

# **PART V**

**(For Antenna 1: Vendor:WNC, Model DMA ,  
with 800mm cable )**

## **Test Report for FCC Part 15 Subpart B & C & E**

*of*  
**WLAN a+b+g mini-PCI Module**

*Model*

**CM9**  
**(Brand: Wistron NeWeb)**

*Applied by:*  
Wistron Neweb Corporation  
No. 10-1, Li-hsin Road 1,  
Science-based Indus  
Taiwan, R. O. C.

*Test Performed by:*  
**International Standards Laboratory**

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.  
Lung-Tan Hsiang, Tao Yuan County 325  
Taiwan, R.O.C.  
Tel:(03)407-1718 Fax:(03)407-1738

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**HC LAB:NVLAP:200234-0;VCCI: R-341,C-354;NEMKO:ELA 113a,113c;BSMI:SL2-IN-E-0037;SL2-R1-E-0037;CNLA:1178**

**LT LAB:NVLAP:200234-0;VCCI: R-1435,C-1440;NEMKO:ELA 113b,113d;BSMI:SL2-IN-E-0013;CNLA:0997**

**ISL-T10-R29-1**

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## 1. General

### 1.1 Certification of Accuracy of Test Data

<b>Standards:</b>	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247) CFR 47 Part 15 Subpart E (Section 15.407)
<b>Test Procedure:</b>	ANSI C63.4: 2001
<b>Equipment Tested:</b>	WLAN a+b+g mini-PCI Module
<b>Model:</b>	CM9
<b>Applied by:</b>	Wistron Neweb Corporation
<b>Sample received Date:</b>	2004/05/10
<b>Final test Date :</b>	2004/06/07 - 2004/06/08
<b>Test Site:</b>	Chamber 02, Conduction 02
<b>Temperature</b>	Refer to each site test data
<b>Humidity:</b>	Refer to each site test data
<b>Test Engineer:</b>	Mailes Hsieh

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature



Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions.

This report shall not be reproduced other than in full without the explicit written consent of ISL.

This report totally contains 71 pages, including 1 cover page , 3 contents page,  
and 67 pages for the test description.

This report must not be use to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard.

International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

## 2. TEST RESULTS (802.11a)

### 2.1 Maximum Peak Output Power [Section 15.407 (a)(1)(2)(3)]

#### 2.1.1 Test Procedure

The transmitter output of EUT was connected to the peak power analyzer.

#### 2.1.2 Test Setup



Frequency Band	Limit
5.15 – 5.25 GHz	The lesser of 50mW (17dBm) or 4dBm+10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm+10logB
5.725-5.825GHz	The lesser of 1W (30dBm) or 17dBm+10logB

Note: B is the 26dB emission bandwidth in MHz

#### 2.1.3 Test Data: (Normal Mode)

Please refer to ISL report 04LR018FC part 1.

#### 2.1.4 Test Data: (Turbo Mode)

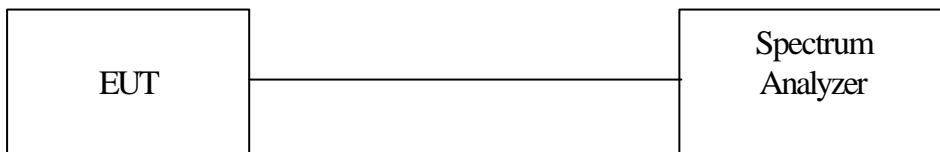
Please refer to ISL report 04LR018FC part 1.

## 2.2 Peak Power Spectral Density [Section 15.407(a)(1)(2)(3) ]

### 2.2.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 30MHz or 50MHz  
RBW: 1MHz  
VBW: 3MHz  
Sweep time: 30 or 50 sec.  
Center frequency: fundamental frequency tested
2. Peak search was read to the peak power after maximum hold function is completed.

### 2.2.2 Test Setup



### 2.2.3 Test Data: (Normal Mode)

Please refer to ISL report 04LR018FC part 1.

### 2.2.4 Test Data: (Turbo Mode)

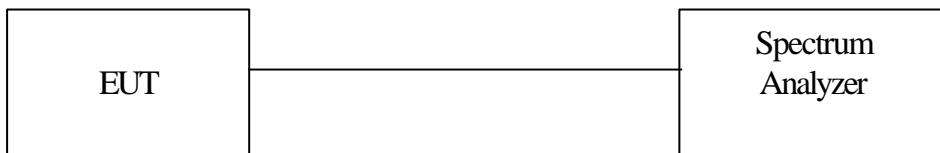
Please refer to ISL report 04LR018FC part 1.

## 2.3 Peak Power Excursion Measurement [Section 15.407(a)(6) ]

### 2.3.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
1. Frequency SPAN of Spectrum: 30MHz or 50MHz.
2. Trace 1 : RBW: 1MHz, VBW: 3MHz. Using positive detector and Max -hold
3. Trace 2 : RBW: 1MHz, VBW: 3MHz. Using Sample detector and Max-hold
4. Record the largest difference between Trace 1 and Trace 2.

### 2.3.2 Test Setup



### 2.3.3 Test Data: (Normal Mode)

Please refer to ISL report 04LR018FC part 1.

### 2.3.4 Test Data: (Turbo Mode)

Please refer to ISL report 04LR018FC part 1.

## 2.4 Powerline Conducted Emissions [Section 15.207 & 15.407 (b)(5) ]

### 2.4.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

### 2.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

### 2.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150 KHz--30MHz
Detector Function:	Quasi-Peak/Average
Bandwidth (RBW):	9KHz

**2.4.4 Test Data:**

**Please refer to ISL report 04LR018FC part 1.**

## 2.5 Radiated Emission Measurement [Section 15.209 & 15.407(b)(5)]

### 2.5.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

### 2.5.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 40GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to para. 6.5.3.

For the test of 2<sup>nd</sup> to 10<sup>th</sup> harmonics frequencies , the equipment setup was also refer to para.6.5.3. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

### 2.5.3 EMI Receiver/Spectrum Analyzer Configuration

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 40 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	30MHz – 40 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

### 2.5.4 Test Data (30MHz – 1GHz) .

#### 30M – 1GHz Open Field Radiated Emissions (Horizontal)

Operator: Mailes Hsieh

Humidity (%): 47  
Temperature (C): 26

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
42.61	23.25	11.04	1.76	0.00	36.05	40.00	-3.95	200.00	281.00
265.71	18.31	12.44	4.32	0.00	35.07	46.00	-10.93	100.00	39.00
395.69	17.45	15.46	5.19	0.00	38.09	46.00	-7.91	200.00	265.00
528.58	13.84	17.79	5.95	0.00	37.58	46.00	-8.42	150.00	348.00
598.42	10.41	18.30	6.31	0.00	35.02	46.00	-10.98	250.00	71.00
661.47	10.37	18.75	6.60	0.00	35.71	46.00	-10.29	100.00	152.00
793.39	11.91	19.77	7.24	0.00	38.92	46.00	-7.08	200.00	184.00
815.7	5.66	19.86	7.34	0.00	32.86	46.00	-13.14	150.00	184.00
863.23	8.12	20.05	7.50	0.00	35.67	46.00	-10.33	250.00	184.00
932.1	7.92	20.39	7.79	0.00	36.11	46.00	-9.89	100.00	103.00

#### 30M – 1GHz Open Field Radiated Emissions (Vertical)

Operator: Mailes Hsieh

Humidity (%): 47  
Temperature (C): 26

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
69.77	26.02	5.40	2.24	0.00	33.65	40.00	-6.35	200.00	222.00
398.6	16.52	15.56	5.20	0.00	37.28	46.00	-8.72	150.00	125.00
528.58	19.14	17.79	5.95	0.00	42.88	46.00	-3.12	250.00	173.00
598.42	14.08	18.30	6.31	0.00	38.69	46.00	-7.31	100.00	303.00
719.67	14.01	19.18	6.86	0.00	40.04	46.00	-5.96	200.00	319.00
732.28	11.55	19.35	6.91	0.00	37.81	46.00	-8.19	150.00	319.00
768.17	10.45	19.67	7.11	0.00	37.22	46.00	-8.78	100.00	11.00
797.27	15.01	19.79	7.26	0.00	42.05	46.00	-3.95	100.00	11.00
815.7	9.95	19.86	7.34	0.00	37.15	46.00	-8.85	100.00	11.00
925.31	9.62	20.35	7.77	0.00	37.75	46.00	-8.25	100.00	11.00

\* NOTE:

During the pre-test, the EUT has been tested for Channel 1, 4, 5, 8, 9, 12 of Normal Mode and Channel 1, 2, 3 ,4, 5 of Turbo mode and transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

Margin=Corrected Amplitude–Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

**All frequencies from 30MHz to 1GHz have been tested**

### 2.5.5 Test Data ( 1GHz – 40 GHz, Transmitting ).

#### 1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 1 : 5180 MHz

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2039.36	55.98	30.99	2.17	46.20	42.93	54.00	-11.07	100	35
2395.40	52.66	30.92	2.67	46.21	40.05	54.00	-13.95	101	200
2773.03	54.41	31.01	2.82	46.41	41.82	54.00	-12.18	102	249
8196.40	44.97	41.03	3.17	43.25	45.92	54.00	-8.08	101	48
10916.8	38.17	39.48	3.35	40.56	40.44	54.00	-13.56	103	313
16002.8	35.69	44.40	6.05	41.14	45.00	54.00	-9.00	102	259

#### 1GHz~ 40 GHz (Vertical), Normal Mode, Channel 1: 5180 MHz

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
3330.47	51.57	31.36	2.32	46.63	38.63	54.00	-15.37	103	213
3952.65	51.20	32.13	2.16	46.16	39.34	54.00	-14.66	100	157
4369.83	51.03	33.31	1.62	46.47	39.49	54.00	-14.51	100	37
7908.69	44.84	40.47	3.08	44.18	44.21	54.00	-9.79	103	107
11078.30	37.99	39.69	3.35	40.68	40.35	54.00	-13.65	103	319
15958.70	36.36	44.27	5.99	41.27	45.35	54.00	-8.65	101	314

Note:

“ \* ”: Fundamental Frequency

“ pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

All frequencies from 1GHz to 40 GHz have been tested.

**1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 4: 5240 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1712.09	60.73	28.58	1.95	46.21	45.05	54.00	-8.95	101	132
4128.87	51.48	32.59	1.98	46.24	39.81	54.00	-14.19	103	205
4326.67	51.61	33.18	1.69	46.43	40.05	54.00	-13.95	100	346
7851.15	44.84	40.39	3.12	44.45	43.90	54.00	-10.10	100	125
11127.30	39.38	39.81	3.35	40.78	41.75	54.00	-12.25	103	165
16007.70	35.84	44.40	6.05	41.15	45.15	54.00	-8.85	100	11

**1GHz~ 40 GHz (Vertical), Normal Mode, Channel 4: 5240 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2395.40	53.17	30.92	2.67	46.21	40.56	54.00	-13.44	103	219
4010.19	50.51	32.23	2.15	46.12	38.77	54.00	-15.23	102	204
4484.92	51.06	33.65	1.45	46.59	39.58	54.00	-14.42	103	143
7757.64	45.47	40.26	3.17	44.88	44.02	54.00	-9.98	100	77
10980.40	38.84	39.50	3.35	40.52	41.16	54.00	-12.84	100	249
17133.60	35.13	46.40	6.33	42.05	45.80	54.00	-8.20	100	98

Note:

“ \* ”: Fundamental Frequency

“ pk ”: peak reading

“ av ”: average reading

The Spectrum noise level+Correction Factor&lt;Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 5 : 5260 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1463.94	63.71	26.63	1.82	46.20	45.96	54.00	-8.04	102	362
4064.14	51.17	32.39	2.08	46.17	39.47	54.00	-14.53	101	286
4229.57	51.02	32.89	1.83	46.33	39.41	54.00	-14.59	101	181
7869.13	44.88	40.42	3.11	44.36	44.04	54.00	-9.96	103	5
10995.10	38.63	39.50	3.35	40.51	40.96	54.00	-13.04	102	206
15777.60	42.95	43.69	5.73	41.87	50.50	54.00	-3.50	103	206

**1GHz~ 40 GHz (Vertical), Normal Mode, Channel 5 : 5260 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1467.53	59.69	26.65	1.82	46.21	41.95	54.00	-12.05	103	73
1715.68	58.27	28.61	1.96	46.21	42.63	54.00	-11.37	100	285
2391.81	52.90	30.92	2.67	46.21	40.28	54.00	-13.72	103	165
7797.20	45.59	40.32	3.15	44.70	44.35	54.00	-9.65	103	241
10730.80	38.30	39.45	3.33	40.68	40.40	54.00	-13.60	100	294
15772.70	42.69	43.67	5.72	41.88	50.20	54.00	-3.80	103	60

Note:

“ \* ”: Fundamental Frequency

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m, } -27 \text{ dBm EIRP} = 68.3 \text{ dBuV}$$

All frequencies from 1GHz to 40 GHz have been tested.

**1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 8: 5320 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1057.54	59.31	24.76	1.54	46.03	39.59	54.00	-14.41	101	336
4110.89	50.66	32.53	2.01	46.22	38.98	54.00	-15.02	103	184
4297.90	50.75	33.09	1.73	46.40	39.17	54.00	-14.83	102	225
7941.06	44.77	40.52	3.06	44.03	44.32	54.00	-9.68	102	106
11254.50	38.36	40.11	3.35	41.06	40.76	54.00	-13.24	101	237
15953.80	41.69	44.25	5.98	41.28	50.64	54.00	-3.36	102	276

**1GHz~ 40 GHz (Vertical), Normal Mode, Channel 8: 5320 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1791.21	55.59	29.25	2.00	46.21	40.63	54.00	-13.37	100	219
4164.83	50.84	32.69	1.93	46.27	39.18	54.00	-14.82	100	360
4323.08	51.54	33.17	1.69	46.43	39.97	54.00	-14.03	103	67
7459.14	44.20	39.83	3.29	46.11	41.22	54.00	-12.78	100	118
10632.90	38.77	39.43	3.33	40.74	40.79	54.00	-13.21	101	215
15953.80	41.61	44.25	5.98	41.28	50.56	54.00	-3.44	103	54

Note:

“ \* ”: Fundamental Frequency

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27\text{dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 9: 5745 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4092.91	50.82	32.48	2.03	46.20	39.13	54.00	-14.87	100	9
4398.60	50.82	33.40	1.58	46.50	39.30	54.00	-14.70	103	96
4506.49	50.93	33.72	1.43	46.61	39.48	54.00	-14.52	100	339
7617.38	45.59	40.06	3.25	45.54	43.37	54.00	-10.63	101	174
11484.60	48.09	40.66	3.35	41.56	50.54	54.00	-3.46	102	352
17231.50	39.46	46.69	6.31	42.09	50.37	54.00	-3.63	101	202

**1GHz~ 40 GHz (Vertical), Normal Mode, Channel 9: 5745 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2122.08	54.65	30.98	2.28	46.20	41.70	54.00	-12.30	102	147
4423.78	51.05	33.47	1.54	46.53	39.54	54.00	-14.46	101	192
4567.63	50.56	33.96	1.40	46.66	39.26	54.00	-14.74	103	327
7239.76	44.65	39.48	3.15	46.20	41.08	54.00	-12.92	100	362
11484.60	48.36	40.66	3.35	41.56	50.82	54.00	-3.18	101	112
17226.60	39.38	46.68	6.31	42.09	50.28	54.00	-3.72	103	269

Note:

“\*”: Fundamental Frequency

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor&lt;Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27\text{dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 12 : 5805 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4373.43	50.70	33.32	1.62	46.48	39.16	54.00	-14.84	101	101
4423.78	51.02	33.47	1.54	46.53	39.50	54.00	-14.50	103	129
4571.23	51.16	33.97	1.40	46.66	39.87	54.00	-14.13	100	339
8095.70	45.27	40.81	3.10	43.50	45.68	54.00	-8.32	101	286
11611.90	48.15	41.06	3.41	41.85	50.77	54.00	-3.23	103	62
17417.50	39.20	47.25	6.27	42.17	50.56	54.00	-3.44	103	214

**1GHz~ 40 GHz (Vertical), Normal Mode, Channel 12 : 5805 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2395.40	53.95	30.92	2.67	46.21	41.34	54.00	-12.66	103	12
4395.00	51.18	33.39	1.59	46.50	39.65	54.00	-14.35	101	341
4441.76	51.29	33.53	1.52	46.54	39.79	54.00	-14.21	103	349
7099.50	45.42	39.26	3.06	46.27	41.48	54.00	-12.52	100	151
11602.10	47.91	41.03	3.41	41.82	50.52	54.00	-3.48	100	194
17402.80	39.03	47.21	6.28	42.16	50.36	54.00	-3.64	102	10

Note:

“ \* ”: Fundamental Frequency

“ pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27\text{dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal), Turbo Mode, Channel 1: 5210 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4085.71	50.88	32.46	2.04	46.19	39.18	54.00	-14.82	102	6
4420.18	51.34	33.46	1.55	46.52	39.82	54.00	-14.18	101	327
4578.42	50.52	34.00	1.39	46.67	39.24	54.00	-14.76	103	144
7387.21	44.49	39.72	3.25	46.14	41.32	54.00	-12.68	103	204
10946.20	38.23	39.49	3.35	40.54	40.53	54.00	-13.47	100	192
16595.10	35.48	44.87	6.30	42.16	44.49	54.00	-9.51	101	84

**1GHz~ 40 GHz (Vertical), Turbo Mode, Channel 1: 5210 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4010.19	50.48	32.23	2.15	46.12	38.74	54.00	-15.26	101	346
4211.59	50.88	32.83	1.86	46.32	39.26	54.00	-14.74	102	10
4567.63	50.23	33.96	1.40	46.66	38.93	54.00	-15.07	103	244
7635.36	46.78	40.09	3.24	45.46	44.66	54.00	-49.34	100	159
10946.20	38.50	39.49	3.35	40.54	40.79	54.00	-13.21	102	315
17202.10	35.27	46.61	6.31	42.08	46.11	54.00	-7.89	101	87

Note:

“ \* ”: Fundamental Frequency

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor&lt;Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27\text{dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal) , Turbo Mode, Channel 2 : 5250 MHZ**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
3722.48	51.33	31.81	2.11	46.41	38.84	54.00	-15.16	102	11
4341.06	50.96	33.22	1.67	46.44	39.41	54.00	-14.59	101	61
4488.51	51.13	33.67	1.45	46.59	39.65	54.00	-14.35	100	44
7282.92	44.73	39.55	3.18	46.19	41.27	54.00	-12.73	103	325
11102.80	38.13	39.75	3.35	40.73	40.49	54.00	-13.51	100	163
15743.40	41.11	43.58	5.68	41.98	48.39	54.00	-5.61	100	339

**1GHz~ 40 GHz (Vertical), Turbo Mode, Channel 2: 5250 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2776.62	52.55	31.01	2.82	46.41	39.97	54.00	-14.03	102	247
3956.24	51.55	32.14	2.16	46.16	39.70	54.00	-14.30	102	152
4589.21	50.76	34.04	1.39	46.68	39.51	54.00	-14.49	103	78
7923.08	44.93	40.49	3.07	44.11	44.39	54.00	-9.61	101	261
10980.40	38.65	39.50	3.35	40.52	40.97	54.00	-13.03	100	113
15743.40	43.05	43.58	5.68	41.98	50.33	54.00	-3.67	101	215

Note:

“ \* ”: Fundamental Frequency

“ pk ”: peak reading

“ av ”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal), Turbo Mode, Channel 3 : 5290 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4279.92	50.88	33.04	1.76	46.38	39.29	54.00	-14.71	103	157
4405.79	50.84	33.42	1.57	46.51	39.32	54.00	-14.68	100	241
4553.25	51.23	33.90	1.40	46.65	39.89	54.00	-14.11	101	296
7736.06	45.40	40.23	3.18	44.99	43.83	54.00	-10.17	101	72
11567.80	38.84	40.92	3.39	41.75	41.40	54.00	-12.60	102	153
16174.10	40.40	44.47	6.13	41.50	49.50	54.00	-4.50	100	244

**1GHz~ 40 GHz (Vertical) , Turbo Mode, Channel 3: 5290 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4042.56	50.87	32.33	2.11	46.15	39.15	54.00	-14.85	102	143
4427.37	50.82	33.48	1.54	46.53	39.31	54.00	-14.69	100	184
4578.42	51.12	34.00	1.39	46.67	39.84	54.00	-14.16	103	83
7851.15	45.62	40.39	3.12	44.45	44.69	54.00	-9.31	101	24
10574.10	39.04	39.41	3.32	40.78	41.00	54.00	-13.00	103	192
16169.20	41.45	44.47	6.13	41.49	50.55	54.00	-3.45	101	281

Note:

“ \* ”: Fundamental Frequency

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

All frequencies from 1GHz to 40 GHz have been tested.

**1GHz~ 40 GHz (Horizontal), Turbo Mode, Channel 4 : 5760 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1467.53	63.80	26.65	1.82	46.21	46.07	54.00	-7.93	103	116
2773.03	50.86	31.01	2.82	46.41	38.28	54.00	-15.72	100	239
4377.02	51.77	33.33	1.61	46.48	40.23	54.00	-13.77	103	155
7408.79	44.60	39.75	3.26	46.13	41.49	54.00	-12.51	101	90
11391.60	41.06	40.44	3.35	41.36	43.50	54.00	-10.50	100	329
17270.60	38.21	46.81	6.30	42.11	49.22	54.00	-4.78	100	199

**1GHz~ 40 GHz (Vertical) , Turbo Mode, Channel 4: 5760 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2395.40	53.70	30.92	2.67	46.21	41.08	54.00	-12.92	103	297
2445.75	52.87	30.91	2.74	46.21	40.31	54.00	-13.69	103	7
4564.04	51.04	33.94	1.40	46.66	39.73	54.00	-14.27	101	221
7549.05	44.73	39.97	3.29	45.86	52.13	54.00	-11.87	100	68
11396.50	42.62	40.45	3.35	41.37	45.05	54.00	-8.95	100	68
17270.60	38.00	46.81	6.30	42.11	49.00	54.00	-5.00	100	54

Note:

“ \* ”: Fundamental Frequency

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor&lt;Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal) , Turbo Mode, Channel 5 : 5800 MHZ**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1467.53	61.84	26.65	1.82	46.21	44.11	54.00	-9.89	103	83
4125.27	50.79	32.58	1.98	46.23	39.12	54.00	-14.88	101	134
4179.22	50.83	32.74	1.90	46.29	39.18	54.00	-14.82	101	151
7408.79	44.65	39.75	3.26	46.13	41.53	54.00	-12.47	101	200
11597.20	47.82	41.01	3.41	41.81	50.42	54.00	-3.58	103	135
17618.20	35.16	48.00	6.05	41.77	47.43	54.00	-6.57	101	59

**1GHz~ 40 GHz (Vertical), Turbo Mode, Channel 5: 5800 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 48  
Temperature (C): 27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4233.17	50.67	32.90	1.82	46.34	39.06	54.00	-14.94	103	256
4445.35	50.76	33.54	1.51	46.55	39.26	54.00	-14.74	100	296
4574.83	51.51	33.98	1.39	46.67	40.22	54.00	-13.78	103	77
7448.35	44.48	39.82	3.29	46.11	41.48	54.00	-12.52	101	231
11597.20	47.95	41.01	3.41	41.81	50.55	54.00	-3.45	100	128
17564.30	34.97	47.77	6.15	41.97	46.92	54.00	-7.08	102	50

Note:

“ \* ”: Fundamental Frequency

“ pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV/m}, -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

**All frequencies from 1GHz to 40 GHz have been tested.**

## 2.6 Band Edge Measurement (Section 15.407 (b) (1) (2))

### 2.6.1 Test Procedure (Conducted)

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer

Peak Mode:	
SPAN	100MHz
RBW	1MHz
VBW	1MHz
Sweep Time	200msec.

2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band.

### 2.6.2 Test Setup (Conducted)



### 2.6.3 Test Data (conducted):

Please refer to ISL report 04LR018FC part 1.

#### 2.6.4 Bandedge Measurement Test Procedure (Radiated)

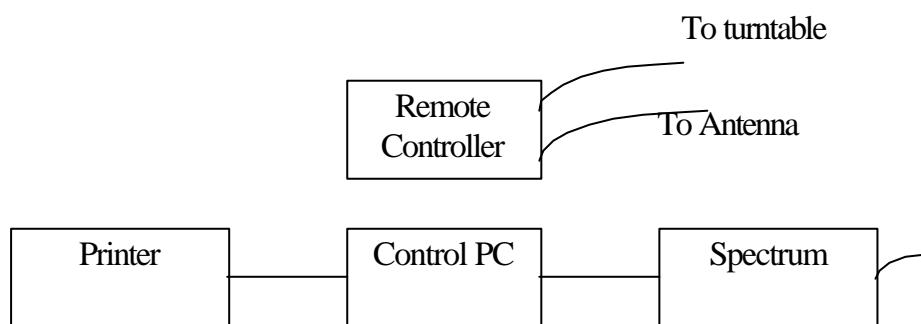
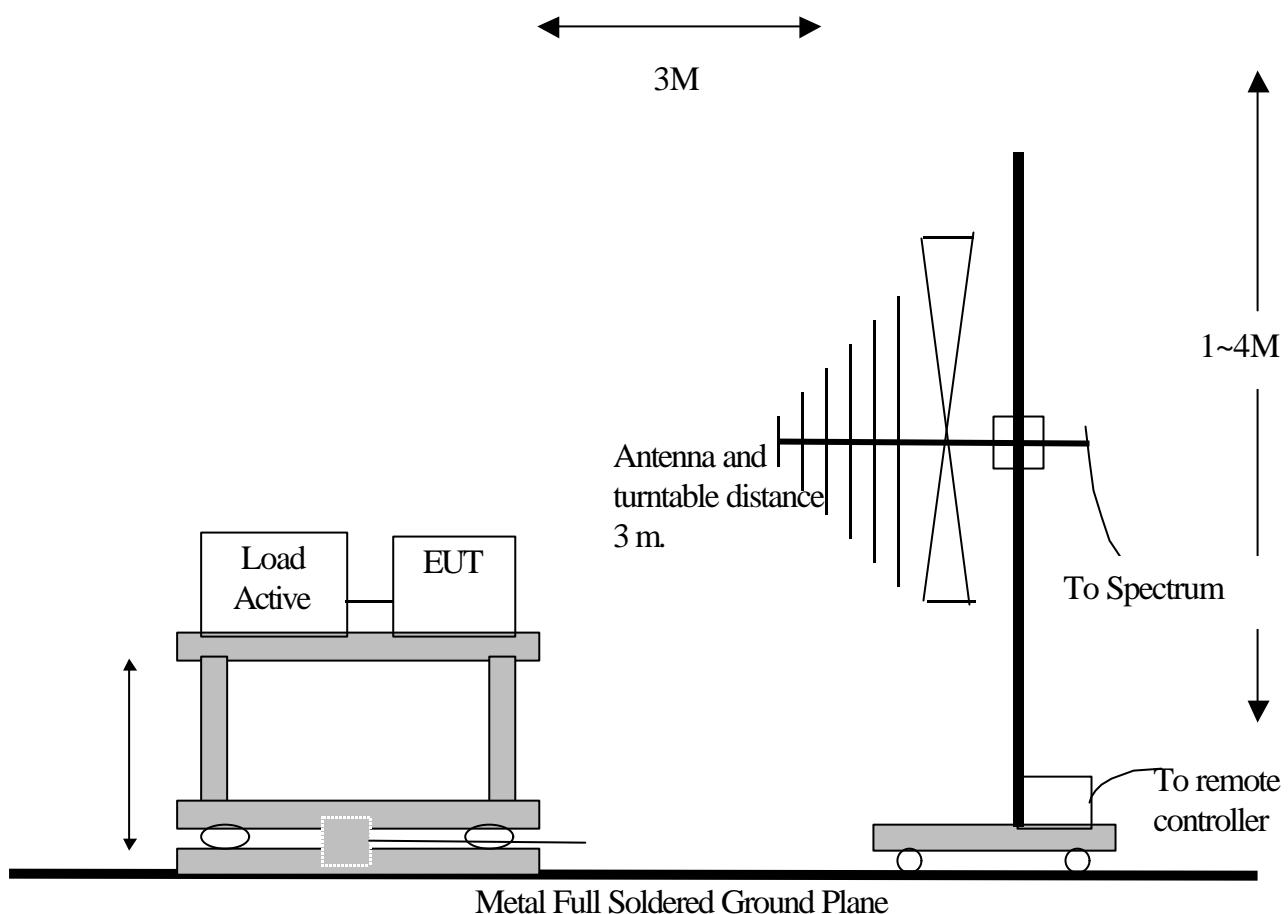
1. Antenna and Turntable test procedure same as Radiated Emissions measurement listed in Para. 6.5

Equipment mode: Spectrum analyzer

Peak Mode:	
SPAN	100MHz
RBW	1MHz
VBW	1MHz
Sweep Time	200msec.
AVE Mode:	
SPAN	100MHz
RBW	1MHz
VBW	10Hz
Sweep Time	20 sec.

2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band.
4. Get the spectrum reading after Maximum Hold function is completed.

### 2.6.5 Test Setup (Radiated)



**2.6.6 Test Data (Radiated):**

**Band Edge measurement (Radiated)**

Test Engr: Mailes Hsieh      Temp. (deg. C): 27  
Humidity (%): 48

Outside Channel (Normal)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Pass/Fail
1 (Peak)	5143.1	21.67	36.93	58.6	74	Pass
1 (Average)	5149.7	8.57	36.93	45.5	54	Pass
3 (Peak)	5352.5	21.38	36.97	58.35	74	Pass
3 (Average)	5350	8.52	36.97	45.49	54	Pass
4 (Peak)	5715	28.79	37.19	65.98	74	Pass
4 (Average)	5714.6	12.21	37.19	49.4	54	Pass
5 (Peak)	5836.1	29.28	37.21	66.49	74	Pass
5 (Average)	5835	14.07	37.21	51.28	54	Pass

Outside Channel (Turbol)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Pass/Fail
1 (Peak)	5143.1	21.67	36.93	58.6	74	Pass
1 (Average)	5149.7	8.57	36.93	45.5	54	Pass
3 (Peak)	5352.5	21.38	36.97	58.35	74	Pass
3 (Average)	5350	8.52	36.97	45.49	54	Pass
4 (Peak)	5715	28.79	37.19	65.98	74	Pass
4 (Average)	5714.6	12.21	37.19	49.4	54	Pass
5 (Peak)	5836.1	29.28	37.21	66.49	74	Pass
5 (Average)	5835	14.07	37.21	51.28	54	Pass

**Note:**

“pk”: peak reading

“av”: average reading

Emission Level=Spectrum Reading+Correction Factor

Correction Factor =Antenna Factor+cable loss

Both Horizontal and Vertical polarization have been tested and the worst data is listed above.

**The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

$$(E = \frac{1000000\sqrt{30P}}{3} \text{ mV / m, } -27 \text{ dBm EIRP} = 68.3 \text{ dBuV})$$

**Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Normal Mode (Channel 1) Peak data**



**Normal Mode (Channel 1) Average Data**



## Normal Mode (Channel 8) Peak data



## Normal Mode (Channel 8) Average data



Normal Mode (Channel 9) Peak data



Normal Mode (Channel 9) Average Data



Normal Mode (Channel 12) Peak data



Normal Mode (Channel 12) Average Data



Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Turbo Mode (Channel 1) Peak data



Turbo Mode (Channel 1) Average data



Turbo Mode (Channel 3) Peak data



Turbo Mode (Channel 3) Average Data



Turbo Mode (Channel 4) Peak data



Turbo Mode (Channel 4) Average data



**Turbo Mode (Channel 5) Peak data****Turbo Mode (Channel 5) Average Data**

**2.7 RF Exposure Measurement [Section 15.407(f)(4) & 1.1307(b)]**

Refer to MPE Test Report

## 2.8 Frequency Stability [Section 15.407(g)]

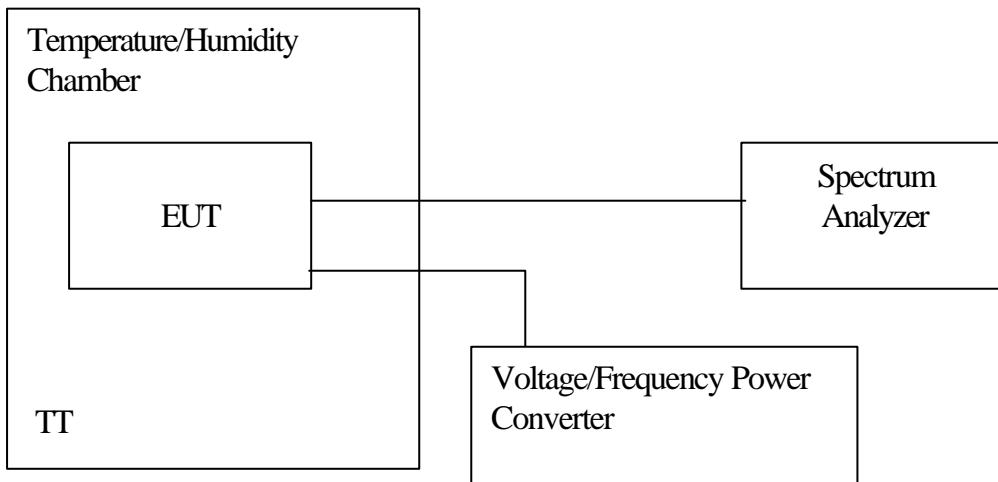
### 2.8.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier sing shall be maintained within +/- 0.02% of the operating frequency over the operation temperature range of EUT ( $0^{\circ}\text{C}$ ~ $35^{\circ}\text{C}$ ), and variation in the primary supply voltage from 85% to 115% of the rated supply voltage (115V AC) at  $20^{\circ}\text{C}$ .

### 2.8.2 Test Procedure

1. The EUT was placed in the Temperature/Humidity Chamber and powered by a Voltage/Frequency Power converter.
2. Connect the RF output of EUT to Spectrum. Turn on the EUT.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the chamber temperature to stabilize. Turn the EUT on and measure the operating frequency after 2, 5, 10 minutes.
5. Set the Voltage/Frequency Power Converter to 85% and 115% of supply voltage, then repeat step 2, 3, 4 respectively.
6. Repeat step 2 , 3, 4, 5 with the temperature of chamber set to the lowest temperature.
7. Repeat step 2 , 3, 4, 5 with the temperature of chamber set to  $20^{\circ}\text{C}$ .

### 2.8.3 Test Setup



**2.8.4 Test Data**

**Please refer to ISL report 04LR018FC part 1.**

### 3. TEST RESULTS (802.11b)

#### 3.1 Powerline Conducted Emissions [Section 15.207]

##### 3.1.1 EUT Configuration

The conducted emission test setups are in accordance with Figs 9, 10(a) and 10(b) of ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996.

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

##### 3.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

##### 3.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

**3.1.4 Test Data:**

**Please refer to ISL report 04LR018FC part 1.**

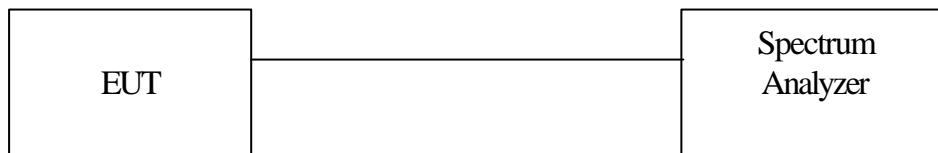
### 3.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

#### 3.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz

#### 3.2.2 Test Setup



#### 3.2.3 Test Data:

Please refer to ISL report 04LR018FC part 1.

### 3.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

#### 3.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

#### 3.3.2 Test Setup



#### 3.3.3 Test Data

Please refer to ISL report 04LR018FC part 1.

### 3.4 Radiated Emission Measurement [Section [15.247(c)(4)]]

#### 3.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

#### 3.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to EMI Receiver/Spectrum Analyzer Configuration.

For the test of 2<sup>nd</sup> to 10<sup>th</sup> harmonics frequencies , the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

#### 3.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

**3.4.4 Test Data (30MHz – 1GHz):**

**30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11**

Operator: Mailes Hsieh

Humidity (%): 47  
Temperature (C): 26

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
66.86	18.70	5.60	2.18	0.00	26.47	40.00	-13.53	200.00	268.00
69.77	16.23	5.60	2.24	0.00	24.06	40.00	-15.94	200.00	252.00
72.68	15.41	5.87	2.27	0.00	23.55	40.00	-16.45	100.00	236.00
99.84	27.18	10.27	2.68	0.00	40.12	43.50	-3.38	150.00	301.00
166.77	26.34	8.76	3.45	0.00	38.55	43.50	-4.95	100.00	334.00
181.32	13.71	8.51	3.58	0.00	25.81	43.50	-17.69	100.00	317.00
300.63	12.95	13.61	4.53	0.00	31.10	46.00	-14.90	100.00	236.00
333.61	8.83	14.07	4.78	0.00	27.67	46.00	-18.33	100.00	268.00
367.56	13.35	14.90	5.02	0.00	33.27	46.00	-12.73	250.00	8.00
433.52	9.62	16.27	5.40	0.00	31.29	46.00	-14.71	100.00	317.00

**30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11**

Operator: Mailes Hsieh

Humidity (%): 47  
Temperature (C): 26

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
32.91	3.22	16.62	1.55	0.00	21.39	40.00	-18.61	250.00	222.00
62.98	15.81	5.60	2.11	0.00	23.52	40.00	-16.48	150.00	254.00
66.86	15.56	5.60	2.18	0.00	23.34	40.00	-16.66	100.00	254.00
69.77	14.03	5.60	2.24	0.00	21.87	40.00	-18.13	100.00	59.00
82.38	9.86	7.00	2.43	0.00	19.30	40.00	-20.70	250.00	173.00
99.84	22.84	10.27	2.68	0.00	35.78	43.50	-7.72	150.00	206.00
166.77	19.48	8.76	3.45	0.00	31.70	43.50	-11.80	100.00	352.00
179.38	9.77	8.51	3.56	0.00	21.85	43.50	-21.65	200.00	26.00
367.56	4.35	14.90	5.02	0.00	24.27	46.00	-21.73	100.00	287.00
433.52	2.40	16.27	5.40	0.00	24.06	46.00	-21.94	100.00	287.00

NOTE:

During the Pre-test, the EUThas been tested for Channel 1 , 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

Margin =      Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

**All frequencies from 30MHz to 1GHz have been tested**

**3.4.5 Test Data ( 1GHz – 25 GHz) .**

**1GHz~ 25 GHz (Horizontal), Channel 1: 2412 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequenc y	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1194.81	60.77	25.40	1.63	46.09	41.71	54.00	-12.29	102	99
1629.37	56.40	27.89	1.91	46.21	39.98	54.00	-14.02	101	69
4821.68	38.98	34.92	1.28	46.88	28.29	54.00	-25.71	100	18
7233.77	38.08	39.47	3.15	46.21	34.49	54.00	-19.51	101	143
9643.36	30.84	40.58	3.17	42.07	32.51	54.00	-21.49	102	7
12017.0	28.26	42.28	3.65	42.75	31.44	54.00	-22.56	100	89

**1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequenc y	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1879.12	59.05	29.98	2.04	46.20	44.88	54.00	-9.12	100	51
2338.66	61.12	30.93	2.59	46.21	48.43	54.00	-5.57	101	149
4821.68	43.54	34.92	1.28	46.88	32.85	54.00	-21.15	100	18
7233.77	41.84	39.47	3.15	46.21	38.25	54.00	-15.75	101	143
9643.36	31.17	40.58	3.17	42.07	32.85	54.00	-21.15	102	7
12082.9	28.94	42.20	3.67	42.77	32.04	54.00	-21.96	100	107

Note:

“ \* ”: Fundamental Frequency

“\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“--”: No meter reading data due to the emission level is smaller than spectrum noise level.

The Spectrum noise level+Correction Factor < Limit - 6 dB

Margin=Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

**1GHz~ 25 GHz (Horizontal) , Channel 6 : 2437 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
2183.82	54.66	30.96	2.37	46.20	41.79	54.00	-12.21	101	101
2321.18	57.86	30.94	2.57	46.21	45.15	54.00	-8.85	101	144
2538.46	61.58	30.92	2.82	46.24	49.08	54.00	-4.92	102	212
4870.63	37.38	35.11	1.25	46.93	26.82	54.00	-27.18	100	13
7305.69	39.08	39.59	3.20	46.18	35.69	54.00	-18.31	101	154
9769.23	31.38	40.31	3.12	41.74	33.06	54.00	-20.94	101	5

**1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1389.61	65.27	26.29	1.76	46.17	47.16	54.00	-6.84	101	85
2366.13	62.30	30.93	2.63	46.21	49.65	54.00	-4.35	101	158
2515.98	57.61	30.91	2.82	46.22	45.11	54.00	-8.89	102	205
4870.63	43.84	35.11	1.25	46.93	33.28	54.00	-20.72	100	13
7311.69	40.18	39.60	3.20	46.17	36.81	54.00	-17.19	101	155
9745.25	32.42	40.36	3.13	41.81	34.11	54.00	-19.89	102	5

Note:

“ \* ”: Fundamental Frequency

“\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“--”: No meter reading data due to the emission level is smaller than spectrum noise level.

The Spectrum noise level+Correction Factor &lt; Limit - 6 dB

Margin=Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

**1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
2358.64	60.68	30.93	2.62	46.21	48.02	54.00	-5.98	101	156
2366.13	60.30	30.93	2.63	46.21	47.65	54.00	-6.35	101	158
3758.74	44.44	31.86	2.12	46.37	32.05	54.00	-21.95	102	162
4923.08	38.81	35.31	1.23	46.97	28.37	54.00	-25.63	100	8
7383.62	39.41	39.71	3.25	46.14	36.22	54.00	-17.78	101	165
9541.46	29.63	40.81	3.21	42.34	31.30	54.00	-22.70	102	9

**1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1467.03	62.37	26.65	1.82	46.21	44.63	54.00	-9.37	101	80
2388.61	62.36	30.92	2.66	46.21	49.74	54.00	-4.26	101	165
4919.58	43.52	35.29	1.23	46.97	33.08	54.00	-20.92	100	8
7377.62	42.29	39.70	3.24	46.14	39.09	54.00	-14.91	101	164
9841.16	32.18	40.15	3.10	41.56	33.87	54.00	-20.13	101	3
12304.7	29.80	41.93	3.76	42.86	32.64	54.00	-21.36	100	165

Note:

“ \* ”: Fundamental Frequency

“\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“--”: No meter reading data due to the emission level is smaller than spectrum noise level.

The Spectrum noise level+Correction Factor < Limit - 6 dB

Margin=Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

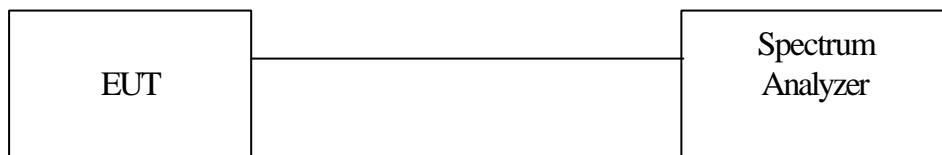
**All frequencies from 1GHz to 25 GHz have been tested.**

## 3.5 Band Edge Measurement

### 3.5.1 Test Procedure (Conducted)

1. The transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 100KHz  
VBW: 100KHz  
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

### 3.5.2 Test Setup (Conducted)



### 3.5.3 Test Data:

Please refer to ISL report 04LR018FC part 1.

### 3.5.4 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 1MHz  
VBW: 1MHz  
Center frequency: 2.395GHz, 2.48GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band ,  
Change RBW: 1MHz  
VBW: 10Hz  
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

### 3.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

### 3.5.6 Test Data

**Table Band Edge measurement (Radiated)**

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dbc ( Limit: > 20dbc)	Limit (dBuV/m)	Equip. Setup VBW	Temp. (deg. C):	27
								Humidity (%):	
1(peak mode)	2413.2	80.25	33.61	113.86	---	---	1MHz	---	
Outside band	2397.6	49.41	33.61	83.02	30.84	---	1MHz	Pass	
1(average mode)	2413.6	71.78	33.61	105.39	---	---	10Hz	---	
Restricted band	2387	18.23	33.61	51.84	---	54	10Hz	Pass	
11(peak mode)	2463	79.47	33.68	113.15	---	---	1MHz	---	
Outside band	2475.9	48.22	33.68	81.9	31.25	---	1MHz	Pass	
11(average mode)	2463.6	69.13	33.68	102.81	---	---	10Hz	---	
Restricted band	2487.3	18.12	33.68	51.8	---	54	10Hz	Pass	

Note:

The Spectrum plot of emission level measurement in Restricted band is attached.

Emission Level=Spectrum Reading+Correction Factor

Correction Factor=Antenna Factor+cable loss+amplifier gain

Both Horizontal and Vertical polarization have been tested and the worst data is listed above.

Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Peak Mode (Channel 1)



Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Average Mode (Channel 1)



**Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Peak Mode (Channel 11)**



**Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Average Mode (Channel 11)**



**3.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]**

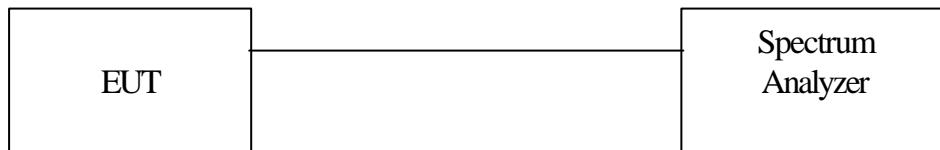
**See MPE report**

### 3.7 DSSS Peak Power Spectral Density [Section 15.247(d) ]

#### 3.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN:1.5MHz  
RBW: 3KHz  
VBW: 30KHz  
Center frequency: fundamental frequency tested.  
Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

#### 3.7.2 Test Setup



#### 3.7.3 Test Data

Please refer to ISL report 04LR018FC part 1

## 4. TEST RESULTS (802.11g)

### 4.1 Powerline Conducted Emissions [Section 15.207]

#### 4.1.1 EUT Configuration

The conducted emission test setups are in accordance with Figs 9, 10(a) and 10(b) of ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996.

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

#### 4.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

#### 4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

**4.1.4 Test Data:**

Please refer to ISL report 04LR018FC part 1.

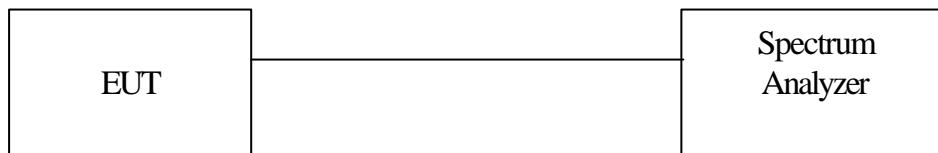
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz

### 4.2.2 Test Setup



### 4.2.3 Test Data:

Please refer to ISL report 04LR018FC part 1.

### 4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

#### 4.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

#### 4.3.2 Test Setup



#### 4.3.3 Test Data

Please refer to ISL report 04LR018FC part 1.

## 4.4 Radiated Emission Measurement [Section [15.247(c)(4)]]

### 4.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

### 4.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2<sup>nd</sup> to 10<sup>th</sup> harmonics frequencies , the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

### 4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

#### 4.4.4 Test Data (30MHz – 1GHz):

##### 30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11

Operator: Mailes Hsieh

Humidity (%): 47  
Temperature (C): 26

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
66.86	20.10	5.60	2.18	0.00	27.88	40.00	-12.12	250.00	254.00
78.5	16.68	6.45	2.37	0.00	25.50	40.00	-14.50	250.00	222.00
97.9	17.39	9.88	2.64	0.00	29.91	43.50	-13.59	200.00	222.00
99.84	27.30	10.27	2.68	0.00	40.25	43.50	-3.25	100.00	222.00
101.78	17.25	10.51	2.69	0.00	30.46	43.50	-13.04	200.00	222.00
166.77	26.10	8.76	3.45	0.00	38.31	43.50	-5.19	250.00	271.00
180.35	17.02	8.50	3.57	0.00	29.10	43.50	-14.40	100.00	172.00
367.56	14.15	14.90	5.02	0.00	34.06	46.00	-11.94	100.00	320.00
400.54	9.85	16.00	5.21	0.00	31.07	46.00	-14.93	100.00	140.00
433.52	11.98	16.27	5.40	0.00	33.65	46.00	-12.35	100.00	320.00

##### 30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11

Operator: Mailes Hsieh

Humidity (%): 47  
Temperature (C): 26

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
32.91	3.20	16.62	1.55	0.00	21.38	40.00	-18.62	150.00	284.00
66.86	16.80	5.60	2.18	0.00	24.58	40.00	-15.42	100.00	186.00
69.77	14.52	5.60	2.24	0.00	22.35	40.00	-17.65	250.00	317.00
87.23	11.88	7.83	2.50	0.00	22.21	40.00	-17.79	250.00	317.00
99.84	24.37	10.27	2.68	0.00	37.31	43.50	-6.19	200.00	268.00
101.78	10.77	10.51	2.69	0.00	23.97	43.50	-19.53	100.00	252.00
166.77	20.81	8.76	3.45	0.00	33.02	43.50	-10.48	150.00	40.00
168.71	11.94	8.73	3.47	0.00	24.13	43.50	-19.37	100.00	40.00
199.75	11.42	8.89	3.78	0.00	24.09	43.50	-19.41	100.00	56.00
433.52	4.80	16.27	5.40	0.00	26.47	46.00	-19.53	100.00	334.00

NOTE:

During the Pre-test, the EUThas been tested for Channel 1 , 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

Margin =      Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

**All frequencies from 30MHz to 1GHz have been tested**

**4.4.5 Test Data ( 1GHz – 25 GHz) .**

**1GHz~ 25 GHz (Horizontal), Channel 1: 2412 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequenc y	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1229.77	60.41	25.56	1.66	46.10	41.52	54.00	-12.48	102	96
2326.17	56.79	30.93	2.57	46.21	44.09	54.00	-9.91	101	145
2501.00	56.80	30.90	2.82	46.21	44.31	54.00	-9.69	102	200
2685.81	53.09	30.97	2.82	46.35	40.54	54.00	-13.46	102	258
4727.27	40.23	34.56	1.32	46.80	29.31	54.00	-24.69	101	27
9571.43	31.48	40.74	3.19	42.26	33.15	54.00	-20.85	102	9

**1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequenc y	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1469.53	63.39	26.66	1.82	46.21	45.66	54.00	-8.34	101	80
1876.62	57.05	29.96	2.04	46.20	42.86	54.00	-11.14	100	52
2768.23	53.49	31.01	2.82	46.41	40.91	54.00	-13.09	102	284
4405.59	45.16	33.42	1.57	46.51	33.64	54.00	-20.36	101	59
7995.00	34.01	40.59	3.03	43.77	33.86	54.00	-20.14	100	254
9343.66	31.52	40.90	3.20	42.58	33.05	54.00	-20.95	102	13

Note:

“\*”: Fundamental Frequency

“\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“---”: No meter reading data due to the emission level is smaller than spectrum noise level.

The Spectrum noise level+Correction Factor < Limit - 6 dB

Margin=Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

**1GHz~ 25 GHz (Horizontal) , Channel 6 : 2437 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1711.79	58.63	28.58	1.95	46.21	42.95	54.00	-11.05	101	63
2356.14	60.54	30.93	2.62	46.21	47.88	54.00	-6.12	101	155
2515.98	59.90	30.91	2.82	46.22	47.40	54.00	-6.60	102	205
4083.92	43.28	32.45	2.05	46.19	31.59	54.00	-22.41	102	92
8516.48	32.96	41.67	3.37	42.48	35.53	54.00	-18.47	102	134
12088.9	29.60	42.19	3.67	42.77	32.69	54.00	-21.31	100	108

**1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1452.05	60.42	26.58	1.81	46.20	42.61	54.00	-11.39	101	81
2366.13	54.51	30.93	2.63	46.21	41.86	54.00	-12.14	101	158
2775.72	52.52	31.01	2.82	46.41	39.93	54.00	-14.07	102	287
4087.41	43.19	32.46	2.04	46.20	31.49	54.00	-22.51	102	91
9757.24	31.08	40.33	3.13	41.78	32.76	54.00	-21.24	101	5
12154.8	29.45	42.11	3.70	42.80	32.46	54.00	-21.54	100	126

Note:

“ \* ”: Fundamental Frequency

“\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“--”: No meter reading data due to the emission level is smaller than spectrum noise level.

The Spectrum noise level+Correction Factor < Limit - 6 dB

Margin=Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

**1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1194.81	60.83	25.40	1.63	46.09	41.77	54.00	-12.23	102	99
2383.62	62.13	30.92	2.65	46.21	49.50	54.00	-4.50	101	163
2770.73	50.23	31.01	2.82	46.41	37.65	54.00	-16.35	102	285
4080.42	41.78	32.44	2.05	46.19	30.08	54.00	-23.92	102	92
9415.58	29.78	40.90	3.21	42.52	31.38	54.00	-22.62	102	12
12011.0	27.94	42.29	3.64	42.74	31.12	54.00	-22.88	100	88

**1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1791.71	55.21	29.25	2.00	46.21	40.25	54.00	-13.75	100	57
2116.38	56.19	30.98	2.28	46.20	43.24	54.00	-10.76	100	80
2773.23	51.88	31.01	2.82	46.41	39.29	54.00	-14.71	102	286
4080.42	46.86	32.44	2.05	46.19	35.16	54.00	-18.84	102	92
8786.21	29.90	41.24	3.26	42.69	31.71	54.00	-22.29	102	70
11573.4	28.24	40.93	3.39	41.76	30.81	54.00	-23.19	101	148

Note:

“ \* ”: Fundamental Frequency

“\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“--”: No meter reading data due to the emission level is smaller than spectrum noise level.

The Spectrum noise level+Correction Factor < Limit - 6 dB

Margin=Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss+Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

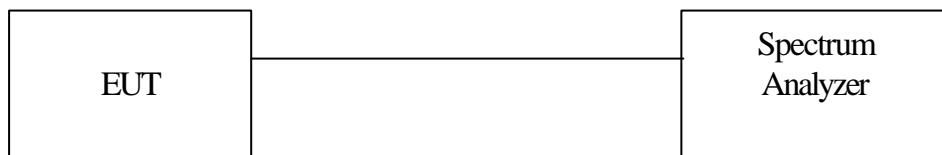
**All frequencies from 1GHz to 25 GHz have been tested.**

## 4.5 Band Edge Measurement

### 4.5.1 Test Procedure (Conducted)

1. The transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 100KHz  
VBW: 100KHz  
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

### 4.5.2 Test Setup (Conducted)



### 4.5.3 Test Data:

Please refer to ISL report 04LR018FC part 1

#### 4.5.4 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 1MHz  
VBW: 1MHz  
Center frequency: 2.395GHz, 2.48GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band ,  
Change RBW: 1MHz  
VBW: 10Hz  
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

#### 4.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

#### 4.5.6 Test Data

**Table Band Edge me asurement (Radiated)**

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc ( Limit: > 20dBc)	Limit (dBuV/m)	Temp. (deg. C):	27
							Humidity (%):	48
1(peak mode)	2414.9	74.19	33.61	107.8	---	---	1MHz	---
Outside band	2400	51.76	33.61	85.37	22.43	---	1MHz	Pass
1(average mode)	2417.9	62.98	33.61	96.59	---	---	10Hz	---
Restricted band	2390	16.81	33.61	50.42	---	54	10Hz	Pass
11(peak mode)	2464.8	73.06	33.68	106.74	---	---	1MHz	---
Outside band	2483.5	35.06	33.68	68.74	38	---	1MHz	Pass
11(average mode)	2455.4	62.23	33.68	95.91	---	---	10Hz	---
Restricted band	2483.5	16.05	33.68	49.73	---	54	10Hz	Pass

**Note:**

The Spectrum plot of emission level measurement in Restricted band is attached.

Emission Level=Spectrum Reading+Correction Factor

Correction Factor=Antenna Factor+cable loss–amplifier gain

Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Peak Mode (Channel 1)



Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Average Mode (Channel 1)



**Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Peak Mode (Channel 11)**



**Band Edge measurement for radiated emission in Restricted Band(Radiated)  
Average Mode (Channel 11)**



**4.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]**

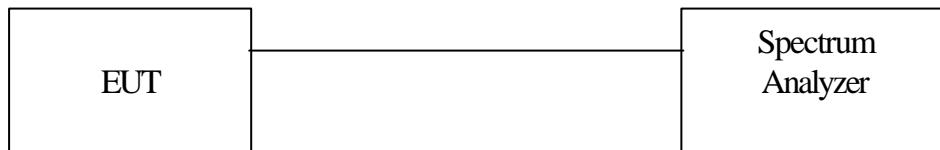
**See MPE report**

## 4.7 DSSS Peak Power Spectral Density [Section 15.247(d) ]

### 4.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN:1.5MHz  
RBW: 3KHz  
VBW: 30KHz  
Center frequency: fundamental frequency tested.  
Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

### 4.7.2 Test Setup



### 4.7.3 Test Data

Please refer to ISL report 04LR018FC part 1.