

佳和集團

怡安科技

CHIA HEIR GROUP

RF-LINK SYSTEMS INC.

FCC ID.: MIBRF60102

EXHIBIT 3

Test Report With Eut Photograph

FCC ID: MIBRF60102
RF-Link System Inc. / Wireless RS232, Model RF-60102-XX ,
QTK99-F002A: 2.4 GHz Spread Spectrum Transceiver
QTK99-F002B: Class B Computing Device Peripheral

FCC Test Report
Application for Certification

On Behalf Of

RF-Link Systems Inc.

Wireless RS232

Model # : RF 60102-xx

FCC ID : MIBRF60102

Prepared For:

RF-Link Systems Inc.

**1F, No.9, Chan Yeh Road 1, Science-Based
Industrial Park, HsinChu, Taiwan, R.O.C.**

Report By : QuieTek Corporation
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The test results are traceable to the national or international standards
Test results given in this report only relate to the specimen(s) tested or measured.
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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

TABLE OF CONTENTS

| Description | Page |
|--|------|
| 1. TEST REPORT CERTIFICATION..... | 4 |
| 2. GENERAL INFORMATION | 5 |
| 2.1 PRODUCTION DESCRIPTION | 5 |
| 2.2 TESTED SYSTEM DETAILS..... | 6 |
| 2.3 TEST METHODOLOGY | 7 |
| 2.4 TEST FACILITY | 8 |
| 3. SUMMARIZATION OF TEST RESULTS | 9 |
| 4. CONDUCTED POWER LINE TEST..... | 10 |
| 4.1 TEST EQUIPMENTS..... | 10 |
| 4.2 BLOCK DIAGRAM OF TEST SETUP | 10 |
| 4.3 CONDUCTED POWERLINE EMISSION LIMIT | 11 |
| 4.4 EUT CONFIGURATION ON MEASUREMENT | 11 |
| 4.5 EUT EXERCISE SOFTWARE..... | 11 |
| 4.6 TEST PROCEDURE | 12 |
| 4.7 CONDUCTED EMISSION DATA..... | 12 |
| 5. OCCUPIED BANDWIDTH..... | 15 |
| 5.1 TEST EQUIPMENT | 15 |
| 5.2 TEST SETUP | 15 |
| 5.3 TEST CONDITION | 15 |
| 5.4 MINIMUM STANDARD | 15 |
| 5.5 OCCUPIED BANDWIDTH DATA..... | 15 |
| 6. PEAK POWER OUTPUT..... | 16 |
| 6.1 TEST EQUIPMENT | 16 |
| 6.2 TEST SETUP | 16 |
| 6.3 TEST CONDITION | 16 |
| 6.4 MINIMUM STANDARD | 16 |
| 6.5 PEAK POWER OUTPUT DATA | 16 |
| 7. RADIATION EMISSION TEST | 17 |
| 7.1 TEST EQUIPMENT | 17 |
| 7.2 TEST SETUP | 17 |
| 7.3 TEST CONDITION | 18 |

| | | |
|------------|---|-----------|
| 7.4 | MINIMUM STANDARD | 18 |
| 7.5 | OPERATING CONDITION OF EUT | 19 |
| 7.6 | TEST PROCEDURE | 19 |
| 7.7 | RADIATED EMISSION DATA | 19 |
| 8. | TRANSMITTER POWER DENSITY | 25 |
| 8.1 | TEST EQUIPMENT | 25 |
| 8.2 | TEST SETUP | 25 |
| 8.3 | TEST CONDITION | 25 |
| 8.4 | MINIMUM STANDARD | 25 |
| 8.5 | TRANSMITTER POWER DENSITY DATA | 25 |
| 9. | PROCESSING GAIN | 26 |
| 9.1 | TEST SETUP | 26 |
| 9.2 | TEST CONDITION | 26 |
| 9.3 | MINIMUM STANDARD | 26 |
| 9.4 | METHOD OF MEASUREMENT | 26 |
| 9.5 | CALCULATION OF PROCESSING GAIN: | 26 |
| 10. | EMI REDUCTION METHOD DURING COMPLIANCE TESTING | 27 |
| 11. | TEST PHOTOGRAPHS | 28 |
| 12. | EUT DETAIL PHOTOGRAPHS | 32 |

1. Test Report Certification

QTK99-F002A/B

Applicant : RF-Link Systems Inc.

EUT Description *SPREAD SPECTRUM TRANSCIVER & CLASS B COMPUTING DEVICE PERIPHERAL*

(1) Model Name : Wireless RS232

(2) Model No. : RF 60102-xx

(3) Serial Number : N/A

(4) FCC ID. : MIBRF60102

(5) Power Supply : 120V/60Hz AC

MEASUREMENT STANDARD USED :

CFR 47, Part 15 Radio Frequency Device Subpart C Paragraph 15.247

CFR 47, Part 15 Radio Frequency Device Subpart B Unintentional Radiators Class B :1996

MEASUREMENT PROCEDURE USED :

ANSI C63.4 Methods of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz. :1992

The device described above was tested by QuiTek Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 limits for various standard requirements.

The measurement results are contained in this test report and QuiTek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC Part 15 limits.

And there are no deviation from the above measurement process.

Sample Received Date : December 10, 1998

Test Date : December 29, 1998

Documented by : Kathy Lee



Test Engineer:

Approve & Authorized Signer:

Neil Huang
Neil Huang

Gene Chang
Gene Chang

FCC ID: MIBRF60102
RF-Link System Inc. / Wireless RS232, Model RF-60102-XX
QTK99-F002A: 2.4 GHz Spread Spectrum Transceiver
QTK99-F002B: Class B Computing Device Peripheral

2. General Information

QTK99-F002

2.1 Production Description

Description : Wireless RS232
 Model Number : RF 60102-xx
 Serial Number : N/A
 FCC ID. : MIBRF60102
 Applicant : RF-Link Systems Inc.
 Address : 1F, No.9, Chan Yeh Road 1, Science-Based Industrial Park, HsinChu, Taiwan, R.O.C.
 Manufacturer : RF-Link Systems Inc.
 Address : 1F, No.9, Chan Yeh Road 1, Science-Based Industrial Park, HsinChu, Taiwan, R.O.C.
 Frequency Range : 2400 MHz to 2483.5 Mhz
 Channel Number : 15
 Tx Frequency of each Channel: 2406.40, 2411.52, 2416.64, 2421.76, 2426.88, 2432.00, 2437.12, 2442.24, 2447.36, 2452.48, 2457.60, 2462.72, 2467.84, 2472.96, 2478.08
 Rx Frequency of each Channel: 2267.392, 2275.512, 2277.632, 2282.752, 2287.872, 2292.992, 2298.112, 2303.232, 2308.352, 2313.472, 2318.592, 2323.712, 2328.832, 2333.952, 2339.072
 Type of Modulation : Direct Sequence Spread Spectrum
 Operator Selection of : Configuration Channel from User's Application Software
 Operating Frequency
 Type of Antenna : Patch Antenna
 Data Cable : Shielded, Detachable, 1.2m
 Power Cord : Shielded, Detachable, 1.5m

Mode Difference :

- (1) Mode 1 : Channel 1 (Frequency : 2406.40 Mhz for Tx, 2267.392 Mhz for Rx)
- (2) Mode 2 : Channel 8 (Frequency : 2442.24 Mhz for Tx, 2303.232 Mhz for Rx)
- (3) Mode 3 : Channel 15 (Frequency : 2478.08 Mhz for Tx, 2339.072 Mhz for Rx)

Note: 1. The data show in this test report reflects the worst-case data for each operation mode.
 2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for non-spread spectrum devices.

2.2 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

Host Personal Computer

Model Number : PIIL97
Manufacturer : ASUS
Serial Number : AS10228
FCC ID : DoC
Power Cord : Non-shielded, Detachable, 1.8m

Keyboard

Model Number : 6311-TW2C
Serial Number : N/A
FCC ID : DoC
Manufacturer : ACER
Data Cable : Shielded, Non-detachable, 1.8m

Monitor

Model Number : CM752ET-311
Serial Number : T8F006364
FCC ID : DoC
Manufacturer : HITACHI
Data Cable : Shielded, Non-Detachable 1.5m
Power Cord : Shielded, Detachable 1.8m

Printer

Model Number : C2642A
Serial Number : MY75J1D1D0
FCC ID : B94C2642X
Manufacturer : HP
Data Cable : Shielded, Detachable, 1.2m
Power Adapter : NMB, M/N: C2175A
Cable for AC IN: Unshielded, Non-detachable, 0.7m
Cable for AC Out: Unshielded, Non-detachable, 1.5m

Modem

Model Number : 1414
Serial Number : 980033038
FCC ID : IFAXDM1414
Manufacturer : ACEEX
Data Cable : Shielded, Detachable, 1.5m
Power Adapter : ACCEX, M/N: SCP41-91000A
Cable Output : Shielded, Non-detachable, 1.5m

Mouse

Model Number : M-S34
Serial Number : LZB75078428
FCC ID : DZL211029
Manufacturer : HP
Data Cable : Shielded, Non-detachable, 1.8m

Wireless RS232 (EUT)

Model Number : RF60102-xx
Serial Number : N/A
FCC ID : MIBRF60102
Manufacturer : RF-Link Systems Inc.
Data Cable : Shielded, Detachable, 1.2m *WITH ONE BONDED FERRITE CORE*
Power Cord : Shielded, Detachable, 1.5m

9V DC POWER ADAPTOR WITH DC CABLE WITH ONE BONDED FERRITE CORE.

2.3 Test Methodology

FCC part 15 Subpart C Paragraph 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5875 MHz

The fundamental, harmonics and general radiated emissions testing were performed according to the procedures in ANSI C63.4-1992.

Radiated testing was performed at an antenna to EUT distance of 3 meters.

2.4 Test Facility

Site Description : November 3, 1998 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2

NVLAP Lab Code: 200347-0
United States Department of Commerce
National Institute of Standards and Technology
National Voluntary Laboratory Accreditation Program

Name of firm : QuieTek Corporation

Site location : No.75-1, Wang-Yeh Valley, Yung-Hsing Tsuen,
Chiung-Lin, Hsin-Chu County, Taiwan, R.O.C.

3. Summarization of Test Results

The test results were performed according to the requirements of measurement standard and process. QuieTek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. The summarization of the worst value is described as below:

| Name of Test | Para. No. | Spec. | Meas. | Result |
|--|--------------|----------------------|------------|--------|
| The Powerline Conducted Emission | 15.207(a) | 48dBuV | Test Data | Pass |
| The Occupied Bandwidth | 15.247(a)(2) | $\geq 500\text{KHz}$ | 1.6MHz | Pass |
| Peak Power Output | 15.247(b) | 1 Watt | 12.39dBm | Pass |
| Spurious Emissions (Band Edge Antenna Radiated) | 15.247(c) | -20dBc | Chart | Pass |
| Spurious Emissions(radiated) | 15.247(c) | Table 15.209(a) | Test Data | Pass |
| Transmitter Power Density | 15.247(d) | $\leq +8\text{dBm}$ | 1.05dBm | Pass |
| Processing Gain | 15.247(e) | $\geq 10\text{ dB}$ | Cust. Data | Pass |

4. Conducted Power Line Test

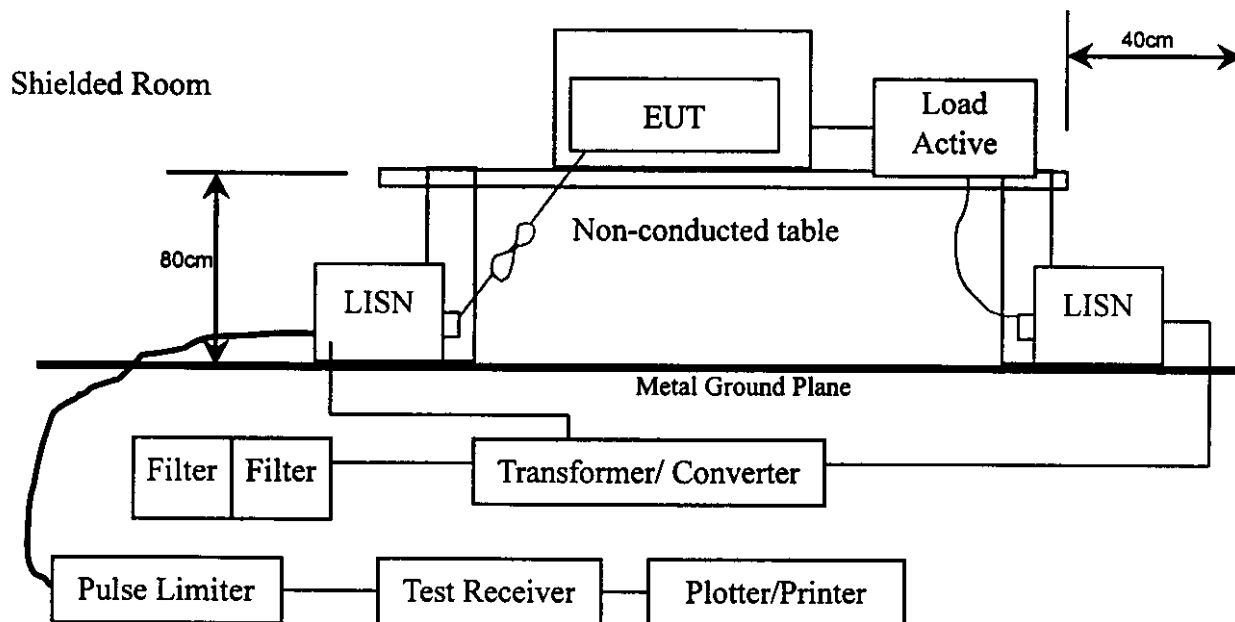
4.1 Test Equipments

The following test equipments are used during the conducted power line tests:

| Item | Instrument | Manufacturer | Type No./Serial No | Last Cal.. | Remark |
|------|--------------------|--------------|--------------------|------------|-------------|
| 1 | Test Receiver | R & S | ESCS 30/825442/17 | May, 1998 | |
| 2 | L.I.S.N. | R & S | ESH3-Z5/825016/6 | May, 1998 | EUT |
| 3 | L.I.S.N. | Kyoritsu | KNW-407/8-1420-3 | May, 1998 | Peripherals |
| 4 | Pulse Limiter | R & S | ESH3-Z2 | N/A | |
| 5 | N0.2 Shielded Room | | | N/A | |

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

4.2 Block Diagram of Test Setup



4.3 Conducted Powerline Emission Limit

➤ 15.207(a) Limits

| Frequency | Maximum RF Line Voltage | |
|-----------|-------------------------|------|
| | uV | dBuV |
| 0.45 – 30 | 250 | 48.0 |

Remarks : In the Above Table, the tighter limit applies at the band edges.

4.4 EUT Configuration on Measurement

The equipments which is listed 3.2 are installed on Conducted Power Line Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.5 EUT Exercise Software

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

- 3.5.1 Setup the EUT and simulators as shown on 3.2
- 3.5.2 Turn on the power of all equipment.
- 3.5.3 Personal Computer reads data from disk.
- 3.5.4 Personal computer sends "H" pattern to printer, the printer will print "H" pattern on paper.
- 3.5.5 Personal computer reads and writes data into and from modem.
- 3.5.6 Personal computer will read data from floppy disk and then writes the data into floppy disk , same operation for hard disk.
- 3.5.6 The EUT will stand by for waiting to receive or transmit the fundamental frequency with data signal.
- 3.5.7 Repeat the above procedure 3.5.4 to 3.5.6

4.6 Test Procedure

The EUT is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables must be changed according to ANSI C63.4-1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 10Khz.

The frequency range from 0.45 MHz to 30 MHz is checked.

4.7 Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

The uncertainty is calculated in accordance with NAMAS NIS 81. The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured: $< \pm 2.0$ dB

CONDUCTED EMISSION DATA

Date of Test : Dec. 29, 1998 Temperature : 25 °C
 EUT : Wireless RS232 Humidity : 61 %
 Test Mode : Mode 1 Display Pattern : H Pattern
 Detector Mode : Quasi-Peak

| Frequency | Cable | LISN | Reading Level | Measurement Level | Limits | |
|-----------|-------|--------|---------------|-------------------|--------|-------|
| MHz | Loss | Factor | Line1 | Line1 | uV | uV |
| | dB | dB | dBuV | dBuV | | |
| 0.516 | 0.07 | 0.10 | 31.60 | 31.77 | 38.7 | 250.0 |
| 0.579 | 0.07 | 0.10 | 30.50 | 30.67 | 34.2 | 250.0 |
| 0.622 | 0.07 | 0.10 | 29.80 | 29.97 | 31.5 | 250.0 |
| 0.668 | 0.08 | 0.10 | 29.00 | 29.18 | 28.8 | 250.0 |
| 0.731 | 0.08 | 0.10 | 28.10 | 28.28 | 26.0 | 250.0 |
| 0.776 | 0.09 | 0.10 | 28.02 | 28.21 | 25.7 | 250.0 |

Remarks : “ * ” means that this data is the worse emission level.

CONDUCTED EMISSION DATA

| | | | |
|---------------|----------------|-----------------|-----------|
| Date of Test | Dec. 29, 1998 | Temperature | 25 °C |
| EUT | Wireless RS232 | Humidity | 61 % |
| Test Mode | Mode 1 | Display Pattern | H Pattern |
| Detector Mode | Quasi-Peak | | |

| Frequency MHz | Cable Loss dB | LISN Factor dB | Reading Level | Measurement Level | | Limits uV |
|------------------|---------------------|----------------------|---------------|-------------------|------|--------------|
| | | | Line2 dBuV | Line2 dBuV | uV | |
| 0.505 | 0.06 | 0.10 | 31.91 | 32.07 | 40.2 | 250.0 |
| 0.524 | 0.07 | 0.10 | 31.33 | 31.50 | 37.6 | 250.0 |
| 0.559 | 0.07 | 0.10 | 30.63 | 30.80 | 34.7 | 250.0 |
| 0.630 | 0.08 | 0.10 | 29.59 | 29.77 | 30.8 | 250.0 |
| 0.680 | 0.08 | 0.10 | 28.89 | 29.07 | 28.4 | 250.0 |
| 0.751 | 0.08 | 0.10 | 27.86 | 28.04 | 25.2 | 250.0 |

Remarks : “ * ” means that this data is the worse emission level.

5. Occupied Bandwidth

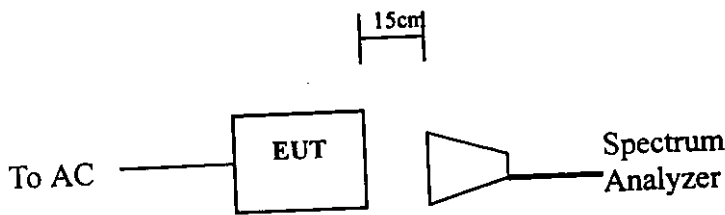
5.1 Test Equipment

The following test equipments are used during the radiated emission tests:

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| X | Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 1998 |
| X | Horn Antenna | EM | EM6917 / 103325 | May, 1998 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

5.2 Test Setup



5.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

5.4 Minimum Standard

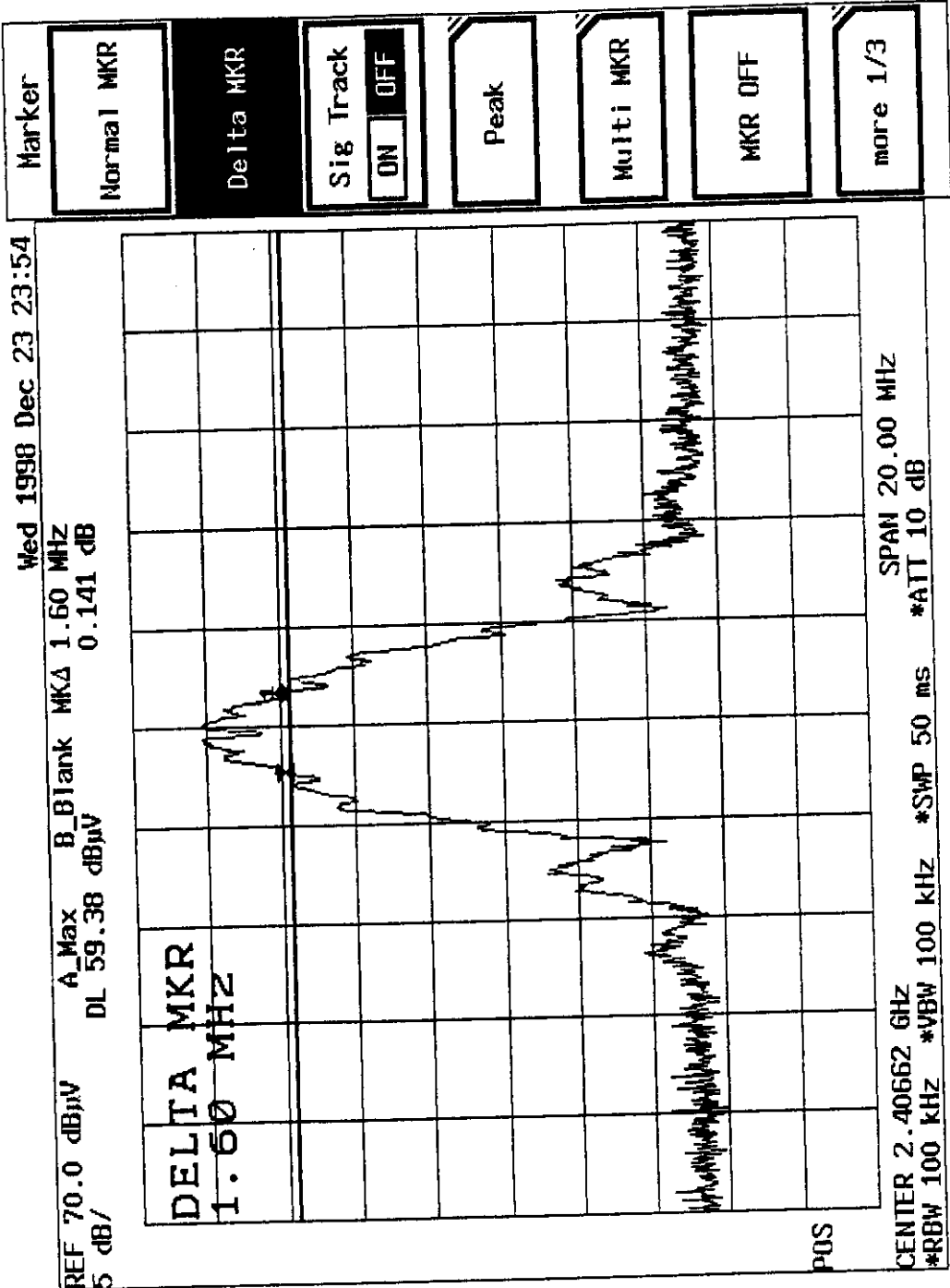
The minimum bandwidth shall be at least 500Khz.

5.5 Occupied Bandwidth Data

| Channel No. | Frequency(Mhz) | Measurement | Required Limit | Result |
|-------------|----------------|-------------|----------------|--------|
| 1 | 2406.4 | 1.60Mhz | ≥ 500Khz | Pass |
| 8 | 2442.24 | 1.68Mhz | ≥ 500Khz | Pass |
| 15 | 2478.08 | 2.32Mhz | ≥ 500Khz | Pass |

See attached graphs.

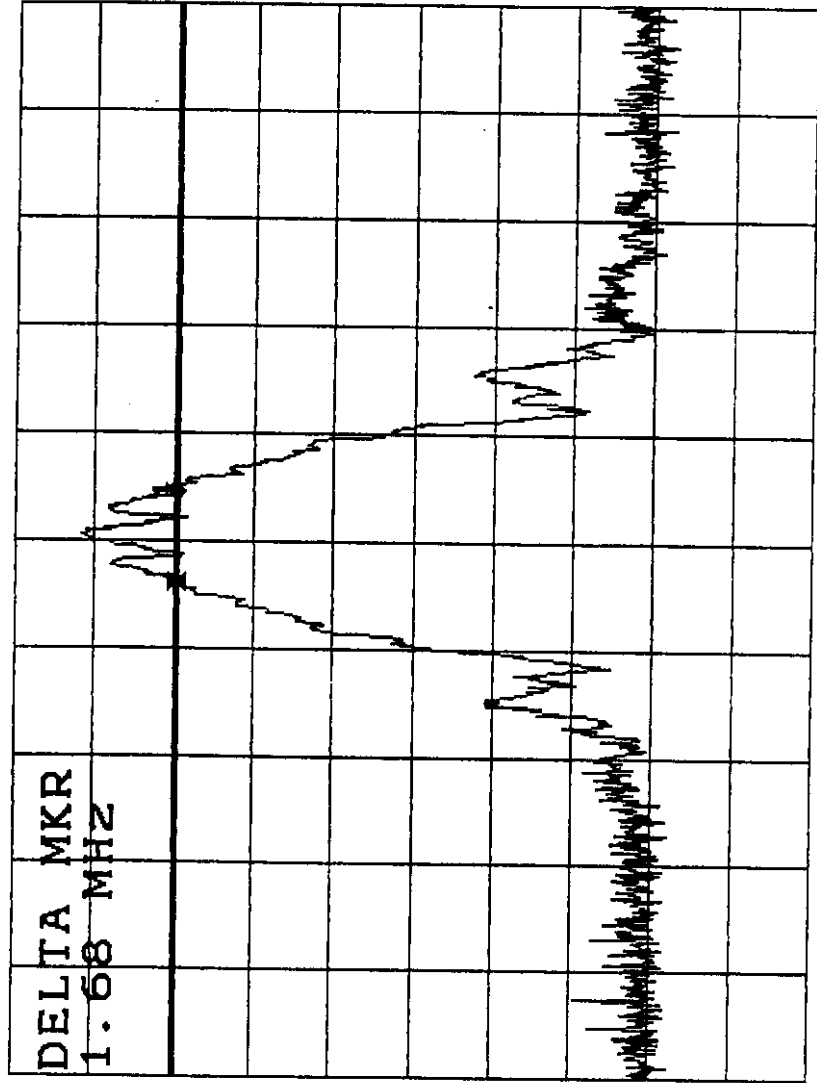
FCC ID: MIBRF60102
 RF-Link System Inc. / Wireless RS232, Model RF-60102-XX
 QTK99-F002A: 2.4 GHz Spread Spectrum Transceiver
 QTK99-F002B: Class B Computing Device Peripheral



Wed 1998 Dec 23 22:20

REF 70.0 dBµV
5 dB/

A_View B_Blank MKΔ 1.68 MHz
DL 59.88 dBµV 0.027 dB



CENTER 2.44224 GHz *RBW 100 kHz *VBW 100 kHz *SMP 50 ms *ATT 10 dB
SPAN 20.00 MHz

Marker

Normal MKR

Delta MKR

Sig Track ON OFF

Peak

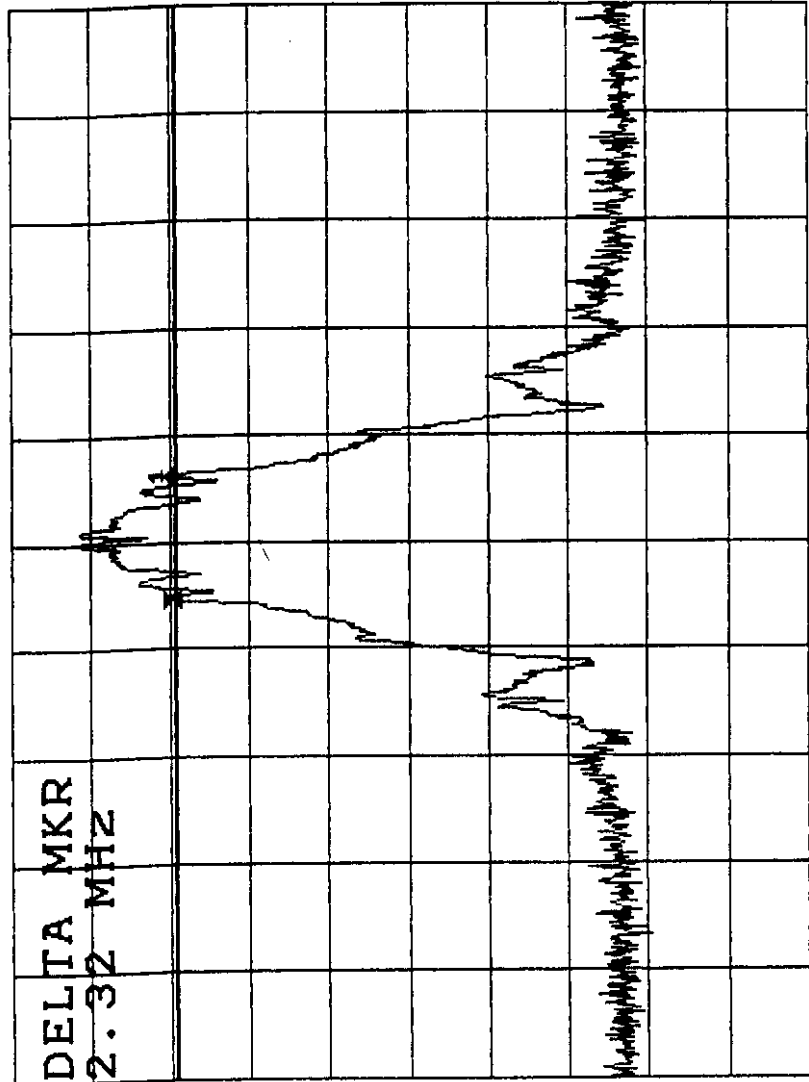
Multi MKR

MKR OFF

more 1/3

Med 1998 Dec 23 23:04

REF 70.0 dBµV A_Max B_Blank MKΔ 2.32 MHz
5 dB/ DL 59.75 dBµV 0.008 dB



POS

CENTER 2.47814 GHz SPAN 20.00 MHz
*RBW 100 kHz *VBW 100 kHz *SMP 50 ms *ATT 10 dB

| |
|------------|
| Marker |
| Normal MKR |
| Delta MKR |
| Sig Track |
| ON OFF |
| Peak |
| Multi MKR |
| MKR OFF |
| more 1/3 |

6. Peak Power Output

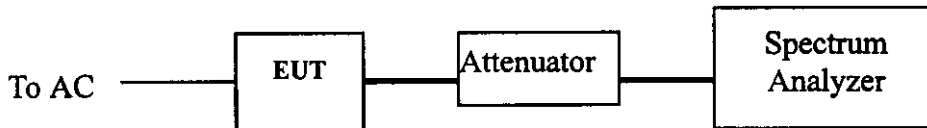
6.1 Test Equipment

The following test equipments are used during the radiated emission tests:

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| X | Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 1998 |
| X | Attenuator | HP | | May, 1998 |
| X | Horn Antenna | EM | EM6917 / 103325 | May, 1998 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

6.2 Test Setup



6.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

6.4 Minimum Standard

The maximum peak power shall be less 1 Watt.

6.5 Peak Power Output Data

| Channel No. | Frequency(Mhz) | Measurement | Required Limit | Result |
|-------------|----------------|-------------|----------------|--------|
| 1 | 2406.4 | 15.28dBm | 1Watt | Pass |
| 8 | 2442.24 | 13.39dBm | 1Watt | Pass |
| 15 | 2478.08 | 13.98dBm | 1Watt | Pass |

7. Radiation Emission Test

FCC ID: MIBRF60102
 RF-Link System Inc. / Wireless RS232, Model RF-60102-XX
 QTK99-F002A: 2.4 GHz Spread Spectrum Transceiver
 QTK99-F002B: Class B Computing Device Peripheral

2

7.1 Test Equipment

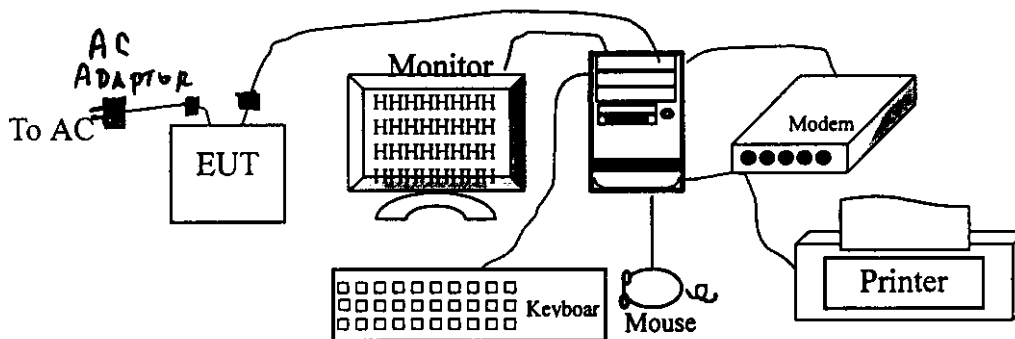
The following test equipments are used during the radiated emission tests:

| Test Site | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|-----------|---------------------|--------------|----------------------|------------|
| SITE # 1 | X Test Receiver | R & S | ESCS 30 / 825442/14 | May, 1998 |
| | X Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 1998 |
| | X Pre-Amplifier | HP | 8447D/3307A01812 | May, 1998 |
| | X Pre-Amplifier | HP | 8449B / 3008A01123 | May, 1998 |
| | X Bilog Antenna | Chase | CBL6112B / 12452 | Sep., 1998 |
| | X Horn Antenna | EM | EM6917 / 103325 | May, 1998 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

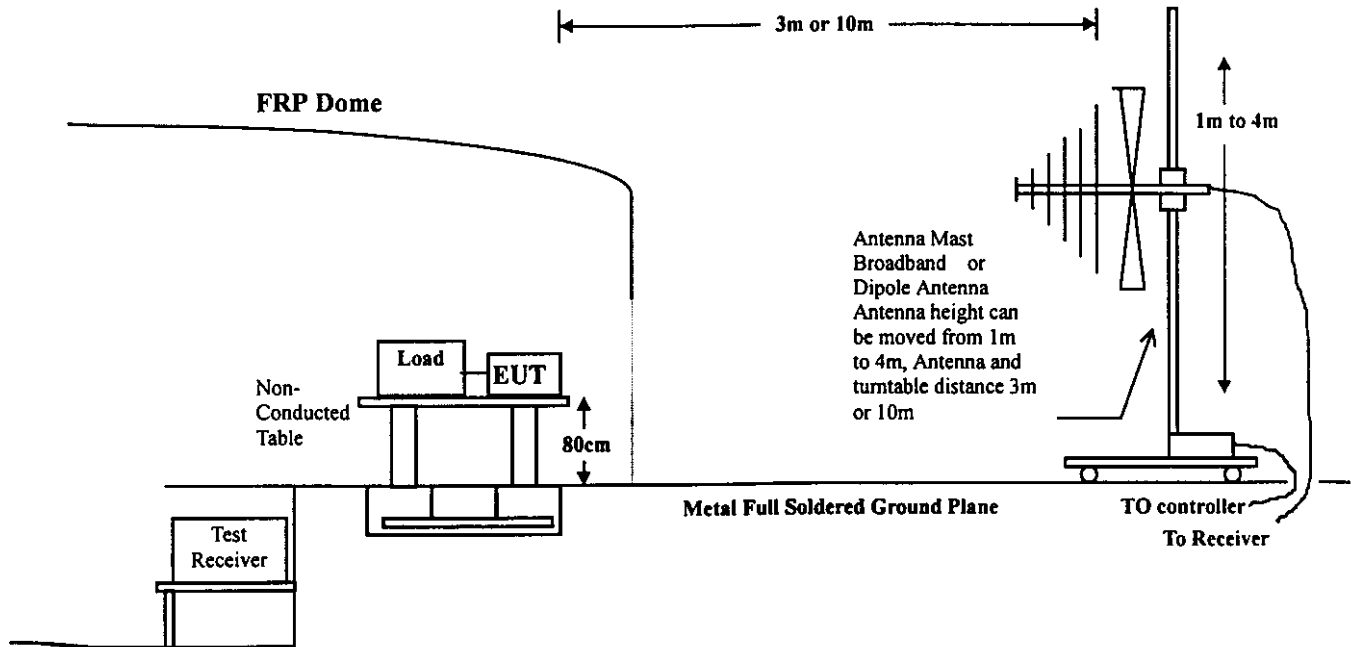
7.2 Test Setup

7.2.1 Block Diagram of Connections between EUT and simulators



*EUT PROVIDED WITH 9V ADAPTOR WITH DC CABLE WITH FERRITE CORE
 AND SERIAL INTERFACE WITH FERRITE CORE*

7.2.2 Open Test Site Setup Diagram



Spurious Emissions
(Band Edge Antenna Radiated)

7.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

7.4 Minimum Standard

In any 100Khz bandwidth outside the 2400 – 483.5Mhz bands emission shall be at least 20dB below the fundamental emission or shall not exceed the following field strength limits.

Emission falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

| Frequency MHz | Field Strength (uV/m @3m) | Field Strength (uV/m @3m) |
|------------------|------------------------------|------------------------------|
| 30-88 | 100 | 40.0 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

7.5 Operating Condition of EUT

Each mode of operation was exercised to produce worst emission. The worst case emissions were with the EUT powered up in the transmit mode.

7.6 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Broadband antenna (calibrated bi-log and horn antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. And a high frequency preamplifier were used increase the sensitivity of the measuring. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4-1992 on radiated measurement.

The additional latch filter below 1Ghz was used to measure the level of harmonics radiated emission during field dtrength of harmonics measurement.

The bandwidth below 1Ghz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 KHz, above 1Ghz are 1 MHz.

The frequency range from 30MHz to 10th harminics is checked.

7.7 Radiated Emission Data

The initial step in collecting radiated data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

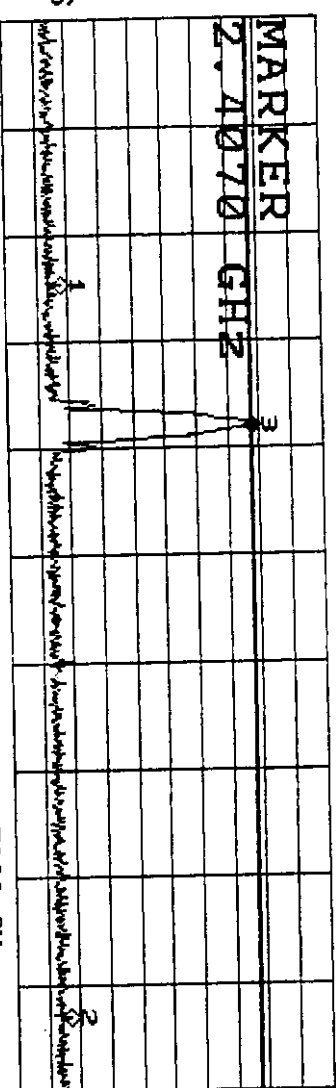
Spurious Emission (Band Edge)

Date of Test : Dec. 15, 1998 Temperature : 24.3 °C
 EUT : Wireless RS232 Humidity : 61 %
 Test Mode : Mode 1, 2 & 3 Display Pattern : _____
 Detector Mode : Peak

| Channel | Fundamental Level | Upper Band Level | Lower Band Level | Upper Margin Level(dBc) | Lower Margin Level(dBc) | Limit |
|---------|-------------------|------------------|------------------|-------------------------|-------------------------|--------|
| 1 | 63.75 | 33.38 | 34.00 | -30.37 | -29.75 | 20 dBc |
| 8 | 64.50 | 32.89 | 34.08 | -31.61 | -30.42 | 20 dBc |
| 15 | 60.50 | 34.20 | 33.81 | -26.83 | -26.69 | 20 dBc |

See Attached Chart

REF 75.0 dBµV A View B Blank MKR 2.4070 GHz
 5 dB/ DL 63.75 dBµV 0.047 dB
 Wed 1999 Jan 27 11:33



START 2.3500 GHz STOP 2.5000 GHz
 *RBW 100 kHz *VBW 1 MHz *SMP 500 ms ATT 10 dB

Multi Marker List

| | | |
|-----|------------|------------|
| 1: | 2.3869 GHz | -29.754 dB |
| 2: | 2.4895 GHz | -30.371 dB |
| 3: | 2.4070 GHz | 0.047 dB |
| 4: | | |
| 5: | | |
| 6: | | |
| 7: | | |
| 8: | | |
| 9: | | |
| 10: | | |
| 4: | | |

Multi MKR

MKR NO **3**

MKR ON

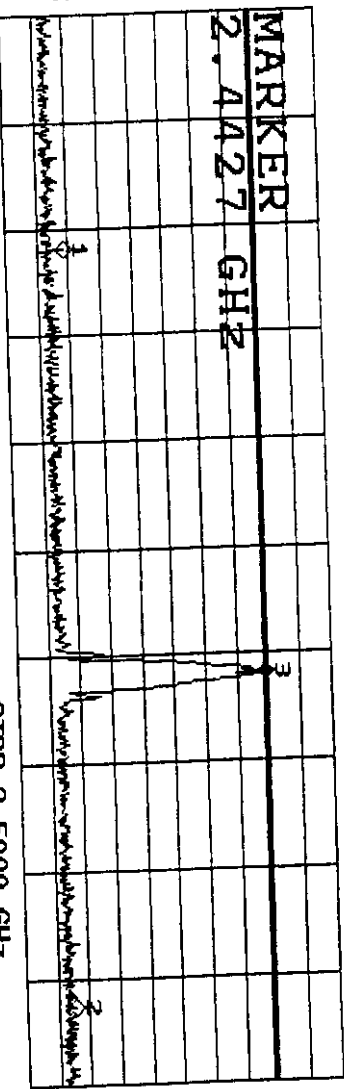
MKR OFF

Active MKR

Reset MKR

return

REF 75.0 dBmV A_View B_Blank MKR 2.4427 GHz
 5 dB/ DL 64.50 dBmV 0.039 dB
 Wed 1999 Jan 27 11:42



START 2.3500 GHz STOP 2.5000 GHz
 *RBW 100 kHz *VBW 1 MHz *SMP 500 ms ATT 10 dB

Multi Marker List

| | | |
|----|------------|------------|
| 1: | 2.3827 GHz | -30.426 dB |
| 2: | 2.4888 GHz | -31.609 dB |
| 3: | 2.4427 GHz | 0.039 dB |

10:
A:

Multi MKR

MKR NO

3

MKR ON

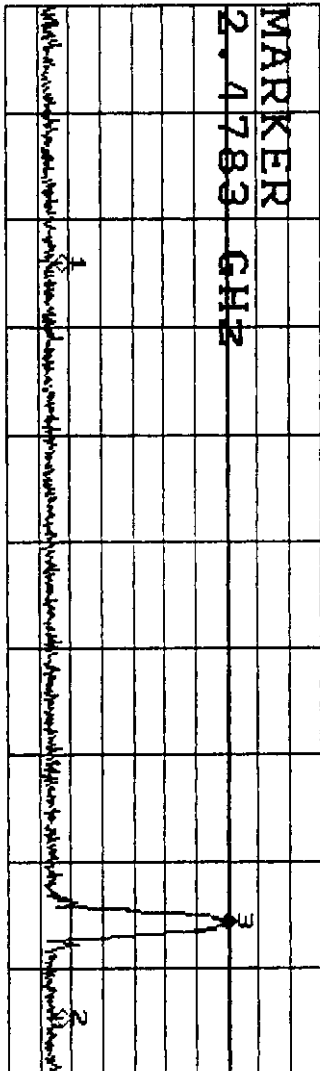
MKR OFF

Active MKR

Reset MKR

return

REF 75.0 dBmV A_View B_Blank MKR 2.4783 GHz
 5 dB/ DL 60.50 dBmV -0.516 dB
 Wed 1999 Jan 27 11:49



START 2.3500 GHz STOP 2.5000 GHz
 *RBW 100 kHz *VBW 1 MHz *SMP 500 ms ATT 10 dB

Multi Marker List

- 1: 2.3859 GHz -26.688 dB
- 2: 2.4918 GHz -26.828 dB
- 3: 2.4783 GHz -0.516 dB

- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:

Multi MKR

MKR NO

3

MKR ON

MKR OFF

Active MKR

Reset MKR

return

Radiated Emission Data

| | | | |
|---------------|----------------|-----------------|-----------|
| Date of Test | Dec. 15, 1998 | Temperature | 24.3 °C |
| EUT | Wireless RS232 | Humidity | 61 % |
| Test Mode | Mode 1 | Display Pattern | H Pattern |
| Detector Mode | Quasi-Peak | | |

| Frequency MHz | Cable Loss dB | Ant Factor dB/m | Reading Level | Emission Level | | Limits | | |
|------------------|---------------------|-----------------------|----------------------|----------------------|-------|--------|------------------|---------------------|
| | | | Horizontal dBuV/m | Horizontal dBuV/m | uV/m | uV/m | Ant Pos cm | Table Pos deg |
| 167.423 | 2.48 | 11.10 | 11.00 | 24.58 | 16.94 | 150 | 400 | 79 |
| 246.100 | 3.23 | 12.44 | 5.04 | 20.71 | 10.86 | 200 | 100 | 95 |
| 282.626 | 3.58 | 13.26 | 16.48 | 33.32 | 46.36 | 200 | 100 | 124 |
| 552.963 | 5.07 | 18.92 | 7.22 | 31.21 | 36.37 | 200 | 132 | 201 |
| 624.123 | 5.44 | 19.29 | 4.24 | 28.97 | 28.08 | 200 | 212 | 34 |
| 958.469 | 7.18 | 21.34 | 5.23 | 33.75 | 48.71 | 200 | 154 | 4 |

Radiated Emission Data

| | | | |
|---------------|----------------|-----------------|-----------|
| Date of Test | Dec. 15, 1998 | Temperature | 24.3 °C |
| EUT | Wireless RS232 | Humidity | 61 % |
| Test Mode | Mode 1 | Display Pattern | H Pattern |
| Detector Mode | Quasi-Peak | | |

| Frequency MHz | Cable Loss dB | Ant Factor dB/m | Reading Level | Emission Level | | Limits | | |
|------------------|---------------------|-----------------------|--------------------|--------------------|-------|--------|------------------|---------------------|
| | | | Vertical dBuV/m | Vertical dBuV/m | uV/m | uV/m | Ant Pos cm | Table Pos deg |
| 167.045 | 2.47 | 9.63 | 14.38 | 26.48 | 21.08 | 150 | 400 | 135 |
| 245.758 | 3.22 | 12.86 | 8.54 | 24.62 | 17.03 | 200 | 100 | 36 |
| 282.626 | 3.58 | 13.38 | 12.62 | 29.58 | 30.14 | 200 | 100 | 28 |
| 552.963 | 5.07 | 18.65 | 8.78 | 32.50 | 42.17 | 200 | 132 | 36 |
| 624.120 | 5.44 | 19.28 | 5.39 | 30.11 | 32.02 | 200 | 212 | 35 |
| 958.469 | 7.18 | 21.94 | 7.14 | 36.26 | 65.03 | 200 | 154 | 114 |

Radiated Emission Data

| | | | |
|---------------|----------------|-----------------|---------------|
| Date of Test | Dec. 15, 1998 | Temperature | 24.3 °C |
| EUT | Wireless RS232 | Humidity | 61 % |
| Test Mode | Mode 1, 2 & 3 | Display Pattern | Data Transfer |
| Detector Mode | Peak | | |

POLARIZATION: HORIZONTAL

| | CHAN NEL | FREQUE NCY MHz | DETECT OR | Correction Factor | READING LEVEL DBUV/M | FIELD STRENGTH DBUV/M | LIMITS dBuV/m | MARGIN dB |
|---|-------------|----------------------|--------------|----------------------|----------------------------|-----------------------------|------------------|--------------|
| * | 1 | 4812.4 | Peak | 2.1 | 62.6 | 64.7 | 74.0 | 9.3 |
| | | 7219.5 | Peak | 7.0 | 42.7 | 49.7 | 74.0 | 24.3 |
| | | 9625.3 | Peak | 10.2 | 46.3 | 56.5 | 74.0 | 17.6 |
| | | 1203.9 | Peak | 13.5 | 45.7 | 59.2 | 74.0 | 14.8 |
| | | 14438.8 | Peak | 16.9 | [44.2 | 61.2 | 74.0 | 12.9 |
| | | 16844.5 | Peak | 19.6 | [44.3 | 63.9 | 74.0 | 10.1 |
| | 8 | 4885.1 | Peak | 2.1 | 57.7 | 59.8 | 74.0 | 14.2 |
| | | 7326.8 | Peak | 7.0 | 42.5 | 49.5 | 74.0 | 24.5 |
| | | 9769.3 | Peak | 10.2 | 45.6 | 55.8 | 74.0 | 18.2 |
| | | 12211.3 | Peak | 13.5 | 45.8 | 59.2 | 74.0 | 14.8 |
| | | 14653.5 | Peak | 16.9 | [44.4 | 61.3 | 74.0 | 12.7 |
| | | 17095.8 | Peak | 19.6 | [44.3 | 63.9 | 74.0 | 10.1 |
| | 15 | 4956.3 | Peak | 2.1 | 58.8 | 60.9 | 74.0 | 13.1 |
| | | 7434.4 | Peak | 7.0 | 40.1 | 47.1 | 74.0 | 26.9 |
| | | 9912.5 | Peak | 10.2 | 46.2 | 56.4 | 74.0 | 17.6 |
| | | 12390.5 | Peak | 13.5 | 46.6 | 60.1 | 74.0 | 14.0 |
| | | 14868.7 | Peak | 16.9 | [44.3 | 61.2 | 74.0 | 12.8 |
| | | 17346.9 | Peak | 19.6 | [44.3 | 63.9 | 74.0 | 10.1 |

Radiated Emission Data

| | | | |
|---------------|----------------|-----------------|---------------|
| Date of Test | Dec. 15, 1998 | Temperature | 24.3 °C |
| EUT | Wireless RS232 | Humidity | 61 % |
| Test Mode | Mode 1, 2 & 3 | Display Pattern | Data Transfer |
| Detector Mode | Peak | | |

POLARIZATION: VERTICAL

| | CHAN | FREQUEN | DETECTO | Correction | READING | FIELD | LIMITS | MARGIN |
|---|------|---------|---------|------------|---------|----------|--------|--------|
| | NEL | CY | R | Factor | LEVEL | STRENGTH | dBuV/m | DB |
| | | MHz | | | DBUV/M | DBUV/M | | |
| * | 1 | 4816 | Peak | 2.1 | 55.2 | 57.3 | 74.0 | 16.7 |
| | | 7223 | Peak | 7.0 | 40.3 | 47.2 | 74.0 | 26.8 |
| | | 9630 | Peak | 10.2 | 45.3 | 55.5 | 74.0 | 18.5 |
| | | 12041 | Peak | 13.5 | 46.0 | 59.5 | 74.0 | 14.5 |
| | | 14449 | Peak | 16.9 | [44.1 | 61.0 | 74.0 | 13.0 |
| | | 16858 | Peak | 19.6 | [44.2 | 63.8 | 74.0 | 10.2 |
| | 8 | 4885.1 | Peak | 2.1 | 57.7 | 59.8 | 74.0 | 14.2 |
| | | 7326.8 | Peak | 7.0 | 40.7 | 47.6 | 74.0 | 26.4 |
| | | 9769.3 | Peak | 10.2 | 45.9 | 56.1 | 74.0 | 17.9 |
| | | 12211.3 | Peak | 13.5 | 44.2 | 57.7 | 74.0 | 16.3 |
| | | 14653.5 | Peak | 16.9 | [44.3 | 61.2 | 74.0 | 12.8 |
| | | 17095.8 | Peak | 19.6 | [44.2 | 63.8 | 74.0 | 10.2 |
| | 15 | 4956.3 | Peak | 2.1 | 59.4 | 61.5 | 74.0 | 12.6 |
| | | 7434.4 | Peak | 7.0 | 39.6 | 46.6 | 74.0 | 27.4 |
| | | 9912.5 | Peak | 10.2 | 46.0 | 56.1 | 74.0 | 17.9 |
| | | 12390.5 | Peak | 13.5 | 46.3 | 59.8 | 74.0 | 14.2 |
| | | 14868.7 | Peak | 16.9 | [44.3 | 61.2 | 74.0 | 8.7 |
| | | 17346.9 | Peak | 19.6 | [44.2 | 63.8 | 74.0 | 5.2 |

Remarks:

1. " * ", means this data is the worse emission level.
2. Field Strength = Reading Level + Correction Factor.
3. Correction Factor = Cable Loss + Antenna Factor- PreAmplifier.

8. Transmitter Power Density

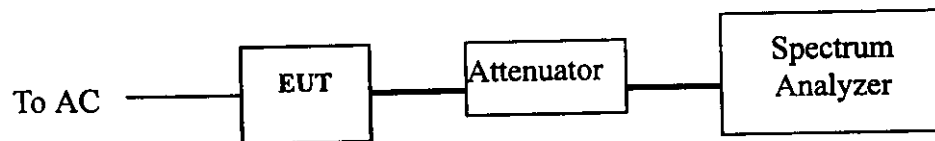
8.1 Test Equipment

The following test equipments are used during the radiated emission tests:

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| X | Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 1998 |
| X | Attenuator | HP | | May, 1998 |
| X | Horn Antenna | EM | EM6917 / 103325 | May, 1998 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

8.2 Test Setup



8.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

8.4 Minimum Standard

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3KHz bandwidth.

8.5 Transmitter Power Density Data

| Channel No. | Frequency(Mhz) | Measurement | Required Limit | Result |
|-------------|----------------|-------------|----------------|--------|
| 1 | 2406.4 | 1.05dBm | ≤8dBm | Pass |
| 8 | 2442.24 | -0.79dBm | ≤8dBm | Pass |
| 15 | 2478.08 | -2.11dBm | ≤8dBm | Pass |

9. Processing Gain

9.1 Test Setup

See Figure 1 Processing Gain Measurement Test Setup.

9.2 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

9.3 Minimum Standard

The processing gain shall be at least 10 dB.

9.4 Method of Measurement

The processing gain of this spread spectrum was measured the CW jamming method . The Section 9.1 illustrates the measurement setup. The output power of the spread spectrum transmitter is fixed and the output power of jammer is adjustable. The frequency of jammer was stopped through the pass band of nominal channel in 50KHz steps. In each frequency step of the jammer, the output power of jammer is adjusted to cause the Bit Error Rate (BER) to be 1.0×10^{-6} . The power levels are recorded to calculate the J/S as shown in Table 1.

9.5 Calculation of Processing Gain:

The processing gain was determined by measuring the jamming margin of the EUT and using the following formula:

$$G_p = (S/N)_o + M_j + L_{sys}$$

Where $(S/N)_o$ is the required signal to noise ratio at the receiver output

M_j is the jammer to signal ratio (J/S)

L_{sys} is the system loss

The $(S/N)_o$ is calculated from:

$$P_e = 1/2 \exp(-1/2(S/N)_o) \quad ; P_e = \text{probability of error (BER)}$$

For the $P_e(\text{BER}) = 1.0 \times 10^{-6}$, the required $(S/N)_o$ is 14.2dB

From Measurement, the minimum J/S(M_j) is -3.4dB

We assume the system loss is 1dB.

Therefore the processing gain is calculated below:

$$G_p = (S/N)_o + M_j + L_{sys} = 14.2 + (-3.4) + 1 = 11.8 \text{ (dB)}$$



佳和集團
怡安科技
CHIA HEIR GROUP
RF-LINK SYSTEMS INC.

WL-RS232 Processing Gain Measurement and Calculation

The processing gain of this spread spectrum was measured using the CW jamming method. Figure 1 illustrates the measurement setup. The out power of the spread spectrum transmitter is fixed and the output power of jammer is adjustable. The frequency of jammer was stopped through the pass band of nominal channel in 50KHz steps. In each frequency step of the jammer, the output power of jammer is adjusted to cause the Bit Error Rate (BER) to be 1.0×10^{-6} . The power levels are recorded to calculate the J/S as shown in Table 1.

The processing gain G_p was calculated using the formula:

$$G_p = (S/N)_o + M_j + L_{sys}$$

Where $(S/N)_o$ is the required signal to noise ratio at the receiver output
 M_j is the jammer to signal ratio (J/S)
 L_{sys} is the system loss

The $(S/N)_o$ is calculated from:

$$P_e = 1/2 \exp(-1/2(S/N)_o) \quad ; \quad P_e = \text{probability of error (BER)}$$

For the $P_e(\text{BER}) = 1.0 \times 10^{-6}$, the required $(S/N)_o$ is 14.2db

From Table 1, the minimum J/S (M_j) is -3.4db.

We assume the system loss is 1db.

Therefore the processing gain is calculated below:

$$G_p = (S/N)_o + M_j + L_{sys} = 14.2 + (-3.4) + 1 = 11.8(\text{db})$$

Figure 1. Processing Gain Measurement Test Setup

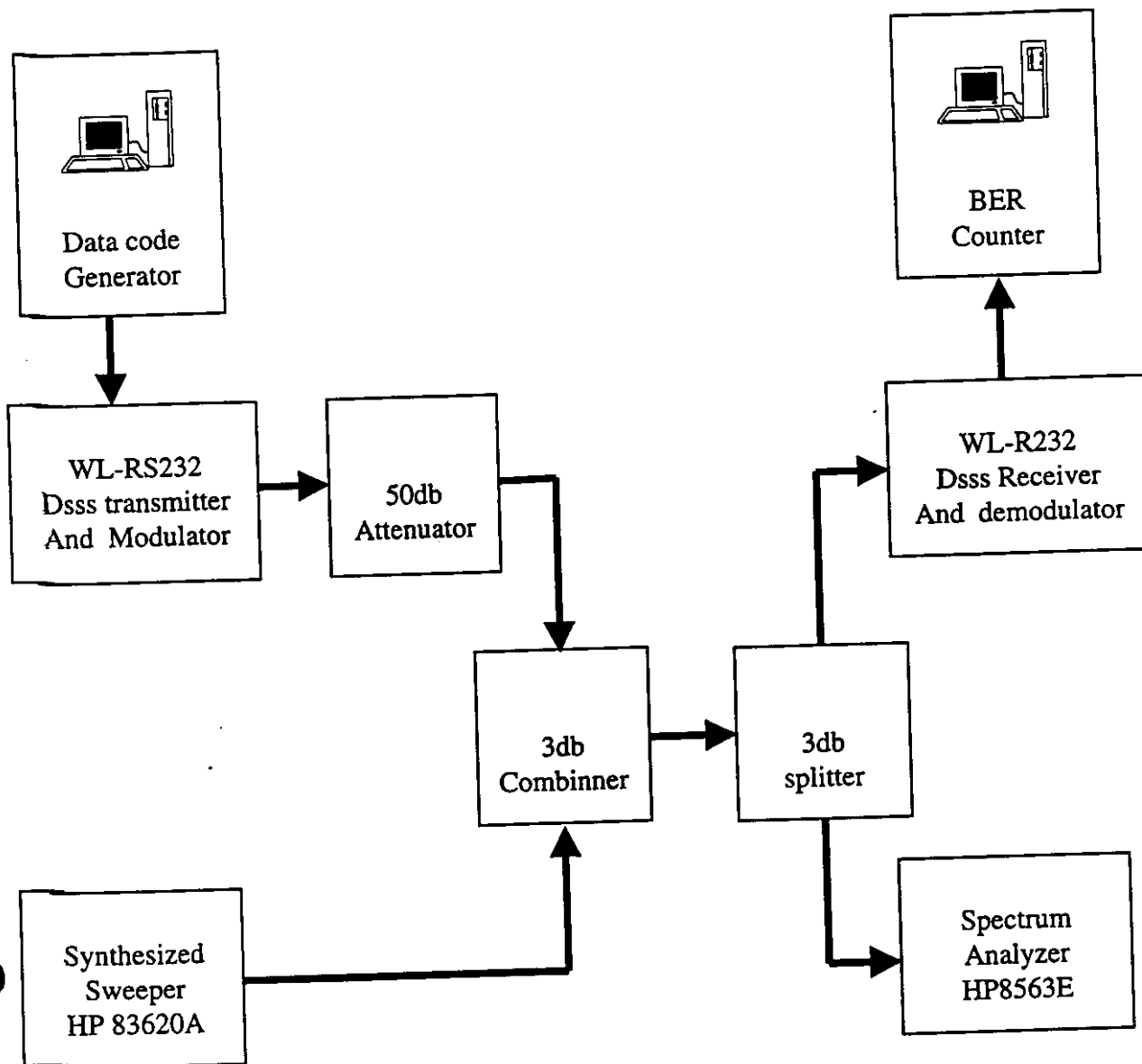


Figure 1

FCC ID: MIBRF60102
 RF-Link System Inc. / Wireless RS232, Model RF-60102-XX
 QTK99-F002A: 2.4 GHz Spread Spectrum Transceiver
 QTK99-F002B: Class B Computing Device Peripheral

| Frequency(MHz) | J/S(db) | Signal(dBm) | J(dBm) |
|----------------|---------|-------------|--------|
| 2435.84 | 4.7 | -43.5 | -38.8 |
| 2435.89 | 4.6 | -43.5 | -38.9 |
| 2435.94 | 4.4 | -43.5 | -39.1 |
| 2435.99 | 4.2 | -43.5 | -39.3 |
| 2436.04 | 4.2 | -43.5 | -39.3 |
| 2436.09 | 4.2 | -43.5 | -39.3 |
| 2436.14 | 4.1 | -43.5 | -39.4 |
| 2436.19 | 4 | -43.5 | -39.5 |
| 2436.24 | 3.8 | -43.5 | -39.7 |
| 2436.29 | 3.8 | -43.5 | -39.7 |
| 2436.34 | 3.7 | -43.5 | -39.8 |
| 2436.39 | 3.6 | -43.5 | -39.9 |
| 2436.44 | 3.4 | -43.5 | -40.1 |
| 2436.49 | 3.4 | -43.5 | -40.1 |
| 2436.54 | 3.3 | -43.5 | -40.2 |
| 2436.59 | 3.1 | -43.5 | -40.4 |
| 2436.64 | 3.1 | -43.5 | -40.4 |
| 2436.69 | 3 | -43.5 | -40.5 |
| 2436.74 | 2.8 | -43.5 | -40.7 |
| 2436.79 | 2.7 | -43.5 | -40.8 |
| 2436.84 | 2.5 | -43.5 | -41 |
| 2436.89 | 2.2 | -43.5 | -41.3 |
| 2436.94 | 2 | -43.5 | -41.5 |
| 2436.99 | 1.9 | -43.5 | -41.6 |
| 2437.04 | 1.8 | -43.5 | -41.7 |
| 2437.09 | 1.7 | -43.5 | -41.8 |
| 2437.14 | 1.7 | -43.5 | -41.8 |
| 2437.19 | 1.7 | -43.5 | -41.8 |
| 2437.24 | 1.6 | -43.5 | -41.9 |
| 2437.29 | 1.5 | -43.5 | -42 |
| 2437.34 | 1.6 | -43.5 | -41.9 |
| 2437.39 | 1.4 | -43.5 | -42.1 |
| 2437.44 | 1.5 | -43.5 | -42 |
| 2437.49 | 1.4 | -43.5 | -42.1 |
| 2437.54 | 1.5 | -43.5 | -42 |
| 2437.59 | 1.5 | -43.5 | -42 |
| 2437.64 | 1.3 | -43.5 | -42.2 |
| 2437.69 | 1.3 | -43.5 | -42.2 |
| 2437.74 | 1.3 | -43.5 | -42.2 |
| 2437.79 | 1.2 | -43.5 | -42.3 |
| 2437.84 | 1.1 | -43.5 | -42.4 |
| 2437.89 | 1 | -43.5 | -42.5 |
| 2437.94 | 0.9 | -43.5 | -42.6 |
| 2437.99 | 0.9 | -43.5 | -42.6 |
| 2438.04 | 0.7 | -43.5 | -42.8 |
| 2438.09 | 0.6 | -43.5 | -42.9 |
| 2438.14 | 0.6 | -43.5 | -42.9 |
| 2438.19 | 0.5 | -43.5 | -43 |
| 2438.24 | 0.4 | -43.5 | -43.1 |
| 2438.29 | 0.3 | -43.5 | -43.2 |
| 2438.34 | 0.1 | -43.5 | -43.4 |
| 2438.39 | 0.1 | -43.5 | -43.4 |
| 2438.44 | -0.1 | -43.5 | -43.6 |
| 2438.49 | -0.2 | -43.5 | -43.7 |
| 2438.54 | -0.3 | -43.5 | -43.8 |

| | | | |
|---------|------|-------|-------|
| 2438.59 | -0.3 | -43.5 | -43.8 |
| 2438.64 | -0.4 | -43.5 | -43.9 |
| 2438.69 | -0.4 | -43.5 | -43.9 |
| 2438.74 | -0.5 | -43.5 | -44 |
| 2438.79 | -0.6 | -43.5 | -44.1 |
| 2438.84 | -0.7 | -43.5 | -44.2 |
| 2438.89 | -0.8 | -43.5 | -44.3 |
| 2438.94 | -0.9 | -43.5 | -44.4 |
| 2438.99 | -1 | -43.5 | -44.5 |
| 2439.04 | -1.2 | -43.5 | -44.7 |
| 2439.09 | -1.3 | -43.5 | -44.8 |
| 2439.14 | -1.3 | -43.5 | -44.8 |
| 2439.19 | -1.2 | -43.5 | -44.7 |
| 2439.24 | -1.3 | -43.5 | -44.8 |
| 2439.29 | -1.3 | -43.5 | -44.8 |
| 2439.34 | -1.2 | -43.5 | -44.7 |
| 2439.39 | -1.3 | -43.5 | -44.8 |
| 2439.44 | -1.4 | -43.5 | -44.9 |
| 2439.49 | -1.3 | -43.5 | -44.8 |
| 2439.54 | -1.5 | -43.5 | -45 |
| 2439.59 | -1.5 | -43.5 | -45 |
| 2439.64 | -1.5 | -43.5 | -45 |
| 2439.69 | -1.3 | -43.5 | -44.8 |
| 2439.74 | -1.1 | -43.5 | -44.6 |
| 2439.79 | -1.2 | -43.5 | -44.7 |
| 2439.84 | -1.1 | -43.5 | -44.6 |
| 2439.89 | -1.1 | -43.5 | -44.6 |
| 2439.94 | -1.2 | -43.5 | -44.7 |
| 2439.99 | -1.2 | -43.5 | -44.7 |
| 2440.04 | -1.3 | -43.5 | -44.8 |
| 2440.09 | -1.2 | -43.5 | -44.7 |
| 2440.14 | -1.3 | -43.5 | -44.8 |
| 2440.19 | -1.3 | -43.5 | -44.8 |
| 2440.24 | -1.3 | -43.5 | -44.8 |
| 2440.29 | -1.2 | -43.5 | -44.7 |
| 2440.34 | -1.3 | -43.5 | -44.8 |
| 2440.39 | -1.4 | -43.5 | -44.9 |
| 2440.44 | -1.5 | -43.5 | -45 |
| 2440.49 | -1.6 | -43.5 | -45.1 |
| 2440.54 | -1.8 | -43.5 | -45.3 |
| 2440.59 | -1.8 | -43.5 | -45.3 |
| 2440.64 | -1.7 | -43.5 | -45.2 |
| 2440.69 | -1.8 | -43.5 | -45.3 |
| 2440.74 | -1.8 | -43.5 | -45.3 |
| 2440.79 | -1.9 | -43.5 | -45.4 |
| 2440.84 | -1.9 | -43.5 | -45.4 |
| 2440.89 | -1.9 | -43.5 | -45.4 |
| 2440.94 | -1.8 | -43.5 | -45.3 |
| 2440.99 | -2 | -43.5 | -45.5 |
| 2441.04 | -2.1 | -43.5 | -45.6 |
| 2441.09 | -2.2 | -43.5 | -45.7 |
| 2441.14 | -2.2 | -43.5 | -45.7 |
| 2441.19 | -2.3 | -43.5 | -45.8 |
| 2441.24 | -2.4 | -43.5 | -45.9 |
| 2441.29 | -2.4 | -43.5 | -45.9 |
| 2441.34 | -2.5 | -43.5 | -46 |

Table 1. J/S Ratio Test Result

| | | | |
|---------|------|-------|-------|
| 2441.39 | -2.5 | -43.5 | -46 |
| 2441.44 | -2.5 | -43.5 | -46 |
| 2441.49 | -2.3 | -43.5 | -45.8 |
| 2441.54 | -2.4 | -43.5 | -45.9 |
| 2441.59 | -2.5 | -43.5 | -46 |
| 2441.64 | -2.5 | -43.5 | -46 |
| 2441.69 | -2.4 | -43.5 | -45.9 |
| 2441.74 | -2.3 | -43.5 | -45.8 |
| 2441.79 | -2.3 | -43.5 | -45.8 |
| 2441.84 | -2.3 | -43.5 | -45.8 |
| 2441.89 | -2.4 | -43.5 | -45.9 |
| 2441.94 | -2.5 | -43.5 | -46 |
| 2441.99 | -2.7 | -43.5 | -46.2 |
| 2442.04 | -2.7 | -43.5 | -46.2 |
| 2442.09 | -2.8 | -43.5 | -46.3 |
| 2442.14 | -2.8 | -43.5 | -46.3 |
| 2442.19 | -3.2 | -43.5 | -46.7 |
| 2442.24 | | | |
| 2442.29 | -3.3 | -43.5 | -46.8 |
| 2442.34 | -2.3 | -43.5 | -45.8 |
| 2442.39 | -2.1 | -43.5 | -45.6 |
| 2442.44 | -1.9 | -43.5 | -45.4 |
| 2442.49 | -1.7 | -43.5 | -45.2 |
| 2442.54 | -1.5 | -43.5 | -45 |
| 2442.59 | -1.2 | -43.5 | -44.7 |
| 2442.64 | -1 | -43.5 | -44.5 |
| 2442.69 | -0.8 | -43.5 | -44.3 |
| 2442.74 | -0.6 | -43.5 | -44.1 |
| 2442.79 | -0.4 | -43.5 | -43.9 |
| 2442.84 | -0.3 | -43.5 | -43.8 |
| 2442.89 | 0.1 | -43.5 | -43.4 |
| 2442.94 | 0.5 | -43.5 | -43 |
| 2442.99 | 1 | -43.5 | -42.5 |
| 2443.04 | 1.5 | -43.5 | -42 |
| 2443.09 | 1.9 | -43.5 | -41.6 |
| 2443.14 | 2.4 | -43.5 | -41.1 |
| 2443.19 | 3.1 | -43.5 | -40.4 |
| 2443.24 | 3.8 | -43.5 | -39.7 |
| 2443.29 | 4.3 | -43.5 | -39.2 |
| 2443.34 | 5.3 | -43.5 | -38.2 |
| 2443.39 | 5.9 | -43.5 | -37.6 |
| 2443.44 | 6.5 | -43.5 | -37 |
| 2443.49 | 7.8 | -43.5 | -35.7 |
| 2443.54 | 8.9 | -43.5 | -34.6 |
| 2443.59 | 9.7 | -43.5 | -33.8 |
| 2443.64 | 10.7 | -43.5 | -32.8 |
| 2443.69 | 11.8 | -43.5 | -31.7 |
| 2443.74 | 12 | -43.5 | -31.5 |
| 2443.79 | 12.2 | -43.5 | -31.3 |
| 2443.84 | 12.6 | -43.5 | -30.9 |
| 2443.89 | 12.8 | -43.5 | -30.7 |
| 2443.94 | 12.5 | -43.5 | -31 |
| 2443.99 | 12.4 | -43.5 | -31.1 |
| 2444.04 | 12.3 | -43.5 | -31.2 |
| 2444.09 | 9.8 | -43.5 | -33.7 |
| 2444.14 | 8.2 | -43.5 | -35.3 |

| | | | |
|---------|------|-------|-------|
| 2444.19 | 6.5 | -43.5 | -37 |
| 2444.24 | 5.6 | -43.5 | -37.9 |
| 2444.29 | 4.9 | -43.5 | -38.6 |
| 2444.34 | 4 | -43.5 | -39.5 |
| 2444.39 | 4.3 | -43.5 | -39.2 |
| 2444.44 | 3.2 | -43.5 | -40.3 |
| 2444.49 | 3.3 | -43.5 | -40.2 |
| 2444.54 | 2.7 | -43.5 | -40.8 |
| 2444.59 | 2.7 | -43.5 | -40.8 |
| 2444.64 | 2.5 | -43.5 | -41 |
| 2444.69 | 2.7 | -43.5 | -40.8 |
| 2444.74 | 2.9 | -43.5 | -40.6 |
| 2444.79 | 2.5 | -43.5 | -41 |
| 2444.84 | 2.3 | -43.5 | -41.2 |
| 2444.89 | 1.4 | -43.5 | -42.1 |
| 2444.94 | 0.8 | -43.5 | -42.7 |
| 2444.99 | -0.3 | -43.5 | -43.8 |
| 2445.04 | -0.3 | -43.5 | -43.8 |
| 2445.09 | -0.3 | -43.5 | -43.8 |
| 2445.14 | -0.3 | -43.5 | -43.8 |
| 2445.19 | -0.2 | -43.5 | -43.7 |
| 2445.24 | -0.3 | -43.5 | -43.8 |
| 2445.29 | -0.3 | -43.5 | -43.8 |
| 2445.34 | -0.4 | -43.5 | -43.9 |
| 2445.39 | -0.3 | -43.5 | -43.8 |
| 2445.44 | -0.2 | -43.5 | -43.7 |
| 2445.49 | 0 | -43.5 | -43.5 |
| 2445.54 | -0.1 | -43.5 | -43.6 |
| 2445.59 | 0 | -43.5 | -43.5 |
| 2445.64 | 0 | -43.5 | -43.5 |
| 2445.69 | -0.1 | -43.5 | -43.6 |
| 2445.74 | 0 | -43.5 | -43.5 |
| 2445.79 | 0.2 | -43.5 | -43.3 |
| 2445.84 | 0.3 | -43.5 | -43.2 |
| 2445.89 | 0.5 | -43.5 | -43 |
| 2445.94 | 0.5 | -43.5 | -43 |
| 2445.99 | 0.6 | -43.5 | -42.9 |
| 2446.04 | 0.6 | -43.5 | -42.9 |
| 2446.09 | 0.5 | -43.5 | -43 |
| 2446.14 | 0.5 | -43.5 | -43 |
| 2446.19 | 0.5 | -43.5 | -43 |
| 2446.24 | 0.5 | -43.5 | -43 |
| 2446.29 | 0.6 | -43.5 | -42.9 |
| 2446.34 | 0.6 | -43.5 | -42.9 |
| 2446.39 | 0.7 | -43.5 | -42.8 |
| 2446.44 | 0.7 | -43.5 | -42.8 |
| 2446.49 | 0.7 | -43.5 | -42.8 |
| 2446.54 | 0.8 | -43.5 | -42.7 |
| 2446.59 | 0.9 | -43.5 | -42.6 |
| 2446.64 | 1 | -43.5 | -42.5 |
| 2446.69 | 1 | -43.5 | -42.5 |
| 2446.74 | 1.1 | -43.5 | -42.4 |
| 2446.79 | 1.1 | -43.5 | -42.4 |
| 2446.84 | 1.2 | -43.5 | -42.3 |
| 2446.89 | 1.2 | -43.5 | -42.3 |
| 2446.94 | 1.2 | -43.5 | -42.3 |

Table 1. J/S Ratio Test Result

| | | | | |
|---------|--|-----|-------|-------|
| 2446.99 | | 1.2 | -43.5 | -42.3 |
| 2447.04 | | 1.3 | -43.5 | -42.2 |
| 2447.09 | | 1.3 | -43.5 | -42.2 |
| 2447.14 | | 1.4 | -43.5 | -42.1 |
| 2447.19 | | 1.5 | -43.5 | -42 |
| 2447.24 | | 1.6 | -43.5 | -41.9 |
| 2447.29 | | 1.7 | -43.5 | -41.8 |
| 2447.34 | | 1.7 | -43.5 | -41.8 |
| 2447.39 | | 1.8 | -43.5 | -41.7 |
| 2447.44 | | 1.8 | -43.5 | -41.7 |
| 2447.49 | | 1.9 | -43.5 | -41.6 |
| 2447.54 | | 1.9 | -43.5 | -41.6 |
| 2447.59 | | 1.9 | -43.5 | -41.6 |
| 2447.64 | | 1.9 | -43.5 | -41.6 |
| 2447.69 | | 2 | -43.5 | -41.5 |
| 2447.74 | | 2 | -43.5 | -41.5 |
| 2447.79 | | 2 | -43.5 | -41.5 |
| 2447.84 | | 2.1 | -43.5 | -41.4 |
| 2447.89 | | 2.2 | -43.5 | -41.3 |
| 2447.94 | | 2.3 | -43.5 | -41.2 |
| 2447.99 | | 2.4 | -43.5 | -41.1 |
| 2448.04 | | 2.4 | -43.5 | -41.1 |
| 2448.09 | | 2.4 | -43.5 | -41.1 |
| 2448.14 | | 2.5 | -43.5 | -41 |
| 2448.19 | | 2.5 | -43.5 | -41 |
| 2448.24 | | 2.5 | -43.5 | -41 |
| 2448.29 | | 2.6 | -43.5 | -40.9 |
| 2448.34 | | 2.7 | -43.5 | -40.8 |
| 2448.39 | | 2.8 | -43.5 | -40.7 |

BER = 1.0×10^{-6}
 Mj (db) -3.4
 Data Rate (Kbps) 192
 Code Rate (Mbps) 3.072
 Band Width (Mhz) 12.288
 Non-coherent (S/N)_o(db) 14.2
 Ls(db) 1
 Pg=(S/N)_o+Mj+Ls (db) 11.8

Table 1. J/S Ratio Test Result

10. EMI Reduction Method During Compliance Testing

1. Added a ferrite core on the interface cable.
2. Added a ferrite core on the cable of power adapter.