

TEST REPORT

Report Number: 18041592HKG-004

Application for Original Grant of 47 CFR Part 15 Certification

Single New of RSS-247 Issue 2 Equipment

This report contains the data of 5GHz WLAN (WiFi) portion only.

FCC ID: Q2O-NODE2I

IC: 152B-NODE2I

Prepared and Checked by:

Signed On File
Chiang Chien Yin, Ven
Assistant Engineer

Approved by:

Lee Shui Tim, Tim
Senior Lead Engineer
Date: August 20, 2018

TEST REPORT

GENERAL INFORMATION

Applicant Name (FCC):	Lenbrook Industries Ltd.
Applicant Address (FCC):	633 Granite Court Pickering ON L1W 3K1 Canada
Applicant Name (IC):	Lenbrook Industries Ltd.
Applicant Address (IC):	633 Granite Court Pickering ON L1W 3K1 Canada
FCC Specification Standard:	FCC Part 15, October 1, 2017 Edition
FCC ID:	Q2O-NODE2I
FCC Model(s):	NODE 2i
IC Specification Standard:	RSS-247 Issue 2, February 2017 RSS-Gen Issue 5, November 2014
IC:	152B-NODE2I
PMN:	Wireless Music Streamer
HVIN:	NODE 2i
Type of EUT:	Unlicensed National Information Infrastructure Transmitter
Description of EUT:	Wireless Music Streamer
Serial Number:	N/A
Sample Receipt Date:	May 08, 2018
Date of Test:	May 08, 2018 to August 18, 2018
Report Date:	August 20, 2018
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 / RSS-247 Issue 2 Certification.

TEST REPORT

TABLE OF CONTENTS

1.0 Test Results Summary & Statement of Compliance	4
1.1 Summary of Test Results	4
1.2 Statement of Compliance	4
2.0 General Description	5
2.1 Product Description	5
2.2 Test Methodology	6
2.3 Test Facility	6
2.4 Related Submittal(s) Grants	6
3.0 System Test Configuration	7
3.1 Justification	7
3.2 EUT Exercising Software.....	8
3.3 Details of EUT and Description of Accessories.....	9
3.4 Measurement Uncertainty.....	9
4.0 Test Results	10
4.1 Maximum Conducted Output Power at Antenna Terminals	10
4.2 Minimum 6dB RF Bandwidth	13
4.3 Maximum Power Spectral Density	16
4.4 Out of Band Conducted Emissions	19
4.5 Field Strength Calculation	20
4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions	21
4.6.1 Radiated Emission Configuration Photograph.....	21
4.6.2 Radiated Emission Data.....	21
4.6.3 Radiated Emission Test Setup	51
4.6.4 Transmitter Duty Cycle Calculation	52
4.7 AC Power Line Conducted Emission	53
4.7.1 AC Power Line Conducted Emission Configuration Photograph	53
4.7.2 AC Power Line Conducted Emission Data	53
4.7.3 Conducted Emission Test Setup	55
4.8 Frequency Stability requirement.....	56
4.9 U-NII1 99% Bandwidth Requirement	56
4.10 DFS Channel Shutdown and Non-occupancy period.	56
5.0 Equipment List	57

TEST REPORT

EXHIBIT 1 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

TEST ITEMS	FCC PART 15 SECTION	RSS-247/ RSS-GEN# SECTION	RESULTS	DETAILS SEE SECTION
Antenna Requirement	15.407(a)	6.2.1.1/ 6.2.2.1/ 6.2.3.1/ 6.2.4.1	Pass	2.1
Max. Conducted Output Power (Peak)	15.407(a)	6.2.1.1/ 6.2.2.1/ 6.2.3.1/ 6.2.4.1	Pass	4.1
Transmit Power Control (TPC)	15.407(h)	6.2.1.1/ 6.2.2.1/ 6.2.3.1/ 6.2.4.1	N/A	See Remark
Min. 6dB RF Bandwidth	15.407(e)	6.2.4.1	Pass	4.2
Max. Power Density (average)	15.407(a)	6.2.4.1	Pass	4.3
Out of Band Antenna Conducted Emission	15.407(b)	6.2.1.2/ 6.2.2.2/ 6.2.3.2/ 6.2.4.2	Pass	4.4
Radiated Emission in Restricted Bands and Spurious Emissions	15.407(b), 15.209 & 15.109	6.2.1.2/ 6.2.2.2/ 6.2.3.2/ 6.2.4.2	Pass	4.6
AC Power Line Conducted Emission	15.207 & 15.107	7.2.4 [#]	Pass	4.7
Dynamic Frequency Selection(DFS)	15.407	6.3.1	N/A	4.10

Remark: not applicable if the EUT is <500mW (27dBm)

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB 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.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2017 Edition
 RSS-247 Issue 2, February 2017
 RSS-Gen Issue 5, November 2014

TEST REPORT

EXHIBIT 2 GENERAL DESCRIPTION

2.0 GENERAL DESCRIPTION

2.1 Product Description

The Equipment-Under-Test (EUT) NODE 2i is a Wireless Music Streamer. The EUT contains both WLAN (WiFi) and Bluetooth modules. The Bluetooth module has Bluetooth 4.0 BLE and Bluetooth 3.0 features. The EUT can accept analog audio signal, digital audio signal and wireless audio signal via Bluetooth devices. An iOS/Android apps Bluesound installed in Smartphone can act as the remote control of the EUT. The EUT is powered by 100-240VAC.

For the WLAN (WiFi) module:

For 2.400-2.4835GHz:

The Equipment Under Test (EUT) operates at frequency range of 2412MHz to 2462MHz with 11 channels. For 802.11b mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Direct-sequence spread spectrum (DSSS) modulation. Maximum bit rate can be up to 11Mbps.

For 802.11g mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps.

For 802.11n (with 20MHz bandwidth) mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps.

For 802.11n (with 40MHz bandwidth) mode, it operates at frequency range of 2422.000MHz to 2452.000MHz with 7 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps.

For 5.15-5.25GHz:

The Equipment Under Test (EUT) operates at frequency range of 5180MHz to 5240MHz with 4 channels. For 802.11a mode, it operates at frequency range of 5180.00MHz to 5250.000MHz with 4 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps.

For 802.11n (with 20MHz bandwidth) mode, it operates at frequency range of 5180.00MHz to 5250.000MHz with 4 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65.0Mbps.

For 802.11n (with 40MHz bandwidth) mode, it operates at frequency range of 5190.00MHz to 5230.000MHz with 2 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 135.0Mbps.

For 802.11ac (with 20MHz bandwidth) mode, it operates at frequency range of 5180.00MHz to 5250.000MHz with 4 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 86.7Mbps.

For 802.11ac (with 40MHz bandwidth) mode, it operates at frequency range of 5190.00MHz to 5230.000MHz with 2 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 180Mbps.

For 802.11ac (with 80MHz bandwidth) mode, it operates at frequency 5210MHz. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 390Mbps.

TEST REPORT

For 5.725-5.850GHz:

The Equipment Under Test (EUT) operates at frequency range of 5745MHz to 5825MHz with 5 channels. For 802.11a mode, it operates at frequency range of 5745.00MHz to 5825.00MHz with 5 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps.

For 802.11n (with 20MHz bandwidth) mode, it operates at frequency range of 5745MHz to 5825MHz with 5 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 216.6Mbps.

For 802.11n (with 40MHz bandwidth) mode, it operates at frequency range of 5755.00MHz to 5795.000MHz with 2 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 450Mbps.

For 802.11ac (with 20MHz bandwidth) mode, it operates at frequency range of 5745MHz to 5825MHz with 5 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 260Mbps.

For 802.11ac (with 40MHz bandwidth) mode, it operates at frequency range of 5755.00MHz to 5795.000MHz with 2 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 600Mbps.

For 802.11ac (with 80MHz bandwidth) mode, it operates at frequency 5775MHz. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 1300Mbps.

For the Bluetooth module:

For Bluetooth 4.0 BLE mode, it occupies a frequency range from 2402MHz to 2480MHz (40 channels with channel spacing of 2MHz). It transmits via GFSK modulation.

For Bluetooth 3.0 mode, it occupies a frequency range from 2402MHz to 2480MHz (79 channels with channel spacing of 1MHz). It transmits via GFSK modulation.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013) and KDB Publication No.789033 D02 v01r04 (02-May-2017) All other measurements were made in accordance with the procedures in 47 CFR Part 2 and RSS-Gen Issue 5 (2014).

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada No.: 2042V-1.

2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver (WiFi portion)

TEST REPORT

EXHIBIT 3 SYSTEM TEST CONFIGURATION

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The device was powered by 120VAC.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Radiated emission measurement for transmitter were performed 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 to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209 / RSS-247 2.5. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 / RSS-247 Section 5.5 Limits.

TEST REPORT

3.1 Justification – Cont'd

Detector function for radiated emissions was in peak mode. Average readings, when required, were 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 section 4.8.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (Teff) was referred to Exhibit 4.8.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

Different data rates have been tested. Worst case is reported only.

All relevant operation modes have been tested, and the worst case data is included in this report.

All data rates were tested under normal mode of WiFi. Only the worst-case data is shown in the report for DSSS and OFDM.

For simultaneous transmission, both WiFi and Bluetooth portions are also switched on when taking radiated emission for determining worst-case spurious emission.

3.2 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

TEST REPORT

3.3 Details of EUT and Description of Accessories

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

Description of Accessories:

1. Earphone with cable of 1.2m meter long
2. Subwoofer coaxial cable of 1.5m long with termination
3. Digital Out coaxial cable of 1.5m long with termination
4. Trigger Out coaxial cable of 1.5m long with termination
5. IR In coaxial cable of 1.5m long with termination
6. 4GB USB flash drive
(Provided by Intertek)
7. LAN cable of 1.5m long with termination
8. Power Cable of 2m long
9. Analog In coaxial cable of 1.5m long with termination
10. Audio Out coaxial cable of 1.5m long with termination
(Provided by Applicant)

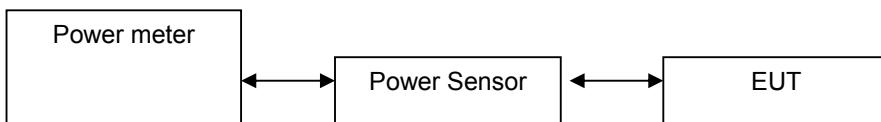
3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are $\pm 5.3\text{dB}$ and $\pm 0.99\text{dB}$ respectively. The value of the Measurement uncertainty for conducted emission test is $\pm 4.2\text{dB}$.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

TEST REPORT**EXHIBIT 4 TEST RESULTS****4.0 TEST RESULTS****4.1 Maximum Conducted (peak) Output Power at Antenna Terminals****RF Conduct Measurement Test Setup**

The figure below shows the test setup, which is utilized to make these measurements.



The antenna port of the EUT was connected to the input of a spectrum analyzer.

- The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals. The measurement procedure E.3.A (789033 D02 General UNII Test Procedures New Rules v01r04 Page 8) was used.
- The EUT should be configured to transmit continuously (at a minimum duty cycle of 98%) at full power over the measurement duration. The measurement procedure AVG1 was used.

IEEE 802.11a (20MHz) (OFDM, 9 Mbps) Antenna Gain = 2.0 dBi (5150-5250 MHz), 2.0 dBi (5725-5850 MHz)

Frequency (MHz)	Conducted output power in dBm	EIRP in dBm	EIRP in mWatt
5180	7.6	9.6	9.12
5200	6.7	8.7	7.41
5240	6.3	8.3	6.76
5745	7.1	9.1	8.13
5785	4.9	6.9	4.90
5825	3.7	5.7	3.72

IEEE 802.11n (20MHz) (OFDM, MCS0) Antenna Gain = 2.0 dBi (5150-5250 MHz), 2.0 dBi (5725-5850 MHz)

Frequency (MHz)	Conducted output power in dBm	EIRP in dBm	EIRP in mWatt
5180	4.5	6.5	4.47
5200	4.1	6.1	4.07
5240	3.8	5.8	3.80
5745	4.7	6.7	4.68
5785	2.5	4.5	2.82
5825	1.7	3.7	2.34

TEST REPORT

IEEE 802.11n (40MHz) (OFDM, MCS0) Antenna Gain = 2.0 dBi (5150-5250 MHz), 2.0 dBi (5725-5850 MHz)

Frequency (MHz)	Conducted output power in dBm	EIRP in dBm	EIRP in mWatt
5190	3.7	5.7	3.72
5230	4.1	6.1	4.07
5755	4.6	6.6	4.57
5795	1.9	3.9	2.45

IEEE 802.11ac (20MHz) (MCS0) Antenna Gain = 2.0 dBi (5150-5250 MHz), 2.0 dBi (5725-5850 MHz)

Frequency (MHz)	Conducted output power in dBm	EIRP in dBm	EIRP in mWatt
5180	4.6	6.6	4.57
5200	4.1	6.1	4.07
5240	4.0	6.0	3.98
5745	4.8	6.8	4.79
5785	2.4	4.4	2.75
5825	1.4	3.4	2.19

IEEE 802.11ac (40MHz) (MCS0) Antenna Gain = 2.0 dBi (5150-5250 MHz), 2.0 dBi (5725-5850 MHz)

Frequency (MHz)	Conducted output power in dBm	EIRP in dBm	EIRP in mWatt
5190	4.1	6.1	4.07
5230	4.2	6.2	4.17
5755	4.3	6.3	4.27
5795	2.0	4.0	2.51

IEEE 802.11ac (80MHz) (MCS0) Antenna Gain = 2.0 dBi (5150-5250 MHz), 2.0 dBi (5725-5850 MHz)

Frequency (MHz)	Conducted output power in dBm	EIRP in dBm	EIRP in mWatt
5210	5.3	7.3	5.37
5775	4.3	6.3	4.27

TEST REPORT

Cable loss : 0.5 dB External Attenuation : 0 dB

Cable loss, external attenuation: included in OFFSET function
 added to SA raw reading

IEEE 802.11ac (20MHz) (DSSS, 1 Mbps)
max. conducted (peak) output level = 4.8 dBm

IEEE 802.11ac (40MHz) (DSSS, 1 Mbps)
max. conducted (peak) output level = 4.3 dBm

IEEE 802.11ac (80MHz) (DSSS, 1 Mbps)
max. conducted (peak) output level = 5.3 dBm

IEEE 802.11a (20MHz) (OFDM, 9 Mbps)
max. conducted (peak) output level = 7.6 dBm

IEEE 802.11n (20MHz) (OFDM, MCS0)
max. conducted (peak) output level = 4.7 dBm

IEEE 802.11n (40MHz) (OFDM, MCS0)
max. conducted (peak) output level = 4.6 dBm

Limits for FCC:

5150-5250MHz:

1W (30dBm) for antennas with gains of 6dBi or less.(Master device)
250mW (24dBm) for antennas with gains of 6dBi or less.(Client device)

5725-5850MHz:

1W (30dBm) for antennas with gains of 6dBi or less.

Limits for RSS:

5150-5250MHz:

200mW (23dBm) for antennas with gains of 6dBi or less.

5725-5850MHz:

1W (30dBm) for antennas with gains of 6dBi or less.

TEST REPORT

4.2 Minimum 6dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. The EBW measurement procedure was used. A PEAK output reading was taken, a DISPLAY line was drawn 6dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

IEEE 802.11a (20MHz) (OFDM, 6Mbps)

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
5180	15.3	16.200000
5200	15.3	16.200000
5240	15.3	16.200000
5745	15.3	16.200000
5785	15.5	16.400000
5825	15.3	16.200000

IEEE 802.11n (20MHz) (OFDM, MCS0)

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
5180	15.3	17.400000
5200	15.3	17.400000
5240	15.3	17.400000
5745	15.3	17.400000
5785	15.3	17.400000
5825	15.3	17.400000

IEEE 802.11n (40MHz) (OFDM, MCS0)

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
5190	35.3	35.955056
5230	35.3	35.955056
5755	35.3	35.955056
5795	35.3	35.655431

IEEE 802.11ac (20MHz) (MCS0)

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
5180	15.3	17.400000
5200	15.3	17.400000
5240	15.3	17.400000
5745	15.3	17.400000
5785	15.3	17.400000
5825	15.3	17.400000

TEST REPORT**IEEE 802.11ac (40MHz) (MCS0)**

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
5190	35.3	35.955056
5230	35.3	35.955056
5755	35.3	35.955056
5795	35.3	35.655431

IEEE 802.11ac (80MHz) (MCS0)

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
5210	75.3	75.000000
5775	70.2	75.000000

TEST REPORT

Limits:

For 5725-5850MHz:

6 dB bandwidth shall be at least 500kHz

The plots of 6dB RF bandwidth and occupied bandwidth are saved with filename : DATA.pdf

TEST REPORT

4.3 Maximum Power Spectral Density

Antenna output of the EUT was coupled directly to spectrum analyzer. The measurement procedure 10.2 PKPSD was used. If an external attenuator and/or cable was used, these losses are compensated for using the OFFSET function of the analyser.

IEEE 802.11a (20MHz) (OFDM, 6 Mbps)

Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 100kHz (dBm)
5180	-3.745	-1.745
5200	-4.858	-2.858
5240	-5.264	-3.264

Frequency (MHz)	Conducted	EIRP
	PSD in 500kHz (dBm)	PSD in 100kHz (dBm)
5745	-7.197	-5.197
5785	-9.145	-7.145
5825	-10.462	-8.462

IEEE 802.11ac (20MHz) (MCS0)

Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 100kHz (dBm)
5180	-6.408	-4.408
5200	-7.217	-5.217
5240	-7.370	-5.370
Frequency (MHz)	Conducted	EIRP
	PSD in 500kHz (dBm)	PSD in 100kHz (dBm)
5745	-9.665	-7.665
5785	-11.557	-9.557
5825	-12.885	-10.885

TEST REPORT

IEEE 802.11ac (40MHz) (MCS0)

Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 100kHz (dBm)
5190	-9.755	-7.755
5230	-10.053	-8.053
Frequency (MHz)	Conducted	EIRP
	PSD in 500kHz (dBm)	PSD in 100kHz (dBm)
5755	-13.005	-8.552
5795	-14.631	-8.711

IEEE 802.11ac (80MHz) (MCS0)

Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 100kHz (dBm)
5210	-11.529	-9.529
Frequency (MHz)	Conducted	EIRP
	PSD in 500kHz (dBm)	PSD in 500kHz (dBm)
5775	-14.763	-12.763

IEEE 802.11n (20MHz) (OFDM, MCS0)

Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 100kHz (dBm)
5180	-6.540	-8.552
5200	-7.266	-8.711
5240	-7.608	-5.608
Frequency (MHz)	Conducted	EIRP
	PSD in 500kHz (dBm)	PSD in 500kHz (dBm)
5745	-9.556	-8.552
5785	-11.622	-8.711
5825	-13.015	-11.015

TEST REPORT

IEEE 802.11n (40MHz) (OFDM, MCS0)

Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 100kHz (dBm)
5190	-9.743	-8.552
5230	-10.084	-8.711
Frequency (MHz)	Conducted	EIRP
	PSD in 100kHz (dBm)	PSD in 500kHz (dBm)
5755	-12.826	-8.552
5795	-14.742	-8.711

Cable Loss: 0.5 dB

Limit:

For U-NII-1:

 FCC:

17dBm/MHz for Master device.
11dBm/MHz for mobile/portable device.

RSS:

10dBm/MHz E.I.R.P

For U-NII-2:

 FCC:

11dBm/MHz

RSS:

11dBm/MHz

For U-NII-3:

 FCC:

30dBm/500kHz.

RSS:

30dBm/500kHz.

The test data are saved with filename: DATA.pdf

TEST REPORT**4.4 Out of Band Conducted Emissions**

The measurement procedures under sections 2G of 789033 D02 General UNII Test Procedures New Rules v01r04 was used.

Furthermore, Integration Method for measuring bandedge emissions was incorporated in the test of the edge at 1MHz.

Limits:

For UNII-1:

All spurious emission outside 5150-5350MHz should be less than -27dBm/MHz for master device.

For UNII-3:

FCC:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

RSS:

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

- a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;
- b. 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
- c. 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
- d. -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

The test data is saved with filename: DATA_SPURIOUS.pdf

TEST REPORT**4.5 Field Strength Calculation**

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

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

Where FS = Field Strength in $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

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

Example

Assume a receiver reading of 62.0 $\text{dB}\mu\text{V}$ is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 $\text{dB}\mu\text{V}/\text{m}$. This value in $\text{dB}\mu\text{V}/\text{m}$ is converted to its corresponding level in $\mu\text{V}/\text{m}$.

RA = 62.0 $\text{dB}\mu\text{V}$

AF = 7.4 dB

CF = 1.6 dB

AG = 29.0 dB

PD = 0.0 dB

AV = -10 dB

$$FS = 62.0 + 7.4 + 1.6 - 29.0 + 0.0 + (-10.0) = 32.0 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm} [(32.0 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

TEST REPORT**4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions**

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.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.6.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

20720.000; 31320.000 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

4.6.2 Radiated Emission Data

The data in below tables list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 0.1 dB margin

TEST REPORT

RADIATED EMISSION DATA

Frequency: 5180MHz
 IEEE 802.11A (20MHz) (OFDM,6MBs)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5150.000	45.4	33	35.7	48.1	74.0	-25.9
H	15540.000	36.9	33	37.7	41.6	74.0	-32.4
H	20720.000	49.2	33	37.7	53.9	74.0	-20.1

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5150.000	45.4	33	35.7	48.1	0	48.1	54.0	-5.9
H	15540.000	36.9	33	37.7	41.6	0	41.6	54.0	-12.4
H	20720.000	49.2	33	37.7	53.9	0	53.9	54.0	-0.1

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5220MHz
 IEEE 802.11A (20MHz) (OFDM,6Mbps)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	15660.000	36.5	33	37.7	41.2	0	41.2	54.0	-12.8
H	20880.000	46.8	33	37.7	51.5	0	51.5	54.0	-2.5
H	31320.000	44.3	33	42.1	53.4	0	53.4	54.0	-0.6

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	15660.000	45.0	33	37.7	49.7	74.0	-24.3
H	20880.000	47.4	33	37.7	52.1	74.0	-21.9
H	31320.000	44.0	33	42.1	53.1	74.0	-20.9

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5240MHz
 IEEE 802.11A (20MHz) (OFDM,6Mbps)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	45.0	33	35.7	47.7	0	47.7	54.0	-6.3
H	15720.000	36.0	33	37.7	40.7	0	40.7	54.0	-13.3
H	20960.000	48.4	33	37.7	53.1	0	53.1	54.0	-0.9
H	31440.000	44.1	33	42.1	53.2	0	53.2	54.0	-0.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	48.0	33	35.7	50.7	74.0	-23.3
H	15720.000	45.0	33	37.7	49.7	74.0	-24.3
H	20960.000	46.0	33	37.7	50.7	74.0	-23.3
H	31440.000	43.5	33	42.1	52.6	74.0	-21.4

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5745MHz
 IEEE 802.11A (20MHz) (OFDM,6Mbps)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	44.9	33	40.8	52.7	0	52.7	54.0	-1.3
H	22980.000	44.8	33	38.3	50.1	0	50.1	54.0	-3.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	44.9	33	40.8	52.7	74.0	-21.3
H	22980.000	44.8	33	38.3	50.1	74.0	-23.9

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5785MHz
 IEEE 802.11A (20MHz) (OFDM,6Mbps)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	40.5	33	40.8	48.3	0	48.3	54.0	-5.7
H	22980.000	44.8	33	38.3	50.1	0	50.1	54.0	-3.9

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	40.5	33	40.8	48.3	74.0	-25.7
H	22980.000	44.8	33	38.3	50.1	74.0	-23.9

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5825MHz
 IEEE 802.11A (20MHz) (OFDM,6Mbps)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11650.000	41.8	33	40.5	49.3	0	49.3	54.0	-4.7

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11650.000	41.8	33	40.5	49.3	74.0	-24.7

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5180MHz
 IEEE 802.11N (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5150.000	45.5	33	35.7	48.2	0	48.2	54.0	-5.8
H	15540.000	36.6	33	37.7	41.3	0	41.3	54.0	-12.7
H	20720.000	47.5	33	37.7	52.2	0	52.2	54.0	-1.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5150.000	49.1	33	35.7	51.8	74.0	-22.2
H	15540.000	43.6	33	37.7	48.3	74.0	-25.7
H	20720.000	45.8	33	37.7	50.5	74.0	-23.5

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5220MHz
 IEEE 802.11N (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	15660.000	36.6	33	37.7	41.3	0	41.3	54.0	-12.7
H	20880.000	48.4	33	37.7	53.1	0	53.1	54.0	-0.9
H	31320.000	43.0	33	42.1	52.1	0	52.1	54.0	-1.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	15660.000	46.9	33	37.7	51.6	74.0	-22.4
H	20880.000	45.4	33	37.7	50.1	74.0	-23.9
H	31320.000	43.7	33	42.1	52.8	74.0	-21.2

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5240MHz
 IEEE 802.11N (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	44.9	33	35.7	47.6	0	47.6	54.0	-6.4
H	15720.000	36.4	33	37.7	41.1	0	41.1	54.0	-12.9
H	20960.000	45.2	33	37.7	49.9	0	49.9	54.0	-4.1
H	31440.000	43.1	33	42.1	52.2	0	52.2	54.0	-1.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	49.7	33	35.7	52.4	74.0	-21.6
H	15720.000	44.6	33	37.7	49.3	74.0	-24.7
H	20960.000	47.4	33	37.7	52.1	74.0	-21.9
H	31440.000	41.7	33	42.1	50.8	74.0	-23.2

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5745MHz
 IEEE 802.11N (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	43.5	33	40.8	51.3	0	51.3	54.0	-2.7
H	22980.000	46.0	33	38.3	51.3	0	51.3	54.0	-2.7

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	43.5	33	40.8	51.3	74.0	-22.7
H	22980.000	46.0	33	38.3	51.3	74.0	-22.7

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5785MHz
 IEEE 802.11N (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	42.5	33	40.8	50.3	0	50.3	54.0	-3.7
H	22980.000	47.4	33	38.3	52.7	0	52.7	54.0	-1.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	42.5	33	40.8	50.3	74.0	-23.7
H	22980.000	47.4	33	38.3	52.7	74.0	-21.3

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5825MHz
 IEEE 802.11N (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11650.000	42.8	33	40.5	50.3	0	50.3	54.0	-3.7

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11650.000	42.8	33	40.5	50.3	74.0	-23.7

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5180MHz
 IEEE 802.11AC (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5150.000	45.4	33	35.7	48.1	0	48.1	54.0	-5.9
H	15540.000	36.7	33	37.7	41.4	0	41.4	54.0	-12.6
H	20720.000	47.5	33	37.7	52.2	0	52.2	54.0	-1.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5150.000	47.5	33	35.7	50.2	74.0	-23.8
H	15540.000	43.2	33	37.7	47.9	74.0	-26.1
H	20720.000	44.8	33	37.7	49.5	74.0	-24.5

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5220MHz
 IEEE 802.11AC (20MHz) (MCS0)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	15660.000	36.3	33	37.7	41.0	0	41.0	54.0	-13.0
H	20880.000	45.1	33	37.7	49.8	0	49.8	54.0	-4.2
H	31320.000	44.8	33	42.1	53.9	0	53.9	54.0	-0.1

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	15660.000	46.9	33	37.7	51.6	74.0	-22.4
H	20880.000	47.6	33	37.7	52.3	74.0	-21.7
H	31320.000	42.4	33	42.1	51.5	74.0	-22.5

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5240MHz
 IEEE 802.11AC (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	45.0	33	35.7	47.7	0	47.7	54.0	-6.3
H	15720.000	35.9	33	37.7	40.6	0	40.6	54.0	-13.4
H	20960.000	48.2	33	37.7	52.9	0	52.9	54.0	-1.1
H	31440.000	44.1	33	42.1	53.2	0	53.2	54.0	-0.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	48.6	33	35.7	51.3	74.0	-22.7
H	15720.000	46.5	33	37.7	51.2	74.0	-22.8
H	20960.000	45.9	33	37.7	50.6	74.0	-23.4
H	31440.000	43.6	33	42.1	52.7	74.0	-21.3

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5745MHz
 IEEE 802.11AC (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	44.9	33	40.8	52.7	0	52.7	54.0	-1.3
H	22980.000	42.8	33	38.3	48.1	0	48.1	54.0	-5.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	44.9	33	40.8	52.7	74.0	-21.3
H	22980.000	42.8	33	38.3	48.1	74.0	-25.9

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5785MHz
 IEEE 802.11AC (20MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	45.0	33	40.8	52.8	0	52.8	54.0	-1.2
H	22980.000	43.5	33	38.3	48.8	0	48.8	54.0	-5.2

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11490.000	45.0	33	40.8	52.8	74.0	-21.2
H	22980.000	43.5	33	38.3	48.8	74.0	-25.2

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5825MHz
 IEEE 802.11AC (20MHz) (MCS0)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11650.000	43.8	33	40.5	51.3	0	51.3	54.0	-2.7

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11650.000	43.8	33	40.5	51.3	74.0	-22.7

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5190MHz
 IEEE 802.11n (40MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5150.000	46.3	33	35.7	49.0	0	49.0	54.0	-5.0
<i>H</i>	15570.000	36.1	33	37.7	40.8	0	40.8	54.0	-13.2
<i>H</i>	20760.000	47.2	33	37.7	51.9	0	51.9	54.0	-2.1
Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)		Peak Limit at 3m (dB μ V/m)	Margin (dB)	
<i>H</i>	5150.000	46.7	33	35.7	49.4		74.0		-24.6
<i>H</i>	15570.000	47.1	33	37.7	51.8		74.0		-22.2
<i>H</i>	20760.000	47.7	33	37.7	52.4		74.0		-21.6

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

 Frequency: 5230MHz
 IEEE 802.11n (40MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5350.000	44.7	33	35.7	47.4	0	47.4	54.0	-6.6
<i>H</i>	15690.000	36.0	33	37.7	40.7	0	40.7	54.0	-13.3
<i>H</i>	20920.000	48.1	33	37.7	52.8	0	52.8	54.0	-1.2
<i>H</i>	31380.000	43.8	33	42.1	52.9	0	52.9	54.0	-1.1

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5350.000	47.7	33	35.7	50.4	74.0	-23.6
<i>H</i>	15690.000	48.3	33	37.7	53.0	74.0	-21.0
<i>H</i>	20920.000	47.7	33	37.7	52.4	74.0	-21.6
<i>H</i>	31380.000	41.9	33	42.1	51.0	74.0	-23.0

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5755MHz
 IEEE 802.11n (40MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11510.000	45.6	33	40.5	53.1	0	53.1	54.0	-0.9
H	23020.000	44.5	33	38.6	50.1	0	50.1	54.0	-3.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11510.000	45.6	33	40.5	53.1	74.0	-20.9
H	23020.000	44.5	33	38.6	50.1	74.0	-23.9

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5795MHz
 IEEE 802.11n (40MHz) (MCS0)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11590.000	43.8	33	40.5	51.3	0	51.3	54.0	-2.7

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11590.000	43.8	33	40.5	51.3	74.0	-22.7

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth

TEST REPORT

Frequency: 5190MHz
 IEEE 802.11ac (40MHz) (MCS0)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5150.000	46.8	33	35.7	49.5	0	49.5	54.0	-4.5
<i>H</i>	15570.000	36.0	33	37.7	40.7	0	40.7	54.0	-13.3
<i>H</i>	20760.000	44.5	33	37.7	49.2	0	49.2	54.0	-4.8

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5150.000	47.4	33	35.7	50.1	74.0	-23.9
<i>H</i>	15570.000	47.2	33	37.7	51.9	74.0	-22.1
<i>H</i>	20760.000	47.6	33	37.7	52.3	74.0	-21.7

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5230MHz
 IEEE 802.11ac (40MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	44.5	33	35.7	47.2	0	47.2	54.0	-6.8
H	15690.000	35.9	33	37.7	40.6	0	40.6	54.0	-13.4
H	20920.000	45.1	33	37.7	49.8	0	49.8	54.0	-4.2
H	31380.000	43.1	33	42.1	52.2	0	52.2	54.0	-1.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	5350.000	45.5	33	35.7	48.2	74.0	-25.8
H	15690.000	45.4	33	37.7	50.1	74.0	-23.9
H	20920.000	46.4	33	37.7	51.1	74.0	-22.9
H	31380.000	42.9	33	42.1	52.0	74.0	-22.0

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5755MHz
 IEEE 802.11ac (40MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11510.000	42.2	33	40.5	49.7	0	49.7	54.0	-4.3
H	23020.000	44.5	33	38.6	50.1	0	50.1	54.0	-3.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11510.000	42.2	33	40.5	49.7	74.0	-24.3
H	23020.000	44.5	33	38.6	50.1	74.0	-23.9

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Frequency: 5795MHz
 IEEE 802.11ac (40MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	11590.000	42.6	33	40.5	50.1	0	50.1	54.0	-3.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	11590.000	42.6	33	40.5	50.1	74.0	-23.9

NOTES: 1. Peak detector is used for the emission measurement.

2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

 Frequency: 5210MHz
 IEEE 802.11ac (80MHz) (MCS0)

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5150.000	48.3	33	35.7	51.0	0	51.0	54.0	-3.0
<i>H</i>	15630.000	35.7	33	37.7	40.4	0	40.4	54.0	-13.6
<i>H</i>	20840.000	47.4	33	37.7	52.1	0	52.1	54.0	-1.9
<i>H</i>	31260.000	43.0	33	42.1	52.1	0	52.1	54.0	-1.9

Polari-zation	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	5150.000	48.6	33	35.7	51.3	74.0	-22.7
<i>H</i>	15630.000	45.4	33	37.7	50.1	74.0	-23.9
<i>H</i>	20840.000	48.0	33	37.7	52.7	74.0	-21.3
<i>H</i>	31260.000	43.0	33	42.1	52.1	74.0	-21.9
<i>H</i>	36470.000	42.7	33	41.7	51.4	74.0	-22.6

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

 Frequency: 5775MHz
 IEEE 802.11ac (80MHz) (MCS0)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	11550.000	45.6	33	40.5	53.1	0	53.1	54.0	-0.9
<i>H</i>	23100.000	46.5	33	38.6	52.1	0	52.1	54.0	-1.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
<i>H</i>	11550.000	45.6	33	40.5	53.1	74.0	-20.9
<i>H</i>	23100.000	46.5	33	38.6	52.1	74.0	-21.9

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: NODE 2i

Worst-Case Operating Mode: WiFi + Bluetooth Audio Playing

Table 4
Pursuant to FCC Part 15 Section 15.209 / RSS-210 4.4 Requirement

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	36.582	40.8	16	10.0	34.8	40.0	-5.2
V	41.052	40.2	16	10.0	34.2	40.0	-5.8
V	46.802	34.8	16	11.0	29.8	40.0	-10.2
V	105.764	37.2	16	13.0	34.2	43.5	-9.3
V	124.990	36.6	16	14.0	34.6	43.5	-8.9
V	166.908	33.2	16	17.0	34.2	43.5	-9.3
H	249.982	35.8	16	20.0	39.8	46.0	-6.2
H	321.935	35.2	16	23.0	42.2	46.0	-3.8
H	375.008	36.0	16	24.0	44.0	46.0	-2.0
V	624.956	29.4	16	29.0	42.4	46.0	-3.6
V	874.974	29.0	16	32.0	45.0	46.0	-1.0

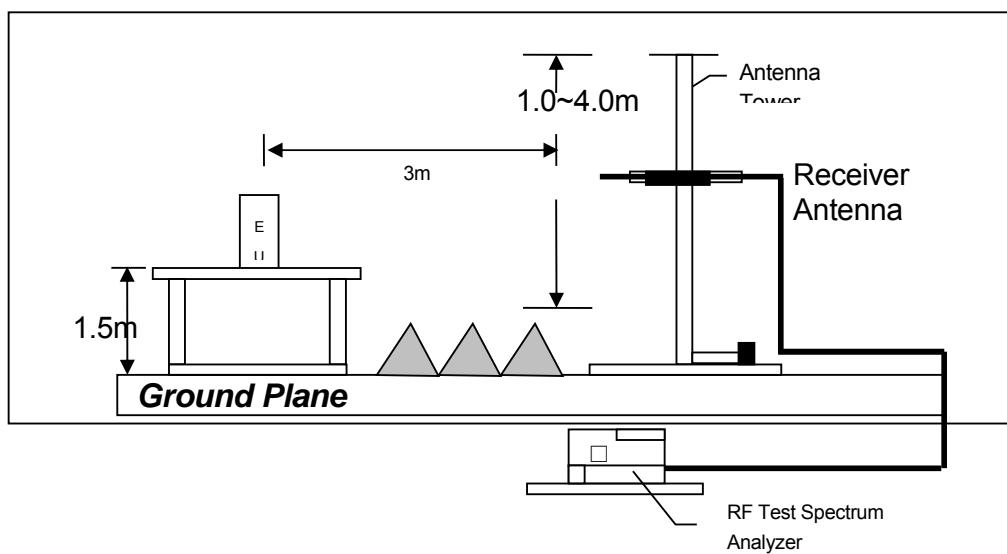
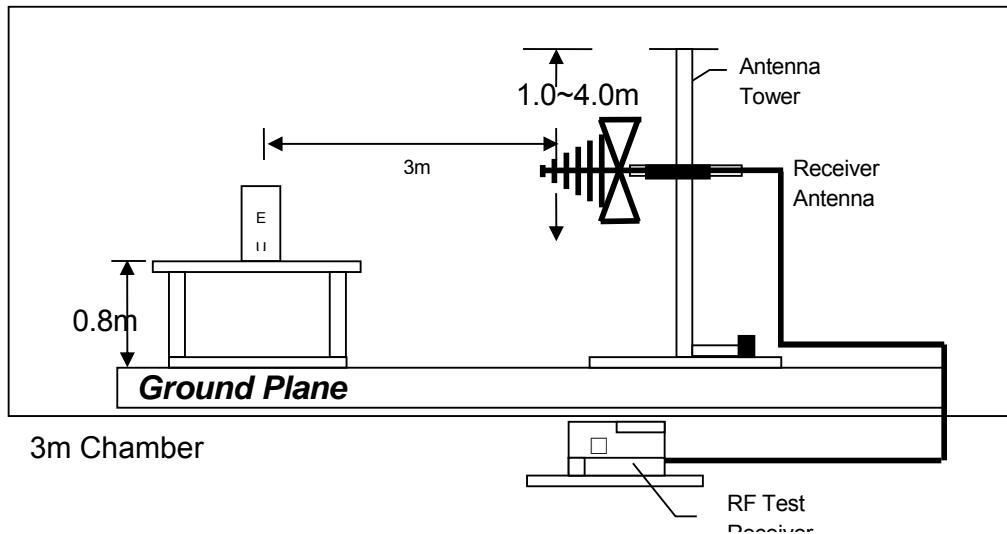
NOTES: 1. Quasi-Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

4.6.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



TEST REPORT**4.6.4 Transmitter Duty Cycle Calculation**

Not applicable – No average factor is required.

TEST REPORT**4.7 AC Power Line Conducted Emission**

- Not applicable – EUT is only powered by battery for operation.
- EUT connects to AC power line. Emission Data is listed in following pages.
- Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.7.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at
735 kHz

The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.7.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

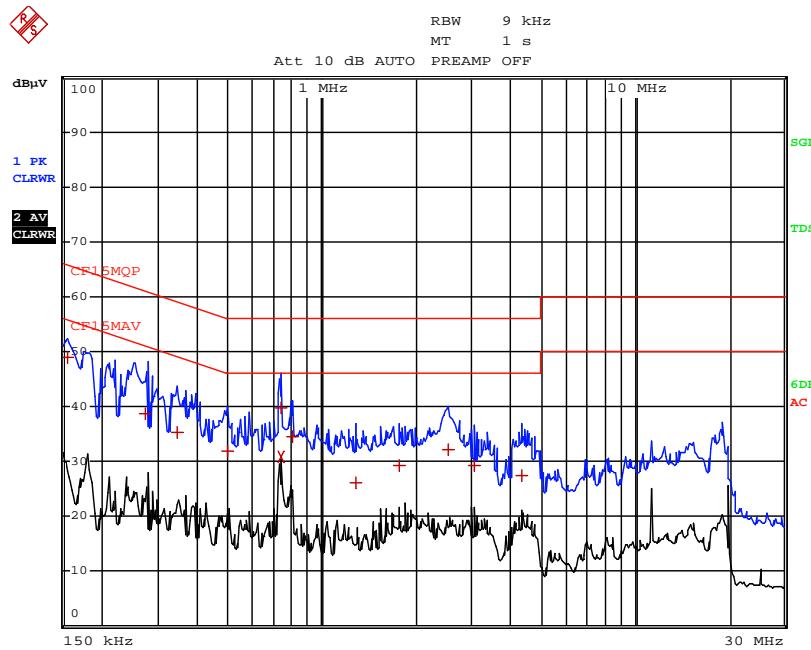
Passed by 15.2 dB margin compare with Quasi-peak limit

TEST REPORT

AC POWER LINE CONDUCTED EMISSION

Model: NODE 2i

Worst-Case Operating Mode: WiFi + Bluetooth Audio Playing

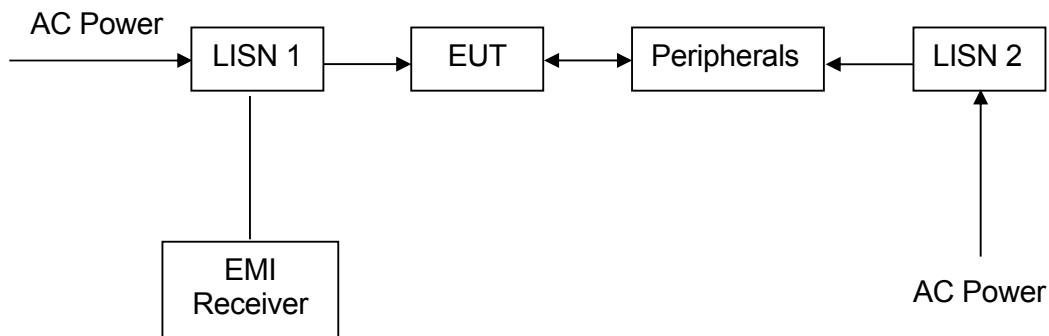


EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CF15MQP				
Trace2:	CF15MAV				
Trace3:	---				
TRACE	FREQUENCY	LEVEL dBμV	DELTA	LIMIT dB	
1 Quasi Peak	154.5 kHz	48.92	N	-16.82	
1 Quasi Peak	276 kHz	38.83	N	-22.09	
1 Quasi Peak	343.5 kHz	35.39	L1	-23.72	
1 Quasi Peak	496.5 kHz	31.86	L1	-24.19	
1 Quasi Peak	735 kHz	39.69	L1	-16.30	
2 CISPR Average	735 kHz	30.84	L1	-15.15	
1 Quasi Peak	802.5 kHz	34.43	N	-21.56	
1 Quasi Peak	1.2795 MHz	26.13	N	-29.86	
1 Quasi Peak	1.7745 MHz	29.17	L1	-26.82	
1 Quasi Peak	2.535 MHz	32.24	L1	-23.75	
1 Quasi Peak	3.0705 MHz	29.38	N	-26.61	
1 Quasi Peak	4.3575 MHz	27.31	N	-28.68	

Note: Measurement Uncertainty is $\pm 4.2\text{dB}$ at a level of confidence of 95%.

TEST REPORT

4.7.3 Conducted Emission Test Setup



TEST REPORT

4.8 Frequency Stability Requirement

Frequency (MHz)	Mode	Measured Value (ppm) (0°C)	Measured Value (ppm) (10°C)	Measured Value (ppm) (20°C)	Measured Value (ppm) (30°C)	Measured Value (ppm) (40°C)	Measured Value (ppm) (50°C)
5180	A	0.804	0.952	4.054	4.102	3.840	3.700
5260		0.799	0.854	4.021	4.125	3.754	3.654
5500		0.755	0.825	4.025	4.258	3.574	3.655
5745		0.725	0.854	4.090	4.894	3.842	4.418

Temperature (°C)	Frequency (MHz)	Mode	Measured Value (ppm)	Measured Value (ppm)	Measured Value (ppm)
			120VAC	138VAC	102VAC
25	5180	A	4.054	4.601	3.893
25	5260		3.954	4.215	3.548
25	5745		3.845	4.871	3.452
25	5745		4.09	3.568	4.496

The Maximum value is +4.894ppm.

It is proved that the frequency stability such that an emission is maintained within the band of operation under all condition.

4.9 U-NII1 99% Bandwidth Requirement

For the case if a channel operating in U-NII 1 band has a 26-dB bandwidth that straddles into U-NII 2A band but its 99% occupied power bandwidth does not. For this rare case, DFS requirement does not apply.

The plots of U-NII1 99% bandwidth is saved with filename: DATA.pdf proved that no further test for DFS.

TEST REPORT

EXHIBIT 5 EQUIPMENT LIST

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-3156	EW-0954	EW-0447
Manufacturer	ROHDE SCHWARZ	EMCO	EMCO
Model No.	ESR26	3104C	3146
Calibration Date	November 10, 2017	February 27, 2018	January 17, 2018
Calibration Due Date	November 10, 2018	August 27, 2019	July 17, 2019

Equipment	Active Loop H-field (9kHz to 30MHz)	12m Double Shield RF Cable (20MHz to 6GHz)	RF Cable (up to 40GHz)
Registration No.	EW-2313	EW-1852	EW-3155
Manufacturer	ELECTROMETRI	RADIALL	N/A
Model No.	EM-6876	N(m)-RG142 - N(m)	1-40 GHz
Calibration Date	March 08, 2018	January 19, 2018	January 29, 2018
Calibration Due Date	September 08, 2019	January 19, 2019	January 29, 2019

Equipment	Double Ridged Guide Antenna	Pyramidal Horn Antenna	Spectrum Analyzer
Registration No.	EW-1015	EW-0905	EW-3110
Manufacturer	EMCO	EMCO	R&S
Model No.	3115	3160-09	FSP30
Calibration Date	November 17, 2017	August 18, 2017	March 05, 2018
Calibration Due Date	May 17, 2019	February 18, 2019	March 05, 2019

Equipment	Notch Filter (cutoff frequency 2.4GHz to 2.5GHz)	Solid State Low Noise Preamplifier Assembly (1 - 18)GHz	RF Pre-amplifier (9kHz to 40GHz)
Registration No.	EW-2213	EW-3229	EW-3006
Manufacturer	MICROTRONICS	BONN ELEKTRO	SCHWARZBECK
Model No.	BRM50701-02	BLMA 0118-5G	BBV 9744
Calibration Date	May 24, 2018	January 30, 2018	April 26, 2018
Calibration Due Date	May 24, 2019	January 30, 2019	April 26, 2019

TEST REPORT

2) Bandedge/Bandwidth Measurement

Equipment	RF Cable (up to 40GHz) 1.5m length	Spectrum Analyzer
Registration No.	EW-3104	EW-2329
Manufacturer	N/A	R&S
Model No.	SMA-M to SMA-M	FSP3
Calibration Date	July 03, 2018	September 28, 2017
Calibration Due Date	July 03, 2019	September 28, 2018

3) Conducted Emissions Test

Equipment	Artificial Mains Network	RF Cable 120cm (RG142) (9kHz to 30MHz)	EMI Test Receiver
Registration No.	EW-2501	EW-2453	EW-2500
Manufacturer	ROHDE SCHWARZ	RADIALL	ROHDE SCHWARZ
Model No.	ENV-216	bnc m st / 142 / bnc m st	ESCI
Calibration Date	February 14, 2018	September 15, 2017	October 13, 2017
Calibration Due Date	February 14, 2019	September 15, 2018	October 13, 2018

END OF TEST REPORT