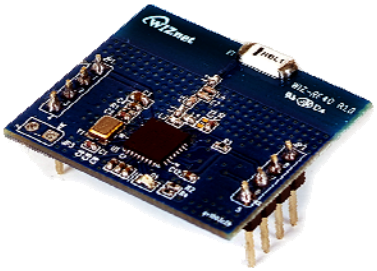
WIZ-RF40 Datasheet

(Version 1.0)



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Document Revision History

Date	Revision	Changes
2010-09-01	V1.0	Official Release

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1. Introduction

Module WIZ-RF40 converts data between RF-communication and serial interface. If this RF-to-Serial module is connected to any device with serial interface, the existing serial data can be sent to other RF modules or RF-to-Ethernet Gateway through RF communication.

1.1 Feature

- Worldwide 2.4GHz ISM band operation, 126 RF channels
- Ultra low power, compact and low cost RF transceiver
- Up to 2Mbps on-air data rate
- Enhanced ShockBurst™ hardware link layer
- Fast Microcontroller(8051 compatible)
- Dynamic payload length and Auto retransmit
- Support to bidirectional transparent mode(UART)
- Support to command mode for RF parameter setting(UART)
- Embedded Chip ANT for efficient radiation
- Embedded status LED
- Support 8-bit UART data communication(up to 57600 bps)
- Compact design 30mm x 25mm x 11.6mm (L x W x H)
- RoHS Compliant

1.2 Specification

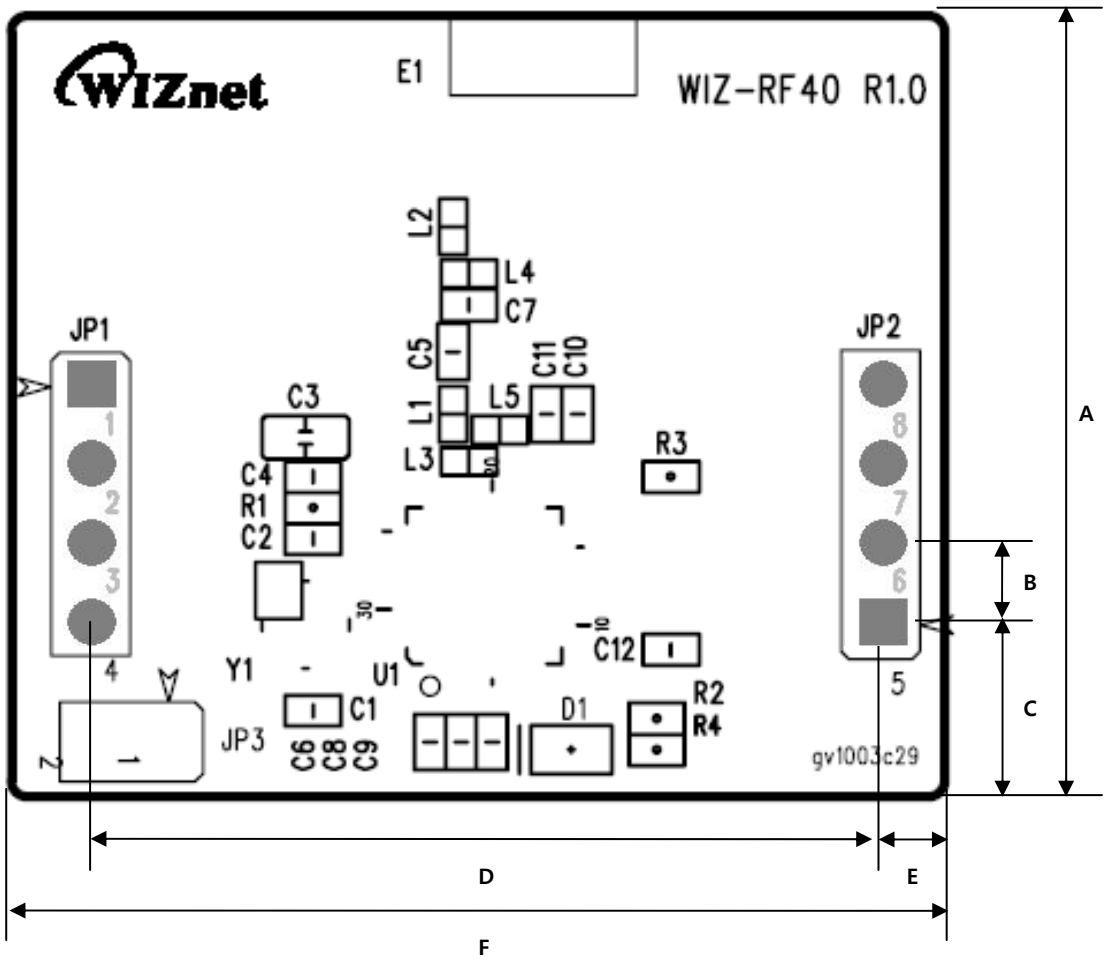
General RF Conditions	Radio Frequency	2.400 ~ 2.4835GHz
	Crystal Frequency	16MHz
	Frequency Deviation@2MHz	±30ppm
	Air Data Rate	250 ~ 2000kbps
	Non-overlapping Channel Spacing @2MHz	2MHz
	Modulation	GFSK
	Sensitivity(0.1%BER) @2MHz	-82dBm ※ **Chipset**
	Distance	Line of Sight: 30m (exclude frequency interference)
Internal Comm. Interface	Interface	UART
	Signals	Tx, Rx, RTS, CTS
	Parameters	RF power, Frequency, RF air data rate, RF address, RF data length, Retransmit count, Auto acknowledge, UART baud rate, Test carrier mode
	Speed	Up to 57600 bps
Power on reset		1us ~ 50ms(Power ramp up time)
Dimension		30mm x 25mm x 11.6mm (Include connector size)
Connector type		2.54mm Pitch Pin-header, 8pin(1*4, 2EA)
Input voltage		1.9V ~ 3.6V
Power consumption		Active mode(Tx, 0dBm) : 11.1mA Active mode(Rx,2Mbps) : 13.3mA Standby mode : 1mA Deep sleep mode : 0.5uA MCU core(8MHz, 4MIPS) : 4mA
Temperature		-40℃ ~ +85℃

Humidity	10 ~ 90 %

Table 1 Specification

2. Hardware Specification

2.1 Dimension



A	B	C	D	E	F
25.00	**2.54**	**5.50**	**25.40**	**2.30**	**30.00**

Figure 1. WIZ-RF40 Dimensions (unit: mm)

2.2 Connector Specification

JP1

REF.	Pin .	Signal	Description
JP1	1	VCC	System Power Input(1.9V ~ 3.6V)
JP1	2	RTS	Request To Send
JP1	3	CTS	Clear To Send
JP1	4	GND	Ground(0V)

JP2

REF.	Pin .	Signal	Description
JP2	5	CMD	Go to Command Mode
JP2	6	RST	Reset
JP2	7	RXD	UART Received Data
JP2	8	TXD	UART Transmitted Data

JP3

REF.	Pin .	Signal	Description
JP3	1	GND	Ground(0V)
JP3	2	F_RESET	Factory Reset

Table 2 Pin Header Connector PIN-Assignment

3. Serial Configuration

3.1 Serial Command Formant

The Parameter of WIZ-RF40 can be modified by using Serial Command. In order to use the Serial Configuration function of WIZ-RF40, pin #5 of WIZ-RF40 must be Low and power must be turned on; then, configuration mode will be activated.

< Frame Format >

Command Frame format

Descriptor	STX	Command code	Parameter	ETX
Length(bytes)	1	2	Variable	1

Table 3 Serial Configuration Frame format

Reply Frame format

Descriptor	STX	Reply code	Parameter	ETX
Length(bytes)	1	1	Variable	1

Table 4 Serial Configuration Reply Frame format

STX & ETX

Setting	Comments
STX	'<' : Hex = 3Ch
ETX	'>' : Hex = 3Eh

Table 5 Serial Configuration STX & ETX

Reply Code

Reply	Comments
S	Command was successful
F	Command failed
0	Invalid STX

1	Invalid command
2	Invalid parameter
3	Invalid ETX
E	Enter Serial Command Mode

Table 6 Serial Configuration Reply Code

3.2 Serial Command Code

Code	Parameter	Comments
WC[1]	**1** : 2402, 2416, 2429, 2443, 2456, 2470 Mhz	Set Channel Table
	2 : 2407, 2421, 2434, 2448, 2461, 2475 Mhz	
	3 : 2412, 2426, 2439, 2453, 2466, 2480 Mhz	
RC	Return the frequency set parameter value	Read Channel
WB	**0** : 4800bps, **1** : 9600bps, **2** : 19200bps, **3** : 38400bps, **4** : 57600bps	Set Baud Rate
RB	Return the UART Baud Rate(bps) parameter value	Read Baud Rate
WL	**1** ~ **32**(Bytes)	Set Data Length
RL	Return the data length(Byte)	Read Data Length
WF	**0** : Disable, **1** : Enable(CTS, RTS)	Set Flow Control
RF	UART Hardware Flow Control(ON/OFF)	Read Flow Control
WH[2]	**0** : Disable, **1** : Enable(1:N, RX mode)	Set Host Mode

[1] There are 3 sets of 6 frequency channels, and the channel separation for adjacent frequency of the total frequency bandwidth is 3~5Mhz. The data bandwidth of nRF24L01's is 2Mhz; In theory, the frequency separation deviation is not affected, but, when using set 1 and set 3, the degree of separation could become narrow to at least 3Mhz, and there can be confusion when sending the re-transmission Packet. Therefore, it is suggested that the address value of the set which uses different frequencies must be separated.

[2] This command is used for 1:N communication. All data pipes of the address table are opened when WH is set enable; and address tables are set by WA command. Each number of the Data Pipe matches with the address number of the address table, and data can be received through the Data Pipe in Rx mode. In Tx mode, Set the Device Number and data can be sent to Rx through each Data Pipe.

<table>
<tr><td>RH</td><td>Return the Host mod(ON/OFF) parameter value</td><td>Read Host Mode</td></tr>
<tr><td>WD[3]</td><td>0 ~ 5 (like set address pipe number)</td><td>Set Device Number</td></tr>
<tr><td>RD</td><td>Return the Device Number value</td><td>Read Device Number</td></tr>
<tr><td>WR</td><td>WC : 1, WL : 1Byte, WB : 3(38400bps), WF : 0(OFF)
WH : 0(OFF), WD : 1, WA : 1</td><td>Reset Default Parameter</td></tr>
<tr><td>TM</td><td>Single Carrier Output(EX : <TM{##}>, ## : frequency)</td><td>Start Test Mode</td></tr>
<tr><td>RS</td><td>Frequency, Address, Baud rate, Data length, Flow contr , Host Mode, Device Number 설정 값 표시</td><td>Read Current Status</td></tr>
<tr><td>ST</td><td>End Command mode and start Data transmission mode</td><td>Start Transparent mode</td></tr>
<tr><td>RA</td><td>Return the address table parameter value that is set</td><td>Read Address Table</td></tr>
<tr><td>WA[4]</td><td>1 :<table><tr><td>Pipe 0</td><td>0x12, 0x4C, 0xF4 0x56, 0xB1</td></tr><tr><td>Pipe 1</td><td>0x01, 0x3B, 0xE3, 0x45, 0xA1</td></tr><tr><td>Pipe 2</td><td>0x01, 0x3B, 0xE3, 0x45, 0xA2</td></tr><tr><td>Pipe 3</td><td>0x01, 0x3B, 0xE3, 0x45, 0xA3</td></tr><tr><td>Pipe 4</td><td>0x01, 0x3B, 0xE3, 0x45, 0xA4</td></tr><tr><td>Pipe 5</td><td>0x01, 0x3B, 0xE3, 0x45, 0xA5</td></tr></table></td><td>Set Address Table</td></tr>
</table>

[3] Device Number sets the Data Pipe; this value is used to collect the matching address from the table, and the data is sent through the corresponding Data Pipe.

[4]This command is used to set the address table, and assigns the address to six Data Pipes, 0~5. The module which has 6 addresses saved can open Data Pipe, if needed, to communicate 1:1 or 1:N. Since 6 address collections exist in one address set, at most 1:6 communication can be composed, and 5 sets of 1:6 communication can be expanded..

	2 :	Pipe 0	0x13, 0x5D, 0xE5, 0x47, 0xC1
		Pipe 1	0x02, 0x4C, 0xD4, 0x36, 0xB0
		Pipe 2	0x02, 0x4C, 0xD4, 0x36, 0xB2
		Pipe 3	0x02, 0x4C, 0xD4, 0x36, 0xB3
		Pipe 4	0x02, 0x4C, 0xD4, 0x36, 0xB4
		Pipe 5	0x02, 0x4C, 0xD4, 0x36, 0xB5
	3 :	Pipe 0	0x14, 0x6E, 0xD6, 0x38, 0xD1
		Pipe 1	0x03, 0x5D, 0xC5, 0x27, 0xC0
		Pipe 2	0x03, 0x5D, 0xC5, 0x27, 0xC2
		Pipe 3	0x03, 0x5D, 0xC5, 0x27, 0xC3
		Pipe 4	0x03, 0x5D, 0xC5, 0x27, 0xC4
		Pipe 5	0x03, 0x5D, 0xC5, 0x27, 0xC5
	4 :	Pipe 0	0x15, 0x7F, 0xC6, 0x29, 0xE1
		Pipe 1	0x04, 0x6E, 0xB5, 0x18, 0xD1
		Pipe 2	0x04, 0x6E, 0xB5, 0x18, 0xD2
		Pipe 3	0x04, 0x6E, 0xB5, 0x18, 0xD3
		Pipe 4	0x04, 0x6E, 0xB5, 0x18, 0xD4
		Pipe 5	0x04, 0x6E, 0xB5, 0x18, 0xD5
	5 :	Pipe 0	0x16, 0x90, 0xB6, 0x1A, 0xF1
		Pipe 1	0x05, 0x7F, 0xA5, 0x09, 0xE1
		Pipe 2	0x05, 0x7F, 0xA5, 0x09, 0xE2
		Pipe 3	0x05, 0x7F, 0xA5, 0x09, 0xE3
		Pipe 4	0x05, 0x7F, 0xA5, 0x09, 0xE4
		Pipe 5	0x05, 0x7F, 0xA5, 0x09, 0xE5

Table 7 Serial Command Code

The commands for WIZ-RF40 Command Mode shown above are internally built in the module. Therefore, the parameter for each element can't be modified. In order to embody reciprocal communication between modules WIZ-RF10, WIZ-RF20, and WIZ-RF30, match each RF setting values from the library firmware of the module with the values shown above in the command table.

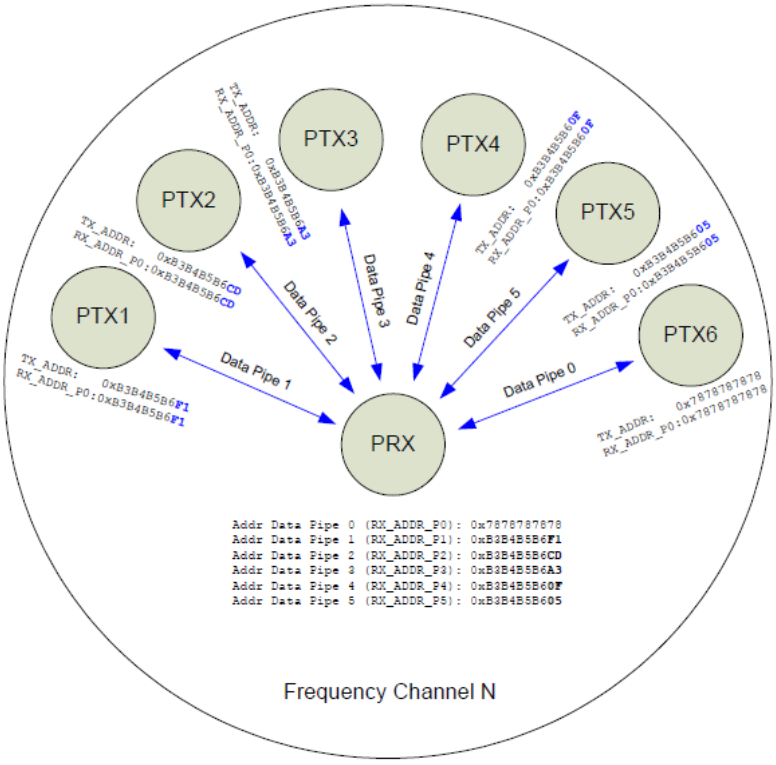
4. Factory Reset

When using Command Mode of the module, the command <WR> returns all setting values to its original value. However, if <WR> is used in the main set, where Serial Flow Control is not supported and the Flow Control value is Enable, the module can't be used because Command Mode is not activated. Also, if the Serial Baud Rate is not known, module communication is not possible, therefore resulting Command Mode to not be activated. Factory Reset can be used in this situation. Factory Reset is the function for returning the module's internal parameter value to its originally saved value when the WIZ-RF40's Factory_reset port is LOW.

5. 1:N Communication

1:N communication is the expanded concept of 1:1 communication; the WIZ-RF40 module can use each address table to embody multi communication with the corresponding collection of modules.

One address table is composed of 6 addresses, and each address number is matched with the Data Pipe number. Therefore, all modules each have six addresses, and communication with an applicable channel is possible by opening only the Data Pipe when needed.



< Example of data pipe addressing in MultiCeiver™ >

As shown above, PRX has all addresses that are set to 6 PTXs, and each Data Pipe that are used by the PTXs can be opened to simultaneously receive data. On the other hand, when PRX sends data, the relevant Data Pipe number can be used to sort each PTX. But if the user wants to change each Data Pipe number and send data, the PRX must be activated Command Mode and change the Device Number(Data Pipe Number).