RL78/G1H, RAA604S00

Recommended Settings Registers

R01AN3410EJ0120
Rev.1.20
Sep 12, 2019

Introduction

This application note gives the recommended settings of registers for RL78/G1H devices, and those of the sub-GHz RAA604S00 transceiver they incorporate.

Note: The contents of this document are provided as an example for reference and do not guarantee the signal quality in systems. When implementing this example into an existing system, thoroughly evaluate the product in the overall system and apply the contents of this document at your own responsibility.

Target Device for Operation Check

The data shown in this document is measured with the following microcomputer.

RL78/G1H, RAA604S00

Contents

1. Introduction 3
1.1 Supported data rate list 3
1.2 Recommended Flow of Writing Register 5

2. Initial Setting Registers in common mode 6

3. Setting Registers fixed at each Data Rate 7
3.1 Setting Registers according to “phyFreqBandId” 7
3.2 Setting Registers according to “phyFreqBandId” and “phyFSKOpeMode” 8
3.3 ARIB STD - T108 mode setting 24

4. Setting Registers optimized by Customer 25
4.1 Register setting for loss of input signal level from antenna 25
4.2 Preamble length setting register 29
4.3 Changing the preamble length using antenna diversity mode 31
4.4 Registers Setting of Reception Filter Bandwidth in ED/CCA mode 33
4.4.1 Setting common register of reception Filter Bandwidth in ED/CCA mode 35
4.4.2 CCA time register in ARIB STD – T108 36

5. Correction function of RF Transceiver 37
5.1 RL78/G1H 37
5.2 RAA604S00 38

6. Setting for transmission 39
6.1 RF frequency setting for transmission 39
6.2 Transmission Output Power Setting 40
6.2.1 Transmission Gain Set Table Number = 001 41
6.2.2 Transmission Gain Set Table Number = 002 45
6.2.3 Transmission Gain Set Table Number = 003 49

6.2.4 Transmission Gain Set Table Number = 004 53

7. Setting for reception 57
7.1 RF frequency setting for reception 57
7.2 Data setting at address 0095H at reception 58
7.2.1 RF Frequency Setting Table Number = 000 60
7.2.2 RF Frequency Setting Table Number = 001 61
7.2.3 RF Frequency Setting Table Number = 002 61
7.2.4 RF Frequency Setting Table Number = 003 62
7.2.5 RF Frequency Setting Table Number = 004 62
7.2.6 RF Frequency Setting Table Number = 005 63
7.2.7 RF Frequency Setting Table Number = 006 63
7.2.8 RF Frequency Setting Table Number = 007 63
7.2.9 RF Frequency Setting Table Number = 008 64
7.2.10 RF Frequency Setting Table Number = 009 66
7.2.11 RF Frequency Setting Table Number = 010 68
7.2.12 RF Frequency Setting Table Number = 011 70
7.2.13 RF Frequency Setting Table Number = 012 70
7.2.14 RF Frequency Setting Table Number = 013 71
7.2.15 RF Frequency Setting Table Number = 014 72
7.2.16 RF Frequency Setting Table Number = 015 73
7.2.17 RF Frequency Setting Table Number = 016 74
7.2.18 RF Frequency Setting Table Number = 017 75

8. Setting for shortening the time from CCA executed once to transmission finish 76

9. Example of channel setting 77

10. Receive SFD detection enhanced mode setting 86

Revision History 87

1. Introduction

1.1 Supported data rate list

The list of each data rate supported by this product is shown in **Table 1–1**. In this document, “phyFreqBandId” and “phyFSKOpeMode” in the table are used for explanation.

Table 1-1 Supported data rate list(1/2)

phyFreq BandId	phyFSK OpeMode	Country or region	Frequency band (MHz)	Modulation	Data rate (kbps)	Modulation index	Chan Center Freq0 (MHz)
04	01	Europe	863-870	2FSK/2GFSK	50	1	863.125
	02				100		863.225
	03			4FSK/4GFSK	200	0.33	863.225
	04			2FSK/2GFSK	50	0.5	863.1
	05				100		863.1
	06				150		863.1
	07				50	1	863.1
05	01	US (FCC Part 90)	896-901	2FSK/2GFSK	10	0.5	896.0125
	02				20		896.025
	03				40		896.05
06	01	US (FCC Part 24)	901-902	2FSK/2GFSK	10	0.5	901.0125
	02				20		901.025
	03				40		901.05
07	01	US	902-928	2FSK/2GFSK	50	1	902.2
	02				150	0.5	902.4
	03				200		902.4
	04 Note				50	1	902.2
08	01	Korea	917-923.5	2FSK/2GFSK	50	1	917.1
	02				150	0.5	917.3
	03				200		917.3
	04 Note				50	1	917.1
09	01	Japan	920-928	2FSK/2GFSK	50	1	920.6
	02				100		920.7
	03				200		920.8
	04			4FSK/4GFSK	400	0.33	920.8
	05			2FSK/2GFSK	150	0.5	920.7
	06 Note				50	1	920.6
14	01	Other	902-928	2FSK/2GFSK	300	0.5	920.8
	02				100		902.2
	03				300		902.6
15	01	Europe	870–876	2FSK/2GFSK	50	0.5	870.1
	02				100		870.1
	03				150		870.1
16	01	Australia/Malaysia/ New Zealand/ Philippines	902–928	2FSK/2GFSK	150	0.5	902.2

Table 1-1 Supported data rate list(2/2)

phyFreq BandId	phyFSK OpeMode	Country or region	Frequency band (MHz)	Modulation	Data rate (kbps)	Modulation index	Chan Center Freq0 (MHz)
17	01	China	920–925	2FSK/2GFSK	50	1	920.625
	02				100	0.5	920.625
	03				150		920.625
	04 Note				50	1	920.625

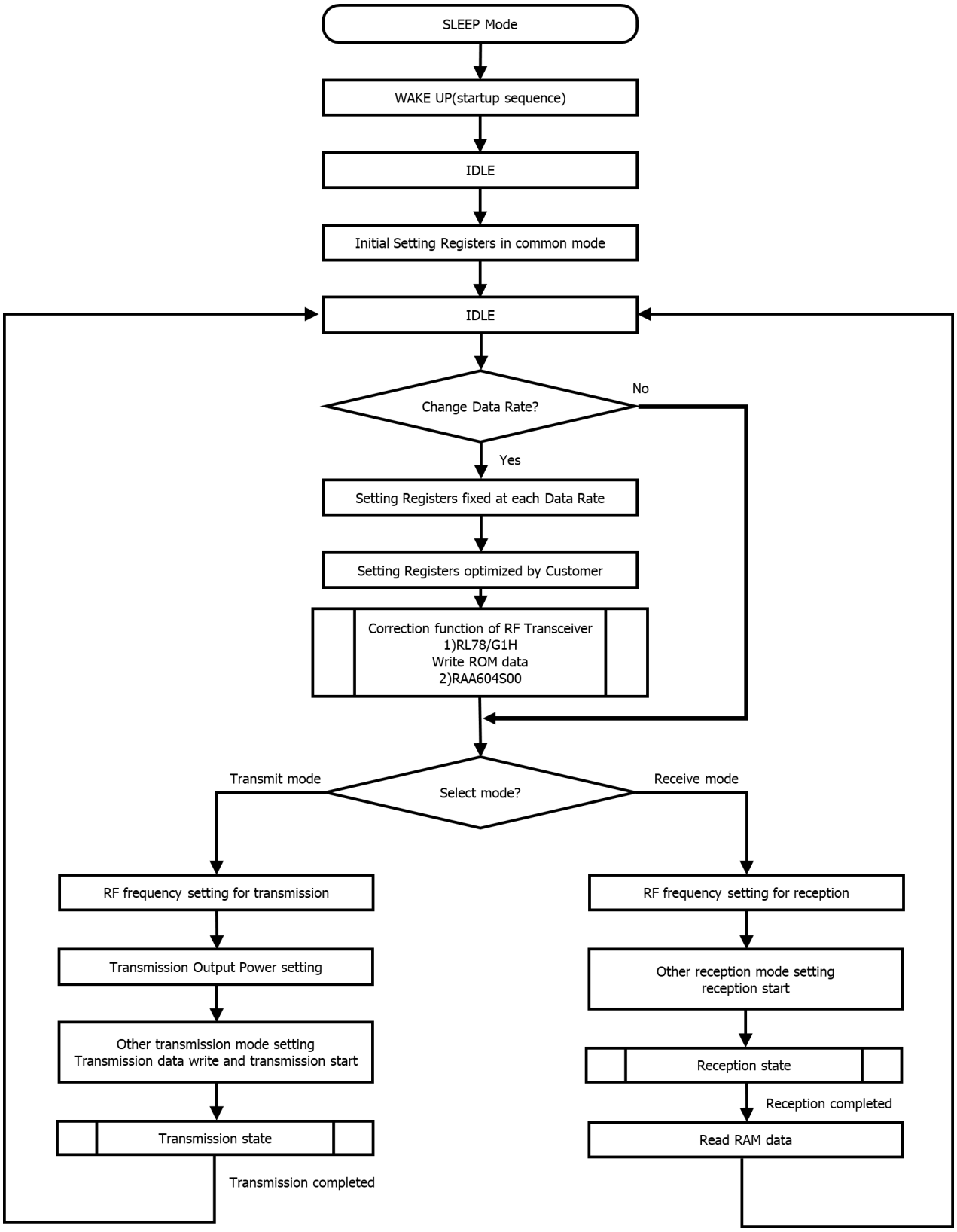
Note These modes are optimized for Frequency Hopping.

It is recommended to use these modes when using Frequency Hopping.

1.2 Recommended Flow of Writing Register

Recommended Flow of Writing Register is shown in **Figure 1-1**. In this document, each register is explained according to this flow.

Figure 1-1 Recommended Flow of Writing Register



2. Initial Setting Registers in common mode

These registers are set at the phase of "Initial Setting Registers in common mode" in **Figure 1-1**. They are initial settings that do not depend on “phyFreqBandId” and “phyFSKOpeMode” of **Table 1-1**. In IDLE mode, set registers in **Table 2-1** in order.

Table 2-1 Initial Setting Registers in common mode

Order of setting	Register address (H)	Setting value (H)	Order of setting	Register address (H)	Setting value (H)
1	000A	8C	29	04F9	01
2	003A	80	30	0501	10
3	0048	04	31	050D	60
4	0052	0E	32	050E	01
5	0053	01	33	0510	00
6	0054	5E	34	0515	03
7	0057	50	35	0583	7F
8	0058	E6	36	0587	7F
9	005A	F0	37	05A5	0A
10	005C	F0	38	05A6	0A
11	0078	E6	39	05AD	40
12	007C	50	40	00D8	04
13	007E	E6	41	00D9	44
14	0086	03	42	00DC	8D
15	008E	73	43	00DD	1F
16	0092	7B	44	00DC	00
17	0094	26	45	00DD	6E
18	0096	73	46	00DC	88
19	00A6	0F	47	00DD	10
20	0402	04	48	00DC	08
21	046F	05	49	00DD	11
22	0470	05	50	00DC	07
23	0475	32	51	00DD	12
24	047A	60	52	00DC	06
25	047B	01	53	00DD	13
26	0481	00	54	00DC	05
27	0488	82	55	00DD	14
28	04EE	00	-	-	-

3. Setting Registers fixed at each Data Rate

These registers are set at the phase of "Setting Registers fixed at each Data Rate" in **Figure 1-1**. In IDLE mode, set registers in **Table 3-1** and **Table 3-2** according to “phyFreqBandId” and “phyFSKOpeMode”.

3.1 Setting Registers according to “phyFreqBandId”

Setting registers according to “phyFreqBandId” are shown in **Table 3-1**.

Table 3-1 Setting registers according to “phyFreqBandId”

phyFreqBandId	phyFSKOpeMode	Address (H)			
		00F5	00FB	00DC	00DD
04	01-07	DA	DA	12	63
05	01-03	CA	CA	0A	63
06	01-03	CA	CA	0A	63
07	01-04	BA	BA	0A	63
08	01-04	BA	BA	0A	63
09	01-06	BA	BA	0A	63
14	01-03	BA	BA	0A	63
15	01-03	DA	DA	12	63
16	01	BA	BA	0A	63
17	01-04	BA	BA	0A	63

3.2 Setting Registers according to “phyFreqBandId” and “phyFSKOpeMode”

Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” are shown in **Table 3-2**.

Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (1/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				000E	00AC	00AD	00B1	00B2	
								Diversity: No	Diversity: Yes
04	01	50	1	00	E0	01	42	14	0B
	02	100		00	F0	00	42	24	16
	03	200	0.33	00	F0	00	83	24	26
	04	50	0.5	05	E0	01	02	14	19
	05	100		00	F0	00	02	24	13
	06	150		0B	A0	00	02	24	18
	07	50	1	00	E0	01	42	14	0B
05	01	10	0.5	0C	60	09	02	10	0B
	02	20		0C	B0	04	02	10	11
	03	40		04	58	02	02	10	13
06	01	10	0.5	0C	60	09	02	10	0B
	02	20		0C	B0	04	02	10	11
	03	40		04	58	02	02	10	13
07	01	50	1	00	E0	01	42	14	0B
	02	150	0.5	0B	A0	00	02	24	18
	03	200		0B	78	00	02	2E	1B
	04	50	1	00	E0	01	42	14	0B
08	01	50	1	00	E0	01	42	14	0B
	02	150	0.5	0B	A0	00	02	24	18
	03	200		0B	78	00	02	2E	1B
	04	50	1	00	E0	01	42	14	0B
09	01	50	1	00	E0	01	42	14	0B Note
	02	100		00	F0	00	42	24	16 Note
	03	200		00	78	00	42	2E	1B Note
	04	400	0.33	00	78	00	83	2E	36 Note
	05	150	0.5	0B	A0	00	02	24	18 Note
	06	50	1	00	E0	01	42	14	0B Note
14	01	300	0.5	1E	50	00	02	3E	20
	02	100		00	F0	00	02	24	13
	03	300		1E	50	00	02	3E	20
15	01	50	0.5	05	E0	01	02	14	19
	02	100		00	F0	00	02	24	13
	03	150		0B	A0	00	02	24	18
16	01	150	0.5	0B	A0	00	02	24	18

Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (2/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				000E	00AC	00AD	00B1	00B2	
								Diversity: No	Diversity: Yes
17	01	50	1	00	E0	01	42	14	0B
	02	100	0.5	00	F0	00	02	24	13
	03	150		0B	A0	00	02	24	18
	04	50	1	00	E0	01	42	14	0B

Note The setting value differs when using the back off reception function in automatic CSMA-CA within ARIB standard. For details, refer to "3.3 ARIB STD - T108 mode setting".

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (3/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				00C0	00C2	00C3	00C4	00C5	00C6
04	01	50	1	AA	09	72	00	00	02
	02	100		AA	09	72	00	00	02
	03	200	0.33	EE	EB	AA	AE	BF	06
	04	50	0.5	AA	09	72	00	00	02
	05	100		AA	09	72	00	00	02
	06	150		AA	09	72	00	00	02
	07	50	1	AA	09	72	00	00	02
05	01	10	0.5	AA	09	72	00	00	02
	02	20		AA	09	72	00	00	02
	03	40		AA	09	72	00	00	02
06	01	10	0.5	AA	09	72	00	00	02
	02	20		AA	09	72	00	00	02
	03	40		AA	09	72	00	00	02
07	01	50	1	AA	09	72	00	00	02
	02	150	0.5	AA	09	72	00	00	02
	03	200		AA	09	72	00	00	02
	04	50	1	AA	09	72	00	00	02
08	01	50	1	AA	09	72	00	00	02
	02	150	0.5	AA	09	72	00	00	02
	03	200		AA	09	72	00	00	02
	04	50	1	AA	09	72	00	00	02
09	01	50	1	AA	09	72	00	00	02
	02	100		AA	09	72	00	00	02
	03	200		AA	09	72	00	00	02
	04	400	0.33	EE	EB	AA	AE	BF	06
	05	150	0.5	AA	09	72	00	00	02
	06	50	1	AA	09	72	00	00	02
14	01	300	0.5	AA	09	72	00	00	02
	02	100		AA	09	72	00	00	02
	03	300		AA	09	72	00	00	02
15	01	50	0.5	AA	09	72	00	00	02
	02	100		AA	09	72	00	00	02
	03	150		AA	09	72	00	00	02
16	01	150	0.5	AA	09	72	00	00	02
17	01	50	1	AA	09	72	00	00	02
	02	100	0.5	AA	09	72	00	00	02
	03	150		AA	09	72	00	00	02
	04	50	1	AA	09	72	00	00	02

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (4/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				00CC	00CE	00D0	00D1	00F1	00F2
					Diversity: Yes	Diversity: Yes	Diversity: Yes		
04	01	50	1	00	0B	78	00	06	0A
	02	100		01	16	BB	00	09	0F
	03	200	0.33	00	26	56	01	0E	17
	04	50	0.5	01	19	CD	00	06	0A
	05	100		01	13	AB	00	0E	17
	06	150		01	18	C4	00	17	25
	07	50	1	00	0B	78	00	06	0A
05	01	10	0.5	00	0B	74	00	06	0A
	02	20		01	11	92	00	06	0A
	03	40		01	13	A4	00	06	0A
06	01	10	0.5	00	0B	74	00	06	0A
	02	20		01	11	92	00	06	0A
	03	40		01	13	A4	00	06	0A
07	01	50	1	00	0B	78	00	06	0A
	02	150	0.5	00	18	C3	00	17	25
	03	200		00	1B	DC	00	26	3D
	04	50	1	01	0B	78	00	06	0A
08	01	50	1	00	0B	78	00	06	0A
	02	150	0.5	00	18	C3	00	17	25
	03	200		00	1B	DC	00	26	3D
	04	50	1	01	0B	78	00	06	0A
09	01	50	1	00	0B Note	78 Note	00 Note	06	0A
	02	100		01	16 Note	BB Note	00 Note	09	0F
	03	200		02	1B Note	DC Note	00 Note	0E	17
	04	400	0.33	02	36 Note	B8 Note	01 Note	0E	17
	05	150	0.5	00	18 Note	C3 Note	00 Note	17	25
	06	50	1	01	0B Note	78 Note	00 Note	06	0A
14	01	300	0.5	02	20	08	01	37	58
	02	100		01	13	AB	00	0E	17
	03	300		02	20	08	01	37	58
15	01	50	0.5	01	19	CD	00	06	0A
	02	100		01	13	AB	00	0E	17
	03	150		01	18	C4	00	17	25
16	01	150	0.5	00	18	C3	00	17	25
17	01	50	1	01	0B	78	00	06	0A
	02	100	0.5	01	13	AB	00	0E	17
	03	150		01	18	C4	00	17	25
	04	50	1	01	0B	78	00	06	0A

Note The setting value differs when using the back off reception function in automatic CSMA-CA within ARIB standard. For details, refer to "3.3 ARIB STD - T108 mode setting".

Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (5/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				00F3	00F4	0100	0101	0102	0103
04	01	50	1	5F	0D	F6	72	00	00
	02	100		5F	11	F6	72	00	00
	03	200	0.33	5F	0F	BE	FF	AE	BF
	04	50	0.5	5F	0D	F6	72	00	00
	05	100		5F	0F	F6	72	00	00
	06	150		5F	0D	F6	72	00	00
	07	50	1	5F	11	F6	72	00	00
05	01	10	0.5	5F	0D	F6	72	00	00
	02	20		5F	0D	F6	72	00	00
	03	40		5F	0D	F6	72	00	00
06	01	10	0.5	5F	0D	F6	72	00	00
	02	20		5F	0D	F6	72	00	00
	03	40		5F	0D	F6	72	00	00
07	01	50	1	5F	0D	F6	72	00	00
	02	150	0.5	5F	0D	F6	72	00	00
	03	200		9F	06	F6	72	00	00
	04	50	1	5F	0D	F6	72	00	00
08	01	50	1	5F	0D	F6	72	00	00
	02	150	0.5	5F	0D	F6	72	00	00
	03	200		9F	06	F6	72	00	00
	04	50	1	5F	0D	F6	72	00	00
09	01	50	1	5F	0D	F6	72	00	00
	02	100		5F	11	F6	72	00	00
	03	200		5F	0F	F6	72	00	00
	04	400	0.33	5F	0F	BE	FF	AE	BF
	05	150	0.5	5F	0D	F6	72	00	00
	06	50	1	5F	0D	F6	72	00	00
14	01	300	0.5	5F	04	F6	72	00	00
	02	100		5F	0F	F6	72	00	00
	03	300		5F	04	F6	72	00	00
15	01	50	0.5	5F	0D	F6	72	00	00
	02	100		5F	0F	F6	72	00	00
	03	150		5F	0D	F6	72	00	00
16	01	150	0.5	5F	0D	F6	72	00	00
17	01	50	1	5F	0D	F6	72	00	00
	02	100	0.5	5F	0F	F6	72	00	00
	03	150		5F	0D	F6	72	00	00
	04	50	1	5F	0D	F6	72	00	00

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (6/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				0104	0105	0106	0107	0108	0109
04	01	50	1	5E	70	00	00	C6	B4
	02	100		5E	70	00	00	C6	B4
	03	200	0.33	FE	BB	AA	BF	BE	FA
	04	50	0.5	5E	70	00	00	C6	B4
	05	100		5E	70	00	00	C6	B4
	06	150		5E	70	00	00	C6	B4
	07	50	1	5E	70	00	00	C6	B4
05	01	10	0.5	5E	70	00	00	C6	B4
	02	20		5E	70	00	00	C6	B4
	03	40		5E	70	00	00	C6	B4
06	01	10	0.5	5E	70	00	00	C6	B4
	02	20		5E	70	00	00	C6	B4
	03	40		5E	70	00	00	C6	B4
07	01	50	1	5E	70	00	00	C6	B4
	02	150	0.5	5E	70	00	00	C6	B4
	03	200		5E	70	00	00	C6	B4
	04	50	1	5E	70	00	00	C6	B4
08	01	50	1	5E	70	00	00	C6	B4
	02	150	0.5	5E	70	00	00	C6	B4
	03	200		5E	70	00	00	C6	B4
	04	50	1	5E	70	00	00	C6	B4
09	01	50	1	5E	70	00	00	C6	B4
	02	100		5E	70	00	00	C6	B4
	03	200		5E	70	00	00	C6	B4
	04	400	0.33	FE	BB	AA	BF	BE	FA
	05	150	0.5	5E	70	00	00	C6	B4
	06	50	1	5E	70	00	00	C6	B4
14	01	300	0.5	5E	70	00	00	C6	B4
	02	100		5E	70	00	00	C6	B4
	03	300		5E	70	00	00	C6	B4
15	01	50	0.5	5E	70	00	00	C6	B4
	02	100		5E	70	00	00	C6	B4
	03	150		5E	70	00	00	C6	B4
16	01	150	0.5	5E	70	00	00	C6	B4
17	01	50	1	5E	70	00	00	C6	B4
	02	100	0.5	5E	70	00	00	C6	B4
	03	150		5E	70	00	00	C6	B4
	04	50	1	5E	70	00	00	C6	B4

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (7/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				010A	010B	0110	0403	0405	0415
04	01	50	1	00	00	9D	04	10	00
	02	100		00	00	9C	04	10	00
	03	200	0.33	BA	EF	9D	0C	04	F1
	04	50	0.5	00	00	A0	04	10	F1
	05	100		00	00	9C	04	10	F1
	06	150		00	00	AA	04	10	F1
	07	50	1	00	00	9D	04	10	00
05	01	10	0.5	00	00	A3	04	10	F1
	02	20		00	00	A4	04	10	F1
	03	40		00	00	A0	04	10	F1
06	01	10	0.5	00	00	A3	04	10	F1
	02	20		00	00	A4	04	10	F1
	03	40		00	00	A0	04	10	F1
07	01	50	1	00	00	9D	04	10	00
	02	150	0.5	00	00	AA	04	10	F1
	03	200		00	00	AC	04	10	F1
	04	50	1	00	00	9D	04	10	00
08	01	50	1	00	00	9D	04	10	00
	02	150	0.5	00	00	AA	04	10	F1
	03	200		00	00	AC	04	10	F1
	04	50	1	00	00	9D	04	10	00
09	01	50	1	00	00	9D	04	10	00
	02	100		00	00	9C	04	10	00
	03	200		00	00	A0	04	10	00
	04	400	0.33	BA	EF	A0	0C	04	F1
	05	150	0.5	00	00	AA	04	10	F1
	06	50	1	00	00	9D	04	10	00
14	01	300	0.5	00	00	C0	04	10	F1
	02	100		00	00	9C	04	10	F1
	03	300		00	00	C0	04	10	F1
15	01	50	0.5	00	00	A0	04	10	F1
	02	100		00	00	9C	04	10	F1
	03	150		00	00	AA	04	10	F1
16	01	150	0.5	00	00	AA	04	10	F1
17	01	50	1	00	00	9D	04	10	00
	02	100	0.5	00	00	9C	04	10	F1
	03	150		00	00	AA	04	10	F1
	04	50	1	00	00	9D	04	10	00

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (8/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)						
				0423	042D		0430	0432	0436 Note	043A
					Diversity: No	Diversity: Yes				
04	01	50	1	01	18	09	0C	18	-	96
	02	100		01	0A	0A	02	0A	-	9E
	03	200	0.33	09	0C	0A	02	0C	-	96
	04	50	0.5	09	22	22	04	20	-	9E
	05	100		09	0A	0A	02	0C	-	96
	06	150		09	08	08	02	0C	-	9E
	07	50	1	01	18	09	0C	18	-	96
05	01	10	0.5	09	3C	3C	3C	78	-	92
	02	20		09	3C	3C	02	10	-	9E
	03	40		09	1E	1E	0C	1E	-	96
06	01	10	0.5	09	3C	3C	3C	78	-	92
	02	20		09	3C	3C	02	10	-	9E
	03	40		09	1E	1E	0C	1E	-	96
07	01	50	1	01	18	09	0C	18	-	96
	02	150	0.5	09	08	08	02	08	-	96
	03	200		09	06	06	02	06	-	96
	04	50	1	01	18	09	02	10	20	BE
08	01	50	1	01	18	09	0C	18	-	96
	02	150	0.5	09	08	08	02	08	-	96
	03	200		09	06	06	02	06	-	96
	04	50	1	01	18	09	02	10	20	BE
09	01	50	1	01	18	09	0C	18	-	96
	02	100		01	0A	0A	02	14	-	9E
	03	200		01	06	06	02	0B	-	9E
	04	400	0.33	09	06	06	02	09	-	9E
	05	150	0.5	09	08	08	02	0E	-	9E
	06	50	1	01	18	09	02	10	20	BE
14	01	300	0.5	09	04	04	02	0C	-	9E
	02	100		09	0A	0A	02	0C	-	96
	03	300		09	04	04	02	0C	-	9E
15	01	50	0.5	09	22	22	04	20	-	9E
	02	100		09	0A	0A	02	0C	-	96
	03	150		09	08	08	02	0C	-	9E
16	01	150	0.5	09	08	08	02	08	-	96
17	01	50	1	01	18	09	0C	18	-	96
	02	100	0.5	09	0A	0A	02	0C	-	96
	03	150		09	08	08	02	0C	-	9E
	04	50	1	01	18	09	02	10	20	BE

Note Address 436H is valid if address 43AH bit 6 is set to "H".
If above bit is set to "L",there's no affect to receive function,so above table '-' means that no need to set value.

Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (9/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)				
				0454	0456	0457	0458	0471
04	01	50	1	2E	06	91	03	04
	02	100		2E	06	A4	05	04
	03	200	0.33	28	02	1D	07	04
	04	50	0.5	28	02	91	03	04
	05	100		28	02	A7	05	04
	06	150		2E	06	F5	08	04
	07	50	1	2E	06	91	03	04
05	01	10	0.5	28	02	B7	01	05
	02	20		28	02	21	02	04
	03	40		28	02	40	03	04
06	01	10	0.5	28	02	B7	01	05
	02	20		28	02	21	02	04
	03	40		28	02	40	03	04
07	01	50	1	2E	06	91	03	04
	02	150	0.5	2E	06	F5	08	04
	03	200		28	02	46	0C	04
	04	50	1	2E	06	91	03	04
08	01	50	1	2E	06	91	03	04
	02	150	0.5	2E	06	F5	08	04
	03	200		28	02	46	0C	04
	04	50	1	2E	06	91	03	04
09	01	50	1	2E	06	91	03	04
	02	100		2E	06	A4	05	04
	03	200		2E	06	46	0C	04
	04	400	0.33	2E	06	7D	0C	04
	05	150	0.5	2E	06	F5	08	04
	06	50	1	2E	06	91	03	04
14	01	300	0.5	28	02	DD	13	04
	02	100		28	02	A7	05	04
	03	300		28	02	DD	13	04
15	01	50	0.5	28	02	91	03	04
	02	100		28	02	A7	05	04
	03	150		2E	06	F5	08	04
16	01	150	0.5	2E	06	F5	08	04
17	01	50	1	2E	06	91	03	04
	02	100	0.5	28	02	A7	05	04
	03	150		2E	06	F5	08	04
	04	50	1	2E	06	91	03	04

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (10/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				0472 Note		0473	0474	0476	0477
				4byte preamble	5byte or longer preamble				
04	01	50	1	-	05	F6	A6	E0	E0
	02	100		04	05	FB	A6	E0	E0
	03	200	0.33	-	05	F6	A6	E0	E0
	04	50	0.5	-	05	F6	A6	E0	E0
	05	100		04	05	F6	A7	E0	E0
	06	150		-	05	F6	66	E0	E0
	07	50	1	-	05	F6	A6	E0	E0
05	01	10	0.5	04	05	F6	A6	E0	E0
	02	20		04	05	F6	A6	E0	E0
	03	40		04	05	F6	A6	E0	E0
06	01	10	0.5	04	05	F6	A6	E0	E0
	02	20		04	05	F6	A6	E0	E0
	03	40		04	05	F6	A6	E0	E0
07	01	50	1	-	05	F6	A6	E0	E0
	02	150	0.5	-	05	F6	66	E0	E0
	03	200		-	05	F6	A6	E0	E0
	04	50	1	-	05	F6	A6	E0	E0
08	01	50	1	-	05	F6	A6	E0	E0
	02	150	0.5	-	05	F6	66	E0	E0
	03	200		-	05	F6	A6	E0	E0
	04	50	1	-	05	F6	A6	E0	E0
09	01	50	1	04	05	F6	A6	E0	E0
	02	100		04	05	FB	A6	E0	E0
	03	200		-	05	F6	A6	E0	E0
	04	400	0.33	-	05	F6	A7	E0	E0
	05	150	0.5	-	05	F6	66	E0	E0
	06	50	1	04	05	F6	A6	E0	E0
14	01	300	0.5	-	05	F6	A7	E0	E0
	02	100		04	05	F6	A7	E0	E0
	03	300		-	05	F6	A7	E0	E0
15	01	50	0.5	-	05	F6	A6	E0	E0
	02	100		04	05	F6	A7	E0	E0
	03	150		-	05	F6	66	E0	E0
16	01	150	0.5	-	05	F6	66	E0	E0
17	01	50	1	-	05	F6	A6	E0	E0
	02	100	0.5	04	05	F6	A7	E0	E0
	03	150		-	05	F6	66	E0	E0
	04	50	1	-	05	F6	A6	E0	E0

Note Address 0472H is preamble length setting registers for reception mode.
When preamble length is 4byte, set 04H to address 0472H.
When preamble length is 5byte or longer, set 05H to address 0472H.
In the mode where 4 byte is "-", preamble length cannot be set to 4 bytes. For details, refer to "4.2 Preamble length setting".

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (11/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				0478	047C	047D	047E	047F	0480
04	01	50	1	00	1B	0F	03	34	00
	02	100		00	1C	0F	03	34	20
	03	200	0.33	00	1B	0F	03	35	00
	04	50	0.5	00	1B	0F	03	34	00
	05	100		00	1B	0F	03	34	00
	06	150		00	1B	0F	03	34	01
	07	50	1	00	1B	0F	03	34	00
05	01	10	0.5	00	1B	0F	03	34	00
	02	20		00	1B	10	03	34	00
	03	40		00	1A	0F	03	34	00
06	01	10	0.5	00	1B	0F	03	34	00
	02	20		00	1B	10	03	34	00
	03	40		00	1A	0F	03	34	00
07	01	50	1	00	1B	0F	03	34	00
	02	150	0.5	00	1B	0F	03	34	01
	03	200		00	1B	0F	03	34	00
	04	50	1	00	1B	0F	03	34	00
08	01	50	1	00	1B	0F	03	34	00
	02	150	0.5	00	1B	0F	03	34	01
	03	200		00	1B	0F	03	34	00
	04	50	1	00	1B	0F	03	34	00
09	01	50	1	00	1B	0F	03	34	00
	02	100		00	1C	0F	03	34	20
	03	200		00	1B	0F	03	34	01
	04	400	0.33	00	1B	0F	03	34	01
	05	150	0.5	00	1B	0F	03	34	01
	06	50	1	00	1B	0F	03	34	00
14	01	300	0.5	00	1B	0E	02	33	02
	02	100		00	1B	0F	03	34	00
	03	300		00	1B	0E	02	33	02
15	01	50	0.5	00	1B	0F	03	34	00
	02	100		00	1B	0F	03	34	00
	03	150		00	1B	0F	03	34	01
16	01	150	0.5	00	1B	0F	03	34	01
17	01	50	1	00	1B	0F	03	34	00
	02	100	0.5	00	1B	0F	03	34	00
	03	150		00	1B	0F	03	34	01
	04	50	1	00	1B	0F	03	34	00

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (12/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				0486	0487	048D	048F	0493	0494
04	01	50	1	55	05	46	66	20	55
	02	100		00	00	57	55	20	55
	03	200	0.33	33	03	46	66	30	55
	04	50	0.5	55	05	55	55	20	44
	05	100		00	00	46	55	20	54
	06	150		32	00	55	55	20	55
	07	50	1	55	05	46	66	20	55
05	01	10	0.5	02	00	46	66	20	55
	02	20		55	00	55	55	20	55
	03	40		32	00	46	55	20	55
06	01	10	0.5	02	00	46	66	20	55
	02	20		55	00	55	55	20	55
	03	40		32	00	46	55	20	55
07	01	50	1	55	05	46	66	20	55
	02	150	0.5	00	00	57	55	20	55
	03	200		00	00	57	55	20	55
	04	50	1	00	00	57	66	20	44
08	01	50	1	55	05	46	66	20	55
	02	150	0.5	00	00	57	55	20	55
	03	200		00	00	57	55	20	55
	04	50	1	00	00	57	66	20	44
09	01	50	1	55	05	46	66	20	55
	02	100		00	00	57	55	20	55
	03	200		00	00	57	55	20	55
	04	400	0.33	00	00	46	66	30	50
	05	150	0.5	00	00	57	55	20	55
	06	50	1	00	00	57	66	20	44
14	01	300	0.5	00	00	46	55	20	54
	02	100		00	00	46	55	20	54
	03	300		00	00	46	55	20	54
15	01	50	0.5	55	05	55	55	20	44
	02	100		00	00	46	55	20	54
	03	150		32	00	55	55	20	55
16	01	150	0.5	00	00	57	55	20	55
17	01	50	1	55	05	46	66	20	55
	02	100	0.5	00	00	46	55	20	54
	03	150		32	00	55	55	20	55
	04	50	1	00	00	57	66	20	44

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (13/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				04D9	04F6	04F8	0505	050F	0581
04	01	50	1	36	10	00	48	01	12
	02	100		36	10	00	48	02	15
	03	200	0.33	2F	10	30	48	02	10
	04	50	0.5	36	10	00	48	01	12
	05	100		36	04	38	45	02	17
	06	150		36	04	38	48	00	12
	07	50	1	36	10	00	48	01	12
05	01	10	0.5	36	04	38	48	00	05
	02	20		36	04	38	48	00	00
	03	40		36	04	38	48	01	1C
06	01	10	0.5	36	04	38	48	00	05
	02	20		36	04	38	48	00	00
	03	40		36	04	38	48	01	1C
07	01	50	1	36	10	00	48	01	12
	02	150	0.5	36	04	38	48	02	12
	03	200		36	04	38	48	02	16
	04	50	1	36	10	00	48	01	12
08	01	50	1	36	10	00	48	01	12
	02	150	0.5	36	04	38	48	02	12
	03	200		36	04	38	48	02	16
	04	50	1	36	10	00	48	01	12
09	01	50	1	36	10	00	48	01	12
	02	100		36	10	00	48	02	15
	03	200		36	10	00	48	02	13
	04	400	0.33	2F	10	30	48	02	11
	05	150	0.5	36	04	38	48	02	12
	06	50	1	36	10	00	48	01	12
14	01	300	0.5	36	04	38	48	02	15
	02	100		36	04	38	45	02	17
	03	300		36	04	38	48	02	15
15	01	50	0.5	36	10	00	48	01	12
	02	100		36	04	38	45	02	17
	03	150		36	04	38	48	00	12
16	01	150	0.5	36	04	38	48	02	12
17	01	50	1	36	10	00	48	01	12
	02	100	0.5	36	04	38	45	02	17
	03	150		36	04	38	48	00	12
	04	50	1	36	10	00	48	01	12

Table 3-2 Setting registers according to "phyFreqBandId" and "phyFSKOpeMode" (14/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				0582	058F	059F	05A0	05A1	05A2
04	01	50	1	26	FF	FF	3F	FF	3F
	02	100		1C	FF	FF	3F	FF	3F
	03	200	0.33	24	FF	FF	3F	FF	3F
	04	50	0.5	26	FF	FF	3F	FF	3F
	05	100		33	FF	FF	3F	FF	3F
	06	150		26	FF	FF	3F	FF	3F
	07	50	1	26	FF	FF	3F	FF	3F
05	01	10	0.5	30	FF	FF	3F	FF	3F
	02	20		30	FF	FF	3F	FF	3F
	03	40		2B	FF	FF	3F	FF	3F
06	01	10	0.5	30	FF	FF	3F	FF	3F
	02	20		30	FF	FF	3F	FF	3F
	03	40		2B	FF	FF	3F	FF	3F
07	01	50	1	26	FF	FF	3F	FF	3F
	02	150	0.5	26	FF	FF	3F	FF	3F
	03	200		2C	FF	FF	3F	FF	3F
	04	50	1	26	FF	FF	3F	FF	3F
08	01	50	1	26	FF	FF	3F	FF	3F
	02	150	0.5	26	FF	FF	3F	FF	3F
	03	200		2C	FF	FF	3F	FF	3F
	04	50	1	26	FF	FF	3F	FF	3F
09	01	50	1	26	FF	FF	3F	FF	3F
	02	100		1C	32	56	03	56	03
	03	200		18	FF	FF	3F	FF	3F
	04	400	0.33	25	FF	FF	3F	FF	3F
	05	150	0.5	26	FF	FF	3F	FF	3F
	06	50	1	26	FF	FF	3F	FF	3F
14	01	300	0.5	21	FF	FF	3F	FF	3F
	02	100		33	FF	FF	3F	FF	3F
	03	300		21	FF	FF	3F	FF	3F
15	01	50	0.5	26	FF	FF	3F	FF	3F
	02	100		33	FF	FF	3F	FF	3F
	03	150		26	FF	FF	3F	FF	3F
16	01	150	0.5	26	FF	FF	3F	FF	3F
17	01	50	1	26	FF	FF	3F	FF	3F
	02	100	0.5	33	FF	FF	3F	FF	3F
	03	150		26	FF	FF	3F	FF	3F
	04	50	1	26	FF	FF	3F	FF	3F

Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (15/15)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				00DC	00DD	00DC	00DD	00DC	00DD
04	01	50	1	10	0E	10	23	60	4E
	02	100		11	0E	10	23	60	4E
	03	200	0.33	10	0E	10	23	60	4E
	04	50	0.5	12	0E	F0	23	70	4E
	05	100		11	0E	10	23	60	4E
	06	150		11	0E	10	23	60	4E
	07	50	1	10	0E	10	23	60	4E
05	01	10	0.5	10	0E	10	23	60	4E
	02	20		11	0E	10	23	60	4E
	03	40		11	0E	10	23	60	4E
06	01	10	0.5	10	0E	10	23	60	4E
	02	20		11	0E	10	23	60	4E
	03	40		11	0E	10	23	60	4E
07	01	50	1	10	0E	10	23	60	4E
	02	150	0.5	10	0E	10	23	60	4E
	03	200		10	0E	10	23	60	4E
	04	50	1	12	0E	F0	23	70	4E
08	01	50	1	10	0E	10	23	60	4E
	02	150	0.5	10	0E	10	23	60	4E
	03	200		10	0E	10	23	60	4E
	04	50	1	12	0E	F0	23	70	4E
09	01	50	1	10	0E	10	23	60	4E
	02	100		11	0E	10	23	60	4E
	03	200		02	0E	40	23	60	4E
	04	400	0.33	02	0E	40	23	60	4E
	05	150	0.5	10	0E	10	23	60	4E
	06	50	1	12	0E	F0	23	70	4E
14	01	300	0.5	02	0E	40	23	60	4E
	02	100		11	0E	10	23	60	4E
	03	300		02	0E	40	23	60	4E
15	01	50	0.5	12	0E	F0	23	70	4E
	02	100		11	0E	10	23	60	4E
	03	150		11	0E	10	23	60	4E
16	01	150	0.5	10	0E	10	23	60	4E
17	01	50	1	11	0E	10	23	60	4E
	02	100	0.5	11	0E	10	23	60	4E
	03	150		11	0E	10	23	60	4E
	04	50	1	12	0E	F0	23	70	4E

3.3 ARIB STD - T108 mode setting

ARIB STD-T108 mode setting are shown in **Table 3-3**. Replace with registers in **Table 3-2** to **Table 3-3** when using the back off reception function in automatic CSMA-CA within the ARIB standard. However, channels requiring carrier sense of 5 msec cannot be used, only channels that require carrier sense of 128 usec can be used.

Table 3-3 ARIB STD-T108 mode setting

phyFreq BandId	phyFSK OpeMode	Country or region	Frequency band (MHz)	Modulation	Data rate (kbps)	Modulation index	Address (H)			
							00B2	00CE	00D0	00D1
09	01	Japan	920-928	2FSK/2GFSK	50	1	0E	0E	87	00
	02				100		1B	1B	D4	00
	03				200		31	31	4C	01
	04			4FSK/4GFSK	400	0.33	63	63	98	02
	05			2FSK/2GFSK	150	0.5	28	28	14	01
	06				50	1	0E	0E	87	00

4. Setting Registers optimized by Customer

These registers are set at the phase of "Setting Registers optimized by Customer" in **Figure 1-1**. In IDLE mode, set registers.

4.1 Register setting for loss of input signal level from antenna

According to loss of RFSW and SAW Filter, set registers in **Table 4-1**. RSSI and CCA / ED value can be corrected.

Table 4-1 Register setting for loss of input signal level from antenna (1/4)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	default (without loss)		
				Address (H)		
				0044		0483
				FEC: Enable	FEC: Disable	
04	01	50	1	8E	8E	3C
	02	100		95	95	3C
	03	200	0.33	95	95	3B
	04	50	0.5	8E	8E	02
	05	100		95	95	3C
	06	150		99	99	09
	07	50	1	8E	8E	3C
05	01	10	0.5	8B	8B	08
	02	20		8F	8F	08
	03	40		90	90	01
06	01	10	0.5	8B	8B	08
	02	20		8F	8F	08
	03	40		90	90	01
07	01	50	1	8E	8E	3C
	02	150	0.5	99	99	07
	03	200		98	98	07
	04	50	1	8E	8E	3C
08	01	50	1	8E	8E	3C
	02	150	0.5	99	99	07
	03	200		98	98	07
	04	50	1	8E	8E	3C
09	01	50	1	8E	8E	3C
	02	100		95	95	3C
	03	200		9A	9A	3B
	04	400	0.33	94	94	3B
	05	150	0.5	99	99	07
	06	50	1	8E	8E	3C
14	01	300	0.5	9C	9C	19
	02	100		95	95	3C
	03	300		9C	9C	19
15	01	50	0.5	8E	8E	02
	02	100		95	95	3C
	03	150		99	99	09
16	01	150	0.5	99	99	07

Table 4-1 Register setting for loss of input signal level from antenna (2/4)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	default (without loss)		
				Address (H)		
				0044		0483
17	01	50	1	8E	8E	3C
	02	100	0.5	95	95	3C
	03	150		99	99	09
	04	50	1	8E	8E	3C

Table 4-1 Register setting for loss of input signal level from antenna (3/4)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	RSSI / CCA / ED +1 dB (1 dB loss)			RSSI / CCA / ED +2 dB (2 dB loss)		
				Address (H)					
				0044		0483	0044		0483
				FEC: Enable	FEC: Disable		FEC: Enable	FEC: Disable	
04	01	50	1	8F	8F	3D	90	90	3E
	02	100		96	96	3D	97	97	3E
	03	200	0.33	96	96	3C	97	97	3D
	04	50	0.5	8F	8F	03	90	90	04
	05	100		96	96	3D	97	97	3E
	06	150		9A	9A	0A	9B	9B	0B
	07	50	1	8F	8F	3D	90	90	3E
05	01	10	0.5	8C	8C	09	8D	8D	0A
	02	20		90	90	09	91	91	0A
	03	40		91	91	02	92	92	03
06	01	10	0.5	8C	8C	09	8D	8D	0A
	02	20		90	90	09	91	91	0A
	03	40		91	91	02	92	92	03
07	01	50	1	8F	8F	3D	90	90	3E
	02	150	0.5	9A	9A	08	9B	9B	09
	03	200		99	99	08	9A	9A	09
	04	50	1	8F	8F	3D	90	90	3E
08	01	50	1	8F	8F	3D	90	90	3E
	02	150	0.5	9A	9A	08	9B	9B	09
	03	200		99	99	08	9A	9A	09
	04	50	1	8F	8F	3D	90	90	3E
09	01	50	1	8F	8F	3D	90	90	3E
	02	100		96	96	3D	97	97	3E
	03	200		9B	9B	3C	9C	9C	3D
	04	400	0.33	95	95	3C	96	96	3D
	05	150	0.5	9A	9A	08	9B	9B	09
	06	50	1	8F	8F	3D	90	90	3E
14	01	300	0.5	9D	9D	1A	9E	9E	1B
	02	100		96	96	3D	97	97	3E
	03	300		9D	9D	1A	9E	9E	1B
15	01	50	0.5	8F	8F	03	90	90	04
	02	100		96	96	3D	97	97	3E
	03	150		9A	9A	0A	9B	9B	0B
16	01	150	0.5	9A	9A	08	9B	9B	09
17	01	50	1	8F	8F	3D	90	90	3E
	02	100	0.5	96	96	3D	97	97	3E
	03	150		9A	9A	0A	9B	9B	0B
	04	50	1	8F	8F	3D	90	90	3E

Table 4-1 Register setting for loss of input signal level from antenna (4/4)

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	RSSI / CCA / ED +3 dB (3 dB loss)			RSSI / CCA / ED +4 dB (4 dB loss)		
				Address (H)					
				0044		0483	0044		0483
				FEC: Enable	FEC: Disable		FEC: Enable	FEC: Disable	
04	01	50	1	91	91	3F	92	92	00
	02	100		98	98	3F	99	99	00
	03	200	0.33	98	98	3E	99	99	3F
	04	50	0.5	91	91	05	92	92	06
	05	100		98	98	3F	99	99	00
	06	150		9C	9C	0C	9D	9D	0D
	01	50	1	91	91	3F	92	92	00
05	01	10	0.5	8E	8E	0B	8F	8F	0C
	02	20		92	92	0B	93	93	0C
	03	40		93	93	04	94	94	05
06	01	10	0.5	8E	8E	0B	8F	8F	0C
	02	20		92	92	0B	93	93	0C
	03	40		93	93	04	94	94	05
07	01	50	1	91	91	3F	92	92	00
	02	150	0.5	9C	9C	0A	9D	9D	0B
	03	200		9B	9B	0A	9C	9C	0B
	04	50	1	91	91	3F	92	92	00
08	01	50	1	91	91	3F	92	92	00
	02	150	0.5	9C	9C	0A	9D	9D	0B
	03	200		9B	9B	0A	9C	9C	0B
	04	50	1	91	91	3F	92	92	00
09	01	50	1	91	91	3F	92	92	00
	02	100		98	98	3F	99	99	00
	03	200		9D	9D	3E	9E	9E	3F
	04	400	0.33	97	97	3E	98	98	3F
	05	150	0.5	9C	9C	0A	9D	9D	0B
	06	50	1	91	91	3F	92	92	00
14	01	300	0.5	9F	9F	1C	A0	A0	1D
	02	100		98	98	3F	99	99	00
	03	300		9F	9F	1C	A0	A0	1D
15	01	50	0.5	91	91	05	92	92	06
	02	100		98	98	3F	99	99	00
	03	150		9C	9C	0C	9D	9D	0D
16	01	150	0.5	9C	9C	0A	9D	9D	0B
17	01	50	1	91	91	3F	92	92	00
	02	100	0.5	98	98	3F	99	99	00
	03	150		9C	9C	0C	9D	9D	0D
	04	50	1	91	91	3F	92	92	00

4.2 Preamble length setting register

Minimum preamble length registers are shown in **Table 4-2**. According to each condition, set a value equal to or larger than the value in **Table 4-2** to the preamble length setting register (address 00A7H, 00A6H). The value is the number of bytes.

2GFSK: 1 byte = 8 symbol periods = 8 bits

4GFSK: 1 byte = 4 symbol periods = 8 bits

When using antenna diversity mode, it is necessary to change “Antenna switch time register” and “Receive start timeout setting register” according to the preamble length. For details, refer to "4.3 changing the preamble length when receiving antenna diversity".

Table 4-2 Minimum preamble length setting register for each data rate (1/2)

phyFreq BandId	phyFSK OpeMode	Modulation	Data rate (kbps)	Modulation index	Normal mode	Antenna diversity mode		
					Preamble length setting register (BBPAMBL) 00A7H,00A6H	Preamble length setting register (BBPAMBL) 00A7H,00A6H	Antenna switch time register (BBANTDIVTIM) 00CFH,00CEH	Receive start timeout setting register (BBANTTIMOUT) 00D1H,00D0H
04	01	2FSK/ 2GFSK	50	1	0005	000A	000B	0078
	02		100		0004	0013	0016	00BB
	03	4FSK/ 4GFSK	200	0.33	000A	0011	0026	0156
	04	2FSK/ 2GFSK	50	0.5	0006	0015	0019	00CD
	05		100		0004	0011	0013	00AB
	06		150		0005	0014	0018	00C4
	07		50	1	0005	000A	000B	0078
05	01	2FSK/ 2GFSK	10	0.5	0004	000A	000B	0074
	02		20		0004	000E	0011	0092
	03		40		0004	0010	0013	00A4
06	01	2FSK/ 2GFSK	10	0.5	0004	000A	000B	0074
	02		20		0004	000E	0011	0092
	03		40		0004	0010	0013	00A4
07	01	2FSK/ 2GFSK	50	1	0005	000A	000B	0078
	02		150	0.5	0005	0014	0018	00C3
	03		200		0006	0017	001B	00DC
	04		50	1	0005	000A	000B	0078
08	01	2FSK/ 2GFSK	50	1	0005	000A	000B	0078
	02		150	0.5	0005	0014	0018	00C3
	03		200		0006	0017	001B	00DC
	04		50	1	0005	000A	000B	0078
09	01	2FSK/ 2GFSK	50	1	0004	000C	000E	0087
	02		100		0004	0016	001B	00D4
	03		200 Note		0006	0025 Note	0031 Note	014C Note
	04	4FSK/ 4GFSK	400 Note	0.33	000C	0025 Note	0063 Note	0298 Note
	05	2FSK/ 2GFSK	150	0.5	0005	001E	0028	0114
	06		50	1	0004	000C	000E	0087

Note The setting value differs when using the back off reception function in automatic CSMA-CA within ARIB standard. Set the value shown in **Table 4-3** Recommended minimum preamble length setting register value (ARIB STD-T108)”.

Table 4-2 Minimum preamble length setting register for each data rate (2/2)

phyFreq BandId	phyFSK OpeMode	Modulation	Data rate (kbps)	Modulation index	Normal mode	Antenna diversity mode		
					Preamble length setting register (BBPAMBL) 00A7H,00A6H	Preamble length setting register (BBPAMBL) 00A7H,00A6H	Antenna switch time register (BBANTDIVTIM) 00CFH,00CEH	Receive start timeout setting register (BBANTTIMOUT) 00D1H,00D0H
14	01	2FSK/ 2GFSK	300	0.5	0007	001C	0020	0108
	02		100		0004	0011	0013	00AB
	03		300		0007	001C	0020	0108
15	01	2FSK/ 2GFSK	50	0.5	0006	0015	0019	00CD
	02		100		0004	0011	0013	00AB
	03		150		0005	0014	0018	00C4
16	1	2FSK/ 2GFSK	150	0.5	0005	0014	0018	00C3
17	01	2FSK/ 2GFSK	50	1	0005	000A	000B	0078
	02		100	0.5	0004	0011	0013	00AB
	03		150		0005	0014	0018	00C4
	04		50	1	0005	000A	000B	0078

Table 4-3 Minimum preamble length setting register (ARIB STD-T108)

phyFreq BandId	phyFSK OpeMode	Modulation	Data rate (kbps)	Modulation index	Normal mode	Antenna diversity mode		
					Preamble length setting register (BBPAMBL) 00A7H,00A6H	Preamble length setting register (BBPAMBL) 00A7H,00A6H	Antenna switch time register (BBANTDIVTIM) 00CFH,00CEH	Receive start timeout setting register (BBANTTIMOUT) 00D1H,00D0H
9	03	2FSK/ 2GFSK	200	1	0006	0017	001B	00DC
	04	4FSK/ 4GFSK	400	0.33	000C	0017	0036	01B8

4.3 Changing the preamble length using antenna diversity mode

When changing the preamble length in antenna diversity mode, it is necessary to change "Receive start timeout setting register (BBANTTIMOUT)" of 00D1H, 00D0H address. The method of changing ""Receive start timeout setting register" is shown below.

< Method of calculation>

1. “DELAY OFFSET [usec]” is constant value corresponding to “phyFreqBandId/phyFSKOpeMode”. Select it from “Calculation example of preamble length at antenna / diversity reception” of **Table 4-4**.
2. Calculate “Required Timeout Time [usec]” from the preamble length and “DELAY OFFSET”.

2FSK/2GFSK Required Timeout Time=

(Preamble length [byte] + SFD [byte] + PHR [byte])*8*(1/Data Rate [kbps]) *1000+DELAY OFFSET [usec]

4FSK/4GFSK Required Timeout Time=

(Preamble length [byte] + SFD [byte] + PHR [byte])*8*(1/(Data Rate [kbps]/2)) *1000+DELAY OFFSET [usec]

3. Round up “Required Timeout Time” corresponding to ”Digit of Carry up“ in **Table 4-4**.
4. Receive start timeout setting register = ROUNDUP (Required Timeout Time[usec])/(1/Data Rate [bps])

Table 4-4 Calculation example of preamble length at antenna / diversity reception

phyFreq BandId	phyFSK OpeMode	Modulation	Data Rate (kbps)	Preamble length (byte)	SFD＋PHR (byte)	DELAY OFFSET (us)	Required Timeout Time (us)	ROUND UP Processing of Required Timeout time		Receive start timeout setting register (BBANTTIMOUT) 00D1H,00D0H
								Digit of Carry up NOTE	Result after ROUNDUP (us)	
04	01	2FSK/2GFSK	50	10	4	60.7	2300.7	2	2400	0078
	02		100	19	4	24.7	1864.7	1	1870	00BB
	03	4FSK/4GFSK	200	17	4	26.7	1706.7	1	1710	0156
	04	2FSK/2GFSK	50	21	4	60.7	4060.7	2	4100	00CD
	05		100	17	4	26.7	1706.7	1	1710	00AB
	06		150	20	4	22.7	1302.7	1	1310	00C4
	07		50	10	4	60.7	2300.7	2	2400	0078
05	01	2FSK/2GFSK	10	10	4	300.7	11500.7	2	11600	0074
	02		20	14	4	78.7	7278.7	2	7300	0092
	03		40	16	4	72.7	4072.7	2	4100	00A4
06	01	2FSK/2GFSK	10	10	4	300.7	11500.7	2	11600	0074
	02		20	14	4	78.7	7278.7	2	7300	0092
	03		40	16	4	72.7	4072.7	2	4100	00A4
07	01	2FSK/2GFSK	50	10	4	60.7	2300.7	2	2400	0078
	02		150	20	4	18.7	1298.7	1	1300	00C3
	03		200	23	4	14.7	1094.7	1	1100	00DC
	04		50	10	4	60.7	2300.7	2	2400	0078
08	01	2FSK/2GFSK	50	10	4	60.7	2300.7	2	2400	0078
	02		150	20	4	18.7	1298.7	1	1300	00C3
	03		200	23	4	14.7	1094.7	1	1100	00DC
	04		50	10	4	60.7	2300.7	2	2400	0078
09	01	2FSK/2GFSK	50	12	4	60.7	2620.7	2	2700	0087
	02		100	22	4	34.7	2114.7	1	2120	00D4
	03		200	23	4	19.7	1099.7	1	1100	00DC
			200	37	4	19.7	1659.7	1	1660	014C
	04	4FSK/4GFSK	400	23	4	17.7	1097.7	1	1100	01B8
			400	37	4	17.7	1657.7	1	1660	0298
	05	2FSK/2GFSK	150	30	4	24.7	1838.0	1	1840	0114
	06		50	12	4	60.7	2620.7	2	2700	0087
14	01	2FSK/2GFSK	300	28	4	22.7	876.0	1	880	0108
	02		100	17	4	26.7	1706.7	1	1710	00AB
	03		300	28	4	22.7	876.0	1	880	0108
15	01	2FSK/2GFSK	50	21	4	60.7	4060.7	2	4100	00CD
	02		100	17	4	26.7	1706.7	1	1710	00AB
	03		150	20	4	22.7	1302.7	1	1310	00C4
16	1	2FSK/2GFSK	150	20	4	18.7	1298.7	1	1300	00C3
17	01	2FSK/2GFSK	50	10	4	60.7	2300.7	2	2400	0078
	02		100	17	4	26.7	1706.7	1	1710	00AB
	03		150	20	4	22.7	1302.7	1	1310	00C4
	04		50	10	4	60.7	2300.7	2	2400	0078

Note ”1” means ”round up tens place”, ”2” means ”round up hundreds place”

4.4 Registers Setting of Reception Filter Bandwidth in ED/CCA mode

In registers setting of “3. Setting Registers fixed at each Data Rate”, ED/CCA value is calculated from analog filter output. This product can change reception filter bandwidth in ED/CCA mode by changing the calculated point from analog filter output to digital filter output. Reception Filter Bandwidth in ED/CCA mode are shown in **Table 4-5**. The bandwidth is a guideline and there is no guarantee.

When the digital filter output is used, automatic CSMA-CA function, back-off reception function, automatic ACK reception function at frame transmission cannot be used. However, automatic CSMA-CA function can be used only in 100 kbps mode. In addition, when the digital filter output is used, the frame reception function is invalid. Be sure to perform "3. Setting for each data rate" in IDLE mode before waiting for reception.

Table 4-5 Reception Filter Bandwidth in ED/CCA mode(1/2)

phyFreq BandId	phyFSK OpeMode	Modulation	Data rate (kbps)	Modulation index	Channel spacing (kHz)	Analog filter (kHz)	Digital filter Opt.1 (kHz)	Digital filter Opt.2 (kHz)
04	01	2FSK/2GFSK	50	1	200	450	300	400
	02		100		400	450	300	400
	03	4FSK/4GFSK	200	0.33	400	450	300	400
	04	2FSK/2GFSK	50	0.5	100	360	300	400
	05		100		100	450	300	400
	06		150		100	450	300	400
	07		50	1	200	450	300	400
05	01	2FSK/2GFSK	10	0.5	25	450	300	400
	02		20		50	450	300	400
	03		40		100	450	300	400
06	01	2FSK/2GFSK	10	0.5	25	450	300	400
	02		20		50	450	300	400
	03		40		100	450	300	400
07	01	2FSK/2GFSK	50	1	200	450	300	400
	02		150	0.5	400	450	300	400
	03		200		400	450	300	400
	04		50	1	200	360	300	400
08	01	2FSK/2GFSK	50	1	200	450	300	400
	02		150	0.5	400	450	300	400
	03		200		400	450	300	400
	04		50	1	200	360	300	400
09	01	2FSK/2GFSK	50	1	200	450	300	400
	02		100		200	450	300	400
	03		200		200	700	300	400
	04	4FSK/4GFSK	400	0.33	200	700	300	400
	05	2FSK/2GFSK	150	0.5	200	450	300	400
	06		50	1	200	360	300	400
14	01	2FSK/2GFSK	300	0.5	200	700	300	400
	02		100		200	450	300	400
	03		300		600	700	300	400
15	01	2FSK/2GFSK	50	0.5	100	360	300	400
	02		100		100	450	300	400
	03		150		100	450	300	400
16	1	2FSK/2GFSK	150	0.5	200	450	300	400

Table 4-5 Reception Filter Bandwidth in ED/CCA mode(2/2)

phyFreq BandId	phyFSK OpeMode	Modulation	Data rate (kbps)	Modulation index	Channel spacing (kHz)	Analog filter (kHz)	Digital filter Opt.1 (kHz)	Digital filter Opt.2 (kHz)
17	01	2FSK/2GFSK	50	1	250	450	300	400
	02		100	0.5	250	450	300	400
	03		150		250	450	300	400
	04		50	1	250	360	300	400

4.4.1 Setting common register of reception Filter Bandwidth in ED/CCA mode

Setting common register of reception Filter Bandwidth in ED/CCA mode is shown in **Table 4-6.** These registers do not depend on data rate.

Before executing CCA/ED, set registers of **Table 4-6** and CCA time register (CCATIME). CCA time register (CCATIME) is 00B3H, 00B2H address.

Table 4-6 Common register of reception Filter Bandwidth in ED/CCA mode

Order of setting	Register address (H)	Setting value (H)		Order of setting	Register address (H)	Setting value (H)	
		Digital filter Opt.1 (H)	Digital filter Opt.2 (H)			Digital filter Opt.1 (H)	Digital filter Opt.2 (H)
1	00AC	F0	F0	15	047D	0F	0F
2	00AD	00	00	16	047E	03	03
3	00B1	42	42	17	047F	34	34
4	0423	01	01	18	0486	66	66
5	042D	14	14	19	0487	06	06
6	0430	02	02	20	0488	81	81
7	0432	08	06	21	048D	57	57
8	0436	08	06	22	048F	55	55
9	043A	BE	BE	23	0493	20	20
10	0471	05	05	24	0494	55	55
11	0472	05	05	25	0505	41	41
12	0473	FB	FB	26	00B2 Note	1F	1F
13	0474	A6	A6	27	00B3 Note	00	00
14	047C	1C	1C	-	-	-	-

Note These values differ in ARIB standard.
For details, refer to "4.4.2 Setting CCA time register in ARIB STD T-108“.

4.4.2 CCA time register in ARIB STD – T108

To use this option and execute CCA within ARIB standards, set the CCA time register (CCATIME) as the register of "ARIB Corresponding CCA Time Register Setting" in **Table 4-7**.

Table 4-7 4.4.2 CCA time register in ARIB STD – T108

phyFreq BandId	phyFSK OpeMode	Modulation	Data rate (kbps)	Modulation index	CCA time register (CCATIME) 00B3H, 00B2H					
					CCATIME 128usec			CCATIME 5000usec		
					Analog filter (H)	Digital filter Opt.1 (H)	Digital filter Opt.2 (H)	Analog filter (H)	Digital filter Opt.1 (H)	Digital filter Opt.2 (H)
09	01	2FSK/ 2GFSK	50	1	001C	0031	0031	0110	0220	0220
	02		100		0024	0031	0031	0209	0220	0220
	03		200		0037	0031	0031	0407	0220	0220
	04	4FSK/ 4GFSK	400	0.33	006E	0031	0031	080D	0220	0220
	05	2FSK/ 2GFSK	150	0.5	002E	0031	0031	0309	0220	0220
	06		50	1	001C	0031	0031	0110	0220	0220

5. Correction function of RF Transceiver

These registers are set at the phase of "Correction function of RF Transceiver" in **Figure 1-1**. The correction method differs between RL78/G1H and RAA604S00.

5.1 RL78/G1H

For RL78 / G1H, read the ROM data in MCU and set the registers shown in **Table 5-1** in order.

Table 5-1 RL78/G1H RF transceiver correction register

phyFreq BandId	phyFSK OpeMode	Data rate (kbps)	Modulation index	Address (H)					
				00DC	00DD	00DC	00DD	00DC	00DD
04	01	50	1	Data1	01	Data2	02	Data3	0B
	02	100		Data1	01	Data2	02	Data3	0B
	03	200	0.33	Data1	01	Data2	02	Data3	0B
	04	50	0.5	Data1	01	Data2	02	Data3	0B
	05	100		Data1	01	Data2	02	Data3	0B
	06	150		Data1	01	Data2	02	Data3	0B
	07	50	1	Data1	01	Data2	02	Data3	0B
05	01	10	0.5	Data1	01	Data2	02	Data3	0B
	02	20		Data1	01	Data2	02	Data3	0B
	03	40		Data1	01	Data2	02	Data3	0B
06	01	10	0.5	Data1	01	Data2	02	Data3	0B
	02	20		Data1	01	Data2	02	Data3	0B
	03	40		Data1	01	Data2	02	Data3	0B
07	01	50	1	Data1	01	Data2	02	Data3	0B
	02	150	0.5	Data1	01	Data2	02	Data3	0B
	03	200		Data1	01	Data2	02	Data3	0B
	04	50	1	Data1	01	Data2	02	Data3	0B
08	01	50	1	Data1	01	Data2	02	Data3	0B
	02	150	0.5	Data1	01	Data2	02	Data3	0B
	03	200		Data1	01	Data2	02	Data3	0B
	04	50	1	Data1	01	Data2	02	Data3	0B
09	01	50	1	Data1	01	Data2	02	Data3	0B
	02	100		Data1	01	Data2	02	Data3	0B
	03	200		Data1	01	Data2	02	Data4	0B
	04	400	0.33	Data1	01	Data2	02	Data4	0B
	05	150	0.5	Data1	01	Data2	02	Data3	0B
	06	50	1	Data1	01	Data2	02	Data3	0B
14	01	300	0.5	Data1	01	Data2	02	Data4	0B
	02	100		Data1	01	Data2	02	Data3	0B
	03	300		Data1	01	Data2	02	Data4	0B
15	01	50	0.5	Data1	01	Data2	02	Data3	0B
	02	100		Data1	01	Data2	02	Data3	0B
	03	150		Data1	01	Data2	02	Data3	0B
16	01	150	0.5	Data1	01	Data2	02	Data3	0B
17	01	50	1	Data1	01	Data2	02	Data3	0B
	02	100	0.5	Data1	01	Data2	02	Data3	0B
	03	150		Data1	01	Data2	02	Data3	0B
	04	50	1	Data1	01	Data2	02	Data3	0B

Data1: Value saved to MCU address EFFECH.

Data2: Value saved to MCU address EFFEDH.

Data3: Value saved to MCU address EFFEEH.

Data4: Value saved to MCU address EFFEFH.

5.2 RAA604S00

For RAA604S00, when WAKE UP or change the data rate, be sure to perform calibration in IDLE according to the following procedure example.

Example of Procedure for Calibration

1. Set 07H to RF start register (BBRFCON).
2. Set 00H to initial setting register 10 (RFINI10) and 00H to initial setting register 11 (RFINI11) continuously.
3. Set 01H to Calibration register (BBCAL).

   Calibration starts.
4. Wait for calibration completion interrupt.
5. Set 03H to RF start register (BBRFCON).

6. Setting for transmission

This section shows settings required in transmission.

6.1 RF frequency setting for transmission

Set BBFREQ register of 00ABH-00A8H address according to RF frequency of transmission. If the frequency setting is integer times N (864 MHz, 912 MHz) of XIN frequency (48 MHz), the transmission character will degrade. If the frequency matches the following condition, it must be changed to other frequency. N is integer, h is modulation index in 2-level FSK and three times of modulation index in 4-level FSK. R is symbol rate.

48MHz *N - (M2+1.5*R) ≦ Use prohibited transmission frequency [Hz] ≦ 48MHz *N + (M2+1.5*R)

Here, M2=3*R*(1+h)

For channel setting examples including prohibition, see "9. Example of channel setting".

.

6.2 Transmission Output Power Setting

The relationship between each data rate and "Transmission Gain Set Table Number" is shown in **Table 6-1**. According to **Table 6-1**, select "Transmission Gain Set Table Number". The relationship between the transmission output power and "Gain Set" are shown in **Figure 6-1** – **Figure 6-4** and **Table 6-2** – **Table 6-5**. The values may vary depending on the load conditions and samples. The combination of the coarse control and fine control enables the wider range of the transmission output power.

Table 6-1 Relationship between each data rate and Transmission Gain Set Table Number

phyFreq BandId	phyFSK OpeMode	Country or region	Frequency band (MHz)	Modulation	Data rate (kbps)	Modulation index	Chan Center Freq0 (MHz)	Transmission Gain Set Table Number
04	01	Europe	863-870	2FSK/2GFSK	50	1	863.125	002
	02				100		863.225	
	03			4FSK/4GFSK	200	0.33	863.225	
	04			2FSK/2GFSK	50	0.5	863.1	
	05				100		863.1	
	06				150		863.1	
	07				50	1	863.1	
05	01	US (FCC Part 90)	896-901	2FSK/2GFSK	10	0.5	896.0125	003
	02				20		896.025	
	03				40		896.05	
06	01	US (FCC Part 24)	901-902	2FSK/2GFSK	10	0.5	901.0125	003
	02				20		901.025	
	03				40		901.05	
07	01	US	902-928	2FSK/2GFSK	50	1	902.2	003
	02				150	0.5	902.4	
	03				200		902.4	
	04				50	1	902.2	
08	01	Korea	917-923.5	2FSK/2GFSK	50	1	917.1	004
	02				150	0.5	917.3	
	03				200		917.3	
	04				50	1	917.1	
09	01	Japan	920-928	2FSK/2GFSK	50	1	920.6	001
	02				100		920.7	
	03				200		920.8	
	04			4FSK/4GFSK	400	0.33	920.8	
	05			2FSK/2GFSK	150	0.5	920.7	
	06				50	1	920.6	001
14	01	Other	902-928	2FSK/2GFSK	300	0.5	920.8	001
	02				100		902.2	
	03				300		902.6	
15	01	Europe	870-876	2FSK/2GFSK	50	0.5	870.1	002
	02				100		870.1	
	03				150		870.1	
16	1	Australia/Malaysia /New Zealand/ Philippines	902-928	2FSK/2GFSK	150	0.5	902.2	003
17	01	China	920-925	2FSK/2GFSK	50	1	920.625	001
	02				100	0.5	920.625	
	03				150		920.625	
	04				50	1		

6.2.1 Transmission Gain Set Table Number = 001

Figure 6-1 Transmission Gain Set Table Number = 001

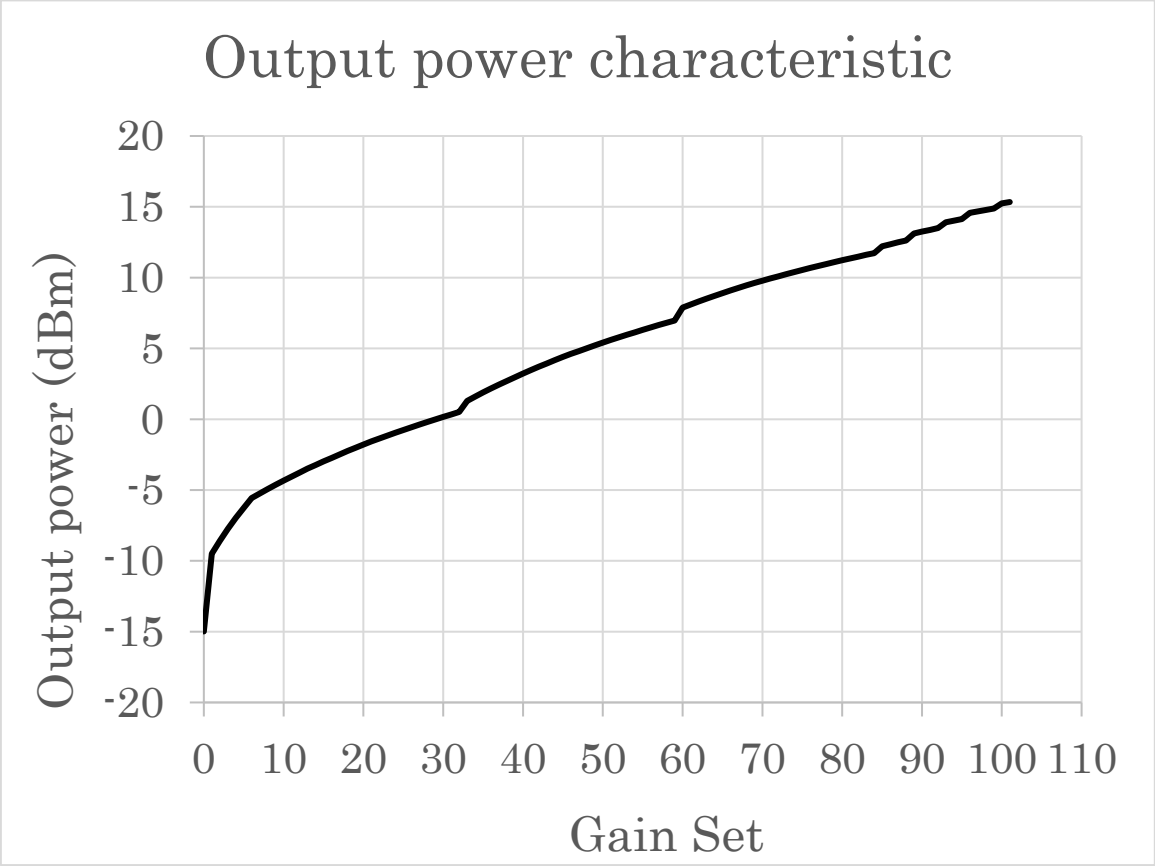


Table 6-2 Gain Set Register (Transmission Gain Set Table Number = 001) (1/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
0	3	00	00	19	00	25	0	1A
1	3	00	00	19	1F	25	6	1A
2	3	01	00	19	1F	25	6	1A
3	3	02	00	19	1F	25	6	1A
4	3	03	00	19	1F	25	6	1A
5	3	04	00	19	1F	25	6	1A
6	3	05	00	19	1F	25	6	1A
7	3	06	00	19	1F	25	6	1A
8	3	07	00	19	1F	25	6	1A
9	3	08	00	19	1F	25	6	1A
10	3	09	00	19	1F	25	6	1A
11	3	0A	00	19	1F	25	6	1A
12	3	0B	00	19	1F	25	6	1A
13	3	0C	00	19	1F	25	6	1A
14	3	0D	00	19	1F	25	6	1A
15	3	0E	00	19	1F	25	6	1A

Table 6-2 Gain Set Register (Transmission Gain Set Table Number = 001) (2/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
16	3	0F	00	19	1F	25	6	1A
17	3	10	00	19	1F	25	6	1A
18	3	11	00	19	1F	25	6	1A
19	3	12	00	19	1F	25	6	1A
20	3	13	00	19	1F	25	6	1A
21	3	14	00	19	1F	25	6	1A
22	2	15	00	19	1F	25	6	1A
23	2	16	00	19	1F	25	6	1A
24	2	17	00	19	1F	25	6	1A
25	2	18	00	19	1F	25	6	1A
26	2	19	00	19	1F	25	6	1A
27	2	1A	00	19	1F	25	6	1A
28	2	1B	00	19	1F	25	6	1A
29	2	1C	00	19	1F	25	6	1A
30	2	1D	00	19	1F	25	6	1A
31	2	1E	00	19	1F	25	6	1A
32	2	1F	00	19	1F	25	6	1A
33	3	05	01	19	15	25	6	1A
34	3	06	01	19	15	25	6	1A
35	3	07	01	19	15	25	6	1A
36	3	08	01	19	15	25	6	1A
37	3	09	01	19	15	25	6	1A
38	3	0A	01	19	15	25	6	1A
39	3	0B	01	19	15	25	6	1A
40	3	0C	01	19	15	25	6	1A
41	3	0D	01	19	15	25	6	1A
42	3	0E	01	19	15	25	6	1A
43	3	0F	01	19	15	25	6	1A
44	3	10	01	19	15	25	6	1A
45	3	11	01	19	15	25	6	1A
46	3	12	01	19	15	25	6	1A
47	3	13	01	19	15	25	6	1A
48	2	14	01	19	15	25	6	1A
49	2	15	01	19	15	25	6	1A
50	2	16	01	19	15	25	6	1A
51	2	17	01	19	15	25	6	1A
52	2	18	01	19	15	25	6	1A
53	2	19	01	19	15	25	6	1A
54	2	1A	01	19	15	25	6	1A

Table 6-2 Gain Set Register (Transmission Gain Set Table Number = 001) (3/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
55	2	1B	01	19	15	25	6	1A
56	2	1C	01	19	15	25	6	1A
57	2	1D	01	19	15	25	6	1A
58	2	1E	01	19	15	25	6	1A
59	2	1F	01	19	15	25	6	1A
60	3	07	02	19	1F	25	6	1A
61	3	08	02	19	1F	25	6	1A
62	3	09	02	19	1F	25	6	1A
63	3	0A	02	19	1F	25	6	1A
64	3	0B	02	19	1F	25	6	1A
65	3	0C	02	19	1F	25	6	1A
66	3	0D	02	19	1F	25	6	1A
67	3	0E	02	19	1F	25	6	1A
68	3	0F	02	19	1F	25	6	1A
69	3	10	02	19	1F	25	6	1A
70	3	11	02	19	1F	25	6	1A
71	3	12	02	19	1F	25	6	1A
72	3	13	02	19	1F	25	6	1A
73	3	14	02	19	1F	25	6	1A
74	2	15	02	19	1F	25	6	1A
75	2	16	02	19	1F	25	6	1A
76	2	17	02	19	1F	25	6	1A
77	2	18	02	19	1F	25	6	1A
78	2	19	02	19	1F	25	6	1A
79	2	1A	02	19	1F	25	6	1A
80	2	1B	02	19	1F	25	6	1A
81	2	1C	02	19	1F	25	6	1A
82	2	1D	02	19	1F	25	6	1A
83	2	1E	02	19	1F	25	6	1A
84	2	1F	02	19	1F	25	6	1A
85	3	11	04	19	16	25	6	1A
86	3	12	04	19	16	25	6	1A
87	3	13	04	19	16	25	6	1A
88	3	14	04	19	16	25	6	1A
89	3	11	06	19	16	25	6	1A
90	3	12	06	19	16	25	6	1A
91	3	13	06	19	16	25	6	1A
92	3	14	06	19	16	25	6	1A
93	2	15	07	19	15	25	6	1A

Table 6-2 Gain Set Register (Transmission Gain Set Table Number = 001) (4/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
94	2	16	07	19	15	25	6	1A
95	2	17	07	19	15	25	6	1A
96	1	1B	07	19	15	25	6	1A
97	1	1C	07	19	15	25	6	1A
98	1	1D	07	19	15	25	6	1A
99	1	1E	07	19	15	25	6	1A
100	1	1E	08	19	11	25	6	1A
101	1	1F	08	19	11	25	6	1A

Note When the power supply voltage is in the range of 2.4 V ≥ VDDRF ≥ 1.8 V, please use Gain Set 92 or less.

6.2.2 Transmission Gain Set Table Number = 002

Figure 6-2 Transmission Gain Set Table Number = 002

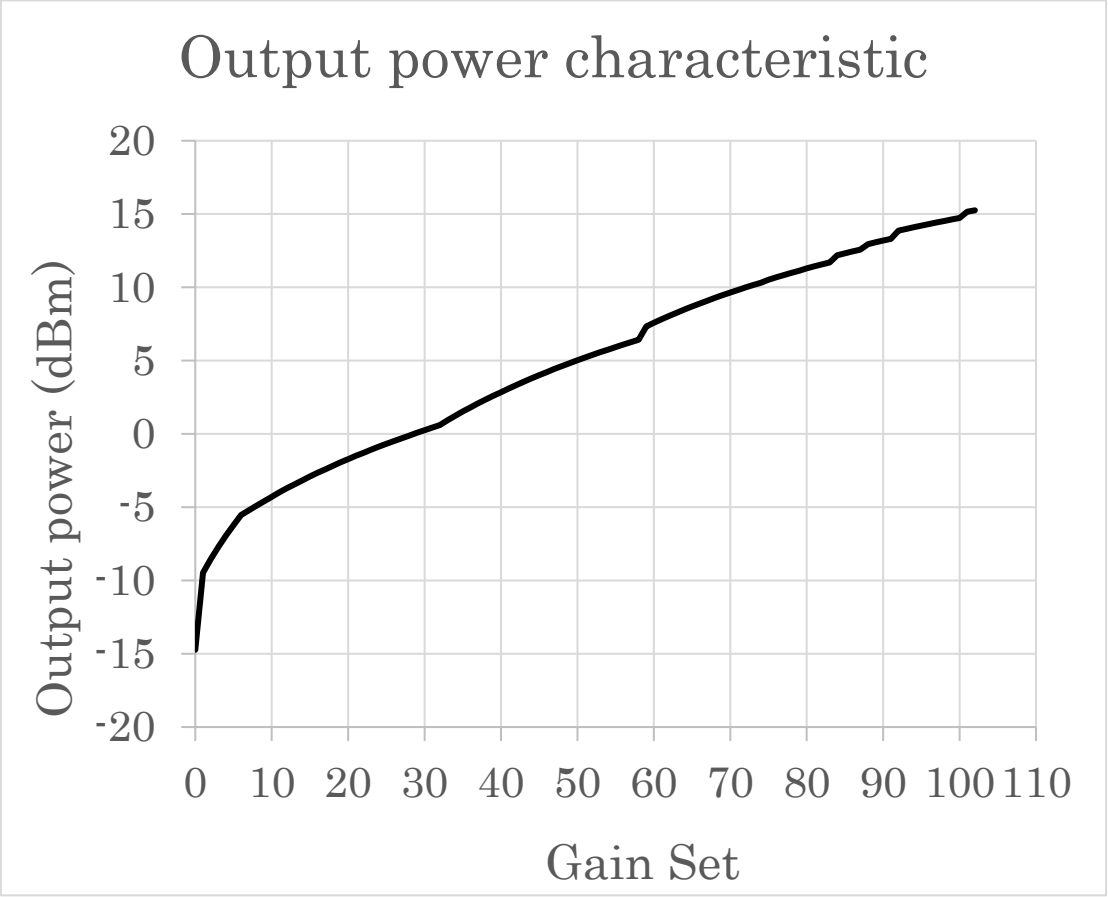


Table 6-3 Gain Set Register (Transmission Gain Set Table Number = 002) (1/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
0	3	00	00	19	00	25	0	1A
1	3	00	00	19	1F	25	7	1A
2	3	01	00	19	1F	25	7	1A
3	3	02	00	19	1F	25	7	1A
4	3	03	00	19	1F	25	7	1A
5	3	04	00	19	1F	25	7	1A
6	3	05	00	19	1F	25	7	1A
7	3	06	00	19	1F	25	7	1A
8	3	07	00	19	1F	25	7	1A
9	3	08	00	19	1F	25	7	1A
10	3	09	00	19	1F	25	7	1A
11	3	0A	00	19	1F	25	7	1A
12	3	0B	00	19	1F	25	7	1A
13	3	0C	00	19	1F	25	7	1A
14	3	0D	00	19	1F	25	7	1A
15	3	0E	00	19	1F	25	7	1A

Table 6-3 Gain Set Register (Transmission Gain Set Table Number = 002) (2/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
16	3	0F	00	19	1F	25	7	1A
17	3	10	00	19	1F	25	7	1A
18	3	11	00	19	1F	25	7	1A
19	3	12	00	19	1F	25	7	1A
20	3	13	00	19	1F	25	7	1A
21	3	14	00	19	1F	25	7	1A
22	2	15	00	19	1F	25	7	1A
23	2	16	00	19	1F	25	7	1A
24	2	17	00	19	1F	25	7	1A
25	2	18	00	19	1F	25	7	1A
26	2	19	00	19	1F	25	7	1A
27	2	1A	00	19	1F	25	7	1A
28	2	1B	00	19	1F	25	7	1A
29	2	1C	00	19	1F	25	7	1A
30	2	1D	00	19	1F	25	7	1A
31	2	1E	00	19	1F	25	7	1A
32	2	1F	00	19	1F	25	7	1A
33	3	06	01	19	0F	25	7	1A
34	3	07	01	19	0F	25	7	1A
35	3	08	01	19	0F	25	7	1A
36	3	09	01	19	0F	25	7	1A
37	3	0A	01	19	0F	25	7	1A
38	3	0B	01	19	0F	25	7	1A
39	3	0C	01	19	0F	25	7	1A
40	3	0D	01	19	0F	25	7	1A
41	3	0E	01	19	0F	25	7	1A
42	3	0F	01	19	0F	25	7	1A
43	3	10	01	19	0F	25	7	1A
44	3	11	01	19	0F	25	7	1A
45	3	12	01	19	0F	25	7	1A
46	3	13	01	19	0F	25	7	1A
47	3	14	01	19	0F	25	7	1A
48	2	15	01	19	0F	25	7	1A
49	2	16	01	19	0F	25	7	1A
50	2	17	01	19	0F	25	7	1A
51	2	18	01	19	0F	25	7	1A
52	2	19	01	19	0F	25	7	1A
53	2	1A	01	19	0F	25	7	1A
54	2	1B	01	19	0F	25	7	1A

Table 6-3 Gain Set Register (Transmission Gain Set Table Number = 002) (3/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
55	2	1C	01	19	0F	25	7	1A
56	2	1D	01	19	0F	25	7	1A
57	2	1E	01	19	0F	25	7	1A
58	2	1F	01	19	0F	25	7	1A
59	3	05	02	19	1B	25	7	1A
60	3	06	02	19	1B	25	7	1A
61	3	07	02	19	1B	25	7	1A
62	3	08	02	19	1B	25	7	1A
63	3	09	02	19	1B	25	7	1A
64	3	0A	02	19	1B	25	7	1A
65	3	0B	02	19	1B	25	7	1A
66	3	0C	02	19	1B	25	7	1A
67	3	0D	02	19	1B	25	7	1A
68	3	0E	02	19	1B	25	7	1A
69	3	0F	02	19	1B	25	7	1A
70	3	10	02	19	1B	25	7	1A
71	3	11	02	19	1B	25	7	1A
72	3	12	02	19	1B	25	7	1A
73	3	13	02	19	1B	25	7	1A
74	3	14	02	19	1B	25	7	1A
75	3	0C	03	19	1F	25	7	1A
76	3	0D	03	19	1F	25	7	1A
77	3	0E	03	19	1F	25	7	1A
78	3	0F	03	19	1F	25	7	1A
79	3	10	03	19	1F	25	7	1A
80	3	11	03	19	1F	25	7	1A
81	3	12	03	19	1F	25	7	1A
82	3	13	03	19	1F	25	7	1A
83	3	14	03	19	1F	25	7	1A
84	3	11	04	19	1B	25	7	1A
85	3	12	04	19	1B	25	7	1A
86	3	13	04	19	1B	25	7	1A
87	3	14	04	19	1B	25	7	1A
88	3	11	06	19	1B	25	7	1A
89	3	12	06	19	1B	25	7	1A
90	3	13	06	19	1B	25	7	1A
91	3	14	06	19	1B	25	7	1A
92	1	14	07	19	16	25	7	1A
93	1	15	07	19	16	25	7	1A

Table 6-3 Gain Set Register (Transmission Gain Set Table Number = 002) (4/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
94	1	16	07	19	16	25	7	1A
95	1	17	07	19	16	25	7	1A
96	1	18	07	19	16	25	7	1A
97	1	19	07	19	16	25	7	1A
98	1	1A	07	19	16	25	7	1A
99	1	1B	07	19	16	25	7	1A
100	1	1C	07	19	16	25	7	1A
101	1	1E	08	19	15	25	7	1A
102	1	1F	08	19	15	25	7	1A

Note When the power supply voltage is in the range of 2.4 V ≥ VDDRF ≥ 1.8 V, please use Gain Set 91 or less.

6.2.3 Transmission Gain Set Table Number = 003

Figure 6-3 Transmission Gain Set Table Number = 003

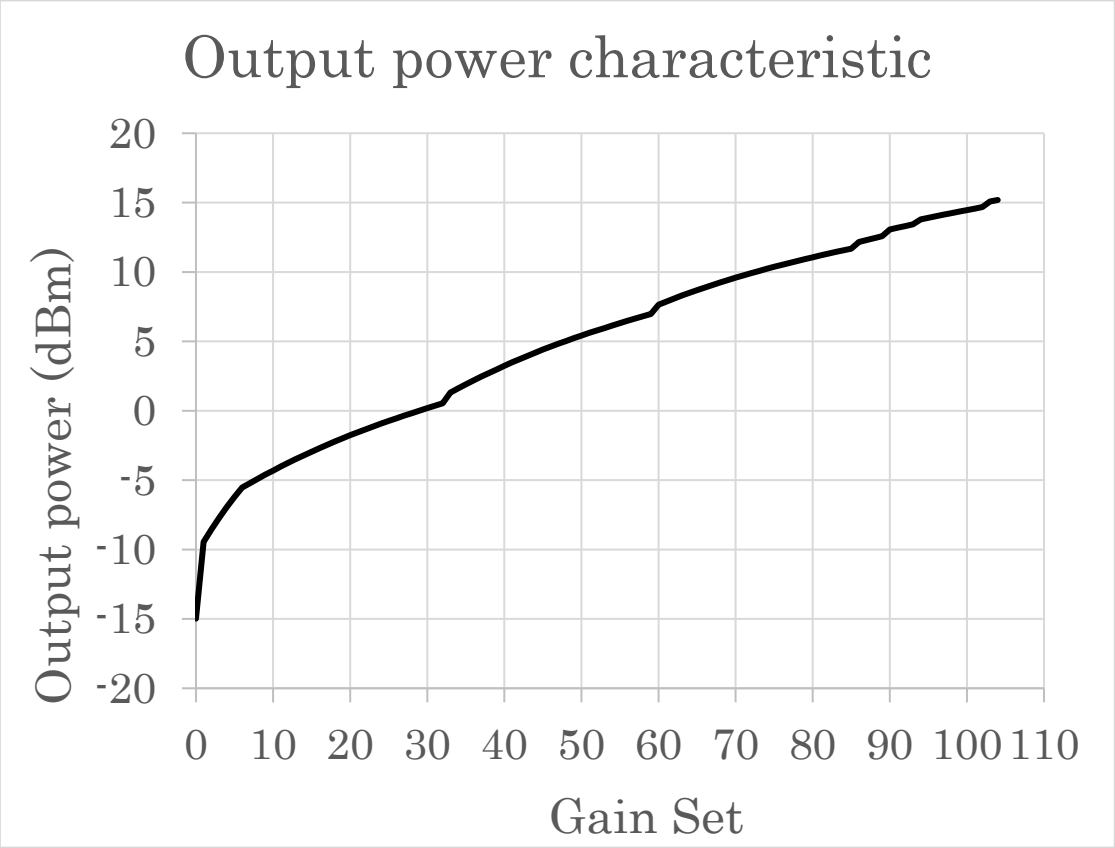


Table 6-4 Gain Set Register (Transmission Gain Set Table Number = 003) (1/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
0	3	00	00	19	00	25	0	1A
1	3	00	00	19	1F	25	6	1A
2	3	01	00	19	1F	25	6	1A
3	3	02	00	19	1F	25	6	1A
4	3	03	00	19	1F	25	6	1A
5	3	04	00	19	1F	25	6	1A
6	3	05	00	19	1F	25	6	1A
7	3	06	00	19	1F	25	6	1A
8	3	07	00	19	1F	25	6	1A
9	3	08	00	19	1F	25	6	1A
10	3	09	00	19	1F	25	6	1A
11	3	0A	00	19	1F	25	6	1A
12	3	0B	00	19	1F	25	6	1A
13	3	0C	00	19	1F	25	6	1A
14	3	0D	00	19	1F	25	6	1A
15	3	0E	00	19	1F	25	6	1A

Table 6-4 Gain Set Register (Transmission Gain Set Table Number = 003) (2/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
16	3	0F	00	19	1F	25	6	1A
17	3	10	00	19	1F	25	6	1A
18	3	11	00	19	1F	25	6	1A
19	3	12	00	19	1F	25	6	1A
20	3	13	00	19	1F	25	6	1A
21	3	14	00	19	1F	25	6	1A
22	2	15	00	19	1F	25	6	1A
23	2	16	00	19	1F	25	6	1A
24	2	17	00	19	1F	25	6	1A
25	2	18	00	19	1F	25	6	1A
26	2	19	00	19	1F	25	6	1A
27	2	1A	00	19	1F	25	6	1A
28	2	1B	00	19	1F	25	6	1A
29	2	1C	00	19	1F	25	6	1A
30	2	1D	00	19	1F	25	6	1A
31	2	1E	00	19	1F	25	6	1A
32	2	1F	00	19	1F	25	6	1A
33	3	05	01	19	15	25	6	1A
34	3	06	01	19	15	25	6	1A
35	3	07	01	19	15	25	6	1A
36	3	08	01	19	15	25	6	1A
37	3	09	01	19	15	25	6	1A
38	3	0A	01	19	15	25	6	1A
39	3	0B	01	19	15	25	6	1A
40	3	0C	01	19	15	25	6	1A
41	3	0D	01	19	15	25	6	1A
42	3	0E	01	19	15	25	6	1A
43	3	0F	01	19	15	25	6	1A
44	3	10	01	19	15	25	6	1A
45	3	11	01	19	15	25	6	1A
46	3	12	01	19	15	25	6	1A
47	3	13	01	19	15	25	6	1A
48	3	14	01	19	15	25	6	1A
49	2	15	01	19	15	25	6	1A
50	2	16	01	19	15	25	6	1A
51	2	17	01	19	15	25	6	1A
52	2	18	01	19	15	25	6	1A
53	2	19	01	19	15	25	6	1A
54	2	1A	01	19	15	25	6	1A

Table 6-4 Gain Set Register (Transmission Gain Set Table Number = 003) (3/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
55	2	1B	01	19	15	25	6	1A
56	2	1C	01	19	15	25	6	1A
57	2	1D	01	19	15	25	6	1A
58	2	1E	01	19	15	25	6	1A
59	2	1F	01	19	15	25	6	1A
60	3	06	02	19	1F	25	6	1A
61	3	07	02	19	1F	25	6	1A
62	3	08	02	19	1F	25	6	1A
63	3	09	02	19	1F	25	6	1A
64	3	0A	02	19	1F	25	6	1A
65	3	0B	02	19	1F	25	6	1A
66	3	0C	02	19	1F	25	6	1A
67	3	0D	02	19	1F	25	6	1A
68	3	0E	02	19	1F	25	6	1A
69	3	0F	02	19	1F	25	6	1A
70	3	10	02	19	1F	25	6	1A
71	3	11	02	19	1F	25	6	1A
72	3	12	02	19	1F	25	6	1A
73	3	13	02	19	1F	25	6	1A
74	3	14	02	19	1F	25	6	1A
75	2	15	02	19	1F	25	6	1A
76	2	16	02	19	1F	25	6	1A
77	2	17	02	19	1F	25	6	1A
78	2	18	02	19	1F	25	6	1A
79	2	19	02	19	1F	25	6	1A
80	2	1A	02	19	1F	25	6	1A
81	2	1B	02	19	1F	25	6	1A
82	2	1C	02	19	1F	25	6	1A
83	2	1D	02	19	1F	25	6	1A
84	2	1E	02	19	1F	25	6	1A
85	2	1F	02	19	1F	25	6	1A
86	3	11	04	19	16	25	6	1A
87	3	12	04	19	16	25	6	1A
88	3	13	04	19	16	25	6	1A
89	3	14	04	19	16	25	6	1A
90	3	11	06	19	16	25	6	1A
91	3	12	06	19	16	25	6	1A
92	3	13	06	19	16	25	6	1A
93	3	14	06	19	16	25	6	1A

Table 6-4 Gain Set Register (Transmission Gain Set Table Number = 003) (4/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
94	1	14	07	19	14	25	6	1A
95	1	15	07	19	14	25	6	1A
96	1	16	07	19	14	25	6	1A
97	1	17	07	19	14	25	6	1A
98	1	18	07	19	14	25	6	1A
99	1	19	07	19	14	25	6	1A
100	1	1A	07	19	14	25	6	1A
101	1	1B	07	19	14	25	6	1A
102	1	1C	07	19	14	25	6	1A
103	1	1D	08	19	11	25	6	1A
104	1	1E	08	19	11	25	6	1A

Note When the power supply voltage is in the range of 2.4 V ≥ VDDRF ≥ 1.8 V, please use Gain Set 93 or less.

6.2.4 Transmission Gain Set Table Number = 004

Figure 6-4 Transmission Gain Set Table Number = 004

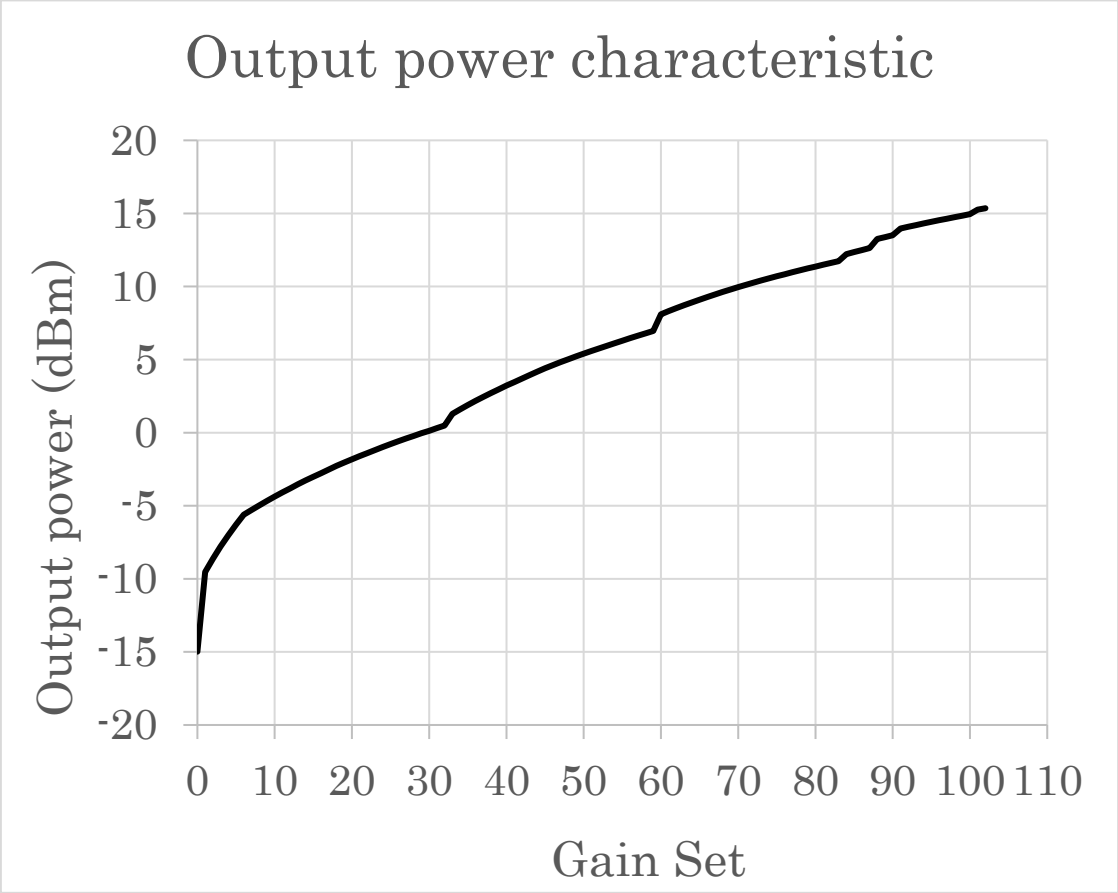


Table 6-5 Gain Set Register (Transmission Gain Set Table Number = 004) (1/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
0	3	00	00	19	00	25	0	1A
1	3	00	00	19	1F	25	6	1A
2	3	01	00	19	1F	25	6	1A
3	3	02	00	19	1F	25	6	1A
4	3	03	00	19	1F	25	6	1A
5	3	04	00	19	1F	25	6	1A
6	3	05	00	19	1F	25	6	1A
7	3	06	00	19	1F	25	6	1A
8	3	07	00	19	1F	25	6	1A
9	3	08	00	19	1F	25	6	1A
10	3	09	00	19	1F	25	6	1A
11	3	0A	00	19	1F	25	6	1A
12	3	0B	00	19	1F	25	6	1A
13	3	0C	00	19	1F	25	6	1A
14	3	0D	00	19	1F	25	6	1A
15	3	0E	00	19	1F	25	6	1A

Table 6-5 Gain Set Register (Transmission Gain Set Table Number = 004) (2/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
16	3	0F	00	19	1F	25	6	1A
17	3	10	00	19	1F	25	6	1A
18	3	11	00	19	1F	25	6	1A
19	3	12	00	19	1F	25	6	1A
20	3	13	00	19	1F	25	6	1A
21	3	14	00	19	1F	25	6	1A
22	2	15	00	19	1F	25	6	1A
23	2	16	00	19	1F	25	6	1A
24	2	17	00	19	1F	25	6	1A
25	2	18	00	19	1F	25	6	1A
26	2	19	00	19	1F	25	6	1A
27	2	1A	00	19	1F	25	6	1A
28	2	1B	00	19	1F	25	6	1A
29	2	1C	00	19	1F	25	6	1A
30	2	1D	00	19	1F	25	6	1A
31	2	1E	00	19	1F	25	6	1A
32	2	1F	00	19	1F	25	6	1A
33	3	05	01	19	15	25	6	1A
34	3	06	01	19	15	25	6	1A
35	3	07	01	19	15	25	6	1A
36	3	08	01	19	15	25	6	1A
37	3	09	01	19	15	25	6	1A
38	3	0A	01	19	15	25	6	1A
39	3	0B	01	19	15	25	6	1A
40	3	0C	01	19	15	25	6	1A
41	3	0D	01	19	15	25	6	1A
42	3	0E	01	19	15	25	6	1A
43	3	0F	01	19	15	25	6	1A
44	3	10	01	19	15	25	6	1A
45	3	11	01	19	15	25	6	1A
46	3	12	01	19	15	25	6	1A
47	3	13	01	19	15	25	6	1A
48	3	14	01	19	15	25	6	1A
49	2	15	01	19	15	25	6	1A
50	2	16	01	19	15	25	6	1A
51	2	17	01	19	15	25	6	1A
52	2	18	01	19	15	25	6	1A
53	2	19	01	19	15	25	6	1A
54	2	1A	01	19	15	25	6	1A

Table 6-5 Gain Set Register (Transmission Gain Set Table Number = 004) (3/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
55	2	1B	01	19	15	25	6	1A
56	2	1C	01	19	15	25	6	1A
57	2	1D	01	19	15	25	6	1A
58	2	1E	01	19	15	25	6	1A
59	2	1F	01	19	15	25	6	1A
60	3	08	02	19	1F	25	6	1A
61	3	09	02	19	1F	25	6	1A
62	3	0A	02	19	1F	25	6	1A
63	3	0B	02	19	1F	25	6	1A
64	3	0C	02	19	1F	25	6	1A
65	3	0D	02	19	1F	25	6	1A
66	3	0E	02	19	1F	25	6	1A
67	3	0F	02	19	1F	25	6	1A
68	3	10	02	19	1F	25	6	1A
69	3	11	02	19	1F	25	6	1A
70	3	12	02	19	1F	25	6	1A
71	3	13	02	19	1F	25	6	1A
72	3	14	02	19	1F	25	6	1A
73	2	15	02	19	1F	25	6	1A
74	2	16	02	19	1F	25	6	1A
75	2	17	02	19	1F	25	6	1A
76	2	18	02	19	1F	25	6	1A
77	2	19	02	19	1F	25	6	1A
78	2	1A	02	19	1F	25	6	1A
79	2	1B	02	19	1F	25	6	1A
80	2	1C	02	19	1F	25	6	1A
81	2	1D	02	19	1F	25	6	1A
82	2	1E	02	19	1F	25	6	1A
83	2	1F	02	19	1F	25	6	1A
84	3	11	04	19	16	25	6	1A
85	3	12	04	19	16	25	6	1A
86	3	13	04	19	16	25	6	1A
87	3	14	04	19	16	25	6	1A
88	3	12	06	19	16	25	6	1A
89	3	13	06	19	16	25	6	1A
90	3	14	06	19	16	25	6	1A
91	1	15	07	19	14	25	6	1A
92	1	16	07	19	14	25	6	1A
93	1	17	07	19	14	25	6	1A

Table 6-5 Gain Set Register (Transmission Gain Set Table Number = 004) (4/4)

Gain Set	Address(H)							
	0090	0092	00DC	00DD	00DC	00DD	00DC	00DD
	Bit [1:0]	Bit [4:0]	Bit [4:0]	Bit [7:0]	Bit [4:0]	Bit [7:0]	Bit [7:4]	Bit [7:0]
94	1	18	07	19	14	25	6	1A
95	1	19	07	19	14	25	6	1A
96	1	1A	07	19	14	25	6	1A
97	1	1B	07	19	14	25	6	1A
98	1	1C	07	19	14	25	6	1A
99	1	1D	07	19	14	25	6	1A
100	1	1E	07	19	14	25	6	1A
101	1	1E	08	19	11	25	6	1A
102	1	1F	08	19	11	25	6	1A

Note When the power supply voltage is in the range of 2.4 V ≥ VDDRF ≥ 1.8 V, please use Gain Set 90 or less.

7. Setting for reception

This section shows settings required in reception.

7.1 RF frequency setting for reception

Set BBFREQ register of 00ABH-00A8H address according to RF frequency of reception. Set the data [7:0] of 0095H address according to “Relationship between each data rate” and “RF Frequency Setting table Number” of **Table 7-1**. For details, see "7.2 Data setting at address 0095H at reception".

At transmission, data [7: 0] at address 0095H is set to 08H.

For channel setting examples including prohibition, see "9. Example of channel setting"

7.2 Data setting at address 0095H at reception

The relationship between each data rate and RF Frequency Setting table Number are shown in **Table 7-1**. According to **Table 7-1**, set ”RF Frequency Setting table Number”. The relationship between ”RF frequency set” and Data[7:0] of address 0095H shown in **Table 7-2** – **Table 7-18**.

Table 7-1 Relationship between each data rate and RF Frequency Setting table Number(1/2)

phyFreq BandId	phyFSK OpeMode	Country or region	Frequency band (MHz)	Modulation	Data rate (kbps)	Modulation index	Channel spacing (kHz)	RF Frequency Setting Table Number
04	01	Europe	863-870	2FSK/2GFSK	50	1	200	001
	02				100		400	002
	03			4FSK/4GFSK	200	0.33	400	003
	04			2FSK/2GFSK	50	0.5	100	002
	05				100		100	002
	06				150		100	003
	07				50	1	200	001
05	01	US (FCC Part 90)	896-901	2FSK/2GFSK	10	0.5	25	004
	02				20		50	004
	03				40		100	005
06	01	US (FCC Part 24)	901-902	2FSK/2GFSK	10	0.5	25	006
	02				20		50	006
	03				40		100	007
07	01	US	902-928	2FSK/2GFSK	50	1	200	008
	02				150	0.5	400	009
	03				200		400	010
	04				50	1	200	008
08	01	Korea	917-923.5	2FSK/2GFSK	50	1	200	011
	02				150	0.5	400	012
	03				200		400	012
	04				50	1	200	011
09	01	Japan	920-928	2FSK/2GFSK	50	1	200	013
	02				100		200	000
	03				200		200	014
	04			4FSK/4GFSK	400	0.33	200	015
	05			2FSK/2GFSK	150	0.5	200	013
	06				50	1	200	013
14	01	Other	902-928	2FSK/2GFSK	300	0.5	200	014
	02				100		200	008
	03				300		600	016
15	01	Europe	870-876	2FSK/2GFSK	50	0.5	100	017
	02				100		100	017
	03				150		100	017
16	1	Australia/Malaysia /New Zealand/ Philippines	902-928	2FSK/2GFSK	150	0.5	200	008

Table 7-1 Relationship between each data rate and RF Frequency Setting table Number(2/2)

phyFreq BandId	phyFSK OpeMode	Country or region	Frequency band (MHz)	Modulation	Data rate (kbps)	Modulation index	Channel spacing (kHz)	RF Frequency Setting Table Number
17	01	China	920-925	2FSK/2GFSK	50	1	250	008
	02				100	0.5	250	008
	03				150		250	008
	04				50	1	250	008

7.2.1 RF Frequency Setting Table Number = 000

Table 7-2 RF Frequency Set (RF Frequency Setting Table Number = 000)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	920.0000	920.3125	68
2	920.3250	920.7625	08
3	920.7750	920.9250	28
4	920.9375	921.3375	48
5	921.3500	921.4125	68
6	921.4250	921.7250	08
7	921.7375	922.4500	28
8	922.4625	923.5750	08
9	923.5875	923.6750	28
10	923.6875	924.1625	68
11	924.1750	924.4875	48
12	924.5000	924.6000	08
13	924.6125	925.2125	48
14	925.2250	926.3125	28
15	926.3250	927.5375	08
16	927.5500	927.9250	68
17	927.9375	928.0000	48

7.2.2 RF Frequency Setting Table Number = 001

Table 7-3 RF Frequency Set (RF Frequency Setting Table Number = 001)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	863.0000	863.1875	08
2	863.2000	864.8000	Prohibited
3	864.8125	865.8750	08
4	865.8875	866.1250	48
5	866.1375	866.4500	28
6	866.4625	867.4875	08
7	867.5000	867.7500	68
8	867.7625	868.0125	48
9	868.0250	868.3125	28
10	868.3250	868.7500	08
11	868.7625	869.1625	48
12	869.1750	869.3000	68
13	869.3125	869.8250	48
14	869.8375	870.0000	28

7.2.3 RF Frequency Setting Table Number = 002

Table 7-4 RF Frequency Set (RF Frequency Setting Table Number = 002)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	863.0000	863.1875	08
2	863.2000	864.8000	Prohibited
3	864.8125	865.8750	08
4	865.8875	866.1375	48
5	866.1500	866.4500	28
6	866.4625	867.5375	08
7	867.5500	868.0375	68
8	868.0500	868.3625	28
9	868.3750	868.6625	08
10	868.6750	868.7500	68
11	868.7625	869.8250	48
12	869.8375	870.0000	28

7.2.4 RF Frequency Setting Table Number = 003

Table 7-5 RF Frequency Set (RF Frequency Setting Table Number = 003)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	863.0000	863.1875	08
2	863.2000	864.8000	Prohibited
3	864.8125	865.8750	08
4	865.8875	866.1375	48
5	866.1500	866.4500	28
6	866.4625	867.5375	08
7	867.5500	868.0250	68
8	868.0375	868.1000	48
9	868.1125	868.3625	28
10	868.3750	868.6625	08
11	868.6750	869.0375	68
12	869.0500	869.8250	48
13	869.8375	870.0000	28

7.2.5 RF Frequency Setting Table Number = 004

Table 7-6 RF Frequency Set (RF Frequency Setting Table Number = 004)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	896.0000	896.3000	68
2	896.3125	896.6625	08
3	896.6750	896.8875	28
4	896.9000	897.2375	48
5	897.2500	898.4500	68
6	898.4625	899.5375	08
7	899.5500	900.4500	28
8	900.4625	900.6625	08
9	900.6750	901.0000	48

7.2.6 RF Frequency Setting Table Number = 005

Table 7-7 RF Frequency Set (RF Frequency Setting Table Number = 005)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	896.0000	896.3750	68
2	896.3875	896.7625	08
3	896.7750	896.8875	28
4	896.9000	897.3375	48
5	897.3500	898.4500	68
6	898.4625	899.5375	08
7	899.5500	900.4625	28
8	900.4750	900.7625	08
9	900.7750	901.0000	48

7.2.7 RF Frequency Setting Table Number = 006

Table 7-8 RF Frequency Set (RF Frequency Setting Table Number = 006)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	901.0000	901.2625	48
2	901.2750	901.5375	28
3	901.5500	901.7125	08
4	901.7250	902.0000	68

7.2.8 RF Frequency Setting Table Number = 007

Table 7-9 RF Frequency Set (RF Frequency Setting Table Number = 007)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	901.0000	901.2625	48
2	901.2750	901.4125	68
3	901.4250	901.5375	08
4	901.5500	901.6875	28
5	901.7000	902.0000	68

7.2.9 RF Frequency Setting Table Number = 008

Table 7-10 RF Frequency Set (RF Frequency Setting Table Number = 008) (1/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	902.0000	902.1625	68
2	902.1750	902.3625	48
3	902.3750	903.6625	08
4	903.6750	903.9125	68
5	903.9250	904.0375	48
6	904.0500	904.2875	28
7	904.3000	904.6875	08
8	904.7000	905.1125	68
9	905.1250	905.3875	28
10	905.4000	905.5875	08
11	905.6000	905.7875	48
12	905.8000	906.0375	08
13	906.0500	906.1625	28
14	906.1750	906.4500	68
15	906.4625	907.5375	08
16	907.5500	907.8500	28
17	907.8625	908.1125	48
18	908.1250	908.4000	68
19	908.4125	908.6500	08
20	908.6625	909.0750	28
21	909.0875	909.2125	48
22	909.2250	909.4125	68
23	909.4250	911.1875	08
24	911.2000	913.5000	Prohibited
25	913.5125	913.8750	08
26	913.8875	914.1375	48
27	914.1500	914.4500	28
28	914.4625	915.5375	08
29	915.5500	915.8750	68
30	915.8875	916.1375	48
31	916.1500	916.4500	28
32	916.4625	916.7625	08
33	916.7750	916.8500	68

Table 7-10 RF Frequency Set (RF Frequency Setting Table Number = 008) (2/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
34	916.8625	917.1125	48
35	917.1250	917.3000	28
36	917.3125	917.4125	48
37	917.4250	917.5375	08
38	917.5500	917.8250	48
39	917.8375	918.4500	28
40	918.4625	919.6625	08
41	919.6750	919.9750	28
42	919.9875	920.4000	68
43	920.4125	920.7625	08
44	920.7750	920.9250	28
45	920.9375	921.2125	48
46	921.2250	921.4125	68
47	921.4250	921.7250	08
48	921.7375	922.4500	28
49	922.4625	923.5375	08
50	923.5500	923.7250	28
51	923.7375	924.1625	68
52	924.1750	924.4500	48
53	924.4625	924.6500	08
54	924.6625	925.2125	48
55	925.2250	926.3125	28
56	926.3250	926.3625	48
57	926.3750	927.5375	08
58	927.5500	927.8750	68
59	927.8875	928.0000	48

7.2.10 RF Frequency Setting Table Number = 009

Table 7-11 RF Frequency Set (RF Frequency Setting Table Number = 009) (1/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	902.0000	902.2375	68
2	902.2500	902.4500	28
3	902.4625	903.6250	08
4	903.6375	903.7500	68
5	903.7625	904.0375	48
6	904.0500	904.3125	28
7	904.3250	904.6625	08
8	904.6750	905.0625	68
9	905.0750	905.3125	28
10	905.3250	905.9375	08
11	905.9500	906.1625	28
12	906.1750	906.4500	68
13	906.4625	907.5375	08
14	907.5500	907.8500	28
15	907.8625	908.2375	48
16	908.2500	908.3000	68
17	908.3125	908.6625	08
18	908.6750	908.9500	28
19	908.9625	909.3125	68
20	909.3250	909.6250	08
21	909.6375	909.8875	28
22	909.9000	910.1125	48
23	910.1250	911.1875	08
24	911.2000	913.5000	Prohibited
25	913.5125	913.8750	08
26	913.8875	914.1375	48
27	914.1500	914.4500	28
28	914.4625	915.5375	08
29	915.5500	916.0250	68
30	916.0500	916.3375	28
31	916.3500	916.6625	08
32	916.6750	916.7500	68
33	916.7625	917.0125	48

Table 7-11 RF Frequency Set (RF Frequency Setting Table Number = 009) (2/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
34	917.0250	917.3125	28
35	917.3250	917.5375	08
36	917.5500	917.8250	48
37	917.8375	918.4500	28
38	918.4625	919.6625	08
39	919.6750	919.9750	28
40	919.9875	920.3000	68
41	920.3125	920.6625	08
42	920.6750	920.9250	28
43	920.9375	921.2375	48
44	921.2500	921.3125	68
45	921.3250	921.6250	08
46	921.6375	922.4500	28
47	922.4625	923.6625	08
48	923.6750	923.8250	48
49	923.8375	924.1625	68
50	924.1750	925.2250	48
51	925.2375	925.3125	28
52	925.3250	925.5375	08
53	925.5500	926.3125	28
54	926.3250	927.5375	08
55	927.5500	928.0000	68

7.2.11 RF Frequency Setting Table Number = 010

Table 7-12 RF Frequency Set (RF Frequency Setting Table Number = 010) (1/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	902.0000	902.2375	68
2	902.2500	902.4500	28
3	902.4625	903.6625	08
4	903.6750	903.9375	68
5	903.9500	904.0125	48
6	904.0250	904.3125	28
7	904.3250	904.6625	08
8	904.6750	905.0625	68
9	905.0750	905.3125	28
10	905.3250	905.9375	08
11	905.9500	906.1625	28
12	906.1750	906.4500	68
13	906.4625	907.5375	08
14	907.5500	907.8500	28
15	907.8625	908.1125	48
16	908.1250	908.3000	68
17	908.3125	908.6625	08
18	908.6750	908.9750	28
19	908.9875	909.2375	48
20	909.2500	909.3125	68
21	909.3250	909.6250	08
22	909.6375	909.8875	28
23	909.9000	910.1125	48
24	910.1250	911.1875	08
25	911.2000	913.5000	Prohibited
26	913.5125	913.8750	08
27	913.8875	914.1375	48
28	914.1500	914.4500	28
29	914.4625	915.5375	08
30	915.5500	916.0250	68
31	916.0375	916.1000	48
32	916.1125	916.3625	28
33	916.3750	916.6625	08

Table 7-12 RF Frequency Set (RF Frequency Setting Table Number = 010) (2/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
34	916.6750	916.7500	68
35	916.7625	916.9750	48
36	916.9875	917.0125	68
37	917.0250	917.3125	28
38	917.3250	917.5375	08
39	917.5500	917.8250	48
40	917.8375	918.4500	28
41	918.4625	919.6625	08
42	919.6750	919.9750	28
43	919.9875	920.3000	68
44	920.3125	920.6625	08
45	920.6750	920.9250	28
46	920.9375	921.2375	48
47	921.2500	921.4000	68
48	921.4125	921.6250	08
49	921.6375	922.4500	28
50	922.4625	923.5375	08
51	923.5500	923.7500	28
52	923.7625	923.8250	48
53	923.8375	924.1625	68
54	924.1750	924.4500	48
55	924.4625	924.6625	08
56	924.6750	925.2250	48
57	925.2375	925.3125	28
58	925.3250	925.5375	08
59	925.5500	926.3875	28
60	926.4000	927.6250	08
61	927.6375	928.0000	68

7.2.12 RF Frequency Setting Table Number = 011

Table 7-13 RF Frequency Set (RF Frequency Setting Table Number = 011)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	917.0000	917.8250	48
2	917.8375	918.4500	28
3	918.4625	919.6500	08
4	919.6625	919.9500	28
5	919.9625	920.3375	68
6	920.3500	920.7625	08
7	920.7750	920.9875	28
8	921.0000	921.2125	48
9	921.2250	921.4625	68
10	921.4750	923.5000	08

7.2.13 RF Frequency Setting Table Number = 012

Table 7-14 RF Frequency Set (RF Frequency Setting Table Number = 012)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	917.0000	917.8250	48
2	917.8375	918.4500	28
3	918.4625	919.6625	08
4	919.6750	919.9750	28
5	919.9875	920.3000	68
6	920.3125	920.6625	08
7	920.6750	920.9375	28
8	920.9500	921.2000	48
9	921.2125	921.3750	68
10	921.3875	923.5000	08

7.2.14 RF Frequency Setting Table Number = 013

Table 7-15 RF Frequency Set (RF Frequency Setting Table Number = 013)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	920.0000	920.3125	68
2	920.3250	920.7625	08
3	920.7750	920.9750	28
4	920.9875	921.2125	48
5	921.2250	921.4125	68
6	921.4250	921.7250	08
7	921.7375	922.4500	28
8	922.4625	923.5375	08
9	923.5500	923.7250	28
10	923.7375	923.8500	48
11	923.8625	924.1625	68
12	924.1750	924.4500	48
13	924.4625	924.6500	08
14	924.6625	925.2125	48
15	925.2250	926.3125	28
16	926.3250	926.3625	48
17	926.3750	927.5375	08
18	927.5500	927.8750	68
19	927.8875	928.0000	48

7.2.15 RF Frequency Setting Table Number = 014

Table 7-16 RF Frequency Set (RF Frequency Setting Table Number = 014)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	920.0000	920.3750	68
2	920.3875	921.0875	08
3	921.1000	921.4625	48
4	921.4750	921.8375	68
5	921.8500	922.1500	08
6	922.1625	922.3750	28
7	922.3875	923.2875	08
8	923.3000	923.7750	68
9	923.7875	923.9750	28
10	923.9875	924.3875	68
11	924.4000	924.7000	48
12	924.7125	924.9250	08
13	924.9375	926.0625	28
14	926.0750	926.4125	08
15	926.4250	926.6125	48
16	926.6250	927.2875	08
17	927.3000	928.0000	68

7.2.16 RF Frequency Setting Table Number = 015

Table 7-17 RF Frequency Set (RF Frequency Setting Table Number = 015)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	920.0000	920.3500	68
2	920.3625	921.1375	08
3	921.1500	921.5750	48
4	921.5875	921.8750	68
5	921.8875	922.1500	08
6	922.1625	922.3750	28
7	922.3875	923.2875	08
8	923.3000	924.3875	68
9	924.4000	925.1375	48
10	925.1500	926.0625	28
11	926.0750	927.2875	08
12	927.3000	928.0000	68

7.2.17 RF Frequency Setting Table Number = 016

Table 7-18 RF Frequency Set (RF Frequency Setting Table Number = 016) (1/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	902.0000	902.7000	68
2	902.7125	903.6375	08
3	903.6500	903.9125	68
4	903.9250	904.5625	48
5	904.5750	905.1375	08
6	905.1500	905.4875	68
7	905.5000	905.5375	48
8	905.5500	905.7625	28
9	905.7750	906.2875	48
10	906.3000	906.7000	68
11	906.7125	907.2875	08
12	907.3000	907.6000	28
13	907.6125	908.2125	48
14	908.2250	908.7000	68
15	908.7125	909.1375	08
16	909.1500	909.4500	28
17	909.4625	909.7125	48
18	909.7250	909.8625	68
19	909.8750	911.3875	08
20	911.4000	914.2000	Prohibited
21	914.2125	914.3875	48
22	914.4000	914.7000	28
23	914.7125	915.2875	08
24	915.3000	916.0125	68
25	916.0250	916.3875	48
26	916.4000	916.7000	28
27	916.7125	917.1375	08
28	917.1500	917.5125	68
29	917.5250	918.0750	48
30	918.0875	918.7000	28
31	918.7125	919.5500	08
32	919.5625	920.0000	48
33	920.0125	920.3375	68

Table 7-18 RF Frequency Set (RF Frequency Setting Table Number = 016) (2/2)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
34	920.3500	921.1375	08
35	921.1500	921.5750	48
36	921.5875	921.8750	68
37	921.8875	922.1500	08
38	922.1625	922.3750	28
39	922.3875	923.2875	08
40	923.3000	923.4250	48
41	923.4375	924.3875	68
42	924.4000	925.1375	48
43	925.1500	926.0625	28
44	926.0750	926.2375	68
45	926.2500	927.2875	08
46	927.3000	927.7750	68
47	927.7875	928.0000	48

7.2.18 RF Frequency Setting Table Number = 017

Table 7-19 RF Frequency Set (RF Frequency Setting Table Number = 017)

RF frequency set	Lower limit RF frequency [MHz]	Upper limit RF frequency [MHz]	0095H address Bit [7:0] Setting value (H)
1	870.0000	871.5375	08
2	871.5500	872.2750	68
3	872.2875	873.8250	48
4	873.8375	875.5375	08
5	875.5500	875.7500	28
6	875.7625	876.0000	68

8. Setting for shortening the time from CCA executed once to transmission finish

By using the automatic CSMA-CA and making the following settings, it can be done in a shorter time than performing CCA execution → result determination → transmission individually.

Set the following registers.

1. CSMA control register 3 (BBCSMACON3) address 003EH: 00H
2. Back off period register 2 (BBBOFFPROD2) address 0069H: 00H
3. Back off cycle register (BOFFPERIOD) address 004BH, 004AH: Depending on the setting value of the CCA time register, the set value to the back-off cycle register will change. Use the calculation formula shown in **Table 8-1** as a guide. Round up to the decimal point of the calculation result.

Table 8-1 Back off cycle register setting value for each modulation

Modulation	Data rate (kbps)	CCA time register (00B3H, 00B2H) setting value	Back off cycle register (004BH, 004AH) setting value
2FSK/2GFSK	10	—	10H
	20	—	10H
	40	11H or less	(CCAtime+12H)/2
		12H or more	10H
	50	15H or less	(CCAtime+16H)/2
		16H or more	10H
	100	27H or less	(CCAtime+28H)/2
		28H or more	10H
	150	39H or less	(CCAtime+3AH)/2
		3AH or more	10H
	200	4CH or less	(CCAtime+4DH)/2
		4DH or more	10H
	300	6DH or less	(CCAtime+6EH)/2
		6EH or more	10H
4FSK/4GFSK	200	4CH or less	(CCAtime+4DH)/2
		4DH or more	10H
	400	95H or less	(CCAtime+96H)/2
		96H or more	10H

Note Round up to the decimal point of the calculation result.

9. Example of channel setting

Example of channel setting and TX and RX prohibit channel are shown in **Table 9-1**~**9-18**. “O” is available channel and ”X” is prohibit channel. For setting registers detail, refer to "6.1 RF frequency setting for transmission" and "7.1 RF frequency setting for reception".

Table 9-1 RF Frequency Set (PhyFreqBandID=4, phyFSKmode=4, 2GFSK, 50kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	863.1	O	O	23	865.4	O	O	46	867.7	O	O
1	863.2	O	X	24	865.5	O	O	47	867.8	O	O
2	863.3	O	X	25	865.6	O	O	48	867.9	O	O
3	863.4	O	X	26	865.7	O	O	49	868.0	O	O
4	863.5	O	X	27	865.8	O	O	50	868.1	O	O
5	863.6	O	X	28	865.9	O	O	51	868.2	O	O
6	863.7	X	X	29	866.0	O	O	52	868.3	O	O
7	863.8	X	X	30	866.1	O	O	53	868.4	O	O
8	863.9	X	X	31	866.2	O	O	54	868.5	O	O
9	864.0	X	X	32	866.3	O	O	55	868.6	O	O
10	864.1	X	X	33	866.4	O	O	56	868.7	O	O
11	864.2	X	X	34	866.5	O	O	57	868.8	O	O
12	864.3	X	X	35	866.6	O	O	58	868.9	O	O
13	864.4	O	X	36	866.7	O	O	59	869.0	O	O
14	864.5	O	X	37	866.8	O	O	60	869.1	O	O
15	864.6	O	X	38	866.9	O	O	61	869.2	O	O
16	864.7	O	X	39	867.0	O	O	62	869.3	O	O
17	864.8	O	X	40	867.1	O	O	63	869.4	O	O
18	864.9	O	O	41	867.2	O	O	64	869.5	O	O
19	865.0	O	O	42	867.3	O	O	65	869.6	O	O
20	865.1	O	O	43	867.4	O	O	66	869.7	O	O
21	865.2	O	O	44	867.5	O	O	67	869.8	O	O
22	865.3	O	O	45	867.6	O	O	68	869.9	O	O

Table 9-2 RF Frequency Set (PhyFreqBandID=4, phyFSKmode=5, 2GFSK, 100kbps, m=0.5) (1/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	863.1	O	O	12	865.5	O	O	24	867.9	O	O
1	863.3	O	X	13	865.7	O	O	25	868.1	O	O
2	863.5	X	X	14	865.9	O	O	26	868.3	O	O
3	863.7	X	X	15	866.1	O	O	27	868.5	O	O
4	863.9	X	X	16	866.3	O	O	28	868.7	O	O
5	864.1	X	X	17	866.5	O	O	29	868.9	O	O
6	864.3	X	X	18	866.7	O	O	30	869.1	O	O
7	864.5	X	X	19	866.9	O	O	31	869.3	O	O

Table 9-2 RF Frequency Set (PhyFreqBandID=4, phyFSKmode=5, 2GFSK, 100kbps, m=0.5) (2/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
8	864.7	O	X	20	867.1	O	O	32	869.5	O	O
9	864.9	O	O	21	867.3	O	O	33	869.7	O	O
10	865.1	O	O	22	867.5	O	O	34	869.9	O	O
11	865.3	O	O	23	867.7	O	O				

Table 9-3 RF Frequency Set (PhyFreqBandID=4, phyFSKmode=6, 2GFSK, 150kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	863.1	X		12	865.5	O	O	24	867.9	O	O
1	863.3	X	X	13	865.7	O	O	25	868.1	O	O
2	863.5	X	X	14	865.9	O	O	26	868.3	O	O
3	863.7	X	X	15	866.1	O	O	27	868.5	O	O
4	863.9	X	X	16	866.3	O	O	28	868.7	O	O
5	864.1	X	X	17	866.5	O	O	29	868.9	O	O
6	864.3	X	X	18	866.7	O	O	30	869.1	O	O
7	864.5	X	X	19	866.9	O	O	31	869.3	O	O
8	864.7	X	X	20	867.1	O	O	32	869.5	O	O
9	864.9	X	O	21	867.3	O	O	33	869.7	O	O
10	865.1	O	O	22	867.5	O	O	34	869.9	O	O
11	865.3	O	O	23	867.7	O	O				

Table 9-4 RF Frequency Set (PhyFreqBandID=15, phyFSKmode=1, 2GFSK, 50kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	870.1	O	O	19	872.0	O	O	38	873.9	O	O
1	870.2	O	O	20	872.1	O	O	39	874.0	O	O
2	870.3	O	O	21	872.2	O	O	40	874.1	O	O
3	870.4	O	O	22	872.3	O	O	41	874.2	O	O
4	870.5	O	O	23	872.4	O	O	42	874.3	O	O
5	870.6	O	O	24	872.5	O	O	43	874.4	O	O
6	870.7	O	O	25	872.6	O	O	44	874.5	O	O
7	870.8	O	O	26	872.7	O	O	45	874.6	O	O
8	870.9	O	O	27	872.8	O	O	46	874.7	O	O
9	871.0	O	O	28	872.9	O	O	47	874.8	O	O
10	871.1	O	O	29	873.0	O	O	48	874.9	O	O
11	871.2	O	O	30	873.1	O	O	49	875.0	O	O
12	871.3	O	O	31	873.2	O	O	50	875.1	O	O
13	871.4	O	O	32	873.3	O	O	51	875.2	O	O
14	871.5	O	O	33	873.4	O	O	52	875.3	O	O
15	871.6	O	O	34	873.5	O	O	53	875.4	O	O
16	871.7	O	O	35	873.6	O	O	54	875.5	O	O
17	871.8	O	O	36	873.7	O	O				
18	871.9	O	O	37	873.8	O	O				

Table 9-5 RF Frequency Set (PhyFreqBandID=15, phyFSKmode=2, 2GFSK, 100kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	870.2	O	O	9	872.0	O	O	18	873.8	O	O
1	870.4	O	O	10	872.2	O	O	19	874.0	O	O
2	870.6	O	O	11	872.4	O	O	20	874.2	O	O
3	870.8	O	O	12	872.6	O	O	21	874.4	O	O
4	871.0	O	O	13	872.8	O	O	22	874.6	O	O
5	871.2	O	O	14	873.0	O	O	23	874.8	O	O
6	871.4	O	O	15	873.2	O	O	24	875.0	O	O
7	871.6	O	O	16	873.4	O	O	25	875.2	O	O
8	871.8	O	O	17	873.6	O	O	26	875.4	O	O

Table 9-6 RF Frequency Set (PhyFreqBandID=15, phyFSKmode=3, 2GFSK, 150kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	870.2	O	O	9	872.0	O	O	18	873.8	O	O
1	870.4	O	O	10	872.2	O	O	19	874.0	O	O
2	870.6	O	O	11	872.4	O	O	20	874.2	O	O
3	870.8	O	O	12	872.6	O	O	21	874.4	O	O
4	871.0	O	O	13	872.8	O	O	22	874.6	O	O
5	871.2	O	O	14	873.0	O	O	23	874.8	O	O
6	871.4	O	O	15	873.2	O	O	24	875.0	O	O
7	871.6	O	O	16	873.4	O	O	25	875.2	O	O
8	871.8	O	O	17	873.6	O	O	26	875.4	O	O

Table 9-7 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=1, 4 2GFSK, 50kbps, m=1) (1/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	902.2	O	O	43	910.8	O	O	86	919.4	O	O
1	902.4	O	O	44	911.0	O	O	87	919.6	O	O
2	902.6	O	O	45	911.2	O	X	88	919.8	O	O
3	902.8	O	O	46	911.4	O	X	89	920.0	O	O
4	903.0	O	O	47	911.6	O	X	90	920.2	O	O
5	903.2	O	O	48	911.8	X	X	91	920.4	O	O
6	903.4	O	O	49	912.0	X	X	92	920.6	O	O
7	903.6	O	O	50	912.2	X	X	93	920.8	O	O
8	903.8	O	O	51	912.4	O	X	94	921.0	O	O
9	904.0	O	O	52	912.6	O	X	95	921.2	O	O
10	904.2	O	O	53	912.8	O	X	96	921.4	O	O
11	904.4	O	O	54	913.0	O	X	97	921.6	O	O
12	904.6	O	O	55	913.2	O	X	98	921.8	O	O
13	904.8	O	O	56	913.4	O	X	99	922.0	O	O
14	905.0	O	O	57	913.6	O	O	100	922.2	O	O
15	905.2	O	O	58	913.8	O	O	101	922.4	O	O

Table 9-7 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=1,4 2GFSK, 50kbps, m=1) (2/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
16	905.4	O	O	59	914.0	O	O	102	922.6	O	O
17	905.6	O	O	60	914.2	O	O	103	922.8	O	O
18	905.8	O	O	61	914.4	O	O	104	923.0	O	O
19	906.0	O	O	62	914.6	O	O	105	923.2	O	O
20	906.2	O	O	63	914.8	O	O	106	923.4	O	O
21	906.4	O	O	64	915.0	O	O	107	923.6	O	O
22	906.6	O	O	65	915.2	O	O	108	923.8	O	O
23	906.8	O	O	66	915.4	O	O	109	924.0	O	O
24	907.0	O	O	67	915.6	O	O	110	924.2	O	O
25	907.2	O	O	68	915.8	O	O	111	924.4	O	O
26	907.4	O	O	69	916.0	O	O	112	924.6	O	O
27	907.6	O	O	70	916.2	O	O	113	924.8	O	O
28	907.8	O	O	71	916.4	O	O	114	925.0	O	O
29	908.0	O	O	72	916.6	O	O	115	925.2	O	O
30	908.2	O	O	73	916.8	O	O	116	925.4	O	O
31	908.4	O	O	74	917.0	O	O	117	925.6	O	O
32	908.6	O	O	75	917.2	O	O	118	925.8	O	O
33	908.8	O	O	76	917.4	O	O	119	926.0	O	O
34	909.0	O	O	77	917.6	O	O	120	926.2	O	O
35	909.2	O	O	78	917.8	O	O	121	926.4	O	O
36	909.4	O	O	79	918.0	O	O	122	926.6	O	O
37	909.6	O	O	80	918.2	O	O	123	926.8	O	O
38	909.8	O	O	81	918.4	O	O	124	927.0	O	O
39	910.0	O	O	82	918.6	O	O	125	927.2	O	O
40	910.2	O	O	83	918.8	O	O	126	927.4	O	O
41	910.4	O	O	84	919.0	O	O	127	927.6	O	O
42	910.6	O	O	85	919.2	O	O	128	927.8	O	O

Table 9-8 RF Frequency Set (PhyFreqBandID=14, phyFSKmode=2, 2GFSK, 100kbps, m=0.5) (1/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	902.2	O	O	43	910.8	O	O	86	919.4	O	O
1	902.4	O	O	44	911.0	O	O	87	919.6	O	O
2	902.6	O	O	45	911.2	O	X	88	919.8	O	O
3	902.8	O	O	46	911.4	X	X	89	920.0	O	O
4	903.0	O	O	47	911.6	X	X	90	920.2	O	O
5	903.2	O	O	48	911.8	X	X	91	920.4	O	O
6	903.4	O	O	49	912.0	X	X	92	920.6	O	O
7	903.6	O	O	50	912.2	X	X	93	920.8	O	O
8	903.8	O	O	51	912.4	X	X	94	921.0	O	O
9	904.0	O	O	52	912.6	X	X	95	921.2	O	O

Table 9-8 RF Frequency Set (PhyFreqBandID=14, phyFSKmode=2, 2GFSK, 100kbps, m=0.5) (2/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
10	904.2	O	O	53	912.8	O	X	96	921.4	O	O
11	904.4	O	O	54	913.0	O	X	97	921.6	O	O
12	904.6	O	O	55	913.2	O	X	98	921.8	O	O
13	904.8	O	O	56	913.4	O	X	99	922.0	O	O
14	905.0	O	O	57	913.6	O	O	100	922.2	O	O
15	905.2	O	O	58	913.8	O	O	101	922.4	O	O
16	905.4	O	O	59	914.0	O	O	102	922.6	O	O
17	905.6	O	O	60	914.2	O	O	103	922.8	O	O
18	905.8	O	O	61	914.4	O	O	104	923.0	O	O
19	906.0	O	O	62	914.6	O	O	105	923.2	O	O
20	906.2	O	O	63	914.8	O	O	106	923.4	O	O
21	906.4	O	O	64	915.0	O	O	107	923.6	O	O
22	906.6	O	O	65	915.2	O	O	108	923.8	O	O
23	906.8	O	O	66	915.4	O	O	109	924.0	O	O
24	907.0	O	O	67	915.6	O	O	110	924.2	O	O
25	907.2	O	O	68	915.8	O	O	111	924.4	O	O
26	907.4	O	O	69	916.0	O	O	112	924.6	O	O
27	907.6	O	O	70	916.2	O	O	113	924.8	O	O
28	907.8	O	O	71	916.4	O	O	114	925.0	O	O
29	908.0	O	O	72	916.6	O	O	115	925.2	O	O
30	908.2	O	O	73	916.8	O	O	116	925.4	O	O
31	908.4	O	O	74	917.0	O	O	117	925.6	O	O
32	908.6	O	O	75	917.2	O	O	118	925.8	O	O
33	908.8	O	O	76	917.4	O	O	119	926.0	O	O
34	909.0	O	O	77	917.6	O	O	120	926.2	O	O
35	909.2	O	O	78	917.8	O	O	121	926.4	O	O
36	909.4	O	O	79	918.0	O	O	122	926.6	O	O
37	909.6	O	O	80	918.2	O	O	123	926.8	O	O
38	909.8	O	O	81	918.4	O	O	124	927.0	O	O
39	910.0	O	O	82	918.6	O	O	125	927.2	O	O
40	910.2	O	O	83	918.8	O	O	126	927.4	O	O
41	910.4	O	O	84	919.0	O	O	127	927.6	O	O
42	910.6	O	O	85	919.2	O	O	128	927.8	O	O

Table 9-9 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=2, 2GFSK, 150kbps, m=0.5) (1/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	902.4	O	O	22	911.2	X	X	44	920.0	O	O
1	902.8	O	O	23	911.6	X	X	45	920.4	O	O
2	903.2	O	O	24	912.0	X	X	46	920.8	O	O
3	903.6	O	O	25	912.4	X	X	47	921.2	O	O

Table 9-9 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=2, 2GFSK, 150kbps, m=0.5) (2/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
4	904.0	O	O	26	912.8	X	X	48	921.6	O	O
5	904.4	O	O	27	913.2	O	X	49	922.0	O	O
6	904.8	O	O	28	913.6	O	O	50	922.4	O	O
7	905.2	O	O	29	914.0	O	O	51	922.8	O	O
8	905.6	O	O	30	914.4	O	O	52	923.2	O	O
9	906.0	O	O	31	914.8	O	O	53	923.6	O	O
10	906.4	O	O	32	915.2	O	O	54	924.0	O	O
11	906.8	O	O	33	915.6	O	O	55	924.4	O	O
12	907.2	O	O	34	916.0	O	O	56	924.8	O	O
13	907.6	O	O	35	916.4	O	O	57	925.2	O	O
14	908.0	O	O	36	916.8	O	O	58	925.6	O	O
15	908.4	O	O	37	917.2	O	O	59	926.0	O	O
16	908.8	O	O	38	917.6	O	O	60	926.4	O	O
17	909.2	O	O	39	918.0	O	O	61	926.8	O	O
18	909.6	O	O	40	918.4	O	O	62	927.2	O	O
19	910.0	O	O	41	918.8	O	O	63	927.6	O	O
20	910.4	O	O	42	919.2	O	O	64	928.0	O	O
21	910.8	O	O	43	919.6	O	O				

Table 9-10 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=3, 2GFSK, 200kbps, m=0.5) (1/2)

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

Table 9-10 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=3, 2GFSK, 200kbps, m=0.5) (2/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
19	910.0	O	O	41	918.8	O	O	63	927.6	O	O
20	910.4	O	O	42	919.2	O	O	64	928.0	O	O
21	910.8	X	O	43	919.6	O	O				

Table 9-11 RF Frequency Set (PhyFreqBandID=14, phyFSKmode=3, 2GFSK, 300kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	902.6	O	O	15	911.6	X	X	30	920.6	O	O
1	903.2	O	O	16	912.2	X	X	31	921.2	O	O
2	903.8	O	O	17	912.8	X	X	32	921.8	O	O
3	904.4	O	O	18	913.4	X	X	33	922.4	O	O
4	905.0	O	O	19	914.0	O	X	34	923.0	O	O
5	905.6	O	O	20	914.6	O	O	35	923.6	O	O
6	906.2	O	O	21	915.2	O	O	36	924.2	O	O
7	906.8	O	O	22	915.8	O	O	37	924.8	O	O
8	907.4	O	O	23	916.4	O	O	38	925.4	O	O
9	908.0	O	O	24	917.0	O	O	39	926.0	O	O
10	908.6	O	O	25	917.6	O	O	40	926.6	O	O
11	909.2	O	O	26	918.2	O	O	41	927.2	O	O
12	909.8	O	O	27	918.8	O	O	42	927.8	O	O
13	910.4	X	O	28	919.4	O	O				
14	911.0	X	O	29	920.0	O	O				

Table 9-12 RF Frequency Set (PhyFreqBandID=8, phyFSKmode=1,4, 2GFSK, 50kbps, m=1)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	917.1	O	O	11	919.3	O	O	22	921.5	O	O
1	917.3	O	O	12	919.5	O	O	23	921.7	O	O
2	917.5	O	O	13	919.7	O	O	24	921.9	O	O
3	917.7	O	O	14	919.9	O	O	25	922.1	O	O
4	917.9	O	O	15	920.1	O	O	26	922.3	O	O
5	918.1	O	O	16	920.3	O	O	27	922.5	O	O
6	918.3	O	O	17	920.5	O	O	28	922.7	O	O
7	918.5	O	O	18	920.7	O	O	29	922.9	O	O
8	918.7	O	O	19	920.9	O	O	30	923.1	O	O
9	918.9	O	O	20	921.1	O	O	31	923.3	O	O
10	919.1	O	O	21	921.3	O	O				

Table 9-13 RF Frequency Set (PhyFreqBandID=8, phyFSKmode=2, 2GFSK, 150kbps, m=0.5) (1/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	917.3	O	O	6	919.7	O	O	12	922.1	O	O
1	917.7	O	O	7	920.1	O	O	13	922.5	O	O

Table 9-13 RF Frequency Set (PhyFreqBandID=8, phyFSKmode=2, 2GFSK, 150kbps, m=0.5) (2/2)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
2	918.1	O	O	8	920.5	O	O	14	922.9	O	O
3	918.5	O	O	9	920.9	O	O	15	923.3	O	O
4	918.9	O	O	10	921.3	O	O				
5	919.3	O	O	11	921.7	O	O				

Table 9-14 RF Frequency Set (PhyFreqBandID=8, phyFSKmode=3, 2GFSK, 200kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	917.3	O	O	6	919.7	O	O	12	922.1	O	O
1	917.7	O	O	7	920.1	O	O	13	922.5	O	O
2	918.1	O	O	8	920.5	O	O	14	922.9	O	O
3	918.5	O	O	9	920.9	O	O	15	923.3	O	O
4	918.9	O	O	10	921.3	O	O				
5	919.3	O	O	11	921.7	O	O				

Table 9-15 RF Frequency Set (PhyFreqBandID=9, phyFSKmode=1,6, 2GFSK, 50kbps, m=1)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	920.6	O	O	13	923.2	O	O	26	925.8	O	O
1	920.8	O	O	14	923.4	O	O	27	926.0	O	O
2	921.0	O	O	15	923.6	O	O	28	926.2	O	O
3	921.2	O	O	16	923.8	O	O	29	926.4	O	O
4	921.4	O	O	17	924.0	O	O	30	926.6	O	O
5	921.6	O	O	18	924.2	O	O	31	926.8	O	O
6	921.8	O	O	19	924.4	O	O	32	927.0	O	O
7	922.0	O	O	20	924.6	O	O	33	927.2	O	O
8	922.2	O	O	21	924.8	O	O	34	927.4	O	O
9	922.4	O	O	22	925.0	O	O	35	927.6	O	O
10	922.6	O	O	23	925.2	O	O	36	927.8	O	O
11	922.8	O	O	24	925.4	O	O	37	928.0	O	O
12	923.0	O	O	25	925.6	O	O				

Table 9-16 RF Frequency Set (PhyFreqBandID=9, phyFSKmode=2, 2GFSK, 100kbps, m=1)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	920.9	O	O	6	923.3	O	O	12	925.7	O	O
1	921.3	O	O	7	923.7	O	O	13	926.1	O	O
2	921.7	O	O	8	924.1	O	O	14	926.5	O	O
3	922.1	O	O	9	924.5	O	O	15	926.9	O	O
4	922.5	O	O	10	924.9	O	O	16	927.3	O	O
5	922.9	O	O	11	925.3	O	O	17	927.7	O	O

Table 9-17 RF Frequency Set (PhyFreqBandID=9, phyFSKmode=5, 2GFSK, 150kbps, m=0.5)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	920.9	O	O	6	923.3	O	O	12	925.7	O	O
1	921.3	O	O	7	923.7	O	O	13	926.1	O	O
2	921.7	O	O	8	924.1	O	O	14	926.5	O	O
3	922.1	O	O	9	924.5	O	O	15	926.9	O	O
4	922.5	O	O	10	924.9	O	O	16	927.3	O	O
5	922.9	O	O	11	925.3	O	O	17	927.7	O	O

Table 9-18 RF Frequency Set (PhyFreqBandID=9, phyFSKmode=3, 2GFSK, 200kbps, m=1)

CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit	CH	Frequency (MHz)	TX prohibit	RX prohibit
0	920.8	O	O	4	923.2	O	O	8	925.6	O	O
1	921.4	O	O	5	923.8	O	O	9	926.2	O	O
2	922.0	O	O	6	924.4	O	O	10	926.8	O	O
3	922.6	O	O	7	925.0	O	O	11	927.4	O	O

10. Receive SFD detection enhanced mode setting

Only when 2FSK / 2GFSK, it is possible to enhance SFD detection in noisy environments by adding 2 bytes of preamble to SFD in addition to conventional 2-byte SFD. However, there are the following restrictions.

1. 2 byte long preamble is required than "minimum preamble length setting register value" of **Table 4-2**.
2. Register setting required before transmission and reception respectively
3. Automatic ACK reception after sending ACK request frame, reception during backoff with automatic CSMA-CA, when address filter is enabled and received at other than PANID = FFFFH, it is automatically detected by SFD 2 byte

Set register of **Table 10-1** at the phase of “Setting Registers adjusted at each Data Rate" in **Figure 1-1**. Set register of **Table 10-2** before transmission and reception respectively.

Table 10-1 initial registers

Register address (H)	Setting value (H)
00C4	09
00C5	72

Table 10-2 register settings before transmitter and reception

Register address (H)	Setting value before transmitter (H)	Setting value before reception (H)
00C2	09	AA
00C3	72	AA
00C6	02	06

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct 17, 2016	–	First edition issued
1.10	Feb 28, 2019	-	Moved register description of "User's Manual: Hardware Rev. 1.20" to this document
1.20	Sep 12,2019	3,4	Table 1-1 Supported data rate list
		7	Table 3-1 Setting registers according to “phyFreqBandId”
		8-10	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (x/15) (x=1 to 3)
		11	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (4/15)
		12-14	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (x/15) (x=5 to 7)
		15	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (8/15)
		16,17,19	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (x/15) (x=9 to 11)
		20	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (12/15)
		21,22	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (x/15) (x=13 to 14)
		23	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (15/15)
		25,26	Table 4-1 Register setting for loss of input signal level from antenna (x/3) x:1-3
		27,28	Table 4-2 Minimum preamble length setting register for each data rate (x/2) x:1-2
		32-34	Table 4-4 Calculation example of preamble length at antenna / diversity reception
			Table 4-5 Reception Filter Bandwidth in ED/CCA mode(x/2) X:1-2
		37	Table 5-1 RL78/G1H RF transceiver correction register
		40	Table 6-1 Relationship between each data rate and Transmission Gain Set Table Number
		58	Table 7-1 Relationship between each data rate and RF Frequency Setting table Number
			Add phyFreqBandId7 phyFSKOpeMode4 phyFreqBandId8 phyFSKOpeMode4 phyFreqBandId9 phyFSKOpeMode6 phyFreqBandId17 phyFSKOpeMode4
		11	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (4/15) change address CCh value 00h to 01h
		15	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (8/15) change address 430h value 0Ch to 02h 432h value 18h to 10h 436h value 18h to 20h 43ah value 96h to BEh Add column for address 436h

Rev.	Date	Description	
		Page	Summary
1.20	Sep 12,2019	20	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (12/15) change address 486h value 55h to 00h 487h value 05h to 00h 48dh value 46h to 57h 494h value 55h to 44h
		23	Table 3-2 Setting registers according to “phyFreqBandId” and “phyFSKOpeMode” (15/15) change address 0DCh value 10h to 12h 0DCh value 10h to F0h 0DCh value 60h to 70h
		24	Table 3-3 ARIB STD-T108 mode setting Add phyFreqBandId9 phyFSKOpeMode6
		36	Table 4-7 4.4.2 CCA time register in ARIB STD – T108 Add phyFreqBandId9 phyFSKOpeMode6
		80 83 84	Table 9-7 RF Frequency Set (PhyFreqBandID=7, phyFSKmode=1 2GFSK, 50kbps, m=1) (x/2） x=1to2 Table 9-12 RF Frequency Set (PhyFreqBandID=8, phyFSKmode=1, 2GFSK, 50kbps, m=1) Table 9-15 RF Frequency Set (PhyFreqBandID=9, phyFSKmode=1, 2GFSK, 50kbps, m=1) Add phyFSKmode4

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.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: “Standard” and “High Quality”. The intended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below.
   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.
   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

   Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user’s manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user’s manuals, application notes, “General Notes for Handling and Using Semiconductor Devices” in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/.