



## Test Report

Product Name	Aperion Home Audio Link
Model No	HAL-1R
FCC ID.	BJM-HAL1R

Applicant	TATUNG CO.
Address	22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.

Date of Receipt	Dec. 03, 2009
Issue Date	Dec. 14, 2009
Report No.	09C115R-RFUSP42V01
Report Version	V1.0

The test results relate only to the samples tested.

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# Test Report Certification

Issue Date: Dec. 14, 2009

Report No.: 09C115R-RFUSP42V01



**Accredited by NIST (NVLAP)**  
NVLAP Lab Code: 200533-0

Product Name	Aperion Home Audio Link
Applicant	TATUNG CO.
Address	22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.
Manufacturer	TATUNG CO.
Model No.	HAL-1R
EUT Rated Voltage	DC 5V (Power by USB)
EUT Test Voltage	AC 120V/60Hz
Trade Name	Aperion
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2008 ANSI C63.4: 2003
Test Result	Complied



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Tested By :

*Johnson Liao*

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Testing Laboratory

0914

Approved By :

*Vincent Lin*

( Manager / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Aperion Home Audio Link
Trade Name	Aperion
Model No.	HAL-1R
FCC ID.	BJM-HAL1R
Frequency Range	2405 – 2479MHz
Type of Modulation	$\pi/4$ DQPSK (Differential Quadrature Phase Shift Keying)
Number of Channels	38
Channel Control	Auto
Antenna Type	Printer on PCB
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: Ktec,M/N:KSUFB0500050W1US Input: AC 100-240V, 50/60Hz,0.15A Output: DC 5V,0.5A Cable IN:Non-Shielded,0.09m

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	TATUNG	N/A	Printer on PCB	3.52dBi in 2.4 GHz

## Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 2:	2405 MHz	Channel 3:	2407 MHz	Channel 4:	2409 MHz
Channel 5:	2411 MHz	Channel 6:	2413 MHz	Channel 7:	2415 MHz
Channel 8:	2417 MHz	Channel 9:	2419 MHz	Channel 10:	2421 MHz
Channel 11:	2423 MHz	Channel 12:	2425 MHz	Channel 13:	2427 MHz
Channel 14:	2429 MHz	Channel 15:	2431 MHz	Channel 16:	2433 MHz
Channel 17:	2435 MHz	Channel 18:	2437 MHz	Channel 19:	2439 MHz
Channel 20:	2441 MHz	Channel 21:	2443 MHz	Channel 22:	2445 MHz
Channel 23:	2447 MHz	Channel 24:	2449 MHz	Channel 25:	2451 MHz
Channel 26:	2453 MHz	Channel 27:	2455 MHz	Channel 28:	2457 MHz
Channel 29:	2459 MHz	Channel 30:	2461 MHz	Channel 31:	2463 MHz
Channel 32:	2465 MHz	Channel 33:	2467 MHz	Channel 34:	2469 MHz
Channel 35:	2471 MHz	Channel 36:	2473 MHz	Channel 37:	2475 MHz
Channel 38:	2477 MHz	Channel 39:	2479 MHz		

## Note:

1. The EUT is a Aperion Home Audio Link with a built-in 2.4GHz transceiver.
2. These tests are conducted on a sample for the purpose of demonstrating compliance of transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 1.2. Operational Description

The EUT is a Aperion Home Audio Link with a built-in 2.4GHz transceiver. The EUT operation frequency is 2.405GHz-2.479GHz. The signals modulated by  $\pi/4$  DQPSK (Differential Quadrature Phase Shift Keying) are transmitted from the Printer on PCB Antenna of the EUT.

Test Mode:	Mode 1: Transmitter
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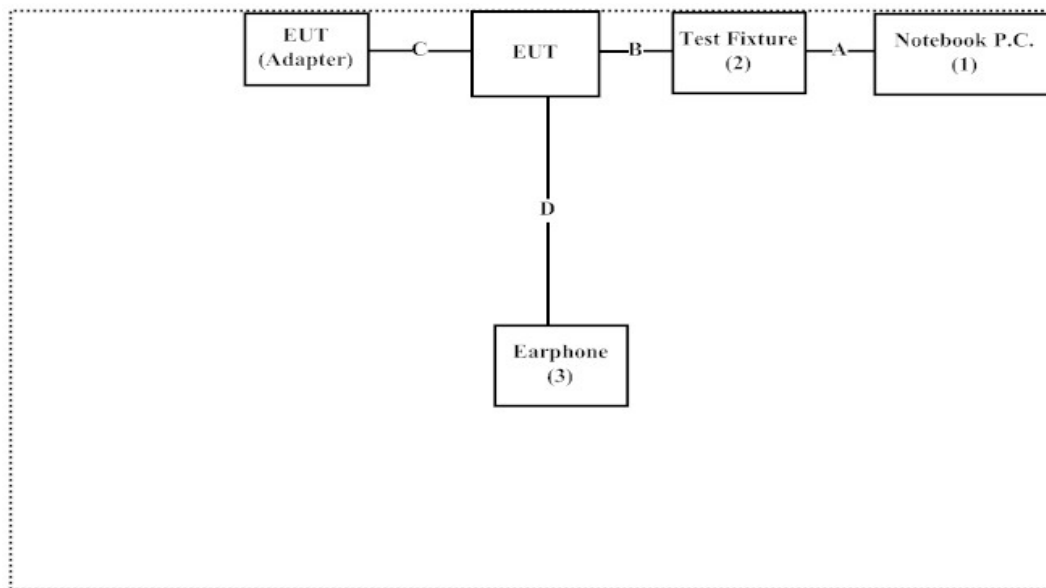
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook P.C.	DELL	PPT	N/A	Non-Shielded, 0.8m
2	Test Fixture	TATUNG	N/A	N/A	N/A
3	Earphone	TATUNG	N/A	N/A	N/A

	Signal Cable Type	Signal cable Description
A.	USB Cable	Shielded, 1.5m
B.	Controller Cable	Non-Shielded, 0.1m
C.	USB Cable	Shielded, 1m
D.	Earphone Cable	Non-Shielded, 1.2m

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Connect the EUT to a notebook via a test fixture.
- (3) Execute “AMD2 Debug.exe (V1.37.001)” on the notebook.
- (4) Setup the test channel.
- (5) Press “Apply” to start the continuous transmit.
- (6) Verify that the EUT works correctly.



**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation’s Web Site :

<http://tw.quietek.com/tw/emc/accreditations/accreditations.htm> The address and introduction of Quietek Corporation’s laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Registration Number: 92195



Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0



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FCC Accreditation Number: TW1014



## 2. Conducted Emission

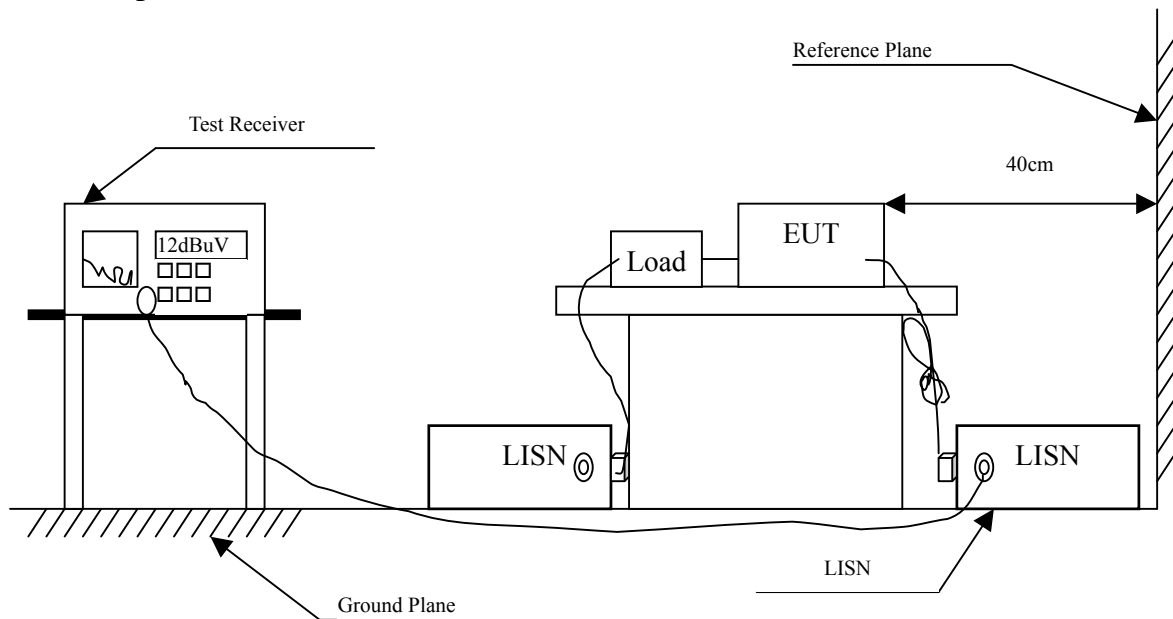
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2009	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2009	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2009	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2009	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

### 2.2. Test Setup



**2.3. Limits**

<b>FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit</b>		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

**2.4. Test Procedure**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

**2.5. Uncertainty**

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Aperion Home Audio Link  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>Line 1</b>					
<b>Quasi-Peak</b>					
0.185	9.719	39.110	48.829	-16.171	65.000
0.240	9.680	36.880	46.560	-16.869	63.429
0.302	9.650	34.470	44.120	-17.537	61.657
0.361	9.650	24.800	34.450	-25.521	59.971
4.072	9.700	19.850	29.550	-26.450	56.000
19.080	9.950	16.390	26.340	-33.660	60.000
<b>Average</b>					
0.185	9.719	22.790	32.509	-22.491	55.000
0.240	9.680	29.010	38.690	-14.739	53.429
0.302	9.650	32.310	41.960	-9.697	51.657
0.361	9.650	17.980	27.630	-22.341	49.971
4.072	9.700	6.310	16.010	-29.990	46.000
19.080	9.950	9.080	19.030	-30.970	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Aperion Home Audio Link  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>Line 2</b>					
<b>Quasi-Peak</b>					
0.181	9.732	42.250	51.982	-13.132	65.114
0.244	9.689	35.930	45.619	-17.695	63.314
0.302	9.660	33.900	43.560	-18.097	61.657
0.603	9.648	18.120	27.768	-28.232	56.000
4.498	9.700	18.430	28.130	-27.870	56.000
19.447	10.040	13.740	23.780	-36.220	60.000
<b>Average</b>					
0.181	9.732	30.210	39.942	-15.172	55.114
0.244	9.689	14.380	24.069	-29.245	53.314
0.302	9.660	30.220	39.880	-11.777	51.657
0.603	9.648	6.710	16.358	-29.642	46.000
4.498	9.700	2.230	11.930	-34.070	46.000
19.447	10.040	9.060	19.100	-30.900	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Peak Power Output

#### 3.1. Test Equipment

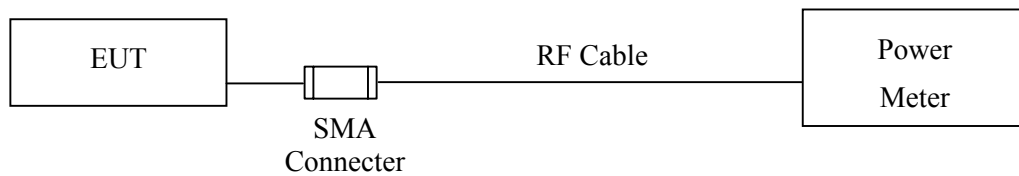
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2009
X Power Sensor	Anritsu	MA2491A/034457	May, 2009

Note: 1. All instruments are calibrated every one year.  
 2. The test instruments marked by “X” are used to measure the final test results.

#### 3.2. Test Setup

Conducted Measurement



#### 3.3. Limits

The maximum peak power shall be less 1 Watt.

#### 3.4. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

#### 3.5. Uncertainty

± 1.27 dB

### 3.6. Test Result of Peak Power Output

Product : Aperion Home Audio Link  
Test Item : Peak Power Output Data  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 02	2405.00	-3.65 dBm	1 Watt= 30 dBm	Pass
Channel 20	2441.00	-4.05 dBm	1 Watt= 30 dBm	Pass
Channel 39	2479.00	-3.59 dBm	1 Watt= 30 dBm	Pass

## 4. Radiated Emission

### 4.1. Test Equipment

The following test equipment are used during the radiated emission test:

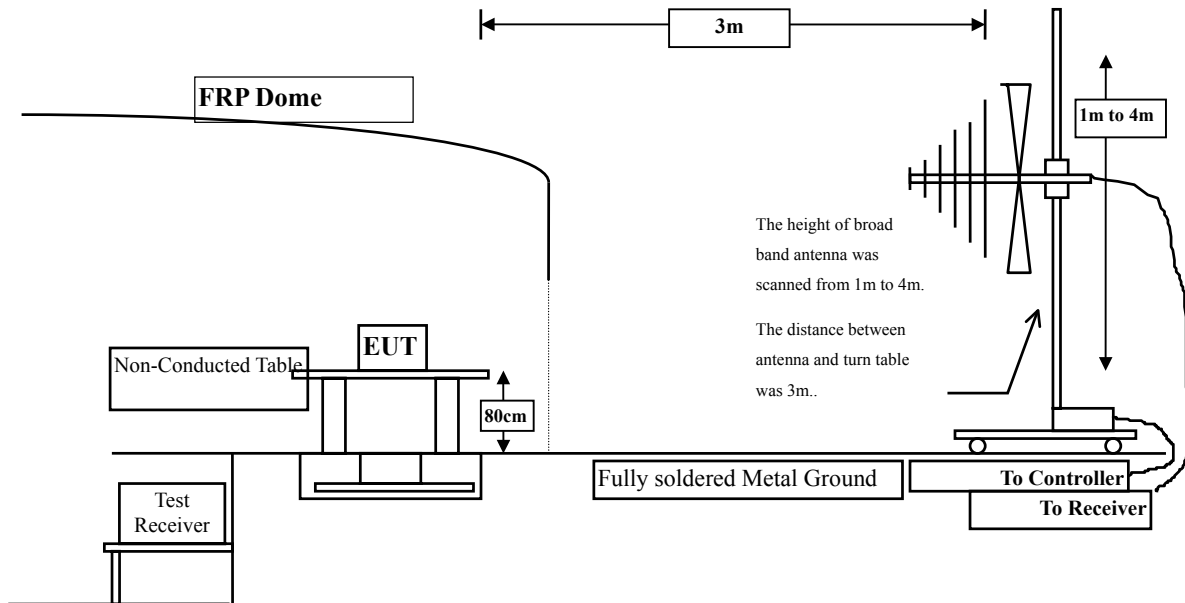
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X	Pre-Amplifier	AGILENT	8447D/2944A09549	Sep., 2009
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Spectrum Analyzer	Advantest	R3162/91700283	Oct., 2009
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2009
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with "X" are used to measure the final test results.

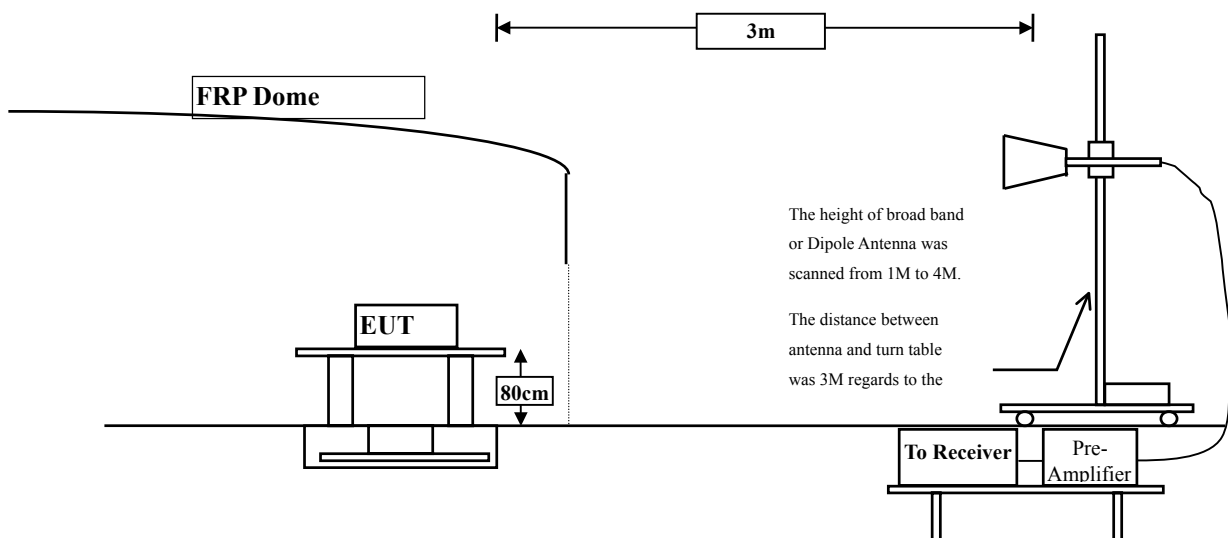


## 4.2. Test Setup

### Radiated Emission Below 1GHz



### Radiated Emission Above 1GHz



### 4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209(a) Limits</b>		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

#### 4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

#### 4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

#### 4.6. Test Result of Radiated Emission

Product : Aperion Home Audio Link  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2405MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4810.000	9.607	44.720	54.326	-19.674	74.000
7215.000	14.334	37.340	51.675	-22.325	74.000
9620.000	19.708	36.090	55.799	-18.201	74.000
<b>Average Detector:</b>					
4810.000	9.607	38.750	48.356	-5.644	54.000
9620.000	19.708	22.190	41.899	-12.101	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4810.000	8.347	45.490	53.836	-20.164	74.000
7215.000	15.419	40.280	55.699	-18.301	74.000
9620.000	18.918	36.640	55.559	-18.441	74.000
<b>Average Detector:</b>					
7215.000	15.419	23.010	38.429	-15.571	54.000
9620.000	18.918	22.400	41.319	-12.681	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means non-restricted bands, limit=fundamental level down 20dBc.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Aperion Home Audio Link  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4882.000	9.489	43.180	52.669	-21.331	74.000
7323.000	14.568	34.940	49.508	-24.492	74.000
9764.000	20.055	35.990	56.045	-17.955	74.000
<b>Average Detector:</b>					
9764.000	20.055	22.450	42.505	-11.495	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4882.000	8.979	46.690	55.669	-18.331	74.000
7323.000	15.262	34.200	49.462	-24.538	74.000
9764.000	19.255	36.160	55.415	-18.585	74.000
<b>Average Detector:</b>					
4882.000	8.979	41.920	50.899	-3.101	54.000
9764.000	19.255	22.390	41.645	-12.355	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means non-restricted bands, limit=fundamental level down 20dBc.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Aperion Home Audio Link  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2479MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4958.000	9.421	42.500	51.921	-22.079	74.000
7437.000	15.001	36.640	51.641	-22.359	74.000
9916.000	19.756	35.340	55.096	-18.904	74.000
<b>Average Detector:</b>					
9916.000	19.756	22.350	42.106	-11.894	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4958.000	9.699	47.230	56.929	-17.071	74.000
7437.000	15.378	39.540	54.918	-19.082	74.000
9916.000	18.901	35.680	54.581	-19.419	74.000
<b>Average Detector:</b>					
4958.000	9.699	41.420	51.119	-2.881	54.000
7437.000	15.378	30.380	45.758	-8.242	54.000
9916.000	18.901	22.190	41.091	-12.909	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means non-restricted bands, limit=fundamental level down 20dBc.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Aperion Home Audio Link  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2441 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
191.020	-10.541	47.100	36.559	-6.961	43.520
350.100	-2.695	34.822	32.127	-13.893	46.020
736.160	1.982	31.091	33.073	-12.947	46.020
885.540	5.669	28.447	34.116	-11.904	46.020
912.700	5.660	25.946	31.606	-14.414	46.020
1000.000	8.637	28.636	37.273	-16.727	54.000
<b>Vertical</b>					
109.540	-0.829	36.032	35.203	-8.317	43.520
212.360	-8.377	33.708	25.331	-18.189	43.520
365.620	-2.667	27.647	24.980	-21.040	46.020
509.180	-0.666	25.857	25.191	-20.829	46.020
720.640	-0.589	24.787	24.198	-21.822	46.020
967.020	7.541	21.203	28.744	-25.256	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

**5. RF antenna conducted test**

**5.1. Test Equipment**

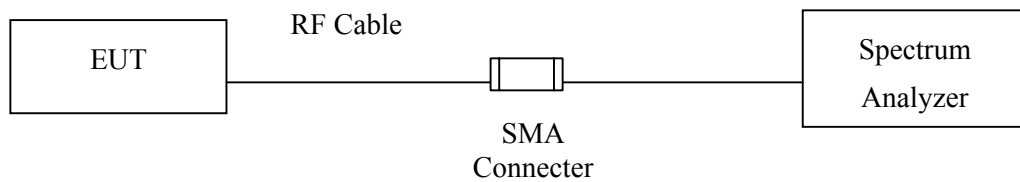
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with “X” are used to measure the final test results.

**5.2. Test Setup**

**RF antenna Conducted Measurement:**



**5.3. Limits**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz 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 the 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)).

**5.4. Test Procedure**

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.



## 5.5. Uncertainty

The measurement uncertainty

Conducted is defined as  $\pm 1.27\text{dB}$

**5.6. Test Result of RF antenna conducted test**

Product : Aperion Home Audio Link  
 Test Item : RF antenna conducted test  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

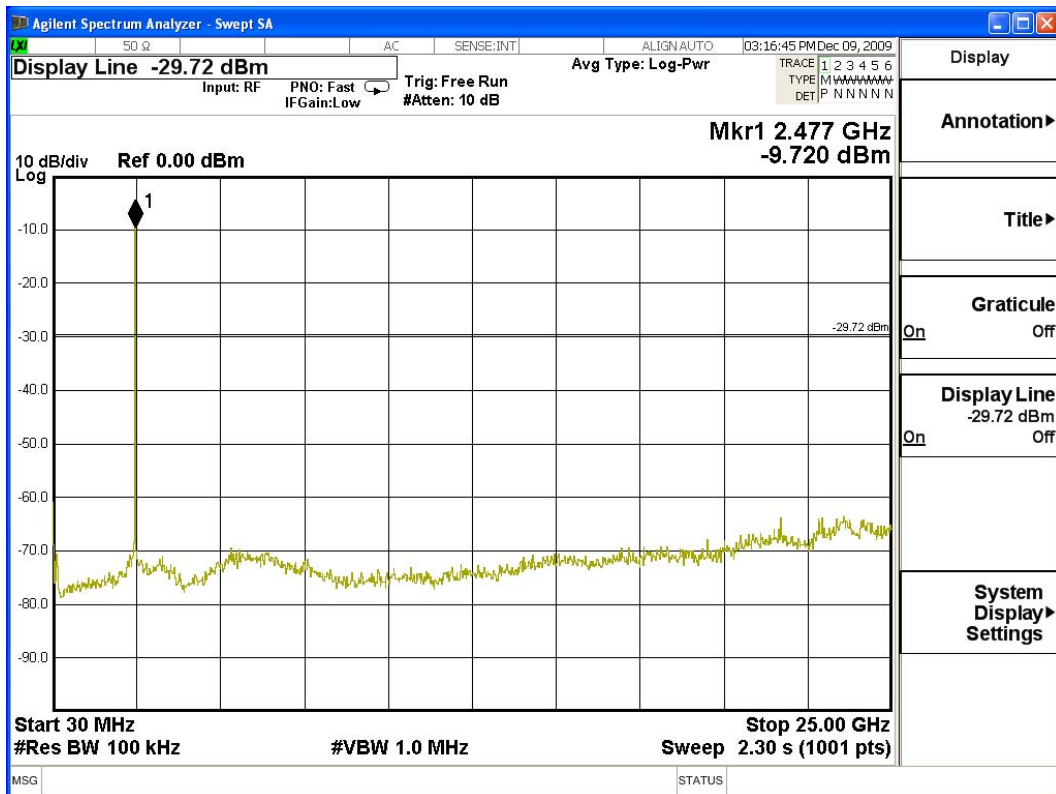
**Channel 02 (2405MHz) 30MHz-25GHz**



**Channel 20 (2441MHz) 30MHz-25GHz**



**Channel 39 (2479MHz) 30MHz-25GHz**



## 6. Band Edge

### 6.1. Test Equipment

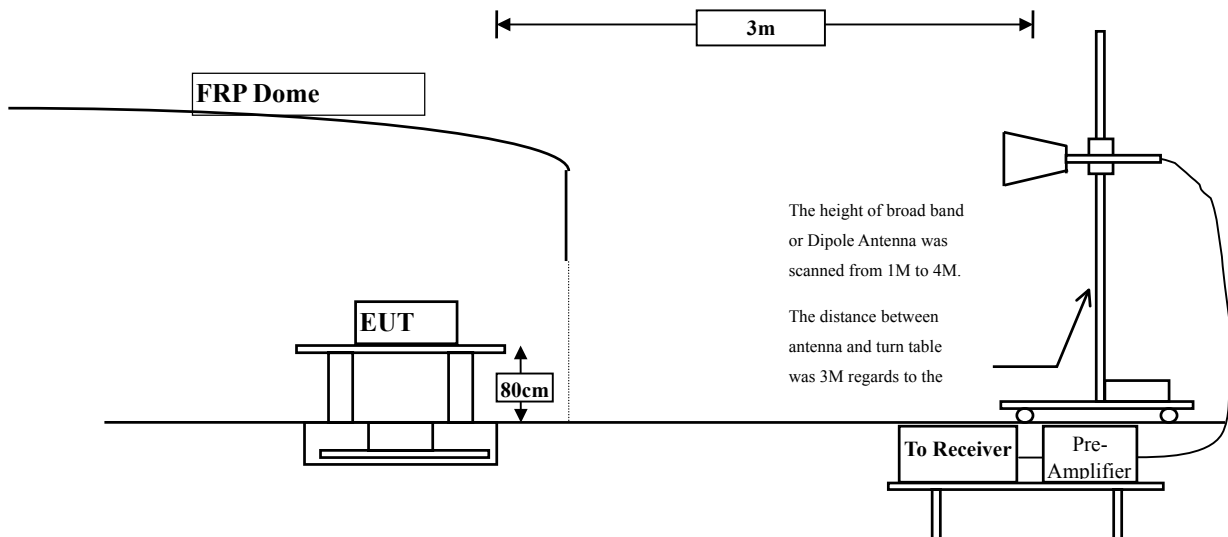
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X Pre-Amplifier	AGILENT	8447D/2944A09549	Sep., 2009
	X Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X Spectrum Analyzer	Advantest	R3162/91700283	Oct., 2009
	X Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2009
	X Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

### 6.2. Test Setup

#### RF Radiated Measurement:



### 6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

#### **6.4. Test Procedure**

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

#### **6.5. Uncertainty**

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

## 6.6. Test Result of Band Edge

Product : Aperion Home Audio Link  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2405	36.603	64.94	101.543	Peak
Horizontal	2405	36.603	61.49	98.093	Average
Vertical	2405	35.599	56.42	92.019	Peak
Vertical	2405	35.599	53.35	88.949	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

### Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2373	101.543	53.35	48.193	Peak
Horizontal	2373.2	98.093	61.61	36.483	Average
Vertical	2373	92.019	53.35	38.669	Peak
Vertical	2373.2	88.949	61.61	27.339	Average

Note:

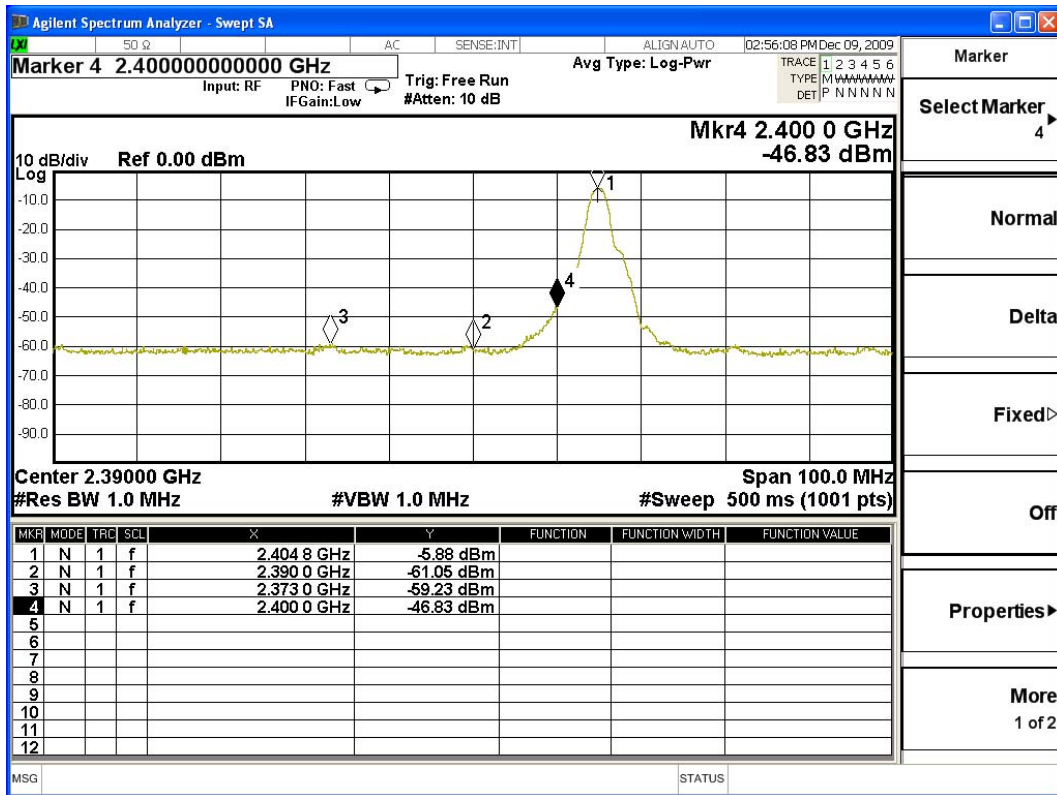
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

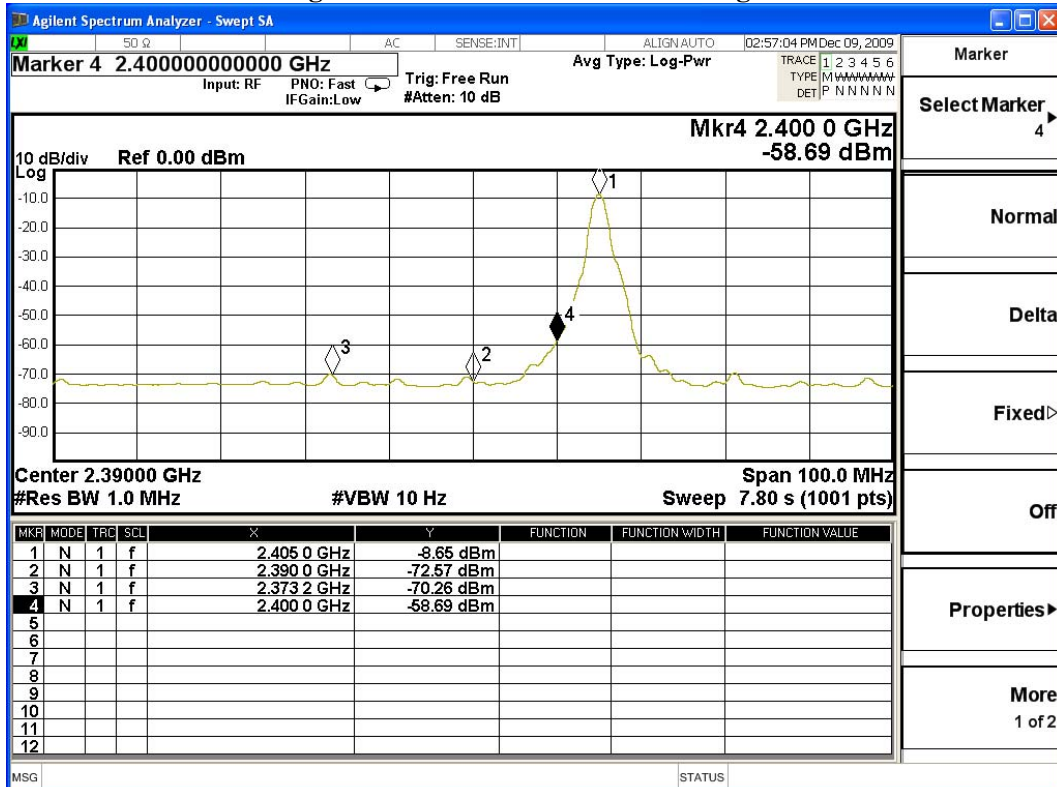
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2479	36.706	62.83	99.536	Peak
Horizontal	2479	36.706	59.58	96.286	Average
Vertical	2479	36.156	54.97	91.126	Peak
Vertical	2479	36.156	51.45	87.606	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

### Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	99.536	44.18	55.356	Peak
Horizontal	2483.5	96.286	51.89	44.396	Average
Vertical	2483.5	91.126	44.18	46.946	Peak
Vertical	2483.5	87.606	51.89	35.716	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

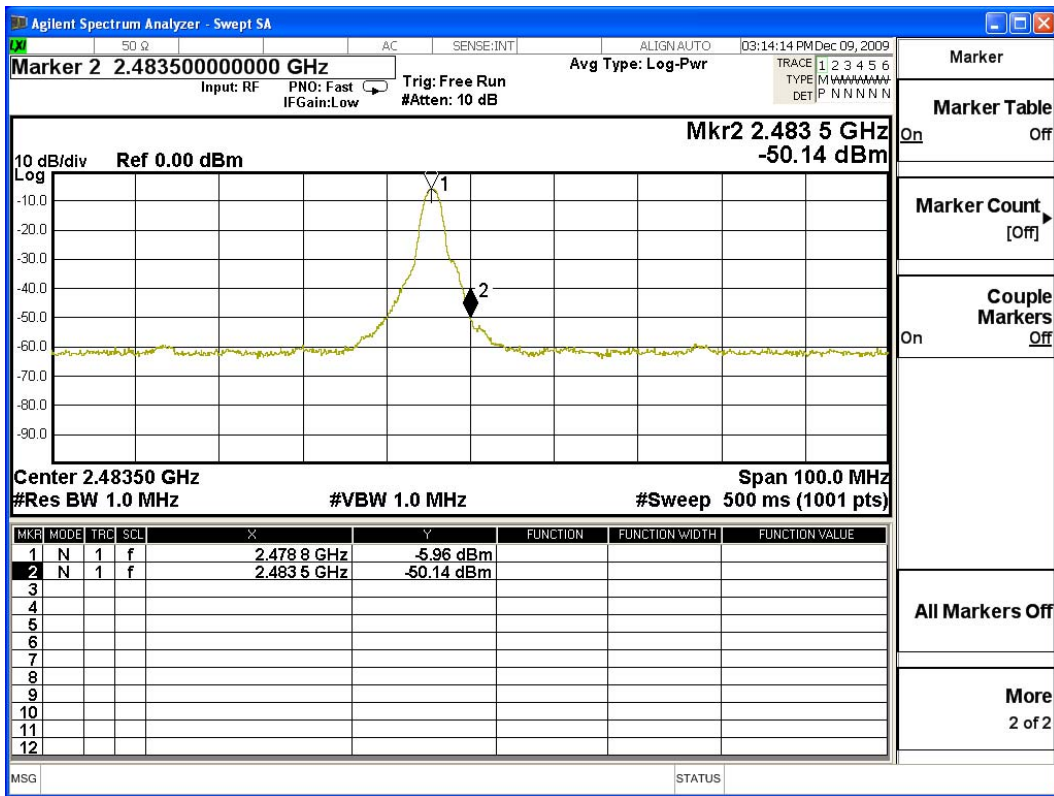
Band Edge field Strength = F -  $\Delta$

F = Fundamental field Strength (Peak or Average)

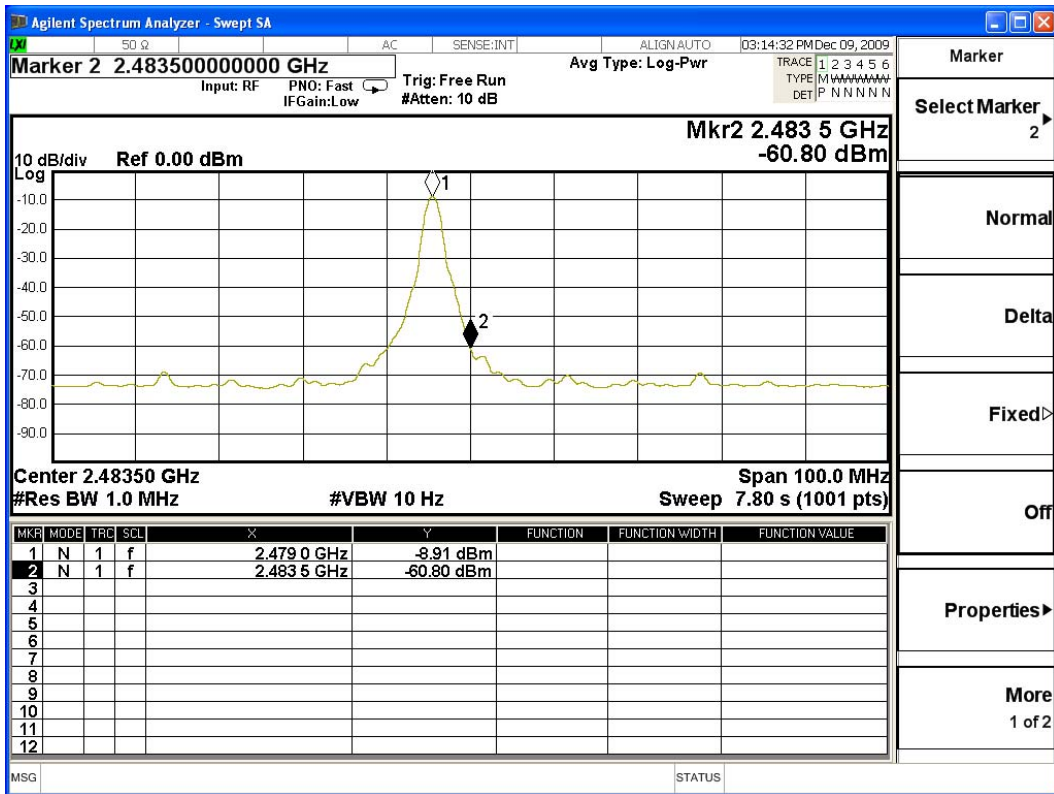
$\Delta$  = Conducted Band Edge Delta (Peak or Average)



### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



## 7. Occupied Bandwidth

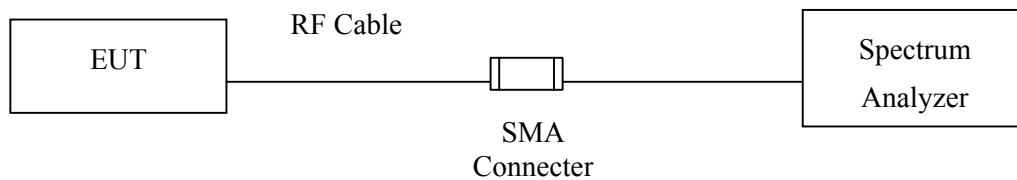
### 7.1. Test Equipment

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2009
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

Note: 1. All instruments are calibrated every one year.  
 2. The test instruments marked by “X” are used to measure the final test results.

### 7.2. Test Setup



### 7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

### 7.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

### 7.5. Uncertainty

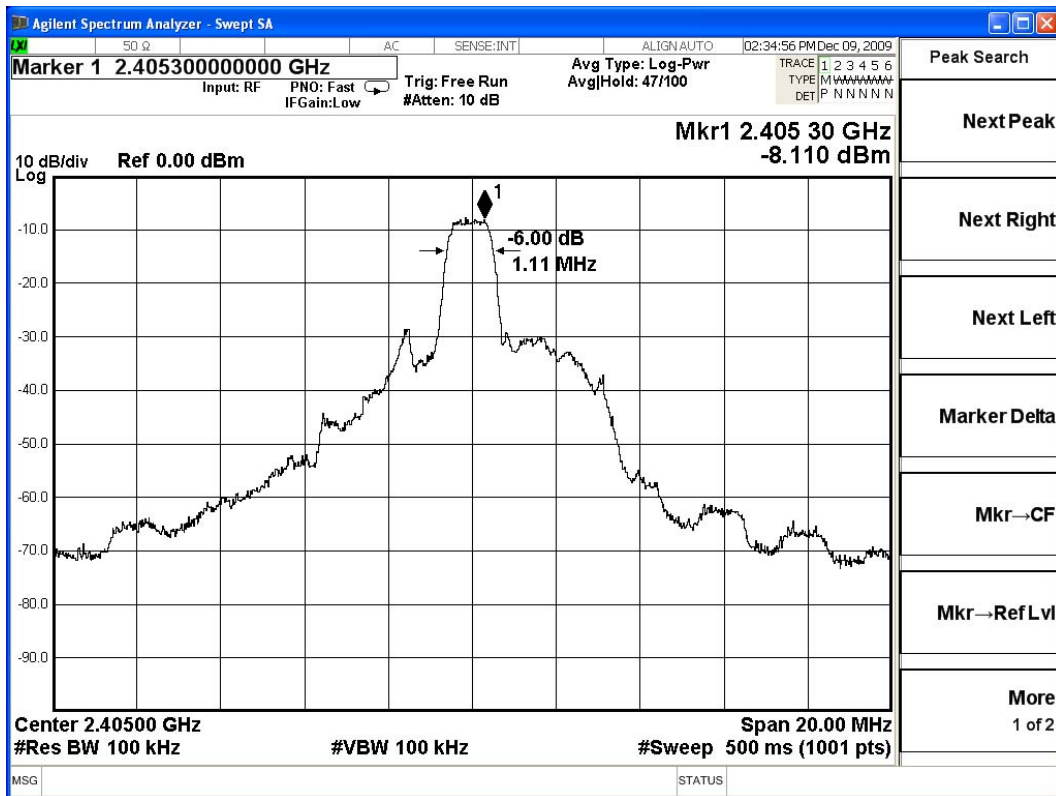
± 150Hz

### 7.6. Test Result of Occupied Bandwidth

Product : Aperion Home Audio Link  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2405MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
2	2405.00	1110	>500	Pass

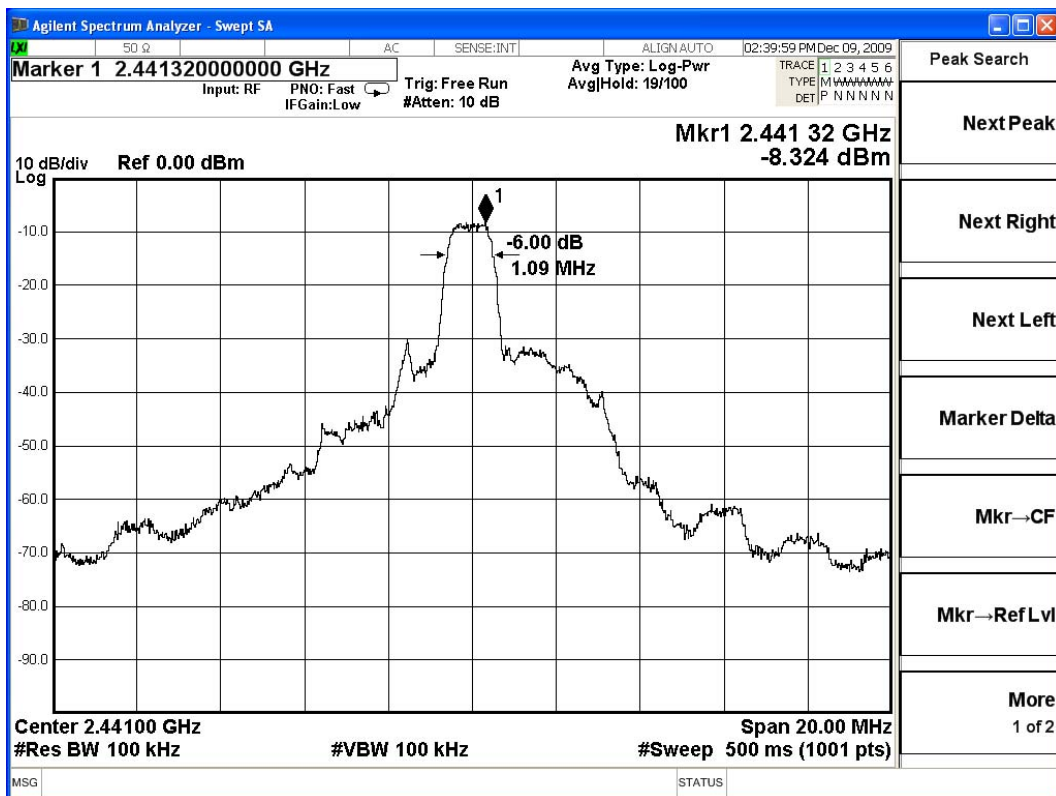
Figure Channel 2:



Product : Aperion Home Audio Link  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
20	2441.00	1090	>500	Pass

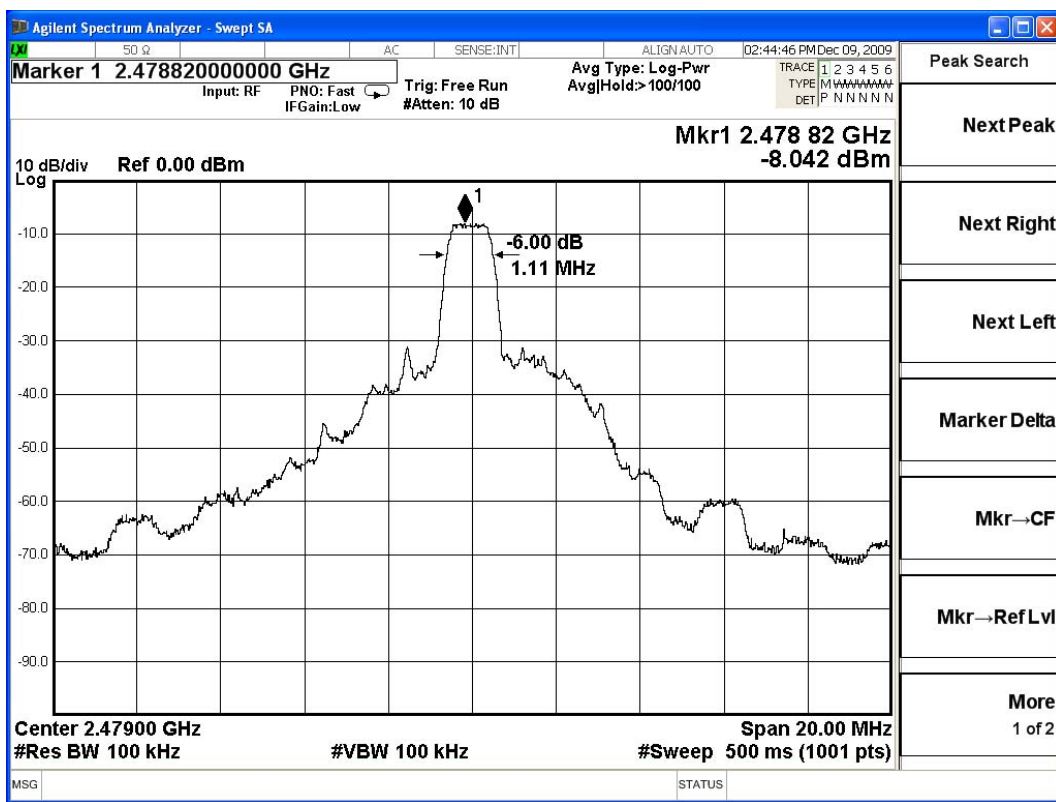
**Figure Channel 20:**



Product : Aperion Home Audio Link  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2479MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2479.00	1110	>500	Pass

**Figure Channel 39:**



## 8. Power Density

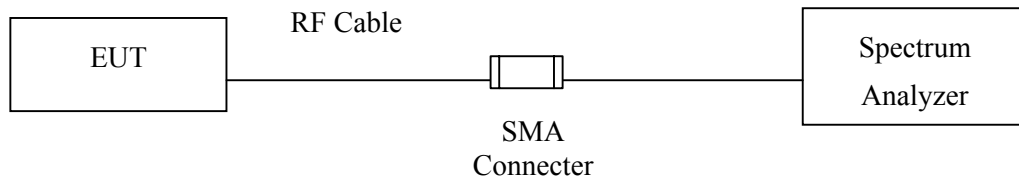
### 8.1. Test Equipment

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2009
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

Note: 1. All equipments are calibrated every one year.  
 2. The test instruments marked by “X” are used to measure the final test results.

### 8.2. Test Setup



### 8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

### 8.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.  
 Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

### 8.5. Uncertainty

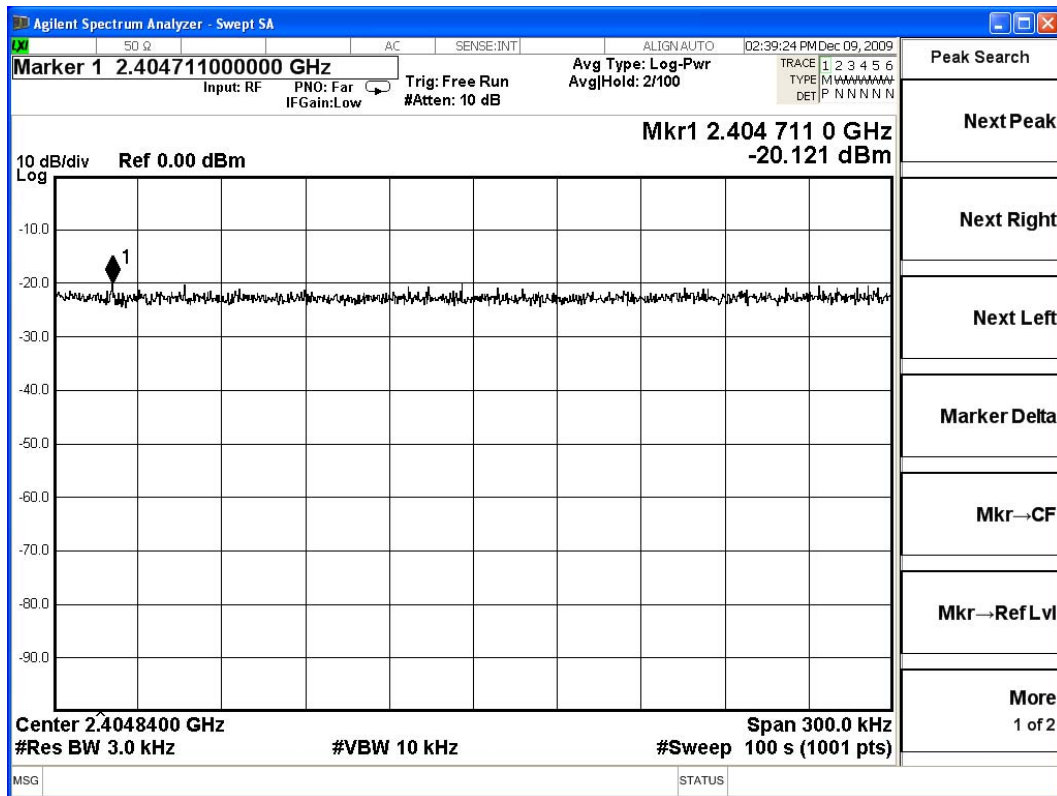
± 1.27 dB

### 8.6. Test Result of Power Density

Product : Aperion Home Audio Link  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2405MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
2	2405.00	-20.121	< 8dBm	Pass

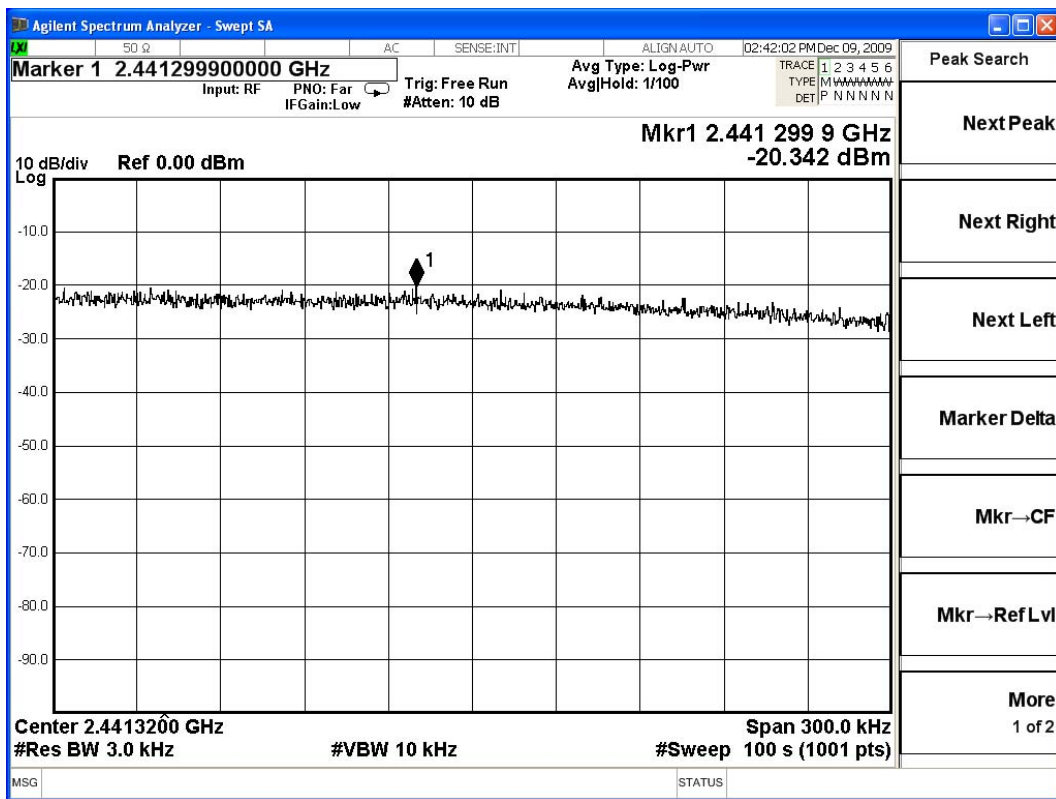
Figure Channel 2:



Product : Aperion Home Audio Link  
 Test Item : Power Density Data  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmitter (2441Hz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
20	2441.000	-20.342	< 8dBm	Pass

**Figure Channel 20:**

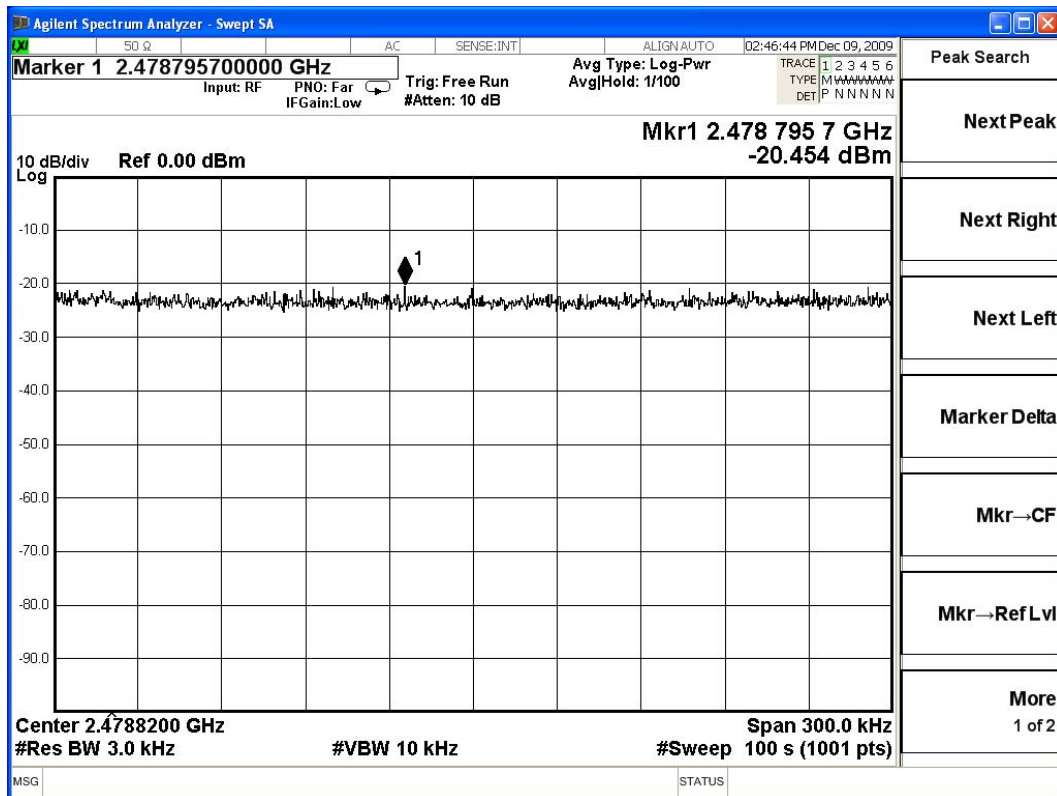




Product : Aperion Home Audio Link  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2479MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2479.00	-20.454	< 8dBm	Pass

**Figure Channel 39:**



## 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.