



---

# User Guide: PRDBIF1

Version 1.0  
March 1, 2016

Presented by:  
Klaus Seiberts  
Jim Childers

---

## 1 Introduction

The PRDBIF1 board is designed as an interface between the MRD2 from Texas Instruments and the RFM (Radio Frequency Module) 007 (Power RFM) and 008 (Remote Power RFM).

The RFM modules to be used are currently offered by two vendors:

Texas Instruments: RI-RFM-007B, RI-RFM-008B

Protagd: PRDRFM007C, PRDRFM008B

TI does not produce a controller module which supports HDX+ tags, which is physically compatible with their Power RFMs. The PRDBIF1 fulfills this need to supply a controller that fits the RFM's physical and electrical format and can support those TI's tag protocols implemented on the MRD2, including the newest HDX+ tags. Access to the MRD2 can be done by USB or RS-232.

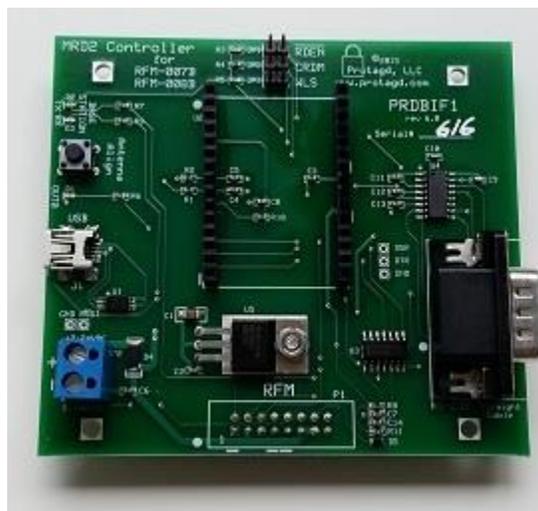


Figure 1.1 PRDBIF1 board

---

## 2 Hardware Setup

### 2.1 Mounting

The PRDBIF1 board screws directly onto the bottom of both RFM types, and plugs into the RFM's 16-pin header, J1. The user must supply power to the PRDBIF1 screw connector, P2, plus either a USB or RS-232 connection to a data logger or other means of SW control such as a PC. The RFM receives all its power through the PRDBIF1.

The PRDBIF1 board comes with four 13mm standoffs and eight M3 screws for mounting to the RFM of choice. Screw the standoffs to the back side of the PRDBIF1 board using the four mounting holes in the corners, align female connector, P1, on the PRDBIF1 with male connector, J1, on the RFM and plug them

together—making certain all 16 pins of J1 fit into all 16 holes on P1. Secure the RFM to the standoffs with the remaining four screws.

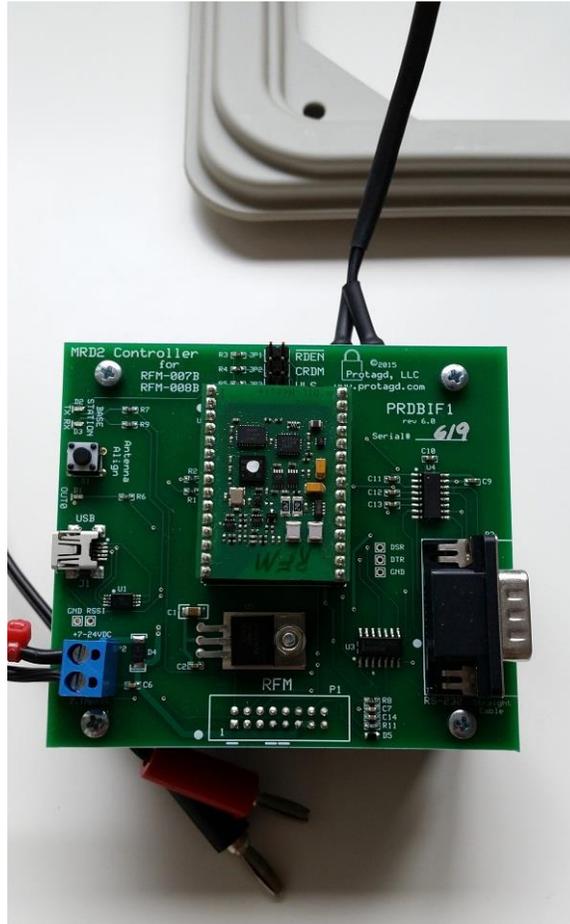


Figure 2.1 PRDBIF1 board mounted on RFM-007

## 2.2 Power

The RFM requires up to 24W of power, which is far more than can be supplied by a standard USB cable. All power is, therefore, supplied via the power connector, P2.



**Caution:** The default setting of the MRD2 will cause a constant carrier signal after connecting the power supply and the USB connection. This can harm the RFM. Please make sure to setup the MRD2 accordingly, i.e. set the “Power Reader (RFM) connected” flag to on. The MRD2 supplied by Protagd together with the PRDBIF1 has already the correct setting.

When choosing a power source, take care when using Switch-Mode Power Supplies (SMPS) as they sometimes generate so much radio-frequency noise as to completely swamp the incoming RFID signal to the RFM. If used, select an SMPS

which has a switching frequency above 250kHz. Whatever the supply, it needs to be rated between 7 and 24VDC and be capable of supplying up to 2.1A peak current. The polarity is clearly marked on the board—positive on the left and negative on the right when facing P2's wire holes. A diode protects the PRDBIF1 and RFM boards if the power is accidentally connected backwards.

*Do not use two 12V batteries in series, as a fully-charged 12V battery is actually 13.2V. Two fully-charged 12V batteries in series can supply 26.4V and possibly damage the RFM (rated at 24VDCmax). Two or three 6V batteries in series are a good choice.*

A linear supply would also be a good choice but they are difficult to find nowadays and are quite inefficient.

---

### 2.3 Jumper Settings

There are three 2-pin jumpers on the PRDBIF1 board labeled RDEN, CRDM, and WLS. Active-low RDEN disables transmission when jumper JP1 is inserted. The default is 'open'. Active-high CRDM enables continuous charge-only read mode when jumper JP2 is inserted. The default is 'open'. Active-high WLS enables wireless synchronization mode when jumper JP3 is inserted. The default is 'open'. Use of these three jumpers are discussed in more detail in the Microreader RI-STU-MRD2 Reference Guide ([SCBU049](#)).

---

### 2.4 Board LED

There are three LEDs on the PRDBIF1 board. The yellow LED is explained in the next section. The remaining two LEDs are 'red' and 'green'. The red LED indicates the RFM transmitter has been activated either by a software command or by pressing the pushbutton on the PRDBIF1 board. The green LED indicates a signal at the RFM receiver is above the threshold set by the RXSS potentiometer on the RFM. To align this potentiometer and make this LED function correctly, follow the RXSS alignment procedures described in Section 1.3 of either RFM manual ([RFM-007B](#)) or ([RFM-008B](#)).

There is a spare yellow LED just above the USB connector which is user-defined. It is connected to the MRD2 signal, SIG\_OUT\_0 and can be turned on ('1') and off ('0') by writing the proper sequence to the communication port (USB or RS-232). Section 6.4 of the Microreader RI-STU-MRD2 Reference Guide ([SCBU049](#)) gives a detailed explanation of how to control the SIG\_OUT\_0 bit.



**Caution:** Do not attempt to change the other signals, SIG\_OUT\_1, SIG\_IN\_0 or SIG\_IN\_1 as these signals are used to control the RFM.

---

## 2.5 Antenna Alignment

To use an RFM of either model, the antenna must be aligned for best sensitivity and power efficiency. The RFM-007B is tuned using a separate tool called an Antenna Tuning Indicator (ATI). This device automatically enables the RFM's transmitter so that tuning can proceed; however, it is possible to tune the RFM-008B by observing the tuning indicator LED on the Antenna Tuning Board (ACC-008B). For this procedure, a pushbutton is included on the PRDBIF1 board. To engage the RFM's transmitter for tuning, press and hold the pushbutton and follow the alignment procedure for the RFM-008B.

---

## 2.6 RSSI Measurement

In receive mode, it is sometimes useful to observe the Received Signal Strength Indicator (RSSI) signal. This signal is a voltage from zero to about 2V which is proportional to the logarithm of the received signal strength. This signal can be measured by a voltmeter placed on the pin holes in the PRDBIF1 board labeled RSSI and GND.

---

# 3 Communication

## 3.1 USB

Before the USB connection can be used, the driver INF file must be installed (see USB Driver Installation Section below). To get the INF file, download [this zip](#).

When using USB, once the USB cable is connected at both ends, the PRDBIF1 will *not enumerate* until power is applied to power connector, P2. This guarantees the hardware is ready to work as soon as it is recognized by the host.



**Hint:** Protagd offers a Graphical User Interface (GUI) that allows to perform basic functions for a number of different transponders.

---

## 3.2 RS-232

Connect the RS-232 cable at both ends. Before the RS-232 connection can be recognized by the host, power must be applied to power connector, P2. The RS-232 connection defaults to 9600 baud, 8 data bits, no parity, and 1 stop bit. Use a 9-pin Female-Female 'straight' cable to connect the PRDBIF1 to a serial port.

Also on the PRDBIF1 board are three pin holes for connection to the RS-232 signals DSR, DTR and GND (ground). DSR is an output to the host, while DTR is an input from the host. DSR can accept 5V TTL or CMOS levels. DTR outputs 5V CMOS levels and can source 1mA and sink 3.2mA.

---

### 3.3 USB Driver Installation

1. Copy the file MicroreaderII.inf to your Win7 computer.
2. Right click on the driver file and click INSTALL.
3. Click YES if Windows prompts for authentication from User Account Control.
4. Click “Install this driver software anyway”, if Windows prompts for authentication.
5. Connect the MRD2.
6. After installation is complete, a message “Device driver software installed successfully.” Is displayed.
7. The USB driver is now installed on the computer, and the system is ready to use.

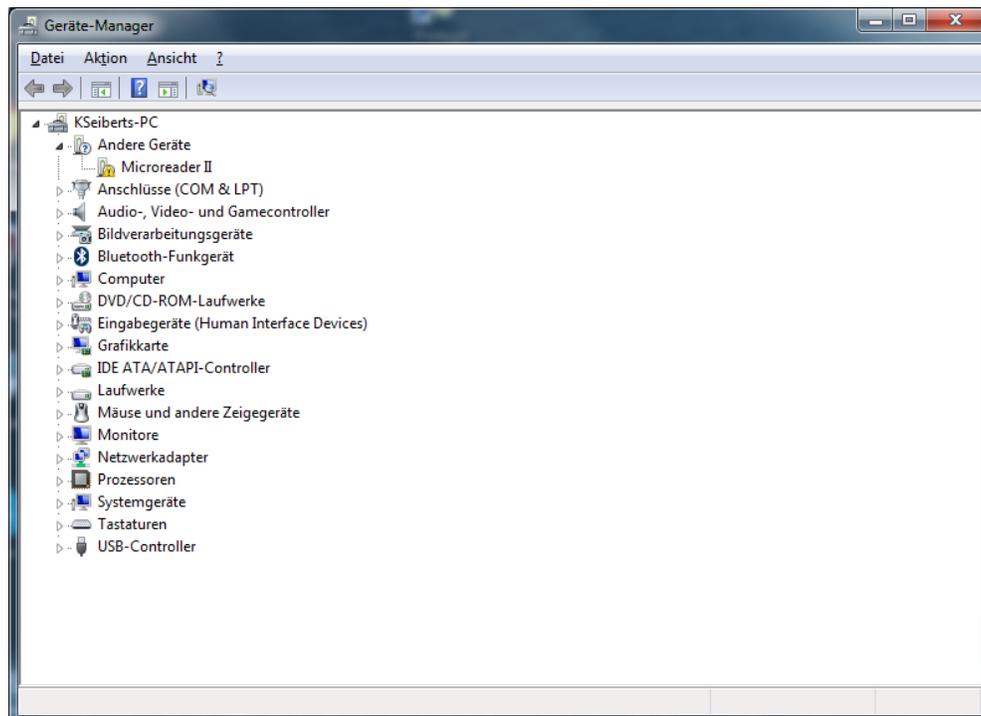
---

### 3.4 USB Troubleshoot

In some cases the installation as described in the User’s Guide does not work. In this case the following procedure is to be used.

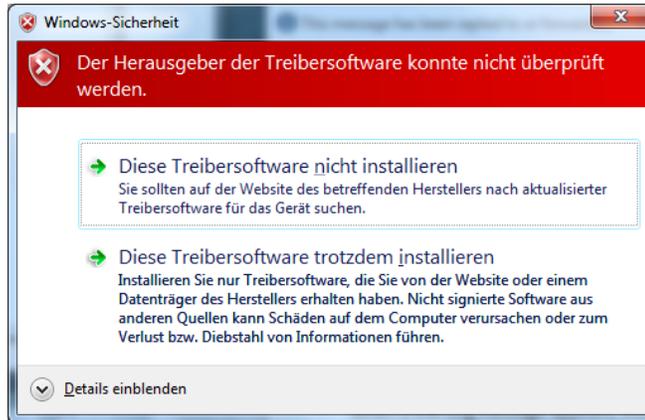
Installation for Win7 Pro:

8. Copy the MicroreaderII.inf file into a folder.
9. Plug the MRD2 into your computer.
10. Go to the Windows Device Manager. The Microreader II is shown.



11. Right click on the Microreader II and choose install driver.
12. Select to browse the driver from your computer.

13. Choose the folder (above) which includes the .inf file.
14. Click Next.
15. When a warning message appears, choose: "Install this driver software anyway".



16. After a fairly long wait (up to 2 minutes), the driver successfully installs.
17. Your Microreader is now seen as a COM port.

