RF Module
USER'S MANUAL

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Content

[ABBREVIATION]

RFMR	R/F Main Module included Ready Signal Communication
RFSR	R/F Sub Module included Ready Signal Communication
RFM	R/F Main Module excluded Ready Signal Communication
RFS	R/F Sub Module excluded Ready Signal Communication

* Default Type : RFM, RFS

RF Exposure Statement

This device and its antenna must not be collocated or operated in conjunction with any other

Antenna or transmitter.

To comply with FCC RF exposure requirements. Only use supplied antenna.

Any unauthorized modification to the antenna or device could void the user's authority to operate

this device.

FCC ID

PXMRF_1A	**V5K - PXMRF - 1A**
PXMRF_2A	**V5K - PXMRF - 2A**
03 / 12 / 2008 Poskom Co., Ltd.	

1. Hardware Specification

1.1 Connector

1) RFMR(RFM) - MAIN

RFMR(RFM) - MAIN			
Part_No	Specification	PIN	Remark
CN3	DEK623PCB-TI (6P4C)	1 Pin : Ready (Hand S/W) 2 Pin : GND 3 Pin : Exposure (Hand S/W) 4 Pin : GND	Connect to Hand S/W
CN4	DEK623PCB-TI (6P6C)	1 Pin : DC + 5V 2 Pin : Ready (Hand S/W) 3 Pin : GND 4 Pin : Exposure (RF Module Main Signal) 5 Pin : GND 6 Pin : GND	Connect to Portable X-ray unit Hand S/W connector

2) RFSR(RFS) - SUB

RFSR(RFS) - SUB			
Part_No	Specification	PIN	Remark
CN3	LAB0640-08	1 Pin : GND 2 Pin : GND 3 Pin : Exposure Trans Line 1 (to DR System) 4 Pin : Exposure Trans Line 2 (to DR System) 5 Pin : Blank 6 Pin : DR OK Receive (from DR System) 7 Pin : DC + 12V 8 Pin : DC + 12V	Connect to DR plate control box

1.2 Status LED
1) RFMR(RFM) - MAIN

Symbol	LED No.	Color	Mean
COMM	LED3	Green	RF MAIN, SUB Linked
ERROR	LED4	Red	RF MAIN, SUB Communication Error
READY	LED5	Orange	Input Hand S/W Ready
EXPOSURE	LED6	Orange	Input Hand S/W Exposure
DR OK	LED7	Red	Output Receive DR OK Signal
Spare	LED8	Red	-

You can control On/Off of Ready, Exposure Status only with Hand S/W.

2) RFSR(RFS) - SUB

Symbol	LED No.	Color	Mean
COMM	LED3	Green	RF MAIN, SUB Linked
ERROR	LED4	Red	RF MAIN, SUB Communication Error
DR OK	LED5	Orange	Input DR OK Signal from DR System
Spare	LED6	Orange	-
READY	LED7	Red	Output Receive Ready
EXPOSURE	LED8	Red	Output Receive Exposure

2. Equipment Operation

- RF Module is operated manually. It has no automatic function.

2.1 Operation preparation

1) Portable X-ray Exposure preparation

Get ready for X-ray exposure, referring to Portable X-ray equipment manual, 'Operation'.

2) RF Module MAIN INSTALLATION

Connect 'Portable' terminal of RF Module MAIN to 'Hand switch' terminal of Portable X-ray equipment, using Harness 'RF-H01'.

3) RF Module SUB INSTALLATION

Connect RF Module SUB to DR I/O Box, using Harness 'RF-H02', equipped in RF Module SUB. For connection details, you can refer to Harness diagram 'RF-H02'.

2.2 Equipment Operation

1) Portable X-ray Exposure

Make an exposure, referring to Portable X-ray equipment manual, 'Operation'.

2) RF Module MAIN

READY LED is lighted on when you push Hand Switch 1'st step (Ready).

EXPOSURE LED is lighted on when you push Hand Switch 2'nd step (Exposure).

When you keep pushing Hand Switch 2'nd step (Exposure), and get DR OK signal from SUB, DR OK LED is lighted on. Then, Exposure signal is transmitted to Portable X-ray equipment.

3) RF Module SUB

When you keep pushing Hand Switch 1'st (Ready), and get READY signal from MAIN, then, READY LED is lighted on in SUB part.

When you push Hand Switch 2'nd (Exposure), Exposure signal is received from MAIN normally, EXPOSURE LED of SUB part is lighted on. At this time, Exposure signal is sent to DR I/O BOX.

When you keep pushing Hand Switch 2'nd (Exposure), DR OK signal is inputted from DR I/O BOX, DR OK LED of SUB part is lighted on, and DR OK signal is transmitted to MAIN part.

3. Frequency Channel and Net No. Setting

You can change Frequency Channel or Net No. with DIP SW(SW1).
(* If you changed SW1 status, do not forget to push RST1(Reset).)

3.1 Frequency Channel

Initial frequency is configured to 433.0000MHz (Ch 01). If you would like other channels, you can change the channels with SW1 (1,2,3,4). There are totally 16 channels - No.1 (433.0000MHz)~ No.16(433.1875MHz) -, frequency of each channel interval is 0.0125MHz.

Channel (Ch)	Frequency (MHz)	SW1 (■ = ON , □ = OFF)							
		1	2	3	4	5	6	7	8
01	433.7000	□	□	□	□	-	-	-	-
02	433.7125	■	□	□	□	-	-	-	-
03	433.7250	□	■	□	□	-	-	-	-
04	433.7375	■	■	□	□	-	-	-	-
05	433.7500	□	□	■	□	-	-	-	-
06	433.7625	■	□	■	□	-	-	-	-
07	433.7750	□	■	■	□	-	-	-	-
08	433.7875	■	■	■	□	-	-	-	-
09	433.8000	□	□	□	■	-	-	-	-
10	433.8125	■	□	□	■	-	-	-	-
11	433.8250	□	■	□	■	-	-	-	-
12	433.8375	■	■	□	■	-	-	-	-
13	433.8500	□	□	■	■	-	-	-	-
14	433.8625	■	□	■	■	-	-	-	-
15	433.8750	□	■	■	■	-	-	-	-
16	433.8875	■	■	■	■	-	-	-	-

3.2 Net No.

Initial Net No. is configured to No.01. If you would like other Net No., you can change the Net No. with SW1(5,6,7,8). There are totally 16 Net No. – No.01~ No.16 like channels. You can configure 16 Net No. with one channel.

Net No.	SW1 (■ = ON , □ = OFF)							
	1	2	3	4	5	6	7	8
No. 01	-	-	-	-	□	□	□	□
No. 02	-	-	-	-	■	□	□	□
No. 03	-	-	-	-	□	■	□	□
No. 04	-	-	-	-	■	■	□	□
No. 05	-	-	-	-	□	□	■	□
No. 06	-	-	-	-	■	□	■	□
No. 07	-	-	-	-	□	■	■	□
No. 08	-	-	-	-	■	■	■	□
No. 09	-	-	-	-	□	□	□	■
No. 10	-	-	-	-	■	□	□	■
No. 11	-	-	-	-	□	■	□	■
No. 12	-	-	-	-	■	■	□	■
No. 13	-	-	-	-	□	□	■	■
No. 14	-	-	-	-	■	□	■	■
No. 15	-	-	-	-	□	■	■	■
No. 16	-	-	-	-	■	■	■	■

4. Communication Frame

4.1 Transmit Frame

	①	②	③	④	⑤	⑥
	Preamble	**Net No.**	**Packet ID**	**Data**	**Check Sum**	**Post dummy**
length (byte)	6	1	1	1	1	3
Total length (byte)	13					

① Preamble (6 byte) : 0x55 + 0x55 + 0x55 + 0x55 + 0x55 + 0xff

② Net No. (1 byte) : Configuration value of SW1(5,6,7,8).

③ Packet ID (1 byte) : ID for distinguishing Main and Sub.

④ Data (1 byte) : * RFMR(MAIN) – Hand S/W status(Ready, Exposure, Off)

　　　　　　　* RFSR(SUB)　- DR OK

⑤ Check Sum (1 byte) : Detect of Data Error, Check Sum = ② + ③ + ④

⑥ Post dummy (3 byte) : 0xff + 0xff + 0xff

4.2 ACK Frame

	①	②	③	④	⑤
	Preamble	**Net No.**	**Packet ID**	**Check Sum**	**Post dummy**
Length (byte)	6	1	2	1	3
Total length (byte)	13				

① Preamble (6 byte) : 0x55 + 0x55 + 0x55 + 0x55 + 0x55 + 0xff

② Net No. (1 byte) : Configuration value of SW1(5,6,7,8).

③ Packet ID (2 byte) : ID for distinguishing MAIN and SUB.(PID + PID)

④ Check Sum (1 byte) : Detect of Data Error,　 Check Sum = ② + ③ + ④

⑤ Post dummy (3 byte) : 0xff + 0xff + 0xff

5. I/O Signal Control

5.1 Default Status

1) In case of turning RFMR(MAIN) On

When RFSR(SUB) power is OFF, as you turn RFMR(MAIN) power On, **ERROR(LED4)** of RFMR(MAIN) is turned on.

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	OFF	**ON**	OFF	OFF	OFF	-

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	OFF	OFF	OFF	-	OFF	OFF

2) In case of turning RFSR(SUB) On

When RFMR(MAIN) power if OFF, as you turn RFSR(SUB) power on, **ERROR(LED4)** of RFSR(SUB) is turned on.

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	OFF	OFF	OFF	OFF	OFF	-

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	OFF	**ON**	OFF	-	OFF	OFF

3) In case of turning RFMR(MAIN) On in '1)'or '2)' status

① in case of RFMR(MAIN) of '1)': **ERROR(LED4)** is turned off and **COMM(LED3)** is turned on within 5sec. .
② in case of RFSR(SUB) of '2)': **ERROR(LED4)** is turned off and **COMM(LED3)** is turned on within 10sec.

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	**ON**	OFF	OFF	OFF	OFF	-

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	**ON**	OFF	OFF	-	OFF	OFF

5.2 Signal Control

Whenever transmission connection status is normal between RFMR(MAIN) and RFSR(SUB) and there is a change on Hand S/W condition basically, Signal Control treats Signal by creating transmission Frame.

1) Ready Signal

1-1) Ready Signal including transmitting• receiving function

① **RFMR(MAIN)**

When Ready S/W of Hand S/W is pushed, Ready Signal is inputted to RFMR(MAIN) and X-Ray Generator. Then, **READY(LED5)** of RFMR(MAIN) is turned on, and MAIN creates transmission Frame about Ready Signal and transmit it to RFSR(SUB). Then, it waits for Receipt OK(ACK) Signal of Ready Signal from RFSR(SUB).
If it fails to receive Receipt OK(ACK) after transmitting Ready Signal, retry to transmit Ready Signal 5 times. If it fails again, considering it to Error, **ERROR(LED4)** is turned on.

- This is normal status when you push READY S/W of Hand S/W

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	ON	OFF	ON	OFF	OFF	-

- Status of not receiving Receipt OK(ACK) Signal according to Ready Signal transmission

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	OFF	ON	ON	OFF	OFF	-

② **RFSR(SUB)**

When Ready Signal is received from RFMR(MAIN), **READY(LED7)** is turned on. And SUB transmits Receipt OK(ACK) Signal of Ready Signal to RFMR(MAIN).

- This is normal status of receiving Ready Signal

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	ON	OFF	OFF	-	ON	OFF

1-2) Ready Signal not including transmitting• receiving fucntion

① RFM(MAIN)

When Ready S/W of Hand S/W is pushed, Ready Signal is inputted to RFM(MAIN) and Portable.
Though, **READY(LED5)** of RFM(MAIN) is turned on, there is no transmission for Ready Signal.
That is, there is no transmission handling for Hand S/W Ready S/W Signal between RFM(MAIN) and
RFS(SUB).

- This is normal status when you push Ready S/W of Hand S/W

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFM(MAIN)	ON	OFF	ON	OFF	OFF	-

② RFS(SUB)

There is no change because there is no handling of transmitting/ receiving of RFM(MAIN) and Ready
S/W of Hand S/W.

- There is no change in RFS(SUB) when you push Ready S/W of Hand S/W

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFS(SUB)	ON	OFF	OFF	-	OFF	OFF

2) Exposure Signal

2-1) Ready Signal including transmitting• receiving function

When '1) Ready Signal' handling is finished and Ready S/W of Hand S/W and Exposure S/W are pushed, Exposure Signal is transmitted from RFMR(MAIN) to RFSR(SUB).

① RFMR(MAIN)

When Exposure S/W of Hand S/W is pushed, **EXPOSURE(LED6)** is turned on, and MAIN creates transmission Frame about Exposure Signal, transmits it to RFSR(SUB), and waits for Receipt OK(ACK) Signal from RFSR(SUB).

If it fails to receive Receipt OK(ACK) for **240ms** after transmitting Exposure Signal, retry to send it 5 times. If it fails again, consider it to Error and **ERROR(LED4)** is turned on.

- This is normal status when you push Exposure S/W of Hand S/W. (in case of pushing Ready S/W)

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	ON	OFF	ON	ON	OFF	-

- This is no receipt status of Receipt OK(ACK) Signal from Exposure Signal transmission

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	OFF	ON	ON	ON	OFF	-

② RFSR(SUB)

When Exposure Signal is received from RFMR(MAIN), **EXPOSURE(LED8)** is turned on, and SUB transmits Receipt OK(ACK) Signal of Exposure Signal to RFMR(MAIN).
At the same time, Exposure Trans Line 1,2 of **CN3-5Pin, 6Pin** are Closed, and give Exposure Signal to DR System. While Exposure S/W of Hand S/W is pushed, they are Closed, and when it is released, they become Open. (Signal of contacting point : On=Close, Off=Open)

If DR OK Signal is occurred from DR System, ignore Receipt OK(ACK) of Exposure Signal, and create transmission Frame of DR OK Signal and transmit it to RFMR(MAIN). (refer to - '4.2-3)DR OK Signal')

- This is normal status of receiving Exposure Signal.

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	ON	OFF	OFF	-	ON	ON

- In case of DR OK Signal

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	ON	OFF	ON	-	ON	ON

2-2) Ready Signal not including transmitting· receiving function

When Ready S/W of Hand S/W and Exposure S/W are pushed, Exposure Signal is transmitted from RFM(MAIN) to RFS(SUB).

① RFM(MAIN)

When Exposure S/W of Hand S/W is pushed, **EXPOSURE(LED6)** is turned on, and MAIN creates transmission Frame of Exposure Signal and transmits it to RFS(SUB). Then it waits for Receipt OK(ACK) Signal from RFS(SUB).

If Receipt OK(ACK) Signal is not received for **240ms** after transmitting EXPOSURE Signal, retry to send Exposure Signal 5 times. If it fails again, consider it to Error, then **ERROR(LED4)** is turned on.

- This is normal status when you push Exposure S/W of Hand S/W (in case of pushing Ready S/W)

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFM(MAIN)	ON	OFF	ON	ON	OFF	-

- This is no receipt status of Receipt OK(ACK) from Exposure Signal transmission

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFM(MAIN)	OFF	ON	ON	ON	OFF	-

② RFS(SUB)

When Exposure Signal is received from RFMR(MAIN), **EXPOSURE(LED8)** is turned on, and SUB transmits the Receipt OK(ACK) Signal to RFMR(MAIN).
At the same time, Exposure Trans Line1, 2 of **CN3-5Pin, 6Pin** are closed and DR System would receive EXPOSURE Signal. While keep pushing Exposure S/W of Hand S/W, it would be Closed and when it is released, it becomes Open.
(Signal of Contacting Point: On=Close, Off=Open)

If you see DR OK Signal from DR System, ignore Receipt OK(ACK) about Exposure Signal, then create transmission Frame about DR OK Signal and transmit it to RFM(MAIN).
(refer to - '4.2-3)DR OK Signal')

- This is normal status of receiving Exposure Signal

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFS(SUB)	ON	OFF	OFF	-	OFF	ON

- This is the status of DR OK Signal occurrence

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFS(SUB)	ON	OFF	ON	-	OFF	ON

3) DR OK Signal

When '2) Exposure Signal' handling is finished and, DR OK Signal occurs from DR System, DR OK Signal is transmitted from RFSR(SUB) to RFMR(MAIN).

3-1) Ready Signal including transmitting• receiving function

① RFSR(SUB)

If Exposure Signal maintains from RFMR(MAIN), and DR OK Signal occurs from DR System, at the same time **DR OK(LED5)** is turned on, and SUB creates transmission Frame of DR OK Signal and transmits it to RFMR(MAIN). Then, it waits for Receipt OK(ACK) Signal from RFMR(MAIN).
If Receipt OK(ACK) Signal is not received for **240ms** after transmitting DR OK Signal, retry to transmit DR OK Signal 5 times. If it fails again, consider it to Error, then **ERROR(LED4)** is turned on.

- This is the status of DR OK Signal occurrence

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFSR(SUB)	ON	OFF	ON	-	ON	ON

② RFMR(MAIN)

When Hand S/W EXPOSURE is pushed and DR OK Signal is received from RFSR(SUB) **DR OK(LED7)** is turned on, and MAIN transmits Receipt OK(ACK) Signal to RFSR(SUB).
At the same time, send Exposure Signal to X-Ray Generator.

If Exposure S/W of Hand S/W is pushed and DR OK Signal is Off or out of transmission range in condition of received as RFMR(MAIN), 5 sec. later, **COMM(LED3)** of RFMR(MAIN) and **DR OK(LED7)** are turned off and **ERROR(LED4)** is turned on.

- This is normal status of receiving DR OK Signal (in case of, Ready S/W, Exposure S/W are pushed)

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	ON	OFF	ON	ON	ON	-

-RFSR(SUB) Power Off or out of transmission range status during processing DR OK Signal receiving.

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFMR(MAIN)	OFF	ON	ON	ON	OFF	-

3-2) Ready Signal not including transmitting• receiving function

① **RFS(SUB)**

If Exposure Signal maintains from RFM(MAIN) and DR OK Signal occurs from DR System, at the same time, **DR OK(LED5)** is turned on, and SUB creates transmission Frame of DR OK Signal and transmits it to RFM(MAIN). Then it waits for Receipt OK(ACK) Signal from RFM(MAIN).
If it fails to receive Receipt OK(ACK) Signal for **240ms**, after transmitting DR OK Signal, retry to transmit DR OK Signal 5 times. If it fails again, consider it to Error. Then **ERROR(LED4)** is turned on.

- This is the status of DR OK Signal occurrence

Part	COMM	ERROR	DR OK	-	READY	EXPOSURE
	LED3	LED4	LED5	-	LED7	LED8
RFS(SUB)	ON	OFF	ON	-	OFF	ON

② **RFM(MAIN)**

When Exposure S/W of Hand S/W is pushed, and DR OK Signal is received from RFS(SUB), **DR OK(LED7)** is turned on, and MAIN transmits Receipt OK(ACK) Signal to RFS(SUB).
At the same time, send Exposure Signal to X-Ray Generator.

If Exposure S/W of Hand S/W is pushed and, when DR OK Signal is received as RFM(MAIN), RFS(SUB) power is Off or out of transmission range, 5sec.later, **COMM(LED3) -** RFM(MAIN)**)** and **DR OK(LED7)** are turned off and **ERROR(LED4)** is turned on.

- This is normal status of receiving DR OK Signal (when Ready S/W, Exposure S/W should be pushed)

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFM(MAIN)	ON	OFF	ON	ON	ON	-

- RFS(SUB) Power Off or out of transmission range status during processing DR OK Signal receiving.

Part	COMM	ERROR	READY	EXPOSURE	DR OK	-
	LED3	LED4	LED5	LED6	LED7	-
RFM(MAIN)	OFF	ON	ON	ON	OFF	-

5.3 ALIVE Check MODE

This is to check the transmission connection when there is no Hand S/W Signal in RFMR(MAIN) or power is off in status of normal transmission connection between RFMR(MAIN) and RFSR(SUB).

1) RFMR(MAIN)

In case that there is no Signal input of Ready S/W of Hand S/W or Exposure S/W for 5sec. MAIN transmits present Hand S/W condition (Ready, Exposure, Off) to RFSR(SUB), then waits for its Receipt OK(ACK) Signal.
If it fails to receive Receipt OK(ACK) Signal, retry to transmit 5 times. If it fails again, considering it to Error, **COMM(LED3)** is turned off, and **ERROR(LED4)** is turned on.

2) RFSR(SUB)

When there is no transmission Signal from RFMR(MAIN) for 10sec., considering it to Error, **COMM(LED3)** is turned off and **ERROR(LED4)** is turned on.

5.4 ERROR

1) RFMR(MAIN)

Whenever is there is a change in Hand S/W condition (Ready, Exposure, Off), MAIN transmits the condition to RFSR(SUB). Or when there is no change in Hand S/W for 5sec. MAIN transmits present Hand S/W condition to (Alive check mode) and waits for its Receipt OK(ACK) Signal.
If it fails to receive Receipt OK(ACK) Signal, retry to transmit 5 times. If it fails again, considering it to ERROR, **COMM(LED3)** is turned off, and **ERROR(LED4)** is turned on.

2) RFSR(SUB)

When there is no Signal for 10sec. after transmitting Receipt OK(ACK) Signal received from RFMR(MAIN) or transmitting DR OK Signal to RFMR (MAIN), **COMM(LED3)** is turned off and **ERROR(LED4)** is turned on.
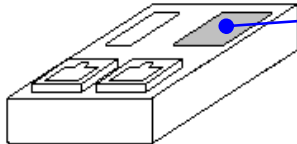
3) ERROR release

When there is normal transmission connecting status after handling Error, RFMR(MAIN) and RFSR(SUB) - **ERROR(LED4)**- are turned off and **COMM(LED3)** is turned on.

6. Supplement

6.1 Label
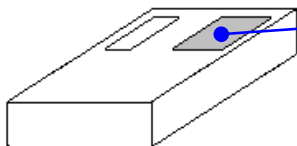
1) PXMRF-1A (MAIN)

This Device Complies with FCC Rules Part 15.

Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference that may be received including interference that may cause undesired operation.

FCC ID	V5K - PXMRF - 1A
S/N	08030001

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2) PXMRF-2A (SUB)

This Device Complies with FCC Rules Part 15.

Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference that may be received including interference that may cause undesired operation.

| FCC ID	V5K - PXMRF - 2A
S/N	08030001

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6.2 RF Communication Timing Chart

● Timing Chart names

  - **MAIN_RDY_SW** : Hand Switch Ready ON
  - **MAIN_EXP_SW** : Hand Switch Exposure ON
  - **RDY** : RF Ready Frame
  - **EXP** : RF Exposure Frame
  - **R_ACK :** Receipt OK(ACK) Frame according to Ready Signal
  - **E_ACK** : Receipt OK(ACK) Frame according to Exposure Signal

● Frame basic Time

  - Frame (13 byte) transmitting Time : about **50 ms**
  - Frame (13 byte * 2) transmitting Time : about **100 ms**
  - Frame (13 byte * 3) transmitting Time : about **150 ms**

● Transmission Ready, Exposure and ACK Signal

  - Ready : transmit same Frame **twice** during transmitting.
  - Exposure : transmit same Frame **twice** during transmitting.
  - ACK : transmit same Frame **3 times** during transmitting.
      Receipt OK(ACK) Signal standby time is **240 ms**, and retrial is permitted **5 times**.
  - Transmitting Ready, Exposure and ACK Signal twice or 3 times is for preventing the case of no receipt.
  - First coming Frame among twice or 2 times of transmission is treated to Signal. However, when transmission clashes against receipt, Frame receipt can not be treated.
  - Whenever transmitting ACK Signal, do not forget to transmit DR OK (from DR System) condition

    together in RF SUB.

● Hand S/W manipulation Tzzzzzzzzzzzime

  - Hand S/W manipulation Time : There is difference in pushing speed. (Ready → Exposure) .
      Considering there is 0ms time difference in pushing Ready and Exposure on Timing Chart
  – Even if you push Hand S/W Ready and Exposure simultaneously, Ready Signal should be treated to handle Exposure Signal.

● Software theoretical Timing Chart (Min, Max) related to RF Communication

● RF Communication Time

  In case of considering, Hand S/W Ready, Exposure handling time is **0 ms**

  - Including Hand S/W Ready : **300 ms ~ 2420 ms**
  - Excluding Hand S/W Ready : **150 ms ~ 1210 ms**
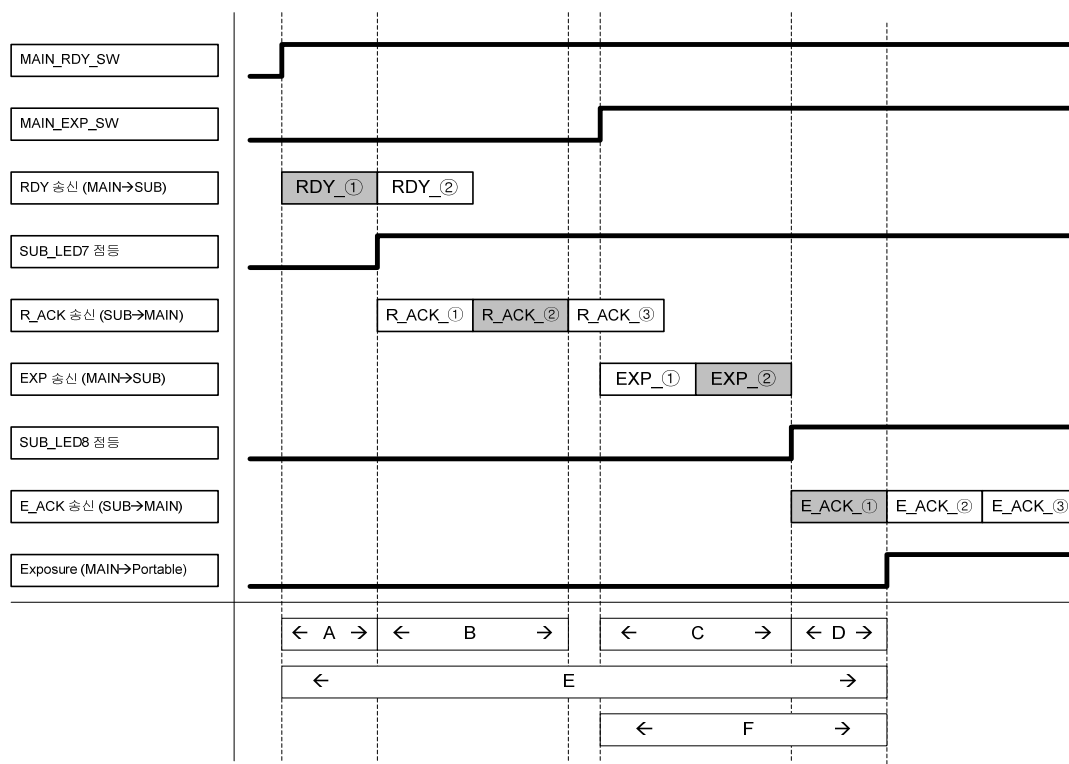
1) Normal Timing Chart
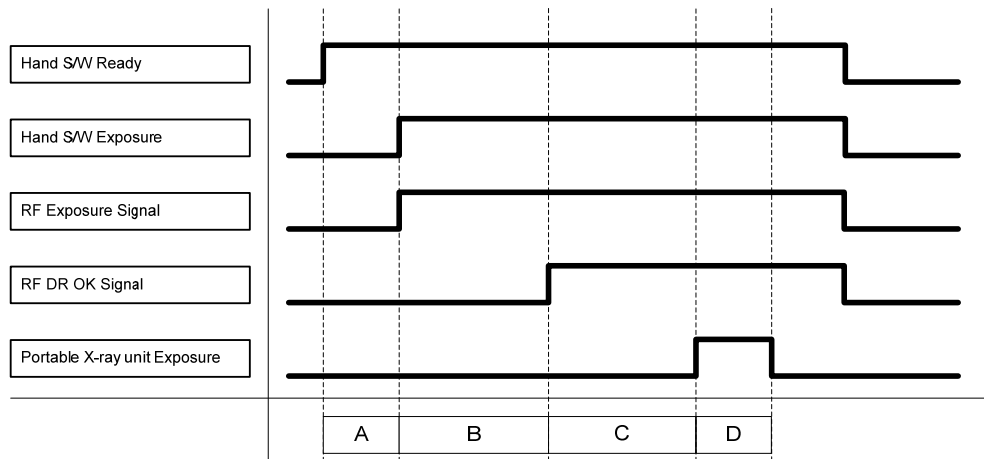
*A section (Time : about **1300 ms**) – *Time from pushing Hand S/W Ready to finalizing Portable X-Ray Unit preheat.*
   : Time to turn on Ready Lamp of Portable X-Ray Unit

*B section (Time : about **200 ms**) – *After finishing Preheat, Time from pushing Exposure of Hand S/W to RF Communication between RFSRs*
   : Time from pushing Hand S/W Exposure to seeing Exposure Signal on Exposure Trans Line 1,2 of RFSR

*C section (Time : about **250 ms**) – *RF Communication Time between RFMRs on RFSR*
   : considering time to see DR OK Signal after Exposure Signal Input in DR System is **0ms**.
   Time to receive DR OK Signal from RFMR

*D section (Time : about **50 ms**) – *Portable X-Ray Unit Exposure Time*

2) MIN. Timing Chart

MAIN_RDY_SW		
MAIN_EXP_SW		
RDY 송신 (MAIN→SUB)	RDY_① RDY_②	
SUB_LED7 점등		
R_ACK 송신 (SUB→MAIN)	R_ACK_① R_ACK_② R_ACK_③	
EXP 송신 (MAIN→SUB)	EXP_① EXP_②	
SUB_LED8 점등		
E_ACK 송신 (SUB→MAIN)	E_ACK_① E_ACK_② E_ACK_③	
Exposure (MAIN→Portable)		

← A → ←   B   →   ←   C   → ← D →

←   E   →

←   F   →

*A section (Time : about **50 ms**) – *Time from pushing Hand S/W Ready to RF SUB Ready LED action*
: 2 Frame related to Ready is transmitted, but, it is considered to be treated in RDY_①.

*B section (Time : about **100 ms**) – *Time from RF SUB Ready LED action to receiving RF MAIN Receipt OK(ACK)*
: Owing to RDY_②, R_ACK can not be received. It is considered that R_ACK_② **is received.**
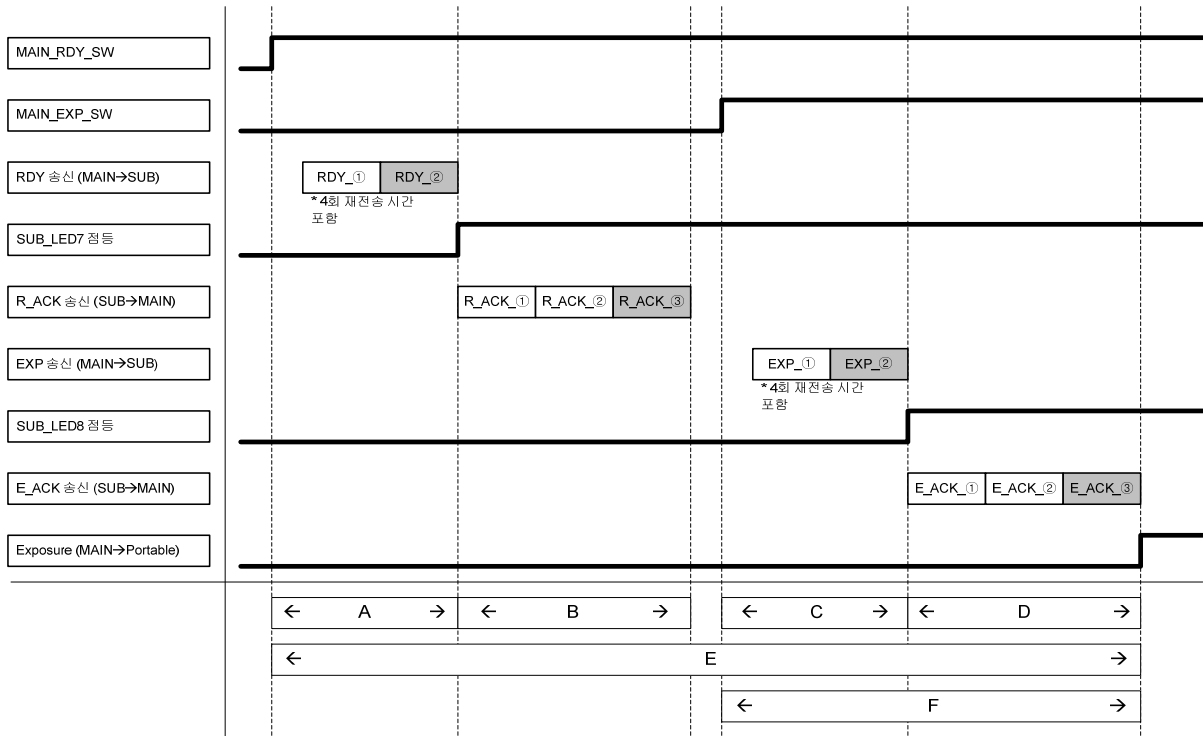(R_ACK_① can not be received with RDY_② transmission treatment in RF MAIN)

*C section (Time : about **100 ms**) – *Time from receiving RF MAIN Ready Receipt OK(ACK) to RF SUB Exposure LED action*
: Owing to R_ACK_③, EXP_① receiving can not be handled.
(EXP_① can not be received with R_ACK_③ transmission treatment in RF SUB)

*D section (Time : about **50 ms**) – *Time from RF SUB Exposure LED action to receiving RF MAIN Receipt OK(ACK)*
: Considering E_ACK_① **is treated right away because there is no clash**.

*E section (Time : about **300 ms**) – *Time from pushing Hand S/W Ready to receipt handling RF MAIN DR OK*
: Time from A section to D section. Considering Hand S/W handling time is **0ms**.

*F section (Time : about **150 ms**) – *Time from pushing Hand S/W Exposure to receipt handling RF MAIN DR OK*
: Time excluding Hand S/W Ready action in E section.

3) MAX. Timing Chart

Signal			
MAIN_RDY_SW			
MAIN_EXP_SW			
RDY 송신 (MAIN→SUB)	RDY_① RDY_② *4회 재전송 시간 포함		
SUB_LED7 점등			
R_ACK 송신 (SUB→MAIN)	R_ACK_① R_ACK_② R_ACK_③		
EXP 송신 (MAIN→SUB)	EXP_① EXP_② *4회 재전송 시간 포함		
SUB_LED8 점등			
E_ACK 송신 (SUB→MAIN)	E_ACK_① E_ACK_② E_ACK_③		
Exposure (MAIN→Portable)			

← A → ← B → ← C → ← D →

← E →

← F →

*A section (Time : about **1060 ms**) – *Time from pushing Hand S/W Ready to RF SUB Ready LED action.*
: considering to be treated on RDY_②, **including 4 times of repetition (transmission)**.

*B section (Time : about **150 ms**) – *Time from F SUB Ready LED action to receiving RF MAIN receipt OK(ACK)*
: considering to be treated on R_ACK_③.

*C section (Time : about **1060 ms**) – *Time from RF MAIN Ready receipt OK(ACK) to RF SUB Exposure LED action.*
: considering to be treated on EXP_② Frame, including 4times of repetition (transmission).

*D section (Time : about **150 ms**) – *Time from RF SUB Exposure LED action to receiving RF MAIN receipt OK(ACK)*
: considering to be treated on E_ACK_③.

*E section (Time : about **2420 ms**) – *Time from pushing Hand S/W Ready to receiving RF MAIN DR OK.*
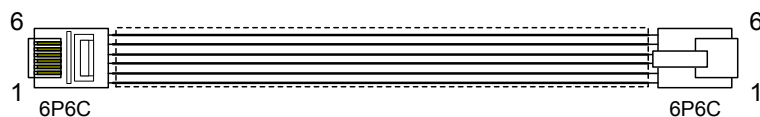: Time between A section and D section. Considering Hand S/W handling Time is **0ms**.

*F section (Time : about **1210 ms**) – *Time from pushing Hand S/W Exposure to receiving RF MAIN DR OK.*
: Time excluding Hand S/W Ready action in E section.

## 6.3 Link Wire

RF-H01

RF-MAIN - Portable Phone Jack

Connection Table

NO	Wire	Color	Start Point	End Point	Length(mm)	Remark
6	2464 AWD24 6C	–	6P6C 1PIN	6P6C 1PIN	300	DC +5V
5		–	6P6C 2PIN	6P6C 2PIN		Hand S/W Ready Signal
4		–	6P6C 3PIN	6P6C 3PIN		GND
3		–	6P6C 4PIN	6P6C 4PIN		PXMRF_1A(MAIN) Exposure Signal
2		–	6P6C 5PIN	6P6C 5PIN		GND
1			6P6C 6PIN	6P6C 6PIN		GND

RF-H02

RF-SUB - DR Plate

LENGTH 250mm   **50mm**

CN3
8
1
5264-08P
5mm 탈피 후 납땜
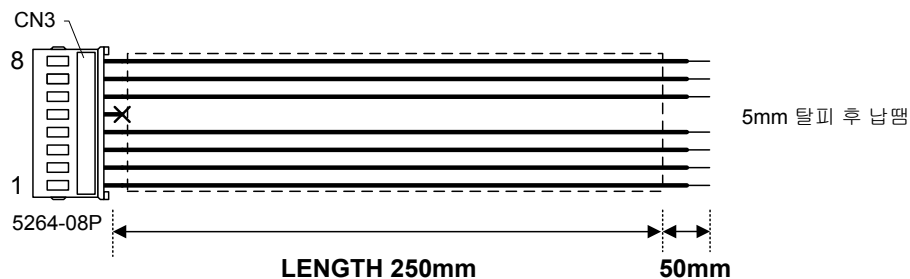
Connection Table

NO	Wire	Color	Start Point	End Point	Length(mm)	Remark
8	2464 AWD24 8C	BLUE	5264-08P PIN 8	DR: +12V	300	+12V
7		GREEN	5264-08P PIN 7	DR: +12V		+12V
6		YELLOW	5264-08P PIN 6	DR: DR OK		RF-SUB Input : DR OK
5		BLANK				
4		ORANGE	5264-08P PIN 4	DR: Exposure		RF-SUB Output : Exposure
3		RED	5264-08P PIN 3	DR: Exposure		RF-SUB Output : Exposure
2		BROWN	5264-08P PIN 2	DR: GND		GND
1		BLACK	5264-08P PIN 1	DR: GND		GND

	작성	검토	승인	MODEL		REV	00
결 재				RF Module	DATE		2007.05.24
					도 번		RF-H01, H02