

PART III

(For Antenna 3: Vendor:Long-Chu, Model: FCF-004)

The antenna 3,5,6,7 are Dipole type in reverse SMA connector, which cannot meet the integral criterion, and only apply the band 5.25GHz~5.35GHz and 5.725GHz~5.825GHz for 11a regulation.

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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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)

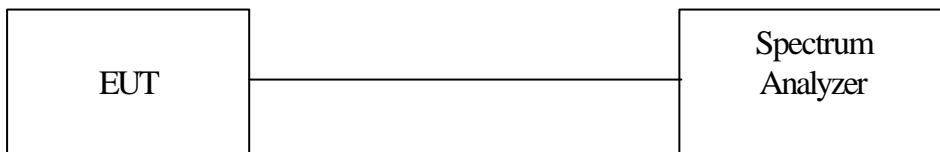
Please refer to ISL report 04LR018FC part 1.

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)

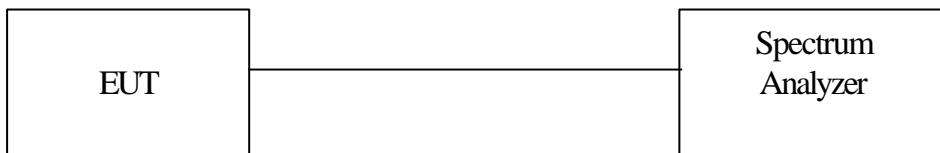
Please refer to ISL report 04LR018FC part 1.

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 2nd to 10th 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	21.73	10.27	3.02	0.00	35.02	43.50	-8.48	200.00	14.00
198.78	24.54	8.86	4.18	0.00	37.58	43.50	-5.92	200.00	54.00
232.73	26.97	9.33	4.50	0.00	40.79	46.00	-5.21	200.00	54.00
298.69	22.45	13.57	4.69	0.00	40.71	46.00	-5.29	100.00	236.00
399.57	19.37	15.99	5.32	0.00	40.67	46.00	-5.33	150.00	302.00
431.58	19.36	16.25	5.61	0.00	41.22	46.00	-4.78	250.00	220.00
464.56	15.16	16.78	5.87	0.00	37.82	46.00	-8.18	100.00	54.00
489.78	17.68	17.43	5.99	0.00	41.11	46.00	-4.89	100.00	220.00
497.54	18.84	17.64	6.04	0.00	42.52	46.00	-3.48	100.00	285.00
564.47	13.92	19.04	6.57	0.00	39.53	46.00	-6.47	100.00	171.00

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
99.84	18.08	10.27	3.02	0.00	31.36	43.50	-12.14	200.00	95.00
141.55	19.85	10.24	3.59	0.00	33.68	43.50	-9.82	150.00	275.00
364.65	15.98	14.80	5.07	0.00	35.85	46.00	-10.15	150.00	193.00
431.58	12.01	16.25	5.61	0.00	33.87	46.00	-12.13	100.00	209.00
497.54	14.06	17.64	6.04	0.00	37.73	46.00	-8.27	200.00	275.00
564.47	7.77	19.04	6.57	0.00	33.38	46.00	-12.62	100.00	209.00
643.04	8.48	19.07	7.00	0.00	34.56	46.00	-11.44	100.00	242.00
652.74	14.27	19.09	7.05	0.00	40.41	46.00	-5.59	100.00	225.00
660.5	9.70	19.08	7.07	0.00	35.84	46.00	-10.16	100.00	242.00
864.2	6.15	20.54	8.24	0.00	34.93	46.00	-11.07	100.00	12.00

* 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
1467.53	56.05	26.65	1.82	46.21	38.32	54.00	-15.68	101	80
1791.21	53.13	29.25	2.00	46.21	38.17	54.00	-15.83	100	57
3449.15	47.60	31.46	2.15	46.64	34.56	54.00	-19.44	103	242
7268.53	44.82	39.53	3.17	46.19	41.33	54.00	-12.67	101	148
11641.3	34.02	41.15	3.43	41.91	36.68	54.00	-17.32	101	138
16007.7	32.20	44.40	6.05	41.15	41.51	54.00	-12.49	102	194

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
1471.13	56.06	26.67	1.82	46.21	38.34	54.00	-15.66	101	79
1873.93	54.25	29.94	2.04	46.21	40.03	54.00	-13.97	100	52
2366.63	52.93	30.93	2.63	46.21	40.28	54.00	-13.72	101	158
7117.48	45.45	39.29	3.08	46.26	41.56	54.00	-12.44	101	126
10716.1	32.84	39.44	3.33	40.69	34.92	54.00	-19.08	102	167
16835.0	32.51	45.54	6.33	42.07	42.31	54.00	-11.69	100	277

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
1485.51	53.84	26.73	1.83	46.21	36.19	54.00	-17.81	101	78
2819.78	46.24	31.03	2.82	46.45	33.64	54.00	-20.36	102	300
3290.91	46.34	31.33	2.38	46.62	33.43	54.00	-20.57	103	282
7635.36	46.36	40.09	3.24	45.46	44.23	54.00	-9.77	100	202
11058.7	33.18	39.64	3.35	40.64	35.53	54.00	-18.47	102	224
16575.5	33.01	44.81	6.30	42.17	41.95	54.00	-12.05	101	251

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
2035.76	49.05	30.99	2.16	46.20	36.00	54.00	-18.00	100	54
2204.80	51.90	30.96	2.40	46.20	39.05	54.00	-14.95	101	107
2391.81	48.73	30.92	2.67	46.21	36.11	54.00	-17.89	101	166
6146.45	54.30	35.98	1.65	46.79	45.13	54.00	-8.87	100	261
11127.3	33.57	39.81	3.35	40.78	35.94	54.00	-18.06	102	214
16453.1	33.11	44.58	6.27	42.10	41.86	54.00	-12.14	101	239

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 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
2345.05	45.15	30.93	2.60	46.21	32.47	54.00	-21.53	101	151
2391.81	47.61	30.92	2.67	46.21	34.99	54.00	-19.01	101	166
2575.22	45.00	30.93	2.82	46.27	32.48	54.00	-21.52	102	224
4751.05	48.54	34.65	1.31	46.82	37.68	54.00	-16.32	100	25
10750.3	34.08	39.45	3.34	40.67	36.20	54.00	-17.80	102	175
15772.7	38.80	43.67	5.72	41.88	46.31	54.00	-7.69	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
1708.49	55.62	28.55	1.95	46.21	39.91	54.00	-14.09	101	63
2122.08	48.56	30.98	2.28	46.20	35.62	54.00	-18.38	100	81
2388.21	49.61	30.92	2.66	46.21	36.99	54.00	-17.01	101	165
6977.22	43.11	38.98	2.96	46.32	38.72	54.00	-15.28	101	113
10745.5	33.92	39.45	3.33	40.67	36.04	54.00	-17.96	102	174
15782.5	42.54	43.70	5.74	41.85	50.13	54.00	-3.87	102	151

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 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
1712.09	55.28	28.58	1.95	46.21	39.61	54.00	-14.39	101	63
2395.40	47.13	30.92	2.67	46.21	34.52	54.00	-19.48	101	167
2773.03	46.38	31.01	2.82	46.41	33.79	54.00	-20.21	102	286
4776.22	48.53	34.75	1.30	46.84	37.74	54.00	-16.26	100	22
10975.5	33.59	39.50	3.35	40.53	35.90	54.00	-18.10	102	227
15953.8	35.85	44.25	5.98	41.28	44.80	54.00	-9.20	102	184

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
1463.94	56.18	26.63	1.82	46.20	38.43	54.00	-15.57	101	80
2388.21	50.29	30.92	2.66	46.21	37.66	54.00	-16.34	101	165
2442.16	51.06	30.91	2.74	46.21	38.50	54.00	-15.50	101	182
4783.42	45.37	34.78	1.29	46.85	34.59	54.00	-19.41	100	22
10667.1	34.38	39.43	3.33	40.72	36.42	54.00	-17.58	102	155
15958.7	40.59	44.27	5.99	41.27	49.59	54.00	-4.41	102	185

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
1794.81	54.68	29.28	2.00	46.21	39.75	54.00	-14.25	100	57
2693.91	47.42	30.98	2.82	46.35	34.87	54.00	-19.13	102	261
3826.77	48.26	31.96	2.14	46.30	36.05	54.00	-17.95	102	145
7462.74	44.63	39.84	3.30	46.11	41.66	54.00	-12.34	101	177
11484.6	42.75	40.66	3.35	41.56	45.21	54.00	-8.79	101	161
17221.7	36.29	46.67	6.31	42.09	47.18	54.00	-6.82	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
2035.76	49.59	30.99	2.16	46.20	36.55	54.00	-17.45	100	54
2395.40	50.34	30.92	2.67	46.21	37.72	54.00	-16.28	101	167
2445.75	47.67	30.91	2.74	46.21	35.12	54.00	-18.88	101	183
7797.20	45.68	40.32	3.15	44.70	44.44	54.00	-9.56	100	225
11479.7	42.84	40.65	3.35	41.55	45.30	54.00	-8.70	101	162
17231.5	34.45	46.69	6.31	42.09	45.36	54.00	-8.64	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.**

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

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
1715.68	49.41	28.61	1.96	46.21	33.77	54.00	-20.23	101	63
2395.40	46.85	30.92	2.67	46.21	34.24	54.00	-19.76	101	167
2877.32	46.27	31.05	2.82	46.49	33.66	54.00	-20.34	103	318
7725.27	45.89	40.22	3.19	45.04	44.26	54.00	-9.74	100	215
11602.1	48.04	41.03	3.41	41.82	50.65	54.00	-3.35	101	144
17407.7	34.48	47.22	6.28	42.16	45.81	54.00	-8.19	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
1546.65	55.39	27.19	1.87	46.22	38.23	54.00	-15.77	101	74
2391.81	49.63	30.92	2.67	46.21	37.01	54.00	-16.99	101	166
2773.03	55.26	31.01	2.82	46.41	42.67	54.00	-11.33	102	286
4797.80	49.12	34.83	1.29	46.86	38.37	54.00	-15.63	100	20
11602.1	47.53	41.03	3.41	41.82	50.14	54.00	-3.86	101	144
17412.6	33.22	47.24	6.28	42.17	44.57	54.00	-9.43	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
1791.21	49.71	29.25	2.00	46.21	34.75	54.00	-19.25	100	57
2201.20	48.66	30.96	2.40	46.20	35.82	54.00	-18.18	101	106
2391.81	46.56	30.92	2.67	46.21	33.94	54.00	-20.06	101	166
4833.77	44.69	34.97	1.27	46.89	34.03	54.00	-19.97	100	17
10985.3	33.83	39.50	3.35	40.52	36.16	54.00	-17.84	102	230
15993.0	32.05	44.38	6.04	41.15	41.32	54.00	-12.68	102	192

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
2197.60	47.92	30.96	2.39	46.20	35.07	54.00	-18.93	101	105
2391.81	49.57	30.92	2.67	46.21	36.95	54.00	-17.05	101	166
2445.75	47.03	30.91	2.74	46.21	34.48	54.00	-19.52	101	183
7887.11	44.88	40.44	3.10	44.28	44.14	54.00	-9.86	100	239
10784.6	33.95	39.46	3.34	40.65	36.09	54.00	-17.91	102	183
15621.0	38.89	43.19	5.50	42.39	45.19	54.00	-8.81	101	120

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 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
1809.19	47.66	29.40	2.01	46.21	32.85	54.00	-21.15	100	56
2395.40	46.80	30.92	2.67	46.21	34.18	54.00	-19.82	101	167
2765.83	46.31	31.01	2.82	46.41	33.73	54.00	-20.27	102	283
4765.43	45.07	34.71	1.30	46.83	34.25	54.00	-19.75	100	23
11602.1	33.63	41.03	3.41	41.82	36.24	54.00	-17.76	101	144
15753.1	35.83	43.61	5.69	41.95	43.18	54.00	-10.82	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
2363.04	53.34	30.93	2.63	46.21	40.69	54.00	-13.31	101	157
2395.40	48.94	30.92	2.67	46.21	36.32	54.00	-17.68	103	167
2442.16	47.54	30.91	2.74	46.21	34.98	54.00	-19.02	101	182
7124.68	44.88	39.30	3.08	46.26	41.01	54.00	-12.99	101	127
10779.7	33.82	39.46	3.34	40.65	35.96	54.00	-18.04	102	182
15738.5	39.77	43.56	5.67	42.00	47.00	54.00	-7.00	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
2391.81	45.70	30.92	2.67	46.21	33.08	54.00	-20.92	101	166
2895.30	46.05	31.06	2.82	46.50	33.43	54.00	-20.57	103	324
3301.70	46.59	31.34	2.37	46.62	33.68	54.00	-20.32	103	279
7822.38	46.15	40.35	3.13	44.58	45.05	54.00	-8.95	100	229
10936.4	34.30	39.49	3.35	40.55	36.59	54.00	-17.41	102	218
15875.5	38.60	44.00	5.87	41.54	46.93	54.00	-7.07	102	169

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
2391.81	49.22	30.92	2.67	46.21	36.60	54.00	-17.40	101	166
2445.75	47.13	30.91	2.74	46.21	34.58	54.00	-19.42	101	183
2776.62	46.70	31.01	2.82	46.41	34.12	54.00	-19.88	102	287
7923.08	45.21	40.49	3.07	44.11	44.67	54.00	-9.33	100	244
10363.6	34.51	39.51	3.24	40.91	36.35	54.00	-17.65	101	85
15855.9	41.90	43.94	5.84	41.61	50.07	54.00	-3.93	102	165

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 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
1467.53	63.77	26.65	1.82	46.21	46.03	54.00	-7.97	101	80
1712.09	53.66	28.58	1.95	46.21	37.99	54.00	-16.01	101	63
3837.56	47.48	31.97	2.14	46.29	35.31	54.00	-18.69	102	142
7203.80	44.73	39.43	3.13	46.22	41.07	54.00	-12.93	101	139
11587.4	33.35	40.98	3.40	41.79	35.94	54.00	-18.06	101	146
17275.5	33.35	46.83	6.30	42.11	44.37	54.00	-9.63	101	270

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
1467.53	56.71	26.65	1.82	46.21	38.97	54.00	-15.03	101	80
2118.48	47.93	30.98	2.28	46.20	34.98	54.00	-19.02	100	80
2388.21	49.38	30.92	2.66	46.21	36.76	54.00	-17.24	101	165
7128.27	44.64	39.31	3.08	46.25	40.77	54.00	-13.23	101	128
11655.9	33.84	41.20	3.44	41.95	36.53	54.00	-17.47	101	136
17158.0	31.83	46.47	6.32	42.06	42.56	54.00	-11.44	100	280

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 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
2395.40	46.72	30.92	2.67	46.21	34.10	54.00	-19.90	101	167
2776.62	46.30	31.01	2.82	46.41	33.71	54.00	-20.29	102	287
3862.74	48.20	32.01	2.14	46.26	36.10	54.00	-17.90	102	135
7782.82	45.56	40.30	3.16	44.77	44.25	54.00	-9.75	100	223
11837.1	32.96	41.78	3.55	42.37	35.92	54.00	-18.08	100	109
17373.4	32.43	47.12	6.28	42.15	43.68	54.00	-10.32	101	262

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
1463.94	56.23	26.63	1.82	46.20	38.48	54.00	-15.52	101	80
2388.21	49.33	30.92	2.66	46.21	36.70	54.00	-17.30	101	165
3862.74	48.71	32.01	2.14	46.26	36.60	54.00	-17.40	102	135
4794.21	49.81	34.82	1.29	46.86	39.06	54.00	-14.94	100	21
11631.5	34.05	41.12	3.43	41.89	36.70	54.00	-17.30	101	140
17089.5	32.45	46.27	6.33	42.04	43.01	54.00	-10.99	100	286

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):

Band Edge measurement (Conducted)

Normal Mode	Outside Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Corrected Factor (dB)		
					Mailes Hsieh	Temp. (deg. C): 25
				Humidity (%): 50		
6	5250.0	66.45	7.1	73.55	80	Pass
8	5353.8	63.74	7.1	70.84	80	Pass
9	5724.6	81.09	7.1	88.19	90	Pass
9	5713.2	68.74	7.1	75.84	80	Pass
12	5825	80.55	7.1	87.65	90	Pass
12	5835	65.58	7.1	72.68	80	Pass
Turbo Mode	Outside Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Corrected Factor (dB)	Corrected Emissions (dBuV ERP)	Limit: (dBuV ERP)
3	5250.0	70.11	7.1	77.21	80	Pass
3	5352.1	60.26	7.1	67.36	80	Pass
4	5725	79.52	7.1	86.62	90	Pass
4	5715	70.95	7.1	78.05	80	Pass
5	5826.7	79.85	7.1	86.95	90	Pass
5	5835	70.31	7.1	77.41	80	Pass

Note: Corrected Emissions=Spectrum + Corrected Factor
Corrected Factor=Cable Loss+Antenna Peak Ga in (dBi)

International Standards Laboratory

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

Report Number: 04LR018FC

Band Edge Conducted measurement (Normal Mode Channel 6)



Band Edge Conducted Measurement (Normal Mode Channel 8)



Band Edge Conducted measurement (Normal Mode Channel 9)



Band Edge Conducted Measurement (Normal Mode Channel 12)



Band Edge Conducted measurement (Turbo Mode Channel 3)



Band Edge Conducted Measurement (Turbo Mode Channel 3)



Band Edge Conducted measurement (Turbo Mode Channel 4)



Band Edge Conducted Measurement (Turbo Mode Channel 5)



2.6.4 Bandedge Measurement Test Procedure (Radiated)

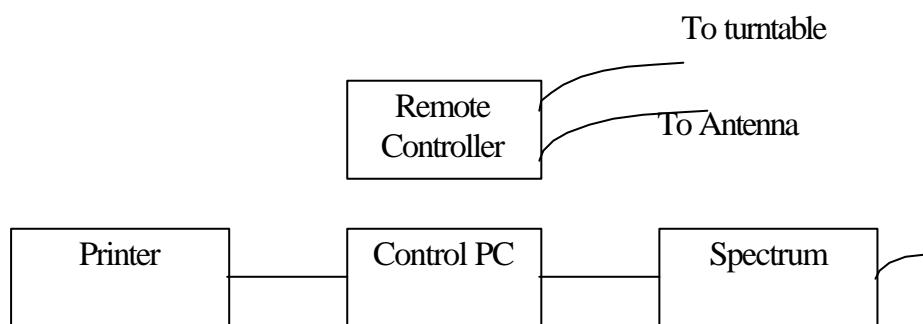
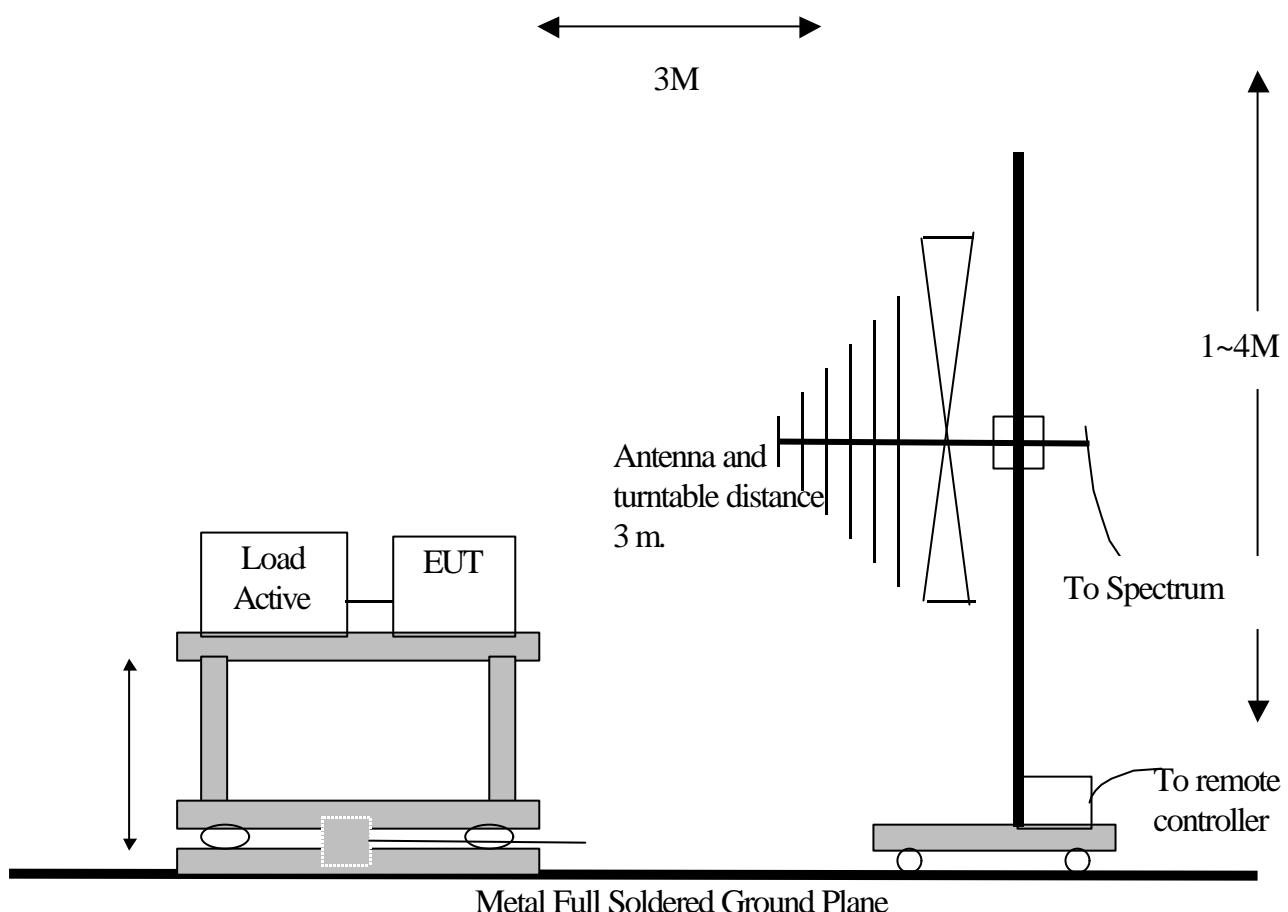
1. Antenna and Turntable test procedure same as Radiated Emissions measurement listed in Para. 6.5

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
6 (Peak)	5249.4	23.21	38.21	61.42	74	Pass
6 (Average)	5250.0	9.48	38.21	47.69	54	Pass
8 (Peak)	5354.3	23.8	38.21	62.01	74	Pass
8 (Average)	5350	8.79	38.21	47	54	Pass
9 (Peak)	5714.7	26.91	38.21	65.12	74	Pass
9 (Average)	5715	10.12	38.21	48.33	54	Pass
12 (Peak)	5838.5	23.72	38.21	61.93	74	Pass
12 (Average)	5835	9.91	38.21	48.12	54	Pass

Outside Channel (Turbo)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Pass/Fail
3 (Peak)	5249.0	30.88	38.21	69.09	74	Pass
3 (Average)	5250.0	12.70	38.21	50.91	54	Pass
3 (Peak)	5351.9	21.66	38.21	59.87	74	Pass
3 (Average)	5350.3	9	38.21	47.21	54	Pass
4 (Peak)	5714.9	31.3	38.21	69.51	74	Pass
4 (Average)	5715	13.91	38.21	52.12	54	Pass
5 (Peak)	5835	29.2	38.21	67.41	74	Pass
5 (Average)	5835	14.76	38.21	52.97	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 6) Peak data



Normal Mode (Channel 6) 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 3) Peak data



Turbo Mode (Channel 3) 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)]

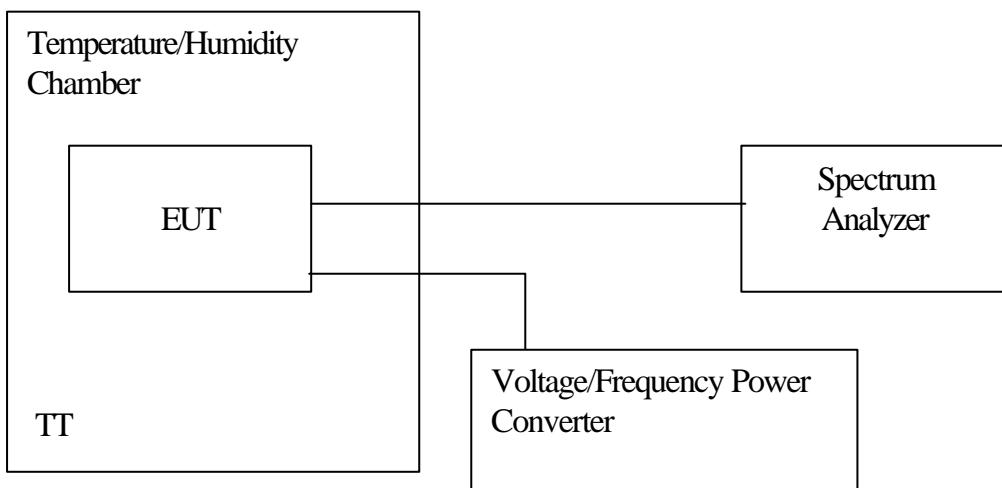
2.8.1 Limits of Frequency Stability Measurement

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°C ~ 35°C), and variation in the primary supply voltage from 85% to 115% of the rated supply voltage (115V AC) at 20°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°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.

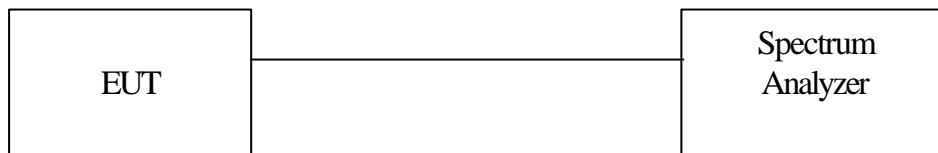
3.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

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 2nd to 10th 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
198.78	24.97	8.86	4.18	0.00	38.01	43.50	-5.49	250.00	349.00
231.76	27.04	9.21	4.48	0.00	40.73	46.00	-5.27	250.00	22.00
298.69	22.39	13.57	4.69	0.00	40.66	46.00	-5.34	100.00	185.00
324.88	23.92	13.95	4.75	0.00	42.62	46.00	-3.38	250.00	5.00
350.1	22.68	14.30	4.97	0.00	41.95	46.00	-4.05	100.00	276.00
365.62	22.13	14.83	5.08	0.00	42.04	46.00	-3.96	100.00	185.00
399.57	21.27	15.99	5.32	0.00	42.57	46.00	-3.43	100.00	243.00
431.58	18.66	16.25	5.61	0.00	40.52	46.00	-5.48	150.00	169.00
464.56	15.53	16.78	5.87	0.00	38.18	46.00	-7.82	100.00	5.00
564.47	13.91	19.04	6.57	0.00	39.52	46.00	-6.48	200.00	169.00

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
99.84	17.84	10.27	3.02	0.00	31.13	43.50	-12.37	250.00	152.00
132.82	17.38	11.12	3.52	0.00	32.02	43.50	-11.48	100.00	267.00
231.76	19.92	9.21	4.48	0.00	33.62	46.00	-12.38	150.00	201.00
364.65	14.64	14.80	5.07	0.00	34.51	46.00	-11.49	100.00	267.00
431.58	13.27	16.25	5.61	0.00	35.13	46.00	-10.87	100.00	267.00
497.54	13.52	17.64	6.04	0.00	37.20	46.00	-8.80	100.00	316.00
564.47	8.02	19.04	6.57	0.00	33.63	46.00	-12.37	100.00	250.00
652.74	14.70	19.09	7.05	0.00	40.84	46.00	-5.16	100.00	283.00
660.5	9.65	19.08	7.07	0.00	35.79	46.00	-10.21	150.00	283.00
864.2	6.28	20.54	8.24	0.00	35.07	46.00	-10.93	100.00	50.00

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
2341.16	60.93	30.93	2.59	46.21	48.25	54.00	-5.75	101	150
2351.15	62.82	30.93	2.61	46.21	50.15	54.00	-3.85	101	153
2501.00	60.56	30.90	2.82	46.21	48.07	54.00	-5.93	102	200
3748.25	47.09	31.85	2.12	46.38	34.68	54.00	-19.32	102	165
4821.68	49.25	34.92	1.28	46.88	38.56	54.00	-15.44	100	18
7227.77	38.33	39.46	3.15	46.21	34.73	54.00	-19.27	101	142

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
2351.15	55.73	30.93	2.61	46.21	43.06	54.00	-10.94	101	153
2361.14	60.72	30.93	2.62	46.21	48.06	54.00	-5.94	101	156
2373.63	63.52	30.93	2.64	46.21	50.87	54.00	-3.13	101	160
4821.68	53.88	34.92	1.28	46.88	43.19	54.00	-10.81	100	18
7233.77	44.36	39.47	3.15	46.21	40.78	54.00	-13.22	101	143
9643.36	34.90	40.58	3.17	42.07	36.58	54.00	-17.42	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	60.63	30.93	2.60	46.21	47.95	54.00	-6.05	101	151
2366.13	62.95	30.93	2.63	46.21	50.30	54.00	-3.70	101	158
2515.98	62.95	30.91	2.82	46.22	50.45	54.00	-3.55	102	205
4870.63	52.42	35.11	1.25	46.93	41.86	54.00	-12.14	100	13
7305.69	39.46	39.59	3.20	46.18	36.07	54.00	-17.93	101	154
9559.44	33.81	40.77	3.20	42.29	35.49	54.00	-18.51	102	9

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
2363.64	55.48	30.93	2.63	46.21	42.83	54.00	-11.17	101	157
2386.11	62.70	30.92	2.66	46.21	50.08	54.00	-3.92	101	164
4870.63	56.67	35.11	1.25	46.93	46.11	54.00	-7.89	100	13
7317.68	45.63	39.61	3.20	46.17	42.27	54.00	-11.73	101	155
9745.25	35.59	40.36	3.13	41.81	37.28	54.00	-16.72	102	5
12178.8	35.12	42.09	3.71	42.81	38.10	54.00	-15.90	100	132

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
2358.64	60.30	30.93	2.62	46.21	47.64	54.00	-6.36	101	156
2368.63	63.48	30.93	2.63	46.21	50.84	54.00	-3.16	101	159
2376.12	63.47	30.92	2.64	46.21	50.83	54.00	-3.17	101	161
4923.08	57.41	35.31	1.23	46.97	46.97	54.00	-7.03	100	8
7383.62	41.30	39.71	3.25	46.14	38.11	54.00	-15.89	101	165
9841.16	34.75	40.15	3.10	41.56	36.44	54.00	-17.56	101	3

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
2378.62	52.01	30.92	2.65	46.21	39.37	54.00	-14.63	101	162
2388.61	57.00	30.92	2.66	46.21	44.38	54.00	-9.62	101	165
2401.10	60.35	30.92	2.68	46.21	47.74	54.00	-6.26	101	169
4919.58	61.15	35.29	1.23	46.97	50.70	54.00	-3.30	100	8
7305.69	39.38	39.59	3.20	46.18	35.98	54.00	-18.02	101	154
9745.25	34.33	40.36	3.13	41.81	36.01	54.00	-17.99	102	5

Note:

“*”: Fundamental Frequency

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

“pk”: peak reading

“av”: average reading

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

The Spectrum noise level+Correction Factor < 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.

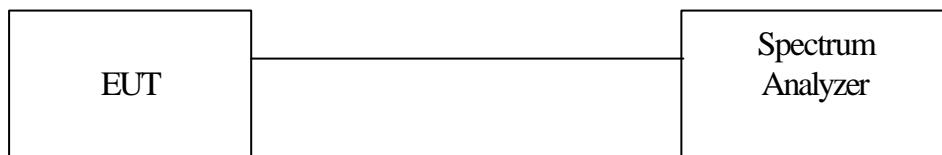
All frequencies from 1GHz to 25 GHz have been tested.

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)	2410.8	78.62	31.1	109.72	---	---			1MHz	---
Outside band	2397.1	47.39	31.1	78.49	31.23	---			1MHz	Pass
1(average mode)	2412.7	70.35	31.1	101.45	---	---			10Hz	---
Restricted band	2387.2	20.21	31.1	51.31	---	54			10Hz	Pass
11(peak mode)	2460.8	77.72	31.1	108.82	---	---			1MHz	---
Outside band	2488	45.51	31.1	76.61	32.21	---			1MHz	Pass
11(average mode)	2460.2	68.36	31.1	99.46	---	---			10Hz	---
Restricted band	2487.3	21.52	31.1	52.62	---	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)]

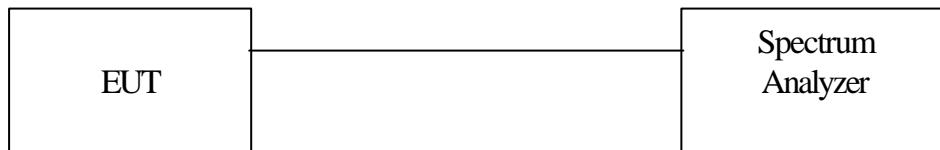
See MPE report

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.

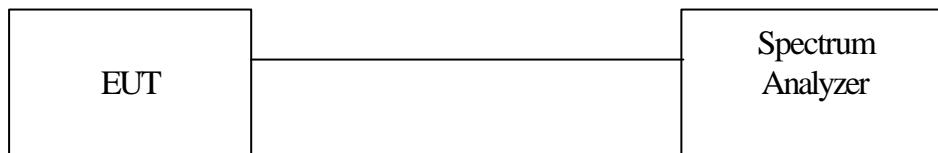
4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

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.

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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 2nd to 10th 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	22.52	10.27	3.02	0.00	35.81	43.50	-7.69	150.00	186.00
198.78	24.87	8.86	4.18	0.00	37.91	43.50	-5.59	200.00	23.00
232.73	27.81	9.33	4.50	0.00	41.64	46.00	-4.36	100.00	72.00
298.69	21.92	13.57	4.69	0.00	40.19	46.00	-5.81	150.00	235.00
397.63	20.13	15.92	5.30	0.00	41.36	46.00	-4.64	250.00	304.00
431.58	19.22	16.25	5.61	0.00	41.08	46.00	-4.92	100.00	218.00
465.53	14.54	16.80	5.88	0.00	37.22	46.00	-8.78	100.00	56.00
497.54	19.08	17.64	6.04	0.00	42.75	46.00	-3.25	100.00	354.00
564.47	13.18	19.04	6.57	0.00	38.79	46.00	-7.21	100.00	354.00
863.23	9.40	20.55	8.23	0.00	38.18	46.00	-7.82	100.00	186.00

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
42.61	14.98	10.99	1.79	0.00	27.75	40.00	-12.25	250.00	107.00
133.79	18.55	11.02	3.52	0.00	33.09	43.50	-10.41	100.00	222.00
231.76	20.26	9.21	4.48	0.00	33.95	46.00	-12.05	200.00	156.00
365.62	15.30	14.83	5.08	0.00	35.20	46.00	-10.80	100.00	206.00
431.58	12.91	16.25	5.61	0.00	34.77	46.00	-11.23	100.00	222.00
497.54	13.07	17.64	6.04	0.00	36.74	46.00	-9.26	150.00	271.00
643.04	9.24	19.07	7.00	0.00	35.32	46.00	-10.68	100.00	238.00
651.77	15.37	19.10	7.04	0.00	41.51	46.00	-4.49	100.00	222.00
661.47	9.04	19.08	7.07	0.00	35.18	46.00	-10.82	100.00	238.00
864.2	6.00	20.54	8.24	0.00	34.78	46.00	-11.22	100.00	156.00

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
2298.70	46.30	30.94	2.53	46.21	33.57	54.00	-20.43	101	137
2518.48	52.41	30.91	2.82	46.22	39.91	54.00	-14.09	102	206
2685.81	46.31	30.97	2.82	46.35	33.76	54.00	-20.24	102	258
3758.74	47.89	31.86	2.12	46.37	35.50	54.00	-18.50	102	162
4821.68	40.73	34.92	1.28	46.88	30.05	54.00	-23.95	100	18
9367.63	33.70	40.90	3.21	42.56	35.25	54.00	-18.75	102	13

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
2123.88	45.88	30.98	2.29	46.20	32.94	54.00	-21.06	100	82
2590.91	45.20	30.94	2.82	46.28	32.67	54.00	-21.33	102	229
2685.81	45.32	30.97	2.82	46.35	32.77	54.00	-21.23	102	258
3758.74	51.91	31.86	2.12	46.37	39.53	54.00	-14.47	102	162
4828.67	45.20	34.95	1.27	46.89	34.53	54.00	-19.47	100	17
9505.49	33.84	40.89	3.22	42.44	35.51	54.00	-18.49	102	10

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
2338.66	53.88	30.93	2.59	46.21	41.20	54.00	-12.80	101	149
2353.65	58.56	30.93	2.61	46.21	45.90	54.00	-8.10	101	154
2528.47	50.22	30.91	2.82	46.23	37.72	54.00	-16.28	102	209
3751.75	48.17	31.85	2.12	46.38	35.77	54.00	-18.23	102	164
4874.13	42.13	35.12	1.25	46.93	31.57	54.00	-22.43	100	13
9397.60	33.18	40.90	3.21	42.53	34.76	54.00	-19.24	102	12

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	50.34	30.93	2.63	46.21	37.69	54.00	-16.31	101	158
2595.90	44.88	30.94	2.82	46.28	32.35	54.00	-21.65	102	230
2773.23	47.32	31.01	2.82	46.41	34.74	54.00	-19.26	102	286
3758.74	52.02	31.86	2.12	46.37	39.64	54.00	-14.36	102	162
4870.63	46.39	35.11	1.25	46.93	35.82	54.00	-18.18	100	13
7311.69	38.52	39.60	3.20	46.17	35.14	54.00	-18.86	101	155

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
2373.63	55.52	30.93	2.64	46.21	42.88	54.00	-11.12	101	160
2381.12	58.63	30.92	2.65	46.21	46.00	54.00	-8.00	101	163
2580.92	47.98	30.93	2.82	46.27	35.47	54.00	-18.53	102	225
3751.75	48.26	31.85	2.12	46.38	35.85	54.00	-18.15	102	164
4923.08	44.30	35.31	1.23	46.97	33.86	54.00	-20.14	100	8
10626.4	32.82	39.43	3.33	40.75	34.83	54.00	-19.17	102	146

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
2121.38	49.47	30.98	2.28	46.20	36.52	54.00	-17.48	100	81
2768.23	50.73	31.01	2.82	46.41	38.15	54.00	-15.85	102	284
3758.74	51.45	31.86	2.12	46.37	39.07	54.00	-14.93	102	162
4923.08	48.76	35.31	1.23	46.97	38.32	54.00	-15.68	100	8
7383.62	42.00	39.71	3.25	46.14	38.82	54.00	-15.18	101	165
12130.9	31.80	42.14	3.69	42.79	34.84	54.00	-19.16	100	119

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)	Mailes Hsieh	Temp. (deg. C):	25
							Humidity (%):	50
1(peak mode)	2414.9	71.01	31.1	102.11	---	---	1MHz	---
Outside band	2399.9	49.7	31.1	80.8	21.31	---	1MHz	Pass
1(average mode)	2408.5	59.82	31.1	90.92	---	---	10Hz	---
Restricted band	2390	14.2	31.1	45.3	---	54	10Hz	Pass
11(peak mode)	2465	72.2	31.1	103.3	---	---	1MHz	---
Outside band	2477.4	40.38	31.1	71.48	31.82	---	1MHz	Pass
11(average mode)	2455.3	60.68	31.1	91.78	---	---	10Hz	---
Restricted band	2483.6	15.37	31.1	46.47	---	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 me asurement for radiated emission in Ristricted 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.