

APPLICATION FOR CERTIFICATION

On Behalf of

Sonos, Inc

Controller

Model No. : CR100

FCC ID : SBVCR001

Prepared for : Sonos, Inc
506 Chapala Street, Santa Barbara,
CA93101, USA

Prepared by : Audix Corporation
Technical Division EMC Department
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Date of Test : Jun. 27 ~ 30, 2005
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TEST REPORT CERTIFICATION

Applicant : Sonos, Inc
 Manufacturer : Inventec Electronics (M) Sdn. Bhd.
 EUT Description : Controller
 FCC ID : SBVCR001
 (A) MODEL NO. : CR100
 (B) SERIAL NO. : N/A
 (C) BRAND : SONOS
 (D) POWER SUPPLY : DC IN 6V or Battery
 (E) TEST VOLTAGE : AC 120V/60Hz (via Power Supply)

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, JANUARY 2005
AND ANSI C63.4/2003

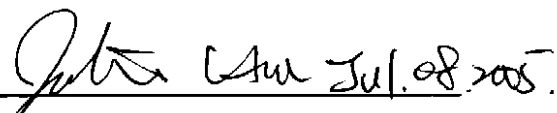
(FCC CFR 47 Part 15C, §15.205, §15.207, §15.209 and §15.247)

The device described above was tested by AUDIX COPORATION to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits.

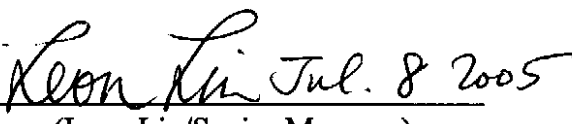
The measurement results are contained in this test report and AUDIX CORPORATION is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX CORPORATION.

Date of Test: Jun. 27 ~ 30, 2005

Prepared by: 
(Julie Hsu/Assistant Administrator)

Test Engineer: 
(Ben Cheng/Section Manager)

Approved & Authorized Signer: 
(Leon Liu/Senior Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Controller This devices is a controller for digital music system (Zone Player, ZP100).
Model Number	:	CR100
Canada IC	:	SBVCR001
Brand Name	:	SONOS
Applicant	:	Sonos, Inc 506 Chapala Street, Santa Barbara, CA93101, USA
Manufacturer	:	Inventec Electronics (M) Sdn. Bhd. Plot 102, Bayan Lepas Industrial Estate, 11900 Bayan Lepas, Penang, Malaysia.
High Frequency of Used	:	5.0MHz、10.0MHz、20.0MHz、33.0MHz、32.768kHz
Li-Polymer Battery (Rechargeable)	:	PL-0548135 >3000mAh
Wireless LAN Card (RF Module)	:	Askey, M/N WLL3090 IEEE 802.11g
I.T.E. Power Supply	:	UNIFIUE, M/N UIA324-06 S/N 410-0215062 BSMI ID. D53003 I/O: AC 100-240V, 50/60Hz, 0.6A O/P: DC 6V, 3.8A Cable: Shielded, Undetachable, 1.85m Bonded a ferrite core
AC Power Cord (2Pin)	:	Non-Shielded, Detachable, 2.0m
Date of Receipt of Sample	:	Jun. 27, 2005
Date of Test	:	Jun. 27 ~ 30, 2005

Remark :

This EUT is a modified version of original FCC ID SBVCR001, the difference is only to change the “RF Module”.

The EUT was re-measured and all the test data are reported in this report.

1.2. Description of Test Facility

Name of Firm : **Audix Corporation**
Technical Division EMC Department
 No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei County 24443, Taiwan, R.O.C.

Test Location & Facility : **No. 2 Shielded Room**
 (C2/AC) No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei County 24443, Taiwan, R.O.C.

Semi-Anechoic Chamber
 No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei County 24443, Taiwan, R.O.C.
 May. 16, 2003 File on
 Federal Communication Commission
 Registration Number: 90993

NVLAP Lab. Code : 200077-0
 (NVLAP is a NATA accredited body under Mutual Recognition Agreement)

1.3. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
Radiation Test (Distance: 3m)	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB
	Above 1GHz	± 5.02dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Emission Limitations	± 0.13dB
Maximum peak output power	± 0.33dBm
Band edges	± 0.13dB
Power spectral density	± 0.13dB

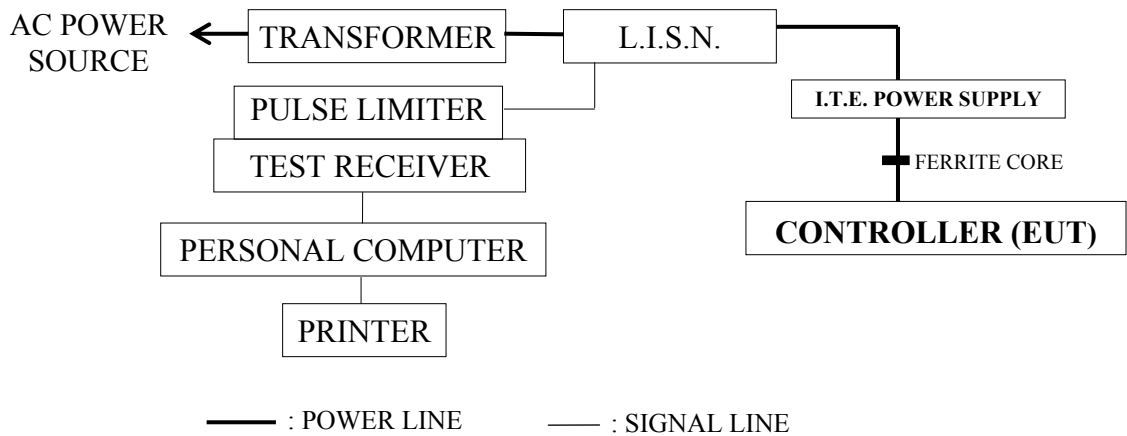
2. CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment was used during the conducted emission measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	Rohde & Schwarz	ESCS 30	100265	Oct.05, 04'	Oct.04, 05'
2.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	Apr.20, 05'	Apr.19, 06'
3.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	001	Apr.09, 05'	Apr.08, 06'

2.2. Block Diagram of Test Setup



2.3. Conducted Emission Limits (§15.207)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

2.4. Operating Condition of EUT

- 2.4.1. Setup the EUT and simulator as shown on 2.2.
- 2.4.2. Turn on the power of all equipment.
- 2.4.3. Run telnet on Notebook to run test software scripts on controller to execute the Wi-Fi Card, Normal application software was running simultaneously.

2.5. Test Procedure

The EUT was put on table which was above the ground by 80cm and its power supply connected to the power mains through a line impedance stabilization network (L.I.S.N.). Both sides of A.C. line were checked to find out the maximum emission level according to FCC ANSI C63.4-2003 regulations during conducted disturbance measurement.

The bandwidth of the R&S Test Receiver ESCS30 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

2.6. Conducted Emission Measurement Results

PASSED. All emissions not reported below are too low against the prescribed limits.

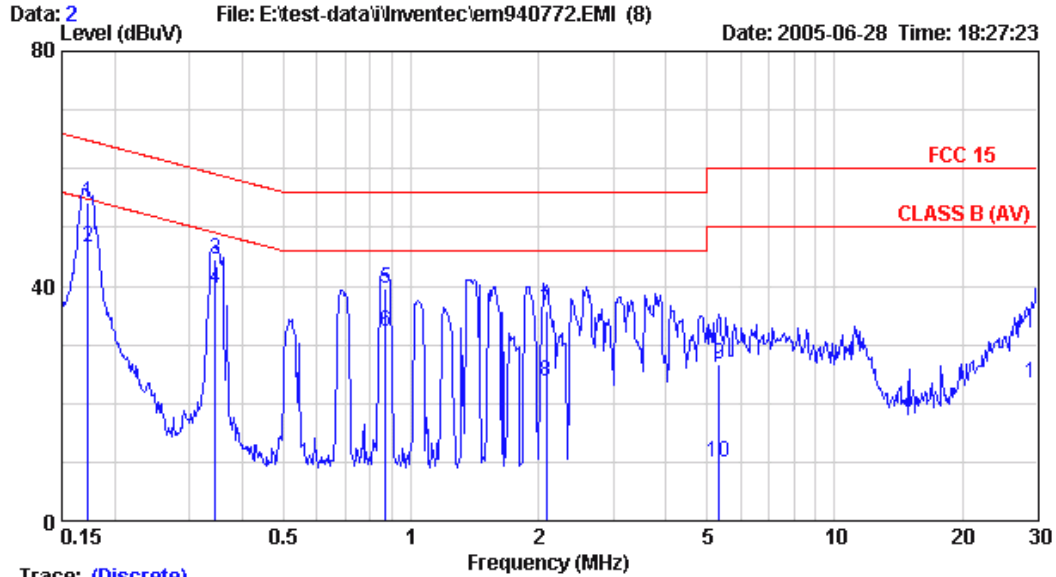
The EUT was tested with the following test mode during conducted measurement and all the test results are attached in next pages.

Test Date : Jun. 28, 2005 Temperature : 23°C Humidity : 56%

No.	Test Mode	Reference Data No.	
		Neutral	Line
1.	Transmitting-2437MHz (CH6)	# 2	# 1
2.	Receiving	# 4	# 3



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Trace: (Discrete)

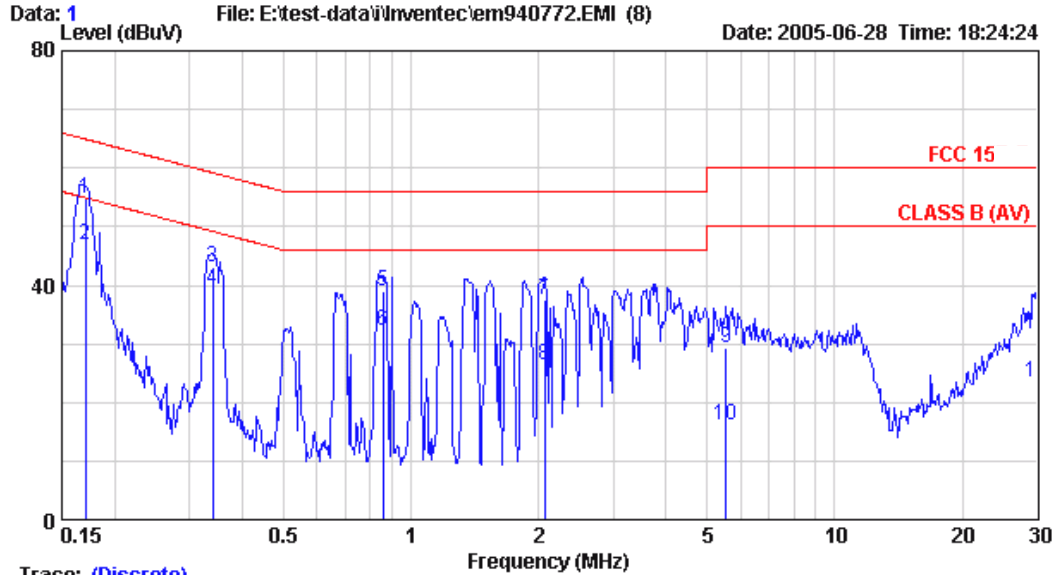
Site	: No.2 Shielded room	Data	: 2
Condition	: KNW-407	Phase	: NEUTRAL
Limit	: FCC 15		
Env. / Ins.	: 23*C,56% / ESCS 30	Engineer:	: Cater Chou
EUT	: Controller M/N:CR100		
Power Rating	: 120Vac/60Hz		
Test Mode	: TX Mode--CH6		

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)	Margin (dB)	Remark
1	0.173	0.25	0.25	53.82	54.32	64.81	10.49	QP
2	0.173	0.25	0.25	46.22	46.72	54.81	8.09	AVERAGE
3	0.346	0.12	0.31	44.08	44.51	59.06	14.55	QP
4	0.346	0.12	0.31	39.14	39.57	49.06	9.49	AVERAGE
5	0.871	0.10	0.39	39.00	39.49	56.00	16.51	QP
6	0.871	0.10	0.39	31.73	32.22	46.00	13.78	AVERAGE
7	2.086	0.10	0.40	35.35	35.85	56.00	20.15	QP
8	2.086	0.10	0.40	23.21	23.71	46.00	22.29	AVERAGE
9	5.338	0.10	0.49	26.20	26.79	60.00	33.21	QP
10	5.338	0.10	0.49	9.27	9.86	50.00	40.14	AVERAGE
11	29.987	0.50	0.70	30.79	31.99	60.00	28.01	QP
12	29.987	0.50	0.70	22.16	23.36	50.00	26.64	AVERAGE

Remarks: 1.Emission Level= LISN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



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Trace: (Discrete)

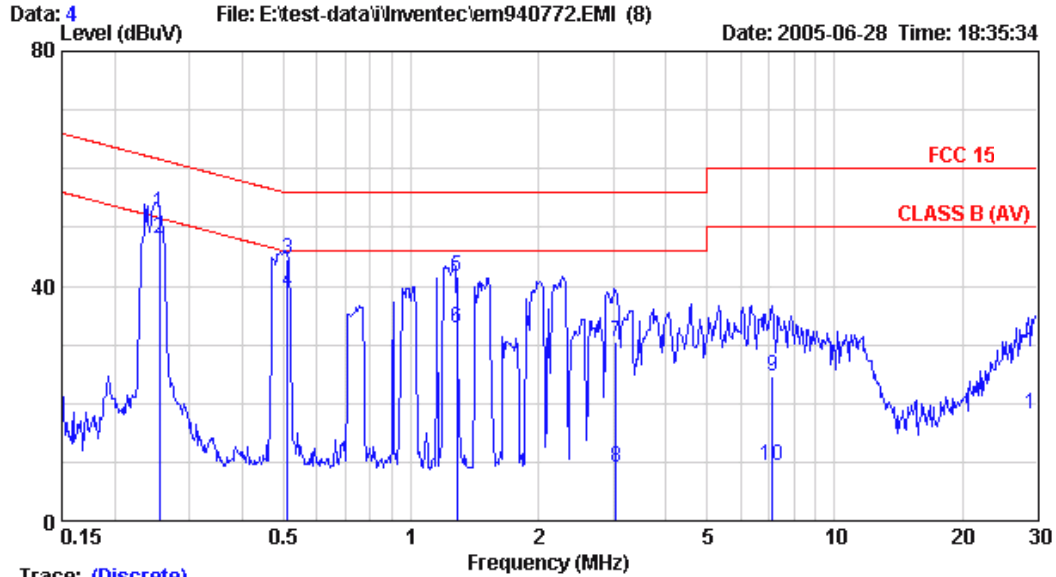
Site	: No.2 Shielded room	Data	: 1
Condition	: KNW-407	Phase	: LINE
Limit	: FCC 15		
Env. / Ins.	: 23°C,56% / ESCS 30	Engineer:	: Cater Chou
EUT	: Controller M/N:CR100		
Power Rating	: 120Vac/60Hz		
Test Mode	: TX Mode---CH6		

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV)	Limits (dB μV)	Margin (dB)	Remark
1	0.171	0.26	0.25	54.26	54.76	64.93	10.17	QP
2	0.171	0.26	0.25	46.35	46.85	54.93	8.08	AVERAGE
3	0.340	0.12	0.31	42.79	43.22	59.19	15.98	QP
4	0.340	0.12	0.31	38.89	39.32	49.19	9.88	AVERAGE
5	0.858	0.10	0.39	38.36	38.85	56.00	17.15	QP
6	0.858	0.10	0.39	31.89	32.38	46.00	13.62	AVERAGE
7	2.070	0.10	0.40	37.08	37.58	56.00	18.42	QP
8	2.070	0.10	0.40	25.98	26.48	46.00	19.52	AVERAGE
9	5.540	0.14	0.51	28.71	29.35	60.00	30.65	QP
10	5.540	0.14	0.51	15.53	16.17	50.00	33.83	AVERAGE
11	29.976	0.60	0.70	30.48	31.78	60.00	28.22	QP
12	29.976	0.60	0.70	22.07	23.37	50.00	26.63	AVERAGE

Remarks: 1.Emission Level= LISN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



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Trace: (Discrete)

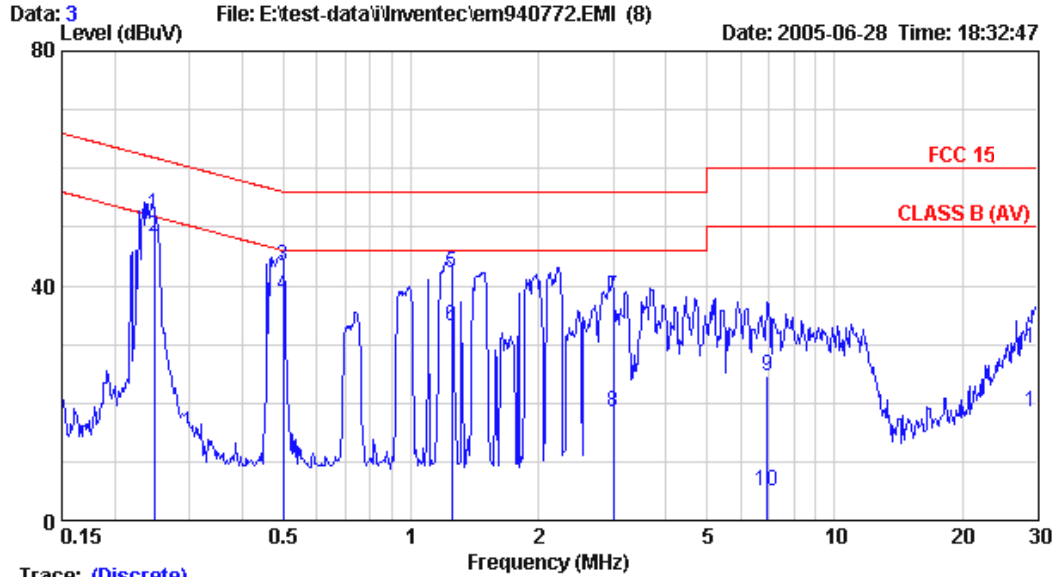
Site	: No.2 Shielded room	Data	: 4
Condition	: KNW-407	Phase	: NEUTRAL
Limit	: FCC 15		
Env. / Ins.	: 23*C,56% / ESCS 30	Engineer:	: Cater Chou
EUT	: Controller M/N:CR100		
Power Rating	: 120Vac/60Hz		
Test Mode	: RX MODE		

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV)	Limits (dB μV)	Margin (dB)	Remark
1	0.254	0.16	0.28	52.05	52.50	61.61	9.11	QP
2	0.254	0.16	0.28	47.62	48.07	51.61	3.54	AVERAGE
3	0.510	0.10	0.34	44.08	44.52	56.00	11.48	QP
4	0.510	0.10	0.34	38.62	39.06	46.00	6.94	AVERAGE
5	1.283	0.10	0.40	41.25	41.75	56.00	14.25	QP
6	1.283	0.10	0.40	32.31	32.81	46.00	13.19	AVERAGE
7	3.052	0.10	0.40	30.09	30.59	56.00	25.41	QP
8	3.052	0.10	0.40	8.47	8.97	46.00	37.03	AVERAGE
9	7.144	0.10	0.59	23.87	24.56	60.00	35.44	QP
10	7.144	0.10	0.59	8.82	9.51	50.00	40.49	AVERAGE
11	29.986	0.50	0.70	27.59	28.79	60.00	31.21	QP
12	29.986	0.50	0.70	16.96	18.16	50.00	31.84	AVERAGE

Remarks: 1.Emission Level= LISN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



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Trace: (Discrete)

Site	: No.2 Shielded room	Data	: 3
Condition	: KNW-407	Phase	: LINE
Limit	: FCC 15		
Env. / Ins.	: 23°C,56% / ESCS 30	Engineer:	: Cater Chou
EUT	: Controller M/N:CR100		
Power Rating	: 120Vac/60Hz		
Test Mode	: RX MODE		

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV)	Limits (dB μV)	Margin (dB)	Remark
1	0.247	0.17	0.28	51.70	52.15	61.84	9.69	QP
2	0.247	0.17	0.28	47.85	48.30	51.84	3.54	AVERAGE
3	0.499	0.10	0.34	43.06	43.50	56.01	12.51	QP
4	0.499	0.10	0.34	37.98	38.42	46.01	7.59	AVERAGE
5	1.250	0.10	0.40	41.83	42.33	56.00	13.67	QP
6	1.250	0.10	0.40	32.68	33.18	46.00	12.82	AVERAGE
7	3.002	0.10	0.40	37.58	38.08	56.00	17.92	QP
8	3.002	0.10	0.40	17.93	18.43	46.00	27.57	AVERAGE
9	6.935	0.16	0.58	23.75	24.49	60.00	35.51	QP
10	6.935	0.16	0.58	4.26	5.00	50.00	45.00	AVERAGE
11	29.980	0.60	0.70	28.08	29.38	60.00	30.62	QP
12	29.980	0.60	0.70	17.04	18.34	50.00	31.66	AVERAGE

Remarks: 1.Emission Level= LISN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

3.1.1. For Frequency 30MHz~1000MHz (at Semi-Anechoic Chamber)

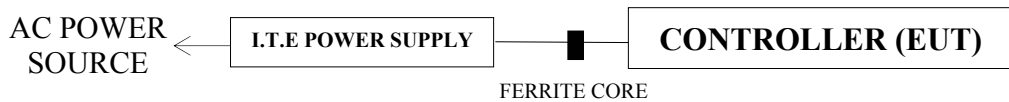
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Oct.04, 04'	Oct.03, 05'
2.	Test Receiver	Schaffner	SCR 3502	008	Mar.04,05'	Mar.04,06'
3.	Pre-Amplifier	HP	8447D	2944A06305	Mar.10, 05'	Mar.09, 06'
4.	Broadband Antenna	Schwarzbeck	BBA 9106	A3L	Feb.18, 05'	Feb.17, 06'
5.	Broadband Antenna	Schwarzbeck	UHALP 9108-A	0139	Dec.14, 04'	Dec.13, 05'

3.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

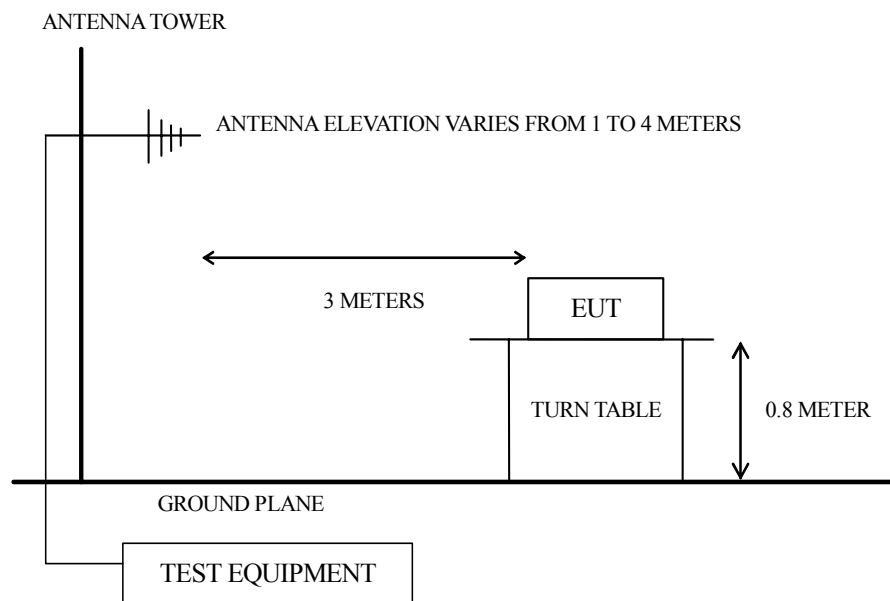
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Oct.04, 04'	Oct.03, 05'
2.	Pre-Amplifier	HP	8449B	3008A00529	Jan.14, 05'	Jan.13, 06'
3.	Horn Antenna	EMCO	3115	9112-3775	May 04, 05'	May 03, 06'

3.2. Test Setup

3.2.1. Block Diagram of connection between EUT and simulators



3.2.2. Semi-Anechoic Chamber (3m) Setup Diagram



3.3. Radiated Emission Limits (§15.209)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ($\text{dB}\mu\text{V/m}$) = 20 log Emission level ($\mu\text{V/m}$)
 - (2) The tighter limit applies at the edge between two frequency bands.
 - (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Operating Condition of EUT

Same as conducted measurement which was listed in 2.4. except the test set up replaced by section 3.2.

3.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log- periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

The bandwidth of the R&S Test Receiver SCR 3502 was set at 120kHz.

The bandwidth of the HP Spectrum Analyzer 8593EM was set at 1MHz.

The frequency range from 30MHz to 25GHz (Up to 10th harmonics from fundamental frequency) was checked.

3.6. Radiated Emission Measurement Results

PASSED. All the emissions not reported below are too low against the official limits.

Test Date : Jun. 27, 2005 Temperature : 21.5°C Humidity : 58%

The EUT was tested with the following test modes in frequency range of 30MHz ~ 1000MHz and all the test results are listed in section 3.6.1.

No.	Test Mode	Test Frequency	Reference Test Data No.	
			Horizontal	Vertical
1.	Transmitting	2412MHz (CH1)	# 13	# 14
2.		2437MHz (CH6)	# 13	# 14
3.		2462MHz (CH11)	# 13	# 14
4.	Receiving	---	# 13	# 14

The EUT was tested with the following test modes in frequency range above 1GHz and all the test results are listed in section 3.6.2.

No.	Test Mode	Test Frequency
1.	Transmitting	2412MHz (CH1)
2.		2437MHz (CH6)
3.		2462MHz (CH11)

The EUT was tested in restricted bands and all the test results are listed in section 3.6.3. (The restricted bands defined in part 15.205(a))

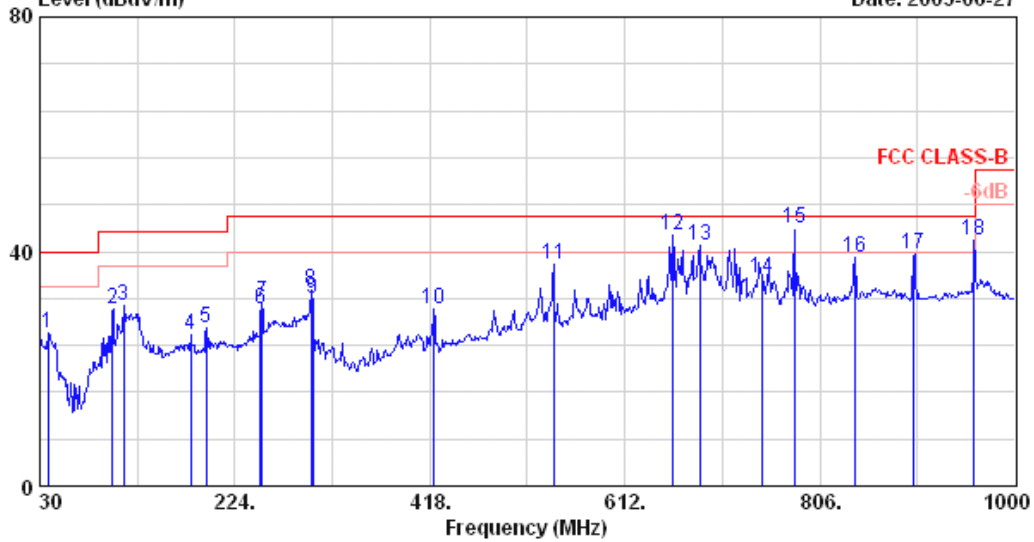
No.	Test Mode	Test Frequency	Reference Test Data No.			
			Horizontal		Vertical	
1.	Out of Band	2412MHz	Peak	# 3	Peak	# 4
			Average	# 2	Average	# 1
		2462MHz	Peak	# 6	Peak	# 5
			Average	# 7	Average	# 8

3.6.1. Frequency Range: 30MHz~1000MHz



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Data: 13 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 13
 Condition : 3m BBA9106/UHALP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH1

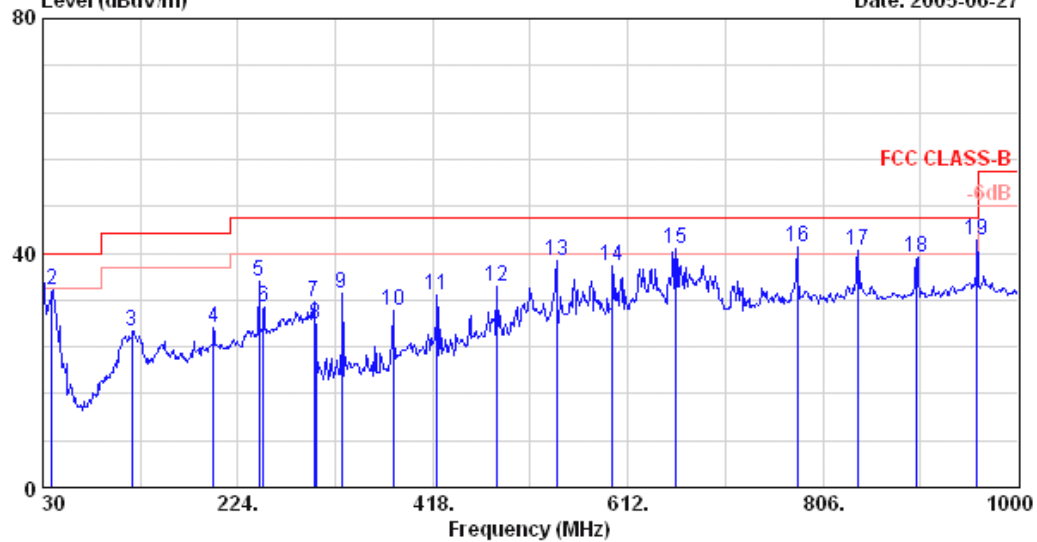
	Ant.	Cable	Emission					
Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark	
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)		
1	21.58	1.20	3.40	26.18	40.00	13.82		
2	17.29	2.10	10.89	30.28	43.50	13.22		
3	18.47	2.26	9.94	30.67	43.50	12.83		
4	21.31	2.90	1.61	25.82	43.50	17.68		
5	21.77	3.00	2.28	27.06	43.50	16.44		
6	23.83	3.50	2.79	30.12	46.00	15.88		
7	23.90	3.50	3.87	31.27	46.00	14.73		
8	26.77	3.90	2.63	33.30	46.00	12.70		
9	14.59	3.90	13.47	31.96	46.00	14.04		
10	17.03	5.10	8.06	30.19	46.00	15.81		
11	19.25	7.01	11.57	37.83	46.00	8.17		
12	22.30	6.40	13.96	42.66	46.00	3.34		
13	23.18	6.50	11.20	40.88	46.00	5.12		
14	23.11	6.70	5.73	35.54	46.00	10.46		
15	24.11	6.80	13.02	43.93	46.00	2.07		
16	25.01	7.10	6.99	39.10	46.00	6.90		
17	24.96	7.37	7.20	39.53	46.00	6.47		
18	26.38	7.60	7.83	41.81	46.00	4.19		

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 14 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH1

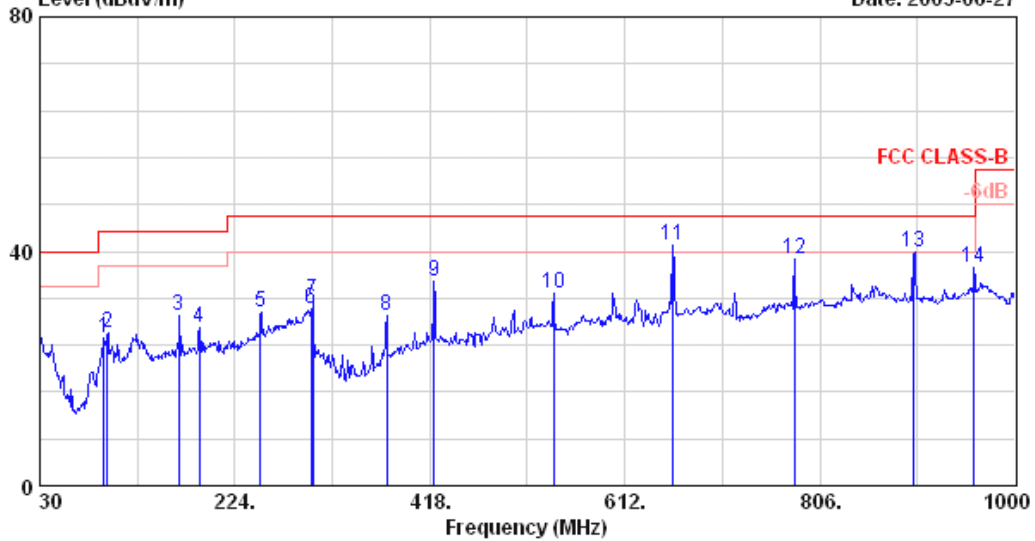
	Ant.	Cable	Emission					
Freq. (MHz)	Factor (dB/m)	Loss (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark	
1	30.000	23.60	1.10	10.97	35.67	40.00	4.33	
2	39.180	21.07	1.20	11.37	33.64	40.00	6.36	
3	118.830	17.53	2.30	6.78	26.60	43.50	16.90	
4	199.830	22.86	3.00	1.47	27.33	43.50	16.17	
5	245.190	24.59	3.50	7.08	35.18	46.00	10.82	
6	249.780	25.02	3.50	2.31	30.83	46.00	15.17	
7	299.730	26.86	3.90	0.88	31.64	46.00	14.36	
8	301.400	14.83	3.90	9.14	27.87	46.00	18.13	
9	327.300	15.45	4.20	13.35	33.00	46.00	13.00	
10	378.400	16.59	4.60	8.87	30.05	46.00	15.95	
11	421.800	17.13	5.10	10.47	32.70	46.00	13.30	
12	481.300	18.93	6.10	9.33	34.35	46.00	11.65	
13	540.800	20.48	7.01	11.23	38.72	46.00	7.28	
14	596.800	21.58	6.27	9.89	37.74	46.00	8.26	
15	659.800	21.96	6.40	12.27	40.63	46.00	5.37	
16	780.900	25.36	6.80	8.78	40.94	46.00	5.06	
17	840.400	26.62	7.10	6.82	40.54	46.00	5.46	
18	899.900	25.83	7.37	5.98	39.18	46.00	6.82	
19	959.400	27.16	7.60	7.53	42.29	46.00	3.71	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 13 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 13
 Condition : 3m BBA9106/UH&LP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH6

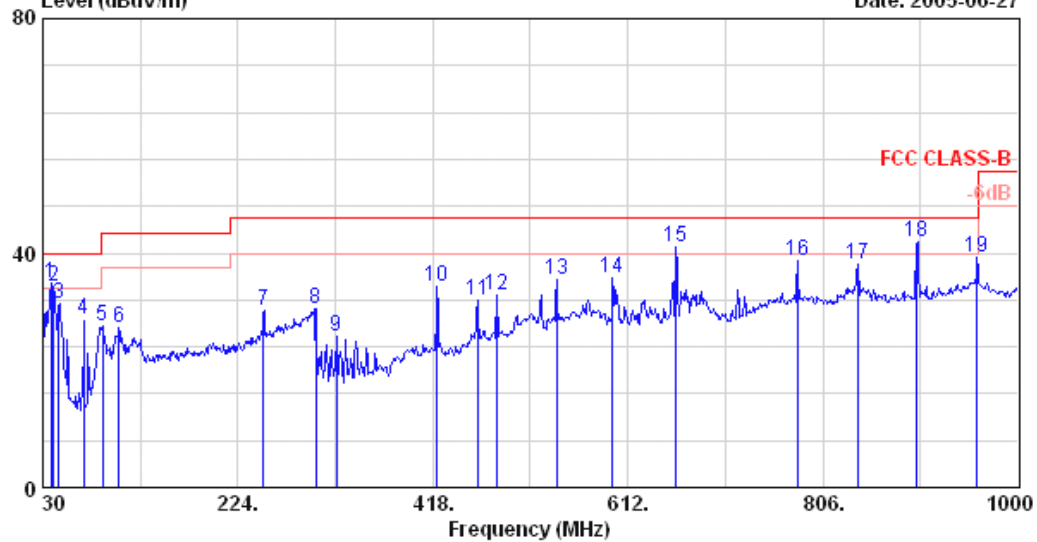
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	93.990	16.37	2.00	6.80	25.17	43.50	18.33	
2	97.230	16.75	2.05	7.21	26.01	43.50	17.49	
3	168.240	20.99	2.80	5.36	29.15	43.50	14.35	
4	188.490	21.43	2.90	2.64	26.97	43.50	16.53	
5	249.780	23.83	3.50	2.12	29.45	46.00	16.55	
6	299.730	26.77	3.90	-0.40	30.27	46.00	15.73	
7	301.400	14.59	3.90	13.15	31.64	46.00	14.36	
8	374.900	17.15	4.60	7.41	29.16	46.00	16.84	
9	421.800	17.03	5.10	12.60	34.73	46.00	11.27	
10	540.800	19.25	7.01	6.62	32.88	46.00	13.12	
11	659.800	22.30	6.40	12.23	40.93	46.00	5.07	
12	780.900	24.11	6.80	7.79	38.70	46.00	7.30	
13	899.900	24.96	7.37	7.46	39.79	46.00	6.21	
14	959.400	26.38	7.60	3.34	37.32	46.00	8.68	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 14 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH6

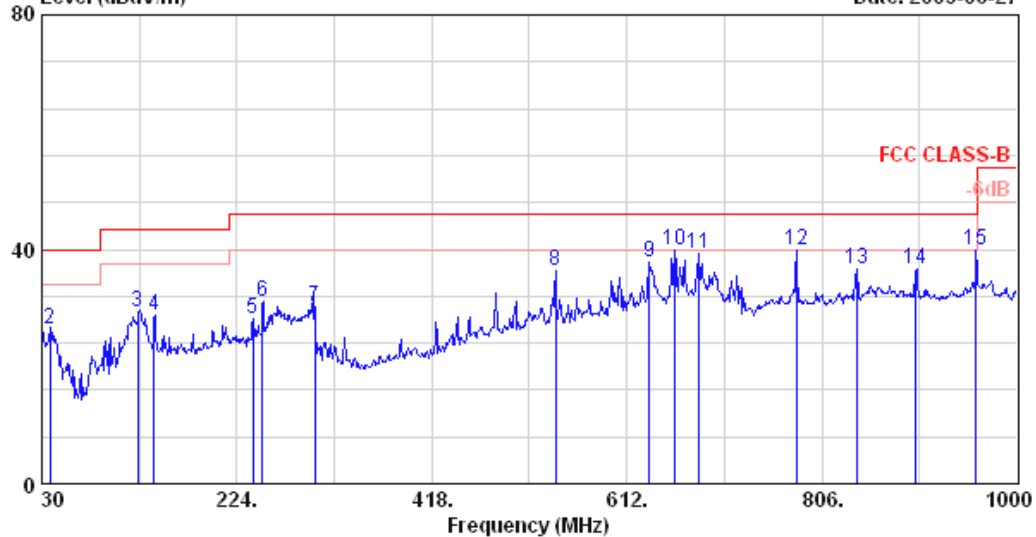
	Ant.	Cable	Emission					
Freq. (MHz)	Factor (dB/m)	Loss (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark	
1	37.830	21.49	1.20	12.15	34.84	40.00	5.16	
2	40.530	20.33	1.30	12.52	34.15	40.00	5.85	
3	45.930	17.45	1.40	12.57	31.42	40.00	8.58	
4	70.230	12.48	1.70	14.40	28.58	40.00	11.42	
5	89.130	15.65	2.00	10.03	27.68	43.50	15.82	
6	105.330	17.68	2.20	7.31	27.19	43.50	16.31	
7	249.780	25.02	3.50	1.71	30.23	46.00	15.77	
8	301.400	14.83	3.90	11.80	30.53	46.00	15.47	
9	322.400	15.61	4.20	6.02	25.83	46.00	20.17	
10	421.800	17.13	5.10	11.99	34.22	46.00	11.78	
11	462.400	18.81	5.70	7.39	31.89	46.00	14.11	
12	481.300	18.93	6.10	7.90	32.92	46.00	13.08	
13	540.800	20.48	7.01	7.98	35.47	46.00	10.53	
14	596.800	21.58	6.27	7.88	35.73	46.00	10.27	
15	659.800	21.96	6.40	12.79	41.15	46.00	4.85	
16	780.900	25.36	6.80	6.64	38.80	46.00	7.20	
17	840.400	26.62	7.10	4.38	38.10	46.00	7.90	
18	899.900	25.83	7.37	8.66	41.86	46.00	4.14	
19	959.400	27.16	7.60	4.58	39.34	46.00	6.66	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 13 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 13
 Condition : 3m BBA9106/UHALP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH11

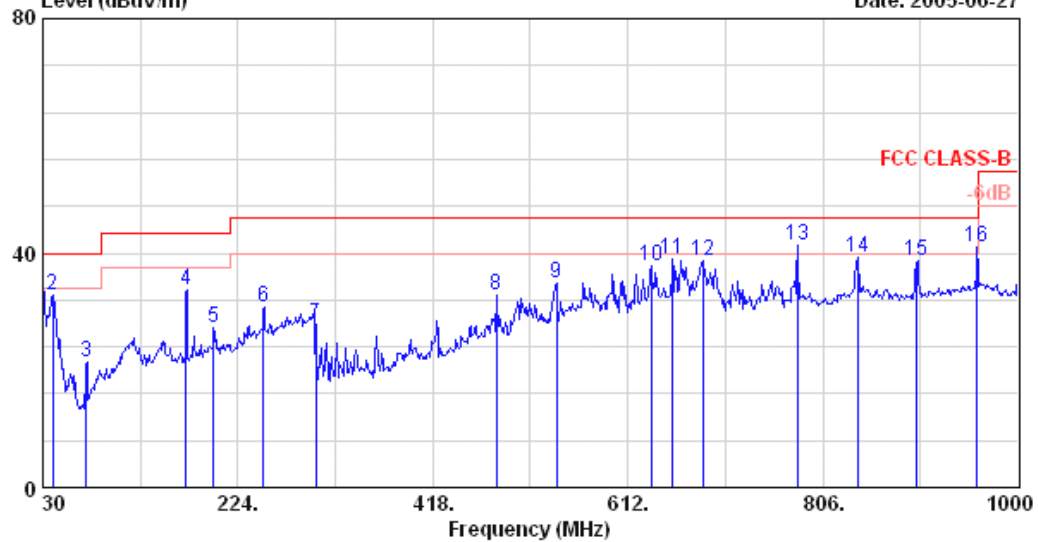
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	30.000	24.86	1.10	0.38	26.34	40.00	13.66	
2	38.100	21.58	1.20	3.65	26.43	40.00	13.57	
3	125.580	19.49	2.38	7.58	29.44	43.50	14.06	
4	141.780	20.25	2.50	6.05	28.80	43.50	14.70	
5	239.790	23.03	3.40	1.65	28.08	46.00	17.92	
6	249.780	23.83	3.50	3.69	31.02	46.00	14.98	
7	301.400	14.59	3.90	11.56	30.05	46.00	15.95	
8	540.800	19.25	7.01	9.96	36.22	46.00	9.78	
9	633.900	20.94	6.30	10.67	37.91	46.00	8.09	
10	659.800	22.30	6.40	11.28	39.98	46.00	6.02	
11	682.900	23.05	6.41	9.92	39.38	46.00	6.62	
12	780.900	24.11	6.80	9.03	39.94	46.00	6.06	
13	840.400	25.01	7.10	4.55	36.66	46.00	9.34	
14	899.900	24.96	7.37	4.25	36.58	46.00	9.42	
15	959.400	26.38	7.60	5.89	39.87	46.00	6.13	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 14 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH11

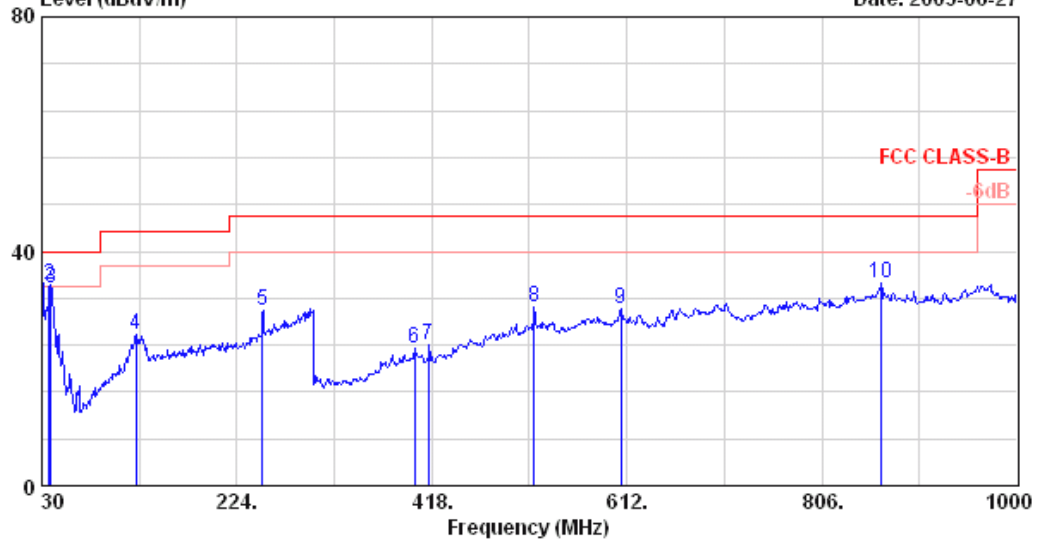
	Ant.	Cable	Emission				
Freq. (MHz)	Factor (dB/m)	Loss (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin Remark (dB)	
1	30.000	23.60	1.10	9.63	34.33	40.00	5.67
2	39.990	20.74	1.20	10.94	32.89	40.00	7.11
3	72.930	12.96	1.80	6.49	21.26	40.00	18.74
4	172.830	20.30	2.80	10.66	33.77	43.50	9.73
5	199.830	22.86	3.00	1.54	27.40	43.50	16.10
6	249.780	25.02	3.50	2.29	30.81	46.00	15.19
7	301.400	14.83	3.90	9.18	27.91	46.00	18.09
8	481.300	18.93	6.10	7.70	32.72	46.00	13.28
9	540.800	20.48	7.01	7.35	34.84	46.00	11.16
10	635.300	21.14	6.30	10.38	37.82	46.00	8.18
11	656.300	21.70	6.40	10.77	38.87	46.00	7.13
12	686.400	23.55	6.50	8.76	38.81	46.00	7.19
13	780.900	25.36	6.80	9.12	41.28	46.00	4.72
14	840.400	26.62	7.10	5.43	39.15	46.00	6.85
15	899.900	25.83	7.37	5.43	38.63	46.00	7.37
16	959.400	27.16	7.60	6.19	40.95	46.00	5.05

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 13 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 13
 Condition : 3m BBA9106/UHALP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 RX Mode

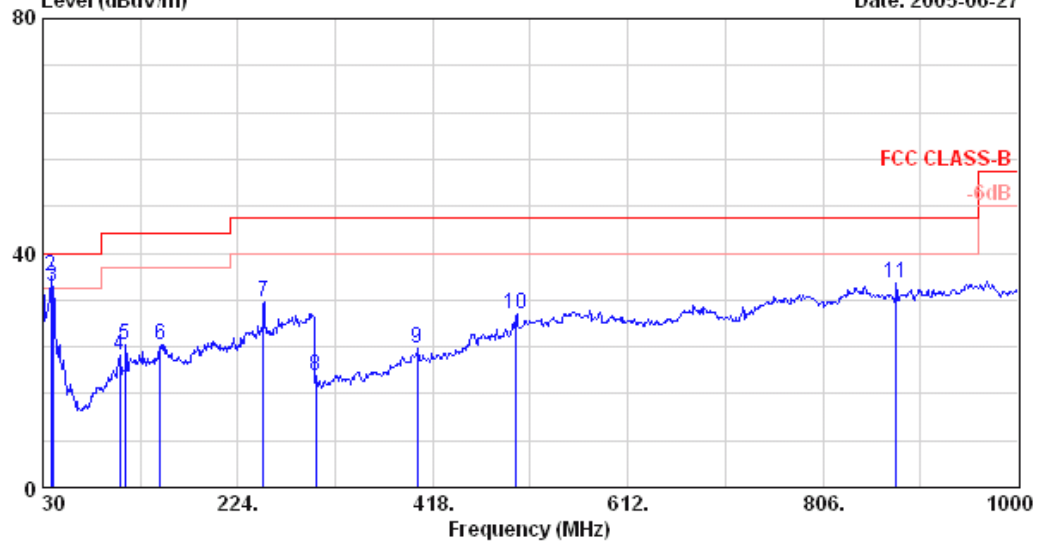
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	30.540	24.81	1.10	8.76	34.67	40.00	5.33	
2	37.290	21.58	1.20	11.58	34.36	40.00	5.64	
3	39.180	21.21	1.20	11.41	33.82	40.00	6.18	
4	123.690	19.32	2.30	4.13	25.75	43.50	17.75	
5	249.780	23.83	3.50	2.49	29.82	46.00	16.18	
6	400.800	17.66	4.80	0.89	23.35	46.00	22.65	
7	414.800	16.99	5.10	1.82	23.91	46.00	22.09	
8	519.800	19.99	6.90	3.65	30.54	46.00	15.46	
9	605.900	21.45	6.20	2.41	30.06	46.00	15.94	
10	864.900	26.00	7.20	1.42	34.63	46.00	11.37	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



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Data: 14 File: D:\測試照片&數據\2005DATA\EM940772(SONOS-CR)\772(CR-Test-Data)\772-e3(CR- Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5*C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 RX Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	30.000	23.60	1.10	8.57	33.27	40.00	6.73	
2	37.830	21.49	1.20	13.29	35.98	40.00	4.02	
3	39.990	20.74	1.20	12.45	34.40	40.00	5.60	
4	106.680	17.75	2.20	2.65	22.60	43.50	20.90	
5	112.080	17.75	2.20	4.26	24.21	43.50	19.29	
6	147.180	21.85	2.58	-0.10	24.32	43.50	19.18	
7	249.780	25.02	3.50	3.03	31.55	46.00	14.45	
8	301.400	14.83	3.90	0.33	19.06	46.00	26.94	
9	402.900	17.46	4.90	1.23	23.59	46.00	22.41	
10	500.900	19.77	6.50	3.24	29.51	46.00	16.49	
11	878.900	25.23	7.30	2.23	34.76	46.00	11.24	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

3.6.2. Frequency Range Above 1GHz

Date of Test : Jun. 27, 2005 Temperature : 21.5°C

EUT : Controller Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2412MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1347.346	25.35	4.98	11.65	41.98	74.00	32.02
	1392.652	25.36	5.12	11.88	42.36	74.00	31.64
	1426.212	25.38	5.22	11.20	41.80	74.00	32.20
	1988.342	27.75	5.95	12.43	46.13	74.00	27.87
Average	1347.346	25.35	4.98	5.65	35.98	54.00	18.02
	1392.652	25.36	5.12	5.88	36.36	54.00	17.64
	1426.212	25.38	5.22	6.20	36.80	54.00	17.20
	1988.342	27.75	5.95	5.43	39.13	54.00	14.87

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1216.462	25.30	4.61	11.93	41.84	74.00	32.16
	1687.980	26.38	6.76	11.92	45.06	74.00	28.94
	1854.102	27.48	6.62	13.02	47.12	74.00	26.88
Average	1216.462	25.30	4.61	5.93	35.84	54.00	18.16
	1687.980	26.38	6.76	5.92	39.06	54.00	14.94
	1854.102	27.48	6.62	6.02	40.12	54.00	13.88

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emission levels were too low against the official limit and not reported.

Date of Test : Jun. 27, 2005 Temperature : 21.5°C

EUT : Controller Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2437MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1548.706	25.66	5.78	11.92	43.36	74.00	30.64
	2374.282	28.57	6.32	18.82	53.71	74.00	20.29
Average	1548.706	25.66	5.78	7.92	39.36	54.00	14.64
	2374.282	28.57	6.32	14.82	49.71	54.00	4.29

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1154.376	25.27	4.50	12.62	42.39	74.00	31.61
	1800.406	26.91	6.92	12.51	46.34	74.00	27.66
	2372.604	28.57	6.31	21.13	56.01	74.00	17.99
	2639.406	29.40	6.69	14.15	50.24	74.00	23.76
Average	1154.376	25.27	4.50	7.62	37.39	54.00	16.61
	1800.406	26.91	6.92	6.51	40.34	54.00	13.66
	2372.604	28.57	6.31	15.13	50.01	54.00	3.99
	2639.406	29.40	6.69	14.15	50.24	54.00	3.76

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emission levels were too low against the official limit and not reported.

Date of Test : Jun. 27, 2005 Temperature : 21.5°C
 EUT : Controller Humidity : 58%
 Test Mode : Transmitting Mode, Frequency: 2462MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1266.802	25.32	4.73	12.88	42.93	74.00	31.07
	1644.352	26.17	6.45	12.72	45.34	74.00	28.66
	1733.286	26.60	7.07	12.18	45.85	74.00	28.15
	2370.926	28.57	6.31	22.31	57.19	74.00	16.81
Average	1266.802	25.32	4.73	6.88	36.93	54.00	17.07
	1644.352	26.17	6.45	7.72	40.34	54.00	13.66
	1733.286	26.60	7.07	6.18	39.85	54.00	14.15
	2370.926	28.57	6.31	13.31	48.19	54.00	5.81

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1162.766	25.37	4.51	11.91	41.79	74.00	32.21
	1179.546	25.28	4.55	12.70	42.53	74.00	31.47
	2374.282	28.57	6.32	19.64	54.53	74.00	19.47
Average	1162.766	25.37	4.51	7.91	37.79	54.00	16.21
	1179.546	25.28	4.55	7.70	37.53	54.00	16.47
	2374.282	28.57	6.32	16.64	51.53	54.00	2.47

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emission levels were too low against the official limit and not reported.

3.6.3. Restricted Bands Measurement Results

Date of Test : Jun. 27, 2005 Temperature : 21.5°C

EUT : Controller Humidity : 58%

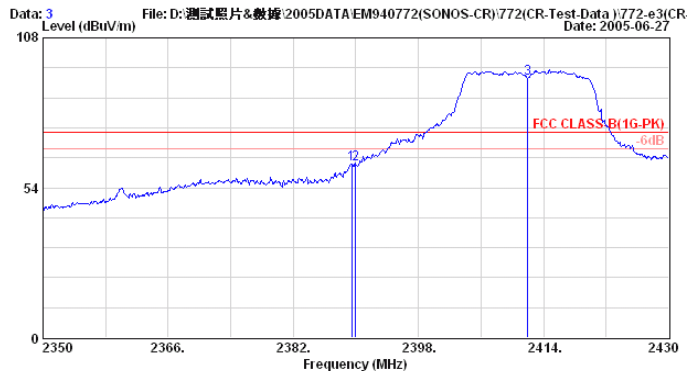
Test Mode : Transmitting Mode, Frequency: 2412MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak *	2387.440	28.59	6.34	27.51	62.44	74.00	11.56
Average *	2359.920	28.54	6.30	5.34	40.18	54.00	13.82

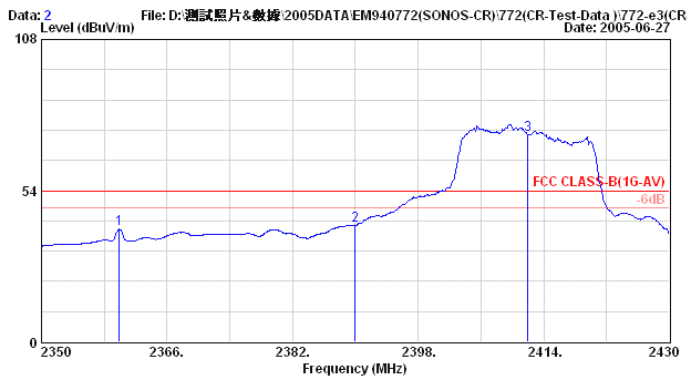
- Remark :
1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2390MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site : A/C Chamber Date : 3
 Condition : 3m 3115 Polarity: HORIZONTAL
 Limit : FCC CLASS-B(1G-PK)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band



Site : A/C Chamber Date : 2
 Condition : 3m 3115 Polarity: HORIZONTAL
 Limit : FCC CLASS-B(1G-AV)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band

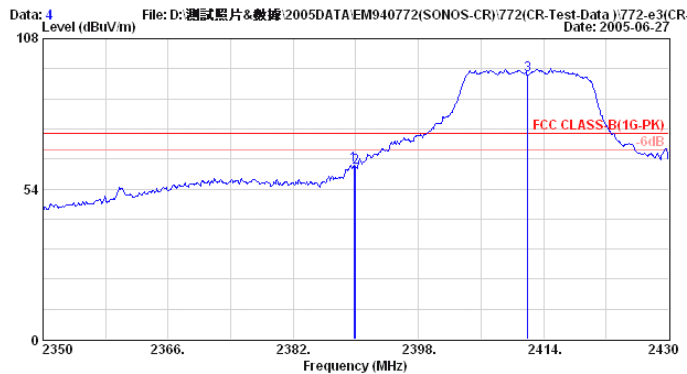
Date of Test : Jun. 27, 2005 Temperature : 21.5°C
 EUT : Controller Humidity : 58%
 Test Mode : Transmitting Mode, Frequency: 2412MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak *	2387.760	28.59	6.34	27.62	62.55	74.00	11.45
Average *	2371.920	28.57	6.31	9.28	44.16	54.00	9.84

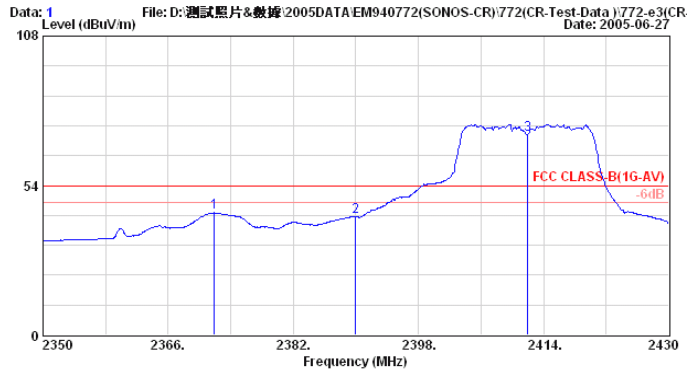
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2390MHz).
 3. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site : A/C Chamber Date : 4
 Condition : 3m 3115 Polarity: VERTICAL
 Limit : FCC CLASS-B(1G-PK)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band



Site : A/C Chamber Date : 1
 Condition : 3m 3115 Polarity: VERTICAL
 Limit : FCC CLASS-B(1G-AV)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band

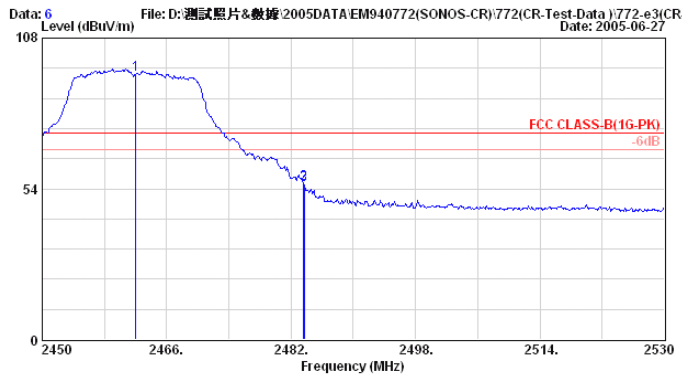
Date of Test : Jun. 27, 2005 Temperature : 21.5°C
 EUT : Controller Humidity : 58%
 Test Mode : Transmitting Mode, Frequency: 2462MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak *	2483.680	28.77	6.45	20.13	55.35	74.00	18.65
Average *	2483.760	28.77	6.45	1.55	36.77	54.00	17.23

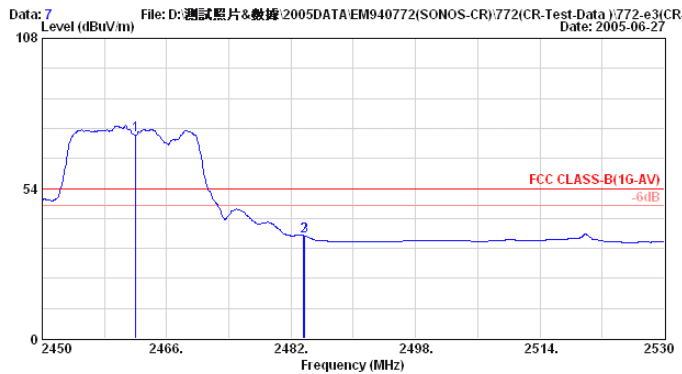
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. High frequency section (spurious in the restricted band 2483.5-2500MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site : A/C Chamber Date : 6
 Condition : 3m 3115 Polarity: HORIZONTAL
 Limit : FCC CLASS-B(1G-PK)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band



Site : A/C Chamber Date : 7
 Condition : 3m 3115 Polarity: HORIZONTAL
 Limit : FCC CLASS-B(1G-AV)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band

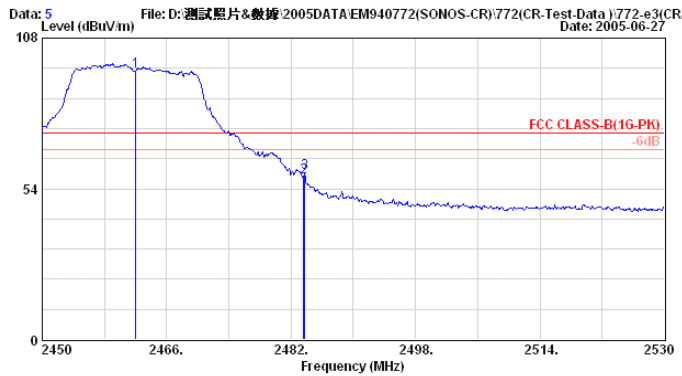
Date of Test : Jun. 27, 2005 Temperature : 21.5°C
 EUT : Controller Humidity : 58%
 Test Mode : Transmitting Mode, Frequency: 2462MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak *	2483.760	28.77	6.45	24.54	59.76	74.00	14.24
Average *	2483.840	28.77	6.45	4.28	39.50	54.00	14.50

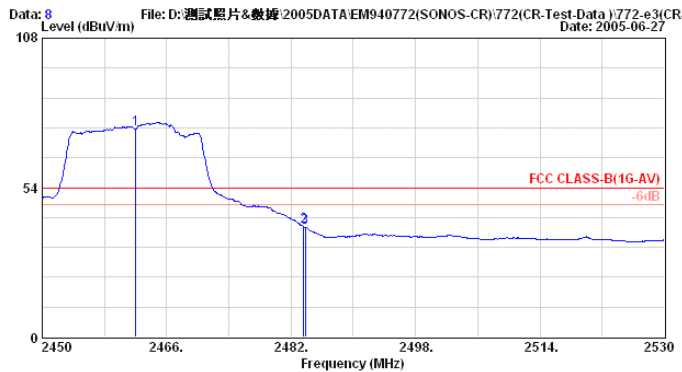
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. High frequency section (spurious in the restricted band 2483.5-2500MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site : A/C Chamber Date : 5
 Condition : 3m 3115 Polarity: VERTICAL
 Limit : FCC CLASS-B(1G-PK)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band



Site : A/C Chamber Date : 8
 Condition : 3m 3115 Polarity: VERTICAL
 Limit : FCC CLASS-B(1G-AV)
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Controller M/N:CR100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 Out of Band

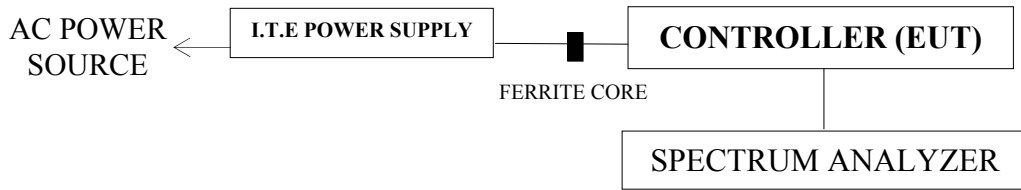
4. 6dB BANDWIDTH MEASUREMENT

4.1. Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Monitor	Agilent	E4446A	US44300366	Aug. 27, 04'	Aug. 26. 05'

4.2. Block Diagram of Test Setup



4.3. Specification Limits (§15.247(a)(2))

The minimum 6dB bandwidth shall be at least 500kHz.

4.4. Operating Condition of EUT

- 4.4.1. Setup the EUT and simulator as shown on 4.2.
- 4.4.2. Turn on the power of all equipment.
- 4.4.3. Run telnet on Notebook to run test software scripts on controller to execute the Wi-Fi Card, Normal application software was running simultaneously.

4.5. Test Procedure

The RF output of EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

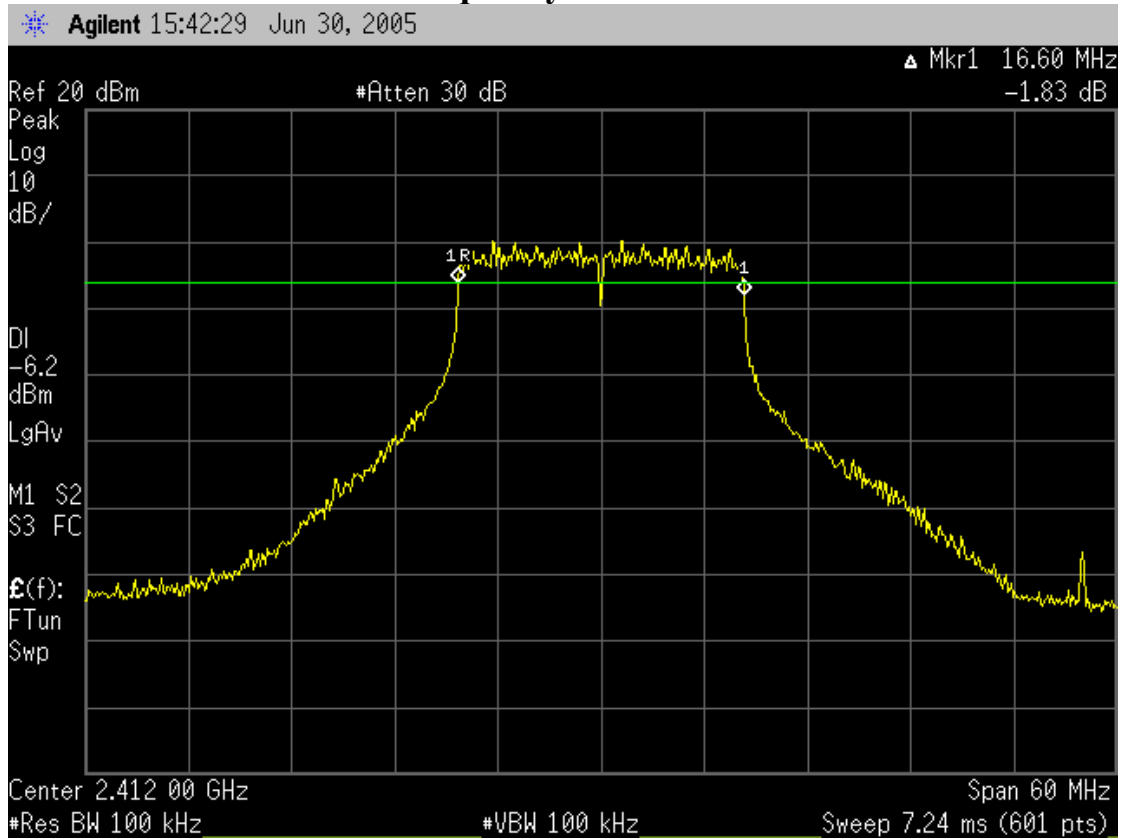
4.6. Test Results

PASSED. All the test results are attached in next pages.

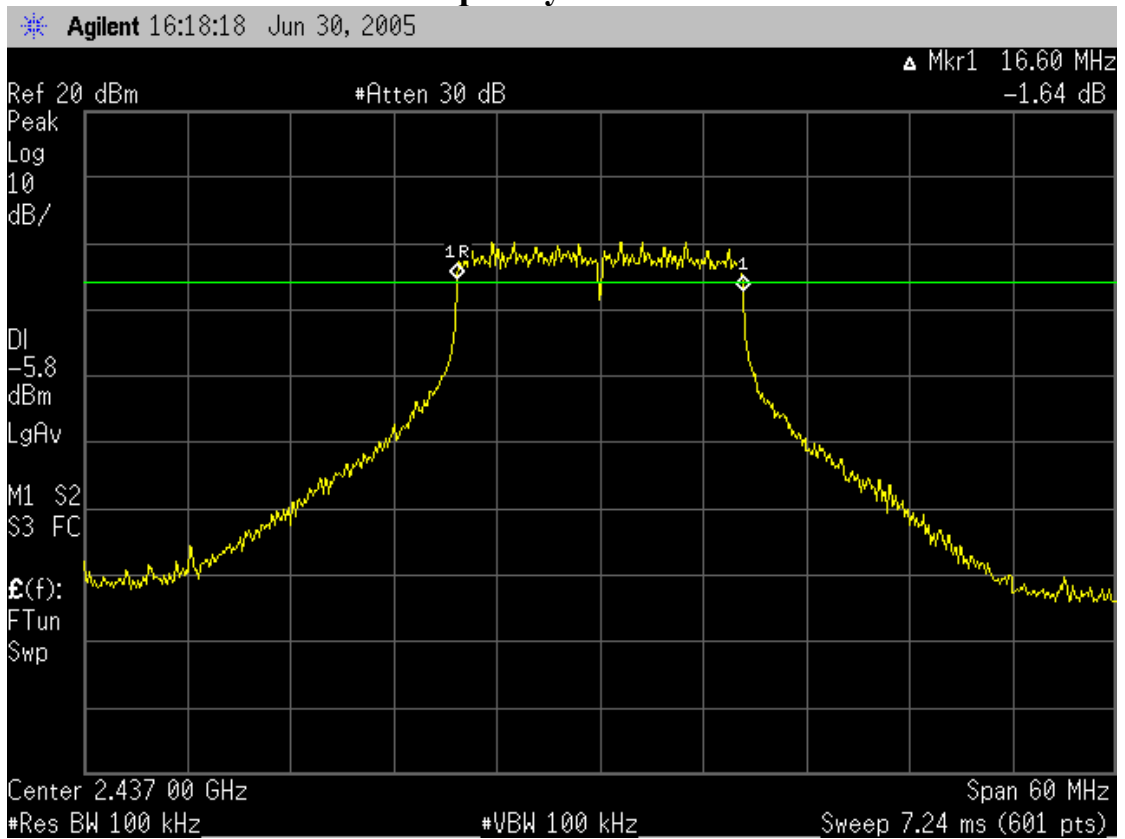
Test Date : Jun. 30, 2005 Temperature : 29 °C Humidity : 63 %

Channel	Frequency	6dB Bandwidth
1	2412MHz	16.6MHz
6	2437MHz	16.6MHz
11	2462MHz	16.6MHz

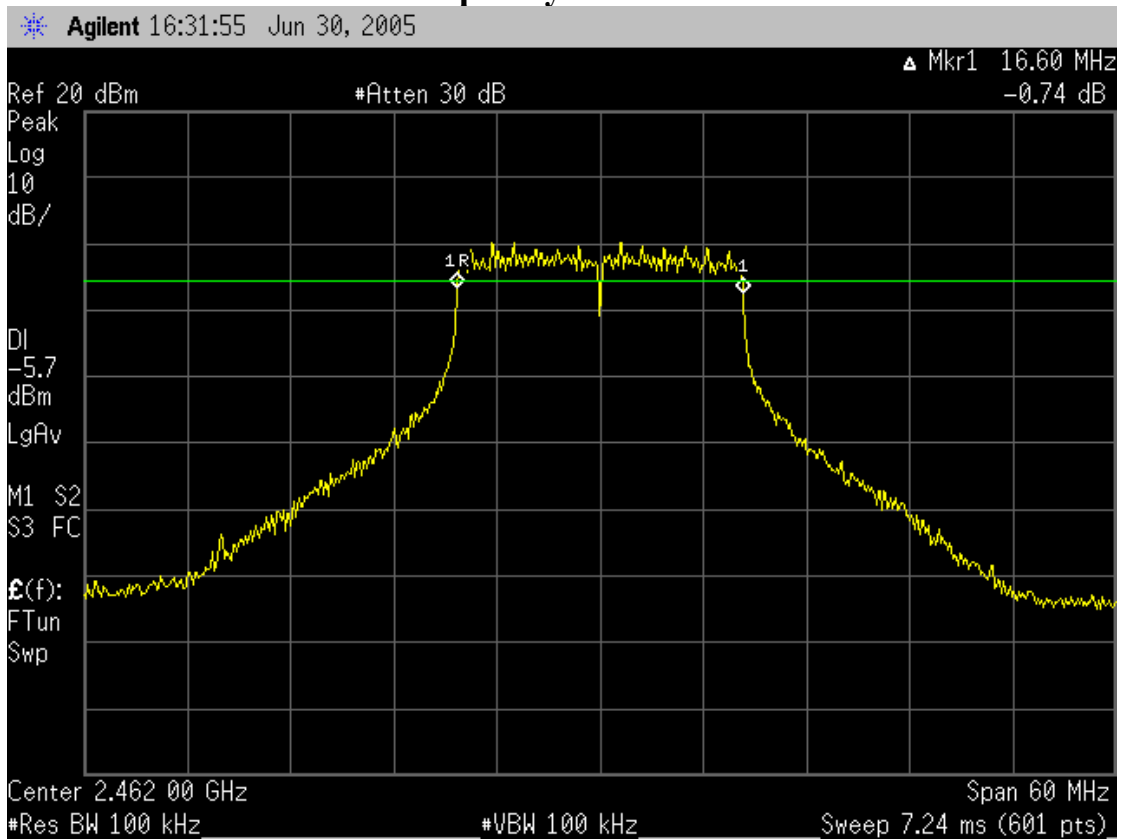
Frequency : 2412MHz



Frequency : 2437MHz



Frequency : 2462MHz



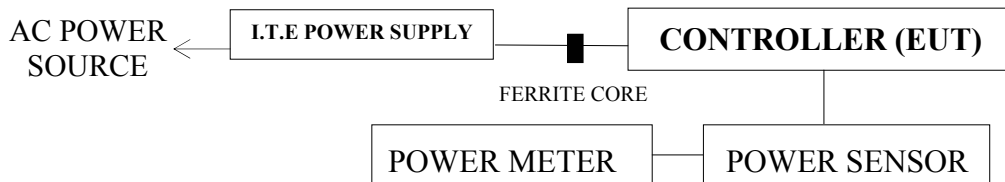
5. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

5.1. Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Power Meter	Anritsu	ML2487A	6K000001563	Jan. 15, 05'	Jan. 14. 06'
2.	Power Sensor with 20MHz Bandwidth	Anritsu	MA2491A	030873	Jan. 15, 05'	Jan. 14. 06'

5.2. Block Diagram of Test Setup



5.3. Specification Limits (§15.247(b)-(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm)

5.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 4.4. except the test set up replaced by section 5.2.

5.5. Test Procedure

The RF output of EUT was connected to the power meter and sensor with 20MHz bandwidth that was designed to detect peak value automatically.

5.6. Test Results

PASSED. All the test results are listed below.

Test Date : Jun. 30, 2005 Temperature : 29 °C Humidity : 63 %

Channel	Frequency	Peak Output Power	Limit
1	2412MHz	18.72dBm	30dBm
6	2437MHz	18.81dBm	30dBm
11	2462MHz	18.53dBm	30dBm

6. EMISSION LIMITATIONS MEASUREMENT

6.1. Test Equipment

The following test equipment was used during the emission limitations test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Monitor	Agilent	E4446A	US44300366	Aug. 27, 04'	Aug. 26. 05'

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits (§15.247(c))

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(※ This test result attaching to §3.6.3)

6.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 4.4. except the test set up replaced by section 6.2.

6.5. Test Procedure

The RF output of EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW.

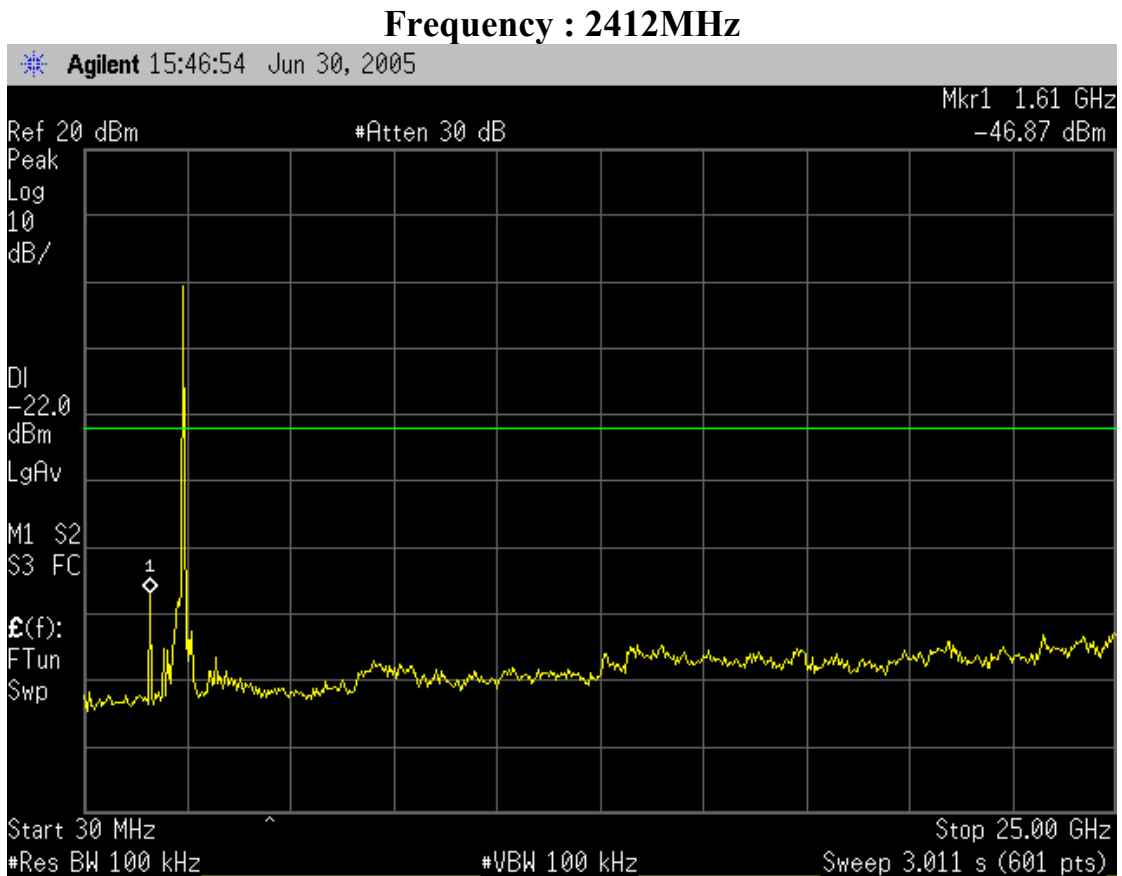
6.6. Test Results

PASSED. The testing data was attached in the next pages.

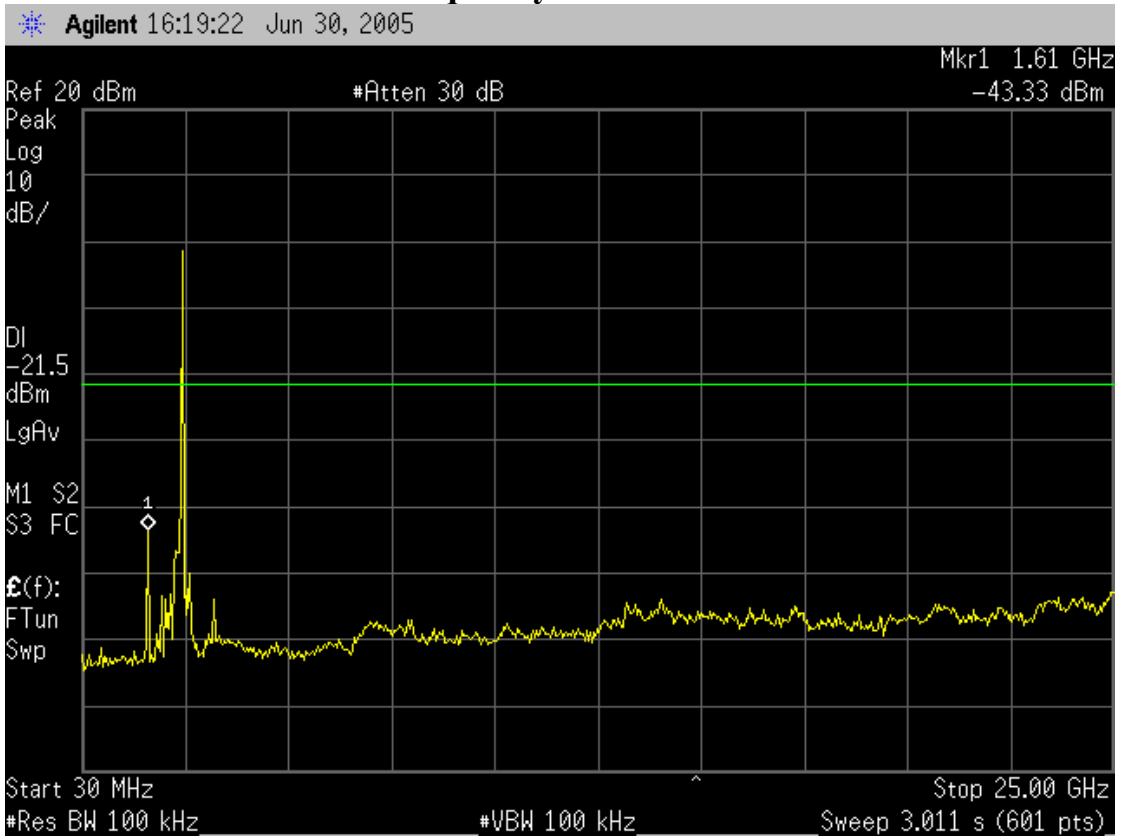
Test Date : Jun. 30, 2005 Temperature : 29 °C Humidity : 63 %

1. 2412MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -46.87dBm is max value that is lower than 20dB of primary channel.
2. 2437MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -43.33dBm is max value that is lower than 20dB of primary channel.
3. 2462MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -42.01dBm is max value that is lower than 20dB of primary channel.

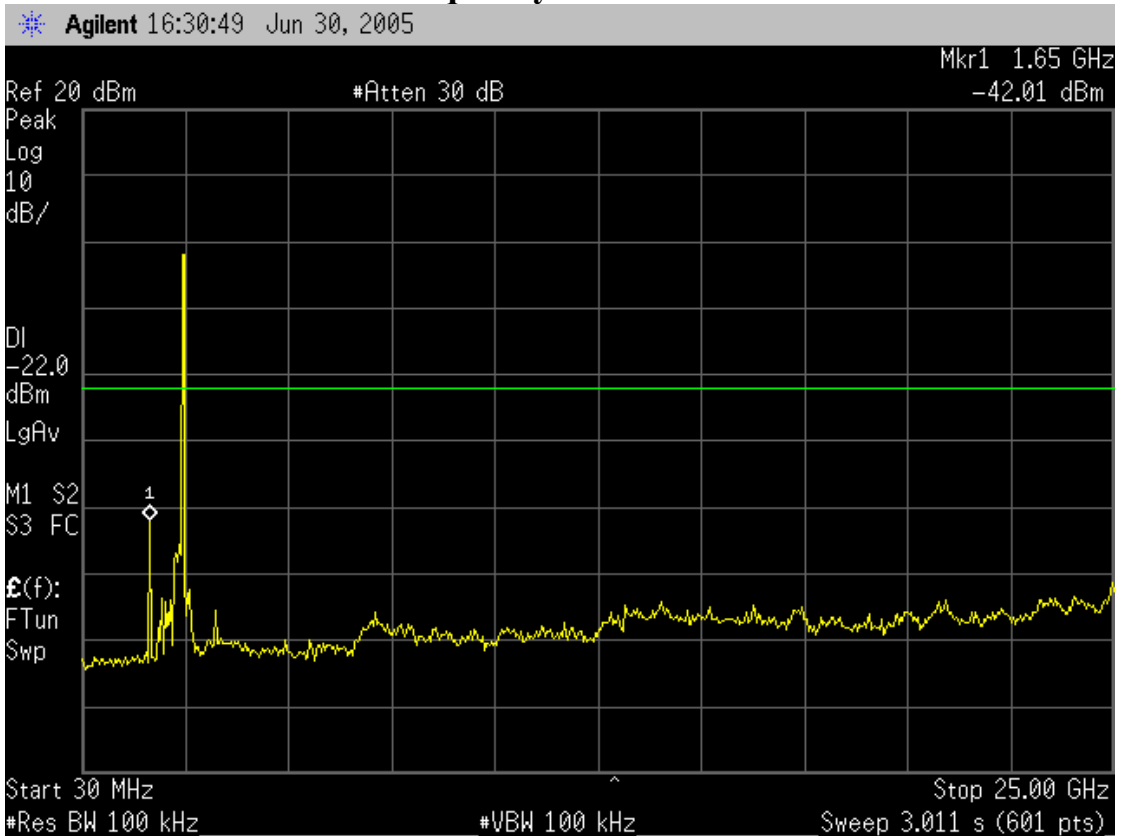
Note: The peak above the limit line is the carrier frequency.



Frequency : 2437MHz



Frequency : 2462MHz



7. BAND EDGES MEASUREMENT

7.1. Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Monitor	Agilent	E4446A	US44300366	Aug. 27, 04'	Aug. 26. 05'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits (§15.247(c))

The highest level should be at least 20 dB below that in the 100kHz bandwidth.

7.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 4.4. except the test set up replaced by section 7.2.

7.5. Test Procedure

The RF output of EUT was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

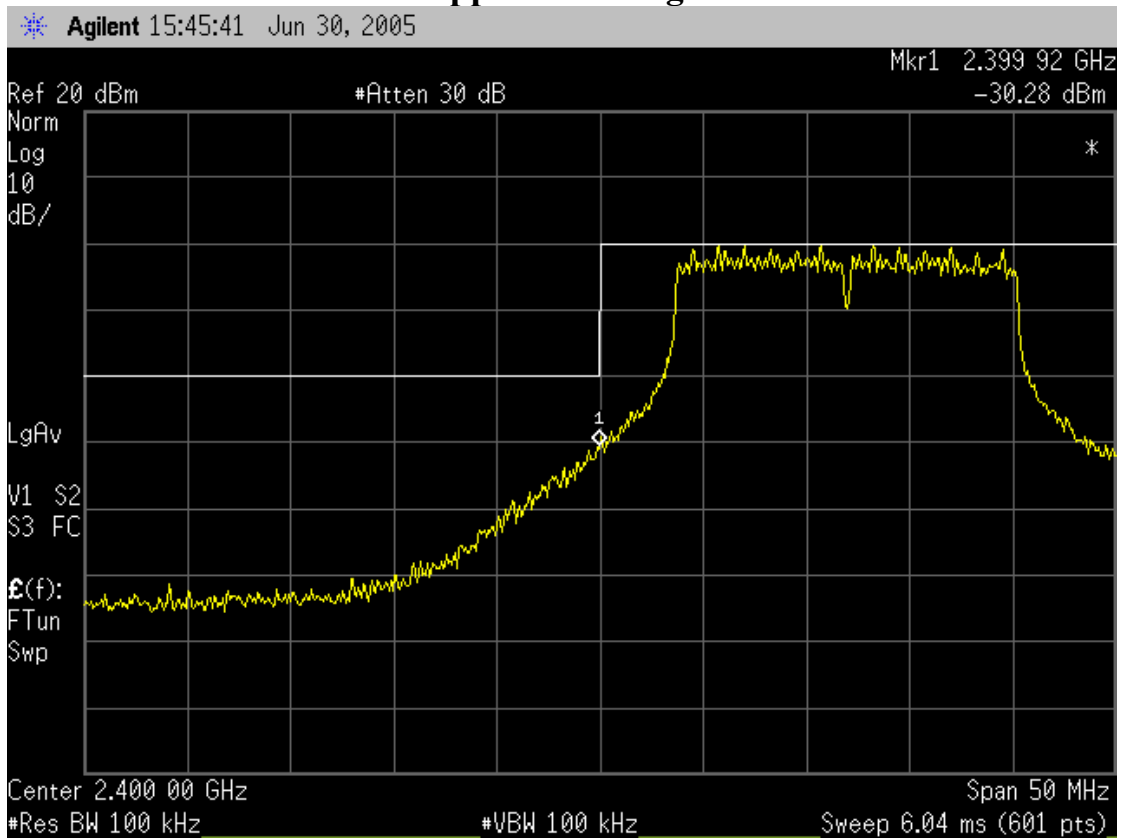
7.6. Test Results

PASSED. All the test results are attached in next page.

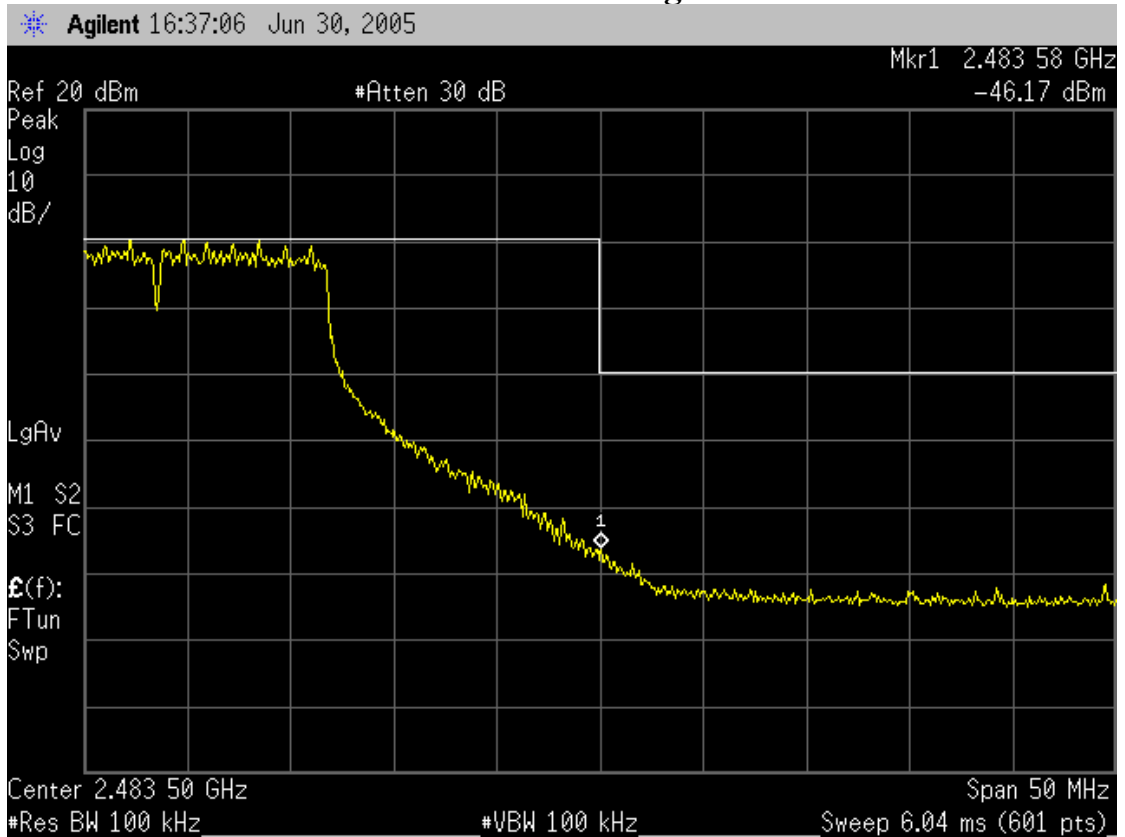
Test Date : Jun. 30, 2005 Temperature : 29 °C Humidity : 63 %

1. Upper Band edge: The highest emission level is – 30.28dBm on 2.39992GHz ◦
2. Below Band edge : The highest emission level is – 46.17dBm on 2.48358GHz ◦

Upper Band edge



Below Band edge



8. POWER SPECTRAL DENSITY MEASUREMENT

8.1. Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Monitor	Agilent	E4446A	US44300366	Aug. 27, 04'	Aug. 26. 05'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits (§15.247(d))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

8.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 4.4. except the test set up replaced by section 8.2.

8.5. Test Procedure

The RF output of EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, span 300kHz set sweep time = span/3kHz.

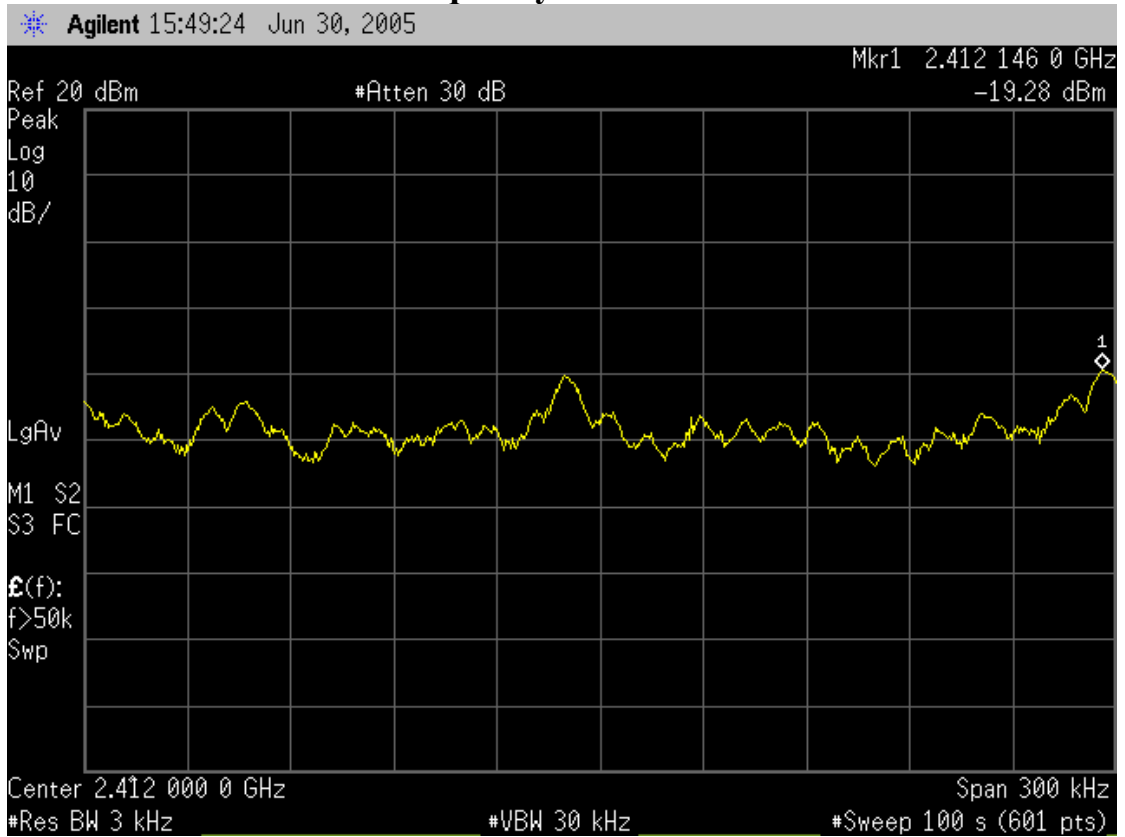
8.6. Test Results

PASSED. All the test results are attached in next pages.

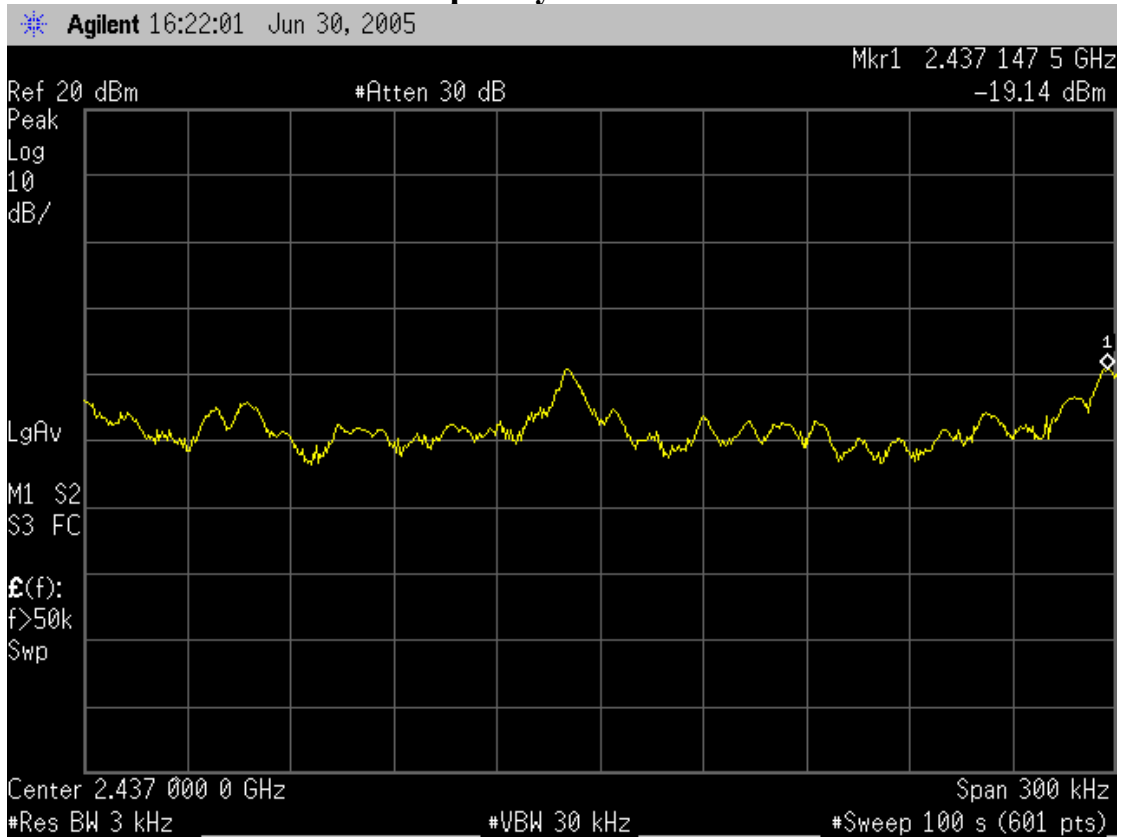
Test Date : Jun. 30, 2005 Temperature : 29 °C Humidity : 63 %

Channel	Frequency	Power Spectral Density	Limit
1	2412MHz	-19.28dBm	8dBm
6	2437MHz	-19.14dBm	8dBm
11	2462MHz	-19.36dBm	8dBm

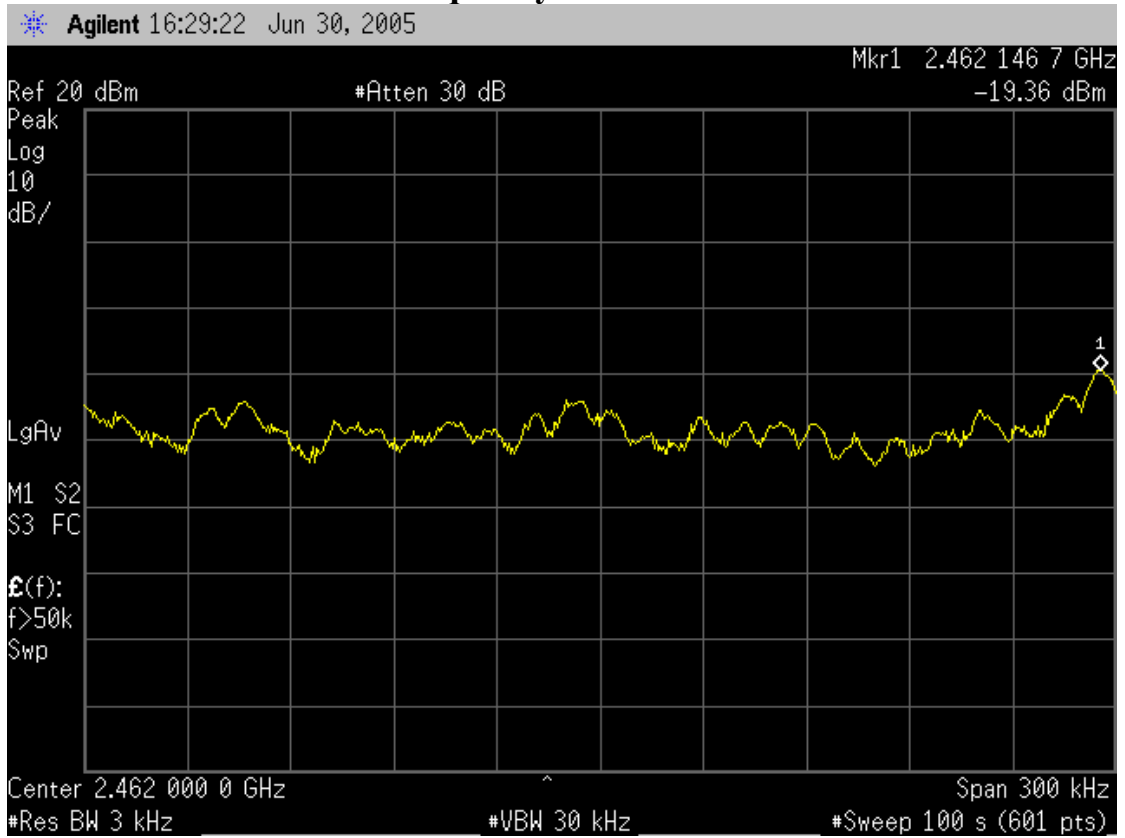
Frequency : 2412MHz



Frequency : 2437MHz



Frequency : 2462MHz



9. DEVIATION TO TEST SPECIFICATIONS

【NONE】

10. PHOTOGRAPHS

10.1. Photos of Conducted Emission Measurement



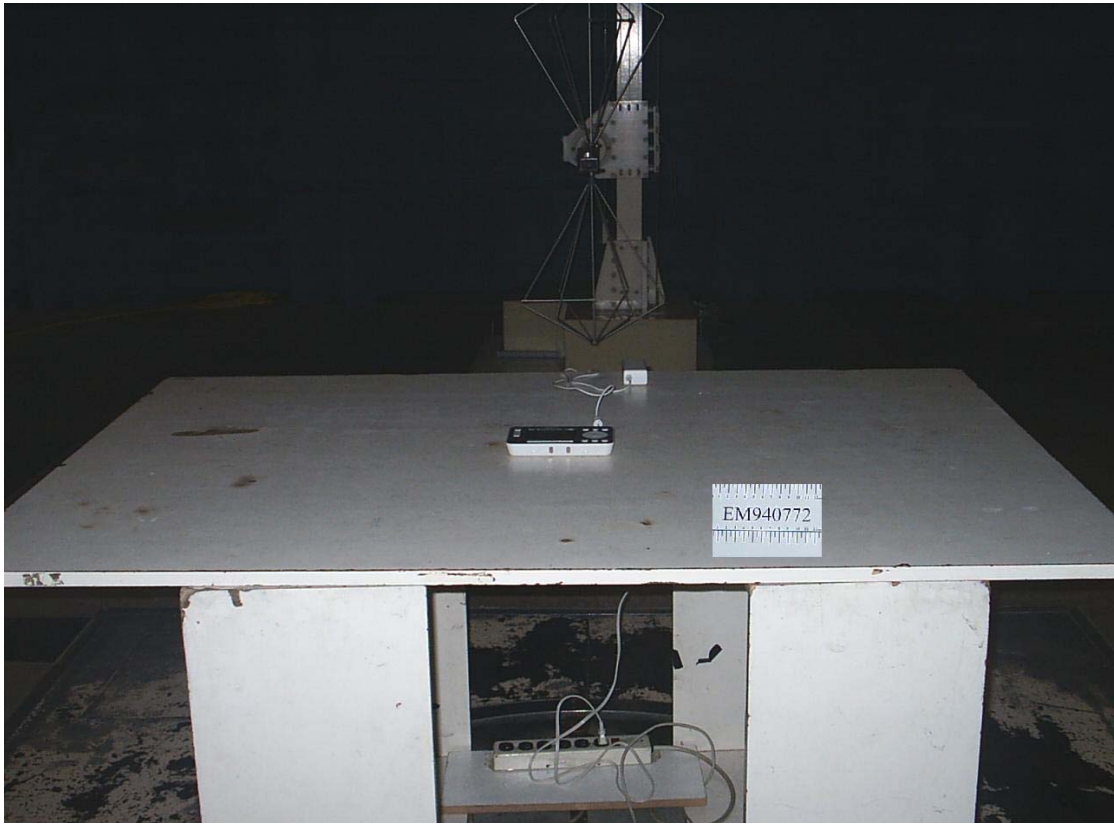
FRONT VIEW OF CONDUCTED MEASUREMENT



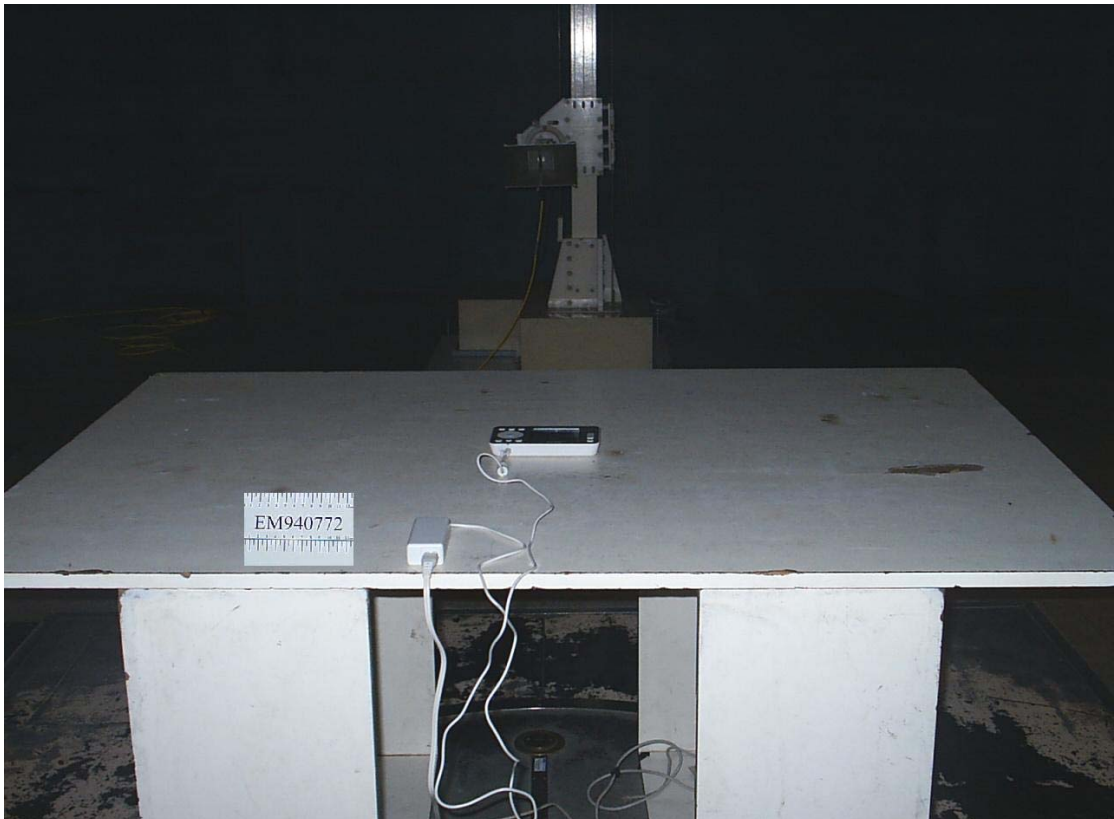
BACK VIEW OF CONDUCTED MEASUREMENT

10.2. Photos of Radiated Measurement at Semi-Anechoic Chamber

10.2.1. Frequency Range: 30MHz to 1GHz



FRONT VIEW OF RADIATED MEASUREMENT

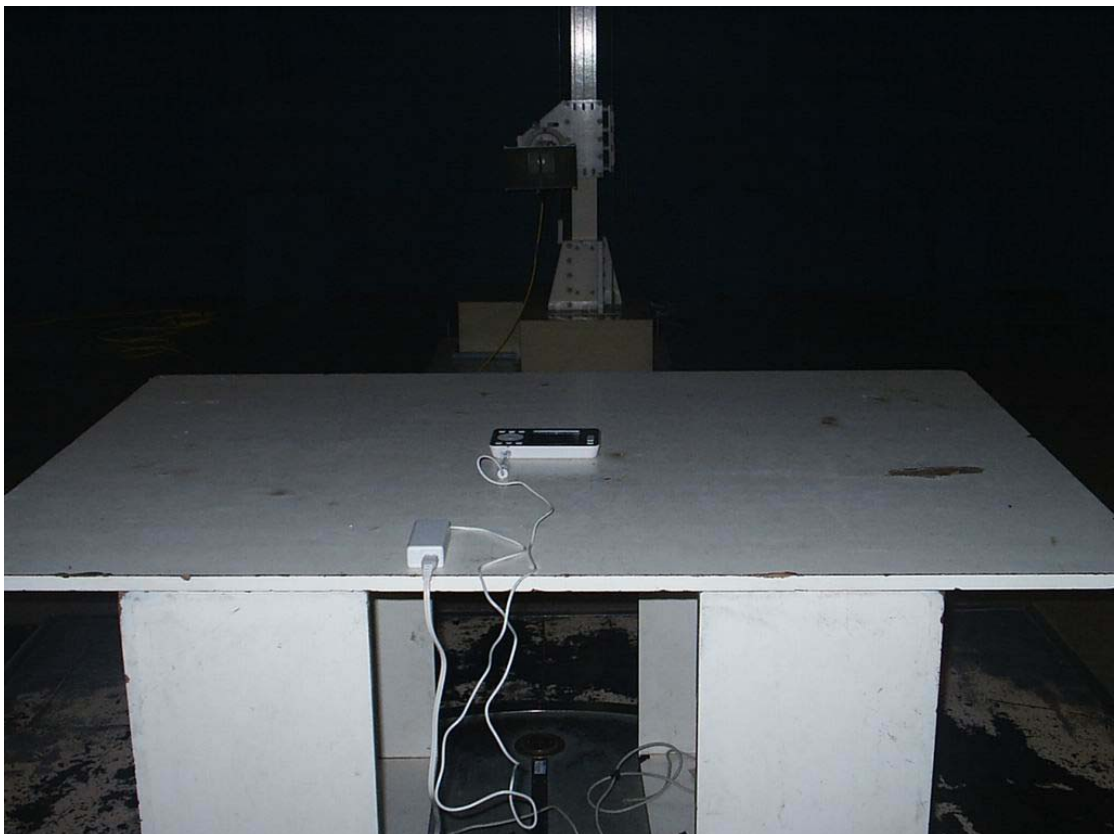


BACK VIEW OF RADIATED MEASUREMENT

10.2.2. Frequency Range: Above 1GHz



FRONT VIEW OF RADIATED MEASUREMENT



BACK VIEW OF RADIATED MEASUREMENT