

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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## TEST REPORT

Report No.: 13010205HKG-001

Lenbrook Industries Limited

Application  
For  
Certification  
(Original Grant)  
(FCC ID: Q20-VISO1AP)  
(IC: 152B-VISO1AP)

Transceiver

Prepared and Checked by:

Approved by:

A handwritten signature in black ink, appearing to read 'Herbert'.

Wong Cheuk Ho, Herbert  
Lead Engineer

A handwritten signature in black ink, appearing to read 'Terry'.

Chan Chi Hung, Terry  
Assistant Supervisor  
Date: May 16, 2013

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**Intertek Testing Services Hong Kong Ltd.**

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.

Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

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## GENERAL INFORMATION

**Lenbrook Industries Limited**  
**BRAND NAME: NAD, MODEL: VISO 1 AP**

**FCC ID: Q20-VISO1AP**  
**IC: 152B-VISO1AP**

Grantee:	Lenbrook Industries Limited
Grantee Address:	Room D, 11th Floor, Wing Cheong Commercial Building, 19-25 Jervois Street, Central, Hong Kong.
Contact Person:	Jes Arcenal
Tel:	852-2517 8292
Fax:	852-2517 4404
e-mail:	jes_arcenal@nadelectronics.com
Manufacturer:	Dongguan Kwan Hong Electronics Co., Ltd.
Manufacturer Address:	KwanHong Building, Xiao Bian 2 <sup>nd</sup> Industrial Zone, ChangAn, DongGuan, China.
Brand Name:	NAD
Model:	VISO 1 AP
Type of EUT:	Transceiver
Description of EUT:	Wireless Airplay Music System
Serial Number:	N/A
FCC ID / IC:	Q20-VISO1AP / 152B-VISO1AP
Date of Sample Submitted:	January 08, 2013
Date of Test:	January 08 to May 03, 2013
Report No.:	13010205HKG-001
Report Date:	May 16, 2013
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Report No.: 13010205HKG-001  
FCC ID: Q20-VISO1AP  
IC: 152B-VISO1AP

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## SUMMARY OF TEST RESULT

**Lenbrook Industries Limited**  
**BRAND NAME: NAD, MODEL: VISO 1 AP**

**FCC ID: Q20-VISO1AP**  
**IC: 152B-VISO1AP**

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.4	Pass
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	Pass
Receiver / Digital Device Radiated Emissions	15.109 / RSS-210 2.5	Pass

The equipment under test is found to be complying with the following standards:  
FCC Part 15, October 1, 2011 Edition  
RSS-210 Issue 8, December 2010  
RSS-Gen Issue 3, December 2010

- Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

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Report No.: 13010205HKG-001  
FCC ID: Q20-VISO1AP  
IC: 152B-VISO1AP

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## 1.0 General Description

### 1.1 Product Description

The Equipment Under Test (EUT) is a Wireless Airplay Music System, equipped with a 2.4GHz WiFi (6201) and Bluetooth (CSR8645) modules. The 2.4GHz WiFi (6201) module is controlled by network media processor DM870 to provide Airplay music streaming features. The Bluetooth (CSR8645) modules provides audio playback via Bluetooth device. The 2.4GHz WiFi (6201) operates in the frequency range between 2412MHz and 2462MHz (11 channels with 5 MHz channel spacing, 802.11 b and g only). The Bluetooth (CSR8645) module operates in the frequency range between 2402MHz and 2480MHz (79 channels with 1 MHz channel spacing). The EUT can also accept digitized audio signal from LAN network (Intertek Radio), USB flash and TOSLINK SPDIF optical input. The EUT has built-in digital power amplifier driving the internal loudspeakers. The EUT is powered by 100-240VAC (universal input with earth pin).

The 2.4GHz WiFi module (6201) contains two antennas. Only one antenna is emitting at the same time.

Bluetooth module (CSR8645) contains single antenna only.

WiFi and Bluetooth do not emit simultaneously in actual product operation.

WiFi Antenna Type: Internal, Integral

(antenna 1 and 2: 2412MHz – 2462MHz, 11 channels, 5MHz spacing)

Bluetooth Antenna Type: Internal, Integral

(single antenna: 2402MHz – 2480MHz, 79 channels, 1MHz spacing)

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## 1.2 Related Submittal(s) Grants

This is a single application for certification of two transceivers: WiFi (wireless LAN) and Bluetooth.

## 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “**Justification Section**” of this Application.

## 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC and IC.

## 2.0 **System Test Configuration**

### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by 100-240VAC.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

All configuration and setting of data rate for each Bluetooth/802.11b/802.11g mode have been considered and worst case test data are shown on this test report.

### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it transmits the RF signal continuously.

### 2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

### 2.4 Equipment Modification

Any modifications installed previous to testing by Lenbrook Industries Limited will be incorporated in each production model sold/leased in the United States and Canada.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

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## 2.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

## 2.6 Support Equipment List and Description

1. 1 x USB cable with 1.0m long (for termination only)
2. 1 x LAN cable with 1.0m long (for termination only)  
(Provided by Intertek)
3. 1 x power cord with 2.0m long  
(Provided by Applicant)



### 3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

#### 3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG - AV$$

where            FS = Field Strength in dB $\mu$ V/m  
                    RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V  
                    CF = Cable Attenuation Factor in dB  
                    AF = Antenna Factor in dB  
                    AG = Amplifier Gain in dB  
                    AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where            FS = Field Strength in dB $\mu$ V/m  
                    RR = RA - AG - AV in dB $\mu$ V  
                    LF = CF + AF in dB

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$\begin{aligned} RA &= 52.0 \text{ dB}\mu\text{V/m} & RR &= 18.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} & LF &= 9.0 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ AV &= 5.0 \text{ dB} \\ FS &= RR + LF \\ FS &= 18 + 9 = 27 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$

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### 3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 14646.000 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

### 3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 1.7 dB

### 3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 23.127 MHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

### 3.5 Conducted Emission Data

The graph and data table of conducted emission as shown below.

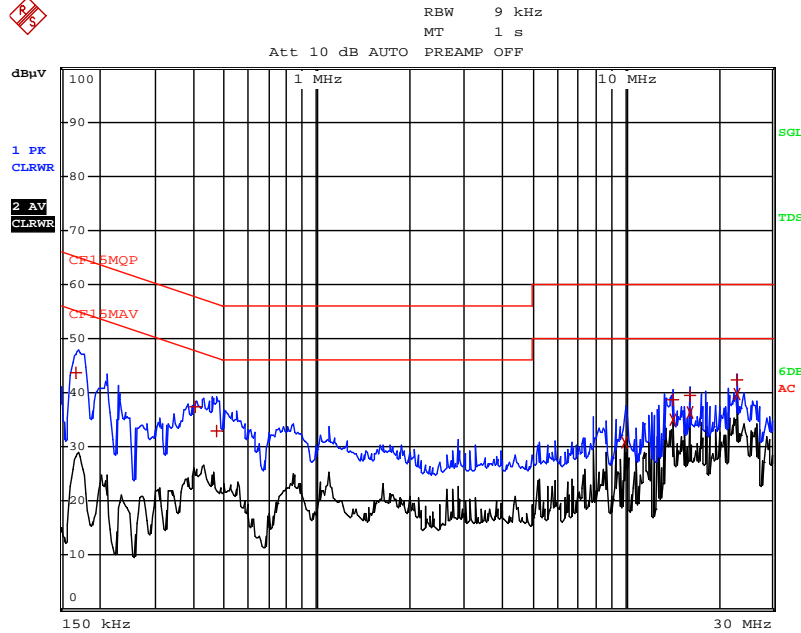
Judgment: Pass by 10.4 dB

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Worst Case Operating Mode: Bluetooth



Date: 30.APR.2013 17:18:11

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP  
Trace2: CF15MAV  
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	168 kHz	43.61 N	-21.44
1 Quasi Peak	402 kHz	37.30 N	-20.50
1 Quasi Peak	474 kHz	33.05 L1	-23.39
2 CISPR Average	9.9375 MHz	30.71 L1	-19.28
1 Quasi Peak	14.2125 MHz	38.76 L1	-21.23
2 CISPR Average	14.2125 MHz	35.12 L1	-14.87
1 Quasi Peak	16.2285 MHz	39.50 L1	-20.49
2 CISPR Average	16.2285 MHz	36.29 L1	-13.70
1 Quasi Peak	23.127 MHz	42.49 N	-17.50
2 CISPR Average	23.127 MHz	39.63 N	-10.36

Date: 30.APR.2013 17:17:24

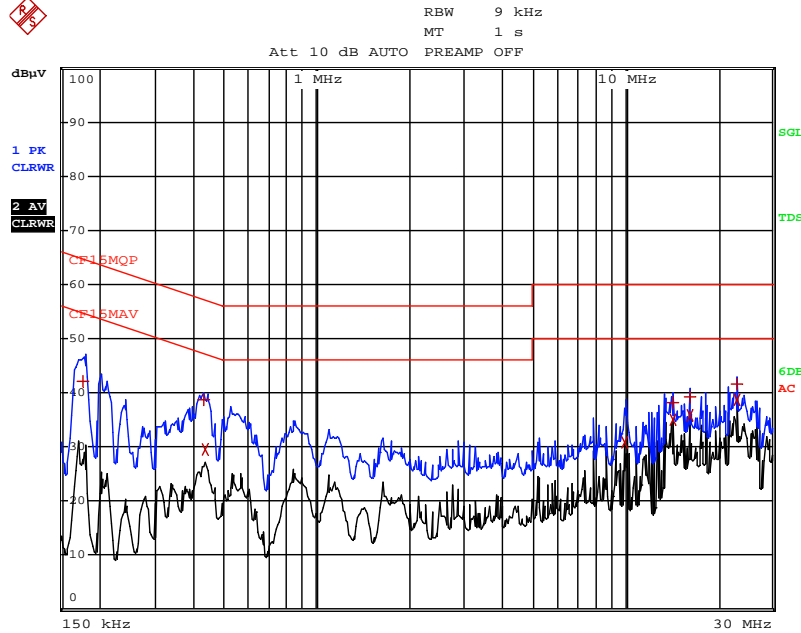
Report No.: 13010205HKG-001  
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Worst Case Operating Mode: Wi-Fi



Date: 30.APR.2013 17:10:05

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP  
Trace2: CF15MAV  
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA	LIMIT dB
1 Quasi Peak	177 kHz	42.03 N		-22.59
1 Quasi Peak	429 kHz	38.83 N		-18.43
2 CISPR Average	433.5 kHz	29.63 N		-17.54
2 CISPR Average	9.9375 MHz	30.77 L1		-19.22
1 Quasi Peak	14.2125 MHz	38.30 L1		-21.69
2 CISPR Average	14.2125 MHz	34.91 L1		-15.08
1 Quasi Peak	16.2285 MHz	39.31 L1		-20.68
2 CISPR Average	16.2285 MHz	35.88 L1		-14.11
1 Quasi Peak	23.127 MHz	41.71 N		-18.28
2 CISPR Average	23.127 MHz	38.83 N		-11.16

Date: 30.APR.2013 17:09:42

Report No.: 13010205HKG-001  
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Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP  
Worst-Case Operating Mode: Bluetooth

Date of Test: May 03, 2013

Table 1

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Lowest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2402.000	86.2	33	29.4	82.6	94.0	-11.4
V	4808.000	42.5	33	34.9	44.4	54.0	-9.6
V	7212.000	42.6	33	37.9	47.5	54.0	-6.5
V	9616.000	42.2	33	40.4	49.6	54.0	-4.4
V	12020.000	42.7	33	40.5	50.2	54.0	-3.8
V	14424.000	45.2	33	40.0	52.2	54.0	-1.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2402.000	86.2	33	29.4	82.6	114.0	-31.4
V	4808.000	42.5	33	34.9	44.4	74.0	-29.6
V	7212.000	42.6	33	37.9	47.5	74.0	-26.5
V	9616.000	42.2	33	40.4	49.6	74.0	-24.4
V	12020.000	42.7	33	40.5	50.2	74.0	-23.8
V	14424.000	45.2	33	40.0	52.2	74.0	-21.8

- NOTES:
1. Peak Detector is used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. Data was collected by spectrum analyzer with 1MHz resolution bandwidth.

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Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP  
Worst-Case Operating Mode: Bluetooth

Date of Test: May 03, 2013

Table 2

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Middle Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2441.000	91.6	33	29.4	88.0	94.0	-6.0
V	4882.000	42.9	33	34.9	44.8	54.0	-9.2
V	7323.000	42.5	33	37.9	47.4	54.0	-6.6
V	9764.000	42.3	33	40.4	49.7	54.0	-4.3
V	12205.000	43.2	33	40.5	50.7	54.0	-3.3
V	14646.000	46.9	33	38.4	52.3	54.0	-1.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2441.000	91.6	33	29.4	88.0	114.0	-26.0
V	4882.000	42.9	33	34.9	44.8	74.0	-29.2
V	7323.000	42.5	33	37.9	47.4	74.0	-26.6
V	9764.000	42.3	33	40.4	49.7	74.0	-24.3
V	12205.000	43.2	33	40.5	50.7	74.0	-23.3
V	14646.000	46.9	33	38.4	52.3	74.0	-21.7

- NOTES:
1. Peak Detector is used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. Data was collected by spectrum analyzer with 1MHz resolution bandwidth.

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Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP  
Worst-Case Operating Mode: Bluetooth

Date of Test: May 03, 2013

Table 3

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Highest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2480.000	94.1	33	29.4	90.5	94.0	-3.5
V	4960.000	43.0	33	34.9	44.9	54.0	-9.1
V	7440.000	42.8	33	37.9	47.7	54.0	-6.3
V	9920.000	41.9	33	40.4	49.3	54.0	-4.7
V	12400.000	43.3	33	40.5	50.8	54.0	-3.2
V	14880.000	46.8	33	38.4	52.2	54.0	-1.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	2480.000	94.1	33	29.4	90.5	114.0	-23.5
V	4960.000	43.0	33	34.9	44.9	74.0	-29.1
V	7440.000	42.8	33	37.9	47.7	74.0	-26.3
V	9920.000	41.9	33	40.4	49.3	74.0	-24.7
V	12400.000	43.3	33	40.5	50.8	74.0	-23.2
V	14880.000	46.8	33	38.4	52.2	74.0	-21.8

- NOTES:
1. Peak Detector is used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. Data was collected by spectrum analyzer with 1MHz resolution bandwidth.

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Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11b, DSSS, 11Mbps) Antenna 1

Table 4

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Lowest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	79.1	33	29.4	75.5	94.0	-18.5
V	4824.000	33.5	33	34.9	35.4	54.0	-18.6
V	7236.000	37.3	33	37.9	42.2	54.0	-11.8
V	9648.000	37.6	33	40.4	45.0	54.0	-9.0
V	12060.000	39.6	33	40.5	47.1	54.0	-6.9
V	14472.000	43.3	33	40.0	50.3	54.0	-3.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	107.6	33	29.4	104.0	114.0	-10.0
V	4824.000	41.9	33	34.9	43.8	74.0	-30.2
V	7236.000	41.9	33	37.9	46.8	74.0	-27.2
V	9648.000	41.1	33	40.4	48.5	74.0	-25.5
V	12060.000	42.8	33	40.5	50.3	74.0	-23.7
V	14472.000	45.2	33	40.0	52.2	74.0	-21.8

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.



Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11b, DSSS, 11Mbps) Antenna 1

Table 5

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Middle Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2437.000	79.3	33	29.4	75.7	94.0	-18.3
V	4874.000	33.4	33	34.9	35.3	54.0	-18.7
V	7311.000	37.7	33	37.9	42.6	54.0	-11.4
V	9748.000	37.9	33	40.4	45.3	54.0	-8.7
V	12185.000	39.8	33	40.5	47.3	54.0	-6.7
V	14622.000	45.4	33	38.4	50.8	54.0	-3.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2437.000	108.4	33	29.4	104.8	114.0	-9.2
V	4874.000	42.0	33	34.9	43.9	74.0	-30.1
V	7311.000	42.1	33	37.9	47.0	74.0	-27.0
V	9748.000	41.4	33	40.4	48.8	74.0	-25.2
V	12185.000	42.7	33	40.5	50.2	74.0	-23.8
V	14622.000	47.0	33	38.4	52.4	74.0	-21.6

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11b, DSSS, 11Mbps) Antenna 1

Table 6

**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.249 Requirement**

Highest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	79.5	33	29.4	75.9	94.0	-18.1
V	4924.000	33.5	33	34.9	35.4	54.0	-18.6
V	7386.000	37.9	33	37.9	42.8	54.0	-11.2
V	9848.000	37.8	33	40.4	45.2	54.0	-8.8
V	12310.000	40.1	33	40.5	47.6	54.0	-6.4
V	14772.000	44.8	33	38.4	50.2	54.0	-3.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	108.1	33	29.4	104.5	114.0	-9.5
V	4924.000	41.6	33	34.9	43.5	74.0	-30.5
V	7386.000	42.0	33	37.9	46.9	74.0	-27.1
V	9848.000	41.6	33	40.4	49.0	74.0	-25.0
V	12310.000	43.3	33	40.5	50.8	74.0	-23.2
V	14772.000	47.4	33	38.4	52.8	74.0	-21.2

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11b, DSSS, 11Mbps) Antenna 2

Table 7

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Lowest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	78.8	33	29.4	75.2	94.0	-18.8
V	4824.000	33.7	33	34.9	35.6	54.0	-18.4
V	7236.000	37.5	33	37.9	42.4	54.0	-11.6
V	9648.000	38.3	33	40.4	45.7	54.0	-8.3
V	12060.000	41.3	33	40.5	48.8	54.0	-5.2
V	14472.000	44.1	33	40.0	51.1	54.0	-2.9

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	108.1	33	29.4	104.5	114.0	-9.5
V	4824.000	41.6	33	34.9	43.5	74.0	-30.5
V	7236.000	41.6	33	37.9	46.5	74.0	-27.5
V	9648.000	41.0	33	40.4	48.4	74.0	-25.6
V	12060.000	42.8	33	40.5	50.3	74.0	-23.7
V	14472.000	45.7	33	40.0	52.7	74.0	-21.3

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.



Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11b, DSSS, 11Mbps) Antenna 2

Table 8

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Middle Channel**

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	81.7	33	29.4	78.1	94.0	-15.9
V	4874.000	33.7	33	34.9	35.6	54.0	-18.4
V	7311.000	37.5	33	37.9	42.4	54.0	-11.6
V	9748.000	38.3	33	40.4	45.7	54.0	-8.3
V	12185.000	41.3	33	40.5	48.8	54.0	-5.2
V	14622.000	45.7	33	38.4	51.1	54.0	-2.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	108.2	33	29.4	104.6	114.0	-9.4
V	4874.000	41.3	33	34.9	43.2	74.0	-30.8
V	7311.000	42.2	33	37.9	47.1	74.0	-26.9
V	9748.000	41.1	33	40.4	48.5	74.0	-25.5
V	12185.000	42.6	33	40.5	50.1	74.0	-23.9
V	14622.000	46.9	33	38.4	52.3	74.0	-21.7

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11b, DSSS, 11Mbps) Antenna 2

Table 9

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Highest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	81.9	33	29.4	78.3	94.0	-15.7
V	4924.000	33.7	33	34.9	35.6	54.0	-18.4
V	7386.000	37.5	33	37.9	42.4	54.0	-11.6
V	9848.000	38.3	33	40.4	45.7	54.0	-8.3
V	12310.000	41.3	33	40.5	48.8	54.0	-5.2
V	14772.000	45.7	33	38.4	51.1	54.0	-2.9

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	108.4	33	29.4	104.8	114.0	-9.2
V	4924.000	41.4	33	34.9	43.3	74.0	-30.7
V	7386.000	41.9	33	37.9	46.8	74.0	-27.2
V	9848.000	41.7	33	40.4	49.1	74.0	-24.9
V	12310.000	42.7	33	40.5	50.2	74.0	-23.8
V	14772.000	47.2	33	38.4	52.6	74.0	-21.4

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11g, OFDM, 54Mbps) Antenna 1

Table 10

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Lowest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	78.9	33	29.4	75.3	94.0	-18.7
V	4824.000	32.5	33	34.9	34.4	54.0	-19.6
V	7236.000	37.1	33	37.9	42.0	54.0	-12.0
V	9648.000	37.6	33	40.4	45.0	54.0	-9.0
V	12060.000	40.4	33	40.5	47.9	54.0	-6.1
V	14472.000	43.3	33	40.0	50.3	54.0	-3.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	99.6	33	29.4	96.0	114.0	-18.0
V	4824.000	41.9	33	34.9	43.8	74.0	-30.2
V	7236.000	42.5	33	37.9	47.4	74.0	-26.6
V	9648.000	41.9	33	40.4	49.3	74.0	-24.7
V	12060.000	42.7	33	40.5	50.2	74.0	-23.8
V	14472.000	45.6	33	40.0	52.6	74.0	-21.4

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: Lenbrook Industries Limited

Date of Test: May 03, 2013

Model: VISO 1 AP

Worst-Case Operating Mode: Transmitting (802.11g, OFDM, 54Mbps) Antenna 1

Table 11

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Middle Channel**

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	79.8	33	29.4	76.2	94.0	-17.8
V	4874.000	33.3	33	34.9	35.2	54.0	-18.8
V	7311.000	37.9	33	37.9	42.8	54.0	-11.2
V	9748.000	38.1	33	40.4	45.5	54.0	-8.5
V	12185.000	40.8	33	40.5	48.3	54.0	-5.7
V	14622.000	45.5	33	38.4	50.9	54.0	-3.1

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	100.6	33	29.4	97.0	114.0	-17.0
V	4874.000	41.8	33	34.9	43.7	74.0	-30.3
V	7311.000	42.7	33	37.9	47.6	74.0	-26.4
V	9748.000	42.3	33	40.4	49.7	74.0	-24.3
V	12185.000	43.1	33	40.5	50.6	74.0	-23.4
V	14622.000	47.2	33	38.4	52.6	74.0	-21.4

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.



Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11g, OFDM, 54Mbps) Antenna 1

Table 12

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Highest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	81.0	33	29.4	77.4	94.0	-16.6
V	4924.000	33.9	33	34.9	35.8	54.0	-18.2
V	7386.000	38.1	33	37.9	43.0	54.0	-11.0
V	9848.000	38.3	33	40.4	45.7	54.0	-8.3
V	12310.000	41.3	33	40.5	48.8	54.0	-5.2
V	14772.000	45.4	33	38.4	50.8	54.0	-3.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	101.9	33	29.4	98.3	114.0	-15.7
V	4924.000	42.0	33	34.9	43.9	74.0	-30.1
V	7386.000	42.9	33	37.9	47.8	74.0	-26.2
V	9848.000	42.4	33	40.4	49.8	74.0	-24.2
V	12310.000	43.3	33	40.5	50.8	74.0	-23.2
V	14772.000	47.2	33	38.4	52.6	74.0	-21.4

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.



Applicant: Lenbrook Industries Limited

Date of Test: May 03, 2013

Model: VISO 1 AP

Worst-Case Operating Mode: Transmitting (802.11g, OFDM, 54Mbps) Antenna 2

Table 13

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Lowest Channel**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	78.9	33	29.4	75.3	94.0	-18.7
V	4824.000	32.5	33	34.9	34.4	54.0	-19.6
V	7236.000	37.1	33	37.9	42.0	54.0	-12.0
V	9648.000	37.6	33	40.4	45.0	54.0	-9.0
V	12060.000	40.4	33	40.5	47.9	54.0	-6.1
V	14472.000	43.3	33	40.0	50.3	54.0	-3.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2412.000	100.1	33	29.4	96.5	114.0	-17.5
V	4824.000	41.4	33	34.9	43.3	74.0	-30.7
V	7236.000	41.5	33	37.9	46.4	74.0	-27.6
V	9648.000	40.9	33	40.4	48.3	74.0	-25.7
V	12060.000	42.5	33	40.5	50.0	74.0	-24.0
V	14472.000	45.6	33	40.0	52.6	74.0	-21.4

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.



Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11g, OFDM, 54Mbps) Antenna 2

Table 14

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.249 Requirement**

**Middle Channel**

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	80.4	33	29.4	76.8	94.0	-17.2
V	4874.000	32.7	33	34.9	34.6	54.0	-19.4
V	7311.000	37.3	33	37.9	42.2	54.0	-11.8
V	9748.000	38.3	33	40.4	45.7	54.0	-8.3
V	12185.000	39.8	33	40.5	47.3	54.0	-6.7
V	14622.000	45.0	33	38.4	50.4	54.0	-3.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	99.3	33	29.4	95.7	114.0	-18.3
V	4874.000	41.8	33	34.9	43.7	74.0	-30.3
V	7311.000	41.6	33	37.9	46.5	74.0	-27.5
V	9748.000	41.1	33	40.4	48.5	74.0	-25.5
V	12185.000	42.1	33	40.5	49.6	74.0	-24.4
V	14622.000	45.9	33	38.4	51.3	74.0	-22.7

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP

Date of Test: May 03, 2013

Worst-Case Operating Mode: Transmitting (802.11g, OFDM, 54Mbps) Antenna 2

Table 15

**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.249 Requirement**

Highest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	80.8	33	29.4	77.2	94.0	-16.8
V	4924.000	32.9	33	34.9	34.8	54.0	-19.2
V	7386.000	38.0	33	37.9	42.9	54.0	-11.1
V	9848.000	38.3	33	40.4	45.7	54.0	-8.3
V	12310.000	40.1	33	40.5	47.6	54.0	-6.4
V	14772.000	44.9	33	38.4	50.3	54.0	-3.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2462.000	101.3	33	29.4	97.7	114.0	-16.3
V	4924.000	40.6	33	34.9	42.5	74.0	-31.5
V	7386.000	41.9	33	37.9	46.8	74.0	-27.2
V	9848.000	41.4	33	40.4	48.8	74.0	-25.2
V	12310.000	42.3	33	40.5	49.8	74.0	-24.2
V	14772.000	46.2	33	38.4	51.6	74.0	-22.4

- NOTES:
1. Average and Peak Detector are used for emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
  6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.



Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP  
Worst-Case Operating Mode: Bluetooth (Other Digital)

Date of Test: May 03, 2013

Table 16

**Radiated Emissions  
Pursuant to FCC Part 15 Section 15.109 Requirement**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	68.564	42.8	16	8.0	34.8	40.0	-5.2
V	120.358	37.2	16	14.0	35.2	43.5	-8.3
H	165.452	35.2	16	17.0	36.2	43.5	-7.3
H	180.247	36.4	16	20.0	40.4	43.5	-3.1
H	209.246	35.2	16	17.0	36.2	43.5	-7.3
H	216.253	35.6	16	17.0	36.6	46.0	-9.4
H	240.356	33.2	16	19.0	36.2	46.0	-9.8
H	266.895	29.2	16	21.0	34.2	46.0	-11.8
H	329.658	25.8	16	24.0	33.8	46.0	-12.2

- NOTES: 1. Peak Detector are used for emission measurement.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.



Applicant: Lenbrook Industries Limited  
Model: VISO 1 AP  
Worst-Case Operating Mode: WiFi (Other Digital)

Date of Test: May 03, 2013

Table 17

**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.109 Requirement**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	68.564	42.8	16	8.0	34.8	40.0	-5.2
V	120.358	37.4	16	14.0	35.4	43.5	-8.1
H	165.452	35.2	16	17.0	36.2	43.5	-7.3
H	180.247	36.4	16	20.0	40.4	43.5	-3.1
H	209.246	35.4	16	17.0	36.4	43.5	-7.1
H	216.253	35.6	16	17.0	36.6	46.0	-9.4
H	240.356	32.2	16	19.0	35.2	46.0	-10.8
H	266.895	29.2	16	21.0	34.2	46.0	-11.8
H	329.658	32.4	16	24.0	40.4	46.0	-5.6

- NOTES: 1. Peak Detector are used for emission measurement.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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#### 4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

#### 5.0 **Product Labelling**

For electronics filing, the FCC ID and IC label artwork and the label location are saved with filename: label.pdf.

#### 6.0 **Technical Specifications**

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

#### 7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States and Canada.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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## 8.0 **Miscellaneous Information**

The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor (calculation and timing diagram).

### 8.1 Measured Bandwidth

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2009) for frequency being measured.

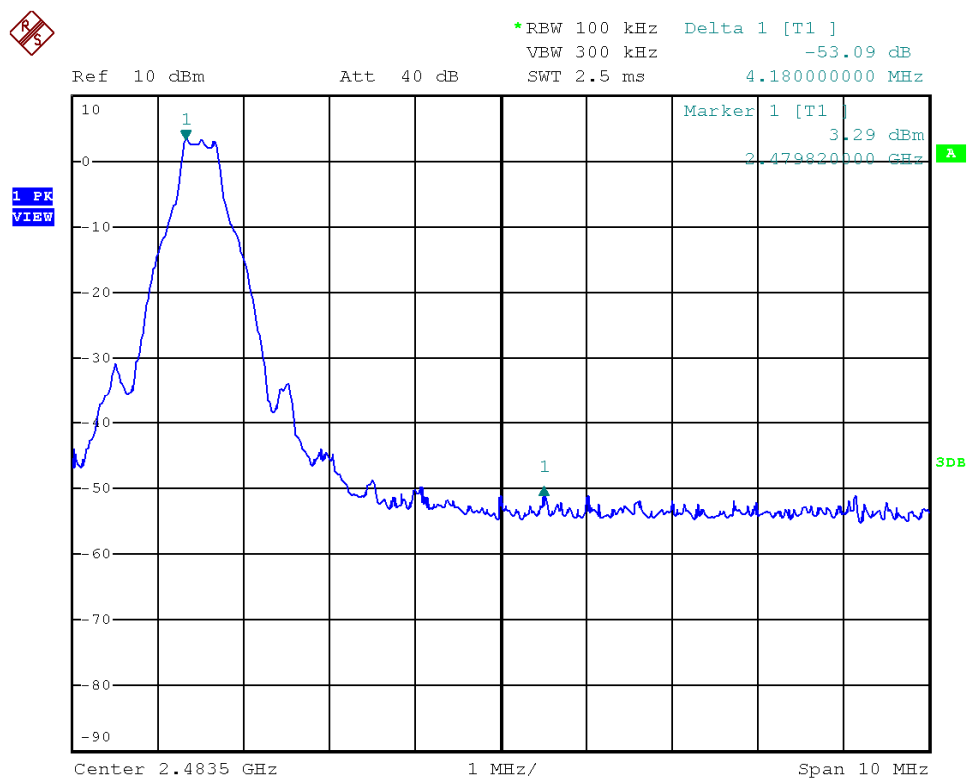
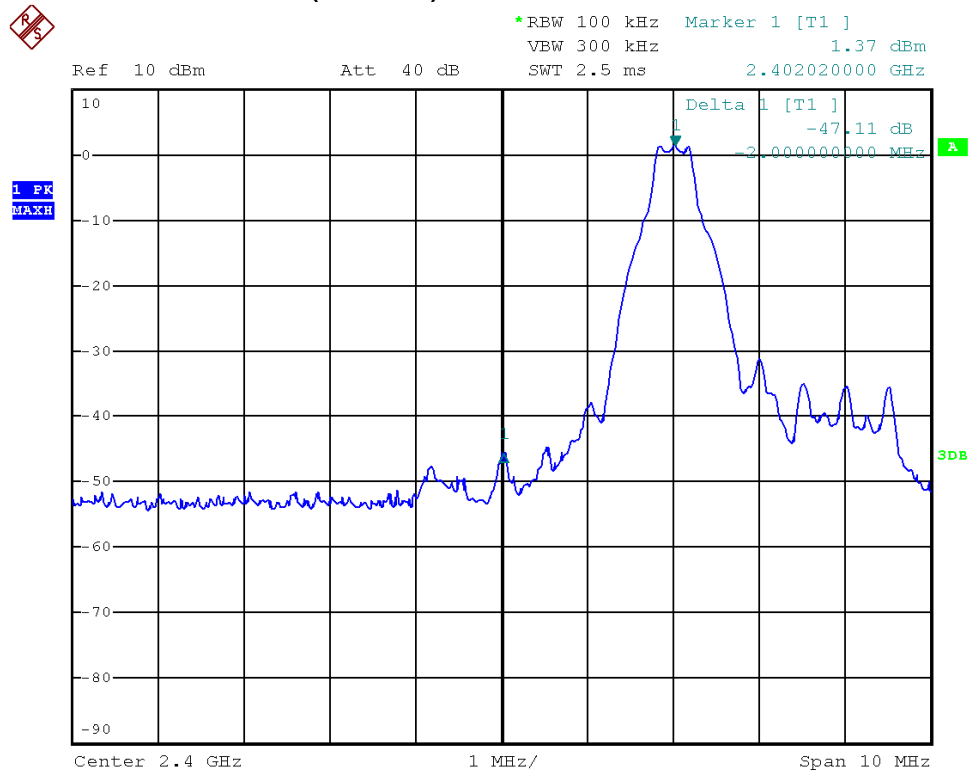
Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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Peak Measurement (Bluetooth)



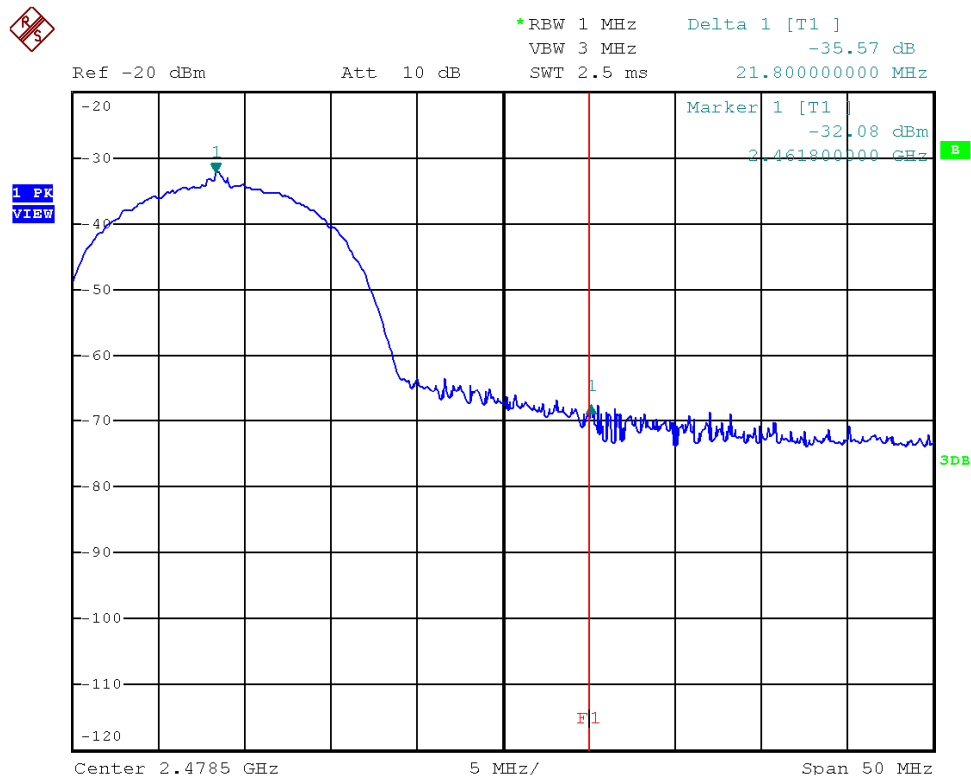
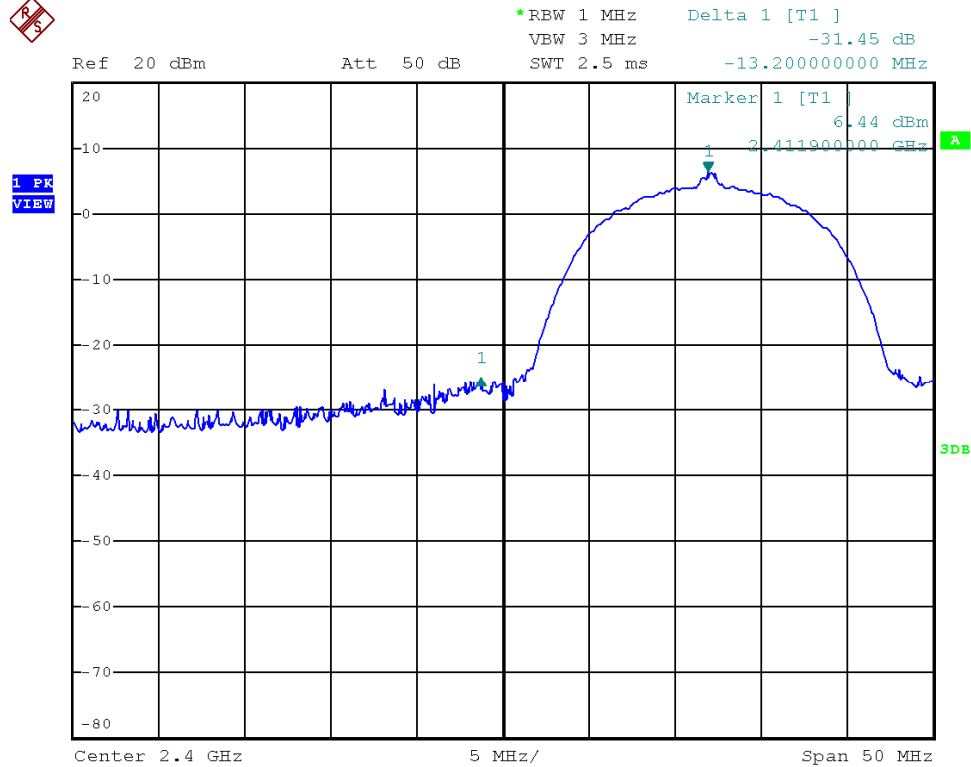


Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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Peak Measurement (802.11b, DSSS, 11Mbps) Antenna 1

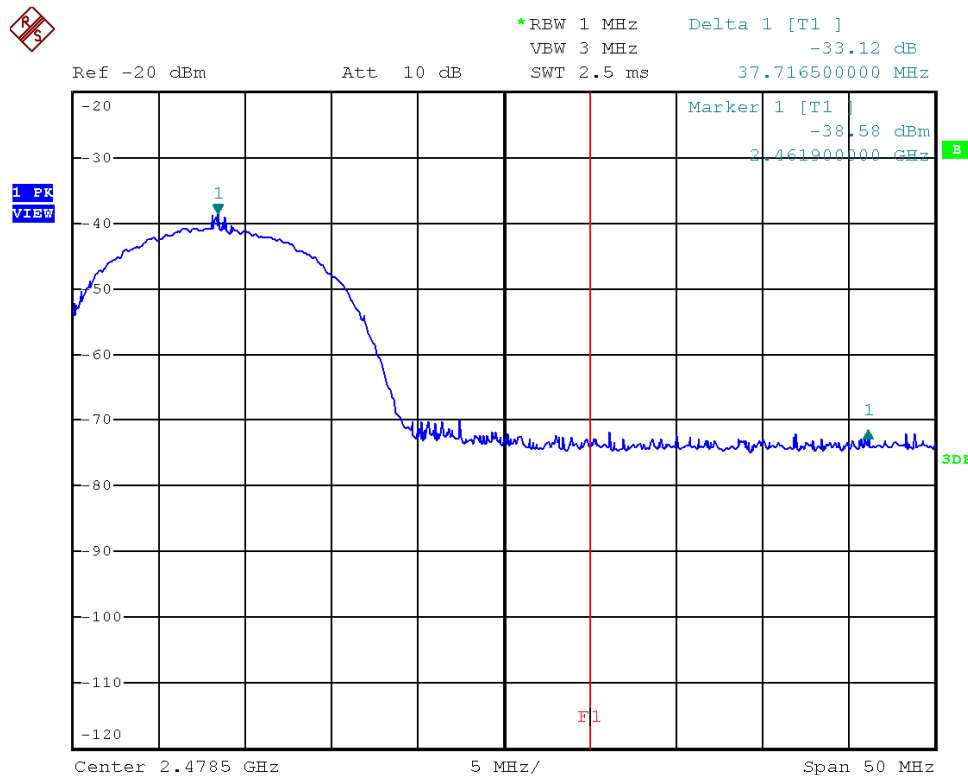
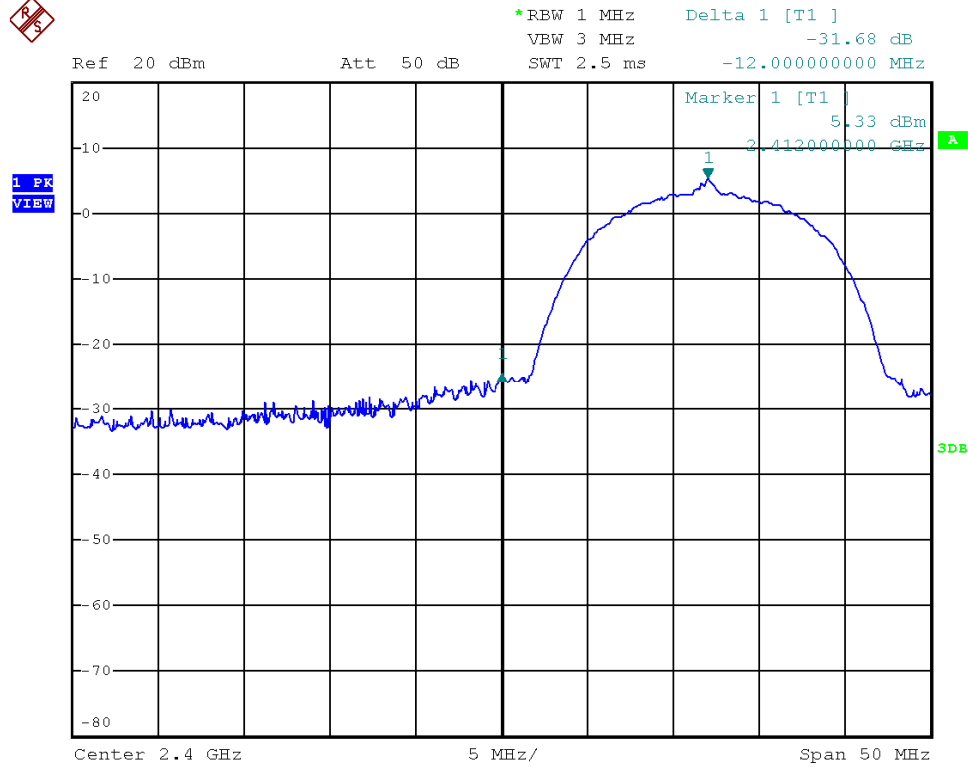


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Peak Measurement (802.11b, DSSS, 11Mbps) Antenna 2

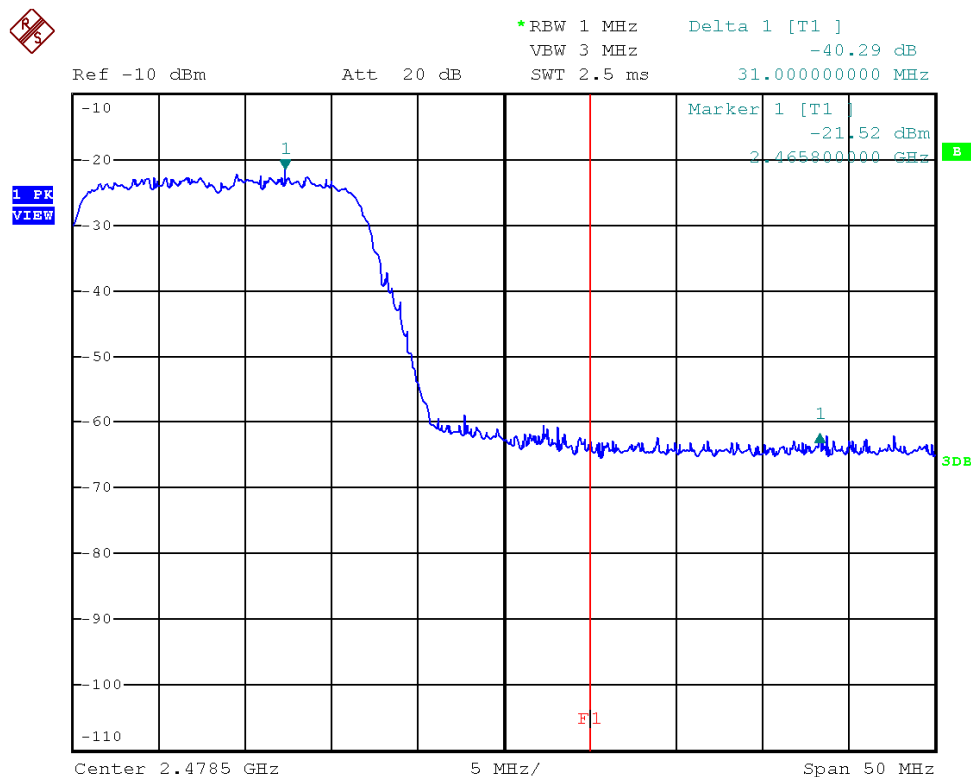
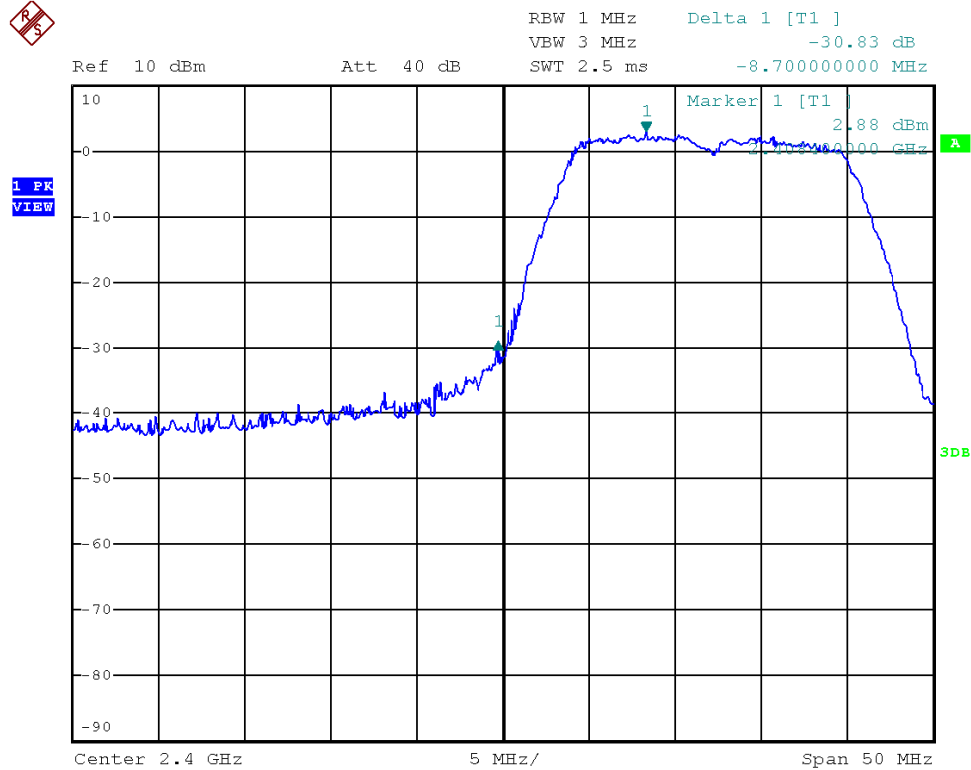


Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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Peak Measurement (802.11g, OFDM, 54Mbps) Antenna 1

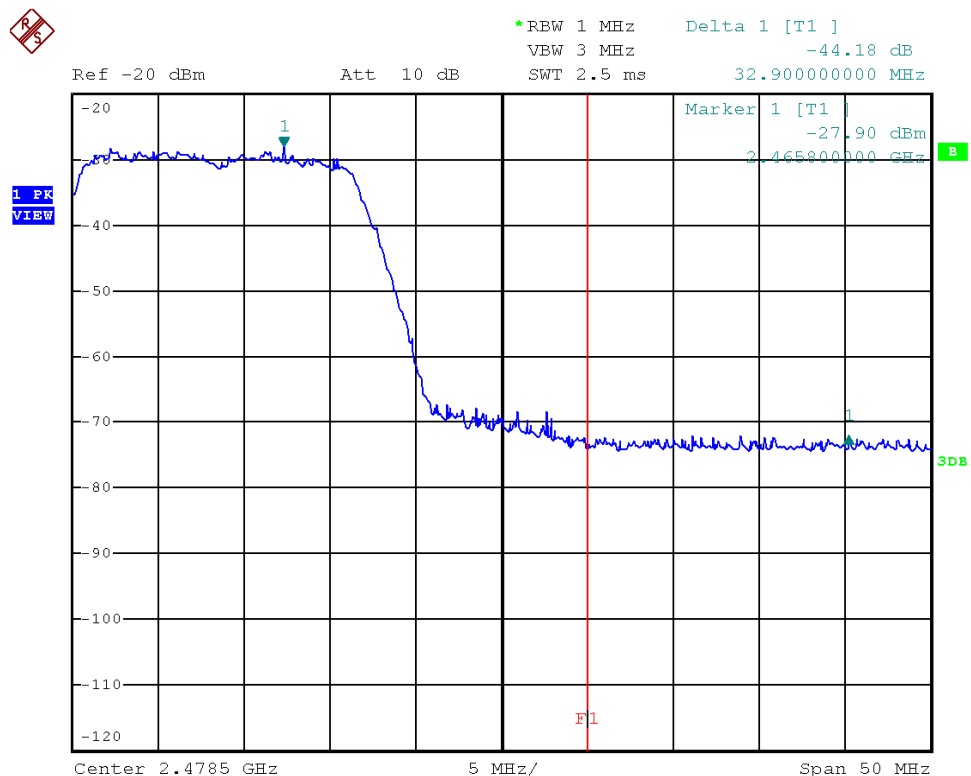
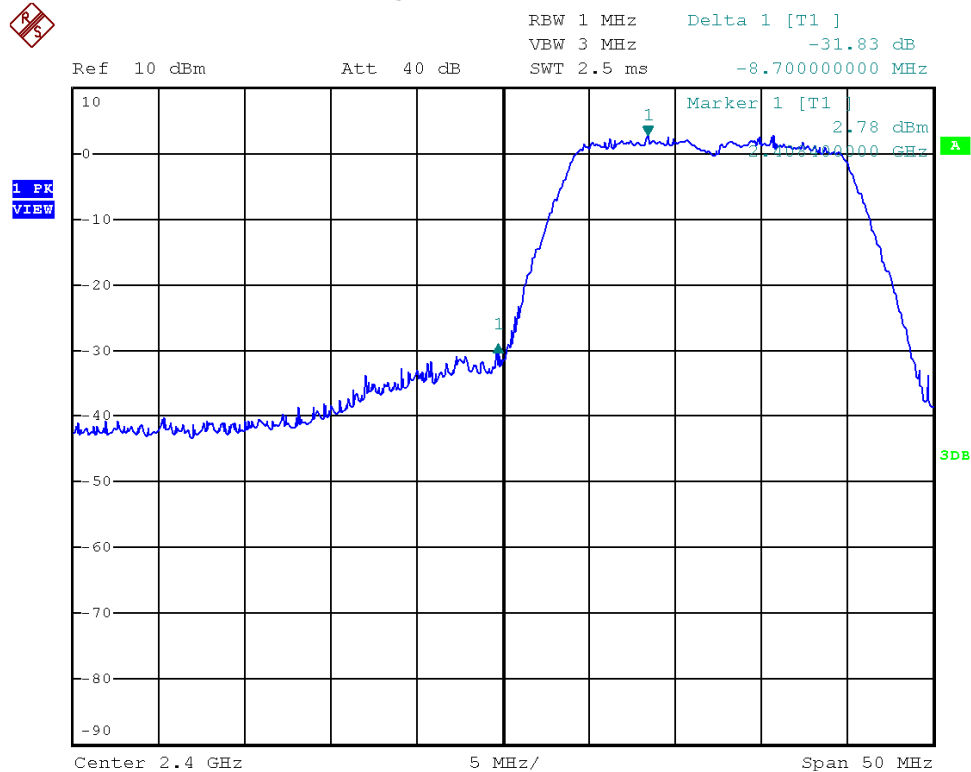


Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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Peak Measurement (802.11g, OFDM, 54Mbps) Antenna 2



### Peak Measurement (Bluetooth)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 82.6 \text{ dB}\mu\text{V/m} - 47.1 \text{ dB} \\ &= 35.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 82.6 \text{ dB}\mu\text{V/m} - 47.1 \text{ dB} \\ &= 35.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 90.5 \text{ dB}\mu\text{V/m} - 53.1 \text{ dB} \\ &= 37.4 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 90.5 \text{ dB}\mu\text{V/m} - 53.1 \text{ dB} \\ &= 37.4 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ V/m (Peak Limit) and 54 dB $\mu$ V/m (Average Limit).

### Peak Measurement (802.11b, DSSS, 11Mbps) Antenna 1

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 104.0 \text{ dB}\mu\text{V/m} - 31.5 \text{ dB} \\ &= 72.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 75.5 \text{ dB}\mu\text{V/m} - 31.5 \text{ dB} \\ &= 44.0 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 104.5 \text{ dB}\mu\text{V/m} - 35.6 \text{ dB} \\ &= 68.9 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 75.9 \text{ dB}\mu\text{V/m} - 35.6 \text{ dB} \\ &= 40.3 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ V/m (Peak Limit) and 54 dB $\mu$ V/m (Average Limit).

### Peak Measurement (802.11b, DSSS, 11Mbps) Antenna 2

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 104.5 \text{ dB}\mu\text{V/m} - 31.7 \text{ dB} \\ &= 72.8 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 75.2 \text{ dB}\mu\text{V/m} - 31.7 \text{ dB} \\ &= 43.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 104.8 \text{ dB}\mu\text{V/m} - 33.1 \text{ dB} \\ &= 71.7 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 78.3 \text{ dB}\mu\text{V/m} - 33.1 \text{ dB} \\ &= 45.2 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ V/m (Peak Limit) and 54 dB $\mu$ V/m (Average Limit).

### Peak Measurement (802.11g, OFDM, 54Mbps) Antenna 1

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=96.0 dB $\mu$ V/m - 30.8 dB  
=65.2 dB $\mu$ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=75.3 dB $\mu$ V/m - 30.8 dB  
=44.5 dB $\mu$ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=98.3 dB $\mu$ V/m - 40.3 dB  
=58.0 dB $\mu$ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=77.4 dB $\mu$ V/m - 40.3 dB  
=37.1 dB $\mu$ V/m

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ V/m (Peak Limit) and 54 dB $\mu$ V/m (Average Limit).



### Peak Measurement (802.11g, OFDM, 54Mbps) Antenna 2

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &=96.5 \text{ dB}\mu\text{V/m} - 31.8 \text{ dB} \\ &=64.7 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &=75.3 \text{ dB}\mu\text{V/m} - 31.8 \text{ dB} \\ &=43.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &=97.7 \text{ dB}\mu\text{V/m} - 44.2 \text{ dB} \\ &=53.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &=77.2 \text{ dB}\mu\text{V/m} - 44.2 \text{ dB} \\ &=33.0 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ V/m (Peak Limit) and 54 dB $\mu$ V/m (Average Limit).

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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## 8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. Since the transmitter transmits the RF signal continuously.

## 8.3 Calculation of Average Factor

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

## 8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 (2009). A typical or an unmodulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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#### 8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 (2009).

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

#### 9.0 **Confidentiality Request**

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.



## 10.0 Equipment List

### 1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2666	EW-2512	EW-0447
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI7	3104C	3146
Calibration Date	May 21, 2012	Nov. 15, 2011	Feb. 08, 2012
Calibration Due Date	May 21, 2013	May 15, 2013	Aug. 08, 2013

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2188	EW-1133
Manufacturer	AGILENTTECH	EMCO
Model No.	E4407B	3115
Calibration Date	Nov. 05, 2012	Oct. 05, 2012
Calibration Due Date	Nov. 05, 2013	Apr. 05, 2014

### 2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2666	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI7	ENV-216
Calibration Date	May 21, 2012	Aug. 15, 2012
Calibration Due Date	May 21, 2013	Aug. 15, 2013

### 3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 04, 2012
Calibration Due Date	Oct. 04, 2013