

Software Release Document

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Project	SmartRF Utility
Version	0.2.0.0
Revision Date	June/2002
Classification	Software
Distribution	AT86RF211
Released By	Mikeal Wang

Description:

This application can fully configure the SmartRF DK for Toptrend during run time (Example: communication test, R/W registers etc).

The SmartRF Utility has the same frame with this document and provides serial interface via Windows platforms. The firmware framework refers to firmware release document, please.

The program just support ANSI ASCII codes between the PC and hardware. All defined parameters include the program and pre-compiled; user can't set during run time.

This tool follow specification of RF211 chip thus user can refer to datasheet get detail information. Now the new firmware had released by ATMEL that improved performance and higher data rate for TX/RX. The shrink version called AT86RF211s, about this detail contact with us. The next utility will support this firmware version. The SmartRF utility will support more function to combine with new feature.

The tool can provide RF chip testing. User can use ICE or download hex file to program our firmware then connect with RF part or RF develop device, the utility can control RF chip and adjust parameters of RF211's registers. Customer can take some information, the RF part is good or not. But customer also needs some instruments to get detail on RF part.

Feature:

- 1.Support standard serial interface (Default: 19200bps).
- 2.Support control RF211's registers function.
- 3.Support state-bar.

- 4.Support RSSI showing.
- 5.Support RF211 state exchange.
- 6.Support UART test.
- 7.Support internal EEPROM R/W functions.
- 8.Support communication test.
- 9.Support counts function for data rate parameter.
10. Support SIM communication for great data. (Default: disable)

System Environment:

MS Windows 98 SE/ME/2000

Hardware Requirement:

Based on ATMEL AT90SL8535 add ATMEL RF211

A UART interface

2.4V-5V operate voltage

Support Firmware:

Firmware version 1.1 or later

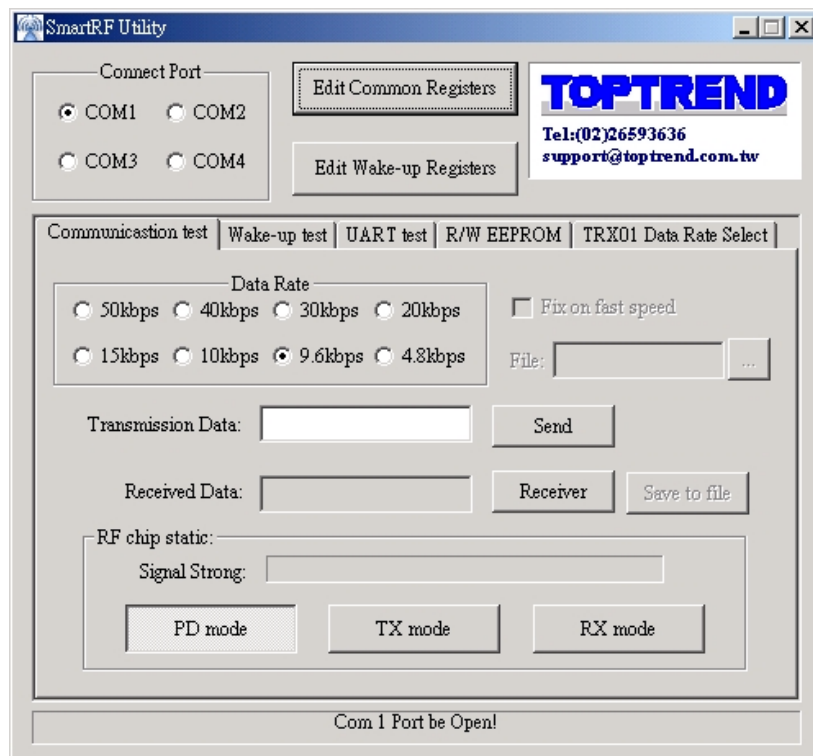
History:

Version 1.1

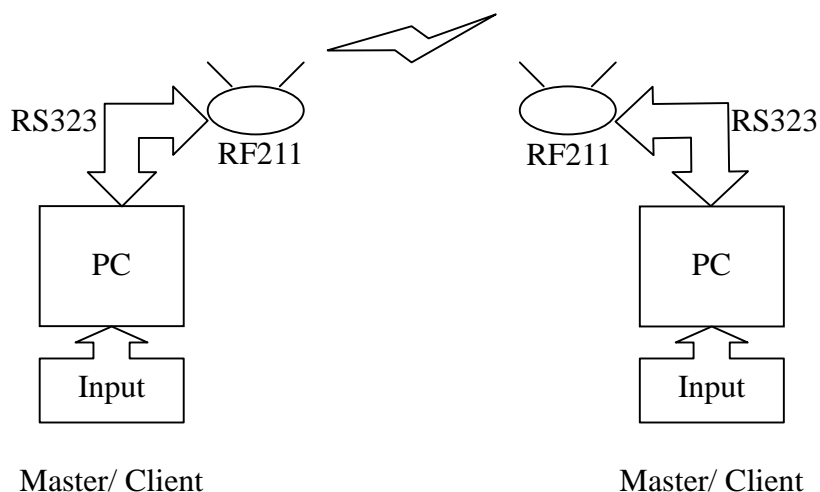
Disable Wake-up function.

Disable great data TX and RX function.

Main Frame:



Diagrammatic Communication:



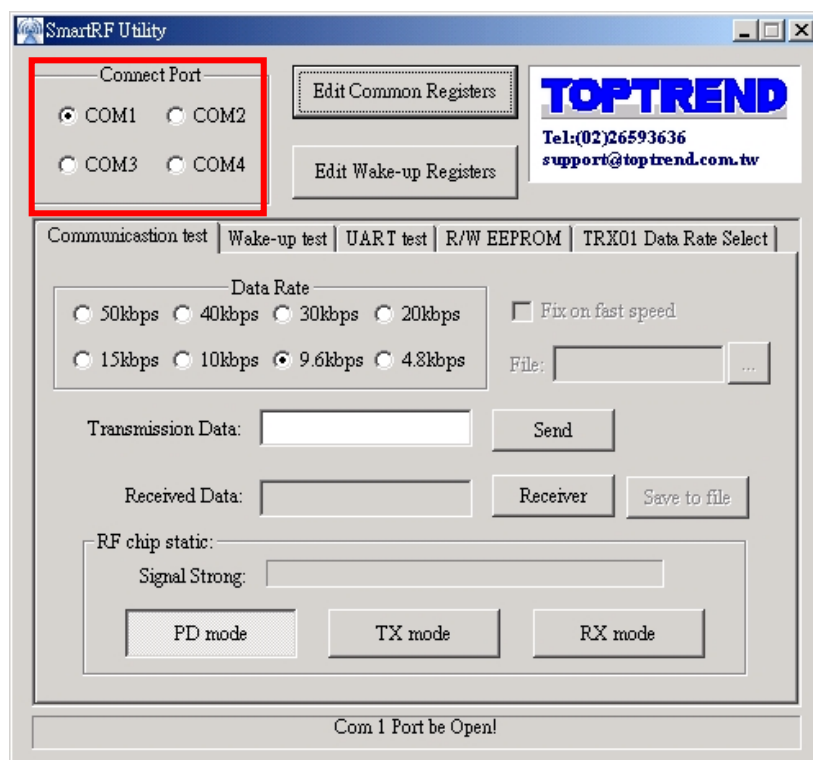
Project Modules Descriptions:

Connect port:	Choices connection interface from COM1 to COM4.
Edit common registers:	Edit RF211's common registers; include RESET, CTRL1, CTRL2, STAT, F0, F1, F2, F3, DTR registers etc.

Edit wake-up registers:	Edit RF211's Wake-Up registers; include WUC, WUR, WUA, WUD registers etc.
Communication test:	Provide simple setting, control function and test function of RF part.
Wake-up test:	Provide wake-up messages detection and transmission function. (Now disable)
UART test:	Provide user tests the UART interface.
R/W EEPROM:	Provide directly reads and writes internal EEPROM.
TRX01 data rate select:	Provide user design transmission and receiver parameters of data rate.

Modules Operate Method:

Connect port:



When you implement the smartRF Utility, that will automatic initial COM port (the default is COM1; parameters as below: 19200, N, 8, 1) and show initial state. If that correct be opened the message is “Com 1 Port be Open!” else shows “Com 1 Port can't be Open!” on the State-Bar.

After initiation, if you want change the connect port. Choices the radio-button which you want opening. The application supports connect port COM1, COM2, COM3 and COM4. Users can choice one opening. When you change connect port, the State-Bar will show success message or error message. But if the COM port is not exist, the State-Bar will not show error message. The program just shows default error message frame.

Notice that the COM port must be opened else user will not control or change any function of RF211.

Edit common registers:

Common Registers

☐ RESET: Reset Register Length = 1bits (Read only) Hex values

☒ CTRL1: Main Control Register Length = 32bits (R/W) Hex values

Name Values

Name	PDN	RXTX	DATACLK	TXLOCK	PAPDN	WUEN	LNAGSEL	MVCC	TRSSI	HRSSI
Values	0	0	0	1	0	0	0	0	0	0

Name	TXLVL	TXFS	RXFS	XTALFQ	FSKBW	FSKPOL	DSREF	-	-	-	-
Values	0	0	0	0	1	1	1	0	0	0	0

☒ CTRL2: Control Register Length = 32bits (R/W) Hex values

Name Values

Name	DATARATE	DATATOL	LDCK	NOLD1	NILD2
Values	0	0	0	2	17

☐ STAT: Stat Register Length = 31bits (Read only) Hex values

Name	PLL	MRSSI	MVCC	WAKEUP	-	MSGERR	MSGDATL	MSGMRATE
Values	0	0	0	0	0	0	0	0

☒ F0: Frequency Register Length = 32bits (R/W) Hex values

☒ F1: Frequency Register Length = 32bits (R/W) Hex values

☒ F2: Frequency Register Length = 32bits (R/W) Hex values

☐ F3: Frequency Register Length = 32bits (Read only) Hex values

☐ DTR: Data Transmission Register Length = 6bits (R/W) Hex values

Name Values

Name	DSOFFSET	-	-
Values	8	0	0

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Tel:(02)26593636
support@toptrend.com.tw

This frame provides detail descriptions of the RF211's common registers, and let user can directly modify it. Program has support Combo Box and directly reedits each field.

Per fields that have check-button, value box, register descriptions of each field. For example the CTRL1 item:

- 1.The number one is a check button that provides a reference point for reads or writes this item. The program has provided reading and writing function. Users have to check it else program will jump this item and without implemented.
- 2.The number two is a draw-box that include all detail field of register name. If user want to change one,

user can select it. In this case CTRL1 provides six fields. We just select first field PDN.

- 3.The number three is a draw-box that provides detail descriptions of field. In this case after pass the number two, you can find the Values show detail descriptions. The PDN have two detail descriptions "Power Down" and "Activated". We select second item "Activated" on this frame.
 - 4.The number four is static-box that provides an interface showing register values. You can find out the number 4 that will be change from "0" to "1". Because program provides automatic exchange data function. So the PDN value become "1" after number 3.
 - 5.The number five is static-box that provides Hex value about this register. The Hex value will depend on detail value of register to change it. The same as step 4, this item has automatic change function.
- The other items are same as descriptions above. User can set or modify all parameters of registers. Please follow steps above descriptions and RF211 datasheet.
- The Write button provides write function. That can set values of common registers into the RF211. And the read button provides read function, which provides read values of common registers into the RF211. The Cancel button provides exit function to leave.

Edit wake-up registers:

WakeUp Registers

☒ WUC: Wake-up Control Register Length = 32bits (R/W) Hex values

Name Values

Name	WUE	DATA	STOP	DATL	ADD	MSGTST	WPER	WL1
Values	0	1	1	1F	1	0	5F	4

Name	WL2	ISTU	-	-
Values	2	0	0	0

☒ WUR: Wake-up Data Rate Register Length = 18bits (R/W) Hex values

Name Values

Name	WUOP	RATECHK	RATE	RATETOL
Values	1	0	3F	8

☒ WUA: Wake-up Address Register Length = 25bits (R/W) Hex values

Name Values

Name	ADDL	ADD
Values	2	0F0F0

☐ WUD: Wake-up Data Register Length = 1bits (Read only) Hex values

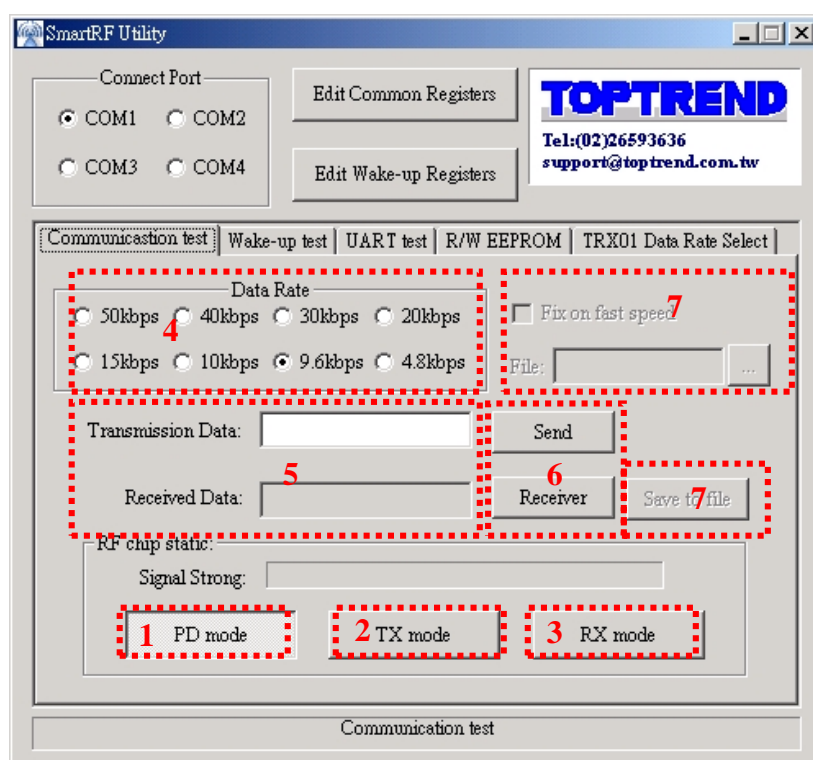
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On this dialog that provides all detail descriptions about wake-up registers, and let user can directly modify it.

About the Wake-Up protocol description, please refer to “Application Note – How to save power with TRX01 Wake-Up protocol? 23/10/00”.

And the reedited method same as **Edit common registers**, please refer to descriptions above.

Communication test:



This internal table provides simple transmit and receive test functions. Besides, the operation mode can be set with button under the table and show Signal Strong on the UI run time.

The first, when program initial dialog, the chip be set PD mode and 9.6kbps data rate.

On this table, you can find two sections. One is transmission and receiver test; one is operation mode test.

● The RF211's operation state test:

The default value is 9.6kbps. The program supports eight available data rate. (Note: New f/w will support higher speed data rate but users have to modify RF part. Now the f/w is available. If you want to add this function, please contact with us. E-mail: support@toptrend.com.tw) The new smartRF utility will support these new function.

When the device start working correctly, user can change operation mode to detect something on chip. For example: current, voltage etc. On the receiver mode, the program get Signal Strong from RF chip and shows on the screen on run time. *Notice: In this state of the program you can't read or write other*

register. Because f/w can't support multi-thread so user can't read/write register values on the same time. If you want to test the RF211 which have accept radio signal or not. The receiver mode is a good choice. For example, the "master" device set RX mode then the "client" device transmits data. The "master" device Signal Strong bar will be changed if RF part is okay.

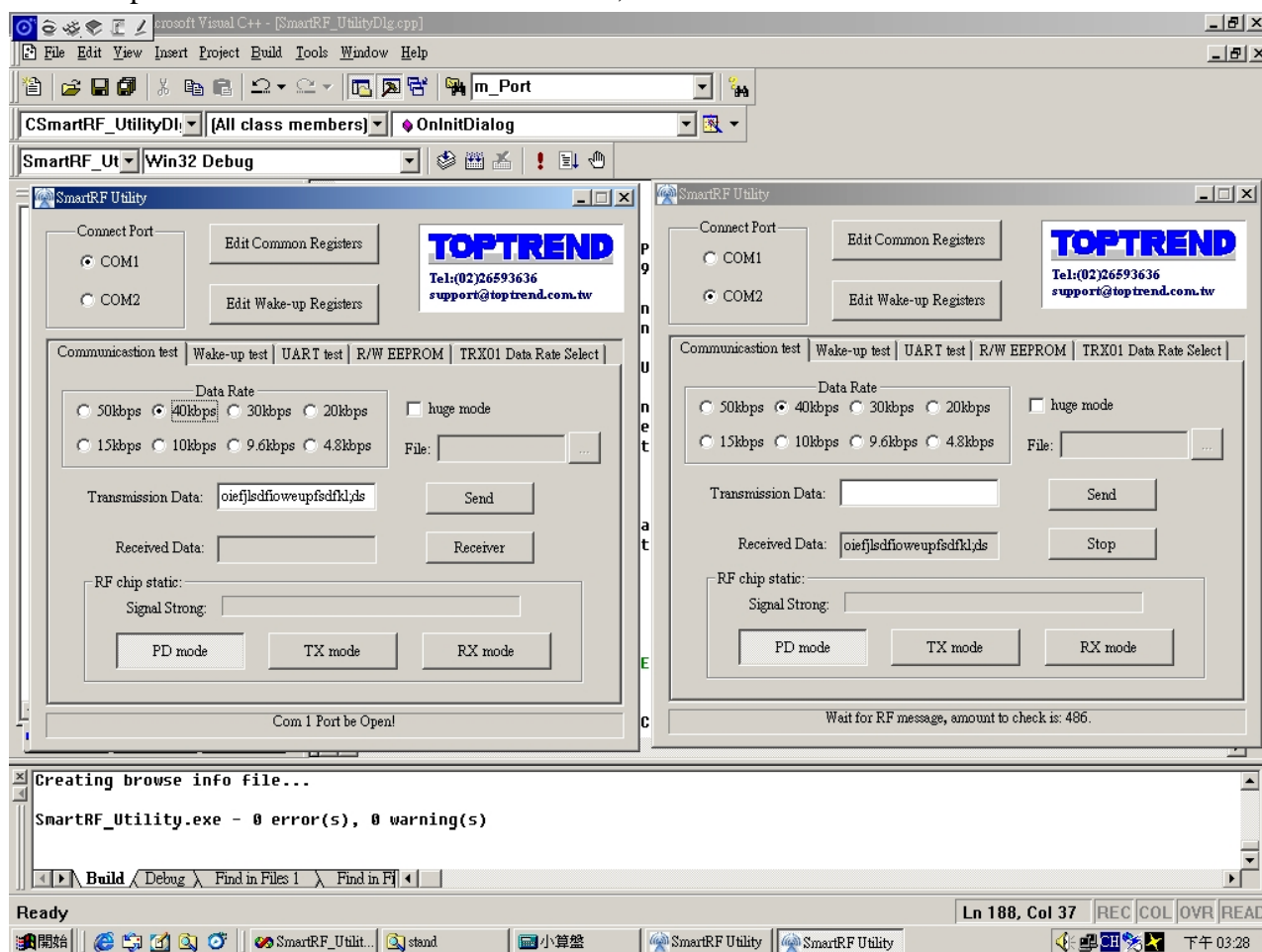
● The TX/RX test:

First, selecting PD mode. The device must be set PD mode before transmission and receiver test.

Choice data rate within Data Rate box. The program provides eight-rate type, but your RF part must support high-speed receiver function, else you will not receive any packages.

Fill in the blanks with words that you want to transmit. If you want to receive packages, jump this step and just press Receiver button. Thereafter press Send button if you want to implement the transmission function test. Program will check buffer length of transmit that should be limited 512 bytes. If data is more then 512 byte the utility will stop and break off test mode.

For example: The "master" device set TX mode, and the "client" device set RX mode as below.



The "client" device will receive data same as "master" device.

The number 7 box that just support great data mode for transmission and receiver. In this mode user can

simulate great data and test TX/RX function. But the development kit can't stable received data complete. The timer must be fine-tuning with oscilloscope or relational implement. If users want to enable this function please contacts with our sales or use e-mail: support@toptrend.com.tw. The great data mode is disable default just now.

Wake-up test:

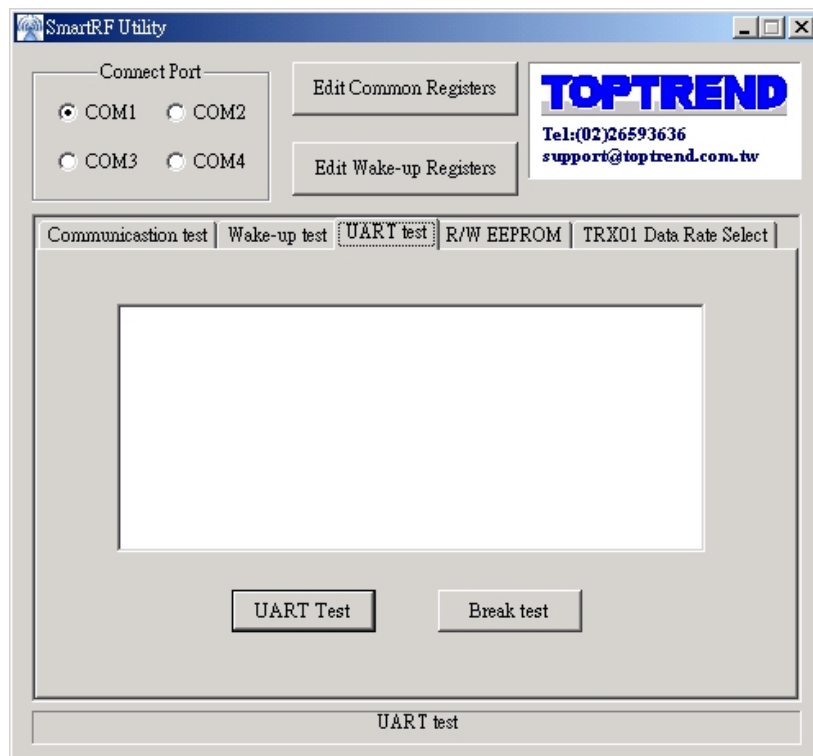
The screenshot shows the 'SmartRF Utility' window. At the top, there's a 'Connect Port' section with radio buttons for COM1, COM2, COM3, and COM4. To the right are buttons for 'Edit Common Registers' and 'Edit Wake-up Registers'. A TOPTREND logo and contact information (Tel: (02)26593636, support@toptrend.com.tw) are also present. Below this is a tabbed interface with 'Communication test', 'Wake-up test', 'UART test', 'R/W EEPROM', and 'TRX01 Data Rate Select'. The 'Wake-up test' tab is active. It contains two test frames, each with 'Address (Bits)' and 'Data (Bits)' input fields. The first frame has a red '1' next to the Data field and a 'Send WUP' button. The second frame has a red '2' next to the Data field and a 'Wake-Up Enable' button. A 'Wake-Up test' label is at the bottom of the window.

On this table that provides wake-up function test.

Now this test frame not opens yet.

Regarding the wake-up function test, expect that next version will support it.

But the Wake-Up receive function code have include, so you can press wake-up enable button to set wake-up mode, thereafter you can come back to PD mode press the same button.

UART test:

On this table program provides UART interface test function.

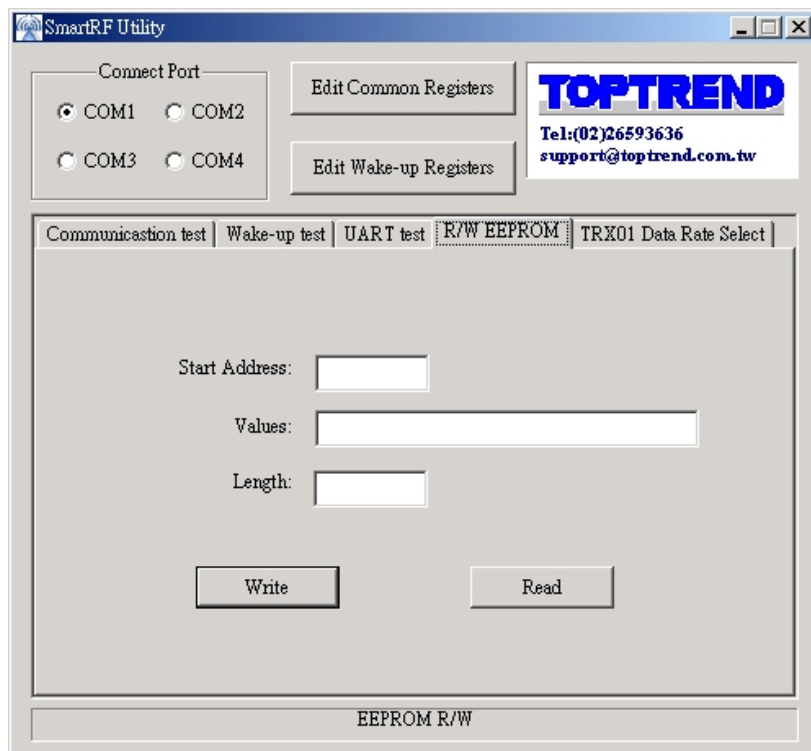
That provides UART test package when development kit receive complete that will return value of package to PC side.

If development kit have not responded to PC, the program will show fail message. The PC controls the Timeout and set 10 times.

When you use other function to r/w development kit and no effect, please use this function to test it. If firmware is okay the result is ready; else the program will show interface is fail.

The break test button provides break function when user wants to break test process on the same time.

R/W EEPROM:



On this table program provides EEPROM r/w test. User can test MUC. If internal EEPROM is fail, you will not r/w this device.

The Start Address is beginning position of EEPROM.

The values are same as data.

The length is same as length of data, which just used on read function.

Application:

When user define parameters and save it in the internal EEPROM. You can use this function to r/w parameters and check that the values are correct or not.

TRX01 data rate select:

The screenshot shows the 'SmartRF Utility' window. At the top, there's a 'Connect Port' section with radio buttons for COM1 (selected), COM2, COM3, and COM4. To the right are buttons for 'Edit Common Registers' and 'Edit Wake-up Registers'. A TOPTREND logo and contact information (Tel: (02)26593636, support@toptrend.com.tw) are in the top right. Below this is a tabbed interface with 'Communication test', 'Wake-up test', 'UART test', 'R/W EEPROM', and 'TRX01 Data Rate Select' (the active tab). The 'TRX01 Data Rate Select' tab contains several input fields: 'MCU Frequency' (8000000), 'TRX01 Frequency' (10245000), 'Rate' (a dropdown menu showing '9.6kbps'), 'Data TX Rate with Timer' (833), 'RX Rate (0-16383)' (1067), and 'Data Tolerance (0-255)' (22). At the bottom of this section are 'Count' and 'Set' buttons. A status bar at the very bottom of the window displays 'Count data rate'.

On this table program provides TX and RX data rate setting. When user set Rate, MCU and TRX01 Frequency the program will automatic count rate and tolerance of data.

The MCU Frequency refers to your MCU operation frequency. (Default: 8MHz)

The TRX01 Frequency refers to RF211 operation frequency. (Default: 10.245MHz)

First you need choice your Rate of TX or RX, then press Count button to obtain all parameters. You can find some block will be change if Rate is differentiation.

This table can aid firmware programmer to design transmission rate.

RX Rate and Data Tolerance both are parameters of receiver. Please refer to RF211 datasheet.

The Set button just provides RX parameters setting, the TX parameter can't be set by this function.

Contact Us:

Toptrend Technologies CORP.

TEL: +886-2-26593636

FAX: +886-2-26591518

Address: 8F-2, No. 15, Lane 360, Sec. 1, Nei-Hu Road, Taipei, Taiwan, R.O.C.

E-mail: Support@toptrend.com.tw

Web Site: <http://www.toptrend.com.tw/>