

TEST REPORT

Report Number: 18081638HKG-003

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-NADM10

IC: 152B-NADM10

Prepared and Checked by:

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Date: February 14, 2019

TEST REPORT

GENERAL INFORMATION

Applicant Name:	Lenbrook Industries Ltd
Applicant Address:	633 Granite Court Pickering ON L1W 3K1 Canada
FCC Specification Standard:	FCC Part 15, October 1, 2017 Edition
FCC ID:	Q2O-NADM10
FCC Model(s):	M10
IC Specification Standard:	RSS-247 Issue 2, February 2017 RSS-Gen Issue 5, April 2018
IC:	152B-NADM10
PMN:	BluOS STREAMING AMPLIFIER
HVIN:	M10
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	BluOS STREAMING AMPLIFIER
Serial Number:	N/A
Sample Receipt Date:	November 05, 2018
Date of Test:	November 05, 2018 to February 14, 2019
Report Date:	February 14, 2019
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.

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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, April 2018

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2.0 GENERAL DESCRIPTION

2.1 Product Description

The Equipment-Under-Test (EUT) M10 is a BluOS STREAMING AMPLIFIER. 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 has internal power amplifiers and loudspeaker. The EUT is powered by 100-120VAC, 200-240VAC. The NFC is a 13.56MHz passive tag only.

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.

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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 v05r01 (11-February-2019) 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)

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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.

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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.

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3.3 Details of EUT and Description of Accessories

Details of EUT:

- (1) The EUT is powered by 120VAC

Description of Accessories:

1. IR-in cable of 2 meter long with termination
2. 12V-trigger cable of 2 meter long with termination
3. HDMI cable of 2 meter long with termination
4. 4GB USB flash drive
5. Pair of loudspeaker with cable of 0.5 meter long
6. LAN cable of 2 meter long with termination
7. Power Cable of 2 meter long
8. 5 X Analog coaxial cable of 2 meter long with termination
(Provided by Intertek)

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.

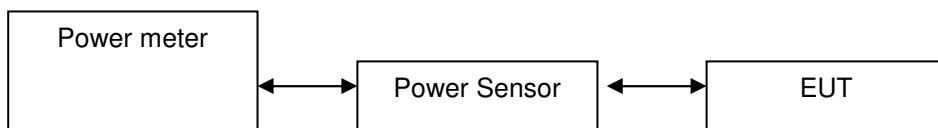
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4.0 TEST RESULTS

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	9.60	9.12
5200	6.45	8.45	7.00
5240	6.12	8.12	6.49
5745	7.1	9.10	8.13
5785	4.34	6.34	4.31
5825	3.7	5.70	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	6.50	4.47
5200	4.1	6.10	4.07
5240	4.1	6.10	4.07
5745	4.7	6.70	4.68
5785	4.5	6.50	4.47
5825	2.3	4.30	2.69

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4.1 Maximum Conducted Output Power at Antenna Terminals – Cont'd

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	4.1	6.10	4.07
5230	4.1	6.10	4.07
5755	4.6	6.60	4.57
5795	4.2	6.20	4.17

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	6.60	4.57
5200	4.4	6.40	4.37
5240	4.3	6.30	4.27
5745	4.8	6.80	4.79
5785	3.1	5.10	3.24
5825	2.5	4.50	2.82

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	6.10	4.07
5230	4.2	6.20	4.17
5755	4.3	6.30	4.27
5795	4.2	6.20	4.17

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

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4.1 Maximum Conducted Output Power at Antenna Terminals – Cont'd

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.

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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

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4.2 Minimum 6dB RF Bandwidth – Cont'd

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

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

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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

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4.3 Maximum Power Spectral Density – Cont'd

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

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

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4.3 Maximum Power Spectral Density – Cont'd

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

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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 then -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 Bm/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 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	45.5	33	35.7	48.2	74.0	-25.8
H	15540.000	38.4	33	37.7	43.1	74.0	-30.9
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	48.2	54.0	-5.8
H	15540.000	36.9	33	37.7	41.6	0	43.1	54.0	-10.9
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	38.7	33	37.7	43.4	0	42.2	54.0	-11.8
H	20880.000	47.9	33	37.7	52.6	0	51.2	54.0	-2.8
H	31320.000	44.0	33	42.1	53.1	0	53.1	54.0	-0.9

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	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	45.4	33	35.7	48.1	0	48.1	54.0	-5.9
H	15720.000	35.9	33	37.7	40.6	0	40.6	54.0	-13.4
H	20960.000	47.4	33	37.7	52.1	0	52.1	54.0	-1.9
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	51.2	54.0	-2.8

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	11490.000	44.9	33	40.8	52.7	74.0	-21.3
H	22980.000	45.9	33	38.3	51.2	74.0	-22.8

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	49.2	54.0	-4.8
H	22980.000	44.8	33	38.3	50.1	0	51.1	54.0	-2.9

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	41.4	33	40.8	49.2	74.0	-24.8
H	22980.000	45.8	33	38.3	51.1	74.0	-22.9

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	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	11650.000	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

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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	47.4	54.0	-6.6
H	15540.000	36.6	33	37.7	41.3	0	42.2	54.0	-11.8
H	20720.000	47.5	33	37.7	52.2	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)
H	5150.000	44.7	33	35.7	47.4	74.0	-26.6
H	15540.000	48.2	33	37.7	52.9	74.0	-21.1
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	49.4	33	37.7	54.1	74.0	-19.9
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	46.4	54.0	-7.6
H	15720.000	36.4	33	37.7	41.1	0	42.1	54.0	-11.9
H	20960.000	45.2	33	37.7	49.9	0	50.1	54.0	-3.9
H	31440.000	40.4	33	42.1	52.2	0	49.5	54.0	-4.5

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	43.7	33	35.7	46.4	74.0	-27.6
H	15720.000	37.4	33	37.7	42.1	74.0	-31.9
H	20960.000	45.4	33	37.7	50.1	74.0	-23.9
H	31440.000	40.4	33	42.1	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: 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	43.4	33	40.8	51.2	0	51.2	54.0	-2.8
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	43.4	33	40.8	51.2	74.0	-22.8
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)

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	42.8	33	40.5	50.3	0	50.3	54.0	-3.7

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	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	46.4	33	35.7	49.1	0	48.1	54.0	-5.9
H	15540.000	36.5	33	37.7	41.2	0	42.1	54.0	-11.9
H	20720.000	47.5	33	37.7	52.2	0	52.0	54.0	-2.0

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	45.4	33	35.7	48.1	74.0	-25.9
H	15540.000	37.4	33	37.7	42.1	74.0	-31.9
H	20720.000	47.3	33	37.7	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: 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	36.5	33	37.7	41.2	0	41.2	54.0	-12.8
H	20880.000	44.1	33	37.7	48.8	0	48.8	54.0	-5.2
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	36.5	33	37.7	41.2	74.0	-32.8
H	20880.000	44.1	33	37.7	48.8	74.0	-25.2
H	31320.000	44.8	33	42.1	53.9	74.0	-20.1

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: 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	44.7	33	35.7	47.4	0	46.6	54.0	-7.4
H	15720.000	36.1	33	37.7	40.8	0	42.8	54.0	-11.2
H	20960.000	47.2	33	37.7	51.9	0	51.1	54.0	-2.9
H	31440.000	44.0	33	42.1	53.2	0	53.1	54.0	-0.9

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	5350.000	43.9	33	35.7	46.6	74.0	-27.4
H	15720.000	38.1	33	37.7	42.8	74.0	-31.2
H	20960.000	46.4	33	37.7	51.1	74.0	-22.9
H	31440.000	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: 5745MHz

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	11490.000	43.9	33	40.8	51.7	0	51.7	54.0	-2.3
H	22980.000	42.8	33	38.3	48.1	0	48.1	54.0	-5.9

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	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)

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	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

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	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)

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	46.5	33	35.7	49.2	0	49.2	54.0	-4.8
<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

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	46.5	33	35.7	49.2	74.0	-24.8
<i>H</i>	15570.000	36.1	33	37.7	40.8	74.0	-33.2
<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)
H	5350.000	44.7	33	35.7	47.4	0	47.4	54.0	-6.6
H	15690.000	36.0	33	37.7	40.7	0	40.7	54.0	-13.3
H	20920.000	48.1	33	37.7	52.8	0	52.8	54.0	-1.2
H	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)
H	5350.000	47.7	33	35.7	50.4	74.0	-23.6
H	15690.000	48.3	33	37.7	53.0	74.0	-21.0
H	20920.000	47.7	33	37.7	52.4	74.0	-21.6
H	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)

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	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

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	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)

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	43.8	33	40.5	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	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)

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	48.5	33	35.7	51.2	0	51.2	54.0	-2.8
H	15630.000	36.5	33	37.7	41.2	0	41.2	54.0	-12.8
H	20840.000	46.4	33	37.7	51.1	0	51.1	54.0	-2.9
H	31260.000	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	5150.000	48.5	33	35.7	51.2	74.0	-22.8
H	15630.000	36.5	33	37.7	41.2	74.0	-32.8
H	20840.000	46.4	33	37.7	51.1	74.0	-22.9
H	31260.000	43.0	33	42.1	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

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)
H	11550.000	45.6	33	40.5	53.1	0	53.1	54.0	-0.9
H	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)
H	11550.000	45.6	33	40.5	53.1	74.0	-20.9
H	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

Mode: WiFi + Bluetooth Audio Playing

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	45.124	40.4	16	10.0	34.4	40.0	-5.6
V	56.410	44.8	16	11.0	39.8	40.0	-0.2
V	191.858	34.5	16	16.0	34.5	43.5	-9.0
V	214.476	33.0	16	17.0	34.0	43.5	-9.5
V	323.954	32.0	16	24.0	40.0	46.0	-6.0
V	424.966	29.0	16	25.0	38.0	46.0	-8.0
V	485.988	33.6	16	26.0	43.6	46.0	-2.4
V	624.962	29.4	16	29.0	42.4	46.0	-3.6
H	749.960	29.5	16	30.0	43.5	46.0	-2.5
H	972.002	23.0	16	33.0	40.0	54.0	-14.0

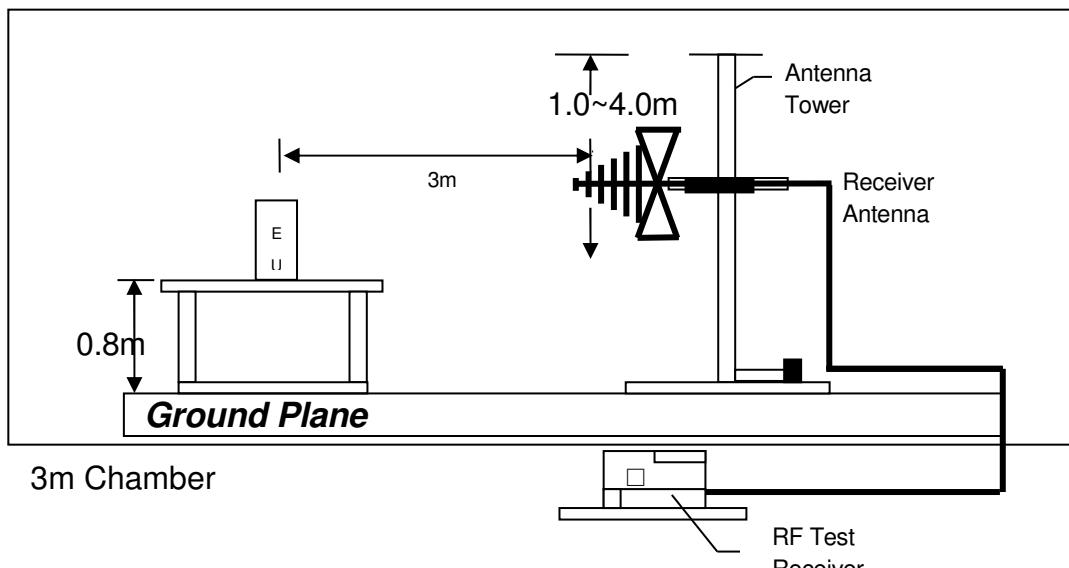
NOTES: 1. Quasi-Peak detector is used for the emission measurement.

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.

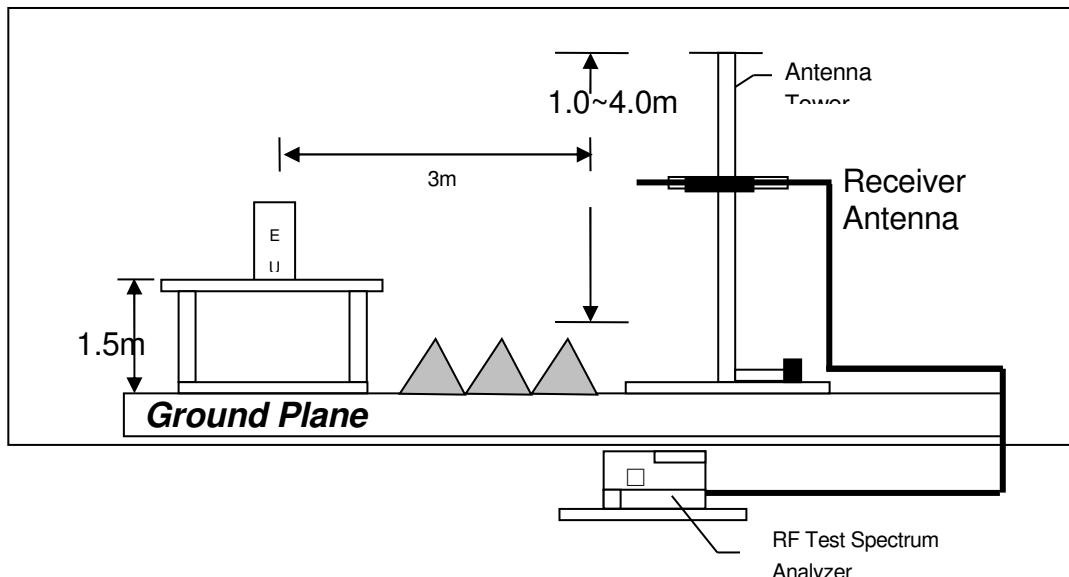
TEST REPORT

4.6.3 Radiated Emission Test Setup

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



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

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
690 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 4.9 dB margin

TEST REPORT**AC POWER LINE CONDUCTED EMISSION**

Worst Case: WiFi + Bluetooth Audio Playing

EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CF15MQP				
Trace2:	CF15MAV				
Trace3:	---				
TRACE	FREQUENCY	LEVEL	dB μ V	DELTA	LIMIT dB
2	CISPR Average 195 kHz	43.36	N	-10.45	
1	Quasi Peak 199.5 kHz	51.54	L1	-12.08	
1	Quasi Peak 222 kHz	42.78	N	-19.95	
2	CISPR Average 276 kHz	35.28	L1	-15.64	
2	CISPR Average 294 kHz	36.73	L1	-13.67	
1	Quasi Peak 370.5 kHz	34.23	L1	-24.25	
1	Quasi Peak 492 kHz	44.14	N	-11.99	
2	CISPR Average 492 kHz	39.92	L1	-6.20	
1	Quasi Peak 690 kHz	45.99	L1	-10.00	
2	CISPR Average 690 kHz	41.12	L1	-4.87	
1	Quasi Peak 852 kHz	39.06	L1	-16.93	
2	CISPR Average 883.5 kHz	38.95	N	-7.04	
2	CISPR Average 1.2795 MHz	39.50	N	-6.49	
1	Quasi Peak 1.473 MHz	39.98	N	-16.02	
2	CISPR Average 1.671 MHz	35.33	N	-10.66	
1	Quasi Peak 1.869 MHz	38.79	N	-17.20	
1	Quasi Peak 2.157 MHz	33.40	N	-22.60	
2	CISPR Average 2.3595 MHz	32.32	L1	-13.67	
1	Quasi Peak 3.93 MHz	33.08	L1	-22.91	
2	CISPR Average 3.9345 MHz	30.14	L1	-15.85	

Date: 28.JAN.2019 07:46:25

TEST REPORT**AC POWER LINE CONDUCTED EMISSION**

Worst Case: WiFi + Bluetooth Audio Playing

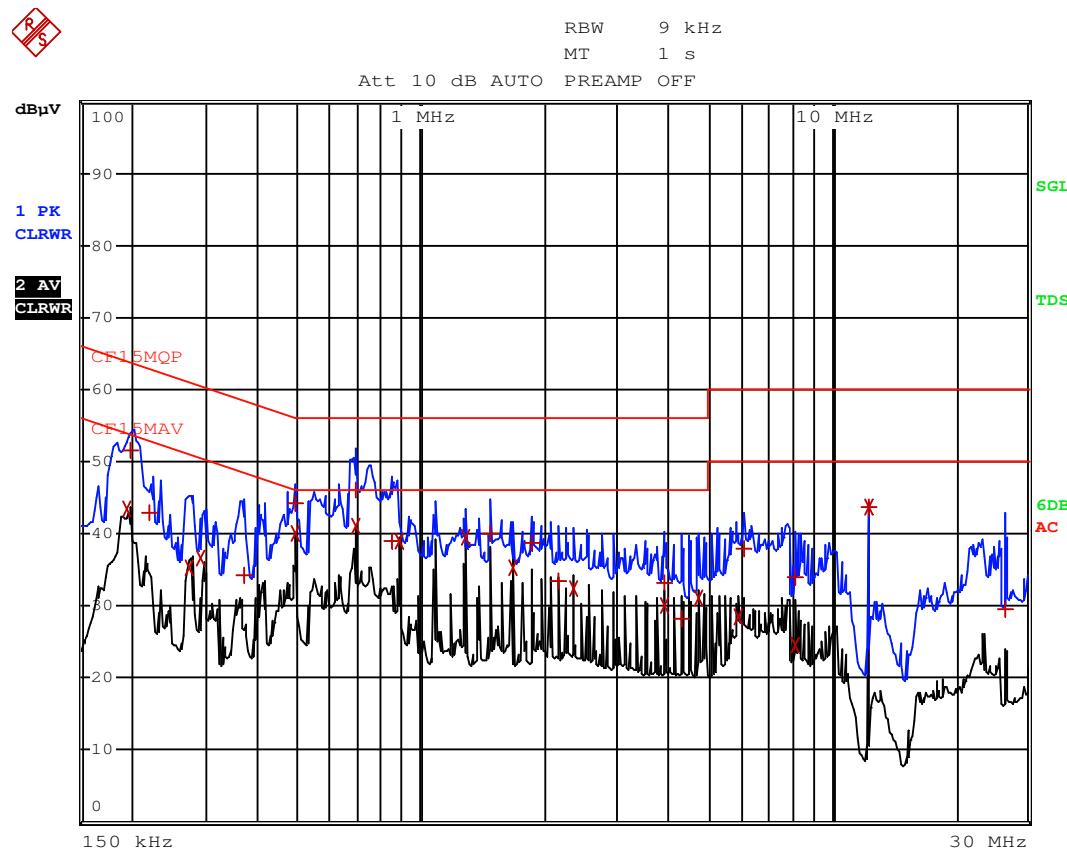
EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CF15MQP				
Trace2:	CF15MAV				
Trace3:	---				
TRACE	FREQUENCY	LEVEL dB μ V	DELTA	LIMIT	dB
1 Quasi Peak	4.317 MHz	28.11 N		-27.88	
2 CISPR Average	4.722 MHz	31.04 N		-14.95	
2 CISPR Average	5.8965 MHz	28.41 N		-21.59	
1 Quasi Peak	6.099 MHz	37.91 L1		-22.09	
1 Quasi Peak	8.151 MHz	33.86 N		-26.13	
2 CISPR Average	8.1555 MHz	24.62 N		-25.37	
1 Quasi Peak	12.2865 MHz	43.72 N		-16.27	
2 CISPR Average	12.2865 MHz	43.69 N		-6.30	
1 Quasi Peak	26.3355 MHz	29.45 L1		-30.54	

Date: 28.JAN.2019 07:47:02

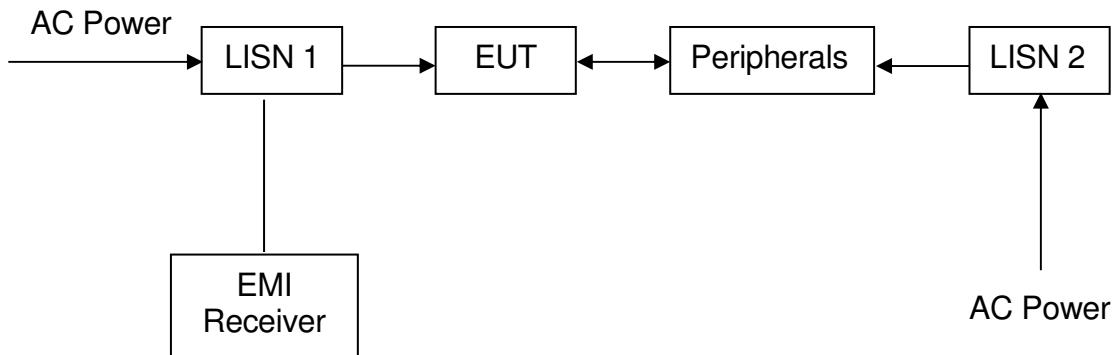
TEST REPORT

AC POWER LINE CONDUCTED EMISSION

Worst Case: WiFi + Bluetooth Audio Playing



Date: 28.JAN.2019 07:47:42

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) (35°C)
5180	A	0.341	0.737	0.691	0.906	0.627
5260		0.703	0.581	0.759	0.641	0.705
5500		0.887	0.449	0.987	0.275	0.784
5745		0.463	0.604	0.109	0.332	0.863
Temperature (°C)	Frequency (MHz)	Mode	Measured Value (ppm)	Measured Value (ppm)	Measured Value (ppm)	
			120VAC	138VAC	102VAC	
25	5180	A	0.185	0.942	0.047	
25	5260		0.152	0.267	0.207	
25	5745		0.077	0.705	0.560	
25	5745		0.071	0.393	0.103	

The Maximum value is +4.841ppm.

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

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-2666	EW-3110	EW-0571
Manufacturer	R&S	R&S	EMCO
Model No.	ESCI7	FSP30	3104C
Calibration Date	August 28, 2018	March 05, 2018	February 27, 2018
Calibration Due Date	August 28, 2019	March 05, 2019	August 27, 2019
Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	14m Double Shield RF Cable (20MHz to 6GHz)
Registration No.	EW-0447	EW-1015	EW-2505
Manufacturer	EMCO	EMCO	RADIALL
Model No.	3148	3115	nm / br5d / sma 14m
Calibration Date	January 17, 2018	November 17, 2017	October 27, 2018
Calibration Due Date	July 17, 2019	May 17, 2019	October 27, 2019
Equipment	RF Cable 14m (1GHz to 26.5GHz)	RF Pre-amplifier 3 pcs (9kHz to 40GHz)	Pyramidal Horn Antenna
Registration No.	EW-2781	EW-3006	EW-0905
Manufacturer	GREATBILLION	SCHWARZBECK	EMCO
Model No.	SMA m/SHF5MPU /SMA m ra14m,26G	BBV 9718 BBV9744 BBV 9721	3160-09
Calibration Date	October 27, 2018	April 26, 2018	August 18, 2017
Calibration Due Date	October 27, 2019	April 26, 2019	February 18, 2019
Equipment	Active Loop H-field (9kHz to 30MHz)	Notch Filter (cutoff frequency 2.4GHz to 2.5GHz)	
Registration No.	EW-2313	EW-2213	
Manufacturer	ELECTROMETRI	MICROTRONICS	
Model No.	EM-6876	BRM50701-02	
Calibration Date	March 08, 2018	May 24, 2018	
Calibration Due Date	September 08, 2019	May 24, 2019	

TEST REPORT

2) Bandedge/Bandwidth Measurement

Equipment	RF Cable (up to 40GHz) 1.5m length	Spectrum Analyzer
Registration No.	EW-3104	EW-3110
Manufacturer	N/A	R&S
Model No.	SMA-M to SMA-M	FSP30
Calibration Date	July 03, 2018	March 05, 2018
Calibration Due Date	July 03, 2019	March 05, 2019

TEST REPORT

3) Conducted Emissions Test

Equipment	Artificial Mains Network	RF Cable 240cm (RG142)	EMI Test Receiver
Registration No.	EW-2501	EW-2454	EW-2666
Manufacturer	ROHDE SCHWARZ	RADIALL	R&S
Model No.	ENV-216	bnc m st / 142 /bnc m ra 240cm	ESCI7
Calibration Date	February 14, 2018	March 27, 2018	August 28, 2018
Calibration Due Date	February 14, 2019	March 27, 2019	August 28, 2019

END OF TEST REPORT