

# **PART VI**

**(For Antenna 8: Vendor:Long-Chu, Model:DBA-IPEX-02,  
with 200mm 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:*

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*Test Performed by:*

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**Report Number: ISL-04LR018FC**

**Issue Date: 2004/05/26**

**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

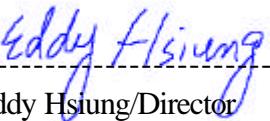
### 1.1 Certification of Accuracy of Test Data

<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 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 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)

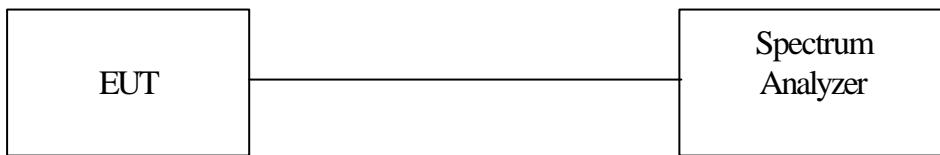
Please refer to ISL report 04LR018FC part 1.

## 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)

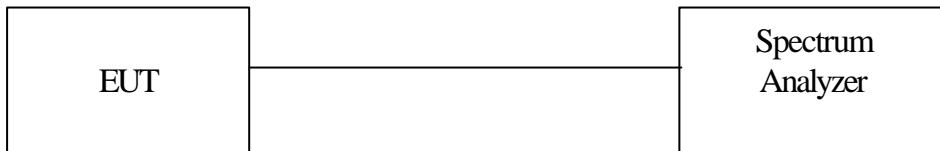
Please refer to ISL report 04LR018FC part 1.

## 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.
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	22.27	11.04	1.76	0.00	35.07	40.00	-4.93	150.00	200.00
399.57	18.49	15.59	5.21	0.00	39.29	46.00	-6.71	150.00	200.00
528.58	13.96	17.79	5.95	0.00	37.70	46.00	-8.30	150.00	28.00
565.44	8.76	18.30	6.14	0.00	33.20	46.00	-12.80	200.00	286.00
576.11	11.79	18.30	6.20	0.00	36.28	46.00	-9.72	150.00	302.00
660.5	9.73	18.74	6.60	0.00	35.07	46.00	-10.93	100.00	97.00
799.21	11.87	19.80	7.27	0.00	38.93	46.00	-7.07	150.00	130.00
815.7	7.05	19.86	7.34	0.00	34.26	46.00	-11.74	100.00	130.00
864.2	5.42	20.06	7.50	0.00	32.98	46.00	-13.02	100.00	113.00
932.1	8.50	20.39	7.79	0.00	36.69	46.00	-9.31	100.00	44.00

#### 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
42.61	21.21	11.04	1.76	0.00	34.02	40.00	-5.98	200.00	297.00
395.69	16.39	15.46	5.19	0.00	37.04	46.00	-8.96	150.00	184.00
532.46	18.75	17.88	5.97	0.00	42.60	46.00	-3.40	150.00	217.00
594.54	12.30	18.30	6.29	0.00	36.89	46.00	-9.11	150.00	314.00
672.14	10.70	18.79	6.65	0.00	36.13	46.00	-9.87	200.00	39.00
719.67	14.22	19.18	6.86	0.00	40.25	46.00	-5.75	150.00	55.00
732.28	11.19	19.35	6.91	0.00	37.45	46.00	-8.55	150.00	55.00
768.17	11.27	19.67	7.11	0.00	38.04	46.00	-7.96	150.00	55.00
797.27	15.64	19.79	7.26	0.00	42.69	46.00	-3.31	100.00	55.00
925.31	10.42	20.35	7.77	0.00	38.54	46.00	-7.46	100.00	55.00

\* 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
4333.87	51.52	33.20	1.68	46.44	39.96	54.00	-14.04	101	67
4481.32	50.99	33.64	1.46	46.58	39.51	54.00	-14.49	101	52
4592.81	50.45	34.05	1.39	46.68	39.20	54.00	-14.80	101	41
7664.14	45.60	40.13	3.22	45.32	43.63	54.00	-10.37	100	206
10094.4	37.98	39.72	3.09	41.08	39.71	54.00	-14.29	100	344
15748.3	35.95	43.59	5.69	41.97	43.26	54.00	-10.74	101	144

#### 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
4351.85	50.73	33.26	1.65	46.45	39.18	54.00	-14.82	101	65
4495.70	50.95	33.69	1.44	46.60	39.48	54.00	-14.52	101	50
4546.05	50.62	33.88	1.41	46.64	39.26	54.00	-14.74	101	45
7433.97	44.60	39.79	3.28	46.12	41.55	54.00	-12.45	101	172
11122.4	38.09	39.79	3.35	40.77	40.46	54.00	-13.54	100	309
15811.9	35.06	43.80	5.78	41.75	42.89	54.00	-11.11	102	157

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
3427.57	51.07	31.44	2.18	46.64	38.05	54.00	-15.95	103	247
3887.91	50.61	32.04	2.15	46.23	38.57	54.00	-15.43	102	129
4175.62	51.33	32.73	1.91	46.28	39.68	54.00	-14.32	102	82
4452.55	51.13	33.56	1.50	46.55	39.63	54.00	-14.37	101	55
11073.4	37.75	39.68	3.35	40.67	40.11	54.00	-13.89	100	78
15880.4	33.93	44.02	5.88	41.53	42.30	54.00	-11.70	102	170

**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
3513.89	51.08	31.52	2.07	46.64	38.04	54.00	-15.96	102	225
4053.35	51.24	32.36	2.09	46.16	39.53	54.00	-14.47	102	95
4146.85	51.07	32.64	1.95	46.25	39.41	54.00	-14.59	102	85
4578.42	50.58	34.00	1.39	46.67	39.30	54.00	-14.70	101	42
10848.3	37.50	39.47	3.34	40.61	39.70	54.00	-14.30	103	301
15914.7	33.70	44.13	5.93	41.41	42.34	54.00	-11.66	102	177

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 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
2391.81	52.15	30.92	2.67	46.21	39.53	54.00	-14.47	101	166
4323.08	51.38	33.17	1.69	46.43	39.82	54.00	-14.18	101	68
4341.06	51.66	33.22	1.67	46.44	40.11	54.00	-13.89	101	66
4582.02	50.96	34.01	1.39	46.67	39.69	54.00	-14.31	101	42
10060.1	37.80	39.75	3.07	41.10	39.53	54.00	-14.47	101	76
15777.6	38.88	43.69	5.73	41.87	46.42	54.00	-7.58	102	150

**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
4279.92	50.69	33.04	1.76	46.38	39.10	54.00	-14.90	101	72
4373.43	51.15	33.32	1.62	46.48	39.61	54.00	-14.39	101	63
4549.65	50.90	33.89	1.41	46.64	39.55	54.00	-14.45	101	45
7804.40	45.33	40.33	3.14	44.67	44.13	54.00	-9.87	100	226
11078.3	37.48	39.69	3.35	40.68	39.84	54.00	-14.16	101	66
15777.6	42.59	43.69	5.73	41.87	50.14	54.00	-3.86	102	150

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
3251.35	50.85	31.30	2.44	46.62	37.98	54.00	-16.02	103	292
3798.00	51.04	31.92	2.13	46.33	38.76	54.00	-15.24	102	152
4582.02	51.09	34.01	1.39	46.67	39.82	54.00	-14.18	101	42
7818.78	45.16	40.35	3.14	44.60	44.04	54.00	-9.96	100	229
10833.6	37.62	39.47	3.34	40.61	39.81	54.00	-14.19	101	75
15953.8	36.94	44.25	5.98	41.28	45.89	54.00	-8.11	102	184

**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
3682.92	51.24	31.76	2.11	46.45	38.65	54.00	-15.35	102	181
4003.00	51.11	32.21	2.17	46.11	39.37	54.00	-14.63	102	100
4553.25	50.80	33.90	1.40	46.65	39.46	54.00	-14.54	101	45
7656.94	45.34	40.12	3.23	45.36	43.33	54.00	-10.67	100	205
11235.0	38.48	40.06	3.35	41.02	40.88	54.00	-13.12	101	9
15953.8	43.24	44.25	5.98	41.28	52.19	54.00	-1.81	102	184

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
3826.77	51.90	31.96	2.14	46.30	39.69	54.00	-14.31	102	145
3995.80	50.94	32.19	2.17	46.11	39.19	54.00	-14.81	102	101
4564.04	50.77	33.94	1.40	46.66	39.46	54.00	-14.54	101	44
7649.75	45.65	40.11	3.23	45.39	43.60	54.00	-10.40	100	204
11479.7	48.40	40.65	3.35	41.55	50.85	54.00	-3.15	101	49
17980.4	30.63	49.52	5.40	40.46	45.09	54.00	-8.91	102	210

**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
1546.65	60.63	27.19	1.87	46.22	43.47	54.00	-10.53	101	74
4344.66	51.13	33.23	1.66	46.45	39.58	54.00	-14.42	101	66
4481.32	51.52	33.64	1.46	46.58	40.04	54.00	-13.96	101	52
7178.62	54.48	39.39	3.11	46.23	40.75	54.00	-13.25	101	135
11474.8	48.50	40.64	3.35	41.54	50.95	54.00	-3.05	100	128
17216.8	33.84	46.65	6.31	42.09	44.71	54.00	-9.29	100	275

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
3931.07	51.23	32.10	2.16	46.18	39.30	54.00	-14.70	102	118
4297.90	51.23	33.09	1.73	46.40	39.66	54.00	-14.34	101	70
4549.65	51.28	33.89	1.41	46.64	39.93	54.00	-14.07	101	45
7243.36	45.25	39.49	3.16	46.20	41.69	54.00	-12.31	101	145
11607.0	48.13	41.04	3.41	41.84	50.75	54.00	-3.25	101	326
17412.6	35.38	47.24	6.28	42.17	46.73	54.00	-7.27	101	259

**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
3711.69	51.97	31.80	2.11	46.42	39.46	54.00	-14.54	102	174
4049.75	50.73	32.35	2.10	46.16	39.02	54.00	-14.98	102	95
4380.62	50.91	33.34	1.61	46.48	39.37	54.00	-14.63	101	62
7412.39	44.62	39.76	3.26	46.13	41.51	54.00	-12.49	101	169
11607.0	48.09	41.04	3.41	41.84	50.71	54.00	-3.29	101	268
17402.8	35.99	47.21	6.28	42.16	47.32	54.00	-6.68	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.

**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
3826.77	50.45	31.96	2.14	46.30	38.25	54.00	-15.75	102	145
4409.39	51.33	33.43	1.56	46.51	39.81	54.00	-14.19	101	59
4585.61	50.64	34.03	1.39	46.68	39.38	54.00	-14.62	101	41
7480.72	44.43	39.87	3.31	46.10	41.51	54.00	-12.49	101	179
10995.1	37.84	39.50	3.35	40.51	40.17	54.00	-13.83	100	34
15855.9	35.38	43.94	5.84	41.61	43.56	54.00	-10.44	102	165

**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
1877.52	58.49	29.97	2.04	46.20	44.30	54.00	-9.70	100	51
4046.15	51.34	32.34	2.10	46.16	39.63	54.00	-14.37	102	95
4459.74	51.02	33.58	1.49	46.56	39.52	54.00	-14.48	101	54
7221.78	44.45	39.45	3.14	46.21	40.84	54.00	-13.16	101	141
10006.3	37.89	39.79	3.04	41.14	39.59	54.00	-14.41	101	319
16012.6	34.24	44.41	6.06	41.16	43.55	54.00	-10.45	102	194

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 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
4114.49	51.80	32.54	2.00	46.22	40.12	54.00	-13.88	102	89
4528.07	50.93	33.81	1.42	46.62	39.53	54.00	-14.47	101	47
4538.86	50.92	33.85	1.41	46.63	39.55	54.00	-14.45	101	46
7430.37	44.50	39.79	3.28	46.12	41.44	54.00	-12.56	101	172
11979.0	37.20	42.23	3.63	42.69	40.37	54.00	-13.63	100	287
15738.5	35.69	43.56	5.67	42.00	42.93	54.00	-11.07	101	143

**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
2391.81	52.04	30.92	2.67	46.21	39.42	54.00	-14.58	101	166
4366.23	50.84	33.30	1.63	46.47	39.29	54.00	-14.71	101	63
4574.83	51.17	33.98	1.39	46.67	39.88	54.00	-14.12	101	43
7164.24	44.61	39.36	3.11	46.24	40.84	54.00	-13.16	101	133
11372.0	37.66	40.39	3.35	41.31	40.09	54.00	-13.91	101	20
15748.3	38.69	43.59	5.69	41.97	46.00	54.00	-8.00	101	144

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
3740.46	51.70	31.84	2.12	46.39	39.26	54.00	-14.74	102	167
4092.91	51.42	32.48	2.03	46.20	39.73	54.00	-14.27	102	91
4484.92	51.65	33.65	1.45	46.59	40.17	54.00	-13.83	101	52
7606.59	45.14	40.05	3.26	45.59	42.86	54.00	-11.14	100	198
11543.4	38.34	40.84	3.38	41.69	40.86	54.00	-13.14	101	14
15870.6	40.26	43.99	5.86	41.56	48.55	54.00	-5.45	102	168

**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
4351.85	51.16	33.26	1.65	46.45	39.61	54.00	-14.39	101	65
4553.25	50.86	33.90	1.40	46.65	39.52	54.00	-14.48	101	45
4585.61	50.66	34.03	1.39	46.68	39.40	54.00	-14.60	101	41
7599.40	45.11	40.04	3.26	45.62	42.79	54.00	-11.21	100	197
10887.4	38.07	39.48	3.34	40.58	40.31	54.00	-13.69	100	316
15870.6	41.86	43.99	5.86	41.56	50.15	54.00	-3.85	102	168

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 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
3765.63	51.49	31.87	2.12	46.36	39.12	54.00	-14.88	102	160
4380.62	50.79	33.34	1.61	46.48	39.25	54.00	-14.75	101	62
4574.83	50.55	33.98	1.39	46.67	39.27	54.00	-14.73	101	43
7872.73	44.95	40.42	3.10	44.35	44.13	54.00	-9.87	100	236
11518.9	48.41	40.76	3.36	41.63	50.90	54.00	-3.10	101	95
17114.0	31.87	46.34	6.33	42.05	42.49	54.00	-11.51	100	284

**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
3798.00	51.07	31.92	2.13	46.33	38.79	54.00	-15.21	102	152
4096.50	50.48	32.49	2.03	46.20	38.80	54.00	-15.20	102	90
4398.60	51.60	33.40	1.58	46.50	40.08	54.00	-13.92	101	60
7682.12	45.43	40.15	3.21	45.24	43.56	54.00	-10.44	100	209
11514.0	47.70	40.74	3.36	41.62	50.18	54.00	-3.82	102	30
17936.4	32.17	49.33	5.48	40.62	46.37	54.00	-7.63	102	213

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
3909.49	52.09	32.07	2.15	46.21	40.11	54.00	-13.89	102	123
3949.05	51.14	32.13	2.16	46.17	39.26	54.00	-14.74	102	113
4596.40	50.43	34.07	1.38	46.68	39.19	54.00	-14.81	101	40
7455.54	45.06	39.83	3.29	46.11	42.07	54.00	-11.93	101	176
11592.3	45.80	41.00	3.40	41.80	48.40	54.00	-5.60	101	45
17985.3	31.84	49.54	5.40	40.44	46.34	54.00	-7.66	102	209

**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
4251.15	51.24	32.95	1.80	46.36	39.64	54.00	-14.36	101	75
4333.87	51.08	33.20	1.68	46.44	39.52	54.00	-14.48	101	67
4574.83	50.93	33.98	1.39	46.67	39.64	54.00	-14.36	101	43
7725.27	45.83	40.22	3.19	45.04	44.20	54.00	-9.80	100	215
11582.5	48.30	40.96	3.40	41.78	50.89	54.00	-3.11	101	29
17936.4	32.98	49.33	5.48	40.62	47.17	54.00	-6.83	102	213

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)

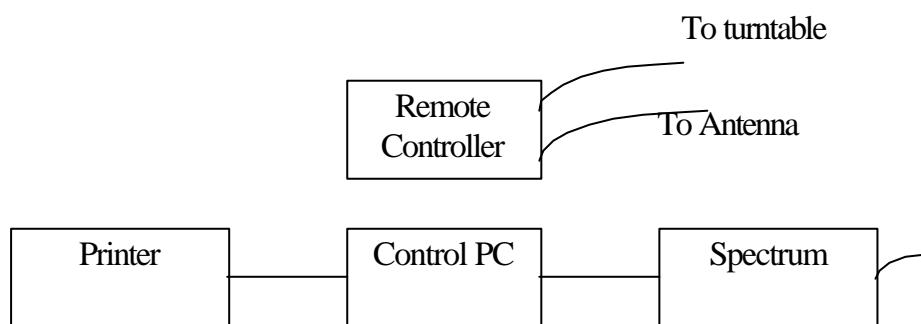
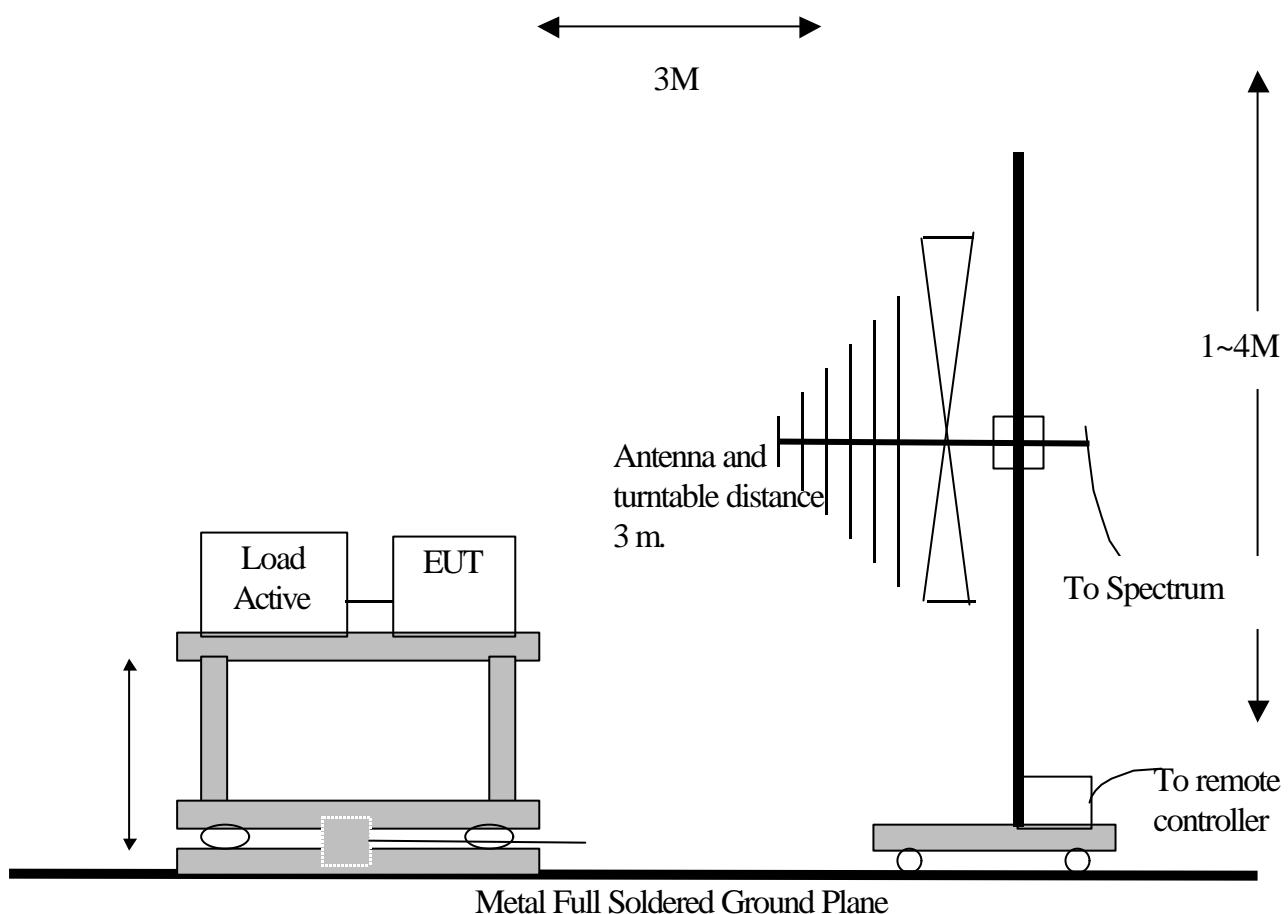
1. Antenna and Turntable test procedure same as Radiated Emissions measurement listed in Para. 6.5

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)**

Temp. (deg. C): 27

Test Engr: Mailes Hsieh 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)	5147.7	21.52	36.93	58.45	74	Pass
1 (Average)	5149.2	7.97	36.93	44.9	54	Pass
3 (Peak)	5360	22.04	36.97	59.01	74	Pass
3 (Average)	5350.3	8.02	36.97	44.99	54	Pass
4 (Peak)	5701.3	23.39	37.19	60.58	74	Pass
4 (Average)	5715	9.35	37.19	46.54	54	Pass
5 (Peak)	5836.2	24	37.21	61.21	74	Pass
5 (Average)	5835	10.22	37.21	47.43	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)	5147.7	21.52	36.93	58.45	74	Pass
1 (Average)	5149.2	7.97	36.93	44.9	54	Pass
3 (Peak)	5360	22.04	36.97	59.01	74	Pass
3 (Average)	5350.3	8.02	36.97	44.99	54	Pass
4 (Peak)	5701.3	23.39	37.19	60.58	74	Pass
4 (Average)	5715	9.35	37.19	46.54	54	Pass
5 (Peak)	5836.2	24	37.21	61.21	74	Pass
5 (Average)	5835	10.22	37.21	47.43	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)]

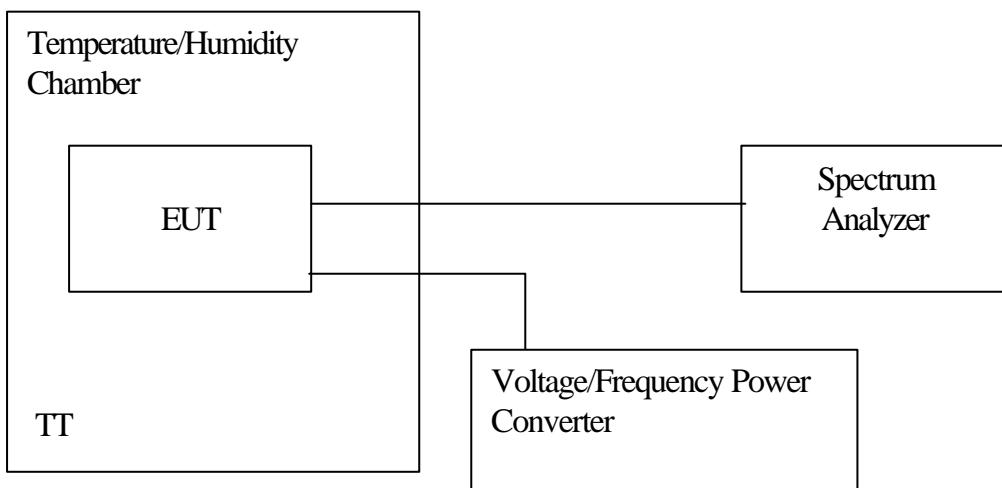
### 2.8.1 Limits of Frequency Stability Measurement

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.**

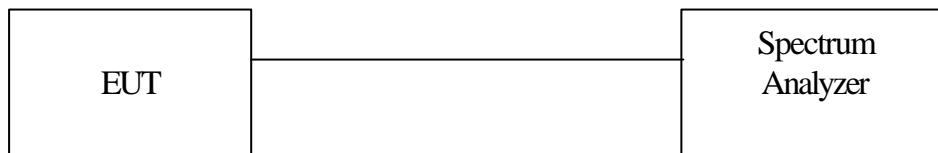
### 3.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

#### 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
210.42	17.59	8.30	3.86	0.00	29.75	43.50	-13.75	200.00	337.00
235.64	16.47	9.68	4.12	0.00	30.27	46.00	-15.73	100.00	156.00
258.92	13.37	12.58	4.29	0.00	30.24	46.00	-15.76	150.00	238.00
298.69	11.45	13.57	4.52	0.00	29.55	46.00	-16.45	100.00	206.00
404.42	10.63	16.04	5.23	0.00	31.90	46.00	-14.10	200.00	107.00
530.52	9.66	18.55	5.96	0.00	34.17	46.00	-11.83	200.00	320.00
749.74	4.07	20.09	6.99	0.00	31.15	46.00	-14.85	100.00	107.00
796.3	6.09	20.01	7.25	0.00	33.35	46.00	-12.65	100.00	140.00
847.71	2.02	20.57	7.43	0.00	30.02	46.00	-15.98	100.00	8.00
871.96	1.62	20.51	7.54	0.00	29.67	46.00	-16.33	100.00	8.00

**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
42.61	19.12	10.99	1.76	0.00	31.86	40.00	-8.14	100.00	236.00
85.29	19.09	7.50	2.47	0.00	29.06	40.00	-10.94	100.00	138.00
142.52	20.19	10.15	3.23	0.00	33.56	43.50	-9.94	200.00	269.00
404.42	13.63	16.04	5.23	0.00	34.90	46.00	-11.10	100.00	187.00
449.04	14.03	16.39	5.48	0.00	35.91	46.00	-10.09	150.00	220.00
452.92	13.77	16.48	5.51	0.00	35.76	46.00	-10.24	100.00	40.00
517.91	10.70	18.20	5.89	0.00	34.79	46.00	-11.21	200.00	187.00
530.52	9.93	18.55	5.96	0.00	34.45	46.00	-11.55	200.00	253.00
638.19	10.57	19.05	6.49	0.00	36.12	46.00	-9.88	100.00	285.00
901.06	6.69	20.42	7.67	0.00	34.78	46.00	-11.22	150.00	253.00

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.	PreAmp	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1449.55	66.46	26.57	1.81	46.20	48.64	54.00	-5.36	101	81
1549.45	64.15	27.22	1.87	46.22	47.01	54.00	-6.99	101	74
2351.15	62.96	30.93	2.61	46.21	50.29	54.00	-3.71	101	153
3755.24	51.73	31.86	2.12	46.37	39.34	54.00	-14.66	102	163
4821.68	46.52	34.92	1.28	46.88	35.83	54.00	-18.17	100	18
7233.77	49.21	39.47	3.15	46.21	45.63	54.00	-8.37	101	143

#### 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.	PreAmp	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1794.21	63.52	29.27	2.00	46.21	48.59	54.00	-5.41	100	57
2768.23	56.51	31.01	2.82	46.41	43.93	54.00	-10.07	102	284
3758.74	56.38	31.86	2.12	46.37	44.00	54.00	-10.00	102	162
4821.68	52.85	34.92	1.28	46.88	42.17	54.00	-11.83	100	18
7233.77	56.27	39.47	3.15	46.21	52.69	54.00	-1.31	101	143
9643.36	37.57	40.58	3.17	42.07	39.25	54.00	-14.75	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 &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 6 : 2437 MHz**

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmp	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1197.30	60.35	25.41	1.63	46.09	41.31	54.00	-12.69	102	98
1796.70	58.25	29.29	2.00	46.21	43.33	54.00	-10.67	100	57
3751.75	52.24	31.85	2.12	46.38	39.84	54.00	-14.16	102	164
4870.63	48.54	35.11	1.25	46.93	37.97	54.00	-16.03	100	13
7305.69	47.02	39.59	3.20	46.18	43.62	54.00	-10.38	101	154
9745.25	35.97	40.36	3.13	41.81	37.65	54.00	-16.35	102	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.	PreAmp	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
2388.61	58.83	30.92	2.66	46.21	46.20	54.00	-7.80	101	165
2770.73	52.88	31.01	2.82	46.41	40.29	54.00	-13.71	102	285
4870.63	54.13	35.11	1.25	46.93	43.56	54.00	-10.44	100	13
7311.69	53.89	39.60	3.20	46.17	50.52	54.00	-3.48	101	155
9745.25	38.77	40.36	3.13	41.81	40.46	54.00	-13.54	102	5
12172.8	35.51	42.09	3.71	42.81	38.50	54.00	-15.50	100	130

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.	PreAmp	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1197.30	60.36	25.41	1.63	46.09	41.31	54.00	-12.69	102	98
1716.78	57.42	28.62	1.96	46.21	41.79	54.00	-12.21	101	63
1796.70	56.60	29.29	2.00	46.21	41.69	54.00	-12.31	100	57
2203.80	52.48	30.96	2.40	46.20	39.64	54.00	-14.36	101	107
4923.08	47.05	35.31	1.23	46.97	36.62	54.00	-17.38	100	8
7383.62	47.46	39.71	3.25	46.14	44.28	54.00	-9.72	101	165

**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.	PreAmp	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV(pk)	dB/m	dB	dB	dBuV/m(pk)	dBuV/m(av)	dB	cm	deg
1794.21	62.69	29.27	2.00	46.21	47.75	54.00	-6.25	100	57
2388.61	58.81	30.92	2.66	46.21	46.19	54.00	-7.81	101	165
2423.58	56.18	30.92	2.71	46.21	43.60	54.00	-10.40	101	176
2985.51	54.16	31.09	2.82	46.57	41.51	54.00	-12.49	103	352
4923.08	52.04	35.31	1.23	46.97	41.60	54.00	-12.40	100	8
7383.62	54.08	39.71	3.25	46.14	50.90	54.00	-3.10	101	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.

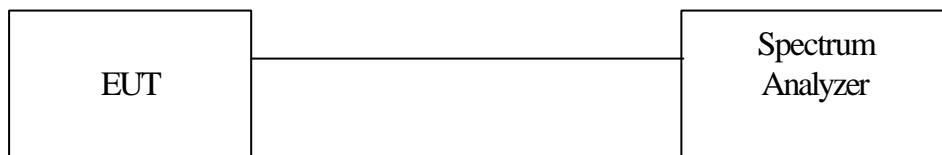
**All frequencies from 1GHz to 25 GHz have been tested.**

## 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)	Test Engr:	Mailes Hsieh	Temp. (deg. C):	27
									Humidity (%):	48
1(peak mode)	2410.4	79.57	33.61	113.18	---	---		1MHz		---
Outside band	2397.7	47.97	33.61	81.58	31.6	---		1MHz		Pass
1(average mode)	2411.2	71.13	33.61	104.74	---	---		10Hz		---
Restricted band	2387	18.31	33.61	51.92	---	54		10Hz		Pass
11(peak mode)	2460.9	78.89	33.68	112.57	---	---		1MHz		---
Outside band	2477.1	47.53	33.68	81.21	31.36	---		1MHz		Pass
11(average mode)	2461.3	70.48	33.68	104.16	---	---		10Hz		---
Restricted band	2487.2	18.29	33.68	51.97	---	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)**



**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.

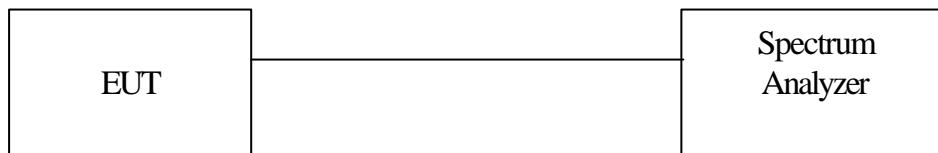
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 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
129.91	16.73	11.40	3.05	0.00	31.19	43.50	-12.31	200.00	121.00
192.96	17.87	8.69	3.71	0.00	30.27	43.50	-13.23	200.00	301.00
235.64	16.02	9.68	4.12	0.00	29.82	46.00	-16.18	200.00	72.00
256.98	14.96	12.37	4.28	0.00	31.61	46.00	-14.39	100.00	301.00
298.69	11.87	13.57	4.52	0.00	29.97	46.00	-16.03	150.00	285.00
453.89	8.79	16.50	5.51	0.00	30.80	46.00	-15.20	100.00	153.00
530.52	9.86	18.55	5.96	0.00	34.37	46.00	-11.63	200.00	104.00
564.47	4.77	19.04	6.14	0.00	29.96	46.00	-16.04	100.00	104.00
798.24	2.92	20.00	7.26	0.00	30.19	46.00	-15.81	200.00	219.00
958.29	1.98	21.20	7.87	0.00	31.05	46.00	-14.95	100.00	334.00

**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
42.61	18.81	10.99	1.76	0.00	31.56	40.00	-8.44	200.00	205.00
56.19	20.39	6.36	2.04	0.00	28.79	40.00	-11.21	100.00	106.00
62.98	21.71	5.60	2.11	0.00	29.42	40.00	-10.58	150.00	155.00
111.48	17.70	11.56	2.80	0.00	32.07	43.50	-11.43	100.00	155.00
142.52	19.74	10.15	3.23	0.00	33.12	43.50	-10.38	200.00	238.00
404.42	13.89	16.04	5.23	0.00	35.16	46.00	-10.84	100.00	123.00
453.89	15.33	16.50	5.51	0.00	37.34	46.00	-8.66	200.00	320.00
531.49	10.80	18.58	5.97	0.00	35.35	46.00	-10.65	100.00	189.00
627.52	8.82	19.01	6.44	0.00	34.27	46.00	-11.73	200.00	221.00
638.19	9.98	19.05	6.49	0.00	35.52	46.00	-10.48	100.00	221.00

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 MHz	Rx_R. dBuV(pk)	Ant_F . dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m(pk)	Limit dBuV/m(av)	Margin dB	A.Tower cm	T.Table deg
1452.05	63.31	26.58	1.81	46.20	45.50	54.00	-8.50	101	81
2366.13	57.80	30.93	2.63	46.21	45.15	54.00	-8.85	101	158
2371.13	62.29	30.93	2.64	46.21	49.64	54.00	-4.36	101	160
4562.94	42.41	33.94	1.40	46.66	31.09	54.00	-22.91	101	44
7947.05	39.10	40.53	3.06	44.00	38.69	54.00	-15.31	100	247
8846.15	38.55	41.15	3.23	42.73	40.19	54.00	-13.81	103	56

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

Operator: Mailes Hsieh

RBW: 1 MHz

Humidity (%): 48

Temperature (C): 27

Frequenc y MHz	Rx_R. dBuV(pk)	Ant_F . dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m(pk)	Limit dBuV/m(av)	Margin dB	A.Tower cm	T.Table deg
1472.03	62.09	26.67	1.82	46.21	44.37	54.00	-9.63	101	79
1799.20	62.23	29.31	2.00	46.21	47.34	54.00	-6.66	100	57
2750.75	56.52	31.00	2.82	46.40	43.94	54.00	-10.06	102	279
2775.72	60.63	31.01	2.82	46.41	48.05	54.00	-5.95	102	287
4083.92	51.78	32.45	2.05	46.19	40.09	54.00	-13.91	102	92
7233.77	42.75	39.47	3.15	46.21	39.17	54.00	-14.83	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 (%): 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
1469.53	67.60	26.66	1.82	46.21	49.87	54.00	-4.13	101	80
1794.21	56.80	29.27	2.00	46.21	41.86	54.00	-12.14	100	57
2396.10	59.24	30.92	2.67	46.21	46.63	54.00	-7.37	101	167
3755.24	52.41	31.86	2.12	46.37	40.01	54.00	-13.99	102	163
5384.62	42.09	35.91	1.13	47.29	31.83	54.00	-22.17	100	110
9769.23	35.80	40.31	3.12	41.74	37.49	54.00	-16.51	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
1876.62	63.68	29.96	2.04	46.20	49.48	54.00	-4.52	100	52
2388.61	59.93	30.92	2.66	46.21	47.31	54.00	-6.69	101	165
3758.74	58.97	31.86	2.12	46.37	46.58	54.00	-7.42	102	162
4080.42	54.08	32.44	2.05	46.19	42.38	54.00	-11.62	102	92
7305.69	41.41	39.59	3.20	46.18	38.02	54.00	-15.98	101	154
8972.03	38.17	40.94	3.18	42.83	39.47	54.00	-14.53	103	27

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
1222.28	66.01	25.52	1.65	46.10	47.08	54.00	-6.92	102	97
1714.29	65.02	28.60	1.96	46.21	49.36	54.00	-4.64	101	63
2203.80	57.18	30.96	2.40	46.20	44.33	54.00	-9.67	101	107
4073.43	50.91	32.42	2.06	46.18	39.21	54.00	-14.79	102	93
7383.62	39.34	39.71	3.25	46.14	36.15	54.00	-17.85	101	165
9775.22	35.80	40.29	3.12	41.73	37.49	54.00	-16.51	101	4

**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
1796.70	61.84	29.29	2.00	46.21	46.93	54.00	-7.07	100	57
2123.88	61.56	30.98	2.29	46.20	48.62	54.00	-5.38	100	82
2393.61	59.47	30.92	2.67	46.21	46.85	54.00	-7.15	101	167
4181.82	49.17	32.75	1.90	46.29	37.53	54.00	-16.47	102	82
7377.62	43.40	39.70	3.24	46.14	40.20	54.00	-13.80	101	164
9253.75	36.03	40.90	3.20	42.65	37.48	54.00	-16.52	102	15

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.

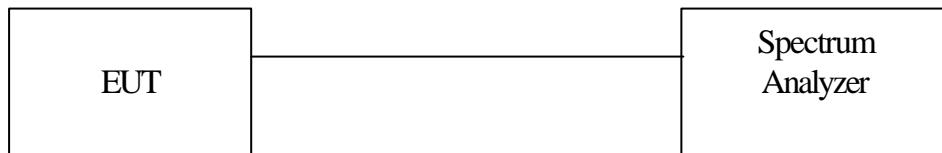
**All frequencies from 1GHz to 25 GHz have been tested.**

## 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)	dBc ( Limit: > 20dBc)	Limit (dBuV/m)	Test Engr:	Mailes Hsieh	Temp. (deg. C): 27	Humidity (%): 48	Equip. Setup VBW	Pass or Fail
1(peak mode)	2409.9	72.85	33.61	106.46	---	---			1MHz		---	
Outside band	2400	50.41	33.61	84.02	22.44	---			1MHz		Pass	
1(average mode)	2405.7	63.09	33.61	96.7	---	---			10Hz		---	
Restricted band	2390	16.95	33.61	50.56	---	54			10Hz		Pass	
11(peak mode)	2464.8	72.95	33.68	106.63	---	---			1MHz		---	
Outside band	2477.8	41.65	33.68	75.33	31.3	---			1MHz		Pass	
11(average mode)	2455.5	62.11	33.68	95.79	---	---			10Hz		---	
Restricted band	2483.5	15.03	33.68	48.71	---	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.