

APPLICATION FOR CERTIFICATION

On Behalf of

Sonos, Inc

Zone Player

Model No. : ZP100

FCC ID : SBVZP001

Prepared for : Sonos, Inc
506 Chapala Street, Santa Barbara,
CA93101, U.S.A.

Prepared by : Audix Corporation
Technical Division EMC Department
No. 53-11, Tin-Fu Tsun, Lin-Kou,
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TEST REPORT CERTIFICATION

Applicant : Sonos, Inc
Manufacturer : Inventec Electronics (M) Sdn Bhd.
EUT Description : Zone Player
Canada IC : SBVZP001
(A) MODEL NO. : ZP100
(B) SERIAL NO. : N/A
(C) BRAND : SONOS
(D) POWER SUPPLY : 100/240Vac, 50/60Hz, Switchable
(E) TEST VOLTAGE : AC 120V/60Hz

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 CORPORATION 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 ~ 29, 2005

Prepared by: Tina Huang Jul. 02, 2005
(Tina Huang/Assistant)

Test Engineer: Ben Cheng Jul. 08, 2005
(Ben Cheng/Section Manager)

Approved & Authorized Signer: Leon Liu Jul. 8 2005
(Leon Liu/Senior Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Zone Player This device is a digital music system using a wired or wireless connection.
Model Number	:	ZP100
Canada IC	:	SBVZP001
Brand Name	:	SONOS
Applicant	:	Sonos, Inc 506 Chapala Street, Santa Barbara, CA 93101, U.S.A.
Manufacturer	:	Inventec Electronics (M) Sdn. Bhd. Plot 102, Bayan Lepas Industrial Estate, 11900 Bayan Lepas, Penang, Malaysia.
High Frequency of Used	:	16.0MHz, 20.0MHz, 25.0MHz, 33.0MHz, 32.768kHz for Main Controller 11.289MHz, 20.0MHz for Audio Controller
Wireless LAN Card	:	Askey, M/N WLL3090 IEEE 802.11g
Interfaces of EUT	:	• Stereo Speaker Outputs (Right/Left channel) • Stereo Audio In (RCA x2) • Stereo Audio Out (RCA x2) • Subwoofer Out (RCA x1) • 10/100 Base-T Ethernet RJ45 x4 • Wireless Ethernet (Mini-PCI x1) • AC In x1
AC Power Cord (2Pin)	:	Non-Shielded, Detachable, 2.0m
Date of Receipt of Sample	:	Jun. 27, 2005
Date of Test	:	Jun. 27 ~29, 2005

Remark :

This EUT is a modified version of original FCC ID SBVZP001, the differences is only change “Wireless LAN Card”.

A modification of EUT was re-measured and the test data reported in this report.

1.2. Tested Supporting System Details

1.2.1. PARTNER NOTEBOOK PC

Model Number	:	2378
Serial Number	:	N/A
FCC ID	:	By DoC
Manufacturer	:	IBM
Power Adapter	:	IBM, M/N 02K6808
		DC Cord: Non-Shielded, Undetachable, 1.0m
		AC Cord: Non-Shielded, Detachable, 1.8m
RJ45 LAN Cable *1EA	:	Non-Shielded, Detachable, 20m

1.2.2. PARTNER CONTROLLER

Model Number	:	CR100
Serial Number	:	N/A
FCC ID	:	By DoC
Manufacturer	:	Inventec Electronics (M) Sdn. Bhd.
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
		DC Cord: Shielded, Undetachable, 1.85m
		Bonded a ferrite core
AC Power Cord	:	Non-Shielded, Detachable, 2.0m

1.2.3. 8 OHM LOAD #1

Model Number	:	N/A
Serial Number	:	N/A
Manufacturer	:	Sonos
Audio Cable *1EA	:	Non-Shielded, Detachable, 2.1m

1.2.4. 8 OHM LOAD #2

Model Number	:	N/A
Serial Number	:	N/A
Manufacturer	:	Sonos
Audio Cable *1EA	:	Non-Shielded, Detachable, 2.1m

1.2.5. AUDIO INPUT/OUTPUT LOAD

Model Number	:	N/A
Serial Number	:	N/A
Manufacturer	:	Sonos
Audio Cable-In *1EA	:	Non-Shielded, Detachable, 1.8m
Audio Cable-Out *2EA	:	Non-Shielded, Detachable, 1.8m

1.2.6. ETHERNET TERMINATOR (100 OHM)

Model Number : N/A
 Serial Number : N/A
 Manufacturer : Sonos
 RJ45 LAN Cable *3EA : Non-Shielded, Detachable, 1.8m

1.3. 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)

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
Radiation Test (Distance: 10m)	30MHz~300MHz	±2.99dB
	300MHz~1000MHz	±2.73dB
Radiation Test (Distance: 3m)	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB
	Above 1GHz	± 5.02dB

Remark : Uncertainty = $k_{uc}(y)$

Test Item	Uncertainty
6dB Bandwidth	$\pm 0.05\text{kHz}$
Emission Limitations	$\pm 0.13\text{dB}$
Maximum peak output power	$\pm 0.33\text{dBm}$
Band edges	$\pm 0.13\text{dB}$
Power spectral density	$\pm 0.13\text{dB}$
Occupied Bandwidth 99% Power	$\pm 0.05\text{kHz}$

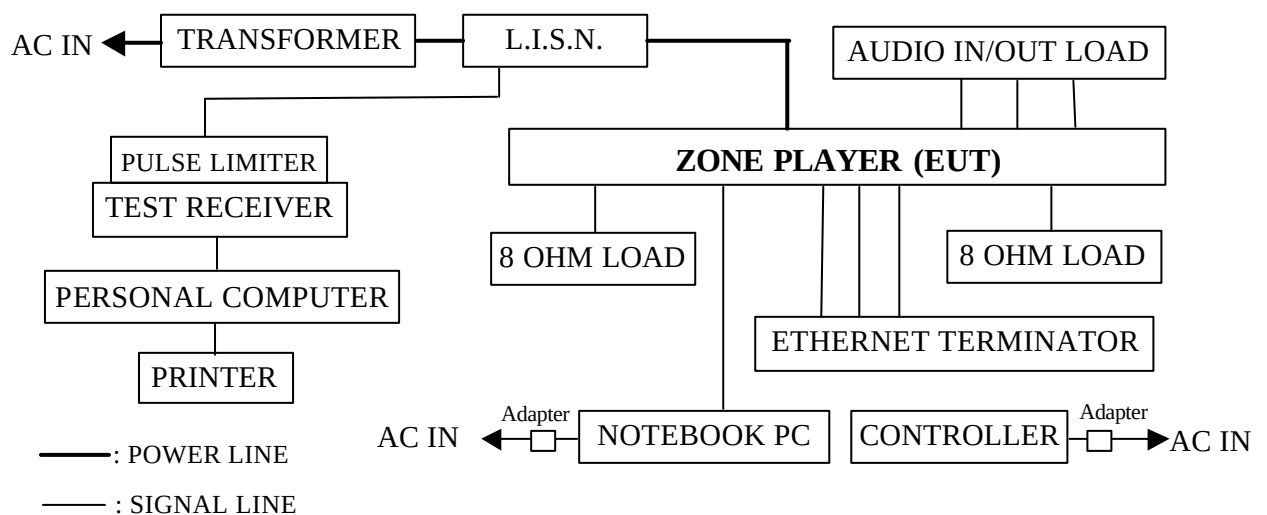
2. CONDUCTED EMISSION MEASUREMENT

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	R & S	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	R & S	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 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

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 the notebook PC (IBM ThinkPad) test software “dsp-write” to set EUT (Zone Player) transmitter channel through RJ45 Ethernet during the testing.

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.

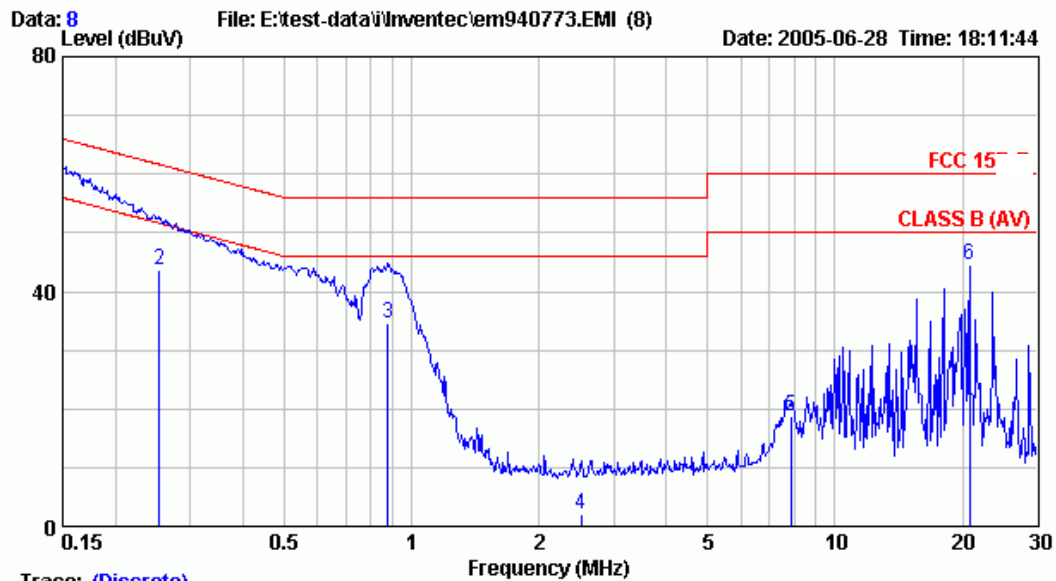
The EUT were performed during conducted measurement and all the test results are attached in next pages.

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

No.	Test Mode	Reference Data No.	
		Neutral	Line
1.	Transmitting-2437MHz (CH6)	# 8	# 7
2.	Receiver	# 6	# 5



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Trace: (Discrete)

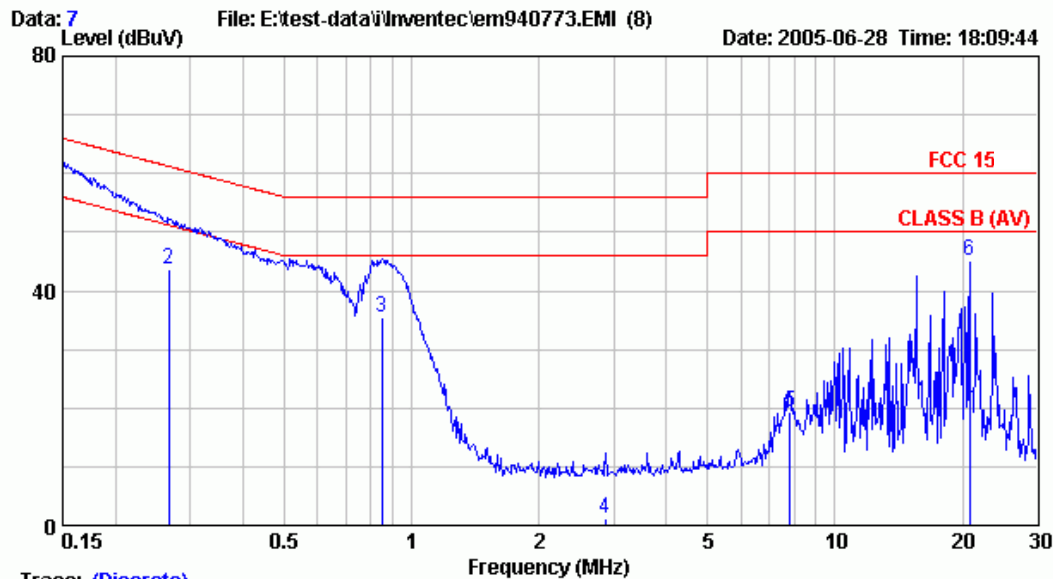
Site	: No.2 Shielded room	Data	: 8
Condition	: KMW-407	Phase	: NEUTRAL
Limit	: FCC 15		
Env. / Ins.	: 23°C, 56% / ESCS 30	Engineer:	Cater Chou
EUT	: Zone Player M/N: ZP100		
Power Rating	: 120Vac/60Hz		
Test Mode	: TX Mode--CH6		

	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	0.150	0.30	0.24	52.52	53.06	66.00	12.94	QP
2	0.253	0.17	0.28	43.36	43.81	61.64	17.84	QP
3	0.880	0.10	0.39	34.20	34.69	56.00	21.31	QP
4	2.515	0.10	0.40	1.41	1.91	56.00	54.09	QP
5	7.863	0.10	0.62	17.97	18.69	60.00	41.31	QP
6	20.807	0.32	0.70	43.56	44.58	60.00	15.42	QP

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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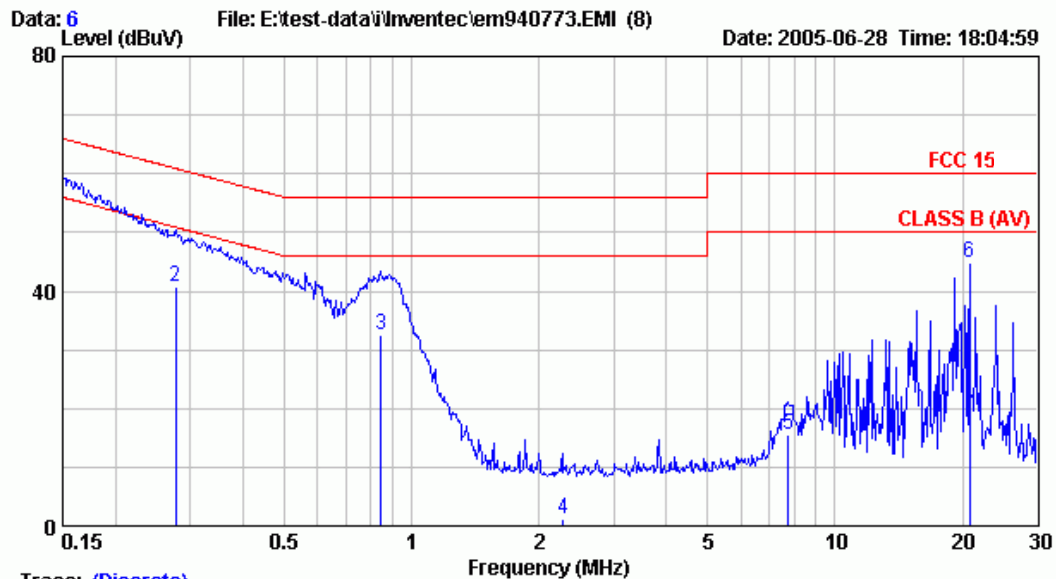
Site : No.2 Shielded room Data : 7
Condition : KHW-407 Phase : LINE
Limit : FCC 15
Env. / Ins. : 23°C, 56% / ESCS 30 Engineer: Cater Chou
EUT : Zone Player M/N: ZP100
Power Rating : 120Vac/60Hz
Test Mode : TX Mode--CH6

	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	0.150	0.30	0.24	52.84	53.38	66.00	12.62	QP
2	0.267	0.16	0.29	43.32	43.76	61.20	17.44	QP
3	0.853	0.10	0.39	35.01	35.50	56.00	20.50	QP
4	2.872	0.10	0.40	0.59	1.09	56.00	54.91	QP
5	7.813	0.17	0.62	18.43	19.22	60.00	40.78	QP
6	20.809	0.34	0.70	44.06	45.10	60.00	14.90	QP

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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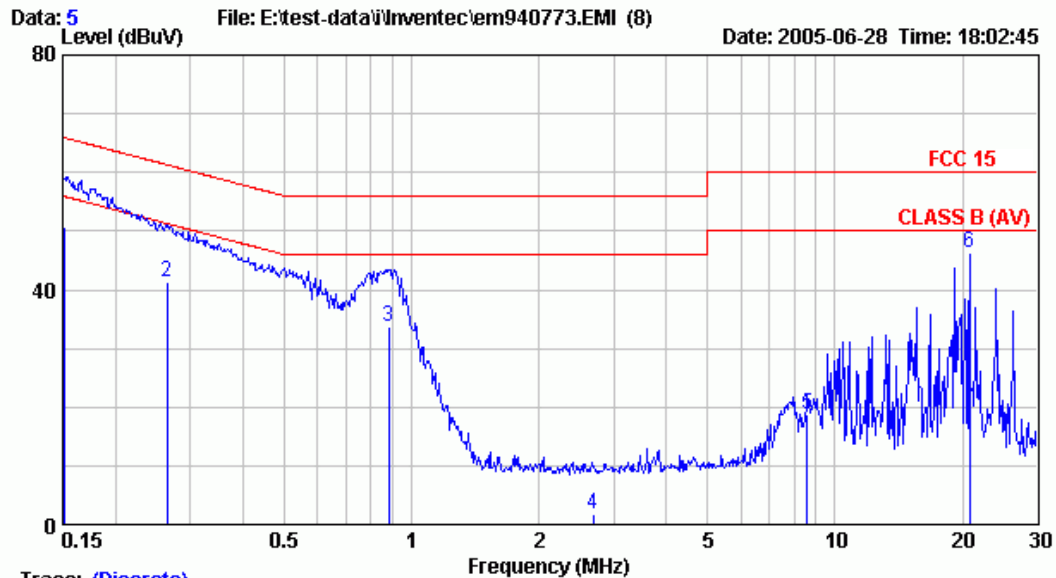
Site : No.2 Shielded room Data : 6
Condition : KMW-407 Phase : NEUTRAL
Limit : FCC 15
Env. / Ins. : 23°C, 56% / ESCS 30 Engineer: Cater Chou
EUT : Zone Player M/N: ZP100
Power Rating : 120Vac/60Hz
Test Mode : RX MODE

		LISN	Cable	Emission				
	Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark
	(MHz)	(dB)	(dB)	(dB μ V)	(dB μ V)	(dB μ V)	(dB)	
1	0.151	0.10	0.24	50.27	50.61	65.96	15.36	QP
2	0.277	0.10	0.29	40.24	40.63	60.90	20.27	QP
3	0.847	0.18	0.39	32.00	32.57	56.00	23.43	QP
4	2.283	0.20	0.40	0.63	1.23	56.00	54.77	QP
5	7.743	0.27	0.62	14.78	15.67	60.00	44.33	QP
6	20.808	0.50	0.70	43.74	44.94	60.00	15.06	QP

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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Site : No.2 Shielded room Data : 5
Condition : KMW-407 Phase : LINE
Limit : FCC 15
Env. / Ins. : 23°C, 56% / ESCS 30 Engineer: Cater Chou
EUT : Zone Player M/N: ZP100
Power Rating : 120Vac/60Hz
Test Mode : RX MODE

		LISN	Cable		Emission			
Freq.		Factor	Loss	Reading	Level	Limits	Margin	Remark
(MHz)		(dB)	(dB)	(dB μ V)	(dB μ V)	(dB μ V)	(dB)	
1	0.151	0.10	0.24	50.49	50.83	65.93	15.10	QP
2	0.264	0.10	0.28	41.01	41.39	61.29	19.90	QP
3	0.885	0.19	0.39	33.17	33.75	56.00	22.25	QP
4	2.686	0.20	0.40	1.22	1.82	56.00	54.18	QP
5	8.594	0.28	0.65	17.81	18.74	60.00	41.26	QP
6	20.809	0.74	0.70	44.90	46.34	60.00	13.66	QP

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)

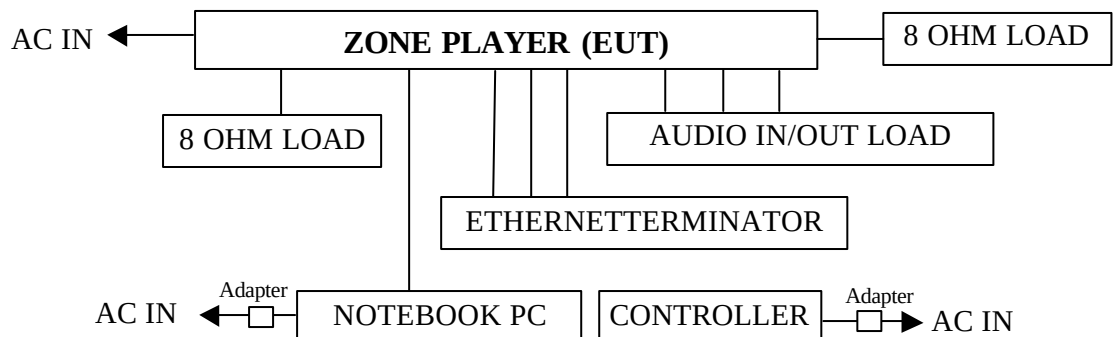
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Oct.04, 04'	Oct.03, 05'
2.	Spectrum Analyzer	HP	8564EC	3946A00249	Sep.17, 04'	Sep.16, 05'
3.	Test Receiver	Schaffner	SCR 3502	008	Mar. 04, 05'	Mar.04, 06'
4.	Pre-Amplifier	HP	8447D	2944A06305	Mar.10, 05'	Mar.09, 06'
5.	Broadband Antenna	Schwarzbeck	BBA 9106	A3L	Feb.18, 05'	Feb.17, 06'
6.	Broadband Antenna	Schwarzbeck	UHALP 9108-A	0139	Dec.14, 04'	Dec.13, 05'

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

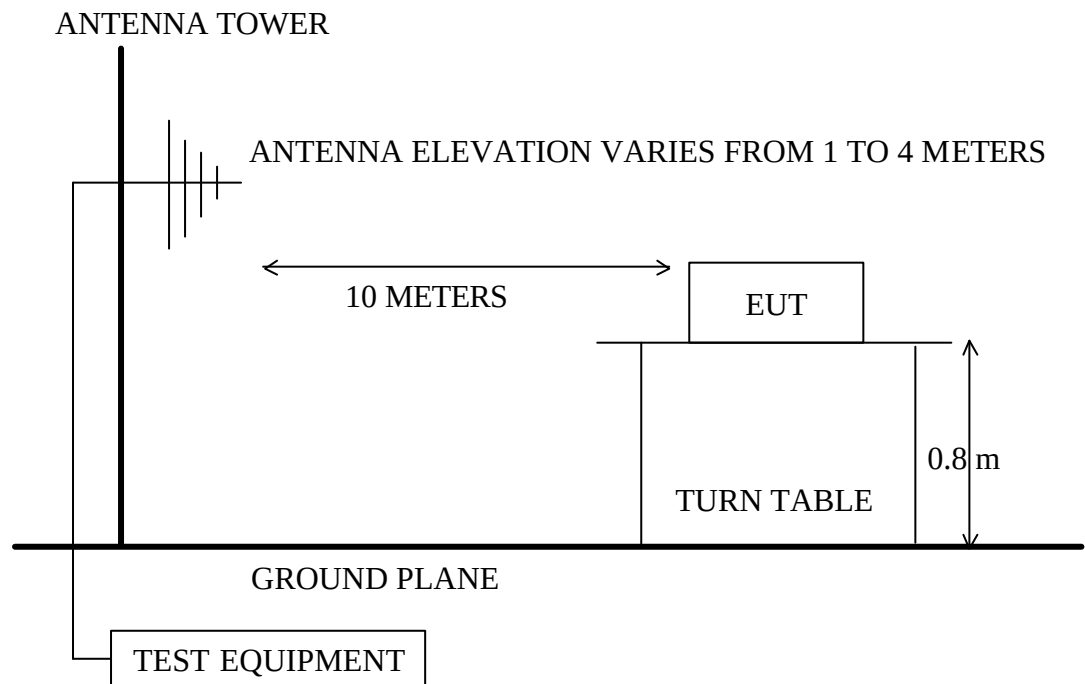
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Oct.04, 04'	Oct.03, 05'
2.	Spectrum Analyzer	HP	8564EC	3946A00249	Sep.17, 04'	Sep.16, 05'
3.	Test Receiver	Schaffner	SCR 3502	008	Mar. 04, 05'	Mar.04, 06'
4.	Pre-Amplifier	HP	8449B	3008A00529	Jan.14, 05'	Jan.13, 06'
5.	Horn Antenna	EMCO	3115	9112-3775	May 04, 05'	May 03, 06'
6.	Horn Antenna	EMCO	3116	2653	Nov. 03, 04'	Nov. 02, 05'

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. (For 30MHz to 1000MHz)

The bandwidth of the HP Spectrum Analyzer 8593EM was set at 1MHz. (For Above 1GHz)

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.

EUT : Zone Player M/N : ZP100

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)	# 14	# 13
2.		2437MHz (CH6)	# 14	# 13
3.		2462MHz (CH11)	# 14	# 13
4.	Receiver	---	# 13	# 14

* Above all final readings were measured with Quasi-Peak detector.

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)

* Above all final readings were measured with Peak detector and Average detector.

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))

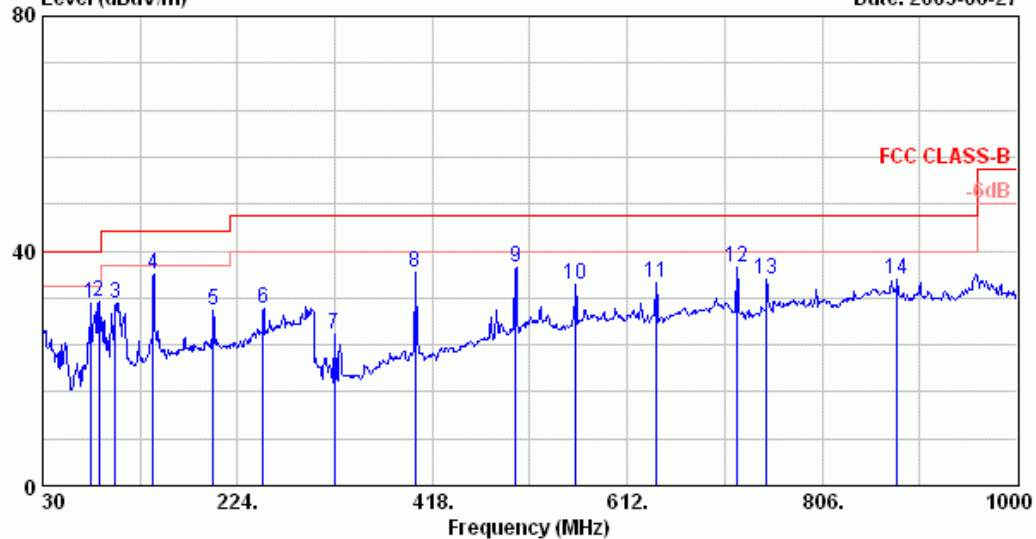
No.	Test Mode	Reference Test Data No.				
		Frequency Range	Horizontal		Vertical	
1.	Transmitting	2412MHz (CH1)	Peak	# 2	Peak	# 1
			Average	# 3	Average	# 4
2.		2462MHz (CH11)	Peak	# 7	Peak	# 8
			Average	# 6	Average	# 5

3.6.1. Frequency Range: 30MHz~1000MHz



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Data: 14 File: D:\測試照片&數據\2005DATA\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
 Level (dBuV/m) Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UH&LP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Zone Player M/N:ZP100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode--CH1

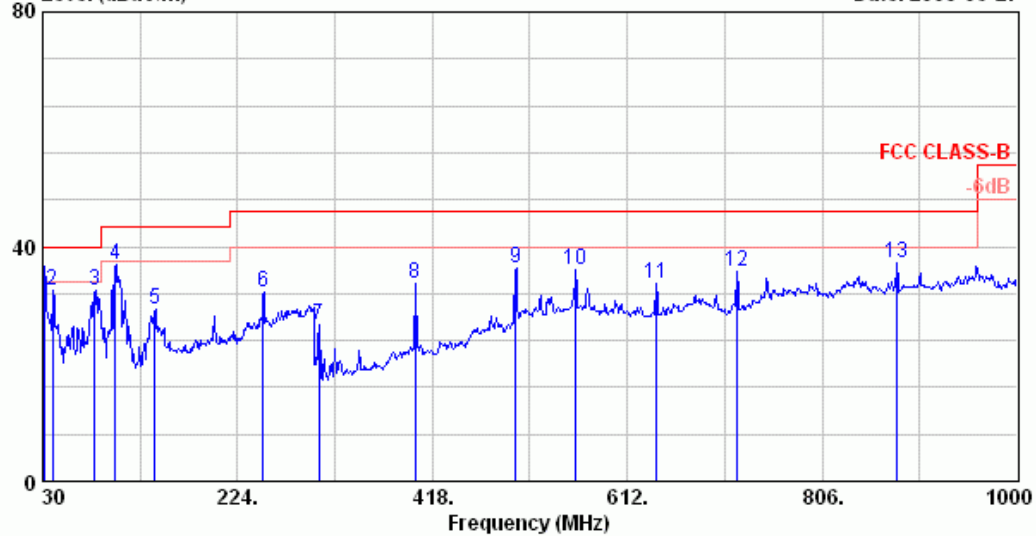
	Ant.	Cable		Emission				
Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark	
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)		
1	77.790	13.22	1.80	16.15	31.17	40.00	8.83	QP
2	85.890	14.98	1.90	14.43	31.30	40.00	8.70	
3	102.090	17.29	2.10	11.81	31.20	43.50	12.30	
4	139.890	20.15	2.50	13.30	35.95	43.50	7.55	
5	199.830	22.09	3.00	4.69	29.78	43.50	13.72	
6	249.780	23.83	3.50	2.95	30.28	46.00	15.72	
7	320.300	14.99	4.20	6.52	25.71	46.00	20.29	QP
8	400.800	17.66	4.80	13.94	36.40	46.00	9.60	
9	500.900	18.87	6.50	11.96	37.33	46.00	8.67	
10	560.400	20.03	6.70	7.49	34.22	46.00	11.78	
11	640.900	21.00	6.30	7.30	34.60	46.00	11.40	
12	721.400	22.21	6.50	8.45	37.16	46.00	8.84	
13	750.800	23.35	6.70	5.18	35.23	46.00	10.77	
14	880.300	25.34	7.30	2.51	35.15	46.00	10.85	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
Level (dBuV/m) Date: 2005-06-27



Site : A/C Chamber Date : 13
Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
Limit : FCC CLASS-B
Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
EUT : Zone Player M/N: ZP100
Power Rating : 120Vac/60Hz
Test Mode : Operating (MIN) All Cable Connected
TX Mode--CH1

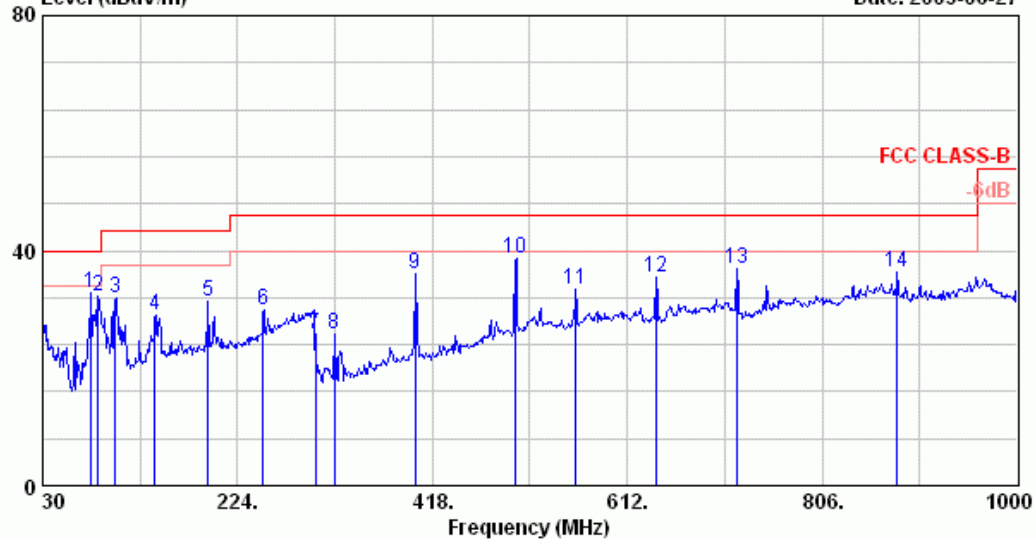
		Ant.	Cable		Emission			
Freq.		Factor	Loss	Reading	Level	Limits	Margin	Remark
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	31.080	23.39	1.10	12.26	36.75	40.00	3.25	QP
2	39.990	20.74	1.20	10.47	32.42	40.00	7.58	
3	81.840	14.30	1.90	16.47	32.67	40.00	7.33	
4	102.630	17.72	2.10	16.99	36.81	43.50	6.69	
5	141.780	20.26	2.50	6.41	29.16	43.50	14.34	
6	249.780	25.02	3.50	3.65	32.17	46.00	13.83	
7	304.900	15.17	3.90	7.62	26.69	46.00	19.31	QP
8	400.800	17.58	4.80	11.29	33.66	46.00	12.34	
9	500.900	19.77	6.50	9.97	36.24	46.00	9.76	
10	560.400	22.08	6.70	7.32	36.10	46.00	9.90	
11	640.900	21.28	6.30	5.99	33.57	46.00	12.43	
12	721.400	22.11	6.50	7.15	35.76	46.00	10.24	
13	880.300	25.34	7.30	4.44	37.08	46.00	8.92	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
 Level (dBuV/m) Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UHALP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Zone Player M/N: ZP100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode---CH6

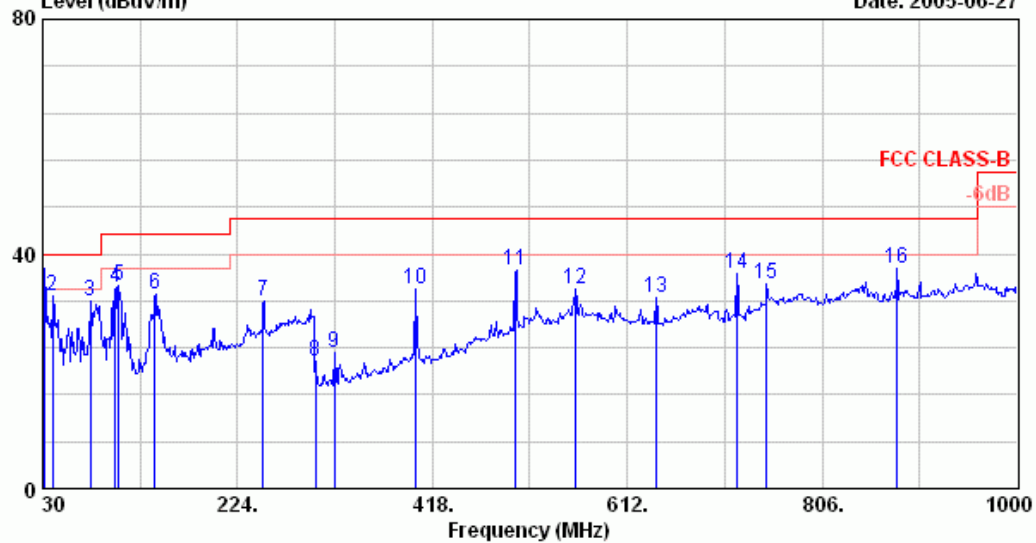
	Freq.	Ant.	Cable		Emission			
	(MHz)	Factor	Loss	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	77.790	13.22	1.80	17.86	32.88	40.00	7.12	QP
2	85.080	14.80	1.90	15.47	32.17	40.00	7.83	
3	102.630	17.40	2.10	12.46	31.96	43.50	11.54	
4	141.780	20.25	2.50	6.24	28.99	43.50	14.51	
5	194.430	21.77	3.00	6.55	31.32	43.50	12.18	
6	249.780	23.83	3.50	2.67	30.00	46.00	16.00	
7	301.400	14.59	3.90	7.19	25.68	46.00	20.32	QP
8	320.300	14.99	4.20	6.47	25.66	46.00	20.34	
9	400.800	17.66	4.80	13.71	36.17	46.00	9.83	
10	500.900	18.87	6.50	13.40	38.77	46.00	7.23	
11	560.400	20.03	6.70	6.62	33.35	46.00	12.65	
12	640.900	21.00	6.30	8.22	35.52	46.00	10.48	
13	721.400	22.21	6.50	8.20	36.91	46.00	9.09	
14	880.300	25.34	7.30	3.65	36.29	46.00	9.71	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
Level (dBuV/m) Date: 2005-06-27



Site : A/C Chamber Date : 13
Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
Limit : FCC CLASS-B
Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
EUT : Zone Player M/N:ZP100
Power Rating : 120Vac/60Hz
Test Mode : Operating (MIN) All Cable Connected
TX Mode--CH6

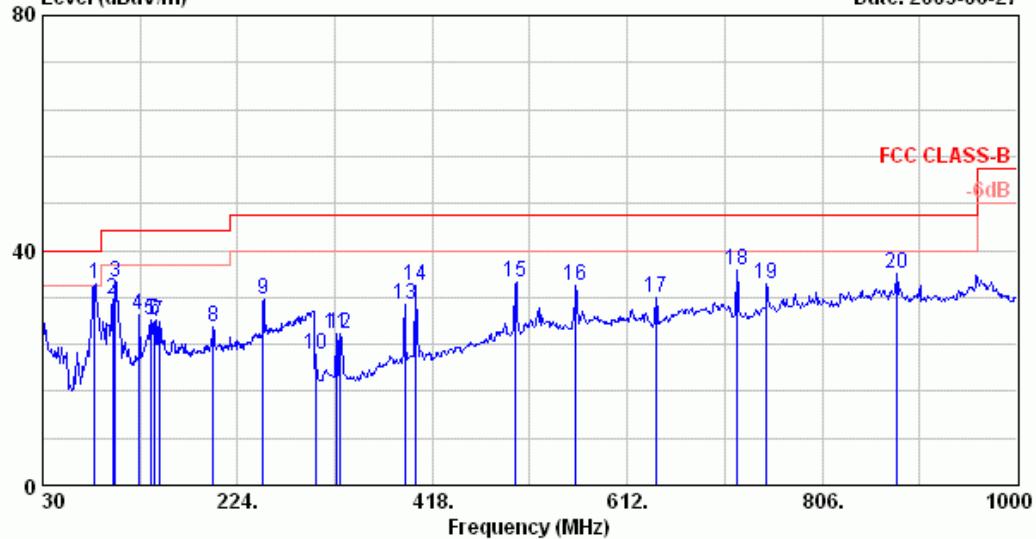
		Ant.	Cable		Emission			
Freq.		Factor	Loss	Reading	Level	Limits	Margin	Remark
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	31.080	23.39	1.10	12.89	37.38	40.00	2.62	QP
2	39.990	20.74	1.20	10.77	32.72	40.00	7.28	
3	77.790	13.71	1.80	16.36	31.87	40.00	8.13	
4	102.630	17.72	2.10	14.60	34.42	43.50	9.08	
5	105.330	17.68	2.20	14.68	34.55	43.50	8.95	
6	141.780	20.26	2.50	10.45	33.20	43.50	10.30	
7	249.780	25.02	3.50	3.46	31.98	46.00	14.02	
8	301.400	14.83	3.90	2.91	21.64	46.00	24.36	QP
9	320.300	15.60	4.20	3.43	23.24	46.00	22.76	
10	400.800	17.58	4.80	11.72	34.09	46.00	11.91	
11	500.900	19.77	6.50	11.09	37.36	46.00	8.64	
12	560.400	22.08	6.70	5.20	33.98	46.00	12.02	
13	640.900	21.28	6.30	4.87	32.45	46.00	13.55	
14	721.400	22.11	6.50	7.99	36.60	46.00	9.40	
15	750.800	24.50	6.70	3.53	34.73	46.00	11.27	
16	880.300	25.34	7.30	4.94	37.58	46.00	8.42	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
 Level (dBuV/m) Date: 2005-06-27



Site : A/C Chamber Date : 14
 Condition : 3m BBA9106/UHALP9108-A Polarity: HORIZONTAL
 Limit : FCC CLASS-B
 Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
 EUT : Zone Player M/N:ZP100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 TX Mode---CH11

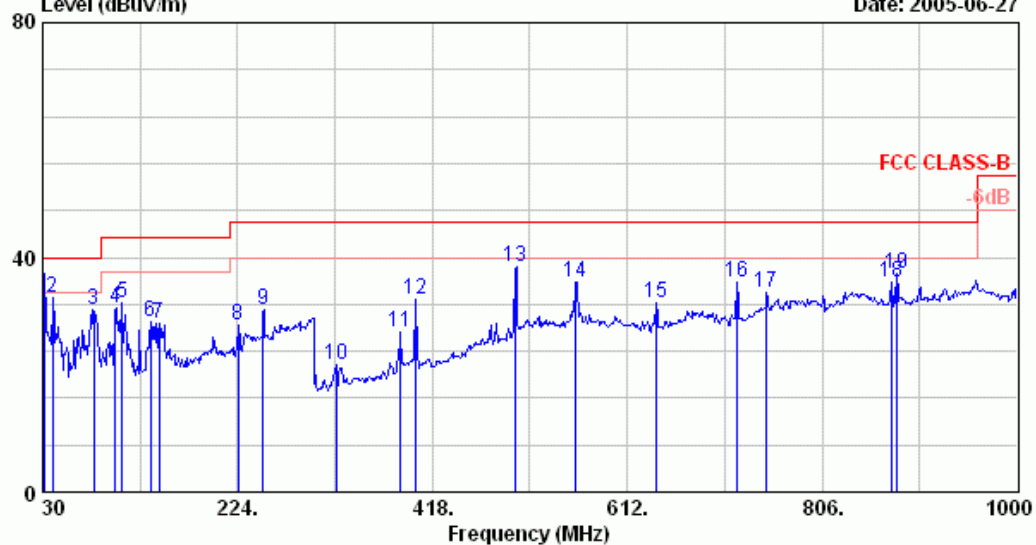
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	81.840	13.97	1.90	18.45	34.32	40.00	5.68	QP
2	99.390	17.08	2.10	12.43	31.61	43.50	11.89	
3	102.630	17.40	2.10	14.97	34.47	43.50	9.03	
4	125.580	19.49	2.38	7.26	29.12	43.50	14.38	
5	137.190	20.01	2.43	5.69	28.13	43.50	15.37	
6	141.780	20.25	2.50	5.36	28.11	43.50	15.39	
7	145.830	20.40	2.59	4.85	27.85	43.50	15.65	
8	199.830	22.09	3.00	1.91	27.00	43.50	16.50	
9	249.780	23.83	3.50	4.19	31.52	46.00	14.48	
10	301.400	14.59	3.90	3.88	22.37	46.00	23.63	QP
11	322.400	15.05	4.20	6.50	25.74	46.00	20.26	
12	325.900	15.15	4.20	6.43	25.79	46.00	20.21	
13	390.300	17.48	4.80	8.40	30.68	46.00	15.32	
14	400.800	17.66	4.80	11.63	34.09	46.00	11.91	
15	500.900	18.87	6.50	9.23	34.60	46.00	11.40	
16	560.400	20.03	6.70	7.37	34.10	46.00	11.90	
17	640.900	21.00	6.30	4.60	31.90	46.00	14.10	
18	721.400	22.21	6.50	7.99	36.70	46.00	9.30	
19	750.800	23.35	6.70	4.38	34.43	46.00	11.57	
20	880.300	25.34	7.30	3.38	36.02	46.00	9.98	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
Level (dBuV/m) Date: 2005-06-27



Site : A/C Chamber Date : 13
Condition : 3m BBA9106/UHALP9108-A Polarity: VERTICAL
Limit : FCC CLASS-B
Env. / Ins. : 8593EM 21.5°C/58% Engineer: Hyper Chang
EUT : Zone Player M/N:ZP100
Power Rating : 120Vac/60Hz
Test Mode : Operating (MIN) All Cable Connected
TX Mode--CH11

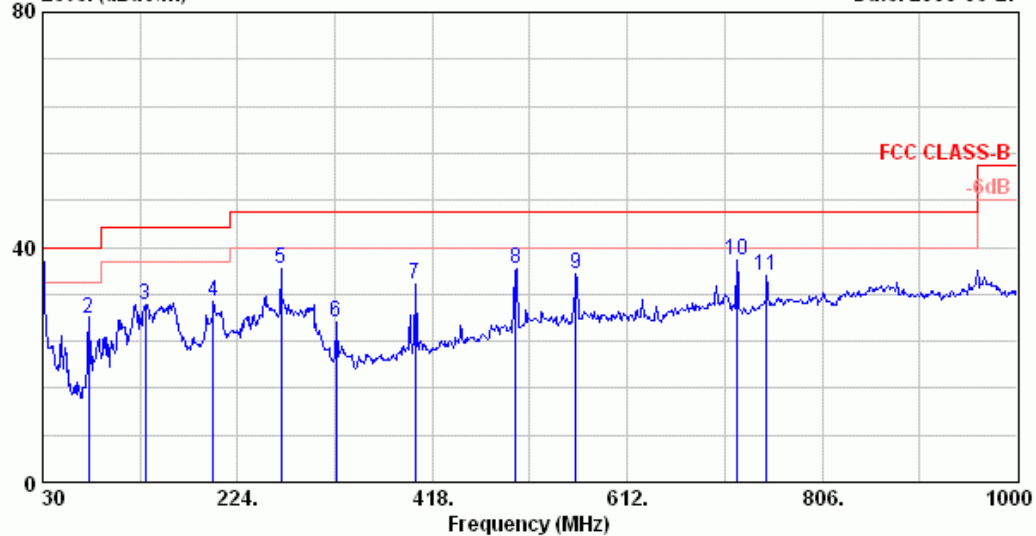
		Ant.	Cable		Emission			
Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark	
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)		
1	31.080	23.39	1.10	12.75	37.24	40.00	2.76	QP
2	39.990	20.74	1.20	11.23	33.18	40.00	6.82	
3	80.490	14.22	1.89	14.92	31.03	40.00	8.97	
4	102.630	17.72	2.10	11.62	31.44	43.50	12.06	
5	108.840	17.88	2.20	12.09	32.17	43.50	11.33	
6	137.730	19.07	2.43	7.38	28.88	43.50	14.62	
7	145.830	21.26	2.59	4.95	28.80	43.50	14.70	
8	224.940	22.29	3.30	2.80	28.39	46.00	17.61	
9	249.780	25.02	3.50	2.63	31.15	46.00	14.85	
10	322.400	15.61	4.20	2.00	21.81	46.00	24.19	QP
11	385.400	17.22	4.70	5.39	27.30	46.00	18.70	
12	400.800	17.58	4.80	10.53	32.90	46.00	13.10	
13	500.900	19.77	6.50	12.22	38.49	46.00	7.51	
14	560.400	22.08	6.70	7.06	35.84	46.00	10.16	
15	640.900	21.28	6.30	4.55	32.13	46.00	13.87	
16	721.400	22.11	6.50	7.08	35.69	46.00	10.31	
17	750.800	24.50	6.70	2.91	34.11	46.00	11.89	
18	875.400	25.21	7.30	3.36	35.86	46.00	10.14	
19	880.300	25.34	7.30	4.71	37.35	46.00	8.65	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
Level (dBuV/m) 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 : Zone Player M/N:ZP100
Power Rating : 120Vac/60Hz
Test Mode : Operating (MIN) All Cable Connected
RX Mode

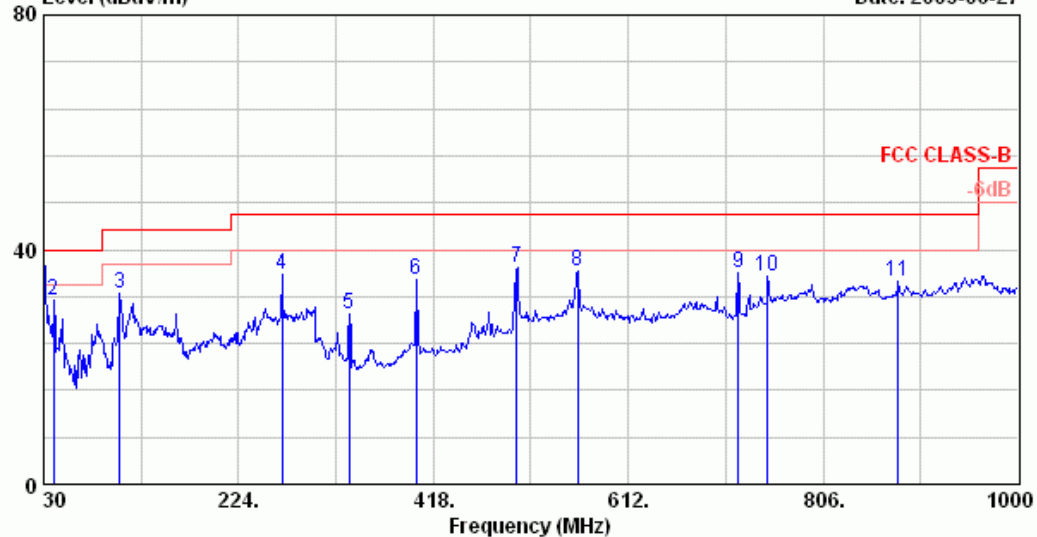
		Ant.	Cable		Emission			
Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark	
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)		
1	30.000	24.86	1.10	10.24	36.20	40.00	3.80	QP
2	75.900	12.88	1.80	13.30	27.98	40.00	12.02	
3	132.330	19.83	2.40	8.07	30.30	43.50	13.21	
4	199.830	22.09	3.00	5.76	30.85	43.50	12.65	
5	267.330	24.79	3.70	7.83	36.32	46.00	9.68	
6	322.400	15.05	4.20	7.94	27.18	46.00	18.82	
7	400.800	17.66	4.80	11.24	33.70	46.00	12.30	
8	500.900	18.87	6.50	11.02	36.39	46.00	9.61	
9	560.400	20.03	6.70	8.72	35.45	46.00	10.55	
10	721.400	22.21	6.50	9.18	37.89	46.00	8.11	
11	750.800	23.35	6.70	5.25	35.30	46.00	10.70	

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\EM940773(SONOS-ZP)\773(ZP-Test-Data)\773-e3(ZP-
 Level (dBuV/m) 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 : Zone Player M/N: ZP100
 Power Rating : 120Vac/60Hz
 Test Mode : Operating (MIN) All Cable Connected
 RX Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	23.60	1.10	11.00	35.70	40.00	4.30	QP
2	39.990	20.74	1.20	9.41	31.36	40.00	8.64	
3	105.330	17.68	2.20	12.78	32.65	43.50	10.85	
4	267.330	25.83	3.70	6.10	35.64	46.00	10.36	
5	334.300	15.55	4.20	9.18	28.93	46.00	17.07	
6	400.800	17.58	4.80	12.36	34.73	46.00	11.27	
7	500.900	19.77	6.50	10.68	36.95	46.00	9.05	
8	561.800	22.08	6.70	7.47	36.25	46.00	9.75	
9	721.400	22.11	6.50	7.57	36.18	46.00	9.82	
10	750.800	24.50	6.70	4.26	35.46	46.00	10.54	
11	880.300	25.34	7.30	1.99	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.

3.6.2. Frequency Range Above 1GHz

Date of Test :	Jun. 27, 2005	Temperature :	21.5°C
EUT :	Zone Player	Humidity :	58%
Test Mode :	Transmitting Mode, Frequency: 2412MHz (CH1)		

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Horizontal dB μ V/m	Emission Level Horizontal dB μ V/m	Limits dB	Margin
Peak	1610.792	26.00	6.21	19.82	52.03	74.00	21.97
	1761.812	26.74	7.12	12.20	46.06	74.00	27.94
	1938.002	27.54	6.18	22.25	55.97	74.00	18.03
	2211.516	28.25	6.12	13.03	47.40	74.00	26.60
	2362.536	28.54	6.30	21.95	56.79	74.00	17.21
Average	1610.792	26.00	6.21	12.82	45.03	54.00	8.97
	1761.812	26.74	7.12	5.20	39.06	54.00	14.94
	1938.002	27.54	6.18	12.25	45.97	54.00	8.03
	2211.516	28.25	6.12	6.03	40.40	54.00	13.60
	2362.536	28.54	6.30	12.95	47.79	54.00	6.21
	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Vertical dB μ V/m	Emission Level Vertical dB μ V/m	Limits dB	Margin
Peak	1006.712	25.20	4.19	40.64	70.03	74.00	3.97
	1036.916	25.22	4.26	11.60	41.08	74.00	32.92
	1082.222	25.24	4.35	14.64	44.23	74.00	29.77
	1182.902	25.28	4.55	12.19	42.02	74.00	31.98
	1610.792	26.00	6.21	20.94	53.15	74.00	20.85
	1761.812	26.74	7.12	12.55	46.41	74.00	27.59
	1938.002	27.54	6.18	24.24	57.96	74.00	16.04
Average	1006.712	25.20	4.19	11.24	40.63	54.00	13.37
	1036.916	25.22	4.26	7.60	37.08	54.00	16.92
	1082.222	25.24	4.35	7.64	37.23	54.00	16.77
	1182.902	25.28	4.55	7.19	37.02	54.00	16.98
	1610.792	26.00	6.21	12.94	45.15	54.00	8.85
	1761.812	26.74	7.12	7.55	41.41	54.00	12.59
	1938.002	27.54	6.18	14.24	47.96	54.00	6.04

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

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

EUT : Zone Player Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2437MHz (CH6)

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Horizontal dBμV/m	Emission Level Horizontal dBμV/m	Limits dB	Margin
Peak	1627.572	26.10	6.36	13.98	46.44	74.00	27.56
	1938.002	27.54	6.18	16.32	50.04	74.00	23.96
	2161.176	28.15	6.06	10.03	44.24	74.00	29.76
	2290.382	28.41	6.22	11.89	46.52	74.00	27.48
	2362.536	28.54	6.30	16.03	50.87	74.00	23.13
Average	1627.572	26.10	6.36	8.98	41.44	54.00	12.56
	1938.002	27.54	6.18	10.32	44.04	54.00	9.96
	2161.176	28.15	6.06	7.03	41.24	54.00	12.76
	2290.382	28.41	6.22	6.89	41.52	54.00	12.48
	2362.536	28.54	6.30	11.03	45.87	54.00	8.13
	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Vertical dBμV/m	Emission Level Vertical dBμV/m	Limits dB	Margin
Peak	1359.092	25.35	5.01	10.92	41.28	74.00	32.72
	1627.572	26.10	6.36	21.44	53.90	74.00	20.10
	1938.002	27.54	6.18	24.52	58.24	74.00	15.76
	2161.176	28.15	6.06	11.32	45.53	74.00	28.47
	2236.686	28.31	6.16	13.04	47.51	74.00	26.49
	2362.536	28.54	6.30	22.64	57.48	74.00	16.52
Average	1359.092	25.35	5.01	5.92	36.28	54.00	17.72
	1627.572	26.10	6.36	12.44	44.90	54.00	9.10
	1938.002	27.54	6.18	14.52	48.24	54.00	5.76
	2161.176	28.15	6.06	5.32	39.53	54.00	14.47
	2236.686	28.31	6.16	7.04	41.51	54.00	12.49
	2362.536	28.54	6.30	11.64	46.48	54.00	7.52

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

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

EUT : Zone Player Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2462MHz (CH11)

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Horizontal dB μ V/m	Emission Level Horizontal dB μ V/m	Limits dB	Margin
Peak	1640.996	26.14	6.41	19.24	51.79	74.00	22.21
	1938.002	27.54	6.18	15.79	49.51	74.00	24.49
	2362.536	28.54	6.30	16.97	51.81	74.00	22.19
Average	1640.996	26.14	6.41	13.24	45.79	54.00	8.21
	1938.002	27.54	6.18	9.79	43.51	54.00	10.49
	2362.536	28.54	6.30	9.97	44.81	54.00	9.19
	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB μ V	Meter Reading Vertical dB μ V/m	Emission Level Vertical dB μ V/m	Limits dB	Margin
Peak	1640.996	26.14	6.41	22.23	54.78	74.00	19.22
	1728.252	26.58	7.04	17.81	51.43	74.00	22.57
	1938.002	27.54	6.18	26.18	59.90	74.00	14.10
	2161.176	28.15	6.06	16.44	50.65	74.00	23.35
	2256.822	28.35	6.17	17.60	52.12	74.00	21.88
	2362.536	28.54	6.30	25.50	60.34	74.00	13.66
Average	1640.996	26.14	6.41	14.23	46.78	54.00	7.22
	1728.252	26.58	7.04	11.81	45.43	54.00	8.57
	1938.002	27.54	6.18	15.18	48.90	54.00	5.10
	2161.176	28.15	6.06	10.44	44.65	54.00	9.35
	2256.822	28.35	6.17	11.60	46.12	54.00	7.88
	2362.536	28.54	6.30	15.50	50.34	54.00	3.66

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

3.6.3. Restricted Bands Measurement Results

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

EUT : Zone Player Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2412MHz (CH1)

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Horizontal dBμV/m	Emission Level Horizontal dBμV/m	Limits dB	Margin
Peak *	2390.000	28.58	6.34	21.26	56.18	74.00	17.82
Average *	2359.840	28.54	6.30	5.57	40.41	54.00	13.59
	2390.000	28.59	6.34	4.59	39.52	54.00	14.48

- 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.



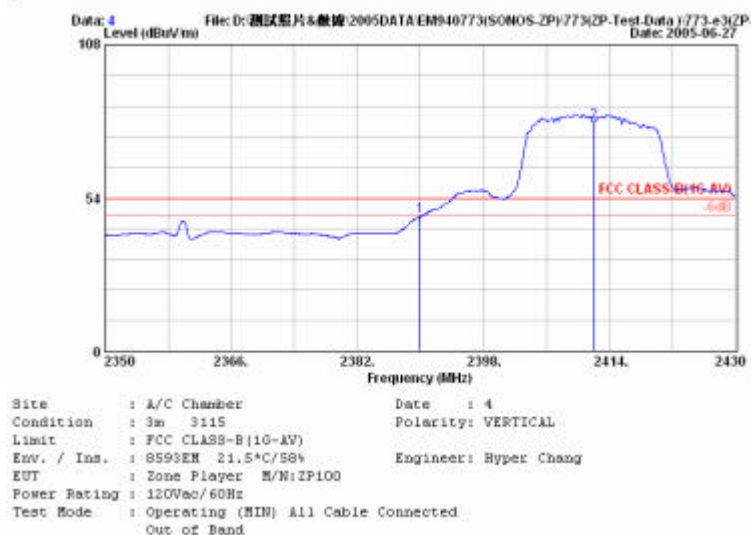
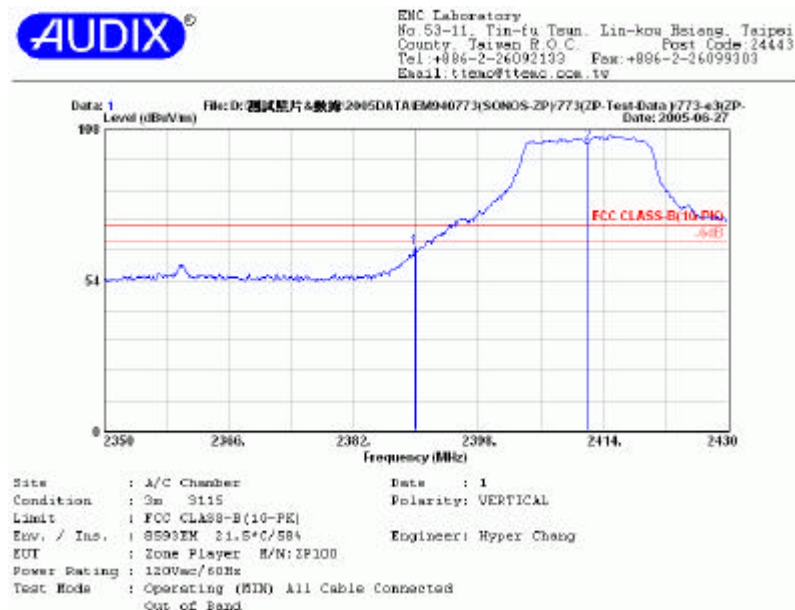
Date of Test : Jun. 27, 2005 Temperature : 21.5°C

EUT : Zone Player Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2412MHz (CH1)

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Vertical dBμV/m	Emission Level Vertical dBμV/m	Limits dB	Margin
Peak *	2389.000	28.59	6.34	30.69	65.62	74.00	8.38
Average *	2390.000	28.59	6.34	12.53	47.46	54.00	6.54

- 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.



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

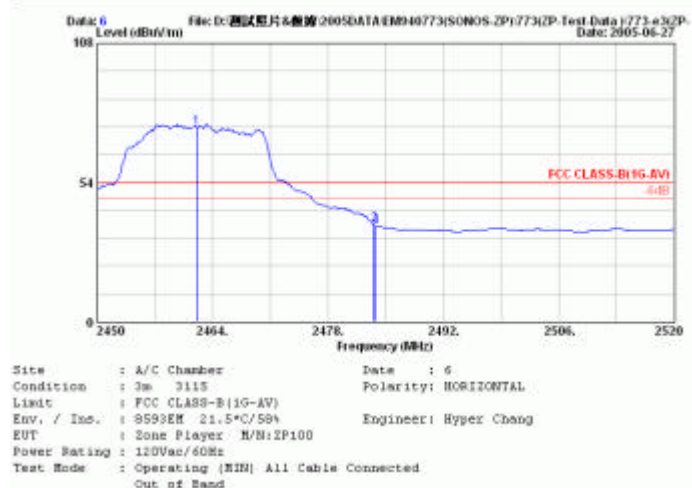
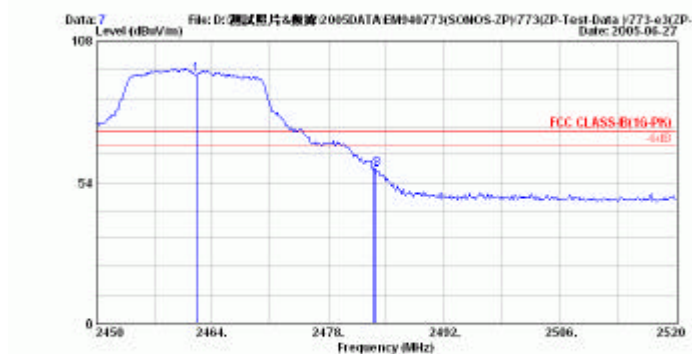
EUT : Zone Player Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2462MHz (CH11)

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Horizontal dBμV/m	Emission Level Horizontal dBμV/m	Limits dB	Margin
Peak *	2483.600	28.77	6.45	22.64	57.86	74.00	16.14
	2483.880	28.77	6.45	23.73	58.95	74.00	15.05
Average *	2483.600	28.77	6.45	2.33	37.55	54.00	16.45
	2483.880	28.77	6.45	1.46	36.68	54.00	17.32

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low 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.

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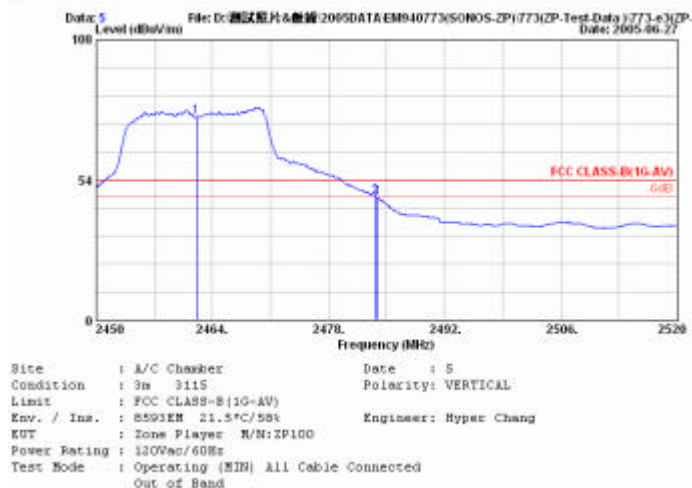
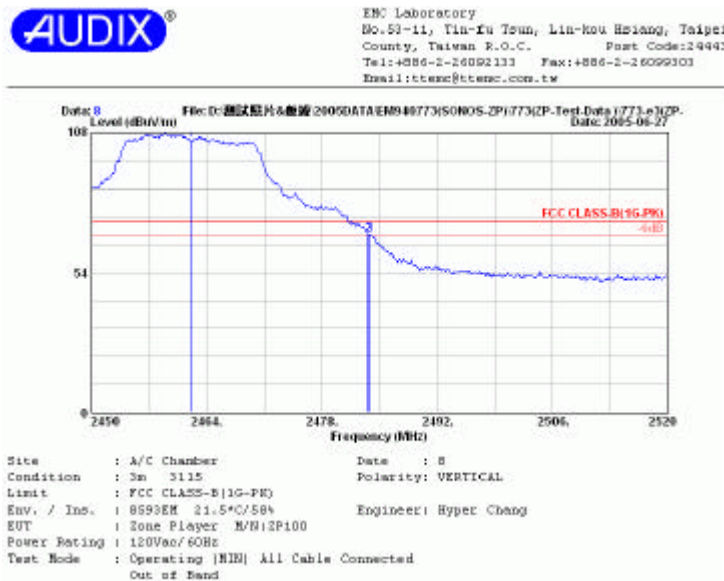
Date of Test : Jun. 27, 2005 Temperature : 21.5°C

EUT : Zone Player Humidity : 58%

Test Mode : Transmitting Mode, Frequency: 2462MHz (CH11)

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dBμV	Meter Reading Vertical dBμV/m	Emission Level Vertical dBμV/m	Limits dB	Margin
Peak *	2483.600	28.77	6.45	33.15	68.37	74.00	5.63
	2483.880	28.77	6.45	33.12	68.34	74.00	5.66
Average *	2483.600	28.77	6.45	12.24	47.46	54.00	6.54
	2483.810	28.77	6.45	11.97	47.19	54.00	6.81

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low 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.



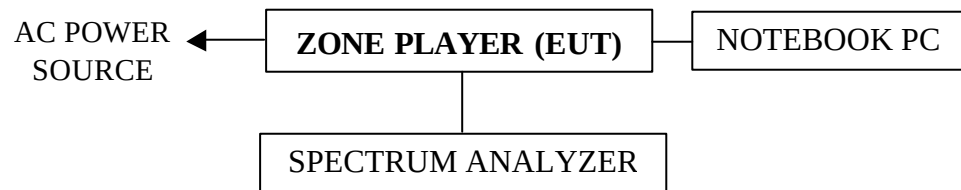
4. 6dB BANDWIDTH MEASUREMENT

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 the notebook PC (IBM ThinkPad) test software “dsp-write” to set EUT (Zone Player) transmitter channel through RJ45 Ethernet during the testing.

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.

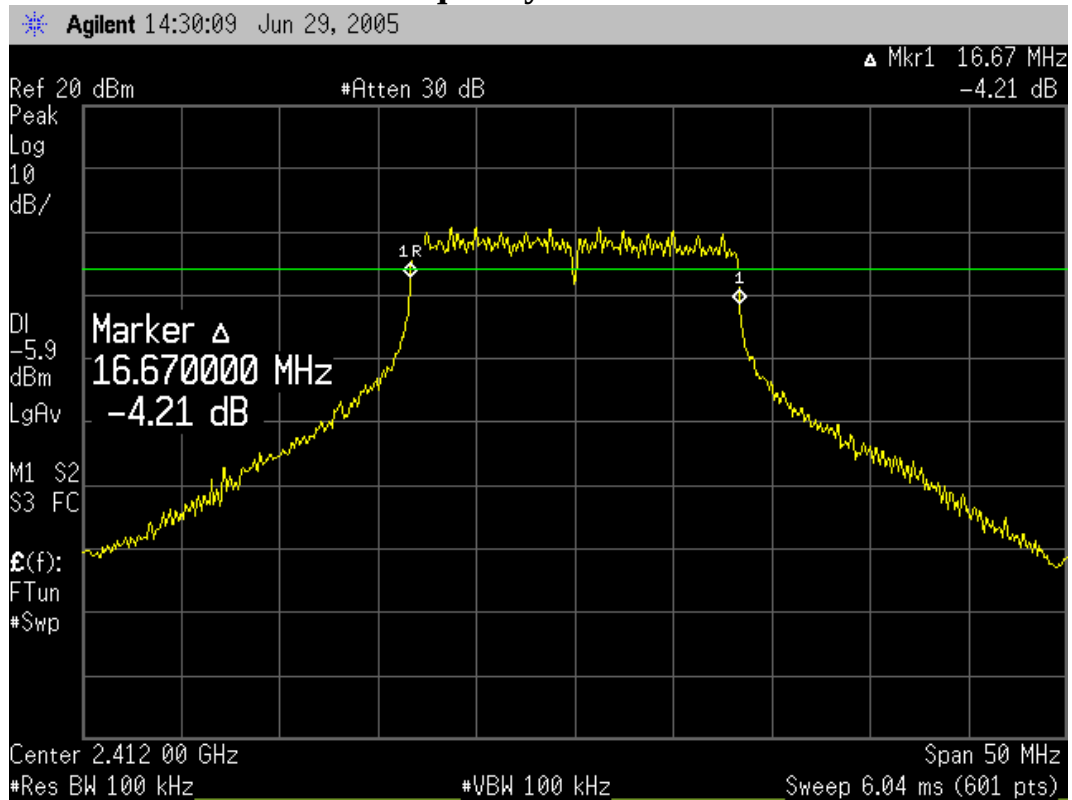
4.6. Test Results

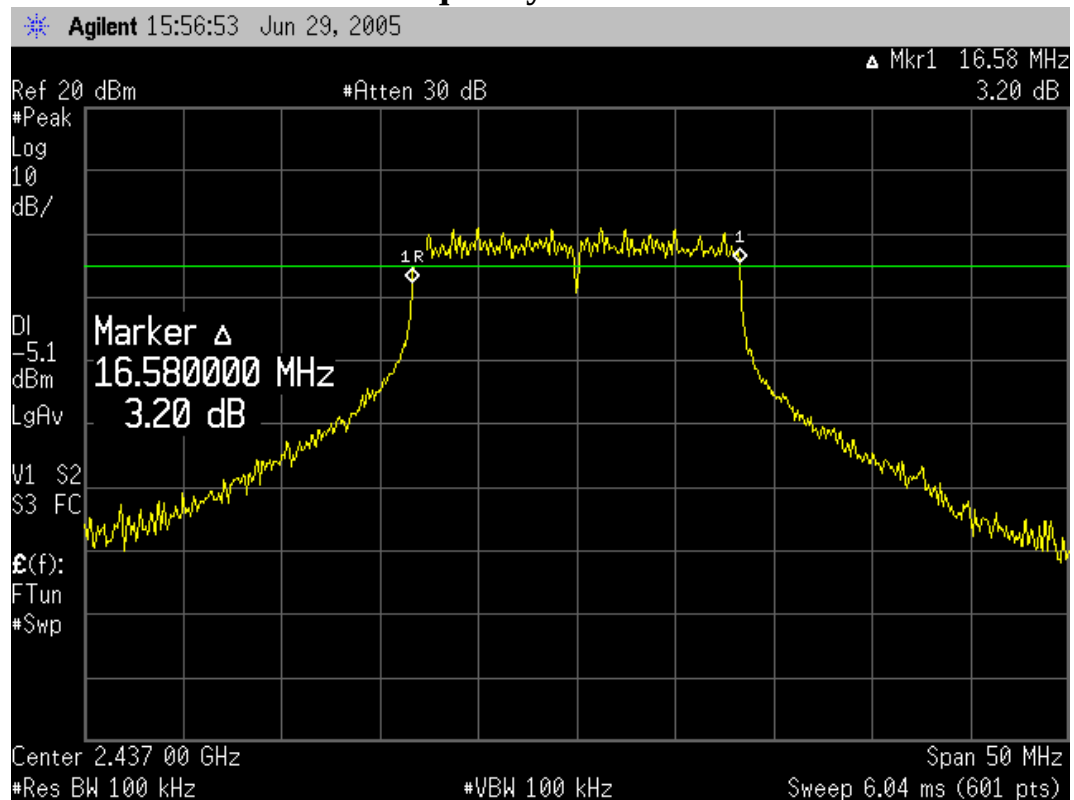
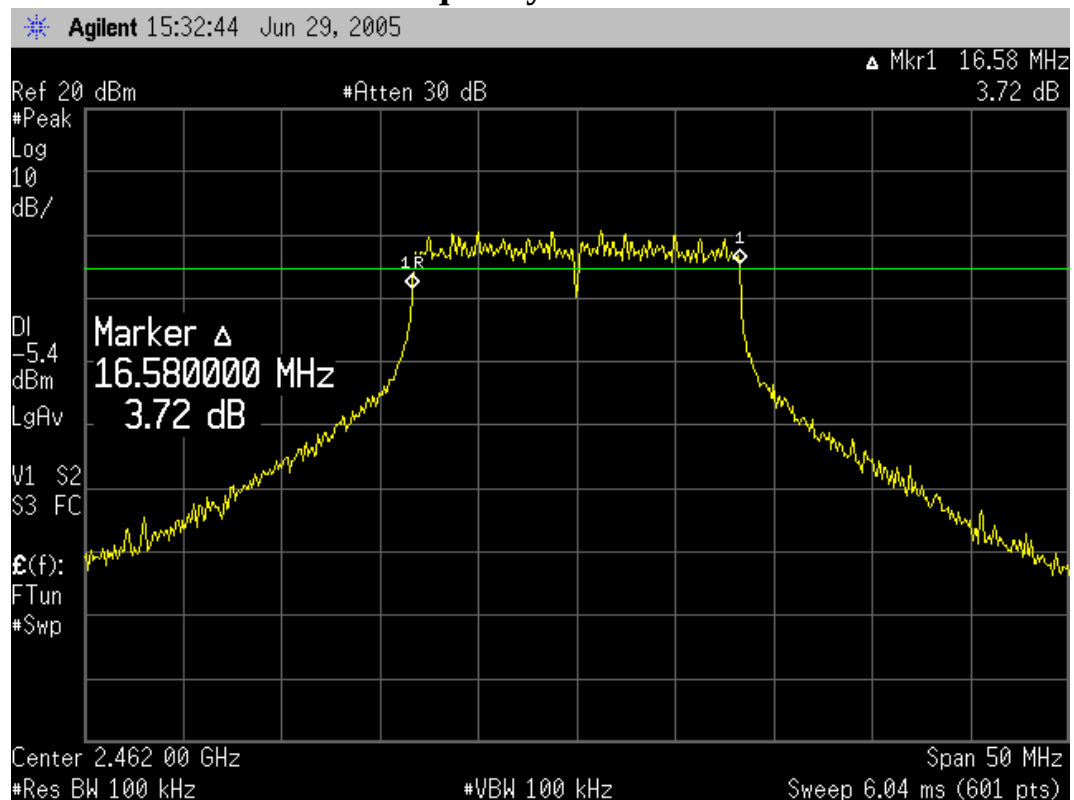
PASSED. All the test results are attached in next pages.

Test Date : Jun. 29, 2005 Temperature : 28 °C Humidity : 65 %

Channel	Frequency	6dB Bandwidth
1.	2412MHz	16.67MHz
6	2437MHz	16.58MHz
11	2462MHz	16.58MHz

Frequency : 2412MHz



Frequency : 2437MHz**Frequency : 2462MHz**

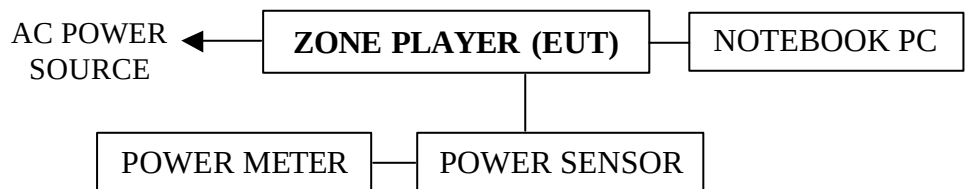
5. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

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. 29, 2005 Temperature : 28 °C Humidity : 65 %

Channel	Frequency	Peak Output Power	Limit
1	2412MHz	19.51dBm	30dBm
6	2437MHz	19.58dBm	30dBm
11	2462MHz	19.16dBm	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

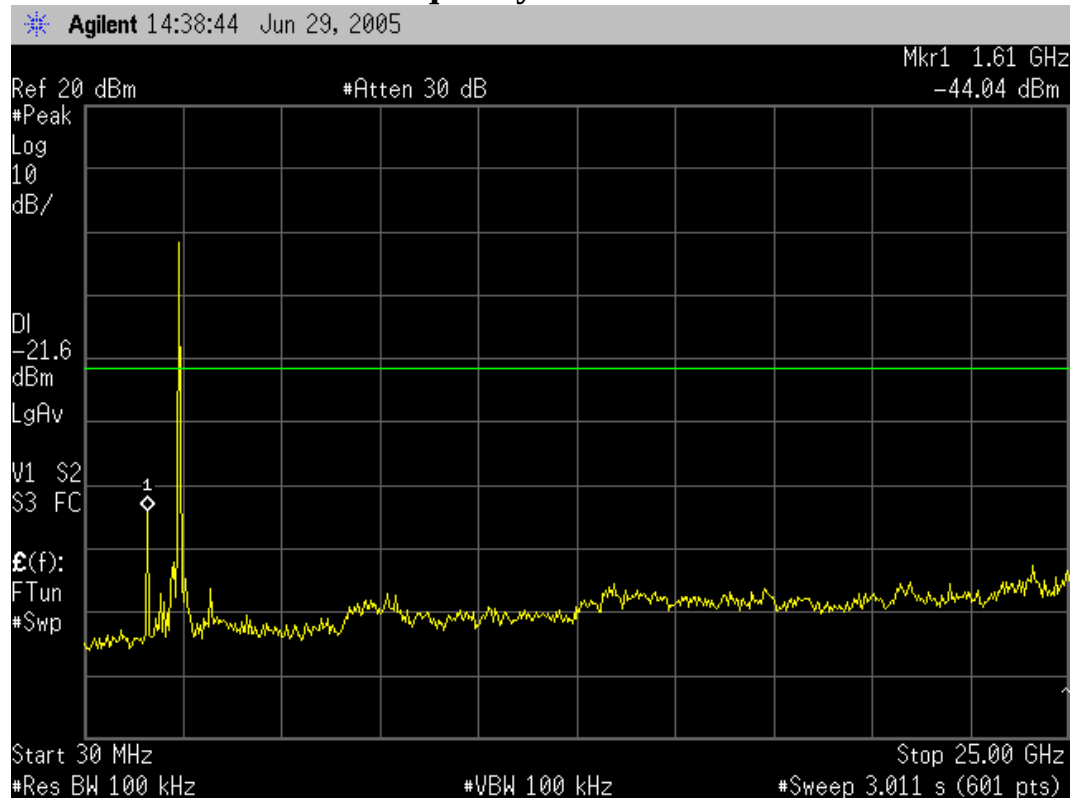
PASSED. The testing data was attached in the next pages.

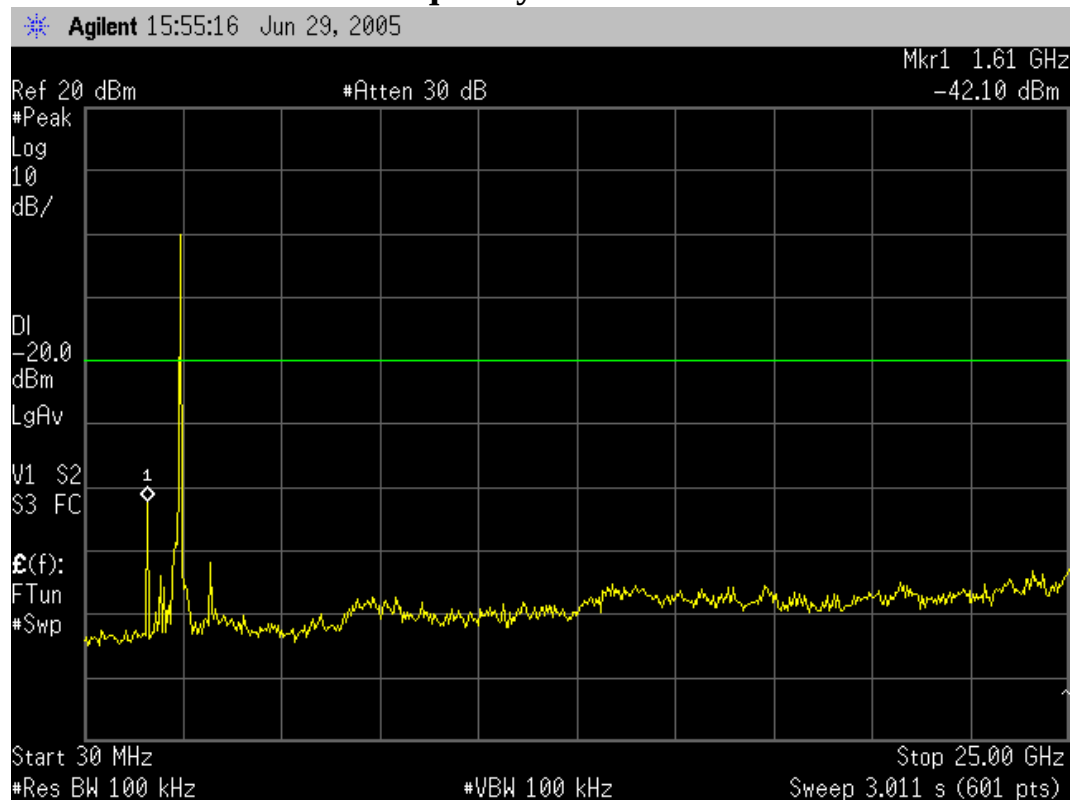
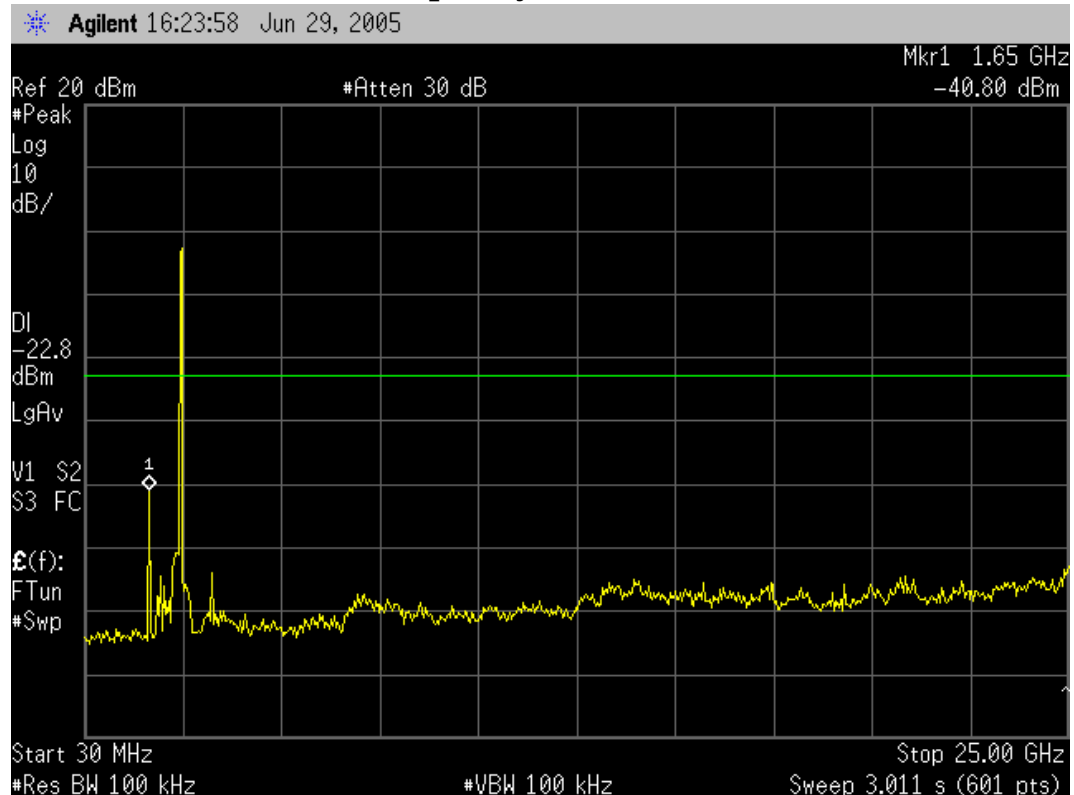
Test Date : Jun. 29, 2005 Temperature : 28 °C Humidity : 65 %

1. 2412MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -44.04dBm is max value that is lower than 20dB of primary channel.
2. 2437MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -42.10dBm is max value that is lower than 20dB of primary channel.
3. 2462MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -40.80dBm is max value that is lower than 20dB of primary channel.

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

Frequency : 2412MHz



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.

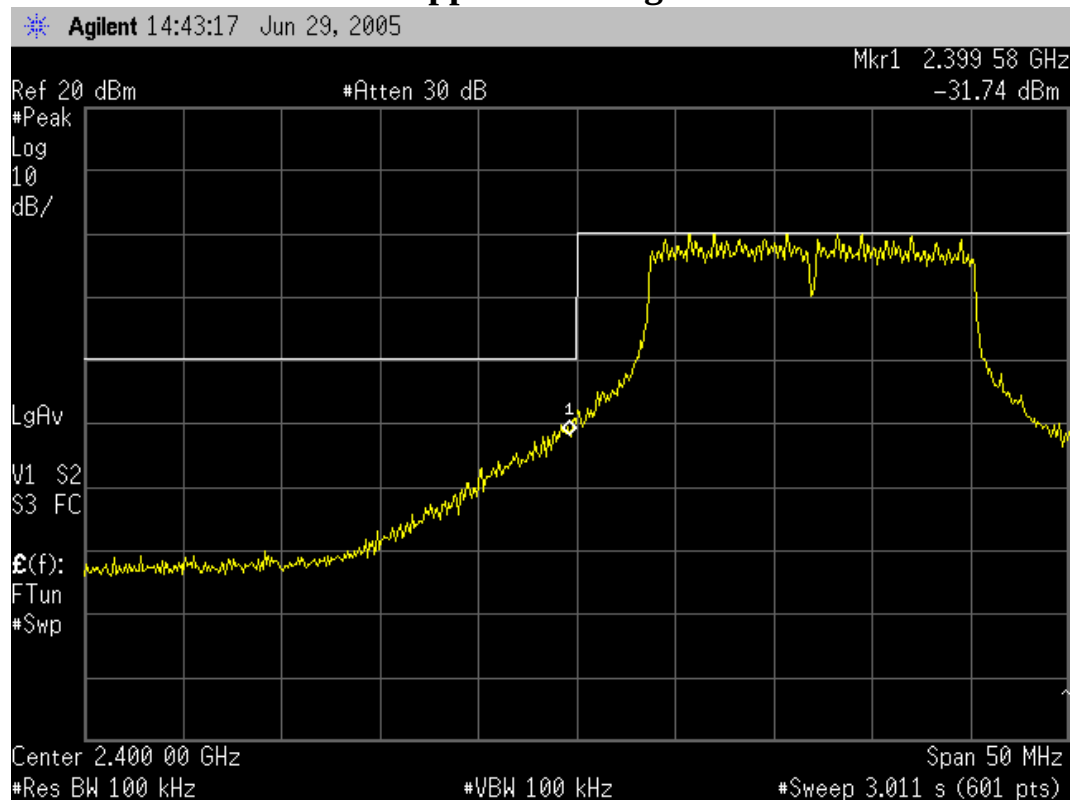
7.6. Test Results

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

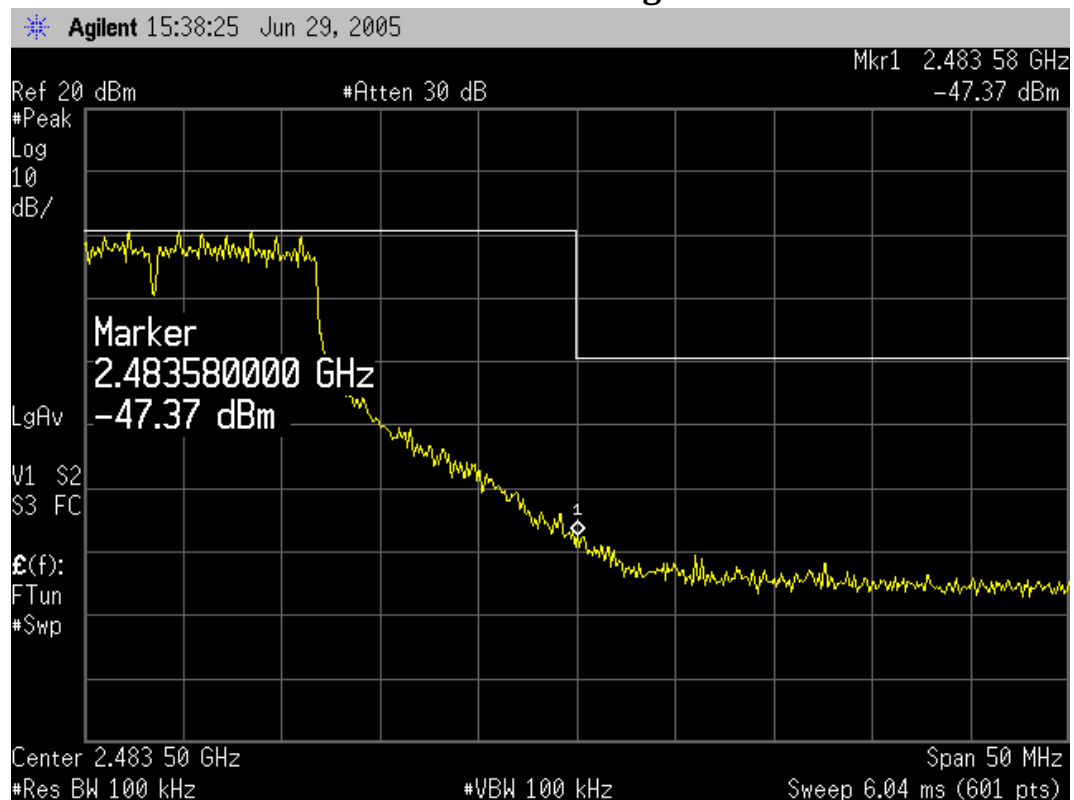
Test Date : Jun. 29, 2005 Temperature : 28 °C Humidity : 65 %

1. Upper Band edge: The highest emission level is – 31.74dBm on 2.39958GHz_o.
2. Below Band edge : The highest emission level is – 47.37dBm on 2.48358GHz_o.

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

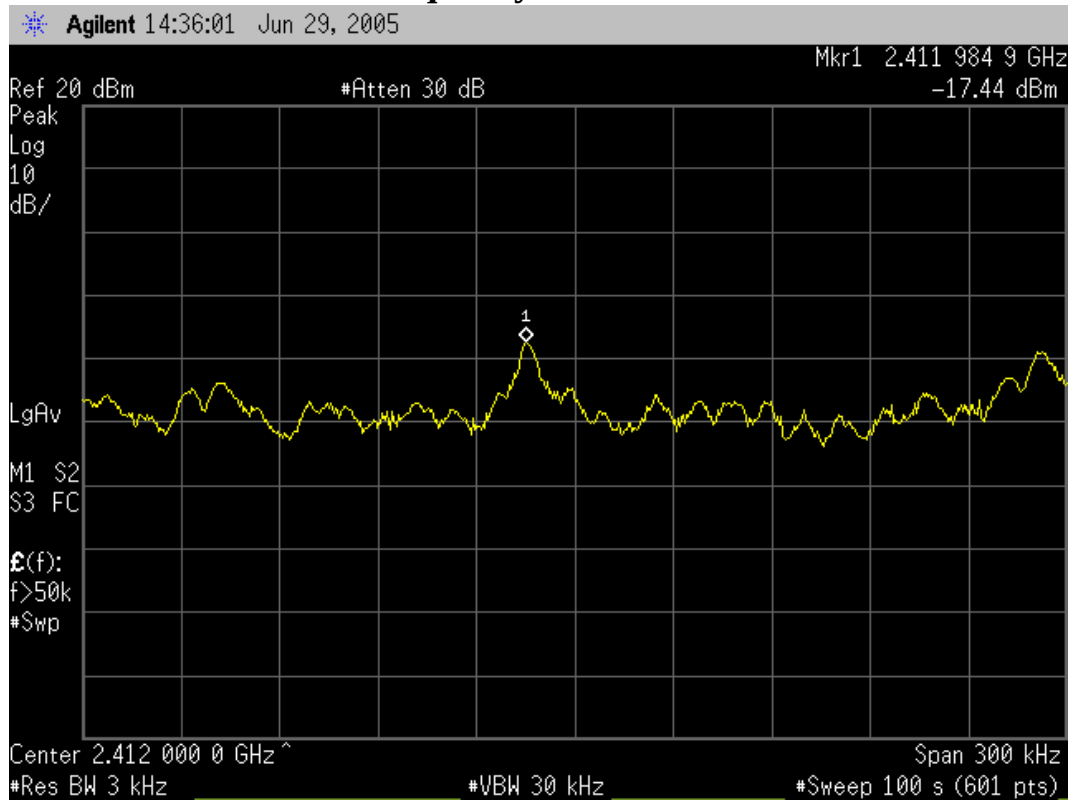
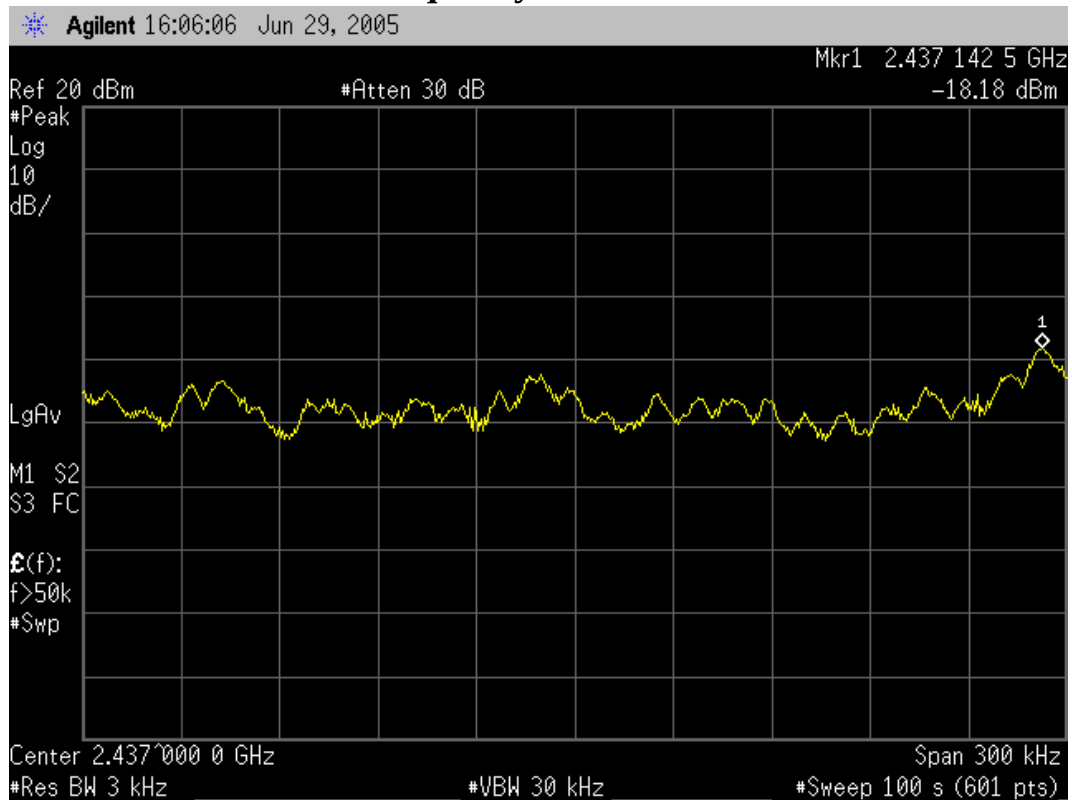
The RF output of EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, span 300kHz set sweep time = span/3kHz.

8.6. Test Results

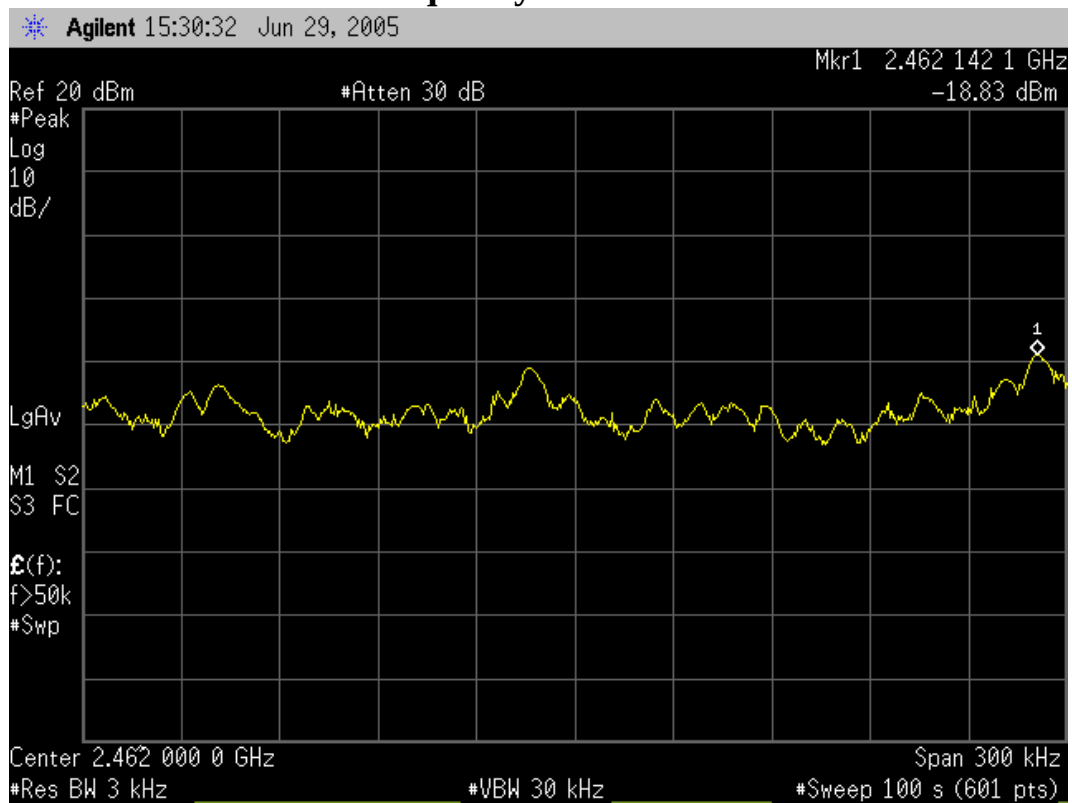
PASSED. All the test results are attached in next pages.

Test Date : Jun. 29, 2005 Temperature : 28 °C Humidity : 65 %

Channel	Frequency	Power Spectral Density	Limit
1	2412MHz	-17.44dBm	8dBm
6	2437MHz	-18.18dBm	8dBm
11	2462MHz	-18.83dBm	8dBm

Frequency : 2412MHz**Frequency : 2437MHz**

Frequency : 2462MHz

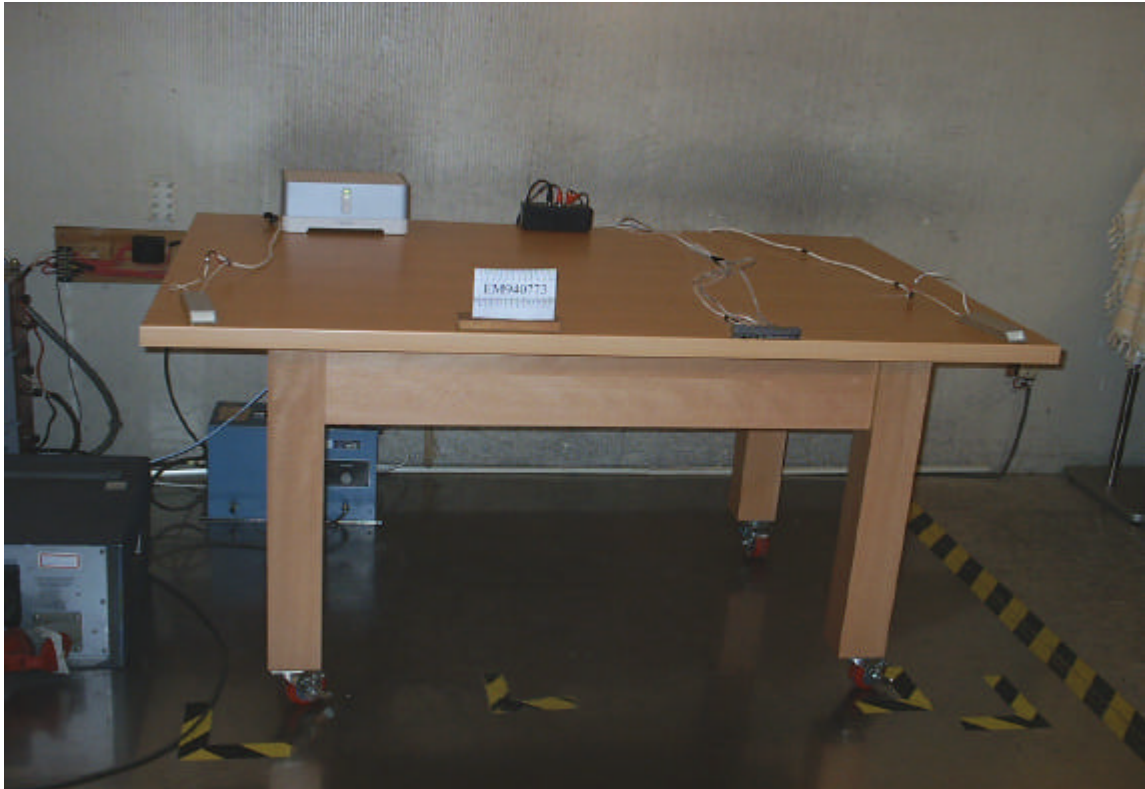


9. DEVIATION TO TEST SPECIFICATIONS

【NONE】

10.PHOTOGRAPHS

10.1.Photos of Conducted Emission Measurement



FRONT VIEW OF CONDUCTED MEASUREMENT



BACK VIEW OF CONDUCTED MEASUREMENT

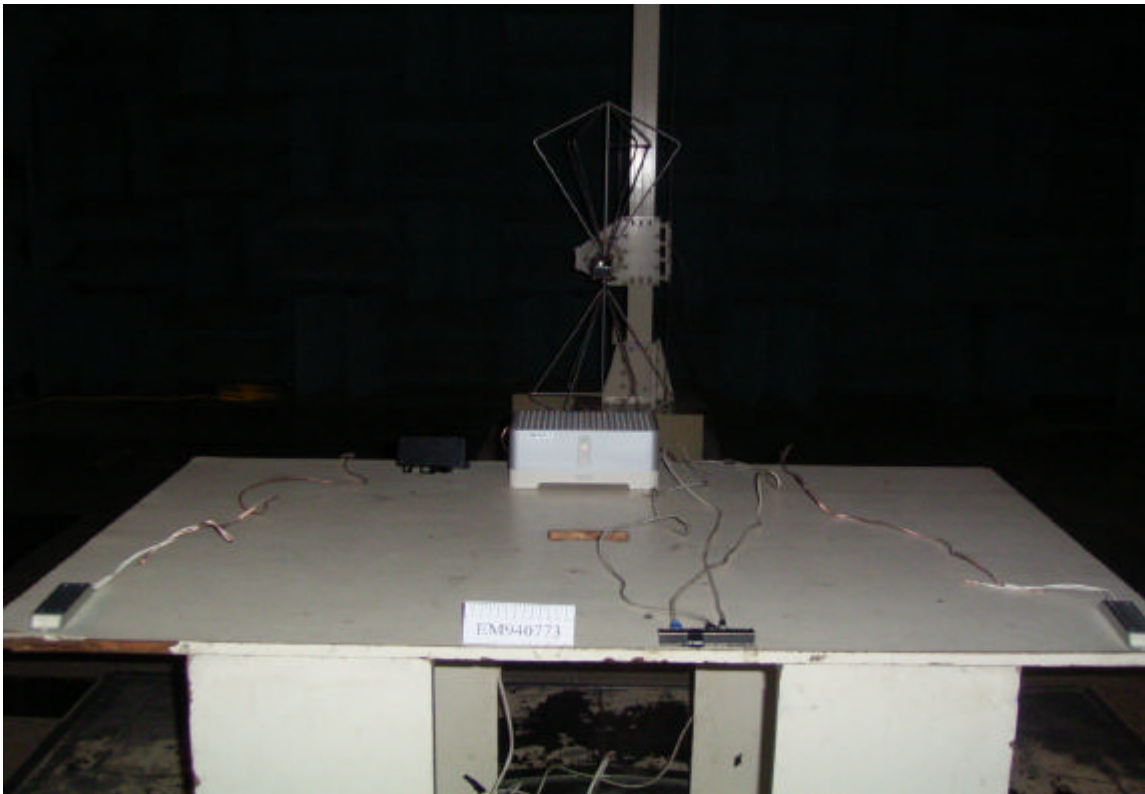
PARTNER NOTEBOOK PC & CONTROLLER



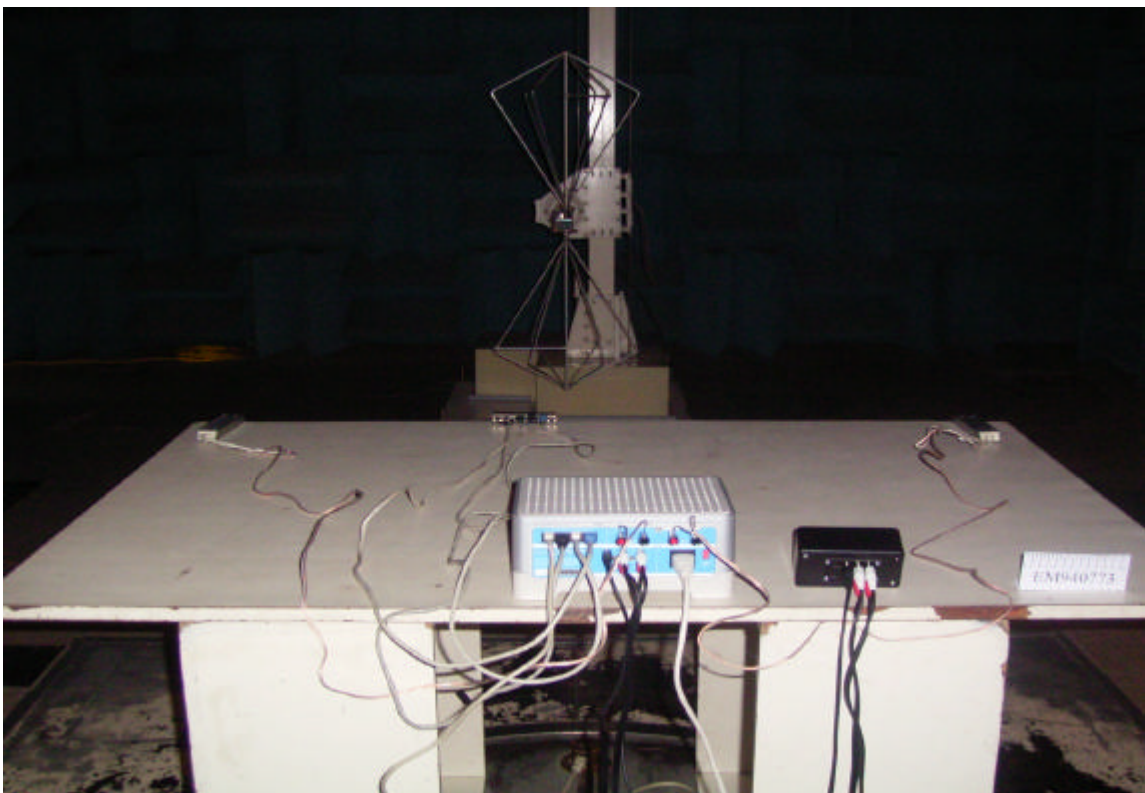
VIEW OF CONDUCTED MEASUREMENT

10.2. Photos of Radiated Measurement at Semi-Anechoic Chamber

10.2.1. Frequency Range: 30MHz to 1GHz

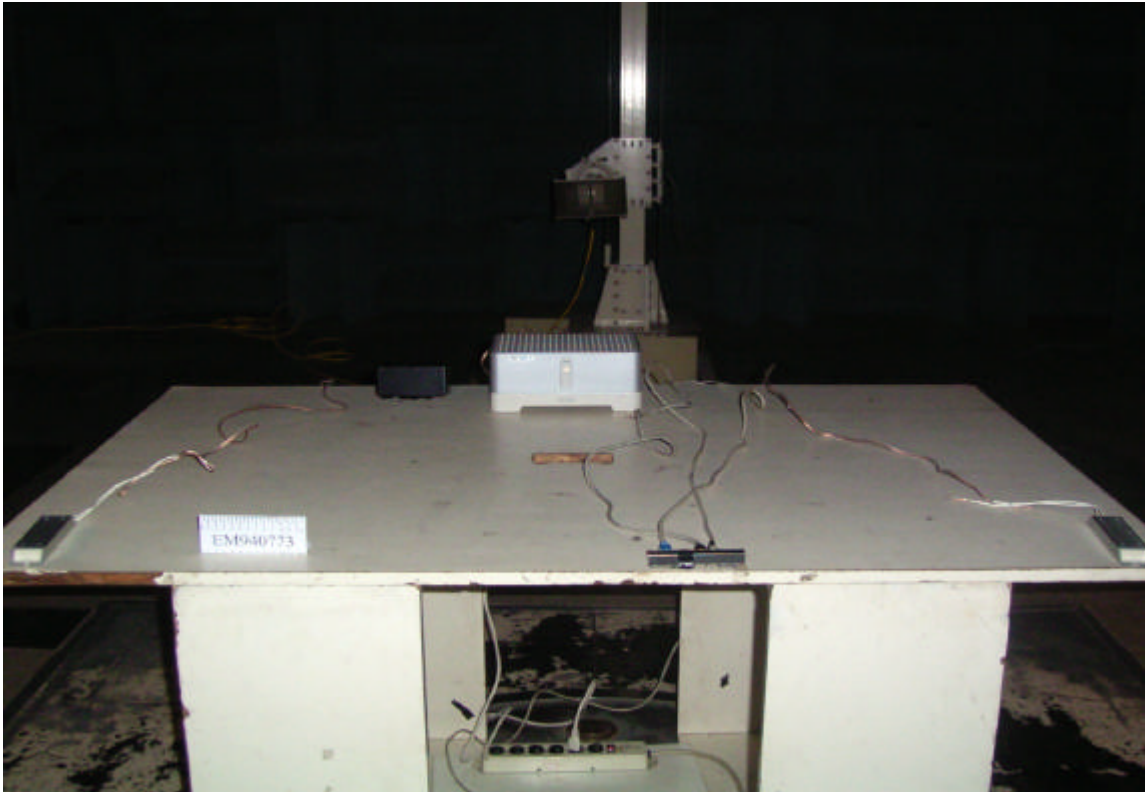


FRONT VIEW OF RADIATED MEASUREMENT

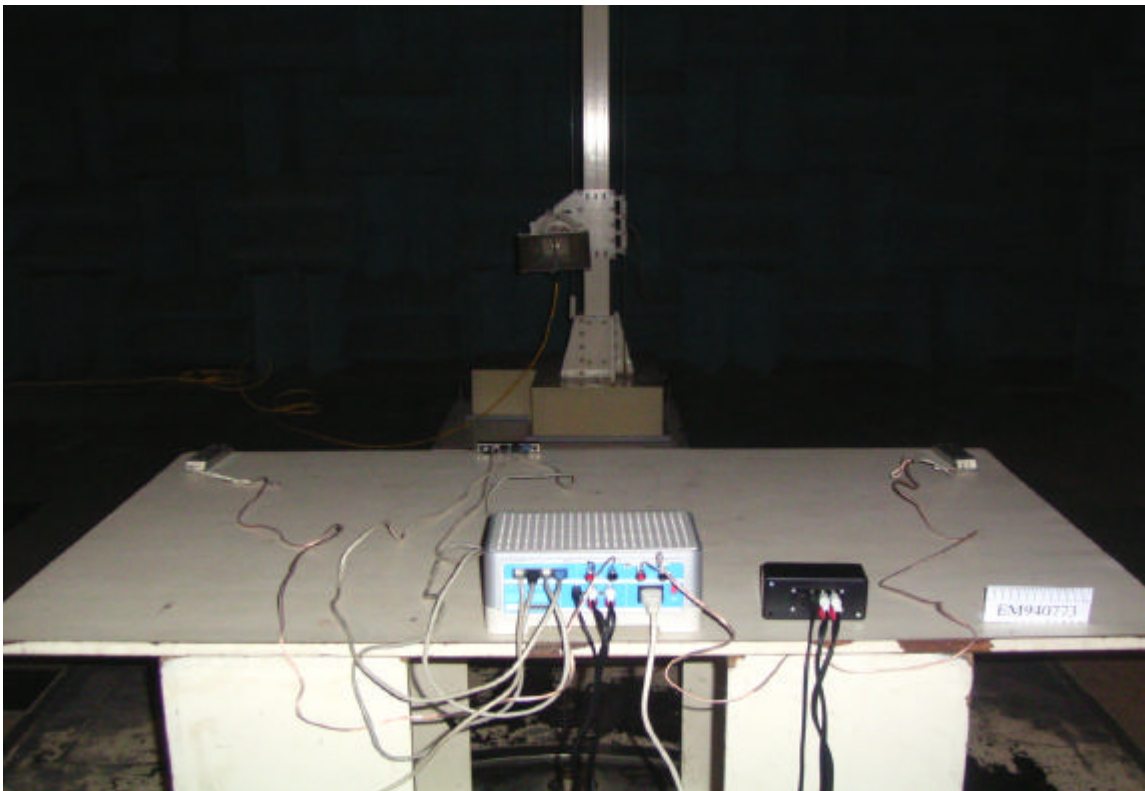


BACK VIEW OF RADIATED MEASUREMENT

10.2.2. Frequency Range: Above 1GHz



FRONT VIEW OF RADIATED MEASUREMENT



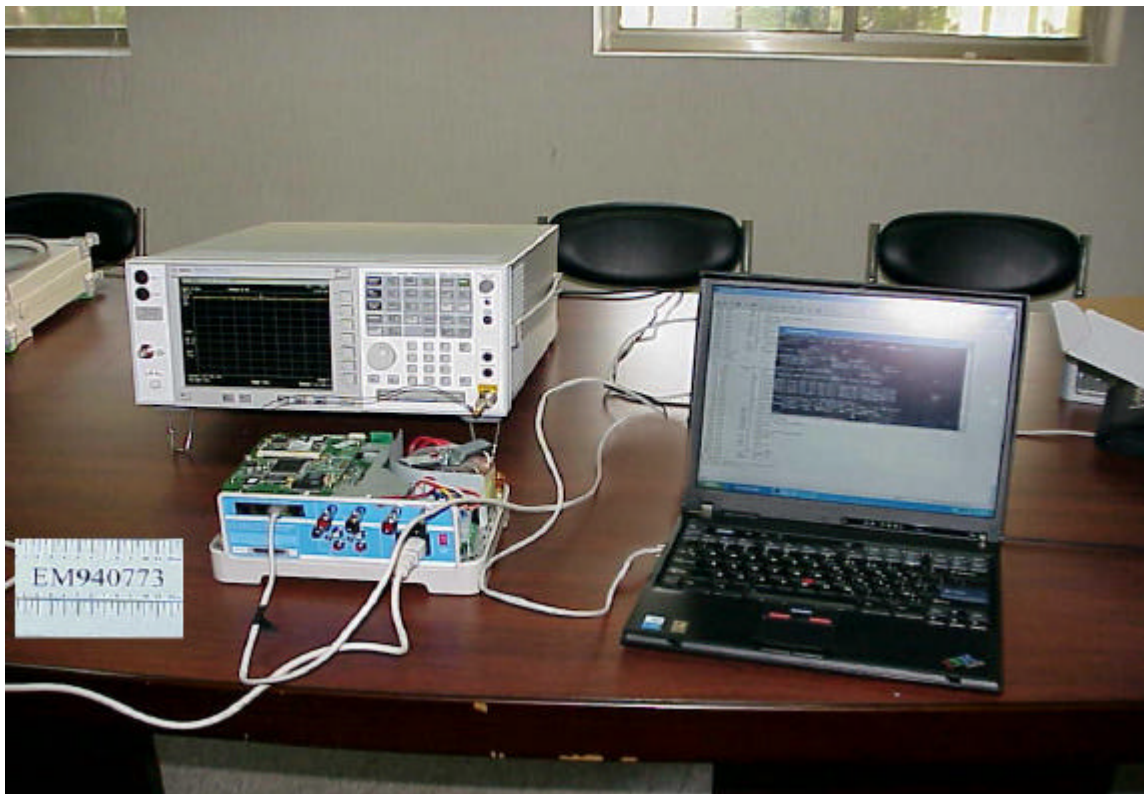
BACK VIEW OF RADIATED MEASUREMENT

PARTNER NOTEBOOK PC & CONTROLLER



VIEW OF RADIATED MEASUREMENT

10.3. Photo of Measurement for Section 4、 6 ~ 8



10.4. Photo of Measurement for Section 5

