

**RFIC
Design
Assistant
5.1**

User Guide






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Overview

The Murata RF Design Assistant (RFDA) includes all the features of the following RFIC Evaluation Boards:

- **DR-TRC103-868** 
- **DR-TRC103-915** 
- **DR-TRC104-2400** 
- **DR-TRC105-433**

Key Features:

- **Comprehensive Evaluation of RFICs™s**
- **Individual Parameter Selection**
- **RS-232 Communication Setup**
- **Device Selection**
- **Band Selection**
- **Center Frequency Setup**
- **Transmitter Parameter Setup**
- **Receiver Parameter Setup**
- **One Click Configuration**
- **Calibration**
- **Sleep/Power Down Setup**
- **Status Register Read**
- **Example Code Setup**
- **Load & Save Configurations**

Note: The RFDA does not currently include software programmable features for the DR-TXC100-315 and DR-TXC100-433 products. However, the listing for reference schematic and output matching values are included.

Note: Software screen captures displaying the RFM logo are products of Murata Manufacturing Co., Ltd.

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Installation

Go to <http://wireless.murata.com/eng/products/support/sub-ghz-radios.html> and click on the RFDA download link at the bottom of the page. The software will install automatically.

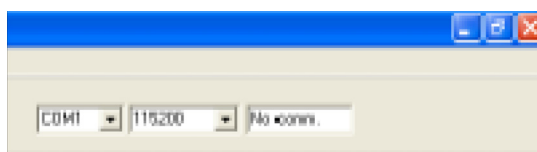
Getting Started

Double click on the RFDA icon and the RF Design Assistant will open to the below screen.



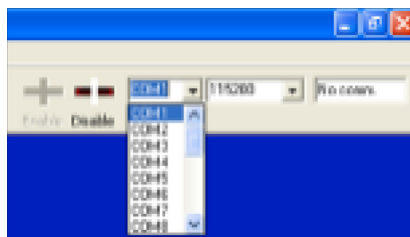
RS-232 Communication Setup

Before continuing, the COM port must be set for communication with the evaluation board. The COM port and Baud Rate selection are located at the top right corner. When the software is first executed, the COM port is automatically connected. To change COM ports simply click on the COM1 drop-down and select the COM port desired. The RFDA automatically disconnects from the current COM port and connects with the new selection. An error message is displayed if the selected COM port is not available.



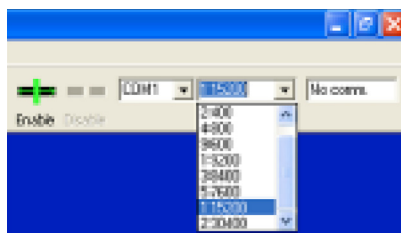
The COM port may be selected from the drop-down box. Select the COM port and it automatically connects. If there is an error with the

COM port, an error box will display.



NOTE: The COM port number assignment is limited to a maximum of 16.

The COM port speed may also be configured. Version 1.0 boards operate at 19.2 kb/s. Version 2.0 and later boards all operate at 115.2 kb/s COM rate. Except for the TRC104. To change the COM port speed, select the speed from the drop-down box.



Preferences

The RFDA may be configured to start up and connect to a specific COM port each time the software is executed. COM port startup can be found by clicking File>Preferences.

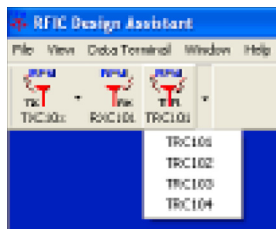


Device Selection

After establishing the correct COM port settings you will need to select the device you wish to evaluate. There is one choice for evaluation: Transceiver (TRC10x).

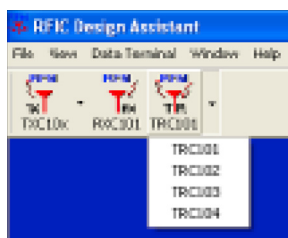


The device is selected by clicking on the arrow to the right of the Toolbar icon and selecting the device from the drop-down box.



TRC103/105 Device Selection

After establishing the correct COM port settings, click the arrow for the drop-down box and select TRC103/105.

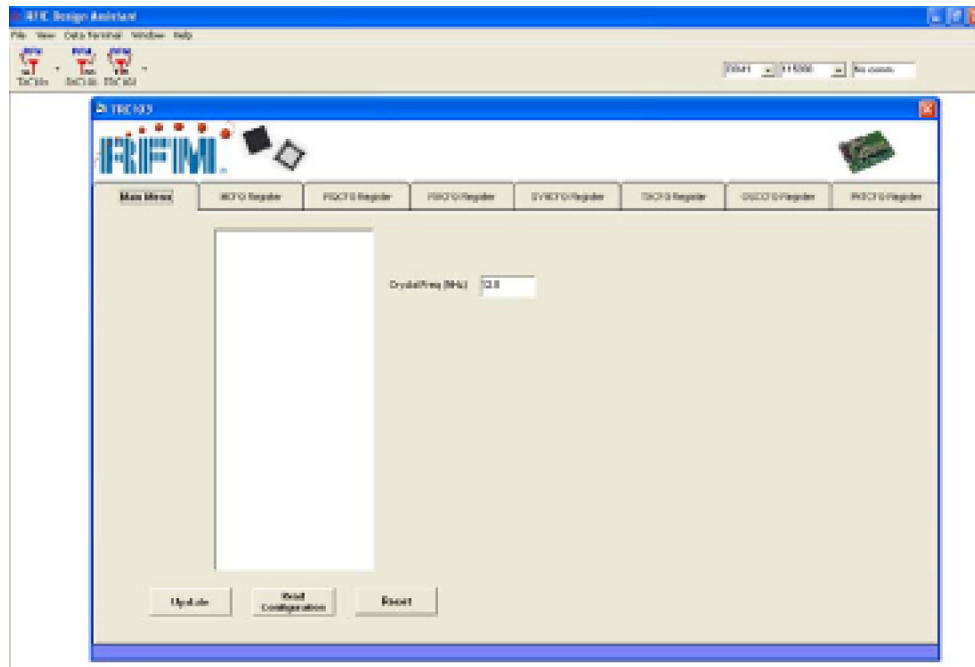


Each configuration tab follows the TRC1XX datasheet. The name of the configuration register as well as its hex address is given at the top of each frame for quick reference. The current register setting value, the "Register Bits" label, is also given at the bottom right corner of each register. When a function is changed, the register setting value is updated with the new value. All register setting values are displayed in hex.

Each register setting name corresponds directly with the TRC1XX datasheet. For example, when changing the Bit Rate (Config 3 0x03) the "D value" is also the same value name referenced in the datasheet. This makes correlation between RFDA and datasheet effortless.

The Update button in ALL configuration tabs sends all 32 registers to the TRC10X, not just that page of values.

Main Menu

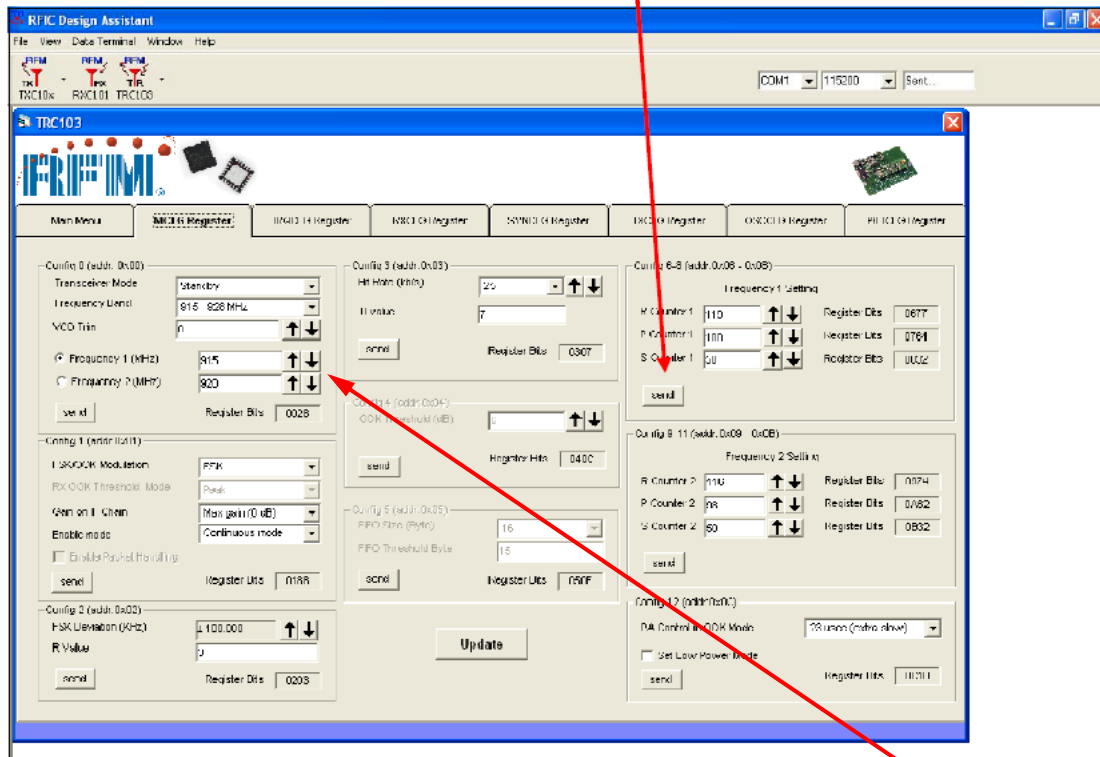


The main menu allows you to select the crystal frequency that will be used with the TRC10X. The standard crystal frequency that is used for device characterization and for which the datasheet values are given is 12.8 MHz. Using other crystal frequencies, while permissible, will affect other critical parameter settings. Parameter setting changes in other registers are reflected when the crystal frequency is changed.

The Reset button reloads the default settings of all registers when selected.

The Read Configuration button reads the current values of all registers of the TRC103 and displays them in the window. The Update button sends the configuration for all registers to the TRC103. All registers allow you to update only that particular setting. Each register has a SEND button that will only send that register's value to the TRC103.

MCFG Register [0x00 - 0x0C]



Frequency Setting

It is advised to allow the RFDA to calculate the R, P, and S register settings for the frequency. However, the user can manually adjust these values if desired and the re-calculated freq is displayed in the Config0 frame. Values for R, P, and S are entered in decimal form (0 to 255) and its hex value is calculated and displayed in the Register Bits label. Exact frequency value can be entered in the frequency box and the R,P,S value is calculated after pressing "Enter". Use the arrows to fine tune the settings. Each click of the arrow will automatically send the new value for that register to the development board (MCFG Register ONLY).

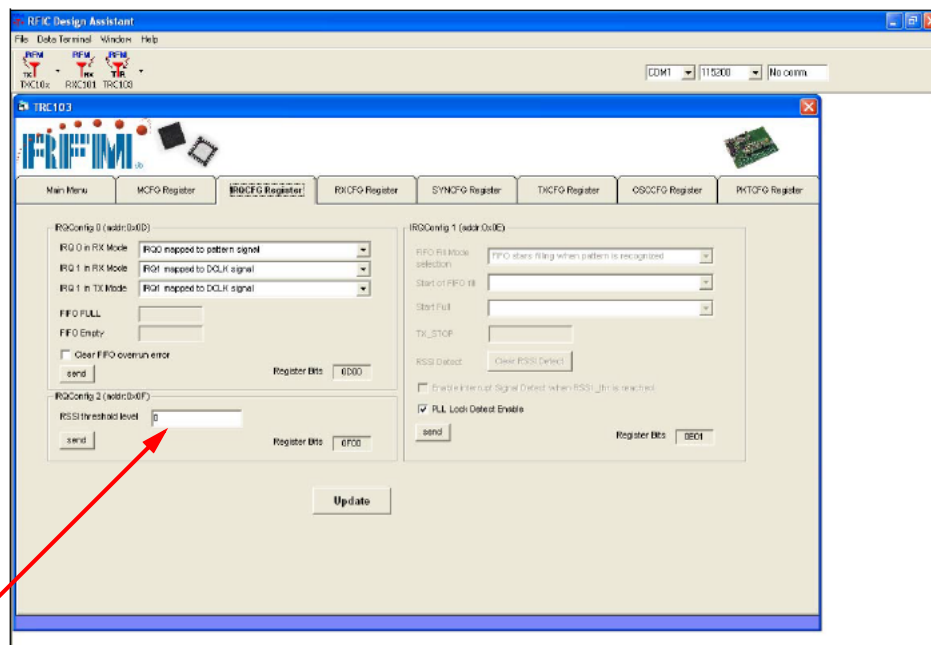
Individual Register Update

There are select registers that allow you to update only that register setting value. These are identified by having the "Send" button available in each individual frame. Clicking on the Send button sends ONLY that register value to the TRC103.

Individual register updates for MCFG are:

1. Bit (Data) Rate
2. R, P, S values for Frequency 1 Setting
3. R, P, S values for Frequency 2 Setting

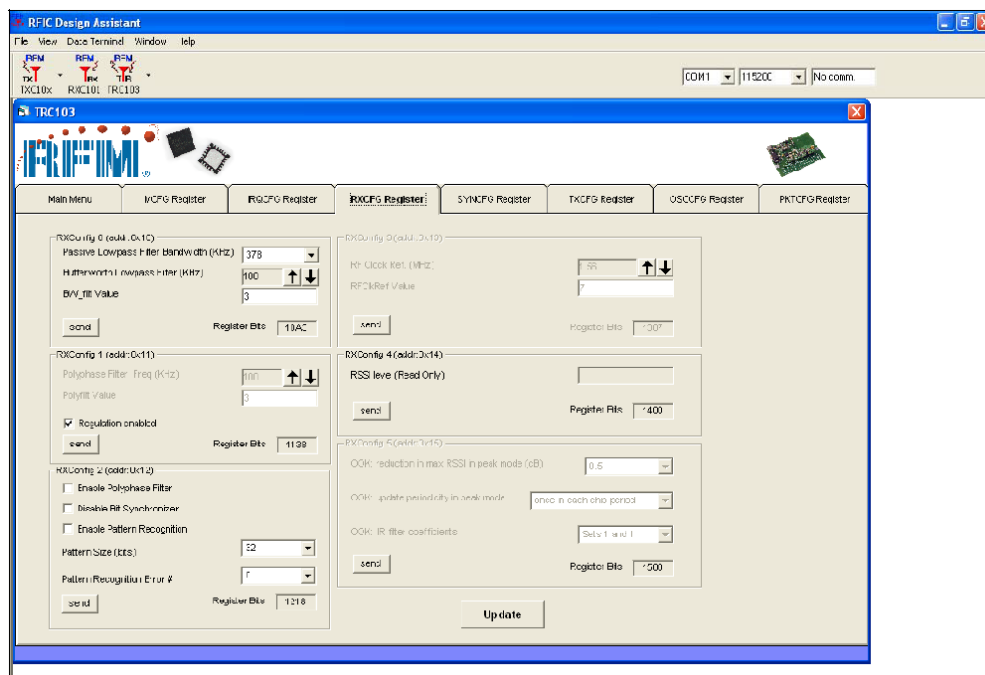
IRQCFG Register [0x0D - 0x0F]



The IRQCFG tab allows for configuration of the interrupt request mapping and FIFO usage. Depending on the mode of operation, continuous versus buffered, the selections for interrupt mapping will automatically change to remain consistent with the correct operating mode.

RSSI threshold level value should be entered as decimal. The hex equivalent is displayed in the Register value label. Read Only bits are grayed out.

RXCFCG Register [0x10 - 0x15]



All RXCFG Register settings are entered as decimal. The hex equivalent is displayed in the Register value label.

SYNCFG Register [0x16 - 0x19]

RFIC Design Assistant

File View Data Terminal Window Help

COM1 115200 No comm.

TRC103

Main Menu MUXCFG Register RXCFG Register TXCFG Register **SYNCFG Register** OSCCFG Register RXTCFG Register

SYNConfig 0 (addr:0x16)
Synch. Value (16/18) 00h Register Bits 1600 send

SYNConfig 1 (addr:0x17)
Synch. Value (16/18) 00h Register Bits 1700 send

SYNConfig 2 (addr:0x18)
Synch. Value (16/18) 00h Register Bits 1800 send

SYNConfig 3 (addr:0x19)
Synch. Value (16/18) 00h Register Bits 1900 send

Update

Register values for the sync bytes should be entered as hex. The 'h' need not be added.

TXCFG Register [0x1A]

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File View Data Terminal Window Help

COM1 115200 No comm.

TRC103

Main Menu MUXCFG Register RXCFG Register TXCFG Register **TXCFG Register** OSCCFG Register RXTCFG Register

TXConfig (addr:0x1A)

TX anti-aliasing Filter Cutoff Frequency (KHz) 200 ↑ ↓

TX Interfill Value 7

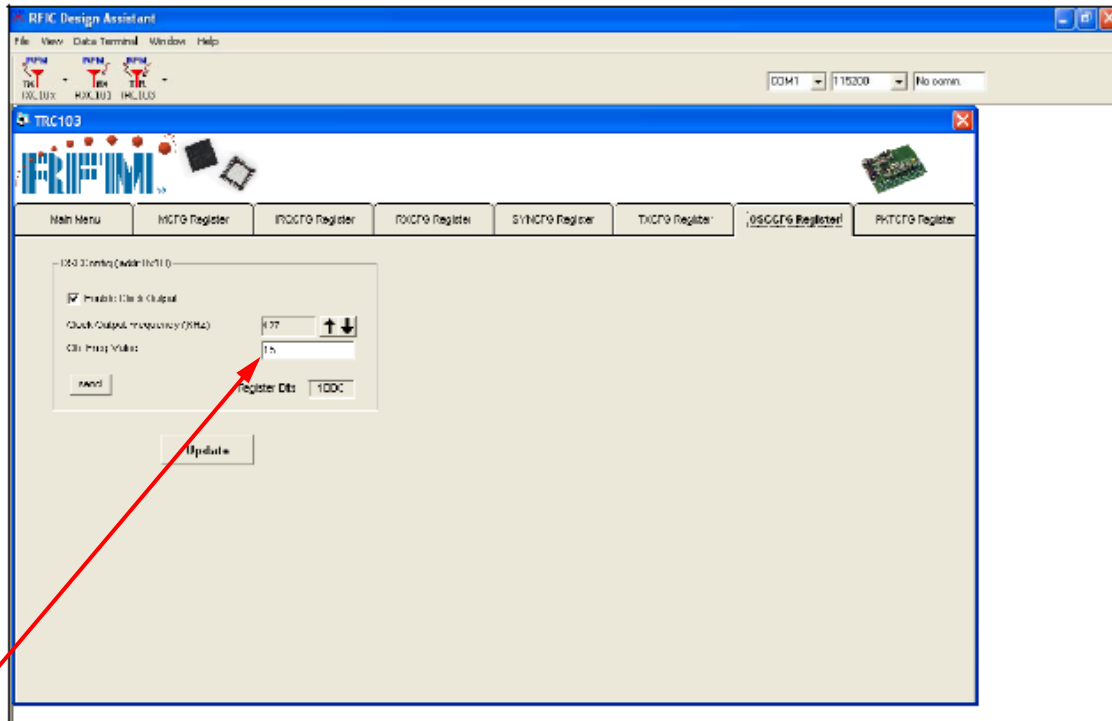
TX Output Power (dBm) Max

send Register Bits 1A70

Update

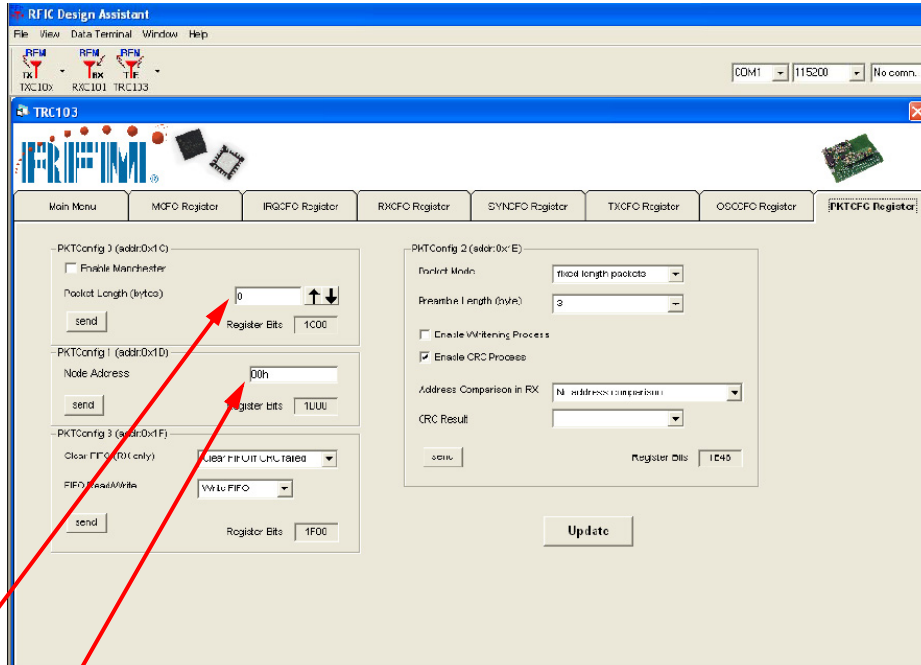
TXInterfilt value should be entered as decimal. The hex equivalent is displayed in the Register value label.

OSCCFG Register [0x1B]



Clk_Freq value should be entered as decimal. The hex equivalent is displayed in the Register value label.

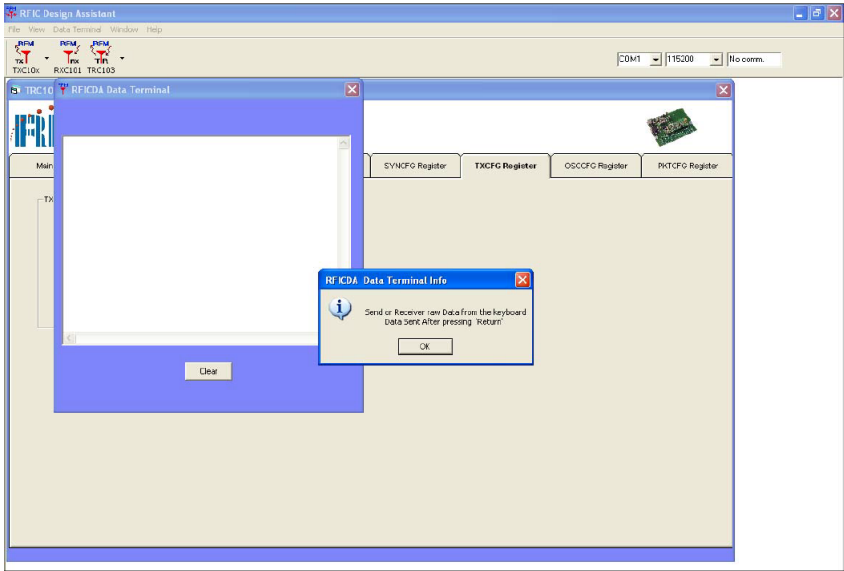
PKTCFG Register [0x1C - 1F]



The node address value should be entered as hex. The 'h' does not need to be added.

Packet Length value (dependent upon Packet Mode) should be entered as decimal. The hex equivalent is displayed in the Register value label. **NOTE: Be sure that the FIFO size is configured correctly (MCFG Register Config5).**

COMLink Data Terminal



To perform a point-to-point terminal com link, click on the Data Terminal Menu selection at the top of the screen. Click on OK to begin terminal use.

Data packets of up to 128 characters (2 x 64 bytes) may be sent using the integrated data terminal. Data packets greater than 128 bytes are truncated. The packet structure is as follows:

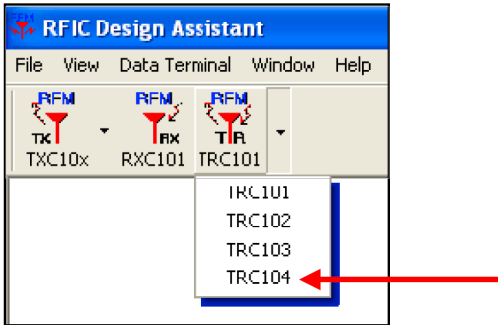
Preamble	Synch Word	Length byte	Start of Text	Character Data	End of Text	CRC
(4 bytes)	(4 bytes)	(Up to 64)	0x02	(Up to 64 bytes)	0x03	(2 bytes)
0xE2E2						

The development board inserts Start of Text (0x02) and End of Text (0x03) characters for use by the onboard microprocessor to know where the packet starts and stops. The TRC103 automatically inserts the preamble, synch word, and CRC when it transmits a packet. The TRC103 will break the packet into two transmissions if the packet length is greater than the FIFO size (64 bytes max).

The Data Terminal requires no special characters or sequence, thus it may be used for general data transfer.

TRC104 Device Selection

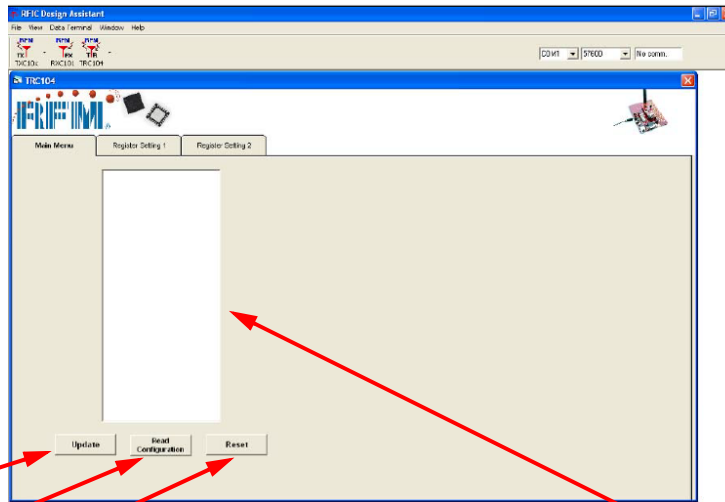
After establishing the correct COM port settings, click the arrow for the drop-down box and select TRC104.



The name of the configuration register and its hex address is given at the top of each frame for quick reference. The current register setting value, labeled "Register Bits", is also given at the bottom right corner of each register. When a function is changed, the register setting value is updated with the new value. All register setting values are displayed in hex. Each register setting name corresponds directly with the TRC104 datasheet. This makes correlation between RFDA and datasheet effortless. The Update button in ALL configuration tabs updates all registers to the TRC104, not just that page of values.

Main Menu

The main menu allows you to read the current configuration of the internal registers, update all registers with the current settings defined in Register 1 and Register 2 tabs, and reset the settings defined in Register 1 and Register 2 to the power-up default configuration.

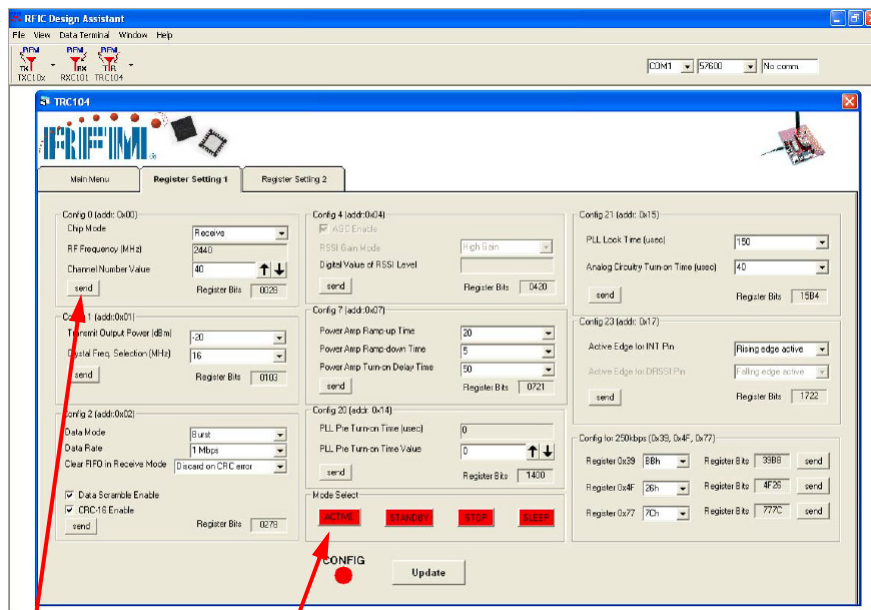


The Update button sends the configuration for all registers to the TRC104. There are select registers that allow you to update only that particular setting and these will be described in the individual tab descriptions.

The Read Configuration button reads the current values of all registers of the TRC104 and displays them in this window.

The Reset button reloads the default settings of all registers when selected.

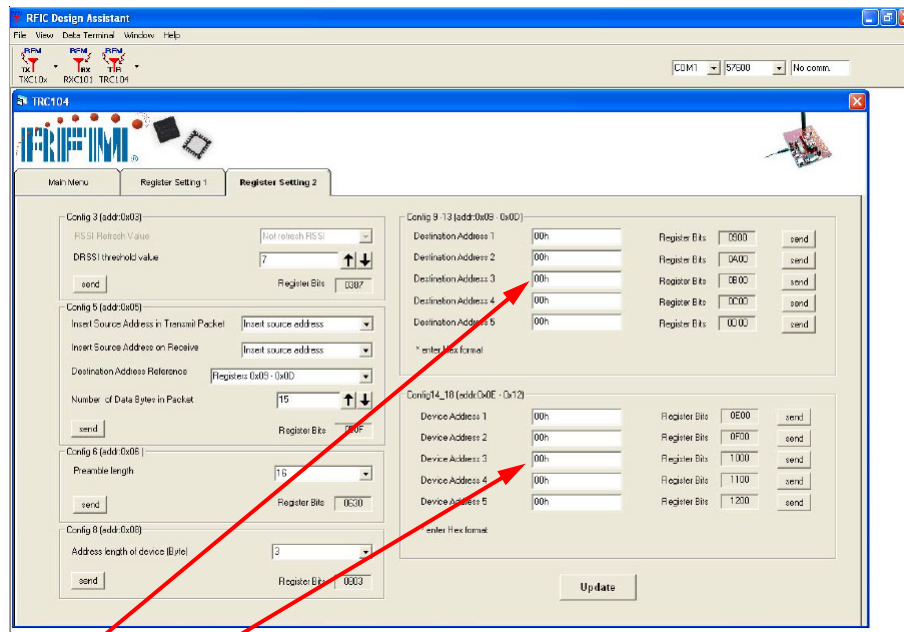
Register Setting 1



Each register has its own SEND button that allows you to update the settings for that register only. The UPDATE button will update ALL registers.

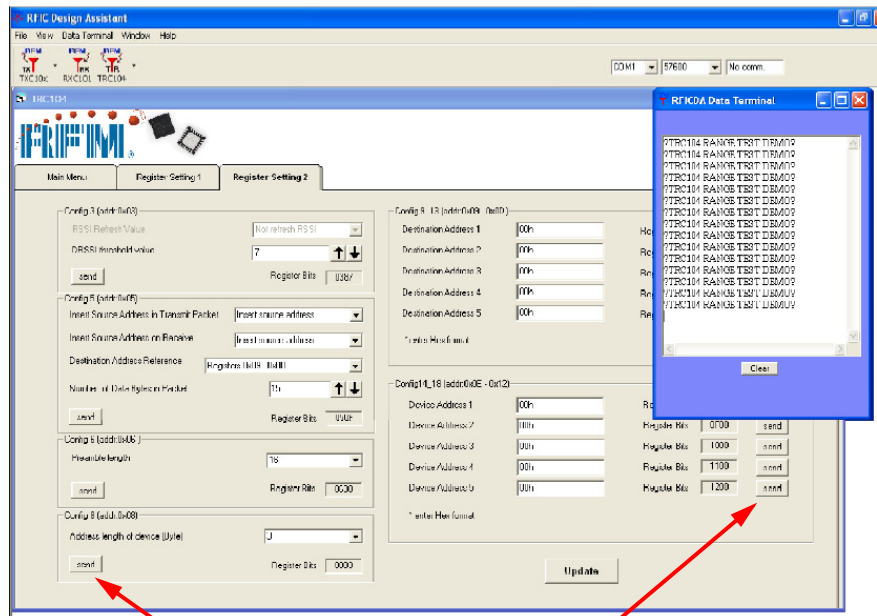
To enable the three low power modes, there are four buttons located at the bottom of the Register Setting 1 screen. At the time the RFDA is launched, all four buttons will be RED by default. A RED button signifies that state to be inactive. A GREEN button signifies an active state. To set the TRC104 into any one of these operation modes, click on the desired button. A command is sent to the DR board to set the device to the desired mode. When performing an UPDATE or SEND, the TRC104 will revert to the STANDBY mode. See the TRC104 datasheet for details on STANDBY mode.

Register Setting 2



When configuring the Destination or Device (Sender) address, the value(s) should be entered in hex format. It is not required to add the 'h' at the end. The address length (Config 8) defines the number of active bytes for both the Destination and Device address setting. The Destination and Device address MUST be configured for the same length.

COMLink Data Terminal

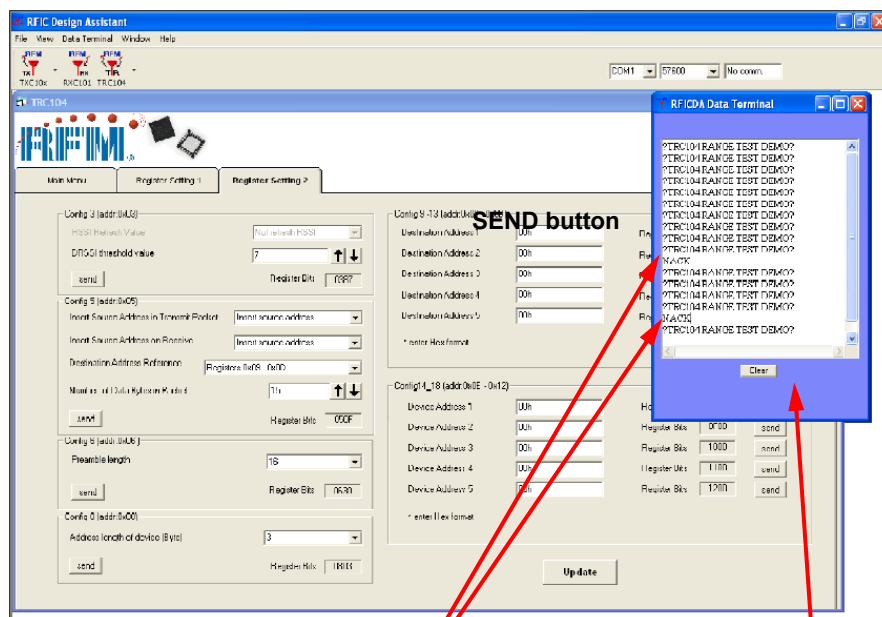


The Data Terminal allows you to monitor the data transferred during a Range Test or to setup a terminal link between two PC's. Contents typed in the Data Terminal are sent upon pressing the ENTER key. An LED will flash indicating a successful transmission.

The receiving terminal will display the sent data and the GREEN LED will flash indicating a successful transfer and CRC check.

When using the COMLink Data Terminal, use the individual SEND buttons to modify the configuration registers individually, since the development boards are preconfigured. See the DR-TRC104-DK User Guide for details on the configuration register settings.

The Data Terminal requires no special characters or sequence, thus it can be used for general data transfer.



When using the COMLink Data Terminal, specifically during a Range Test, the received data is displayed in the terminal window. If a packet is missed, the development board will respond with a NACK response in the terminal window indicating that there was no response from the remote unit for that packet. Good packets will be displayed in the terminal window.