

R9A06G062GNP

RTK0EE0013D10001BJ User's Manual

Sub-GHz Wireless Communication Evaluation Kit
For North America

Rev.1.01

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General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity.

Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).

7. Prohibition of access to reserved addresses

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

How to Use This Manual

1. Purpose and Target Readers

This manual is intended to give users an understanding of the basic specifications and correct usage of this product. This manual is intended for users who want to use this product to evaluate the MCU and debug programs. The readers of this manual are expected to have knowledge of the MCU functions and debuggers.

Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to RTK0EE0013D10001BJ. Be sure to refer to the latest versions of these documents.

The newest versions of the listed documents are available on the Renesas Electronics Web site.

Document Type	Description	Document Title	Document No.
User's manual	RTK0EE0013D10001BJ hardware specifications	RTK0EE0013D10001BJ User's Manual	R02UZ0004EJ (this manual)
Design data	RTK0EE0013D10001BJ Circuit schematics Parts list	RTK0EE0013D10001BJ Circuit schematics Parts list	R02AN0047EJ
User's manual for R9A06G062GNP	Hardware specifications (pin assignments, peripheral function specifications, electrical characteristics, timing charts) and descriptions of operation	R9A06G062GNP Sub-GHz Transceiver User's Manual: Hardware	R02UH0006EJ
RX65N User's manual for the hardware	Hardware specifications (pin assignments, memory maps, peripheral function specifications, electrical characteristics, timing charts) and descriptions of operation	RX65N Group User's Manual: Hardware	R01UH0590EJ
ISL80510 Datasheet	Hardware specifications (pin assignments, electrical characteristics) and descriptions of operation	ISL80510 Datasheet	FN8767
ISL9005A Datasheet	Hardware specifications (pin assignments, electrical characteristics) and descriptions of operation	ISL9005A Datasheet	FN6452

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1. Overview

1.1 Package Components

Thank you for purchasing the Sub-GHz Wireless Communication Evaluation Kit from Renesas (hereinafter referred to as "this product"). This product consists of the Target Board for Sub-GHz Wireless Communication Evaluation Kit (RTK0EE0013D10001BJ)

1.2 Purpose

This product is an evaluation tool for a Sub-GHz Wireless Communication Solutions. This manual describes hardware specifications.

1.3 Features

This product includes the following features:

- Sub-GHz Wireless Communication evaluation

This product offers sub-GHz wireless communication solutions with FCC of North America to help you easily start developing your application.

1.4 Sub-GHz Wireless Communication Evaluation Kit: Table of Specifications

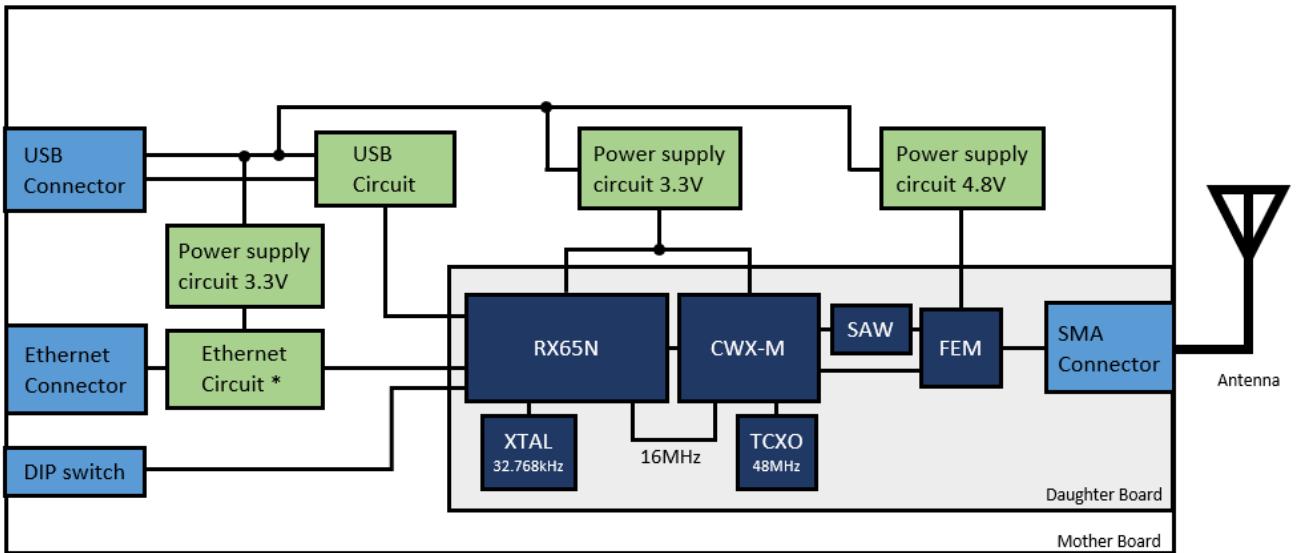
Table 1-1 shows the specifications of this product.

Table 1-1: Sub-GHz Wireless Communication Evaluation Kit Specification Table

Item	Specification
Enclosure size	Size: 92.0mm x 66.5mm x 28.0mm
Operating ambient temperature	-10 to +60°C
Power-supply circuit	USB connector: 5-V input
Transceiver IC (CWX-M)	Part Number: R9A06G062GNP (Renesas) Package: 40-Pin HVQFN
Control MCU (RX65N)	Part Number: R5F565NEDDFP (Renesas) Package: 100pin LFQFP
Power-supply IC	Part Number: ISL80510 (Renesas) Part Number: ISL9005A (Renesas)
SAW filter	Part Number: B39921B2672P810 (Qualcomm)
FEM	Part Number: SKY66122-11(Skyworks)
Control MCU/ Main clock	Connected to CKOUT pin of CWX-M (16MHz)
Control MCU/ Sub-clock	Crystal oscillator for the sub-clock (32.768KHz)
Wireless function	Sub-GHz Wireless circuit North America Band: 902 to 928MHz (FCC) Modulation Method: FSK / OFDM
USB : Type-C USB bus power (DC5.0V/3.0A) USB2.0	Connector for an on-board emulator: USB Connector for a USB serial-conversion interface
Setting of USB Mode	DIP switch x1
Ethernet	Part Number: LAN8720A (Microchip) Note: The Ethernet function is disabled on this product.
Antenna	Part Number: TI.92.2113 (Taoglas limited)

1.5 Block Diagram

Figure 1-1 shows the block diagram of this product.



*Ethernet function is disabled.

Figure 1-1: Block Diagram

2. External view

Figure 2-1 shows the external view of this product.



Figure 2-1: External view

This product includes Sub-GHz wireless function.

The antenna of this product permanently glued with epoxy to the SMA connector and cannot be removed.

Note:

Never disassemble or remodel this product.

Never use an antenna other than the antenna provided with the product, as it violates the radio-related laws.

3. Parts Layout

Figure 3-1 shows the parts layout of this product.

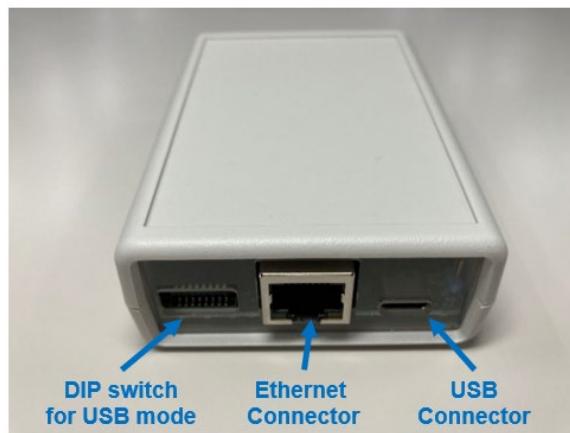


Figure 3-1: Parts Layout

4. Operating Environment

Figure 4-1 shows the operating environment of this product. Install “Virtual COM Port USB Driver” on the host PC. In addition, install the serial terminal software as it will be used for wireless evaluation.

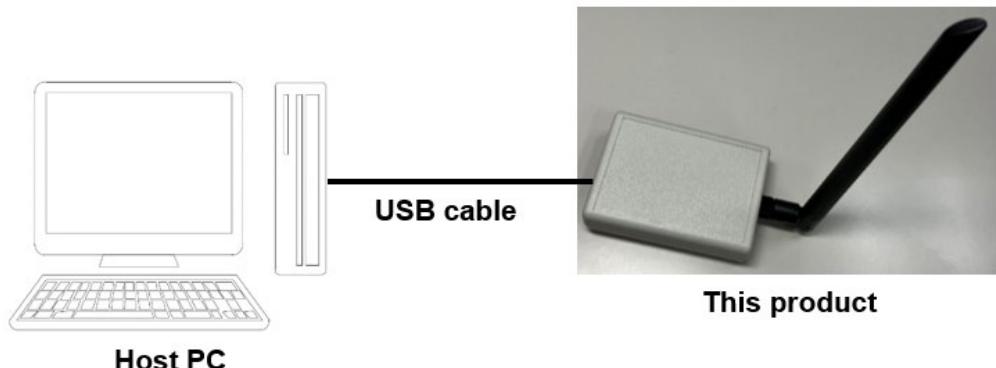


Figure 4-1: Operating Environment

4.1 Virtual COM Port USB Driver

If your PC is connected to the Internet, Windows Update will automatically install the latest driver. Please wait until you see the following pop-up message: Your device is ready to use. If you have not yet installed the driver on your PC, Download and install the driver. Virtual COM port drivers can be downloaded from the FTDI website. FTDI manufactures USB chips embedded in this product.

FTDI website : <http://www.ftdichip.com/Drivers/VCP.htm>

4.2 Serial Terminal Software

The serial terminal software enables data to be input to and output from a serial console. The serial terminal settings are as shown in **Table 4-1**.

Table 4-1: Serial Terminal Settings

Setting item	Setting value
Baud rate	500000 bps
Data	8 bits
Parity	None
Stop bit	1 bit
Flow control	Not used
Newline code	Reception: LF or AUTO Transmission: CR+LF or LF
Local echo	Enabled

Note:

Windows does not come with serial terminal software. Please use the free terminal software of your choice.

5. User Circuits

5.1 DIP switch

Set the following when evaluating (normal mode).

Table 5-1: DIP switch Settings

Mode	DIP switch Settings
Evaluation (normal mode)	ON:1,2 OFF:3,4,5,6,7,8

5.2 Connection of control MCU(RX65N) and wireless transceiver IC (CWX-M)

Table 5-2: Connection of control MCU(RX65N) and wireless transceiver IC (CWX-M)

Control MCU(RX65N)	Transceiver IC (CWX-M)	Note
RSTB	P46	CWX-M reset control
MODE	P47	CWX-M operation mode control
INTOUT0	PD5	CWX-M GPIO0
INTOUT1	PD6	CWX-M GPIO1 *1
INTOUT2	PD7	CWX-M GPIO2 *1
CLK	PD3	SPI Serial clock *2
SEN	PD4	SPI Slave select *2
SIN	PD1	SPI MOSI(Master Out Slave In) *2
SOUT	PD2	SPI MISO(Master In Slave Out) *2

*1 Reserved for option use.

*2 RX65N is master device.

6. Wireless evaluation

6.1 Serial terminal software connection settings

1. Connect the host PC and this product with a USB cable.
2. Check which COM port the USB of this product is assigned to using the device manager.
3. Start up the serial terminal software and set serial port.

6.2 Command specification

1. When the sample program is started, it enters "command menu mode" and is ready to accept commands. **Table 6-1** shows the command list of sample program.
2. To execute the function of a command, enter the command and then press the return key. When the command has an argument, enter the command, a space and the argument, and then press the return key.

Table 6-1: Command list of sample program

Command	Function	Argument
tboot	Renesas Sub-GHz transceiver bootstrapping	Boot mode
tinit	Test function initialization and reset Renesas Sub-GHz transceiver	(None)
tope	PHY operation mode setting	FSK/OFDM operation mode Prohibit the use in modes other than the following. tope FSK NA FSKwoFEC 1b 1 tope FSK NA FSKwoFEC 3 2 tope OFDM NA OFDMOP4 MCS6 1 tope OFDM NA OFDMOP3 MCS6 2 tope OFDM NA OFDMOP2 MCS6 4 tope OFDM NA OFDMOP1 MCS6 5
tch	Channel number setting	Channel number
txpow	FSK and OFDM transmission output power setting	Transmission output power value (Index number)
txpowd	FSK and OFDM transmission output power setting (dBm)	Transmission output power value (dBm)
ttxpowd	FSK transmission output power setting (dBm)	FSK transmission output power value (dBm)
totxpowd	OFDM transmission output power setting (dBm)	OFDM transmission output power value (dBm)
trxgain	External gain setting for reception signal	External gain value for RF input signal
trxgained	External gain setting for reception signal	External gain value for RF input signal(dBm)
tfrlen	Transmission packet length setting	Transmission packet length
ti	Continuous transmission interval time setting	Continuous transmission interval time setting
txopt	Transmission option setting	Transmission option
tsfd	FSK SFD mode setting	FSK SFD mode
tfpl	FSK Preamble length setting	FSK Preamble length
tdw	FSK Data whitening option setting	FSK Data whitening option
tfecs	FSK FCS length setting	FSK FCS length
tfscheme	FSK FEC scheme setting	FSK FEC Scheme
tffecrx	FSK Reception packet FEC setting	FSK FEC setting
tofcs	OFDM FCS length setting	FSK FCS length (CRC bit width)

tointl	OFDM Interleaving mode setting	Interleaving mode
toscr	OFDM Scrambler value setting	OFDM Scrambler value
tostf	OFDM STF length setting	OFDM STF length
tccam	CCA mode setting	CCA mode
tfcdr	CCA duration setting for FSK	CCA duration for FSK
tfccavt	CCA level threshold for FSK	CCA level threshold value for FSK
tfccavtd	CCA level threshold for FSK in dBm	CCA level threshold value (dBm) for FSK
tocdr	CCA duration setting for OFDM	CCA duration for OFDM
toccavt	CCA level threshold for OFDM	CCA level threshold value for OFDM
toccavtd	CCA level threshold for OFDM in dBm	CCA level threshold value (dBm) for OFDM
tgpios	GPIO terminal setting	GPIO terminal function
tgpio	Get the current settings of the GPIO terminal	(None)
tgpioo	GPIO output port voltage level setting	GPIO output port voltage level
tgpioi	Get the GPIO input port voltage level	GPIO port number
tberlen	Frame length for RX BER setting	Frame length for RX BER
tberpn9	PN9 mode for BER setting	PN9 mode for BER
tfhh	Frequency hopping transmission (FSK)	Setting for frequency hopping transmission
tofh	Frequency hopping transmission (OFDM)	Setting for frequency hopping transmission
ram	RAM read and write mode	read and write mode setting
reg	Register read and write mode	read and write mode setting
tftx	FSK Packet transmission	Number of transmissions
totx	OFDM Packet transmission	Number of transmissions
tfpn9	FSK PN9 continuous modulated transmission	(None)
topn9	OFDM PN9 continuous modulated transmission	(None)
tnmtx	Continuous unmodulated transmission	(None)
tfrx	FSK Packet reception	Reception option
torx	OFDM Packet reception	Reception option
te	ED measurement	(None)
tcca	CCA execution	(None)
tmstxs	Tx setting for ModeSwitch & New Mode Frame	Setting option
tmstx	ModeSwitch & New Mode Frame transmission	Number of transmissions
tmsrxs	Rx setting for ModeSwitch & New Mode Frame	Setting option
tmsrx	ModeSwitch & New Mode Frame reception	Reception options
ttl	Regulation mode setting (Tx Total Time Limit, Max Tx Duration and Min Pause Duration Setting)	Regulation mode and parameters
tantdv	Antenna diversity setting	Enable / Disable
tantnum	Setting the number of antennas to use	Number of antennas
tantsel	Setting the antenna number used for Tx / Rx	Antenna number
rst	Reset all (Test function, RF driver and Renesas Sub-GHz transceiver)	(None)
opt	Test function option setting	Display mode of Test function
val	Test function settings display	(None)

help	Command list display	(None)
tsleep	Sleep Mode Setting	(None)

- The gray areas are commands not supported by this product.
- The transmission output power setting of R9A06G062GNP is fixed to the following settings. It cannot be changed by command.
FSK: 1.5dBm OFDM: -2.0dBm
- Details on the command specification is explained in the application note " RF Characteristic Evaluation Program for Renesas Sub-GHz Transceiver Operation Manual (R30AN0376)". Obtain the latest version of this document from the Renesas website.

7. Hardware specifications

Table 7-1 shows the communication specifications of this product.

Table 7-1: Communication specifications

		Channel Spacing	Modulation		
			Option	MCS	Data Rate / Modulation Index
North America Band 902 - 928MHz	OFDM	1200KHz	Option1	MCS6	2400kbps
		800KHz	Option2	MCS6	1200kbps
		400KHz	Option3	MCS6	600kbps
		200KHz	Option4	MCS6	300kbps
	FSK	200KHz	Operating mode #1b		50kbps / m=1.0
		400KHz	Operating mode #3		150kbps / m=0.5

7.1 North America Band

7.1.1 OFDM, Channel Spacing = 1200KHz, Modulation = Option1 / MCS6 / 2400kbps

- Transmission output power at SMA connector = +24dBm
- Channel Number Setting: ChanPlanID 5

Channel number	Frequency [MHz]						
0	903.2	1	904.4	2	905.6	3	906.8
4	908.0	5	909.2	6	910.4	7	911.6
8	912.8	9	914.0	10	915.2	11	916.4
12	917.6	13	918.8	14	920.0	15	921.2
16	922.4	17	923.6	18	924.8	19	926.0
20	927.2						

7.1.2 OFDM, Channel Spacing = 800KHz, Modulation = Option2 / MCS6 / 1200kbps

- Transmission output power at SMA connector = +24dBm
- Channel Number Setting: ChanPlanID 4

Channel number	Frequency [MHz]						
0	902.8	1	903.6	2	904.4	3	905.2
4	906.0	5	906.8	6	907.6	7	908.4
8	909.2	9	910.0	10	910.8	11	911.6
12	912.4	13	913.2	14	914.0	15	914.8
16	915.6	17	916.4	18	917.2	19	918.0
20	918.8	21	919.6	22	920.4	23	921.2
24	922.0	25	922.8	26	923.6	27	924.4
28	925.2	29	926.0	30	926.8	31	927.6

7.1.3 OFDM, Channel Spacing = 400KHz, Modulation = Option3 / MCS6 / 600kbps

- Transmission output power at SMA connector = +24dBm
- Channel Number Setting: ChanPlanID 2

Channel number	Frequency [MHz]						
0	902.4	1	902.8	2	903.2	3	903.6
4	904.0	5	904.4	6	904.8	7	905.2
8	905.6	9	906.0	10	906.4	11	906.8
12	907.2	13	907.6	14	908.0	15	908.4
16	908.8	17	909.2	18	909.6	19	910.0
20	910.4	21	910.8	22	911.2	23	911.6
24	912.0	25	912.4	26	912.8	27	913.2
28	913.6	29	914.0	30	914.4	31	914.8
32	915.2	33	915.6	34	916.0	35	916.4
36	916.8	37	917.2	38	917.6	39	918.0
40	918.4	41	918.8	42	919.2	43	919.6
44	920.0	45	920.4	46	920.8	47	921.2
48	921.6	49	922.0	50	922.4	51	922.8
52	923.2	53	923.6	54	924.0	55	924.4
56	924.8	57	925.2	58	925.6	59	926.0
60	926.4	61	926.8	62	927.2	63	927.6

7.1.4 OFDM, Channel Spacing = 200KHz, Modulation = Option4 / MCS6 / 300kbps

- Transmission output power at SMA connector = +24dBm
- Channel Number Setting: ChanPlanID 1

Channel number	Frequency [MHz]						
0	902.2	1	902.4	2	902.6	3	902.8
4	903.0	5	903.2	6	903.4	7	903.6
8	903.8	9	904.0	10	904.2	11	904.4
12	904.6	13	904.8	14	905.0	15	905.2
16	905.4	17	905.6	18	905.8	19	906.0
20	906.2	21	906.4	22	906.6	23	906.8
24	907.0	25	907.2	26	907.4	27	907.6
28	907.8	29	908.0	30	908.2	31	908.4
32	908.6	33	908.8	34	909.0	35	909.2
36	909.4	37	909.6	38	909.8	39	910.0
40	910.2	41	910.4	42	910.6	43	910.8
44	911.0	45	911.2	46	911.4	47	911.6
48	911.8	49	912.0	50	912.2	51	912.4
52	912.6	53	912.8	54	913.0	55	913.2
56	913.4	57	913.6	58	913.8	59	914.0
60	914.2	61	914.4	62	914.6	63	914.8
64	915.0	65	915.2	66	915.4	67	915.6
68	915.8	69	916.0	70	916.2	71	916.4
72	916.6	73	916.8	74	917.0	75	917.2
76	917.4	77	917.6	78	917.8	79	918.0
80	918.2	81	918.4	82	918.6	83	918.8
84	919.0	85	919.2	86	919.4	87	919.6
88	919.8	89	920.0	90	920.2	91	920.4
92	920.6	93	920.8	94	921.0	95	921.2
96	921.4	97	921.6	98	921.8	99	922.0
100	922.2	101	922.4	102	922.6	103	922.8
104	923.0	105	923.2	106	923.4	107	923.6
108	923.8	109	924.0	110	924.2	111	924.4
112	924.6	113	924.8	114	925.0	115	925.2
116	925.4	117	925.6	118	925.8	119	926.0
120	926.2	121	926.4	122	926.6	123	926.8
124	927.0	125	927.2	126	927.4	127	927.6
128	927.8						

7.1.5 FSK, Channel Spacing = 200KHz, 50kbps / m = 1.0

- Transmission output power at SMA connector = +30dBm
- Channel Number Setting: ChanPlanID 1

Channel number	Frequency [MHz]						
0	902.2	1	902.4	2	902.6	3	902.8
4	903.0	5	903.2	6	903.4	7	903.6
8	903.8	9	904.0	10	904.2	11	904.4
12	904.6	13	904.8	14	905.0	15	905.2
16	905.4	17	905.6	18	905.8	19	906.0
20	906.2	21	906.4	22	906.6	23	906.8
24	907.0	25	907.2	26	907.4	27	907.6
28	907.8	29	908.0	30	908.2	31	908.4
32	908.6	33	908.8	34	909.0	35	909.2
36	909.4	37	909.6	38	909.8	39	910.0
40	910.2	41	910.4	42	910.6	43	910.8
44	911.0	45	911.2	46	911.4	47	911.6
48	911.8	49	912.0	50	912.2	51	912.4
52	912.6	53	912.8	54	913.0	55	913.2
56	913.4	57	913.6	58	913.8	59	914.0
60	914.2	61	914.4	62	914.6	63	914.8
64	915.0	65	915.2	66	915.4	67	915.6
68	915.8	69	916.0	70	916.2	71	916.4
72	916.6	73	916.8	74	917.0	75	917.2
76	917.4	77	917.6	78	917.8	79	918.0
80	918.2	81	918.4	82	918.6	83	918.8
84	919.0	85	919.2	86	919.4	87	919.6
88	919.8	89	920.0	90	920.2	91	920.4
92	920.6	93	920.8	94	921.0	95	921.2
96	921.4	97	921.6	98	921.8	99	922.0
100	922.2	101	922.4	102	922.6	103	922.8
104	923.0	105	923.2	106	923.4	107	923.6
108	923.8	109	924.0	110	924.2	111	924.4
112	924.6	113	924.8	114	925.0	115	925.2
116	925.4	117	925.6	118	925.8	119	926.0
120	926.2	121	926.4	122	926.6	123	926.8
124	927.0	125	927.2	126	927.4	127	927.6
128	927.8						

7.1.6 FSK, Channel Spacing = 400KHz, 150kbps / m = 0.5

- Transmission output power at SMA connector = +30dBm
- Channel Number Setting: ChanPlanID 2

Channel number	Frequency [MHz]						
0	902.4	1	902.8	2	903.2	3	903.6
4	904.0	5	904.4	6	904.8	7	905.2
8	905.6	9	906.0	10	906.4	11	906.8
12	907.2	13	907.6	14	908.0	15	908.4
16	908.8	17	909.2	18	909.6	19	910.0
20	910.4	21	910.8	22	911.2	23	911.6
24	912.0	25	912.4	26	912.8	27	913.2
28	913.6	29	914.0	30	914.4	31	914.8
32	915.2	33	915.6	34	916.0	35	916.4
36	916.8	37	917.2	38	917.6	39	918.0
40	918.4	41	918.8	42	919.2	43	919.6
44	920.0	45	920.4	46	920.8	47	921.2
48	921.6	49	922.0	50	922.4	51	922.8
52	923.2	53	923.6	54	924.0	55	924.4
56	924.8	57	925.2	58	925.6	59	926.0
60	926.4	61	926.8	62	927.2	63	927.6

8. Additional Information

Technical Support

For details on the Transceiver IC (CWX-M), refer to the R9A06G062GNP Sub-GHz Transceiver User's Manual: Hardware.

The latest information is available from the Web page.

Technical Contact Details

General information on Renesas microcontrollers can be found on the Renesas website at:

<https://www.renesas.com/>

Note

- Do not install this product into your product.
- When using this product, be sure to use the antenna provided with the product.
- Never disassemble or modify this product.
- Do not use any firmware other than the dedicated firmware for this product during wireless evaluation.
- This product have FCC certification. In order to use wireless equipment and devices, it is necessary to comply with the wireless regulations established in the country of use. This fact must be taken into account when this product is used in your country.

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9. Certification of Compliance

This product complies with the laws and regulations described below.

9.1 Radio-Related Laws

North America: FCC ID : 2AEMXCWXMRK1BJ

FCC Regulatory

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated keeping the radiator at least 20cm or more away from person's body.

This equipment has been tested and meets the FCC RF exposure guidelines when used with the Renesas accessories supplied or designated for this product. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

This equipment must be used with the approved antenna included in the product.

The certified antenna include:

TERMINAL DIPOLE ANTENNA (Taoglas: TI.92.2113) with peak gain 2.14dBi.

The antenna of this product permanently glued with epoxy to the SMA connector and cannot be removed.

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Rev.	Date	Description	
		Page	Summary
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1.01	2023.3.24	18	Note, added

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