

# **PART IV**

**(For Antenna 4:Vendor:Long-Chu, Model:DBA-IPEX-01)**

## **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:*

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**Report Number: ISL-04LR018FC**

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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

**Standards:** 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)

**Test Procedure:** ANSI C63.4: 2001

**Equipment Tested:** WLAN a+b+g mini-PCI Module

**Model:** CM9

**Applied by:** Wistron Neweb Corporation

**Sample received Date:** 2004/05/10

**Final test Date :** 2004/05/11-2004/05/20

**Test Site:** Chamber 02, Conduction 02

**Temperature** Refer to each site test data

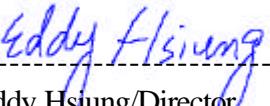
**Humidity:** Refer to each site test data

**Test Engineer:** 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 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  
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 4 parts, this part totally 72 pages, including 1 cover page , 3 contents page, and 68 pages for the test description.  
This report must not be used 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)

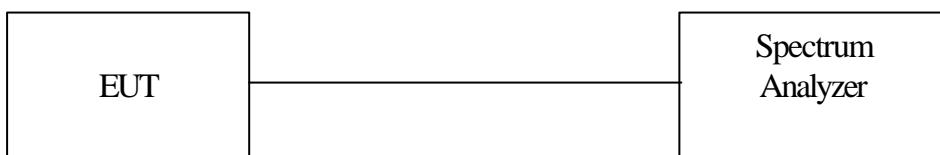
Please refer to ISL report 04LR018FC part 1.

## 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)

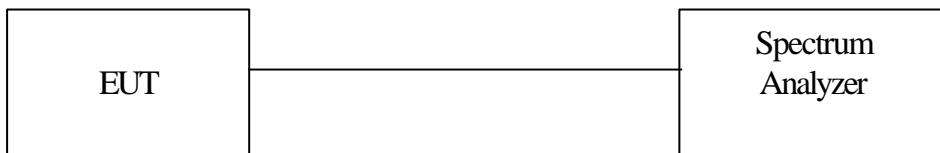
Please refer to ISL report 04LR018FC part 1

## 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.
2. Frequency SPAN of Spectrum: 30MHz or 50MHz.
3. Trace 1 : RBW: 1MHz, VBW: 1MHz. Using peak detector and Max -hold
4. Trace 2 : RBW: 1MHz, VBW:30KHz. Using peak detector and Max-hold
5. 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 (%): 46

Temperature (C): 25

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
99.84	22.17	10.27	3.02	0.00	35.46	43.50	-8.04	200.00	353.00
198.78	24.31	8.86	4.18	0.00	37.35	43.50	-6.15	100.00	353.00
231.76	26.77	9.21	4.48	0.00	40.47	46.00	-5.53	200.00	10.00
298.69	21.66	13.57	4.69	0.00	39.92	46.00	-6.08	100.00	304.00
364.65	22.13	14.80	5.07	0.00	42.00	46.00	-4.00	100.00	207.00
398.6	19.30	15.95	5.31	0.00	40.57	46.00	-5.43	150.00	223.00
431.58	19.03	16.25	5.61	0.00	40.89	46.00	-5.11	100.00	174.00
464.56	14.85	16.78	5.87	0.00	37.50	46.00	-8.50	100.00	10.00
564.47	13.98	19.04	6.57	0.00	39.59	46.00	-6.41	100.00	108.00
865.17	6.78	20.54	8.25	0.00	35.57	46.00	-10.43	100.00	125.00

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

Operator: Mailes Hsieh

Humidity (%): 46

Temperature (C): 25

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	9.77	16.62	1.53	0.00	27.92	40.00	-12.08	150.00	182.00
134.76	17.75	10.92	3.53	0.00	32.20	43.50	-11.30	100.00	314.00
231.76	20.00	9.21	4.48	0.00	33.70	46.00	-12.30	100.00	95.00
365.62	15.23	14.83	5.08	0.00	35.13	46.00	-10.87	250.00	231.00
431.58	12.95	16.25	5.61	0.00	34.80	46.00	-11.20	100.00	264.00
497.54	13.05	17.64	6.04	0.00	36.73	46.00	-9.27	200.00	346.00
643.04	7.68	19.07	7.00	0.00	33.76	46.00	-12.24	250.00	297.00
651.77	13.86	19.10	7.04	0.00	40.00	46.00	-6.00	250.00	314.00
660.5	9.04	19.08	7.07	0.00	35.18	46.00	-10.82	100.00	281.00
863.23	7.08	20.55	8.23	0.00	35.86	46.00	-10.14	100.00	68.00

\* 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 (%): 46  
Temperature (C): 25

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
1550.25	49.83	27.22	1.87	46.22	32.70	54.00	-21.30	101	74
2823.38	45.90	31.03	2.82	46.45	33.30	54.00	-20.70	102	302
3298.10	46.62	31.34	2.37	46.62	33.71	54.00	-20.29	103	280
7973.43	44.57	40.56	3.05	43.87	44.30	54.00	-9.70	100	251
10965.7	31.31	39.49	3.35	40.53	33.62	54.00	-20.38	102	225
16017.5	30.22	44.41	6.06	41.17	39.52	54.00	-14.48	102	195

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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	47.15	30.92	2.67	46.21	34.53	54.00	-19.47	101	167
2916.88	46.17	31.07	2.82	46.52	33.54	54.00	-20.46	103	331
3046.35	46.22	31.14	2.75	46.59	33.52	54.00	-20.48	103	345
7804.40	45.61	40.33	3.14	44.67	44.41	54.00	-9.59	100	226
11504.2	31.84	40.71	3.35	41.60	34.30	54.00	-19.70	101	158
15997.9	30.05	44.39	6.05	41.14	39.35	54.00	-14.65	102	193

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.

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

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

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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	51.74	26.65	1.82	46.21	34.01	54.00	-19.99	101	80
2859.34	46.23	31.04	2.82	46.48	33.62	54.00	-20.38	103	313
3150.65	45.84	31.22	2.59	46.60	33.06	54.00	-20.94	103	318
7203.80	43.77	39.43	3.13	46.22	40.11	54.00	-13.89	101	139
10765.0	31.75	39.45	3.34	40.66	33.88	54.00	-20.12	102	178
16007.7	30.40	44.40	6.05	41.15	39.71	54.00	-14.29	102	194

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2589.61	46.01	30.94	2.82	46.28	33.49	54.00	-20.51	102	228
2834.17	46.23	31.03	2.82	46.46	33.62	54.00	-20.38	103	305
2985.21	46.52	31.09	2.82	46.57	33.87	54.00	-20.13	103	352
7599.40	43.81	40.04	3.26	45.62	41.49	54.00	-12.51	100	197
10706.3	31.78	39.44	3.33	40.70	33.86	54.00	-20.14	102	165
15723.8	33.00	43.52	5.65	42.05	40.12	54.00	-13.88	101	140

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.

**All frequencies from 1GHz to 40 GHz have been tested.****The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

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

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2391.81	46.12	30.92	2.67	46.21	33.50	54.00	-20.50	101	166
2906.09	47.00	31.06	2.82	46.51	34.37	54.00	-19.63	103	328
3280.12	45.95	31.32	2.40	46.62	33.06	54.00	-20.94	103	285
8041.76	44.93	40.69	3.06	43.64	45.04	54.00	-8.96	100	245
10172.7	29.88	39.66	3.14	41.03	31.64	54.00	-22.36	101	40
15772.7	35.52	43.67	5.72	41.88	43.03	54.00	-10.97	102	149

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2391.81	47.54	30.92	2.67	46.21	34.92	54.00	-19.08	101	166
2737.06	46.38	30.99	2.82	46.39	33.81	54.00	-20.19	102	274
2931.27	46.63	31.07	2.82	46.53	34.00	54.00	-20.00	103	335
7973.43	43.79	40.56	3.05	43.87	43.52	54.00	-10.48	100	251
8493.71	34.43	41.69	3.38	42.49	37.01	54.00	-16.99	101	139
15767.8	39.55	43.66	5.72	41.90	47.03	54.00	-6.97	102	148

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.

**All frequencies from 1GHz to 40 GHz have been tested.****The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2916.88	46.08	31.07	2.82	46.52	33.45	54.00	-20.55	103	331
2956.44	46.30	31.08	2.82	46.55	33.66	54.00	-20.34	103	343
3129.07	45.95	31.20	2.63	46.60	33.18	54.00	-20.82	103	324
7840.36	44.57	40.38	3.12	44.50	43.57	54.00	-10.43	100	232
8527.97	34.30	41.66	3.37	42.49	36.84	54.00	-17.16	102	131
15944.1	33.56	44.22	5.97	41.32	42.44	54.00	-11.56	102	182

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2848.55	46.69	31.04	2.82	46.47	34.08	54.00	-19.92	103	309
2988.81	47.44	31.10	2.82	46.57	34.78	54.00	-19.22	103	353
3100.30	46.48	31.18	2.67	46.59	33.73	54.00	-20.27	103	331
7448.35	43.86	39.82	3.29	46.11	40.85	54.00	-13.15	101	174
10637.8	30.51	39.43	3.33	40.74	32.53	54.00	-21.47	102	149
15949.0	40.26	44.24	5.98	41.30	49.17	54.00	-4.83	102	183

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.

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

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

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2391.81	45.48	30.92	2.67	46.21	32.86	54.00	-21.14	101	166
2826.97	46.05	31.03	2.82	46.45	33.45	54.00	-20.55	102	303
3301.70	45.63	31.34	2.37	46.62	32.72	54.00	-21.28	103	279
7239.76	44.85	39.48	3.15	46.20	41.28	54.00	-12.72	101	144
11484.6	37.55	40.66	3.35	41.56	40.00	54.00	-14.00	101	161
17226.6	31.15	46.68	6.31	42.09	42.05	54.00	-11.95	100	275

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2924.08	45.13	31.07	2.82	46.52	32.50	54.00	-21.50	103	333
3229.77	45.61	31.28	2.48	46.61	32.76	54.00	-21.24	103	298
3269.33	45.32	31.32	2.42	46.62	32.43	54.00	-21.57	103	288
7973.43	44.32	40.56	3.05	43.87	44.05	54.00	-9.95	100	251
11489.5	39.33	40.67	3.35	41.57	41.79	54.00	-12.21	101	161
17236.4	31.95	46.71	6.31	42.09	42.88	54.00	-11.12	100	274

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.

**All frequencies from 1GHz to 40 GHz have been tested.****The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2924.08	45.28	31.07	2.82	46.52	32.65	54.00	-21.35	103	333
2992.41	44.58	31.10	2.82	46.57	31.92	54.00	-22.08	103	355
3154.25	45.30	31.22	2.59	46.60	32.52	54.00	-21.48	103	317
7660.54	44.77	40.12	3.23	45.34	42.78	54.00	-11.22	100	205
11597.2	38.68	41.01	3.41	41.81	41.28	54.00	-12.72	101	145
17407.7	30.78	47.22	6.28	42.16	42.12	54.00	-11.88	101	259

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2762.24	45.66	31.00	2.82	46.40	33.08	54.00	-20.92	102	282
2880.92	45.73	31.05	2.82	46.49	33.11	54.00	-20.89	103	320
2985.21	45.27	31.09	2.82	46.57	32.61	54.00	-21.39	103	352
7854.75	44.44	40.40	3.11	44.43	43.52	54.00	-10.48	100	234
11611.9	42.39	41.06	3.41	41.85	45.02	54.00	-8.98	101	142
17407.7	30.67	47.22	6.28	42.16	42.01	54.00	-11.99	101	259

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.

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

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

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2791.01	45.53	31.02	2.82	46.43	32.94	54.00	-21.06	102	291
2873.73	45.63	31.05	2.82	46.49	33.02	54.00	-20.98	103	317
3125.47	45.85	31.20	2.63	46.60	33.09	54.00	-20.91	103	325
4729.47	44.05	34.57	1.32	46.80	33.14	54.00	-20.86	101	27
10167.8	31.97	39.67	3.13	41.03	33.73	54.00	-20.27	101	39
15944.1	30.56	44.22	5.97	41.32	39.44	54.00	-14.56	102	182

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2391.81	44.84	30.92	2.67	46.21	32.22	54.00	-21.78	101	166
2913.29	46.49	31.07	2.82	46.52	33.86	54.00	-20.14	103	330
3262.14	45.96	31.31	2.43	46.62	33.08	54.00	-20.92	103	290
7646.15	44.52	40.10	3.24	45.41	42.45	54.00	-11.55	100	203
9120.28	33.24	40.90	3.18	42.75	34.57	54.00	-19.43	103	18
15625.9	34.46	43.20	5.51	42.37	40.80	54.00	-13.20	101	121

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.

**All frequencies from 1GHz to 40 GHz have been tested.****The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2794.61	45.37	31.02	2.82	46.43	32.78	54.00	-21.22	102	293
2891.71	45.50	31.06	2.82	46.50	32.88	54.00	-21.12	100	323
3193.81	45.41	31.26	2.53	46.61	32.59	54.00	-21.41	103	307
7653.35	45.71	40.11	3.23	45.37	43.68	54.00	-10.32	100	204
10574.1	31.66	39.41	3.32	40.78	33.62	54.00	-20.38	102	134
15753.1	33.30	43.61	5.69	41.95	40.66	54.00	-13.34	102	145

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2737.06	46.64	30.99	2.82	46.39	34.07	54.00	-19.93	102	274
2888.11	44.81	31.06	2.82	46.50	32.19	54.00	-21.81	103	322
3265.73	45.31	31.31	2.42	46.62	32.43	54.00	-21.57	103	289
7700.10	44.78	40.18	3.20	45.15	43.01	54.00	-10.99	100	211
10750.3	31.70	39.45	3.34	40.67	33.82	54.00	-20.18	102	175
15743.4	37.32	43.58	5.68	41.98	44.60	54.00	-9.40	101	143

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.

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

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

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2848.55	46.74	31.04	2.82	46.47	34.13	54.00	-19.87	103	309
2898.90	46.05	31.06	2.82	46.51	33.42	54.00	-20.58	103	325
3290.91	46.17	31.33	2.38	46.62	33.27	54.00	-20.73	103	282
7732.47	44.56	40.23	3.19	45.00	42.97	54.00	-11.03	100	216
10138.5	32.17	39.69	3.12	41.05	33.93	54.00	-20.07	101	32
15870.6	33.52	43.99	5.86	41.56	41.81	54.00	-12.19	102	168

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2780.22	45.53	31.01	2.82	46.42	32.95	54.00	-21.05	102	288
3031.97	45.09	31.13	2.77	46.58	32.41	54.00	-21.59	103	349
3272.93	45.34	31.32	2.41	46.62	32.45	54.00	-21.55	103	287
8066.93	44.50	40.75	3.08	43.58	44.75	54.00	-9.25	100	239
10569.2	32.79	39.41	3.32	40.78	34.75	54.00	-19.25	102	133
15875.5	39.57	44.00	5.87	41.54	47.90	54.00	-6.10	102	169

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.

**All frequencies from 1GHz to 40 GHz have been tested.****The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2866.53	46.09	31.05	2.82	46.48	33.47	54.00	-20.53	103	315
3150.65	45.37	31.22	2.59	46.60	32.58	54.00	-21.42	103	318
3276.52	45.47	31.32	2.41	46.62	32.58	54.00	-21.42	103	286
7851.15	44.22	40.39	3.12	44.45	43.28	54.00	-10.72	100	233
11514.0	36.95	40.74	3.36	41.62	39.43	54.00	-14.57	101	157
17265.7	29.87	46.80	6.30	42.11	40.86	54.00	-13.14	101	271

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2765.83	46.24	31.01	2.82	46.41	33.66	54.00	-20.34	102	283
2808.99	45.49	31.02	2.82	46.44	32.90	54.00	-21.10	102	297
3168.63	45.35	31.23	2.57	46.60	32.55	54.00	-21.45	103	314
7725.27	44.27	40.22	3.19	45.04	42.64	54.00	-11.36	100	215
11514.0	41.10	40.74	3.36	41.62	43.58	54.00	-10.42	101	157
17314.7	29.32	46.94	6.29	42.13	40.43	54.00	-13.57	101	267

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.

**All frequencies from 1GHz to 40 GHz have been tested.****The restricted band limit is 54dBuV, the out of band limit is 68.3dBuV. All test data can meet this both limit.**

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

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2830.57	46.17	31.03	2.82	46.45	33.57	54.00	-20.43	102	304
2924.08	45.73	31.07	2.82	46.52	33.09	54.00	-20.91	103	333
3294.51	46.55	31.34	2.38	46.62	33.64	54.00	-20.36	103	281
7829.57	45.07	40.36	3.13	44.55	44.01	54.00	-9.99	100	230
11592.3	34.39	41.00	3.40	41.80	36.99	54.00	-17.01	101	145
17960.8	29.67	49.44	5.44	40.53	44.02	54.00	-9.98	102	211

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

Operator: Mailes Hsieh

RBW: 1 MHz  
Humidity (%): 46  
Temperature (C): 25

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
2884.52	46.02	31.05	2.82	46.49	33.40	54.00	-20.60	103	321
2920.48	46.11	31.07	2.82	46.52	33.48	54.00	-20.52	103	332
3301.70	45.33	31.34	2.37	46.62	32.41	54.00	-21.59	103	279
7811.59	44.56	40.34	3.14	44.63	43.41	54.00	-10.59	100	227
11592.3	37.24	41.00	3.40	41.80	39.84	54.00	-14.16	101	145
17236.4	29.73	46.71	6.31	42.09	40.66	54.00	-13.34	100	274

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.

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

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

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

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

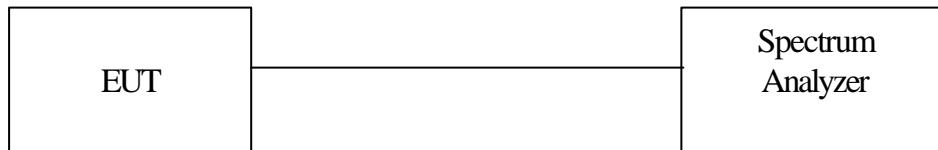
### 2.6.1 Test Procedure (Conducted)

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)

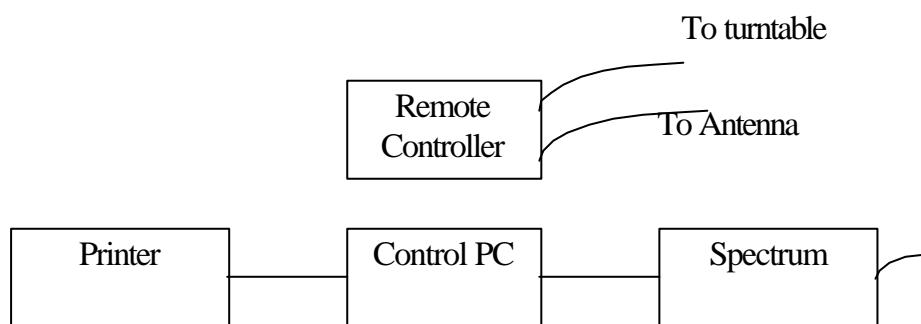
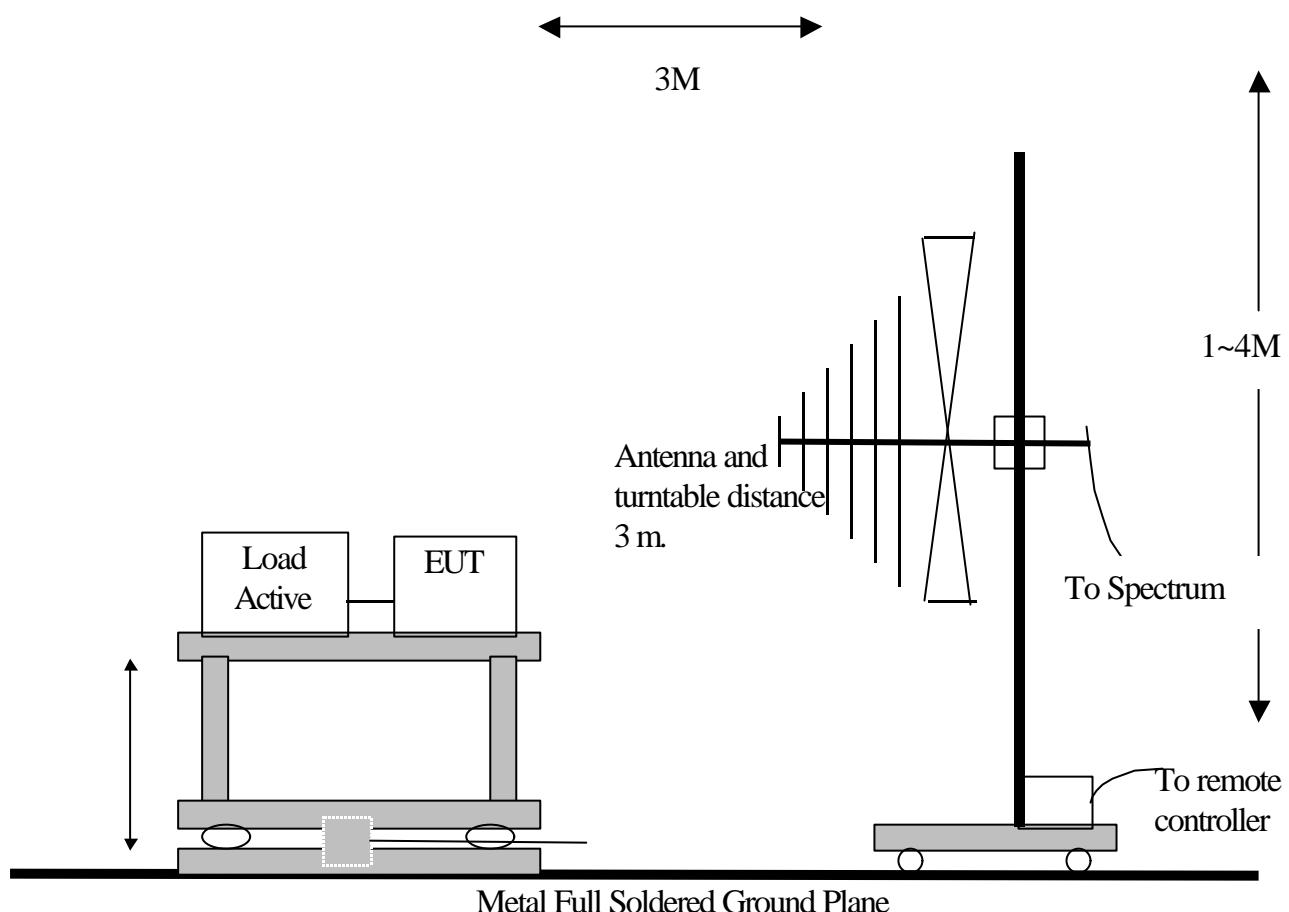
1. Antenna and Turntable test procedure same as Radiated Emissions measurement listed in Para. 6.5

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):	25			
Outside Channel (Normal)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Humidity (%):	50
1 (Peak)	5149.9	21.95	38.21	60.16	74	Pass
1 (Average)	5146.7	8.34	38.21	46.55	54	Pass
8 (Peak)	5376.4	21.7	38.21	59.91	74	Pass
8 (Average)	5351.4	8.52	38.21	46.73	54	Pass
9 (Peak)	5713	24.55	38.21	62.76	74	Pass
9 (Average)	5715	9.25	38.21	47.46	54	Pass
12 (Peak)	5844.2	23.15	38.21	61.36	74	Pass
12 (Average)	5835.3	9.19	38.21	47.4	54	Pass

Outside Channel (Turbo)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Pass/Fail
1 (Peak)	5146.4	21.39	38.21	59.6	74	Pass
1 (Average)	5147.7	8.3	38.21	46.51	54	Pass
3 (Peak)	5352.2	21.38	38.21	59.59	74	Pass
3 (Average)	5352.8	8.44	38.21	46.65	54	Pass
4 (Peak)	5715	24.91	38.21	63.12	74	Pass
4 (Average)	5715	10.35	38.21	48.56	54	Pass
5 (Peak)	5835.8	23.34	38.21	61.55	74	Pass
5 (Average)	5835	10.33	38.21	48.54	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)]

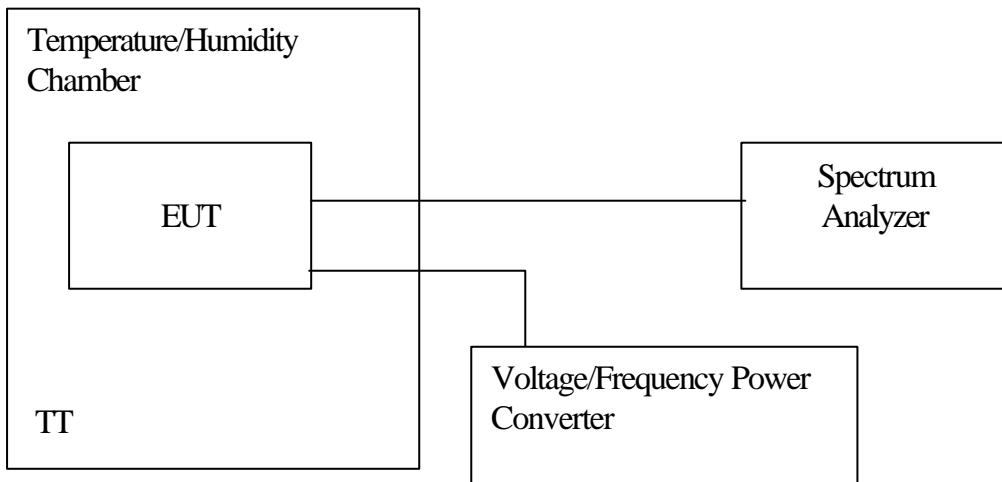
### 2.8.1 Limits of Frequency Stability Measurement

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**

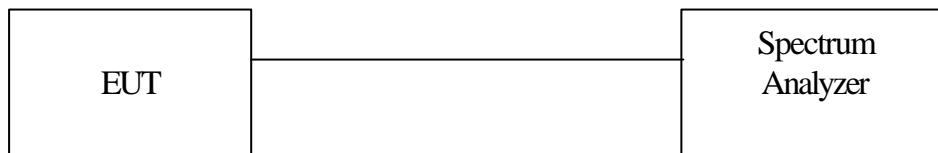
### 3.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

#### 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 (%): 46  
Temperature (C): 25

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
99.84	22.14	10.27	3.02	0.00	35.43	43.50	-8.07	200.00	204.00
198.78	24.55	8.86	4.18	0.00	37.59	43.50	-5.91	250.00	23.00
231.76	27.33	9.21	4.48	0.00	41.02	46.00	-4.98	200.00	56.00
298.69	22.11	13.57	4.69	0.00	40.38	46.00	-5.62	250.00	236.00
365.62	21.61	14.83	5.08	0.00	41.52	46.00	-4.48	200.00	270.00
398.6	19.96	15.95	5.31	0.00	41.22	46.00	-4.78	250.00	286.00
431.58	18.99	16.25	5.61	0.00	40.85	46.00	-5.15	100.00	236.00
465.53	16.03	16.80	5.88	0.00	38.71	46.00	-7.29	100.00	56.00
564.47	12.98	19.04	6.57	0.00	38.59	46.00	-7.41	100.00	220.00
864.2	8.27	20.54	8.24	0.00	37.05	46.00	-8.95	100.00	187.00

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

Operator: Mailes Hsieh

Humidity (%): 46  
Temperature (C): 25

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
137.67	18.62	10.63	3.55	0.00	32.80	43.50	-10.70	250.00	235.00
232.73	19.61	9.33	4.50	0.00	33.44	46.00	-12.56	200.00	170.00
365.62	14.97	14.83	5.08	0.00	34.88	46.00	-11.12	250.00	219.00
431.58	13.38	16.25	5.61	0.00	35.24	46.00	-10.76	100.00	219.00
488.81	10.31	17.41	5.99	0.00	33.71	46.00	-12.29	100.00	252.00
498.51	14.32	17.66	6.04	0.00	38.02	46.00	-7.98	250.00	269.00
644.01	9.12	19.08	7.01	0.00	35.21	46.00	-10.79	100.00	235.00
652.74	14.52	19.09	7.05	0.00	40.66	46.00	-5.34	100.00	219.00
662.44	9.28	19.08	7.07	0.00	35.43	46.00	-10.57	100.00	219.00
863.23	7.78	20.55	8.23	0.00	36.56	46.00	-9.44	100.00	6.00

#### 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 (%): 46

Temperature (C): 25

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
2318.68	57.74	30.94	2.56	46.21	45.03	54.00	-8.97	101	143
2341.16	63.00	30.93	2.59	46.21	50.32	54.00	-3.68	101	150
2553.45	48.79	30.92	2.82	46.25	36.28	54.00	-17.72	102	217
4821.68	42.95	34.92	1.28	46.88	32.27	54.00	-21.73	100	18
7233.77	39.20	39.47	3.15	46.21	35.61	54.00	-18.39	101	143
11981.0	28.77	42.24	3.63	42.70	31.95	54.00	-22.05	100	88

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2328.67	52.33	30.93	2.58	46.21	39.63	54.00	-14.37	101	146
2341.16	55.51	30.93	2.59	46.21	42.83	54.00	-11.17	101	150
2501.00	48.89	30.90	2.82	46.21	36.40	54.00	-17.60	102	200
4821.68	44.70	34.92	1.28	46.88	34.02	54.00	-19.98	100	18
7233.77	43.82	39.47	3.15	46.21	40.24	54.00	-13.76	101	143
9643.36	30.58	40.58	3.17	42.07	32.26	54.00	-21.74	102	7

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 (%): 46

Temperature (C): 25

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
2343.66	60.00	30.93	2.60	46.21	47.32	54.00	-6.68	101	151
2353.65	63.53	30.93	2.61	46.21	50.87	54.00	-3.13	101	154
2505.99	62.23	30.90	2.82	46.21	49.74	54.00	-4.26	102	202
4870.63	44.75	35.11	1.25	46.93	34.18	54.00	-19.82	100	13
7305.69	39.32	39.59	3.20	46.18	35.93	54.00	-18.07	101	154
11369.6	29.26	40.39	3.35	41.31	31.69	54.00	-22.31	101	178

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2366.13	56.62	30.93	2.63	46.21	43.97	54.00	-10.03	101	158
2376.12	60.68	30.92	2.64	46.21	48.04	54.00	-5.96	101	161
4870.63	44.80	35.11	1.25	46.93	34.23	54.00	-19.77	100	13
7305.69	42.12	39.59	3.20	46.18	38.73	54.00	-15.27	101	154
9745.25	30.75	40.36	3.13	41.81	32.43	54.00	-21.57	102	5
12064.9	28.67	42.22	3.66	42.76	31.79	54.00	-22.21	100	102

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 (%): 46

Temperature (C): 25

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
2356.14	58.88	30.93	2.62	46.21	46.21	54.00	-7.79	101	155
2368.63	61.20	30.93	2.63	46.21	48.55	54.00	-5.45	101	159
2381.12	62.11	30.92	2.65	46.21	49.48	54.00	-4.52	101	163
4923.08	43.42	35.31	1.23	46.97	32.98	54.00	-21.02	100	8
7383.62	42.92	39.71	3.25	46.14	39.74	54.00	-14.26	101	165
11459.5	29.04	40.60	3.35	41.50	31.49	54.00	-22.51	101	165

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2401.10	61.70	30.92	2.68	46.21	49.09	54.00	-4.91	101	169
2510.99	59.68	30.90	2.82	46.22	47.19	54.00	-6.81	102	203
4923.08	43.36	35.31	1.23	46.97	32.92	54.00	-21.08	100	8
7383.62	48.78	39.71	3.25	46.14	45.60	54.00	-8.40	101	165
9841.16	31.27	40.15	3.10	41.56	32.96	54.00	-21.04	101	3
12304.7	29.93	41.93	3.76	42.86	32.76	54.00	-21.24	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.

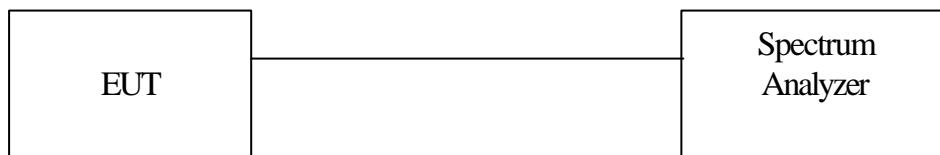
**All frequencies from 1GHz to 25 GHz have been tested.**

## 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)	dBr ( Limit: > 20dBr)	Limit (dBuV/m)	Test Engr:	Mailes Hsieh	Temp. (deg. C):	25
									Humidity (%):	50
1(peak mode)	2412.2	79.69	31.1	110.79	---	---		1MHz		---
Outside band	2396.9	49.15	31.1	80.25	30.54	---		1MHz	Pass	
1(average mode)	2412.7	70.41	31.1	101.51	---	---		10Hz		---
Restricted band	2387.1	20.13	31.1	51.23	---	54		10Hz	Pass	
11(peak mode)	2460.8	79.08	31.1	110.18	---	---		1MHz		---
Outside band	2476.8	48.84	31.1	79.94	30.24	---		1MHz	Pass	
11(average mode)	2460.8	71.08	31.1	102.18	---	---		10Hz		---
Restricted band	2487.3	21.26	31.1	52.36	---	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.

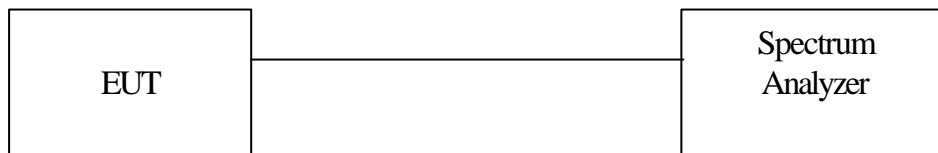
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 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 (%): 46  
Temperature (C): 25

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
99.84	22.16	10.27	3.02	0.00	35.44	43.50	-8.06	250.00	330.00
198.78	25.11	8.86	4.18	0.00	38.15	43.50	-5.35	200.00	330.00
232.73	26.41	9.33	4.50	0.00	40.23	46.00	-5.77	250.00	23.00
298.69	22.27	13.57	4.69	0.00	40.53	46.00	-5.47	100.00	171.00
364.65	22.51	14.80	5.07	0.00	42.38	46.00	-3.62	100.00	171.00
397.63	19.26	15.92	5.30	0.00	40.48	46.00	-5.52	250.00	215.00
431.58	18.89	16.25	5.61	0.00	40.75	46.00	-5.25	200.00	171.00
464.56	15.72	16.78	5.87	0.00	38.37	46.00	-7.63	100.00	7.00
563.5	15.18	19.05	6.56	0.00	40.78	46.00	-5.22	100.00	314.00
864.2	7.08	20.54	8.24	0.00	35.86	46.00	-10.14	100.00	138.00

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

Operator: Mailes Hsieh

Humidity (%): 46  
Temperature (C): 25

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
142.52	18.84	10.15	3.61	0.00	32.60	43.50	-10.90	250.00	298.00
231.76	20.66	9.21	4.48	0.00	34.36	46.00	-11.64	200.00	217.00
364.65	14.37	14.80	5.07	0.00	34.23	46.00	-11.77	150.00	282.00
398.6	12.24	15.95	5.31	0.00	33.50	46.00	-12.50	100.00	249.00
431.58	12.70	16.25	5.61	0.00	34.55	46.00	-11.45	100.00	265.00
497.54	14.24	17.64	6.04	0.00	37.91	46.00	-8.09	100.00	314.00
643.04	8.85	19.07	7.00	0.00	34.93	46.00	-11.07	250.00	298.00
652.74	14.53	19.09	7.05	0.00	40.67	46.00	-5.33	200.00	265.00
661.47	8.72	19.08	7.07	0.00	34.86	46.00	-11.14	250.00	298.00
864.2	6.98	20.54	8.24	0.00	35.77	46.00	-10.23	100.00	69.00

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 (%): 46

Temperature (C): 25

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
2316.18	50.88	30.94	2.56	46.21	38.16	54.00	-15.84	101	142
2341.16	60.45	30.93	2.59	46.21	47.76	54.00	-6.24	101	150
2523.48	46.43	30.91	2.82	46.23	33.93	54.00	-20.07	102	207
2823.18	45.75	31.03	2.82	46.45	33.15	54.00	-20.85	102	301
4821.68	36.47	34.92	1.28	46.88	25.78	54.00	-28.22	100	18
11237.8	30.37	40.07	3.35	41.02	32.76	54.00	-21.24	102	198

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2361.14	55.80	30.93	2.62	46.21	43.15	54.00	-10.85	101	156
2733.27	45.62	30.99	2.82	46.38	33.05	54.00	-20.95	102	273
2788.21	45.77	31.02	2.82	46.42	33.19	54.00	-20.81	102	290
2833.17	45.69	31.03	2.82	46.46	33.08	54.00	-20.92	102	305
4723.78	38.66	34.55	1.32	46.80	27.73	54.00	-26.27	101	28
7233.77	35.26	39.47	3.15	46.21	31.67	54.00	-22.33	101	143

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 (%): 46

Temperature (C): 25

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
2361.14	54.85	30.93	2.62	46.21	42.19	54.00	-11.81	101	156
2378.62	59.19	30.92	2.65	46.21	46.55	54.00	-7.45	101	162
2505.99	58.06	30.90	2.82	46.21	45.57	54.00	-8.43	102	202
2530.97	49.22	30.91	2.82	46.23	36.72	54.00	-17.28	102	210
4874.13	35.79	35.12	1.25	46.93	25.23	54.00	-28.77	100	13
9721.28	30.09	40.41	3.14	41.87	31.77	54.00	-22.23	102	6

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
1791.71	49.86	29.25	2.00	46.21	34.90	54.00	-19.10	100	57
2303.70	44.76	30.94	2.54	46.21	32.03	54.00	-21.97	101	138
2371.13	49.65	30.93	2.64	46.21	37.00	54.00	-17.00	101	160
2618.38	44.77	30.95	2.82	46.30	32.24	54.00	-21.76	102	237
4870.63	35.57	35.11	1.25	46.93	25.00	54.00	-29.00	100	13
11531.5	29.21	40.80	3.37	41.66	31.72	54.00	-22.28	101	154

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 (%): 46

Temperature (C): 25

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
2368.63	49.49	30.93	2.63	46.21	36.84	54.00	-17.16	101	159
2373.63	50.58	30.93	2.64	46.21	37.94	54.00	-16.06	101	160
2393.61	58.52	30.92	2.67	46.21	45.91	54.00	-8.09	101	167
2406.09	61.43	30.92	2.69	46.21	48.83	54.00	-5.17	101	171
4919.58	36.66	35.29	1.23	46.97	26.21	54.00	-27.79	100	8
9325.67	30.84	40.90	3.20	42.59	32.35	54.00	-21.65	102	13

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 46

Temperature (C): 25

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
2388.61	46.58	30.92	2.66	46.21	33.95	54.00	-20.05	101	165
2533.47	45.48	30.91	2.82	46.23	32.98	54.00	-21.02	102	211
2748.25	45.12	31.00	2.82	46.39	32.54	54.00	-21.46	102	278
4569.93	40.38	33.97	1.40	46.66	29.08	54.00	-24.92	101	43
7383.62	39.88	39.71	3.25	46.14	36.69	54.00	-17.31	101	165
11471.5	29.89	40.63	3.35	41.53	32.34	54.00	-21.66	101	163

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.

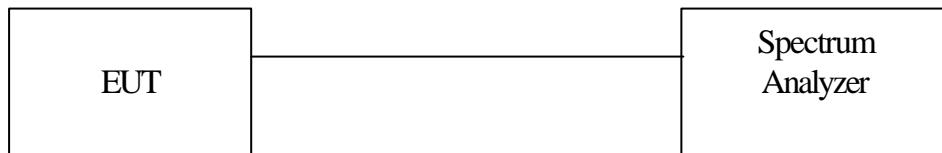
**All frequencies from 1GHz to 25 GHz have been tested.**

## 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 measurement (Radiated)**

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBr (Limit: > 20dBr)	Limit (dBuV/m)	Test Engr:	Mailes Hsieh	Temp. (deg. C):	25
									Humidity (%):	50
1(peak mode)	2414.8	73.44	31.1	104.54	---	---			1MHz	---
Outside band	2400	52.38	31.1	83.48	21.06	---			1MHz	Pass
1(average mode)	2407.9	62.16	31.1	93.26	---	---			10Hz	---
Restricted band	2390	14.59	31.1	45.69	---	54			10Hz	Pass
11(peak mode)	2455.3	72.84	31.1	103.94	---	---			1MHz	---
Outside band	2476.2	43.52	31.1	74.62	29.32	---			1MHz	Pass
11(average mode)	2455.1	62.37	31.1	93.47	---	---			10Hz	---
Restricted band	2483.5	14.11	31.1	45.21	---	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)**



**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.

#### **4.8 Appendix : Antenna Spec.**

Please refer to the attached file.