



Test report No. : 4788872713-US-R0-V0
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Issued date : May. 23, 2019
FCC ID : S8W-W04A

RADIO TEST REPORT

Product : W04A
Model Name : Whistle GO
Series Model Name : Whistle GO Explore
FCC ID : S8W-W04A
Test Regulation : FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date : Mar. 4, 2019
Test Date : Mar. 4, 2019 ~ Mar 29, 2019
Issued Date : May. 23, 2019

Applicant : Whistle Labs, Inc
1355 Market Street Suite 210 San Francisco, CA 94103, USA
Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan



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Doc No: 17-EM-F0876 / 2.0



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REVISION HISTORY

Original Test Report No.: 4788872713-US-R0-V0

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1. Attestation of Test Results

APPLICANT: Whistle Labs, Inc
1355 Market Street Suite 210 San Francisco, CA 94103, USA

MANUFACTURER Whistle Labs, Inc
1355 Market Street Suite 210 San Francisco, CA 94103, USA

EUT DESCRIPTION: W04A

BRAND: Whistle

MODEL: Whistle GO

SERIES MODEL: Whistle GO Explore

SAMPLE STAGE: PVT

DATE of TESTED: Mar. 4, 2019 ~ Mar 29, 2019

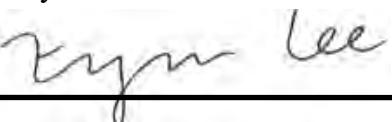
APPLICABLE STANDARDS

| STANDARD | Test Results |
|---|--------------|
| FCC 47 CFR PART 15 Subpart C (Section 15.247) | PASS |

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

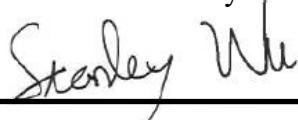
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:


Evelyn Lee
Project Handler

Date : May. 23, 2019

Approved and Authorized By:


Stanley Wu
Date : May. 23, 2019
Senior Project Engineer

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2. Summary of Test Results

| Summary of Test Results | | |
|--------------------------------|---|--------|
| FCC Clause | Test Items | Result |
| 15.247(a)(2) | 6dB Bandwidth | PASS |
| 15.247(b) | Conducted Output Power | PASS |
| 15.247(e) | Power Spectral Density | PASS |
| 15.247(d) | Antenna Port Emission | PASS |
| 15.205 / 15.209 / 15.247(d) | Radiated Emissions and Band Edge Measurement | PASS |
| 15.207 | AC Power Conducted Emission | PASS |
| 15.203 | Antenna Requirement | PASS |

Note:

1. For the Radiated Band Edge test plots were recorded in Appendix I, the Radiated Emissions test plots were recorded in Appendix II.

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3. Test Methodology

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB558074 D01 DTS Meas Guidance v05r01, KDB414788 D01 Radiated Test Site v01, ANSI C63.10-2013.

4. Facilities and Accreditation

| | |
|----------------------------------|--|
| Test Location | Underwriters Laboratories Taiwan Co., Ltd. |
| Address | Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan |
| Accreditation Certificate | Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398 |

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5. Measurement Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

| Test Item | Measurement Frequency Range | K | U(dB) |
|--|-----------------------------|---|-------|
| Conducted disturbance at mains terminals ports | 0.15MHz ~ 30MHz | 2 | 2.6 |
| RF Conducted | 9 kHz - 40GHz | 2 | 1.0 |
| Radiated disturbance below 30MHz | 9 kHz - 30 MHz | 2 | 2.4 |
| Radiated disturbance below 1 GHz | 30MHz ~ 1GHz | 2 | 5.5 |
| Radiated disturbance above 1GHz | 1GHz ~ 40GHz | 2 | 5.0 |

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6. Equipment under Test

6.1. Description of EUT

| | |
|-----------------------------|---|
| Product | W04A |
| Brand Name | Whistle |
| Model Name | Whistle GO |
| Series Model Name | Whistle GO Explore |
| Operating Frequency | 2412MHz ~ 2462MHz |
| Modulation | CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM |
| Transfer Rate | 802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS7 |
| Number of Channel | 11 for 802.11b, 802.11g, 802.11n (HT20) |
| Maximum Output Power | 802.11b: 17.71 dBm 802.11g: 22.30 dBm 802.11n (HT20): 22.02 dBm |
| Normal Voltage | 5Vdc (adapter or host equipment) 3.8Vdc for battery |
| Hardware Version | PVT1 |
| Software Version | 0.0.1-d2aa817 |
| Model difference | Whistle GO is with small LED window while Whistle GO Explore is with big LED window |

Note:

1. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitters and one receivers.

| Modulation Mode | Tx,Rx Function |
|------------------------|-----------------------|
| 802.11b | 1TX,1RX |
| 802.11g | 1TX,1RX |
| 802.11n (HT20) | 1TX,1RX |

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2. The EUT contains following accessory devices

| Product | Brand | Model | Description |
|-------------------|---------|-------|--|
| USB Cable | Whistle | N/A | 0.77 meter, non-shielded cable, w/o ferrite core |
| Collar Attachment | Whistle | N/A | N/A |

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

6.2. Channel List

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 1 | 2412MHz | 7 | 2442MHz |
| 2 | 2417MHz | 8 | 2447MHz |
| 3 | 2422MHz | 9 | 2452MHz |
| 4 | 2427MHz | 10 | 2457MHz |
| 5 | 2432MHz | 11 | 2462MHz |
| 6 | 2437MHz | - | - |

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6.3. Test Condition

| Test Item | Test Site No. | Environmental Condition | Input Power | Test Date | Tested by |
|------------------------------------|---------------|-------------------------|----------------|------------------------------|------------|
| Antenna Port Conducted Measurement | SR4 | 25°C / 62%RH | 120Vac / 60 Hz | Mar. 4, 2019 ~ Mar. 29, 2019 | Wayne Chen |
| Radiated Spurious Emission | 966-2 | 24°C / 68%RH | 120Vac / 60 Hz | Mar. 8, 2019 ~ Mar. 29, 2019 | Will Chen |
| AC power Line Conducted Emission | SR1 | 26°C / 60%RH | 120Vac / 60 Hz | Mar. 22, 2019 | Will Chen |

FCC Test Firm Registration Number: 498077

6.4. Description Of Available Antennas

| Antenna | Brand Name | Model Name | Antenna Type | Antenna Gain(dBi) |
|----------|------------|------------|--------------|-------------------|
| Chain(0) | N/A | N/A | PCB | -4.4 |

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6.5. Test Mode Applicability and Tested Channel Detail

| Test item | Mode | Modulation Technology | Modulation Type | Available Channel | Test Channel | Data Rate |
|------------------------------------|---------------|-----------------------|-----------------|-------------------|--------------|-----------|
| Radiated Emissions (Above 1GHz) | 802.11b | DSSS | DBPSK | 1 to 11 | 1,6,11 | 1.0 |
| | 802.11g | OFDM | BPSK | 1 to 11 | 1,6,11 | 6.0 |
| | 802.11n(HT20) | OFDM | BPSK | 1 to 11 | 1,6,11 | MCS0 |
| Radiated Emissions (Below 1GHz) | 802.11n(HT20) | OFDM | BPSK | 1 to 11 | 11 | MCS0 |
| AC Power Line Conducted Emission | 802.11n(HT20) | OFDM | BPSK | 1 to 11 | 11 | MCS0 |
| Antenna Port Conducted Measurement | 802.11b | DSSS | DBPSK | 1 to 11 | 1,6,11 | 1.0 |
| | 802.11g | OFDM | BPSK | 1 to 11 | 1,6,11 | 6.0 |
| | 802.11n(HT20) | OFDM | BPSK | 1 to 11 | 1,6,11 | MCS0 |

Note:

1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
2. For below 1 GHz radiated emission and AC power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case.
3. For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
4. The EUT have two kinds of the enclosure and six colors, and other circuits design and PCB layout are the same; therefore, there is no more testing need to be verified.
5. The fundamental of the EUT was investigated in three orthogonal axes X/Y/Z, it was determined that Z axis was worst-case . Therefore, all final radiated testing was performed with the EUT in Z axis.

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6.6. Duty cycle

802.11b: Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11g: Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11n (HT20): Duty cycle of test signal is $\geq 98\%$, duty factor is not required.





7. Test Equipment

| Test Equipment List | | | | | |
|--|-----------------------------|--|----------------------------|---------------|---------------|
| Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
| Radiated Spurious Emission | | | | | |
| Spectrum Analyzer | Keysight | N9010A | MY56070827 | Nov. 8, 2018 | 1 year |
| EMI Test Receiver | Rohde & Schwarz | ESR7 | 101754 | Nov. 8, 2018 | 1 year |
| Loop Antenna | ETS lindgren | 6502 | 00213440 | Dec. 11, 2018 | 1 year |
| Trilog-Broadband Antenna with 5dB Attenuator | Schwarzbeck & EMCI | VULB 9168 & N-6-05 | 774 & AT-N0538 | Jan. 14, 2019 | 1 year |
| Horn Antenna (1-18 GHz) | Schwarzbeck | BBHA 9120 D | 01690 | Jan. 25, 2019 | 1 year |
| Horn Antenna(18-40 GHz) | Schwarzbeck | BBHA 9170 | 781 | Jan.16, 2019 | 1 year |
| Preamplifier (30-1000 MHz) | EMCI | EMC330E | 980405 | Jan. 30, 2019 | 1 year |
| Preamplifier (1-18 GHz) | EMCI | EMC051835BE | 980406 | Jan. 29, 2019 | 1 year |
| Preamplifier (18-40GHz) | EMCI | EMC184040SE E | 980426 | Apr. 26, 2018 | 1 year |
| RF Cable (9 KHz~18 GHz) | UltraPhase & EMC Instrument | A1K50-UP0358-A1K50-1500&EMC106-NM-SM-2500/7000 | 170111-4&170219/170 102 | Jan. 29, 2019 | 1 year |
| RF Cable (18 GHz~40 GHz) | UltraPhase | K1K50-UP0264-K1K50-2500/2500/600 | 170214-2/170214-6/170111-1 | Jan. 29, 2019 | 1 year |

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| Test Equipment List | | | | | |
|---|-----------------|-----------|----------------|---------------|---------------|
| Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
| Antenna Port Conducted Measurement | | | | | |
| Spectrum Analyzer | Keysight | N9010A | MY56070834 | Nov. 8, 2018 | 1 year |
| Pulse Power Sensor | Anrisu | MA2411B | 1531202 | Dec. 17, 2018 | 1 year |
| Power Meter | Anrisu | ML2495A | 1645002 | Dec. 17, 2018 | 1 year |
| AC power Line Conducted Emission | | | | | |
| EMI Test Receiver | Rohde & Schwarz | ESR7 | 101753 | Nov. 14, 2018 | 1 year |
| Two-Line V- Network | Rohde & Schwarz | ENV216 | 102136 | Aug. 5, 2018 | 1 year |
| Impuls-Begrenzer Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 102219-Qt | Aug. 2, 2018 | 1 year |
| Cables | Huber+Suhner | RG 214/U | FCC-BCICF-4 RF | Jan. 29, 2019 | 1 year |

| UL Software | | |
|----------------------------------|---------------------|---------|
| Description | Name | Version |
| Radiated measurement | EZ_EMCA | 1.1.4.2 |
| Conducted measurement | Keysight.TestSystem | 1.0.0.0 |
| AC power Line Conducted Emission | EZ_EMCA | 1.1.4.2 |

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8. Description of Test Setup

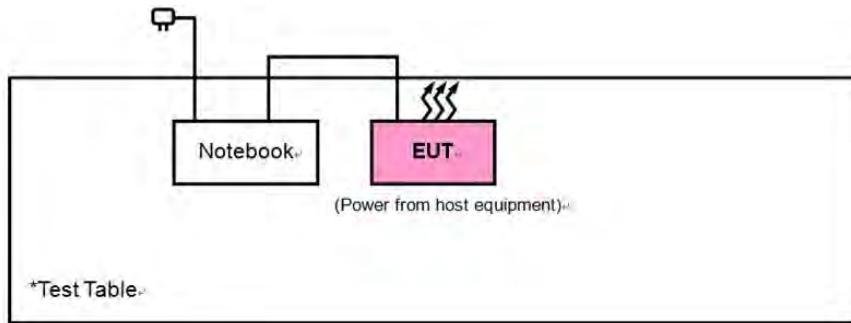
Support Equipment

| Item | Equipment | Brand Name | Model Name | S/N |
|------|-----------|------------|----------------|---------|
| 1 | Notebook | DELL | Latitude E5470 | 3JFKWF2 |

Test Setup

Controlled using a bespoke application (Teraterm469) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



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9. Test Results

9.1. 6dB Bandwidth

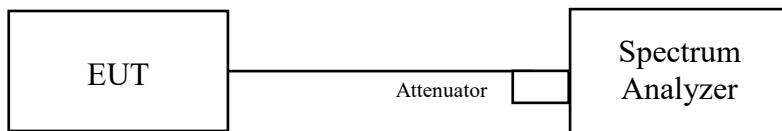
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Test Setup



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Test Data

802.11b

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 1 | 2412 | 10.054 | 0.5 | Pass |
| 6 | 2437 | 10.046 | 0.5 | Pass |
| 11 | 2462 | 10.080 | 0.5 | Pass |

802.11g

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 1 | 2412 | 16.523 | 0.5 | Pass |
| 6 | 2437 | 16.474 | 0.5 | Pass |
| 11 | 2462 | 16.556 | 0.5 | Pass |

802.11n (HT20)

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 1 | 2412 | 17.719 | 0.5 | Pass |
| 6 | 2437 | 17.700 | 0.5 | Pass |
| 11 | 2462 | 17.790 | 0.5 | Pass |

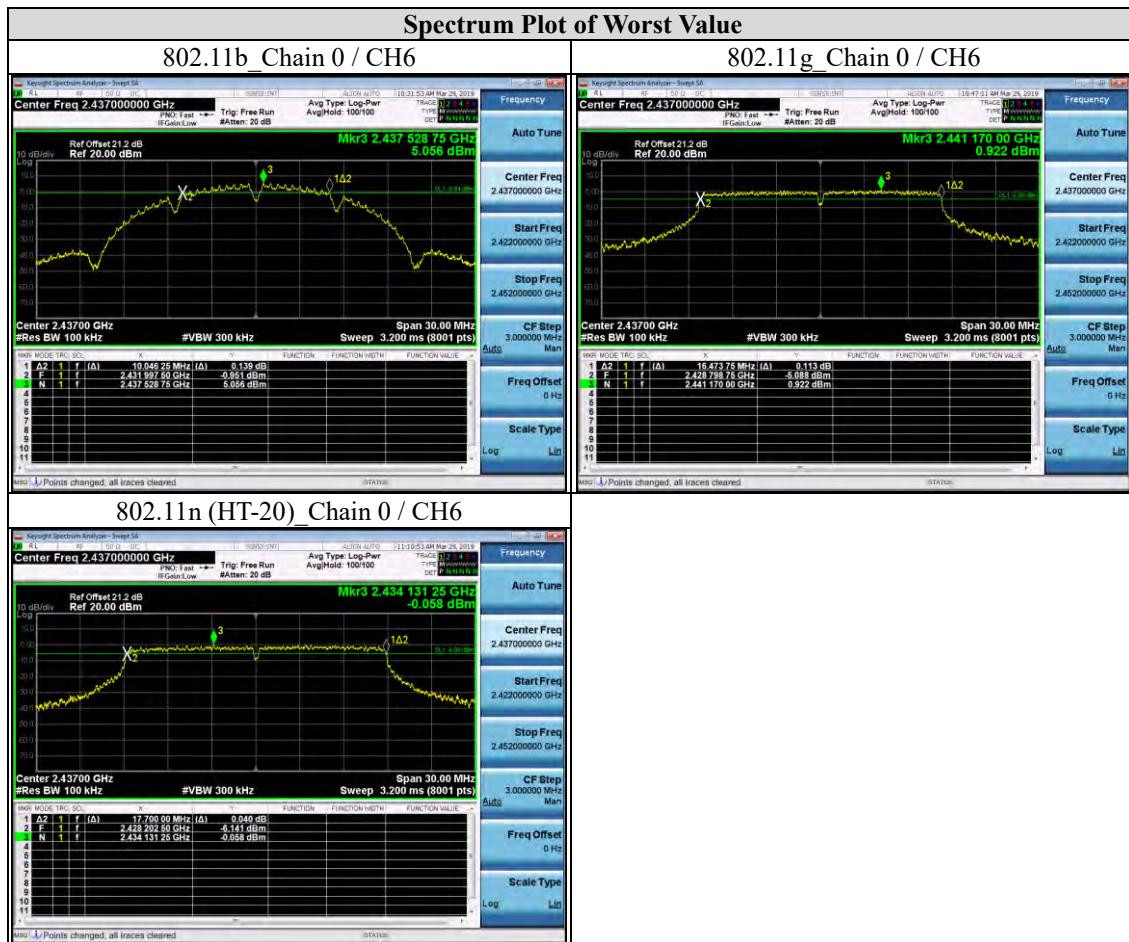
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9.2. Conducted output power

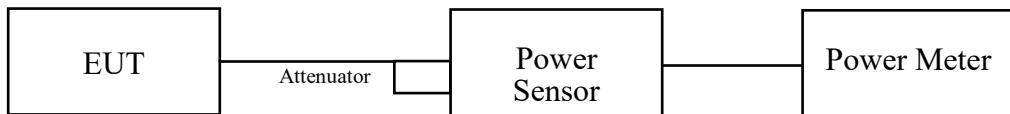
Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



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Test Data

802.11b

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 1 | 2412 | 57.94 | 17.63 | 30 | Pass |
| 6 | 2437 | 59.02 | 17.71 | 30 | Pass |
| 11 | 2462 | 56.36 | 17.51 | 30 | Pass |

802.11g

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 1 | 2412 | 169.82 | 22.30 | 30 | Pass |
| 6 | 2437 | 143.88 | 21.58 | 30 | Pass |
| 11 | 2462 | 148.94 | 21.73 | 30 | Pass |

802.11n (HT20)

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 1 | 2412 | 159.22 | 22.02 | 30 | Pass |
| 6 | 2437 | 143.22 | 21.56 | 30 | Pass |
| 11 | 2462 | 148.25 | 21.71 | 30 | Pass |

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9.3. Power Spectral Density

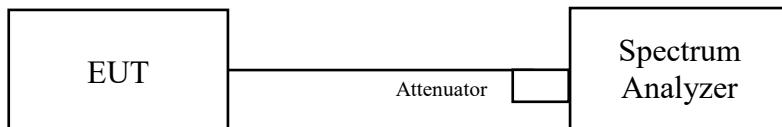
Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

Test procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d. Set the VBW $\geq 3 \times \text{RBW}$.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

Test Setup



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Doc No: 17-EM-F0876 / 2.0



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Test Data

802.11b

| Channel | Frequency (MHz) | PSD (dBm/3 kHz) | Limit (dBm/3 kHz) | Pass / Fail |
|---------|-----------------|-----------------|-------------------|-------------|
| 1 | 2412 | -14.977 | 8 | Pass |
| 6 | 2437 | -14.855 | 8 | Pass |
| 11 | 2462 | -14.771 | 8 | Pass |

802.11g

| Channel | Frequency (MHz) | PSD (dBm/3 kHz) | Limit (dBm/3 kHz) | Pass / Fail |
|---------|-----------------|-----------------|-------------------|-------------|
| 1 | 2412 | -14.454 | 8 | Pass |
| 6 | 2437 | -14.312 | 8 | Pass |
| 11 | 2462 | -14.615 | 8 | Pass |

802.11n (HT20)

| Channel | Frequency (MHz) | PSD (dBm/3 kHz) | Limit (dBm/3 kHz) | Pass / Fail |
|---------|-----------------|-----------------|-------------------|-------------|
| 1 | 2412 | -13.555 | 8 | Pass |
| 6 | 2437 | -13.912 | 8 | Pass |
| 11 | 2462 | -14.423 | 8 | Pass |

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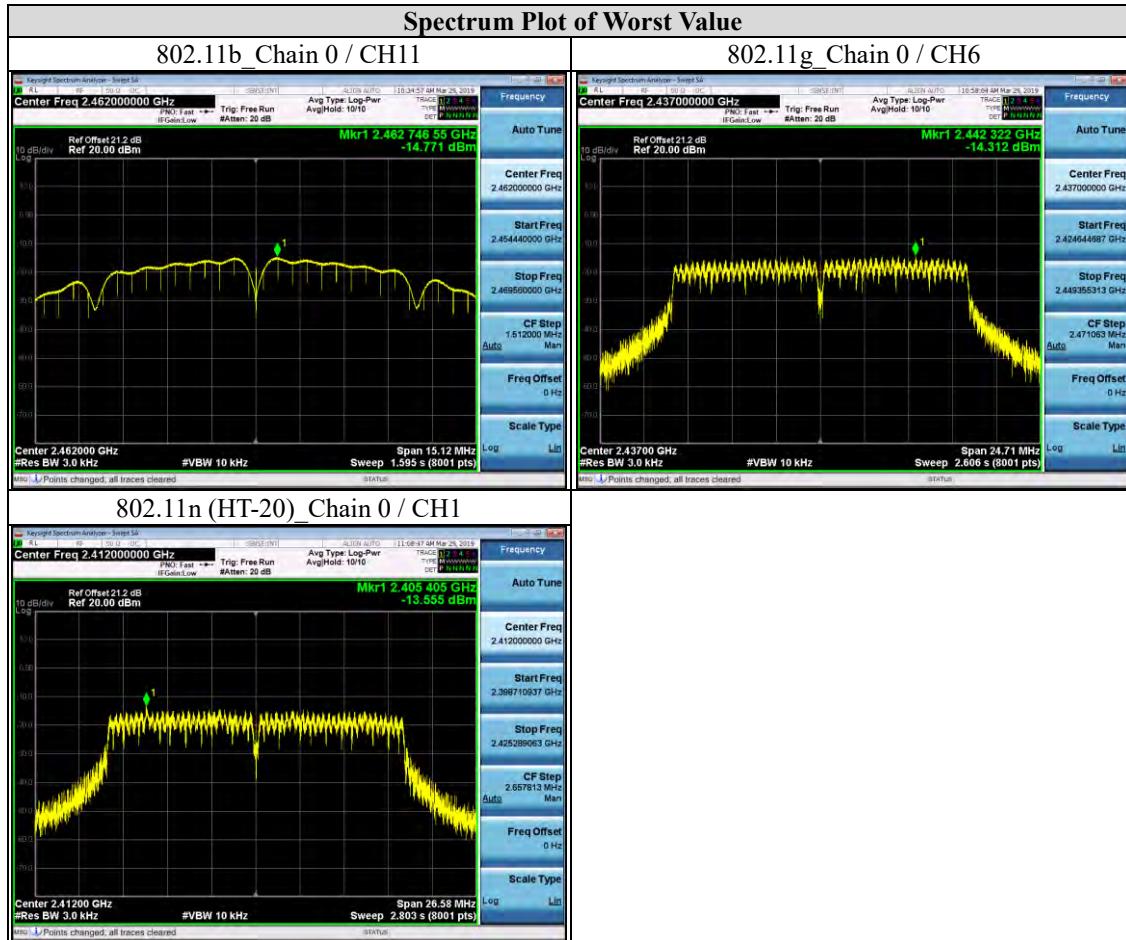
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Doc No: 17-EM-F0876 / 2.0



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9.4. Conducted Out of Band Emission

Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209 (a) is not required.

Test procedure

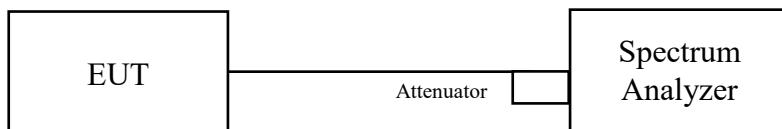
Measurement Procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure OOB

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

Test Setup



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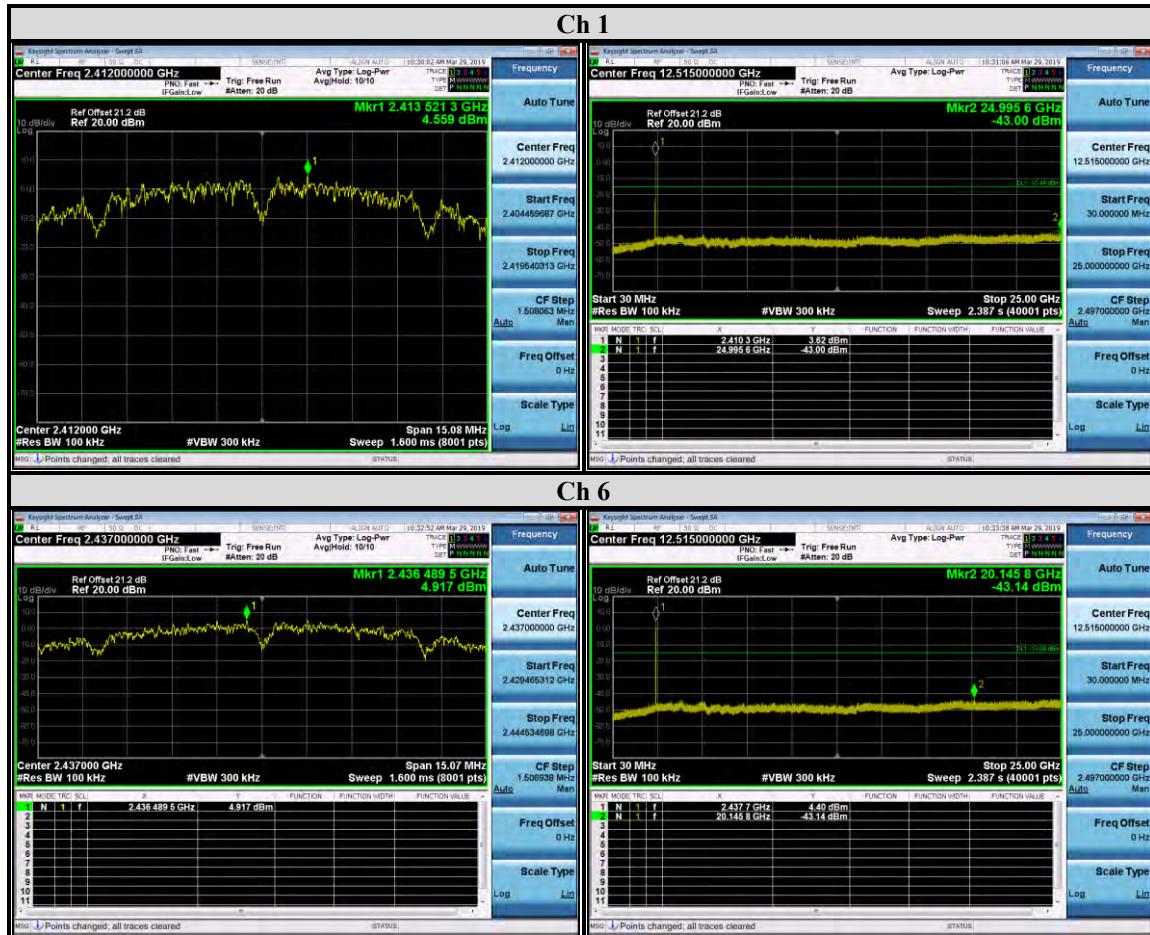
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Test Data

802.11b



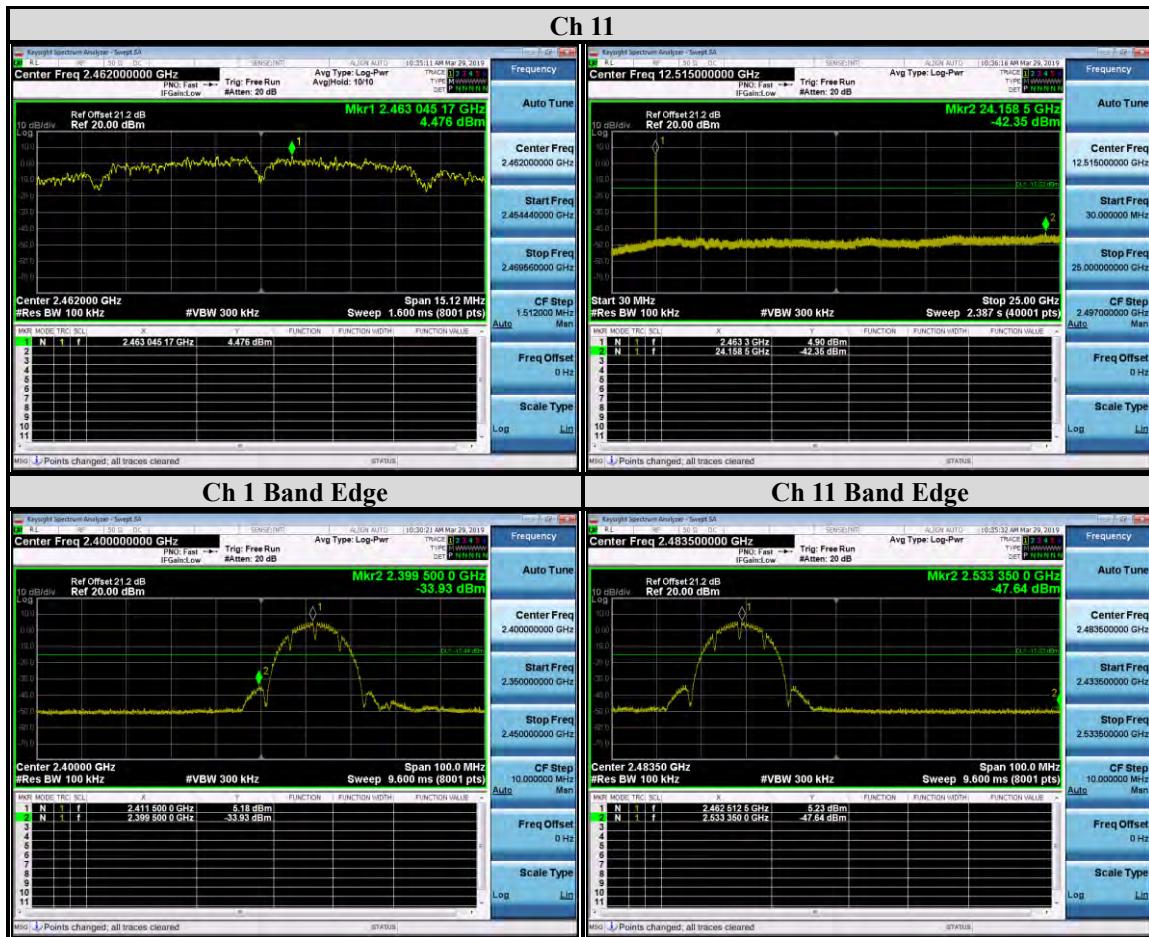
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802.11g



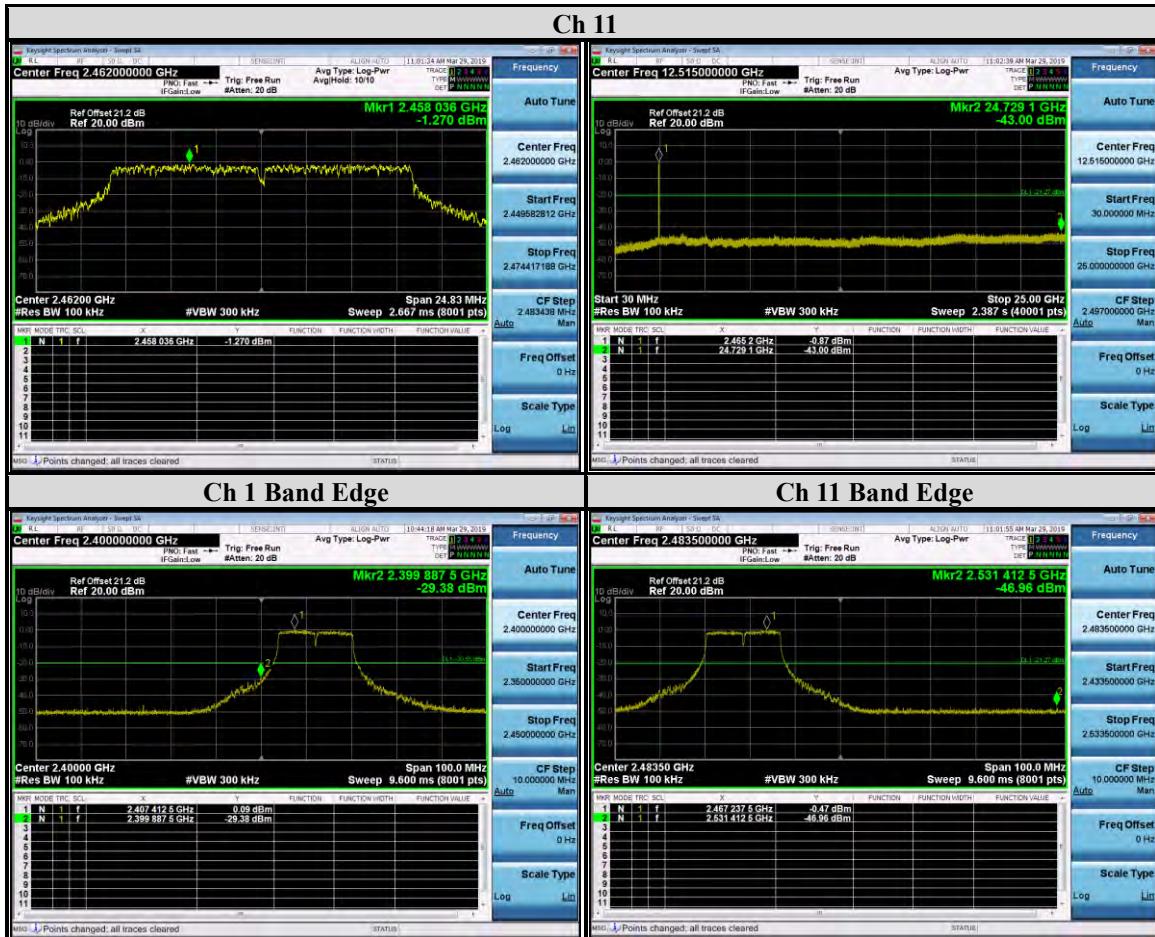
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802.11n (HT20)



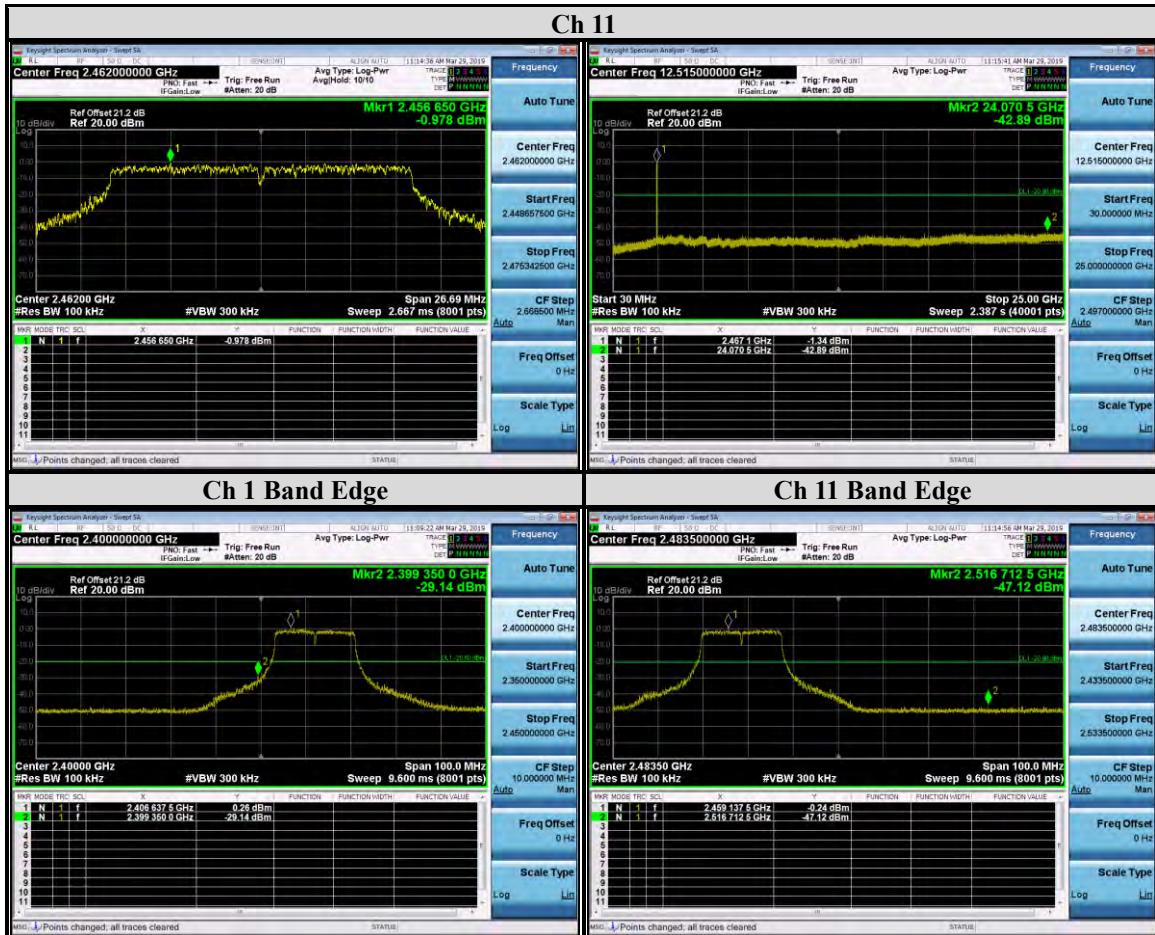
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9.5. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

| Frequency(MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|----------------|--------------------------------------|----------------------------------|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB_uV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

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Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

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Note:

- a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

| Configuration | Average | |
|----------------|---------|-------|
| | RBW | VBW |
| 802.11b | 1MHz | 10 Hz |
| 802.11g | | 10 Hz |
| 802.11n (HT20) | | 10 Hz |

Note: Refer to section 6.6 for duty cycle.

- d. All modes of operation were investigated and the worst-case emissions are reported.

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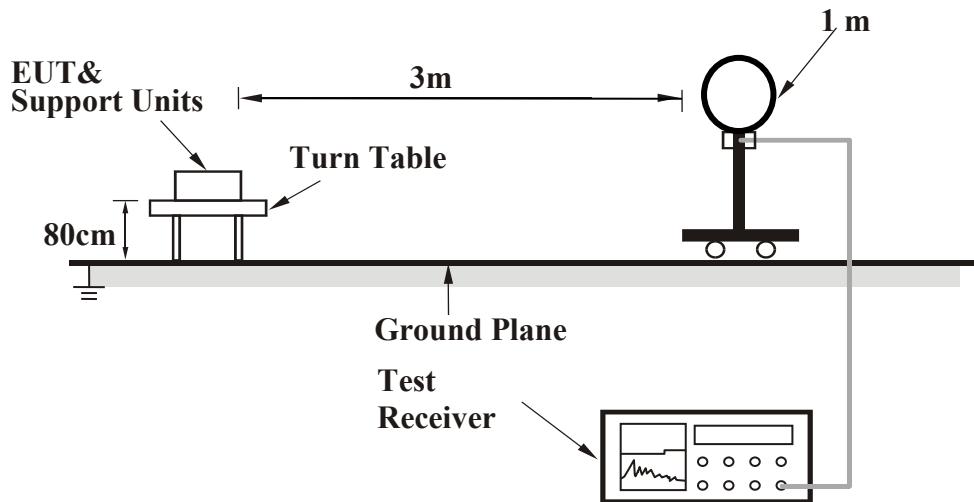
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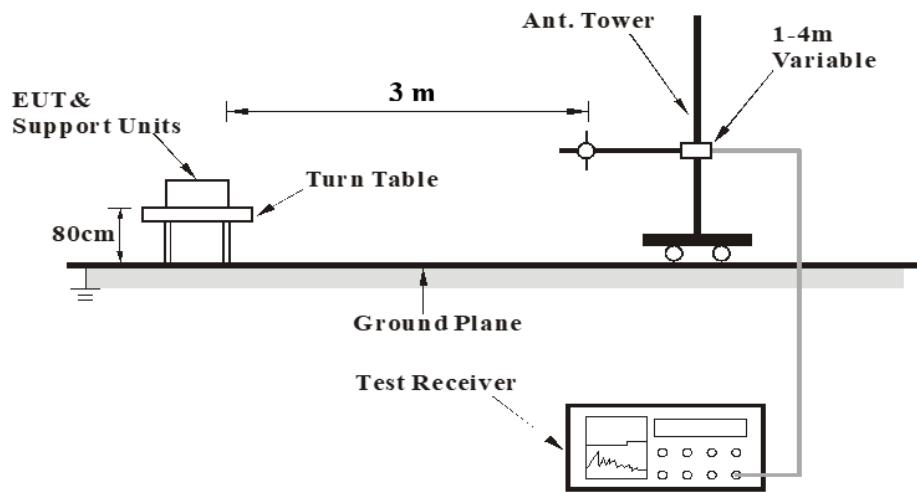
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Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



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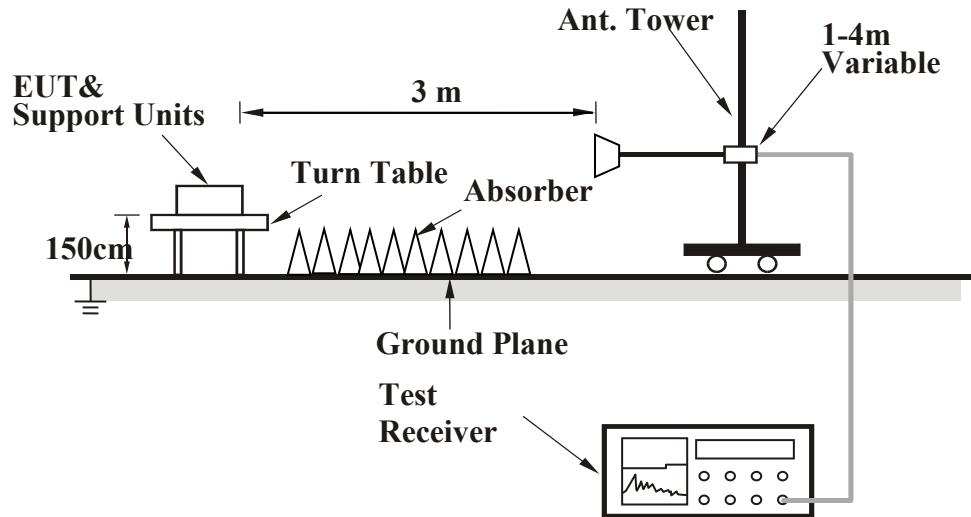
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<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

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Test Data

Above 1GHz Data

802.11b

| EUT Test Condition | | Measurement Detail | | |
|--------------------|-----------|--------------------|----------------|--|
| Channel | Channel 1 | Frequency Range | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2386.400 | 55.24 | -7.62 | 47.62 | 74.00 | -26.38 | peak |
| @ | 2412.000 | 106.85 | -7.61 | 99.24 | - | - | peak |
| - | 2390.000 | 42.46 | -7.60 | 34.86 | 54.00 | -19.14 | AVG |
| @ | 2412.000 | 103.18 | -7.61 | 95.57 | - | - | AVG |
| * | 4824.000 | 49.91 | -3.04 | 46.87 | 74.00 | -27.13 | peak |

| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2390.000 | 56.95 | -7.60 | 49.35 | 74.00 | -24.65 | peak |
| @ | 2412.000 | 112.40 | -7.61 | 104.79 | - | - | peak |
| - | 2390.000 | 45.22 | -7.60 | 37.62 | 54.00 | -16.38 | AVG |
| @ | 2412.000 | 108.84 | -7.61 | 101.23 | - | - | AVG |
| * | 4824.000 | 46.02 | -3.04 | 42.98 | 74.00 | -31.02 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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| EUT Test Condition | | | Measurement Detail | | | |
|--------------------|-----------|--|--------------------|--|----------------|--|
| Channel | Channel 6 | | Frequency Range | | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2388.600 | 53.88 | -7.60 | 46.28 | 74.00 | -27.72 | peak |
| @ | 2437.000 | 109.30 | -7.69 | 101.61 | - | - | peak |
| - | 2484.000 | 55.16 | -7.63 | 47.53 | 74.00 | -26.47 | peak |
| - | 2390.000 | 41.84 | -7.60 | 34.24 | 54.00 | -19.76 | AVG |
| @ | 2437.000 | 105.47 | -7.69 | 97.78 | - | - | AVG |
| - | 2484.400 | 43.03 | -7.63 | 35.40 | 54.00 | -18.60 | AVG |
| * | 4874.000 | 45.21 | -3.02 | 42.19 | 74.00 | -31.81 | peak |
| * | 7311.000 | 41.65 | 3.59 | 45.24 | 74.00 | -28.76 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2388.000 | 54.79 | -7.61 | 47.18 | 74.00 | -26.82 | peak |
| @ | 2437.000 | 113.73 | -7.69 | 106.04 | - | - | peak |
| - | 2484.000 | 57.49 | -7.63 | 49.86 | 74.00 | -24.14 | peak |
| - | 2389.600 | 43.12 | -7.60 | 35.52 | 54.00 | -18.48 | AVG |
| @ | 2437.000 | 109.76 | -7.69 | 102.07 | - | - | AVG |
| - | 2483.800 | 45.45 | -7.63 | 37.82 | 54.00 | -16.18 | AVG |
| * | 4874.000 | 44.66 | -3.02 | 41.64 | 74.00 | -32.36 | peak |
| * | 7311.000 | 42.15 | 3.59 | 45.74 | 74.00 | -28.26 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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Doc No: 17-EM-F0876 / 2.0



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| EUT Test Condition | | | Measurement Detail | | | |
|--------------------|------------|--|--------------------|--|----------------|--|
| Channel | Channel 11 | | Frequency Range | | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| @ | 2462.000 | 108.33 | -7.69 | 100.64 | - | - | peak |
| - | 2484.800 | 55.80 | -7.63 | 48.17 | 74.00 | -25.83 | peak |
| @ | 2462.000 | 104.50 | -7.69 | 96.81 | - | - | AVG |
| - | 2484.000 | 44.06 | -7.63 | 36.43 | 54.00 | -17.57 | AVG |
| * | 4924.000 | 50.65 | -3.00 | 47.65 | 74.00 | -26.35 | peak |
| * | 7386.000 | 43.50 | 3.94 | 47.44 | 74.00 | -26.56 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| @ | 2462.000 | 112.85 | -7.69 | 105.16 | - | - | peak |
| - | 2483.500 | 59.78 | -7.63 | 52.15 | 74.00 | -21.85 | peak |
| @ | 2462.000 | 109.02 | -7.69 | 101.33 | - | - | AVG |
| - | 2483.500 | 47.69 | -7.63 | 40.06 | 54.00 | -13.94 | AVG |
| * | 4924.000 | 44.16 | -3.00 | 41.16 | 74.00 | -32.84 | peak |
| * | 7386.000 | 42.42 | 3.94 | 46.36 | 74.00 | -27.64 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@" : Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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802.11g

| EUT Test Condition | | Measurement Detail | | |
|--------------------|-----------|--------------------|----------------|--|
| Channel | Channel 1 | Frequency Range | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2390.000 | 59.65 | -7.60 | 52.05 | 74.00 | -21.95 | peak |
| @ | 2412.000 | 107.82 | -7.61 | 100.21 | - | - | peak |
| - | 2390.000 | 44.71 | -7.60 | 37.11 | 54.00 | -16.89 | AVG |
| @ | 2412.000 | 98.29 | -7.61 | 90.68 | - | - | AVG |
| * | 4824.000 | 46.43 | -3.04 | 43.39 | 74.00 | -30.61 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2390.000 | 67.08 | -7.60 | 59.48 | 74.00 | -14.52 | peak |
| @ | 2412.000 | 112.45 | -7.61 | 104.84 | - | - | peak |
| - | 2390.000 | 49.82 | -7.60 | 42.22 | 54.00 | -11.78 | AVG |
| @ | 2412.000 | 103.07 | -7.61 | 95.46 | - | - | AVG |
| * | 4824.000 | 43.58 | -3.04 | 40.54 | 74.00 | -33.46 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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Doc No: 17-EM-F0876 / 2.0



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FCC ID : S8W-W04A

| EUT Test Condition | | Measurement Detail | | | | | |
|--------------------|-----------|--------------------|--|--|----------------|--|--|
| Channel | Channel 6 | Frequency Range | | | 1 GHz ~ 26 GHz | | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2388.800 | 54.47 | -7.60 | 46.87 | 74.00 | -27.13 | peak |
| @ | 2437.000 | 109.09 | -7.69 | 101.40 | - | - | peak |
| - | 2498.800 | 54.57 | -7.58 | 46.99 | 74.00 | -27.01 | peak |
| - | 2390.000 | 42.01 | -7.60 | 34.41 | 54.00 | -19.59 | AVG |
| @ | 2437.000 | 99.73 | -7.69 | 92.04 | - | - | AVG |
| - | 2484.600 | 42.65 | -7.63 | 35.02 | 54.00 | -18.98 | AVG |
| * | 4874.000 | 45.04 | -3.02 | 42.02 | 74.00 | -31.98 | peak |
| * | 7311.000 | 42.53 | 3.59 | 46.12 | 74.00 | -27.88 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2390.000 | 55.62 | -7.60 | 48.02 | 74.00 | -25.98 | peak |
| @ | 2437.000 | 113.74 | -7.69 | 106.05 | - | - | peak |
| - | 2484.400 | 57.84 | -7.63 | 50.21 | 74.00 | -23.79 | peak |
| - | 2390.000 | 42.83 | -7.60 | 35.23 | 54.00 | -18.77 | AVG |
| @ | 2437.000 | 104.03 | -7.69 | 96.34 | - | - | AVG |
| - | 2484.400 | 44.78 | -7.63 | 37.15 | 54.00 | -16.85 | AVG |
| * | 4874.000 | 43.16 | -3.02 | 40.14 | 74.00 | -33.86 | peak |
| * | 7311.000 | 41.76 | 3.59 | 45.35 | 74.00 | -28.65 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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| EUT Test Condition | | | Measurement Detail | | | |
|--------------------|--|------------|--------------------|--|----------------|--|
| Channel | | Channel 11 | Frequency Range | | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| @ | 2462.000 | 108.88 | -7.69 | 101.19 | - | - | peak |
| - | 2483.500 | 65.71 | -7.63 | 58.08 | 74.00 | -15.92 | peak |
| @ | 2462.000 | 99.09 | -7.69 | 91.40 | - | - | AVG |
| - | 2483.500 | 48.86 | -7.63 | 41.23 | 54.00 | -12.77 | AVG |
| * | 4924.000 | 45.69 | -3.00 | 42.69 | 74.00 | -31.31 | peak |
| * | 7386.000 | 41.43 | 3.94 | 45.37 | 74.00 | -28.63 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| @ | 2462.000 | 113.68 | -7.69 | 105.99 | - | - | peak |
| - | 2483.500 | 75.14 | -7.63 | 67.51 | 74.00 | -6.49 | peak |
| @ | 2462.000 | 103.84 | -7.69 | 96.15 | - | - | AVG |
| - | 2483.500 | 56.59 | -7.63 | 48.96 | 54.00 | -5.04 | AVG |
| * | 4924.000 | 43.39 | -3.00 | 40.39 | 74.00 | -33.61 | peak |
| * | 7386.000 | 42.05 | 3.94 | 45.99 | 74.00 | -28.01 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@" : Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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Doc No: 17-EM-F0876 / 2.0



802.11n (HT-20)

| EUT Test Condition | | Measurement Detail | | |
|--------------------|-----------|--------------------|----------------|--|
| Channel | Channel 1 | Frequency Range | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2390.000 | 66.00 | -7.60 | 58.40 | 74.00 | -15.60 | peak |
| @ | 2412.000 | 107.41 | -7.61 | 99.80 | - | - | peak |
| - | 2390.000 | 45.21 | -7.60 | 37.61 | 54.00 | -16.39 | AVG |
| @ | 2412.000 | 98.17 | -7.61 | 90.56 | - | - | AVG |
| * | 4824.000 | 45.64 | -3.04 | 42.60 | 74.00 | -31.40 | peak |

| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2390.000 | 74.81 | -7.60 | 67.21 | 74.00 | -6.79 | peak |
| @ | 2412.000 | 112.47 | -7.61 | 104.86 | - | - | peak |
| - | 2390.000 | 51.37 | -7.60 | 43.77 | 54.00 | -10.23 | AVG |
| @ | 2412.000 | 103.27 | -7.61 | 95.66 | - | - | AVG |
| * | 4824.000 | 42.72 | -3.04 | 39.68 | 74.00 | -34.32 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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| EUT Test Condition | | | Measurement Detail | | | |
|--------------------|-----------|--|--------------------|--|----------------|--|
| Channel | Channel 6 | | Frequency Range | | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2388.600 | 54.56 | -7.60 | 46.96 | 74.00 | -27.04 | peak |
| @ | 2437.000 | 109.23 | -7.69 | 101.54 | - | - | peak |
| - | 2485.200 | 54.66 | -7.63 | 47.03 | 74.00 | -26.97 | peak |
| - | 2389.600 | 41.50 | -7.60 | 33.90 | 54.00 | -20.10 | AVG |
| @ | 2437.000 | 99.10 | -7.69 | 91.41 | - | - | AVG |
| - | 2484.000 | 42.15 | -7.63 | 34.52 | 54.00 | -19.48 | AVG |
| * | 4874.000 | 43.87 | -3.02 | 40.85 | 74.00 | -33.15 | peak |
| * | 7311.000 | 42.03 | 3.59 | 45.62 | 74.00 | -28.38 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 2387.800 | 54.86 | -7.61 | 47.25 | 74.00 | -26.75 | peak |
| @ | 2437.000 | 113.51 | -7.69 | 105.82 | - | - | peak |
| - | 2484.800 | 57.85 | -7.63 | 50.22 | 74.00 | -23.78 | peak |
| - | 2390.000 | 42.98 | -7.60 | 35.38 | 54.00 | -18.62 | AVG |
| @ | 2437.000 | 103.88 | -7.69 | 96.19 | - | - | AVG |
| - | 2484.200 | 44.93 | -7.63 | 37.30 | 54.00 | -16.70 | AVG |
| * | 4874.000 | 43.41 | -3.02 | 40.39 | 74.00 | -33.61 | peak |
| * | 7311.000 | 42.28 | 3.59 | 45.87 | 74.00 | -28.13 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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Doc No: 17-EM-F0876 / 2.0



| EUT Test Condition | | | Measurement Detail | | | |
|--------------------|--|------------|--------------------|--|----------------|--|
| Channel | | Channel 11 | Frequency Range | | 1 GHz ~ 26 GHz | |

| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| @ | 2462.000 | 108.62 | -7.69 | 100.93 | - | - | peak |
| - | 2483.500 | 71.14 | -7.63 | 63.51 | 74.00 | -10.49 | peak |
| @ | 2462.000 | 99.03 | -7.69 | 91.34 | - | - | AVG |
| - | 2483.500 | 50.28 | -7.63 | 42.65 | 54.00 | -11.35 | AVG |
| * | 4924.000 | 47.84 | -3.00 | 44.84 | 74.00 | -29.16 | peak |
| * | 7386.000 | 42.43 | 3.94 | 46.37 | 74.00 | -27.63 | peak |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| @ | 2462.000 | 113.30 | -7.69 | 105.61 | - | - | peak |
| - | 2483.500 | 80.51 | -7.63 | 72.88 | 74.00 | -1.12 | peak |
| @ | 2462.000 | 103.77 | -7.69 | 96.08 | - | - | AVG |
| - | 2483.500 | 59.13 | -7.63 | 51.50 | 54.00 | -2.50 | AVG |
| * | 4924.000 | 43.79 | -3.00 | 40.79 | 74.00 | -33.21 | peak |
| * | 7386.000 | 41.84 | 3.94 | 45.78 | 74.00 | -28.22 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@" : Fundamental Frequency.
5. "*" : The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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Below 1GHz Data

No non-compliance noted:

KDB 414788

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OFS and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

9 kHz ~ 30 MHz Data

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

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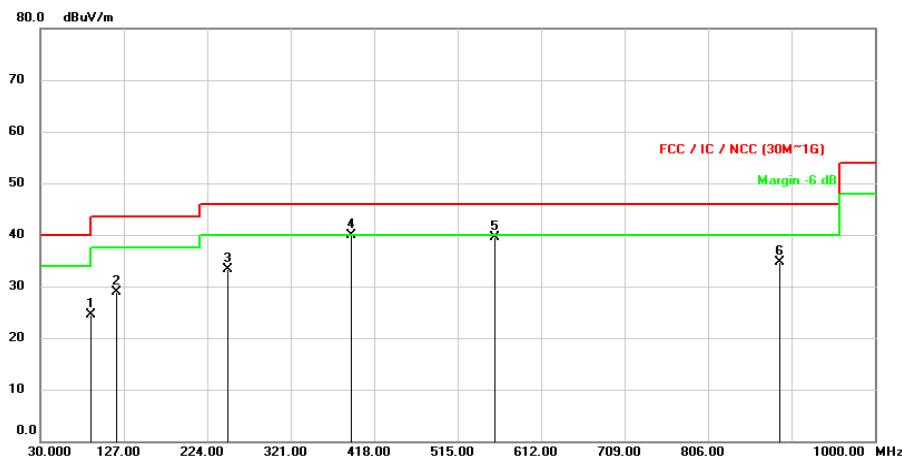
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30 MHz ~ 1 GHz Data

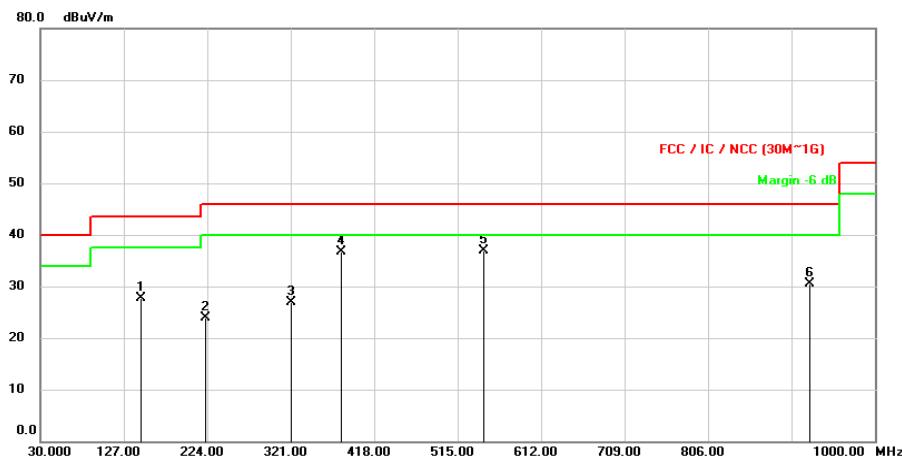
802.11n (HT-20)

| EUT Test Condition | | Measurement Detail | |
|--------------------|------------|--------------------|----------------|
| Channel | Channel 11 | Frequency Range | 30 MHz ~ 1 GHz |

Horizontal



Vertical



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| Antenna Polarity & Test Distance: Horizontal at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 88.5233 | 45.73 | -21.15 | 24.58 | 43.50 | -18.92 | peak |
| - | 118.2053 | 46.83 | -17.94 | 28.89 | 43.50 | -14.61 | peak |
| - | 248.3793 | 49.06 | -15.79 | 33.27 | 46.00 | -12.73 | peak |
| - | 390.8400 | 51.61 | -11.72 | 39.89 | 46.00 | -6.11 | peak |
| - | 556.9040 | 47.70 | -8.14 | 39.56 | 46.00 | -6.44 | peak |
| - | 888.8057 | 37.56 | -2.79 | 34.77 | 46.00 | -11.23 | peak |

| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
|---|-----------|----------|---------|----------|----------|--------|--------|
| Notation | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | |
| - | 146.6910 | 43.03 | -15.33 | 27.70 | 43.50 | -15.80 | peak |
| - | 221.9307 | 41.43 | -17.48 | 23.95 | 46.00 | -22.05 | peak |
| - | 320.3533 | 40.36 | -13.51 | 26.85 | 46.00 | -19.15 | peak |
| - | 379.4910 | 48.78 | -12.06 | 36.72 | 46.00 | -9.28 | peak |
| - | 544.8760 | 45.31 | -8.45 | 36.86 | 46.00 | -9.14 | peak |
| - | 925.0190 | 32.43 | -2.02 | 30.41 | 46.00 | -15.59 | peak |

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The other emission levels were very low against the limit.

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9.6. AC Power Line Conducted Emission

Requirements

| Frequency (MHz) | Conducted limit (dB μ V) | |
|-----------------|------------------------------|---------|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

Note:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Procedures

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

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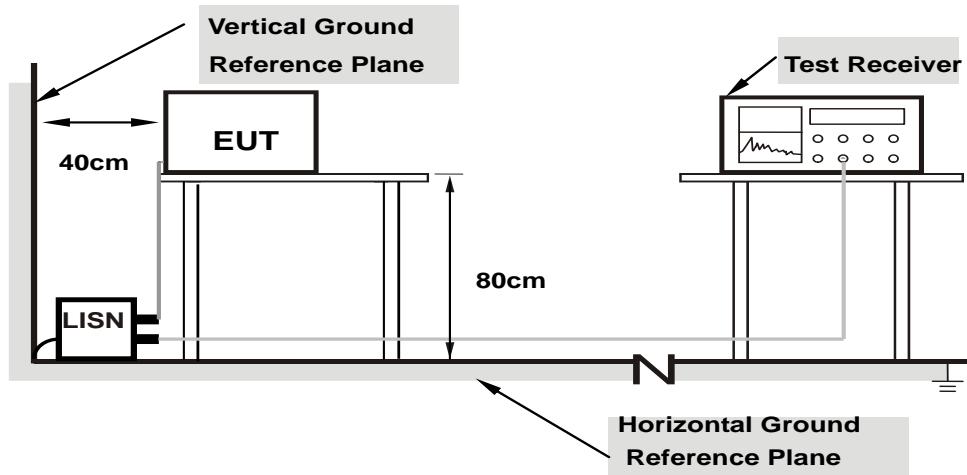
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Test Setup



Note: 1. Support units were connected to second LISN.

For the actual test configuration, please refer to the Setup Configurations.

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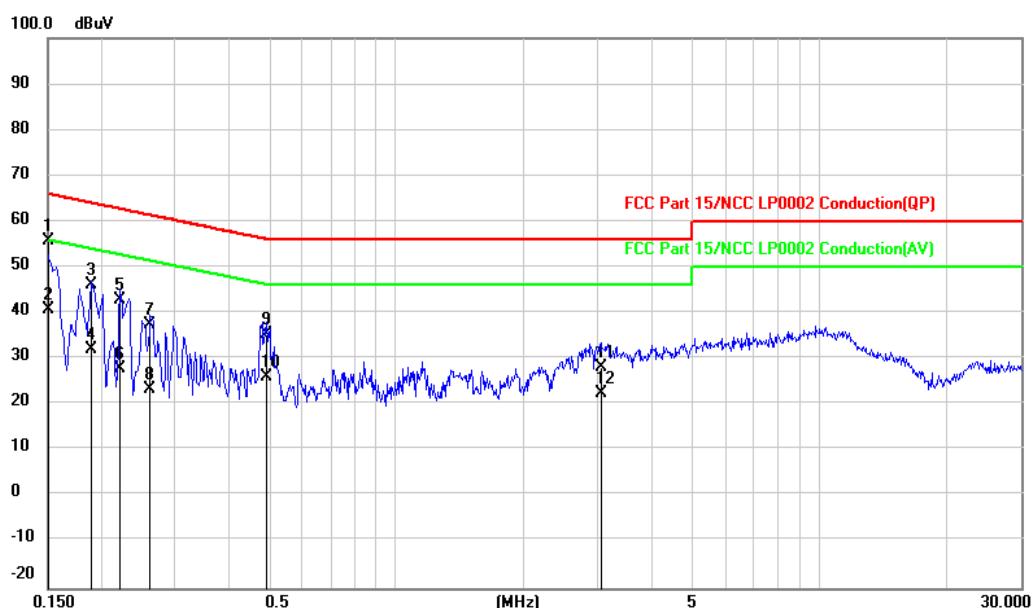
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Test Data

802.11n (HT-20)

| EUT Test Condition | | Measurement Detail | |
|--------------------|------------|--------------------|------------------|
| Channel | Channel 11 | Frequency Range | 150 kHz ~ 30 MHz |

Phase of Power : Line (L)



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| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|-----|-----------|---------|---------|--------|--------|--------|--------|
| | (MHz) | (dBuV) | dB | (dBuV) | (dBuV) | (dB) | |
| 1 | 0.1500 | 35.97 | 19.69 | 55.66 | 66.00 | -10.34 | QP |
| 2 | 0.1500 | 21.04 | 19.69 | 40.73 | 56.00 | -15.27 | AVG |
| 3 | 0.1900 | 26.57 | 19.68 | 46.25 | 64.04 | -17.79 | QP |
| 4 | 0.1900 | 12.23 | 19.68 | 31.91 | 54.04 | -22.13 | AVG |
| 5 | 0.2220 | 23.18 | 19.68 | 42.86 | 62.74 | -19.88 | QP |
| 6 | 0.2220 | 8.11 | 19.68 | 27.79 | 52.74 | -24.95 | AVG |
| 7 | 0.2618 | 17.78 | 19.68 | 37.46 | 61.37 | -23.91 | QP |
| 8 | 0.2618 | 3.82 | 19.68 | 23.50 | 51.37 | -27.87 | AVG |
| 9 | 0.4940 | 15.81 | 19.67 | 35.48 | 56.10 | -20.62 | QP |
| 10 | 0.4940 | 6.32 | 19.67 | 25.99 | 46.10 | -20.11 | AVG |
| 11 | 3.0460 | 8.37 | 19.72 | 28.09 | 56.00 | -27.91 | QP |
| 12 | 3.0460 | 2.77 | 19.72 | 22.49 | 46.00 | -23.51 | AVG |

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

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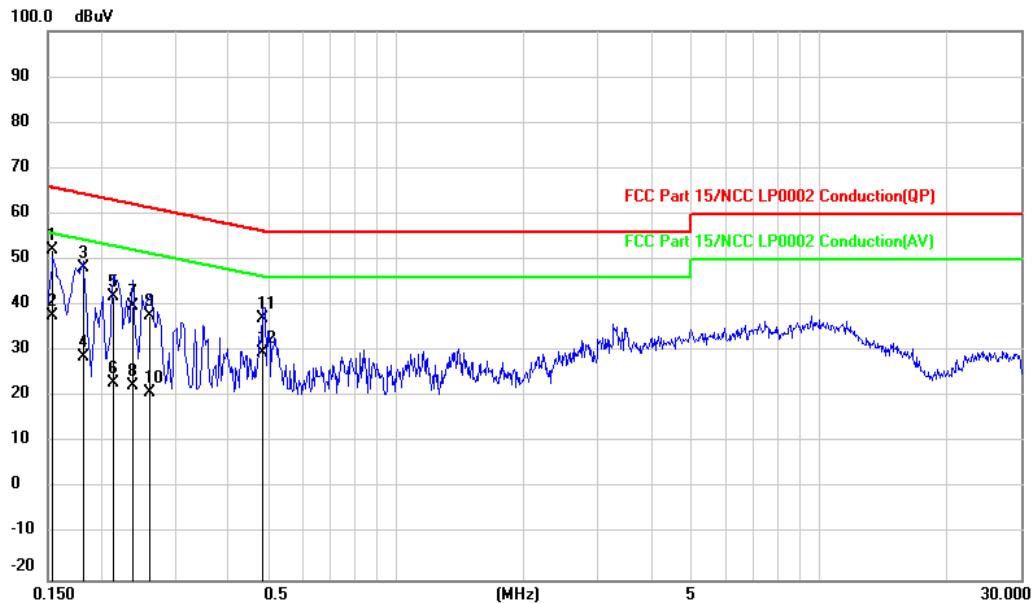
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Phase of Power : Neutral (N)



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| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|-----|-----------|---------|---------|--------|--------|--------|--------|
| | (MHz) | (dBuV) | dB | (dBuV) | (dBuV) | (dB) | |
| 1 | 0.1539 | 32.41 | 19.68 | 52.09 | 65.79 | -13.70 | QP |
| 2 | 0.1539 | 18.05 | 19.68 | 37.73 | 55.79 | -18.06 | AVG |
| 3 | 0.1819 | 28.53 | 19.68 | 48.21 | 64.40 | -16.19 | QP |
| 4 | 0.1819 | 9.07 | 19.68 | 28.75 | 54.40 | -25.65 | AVG |
| 5 | 0.2140 | 22.23 | 19.68 | 41.91 | 63.05 | -21.14 | QP |
| 6 | 0.2140 | 3.43 | 19.68 | 23.11 | 53.05 | -29.94 | AVG |
| 7 | 0.2380 | 20.10 | 19.68 | 39.78 | 62.17 | -22.39 | QP |
| 8 | 0.2380 | 2.78 | 19.68 | 22.46 | 52.17 | -29.71 | AVG |
| 9 | 0.2620 | 18.01 | 19.68 | 37.69 | 61.37 | -23.68 | QP |
| 10 | 0.2620 | 1.40 | 19.68 | 21.08 | 51.37 | -30.29 | AVG |
| 11 | 0.4860 | 17.50 | 19.67 | 37.17 | 56.24 | -19.07 | QP |
| 12 | 0.4860 | 9.97 | 19.67 | 29.64 | 46.24 | -16.60 | AVG |

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

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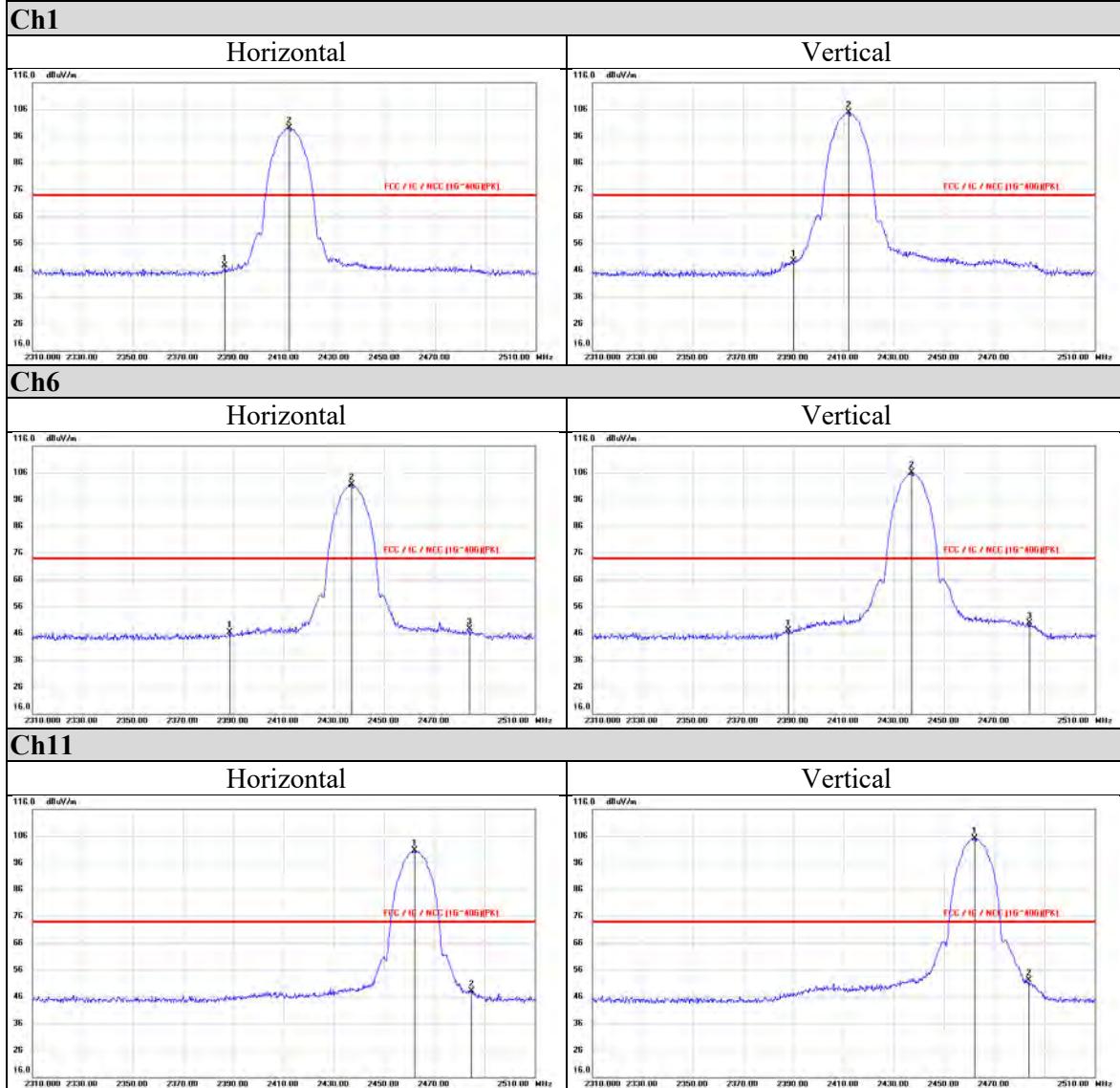
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Appendix I Radiated Band Edge Measurement

802.11b

Peak



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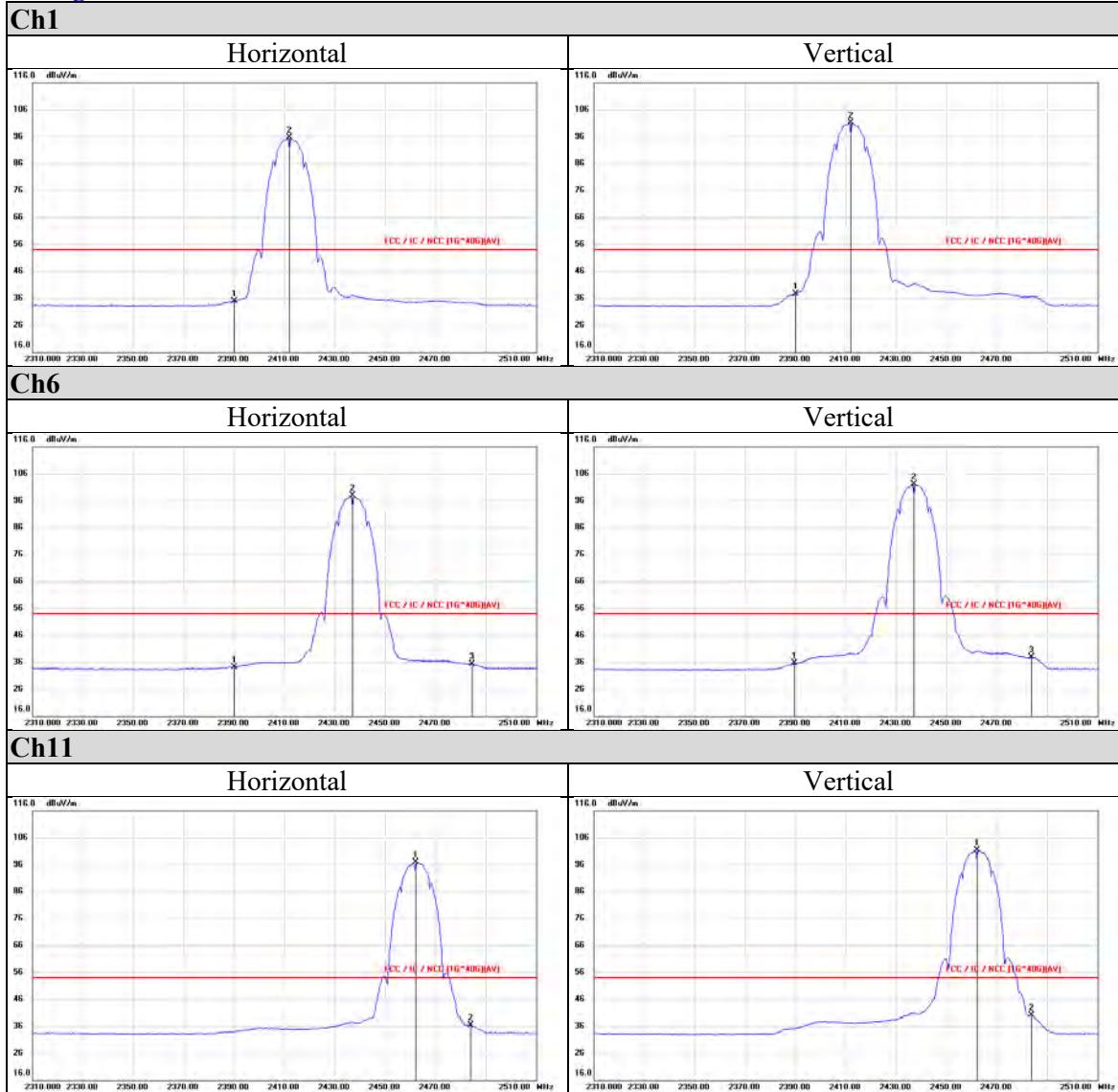
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Average



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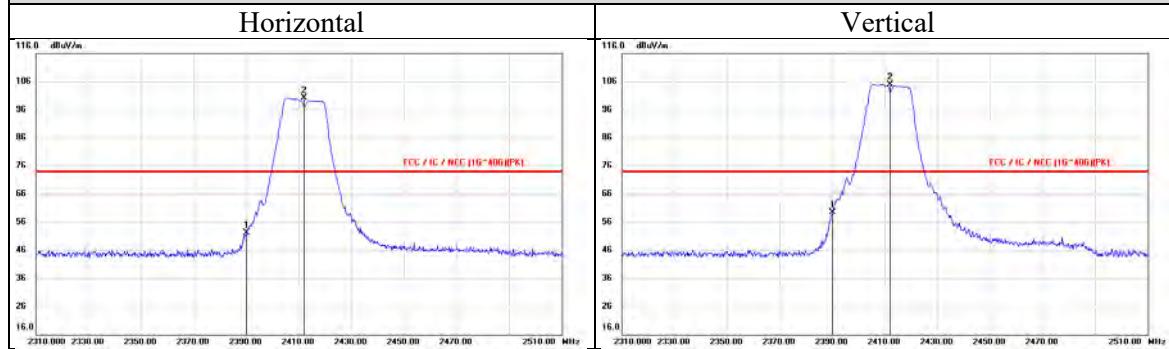
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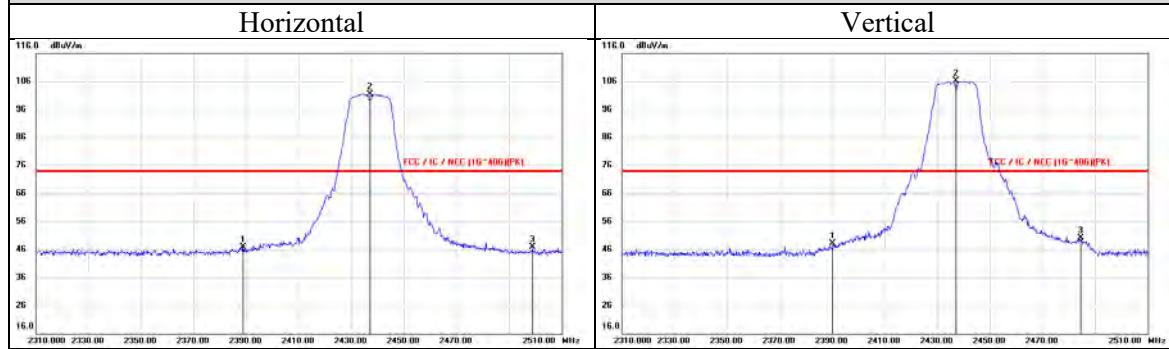
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**802.11g
Peak**

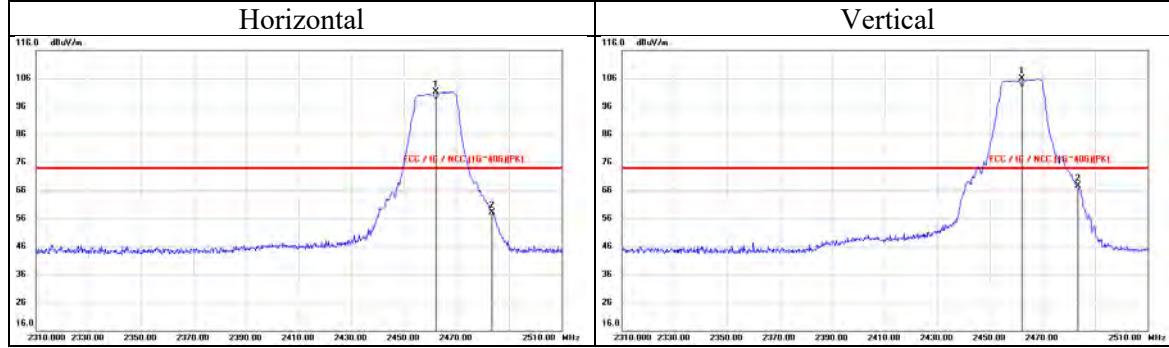
Ch1



Ch6



Ch11



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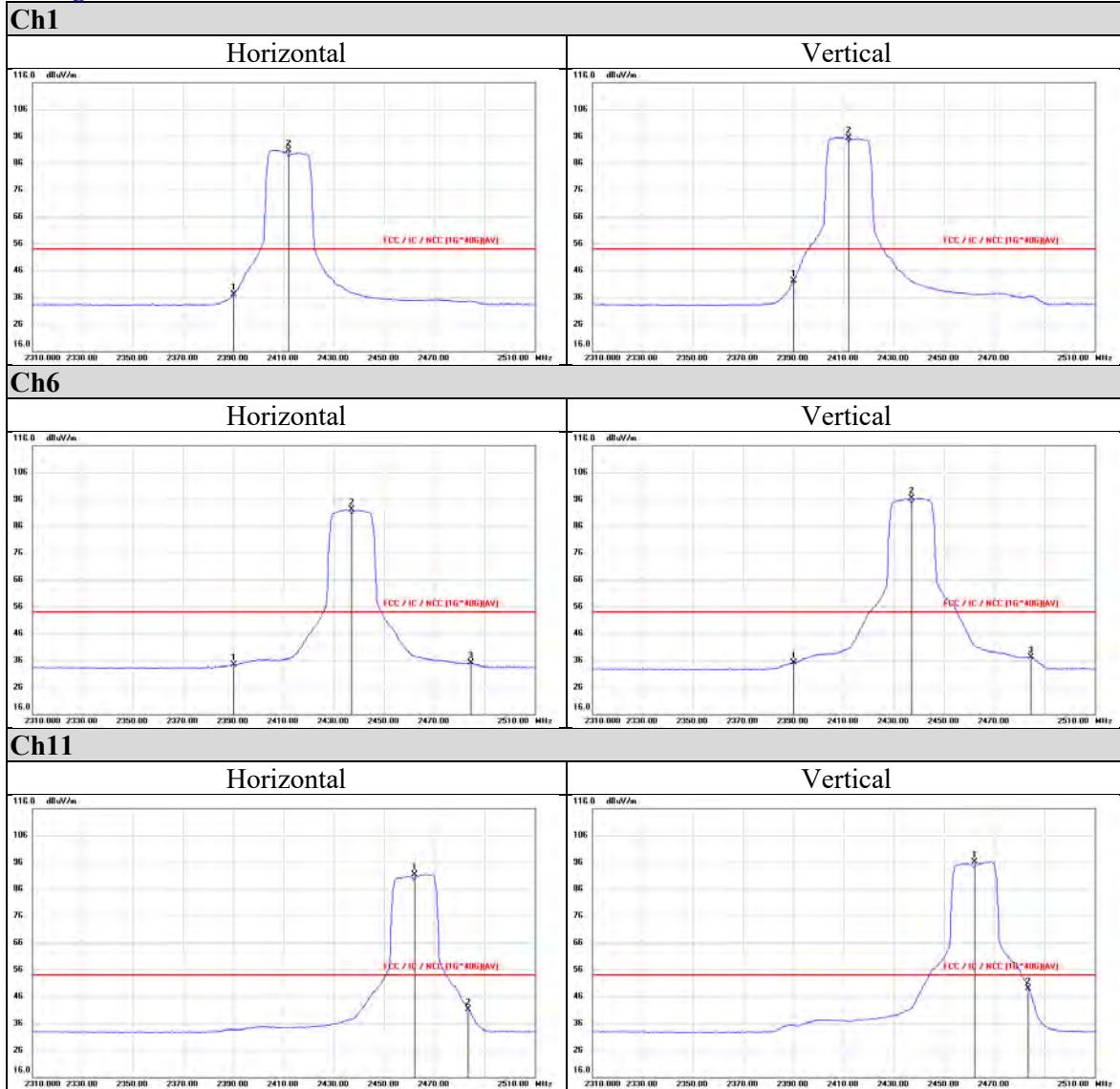
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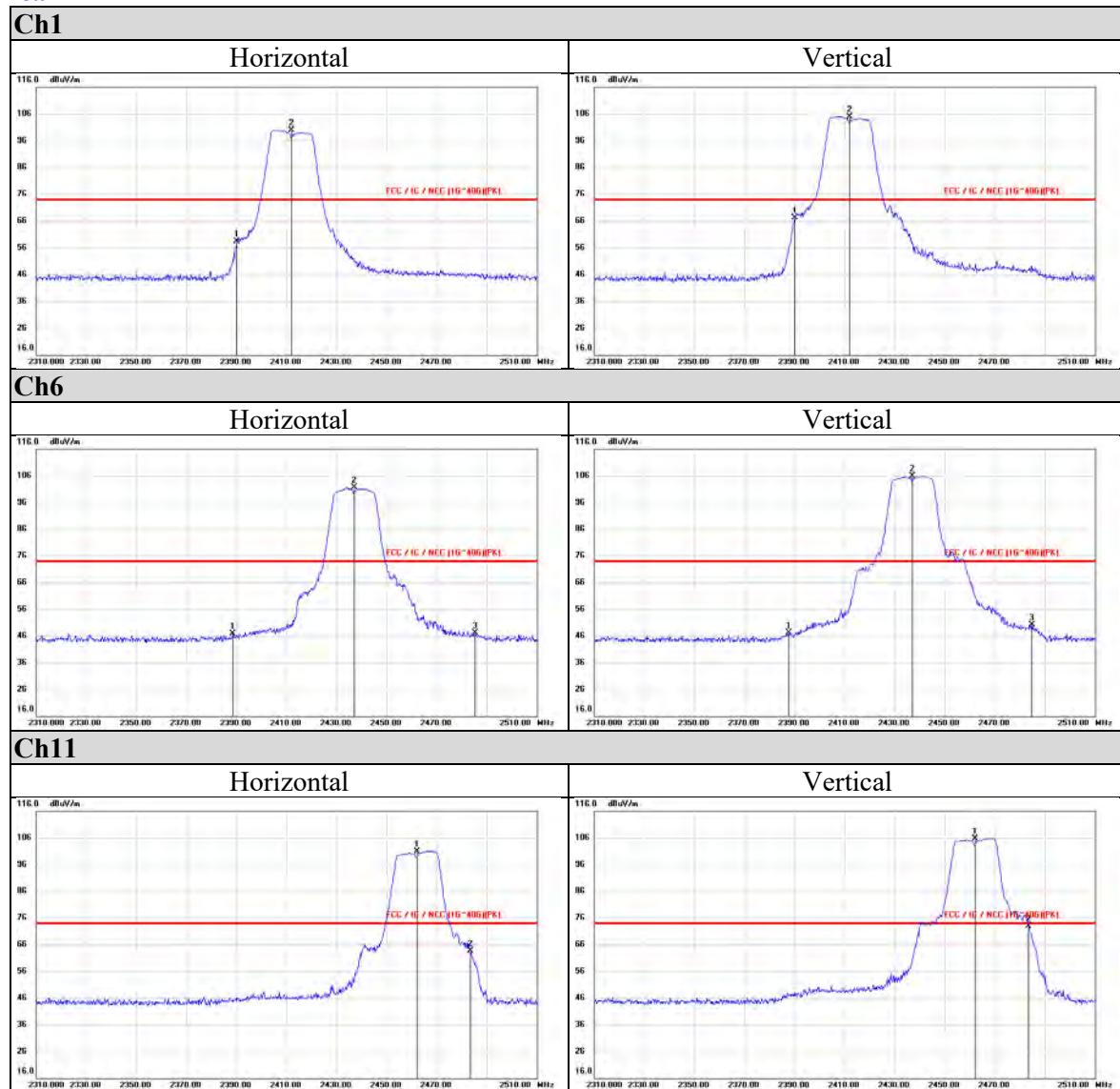
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802.11n (HT-20)

Peak



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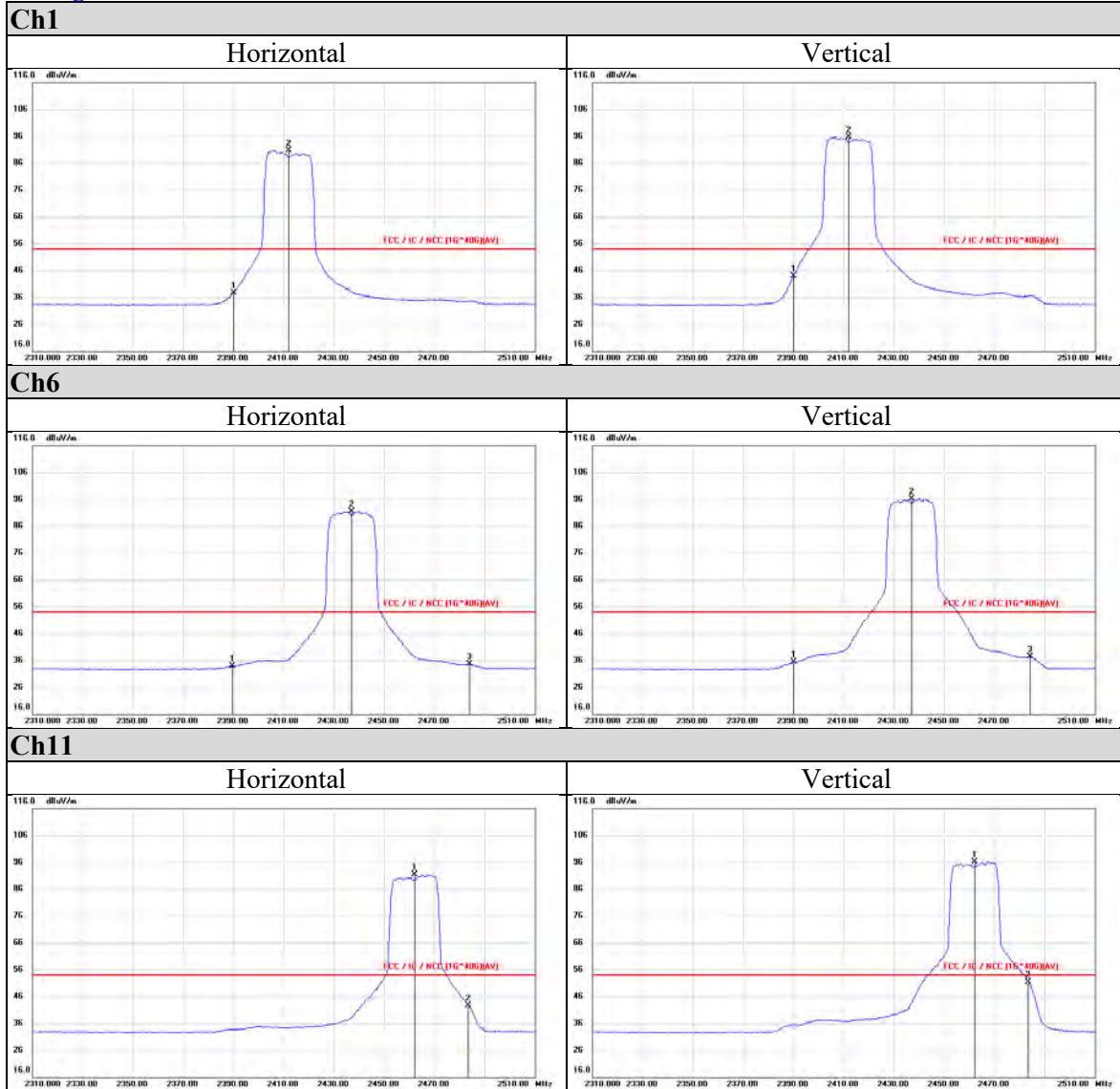
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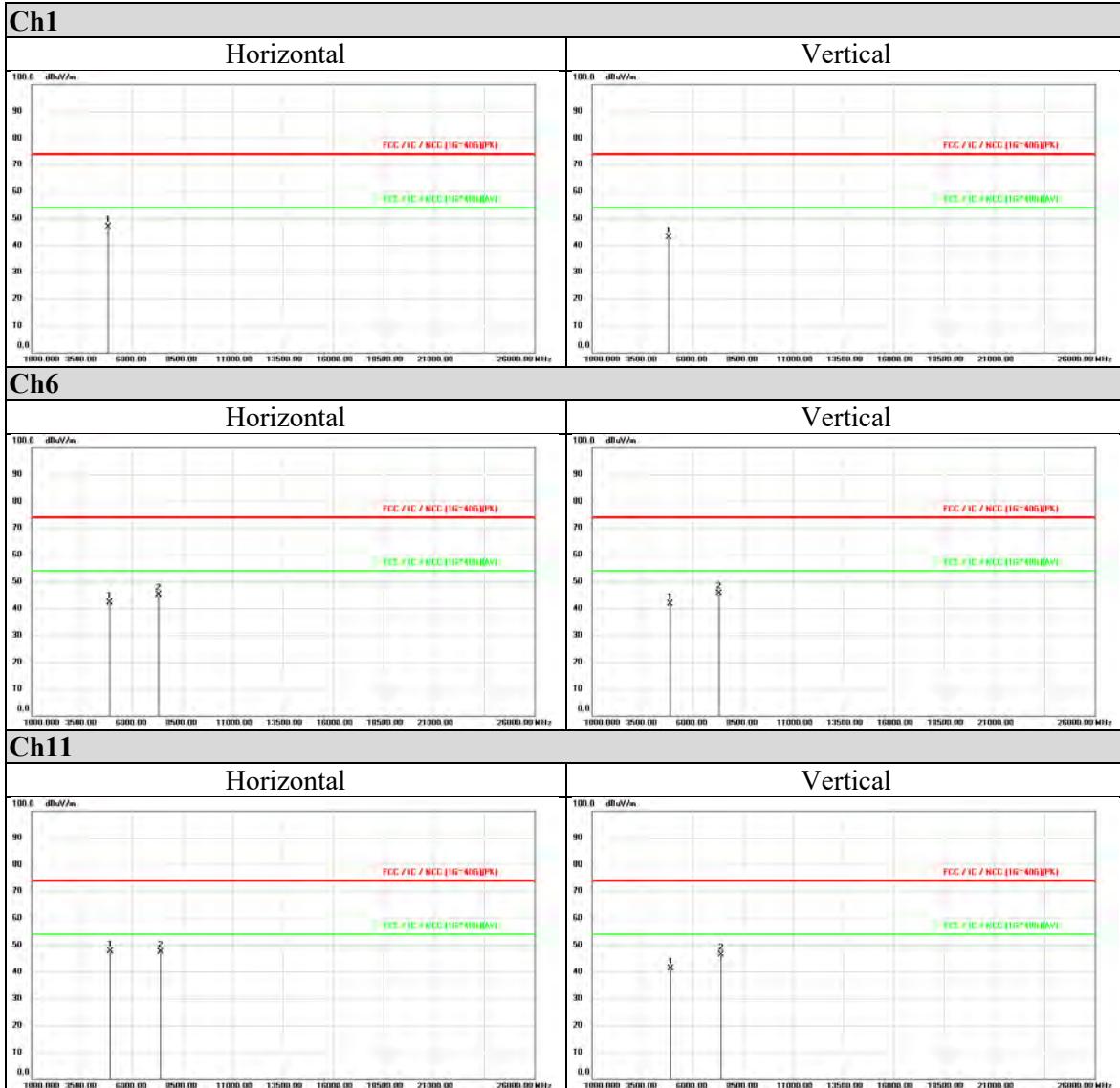
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Appendix II Radiated Spurious Emission Measurement

802.11b



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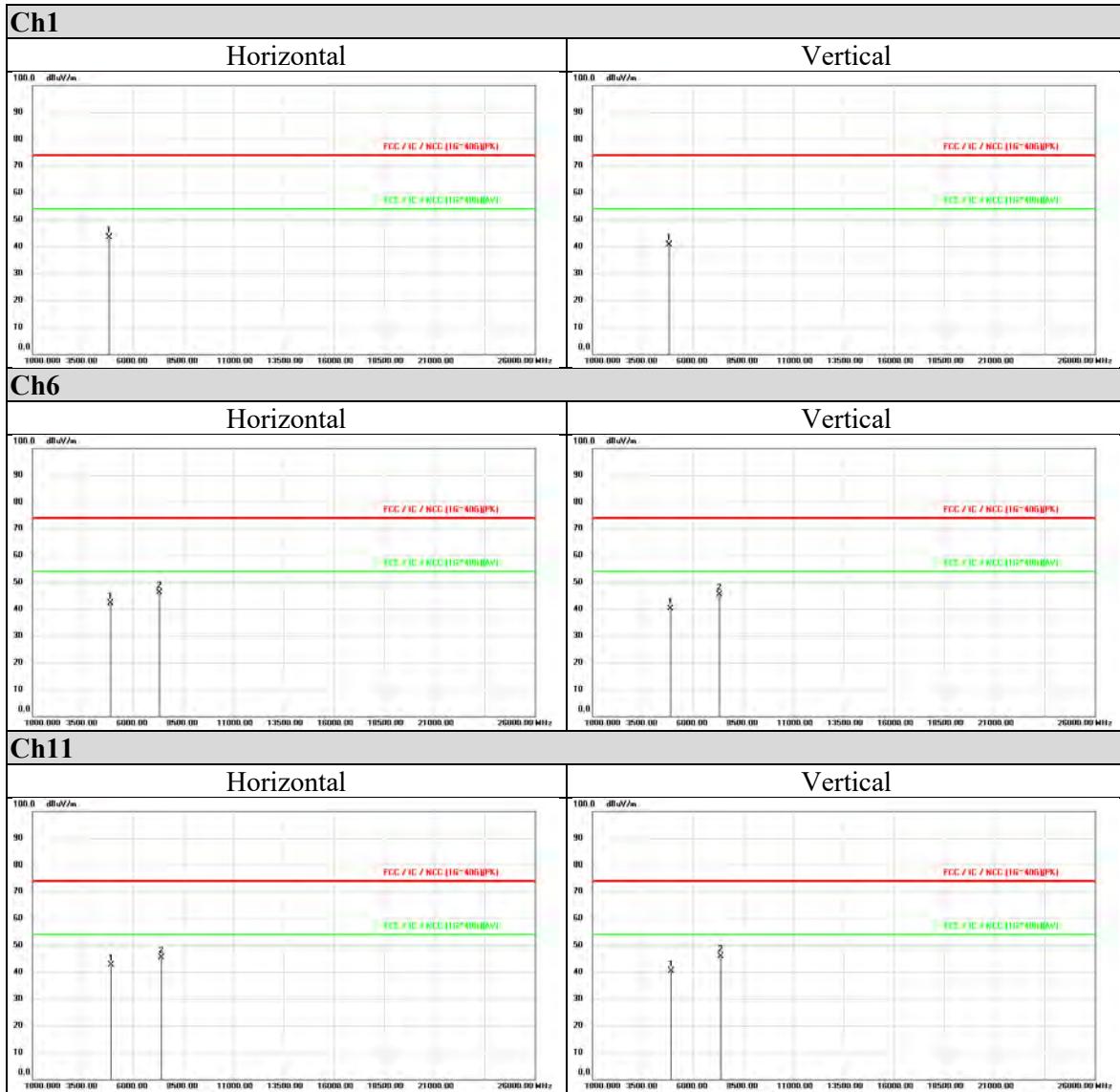
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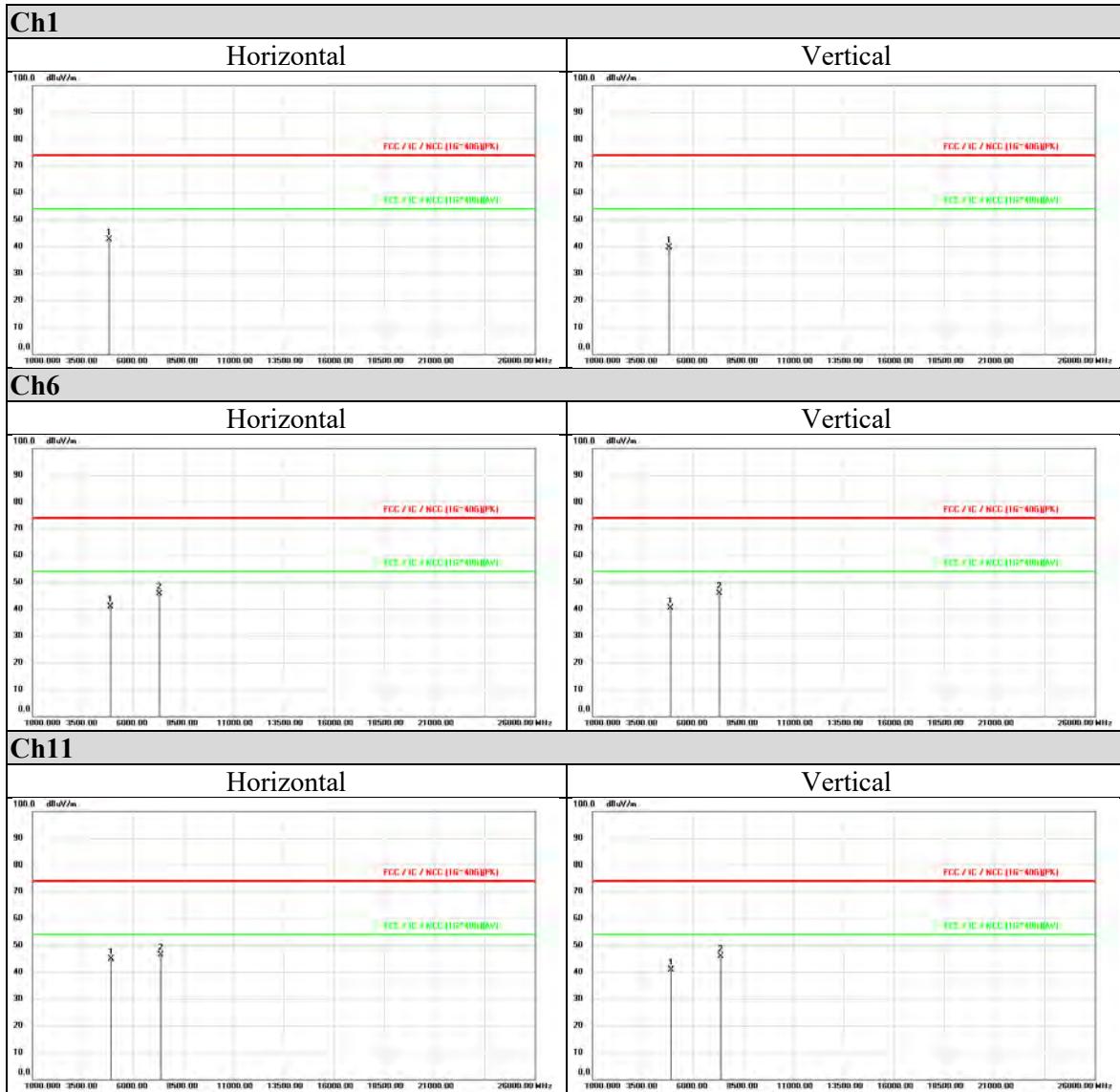
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802.11n (HT-20)



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