or in the Port 1 Settings on the PC Settings tab.
EEPROM can be read/viewed with the OEM software, but data cannot be sent between the two transceivers using OEM.exe.	<ol style="list-style-type: none"> 1. Reset both radios. 2. Make sure both transceivers have the same Channel Number and System ID 3. Check all cables and connections. 4. Make sure one radio is a server and one is a client. 5. Check radio addressing. 6. Make sure that radios are separated by at least ten feet. 7. Make sure the In Range LED is lit on both transceivers.
Packets can be sent between both radios using OEM.exe but cannot be sent from software or hardware not supplied by Laird Technologies	<ol style="list-style-type: none"> 1. Use the Hardware section of this guide to determine if a null-modem adapter is required for interfacing to the hardware. 2. Make sure the baud rate of the radios matches that of the OEM Host hardware.
A Framing or Data Timeout error occurs while running a Range Test.	<ol style="list-style-type: none"> 1. Verify that the baud rate on the PC Settings page matches that of the radio's EEPROM. 2. Verify that both radios are powered on and that the Port settings are correct. 3. Verify that the In Range LED is lit on both radios.

TECHNICAL SUPPORT

Please refer to the contact information included in the DVK for further details. For all other inquiries, please refer to the RM024 Quick Start Guide and RM024 User's Guides.

RM024 Basics and Tips

1. There must only be one server per network (RF Channel Number & System ID); there can be any number of clients.
2. The Default configuration is a client radio with the addressing mode not set. For the radios to communicate, the addressing must be set to either:
 - Broadcast Mode
 - Auto Destination (for clients only)
 - The MAC Address of the remote radio must be entered into the Destination Field.
3. The Link LED on the server is always lit. The Link LED on a client is lit when it is in sync with a server. The Link light must be lit for RF communications to occur.
4. Configuration should always be performed with the Laird Technologies Windows OEM Configuration Utility. Though the radios are serial modems accessible through traditional terminal emulators such as HyperTerminal, the AT commands must be sent in their entirety which cannot be achieved when typed in manually. Once configured, testing can be performed with HyperTerminal or another emulator to send serial data.
5. Windows only allows one program to access a Serial Communications Port at a time. When the Laird Technologies Windows OEM Configuration Utility is open, no other serial applications should be open.
6. When using the USB Evaluation Board, it is recommended to click **Close the Port** on the PC Settings tab prior to unplugging the USB cable or powering off the module. If not, the port may become unavailable and need to be either toggled by closing and opening the port, or the software may need to be reset.
7. The PC Settings tab is used to set the configuration of the OEM Configuration Utility, not the radio. The Configuration Tab is used to configure the radio, but the radio's EEPROM must be read first.