

| Product Name | Aperion Home Audio Link |
|--------------|-------------------------|
| Model No     | HAL-1T                  |
| FCC ID.      | BJM-HAL1T               |

| 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. 15, 2009      |
| Report No.      | 09C120R-RFUSP42V01 |
| Report Version  | V1.0               |

The test results relate only to the samples tested.

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# Test Report Certification

Issue Date: Dec. 15, 2009 Report No.: 09C120R-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-1T   |        |  |
| 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                   | G      |  |
|                     | ANSI C63.4: 2003   | ٧Ļ     |  |
| Test Result         | Complied   | ч<br>Ч |  |

The test results relate only to the samples tested.

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Documented By :

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(Engineering Adm. Specialist / Rita Huang)

Tested By

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(Engineer / Johnson Liao)

Approved By



(Manager / Vincent Lin)

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- Attachment 2: EUT Detailed Photographs

# 1. GENERAL INFORMATION

# 1.1. EUT Description

| Product Name                    | Aperion Home Audio Link                                    |  |
|---------------------------------|--|--|
| Trade Name                      | Aperion  |  |
| Model No.                       | HAL-1T   |  |
| FCC ID.                         | BJM-HAL1T  |  |
| 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"                          |  |
| Audio Cable                     | Non-Shielded, 0.3m   |  |
| Power Adapter                   | MFR: Ktec, M/N: KSUFB0500050W1US                           |  |
| Input: 100-240V, 50-60Hz, 0.15A |  |  |
|                                 | Output: 5.0V – 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 | 1.88 dBi for 2.4 GHz |

| senter rrequency | of Luch Chuin | <b>IU</b> 1. |           |             |           |
|------------------|---------------|--------------|-----------|-------------|-----------|
| 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  |
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| 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  |             |           |

Center Frequency of Each Channel:

- 1. The EUT is an Aperion Home Audio Link with a built-in 2.4GHz transceiver.
- 2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247.
- 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 |
|------------|---------------------|
|------------|---------------------|

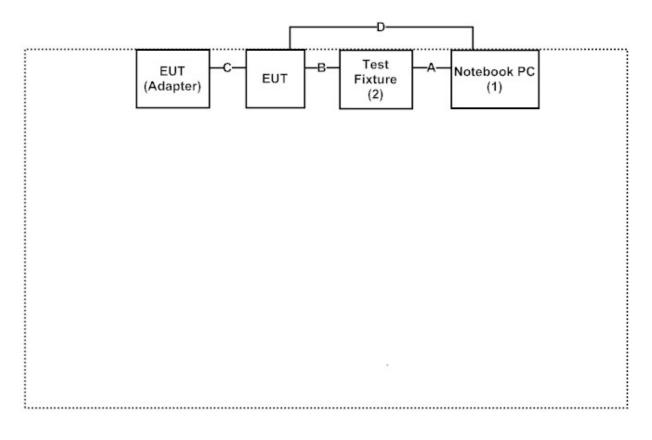
### **1.3.** Tested System Details

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 PC  | DELL         | РРТ       | N/A        | Non-Shielded, 0.8m |
| (2) | Test Fixture | TATUNG       | N/A       | N/A        | N/A                |

| Signa | l Cable Type  | Signal cable Description |
|-------|---------------|--------------------------|
| А     | USB Cable     | Shielded, 1.5m           |
| в     | Control Cable | Non-Shielded, 0.1m       |
| С     | USB Cable     | Shielded, 1.0m           |
| D     | Audio Cable   | Non-Shielded, 0.3m       |

# **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 : <u>http://www.quietek.com/</u>

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

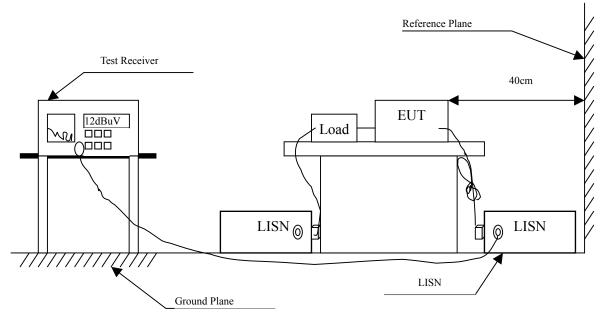
### 2.1. Test Equipment

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 Roo | m            |                    | N/A       |             |

Note: All instruments are calibrated every one year.

# 2.2. Test Setup



### 2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit |       |        |  |  |
|---|-------|--------|--|--|
| Frequency   | I     | limits |  |  |
| MHz   | 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

| : | Aperion Home Audio Link       |
|---|-------------------------------|
| : | Conducted Emission Test       |
| : | Line 1                        |
| : | Mode 1: Transmitter (2441MHz) |
|   | :                             |

| Frequency  | Correct | Reading | Measurement | Margin  | Limit  |
|------------|---------|---------|-------------|---------|--------|
|            | Factor  | Level   | Level       |         |        |
| MHz        | dB      | dBuV    | dBuV        | dB      | dBuV   |
| Line 1     |         |         |             |         |        |
| Quasi-Peak |         |         |             |         |        |
| 0.181      | 9.724   | 40.960  | 50.684      | -14.430 | 65.114 |
| 0.240      | 9.680   | 35.010  | 44.690      | -18.739 | 63.429 |
| 0.302      | 9.650   | 28.510  | 38.160      | -23.497 | 61.657 |
| 0.361      | 9.650   | 22.000  | 31.650      | -28.321 | 59.971 |
| 1.880      | 9.680   | 19.230  | 28.910      | -27.090 | 56.000 |
| 3.888      | 9.700   | 22.940  | 32.640      | -23.360 | 56.000 |
|            |         |         |             |         |        |
| Average    |         |         |             |         |        |
| 0.181      | 9.724   | 31.760  | 41.484      | -13.630 | 55.114 |
| 0.240      | 9.680   | 27.740  | 37.420      | -16.009 | 53.429 |
| 0.302      | 9.650   | 10.270  | 19.920      | -31.737 | 51.657 |
| 0.361      | 9.650   | 15.190  | 24.840      | -25.131 | 49.971 |
| 1.880      | 9.680   | 16.240  | 25.920      | -20.080 | 46.000 |
| 3.888      | 9.700   | 17.180  | 26.880      | -19.120 | 46.000 |

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 (244 | 1MHz)       |         |        |  |
|            |                           |                  |             |         |        |  |
| Frequency  | Correct                   | Reading          | Measurement | Margin  | Limit  |  |
|            | Factor                    | Level            | Level       |         |        |  |
| MHz        | dB                        | dBuV             | dBuV        | dB      | dBuV   |  |
| Line 2     |                           |                  |             |         |        |  |
| Quasi-Peak |                           |                  |             |         |        |  |
| 0.181      | 9.732                     | 40.920           | 50.652      | -14.462 | 65.114 |  |
| 0.244      | 9.689                     | 35.340           | 45.029      | -18.285 | 63.314 |  |
| 0.298      | 9.660                     | 24.020           | 33.680      | -28.091 | 61.771 |  |
| 0.353      | 9.655                     | 10.950           | 20.605      | -39.595 | 60.200 |  |
| 3.822      | 9.700                     | 26.010           | 35.710      | -20.290 | 56.000 |  |
| 15.466     | 10.000                    | 8.840            | 18.840      | -41.160 | 60.000 |  |
|            |                           |                  |             |         |        |  |
| Average    |                           |                  |             |         |        |  |
| 0.181      | 9.732                     | 32.030           | 41.762      | -13.352 | 55.114 |  |
| 0.244      | 9.689                     | 26.810           | 36.499      | -16.815 | 53.314 |  |
| 0.298      | 9.660                     | 19.500           | 29.160      | -22.611 | 51.771 |  |
| 0.353      | 9.655                     | 3.310            | 12.965      | -37.235 | 50.200 |  |
| 3.822      | 9.700                     | 19.630           | 29.330      | -16.670 | 46.000 |  |
| 15.466     | 10.000                    | 3.060            | 13.060      | -36.940 | 50.000 |  |
|            |                           |                  |             |         |        |  |

- 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. |
|---|--------------|--------------|----------------------|-----------|
| Х | Power Meter  | Anritsu      | ML2495A/6K00003357   | May, 2009 |
| Х | 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

 $\pm$  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         | -7.80dBm    | 1Watt= 30 dBm  | Pass   |
| Channel 20  | 2441.00         | -8.39dBm    | 1Watt= 30 dBm  | Pass   |
| Channel 39  | 2479.00         | -9.20dBm    | 1Watt= 30 dBm  | Pass   |

### 4. Radiated Emission

### 4.1. Test Equipment

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

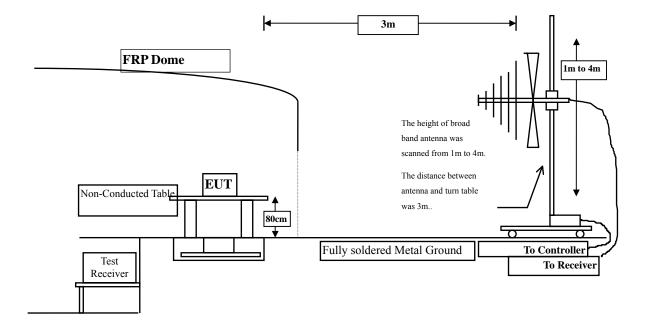
| Test Site |   | Equipment         | Manufacturer    | Model No./Serial No.  | Last Cal.  |
|-----------|---|-------------------|-----------------|-----------------------|------------|
| Site # 3  | Х | Bilog Antenna     | Schaffner Chase | CBL6112B/2673         | Sep., 2009 |
|           | Х | Horn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

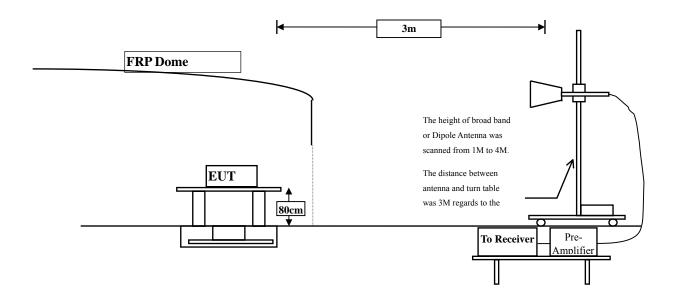
2. The test instruments marked with "X" are used to measure the final test results.

### 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.

| FCC Part 15 Subpart C Paragraph 15.209(a) Limits |          |           |  |  |
|--|----------|-----------|--|--|
| Frequency<br>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 form 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        | Correct | Reading | Measurement | Margin  | Limit  |
|------------------|---------|---------|-------------|---------|--------|
|                  | Factor  | Level   | Level       |         |        |
| MHz              | dB      | dBuV    | dBuV/m      | dB      | dBuV/m |
| Horizontal       |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4810.000         | 9.607   | 45.950  | 55.556      | -18.444 | 74.000 |
| 7215.000         | 14.334  | 43.700  | 58.035      | -15.965 | 74.000 |
| 9620.000         | 19.708  | 33.840  | 53.549      | -20.451 | 74.000 |
| Average          |         |         |             |         |        |
| <b>Detector:</b> |         |         |             |         |        |
| 4810.000         | 9.607   | 38.710  | 48.316      | -5.684  | 54.000 |
| 7215.000         | 14.334  | 29.750  | 44.085      | -9.915  | 54.000 |
| Vertical         |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4810.000         | 8.347   | 45.980  | 54.326      | -19.674 | 74.000 |
| 7215.000         | 15.419  | 44.050  | 59.469      | -14.531 | 74.000 |
| 9620.000         | 18.918  | 36.120  | 55.039      | -18.961 | 74.000 |
| Average          |         |         |             |         |        |
| <b>Detector:</b> |         |         |             |         |        |
| 4810.000         | 8.347   | 38.350  | 46.696      | -7.304  | 54.000 |
| 7215.000         | 15.419  | 37.030  | 52.449      | -1.551  | 54.000 |
| 9620.000         | 18.918  | 22.640  | 41.559      | -12.441 | 54.000 |
|                  |         |         |             |         |        |

- 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.

| Product               | : Aperion Home Audio Link         |                  |             |         |        |  |  |
|-----------------------|-----------------------------------|------------------|-------------|---------|--------|--|--|
| Test Item             | : Harmonic Radiated Emission Data |                  |             |         |        |  |  |
| Test Site             | : No.3 OATS                       |                  |             |         |        |  |  |
| Test Mode             | : Mode 1:                         | Transmitter (244 | 1 MHz)      |         |        |  |  |
|                       |                                   |                  |             |         |        |  |  |
| Frequency             | Correct                           | Reading          | Measurement | Margin  | Limit  |  |  |
|                       | Factor                            | Level            | Level       |         |        |  |  |
| MHz                   | dB                                | dBuV             | dBuV/m      | dB      | dBuV/m |  |  |
| Horizontal            |                                   |                  |             |         |        |  |  |
| <b>Peak Detector:</b> |                                   |                  |             |         |        |  |  |
| 4882.000              | 9.489                             | 45.910           | 55.399      | -18.601 | 74.000 |  |  |
| 7323.000              | 14.568                            | 35.830           | 50.398      | -23.602 | 74.000 |  |  |
| 9764.000              | 20.055                            | 36.050           | 56.105      | -17.895 | 74.000 |  |  |
|                       |                                   |                  |             |         |        |  |  |
| Average               |                                   |                  |             |         |        |  |  |
| <b>Detector:</b>      |                                   |                  |             |         |        |  |  |
| 4882.000              | 9.489                             | 40.880           | 50.369      | -3.631  | 54.000 |  |  |
| 7323.000              | 14.568                            | 25.440           | 40.008      | -13.992 | 54.000 |  |  |
| 9764.000              | 20.055                            | 22.570           | 42.625      | -11.375 | 54.000 |  |  |
| Vertical              |                                   |                  |             |         |        |  |  |
| <b>Peak Detector:</b> |                                   |                  |             |         |        |  |  |
| 4882.000              | 8.979                             | 42.860           | 51.839      | -22.161 | 74.000 |  |  |
| 7323.000              | 15.262                            | 39.850           | 55.112      | -18.888 | 74.000 |  |  |
| 9764.000              | 19.255                            | 35.750           | 55.005      | -18.995 | 74.000 |  |  |
| Average               |                                   |                  |             |         |        |  |  |
| Detector:             |                                   |                  |             |         |        |  |  |
| 7323.000              | 15.262                            | 31.600           | 46.862      | -7.138  | 54.000 |  |  |
| 9764.000              | 19.255                            | 22.490           | 41.745      | -12.255 | 54.000 |  |  |

- 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.

| Product<br>Test Item | <ul> <li>Aperion Home Audio Link</li> <li>Harmonic Radiated Emission Data</li> </ul> |                  |             |         |        |  |  |  |
|----------------------|--|------------------|-------------|---------|--------|--|--|--|
| Test Site            | : No.3 OA  | : No.3 OATS      |             |         |        |  |  |  |
| Test Mode            | : Mode 1:  | Transmitter (247 | 9 MHz)      |         |        |  |  |  |
| Frequency            | Correct  | Reading          | Measurement | Margin  | Limit  |  |  |  |
|                      | Factor   | Level            | Level       |         |        |  |  |  |
| MHz                  | dB   | dBuV             | dBuV/m      | dB      | dBuV/m |  |  |  |
| Horizontal           |  |                  |             |         |        |  |  |  |
| Peak Detector:       |  |                  |             |         |        |  |  |  |
| 4958.000             | 9.421  | 46.080           | 55.501      | -18.499 | 74.000 |  |  |  |
| 7437.000             | 15.001   | 37.060           | 52.061      | -21.939 | 74.000 |  |  |  |
| 9916.000             | 19.756   | 37.250           | 57.006      | -16.994 | 74.000 |  |  |  |
| Average              |  |                  |             |         |        |  |  |  |
| <b>Detector:</b>     |  |                  |             |         |        |  |  |  |
| 4958.000             | 9.421  | 41.020           | 50.441      | -3.559  | 54.000 |  |  |  |
| 9916.000             | 19.756   | 22.750           | 42.506      | -11.494 | 54.000 |  |  |  |
| Vertical             |  |                  |             |         |        |  |  |  |
| Peak Detector:       |  |                  |             |         |        |  |  |  |
| 4958.000             | 9.699  | 42.300           | 51.999      | -22.001 | 74.000 |  |  |  |
| 7437.000             | 15.378   | 39.180           | 54.558      | -19.442 | 74.000 |  |  |  |
| 9916.000             | 18.901   | 34.980           | 53.881      | -20.119 | 74.000 |  |  |  |
| Average              |  |                  |             |         |        |  |  |  |
| <b>Detector:</b>     |  |                  |             |         |        |  |  |  |
| 7437.000             | 15.378   | 31.230           | 46.608      | -7.392  | 54.000 |  |  |  |

- 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.

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

| Frequency  | Correct | Reading | Measurement | Margin  | Limit  |
|------------|---------|---------|-------------|---------|--------|
|            | Factor  | Level   | Level       |         |        |
| MHz        | dB      | dBuV    | dBuV/m      | dB      | dBuV/m |
| Horizontal |         |         |             |         |        |
| 111.480    | -8.317  | 37.327  | 29.010      | -14.510 | 43.520 |
| 258.920    | -5.458  | 34.309  | 28.851      | -17.169 | 46.020 |
| 365.620    | -1.817  | 27.328  | 25.511      | -20.509 | 46.020 |
| 563.500    | 1.040   | 26.659  | 27.700      | -18.320 | 46.020 |
| 720.640    | 3.021   | 23.772  | 26.793      | -19.227 | 46.020 |
| 912.700    | 5.660   | 20.509  | 26.169      | -19.851 | 46.020 |
|            |         |         |             |         |        |
| Vertical   |         |         |             |         |        |
| 55.220     | -5.133  | 38.197  | 33.064      | -6.936  | 40.000 |
| 109.540    | -0.829  | 34.224  | 33.395      | -10.125 | 43.520 |
| 208.480    | -8.201  | 33.322  | 25.121      | -18.399 | 43.520 |
| 499.480    | -1.342  | 25.582  | 24.239      | -21.781 | 46.020 |
| 699.300    | 0.242   | 26.345  | 26.587      | -19.433 | 46.020 |
| 965.080    | 7.397   | 20.521  | 27.918      | -26.082 | 54.000 |

- 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:

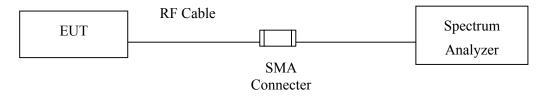
|   | Equipment         | Manufacturer | Model No./Serial No. | Last Cal.  |
|---|-------------------|--------------|----------------------|------------|
|   | Spectrum Analyzer | R&S          | FSP40 / 100170       | Nov, 2009  |
|   | Spectrum Analyzer | Agilent      | E4407B / US39440758  | May, 2009  |
| Х | 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  $\pm$  1.27dB

# 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       |

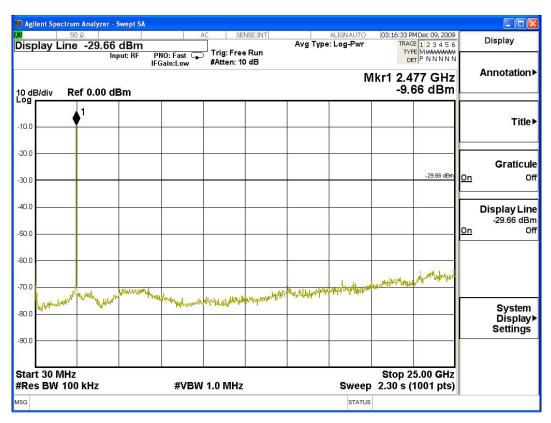
### Channel 02 (2405MHz) 30-25GHz

| 💴 Agilent Spectrum Analyzer - Sw | rept SA   | 122                          |                       |   |   | 500<br>100      |  |           |                                   |
|----------------------------------|---|------------------------------|-----------------------|---|---|-----------------|--|-----------|-----------------------------------|
| <mark>ιχί</mark> 50 Ω            | A   | C SENS                       | E:INT                 | Avg Type  | ALIGN AUTO  |                 | MDec 09, 2009                              |           | Display                           |
| Display Line -30.49 d            | I <b>BM</b><br>t: RF PNO: Fast ⊊⊃<br>IFGain:Low | Trig: Free F<br>#Atten: 10 c |                       | Avg Type  | : Log-Pwr   | TYP             | E 1 2 3 4 5 6<br>E MWWWWW<br>T P N N N N N |           |                                   |
| 10 dB/div Ref 0.00 dB            | m   |                              |                       |   | М   |                 | 02 GHz<br>19 dBm                           |           | Annotation►                       |
| -10.0                            |   |                              |                       |   |   |                 |  |           | Title►                            |
| -20.0                            |   |                              |                       |   |   |                 | -30.49 dBm                                 | <u>On</u> | Graticule<br>Off                  |
| -40.0                            |   |                              |                       |   |   |                 |  | <u>On</u> | Display Line<br>-30.49 dBm<br>Off |
| -60.0                            | televenture .                                   |                              | . al. ab              | in the second states of the | and the state of the | La Lader Marsha | bruner bielym                              |           |                                   |
| -80.0                            | tater-activestry-Matthedralam                   | while when the second des    | land low and a second | and Articles 2  |   |                 |  |           | System<br>Display<br>Settings     |
| Start 30 MHz<br>#Res BW 100 kHz  | #VBW  | 1.0 MHz                      |                       |   | Sweep   |                 | 5.00 GHz<br>1001 pts)                      |           |                                   |
| MSG                              |   |                              |                       |   | STATUS  |                 |  |           |                                   |



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

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



#### 6. **Band Edge**

#### 6.1. **Test Equipment**

| Test Site |   | Equipment         | Manufacturer    | Model No./Serial No.  | Last Cal.  |
|-----------|---|-------------------|-----------------|-----------------------|------------|
|           |   | Bilog Antenna     | Schaffner Chase | CBL6112B/2673         | Sep., 2009 |
|           | Х | Horn Antenna      | Schwarzbeck     | BBHA9120D/D305        | Sep., 2009 |
|           | Х | Pre-Amplifier     | AGILENT         | 8447D/2944A09549      | Sep., 2009 |
| Site # 3  | Х | Test Receiver     | R & S           | ESCS 30/ 825442/018   | Sep., 2009 |
|           | Х | Spectrum Analyzer | Advantest       | R3162/91700283        | Oct., 2009 |
|           | Х | Coaxial Cable     | QuieTek         | QTK-CABLE/ CAB5       | Feb., 2009 |
|           | Х | Controller        | QuieTek         | QTK-CONTROLLER/ CTRL3 | N/A        |
|           | Х | Coaxial Switch    | Anritsu         | MP59B/6200265729      | N/A        |
|           | Х | Spectrum Analyzer | Agilent         | N9010A / MY48030495   | Apr., 2009 |

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

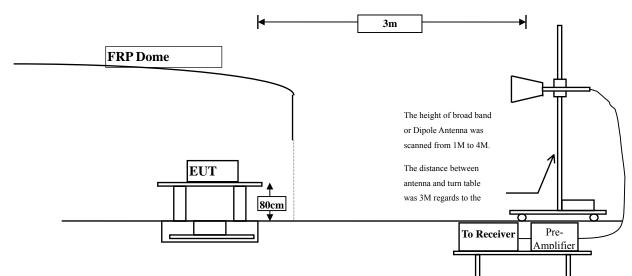
### Note:

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-Channel 02 |

# Fundamental Filed Strength

| Antenna    | Frequency | Correction Factor | Reading Level | Emission Level | Detector |
|------------|-----------|-------------------|---------------|----------------|----------|
| Pole       | [MHz]     | [dB/m]            | [dBuV]        | [dBuV/m]       |          |
| Horizontal | 2405      | 36.603            | 63.35         | 99.953         | Peak     |
| Horizontal | 2405      | 36.603            | 60.51         | 97.113         | Average  |
| Vertical   | 2405      | 35.599            | 67.19         | 102.789        | Peak     |
| Vertical   | 2405      | 35.599            | 64.64         | 100.239        | Average  |

Note: 1:Spectrum Analyzer setting:

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

Average detector: RBW=1MHz, VBW=30Hz

# Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | $\Delta$ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|---------------|---|----------|
| Horizontal      | 2342.1                  | 99.953                  | 53.47         | 46.483                                  | Peak     |
| Horizontal      | 2380.8                  | 97.113                  | 63.01         | 34.103                                  | Average  |
| Vertical        | 2342.1                  | 102.789                 | 53.47         | 49.319                                  | Peak     |
| Vertical        | 2380.8                  | 100.239                 | 63.01         | 37.229                                  | 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)

| Agilent Spectrum Analyzer                             | - Swept SA   |   |                                 |  |                   |
|---|--|---|---------------------------------|--|-------------------|
| 50 Ω<br>larker 4 2.400000                             | Input: RF PNO: Fast                                      |   | ALIGN AUTO<br>Avg Type: Log-Pwr | 10:17:48 AM Dec 08, 2009<br>TRACE 1 2 3 4 5 6<br>TYPE M WWWWW<br>DET P N N N N N | Marker            |
| 0 dB/div Ref 0.00                                     | IFGain:Low   | , #Atten: 10 dB                                     | Mk                              | r4 2.400 0 GHz<br>-47.01 dBm   | Select Marke      |
|   |  |   |                                 |  | Norm              |
| 0.0<br>0.0<br>30.0<br>30.0                            |  | 2   | 4                               | and when the second second second  | De                |
| 0.0<br>0.0<br>0.0                                     |  |   |                                 |  | Fixe              |
| enter 2.39000 GHz<br>Res BW 1.0 MHz<br>R MODE TRC SCL |  | BW 1.0 MHz  | #Sweep                          | Span 100.0 MHz<br>500 ms (1001 pts)  | į                 |
| 1 N 1 f<br>2 N 1 f<br>3 N 1 f<br>4 N 1 f<br>5         | 2.404 8 GHz<br>2.390 0 GHz<br>2.342 1 GHz<br>2.400 0 GHz | -7.06 dBm<br>-62.96 dBm<br>-60.53 dBm<br>-47.01 dBm |                                 |  | Propertie         |
| 8<br>9<br>0<br>1                                      |  |   |                                 |  | <b>M</b> c<br>1 c |
| 2   |  |   |                                 |  |                   |

# Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 💭 Agilent Spectrum Analyzer - | Swept SA                           |                                 |                                 |   |               |
|-------------------------------|------------------------------------|---------------------------------|---------------------------------|---|---------------|
| Marker 4 2.400000             |                                    | AC SENSE:INT                    | ALIGN AUTO<br>Avg Type: Log-Pwr | 10:18:20 AM Dec 08, 2009<br>TRACE 1 2 3 4 5 6 | Marker        |
| h                             | nput: RF PNO: Fast 🕞<br>IFGain:Low | Trig: Free Run<br>#Atten: 10 dB | 641.                            |   | Select Marker |
| 10 dB/div Ref 0.00 d          | IBm                                |                                 |                                 | r4 2.400 0 GHz<br>-59.35 dBm                  | 4             |
| - <b>og</b><br>10.0           |                                    |                                 | 1                               |   |               |
| 20.0                          |                                    |                                 | +                               |   | Norm          |
| 10.0                          |                                    |                                 |                                 |   | -             |
| i0.0                          |                                    |                                 | 4                               |   | De            |
| 60.0                          |                                    | ∧ <sup>3</sup> ∧2               |                                 |   |               |
| 70.0                          |                                    |                                 |                                 | ^   |               |
| 30.0                          |                                    |                                 |                                 |   | Fixe          |
| enter 2.39000 GHz             |                                    |                                 |                                 | Snop 100 0 MHz                                |               |
| Res BW 1.0 MHz                | #VBV                               | V 10 Hz                         | Sweep                           | Span 100.0 MHz<br>7.80 s (1001 pts)           | c             |
| ikr mode tro scl<br>1 N 1 f   | ×<br>2.405 0 GHz                   | -9.59 dBm                       | INCTION FUNCTION WIDTH          | FUNCTION VALUE                                | 12            |
| 2 N 1 f<br>3 N 1 f            | 2.390 0 GHz<br>2.380 8 GHz         | -74.38 dBm<br>-72.60 dBm        |                                 |   |               |
| 4 N 1 f                       | 2.400 0 GHz                        | -59.35 dBm                      |                                 |   | Propertie     |
| 6<br>7                        |                                    |                                 |                                 |   |               |
| 8 9                           |                                    |                                 |                                 |   | Мо            |
|                               |                                    |                                 |                                 |   | 1 0           |
| 12 12 SG                      |                                    |                                 | STATUS                          |   |               |
|                               |                                    |                                 | STATUS                          |   |               |

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

# Fundamental Filed Strength

| Antenna    | Frequency Correction Factor |        | Correction Factor Reading Level |            | Detector |
|------------|-----------------------------|--------|---------------------------------|------------|----------|
| Pole       | [MHz]                       | [dB/m] | [dB(uV)]                        | [dB(uV/m)] |          |
| Horizontal | 2479                        | 36.706 | 60.09                           | 96.796     | Peak     |
| Horizontal | 2479                        | 36.706 | 57.05                           | 93.756     | Average  |
| Vertical   | 2479                        | 36.156 | 63.96                           | 100.116    | Peak     |
| Vertical   | 2479                        | 36.156 | 61.17                           | 97.326     | Average  |

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Note: 1:Spectrum Analyzer setting:

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

Average detector: RBW=1MHz, VBW=30Hz

# Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | $\Delta$ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|---------------|---|----------|
| Horizontal      | 2483.5                  | 96.796                  | 40.53         | 56.266                                  | Peak     |
| Horizontal      | 2483.5                  | 93.756                  | 50.86         | 42.896                                  | Average  |
| Vertical        | 2483.5                  | 100.116                 | 40.53         | 59.586                                  | Peak     |
| Vertical        | 2483.5                  | 97.326                  | 50.86         | 46.466                                  | 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)

|              |   |                            |         |                                  | vept SA                                    | nalyzer - Swe             |              | nt Spec    | Agile    |
|--------------|---|----------------------------|---------|----------------------------------|--|---------------------------|--------------|------------|----------|
| Marker       | 10:18:52 AM Dec 08, 2009<br>TRACE 1 2 3 4 5 6 | ALIGNAUTO<br>Type: Log-Pwr | A       | AC SENS                          | 00000 GHz                                  | 33500000                  | 50 Ω<br>2.48 | er 2       | ark      |
| Select Marke | DET P N N N N                                 |                            | n       | Trig: Free F<br>#Atten: 10       |  | Input:                    |              |            |          |
|              | r2 2.483 5 GHz<br>-48.83 dBm                  | Mk                         |         |                                  | m  | 0.00 dBm                  | Ref          | div        | dB       |
|              |   |                            |         | <u>(</u> 1                       |  |                           |              |            |          |
| Norr         |   |                            |         | ()                               |  |                           |              |            | .0       |
|              |   |                            |         |                                  |  |                           |              |            |          |
|              |   |                            |         |                                  |  |                           |              |            | .0       |
| De           |   |                            |         |                                  |  |                           | _            |            | .0       |
|              | halo and a local state of the second          | waren agenterales          | La mar  |                                  | مرسحية للقيص بمحمد والمتحم معدار المقداميم | والار والمعالية والمعالمة |              | Lost Culle | .0       |
|              | an a      | and address day            |         |                                  | and the second                             | - Handler                 |              |            | .0       |
| Fixe         |   |                            |         |                                  |  |                           |              |            | .0       |
|              |   |                            |         |                                  |  |                           |              |            | .0       |
|              | Span 100.0 MHz                                |                            |         | 50. Vie                          | 10   | GHz                       | 8350         | er 2.4     | L<br>Int |
| ĵ            | 500 ms (1001 pts)                             | #Sweep                     |         | W 1.0 MHz                        | #VE  | Hz                        | 1.0 M        | BW         | es       |
|              | FUNCTION VALUE                                | FUNCTION WIDTH             | FUNCTIO | Y                                | X  |                           |              | DDE TR     |          |
|              |   |                            |         | -8.30 dB                         | 2.479 1 GHz<br>2.483 5 GHz                 |                           | f            | V 1<br>V 1 |          |
| Burnette     |   |                            |         | 1992 - 1998 (1999 - 1999) - 1999 |  |                           |              |            |          |
| Propertie    |   |                            |         |                                  |  |                           |              |            |          |
|              |   |                            |         |                                  |  |                           |              |            |          |
| M            |   |                            |         |                                  |  |                           |              | -          |          |
| 1.           |   |                            |         |                                  |  |                           |              | _          |          |
|              |   |                            |         |                                  |  |                           |              |            | 2        |
|              |   | STATUS                     |         |                                  |  |                           |              |            | i        |

### Peak Detector of conducted Band Edge Delta

# Average Detector of conducted Band Edge Delta

|               |                  |                   |                        |         |     |            |                           | - Swept SA |          |             | ent Spe        |                     |
|---------------|------------------|-------------------|------------------------|---------|-----|------------|---------------------------|------------|----------|-------------|----------------|---------------------|
| Marker        | E 1 2 3 4 5 6    | TRAC              | ALIGNAUTO<br>: Log-Pwr | Avg Typ |     |            | GHz                       | 000000     | 83500    | 50 s<br>2.4 | ker 2          | l<br>Iarl           |
| Select Marker |                  |                   |                        |         |     | #Atten: 10 | PNO: Fast C<br>IFGain:Low |            |          |             |                |                     |
| 2             | 35 GHz<br>35 dBm | r2 2.483<br>-61.5 | Mk                     |         |     |            |                           | dBm        | f 0.00 c | Ref         | div            | 0 dE                |
|               |                  |                   |                        |         |     | 1          |                           |            |          |             |                | . <b>og</b><br>10.0 |
| Norma         |                  |                   |                        | -       |     | A          |                           |            |          | _           |                | 20.0                |
|               |                  |                   |                        |         |     | +          |                           |            |          | -           |                | 30.0                |
| D. H          |                  |                   |                        |         |     | $\uparrow$ |                           |            |          |             |                | 40.0                |
| Delta         |                  |                   |                        |         | 2   |            |                           |            |          |             |                | 50.0<br>60.0        |
|               |                  |                   |                        | 0       | 1mg | /          |                           |            |          | _           |                | 70.0                |
| Fixed         |                  |                   |                        |         | ~   |            | ~                         |            |          |             |                | 80.0                |
|               |                  |                   |                        |         |     | - 0        |                           |            |          |             |                | 90.0                |
|               | 00.0 MHz         | Span 1            |                        |         | 25  |            |                           |            | 0 GHz    |             |                |                     |
| 01            | 1001 pts)        |                   |                        |         |     | V 10 Hz    | #VB                       |            |          |             | BW             |                     |
|               | IN VALUE         | FUNCTIO           | ICTION WIDTH           | NCTION  | 3m  | -10.99 di  | 90 GHz                    |            |          | f           | IDDE TI<br>N 1 | 1                   |
|               |                  |                   |                        | 1       | 3m  | -61.85 d   | 35GHz                     | 2.48       |          | f           | N 1            | 3                   |
| Properties    |                  |                   |                        |         |     |            |                           |            |          |             |                | 4                   |
|               |                  |                   |                        |         |     |            |                           |            |          |             |                | 6<br>7              |
| Mor           |                  |                   |                        |         |     |            |                           |            |          |             |                | 8<br>9              |
| 1 of 2        |                  |                   |                        | 1       |     |            | 1                         |            |          |             |                | 10<br>11            |
|               |                  |                   | OTATIO                 |         |     |            |                           |            |          |             |                | 12                  |
|               |                  |                   | STATUS                 |         |     |            |                           |            |          |             |                | SG                  |

# 7. Occupied Bandwidth

### 7.1. Test Equipment

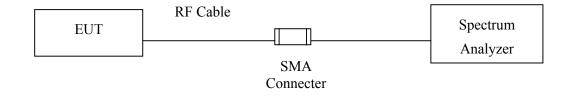
The following test equipments are used during the radiated emission tests:

|   | Equipment         | Manufacturer | Model No./Serial No. | Last Cal. |   |
|---|-------------------|--------------|----------------------|-----------|---|
| Х | 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

 $\pm$  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<br>(MHz) | Measurement Level<br>(kHz) | Required Limit<br>(kHz) | Result |
|-------------|--------------------|----------------------------|-------------------------|--------|
| 02          | 2405.00            | 1100                       | >500                    | Pass   |

# Figure Channel 02:

| enter 2.40500 GHz<br>Res BW 100 kHz | #                          | <b>#VBW</b> 100 kH | Iz                  | #Sweep                       | Span 20.00 MHz<br>500 ms (1001 pts)           |             |
|-------------------------------------|----------------------------|--------------------|---------------------|------------------------------|---|-------------|
| 0.0                                 |                            |                    |                     |                              |   | Mo          |
| 0.0                                 |                            |                    |                     |                              |   | Mkr→RefL    |
| 0.0<br>0.0 0.0 0.0                  | 1 <sup>2</sup> .           |                    |                     | - WANN                       | harmond rahilian                              | Mkr→        |
| 0.0                                 | a Warman Manuel a          |                    |                     | - White                      |   |             |
| 0.0                                 |                            | un <sup>1</sup>    |                     | <u>\</u>                     |   | Marker De   |
| 0.0                                 |                            | mar wo             | 1                   | А.                           |   |             |
| 0.0                                 |                            |                    |                     |                              |   | Next L      |
| 0.0                                 |                            |                    | -6.00 dB<br>1.10 MH | z                            |   |             |
| 0.0                                 |                            |                    |                     |                              |   | Next Rig    |
| dB/div Ref 0.00 d                   | Bm                         |                    | - 100               | Mkı                          | 1 2.404 86 GHz<br>-8.584 dBm                  |             |
|                                     | put: RF PNO: F<br>IFGain:1 |                    |                     | g Hold:>100/100              | DET P N N N N                                 | NextPe      |
| 50 Ω<br>arker 1 2.4048600           | 00000 GHz                  | AC                 | SENSE:INT           | ALIGNAUTO<br>g Type: Log-Pwr | 04:02:11 PM Dec 07, 2009<br>TRACE 1 2 3 4 5 6 | Peak Search |

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

| Channel No. | Frequency<br>(MHz) | Measurement Level<br>(kHz) | Required Limit<br>(kHz) | Result |
|-------------|--------------------|----------------------------|-------------------------|--------|
| 20          | 2441.00            | 1080                       | >500                    | Pass   |

# Figure Channel 20:

| Input: R                            |               |          | g Type: Log-Pwr<br>g Hold: 32/100 | TRACE 1 2 3 4 5 6<br>TYPE MWWWWWW<br>DET P N N N N N | Peak Search      |
|-------------------------------------|---------------|----------|-----------------------------------|--|------------------|
| dB/div Ref 0.00 dBm                 | in connection |          | Mkr                               | 1 2.441 32 GHz<br>-9.332 dBm                         | NextPea          |
| <b>g</b><br>                        |               | -6.00 dB |                                   |  | Next Rig         |
| .0                                  |               | 1.08 MHz | :                                 |  | Next Le          |
| ).0                                 |               | How with | <u>\</u>                          |  | Marker De        |
| 0.0<br>.0<br>.0                     | Manyard Maria |          | harden                            |  | Mkr→0            |
| 0.0 Ring bland                      |               |          | *~~1                              | Any no statistizione in a statistica and             |                  |
| .0                                  |               |          |                                   |  | Mkr→RefL         |
| enter 2.44100 GHz<br>Res BW 100 kHz | #VBW 100      | (H7      | #Sween                            | Span 20.00 MHz<br>500 ms (1001 pts)                  | <b>Мо</b><br>1 о |

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

| Channel No. | Frequency<br>(MHz) | Measurement Level<br>(kHz) | Required Limit<br>(kHz) | Result |
|-------------|--------------------|----------------------------|-------------------------|--------|
| 39          | 2479.00            | 1100                       | >500                    | Pass   |

# Figure Channel 39:

| 50 Ω<br>arker 1 2.47898000000       |   | ENSE:INT Avg T | ALIGNAUTO    | 04:09:05 PM Dec 07, 2009<br>TRACE 1 2 3 4 5 6 | Peak Search |
|-------------------------------------|---|----------------|--------------|---|-------------|
| Input: RF                           | PNO: Fast Trig: Fr<br>IFGain:Low Atten: 1 |                | ld: 77/100   | DET P N N N N N                               |             |
| dB/div Ref 0.00 dBm                 |   |                | Mkr          | 2.478 98 GHz<br>-10.628 dBm                   | NextPea     |
|                                     |   | 1              |              |   | Next Rig    |
| 0.0                                 |   | -6.00 dB       |              |   |             |
|                                     |   |                |              |   | Next Le     |
| 2.0                                 | work work                                 | how my         |              |   |             |
| 2.0                                 |   |                |              |   | Marker De   |
| 2013 B                              | hope with                                 |                | Why .        |   |             |
| 0.0                                 |   |                | Lan Verynaur | An Anna Anna Anna Anna Anna Anna Anna A       | Mkr→        |
| J.U Josho And                       |   |                |              | Wyought Wandelshi                             |             |
| 0.0                                 |   |                |              |   | Mkr→RefL    |
| 0.0                                 |   |                |              |   | Mo          |
| enter 2.47900 GHz<br>Res BW 100 kHz | #VBW 100 kH                               | 7              | #Sween       | Span 20.00 MHz<br>500 ms (1001 pts)           | 1 0         |

### 8. Power Density

### 8.1. Test Equipment

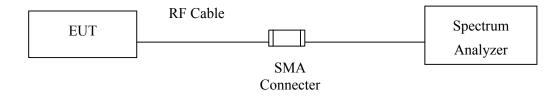
The following test equipments are used during the radiated emission tests:

|   | Equipment         | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| Х | Spectrum Analyzer | Agilent      | N9010A / MY48030495  | Apr, 2009 |
|   | 4 4 11 4 4        |              |                      |           |

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

 $\pm$  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<br>(MHz) | Measure Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------|--------------------|------------------------|----------------|--------|
| 02          | 2405.00            | -21.284                | < 8dBm         | Pass   |

# Figure Channel 02:

| Marker 1         Z.405195000000 GHZ         Trig: Free Run         Avg type. Log-rwr         Trig: Trig: Free Run           Input: RF         PNO: Far         Trig: Free Run         Avg type. Log-rwr         N           10 dB/div         Ref 0.00 dBm         -21.284 dBm         -21.284 dBm         N           200         1         -1         -1         -21.284 dBm         N           300         -1         -1         -1         -21.284 dBm         N           300         -1         -1         -1         -21.284 dBm         N           300         -1 | 0                 | 1Dec 07, 2009 | 04:04:51 PN        | ALIGNAUTO      |                 | VSE:INT           | C SE         | A.        |                | 0Ω                       |                  | KI 🛛 |
|---|-------------------|---------------|--------------------|----------------|-----------------|-------------------|--------------|-----------|----------------|--------------------------|------------------|------|
| Mkr1 2.405 195 0 GHz         N           0 dB/div         Ref 0.00 dBm         -21.284 dBm         N           00         1         1         1         N           00         1         1         1         1         N           00         1         1         1         1         1         N           00         1  | Search            | MWWWWW        | TYP                |                |                 |                   |              | NO: Far 😱 | put: RF P      |                          | ker 12           | larl |
| 10.0     1     1     1     1     1       20.0     1     1     1     1     1       30.0     1     1     1     1     1       40.0     1     1     1     1     1       50.0     1     1     1     1     1       60.0     1     1     1     1     1   | lext Pea          |               |                    | Mkr1 2.4       |                 |                   |              |           |                | ef 0.00 d                | 3/div F          | 0 dE |
|   | ext Rigi          |               |                    |                |                 |                   | -            |           |                |                          |                  |      |
|   | Next Le           | twaysoft, but | ĸŀ?ŷĸ-ĂţĸĿĬſĬĬŎĬġĬ | Nalisian weeks | uhafhyriyyyynau | llaiset-ikilvinii | leithwighter | whenthe   | mhurneridylite | ₽₽ <b>₩₩₩₽₩₩₩₩₩₩₩₩₩₩</b> | Yadir.yaj dukulu |      |
|   | ker De            |               |                    |                |                 |                   |              |           |                |                          |                  |      |
|   | Mkr→(             |               |                    |                |                 |                   |              |           |                |                          |                  |      |
|   | →RefL             |               |                    |                |                 |                   |              |           |                |                          |                  |      |
| 0.0<br>enter 2.4052400 GHz<br>Res BW 3.0 kHz #VBW 10 kHz #Sweep 100 s (1001 pts)  | <b>Mo</b><br>1 of |               |                    | #Sweep         |                 |                   | 10 kHz       | #VBW      | Z              |                          |                  | ent  |

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

| Channel No. | Frequency<br>(MHz) | Measurement Level<br>(dBm) | Required Limit<br>(dBm) | Result |
|-------------|--------------------|----------------------------|-------------------------|--------|
| 20          | 2441.000           | -22.397                    | < 8dBm                  | Pass   |

# Figure Channel 20:

| 50 Ω  | - Swept SA AC  | SENSE:INT                                |                       | 04:08:02 PM Dec 07, 2009                  | Dank Danak  |
|---|--|--|-----------------------|---|-------------|
|   |  | Avg Typ<br>Free Run Avg Hold<br>n: 10 dB | e: Log-Pwr<br>: 1/100 | TRACE 123456<br>TYPE MWWWWW<br>DET PNNNNN | Peak Search |
| 0 dB/div Ref 0.00 (   | dBm  |  | Mkr1 2.4              | 41 207 2 GHz<br>-22.397 dBm               | NextPea     |
| og<br>0.0   |  |  |                       |   | Next Rig    |
| 20.0<br>/**/thm./*/in./*/in./*/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/**/in/* | and war and the stand of the st | r/ballacontrologicality.com              | hutophotometer        | 4+1-4+hrille,atmy.uperpresed              | Next Lo     |
| 0.0   |  |  |                       | F   | Marker De   |
| 0.0   |  |  |                       |   | Mkr→        |
| 0.0   |  |  |                       | F   | Mkr→Refl    |
| 0.0   |  |  |                       |   | Ма          |
| enter 2.4413200 GI<br>Res BW 3.0 kHz  | lz<br>#VBW 10 k  | · · · ·                                  | #Sween                | Span 300.0 kHz<br>100 s (1001 pts)        | 1 o         |

| : | Aperion Home Audio Link       |
|---|-------------------------------|
| : | Power Density Data            |
| : | No.3 OATS                     |
| : | Mode 1: Transmitter (2479MHz) |
|   | :                             |

| Channel No. | Frequency<br>(MHz) | Measurement Level<br>(dBm) | Required Limit<br>(dBm) | Result |
|-------------|--------------------|----------------------------|-------------------------|--------|
| 39          | 2479.00            | -21.888                    | < 8dBm                  | Pass   |

### Figure Channel 39:

| Peak Search          | 04:11:16 PM Dec 07, 2009<br>TRACE 1 2 3 4 5 6<br>TYPE MWWWWW<br>DET P N N N N N | ALIGNAUTO<br>: Log-Pwr<br>1/100 | Avg Ty:<br>Avg Hol |                | Trig: Free<br>Atten: 10 |      | 000000 G       |                     | ker 1    | larl             |
|----------------------|---|---------------------------------|--------------------|----------------|-------------------------|------|----------------|---------------------|----------|------------------|
| NextPea              | 479 073 0 GHz<br>-21.888 dBm  | Mkr1 2.4                        |                    |                |                         |      |                | Ref 0.00 (          | 3/div    |                  |
| Next Rig             |   |                                 |                    |                |                         | 2    | ~              |                     |          | <b>og</b><br>0.0 |
|                      | ● <sup>1</sup> F  | •                               |                    | -              |                         |      |                |                     |          | 0.0              |
| Next L               | an water you wanter and the second  | uyurahayulaya                   | 1/4akahahayya      | erlyenthereten | ntilleformaniskyllister |      | yladyirayylary | nlphiliphytywalwyty | nthouna  | 0.0              |
| MarkerD              |   |                                 |                    |                |                         |      |                |                     |          | D.O              |
| Marker De            |   |                                 |                    | ·              |                         |      |                | 4                   |          | 0.0              |
| Mkr→                 |   |                                 |                    |                |                         |      | -              |                     |          | D.O              |
| 94994417213994 - 613 |   |                                 |                    | 2              |                         |      |                |                     |          | 0.0              |
| Mkr→Refl             | [   |                                 |                    |                |                         |      |                |                     |          | 0.0              |
|                      |   |                                 |                    | £              |                         |      |                | -                   |          | 0.0              |
| Mc<br>1 c            | Span 300.0 kHz  |                                 |                    |                |                         |      |                | 89800 GÎ            | ter 2.47 | en               |
|                      |   | #Sweep                          |                    |                | 10 kHz                  | #VBW | -              |                     | s BW 3   |                  |

# 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs