

**EMC  
TEST REPORT****Report No. : EME-020145****Model No. : KWL-220****Issued Date : Feb. 27, 2002**

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**Test By : Intertek Testing Services Taiwan Ltd.**  
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Test Engineer

Approved By



Kaysi Chen

  
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### Summary of Tests

#### **2.4GHz WLAN USB ADAPTER-Model: KWL-220** **FCC ID: OIBKWL-220**

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Complies
Maximum Output Power test	15.247(b)	Complies
Antenna Conducted test	15.247(c)	Complies
Radiated Spurious Emission test	15.205, 15.209	Complies
Power Spectrum Density test	15.247(d)	Complies
Power Line Conducted Emission test	15.207	Complies



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### 1. General information

#### 1.1 Identification of the EUT

Manufacturer : Kai-Link Corporation Ltd.  
Product : 2.4GHz WLAN USB ADAPTER  
Model No. : KWL-220  
FCC ID. : OIBKWL-220  
Frequency Range : 2412MHz to 2462MHz  
Channel Number : 11 channels  
Frequency of Each Channel : 2412MHz, 2417MHz, 2422MHz, 2427MHz, 2432MHz, 2437MHz, 2442MHz, 2447MHz, 2452MHz, 2457MHz, 2462MHz  
Type of Modulation : DSSS, DBPSK, DQPSK, CCK  
Power Supply : 5Vdc  
Power Cord : USB Cable length 1.2m ×1  
Sample Received : Feb. 19, 2002  
Test Date(s) : Feb. 20, 2002 to Feb. 21, 2002

A FCC DoC report has been generated for the client.

#### 1.2 Additional information about the EUT

The EUT is a Wireless LAN Card with a rate of 1, 2, 5.5, and 11 Mbps operating in the ISM band using Direct Sequence Spread Spectrum (DSSS) transmission, implementing the IEEE 802.11b standard.

The models below are identical to model KWL-220 (EUT); the difference is in brand set up to serve various clients as marketing strategy as follows:

<u>Trade Name(s)</u>	<u>Model Number</u>
Chou Chin	KWL-220
Arcscom	KWL-220

For more detail features, please refer to User's manual as file name "installation guide.pdf"



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### 1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0dBi max

Antenna Type : Monopole antenna

### 1.4 Peripherals equipment

1. PC1
  - Product No. : 634588V
  - Serial No. : BN3R1VC
  - Manufacturer : IBM
2. Key Board
  - Product No. : 37L2548
  - Serial No. : 0095996
  - Manufacturer : IBM
3. Monitor
  - Product No. : 6331-0LN
  - Serial No. : 23-NW855
  - Manufacturer : IBM
4. Mouse
  - Product No. : 10L6144
  - Serial No. : 23-071328
  - Manufacturer : IBM
5. Printer
  - Product No. : C2642A
  - Serial No. : TH86K1N2ZB
  - Manufacturer : HP
6. Modem
  - Product No. : V1456VQE
  - Serial No. : 700V23100066865
  - Manufacturer : Aski



## **2. Test specifications**

### **2.1 Test standard**

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.207 、§15.209 、§15.247 and ANSI C63.4/1992.

### **2.2 Operation mode**

Connect the EUT to personal computer via a 1.2 meter length USB Cable, run the testing program “RF test tool” under Windows OS, which provided by manufacturer.

The EUT transmitted continuously during all the tests.

### **2.3 Modifications required for compliance**

No modification were installed during test performance to bring the product into compliance (Please note that this list does not include changes made specifically by Kai-Link Corporation Ltd. Prior to compliance testing.)



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### 2.4 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Next Cal.Date
EMI Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	May 29, 2002
Pulse Limiter	Rohde & Schwarz	9kHz~30MHz	ESH3-Z2	848.766/052	N/A
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 9, 2002
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5822	Sep. 10, 2002
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 21, 2002
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3111	June 21, 2002
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A

Note:

1. The calibration interval of the above instruments is 12 months.

### 3. Minimum 6dB Bandwidth test

#### 3.1 Operating environment

Temperature: 22 °C  
Relative Humidity: 59 %

#### 3.2 Test setup & procedure

The minimum 6dB bandwidth per FCC § 15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth set at 3MHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The minimum 6-dB modulation bandwidth is in the following Table. See Minimum 6dB Bandwidth plot as file name “Minimum 6dB Bandwidth plot.pdf”

#### 3.3 Measured data of Minimum 6dB Bandwidth test results

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
Low	2410.80	11.52	>500kHz
Middle	2438.28	11.60	>500kHz
High	2463.60	11.44	>500kHz



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### 4. Maximum Output Power test

#### 4.1 Operating environment

Temperature: 22 °C  
Relative Humidity: 59 %

#### 4.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to spectrum analyzer. The RBW of spectrum analyzer was set to 10MHz, VBW=RBW. Power was read directly and cable loss correction (1dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

See Maximum Output Power plot as file name “Maximum Output Power plot low channel, middle channel, high channel.pdf”

#### 4.3 Measured data of Maximum Output Power test results

Channel	Frequency (MHz)	C.B.L. (dB)	Reading (dBm)	Power Output		Limit (W)
				(dBm)	(mW)	
Lowest	2412.56	1	14.35	15.35	34.28	1
Middle	2437.64	1	14.35	15.35	34.28	1
Highest	2462.80	1	13.98	14.98	31.48	1

## 5. RF Antenna Conducted test

### 5.1 Operating environment

Temperature: 22 °C  
Relative Humidity: 59 %

### 5.2 Test setup & procedure

RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz.

Harmonics and spurious noise is at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel. See RF Antenna Conducted plot as file name “RF Antenna Conducted plot.pdf”

### 5.3 Measured data of the highest RF Antenna Conducted test result

Channel	Max level at Frequency (MHz)	Emission level (dBm)	Limit (dB)
Low	2785.00	-32.66	-23.98
Middle	2810.00	-32.75	-24.49
High	2835.00	-32.03	-24.00

Note: 1. Limit = peak power output (in 100kHz RBW) – 20dB

2. All the other emissions were very low the limit.

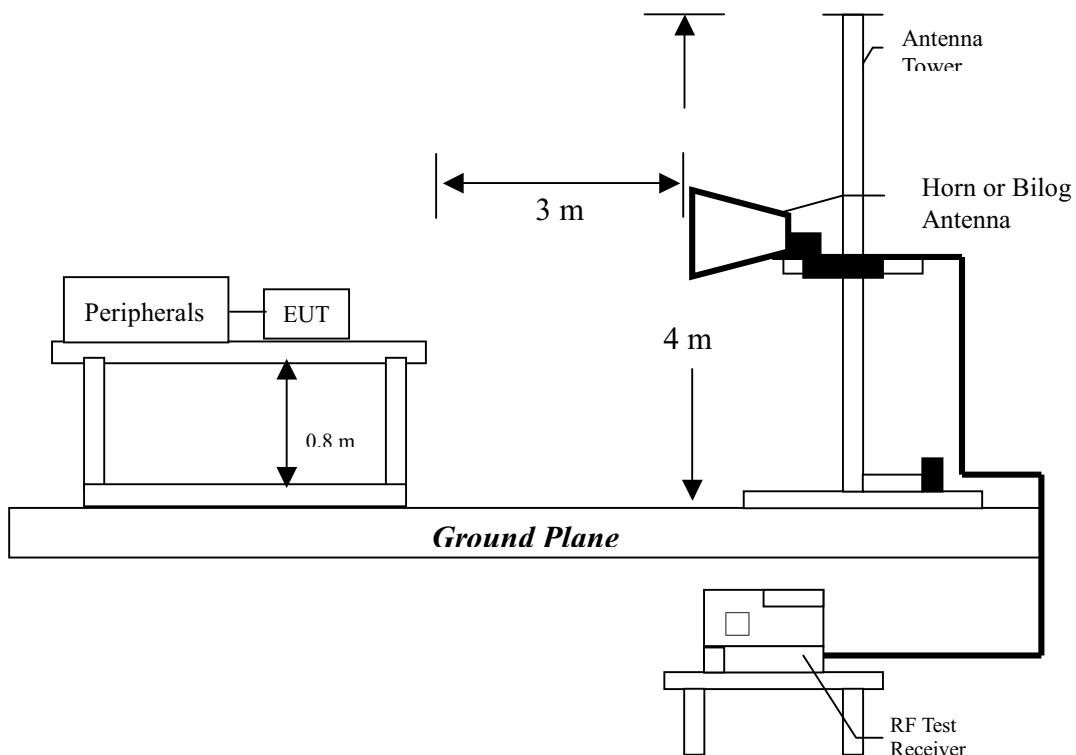
## 6. Radiated Emission test

### 6.1 Operating environment

Temperature: 20 °C  
Relative Humidity: 58 %

### 6.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



The signal is maximized through rotation and placement in the three orthogonal axes. The EUT and its peripherals 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. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4/1992 on radiated measurement. Radiated emission measurement were performed from 30MHz to 40GHz or to the tenth harmonic of the highest fundamental frequency, which is lower.

The bandwidth below 1GHz setting on the field strength meter is 120kHz and above 1GHz is 1MHz.

While average detecting, RBW was set to 1MHz and VBW was set to 10Hz.

### 6.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB $\mu$ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81. In the General Radiated Emission Test, the uncertainty is within  $\pm 2.5$ dB

**6.4 Radiated spurious emission test data****6.4.1 Measurement results: frequencies equal to or less than 1 GHz**

EUT : KWL-220

Test Mode : Transmit mode

Test Condition : Low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
35.90000	QP	V	0	18.33	16.87	35.20	40	-4.80
44.00000	QP	V	0	13.70	21.40	35.10	40	-4.90
47.80000	QP	V	0	15.01	18.89	33.90	40	-6.10
132.10000	QP	V	0	9.73	20.47	30.20	43.5	-13.30
307.10000	QP	V	0	15.91	10.69	26.60	46	-19.40
748.00000	QP	V	0	25.27	3.03	28.30	46	-17.70
44.00000	QP	H	0	13.70	12.80	26.50	40	-13.50
47.80000	QP	H	0	15.01	10.99	26.00	40	-14.00
132.10000	QP	H	0	9.73	17.77	27.50	43.5	-16.00
220.10000	QP	H	0	13.82	16.58	30.40	46	-15.60
263.80000	QP	H	0	14.77	12.53	27.30	46	-18.70
748.00000	QP	H	0	25.27	8.43	33.70	46	-12.30

## Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.



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EUT : KWL-220

Test Mode : Transmit mode

Test Condition : Middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
44.00000	QP	V	0	13.70	21.50	35.20	40	-4.80
47.80000	QP	V	0	15.01	19.19	34.20	40	-5.80
107.80000	QP	V	0	10.18	13.62	23.80	43.5	-19.70
132.10000	QP	V	0	9.73	20.07	29.80	43.5	-13.70
175.80000	QP	V	0	10.97	11.03	22.00	43.5	-21.50
220.10000	QP	V	0	13.82	8.48	22.30	46	-23.70
47.80000	QP	H	0	15.01	14.39	29.40	40	-10.60
132.10000	QP	H	0	9.73	18.67	28.40	43.5	-15.10
220.10000	QP	H	0	13.82	15.28	29.10	46	-16.90
263.80000	QP	H	0	14.77	11.53	26.30	46	-19.70
659.80000	QP	H	0	23.60	4.70	28.30	46	-17.70
748.00000	QP	H	0	25.27	6.73	32.00	46	-14.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor.



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EUT : KWL-220

Test Mode : Transmit mode

Test Condition : High channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
47.80000	QP	V	0	15.01	19.59	34.60	40	-5.40
107.80000	QP	V	0	10.18	13.22	23.40	43.5	-20.10
119.60000	QP	V	0	10.28	12.92	23.20	43.5	-20.30
132.10000	QP	V	0	9.73	21.77	31.50	43.5	-12.00
220.10000	QP	V	0	13.82	8.98	22.80	46	-23.20
307.10000	QP	V	0	15.91	9.99	25.90	46	-20.10
132.10000	QP	H	0	9.73	19.47	29.20	43.5	-14.30
141.80000	QP	H	0	9.88	17.02	26.90	43.5	-16.60
220.10000	QP	H	0	13.82	15.28	29.10	46	-16.90
263.80000	QP	H	0	14.77	11.93	26.70	46	-19.30
307.00000	QP	H	0	15.91	9.49	25.40	46	-20.60
659.80000	QP	H	0	23.60	5.30	28.90	46	-17.10

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor.

**6.4.2 Measurement results: frequency above 1GHz****The radiated emissions at**

Frequency(MHz)	Margin
4075.36	-2.11
6113.92	-2.16
4815.7	-2.04

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

EUT : KWL-220

Test Mode : Transmit mode

Test Condition : Low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2037.88	PK	V	0	32.87	23.41	56.28	74	-17.72
2037.88	AV	V	0	32.87	12.83	45.7	54	-8.3
4075.36	PK	V	0	39.78	22.17	61.95	74	-12.05
4075.36	AV	V	0	39.78	12.11	51.89	54	-2.11
6113.92	PK	V	0	42.63	18.56	61.19	74	-12.81
6113.92	AV	V	0	42.63	9.21	51.84	54	-2.16
8152	PK	V	0	45.23	-	-	74	-
8152	AV	V	0	45.23	-	-	54	-
4815.7	PK	V	0	38.98	21.73	60.71	74	-13.29
4815.7	AV	V	0	38.98	12.98	51.96	54	-2.04
7237.7	PK	V	0	43.73	18.38	62.11	74	-11.89
7237.7	AV	V	0	43.73	7.12	50.85	54	-3.15
9654	PK	V	0	46.71	-	-	74	-
9654	AV	V	0	46.71	-	-	54	-

**Remark:**

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.

**The radiated emissions at**

Frequency(MHz)	Margin
4076.15	-2.23
6114.18	-2.46
4823.8	-0.67

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

EUT : KWL-220

Test Mode : Transmit mode

Test Condition : Low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2038	PK	H	0	32.87	22.52	55.39	74	-18.61
2038	AV	H	0	32.87	13.43	46.3	54	-7.7
4076.15	PK	H	0	39.78	20.54	60.32	74	-13.68
4076.15	AV	H	0	39.78	11.99	51.77	54	-2.23
6114.18	PK	H	0	42.63	18.22	60.85	74	-13.15
6114.18	AV	H	0	42.63	8.91	51.54	54	-2.46
8152	PK	H	0	45.23	-	-	74	-
8152	AV	H	0	45.23	-	-	54	-
4823.8	PK	H	0	38.98	26.18	65.16	74	-8.84
4823.8	AV	H	0	38.98	14.35	56.33	54	-0.67
7236.88	PK	H	0	43.73	26.19	69.92	74	-4.08
7236.88	AV	H	0	43.73	7.56	51.29	54	-2.71
9654	PK	H	0	46.71	-	-	74	-
9654	AV	H	0	46.71	-	-	54	-

**Remark:**

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.



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### The radiated emissions at

Frequency(MHz)	Margin
4127.41	-2.11
6189.54	-2.16

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

EUT : KWL-220

Test Mode : Transmit mode

Test Condition : Middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2063	PK	V	0	32.87	23.29	56.16	74	-17.84
2063	AV	V	0	32.87	12.62	45.49	54	-8.51
4127.41	PK	V	0	39.78	22.17	61.95	74	-12.05
4127.41	AV	V	0	39.78	12.11	51.89	54	-2.11
6189.54	PK	V	0	42.63	18.56	61.19	74	-12.81
6189.54	AV	V	0	42.63	9.21	51.84	54	-2.16
8252	PK	V	1	45.23	-	-	74	-
8252	AV	V	2	45.23	-	-	54	-
4874.11	PK	V	0	38.98	21.88	60.86	74	-13.14
4874.11	AV	V	0	38.98	12.43	51.41	54	-2.59
7311.45	PK	V	0	43.73	15.88	59.61	74	-14.39
7311.45	AV	V	0	43.73	6.67	50.4	54	-3.6
9748	PK	V	0	46.71	-	-	74	-
9748	AV	V	0	46.71	-	-	54	-

### Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor.



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### The radiated emissions at

Frequency(MHz)	Margin
4874	-0.7

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

EUT : KWL-220

Test Mode : Transmit mode

Test Condition : Middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2063	PK	H	0	32.87	22.89	55.76	74	-18.24
2063	AV	H	0	32.87	13.79	46.66	54	-7.34
4126.65	PK	H	0	39.78	21.16	60.94	74	-13.06
4126.65	AV	H	0	39.78	10.33	50.11	54	-3.89
6189.23	PK	H	0	42.63	17.81	60.44	74	-13.56
6189.23	AV	H	0	42.63	7.18	49.81	54	-4.19
8252	PK	H	0	45.23	-	-	74	-
8252	AV	H	0	45.23	-	-	54	-
4874	PK	H	0	38.98	25.33	64.31	74	-9.69
4874	AV	H	0	38.98	14.32	53.3	54	-0.7
7310.98	PK	H	0	43.73	25.45	69.18	74	-4.82
7310.98	AV	H	0	43.73	7.23	50.96	54	-3.04
9748	PK	H	0	46.71	-	-	74	-
9748	AV	H	0	46.71	-	-	54	-

### Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.



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Test Condition : High channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2088.1	PK	V	0	32.87	21.23	54.1	74	-19.9
2088.1	AV	V	0	32.87	13.11	45.98	54	-8.02
4176.3	PK	V	0	39.78	22.76	62.54	74	-11.46
4176.3	AV	V	0	39.78	10.32	50.1	54	-3.9
6264.87	PK	V	0	42.63	19.21	61.84	74	-12.16
6264.87	AV	V	0	42.63	7.64	50.27	54	-3.73
8352	PK	V	1	45.23	-	-	74	-
8352	AV	V	2	45.23	-	-	54	-
4925.1	PK	V	0	38.98	21.43	60.41	74	-13.59
4925.1	AV	V	0	38.98	11.19	50.17	54	-3.83
7386.76	PK	V	0	43.73	17.54	61.27	74	-12.73
7386.76	AV	V	0	43.73	6.91	50.64	54	-3.36
9848	PK	V	0	46.71	-	-	74	-
9848	AV	V	0	46.71	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor.



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### The radiated emissions at

Frequency(MHz)	Margin
4925.32	-1.39

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

EUT : KWL-220

Test Mode : Transmit mode

Test Condition : High channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2088.23	PK	H	0	32.87	23.17	56.04	74	-17.96
2088.23	AV	H	0	32.87	12.54	45.41	54	-8.59
4176.11	PK	H	0	39.78	20.96	60.74	74	-13.26
4176.11	AV	H	0	39.78	11.21	50.99	54	-3.01
6264.65	PK	H	0	42.63	18.01	60.64	74	-13.36
6264.65	AV	H	0	42.63	7.82	50.45	54	-3.55
8352	PK	H	0	45.23	-	-	74	-
8352	AV	H	0	45.23	-	-	54	-
4925.32	PK	H	0	38.98	24.22	63.2	74	-10.8
4925.32	AV	H	0	38.98	13.63	52.61	54	-1.39
7386.88	PK	H	0	43.73	24.74	68.47	74	-5.53
7386.88	AV	H	0	43.73	6.41	50.14	54	-3.86
9848	PK	H	0	46.71	-	-	74	-
9848	AV	H	0	46.71	-	-	54	-

### Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor.

## 7. Power Spectrum Density test

### 7.1 Operating environment

Temperature: 22 °C  
Relative Humidity: 58 %

### 7.2 Test setup & procedure

The power spectrum density per FCC § 15.247(d) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 30kHz, a span of 1.5 MHz, and the sweep time set at 500 seconds. The test was performed at 3 channels (lowest, middle and highest channel). The Power Spectral Density measured result is in the following table. See Power Spectrum Density plot as file name “Power Spectrum Density plot.pdf”

### 7.3 Measured data of Power Spectrum Density test results

Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
Low	2411.26	-12.85	8
Middle	2436.26	-11.66	8
High	2462.87	-12.65	8



**8. Emission on the band edge §FCC 15.247(C)**

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

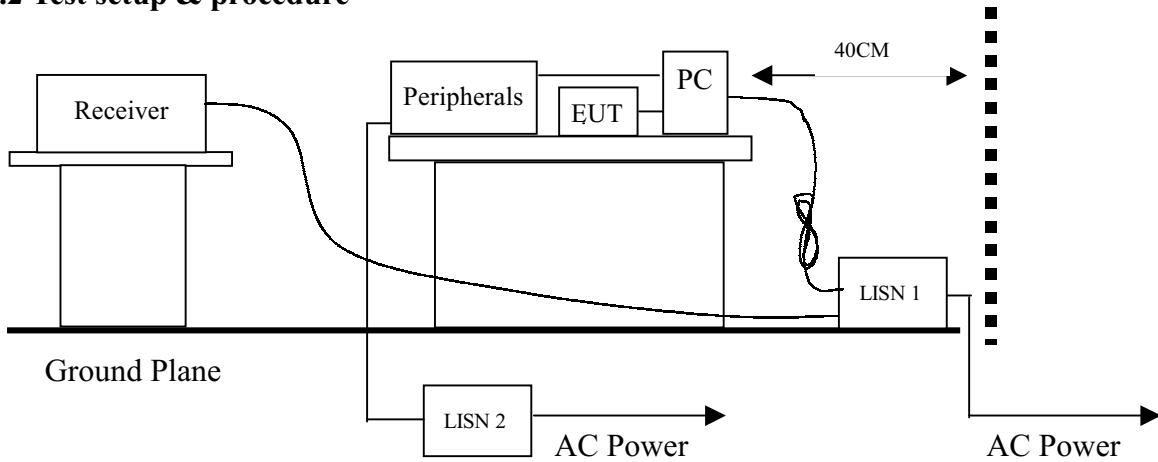
See band-edge plot as file name “Band-edge plot.pdf”.

## 9. Power Line Conducted Emission test §FCC 15.207

### 9.1 Operating environment

Temperature: 20 °C  
Relative Humidity: 58 %

### 9.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). 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.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment 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 9kHz.

See Power Line Conducted Emission plot as file name "Power Line Conducted Emission plot.pdf".

Emission Limit

FCC Part 15 Paragraph 15.207		
Freq. (MHz)	Maximum RF Line Voltage	
	uV	dBuV
0.45 - 30	250	48.0

**9.3 Power Line Conducted Emission test data****Worst case conducted emission  
at Low Channel, Line 11.00200MHz ,margin:-14.70 dB**

EUT : KWL-220  
 Test Mode : Low Channel  
 Test Condition : Transmitted Mode

Power Line (circle)	Freq. (MHz)	Reading (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Margin (dB) QP
LINE	0.69800	27.4	48.00	-20.60
LINE	1.48200	25.9	48.00	-22.10
LINE	3.66600	28.7	48.00	-19.30
LINE	7.42600	32.7	48.00	-15.30
LINE	11.00200	33.3	48.00	-14.70
LINE	25.06600	29.7	48.00	-18.30
NEUTRAL	0.69800	29.8	48.00	-18.20
NEUTRAL	1.39400	26.2	48.00	-21.80
NEUTRAL	2.97000	26.7	48.00	-21.30
NEUTRAL	8.81800	31.3	48.00	-16.70
NEUTRAL	17.03400	27.2	48.00	-20.80
NEUTRAL	25.85000	31.7	48.00	-16.30

**Remark:**

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within  $\pm 2$ dB
3. The average measurement was not performed when the peak measured data under the limit of average detection.



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EUT : KWL-220  
Test Mode : Middle Channel  
Test Condition : Transmitted Mode

Power Line (circle)	Freq. (MHz)	Reading (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Margin (dB) QP
LINE	0.69800	28.5	48.00	-19.50
LINE	1.48200	25.5	48.00	-22.50
LINE	3.66600	27.8	48.00	-20.20
LINE	7.33800	31.3	48.00	-16.70
LINE	11.00200	32.7	48.00	-15.30
LINE	25.32200	27.8	48.00	-20.20
NEUTRAL	0.69800	31.4	48.00	-16.60
NEUTRAL	1.57000	25.0	48.00	-23.00
NEUTRAL	2.18600	25.9	48.00	-22.10
NEUTRAL	8.73000	32.6	48.00	-15.40
NEUTRAL	17.19400	28.0	48.00	-20.00
NEUTRAL	25.49000	31.3	48.00	-16.70

Remark:

1. The reading value included cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within  $\pm 2$ dB
3. The average measurement was not performed when the peak measured data under the limit of average detection.



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EUT : KWL-220  
Test Mode : High Channel  
Test Condition : Transmitted Mode

Power Line (circle)	Freq. (MHz)	Reading (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Margin (dB) QP
LINE	0.69800	29.2	48.00	-18.80
LINE	1.39400	26.8	48.00	-21.20
LINE	2.18600	24.9	48.00	-23.10
LINE	3.57800	27.5	48.00	-20.50
LINE	7.24200	24.6	48.00	-23.40
LINE	24.69800	30.6	48.00	-17.40
NEUTRAL	0.69800	31.5	48.00	-16.50
NEUTRAL	1.39400	28.4	48.00	-19.60
NEUTRAL	1.74600	26.9	48.00	-21.10
NEUTRAL	2.88200	24.9	48.00	-23.10
NEUTRAL	8.73000	31.0	48.00	-17.00
NEUTRAL	25.48200	32.1	48.00	-15.90

Remark:

1. The reading value included cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81. In the Conducted Emission Test, the uncertainty is within  $\pm 2$ dB
3. The average measurement was not performed when the peak measured data under the limit of average detection.