Linx TECHNOLOGIES

HumPRC™ 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 have a frequency hopping protocol built in, but the developer should still be aware of the risk of interference.

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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HumPRC™ Master Development System

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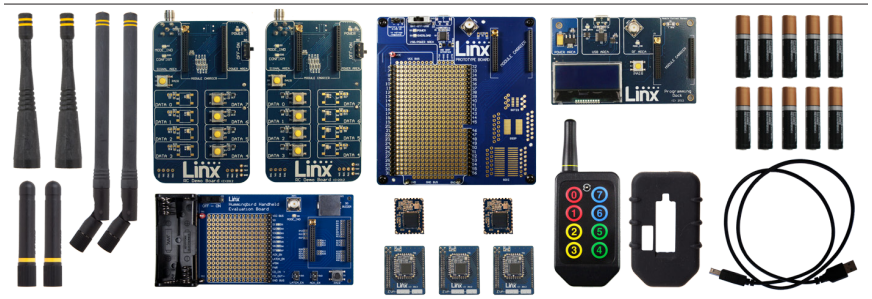


Figure 1: HumPRC™ Series Master Development System

Introduction

The Linx HumPRC™ Series Remote Control Transceiver modules offer a simple, efficient and cost-effective method of adding remote control capabilities to any product. The Master Development System provides a designer with all the tools necessary to correctly and legally incorporate the module into an end product. The boards serve several important functions:

- Rapid Module Evaluation: The boards allow the performance of the Linx HumPRC™ Series modules to be evaluated quickly in a user's environment. The development boards can be used to evaluate the range performance of the modules.
- Application Development: A prototyping board allows the development of custom circuits directly on the board. All signal lines are available on headers for easy access.
- Software Development: A programming dock with a PC interface allows development and testing of custom software applications for control of the module.
- Design Benchmark: The boards provide a known benchmark against which the performance of a custom design may be judged.

Includes 3 Carrier Boards, 2 PRC Demo Boards, 1 Programming Dock, 1 Prototype Board, 2 HumPRC™ Series transceivers, 1 PRC Long-Range Handheld transmitter and accessories, 1 evaluation board, antennas, batteries, USB cables, software and full documentation.

Ordering Information

Ordering Information	
Part Number	**Description**
MDEV-***-PRC	HumPRC™ Series Master Development System
HUM-***-PRC	HumPRC™ Series Remote Control Transceiver, Castellation Interface, External Antenna Connection
HUM-***-PRC-CAS	HumPRC™ Series Remote Control Transceiver, Certified, Castellation Interface, External Antenna Connection
HUM-***-PRC-UFL	HumPRC™ Series Remote Control Transceiver, Certified, Castellation Interface, U.FL Connector
EVM-***-PRC	HumPRC™ Series Carrier Board, Not Certified, Through-Hole Pin Interface, MMCX Connector for the Development System
EVM-***-PRC-CAS	HumPRC™ Series Carrier Board, Certified, Through-Hole Pin Interface, RP-SMA Connector
EVM-***-PRC-UFL	HumPRC™ Series Carrier Board, Certified, Through-Hole Pin Interface, U.FL Connector
MDEV-DEMO-RC-A	Development System Remote Control Demo Board, Type A
MDEV-DEMO-RC-B	Development System Remote Control Demo Board, Type B
MDEV-PGDOCK	Development System Programming Dock
MDEV-PROTO	Development System Prototype Board
CON-SOC-EVM	EVM Module Socket Kit

*** = Frequency; 868, 900MHz

Figure 2: Ordering Information

HumPRC™ Series Transceiver Carrier Board

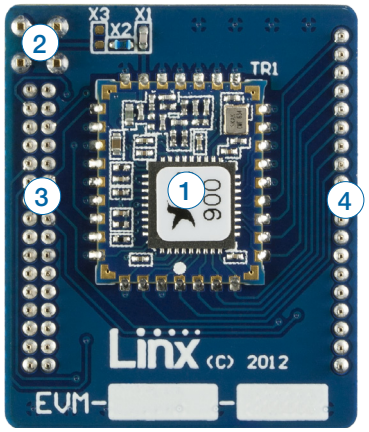


Figure 3: HumPRC™ Series Transceiver Carrier Board

HumPRC™ Series Transceiver Carrier Board Objects

1. HumPRC™ Series Transceiver
2. MMCX RF Connector
3. Dual Row Header
4. Single Row Header

HumPRC™ Series Transceiver Carrier Board Pin Assignments

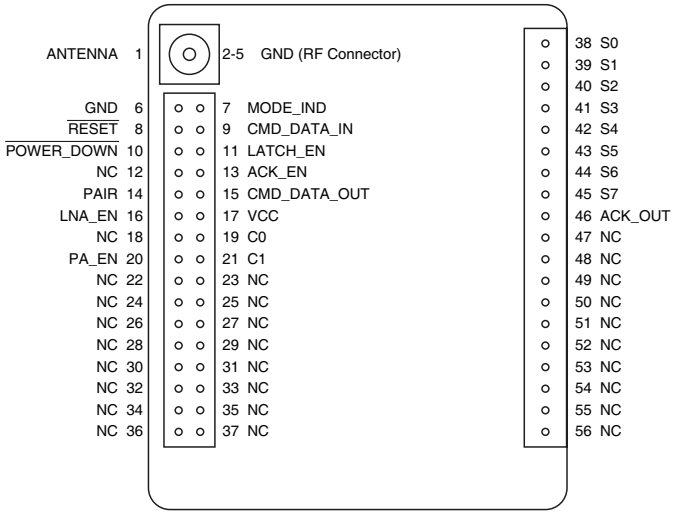


Figure 4: HumPRC™ Series Transceiver Carrier Board Pin Assignments (Top View)

Programming Dock

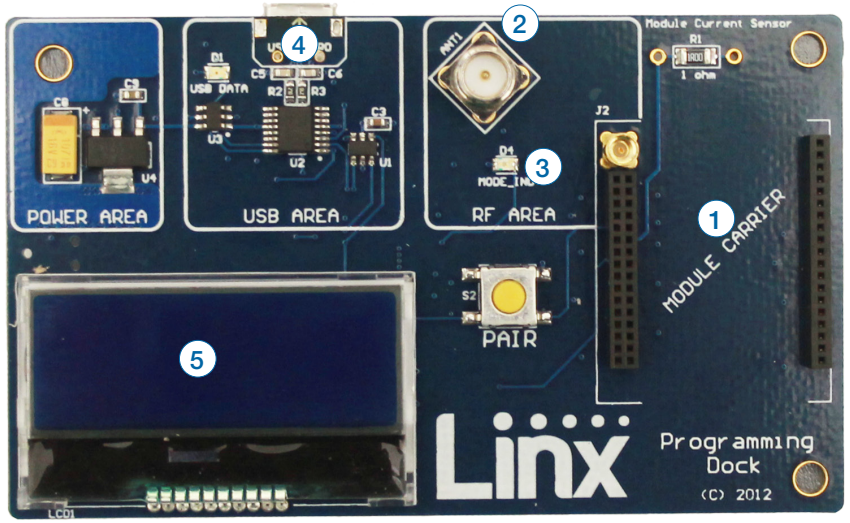
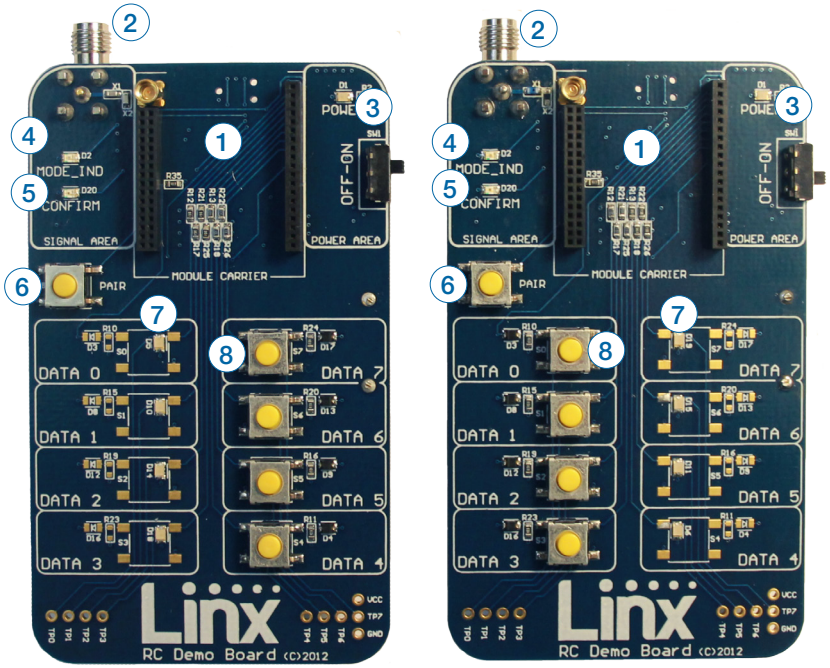


Figure 5: Programming Dock

Programming Dock Objects

1. Carrier Board Socket
2. RP-SMA Antenna Connector
3. MODE_IND LED
4. Micro USB Connector
5. LCD Display

Remote Control Demo Board



Board A Board B

Figure 6: Remote Control Demo Board

Remote Control Demo Board Objects

1. Carrier Board Socket
2. RP-SMA Antenna Connector
3. Power Switch
4. MODE_IND LED
5. CONFIRM LED
6. PAIR button
7. Status Line Output LEDs
8. Status Line Input Buttons
9. 4 AAA Batteries (Not shown, on the back of the boards)

Prototype Board

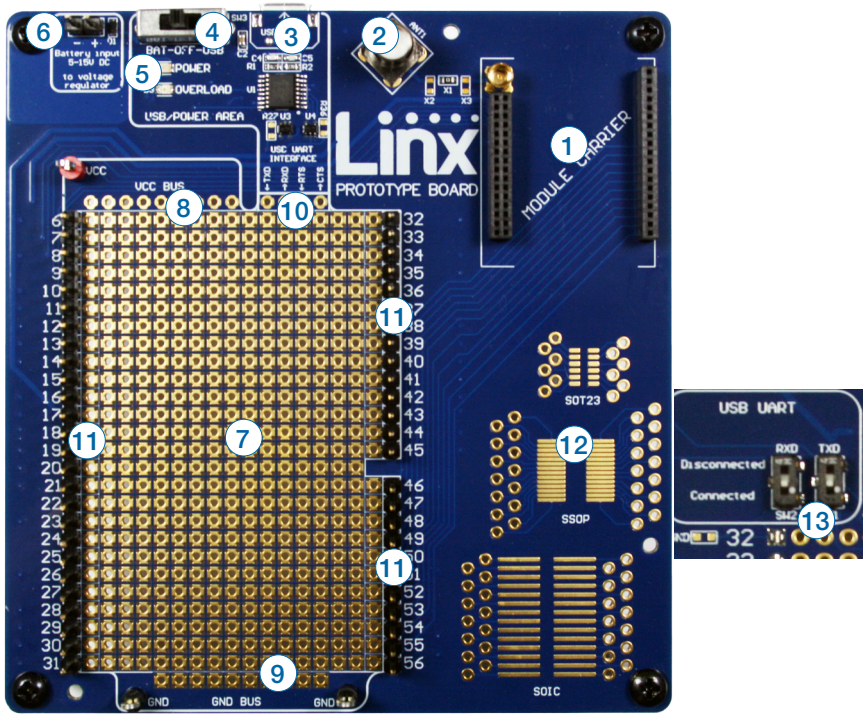


Figure 7: Prototype Board

Prototype Board Objects

1. Carrier Board Socket
2. RP-SMA Antenna Connector
3. Micro USB Connector
4. Power Switch
5. Power LED
6. External Battery Connection
7. Prototyping Area
8. 3.3V Supply Bus
9. Ground Bus
10. USB Interface Lines
11. Module Interface Headers
12. Standard IC Package Footprints
13. Command Data Interface Routing Switches (on back)

HumPRC™ Series Handheld Transmitter Evaluation Board

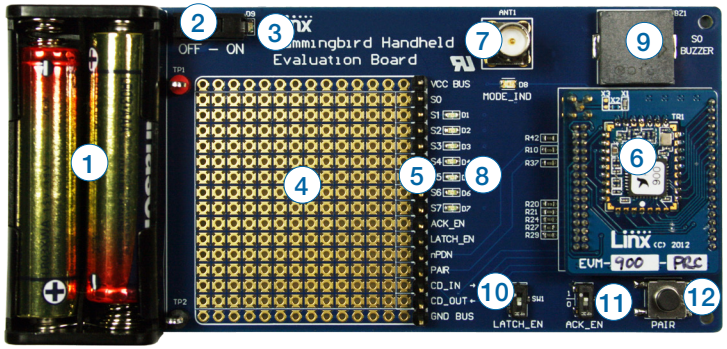


Figure 8: HumPRC™ Series Transceiver Evaluation Board

1. Battery – 3VDC (use 2 AAA style batteries)
2. Power Switch
3. Power On Indicator LED
4. Prototyping Area
5. Breakout Header
6. HumPRC™ Series Transceiver Carrier Board
7. Reverse-Polarity SMA Antenna Connector
8. LEDs – S1–S7
9. Buzzer – S0
10. Latch Enable Selection Switch
11. ACK Enable Selection Switch
12. PAIR Button

Long-range Handheld Transmitter Button Assignments

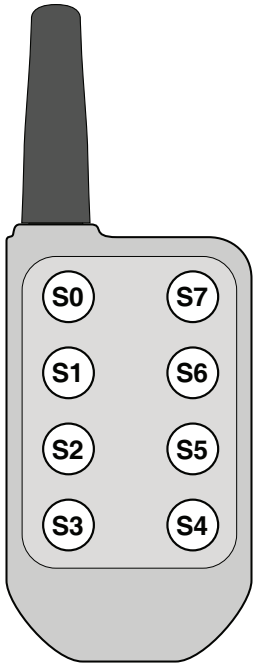


Figure 9: OTX-***-HH-LR8-PRC Button Assignments

Initial Setup

Several boards are included with the Development System that are intended for different use cases:

1. Two Remote Control Demo Boards for bi-directional operation and range testing
2. One Programming Dock to demonstrate use of the Command Data Interface with a PC.
3. One Prototype Board for use in developing a custom application
4. One Handheld transmitter and Handheld Transmitter Evalution Board for one-way operation with a finished transmitter.

The Carrier Boards have a HumPRC™ Series transceiver on a daughter board with headers. These boards snap into sockets on the other boards, enabling the modules to be easily moved among the test boards.

Warning: Installing or removing a Carrier Board while power is applied could cause permanent damage to the module. Either turn off power to the board or unplug the USB cable before installing or removing a Carrier Board

There are two Remote Control Demo Boards that are populated differently. Board A has the buttons on the right column and board B has them on the left column. These accept the Carrier Boards and are used to demonstrate the bi-directional remote control functionality of the HumPRC™ Series. They can also be used for range testing. These boards use hardware configuration, so if any changes have been made to the modules using the software then they may not operate correctly. A restore to default configuration can be used to reset the modules.

The Programming Dock that has a socket for a Carrier Board and a USB interface for connection to a PC. This is used with the demonstration software included with the kit to configure the module through its Command Data Interface.

There is one Prototype Board that has a socket for a Carrier Board, a USB interface and a large area of plated through holes that can be used to develop custom circuitry. The board can be powered either from the USB connection or an external battery.

There is one Handheld Transmitter Evaluation Board that is used to receive transmissions from the included Long-Range Handheld Transmitter. This board has a buzzer and LEDs that are activated by the transmitter. This can be used for simple range testing.

The development software supports Windows 7 and 10; with Java 1.6 or later.

Using the Programming Dock

Snap a Carrier Board onto the socket on the Programming Dock as shown in Figure 10.

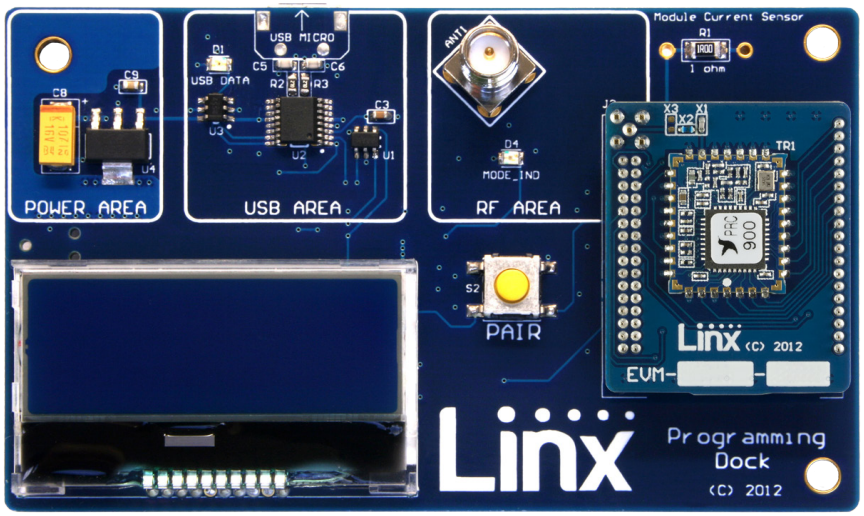


Figure 10: Programming Dock with a Carrier Board

Connect a micro USB cable into the connector at the top of the board. Plug the other end into a PC. The board is powered by the USB bus. The demonstration software included with the kit or custom application software can be used to configure the module through its Command Data Interface. The LCD is used to display information about the module. This includes the module's local address and a custom nickname. The nickname is entered using the development kit software and can be any name that helps distinguish the modules from one another. This is convenient when multiple programming docks are connected to the same computer. Please see the development kit software section for more information on the nicknames.

The HumPRC™ Series transceiver has a serial Command Data Interface that offers the option to configure the transceiver through software instead of through hardware. This interface consists of a standard UART with a serial command set.

Using the Remote Control Demo Board

Snap a Carrier Board onto the socket on each Remote Control Demo Board as shown in Figure 11.

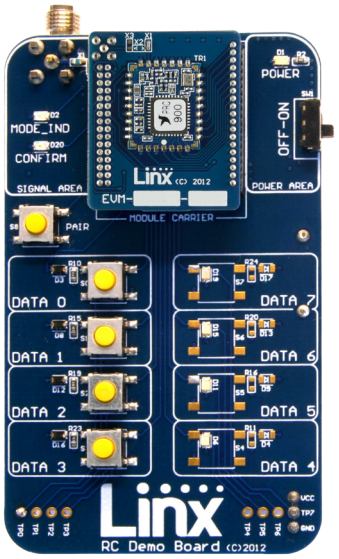


Figure 11: Remote Control Demo Board with a Carrier Board

Insert 4 AAA batteries into the holders on the back of each board, connect antennas and turn on power.

The modules come paired out of the box, but to pair additional modules, ensure that one module is an Administrator (see page 17). Press the PAIR button on both boards. The MODE_IND LEDs flash to indicate that the modules are searching for each other and exchanging addresses. The MODE_IND has a quick flash while searching (100ms on, 900ms off) and a longer flash once Pairing is complete (400ms on, 100ms off). This process only takes a few seconds. The pairing process accounts for the status line input / output directions. If these are changed then the modules should be paired again.

Once complete, pressing a button on one board (the Initiating Unit or IU) causes an LED to light up on the other board (the Responding Unit or RU). The RU sends an acknowledgement message to the IU. If the message is valid, the IU turns on the CONFIRM LED.

Note: To restore the default configuration, push the PAIR button four times and hold it down on the fifth press. The MODE_IND LED flashes when it has reset.

Range Testing

Several complex mathematical models exist for determining path loss in many environments. These models vary as the transmitter and receiver are moved from indoor operation to outdoor operation. Although these models can provide an estimation of range performance in the field, the most reliable method is to simply perform range tests using the modules in the intended operational environment.

Range testing can be performed with the Remote Control Demo Boards. To prepare the board for range testing, simply turn it on by switching the power switch to the ON position. Pressing a status line button on one board (the IU) activates an LED on the other board (the RU). The RU then sends an acknowledgement back to the IU, which turns on the CONFIRM LED. This indicates good bi-directional RF communications and lets the user set one board down and walk with the other board.

As the maximum range of the link in the test area is approached, it is not uncommon for the signal to cut in and out as the radio moves. This is normal and can result from other interfering sources or fluctuating signal levels due to multipath effects. This results in cancellation of the transmitted signal as direct and reflected signals arrive at the receiver at differing times and phases. The areas in which this occurs are commonly called “nulls” and simply walking a little farther usually restores the signal. If the signal is not restored, then the maximum range of the link has been reached.

To achieve maximum range, keep objects such as your hand away from the antenna and ensure that the antenna on the transmitter has a clear and unobstructed line-of-sight path to the receiver board. Range performance is determined by many interdependent factors. If the range you are able to achieve is significantly less than specified by Linx for the products you are testing, then there is likely a problem with either the board or the ambient RF environment in which the board is operating. First, check the battery, switch positions, and antenna connection. Next, measure the receiver’s RSSI voltage with the transmitter turned off to determine if ambient interference is present. High RSSI readings while the transmitter off indicate there is interference. If this fails to resolve the issue, please contact Linx technical support.

Note: The Remote Control Demo boards are designed for hardware configuration. If the modules are changed through software configuration then the boards may not operate as expected. A restore to default configuration can be used to reset the modules.

Using the Prototype Board

Snap a Carrier Board onto the socket on the Prototype Board as shown in Figure 12.

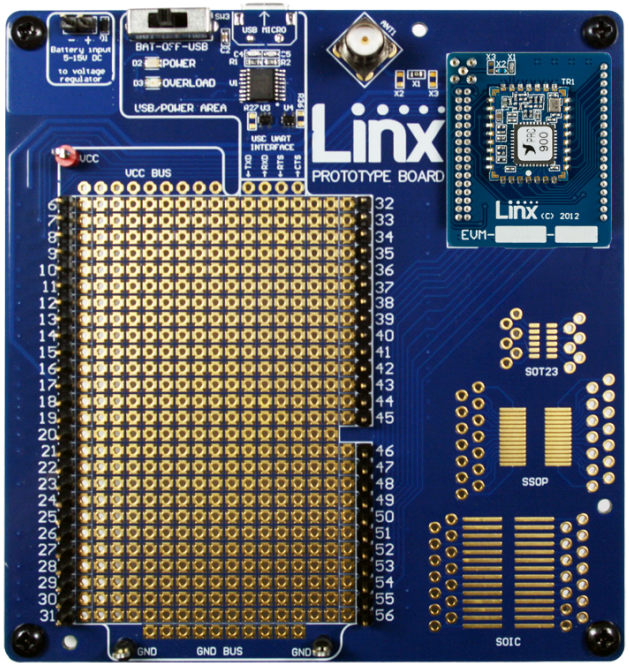


Figure 12: Prototype Board with a Carrier Board

Place the power switch into the “USB” position then connect a micro USB cable into the connector at the top of the board. Plug the other end into a PC or any USB charger. The board is powered by the USB bus. This board features a prototyping area to facilitate the addition of application-specific circuitry. The prototyping area contains a large area of plated through-holes so that external circuitry can be placed on the board. The holes are set at 0.100” on center with a 0.040” diameter, accommodating most industry-standard SIP and DIP packages.

At the top of the prototyping area is a row connected to the 3.3V power supply and at the bottom is a row connected to ground. External circuitry can be interfaced to the transceiver through the breakout headers. The numbers next to the headers correspond to the pin numbers on the Carrier Board. Figure 4 shows the pin assignments for the Carrier Board.

The OVERLOAD LED indicates that that too much current is being pulled from the USB bus. This is used to prevent damage to the parts or the bus. The overload condition is reset once the excess current draw is removed.

Supply for the module is connected through R17. This can be removed and replaced by another supply or used to measure the current consumption of the module.

Note: The onboard 3.3-volt regulator has approximately 400mA available for additional circuitry when plugged into a PC. If more current is required, the user must power the board from an external supply or a USB charger with more current capabilities, up to 1A.

Figure 13 shows the bottom of the board.

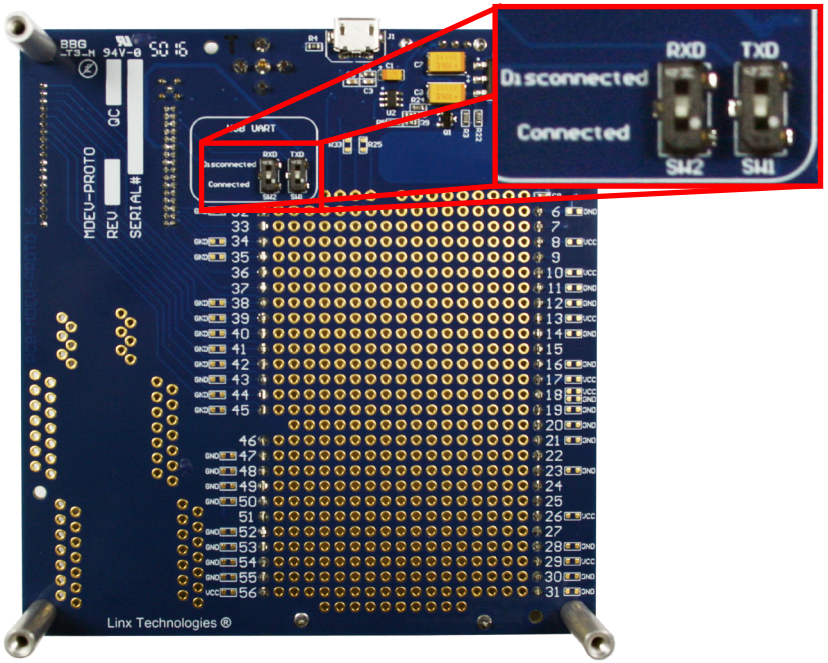


Figure 13: Prototype Board Bottom Side

SW1 and SW2 connect the USB interface to the Command Data Interface lines on the module. This allows the prototype board to be used with the development kit software or a custom application. When in the “USB Connected position”, the module is connected to the USB interface. The “Header Only” position connects the module to the header. The prototype board is shipped with the switches in the “Header Only” position.

Footprints for 0603 size resistors are on most lines so that pull-ups or pull-downs can easily be added to the lines. The pads are connected to V_{CC} or GND based on the most common configuration for the module. The schematic at the end of this document shows how each line is connected.

Figure 14 shows a convenient cross reference showing which lines on the module connect to which lines on the prototype board.

Module to Prototype Board Pin Number Cross Reference

Pin Name	Module Pin Number	Prototype Board Pin Number
GND	9, 14, 15, 16, 17, 18, 20, 25, 32	6
MODE_IND	30	7
$\overline{\text{RESET}}$	22	8
CMD_DATA_IN	27	9
$\overline{\text{POWER_DOWN}}$	12	10
LATCH_EN	13	11
ACK_EN	28	13
PAIR	29	14
CMD_DATA_OUT	26	15
LNA_EN	23	16
VCC	21	17
C0	10	19
PA_EN	24	20
C1	11	21
S0	8	38
S1	7	39
S2	6	40
S3	5	41
S4	4	42
S5	3	43
S6	2	44
S7	1	45
ACK_OUT	31	46

Figure 14: Module to Prototype Board Pin Number Cross Reference

Using the Handheld Transmitter Evaluation Board

Snap a Carrier Board onto the socket on the Handheld Transmitter Evaluation Board and install the batteries and an antenna as shown in Figure.

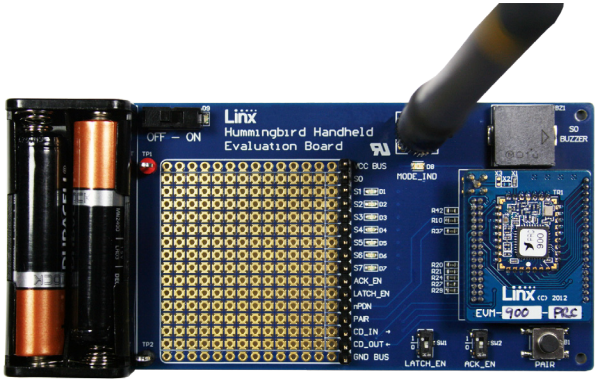


Figure 15: Assembled Handheld Transmitter Evaluation Board

The receiver board is powered by two AAA batteries. A Linx HumPRC™ Series transceiver is used for reception of the transmitted signal. This receiver provides exceptional sensitivity, allowing the transmitter and receiver to operate at distances of up to 0.8 mile (1,300m) depending on signal conditions. The data recovered by the transceiver is validated and if everything is correct, the status line outputs are updated to match the states of the buttons on the transmitter. To demonstrate this, one status line on the evaluation board is used to drive a buzzer while the other lines activate LEDs. The board also has a prototyping area with all of the transceiver lines brought out to a header.

Turn on the power to the board, and press a button on the handheld transmitter. When S0 is pressed, the buzzer sounds; when S1–S7 are pressed, the LEDs turn on. When any button (S0–S7) is pressed on the transmitter, the corresponding output (S0–S7) is active high (V_{CC}) on the prototyping header.

Simple range testing can be performed with the transmitter and Evaluation Board by placing the board in a stationary location and walking away with the transmitter. When in good signal range, as a button is pressed on the transmitter, the buzzer will sound or an LED will light up on the Evaluation Board. Also, the Acknowledgement LED will light on the transmitter. When the Evaluation Board no longer activates and moving around a few feet does not restore operation, the maximum range in the operating environment has been reached.

Joining a Transmitter

The transmitter is associated with a receiver using the built-in Join Process. This process configures a star network with the central unit as the system Administrator. Other units are added to the network as nodes one at a time. Typically, the handheld transmitter is added as a node to a module that has been configured as an administrator. While transmitters and evaluation board are paired at the factory, the following procedure describes how to configure the evaluation board and pair a transmitter.

Configure the evaluation board as an Administrator by pressing and holding the PAIR button for 30 seconds. While the button is held, the MODE_IND line is on. After 30 seconds, the MODE_IND line repeats a double blink, indicating that the operation has begun. When the button is released the key and address generation are complete and the module is an Administrator. A full explanation of this operation is in the HumPRC™ Series data guide.

Figure 16: Evaluation Board PAIR Button

The handheld transmitter is joined to an Administrator by pressing and releasing the PAIR buttons on both units. The modules automatically search for each other using a special protocol. When they find each other, the administrator sends the node the encryption key, UMASK and its network address. The UDESTID is set to the address of the administrator. The values are encrypted using a special factory-defined key. Once the JOIN process is complete, the MODE_IND blinks on both units and they now operate together.

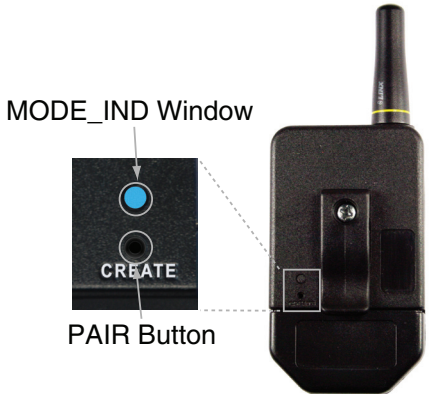


Figure 17: Transmitter PAIR Button Access

The Development Kit Demonstration Software

The development kit includes software that is used to configure and control the module through the Programming Dock. The software defaults to the RC Configuration tab when opened (Figure 18). This window offers basic configuration and demonstration of the module's functionality with the current configuration.

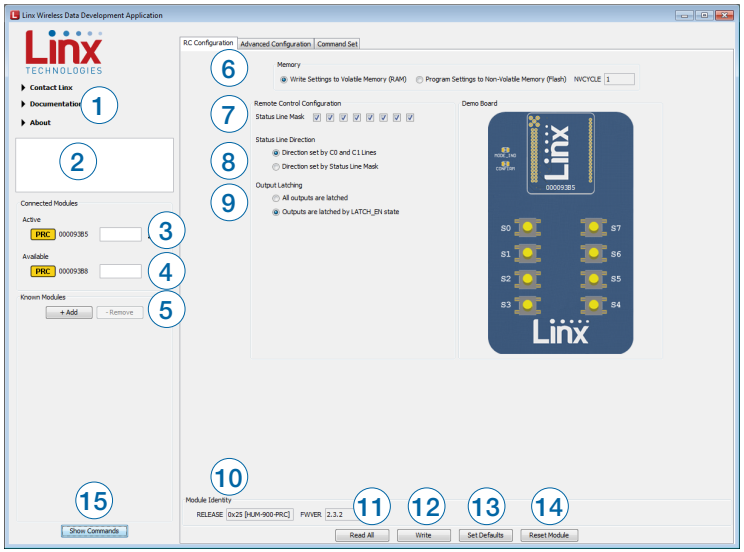


Figure 18: The Master Development System Software Demo and EZConfiguration Tab

1. Clicking the Contact Linx, Documentation and About labels on the left side expands them to show additional information and links to the latest documentation. This is shown in Figure 19.
2. The Help window shows tips and comments about the software.
3. The active module is connected to the PC and being configured by the software.
4. Available modules are connected to the PC but are not currently being configured or controlled by the PC
5. Known Modules are not currently connected to the PC, but have either been connected to the software in the past or have been manually entered.
6. The Memory group selects if changes are written to volatile or non-volatile memory.

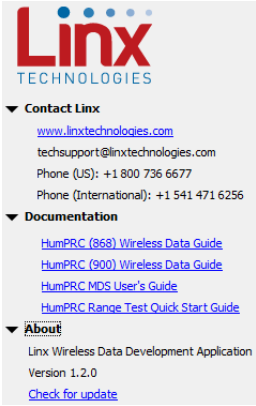


Figure 19: Additional Information

7. The Status Line Mask selects the input / output direction of the individual status lines. A checked box sets that line as an input, an unchecked box is an output. The Status Line Direction needs to be configured before this can be changed. Settings are reflected in the image on the right.
8. The Status Line Direction option determines if the input / output direction of the status lines is set by the C0 and C1 lines or the Status Line Mask
9. The Output Latching option sets the outputs as either all latched or set by the LATCH_EN line on the module. Settings are reflected in the image on the right.
10. The Module Identity group displays the Release and Firmware Version of the active module.
11. The Read All button reads all of the active module's configurations and updates the items in the window.
12. The Write button writes the changed configurations to the selected memory location of the active module.
13. The Set Defaults button returns the module to the factory default configurations.
14. The Reset Module button issues a soft reset that causes the module to reboot. This sets all volatile memory configurations to the non-volatile default values.
15. The Show Commands button opens a larger window to view the serial commands sent to and received from the module.

The modules are shown with three identifiers as shown in Figure 20.

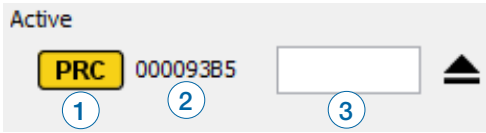


Figure 20: The Master Development System Software Module Identifiers

1. The type of module (HumPRC™ Series)
2. The module's local address.
3. A custom name that can be given to the module. Type a name into the box and press Enter to apply it. This name is shown on the LCD display on the programming dock.

The Advanced Configuration tab (Figure 21) offers more detailed configuration options for the active module.

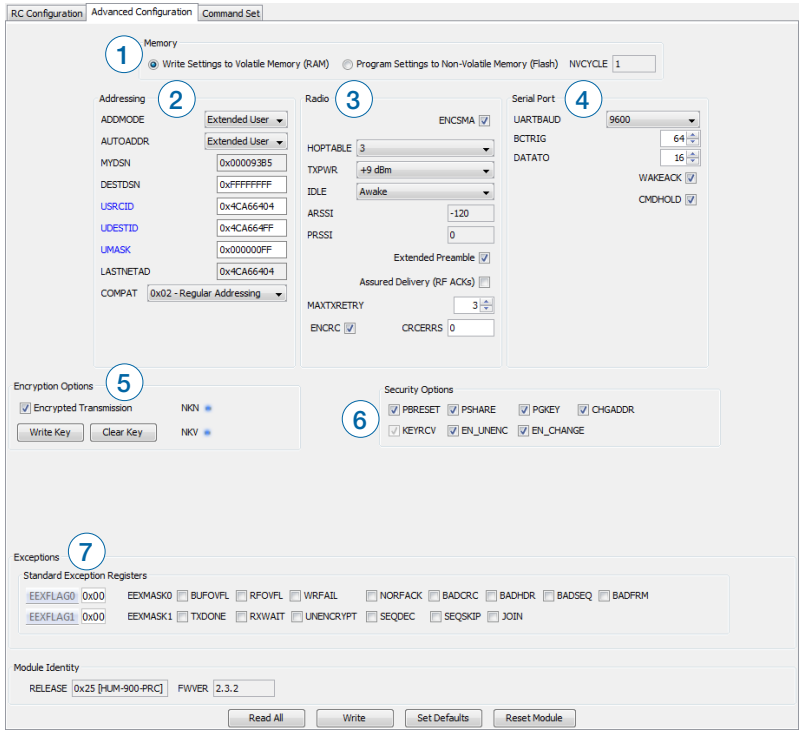


Figure 21: The Master Development System Software Advanced Configuration Tab

1. The Memory group selects if changes are written to volatile or non-volatile memory.
2. The configurations are divided into groups. The Addressing group configures the addressing features of the module.

- The Addressing Mode (ADDMODE) menu sets the addressing mode used by the module; either DSN, User or Extended User.
- The Auto Addressing (AUTOADDR) menu turns the automatic addressing feature on and off.
- The MYDSN address is the module's local address. This is configured at the factory and cannot be changed.
- The DSN Destination Address (DESTDSN) is the address of the desired destination module when DSN addressing mode is used.
- User Source Address (USRCID) is the module's local address when User and Extended User modes are used.

- User Destination Address (UDESTID) is the address of the destination module when User and Extended User addressing modes are used.
- User ID Address Mask (UMASK) is the mask for screening incoming packets.
- The LASTNETAD is the last address that the module assigned using the JOIN process. This is only used if encryption is used and the module is an administrator.
- The Compatibility (COMPAT) setting allows communication with legacy products. COMPAT = 0x00 is not available with the 868MHz module.

3. The Radio group configures the radio settings of the module.

- For 900MHz units, checking the ENCSMA box enables the Carrier Sense Multiple Access feature.
- The HOPTABLE menu selects the module's hopping pattern
- The TXPWR menu sets the module's transmitter output power.
- The IDLE menu sets the module's operating state as awake or asleep.
- The ARSSI measurement is the ambient RSSI in the local environment on the current channel at the time when the read command is issued.
- The PRSSI is the RSSI measurement of the last valid packet that was received.
- Checking the Extended Preamble box configures the module to send a long preamble at the beginning of every packet.
- Checking the Assured Delivery box enables RF acknowledgements and retries when an acknowledgement is not received.
- MAXTXRETRY sets the maximum number of times that the module will retry sending the packet before an exception is thrown.
- Checking the ENCRC box enables the CRC checks on the incoming data. The CRC Errors box shows the number of errors since the last power cycle or the last time the count was reset.

4. The Serial Port group configures all of the UART serial port settings.

- The UARTBAUD menu configures the serial port baud rate, which is used by the module to set the over-the-air RF data rate.
- The Byte Count Trigger (BCTRIG) sets the number of bytes that the UART receives before triggering the transmission of a packet.

- The UART Data Timeout (DATATO) sets the number of milliseconds from the last character received on the UART before the module transmits the data in its buffer.
- Selecting the WAKEACK box instructs the module to output the acknowledgement (0x06) on the UART when the module wakes from sleep or power cycle.
- Selecting the CMDHOLD box instructs the module to buffer any received over-the-air data while processing configuration commands.

5. The Encryption Options group configures the encryption settings.

- Selecting the Encrypted Transmission box enables encryption.
- Clicking the Write Key button opens a window where the 128-bit AES key can be entered (Figure 22).
- Clicking the Clear Key button opens a window where the key can be cleared (Figure 22).

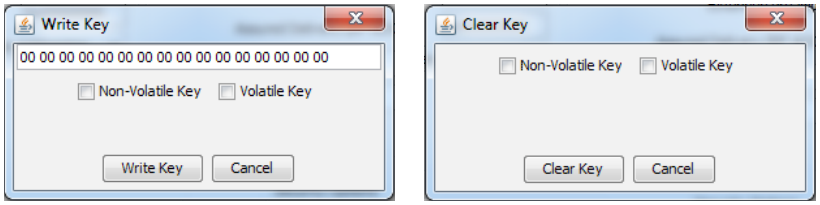


Figure 22: The Master Development System Software Write Key and Clear Key Windows

6. The Security Options group corresponds to the SECOPT register. This configures the security options related to encryption and the Join Process for setting up networks.
7. The Exceptions group configures the Extended Exception Flags and Extended Exception Mask.

- Checking the boxes in the EEMASK0 and EEMASK1 rows sets which exception conditions trigger the exception flags
- The EEXFLAG0 and EEXFLAG1 boxes show the current value for the flags. 0x00 means no exceptions were detected. A non-zero value means an exception flag is set. Clicking on the box opens a menu showing which flags are set. Clicking on the flag clears it (Figure 23).

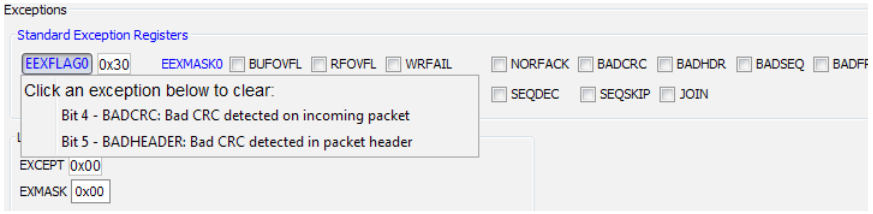


Figure 23: The Master Development System Software Exception Flags

The Command Set tab (Figure 24) allows specific commands to be written to the module.

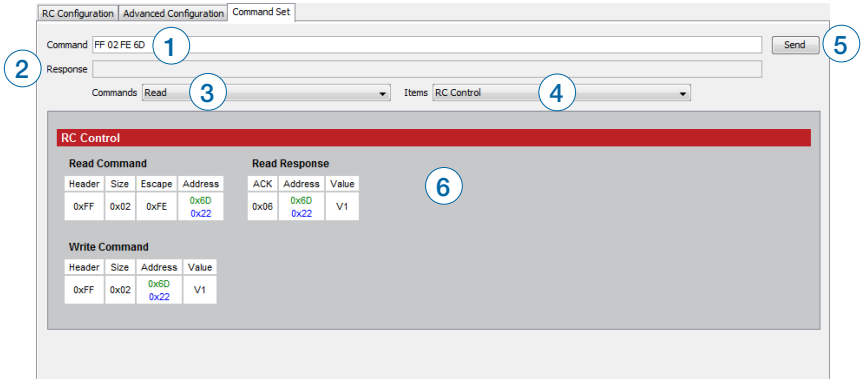


Figure 24: The Master Development System Software Command Set Tab

1. The Command box shows the hexadecimal values that are written to the module. Values can be typed into the box or a command can be selected from the Commands menu.
2. The Response box shows the hexadecimal values that are returned from the module in response to a command.
3. The Commands drop-down menu shows all of the commands that are available for the active module (Figure 25). Selecting one of the commands from this menu automatically fills in the Command box. The values can be adjusted by typing in the box.

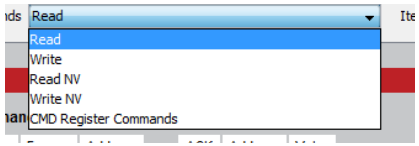


Figure 25: The Master Development System Software Command Set Tab Commands Menu

4. The Items drop down menu displays all of the items that are available for the active module (Figure 26). Selecting one of the items from this menu automatically fills in the Command box. The values can be adjusted by typing in the box.

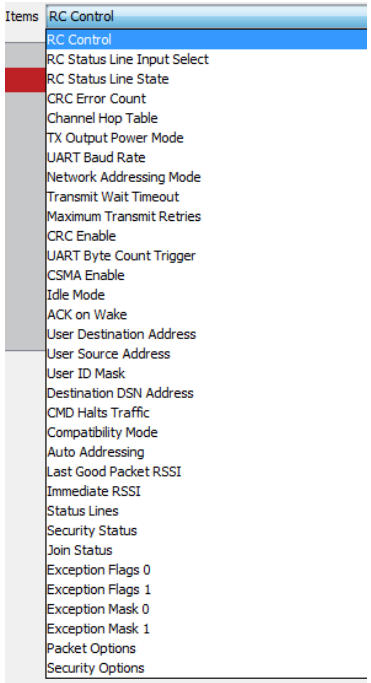


Figure 26: The Master Development System Software Command Set Tab Items Menu

5. Clicking the Send button writes the values in the Command box to the module.
6. The structure of the selected command and its response is shown in the main window. Please see the HumPRC™ Series Transceiver Data Guide for definitions of each value.

Development Kit Demonstration Software Example

This example shows how to configure a module using the development kit software. The software defaults to the RC Configuration tab (Figure 27).

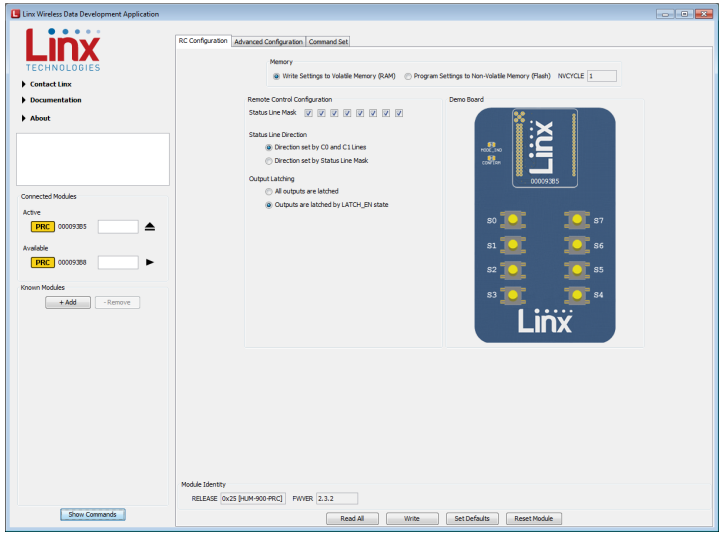


Figure 27: The Master Development System Software RC Configuration Tab

Install a Carrier Board onto the Programming Dock and plug a USB cable between the Programming Dock and the PC. The software automatically detects attached devices. The first module that is identified appears under the Active label. This is the module that is actively controlled by the software. Subsequent modules are listed under the Available label as shown in Figure 28.

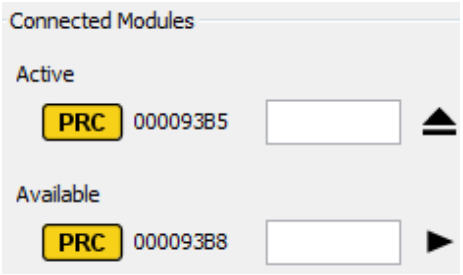


Figure 28: The Master Development System Software Connected Modules

To change the status line directions, first change the Status Line Direction option to “Direction set by Status Line Mask.” The change is highlighted in red (Figure 29). Click the Write button to write the change to the module.

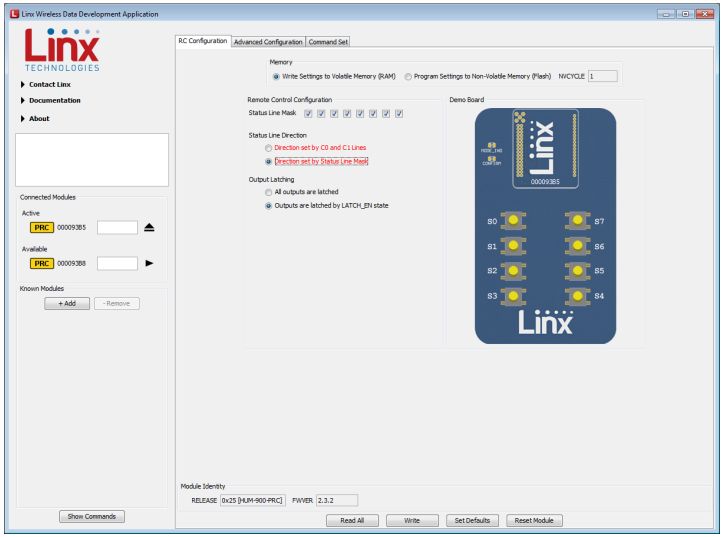


Figure 29: The Master Development System Changed Status Line Direction

Then change the Status Line Mask as desired. Checked boxes are set as inputs for buttons (Figure 30).

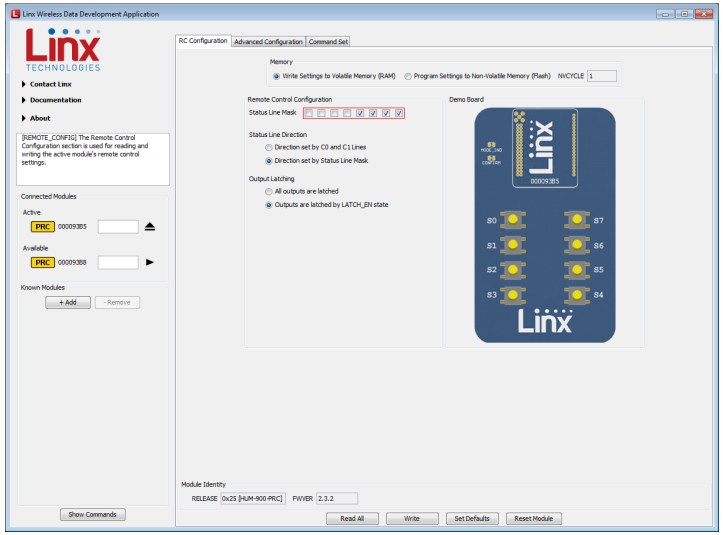


Figure 30: The Master Development System Changed Status Line Mask

When the Write button is clicked, the new states are written to the module and are reflected in the model to the right. All lines that were unchecked become outputs represented by LEDs (Figure 31).

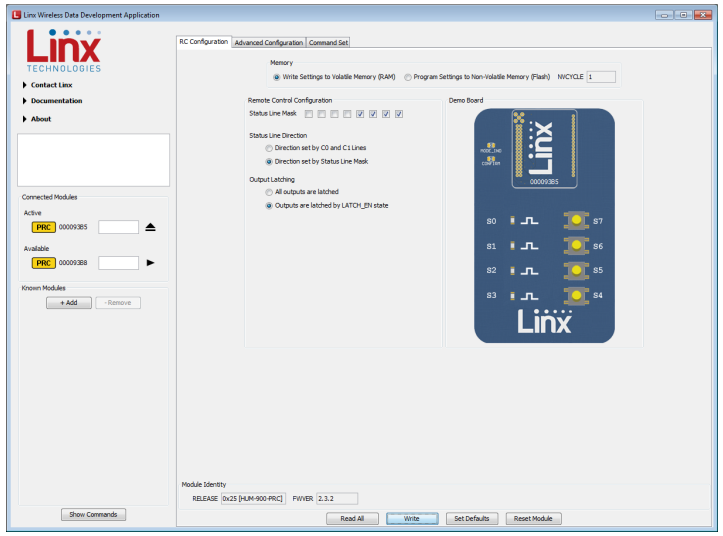


Figure 31: The Master Development System Software Configured Module

The lines can be configured as momentary or latched. By default, this is set by the logic state of the LATCH_EN line on the module. All of the lines can be set as latched by selecting the “All output are latched” option and clicking the Write button (Figure 32).

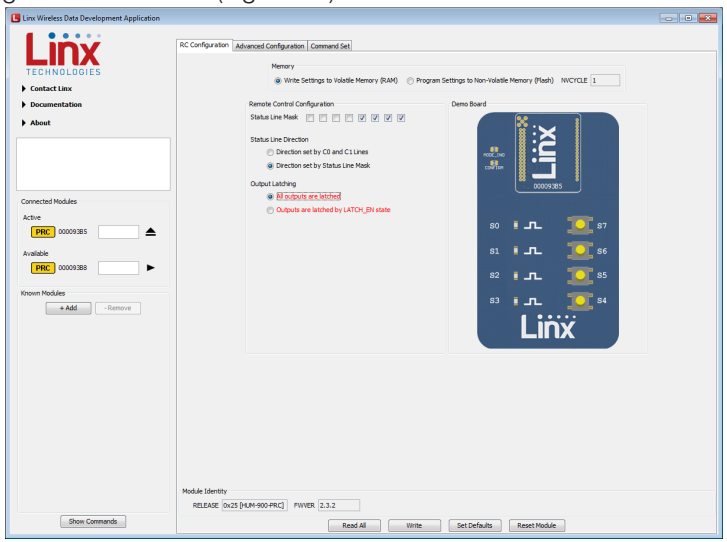


Figure 32: The Master Development System Software Changed Latch Status

When the latched configuration is written to the module, the symbol next to the LEDs changes to reflect the operation (Figure 33).

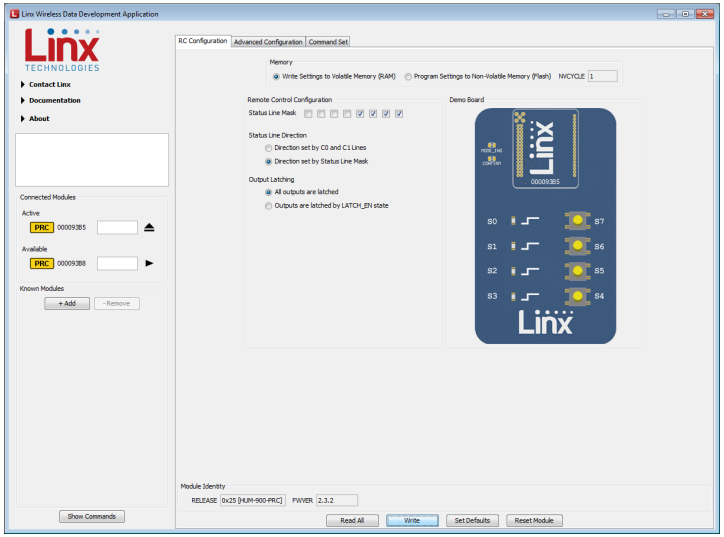


Figure 33: The Master Development System Software Configured Module

Figure 34 shows the latching and momentary symbols.

Figure 34: The Master Development System Software Latching (1) and Momentary (2) Symbols

The software continuously polls the module checking the state of its outputs. When it detects that the module has taken a line high, this is reflected in the software as an active LED (Figure 35).

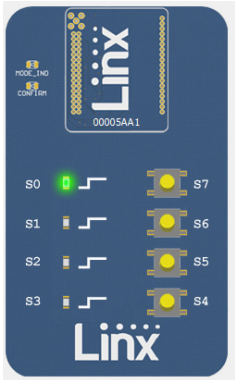


Figure 35: The Master Development System Software Activated Module

The Advanced Configuration tab shows the addressing and radio configurations for the module. Figure 36 and Figure 37 show the tab for two modules.

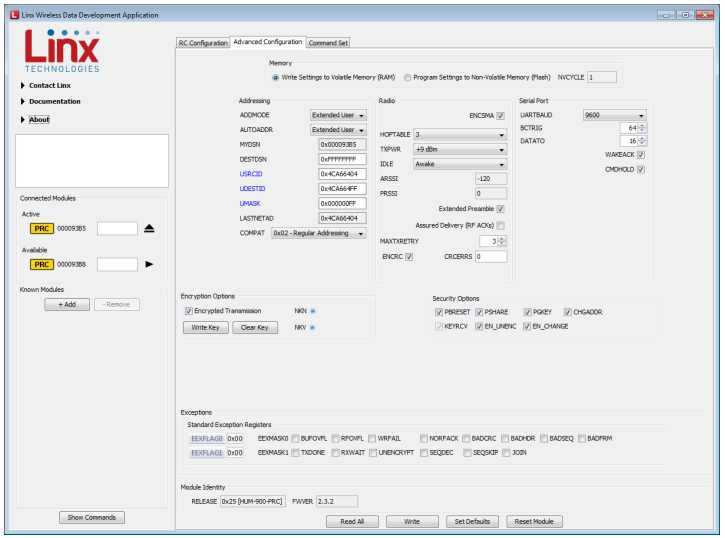


Figure 36: The Master Development System Software Module 1 Advanced Configuration Tab

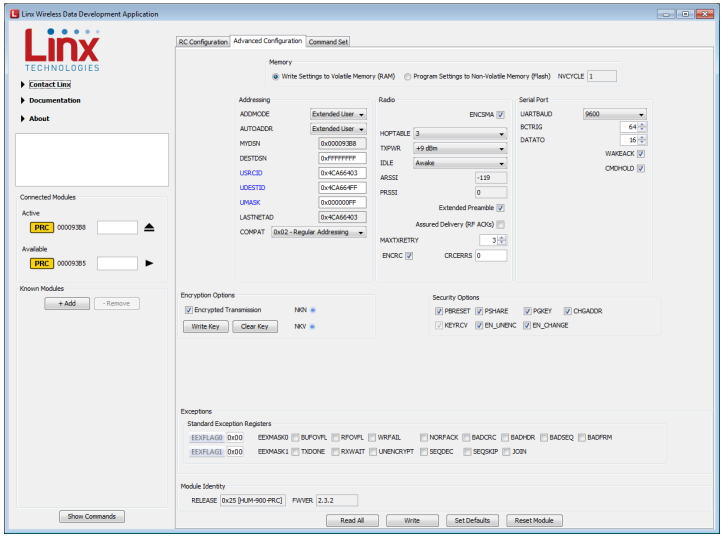


Figure 37: The Master Development System Software Module 2 Advanced Configuration Tab

In the Addressing group, the MYDSN is the unique serial number for each module. The modules are configured by the Join Process to use Extended User address mode. This makes use of the USRCID, UDESTID and UMASK fields.

The Join Process selects a random 3-byte number that is used as a network address. This is placed in the upper 3 bytes of the module's local source address (USRCID) and the destination address (UDESTID). In this example, the number is 0x4CA664. The last byte in the USRCID field is the module's unique address, in this case 0x03 and 0x04 for the two modules.

The UMASK value is 0x000000FF. This divides the address into two groups. All of the address bits in a received message represented by the '0's must match the local USRCID exactly in order for the message to be accepted. In this case, the UDESTID address in a received packet must be 0x4CA664 or the packet is rejected.

The bits in a received packet represented by the 0xFF in the mask must match exactly or be all '1's in order for the message to be accepted. In this case, the low byte of the received UDESTID must match the last byte of the local USRCID or be 0xFF in order for the received packet to be accepted. Since all modules will accept a 0xFF, this is the network broadcast address.

The HumPRC™ Join Process automatically sets the lower byte UDESTID to 0xFF, so all modules broadcast to the entire network. This means all modules can control all other modules in the network. This is limited by the status line input / output configurations as a line set as an input cannot be activated. Only lines set as outputs can be activated.

For more information on the addressing modes and join process, please see RG-00105, the HumPRO™ Series Addressing Mode Reference Guide and RG-00107, The HumPRO™ Series Join Process Reference Guide.

Carrier Board Schematic

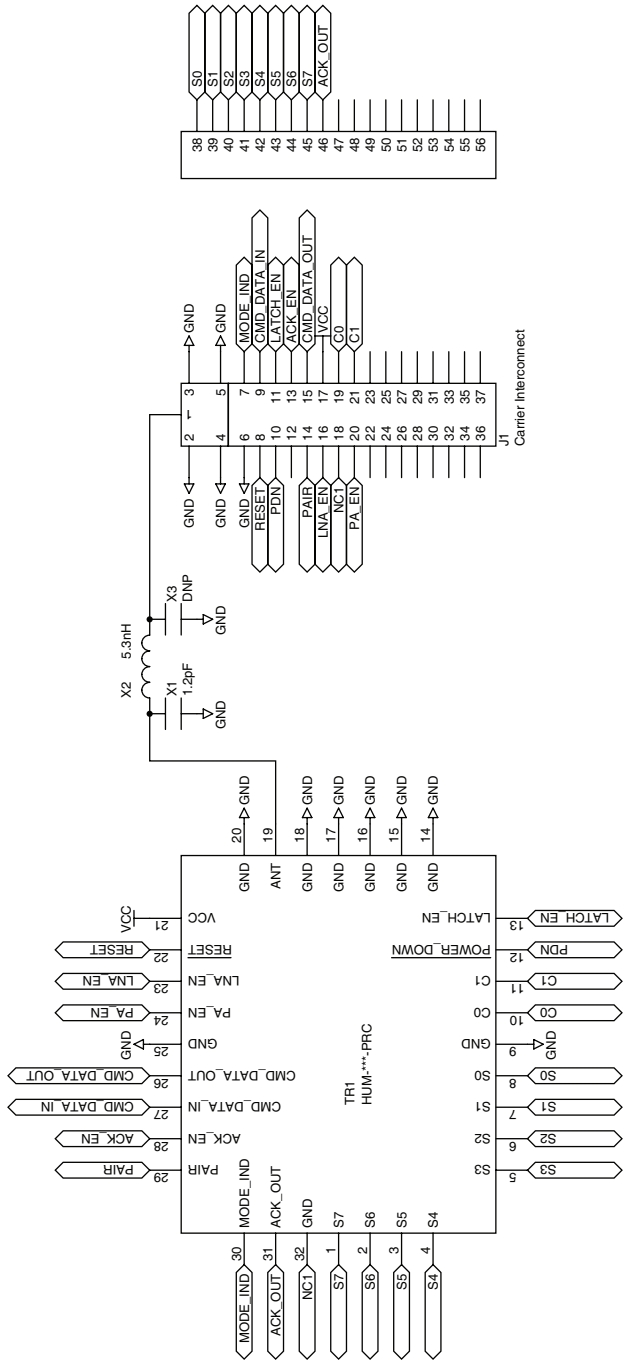


Figure 38: HumPRC™ Series Transceiver Carrier Board Module Schematic

Remote Control Demo Board Schematic

Note: The Remote Control Demo boards are designed to accept carrier boards for multiple module families. Some circuitry is not applicable for some modules.

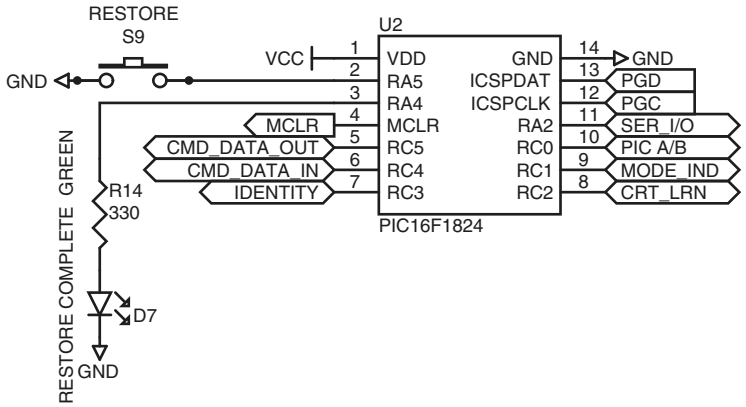


Figure 39: Remote Control Demo Board Microcontroller Area Schematic

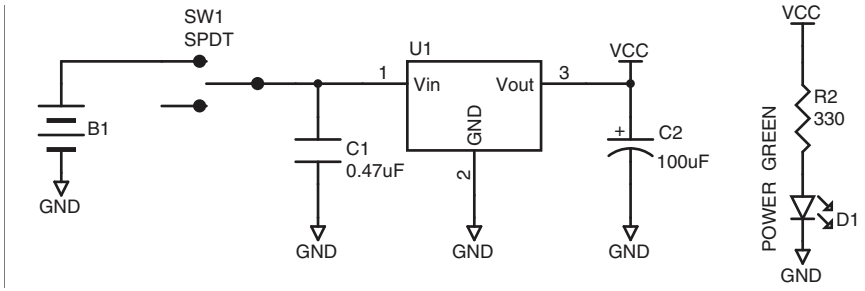


Figure 40: Remote Control Demo Board Power Supply Area Schematic

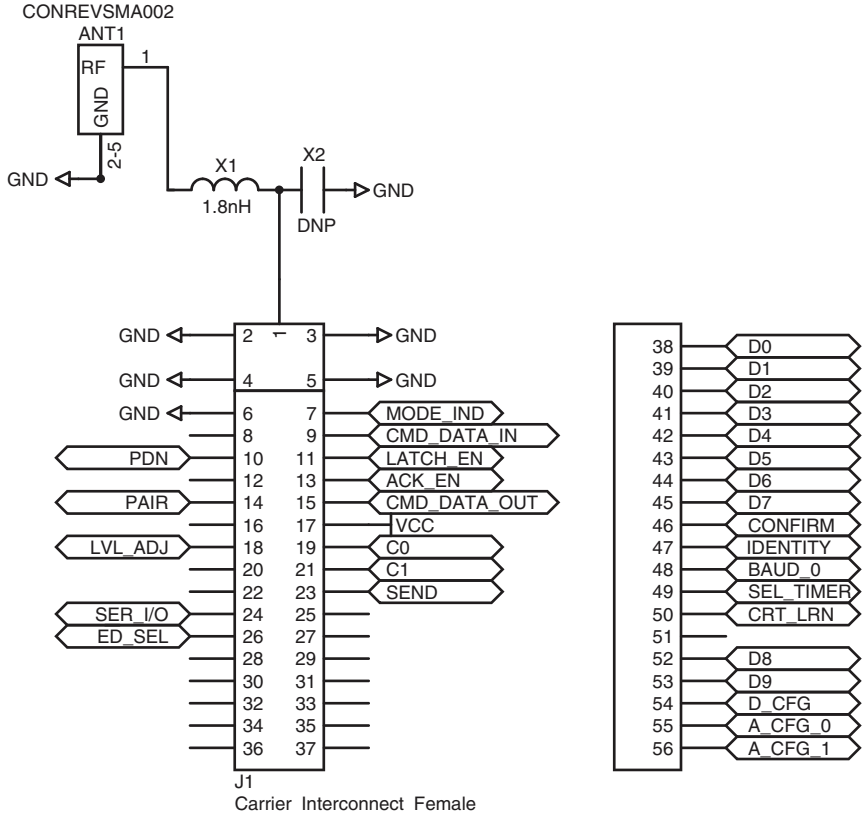


Figure 41: Remote Control Demo Board RF Carrier Area Schematic

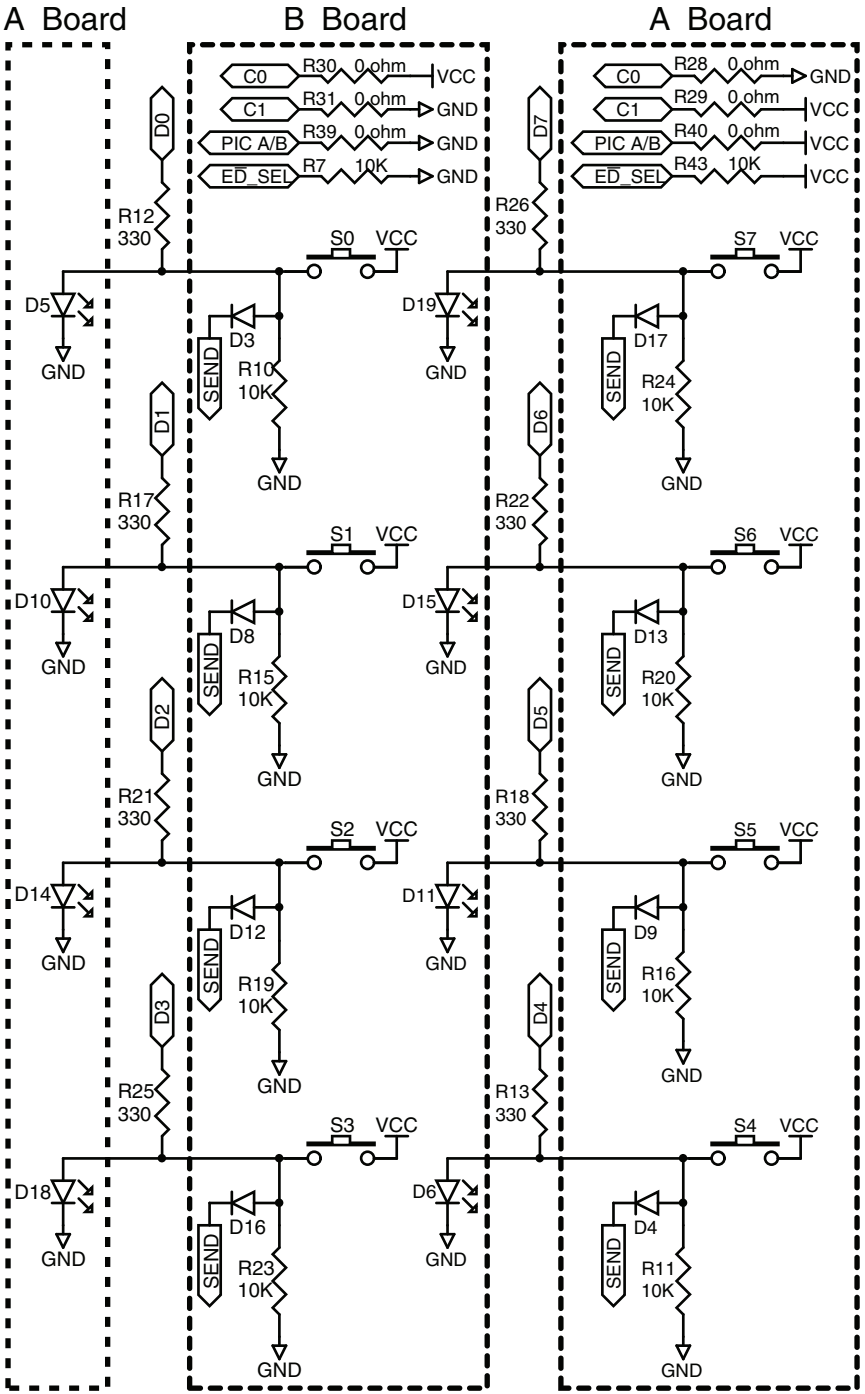


Figure 42: Remote Control Demo Board Remote Control Area Schematic

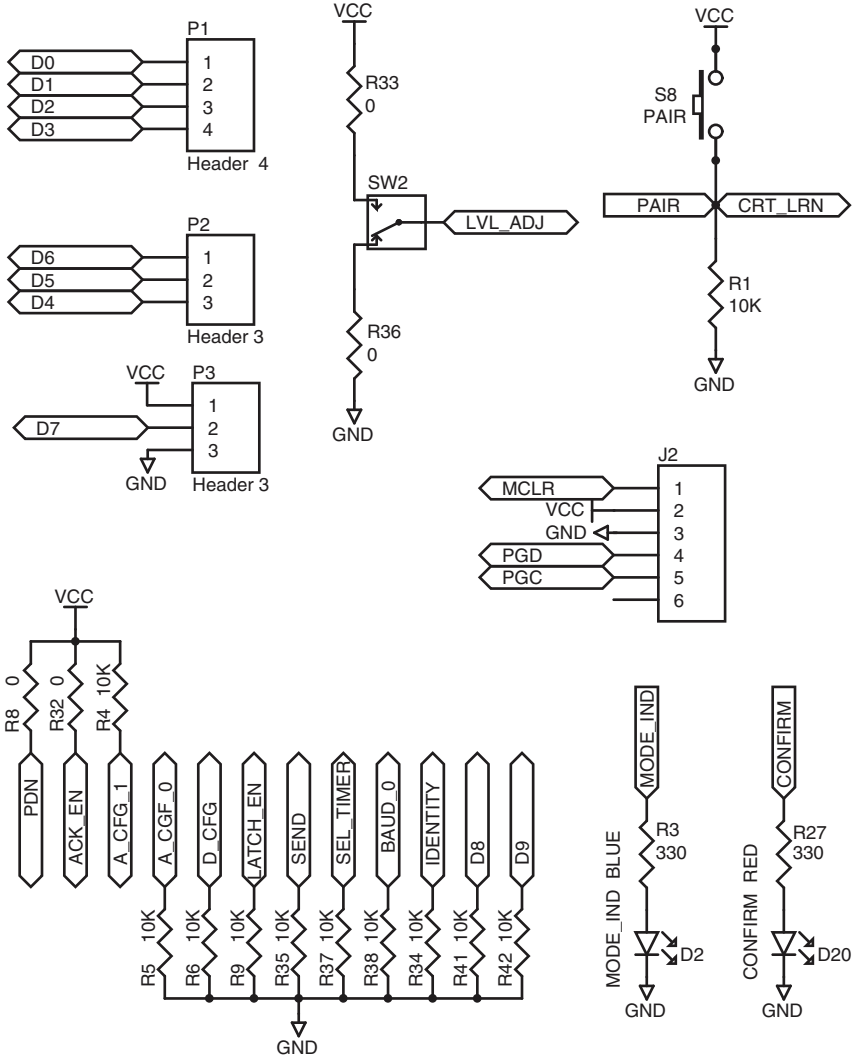


Figure 43: Remote Control Demo Board Miscellaneous Circuits Schematic

Programming Dock Board Schematic

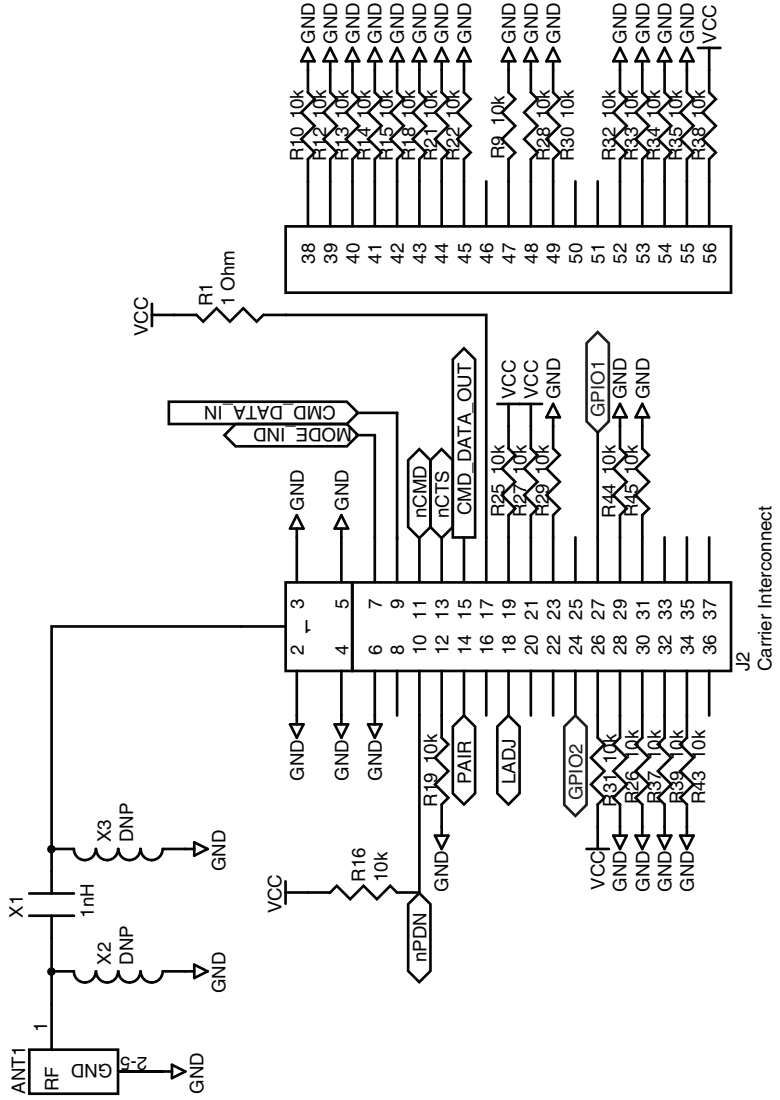


Figure 44: Programming Dock Board RF Carrier Area Schematic

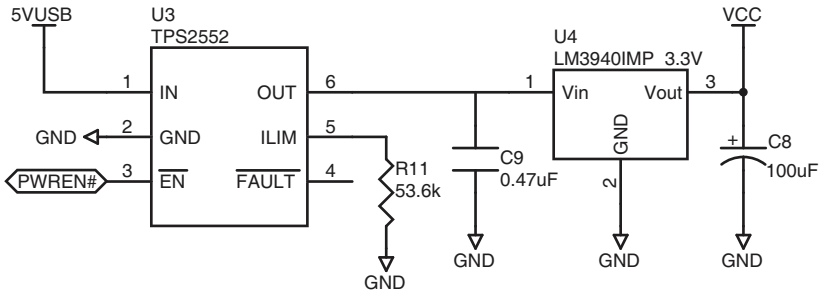


Figure 45: Programming Dock Board Power Supply Area Schematic

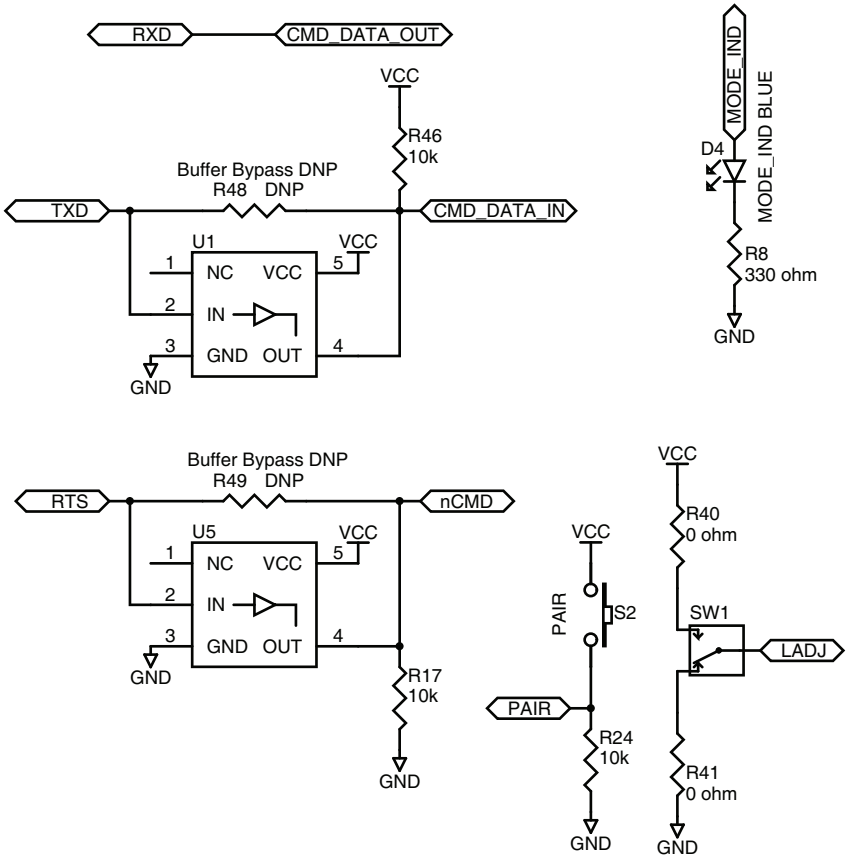


Figure 46: Programming Dock Board Signal Routing Schematic

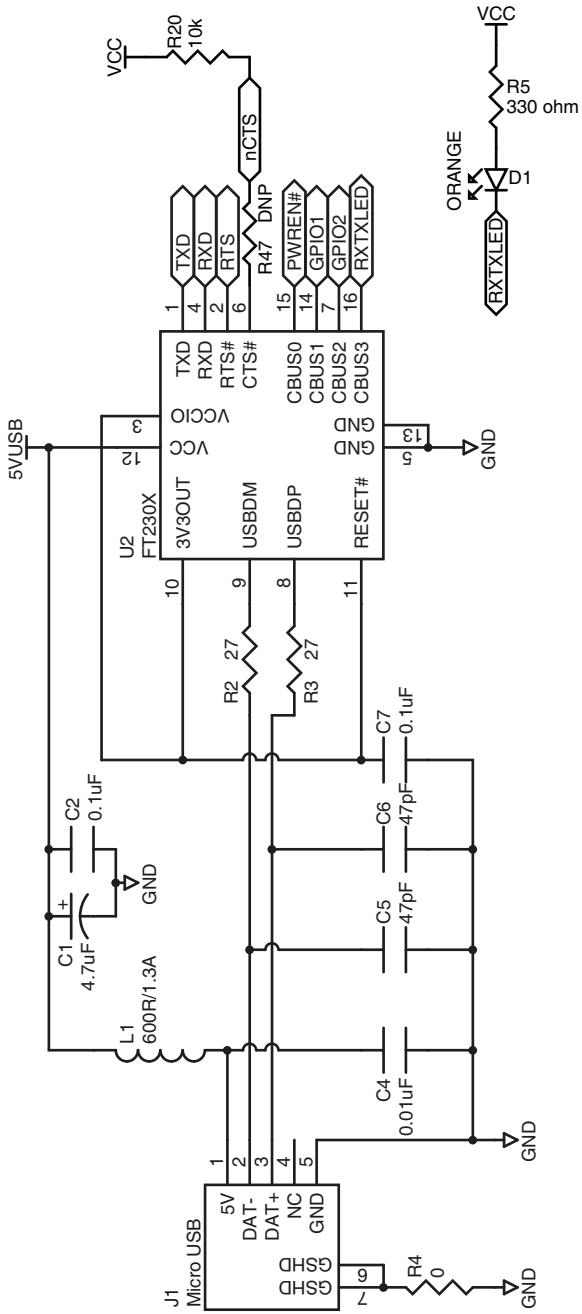


Figure 47: Programming Dock Board USB Area Schematic

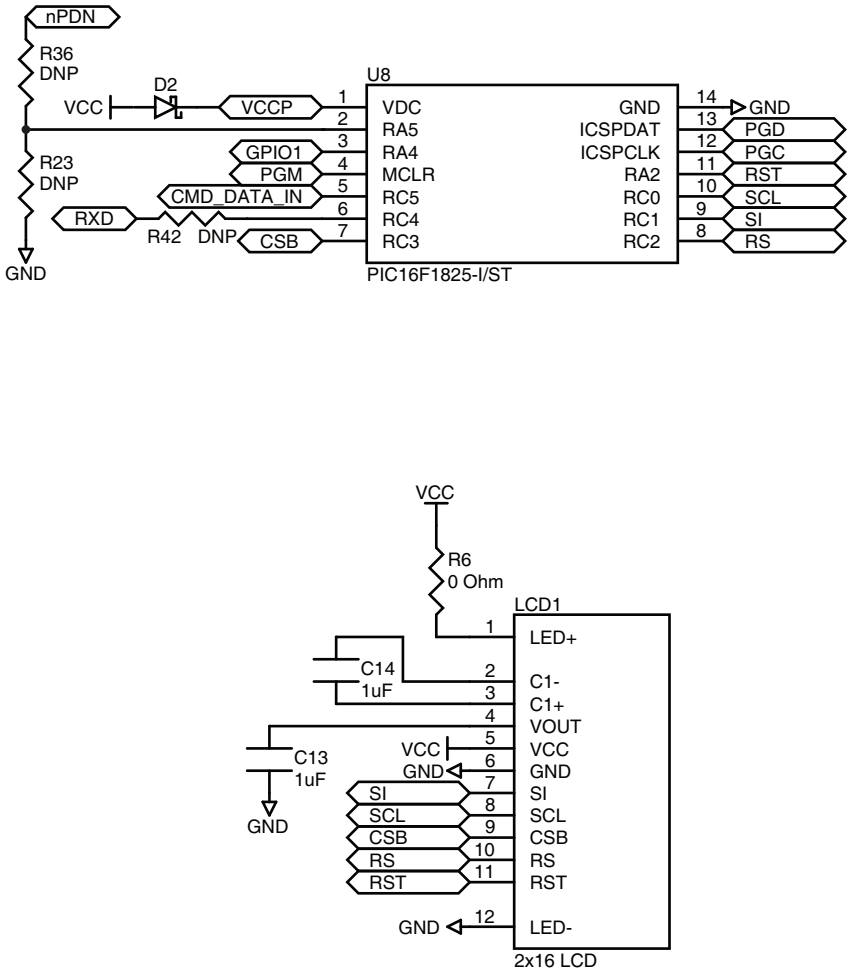


Figure 48: Programming Dock Board Microcontroller Area Schematic

Prototype Board Schematic

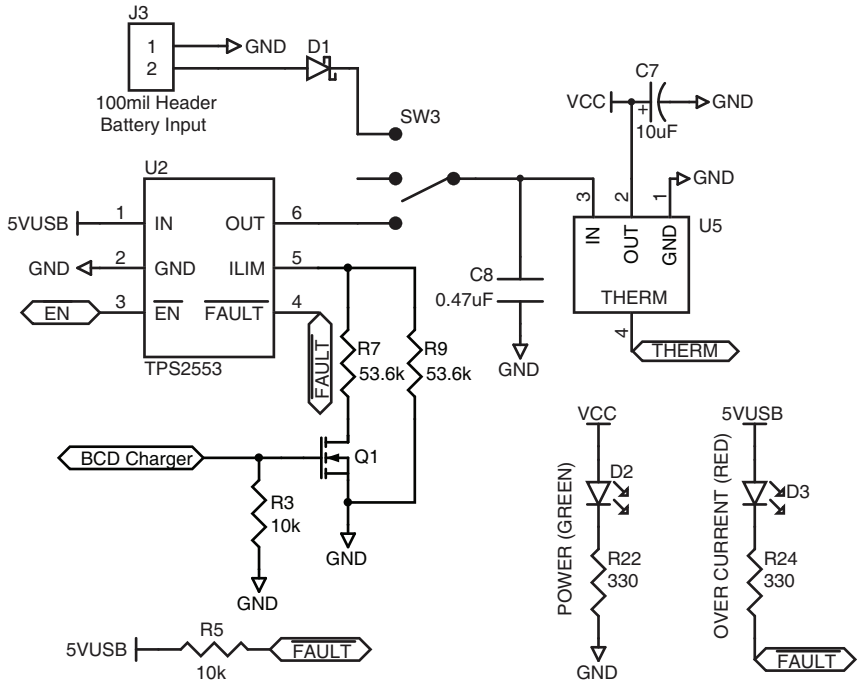


Figure 49: Prototype Board Power Supply Area Schematic

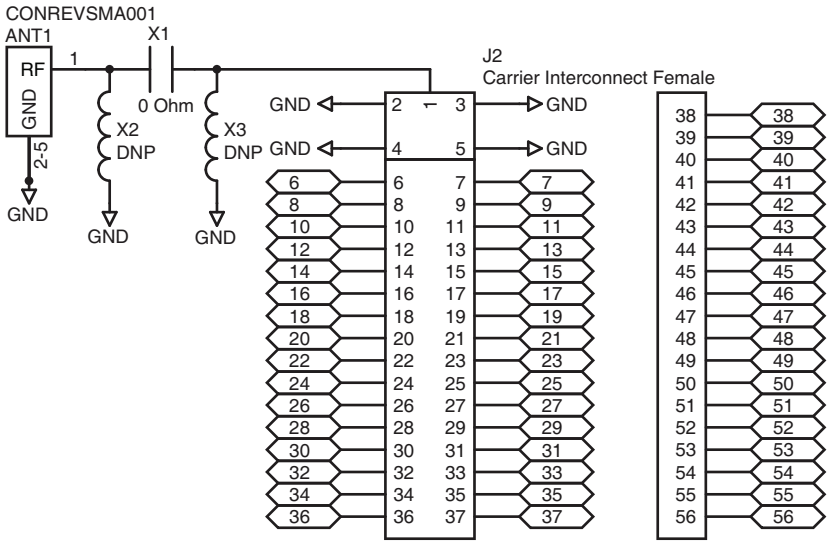


Figure 50: Prototype Board RF Carrier Area Schematic

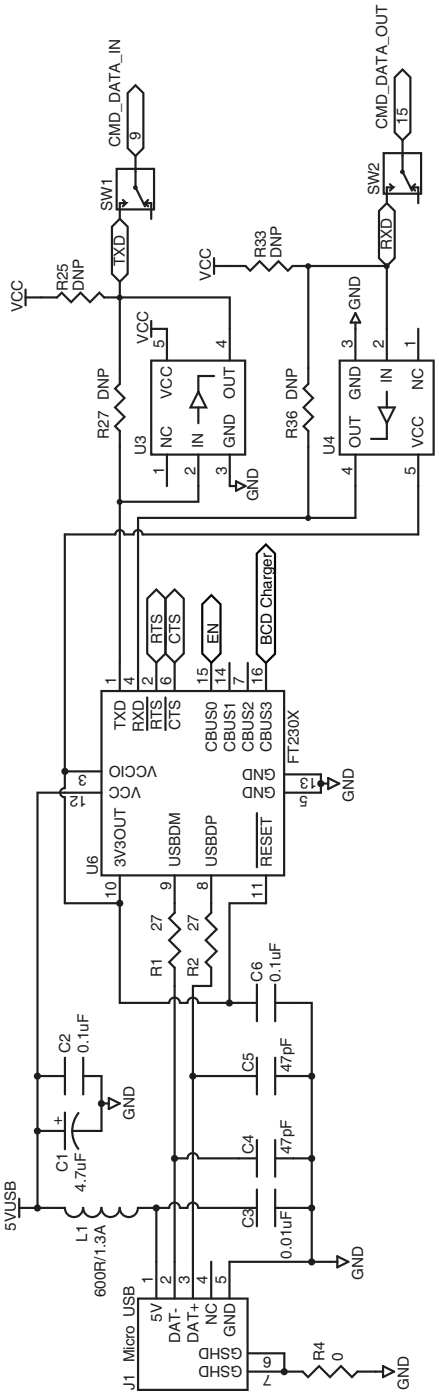


Figure 51: Prototype Board USB Area Schematic

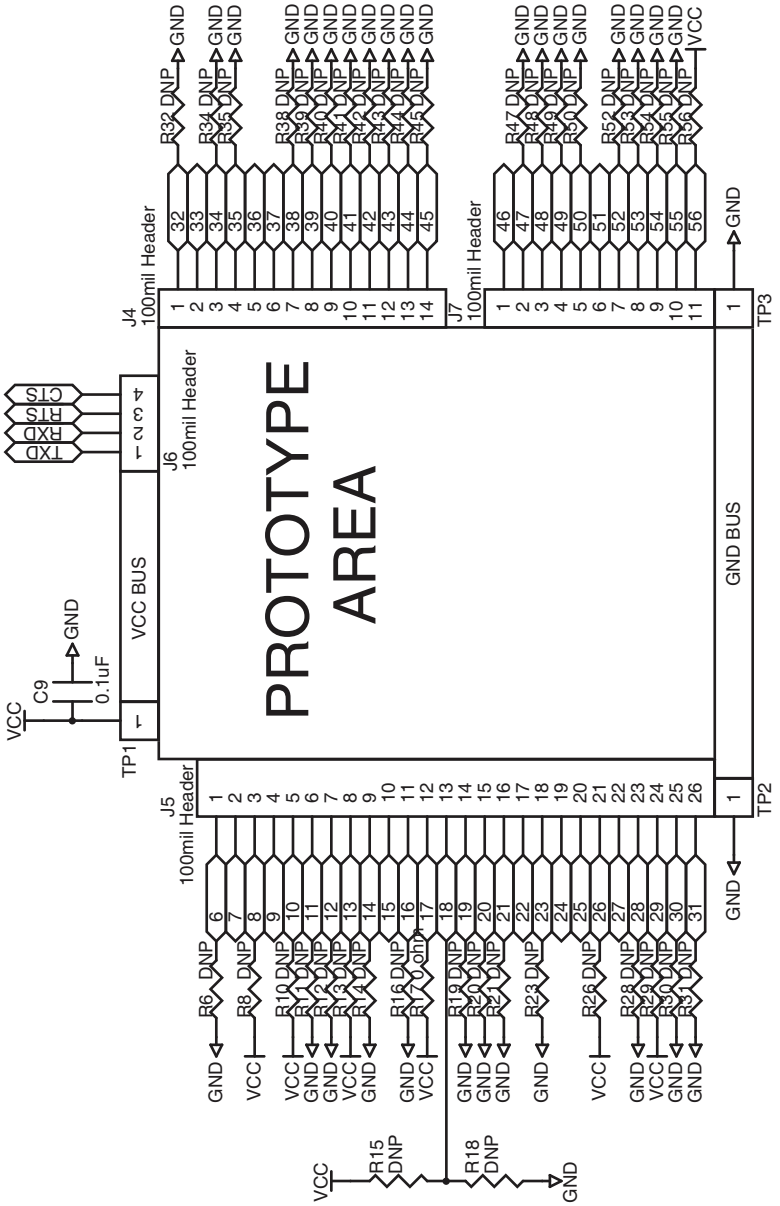


Figure 52: Prototype Board Prototype Area Schematic

HumPRC™ Series Evaluation Board Schematic

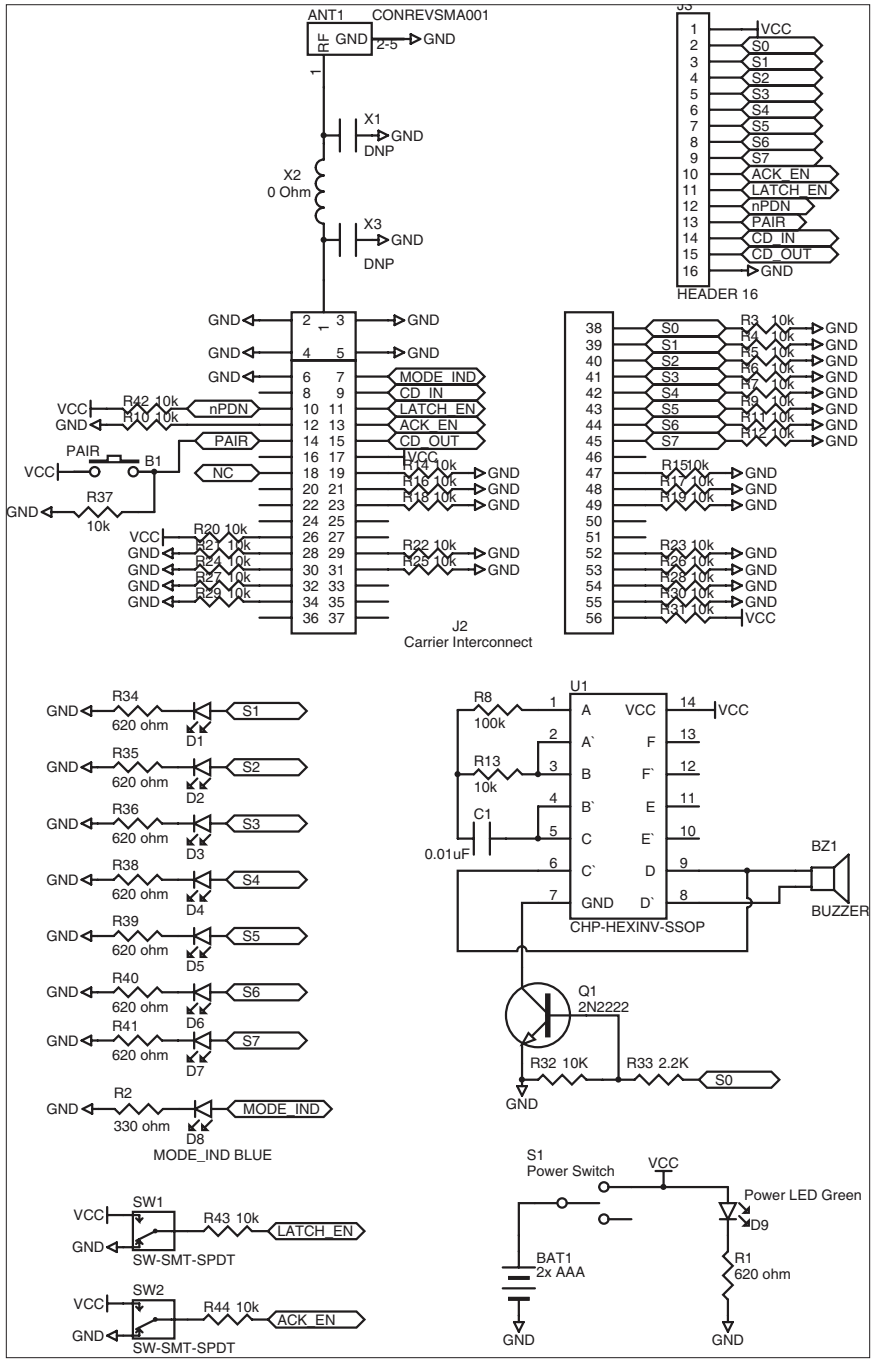


Figure 53: HumPRC™ Series Evaluation Board Schematic

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- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

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