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.

HOKLAS 005
TEST

TEST REPORT

Report No.: 13020016HKG-002

Lenbrook Industries Limited

Application
For
Certification
(Original Grant)
(FCC ID: Q2O-P300WSMS)
(IC: 152B-P300WSMS)

Transceiver

Prepared and Checked by:

Wong Cheuk Ho, Herbert
Lead Engineer

Approved by:

Chan Chi Hung, Terry
Assistant Supervisor
Date: May 08, 2013

GENERAL INFORMATION

Lenbrook Industries Limited
BRAND NAME: Bluesound, MODEL: PULSE P300

FCC ID: Q2O-P300WSMS
IC: 152B-P300WSMS

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 2nd Industrial Zone, ChangAn, DongGuan, China.
Brand Name:	Bluesound
Model:	PULSE P300
Type of EUT:	Transceiver
Description of EUT:	Wireless Streaming Music System
Serial Number:	N/A
FCC ID / IC:	Q2O-P300WSMS / 152B-P300WSMS
Date of Sample Submitted:	February 01, 2013
Date of Test:	April 29, 2013
Report No.:	13020016HKG-002
Report Date:	May 08, 2013
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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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HOKLAS 005 TEST

SUMMARY OF TEST RESULT

Lenbrook Industries Limited
BRAND NAME: Bluesound, MODEL: PULSE P300

FCC ID: Q2O-P300WSMS
IC: 152B-P300WSMS

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 pervisions 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 excepted variations in temperature and supply voltage were considered.

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is an Amplified Wireless Streaming Music System, equipped with a 2.4GHz WiFi transceiver (SG901) which is operating in the frequency range between 2412MHz and 2462MHz (11 channels with 5 MHz channel spacing).

The EUT can accept digitized audio signal from LAN network, USB port and wireless WiFi. The EUT has built-in digital power amplifiers driving internal stereo loudspeaker and mono subwoofer.

In 802.11b mode, the EUT employs Direct-Sequence Spread Spectrum (DSSS) modulation with maximum bit rate 11Mbps.

In 802.11g mode, the EUT employs Orthogonal Frequency Division Multiplexing (OFDM) modulation with maximum bit rate 54Mbps.

In 802.11n mode, the EUT employs modulation type according to MCSn (Modulation and Coding Scheme) setting where n is 0 to 7, with maximum bit rate 65Mbps at n=7. The EUT can only support 20MHz bandwidth modulation in 802.11n mode.

The RF output power is below +10dBm for all types of modulation during test.

The mini-USB port is for factory maintenance only and not accessible by end-user.

The EUT is powered by 100-240VAC (universal input with earth pin).

Antenna Type: Internal, Integral (2412MHz – 2462MHz, 11 channels, 5MHz spacing)

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

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1.2 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

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.

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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 120VAC.

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 802.11b/802.11g/802.11n 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.

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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 Mass Storage Drive (Model: DT100/4GB Kingston) (Provided by Intertek)
2. 1 x power cord with 2.0m in length
3. 1 x Ethernet cable with 2.0m in length (Provided by Applicant)

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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 dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
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 dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV 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 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 4924.000 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 5.0 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.155 MHz

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

3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 7.7 dB

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

Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11b DSSS, 11Mbps)

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	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)
H	2412.000	90.0	33	29.4	86.4	94.0	-7.6
H	4824.000	46.6	33	34.9	48.5	54.0	-5.5
H	7236.000	41.6	33	37.9	46.5	54.0	-7.5
H	9648.000	37.9	33	40.4	45.3	54.0	-8.7
H	12060.000	37.7	33	40.5	45.2	54.0	-8.8
H	14472.000	37.6	33	40.0	44.6	54.0	-9.4

Polari-zation	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)
H	2412.000	106.4	33	29.4	102.8	114.0	-11.2
H	4824.000	56.8	33	34.9	58.7	74.0	-15.3
H	7236.000	47.1	33	37.9	52.0	74.0	-22.0
H	9648.000	43.8	33	40.4	51.2	74.0	-22.8
H	12060.000	43.5	33	40.5	51.0	74.0	-23.0
H	14472.000	43.6	33	40.0	50.6	74.0	-23.4

NOTES: 1. Peak Detector Data unless otherwise stated.

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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11b DSSS, 11Mbps)

Table 2

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	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)
H	2437.000	89.5	33	29.4	85.9	94.0	-8.1
H	4874.000	47.0	33	34.9	48.9	54.0	-5.1
H	7311.000	41.9	33	37.9	46.8	54.0	-7.2
H	9748.000	38.2	33	40.4	45.6	54.0	-8.4
H	12185.000	37.8	33	40.5	45.3	54.0	-8.7
H	14622.000	39.2	33	38.4	44.6	54.0	-9.4

Polari-zation	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)
H	2437.000	106.6	33	29.4	103.0	114.0	-11.0
H	4874.000	57.0	33	34.9	58.9	74.0	-15.1
H	7311.000	47.3	33	37.9	52.2	74.0	-21.8
H	9748.000	43.8	33	40.4	51.2	74.0	-22.8
H	12185.000	43.6	33	40.5	51.1	74.0	-22.9
H	14622.000	45.2	33	38.4	50.6	74.0	-23.4

NOTES: 1. Peak Detector Data unless otherwise stated.

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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11b DSSS, 11Mbps)

Table 3

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	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)
H	2462.000	91.6	33	29.4	88.0	94.0	-6.0
H	4924.000	47.1	33	34.9	49.0	54.0	-5.0
H	7386.000	41.4	33	37.9	46.3	54.0	-7.7
H	9848.000	38.1	33	40.4	45.5	54.0	-8.5
H	12310.000	37.7	33	40.5	45.2	54.0	-8.8
H	14772.000	39.2	33	38.4	44.6	54.0	-9.4

Polari-zation	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)
H	2462.000	106.8	33	29.4	103.2	114.0	-10.8
H	4924.000	57.1	33	34.9	59.0	74.0	-15.0
H	7386.000	47.1	33	37.9	52.0	74.0	-22.0
H	9848.000	43.9	33	40.4	51.3	74.0	-22.7
H	12310.000	43.8	33	40.5	51.3	74.0	-22.7
H	14772.000	45.2	33	38.4	50.6	74.0	-23.4

NOTES: 1. Peak Detector Data unless otherwise stated.

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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11g OFDM, 54Mbps)

Table 4

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	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)
H	2412.000	89.5	33	29.4	85.9	94.0	-8.1
H	4824.000	46.6	33	34.9	48.5	54.0	-5.5
H	7236.000	41.6	33	37.9	46.5	54.0	-7.5
H	9648.000	37.9	33	40.4	45.3	54.0	-8.7
H	12060.000	37.7	33	40.5	45.2	54.0	-8.8
H	14472.000	37.6	33	40.0	44.6	54.0	-9.4

Polari-zation	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)
H	2412.000	106.1	33	29.4	102.5	114.0	-11.5
H	4824.000	56.4	33	34.9	58.3	74.0	-15.7
H	7236.000	47.2	33	37.9	52.1	74.0	-21.9
H	9648.000	43.5	33	40.4	50.9	74.0	-23.1
H	12060.000	43.5	33	40.5	51.0	74.0	-23.0
H	14472.000	43.6	33	40.0	50.6	74.0	-23.4

NOTES: 1. Peak Detector Data unless otherwise stated.

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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11g OFDM, 54Mbps)

Table 5

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	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)
H	2437.000	89.4	33	29.4	85.8	94.0	-8.2
H	4874.000	46.3	33	34.9	48.2	54.0	-5.8
H	7311.000	41.6	33	37.9	46.5	54.0	-7.5
H	9748.000	37.9	33	40.4	45.3	54.0	-8.7
H	12185.000	37.7	33	40.5	45.2	54.0	-8.8
H	14622.000	39.2	33	38.4	44.6	54.0	-9.4

Polari-zation	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)
H	2437.000	106.2	33	29.4	102.6	114.0	-11.4
H	4874.000	56.0	33	34.9	57.9	74.0	-16.1
H	7311.000	47.3	33	37.9	52.2	74.0	-21.8
H	9748.000	43.8	33	40.4	51.2	74.0	-22.8
H	12185.000	43.6	33	40.5	51.1	74.0	-22.9
H	14622.000	44.9	33	38.4	50.3	74.0	-23.7

NOTES: 1. Average Detector 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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11g OFDM, 54Mbps)

Table 6

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	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)
H	2462.000	90.4	33	29.4	86.8	94.0	-7.2
H	4924.000	46.7	33	34.9	48.6	54.0	-5.4
H	7386.000	41.6	33	37.9	46.5	54.0	-7.5
H	9848.000	37.9	33	40.4	45.3	54.0	-8.7
H	12310.000	37.7	33	40.5	45.2	54.0	-8.8
H	14772.000	39.2	33	38.4	44.6	54.0	-9.4

Polari-zation	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)
H	2462.000	106.4	33	29.4	102.8	114.0	-11.2
H	4924.000	56.3	33	34.9	58.2	74.0	-15.8
H	7386.000	47.1	33	37.9	52.0	74.0	-22.0
H	9848.000	43.9	33	40.4	51.3	74.0	-22.7
H	12310.000	43.7	33	40.5	51.2	74.0	-22.8
H	14772.000	44.8	33	38.4	50.2	74.0	-23.8

NOTES: 1. Average Detector 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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11n mcs7, HT20, 65Mbps)

Table 7

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	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)
H	2412.000	89.0	33	29.4	85.4	94.0	-8.6
H	4824.000	46.9	33	34.9	48.8	54.0	-5.2
H	7236.000	41.7	33	37.9	46.6	54.0	-7.4
H	9648.000	37.9	33	40.4	45.3	54.0	-8.7
H	12060.000	37.7	33	40.5	45.2	54.0	-8.8
H	14472.000	37.6	33	40.0	44.6	54.0	-9.4

Polari-zation	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)
H	2412.000	105.8	33	29.4	102.2	114.0	-11.8
H	4824.000	56.4	33	34.9	58.3	74.0	-15.7
H	7236.000	47.5	33	37.9	52.4	74.0	-21.6
H	9648.000	43.5	33	40.4	50.9	74.0	-23.1
H	12060.000	43.5	33	40.5	51.0	74.0	-23.0
H	14472.000	43.6	33	40.0	50.6	74.0	-23.4

NOTES: 1. Average Detector 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.

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

Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11n mcs7, HT20, 65Mbps)

Table 8

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	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)
H	2437.000	88.8	33	29.4	85.2	94.0	-8.8
H	4874.000	46.6	33	34.9	48.5	54.0	-5.5
H	7311.000	41.6	33	37.9	46.5	54.0	-7.5
H	9748.000	37.9	33	40.4	45.3	54.0	-8.7
H	12185.000	37.7	33	40.5	45.2	54.0	-8.8
H	14622.000	39.2	33	38.4	44.6	54.0	-9.4

Polari-zation	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)
H	2437.000	106.0	33	29.4	102.4	114.0	-11.6
H	4874.000	55.6	33	34.9	57.5	74.0	-16.5
H	7311.000	47.3	33	37.9	52.2	74.0	-21.8
H	9748.000	43.9	33	40.4	51.3	74.0	-22.7
H	12185.000	43.6	33	40.5	51.1	74.0	-22.9
H	14622.000	44.9	33	38.4	50.3	74.0	-23.7

NOTES: 1. Average Detector 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.

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Applicant: Lenbrook Industries Limited Date of Test: April 29, 2013
Model: PULSE P300
Worst-Case Operating Mode: Transmitting (802.11n mcs7, HT20, 65Mbps)

Table 9

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	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)
H	2462.000	88.6	33	29.4	85.0	94.0	-9.0
H	4924.000	46.8	33	34.9	48.7	54.0	-5.3
H	7386.000	41.9	33	37.9	46.8	54.0	-7.2
H	9848.000	37.9	33	40.4	45.3	54.0	-8.7
H	12310.000	37.7	33	40.5	45.2	54.0	-8.8
H	14772.000	39.1	33	38.4	44.5	54.0	-9.5

Polari-zation	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)
H	2462.000	106.2	33	29.4	102.6	114.0	-11.4
H	4924.000	56.7	33	34.9	58.6	74.0	-15.4
H	7386.000	47.1	33	37.9	52.0	74.0	-22.0
H	9848.000	43.9	33	40.4	51.3	74.0	-22.7
H	12310.000	43.7	33	40.5	51.2	74.0	-22.8
H	14772.000	44.6	33	38.4	50.0	74.0	-24.0

NOTES: 1. Average Detector 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.

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Applicant: Lenbrook Industries Limited
Model: PULSE P300
Worst-Case Operating Mode: Other Digital

Date of Test: April 29, 2013

Table 10

Radiated Emissions
Pursuant to FCC Part 15 Section 15.109 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	38.236	39.6	16	10.0	33.6	40.0	-6.4
V	45.368	39.9	16	10.0	33.9	40.0	-6.1
V	54.689	39.8	16	11.0	34.8	40.0	-5.2
H	108.658	36.5	16	14.0	34.5	43.5	-9.0
H	135.654	36.6	16	14.0	34.6	43.5	-8.9
H	162.359	33.8	16	16.0	33.8	43.5	-9.7

NOTES: 1. Average Detector 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.

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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.

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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.

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).

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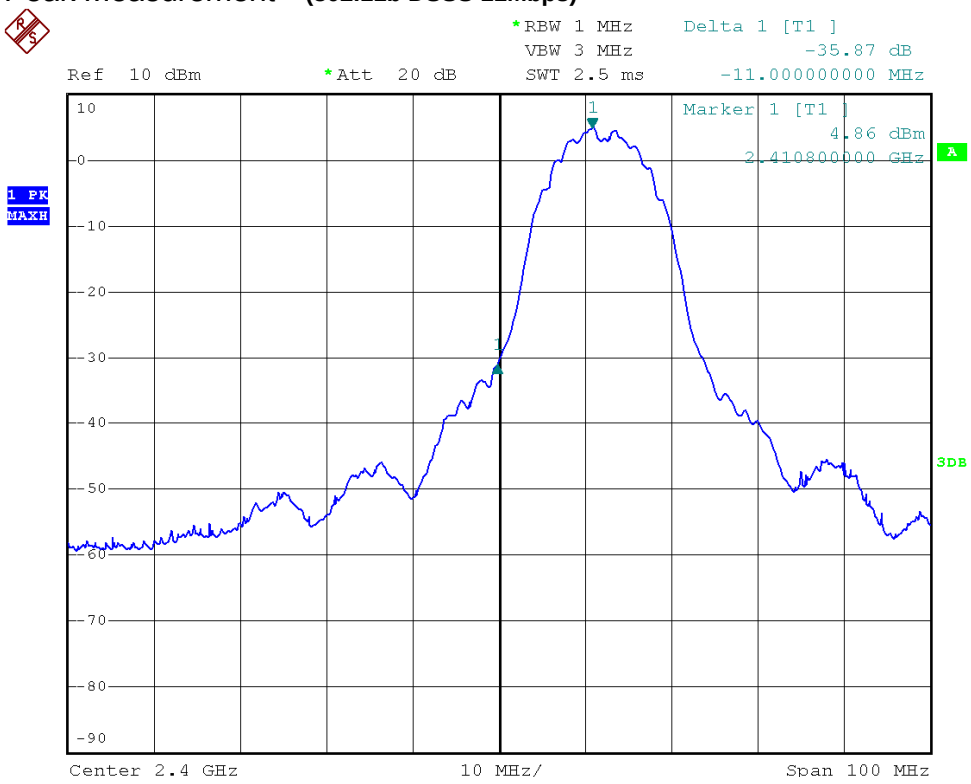
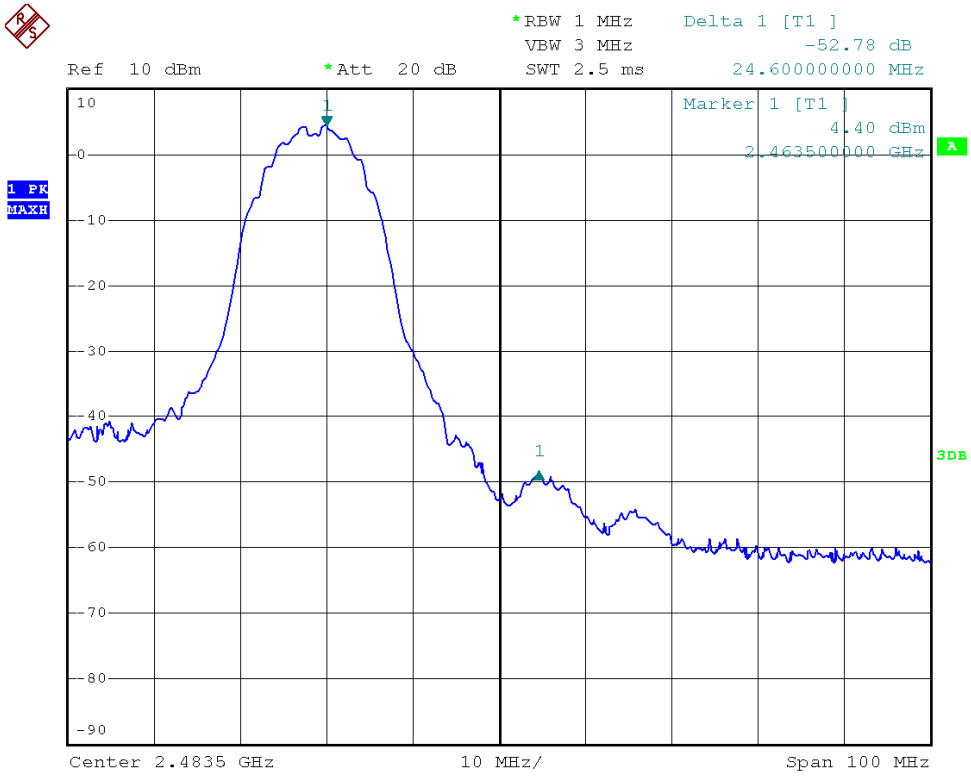
Peak Measurement **(802.11b DSSS 11Mbps)**





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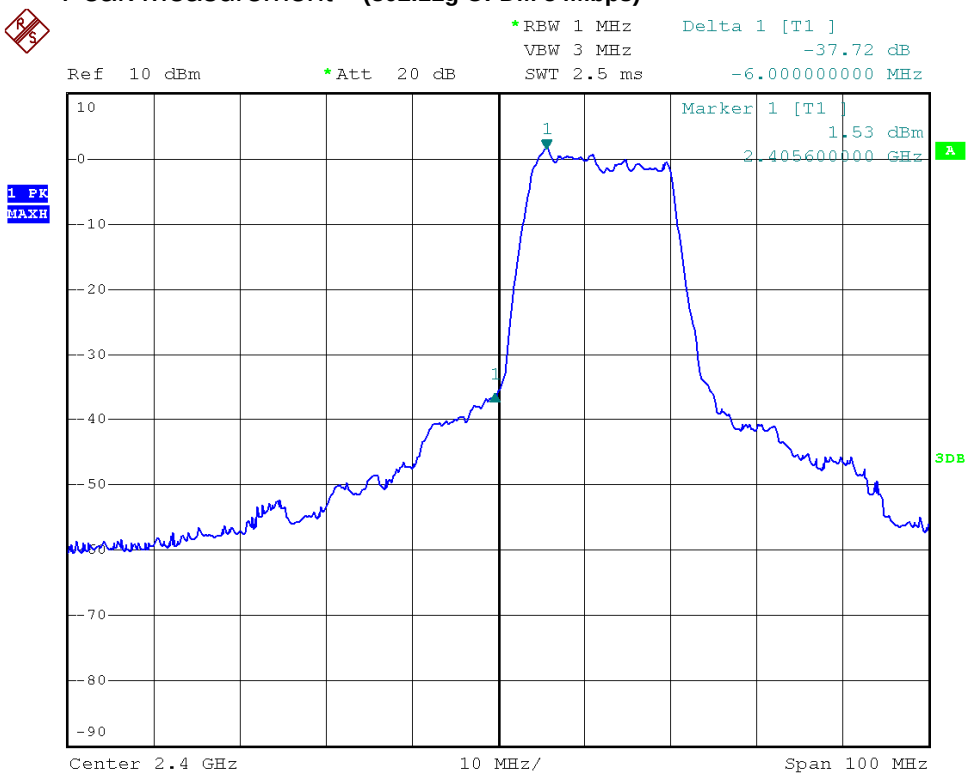
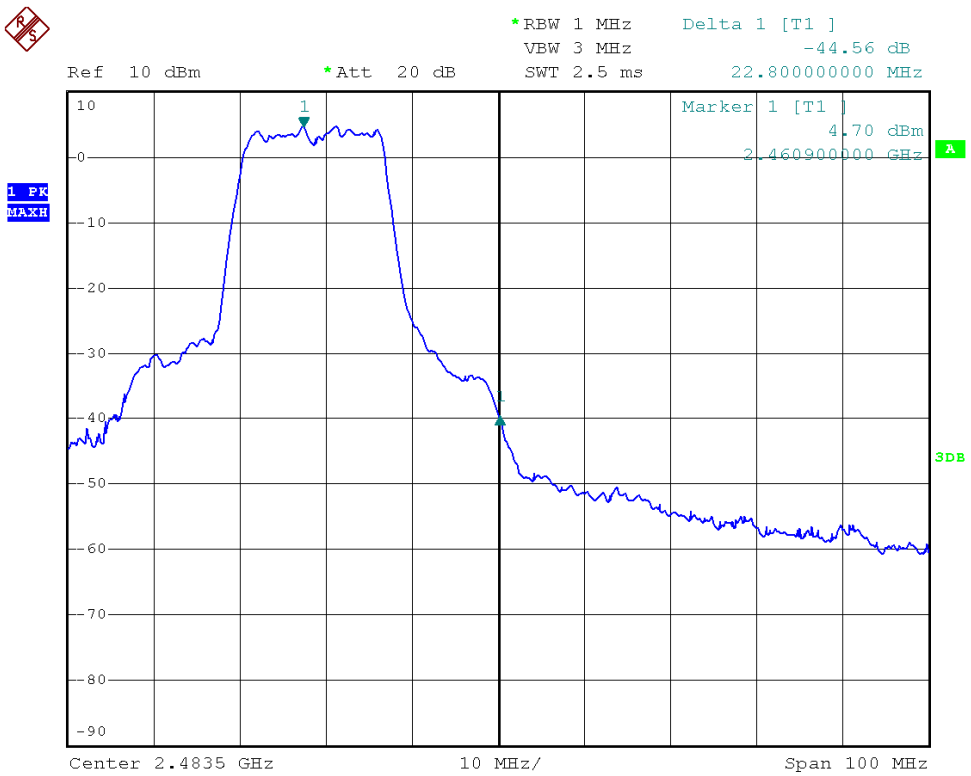
Peak Measurement **(802.11g OFDM 54Mbps)**





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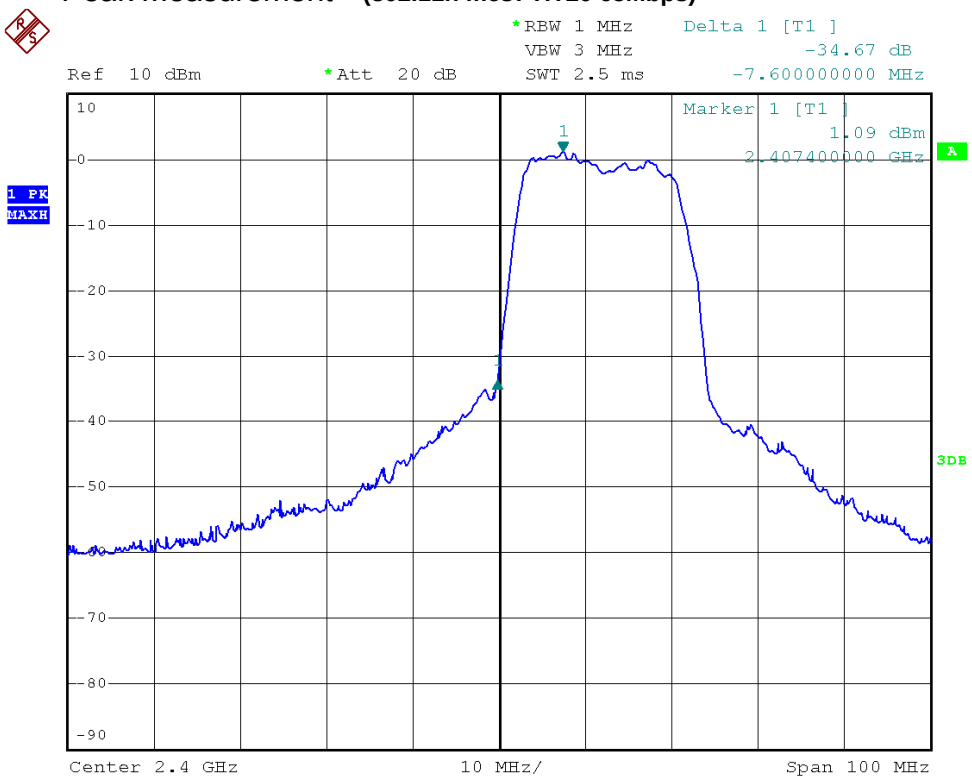
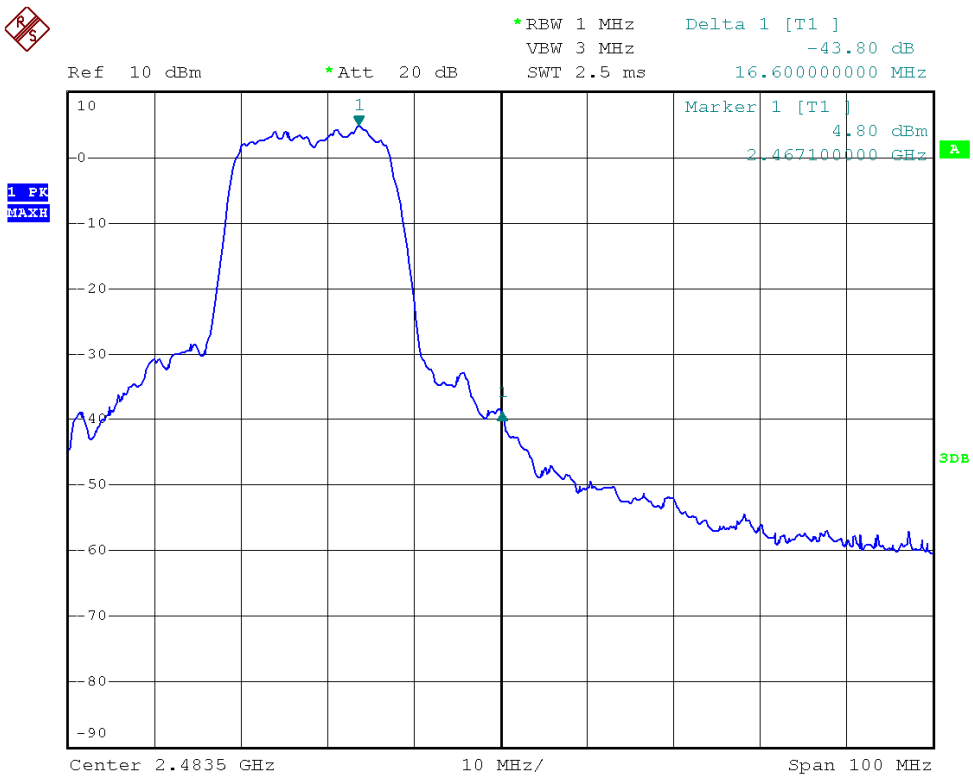
Peak Measurement **(802.11n mcs7 HT20 65Mbps)**





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Peak Measurement (802.11b DSSS, 11Mbps)

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

=102.8 dBµV/m - 35.9 dB
=66.9 dBµV/m

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

=86.4 dBµV/m - 35.9 dB
=50.5 dBµV/m

Upper bandedge

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

=103.2 dBµV/m - 52.8 dB
=50.4 dBµV/m

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

=88.0 dBµV/m - 52.8 dB
=35.2 dBµV/m

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

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Peak Measurement (802.11g OFDM, 54Mbps)

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

=102.5 dBµV/m - 37.7 dB
=64.8 dBµV/m

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

=85.9 dBµV/m - 37.7 dB
=48.2 dBµV/m

Upper bandedge

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

=102.8 dBµV/m - 44.6 dB
=58.2 dBµV/m

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

=86.8 dBµV/m - 44.6 dB
=42.2 dBµV/m

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

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Peak Measurement (802.11n mcs7, HT20, 65Mbps)

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

=102.2 dBµV/m - 34.7 dB
=67.5 dBµV/m

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

=85.4 dBµV/m - 34.7 dB
=50.7 dBµV/m

Upper bandedge

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

=102.6 dBµV/m - 43.8 dB
=58.8 dBµV/m

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

=85.0 dBµV/m - 43.8 dB
=41.2 dBµV/m

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

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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.

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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.

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10.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2666	EW-2512	EW-0572
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI7	3104C	3146
Calibration Date	May 21, 2012	Nov. 15, 2011	Nov. 15, 2011
Calibration Due Date	May 21, 2013	May 15, 2013	May 15, 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-2466
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Jul. 06, 2012
Calibration Due Date	Jul. 06, 2013

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