# RK-Wi.232FHSS-25/250 User's Manual

Rev 1.0.0

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# Document Control

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# 1 Description

The RK-Wi.232FHSS-250 is a rapid-development/evaluation kit for the Wi.232FHSS-250 data transceiver.
Included in the kit is:

- 1-Rapid Development Case.
- 1-Rapid Development Utility and Documentation CD.
- 2-Wi.232FHSS-250 Rapid Development Boards.
- 2-Wi.232FHSS-250 -or- 2-Wi.232FHSS-25 Transceiver Modules mounted on EVM's*.
- 2-900 MHz antennas.
- 2-RS-232 cables.
- 2-USB cables.
- 6-AAA batteries.
- Startup Guide.

* An EVM is a Wi.232FHSS module pre-mounted on a small PCB with onboard antenna connector and power supply regulator.

# 2 *RA*pid *D*evelopment Kit Setup

- Insert the AAA batteries into the evaluation PCB, observing the correct polarity.
- Insert an EVM into one of the evaluation boards, observing the correct orientation (see later in this document). The correct orientation of the EVM is with the antenna connector closest to the edge of the evaluation board. Make sure the module is seated fully and correctly.
- Insert the other EVM into the other evaluation board, also observing the correct polarity.
- Connect antennas to EVM's.
- Connect evaluation boards to computers. If using USB communications, populate USB jumpers and remove RS-232 jumpers. If using RS-232 communications, populate RS-232 jumpers and remove USB jumpers.
- Install the RK-Wi.232FHSS Windows software. If already installed, skip this step.
- Select the type of module provided in this kit (Wi.232FHSS-25 LP or Wi.232FHSS-250)
- Select COM port and 2400 baud operation. Navigate to the "Wireless Chat" tab.
- Power-On both evaluation boards, verifying that the version/copyright information is echoed to the screen from both modules.
- Chat back and forth between evaluation boards, verifying that serial and RF communications are successful.
- **IMPORTANT NOTE FOR HYPERTERMINAL USERS**: See section 4.1

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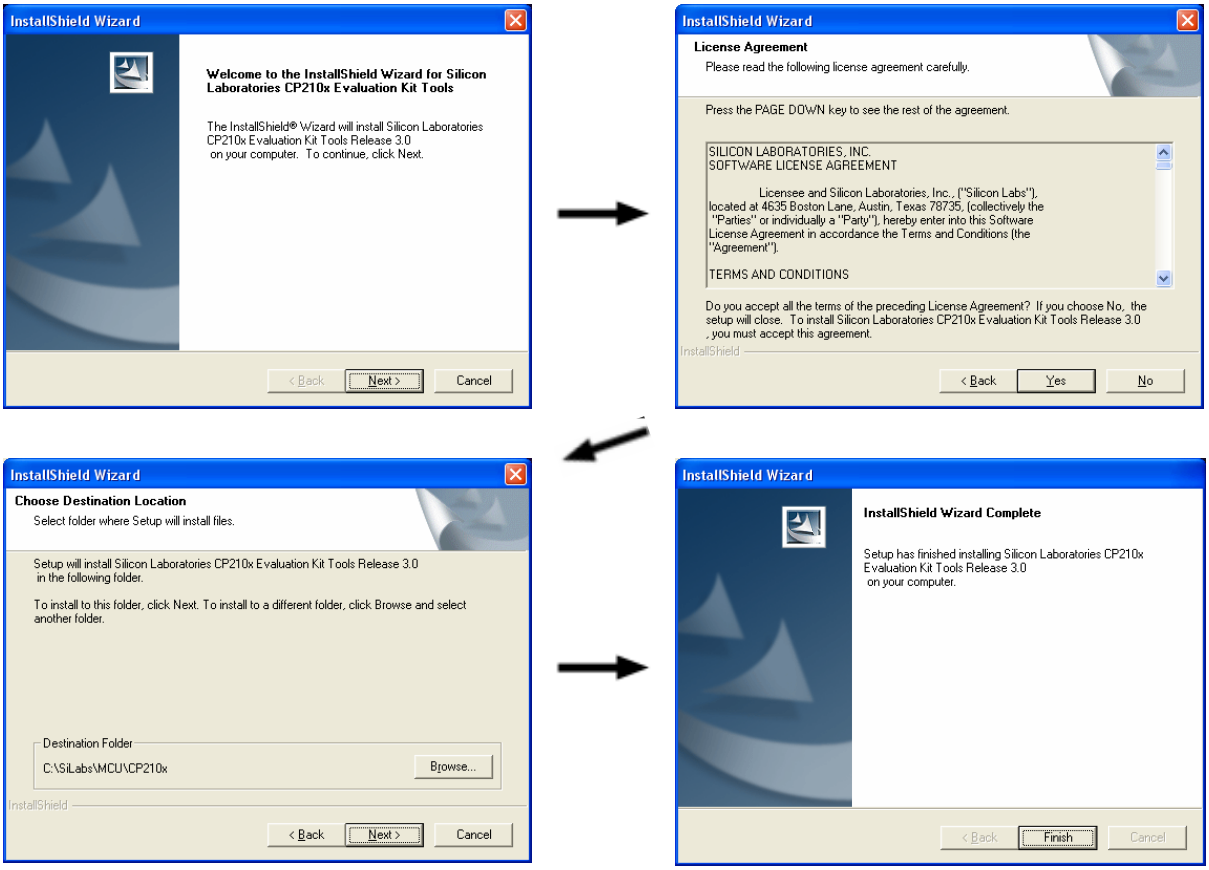
## 2.1 Windows USB Driver Installation.

If you plan on using the USB connector on the evaluation board to communicate with the Wi.232FHSS module, please follow the following steps to successfully install the driver.

Do **not** connect the evaluation board to your PC without first installing the driver. To install the driver, run the Silicon Laboratories CP210x UART to USB Bridge Driver as illustrated below.




When the driver installation is complete, you may connect the RK-Wi.232FHSS evaluation board to your PC. Windows will recognize the hardware and automatically install the driver for it.

If Windows cannot find the driver for the CP210x device, you may have to locate it manually. The driver is unpacked to the subdirectory "**`\SiLabs\MCU\CP210x`**" in the root of your default drive when you first run the installation.

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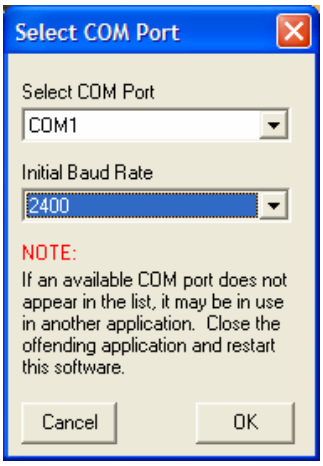
# 3 Introduction to the RK-Wi.232FHSS Evaluation Software

The software supplied with the RK-Wi.232FHSS RadKit is used to read and set the volatile and non-volatile registers with the Wi.232FHSS module. Refer to the Wi.232FHSS Users Manual for more information on the register settings.

## 3.1 COM Port Setup and Selection.

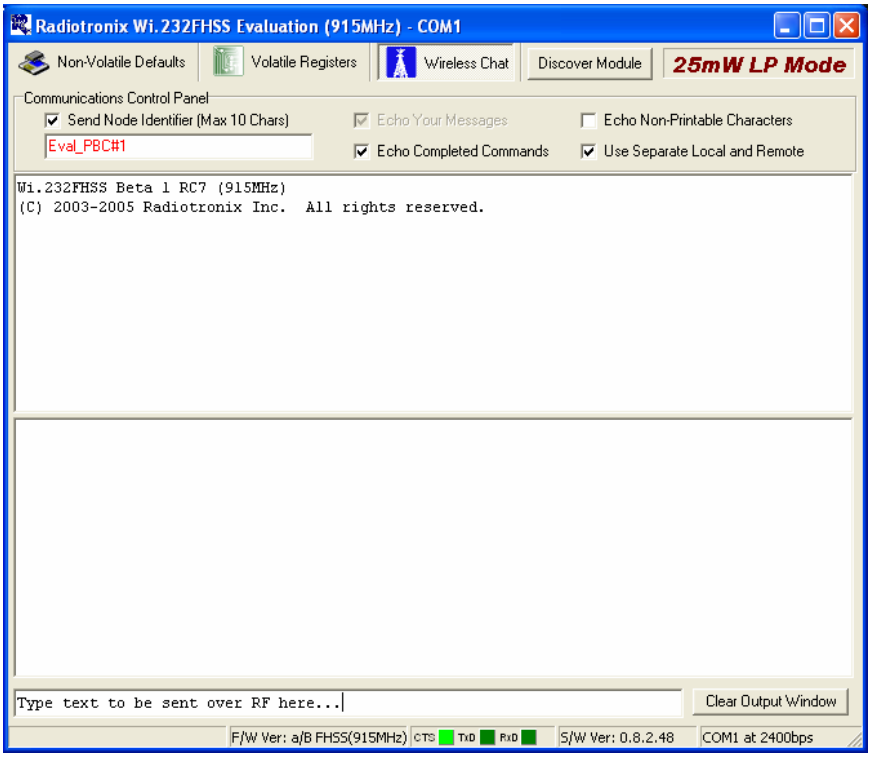



Upon starting the RK-Wi.232FHSS evaluation software, you will be presented with a COM port selection dialog box. If you are using the USB interface, make sure that the evaluation board is already connected to the computer via the USB cable before you start the software. This will ensure that the virtual COM port which is assigned to the USB to UART bridge controller by Windows is visible in the COM port selection list.

The first time you start the RK-Wi.232FHSS evaluation software, the Baud Rate should be left at 2400 baud, since this is the factory default baud rate setting for the module.

**Tip:** There is no way for the RK-Wi.232FHSS evaluation software to detect which baud rate the module is set to. If you have changed the Non-Volatile Data Rate register, you will have to select the baud rate you set this register to when you start the RK-Wi.232FHSS evaluation software.

## 3.2 Wireless Chat Page.

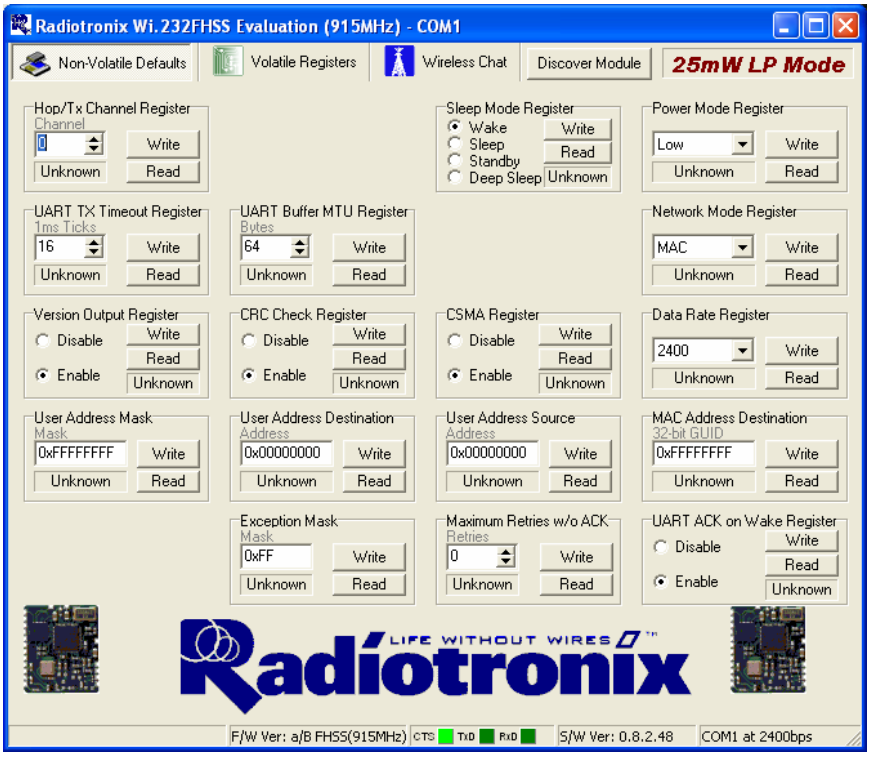



The Wireless Chat page in the RK-Wi.232FHSS evaluation software demonstrates the capability of the Wi.232FHSS to be used as a wireless communications link. The Rapid Development kit works as a wireless chat link with no register changes required, out of the box.

To Use Wireless Chat:

Type a message in the lower text field and press Enter. The text you typed will be displayed on the remote system, prefixed with a Node Identifier if you specified one.

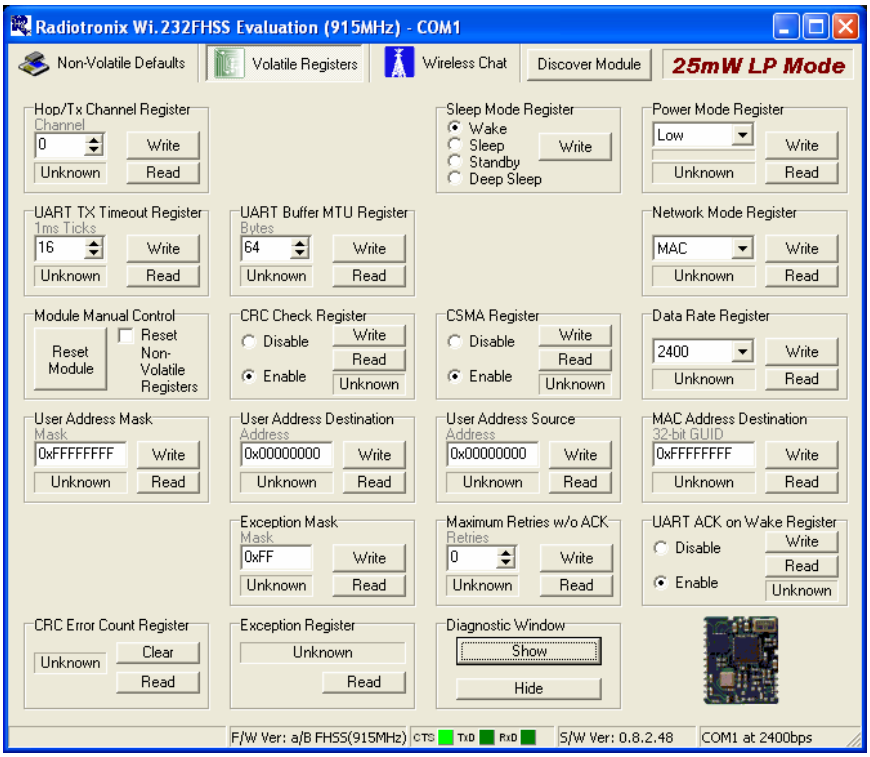
## 3.3 Non-Volatile Register Page.




The Non-Volatile Register page in the evaluation software allows you to change the default settings which will be loaded when the module is powered on.

**Tip:** If you change the Non-Volatile Data Rate setting, you will have to select the baud rate you set this register to when you start the RK-Wi.232FHSS evaluation software.

## 3.4 Volatile Register Page




In this page, you can change the Volatile settings of the module. Values programmed into these registers are lost when power is removed from the module.

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### 3.5 Diagnostic Window

The diagnostic window provides a means to switch the transmitter and receiver on and off, enable and disable carrier modulation, start, stop and set hop sequence, set transmitter power, set transceiver channels and perform bit error testing.

# 4 Using the Evaluation Software.

## 4.1 Setting Register Values.

On both the Volatile and Non-Volatile pages, the registers are labeled by function. To set a register value, select the value from the options available for that register and click the "Write" button. To perform a read of that register, simply click the "Read" button. Descriptions of the register functions can be found in the Wi.232FHSS Users Manual.

## 4.2 Power Mode.

This selects the mode of both the transmitter and receiver. The mode is not set until "Set Tx 1-Channel Diag", "Tx FHSS Diag" or "Set RX Diag" is pressed.

## 4.3 Receive Diagnostic.

Receive Diagnostic consists of four radio buttons which select the transmit channel. Low, Mid and High are quick reference buttons which can be used to select the lowest, the middle, or the highest channel. Any specific channel can be selected by using the controls above the "Set RX Diag" button.

The "Set RX Diag" button switches on the receiver using the channel set by the channel selector.

If a "…1010101010101…" bit pattern is being received at the frequency and baud rate set up in the relevant registers, a BER test will be performed and the number and percent of bit errors is displayed in the panel otherwise populated with the text "Unknown".

## 4.4 Transmit Diagnostic.

Transmit Diagnostic consists of four radio buttons which select the transmit channel. Low, Mid and High are quick reference buttons which can be used to select the lowest, the middle, or the highest channel. Any specific channel can be selected by using the controls below the "Set 1-Channel Tx Diag" button.

The "Set 1-Channel Tx Diag" button switches on the transmitter using the channel and mode set up using the channel selector and transceiver mode controls.

A "…1010101010101…" bit pattern is transmitted for bit error testing with another system. This is not a true pseudo-random sequence BER test.

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### 4.5 FHSS Transmit Diagnostic.

FHSS Transmit Diagnostic switches on the transmitter in Frequency Hopping mode, using the hop set and power mode selected. A "…1010101010101…" bit pattern is transmitted. This mode cannot be used as an excitation source for the receive diagnostic and is provided for testing purposes only.

## 5 Additional Operational Notes

### 5.1 Microsoft Windows / Hilgraeve HyperTerminal.

The RK-Wi.232FHSS Evaluation Kit can be used with HyperTerminal to receive and transmit RS-232 data and send files using file transfer protocols such as ZMODEM. HyperTerminal and many other terminal programs assert RTS by default. On the evaluation board, the RTS line is tied to the CMD pin on the module. When the CMD pin is held low, which is the case when the RTS line is asserted, the module will be placed in command mode.

In command mode, all UART data sent to the module will be interpreted as commands and will NOT be sent to the RF engine for transmission. Additionally, if an evaluation board is switched on in the presence of an asserted RTS line, it will perform a full hardware and flash reset to the factory defaults.

To use the evaluation board with HyperTerminal or other terminal program, you must first remove the jumpers from pins 7+8 of JP2, if you are using an RS-232 connection to your PC, or JP3, if you are using a USB connection to your PC. Removing this jumper will disconnect the RTS line from the CMD pin on the module, allowing normal operation.

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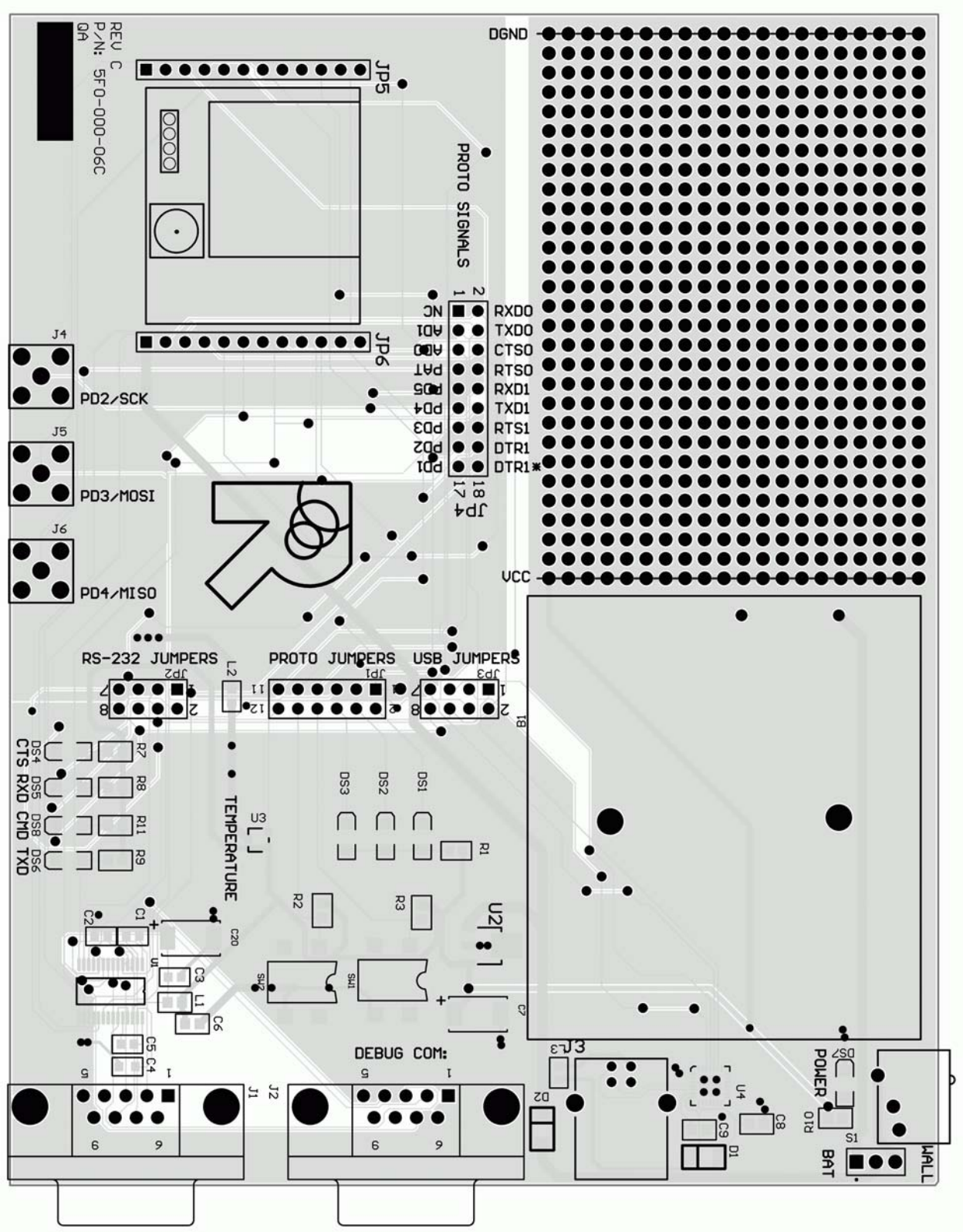
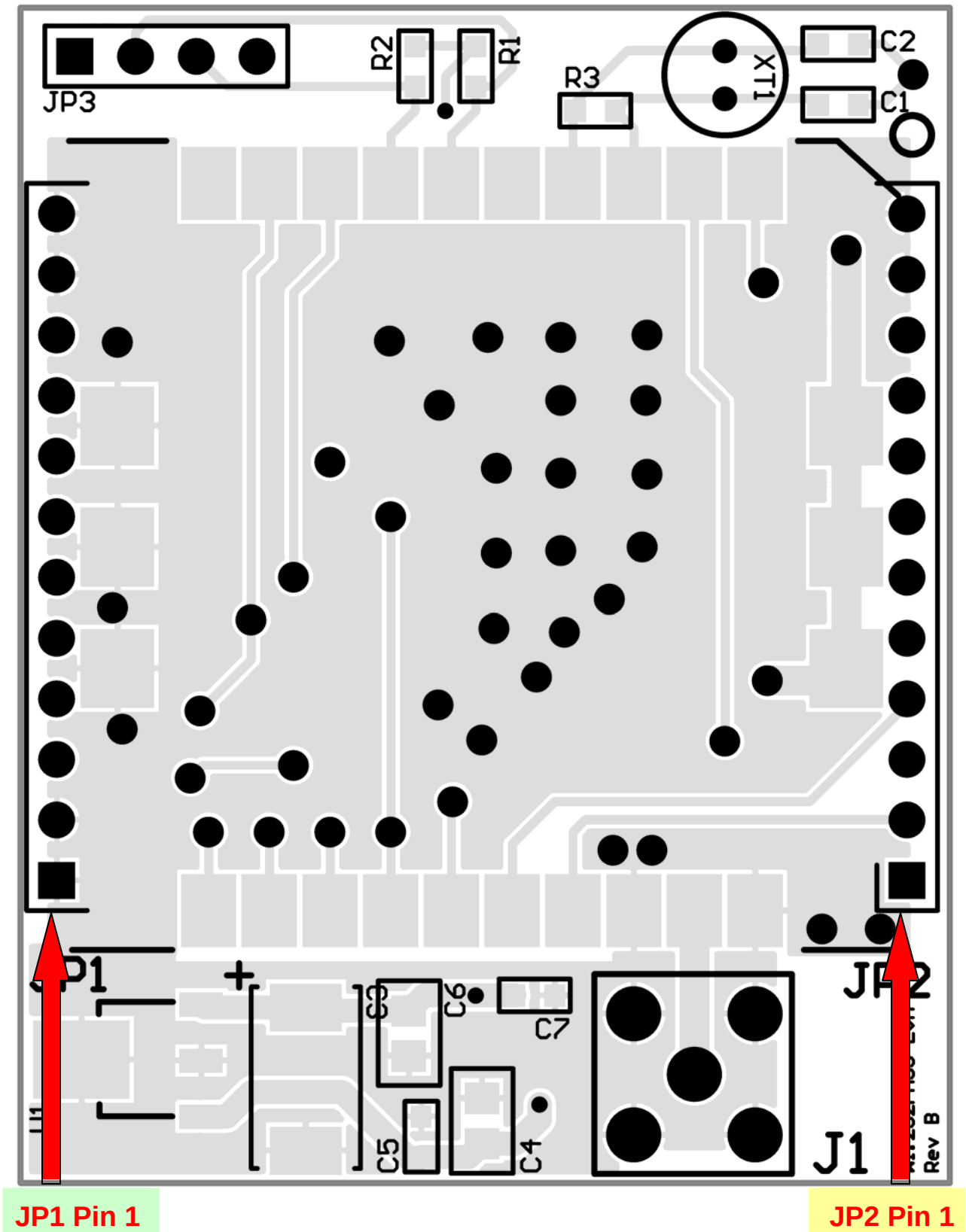
# 6 PCB Layout Diagrams

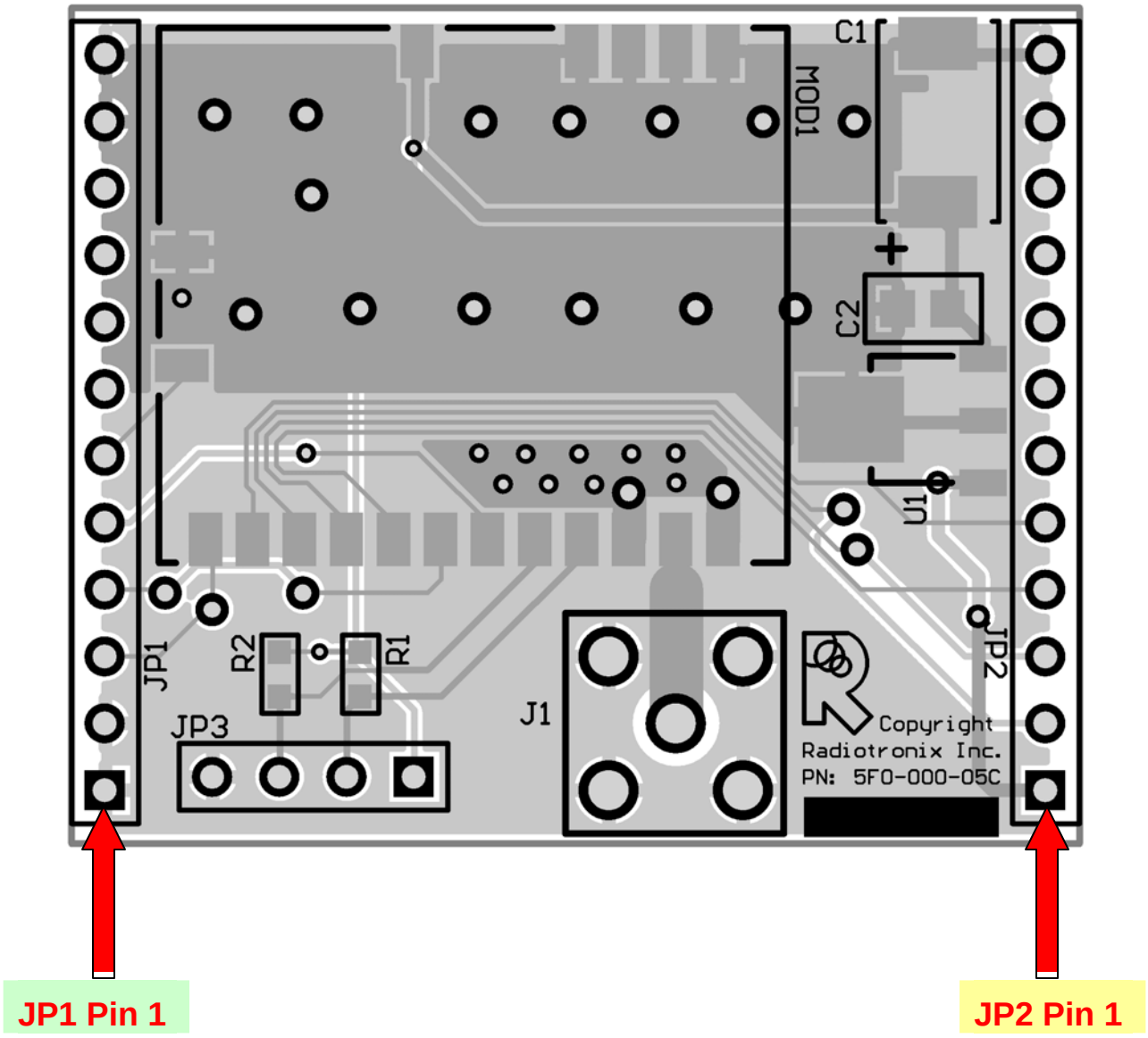
## 6.1 RK-Wi.232FHSS Evaluation (Rapid Development) Board Layout



## 6.2 Wi.232FHSS-250 EVM (EValuation Module) Layout



## 6.3 Wi.232FHSS-25 EVM (EValuation Module) Layout



**NOTE:** Pin 1 of the EVM's JP2 aligns with Pin 1 of JP6 on the evaluation board. The following table lists the pin numbers and their assignments

| Pin Name | Pin Description |
|---|---|
| JP2 Pin 1 | 4V to 12V Vdd |
| JP2 Pin 2 | RxD0 |
| JP2 Pin 3 | TxD0 |
| JP2 Pin 4 | CTS0 |
| JP2 Pin 5 | CMD (Active Low) |
| JP2 Pin 6 | RxD1 – Reserved for Future – No Connect |
| JP2 Pin 7 | TxD1 – Reserved for Future – No Connect |
| JP2 Pin 8 | RTS1 – Reserved for Future – No Connect |
| JP2 Pin 9 | DTR1 – Reserved for Future – No Connect |
| JP2 Pin 10 | DTR1* - Reserved for Future – No Connect |
| JP2 Pin 11 | GND |
| JP2 Pin 12 | GND |
| JP1 Pin 1 | GND |
| JP1 Pin 2 | GND |
| JP1 Pin 3 | AD1/BE |
| JP1 Pin 4 | AD0/CMD_RSP |
| JP1 Pin 5 | RSSI |
| JP1 Pin 6 | PD5/EX |
| JP1 Pin 7 | PD4 – Reserved for Future – No Connect |
| JP1 Pin 8 | PD3 – Reserved for Future – No Connect |
| JP1 Pin 9 | PD2 – Reserved for Future – No Connect |
| JP1 Pin 10 | PD1 – Reserved for Future – No Connect |
| JP1 Pin 11 | GND |
| JP1 Pin 12 | GND |

**Table 1, EVM Module Pinout**

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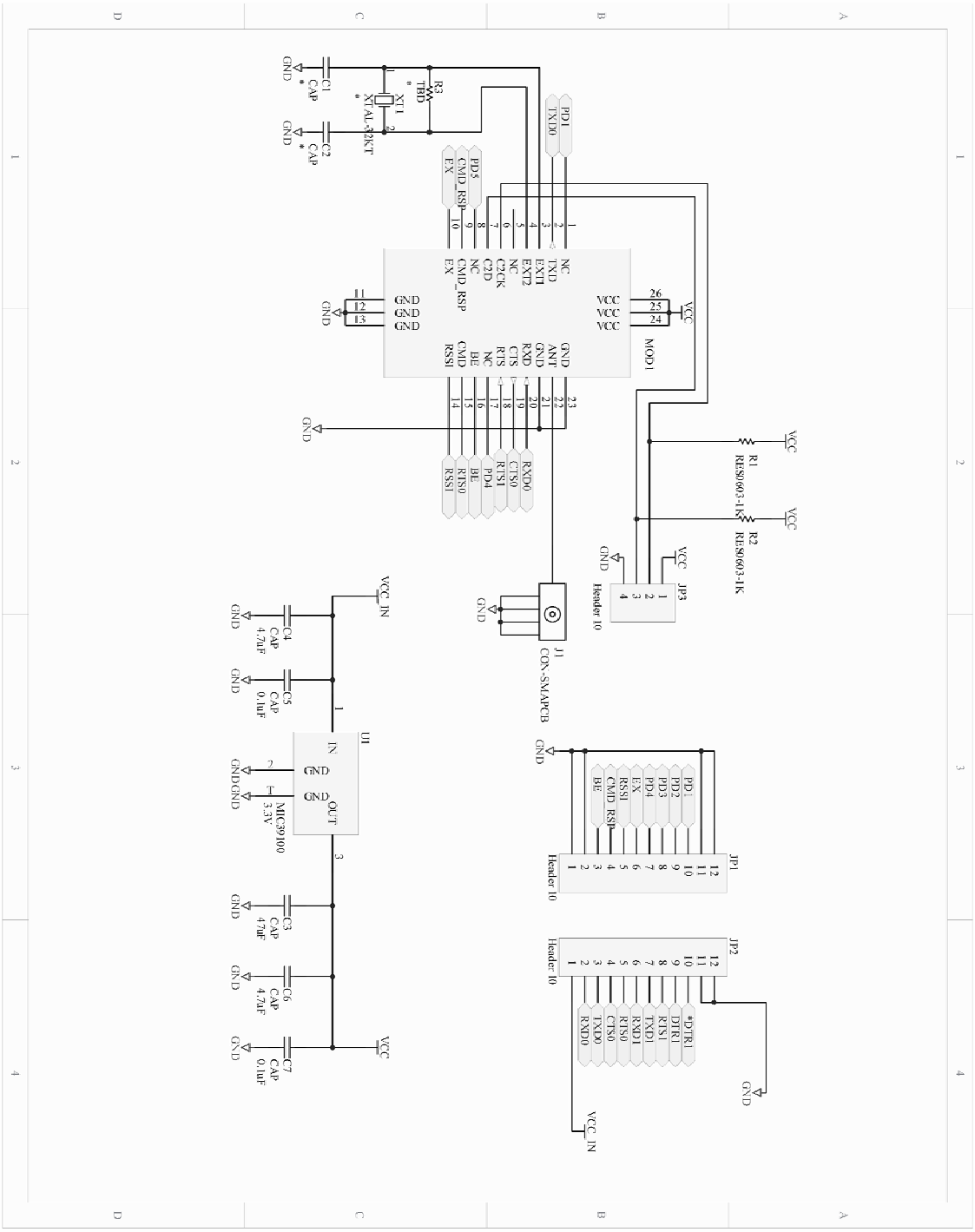
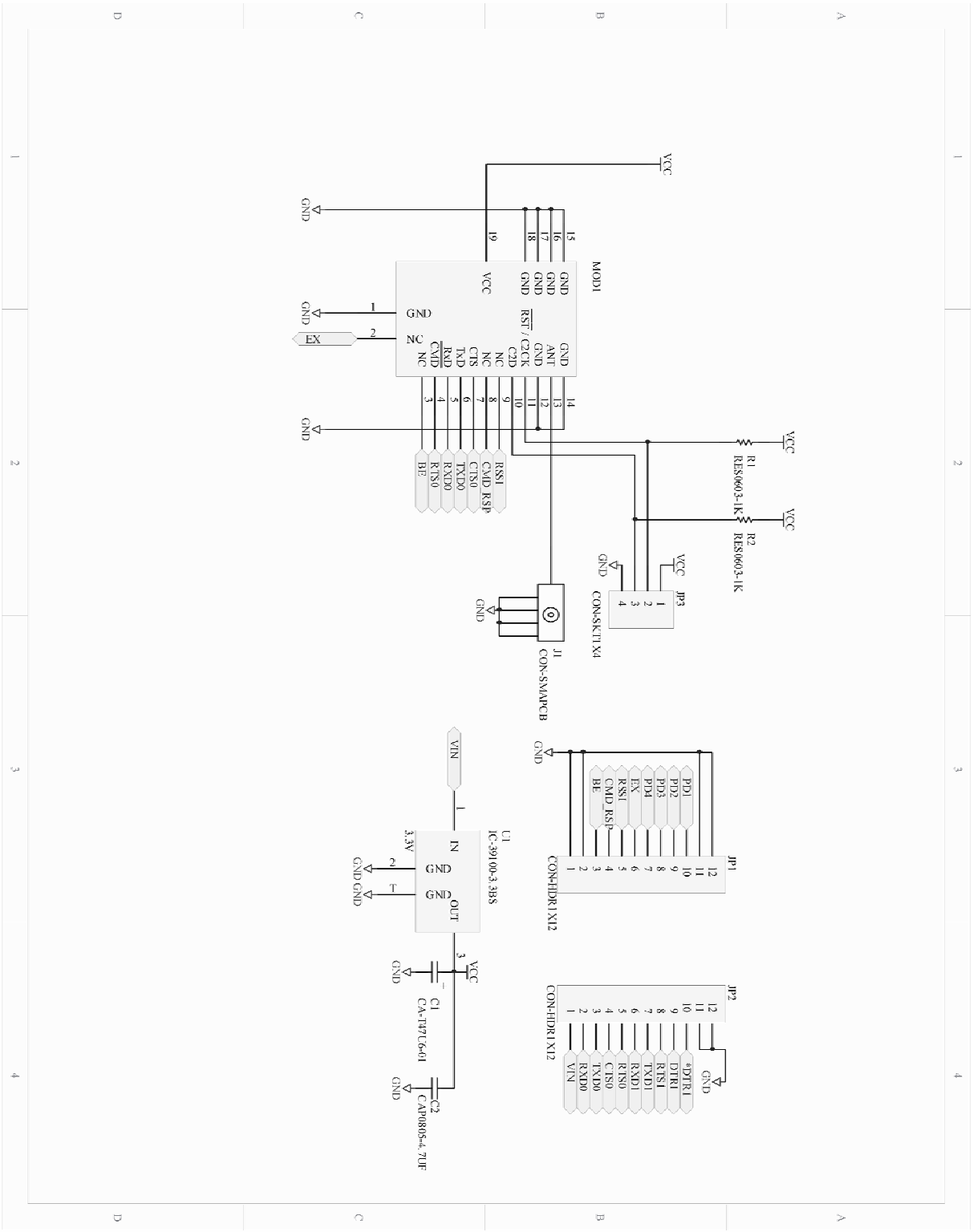
# 7 Schematic Diagrams

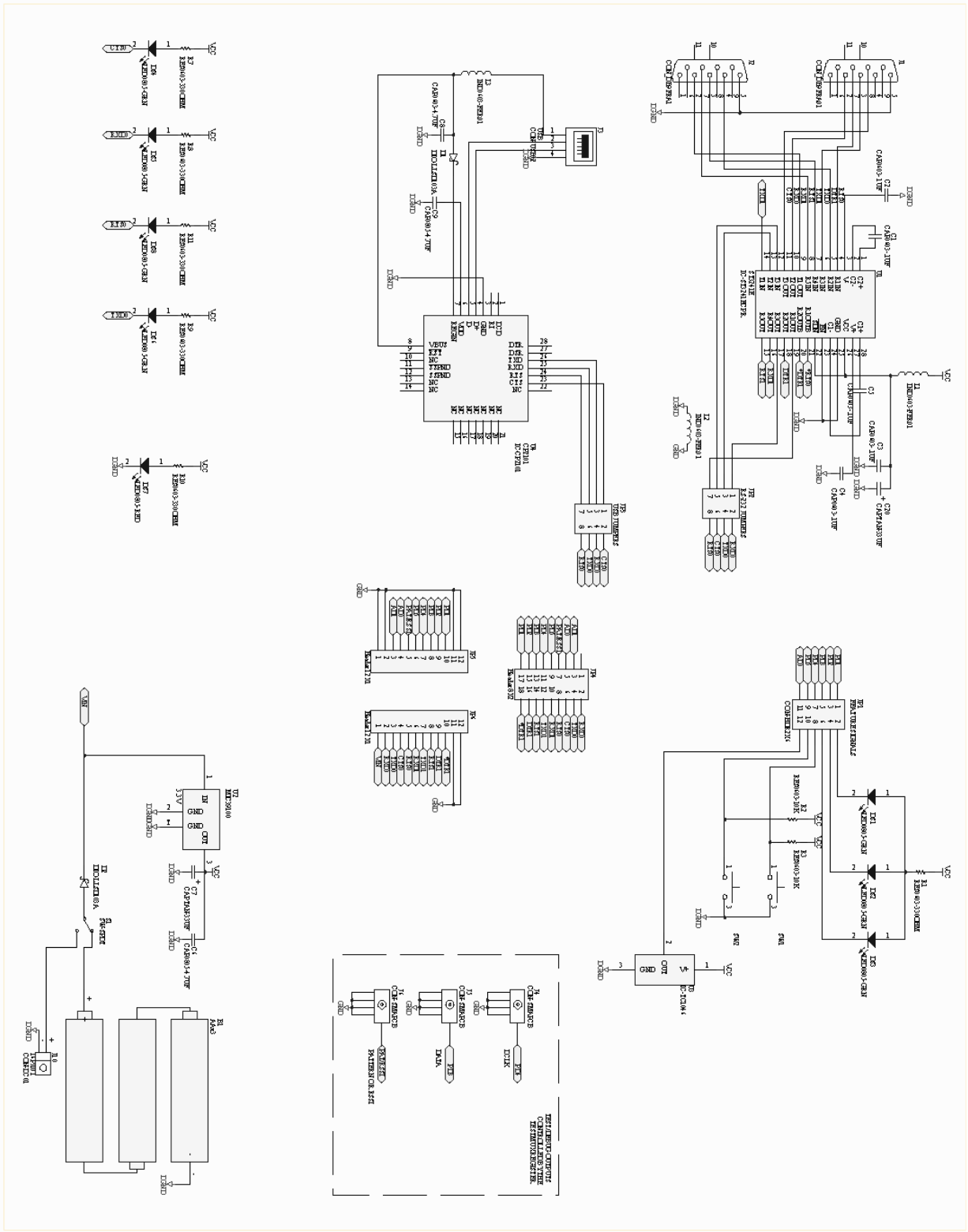
## 7.1 Wi.232FHSS-250 EVM (EValuation Module) Schematic Diagram



## 7.2 Wi.232FHSS-25 EVM (EValuation Module) Schematic Diagram



## 7.3 RK-Wi.232FHSS Evaluation (Rapid Development) Schematic Diagram.



# 8 NOTES

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