Prüfbericht - Nr.: *Test Report No.:*	**16013945 001**	**Seite 1 von 32** *Page 1 of 32*

Auftraggeber: *Client:*	**UNI-ART PRECISE PRODUCTS LTD** **11-12/F., YUE XIU IND'L BLDG.** **87 HUNG TO ROAD,** **KWUN TONG, KOWLOON** **HONG KONG**
Gegenstand der Prüfung: *Test item:*	**2.4GHz Digital Wireless Headphone (Audio Transmitter Part)**
Bezeichnung: *Identification:*	**DHP191**
Certificate Number: *Certificate Number*	**FCC ID: MVADHP190-001T** **IC: N/A**
Wareneingangs-Nr.: *Receipt No.:*	**173032350** **173033413**
Eingangsdatum: *Date of receipt:*	**03.Sep.2007**
Prüfort: *Testing location:*	**TÜV Rheinland (Guangdong) Ltd. EMC Laboratory** **Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650,** **P. R. China**
	Listed test laboratory according to FCC rules section 2.948 and RSS-Gen, for measuring devices.
Prüfgrundlage: *Test specification:*	**ANSI C63.4: 2003** **FCC Part 15: 20, Sep. 2007, Subpart C section 15.207, 15.209 and 15.247** **RSS-GEN Issue 2, June 2007** **RSS-210 Issue 7, June 2007** **RSS-102 Issue 2, November 2005**
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (Guangdong) Ltd.**

geprüft/ *tested by*:			**kontrolliert**/ *reviewed by*:		
15. Aug. 2008	Ricky Liu Project Manager	Ricky Liu	15. Aug. 2008	Liangdong Xie Project Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges/ Other Aspects:

Abkürzungen:				*Abbreviations:*			
P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*	
F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*	
N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*	
N/T	=	*nicht getestet*		*N/T*	=	*not tested*	

Test Summary

FCC and IC test specification		Test items	Result
Paragraph	**Released Date**		
Part 15 Per Section 15.207(a)	**20. Sep, 2007**	**Conducted Emission**	**Pass**
RSS-Gen Per Section 7.2.2	**June 2007**		
Part 15 Per Section 15.209(a)	**20. Sep, 2007**	**Transmitter Radiated Spurious Emission**	**Pass**
RSS-210 Issue 7 Section 2.6	**June 2007**		
RSS-210 Issue 7 Section 2.3	**June 2007**	**Receiver Radiated Spurious Emission**	**Pass**
Part 15 Per Section 15.203	**20. Sep, 2007**	**Antenna requirement**	**Pass**
Part 15 Per Section 15.247(b)(1)	**20. Sep, 2007**	**Maximum Peak Output power**	**Pass**
RSS-210 Issue 7 Section A8.4 (2)	**June 2007**		
Part 15 Per Section 15.247(a)(1)	**20. Sep, 2007**	**20dB Bandwidth**	**Pass**
RSS-210 Issue 7 Section A8.1 (b)	**June 2007**		
Part 15 Per Section 15.247(a)(1)	**20. Sep, 2007**	**Hopping Channel Carrier Frequency Separation**	**Pass**
RSS-210 Issue 7 Section A8.1 (b)	**June 2007**		

Part 15 Per Section 15.247(a)(1)(iii)	**20. Sep, 2007**	**Number of Hopping Frequency Used**	**Pass**
RSS-210 Issue 7 Section A8.1 (d)	**June 2007**		
Part 15 Per Section 15.247(a)(1)(iii)	**20. Sep, 2007**	**Time of Occupancy (Dwell Time)**	**Pass**
RSS-210 Issue 7 Section A8.1 (d)	**June 2007**		
Part 15 Per Section 15.247(d)	**20. Sep, 2007**	**Out-Of-Band Emission measurement**	**Pass**
RSS-210 Issue 7 A8.5	**June 2007**		
RSS-102 Issue 2 Section 2.5.2	**November 2005**	**Exemption from Routine Evaluation Limits – RF Exposure Evaluation**	**Pass**

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test result

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory

Guangzhou Auto Market, Yuan Gang Section of Guangshan Road
Guangzhou 510650

P. R. China

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Type	Manufacturer	S/N	Calibrated until	Calibrated Interval
EMI Test Receiver	ESCI-3	Rohde & Schwarz	100216	26.Nov.2008	1 year
Spectrum Analyzer	FSP30	Rohde & Schwarz	100286	24.Aug.2008	1 year
Trilog-Broadband Antenna	VULB9168	SCHWARZBECK MESS-ELEKTRONIK	210	08.May.2009	2 year
Double-Ridged Waveguide Horn Antenna	HF906	Rohde & Schwarz	100385	18.Jul.2009	2 year
Double-Ridged Waveguide Horn Antenna	HF906	Rohde & Schwarz	100407	08.May.2009	2 year
Pre-amplifier	AFS42-00101800-25-S-42	MITEQ	1101599	31.Jul.2009	2 year
Band Reject Filter	BRM50702	Micro-Tronics	023	14.Mar.2010	2 year
Standard Gain Horn Antenna	3160-09	EMCO	21642	N/A	N/A
Standard Gain Horn Antenna	3160-09	EMCO	21645	N/A	N/A
Pre-amplifier	AFS33-18002650-30-8P-44	MITEQ	1108282	31.Jul.2009	2 year
3m Anechoic Chamber	N/A	Albatross Project GmbH	N/A	16.Apr.2009	3 year
EMI Test Receiver	ESCS30	Rohde & Schwarz	100316	27.Mar.2009	1 year
Two-Line V-Network	ESH3-Z5	Rohde & Schwarz	100308	27.Mar.2009	1 year
Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100701	27.Mar.2009	1 year

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Uncertainty for conducted emissions measurements is ± 2.51dB.
Uncertainty for radiated emissions measurements is ± 4.9dB (30MHz-1GHz), ± 4.84dB (>1GHz).

The reported expanded uncertainty is based on a standard uncertainty multiply by a coverage factor k=2, providing a level of confidence of approximately 95%.

2.6 Location of original data

The original copies of test data taken during actual testing were attached at Appendix 1 of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Guangdong) file for certification follow-up purposes.

2.7 Status of facility used for testing

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory; Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements, the register no. 833845

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory; Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China is listed on Certification and Engineering Bureau of Canada, whose file number is IC 2932C.

3 General Product Information

The EUT is the audio transmitter part of a 2.4GHz Digital Wireless Headphone System.

The EUT is powered by an accessory AC/DC adaptor.

The 2.4GHz Digital Wireless Headphone System consists of an audio transmitter part and an audio receiver headphone. The audio receiver headphone is powered by battery and can be charged by the EUT's charge output port.

3.1 Product Function and Intended Use

Refer to the Technical Documentation and user manual.

3.2 Ratings and System Details

Frequency range	:	2402.0MHz – 2483.5MHz (unlicensed ISM band)
Number of employed channels	:	15 channels
Total Number of channels	:	26 channels: 2402.304 MHz, 2405.376 MHz, 2408.448 MHz 2411.520 MHz, 2414.592 MHz, 2417.664 MHz 2420.736 MHz, 2423.808 MHz, 2426.880 MHz 2429.952 MHz, 2433.024 MHz, 2436.096 MHz 2439.168 MHz, 2442.240 MHz, 2445.312 MHz 2448.384 MHz, 2451.456 MHz, 2454.528 MHz 2457.600 MHz, 2460.672 MHz, 2463.744 MHz 2466.816 MHz, 2469.888 MHz, 2472.960 MHz 2476.032 MHz, 2479.104 MHz
Modulation Type	:	Frequency Hopping Spread Spectrum
Mode of RF Operation (Simplex/ Duplex)	:	Duplex
Category of equipment	:	Low-power License-exempt Radiocommunication Devices(All Frequency Bands):Category I equipment (refer to RSS-Gen, clause 2)
Type of antenna	:	Integral antenna
Power supply	:	9V DC
Ports	:	DC in; Audio in; Charge output port for relative headphone.
Protection Class	:	III

Refer to the Technical Documentation for further information

3.3 Independent Operation Modes

The basic operation modes are:

On: RF transmitting with FHSS
Off

For further information refer to User Manual

3.4 Submitted Documents

Operation Description and Frequency Table
Block Diagram
Schematics
Components List
FCC and IC label and its location
User Manual
Internal Photos
External Photos
Application form

4 Test Set-up and Operation Mode

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Refer to test set-up in chapter 5.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following linear AC/DC Adaptor:

Input : AC 120V, 60Hz
Output : DC 9V / 400mA
Protection class : II

4.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the technical document. No additional measures were employed to achieve compliance.

4.5 Test set-up

Diagram 1 of Configuration for Testing Radiated Emission below 1 GHz

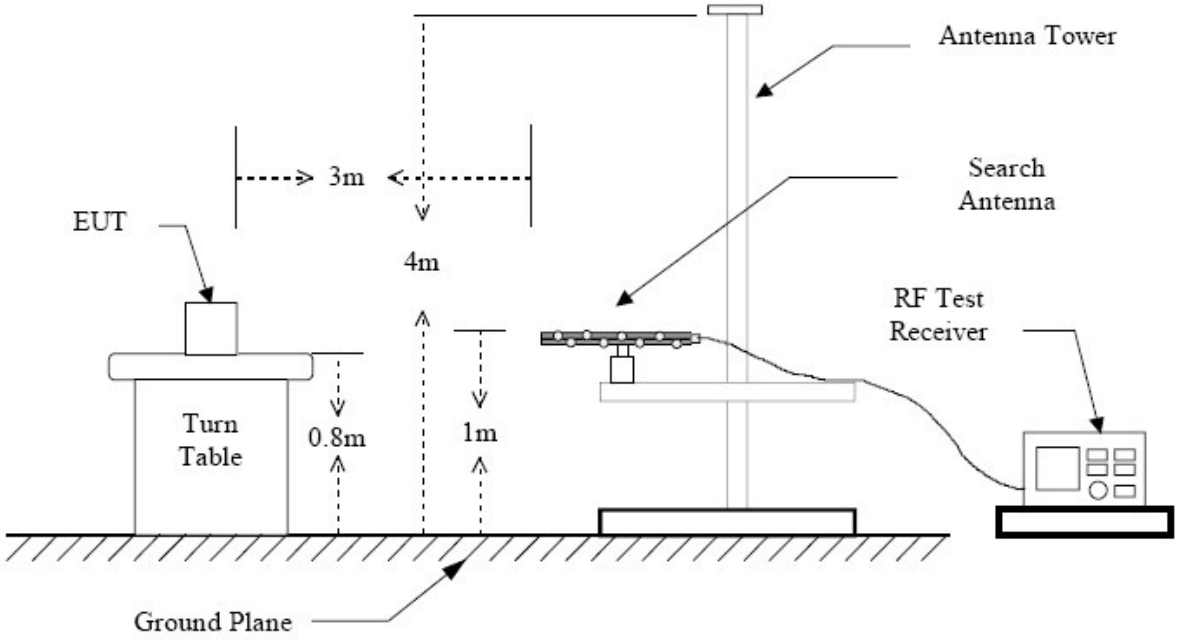


Diagram 2 of Configuration for Testing Radiated Emission above 1 GHz

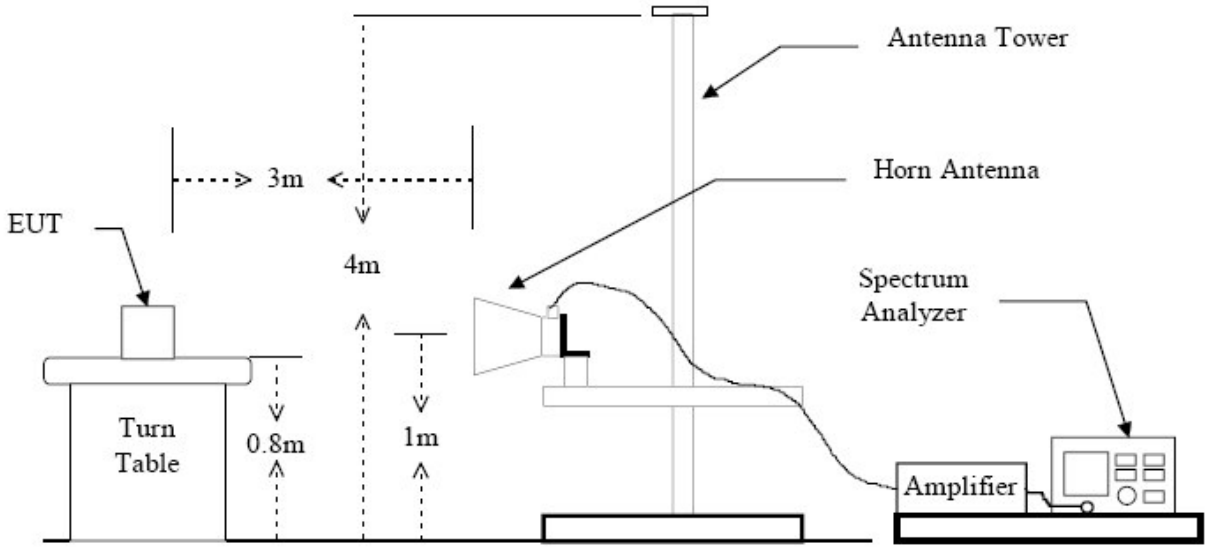


Diagram 3 of Measurement Equipment Configuration for Testing Conducted Emission

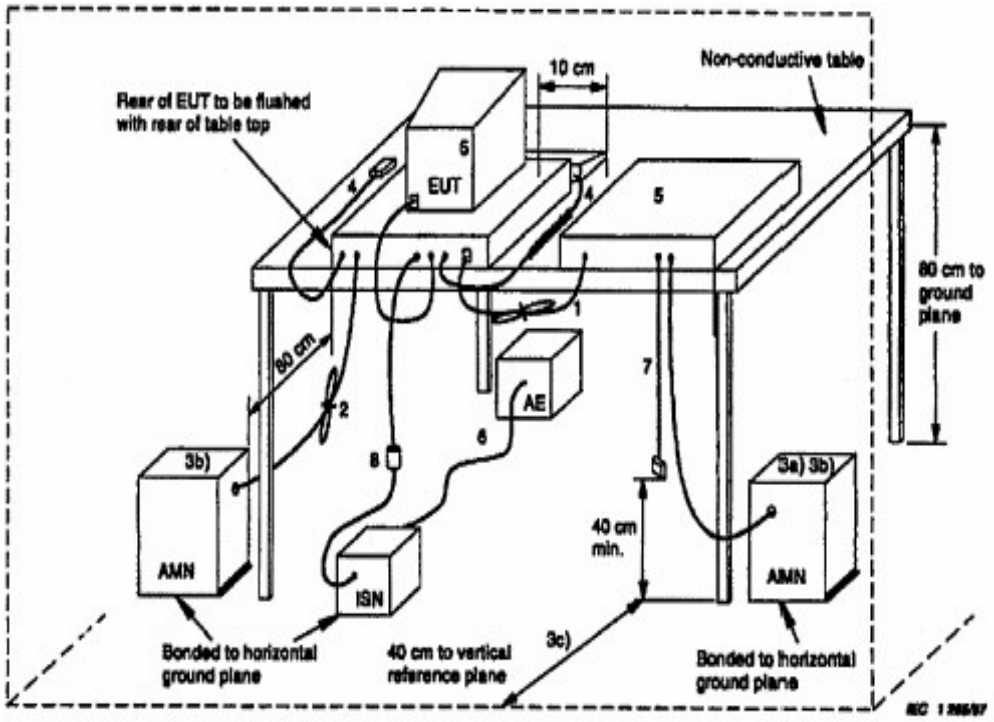
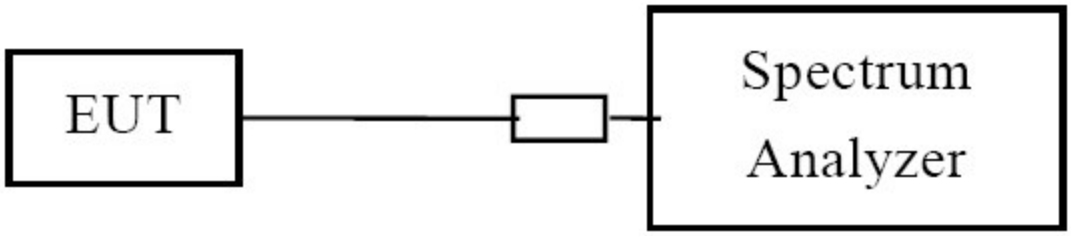


Diagram 4 of Configuration for Testing other test items



5 Test Results E M I S S I O N

5.1 Conducted Emission for FCC Part 15 Per Section 15.207(a)

RESULT: **Pass**

Date of testing	:	27.12.2007, 14.08.2008
Test specification	:	FCC Part 15 Per Section 15.207(a) RSS-Gen Per Section 7.2.2
Limits	:	FCC Part 15 Per Section 15.207(a) RSS-Gen Per Section 7.2.2, table 2
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Deviations from Standard Test procedures	:	None
Kind of test site	:	Shielded room
Operation mode	:	Transmitting / Charging
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	20°C
Humidity	:	45%

Test procedure:
1. Place the EUT as specified in ANSI C63.4 Clause 7.2.1

2. Plug the LISN to a correct power source (pay attention to: AC/DC, voltage, frequency).

4. Connect the EUT to LISN and choose N or L1 on the LISN.

5. Connect ESCS30 and LISN via a 50-ohm coaxial cable and a pulse limiter then begin exploratory measurement as specified in ANSI C63.4 Clause 7.2.3

6. Make final measurement as specified in ANSI C63.4 Clause 7.2.4

7. Switch to the other line on the LISN and repeat step 4 to 6.

Table 2: Disturbance Voltage on AC Mains

Transmitting mode

Frequency [MHz]	**Line** L/N	**QP** [dBµV]	**AV** [dBµV]	**Quasi Peak Limit** [dBµV]	**Average Limit** [dBµV]
1.025	N	39.4	31.3	56	46
1.000	L	36.5	27.9	56	46
*)					

*) Disturbances other than those mentioned above are small or not detectable.

Charging mode

Frequency [MHz]	**Line** L/N	**QP** [dBµV]	**AV** [dBµV]	**Quasi Peak Limit** [dBµV]	**Average Limit** [dBµV]
*)					

*) Disturbances level is far below the limit. No final measurement is performed. Refer to Appendix 1 for the exploratory measurement of un-weighted peak values and average values.

If the result of the measurement with the Quasi Peak detector is below the Average limit, the measurement with Average Detector may be omitted.

The spectral diagrams in Appendix 1 display the exploratory measurement of un-weighted peak values and average values.

5.2 Transmitter Radiated Spurious Emission

RESULT: **Pass**

Date of testing	:	19.10.2007
Test specification	:	FCC Part 15 Per Section 15.209(a) RSS-210 Per Section 2.6
Limits	:	FCC Part 15 Per Section 15.209(a) RSS-210 Per Section 2.6, table 2
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Deviations from Standard Test procedures	:	None
Kind of test site	:	3m Semi-anechoic chamber
Operation mode	:	RF transmitting
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	23°C
Humidity	:	48%

Test procedure:

1. The EUT was placed on the top of a rotatable table 0.8 meters above the ground with 3-orthogonal direction and be kept close enough to the receiving antenna. The table was rotated 360 degrees to determine the suspected emission frequency and the position of the worst radiation case with both horizontal and vertical antenna polarization.

2. The EUT was then set 3 meters away from the receiving antenna, which was mounted on a variable-height antenna tower.

3. For each suspected emission frequency recorded in step 1, the EUT was arranged to its worst case that the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to read the maximum emission.

Table 3: Radiated Emission (Transmitting at channel low)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dBµV/m]			(H/V)	[dBµV/m]		
7205.000	N/A	42.2	51.2	V	N/A	54	74
13724.500	N/A	43.4	54.3	V	N/A	54	74
17844.875	N/A	45.6	57.1	V	N/A	54	74
21302.000	N/A	41.0	51.9	V	N/A	54	74
22975.000	N/A	41.3	52.6	V	N/A	54	74
25750.000	N/A	43.2	53.8	V	N/A	54	74
*)---							

Table 4: Radiated Emission (Transmitting at channel mid)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dBµV/m]			(H/V)	[dBµV/m]		
7328.250	N/A	41.9	49.9	V	N/A	54	74
13713.875	N/A	42.8	54.7	V	N/A	54	74
17834.250	N/A	45.3	56.8	V	N/A	54	74
20205.000	N/A	40.1	52.5	V	N/A	54	74
22756.000	N/A	41.3	51.7	V	N/A	54	74
25637.000	N/A	42.7	54.0	V	N/A	54	74
*)---							

Table 5: Radiated Emission (Transmitting at channel high)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dBµV/m]			(H/V)	[dBµV/m]		
7445.125	N/A	39.1	48.1	V	N/A	54	74
13750.000	N/A	42.3	52.4	V	N/A	54	74
17908.625	N/A	45.0	55.7	V	N/A	54	74
21441.000	N/A	40.1	51.9	V	N/A	54	74
23254.000	N/A	41.0	53.0	V	N/A	54	74
25486.000	N/A	42.6	53.7	V	N/A	54	74
*)---							

*) Disturbances other than those mentioned above are small or not detectable.

5.3 Receiver Radiated Spurious Emission

RESULT: **Pass**

Date of testing	:	27.12.2007
Test specification	:	RSS-210 Per Section 2.3
Limits	:	RSS-210 Per Section 2.3 RSS-Gen Per Section 7.2.3.2
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Deviations from Standard Test procedures	:	None
Kind of test site	:	3m Semi-anechoic chamber
Operation mode	:	RF Receiving
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	23°C
Humidity	:	48%

Test procedure:

1. The EUT was placed on the top of a rotatable table 0.8 meters above the ground with 3-orthogonal direction and be kept close enough to the receiving antenna. The table was rotated 360 degrees to determine the suspected emission frequency and the position of the worst radiation case with both horizontal and vertical antenna polarization.

2. The EUT was then set 3 meters away from the receiving antenna, which was mounted on a variable-height antenna tower.

3. For each suspected emission frequency recorded in step 1, the EUT was arranged to its worst case that the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to read the maximum emission.

Table 6: Receiver Radiated Emission (Worst Case of High, Mid, Low channel)

Frequency	QP	AV	PK	Polarity	Limit		
					QP	AV	PK
[MHz]	[dBµV/m]			(H/V)	[dBµV/m]		
8840.000	N/A	38.2	50.0	H	N/A	54	74
*)---							

*) Disturbances are far below the limit. Refer to Appendix 1 for the noise floor of disturbance. The value recorded in the table is the max level of the noise floor.

5.4 Antenna requirement

RESULT: **Pass**

Date of testing	:	---
Test specification	:	FCC Part 15 Per Section 15.203 FCC Part 15 Per Section 15.247(b)

For intentional device, according to 15.203, and intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to 15.247(b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by amount in dB than the directional gain of the antenna exceeds of 6dBi.

As the antenna is permanently mounted on RF Board, there is no consideration of replacement.

And the max gain of the antenna is 0dBi.

5.5 Maximum Peak Output Power

RESULT: **Pass**

Date of testing	:	20.03.2008
Test specification	:	FCC Part 15 Per Section 15.247(b)(1) RSS-210 Issue 7 Section A8.4 (2)
Limits	:	FCC Part 15 Per Section 15.247(b)(1) RSS-210 Issue 7 Section A8.4 (2) For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.
Deviations from Standard Test procedures	:	None
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Kind of test site	:	Shielded room
Operation mode	:	Continuously transmitting on the measured channel.
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency= measured channel, RBW=3MHz, VBW≥RBW.
4. Mark the peak power output frequency and record the max reading.
5. Repeat step 2 to 4 until all the channels measured are finished.

Table 7: Peak Conducted Power

Channel	Frequency (MHz)	Power Reading(dBm)	Cable Loss (dB)	Output Power		Limit *
				(dBm)	(mW)	(mW)
Low	2402.304	12.68	0.8	13.48	22.28	125
Mid	2442.240	12.57	0.8	13.37	21.73	125
High	2479.104	12.14	0.8	12.94	19.68	125
*Note: Refer to the test result of "Number of Hopping Channel Used" for the non-overlap channel number.						

5.6 20dB Bandwidth

RESULT: **Pass**

Date of testing	:	20.03.2008
Test specification	:	FCC Part 15 Per Section 15.247(a)(1) RSS-210 Issue 7 Section A8.1 (b)
Limits	:	FCC Part 15 Per Section 15.247(b)(1) RSS-210 Issue 7 Section A8.1 (b) Frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.
Deviations from Standard Test procedures	:	None
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Operation mode	:	Continuously transmitting on the measured channel.
Kind of test site	:	Shielded room
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency= measured channel, RBW=10kHz, VBW=30kHz.
4. Mark the peak power frequency point and the -20dB upper and lower frequency points.
5. Read the frequency delta value between the -20dB upper and lower frequency points.
6. Repeat step 2 to 5 until all the channels required are finished.

Table 8: 20dB Bandwidth

Channel	Frequency (GHz)	Test Result (kHz)
Low	2402.304	3080
Mid	2442.240	3072
High	2479.104	3080

Please refer to Appendix 1 for measurement data.

5.7 Hopping Channel Carrier Frequency Separation

RESULT: **Pass**

Date of testing	:	20.03.2008
Test specification	:	FCC Part 15 Per Section 15.247(a)(1) RSS-210 Issue 7 Section A8.1 (b)
Limits	:	FCC Part 15 Per Section 15.247(a)(1) RSS-210 Issue 7 Section A8.1 (b) Frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.
Deviations from Standard Test procedures	:	None
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Kind of test site	:	Shielded room
Operation mode	:	Transmitting with hopping at the full channel set
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency = measured channel, RBW = 10 kHz, VBW = 30 kHz, Frequency Span = wide enough to cover the adjacent channel.
4. Mark the peak power frequency point of the measured channel and its adjacent channel(s)
5. Read the frequency delta value between the measured channel and its adjacent channel(s)
6. Repeat step 3 to 5 until all the channels measured are finished.

Table 9: Hopping Channel Carrier Frequency Separation

Channel	**Adjacent Hopping channel separation (kHz)**	**Limit**
Low	3040	At least 25kHz or tow-thirds of the 20dB bandwidth of the hopping channel, whichever is greater. Note: refer to table 7 for the value of 20dB bandwidth
Mid	3120	
High	3060	

Please refer to Appendix 1 for measurement data.

5.8 Number of Hopping Frequency Used

RESULT: **Pass**

Date of testing	:	20.03.2008
Test specification	:	FCC Part 15 Per Section 15.247(a)(1)(iii) RSS-210 Issue 7 Section A8.1 (d)
Limits	:	FCC Part 15 Per Section 15.247(a)(1)(iii) RSS-210 Issue 7 Section A8.1 (d) Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels
Deviations from Standard Test procedures	:	None
Test procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Kind of test site	:	Shielded room
Operation mode	:	Transmitting with hopping at the full channel set
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: RBW = 100 kHz, VBW≥RBW, Frequency Span = wide enough to cover the channels to be plotted.
4. Set the spectrum analyzer to Max-hold mode and plot the result(s) with record of all hopping channel.

Table 10: Number of hopping frequency

Number of hopping frequency (full set):	26
Number of actual employed hopping frequency:	15 *
Limit:	At least 15 non-overlapping channels

Please refer to Appendix 1 for measurement data.
* Refer to “Operation Description and Frequency Table” for the detail.

5.9 Time of Occupancy (Dwell Time)

RESULT: **Pass**

Date of testing	:	20.03.2008
Test specification	:	FCC Part 15 Per Section 15.247(a)(1)(iii) RSS-210 Issue 7 Section A8.1 (d)
Limits	:	FCC Part 15 Per Section 15.247(a)(1)(iii) RSS-210 Issue 7 Section A8.1 (d) For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period 0f 0.4 seconds multiplied by the number of hopping channels employed.
Deviations from Standard Test procedures	:	None
Test Procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Kind of test site	:	Shielded room
Operation mode	:	Transmitting with hopping at the full channel set
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency = measured channel, RBW = 3MHz, VBW≥RBW, Frequency Span = 0.
4. Set sweep time properly to capture the entire dwell time per hopping channel.
5. Set detector type to Peak and trace mode to Max Hold and make the measurement.
6. Repeat step 3-5 until all channels measured were complete.

Table 11: Dwell Time

channel	Frequency (GHz)	Dwell time of one signal Burst (ms)	Total Dwell Time (ms)	Limit (ms)
Low	2402.304	6.38	(6.38 x **54.4**) = 347.072	400
Mid	2442.240	6.49	(6.49 x **54.4**) = 352.512	400
High	2479.104	6.49	(6.49 x **54.4**) = 352.512	400

Note:

Period of the EUT= 0.4 (seconds) x 15 (channels) = 6 seconds

For the EUT, there are 136 hoppings in one second. The EUT operates on a 1-transmission-receiving basis in every hop. Thus there are 136 transmissions per second. In one period for each particular channel there are (136/15) x 6 = **54.4** times of transmission.

Dwell Time in one period(ms) = Dwell time of one transmission(ms) multiplexes **54.4**

Please refer to Appendix 1 for measurement data.

5.10 Out-of-Band Emission

RESULT: **Pass**

Date of testing	:	20.03.2008
Test specification	:	FCC Part 15 Per Section 15.247(d) RSS-210 Issue 7 A8.5
Limits	:	FCC Part 15 Per Section 15.247(d) RSS-210 Issue 7 A8.5 In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition: FCC Part 15 - radiated emission 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). RSS-210 Section 2.2- Unwanted emissions falling into restricted bands of Table 1 shall meet Tables 2 and 3 limits.
Deviations from Standard Test procedures	:	None
Test Procedure	:	Procedure specified in ANSI C63.4/RSS-Gen were followed
Kind of test site	:	Shielded room
Operation mode	:	Transmitting at the highest and lowest channel (band edge) Transmitting at low, middle and high channel (whole rang)
Power supply	:	AC 120V;60Hz to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Test procedure:

1. Connect the antenna port of the EUT to the spectrum analyzer by a low lost cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: RBW = 100 kHz, VBW≥RBW.
4. Set proper frequency span respectively for out-of-band emission measurement of the band edge and the whole range (up to 10 times of the carrier frequency.)
5. Set the trace mode to Max Hold and mark the peak reading of any spurious emission recorded.

Table 12: Band Edges Emission

Emission	Attenuation (dB)	Limit (dB)
Lower Band Edge	All emission in this 100kHz bandwidth are attenuated more than 20dB from the carrier	△≥20
Upper Band Edge	All emission in this 100kHz bandwidth are attenuated more than 20dB from the carrier	△≥20

Table 13: Out-Of-Band Emission measurement (conducted)

Emission (Max reading among Channel low, mid and high)	Attenuation	Limit (dB)
30MHz to 25GHz	All emission in this 100kHz bandwidth are attenuated more than 20dB from the carrier	△≥20

Table 14: Band Edges Emission in the Restricted Bands 2483.5-2500MHz and 2310-2390MHz

Restricted band	Frequency [MHz]	dBc [dB]	PK [dBμV/m]	Polarity (H/V)	PK limit [dBμV/m]	AV limit [dBμV/m]
Low band	*---				74	54
High band	*---				74	54

Remark:
1. The test result of peak carrier field strength of lowest channel and highest channel is recorded.

2. The dBc value between the carrier maximum power and band edge emission power of the frequency listed in the table is calculated from the test record showed in Appendix 1.

3. Peak value of the band edge emission listed in the table is calculated by the below formula:
PK value of band edge emission = Peak carrier field strength – dBc value in item2

*** Note:** Disturbances other than those mentioned above are small or not detectable. Please refer to the Appendix 1 for the noise floor of the band edge emission.

5.11 Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RESULT: **Pass**

Date of testing : ---
Test specification : RSS-102 Issue 2 Section 2.5.2
Limits : RSS-102 Issue 2 Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm, except when the device operates:
Below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W;

At or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.

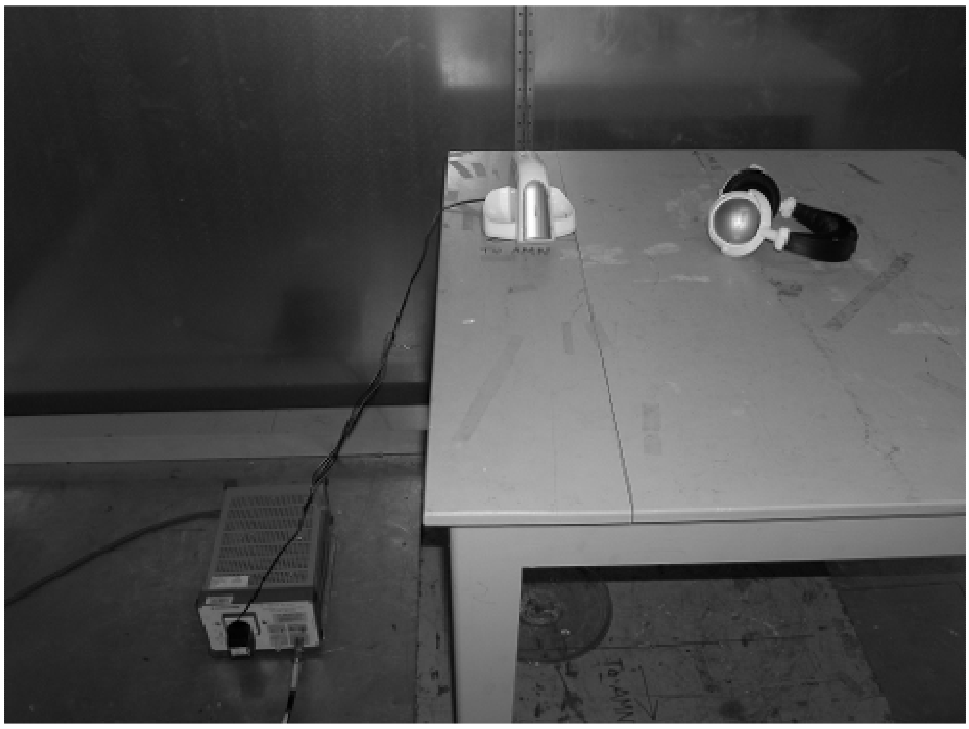
The EUT is a wireless audio transmitter which separation between it and the user is greater than 20 cm.

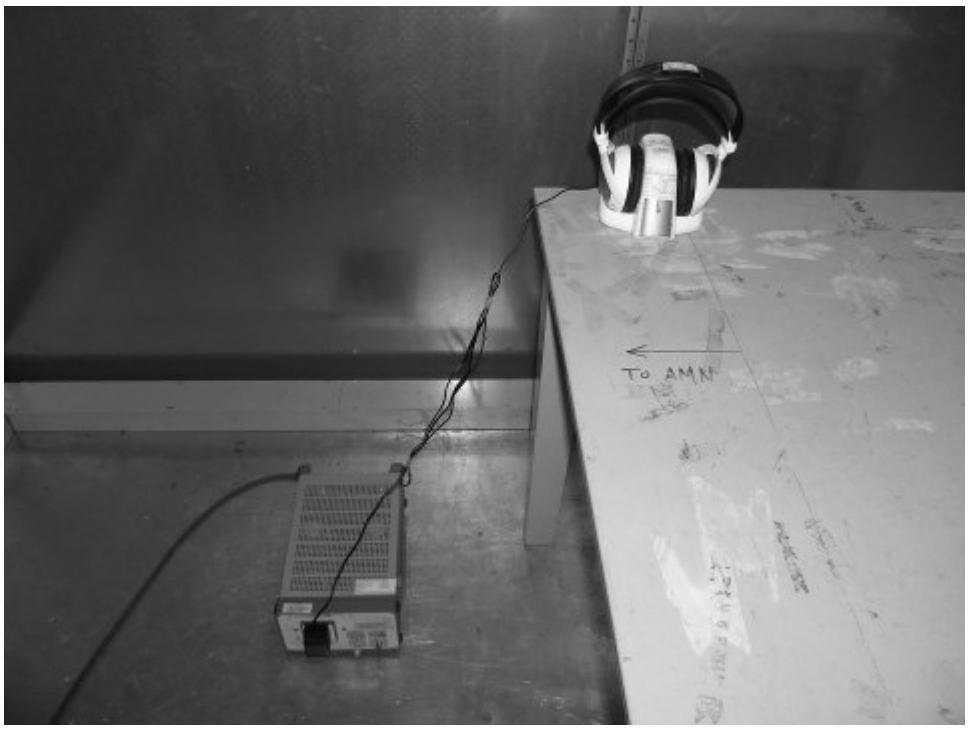
Table 15: e.i.r.p

Channel	Frequency	Peak Conducted Output Power	Antenna Gain	e.i.r.p		Limit
	(MHz)	(dBm)	(dBi)	(dBm)	(mW)	(mW)
Low	2402.304	13.48	0	13.48	22.28	5000
Mid	2442.240	13.37	0	13.37	21.73	5000
High	2479.104	12.94	0	12.94	19.68	5000

6 Photographs of the Test Set-Up

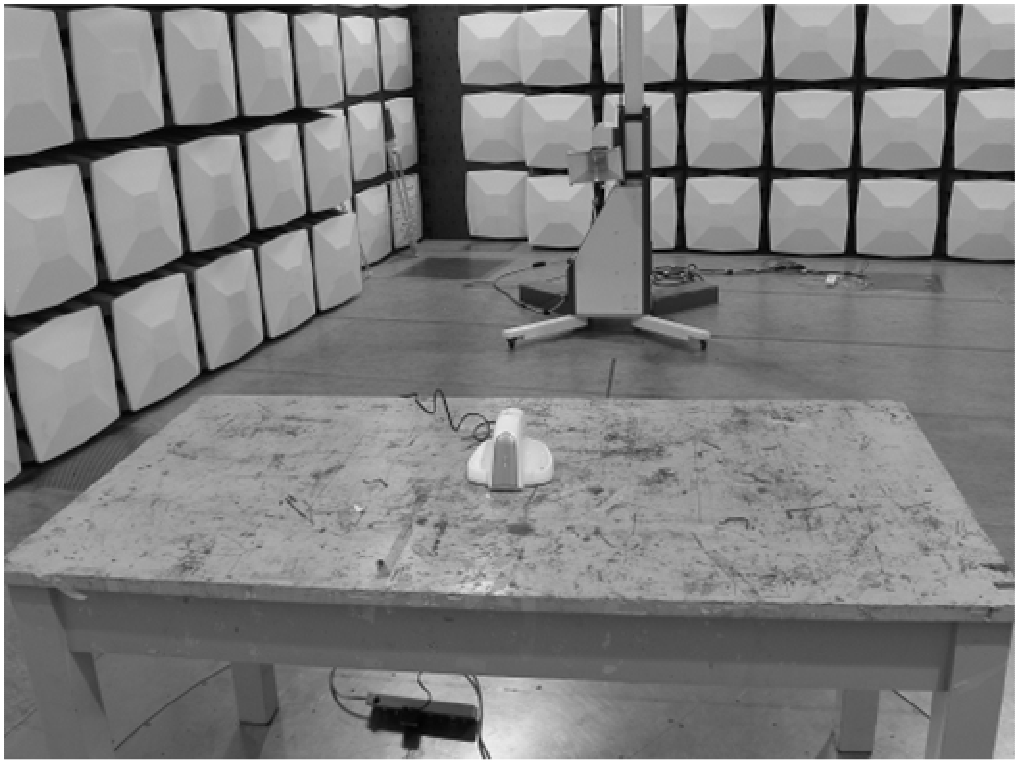
Photograph 1: Set-up for Conducted Emission Measurement





Photograph 2: Set-up for Radiation Measurement below 1GHz

Photograph 3: Set-up for Radiation Measurement above 1GHz



7 List of Tables

8 List of Photographs