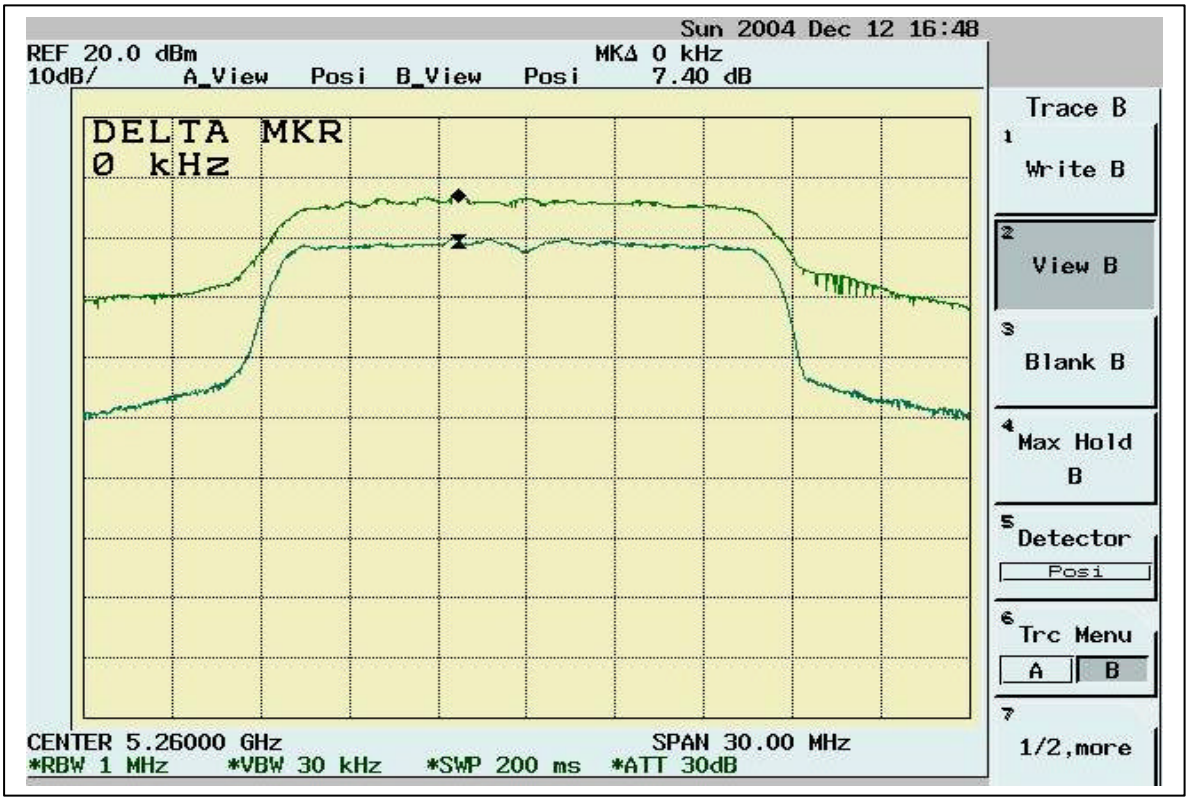
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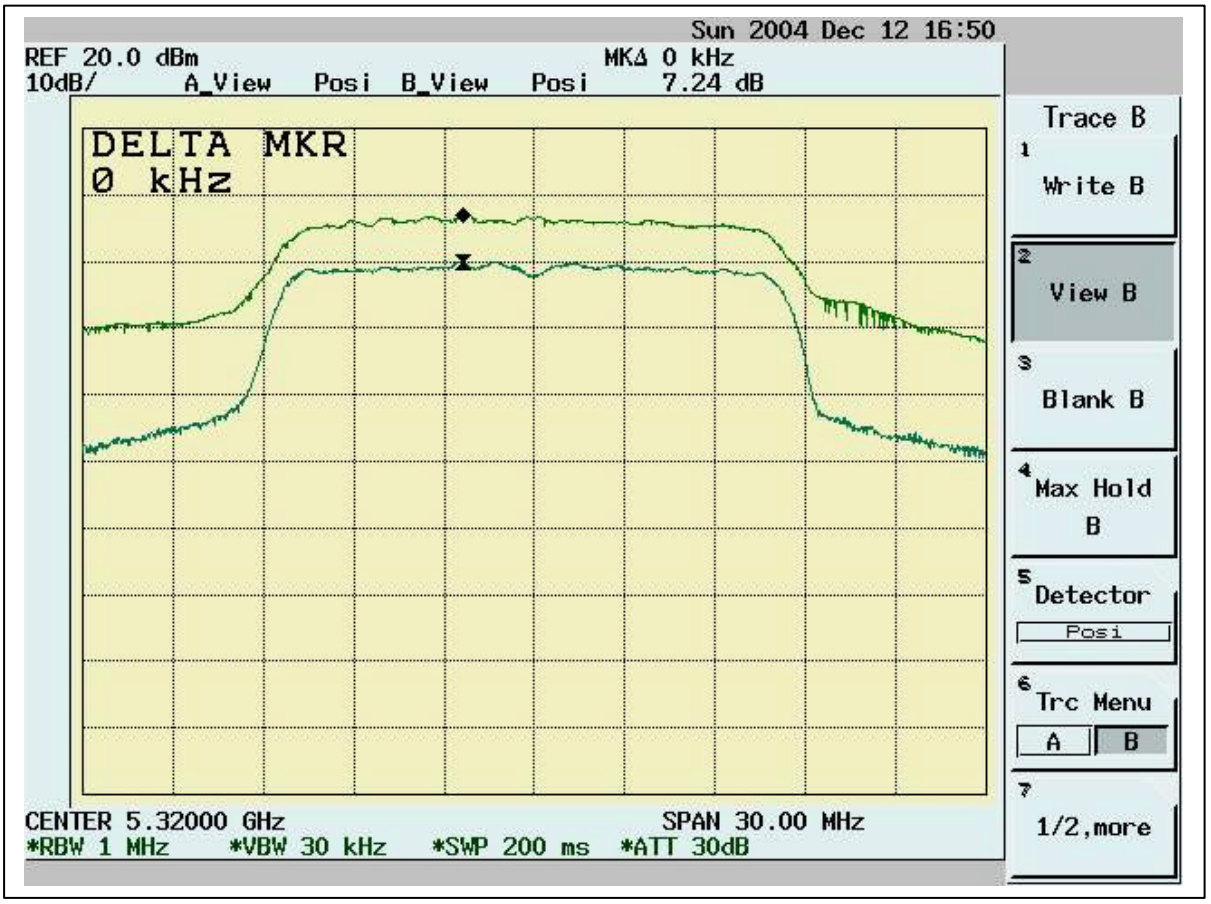
10dB/
A_View Posi B_View Posi
MKΔ 0 kHz
7.40 dB
DELTA MKR
0 kHz
Trace B
1 Write B
2 View B
3 Blank B
4 Max Hold B
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more
CENTER 5.26000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 30 kHz *SWP 200 ms *ATT 30dB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10dB/
A_View Posi B_View Posi
MKΔ 0 kHz
7.24 dB
DELTA MKR
0 kHz
Trace B
1 Write B
2 View B
3 Blank B
4 Max Hold B
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more
CENTER 5.32000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 30 kHz *SWP 200 ms *ATT 30dB

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

5.4.1 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.

5.4.2 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 6dß 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 6dß 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.

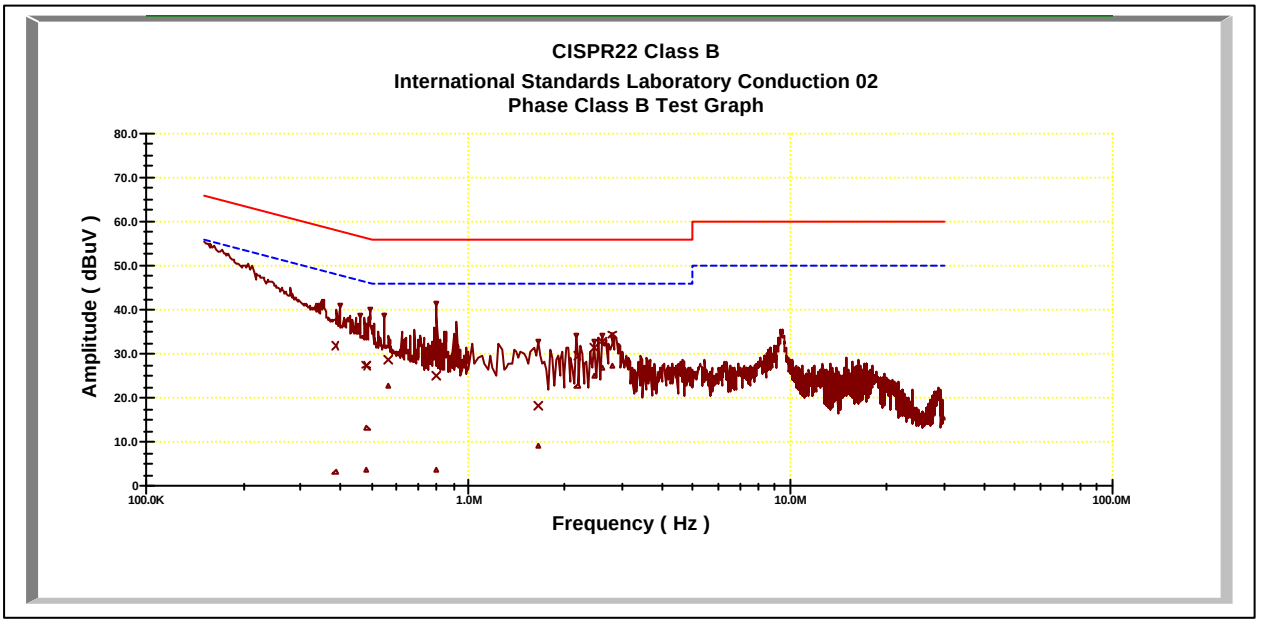
5.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

5.4.4 Test Data:

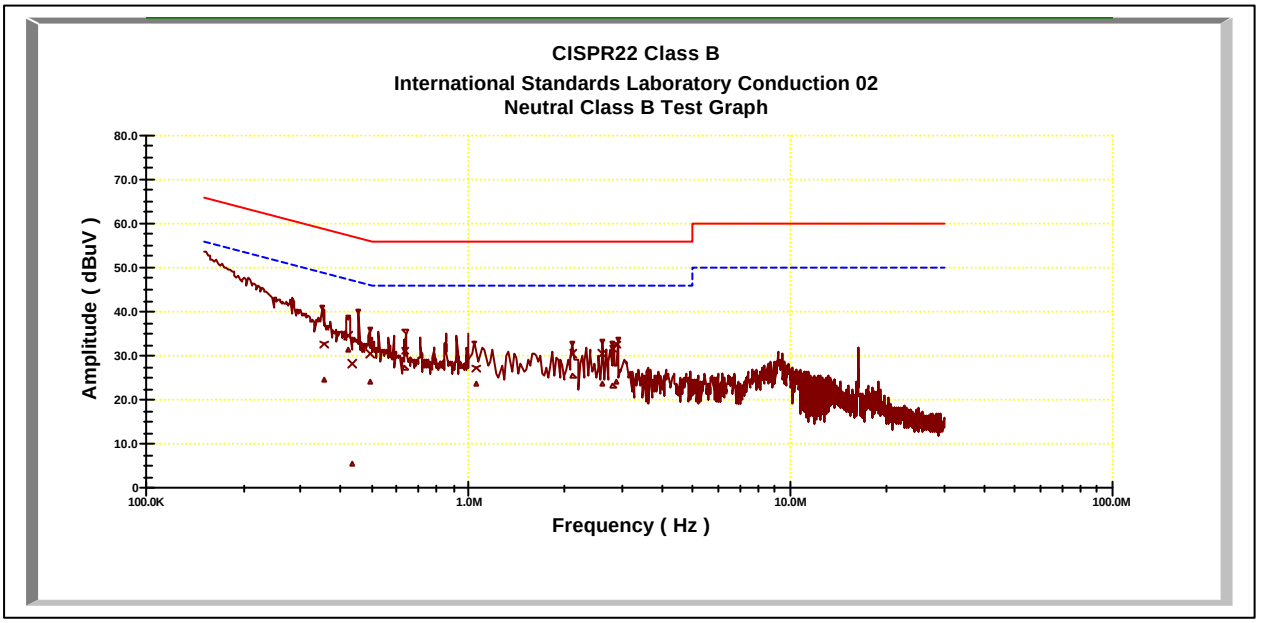
Power Line Conducted Emissions (Hot)

	Corrective Factor		Quasi-Peak			Average		
Frequency (MHz)	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.38603	0.10	0.02	31.78	59.26	-27.47	3.04	49.26	-46.21
0.47938	0.11	0.03	27.51	56.59	-29.08	3.73	46.59	-42.86
0.4846	0.11	0.03	27.38	56.44	-29.06	13.13	46.44	-33.31
0.56403	0.13	0.04	28.72	56.00	-27.28	22.73	46.00	-23.27
0.79841	0.17	0.05	25.03	56.00	-30.97	3.63	46.00	-42.37
1.65363	0.30	0.09	18.12	56.00	-37.88	9.01	46.00	-36.99
2.181	0.21	0.10	29.62	56.00	-26.38	22.75	46.00	-23.25
2.46208	0.22	0.10	31.45	56.00	-24.55	24.96	46.00	-21.04
2.60348	0.23	0.11	32.94	56.00	-23.06	26.77	46.00	-19.23
2.8149	0.24	0.11	34.34	56.00	-21.66	27.21	46.00	-18.79



Power Line Conducted Emissions (Neutral)

	Corrective Factor		Quasi-Peak			Average		
Frequency (MHz)	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.35638	0.10	0.02	32.54	60.10	-27.56	24.66	50.10	-25.45
0.42331	0.10	0.03	34.49	58.19	-23.70	31.49	48.19	-16.70
0.43703	0.11	0.03	28.25	57.80	-29.55	5.30	47.80	-42.50
0.49545	0.12	0.03	30.34	56.13	-25.79	24.11	46.13	-22.02
0.63505	0.14	0.04	31.12	56.00	-24.88	27.30	46.00	-18.70
1.05966	0.29	0.07	27.13	56.00	-28.87	23.65	46.00	-22.35
2.11467	0.20	0.10	30.54	56.00	-25.46	25.54	46.00	-20.46
2.60897	0.20	0.11	30.57	56.00	-25.43	23.66	46.00	-22.34
2.81865	0.20	0.11	31.58	56.00	-24.42	23.02	46.00	-22.98
2.88817	0.20	0.11	32.53	56.00	-23.47	23.95	46.00	-22.05



* NOTE: During the test, the EMI receiver was set to Max.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

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

5.5.1 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.

5.5.2 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^{nd} to 10^{th} 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.

5.5.3 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

5.5.4 Test Data (30MHz – 1GHz) .

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
42.61	14.40	11.04	1.76	0.00	27.20	40.00	-12.80	150.00	272.00
333.61	13.23	13.54	4.78	0.00	31.54	46.00	-14.46	100.00	135.00
431.58	10.23	15.85	5.39	0.00	31.47	46.00	-14.53	150.00	27.00
455.83	11.19	16.13	5.52	0.00	32.84	46.00	-13.16	200.00	355.00
719.67	6.96	19.18	6.86	0.00	33.00	46.00	-13.00	100.00	355.00
766.23	4.25	19.66	7.09	0.00	31.01	46.00	-14.99	100.00	217.00
815.7	13.11	19.86	7.34	0.00	40.31	46.00	-5.69	250.00	264.00
836.07	3.87	19.94	7.41	0.00	31.23	46.00	-14.77	150.00	355.00
864.2	3.77	20.06	7.50	0.00	31.32	46.00	-14.68	250.00	157.00
911.73	14.91	20.27	7.72	0.00	42.90	46.00	-3.10	150.00	355.00

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
169.68	16.73	8.61	3.48	0.00	28.82	43.50	-14.68	100.00	24.00
211.39	18.74	8.57	3.87	0.00	31.18	43.50	-12.32	100.00	258.00
233.7	19.17	9.97	4.10	0.00	33.24	46.00	-12.76	100.00	225.00
434.49	11.37	15.88	5.40	0.00	32.65	46.00	-13.35	200.00	346.00
455.83	15.98	16.13	5.52	0.00	37.64	46.00	-8.36	100.00	41.00
597.45	8.33	18.30	6.31	0.00	32.93	46.00	-13.07	100.00	346.00
635.28	9.30	18.58	6.48	0.00	34.36	46.00	-11.64	250.00	62.00
768.17	4.54	19.67	7.11	0.00	31.32	46.00	-14.68	100.00	41.00
815.7	10.73	19.86	7.34	0.00	37.93	46.00	-8.07	200.00	274.00
911.73	13.20	20.27	7.72	0.00	41.19	46.00	-4.81	250.00	193.00

* NOTE:

During the Pre-test, the EUT has been tested for Channel 1 , 4, 5, 8 of Normal Mode 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

5.5.5 Test Data (1GHz – 40 GHz, Transmitting).

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7164.83	42.11	39.80	2.35	46.24	38.02	54.00	-15.98	108	156
11410.6	25.70	42.06	3.01	41.40	29.37	54.00	-24.63	102	25
14688.3	31.18	44.22	3.43	42.34	36.50	54.00	-17.50	106	82
15316.7	25.32	43.09	3.50	43.22	28.69	54.00	-25.31	103	135
15690.3	26.57	43.41	3.54	42.16	31.36	54.00	-22.64	101	118
15979.0	25.32	44.33	3.57	41.20	32.02	54.00	-21.98	100	110

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7130.87	42.16	39.84	2.34	46.25	38.10	54.00	-15.90	100	235
11886.1	26.89	42.17	3.08	42.48	29.66	54.00	-24.34	106	24
13567.4	26.52	42.03	3.30	41.88	29.97	54.00	-24.03	107	71
14688.3	31.30	44.22	3.43	42.34	36.62	54.00	-17.38	109	125
15707.3	26.74	43.46	3.54	42.10	31.64	54.00	-22.36	102	108
15962.0	25.59	44.28	3.57	41.26	32.18	54.00	-21.82	100	190

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.

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7130.87	42.27	39.84	2.34	46.25	38.21	54.00	-15.79	103	267
11138.9	26.05	41.03	2.98	40.81	29.25	54.00	-24.75	100	142
14688.3	30.81	44.22	3.43	42.34	36.13	54.00	-17.87	100	71
15265.7	26.65	43.17	3.49	43.34	29.97	54.00	-24.03	102	125
15690.3	26.11	43.41	3.54	42.16	30.90	54.00	-23.10	105	108
15996.0	25.38	44.39	3.57	41.14	32.20	54.00	-21.80	100	136

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7147.85	42.09	39.82	2.35	46.24	38.02	54.00	-15.98	100	327
11903.1	26.78	42.16	3.08	42.52	29.50	54.00	-24.50	105	230
14688.3	31.25	44.22	3.43	42.34	36.57	54.00	-17.43	100	175
15248.8	26.60	43.20	3.49	43.38	29.91	54.00	-24.09	109	140
15656.3	28.13	43.30	3.53	42.27	32.69	54.00	-21.31	102	130
15979.0	24.97	44.33	3.57	41.20	31.67	54.00	-22.33	100	192

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.

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7164.83	42.05	39.80	2.35	46.24	37.97	54.00	-16.03	100	310
8387.61	28.13	41.04	2.57	42.76	28.99	54.00	-25.01	102	30
11410.6	25.70	42.06	3.01	41.40	29.38	54.00	-24.62	100	75
14688.3	30.70	44.22	3.43	42.34	36.02	54.00	-17.98	106	140
15690.3	26.21	43.41	3.54	42.16	31.00	54.00	-23.00	100	218
15962.0	25.55	44.28	3.57	41.26	32.14	54.00	-21.86	105	130

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7130.87	42.16	39.84	2.34	46.25	38.10	54.00	-15.90	100	93
11189.8	26.32	41.22	2.98	40.92	29.61	54.00	-24.39	100	203
13312.7	26.48	41.64	3.27	41.86	29.53	54.00	-24.47	106	70
14688.3	31.26	44.22	3.43	42.34	36.58	54.00	-17.42	103	262
15656.3	26.62	43.30	3.53	42.27	31.18	54.00	-22.82	107	124
16000.0	25.29	44.40	3.57	41.13	32.13	54.00	-21.87	101	113

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.

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7147.85	42.03	39.82	2.35	46.24	37.96	54.00	-16.04	106	223
11444.6	25.28	42.19	3.02	41.47	29.02	54.00	-24.98	100	173
14688.3	31.16	44.22	3.43	42.34	36.48	54.00	-17.52	100	270
15299.7	25.60	43.12	3.50	43.26	28.96	54.00	-25.04	100	324
15690.3	26.10	43.41	3.54	42.16	30.89	54.00	-23.11	109	124
15996.0	25.74	44.39	3.57	41.14	32.56	54.00	-21.44	102	113

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
7130.87	41.71	39.84	2.34	46.25	37.64	54.00	-16.36	100	146
11478.5	26.05	42.32	3.02	41.54	29.85	54.00	-24.15	100	93
14688.3	31.46	44.22	3.43	42.34	36.78	54.00	-17.22	100	189
15656.3	26.94	43.30	3.53	42.27	31.50	54.00	-22.50	101	342
15996.0	25.70	44.39	3.57	41.14	32.52	54.00	-21.48	102	210
16420.6	25.32	44.57	3.62	42.03	31.48	54.00	-22.52	101	195

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.

5.6 Band Edge Measurement (Section 15.407 (b) (1) (2))

5.6.1 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: 1 MHHz
   VBW: 1 MHz
   Sweep time= 200 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.

5.6.2 Test Setup (Conducted)

5.6.3 Test Data (conducted):

Band Edge measurement (Conducted)

Outside Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Corrected Factor (dB)	Corrected Emissions (dBuV ERP)	Limit: (dBuV ERP)	Pass or Fail
1 (Normal)	5150.0	75.02	1.8	76.82	80	Pass
8 (Normal)	5350.1	75.83	1.8	77.63	80	Pass

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

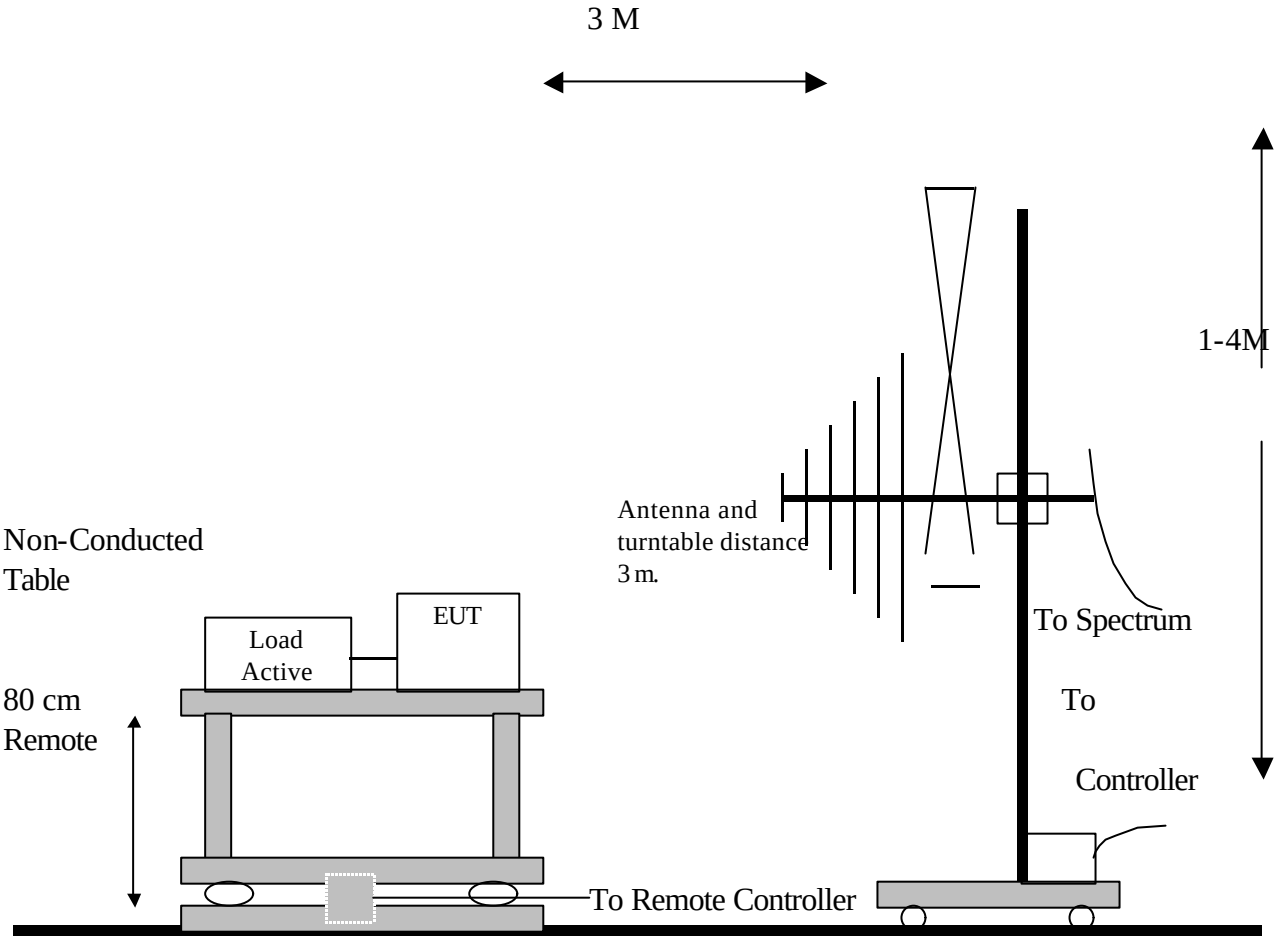
Band Edge Conducted measurement (Normal Mode Channel 1)

Band Edge Conducted Measurement (Normal Mode Channel 8)

5.6.4 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
   Detector function: Peak mode SPAN: 100MHz
   RBW=1 MHz, VBW = 1MHz for Peak measurement
   RBW=1 MHz, VBW = 10 Hz for Average measurement
   Sweep time= 200 msec for peak measurement, 20 sec. for Average
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.

5.6.5 Test Setup (Radiated)



5.6.6 Test Data (Radiated):

Band Edge measurement (Radiated)

Outside Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Pass/Fail
1 (Normal)	5149.9	25.11 (pk)	38.1	63.21	74	Pass
1 (Normal)	5147.7	7.73 (av)	38.1	45.83	54	Pass
8 (Normal)	5351.0	23.66(pk)	38.1	61.76	74	Pass
8 (Normal)	5352.4	8.12(av)	38.1	46.22	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.

Band Edge measurement for radiated emission in Restricted Band(Radiated)

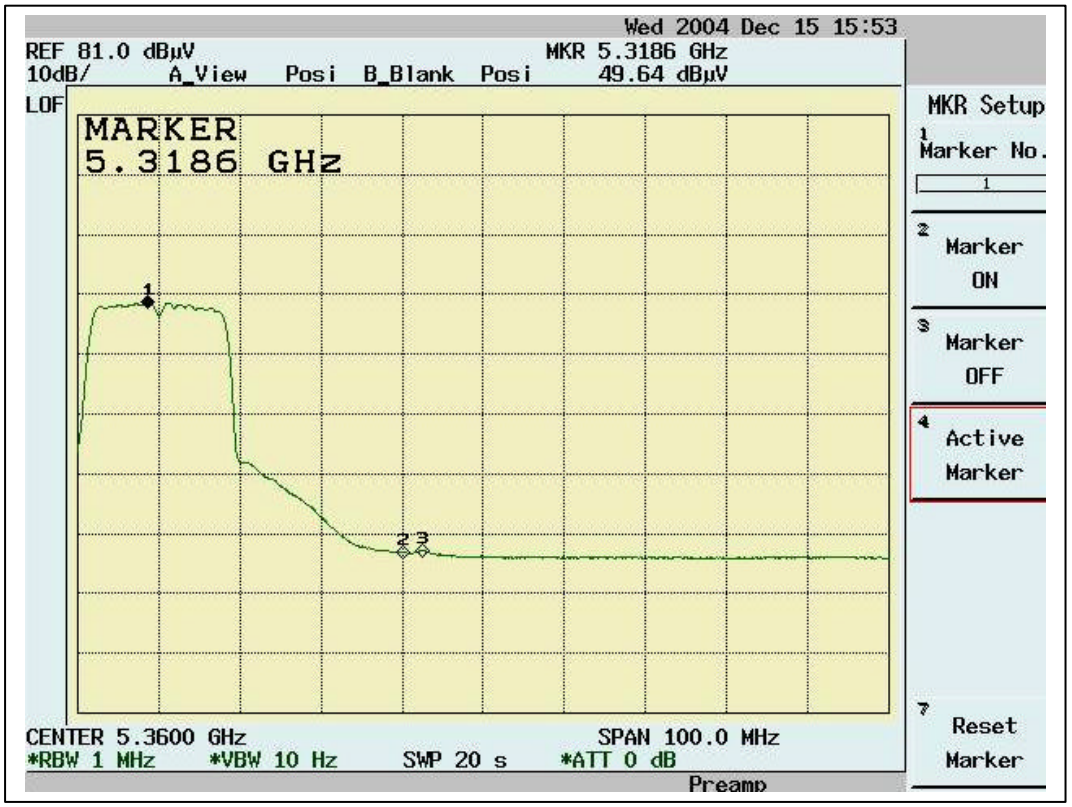
Normal Mode (Channel 1) Peak data

Normal Mode (Channel 1) Average Data

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Normal Mode (Channel 8) Peak data

Normal Mode (Channel 8) , Average data



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

Refer to SAR Test Report

5.8 Frequency Stability [Section 15.407(g)]

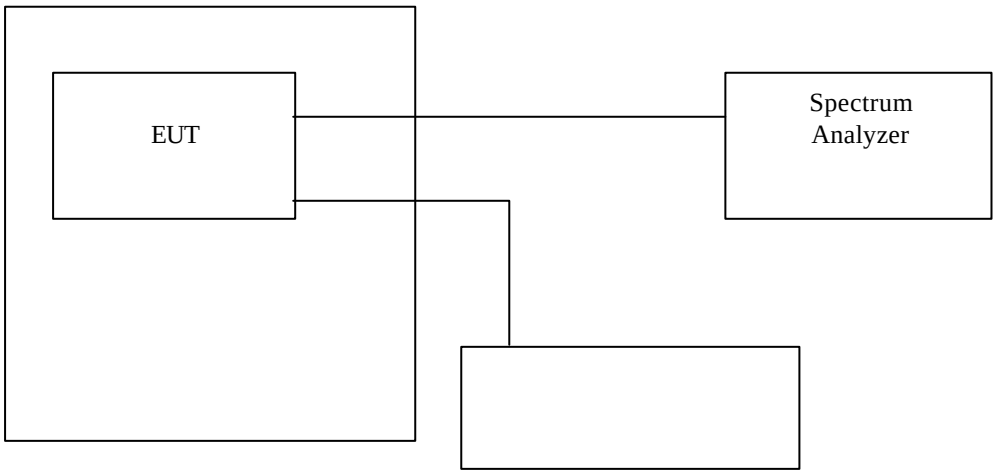
5.8.1 Limits of Frequency Stability Measurement

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

5.8.2 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 20^0C

5.8.3 Test Setup



Temperature/Humidity Chamber

Voltage/Frequency Power Converter

5.8.4 Test Data

Operating Frequency: 5180MHz		Limit: +/- 0.02%					
Temp. (^{0}C)	Power Supply (V AC)	2 minutes		5 minutes		10 minutes	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
35	132	5180.0016	0.000031	5180.0048	0.000093	5180.0208	0.000402
	115	5180.0052	0.000100	5180.0122	0.000236	5190.0211	0.193458
	97	5180.0036	0.000069	5180.0122	0.000236	5180.0013	0.000025
0	132	5180.0052	0.000100	5180.0153	0.000295	5180.0094	0.000181
	115	5180.0111	0.000214	5180.0233	0.000450	5180.0199	0.000384
	97	5180.0307	0.000593	5180.0193	0.000373	5180.0202	0.000390
20	132	5180.0043	0.000083	5180.0127	0.000245	5180.0087	0.000168
	115	5180.0108	0.000208	5180.0172	0.000332	5180.0121	0.000234
	97	5179.9922	-0.000151	5180.0249	0.000481	5179.9940	-0.000116

Operating Frequency: 5320 MHz		Limit: +/- 0.02%					
Temp. (^{0}C)	Power Supply (V AC)	2 minutes		5 minutes		10 minutes	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
35	132	5320.0128	0.000241	5320.0140	0.000263	5320.0265	0.000498
	115	5320.0262	0.000492	5320.0049	0.000092	5320.0103	0.000194
	97	5320.0310	0.000583	5320.0058	0.000109	5320.0074	0.000139
0	132	5320.0149	0.000280	5320.0229	0.000430	5320.0047	0.000088
	115	5320.0187	0.000352	5320.0161	0.000303	5320.0116	0.000218
	97	5320.0214	0.000402	5320.0016	0.000030	5320.0043	0.000081
20	132	5320.0177	0.000333	5320.0173	0.000325	5320.0043	0.000081
	115	5320.0156	0.000293	5320.0113	0.000212	5320.0077	0.000145
	97	5320.0145	0.000273	5320.0276	0.000519	5320.0194	0.000365

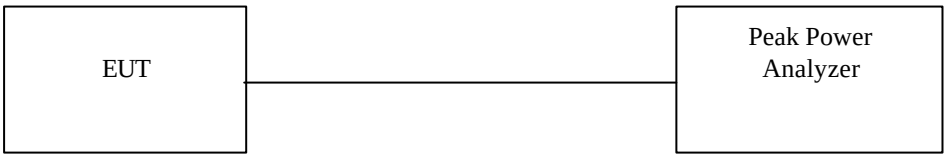
6. TEST RESULTS (Bluetooth)

6.1 Maximum Peak Output Power [Section 15.247 (b)(1)]

6.1.1 Test Procedure

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

6.1.2 Test Setup



6.1.3 Test Data:

Table Maximum Peak Output Power

Chennel	Frequency (MHz)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
0	2402	2.20	3.43	30	Pass
39	2441	2.32	3.65	30	Pass
78	2480	2.21	3.45	30	Pass

6.2 Radiated Emission Measurement [Section [15.247(c)(4)]

6.2.1 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.

6.2.2 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^{nd} to 10^{th} 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.

6.2.3 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

6.2.4 Test Data (above 1GHz) :.

1GHz~ 25 GHz (Horizontal), The Emission Data While Bluetooth Channel 10 : 2412 MHz & 802.11b WLAN Channel 1 : 2412 MHz operating

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
1129.87	60.64	25.05	0.72	46.06	40.35	54.00	-13.65	100	123
1671.83	56.98	28.01	0.90	46.21	39.68	54.00	-14.32	100	184
4800.7	39.79	34.66	1.93	46.86	29.51	54.00	-24.49	103	122
6912.59	36.23	39.49	2.30	46.35	31.68	54.00	-22.32	101	192
8654.35	40.27	40.81	2.62	42.59	41.11	54.00	-12.89	100	205
11261.7	36.74	41.49	2.99	41.08	40.15	54.00	-13.85	100	246

1GHz~ 25 GHz (Vertical), , The Emission Data While Bluetooth Channel 10 : 2412 MHz & 802.11b WLAN Channel 1 : 2412 MHz operating

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
1002.5	64.52	24.51	0.68	46.00	43.71	54.00	-10.29	100	115
1332.17	59.78	25.90	0.79	46.15	40.32	54.00	-13.68	100	294
4958.04	40.77	35.32	1.95	47.00	31.05	54.00	-22.95	105	198
6968.53	37.49	39.82	2.31	46.33	33.30	54.00	-20.70	100	289
8042.96	41.01	41.18	2.51	43.64	41.06	54.00	-12.94	101	121
11225.8	36.85	41.36	2.99	41.00	40.20	54.00	-13.80	100	305

Note:

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.
The worst data of the Radiated Emission over 1GHz are listed above when the bluetooth device is co-located with the WLAN device.

6.3 Band Edge Measurement (when Bluetooth and WLAN are operating at the same time)

!! Measuring the Peak / Average Mode when Bluetooth Channel 0 is co-located with the WLAN Channel 1 and Bluetooth Channel 78 is co-located with the WLAN Channel 11.

6.3.1 Band Edge measurement 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, 2.48 GHz.

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.

6.3.2 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

6.3.3 Test Data:

Band Edge measurement (Radiated)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
1(WLAN peak mode)	2413.6	63.23	31.67	94.90	---	---	1MHz	---
0(bluetooth peak mode)	2402.0	56.97	31.67	88.64	---	---	1MHz	---
Outside band	2400.0	31.65	31.67	63.32	25.32	---	1MHz	Pass
1(WLAN average mode)	2412.4	52.55	31.67	84.22	---	---	10Hz	---
0(bluetooth average mode)	2402.8	33.55	31.67	65.22	---	---	10Hz	---
Restricted band	2389.8	4.98	31.67	36.65	-----	54	10Hz	Pass
11(WLAN peak mode)	2463.7	63.09	31.64	94.73	----	---	1MHz	---
11(bluetooth peak mode)	2480	50.55	31.64	82.19	----	---	1MHz	---
Outside band	2483.5	13.83	31.64	45.47	36.72	---	1MHz	Pass
11(WLAN average mode)	2462.5	53.48	31.64	85.12	----	---	10Hz	---
11(bluetooth average mode)	2480.0	23.43	31.64	55.07	----	---	10Hz	---
Restricted band	2484.1	5.14	31.64	36.78	-----	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

Band Edge measurement for radiated emission in Restricted Band(Radiated)
Peak Mode (Bluetooth Channel 0 is co-located with the WLAN Channel 1)

Band Edge measurement for radiated emission in Restricted Band(Radiated)
Average Mode (Bluetooth Channel 0 is co-located with the WLAN Channel 1)

Band Edge measurement for radiated emission in Restricted Band(Radiated)
Peak Mode (Bluetooth Channel 78 is co-located with the WLAN Channel 11)

Band Edge measurement for radiated emission in Restricted Band(Radiated)
Average Mode (Bluetooth Channel 78 is co-located with the WLAN Channel 11)

7. Appendix

7.1 Appendix A: Measurement Procedure for Power line Conducted Emissions

The EUT is set up in accordance with the suggested configuration given in 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 measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the Figure 1 of the ANSI C63.4-2001 or CISPR16. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum according to ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996. Both the line of power cord, hot and neutral, were measured.

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.

7.2 Appendix B: Test Procedure for Radiated Emissions

Preliminary Measurements in the Anechoic Chamber

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

Measurements on the Open Site or 10m EMC Chamber

The radiated emissions test will then be repeated on the open site or 10m EMC chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of the 3 or 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum according to ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

7.3 Appendix C: Test Equipment

7.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	12/04/2003	12/04/2004
Conduction	50 Ohms Load Conduction 02	EMCO	N/A	ISL-50ohms conduction 02	11/21/2003	11/21/2004
Conduction	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	06/03/2003	06/03/2004
Conduction	EMI Receiver 02	HP	85460A	3448A00183	08/21/2003	08/21/2004
Conduction	ISN T4	Schaffner	ISN T400	16593	08/20/2002	08/20/2004
Conduction	ISN T4 02	FCC	F-CMISN-CAT5	02003	12/17/2003	12/17/2004
Conduction	CISPR22 Voltage Probe	FCC	F-CVP-1	68	12/18/2003	12/18/2004
Conduction	Current Probe	Schaffner	SMZ 11	18030	01/09/2003	01/09/2004
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	05/07/2003	05/07/2004
Conduction	LISN 04	EMCO	3810/2	9604-1429	12/17/2003	12/16/2004
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	12/04/2003	12/04/2004
Radiation	Spectrum Analyzer 06	Advantest	R3162	91700295	09/25/2003	09/24/2004
Radiation	EMI Receiver 04	AFJ	ER 55CR	55390143233	10/28/2003	10/27/2004
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/04/2003	06/04/2004
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	10/03/2003	10/03/2004
Radiation	Microwave Cable Chmb 02 3M	HUBER+SUHNER AG.	Sucoflex 103	42731/3 & 42729/3	03/21/2003	03/21/2004
Radiation	Temperature/ Humility Chamber	K. Son Ins. Tech.	THS-B4H^{+}-100	2287	03/01/2003	03/01/2004
Radiation	Voltage/Frequency Power converter	EXTECH Electronics	CFC-105W	780274	08/25/2003	08/25/2004
Rad. Above 1Ghz	Spectrum Analyzer 07	Advantest	R3182	110600649	10/17/2003	10/17/2004
Rad. Above 1Ghz	Horn Antenna 02	Com-Power	AH-118	10088	02/06/2003	02/05/2004
Rad. Above 1Ghz	Horn Antenna 04	Com-Power	AH-826	081-001	12/10/2003	12/09/2004
Rad. above 1Ghz	Horn Antenna 05	Com-Power	AH-640	100A	09/13/2003	09/13/2004
Rad. above 1Ghz	Microwave Cable Chmb 05	HUBER+SUHNER AG.	Sucoflex 103	42726/3 & 42727/3	09/11/2003	09/11/2004

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1Ghz	Preamplifier 02	MITEQ	AFS44-00102650-40-10P-44	728229	05/07/2003	05/07/2004
Rad. Above 1Ghz	Preamplifier 09	MITEQ	AFS44-00102650-40-10P-44	858687	02/28/2003	02/28/2004
Rad. Above 1Ghz	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	02/28/2003	02/28/2004
Rad. Above 1Ghz	Signal Generator 03	Anritsu	MG3642A	6200162550	02/10/2003	02/09/2004
Rad. Above 1Ghz	Signal Generator 04	Anritsu	MG3692A	020311	02/06/2003	02/06/2004
Rad. Above 1Ghz	Peak Power Analyzer	HP	8990A	3621A01269	12/09/2003	12/09/2004
Rad. Above 1Ghz	Power Sensor Radar	HP	84815A	3318A01828	11/12/2003	11/12/2004

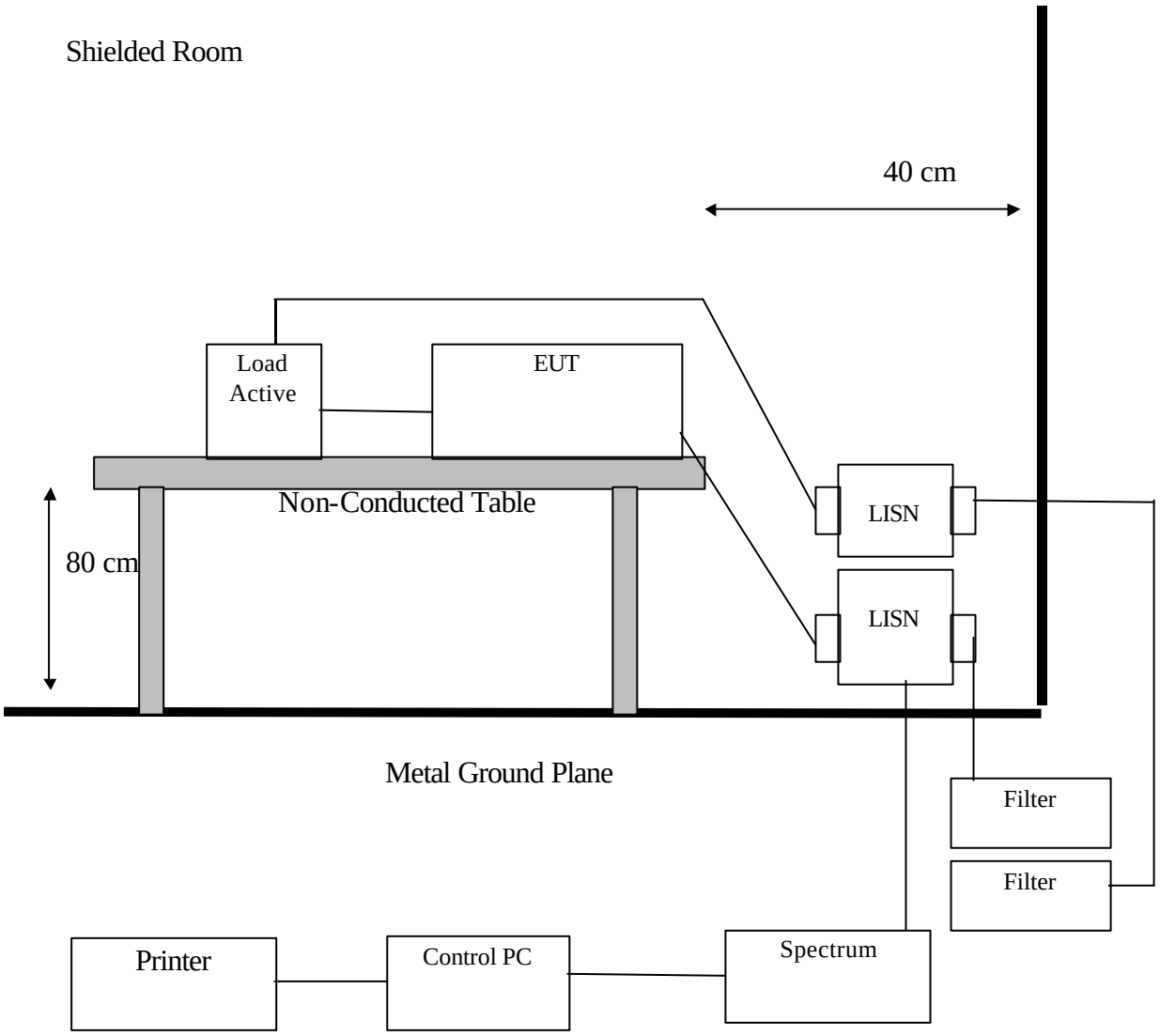
Note: Calibration traceable to NIST or national or international standards.

7.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

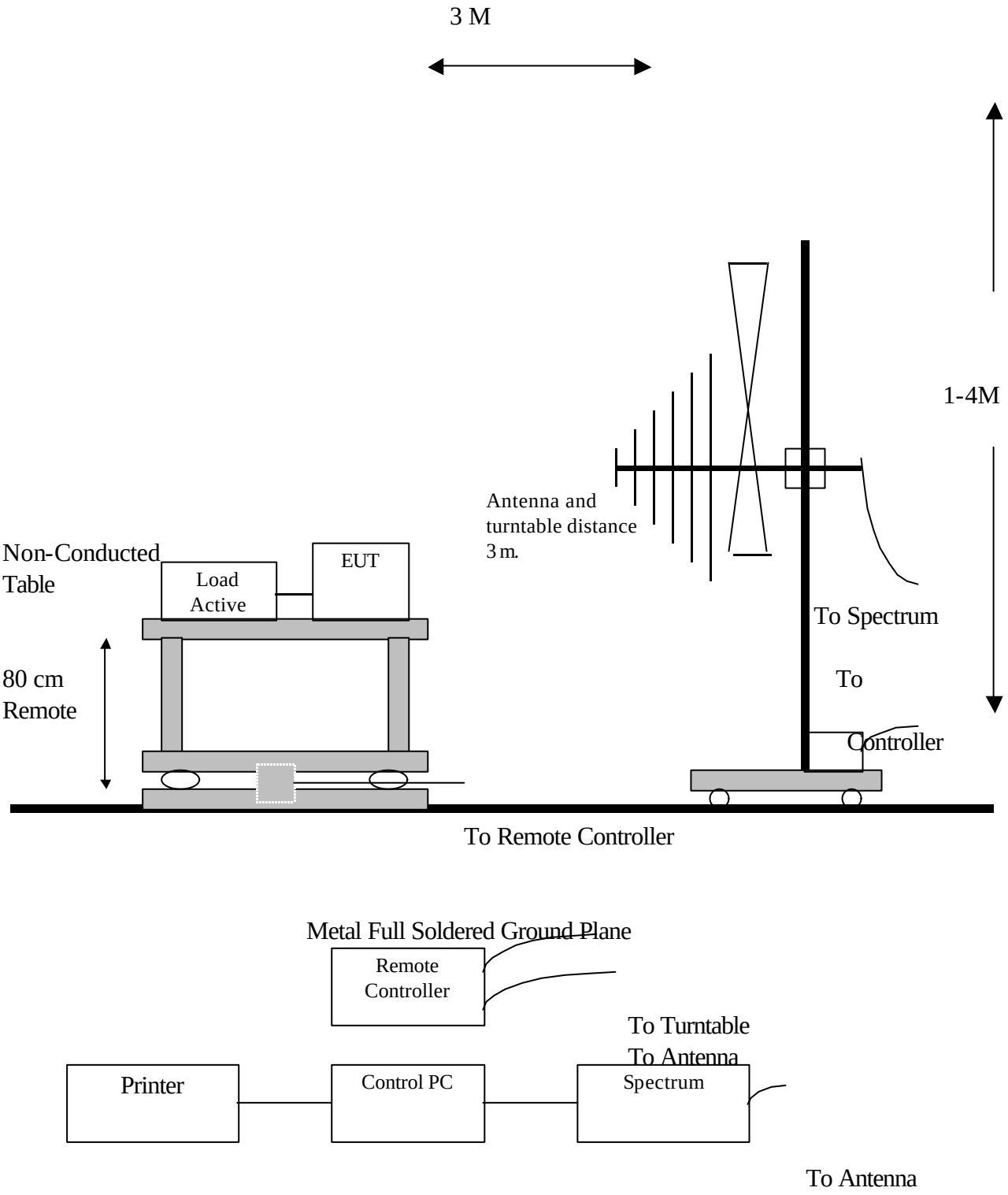
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

7.4 Appendix D: Layout of EUT and Support Equipment

7.4.1 General Conducted Test Configuration



7.4.2 General Radiation Test Configuration



7.5 Appendix E: Description of Support Equipment

7.5.1 Description of Support Equipment

Support Unit 1.

Description:	Logitech USB Mouse
Model Number:	M-u48a
Serial Number:	LZE02050204
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	JNZ211360

Support Unit 2.

Description:	Acer USB Keyboard
Model Number:	6511-UV
Serial Number:	N/A
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	N/A (comply with FCC DOC)

Support Unit 3.

Description:	Acer Monitor
Model:	G781
Serial Number:	999007101214400445T7AA31T
Power Cord:	Non-shielded, Detachable
FCC ID:	(Comply with FCC Standards)

7.5.2 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

A. Read and write to the disk drives.
B. Send H pattern to the video port device (Monitor).
C. Repeat the above steps.

	Filename	Issued Date
Monitor	HH.bat	8/20/1991

7.5.3 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to AC Power Cord Inlet (3-pin)	1.8M	Nonshielded, Detachable	Plastic Head
Monitor Data Cable	Monitor to PC VGA port	1.6M	Shielded, Un-detachable	Metal Head
USB Mouse Data Cable	USB Mouse to PC USB port	1.8M	Shielded, Un-detachable	Metal Head
USB Keyboard Data Cable	USB Keyboard to PC USB port	1.8M	Shielded, Undetachable	Metal Head

7.6 Appendix F: Accuracy of Measurement

Test Site: Conduction 02

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=2	0.104	k=1	0.052
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.330	k=1	0.165
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	LISN Factor Calibration	Normal	k=2	1.200	k=1	0.600
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	0.850
7	**Total Uncertainty @95% mim. Confidence Level**	**Normal**	**k=2**	**1.701**		

Measurement Uncertainty Calculations:

Uc (y) = square root (u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2)
U = 2 * Uc (y)

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

Test Site: Chamber 02-3M

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=2	0.067	k=1	0.034
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.103	k=1	0.052
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	Antenna Factor Calibration	Normal	k=2	1.700	k=1	0.850
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	1.029
7	**Total Uncertainty @95% mim. Confidence Level**	**Normal**	**k=2**	**2.059**		

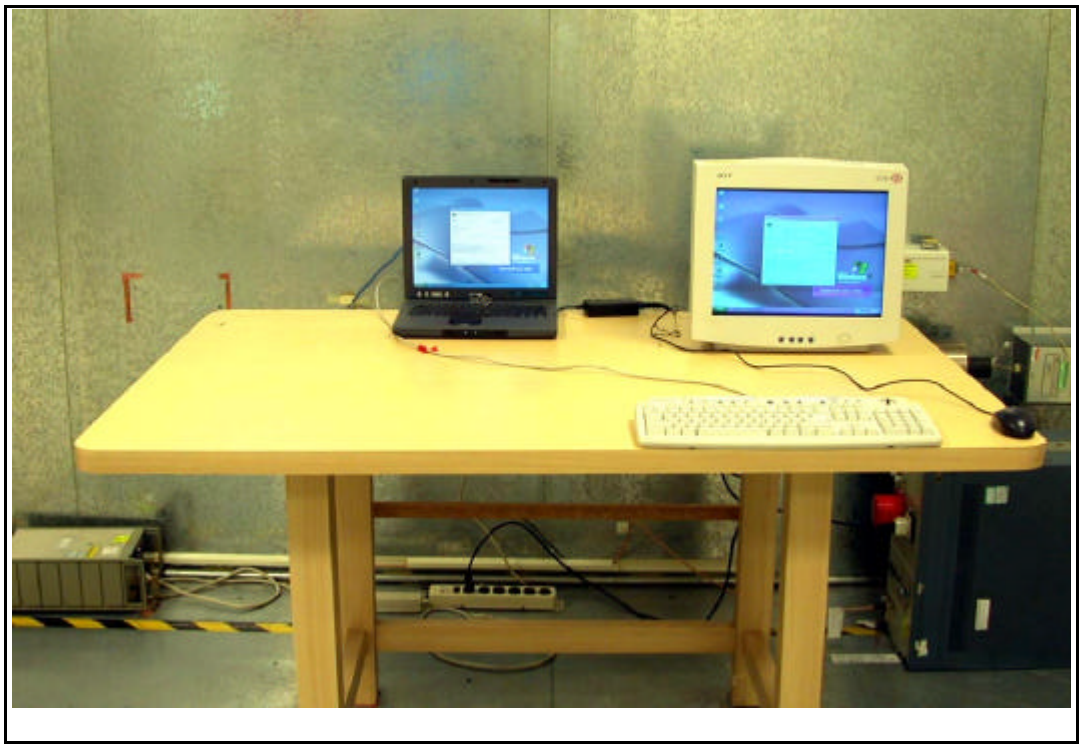
Measurement Uncertainty Calculations:

Uc (y) = square root (u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2)
U = 2 * Uc (y)

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

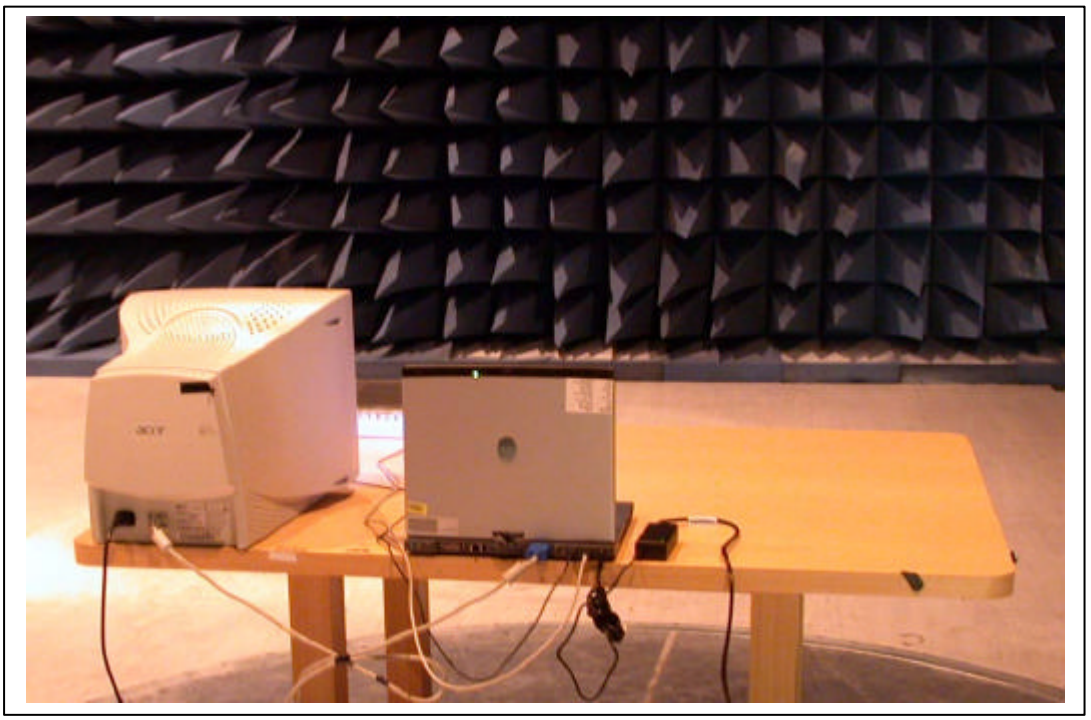
7.7 Appendix G: Photographs of EUT Configuration Test Set Up

The Front View of Highest Conducted Set-up For EUT



The Front View of Highest Radiated Set-up For EUT

The Back View of Highest Radiated Set-up For EUT



7.8 Appendix H: Antenna Spec.

Please refer to the attached file.