Applicant	:	**SEJIN ELECTRON INC.** Head office & Factory 60-19,Kasan-dong,Keumchon-Ku, Seoul, Korea 153-801
Manufacturer	:	**SEJIN ELECTRON INC.** Head office & Factory 60-19,Kasan-dong,Keumchon-Ku, Seoul, Korea 153-801.
Test Item	:	907MHz Wireless Keyboard
FCC ID		**GJJSRF907**
Test Specification	:	ANSI C63.4: 1992 FCC Part 15 Subpart C-Intentional Radiators
Tested Date	:	May 29 - 31, 2002
Issued Date	:	June 8, 2002
Test Result	:	**Passed**

Tested by :

K.T.LEE

Name Signature

Reviewed by :

C.H.AHN

Name Signature

Other Aspects :

Abbreviations : OK, Pass = passed , Fail = failed , N/A = not applicable

NVLAP LAB CODE 200559-0

TEST SUMMARY

The data collected shows that the **SE-JIN ELECTRON INC. (FCC ID: GJJSRF907) 907MHz Wireless Keyboard** complies with §15.209, §15.249 of the FCC Rules.
The highest emission observed, with a minimum margin to the specifications, was at 893.3MHz for radiated emissions (Pol.: Vertical, EUT Angle : 108degree , ANT. Height : 100cm)with a margin of 3.4dB.

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report accdg. to NIS 81 / 5 1994.".

5.1 ANTENNA REQUIREMENT

RESULT : Pass

5.2 RADIATED EMISSIONS - General requirements

RESULT : Pass

5.3 RADIATED EMISSIONS – within the bands 902-928 MHz

RESULT : Pass

Contents

1. General Remarks

This Report describes the emission characteristics of the tested product.

If the product will be used with additional equipment other than those mentioned in this report or if the tested product will be used against the manufacture's specifications, the compliance with the relevant standards for the system has to be ensured.

2. Test Facility

2.1 Test Laboratory

Quality control in the testing laboratory is implemented as per ISO/IEC 17025, which is the "General requirements for the competents of calibration and testing laboratory".

This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

DIGITAL EMC CO., LTD.

Address : 683-2, Yubang-Dong, Yongin-Si, Kunggi-Do, Korea. 449-080

http://www.digitalemc.com

E-mail : demc@unitel.co.kr

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2.2 Measurement Instruments

Refer to each item.

3. General Product Information

GJJSRF907	
Kind of Equipment	: 907MHz Wireless Keyboard
FCC ID	: **GJJSRF907**
Model No.	: SWK-1115F1
RF MODULE	: 907 MHz band
Output power	: Less than 5mW
High Frequency	: 14.1718 MHz(TX board CLK) 4MHz (Wireless Keyboard Main CLK)
Applicant	: SE-JIN ELECTRON INC.
Manufacturer	: SE-JIN ELECTRON INC.
Date of Receipt of Sample	: 2002-5-23

4. Test Set-up and operation modes

4.1 Principle of Configuration Selection

Emission : The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation modes

The measurement is maximized and made by varying the mode of operation; scrolling the 'H' character.

4.3 Support Equipment Used

TYPE	MANUFACTURER	MODEL NO.(FCC ID)	SERIAL NO.	Cable
Notebook	COMPAQ	CM2080 (DoC)	5Y23KNG6515N	1.8m power cable(non-shield) 1.5m RF cable(shield)
Adaptor(For Notebook)	LITE-ON Elec.	PA-1600-02	N/A	1.8m power cable(non-shield)
Printer	H.P	C6464C (DoC)	TH15VH3KZW	1.8m power cable(non-shield) 1.5m I/F cable(shield)
Receiver	SEJIN	SWR-300U(DoC)	N/A	1.8m I/F cable(non-shield)
Wireless Keyboard	SEJIN	SWK-1115F1	N/A	-
Speaker	SAMSUNG	SP08A11 (DoC)	N/A	1.8m power cable(non-shield) 1.5m power cable(non-shield)

NOTE

- See "photographs" for actual system test setup

5. Test Results EMISSION

5.1 § 15.203 Antenna Requirement

RESULT : Pass

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

--- The antenna Type : PCB Pattern antenna

5.2 Radiated Emission – General Requirement

RESULT : Pass

5.2.1 Measurement Procedure

In the range of 30㎒ to 1㎓ the Electric Field strength was measured in accordance with ANSI C 63.4:1992. The test set-up was made according to ANSI C 63.4:1992.

On open test site, which allows a 3m-distance measurement. The EUT was placed in the center of a wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization (high:1-4m). The turntable has been fully rotated. The highest radiation of the equipment has been recorded. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission. For further description of the configuration refer to the picture of the test set-up.

5.2.2 List of Test and Measurement Instruments

Radiated Emission (OATS)				
Name of Instrument	**Model No**	**Serial No**	**Manufacturer**	**Next Cal. Date**
RFI/Field intensity Meter	KNM-504D	4N-161-4	Kyoritsu Electrical Work	2002.07
Frequency Converter	KCV-604C	4-230-3	Kyoritsu Electrical Work	2002.07
Spectrum Analyzer	8563E	3720A07025	Hewlett Packard	2002.08
BICONICAL ANT.	VHA9103	VHA91031946	SCHWARZBECK	2003.06
LOG-PERIODIC ANT.	UHALP9108-A1	1098	SCHWARZBECK	2003.06
Amplifier (25dB)	8447D	2944A10144	Agilent	2003.04
Position Controller	5902T2	14173	TOKIN	N/A
DRIVER	5902T2	14174	TOKIN	N/A
SWITCH	MP59B	6100097292	ANRITSU	N/A
Radiated Emission (ANECHOIC CHAMBER-PRE TESTING)				
Spectrum Analyzer	E4404B	US41061134	Agilent	2003.04
Amplifier (25dB)	8447D	2443A03690	Agilent	2003.04
BILOG ANTENNA	CBL6112B	2737	SCHAFFNER	2003.01
CONTROLLER	5900	N/A	TOKIN	N/A

5.2.3 Radiated Test Data

1) Test Data: May 29, 2002 Humidity: 51 %

Temperature: 22 ℃ Barometric: 994 mbar

2) Measurement uncertainty(95%, Confidence level, k=2) : +5.3dB / -4.74dB

3) Result ;

Frequency [㎒]	ANT Pol.	Reading [dBμV]	T.F [dB(1/m)]	Results [dBμV/m]	Limits [dBμV/m]	Margin [dB]
527.12	V	39.3	0.18	39.5	46	6.5
752.65	V	33.5	3.63	37.1	46	8.9
772.05	V	36.7	3.99	40.7	46	5.3
835.10	V	34.2	5.33	39.5	46	6.5
847.22	V	31.3	5.55	36.8	46	9.2
893.30	**V**	**36.4**	**6.19**	**42.6**	**46**	**3.4**
127.00	H	41.3	-8.6	32.7	43.5	10.8
163.38	H	38.7	-5.69	33.0	43.5	10.5
175.50	H	40.4	-5.27	35.1	43.5	8.4
527.14	H	37.1	0.18	37.3	46	8.7
835.10	H	32.2	5.33	37.5	46	8.5
893.30	H	35.8	6.19	42.0	46	4.0

Table 1 : Radiated Test Data-general requirement

NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. H = Horizontal; V = Vertical
3. Margin = Limit – Result
4. T.F. : Correction Factors(Cable loss + Antenna factor) – AMP Gain
5. Refer to “APPENDIX 2 Photographs” ” for actual system test setup.
6. Measurement Data’s kept in DIGITAL EMC
7. Sample calculation ;At Frequency : 893.30MHz
   Result = Reading + T.F.=36.4 + 6.19 = 42.6[dBμV/m]

§ 15.209 limit

Frequency (MHz)	Field strength microvolts/meter	Field strength dBμV/m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

5.3 Radiated Emission – With the bands 902 ~ 928 MHz

RESULT : Pass

5.2.1 Measurement Procedure

The field strength of emissions from intentional radiators operated within the bands 902 ~ 928MHz was measured in accordance with FCC Part 15C §15.249. The test set-up was made according to ANSI C 63.4:1992.

On open test site, which allows a 3m-distance measurement. The EUT was placed in the center of a wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization (high:1-4m). The turntable has been fully rotated. The highest radiation of the equipment has been recorded. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission. For further description of the configuration refer to the picture of the test set-up.

5.2.2 List of Test and Measurement Instruments

Radiated Emission (OATS)				
Name of Instrument	**Model No**	**Serial No**	**Manufacturer**	**Next Cal. Date**
RFI/Field intensity Meter	KNM-504D	4N-161-4	Kyoritsu Electrical Work	2002.07
Frequency Converter	KCV-604C	4-230-3	Kyoritsu Electrical Work	2002.07
Spectrum Analyzer	8563E	3720A07025	Hewlett Packard	2002.08
LOG-PERIODIC ANT.	UHALP9108-A1	1098	SCHWARZBECK	2003.06
Horn ANT.	3155	6419	EMCO	2003.02
Amplifier (25dB)	8447D	2944A10144	Agilent	2003.04
Amplifier (30dB)	8449B	3008A01590	Agilent	2003.05
Position Controller	5902T2	14173	TOKIN	N/A
DRIVER	5902T2	14174	TOKIN	N/A
SWITCH	MP59B	6100097292	ANRITSU	N/A

5.2.3 Radiated Test Data

1) Test Data: May 31, 2002 Humidity: 55 %

Temperature: 24 ℃ Barometric: 998 mbar

2) Measurement uncertainty(95%, Confidence level, k=2) : +5.3dB / -4.74dB

3) Result ;

Frequency [㎒]	ANT Pol.	Reading [dBμV]	T.F [dB(1/m)]	Results [dBμV/m]	Limits [dBμV/m]	Margin [dB]
907.05	H	59.8	6.0	65.8	94	28.2
907.05	V	55.3	6.0	61.3	94	32.7
1814	H	38.1	6.3	44.4	74	29.6
1814	V	34.1	6.3	40.4	74	33.6

Table 2 : Radiated Test Data-general requirement

NOTES:

1. Up to the 10th harmonics were investigated according to §15.33 and the worst-case emissions are reported.
2. H = Horizontal; V = Vertical; Margin = Limit – Result
3. T.F. : Correction Factors(Cable loss + Antenna factor) – AMP Gain
4. Measurements above 1000MHz shall be performed using a minimum resolution bandwidth of 1 MHz.
5. Refer to “APPENDIX 2 Photographs” ” for actual system test setup.
6. Measurement Data’s kept in DIGITAL EMC

§15.249 limit

Fundamental Frequency (MHz)	Field strength of fundamental microvolts/meter (dBμV/m)		Field strength of harmonics microvolts/meter (dBμV/m)	
902 ~ 928	50	(94)	500	(54)

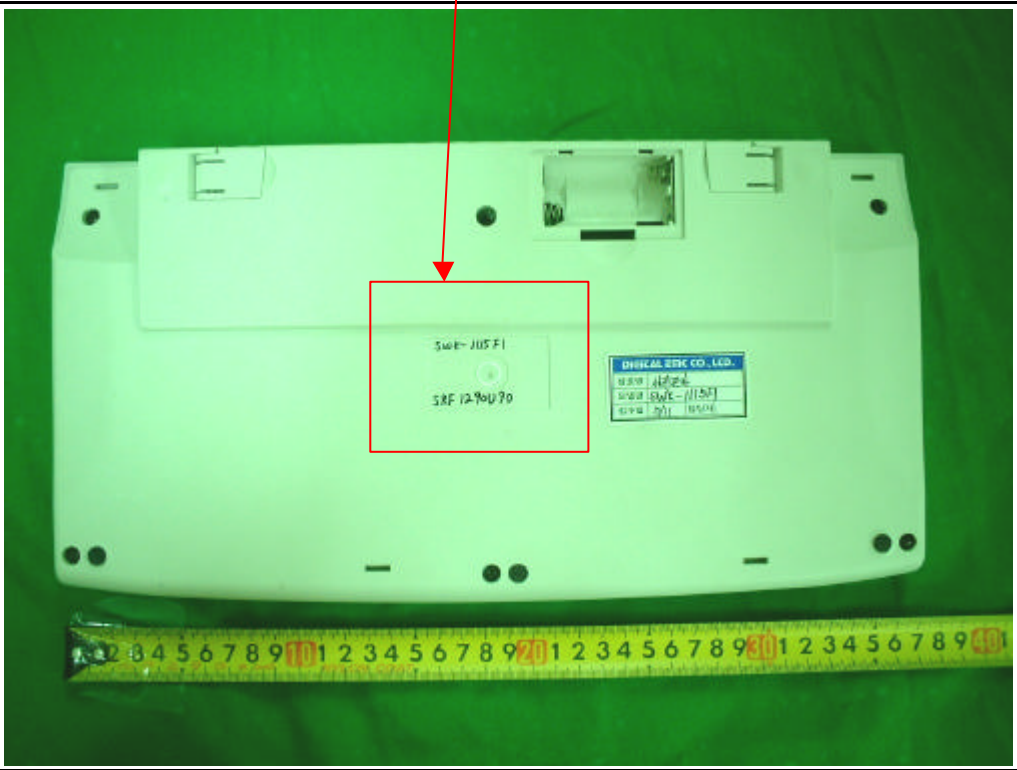
APPENDIX 1 **Sample Label**

Labeling Requirements

The sample label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.

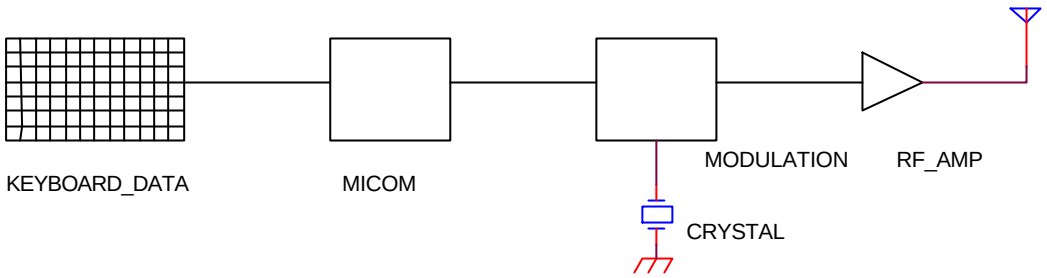
FCC ID:
Trade Name: SEJIN
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

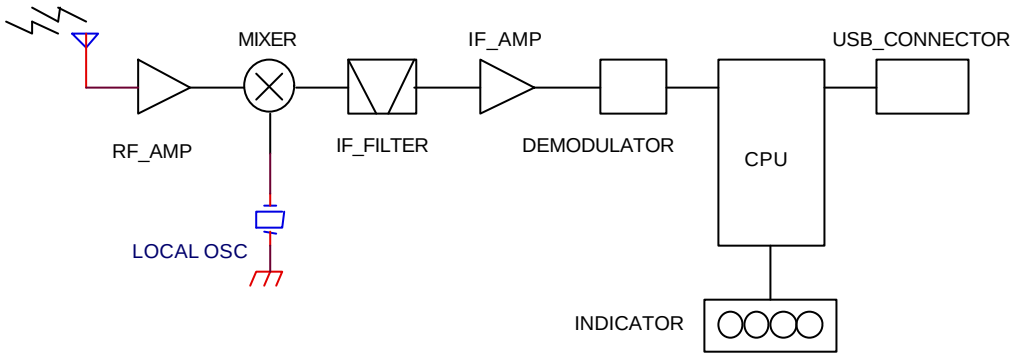
FCC ID location of EUT



APPENDIX 2

BLCOK DIAGRAM

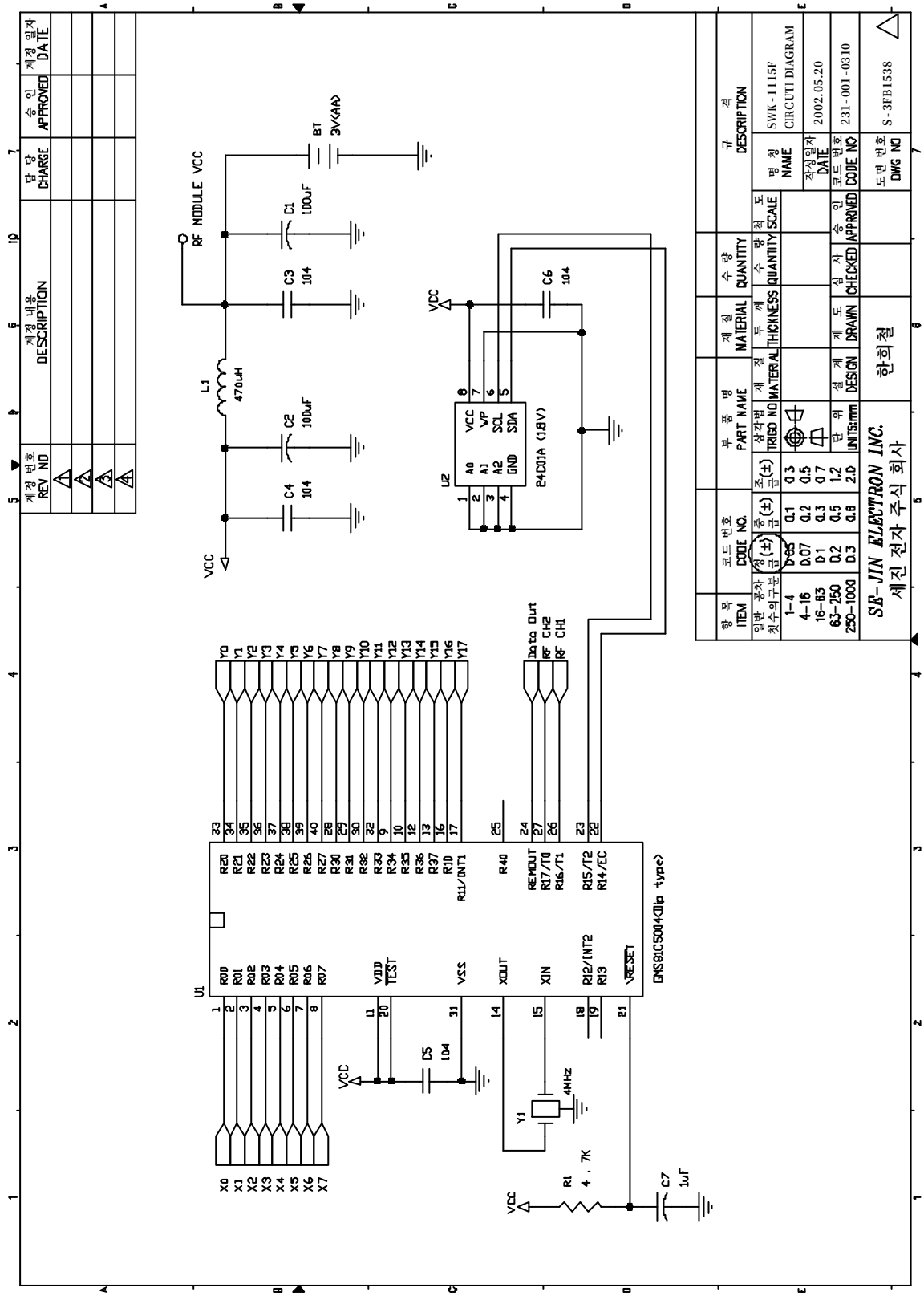




APPENDIX 3

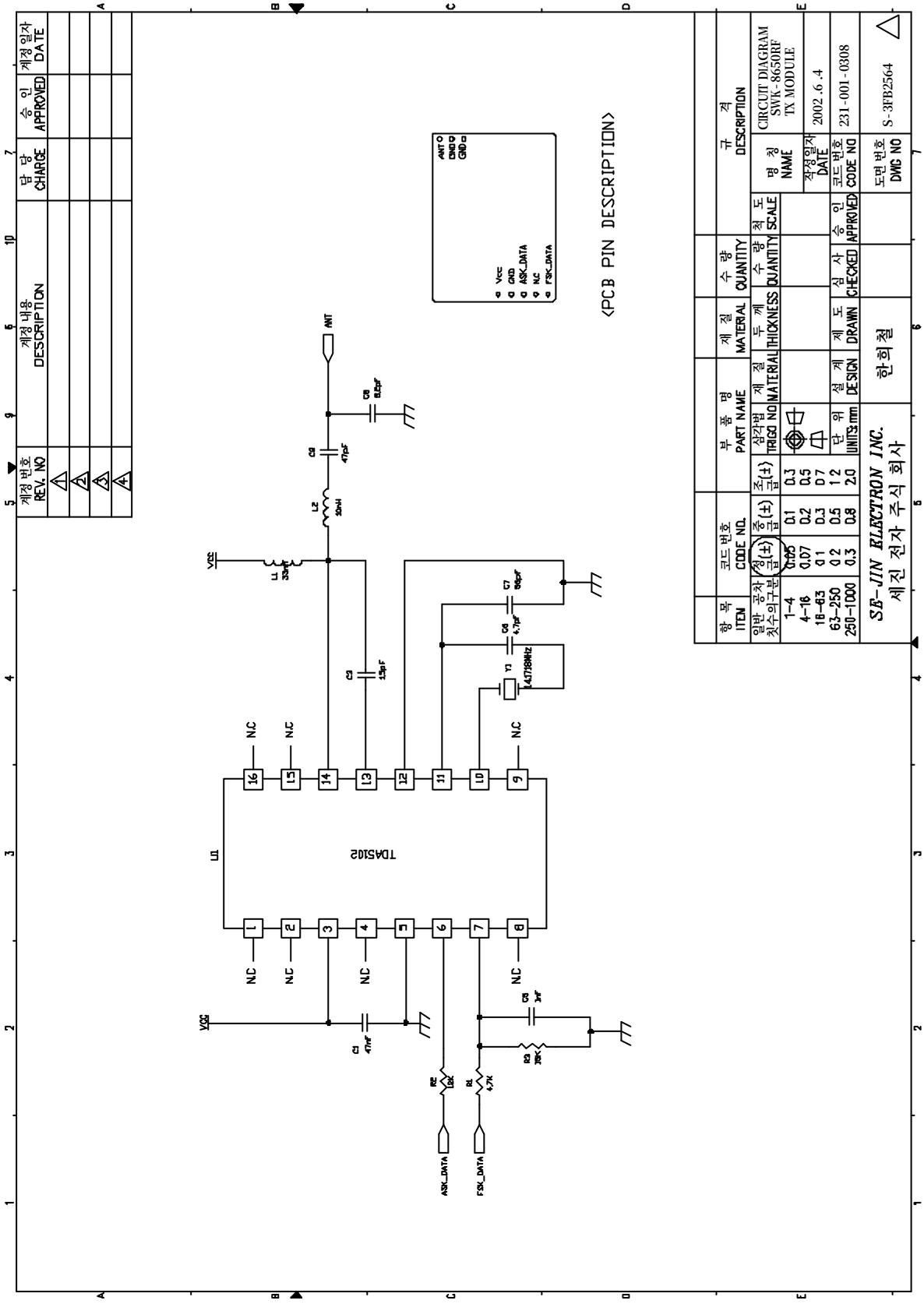
SCHEMATIC DIAGRAM(S)

Keyboard Main board



FCC ID: GJJSRF907

Keyboard TX board



FCC ID: GJJSRF907

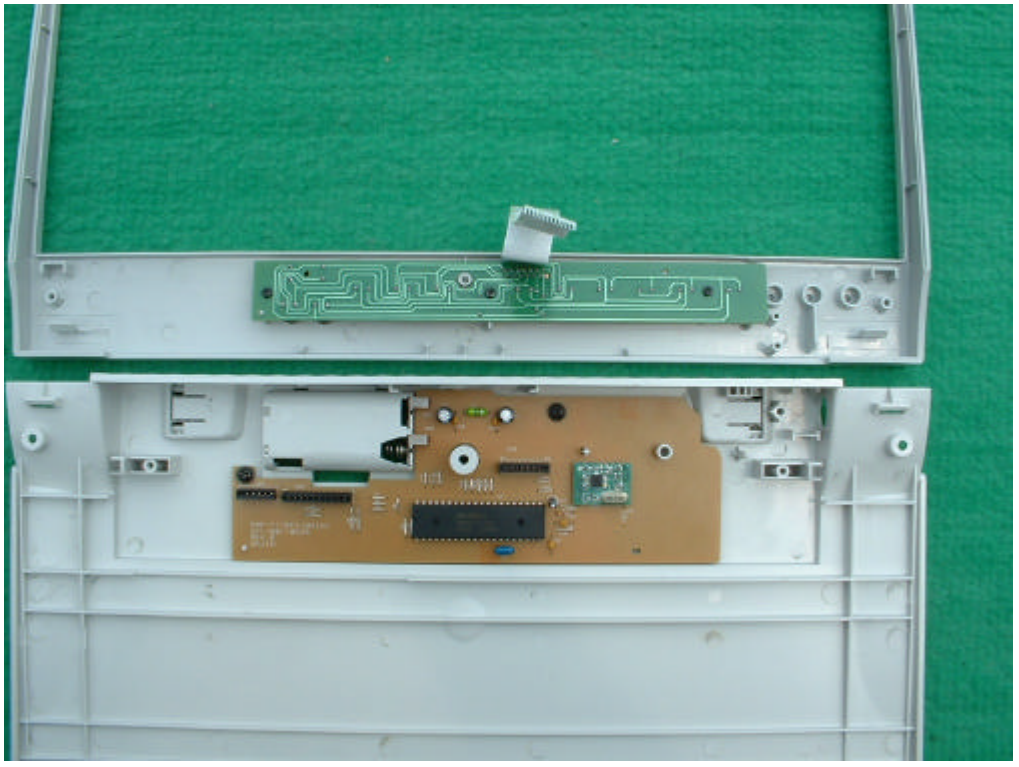
APPENDIX 4

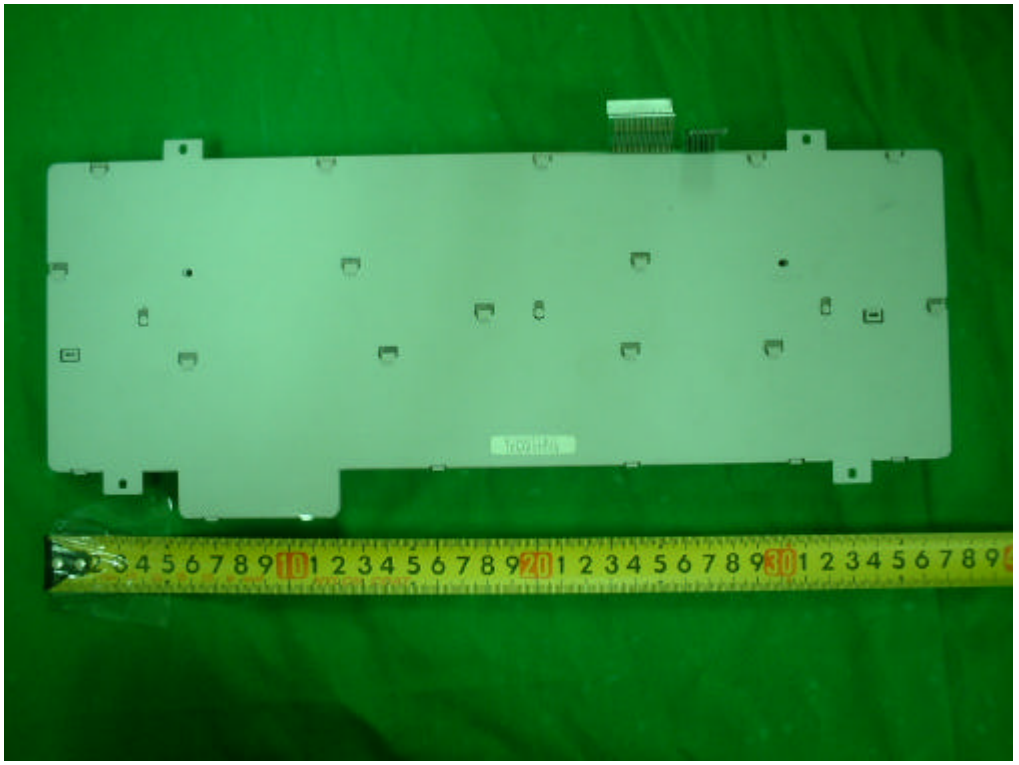
Test setup photographs

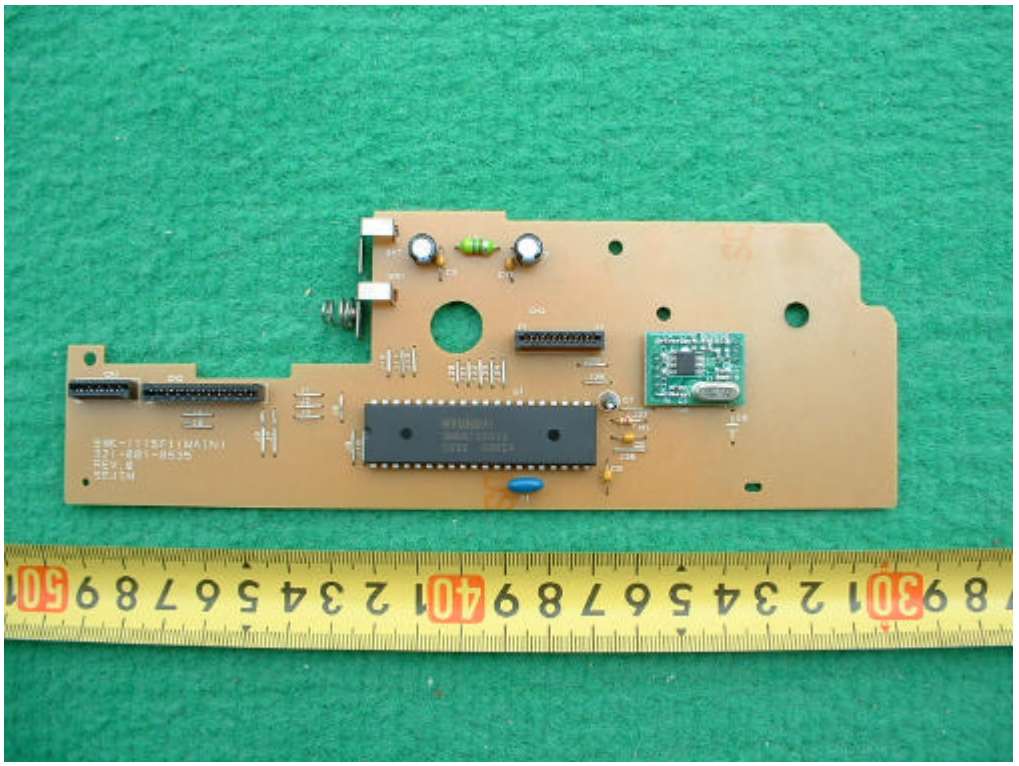
APPENDIX 5

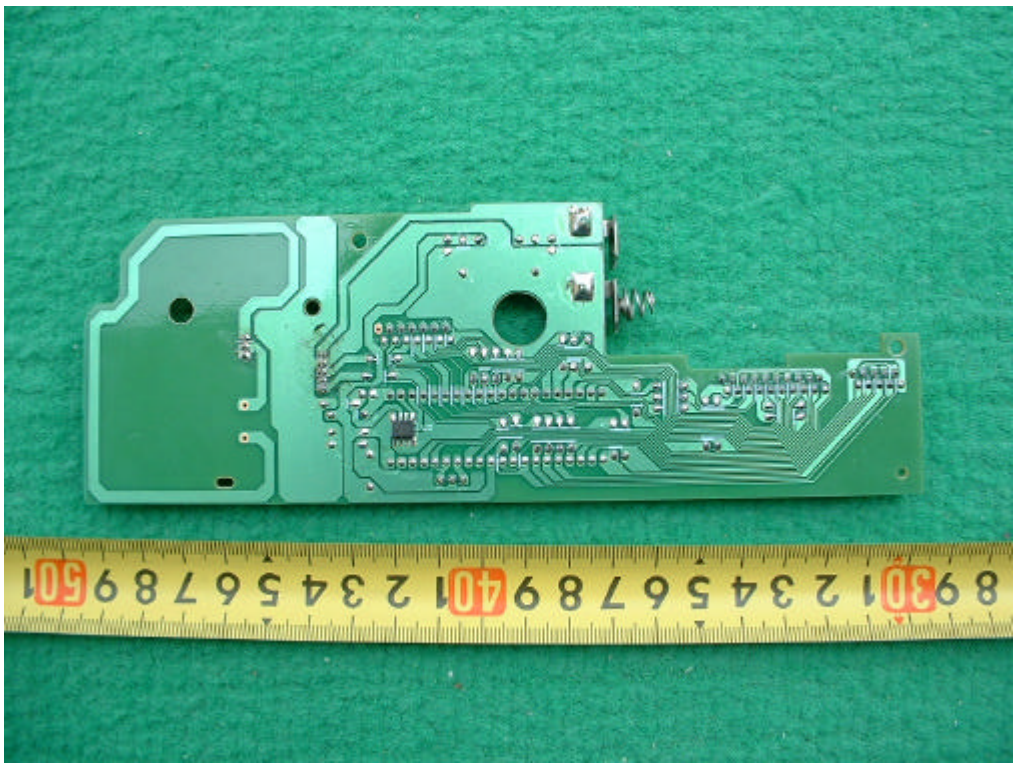
External photographs

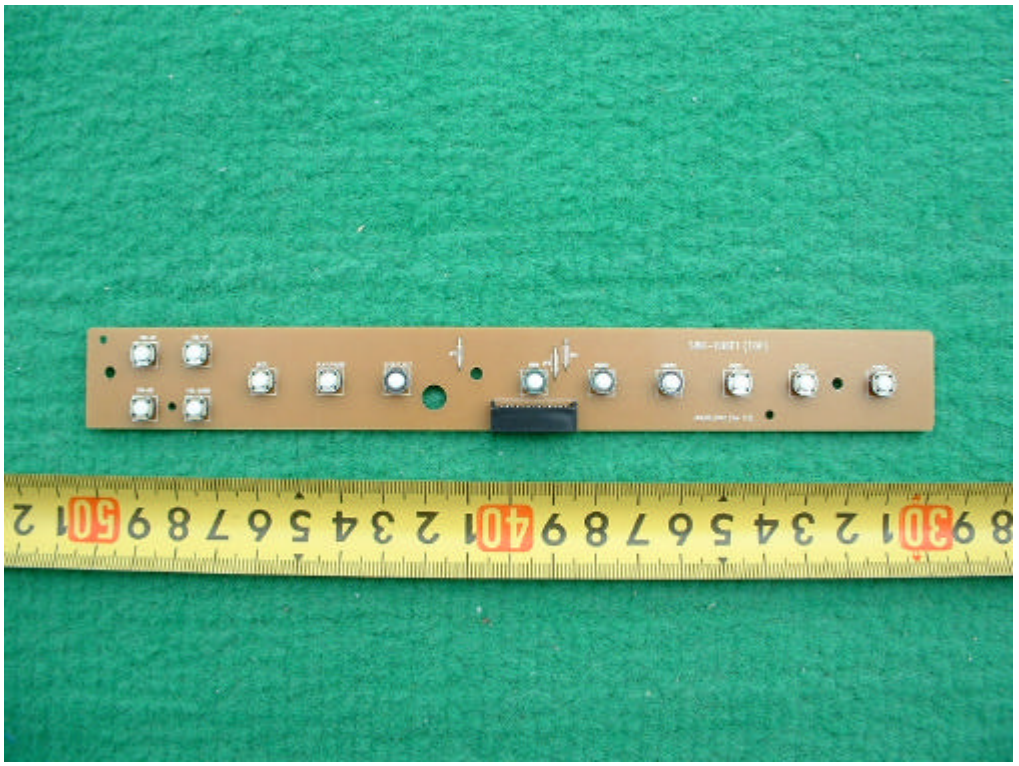
APPENDIX 6 **Internal photographs**

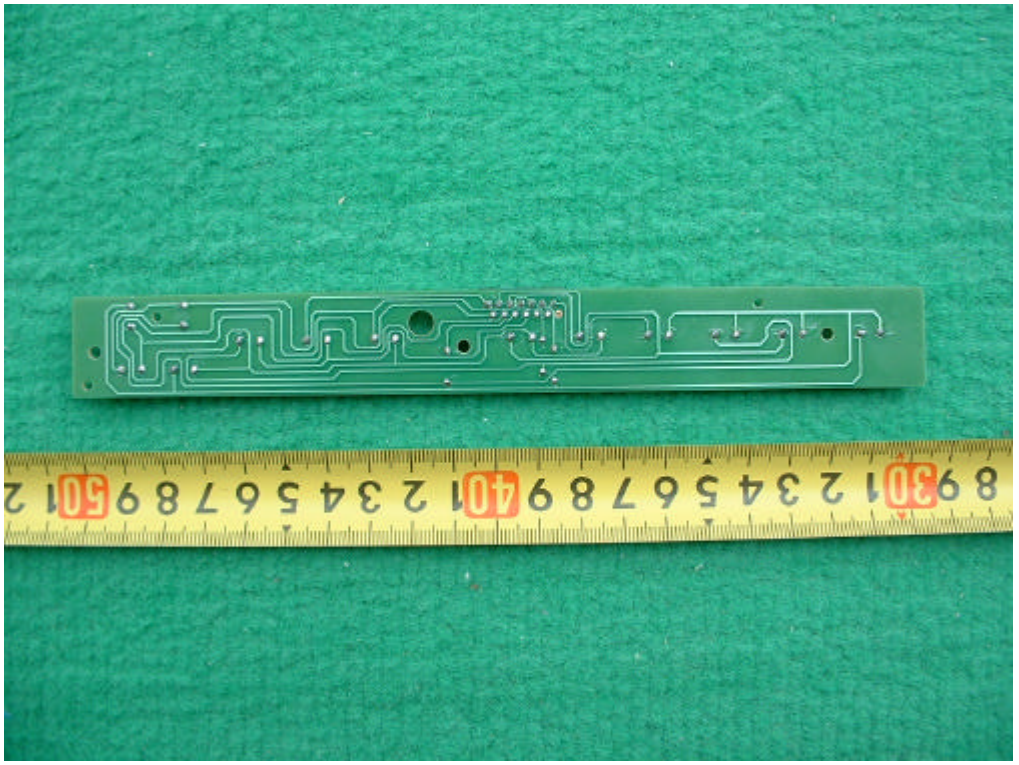


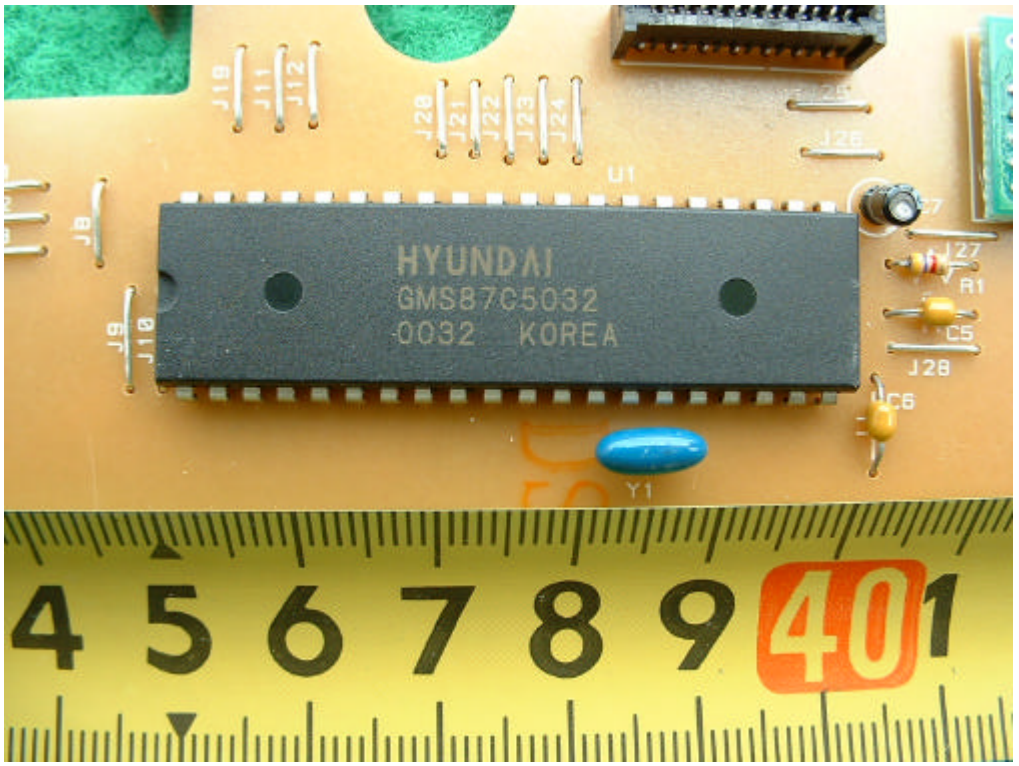








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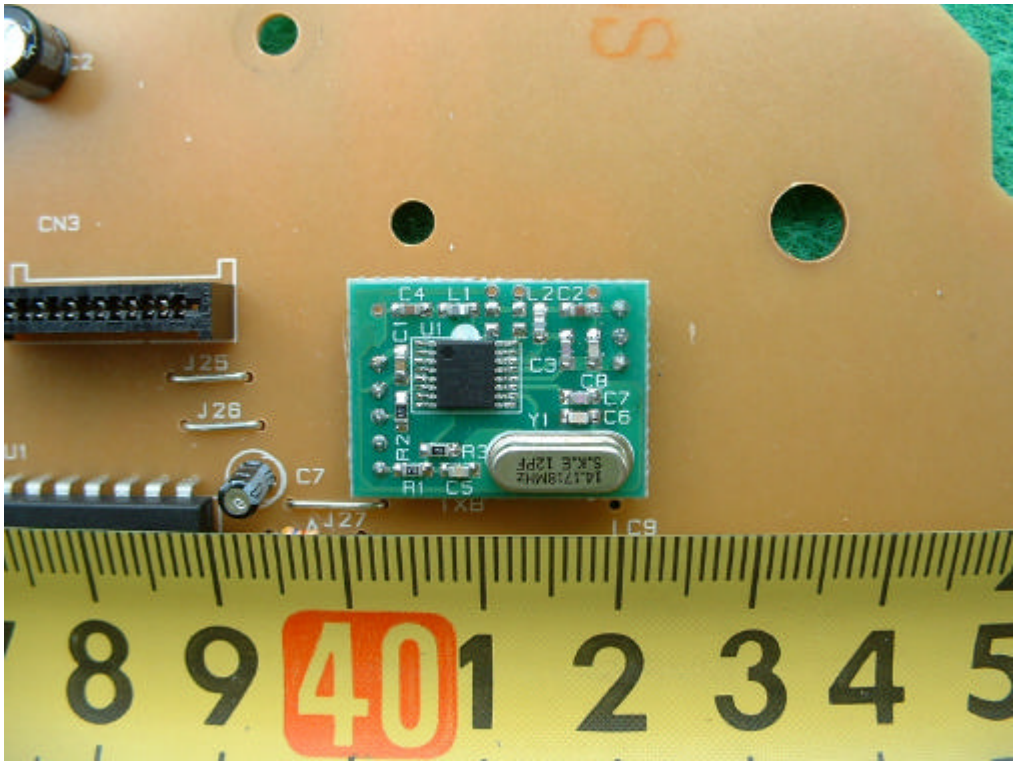
0032 KOREA
U1
Y1
J28
C5
C6
R1
J27


CN3
J25
J26
C7
U1
C4
L1
L2
C2
C1
C3
C8
C6
Y1
R1
C5
C9

APPENDIX 7 **USER'S MANUAL**

Production Name: 907MHz Wireless Keyboard

FCC WARNING:

This equipment generates or uses radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose authority to operate this equipment if an unauthorized change or modification is mode

CAUTION: Change or modifications not expressly approved by manufacturer responsible for Compliance could void the user's authority to operate the equipment.

1. General features

- Microsoft Windows 98/Me/2000/XP compatible
- USB Standard Base station: "A" type connector, Low speed(1.5Mbps)
- Full size key pitch with a quite tactile feel
- Battery life : 12 Months (assuming the user typed for 30 minutes each day)
- User ID support : Max 255 User' s ID * 3 Bytes Random codes (SEJIN ID Mode Support)
- Suspend mode : When not in use, the keyboard enter a suspend mode to reduce power consumption. Any key input return the keyboard to the active mode
- Operating Distance : 5meters(Min)
- Built-in 11 Hot keys.

2. RF Features

- **Radio Frequency in conformance with USA Radio Standards**
  -Operating Frequency : ISM(Industrial, Scientific, Medical) Band, 907MHz zone
  -Output Power : Less than 5mW
- **Safety Radio Transmission in a noise environment**
  -Super Heterodyne Demodulation
  -Narrow Band Operating (Frequency Modulation)
- **Secure Radio Transmission**
  Max 255 User' s ID. (SEJIN ID Mode Support)
- **Antenna Type**
  Keyboard : PCB Pattern antenna

Receiver : PCB Pattern antenna

3. User ID settings

3.1 Description

The user ID is stored into the internal serial EEPROM and the stored data is kept even though the system power down.

3.2 User ID setting procedure:

1) Insert batteries into the keyboard.
2) Push the `Wakeup/ID set' button on the RF Base station and hold down for three seconds. Power/Data indication LED will blink in every a second.
3) Type ESC key with Left-Control, Left-Shift and Right-Shift key down combination. The Power/Data indication LED will blink still.
4) Input user ID number that is 1 to 255 with the numeric keys on the keyboard and than type Enter key. After input the Enter key, the Power/Data indication LED will stop to blink.
5) Once the user ID setting is done, the RF Base station automatically returns back its normal operation mode.

∗ Note: Step 2 though step 4 must be done within 30 second. Otherwise, the RF base station will cancel the matrix ID setting procedure. In the case, the operator will have to retry from step 2. If a wrong key has typed, the keyboard will cancel the user ID setting procedure. In the case, if the Power/Data indication LED on the RF base station is still blinking, the operator will have to retry from step 3. Otherwise, the operator will have to retry from step 2.

4. Consumer control buttons

The SKR-1115F1(SRF-1209U90) has a built-in 13 hotkeys for 11 consumer control buttons and Sleep and Power off control button.

- Table for Consumer control buttons

Key Name	Description
MUTE	Mute
Vol +	Volume increase
Vol -	Volume decrease
Track +	Scan next track
Track -	Scan previous track
■ STOP	Stop

Key Name	Description
⏵/⏸ Play/Pause	Play / Pause
(Back)	Application Control Back
⊗ (Stop)	Application Control Stop
(Forward)	Application Control Forward
↻ (Refresh)	Application Control Refresh

4. Electrical Specification

- Power : 3V DC (2 ‘ AA’ batteries)
- Contact resistance : 500Ω min. per each key.
- Insulation resistance : 100 MΩ at DC 250 V
- Bounce : less than 10msec
- RF MODULE : 907MHz band
- Simultaneously working with the SEJIN standard remote
- Mouse data reporting rate : 60 packets / sec

5. Mechanical Specifications

Keyswitch type	Membrane & rubber contact with Quiet tactile feel
Number of keys	US / Korean ver. : 100 keys, European ver. : 102 keys Japanese ver. : 104 keys
Functionality	Full 104 or 105,106, 109 keyboard for Windows
Key travel (Full stroke)	3.5 ± 0.5 mm
Operating force	55 ± 15 gf
Key pitch	Full size key pitch ; 19.05 mm(0.75 in)
Compatibility	PC/AT, USB and Microsoft Windows compatible
Dimension(L x W x H)	390 x 230 x 49 mm (15.35 x 9.05 x 1.93 in)

6. Environmental Characteristic

- Ambient temperature and Humidity (Operation)

  Temperature : 0 ~ 50 °C

  Humidity : 85% RH (without condensation)

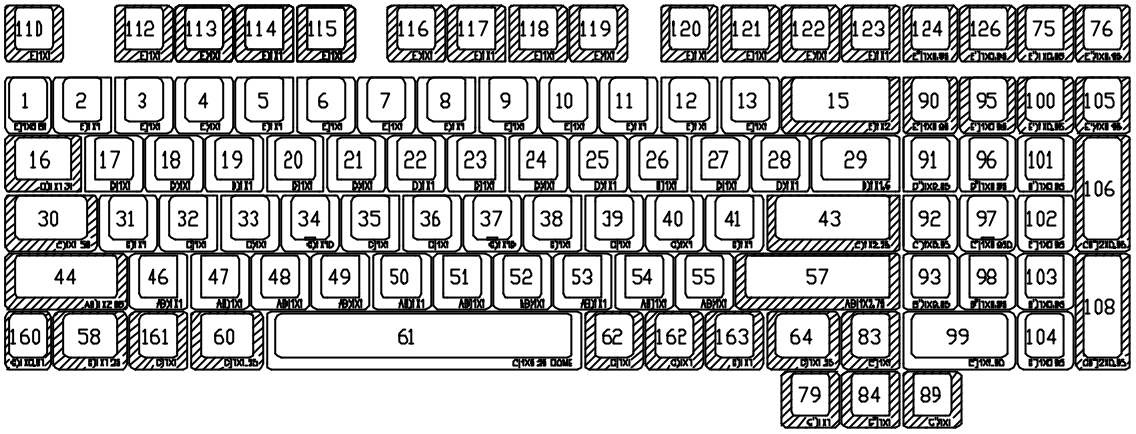
- Ambient temperature and Humidity (Storage)

  Temperature : -20 ~ 50 °C

  Humidity : 95% RH (Storage)

7. Keyboard Matrix and RF code

7.1Key Position Number(US version)



7.3 Keyboard Layout(US version)