# CFR 47 FCC PART 15 SUBPART C
# ISED RSS-247 ISSUE 2

## CERTIFICATION TEST REPORT

*For*

**Winees Spotlight Cam**

**MODEL NUMBER: WP280013267**

**FCC ID: 2AYZ8WP280013267**

**IC: 27824-WP280013267**

**REPORT NUMBER: 4790099828.1-2**

**ISSUE DATE: October 13, 2021**

Prepared for

**Linkzone Technology Co., Limited**
**ROOM 20 5/F WAYSON COMMERCIAL BLDG 28 CONNAUGHT ROAD WEST**
**SHEUNG WAN Hong Kong China**

*Prepared by*

**UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch**

**Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China**

**Tel: +86 769 22038881**
**Fax: +86 769 33244054**
**Website: www.ul.com**

**The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.**

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V0 | 10/13/2021 | Initial Issue | |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

| Summary of Test Results | | | |
|---|---|---|---|
| **Clause** | **Test Items** | **FCC/ISED Rules** | **Test Results** |
| 1 | 6dB Bandwidth and 99% Occupied Bandwidth | FCC Part 15.247 (a) (2)<br>RSS-247 Clause 5.2 (a)<br>ISED RSS-Gen Clause 6.7 | Pass |
| 2 | Conducted Output Power | FCC Part 15.247 (b) (3)<br>RSS-247 Clause 5.4 (d) | Pass |
| 3 | Power Spectral Density | FCC Part 15.247 (e)<br>RSS-247 Clause 5.2 (b) | Pass |
| 4 | Conducted Bandedge and Spurious Emission | FCC Part 15.247 (d)<br>RSS-247 Clause 5.5 | Pass |
| 5 | Radiated Bandedge and Spurious Emission | FCC Part 15.247 (d)<br>FCC Part 15.209<br>FCC Part 15.205<br>RSS-247 Clause 5.5<br>RSS-GEN Clause 8.9 | Pass |
| 6 | Conducted Emission Test for AC Power Port | FCC Part 15.207<br>RSS-GEN Clause 8.8 | Pass |
| 7 | Antenna Requirement | FCC Part 15.203<br>RSS-GEN Clause 6.8 | Pass |

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >< ISED RSS-247 > when <Accuracy Method> decision rule is applied.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# TABLE OF CONTENTS

**1. ATTESTATION OF TEST RESULTS ..... 6**

**2. TEST METHODOLOGY ..... 7**

**3. FACILITIES AND ACCREDITATION ..... 7**

**4. CALIBRATION AND UNCERTAINTY ..... 8**

*4.1. MEASURING INSTRUMENT CALIBRATION ..... 8*

*4.2. MEASUREMENT UNCERTAINTY ..... 8*

**5. EQUIPMENT UNDER TEST ..... 9**

*5.1. DESCRIPTION OF EUT ..... 9*

*5.2. CHANNEL LIST ..... 9*

*5.3. MAXIMUM OUTPUT POWER ..... 9*

*5.4. TEST CHANNEL CONFIGURATION ..... 10*

*5.5. THE WORSE CASE POWER SETTING PARAMETER ..... 10*

*5.6. THE WORSE CASE CONFIGURATIONS ..... 11*

*5.7. DESCRIPTION OF AVAILABLE ANTENNAS ..... 12*

*5.8. DESCRIPTION OF TEST SETUP ..... 13*

**6. MEASURING INSTRUMENT AND SOFTWARE USED ..... 14**

**7. ANTENNA PORT TEST RESULTS ..... 16**

*7.1. ON TIME AND DUTY CYCLE ..... 16*

*7.2. 6 dB DTS BANDWIDTH AND 99 % OCCUPIED BANDWIDTH ..... 17*

*7.3. CONDUCTED OUTPUT POWER ..... 19*

*7.4. POWER SPECTRAL DENSITY ..... 20*

*7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS ..... 22*

**8. RADIATED TEST RESULTS ..... 24**

*8.1. RESTRICTED BANDEDGE ..... 30*

8.1.1. 802.11b SISO MODE ..... 30
8.1.2. 802.11g SISO MODE ..... 34
8.1.3. 802.11n HT20 MIMO MODE ..... 38
8.1.4. 802.11n HT40 MIMO MODE ..... 41

*8.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz) ..... 46*

8.2.1. 802.11b SISO MODE ..... 46

*8.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz) ..... 52*

8.3.1. 802.11b SISO MODE ..... 52
8.3.2. 802.11g SISO MODE ..... 58
8.3.3. 802.11n HT20 MIMO MODE ..... 64
8.3.4. 802.11n HT40 MIMO MODE ..... 70


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

*8.5. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz) ..... 76*
8.5.1. 802.11n HT20 MIMO MODE ..... 76

*8.6. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz) ..... 78*
8.6.1. 802.11n HT20 MIMO MODE ..... 78

*8.7. SPURIOUS EMISSIONS BELOW 30 MHz ..... 79*
8.7.1. 802.11n HT20 MIMO MODE ..... 79

**9. AC POWER LINE CONDUCTED EMISSIONS ..... 83**

9.1.1. 802.11n HT20 MIMO MODE ..... 84

**10. ANTENNA REQUIREMENTS ..... 86**

**11. Appendix ..... 87**

*11.1. Appendix A: DTS Bandwidth ..... 87*
11.1.1. Test Result ..... 87
11.1.2. Test Graphs ..... 88

*11.2. Appendix B: Occupied Channel Bandwidth ..... 96*
11.2.1. Test Result ..... 96
11.2.2. Test Graphs ..... 97

*11.3. Appendix C: Maximum conducted output power ..... 105*
11.3.1. Test Result ..... 105

*11.4. Appendix D: Maximum power spectral density ..... 106*
11.4.1. Test Result ..... 106
11.4.2. Test Graphs ..... 107

*11.5. Appendix E: Band edge measurements ..... 113*
11.5.1. Test Result ..... 113
11.5.2. Test Graphs ..... 114

*11.6. Appendix F: Conducted Spurious Emission ..... 118*
11.6.1. Test Result ..... 118
11.6.2. Test Graphs ..... 119

*11.7. Appendix G: Duty Cycle ..... 137*
11.7.1. Test Result ..... 137
11.7.2. Test Graphs ..... 138


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 1. ATTESTATION OF TEST RESULTS

**Applicant Information**

Company Name: Linkzone Technology Co., Limited
Address: ROOM 20 5/F WAYSON COMMERCIAL BLDG 28 CONNAUGHT ROAD WEST SHEUNG WAN Hong Kong China

**Manufacturer Information**

Company Name: Linkzone Technology Co., Limited
Address: ROOM 20 5/F WAYSON COMMERCIAL BLDG 28 CONNAUGHT ROAD WEST SHEUNG WAN Hong Kong China

**EUT Information**

EUT Name: Winees Spotlight Cam
Model: WP280013267
Sample Received Date: September 13, 2021
Sample Status: Normal
Sample ID: 4208564
Date of Tested: September 13, 2021~ September 30, 2021

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 FCC PART 15 SUBPART C | PASS |
| ISED RSS-247 Issue 2 | PASS |
| ISED RSS-GEN Issue 5 | PASS |

Prepared By:

Kebo Zhang
Project Engineer

Checked By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo
Laboratory Manager


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, KDB 662911 D01 Multiple Transmitter Output v02r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

# 3. FACILITIES AND ACCREDITATION

| | |
|---|---|
| Accreditation Certificate | **A2LA (Certificate No.: 4102.01)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.<br>**FCC (FCC Designation No.: CN1187)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules<br>**ISED (Company No.: 21320)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED.<br>The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.<br>**VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)**<br>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.<br>Facility Name:<br>Chamber D, the VCCI registration No. is G-20019 and R-20004<br>Shielding Room B , the VCCI registration No. is C-20012 and T-20011 |

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

## 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Item | Uncertainty |
|---|---|
| Conduction emission | 3.62 dB |
| Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz) | 2.2 dB |
| Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz) | 4.00 dB |
| Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz) | 5.78 dB (1 GHz ~ 18 GHz) |
| | 5.23 dB (18 GHz ~ 26 GHz) |
| Duty Cycle | ±0.028% |
| DTS and 99% Occupied Bandwidth | ±0.0196% |
| Maximum Conducted Output Power | ±0.686 dB |
| Maximum Power Spectral Density Level | ±0.743 dB |
| Conducted Band-edge Compliance | ±1.328 dB |
| Conducted Unwanted Emissions In Non-restricted Frequency Bands | ±0.746 dB (9 kHz ~ 1 GHz) |
| | ±1.328dB (1 GHz ~ 26 GHz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

| | |
|---|---|
| EUT Name | Winees Spotlight Cam |
| Model Name | WP280013267 |
| Radio Technology | IEEE802.11b/g/n HT20/n HT40 |
| Operation frequency | IEEE 802.11b: 2412MHz—2462MHz<br>IEEE 802.11g: 2412MHz—2462MHz<br>IEEE 802.11n HT20: 2412MHz—2462MHz<br>IEEE 802.11n HT40: 2422MHz—2452MHz |
| Modulation | IEEE 802.11b: DSSS(CCK)<br>IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) |
| Power Supply | DC 12V via Adapter |

## 5.2. CHANNEL LIST

| Channel List for 802.11b/g/n (20 MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 1 | 2412 | 4 | 2427 | 7 | 2442 | 10 | 2457 |
| 2 | 2417 | 5 | 2432 | 8 | 2447 | 11 | 2462 |
| 3 | 2422 | 6 | 2437 | 9 | 2452 | / | / |

| Channel List for 802.11n (40 MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 3 | 2422 | 5 | 2432 | 7 | 2442 | 9 | 2452 |
| 4 | 2427 | 6 | 2437 | 8 | 2447 | / | / |

## 5.3. MAXIMUM OUTPUT POWER

| IEEE Std. 802.11 | Frequency (MHz) | Channel Number | Maximum Conducted AVG Output Power (dBm) | Maximum AVG EIRP (dBm) |
|---|---|---|---|---|
| b | 2412 ~ 2462 | 1-11[11] | 17.87 | 21.01 |
| g | 2412 ~ 2462 | 1-11[11] | 18.02 | 21.16 |
| n HT20 | 2412 ~ 2462 | 1-11[11] | 19.13 | 22.27 |
| n HT40 | 2422 ~ 2452 | 3-9[7] | 18.08 | 21.22 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 5.4. TEST CHANNEL CONFIGURATION

| IEEE Std. 802.11 | Test Channel Number | Frequency |
|---|---|---|
| b | CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel) | 2412 MHz, 2437 MHz, 2462 MHz |
| g | CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel) | 2412 MHz, 2437 MHz, 2462 MHz |
| n HT20 | CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel) | 2412 MHz, 2437 MHz, 2462 MHz |
| n HT40 | CH 3(Low Channel), CH 6(MID Channel), CH 9(High Channel) | 2422 MHz, 2437 MHz, 2452 MHz |

## 5.5. THE WORSE CASE POWER SETTING PARAMETER

| The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test Software | | UART | | | | | |
| Modulation Mode | Transmit Antenna Number | Test Channel | | | | | |
| | | NCB: 20MHz | | | NCB: 40MHz | | |
| | | CH 1 | CH 6 | CH 11 | CH 3 | CH 6 | CH 9 |
| 802.11b | 1 | 32 | 32 | 32 | / | | |
| | 2 | 32 | 32 | 32 | | | |
| 802.11g | 1 | 45 | 45 | 45 | | | |
| | 2 | 45 | 45 | 45 | | | |
| 802.11n HT20 | 1 | 43 | 43 | 43 | | | |
| | 2 | 43 | 43 | 43 | | | |
| 802.11n HT40 | 1 | / | | | 40 | 40 | 40 |
| | 2 | / | | | 40 | 40 | 40 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 5.6. THE WORSE CASE CONFIGURATIONS

The EUT was tested in the following configuration(s):

Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

Test channels referring to section 5.4.

Maximum power setting referring to section 5.5.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0

802.11b/g only support SISO mode.
802.11 n HT20/HT40 support SISO and MIMO mode.

802.11n SISO mode and MIMO mode have the same power setting, so only the worst case power mode(MIMO) will be record in the report.

The EUT has 2 separate antennas which correspond to 2 separate antenna ports. Core 0 and Core 1 correspond to antenna 1 and antenna 2 respectively.

The measured additional path loss was included in any path loss calculations for all RF cable used during tested.

Conducted output power, power spectral density tests separately on each port with all supported SISO & MIMO port combinations.

The EUT support Cyclic Shift Diversity(CDD), Space Time Coding(STBC), Spartial Division Multiplexing(SDM) modes. They use the same conducted power per chain in any given mode, CDD mode have the maximum power setting, so we only chose the worst case mode CDD for final testing.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 5.7. DESCRIPTION OF AVAILABLE ANTENNAS

| Antenna | Frequency (MHz) | Antenna Type | MAX Antenna Gain (dBi) |
|---|---|---|---|
| 1 | 2412-2462 | Stainless Steel Loop Antenna | 3.14 |
| 2 | 2412-2462 | Stainless Steel Loop Antenna | 3.14 |

The EUT support Cyclic Shift Diversity(CDD) mode.

MIMO output power port and MIMO PSD port summing was performed in accordance with KDB 662911 D01. For the CDD results the Directional Gain was calculated in accordance with the following mothed.

For output power measurements:
Directional gain= $G_{ANT}$ + Array Gain = 3.14dBi
$G_{ANT}$ : equal to the gain of the antenna having the highest gain
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$

For power spectral density (PSD) measurements:
Directional gain= $G_{ANT}$ + Array Gain = 6.15 dBi
Array Gain = 10 log($N_{ANT}$/$N_{SS}$) dB.
$N_{ANT}$ : number of transmit antennas
$N_{SS}$ : number of spatial streams, The worst case directional gain will occur when $N_{SS}$ = 1

| Test Mode | Transmit and Receive Mode | Description |
|---|---|---|
| IEEE 802.11b | ☒2TX, 2RX | ANT 1 and ANT 2 can be used as transmitting/receiving antenna. |
| IEEE 802.11g | ☒2TX, 2RX | ANT 1 and ANT 2 can be used as transmitting/receiving antenna. |
| IEEE 802.11n HT20 | ☒2TX, 2RX | ANT 1 and ANT 2 can be used as transmitting/receiving antenna. |
| IEEE 802.11n HT40 | ☒2TX, 2RX | ANT 1 and ANT 2 can be used as transmitting/receiving antenna. |

Note: The value of the antenna gain was declared by customer.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 5.8. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Item | Equipment | Brand Name | Model Name | Remarks |
|---|---|---|---|---|
| 1 | laptop | Lenovo | E42-80 | R303U5EC |
| 2 | Micro SD Card | Kingston | / | 8GB |

**I/O CABLES**

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|---|---|---|---|---|---|
| 1 | USB cable | Unshielded | NO | 1.5 m | / |

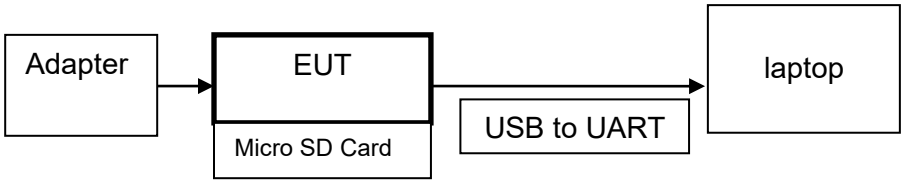
**ACCESSORIES**

| Item | Accessory | Brand Name | Model Name | Description |
|---|---|---|---|---|
| 1 | Adapter | / | AMS159A-1201000FU | INPUT: 100-240 V~50/60 Hz 0.5/33VA<br>OUTPUT: 12V, 1.0 A |

**TEST SETUP**

The EUT can work in engineering mode with a software.

**SETUP DIAGRAM FOR TESTS**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 6. MEASURING INSTRUMENT AND SOFTWARE USED

| Conducted Emissions | | | | | |
|---|---|---|---|---|---|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Due Date |
| EMI Test Receiver | R&S | ESR3 | 101961 | Nov. 12, 2020 | Nov. 11, 2021 |
| Two-Line V-Network | R&S | ENV216 | 101983 | Nov. 12, 2020 | Nov. 11, 2021 |
| Artificial Mains Networks | Schwarzbeck | NSLK 8126 | 8126465 | Nov. 12, 2020 | Nov. 11, 2021 |
| Software | | | | | |
| Description | | | Manufacturer | Name | Version |
| Test Software for Conducted Emissions | | | Farad | EZ-EMC | Ver. UL-3A1 |

| Radiated Emissions | | | | | |
|---|---|---|---|---|---|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Due Date |
| MXE EMI Receiver | KESIGHT | N9038A | MY56400036 | Nov. 12, 2020 | Nov. 11, 2021 |
| Hybrid Log Periodic Antenna | TDK | HLP-3003C | 130959 | April 24, 2020 | April 23, 2023 |
| Preamplifier | HP | 8447D | 2944A09099 | Nov. 12, 2020 | Nov. 11, 2021 |
| EMI Measurement Receiver | R&S | ESR26 | 101377 | Nov. 12, 2020 | Nov. 11, 2021 |
| Horn Antenna | TDK | HRN-0118 | 130940 | Jul. 20, 2021 | Jul. 19, 2024 |
| Preamplifier | TDK | PA-02-0118 | TRS-305-00067 | Nov. 20, 2020 | Nov. 19, 2021 |
| Horn Antenna | Schwarzbeck | BBHA9170 | #697 | July 20, 2021 | July 19, 2024 |
| Preamplifier | TDK | PA-02-2 | TRS-307-00003 | Nov. 12, 2020 | Nov. 11, 2021 |
| Preamplifier | TDK | PA-02-3 | TRS-308-00002 | Nov. 12, 2020 | Nov. 11, 2021 |
| Loop antenna | Schwarzbeck | 1519B | 00008 | Jan.17, 2019 | Jan.17,2022 |
| Preamplifier | TDK | PA-02-001-3000 | TRS-302-00050 | Nov. 12, 2020 | Nov. 11, 2021 |
| Preamplifier | Mini-Circuits | ZX60-83LN-S+ | SUP01201941 | Nov. 20, 2020 | Nov. 19, 2021 |
| High Pass Filter | Wi | WHKX10-2700-3000-18000-40SS | 23 | Nov. 12, 2020 | Nov. 11, 2021 |
| Band Reject Filter | Wainwright | WRCJV8-2350-2400-2483.5-2533.5-40SS | 4 | Nov. 12, 2020 | Nov. 11, 2021 |
| Software | | | | | |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

| Description | Manufacturer | Name | Version |
|---|---|---|---|
| Test Software for Radiated Emissions | Farad | EZ-EMC | Ver. UL-3A1 |

| Tonsend RF Test System | | | | | |
|---|---|---|---|---|---|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Due. Date |
| Wideband Radio Communication Tester | R&S | CMW500 | 155523 | Nov.20,2020 | Nov.19,2021 |
| PXA Signal Analyzer | Keysight | N9030A | MY55410512 | Nov.20,2020 | Nov.19,2021 |
| MXG Vector Signal Generator | Keysight | N5182B | MY56200284 | Nov.20,2020 | Nov.19,2021 |
| MXG Vector Signal Generator | Keysight | N5172B | MY56200301 | Nov.20,2020 | Nov.19,2021 |
| DC power supply | Keysight | E3642A | MY55159130 | Nov.24,2020 | Nov.23,2021 |

| Software | | | |
|---|---|---|---|
| Description | Manufacturer | Name | Version |
| Tonsend SRD Test System | Tonsend | JS1120-3 RF Test System | 2.6.77.0518 |

| Other Instruments | | | | | |
|---|---|---|---|---|---|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
| Dual Channel Power Meter | Keysight | N1912A | MY55416024 | Nov. 20, 2020 | Nov. 19, 2021 |
| Power Sensor | Keysight | USB Wideband Power Sensor | MY5100022 | Nov. 20, 2020 | Nov. 19, 2021 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 7. ANTENNA PORT TEST RESULTS

## 7.1. ON TIME AND DUTY CYCLE

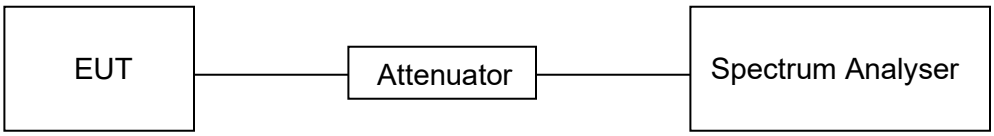
**LIMITS**

None; for reporting purposes only

**PROCEDURE**

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 26.6 °C | Relative Humidity | 54.5 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 12 V |

**RESULTS**

Please refer to appendix G.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 7.2. 6 dB DTS BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C<br>ISED RSS-247 ISSUE 2 | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(a)(2)<br>ISED RSS-247 5.2 (a) | 6 dB Bandwidth | ≥ 500 kHz | 2400-2483.5 |
| ISED RSS-Gen Clause 6.7 | 99 % Occupied Bandwidth | For reporting purposes only. | 2400-2483.5 |

**TEST PROCEDURE**

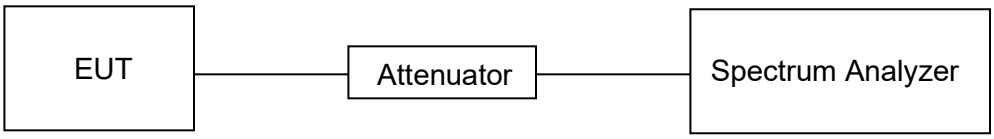
Connect the EUT to the spectrum analyser and use the following settings:

| | |
|---|---|
| Center Frequency | The center frequency of the channel under test |
| Frequency Span | Between 1.5 times and 5.0 times the OBW |
| Detector | Peak |
| RBW | For 6 dB Bandwidth: 100 kHz<br>For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth |
| VBW | For 6 dB Bandwidth: ≥3 × RBW<br>For 99 % Occupied Bandwidth: ≥3 × RBW |
| Trace | Max hold |
| Sweep | Auto couple |

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**TEST SETUP**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 26.6 °C | Relative Humidity | 54.5 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 12 V |

**RESULTS**

Please refer to appendix A & B.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 7.3. CONDUCTED OUTPUT POWER

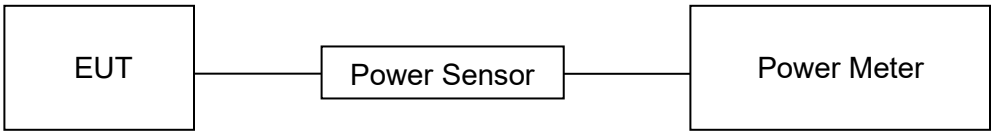
**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C<br>ISED RSS-247 ISSUE 2 | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(b)(3)<br>ISED RSS-247 5.4 (d) | AVG Output Power | 1 watt or 30 dBm | 2400-2483.5 |

**TEST PROCEDURE**

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).
Measure peak emission level, the indicated level is the average output power, after any corrections for external attenuators and cables.

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 26.6 °C | Relative Humidity | 54.5 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 12 V |

**RESULTS**

Please refer to appendix C.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 7.4. POWER SPECTRAL DENSITY

**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C<br>ISED RSS-247 ISSUE 2 | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC §15.247 (e)<br>ISED RSS-247 5.2 (b) | Power Spectral Density | 8 dBm/3 kHz | 2400-2483.5 |

**TEST PROCEDURE**

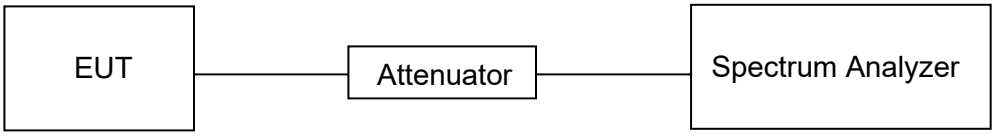
Refer to ANSI C63.10-2013 clause 11.10.

Connect the EUT to the spectrum analyser and use the following settings:

| | |
|---|---|
| Center Frequency | The center frequency of the channel under test |
| Detector | PEAK |
| RBW | 3 kHz ≤ RBW ≤ 100 kHz |
| VBW | ≥3 × RBW |
| Span | 1.5 x DTS bandwidth |
| Trace | Max hold |
| Sweep time | Auto couple |

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 26.6 °C | Relative Humidity | 54.5 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 12 V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**RESULTS**

Please refer to appendix D.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C<br>ISED RSS-247 ISSUE 2 | | |
|---|---|---|
| Section | Test Item | Limit |
| CFR 47 FCC §15.247 (d)<br>ISED RSS-247 5.5 | Conducted Bandedge and Spurious Emissions | at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power |

**TEST PROCEDURE**

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

| | |
|---|---|
| Center Frequency | The center frequency of the channel under test |
| Detector | Peak |
| RBW | 100 kHz |
| VBW | ≥3 × RBW |
| Span | 1.5 x DTS bandwidth |
| Trace | Max hold |
| Sweep time | Auto couple. |

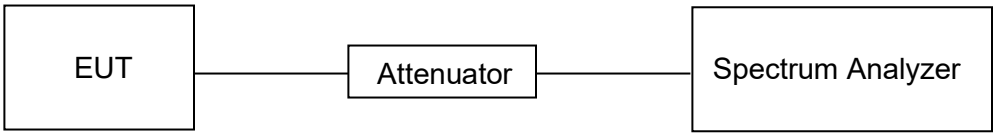
Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.
Change the settings for emission level measurement:

| | |
|---|---|
| Span | Set the center frequency and span to encompass frequency range to be measured |
| Detector | Peak |
| RBW | 100 kHz |
| VBW | ≥3 × RBW |
| measurement points | ≥span/RBW |
| Trace | Max hold |
| Sweep time | Auto couple. |

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

**TEST SETUP**


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 26.6 °C | Relative Humidity | 54.5 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 12 V |

**RESULTS**

Please refer to appendix E & F.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 8. RADIATED TEST RESULTS

**LIMITS**

Please refer to CFR 47 FCC §15.205 and §15.209.

Please refer to ISED RSS-GEN Clause 8.9 and Clause 8.10.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

| Emissions radiated outside of the specified frequency bands above 30 MHz | | | |
|---|---|---|---|
| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m | |
| | | Quasi-Peak | |
| 30 - 88 | 100 | 40 | |
| 88 - 216 | 150 | 43.5 | |
| 216 - 960 | 200 | 46 | |
| Above 960 | 500 | 54 | |
| Above 1000 | 500 | Peak | Average |
| | | 74 | 54 |

| FCC Emissions radiated outside of the specified frequency bands below 30 MHz | | |
|---|---|---|
| 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 |

ISED General field strength limits at frequencies below 30 MHz

| Table 6 – General field strength limits at frequencies below 30 MHz | | |
|---|---|---|
| **Frequency** | **Magnetic field strength (H-Field) (µA/m)** | **Measurement distance (m)** |
| 9 - 490 kHz[Note 1] | 6.37/F (F in kHz) | 300 |
| 490 - 1705 kHz | 63.7/F (F in kHz) | 30 |
| 1.705 - 30 MHz | 0.08 | 30 |

**Note 1:** The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

ISED Restricted bands please refer to ISED RSS-GEN Clause 8.10

| Table 7 – Restricted frequency bands[Note 1] | | |
|---|---|---|
| MHz | MHz | GHz |
| 0.090 - 0.110 | 149.9 - 150.05 | 9.0 - 9.2 |
| 0.495 - 0.505 | 156.52475 - 156.52525 | 9.3 - 9.5 |
| 2.1735 - 2.1905 | 156.7 - 156.9 | 10.6 - 12.7 |
| 3.020 - 3.026 | 162.0125 - 167.17 | 13.25 - 13.4 |
| 4.125 - 4.128 | 167.72 - 173.2 | 14.47 - 14.5 |
| 4.17725 - 4.17775 | 240 – 285 | 15.35 - 16.2 |
| 4.20725 - 4.20775 | 322 - 335.4 | 17.7 - 21.4 |
| 5.677 - 5.683 | 399.9 - 410 | 22.01 - 23.12 |
| 6.215 - 6.218 | 608 - 614 | 23.6 - 24.0 |
| 6.26775 - 6.26825 | 960 - 1427 | 31.2 - 31.8 |
| 6.31175 - 6.31225 | 1435 - 1626.5 | 36.43 - 36.5 |
| 8.291 - 8.294 | 1645.5 - 1646.5 | Above 38.6 |
| 8.362 - 8.366 | 1660 - 1710 | |
| 8.37625 - 8.38675 | 1718.8 - 1722.2 | |
| 8.41425 - 8.41475 | 2200 - 2300 | |
| 12.29 - 12.293 | 2310 - 2390 | |
| 12.51975 - 12.52025 | 2483.5 - 2500 | |
| 12.57675 - 12.57725 | 2655 - 2900 | |
| 13.36 - 13.41 | 3260 – 3267 | |
| 16.42 - 16.423 | 3332 - 3339 | |
| 16.69475 - 16.69525 | 3345.8 - 3358 | |
| 16.80425 - 16.80475 | 3500 - 4400 | |
| 25.5 - 25.67 | 4500 - 5150 | |
| 37.5 - 38.25 | 5350 - 5460 | |
| 73 - 74.6 | 7250 - 7750 | |
| 74.8 - 75.2 | 8025 – 8500 | |
| 108 – 138 | | |

**Note 1:** Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

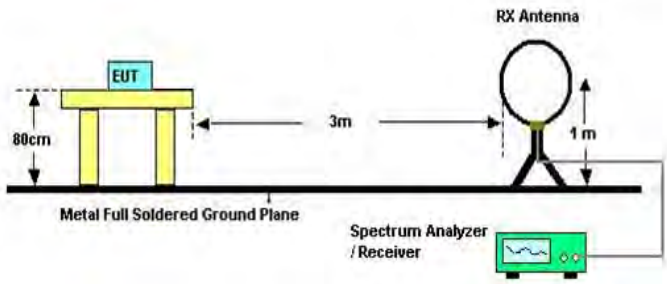
| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| [1]0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | ([2]) |
| 13.36-13.41 | | | |

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**TEST SETUP AND PROCEDURE**

Below 30 MHz




The setting of the spectrum analyser

| | |
|---|---|
| RBW | 200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz) |
| VBW | 200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz) |
| Sweep | Auto |

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

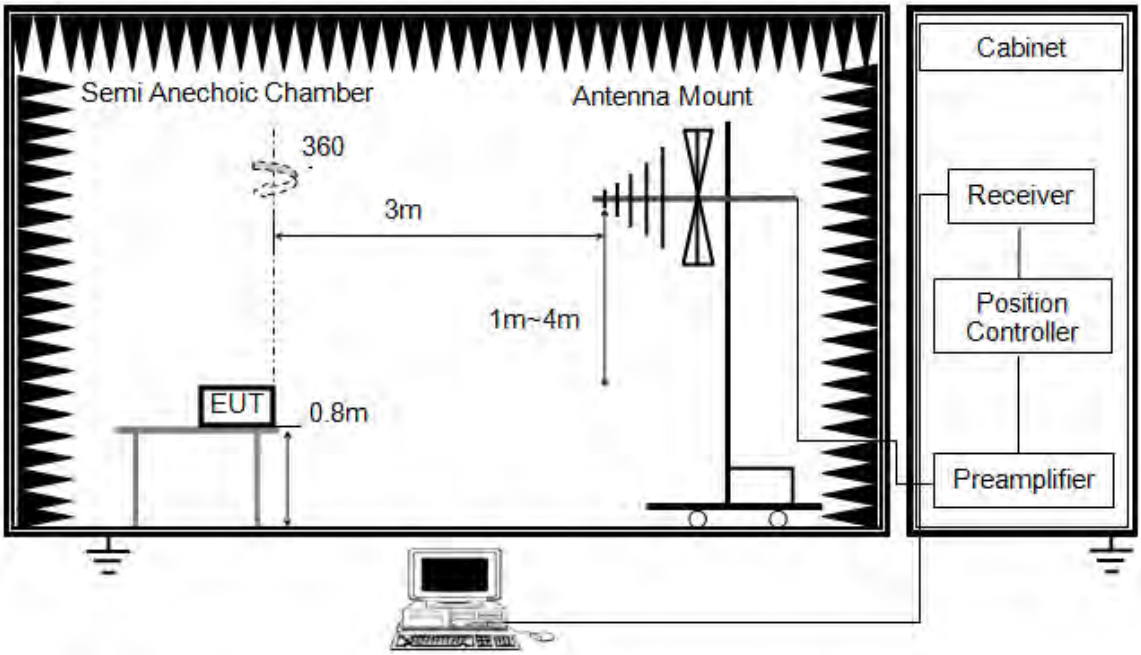
6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.

7. 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 site based on KDB 414788.

8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




The setting of the spectrum analyser

| | |
|---|---|
| RBW | 120 kHz |
| VBW | 300 kHz |
| Sweep | Auto |
| Detector | Peak/QP |
| Trace | Max hold |

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

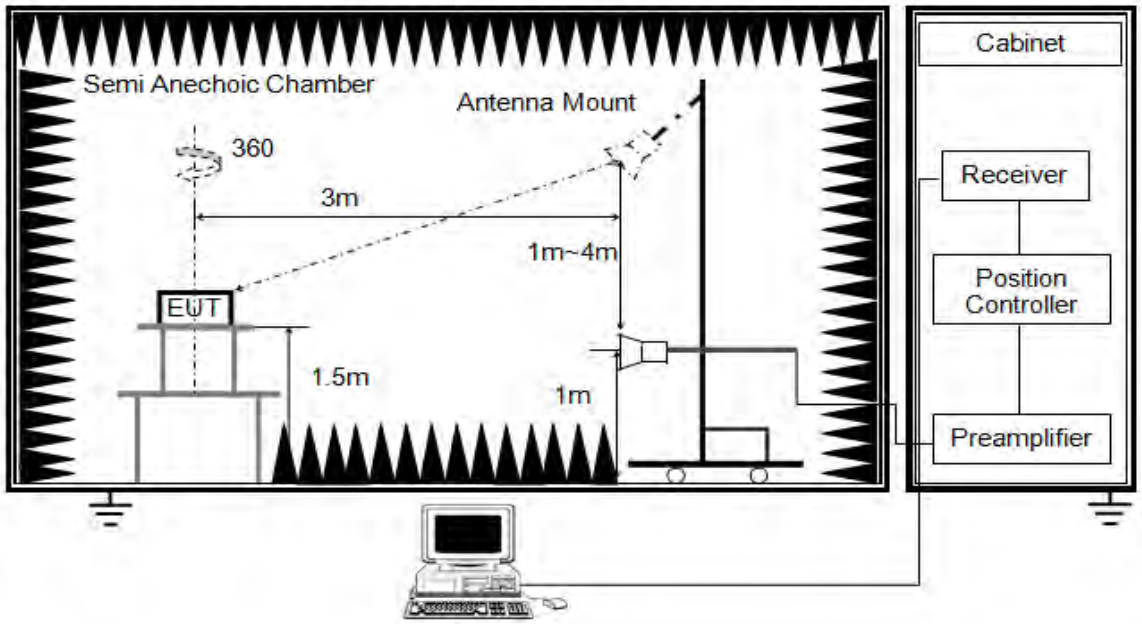
3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1 GHz, 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 3 dB 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.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

Above 1 GHz




The setting of the spectrum analyser

| | |
|---|---|
| RBW | 1 MHz |
| VBW | PEAK: 3 MHz<br>AVG: see note 6 |
| Sweep | Auto |
| Detector | Peak |
| Trace | Max hold |

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5 m above ground.

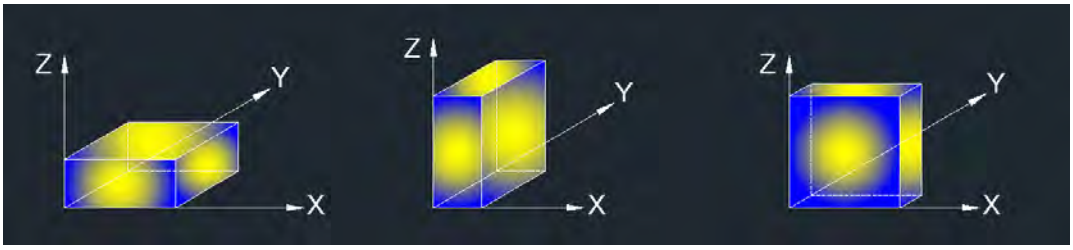
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

X axis, Y axis, Z axis positions:




Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 23.7 °C | Relative Humidity | 59 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | DC 12 V |

**RESULTS**


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

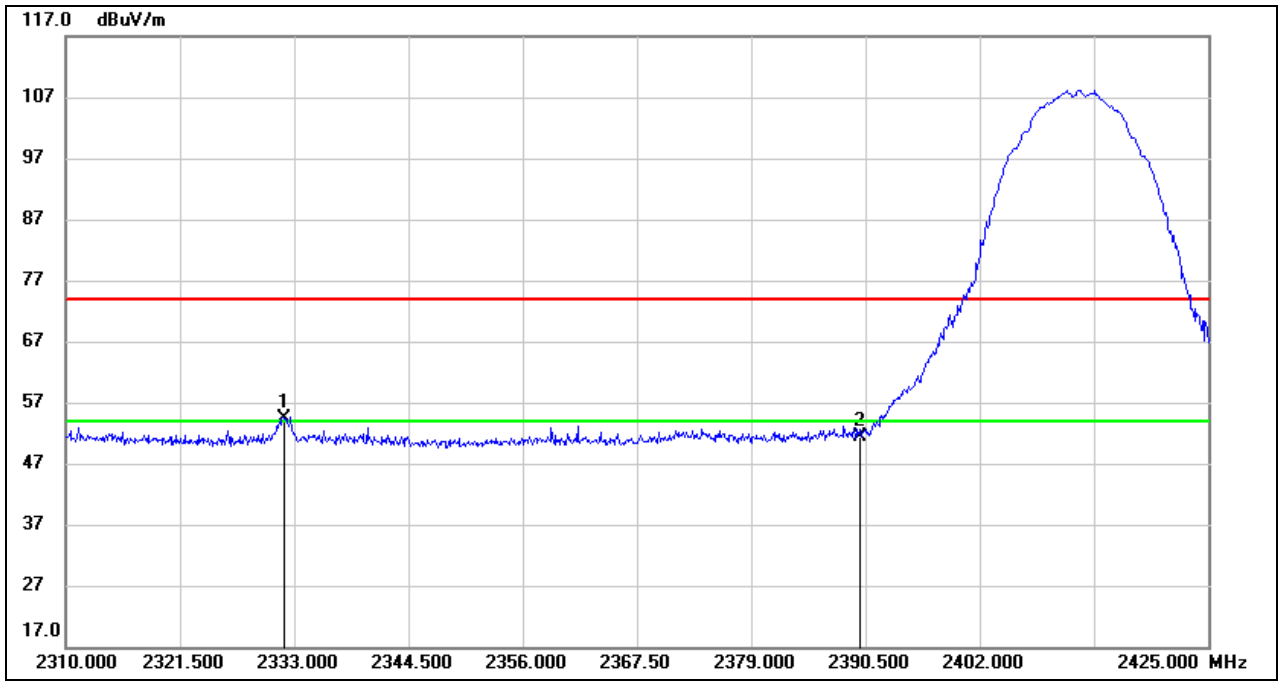
## 8.1. RESTRICTED BANDEDGE

### 8.1.1. 802.11b SISO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**

**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

**PEAK**

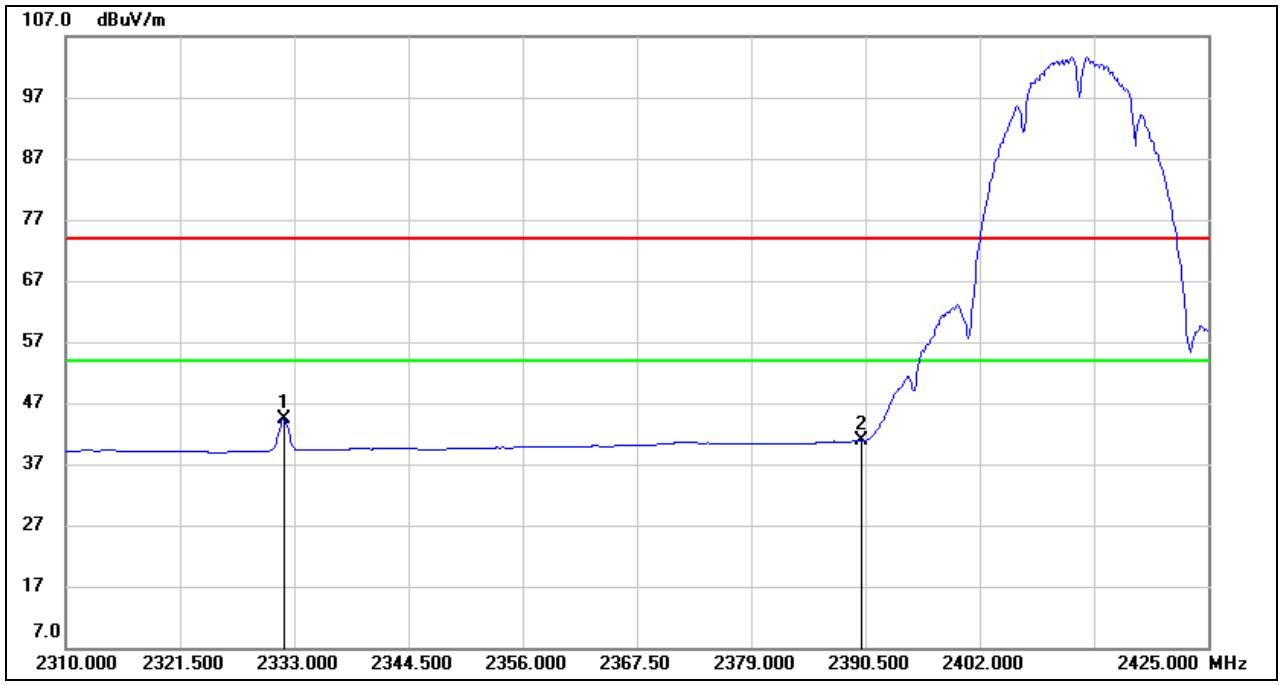



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2331.965 | 21.58 | 32.91 | 54.49 | 74.00 | -19.51 | peak |
| 2 | 2390.000 | 18.09 | 33.35 | 51.44 | 74.00 | -22.56 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**



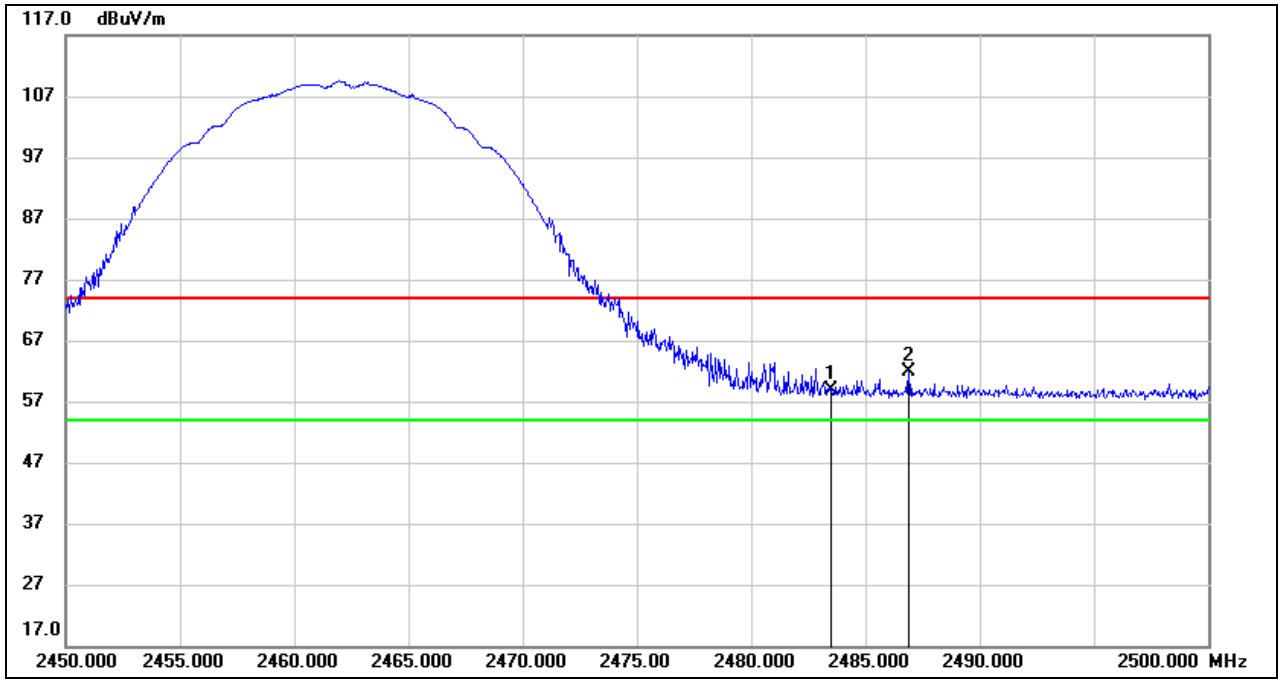

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2331.965 | 11.51 | 32.91 | 44.42 | 54.00 | -9.58 | AVG |
| 2 | 2390.000 | 7.54 | 33.35 | 40.89 | 54.00 | -13.11 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

**PEAK**

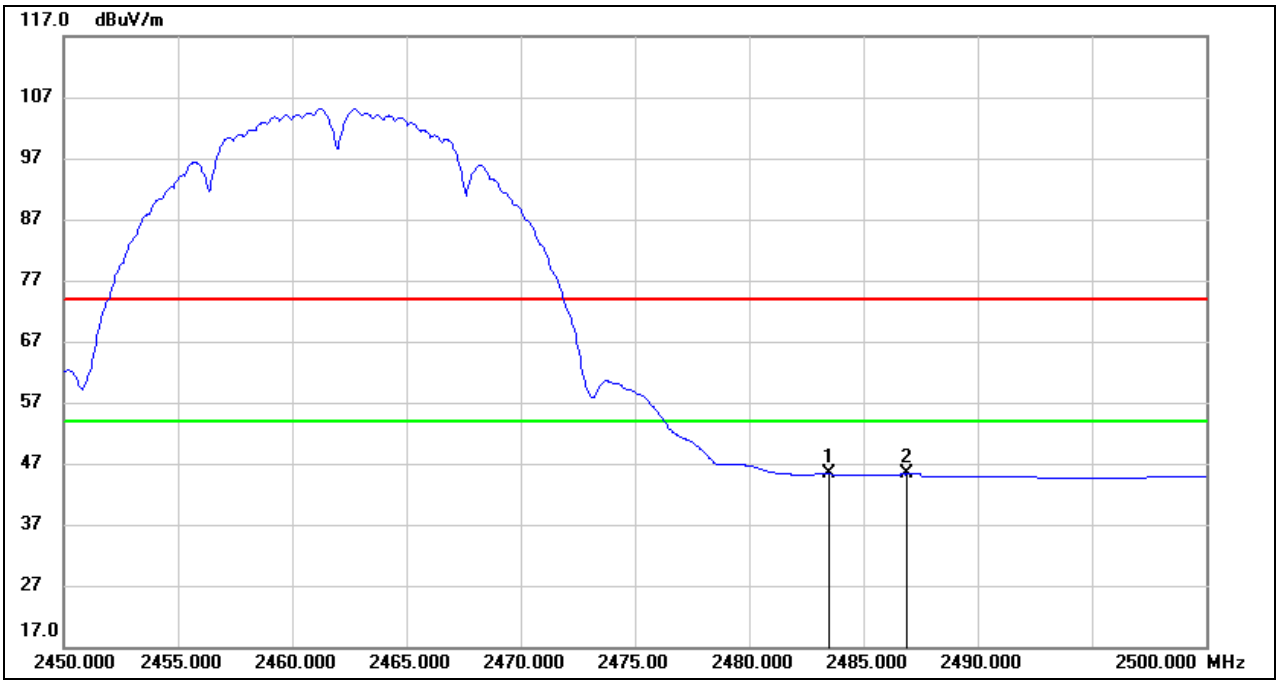



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 25.05 | 33.71 | 58.76 | 74.00 | -15.24 | peak |
| 2 | 2486.900 | 28.05 | 33.72 | 61.77 | 74.00 | -12.23 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 11.55 | 33.71 | 45.26 | 54.00 | -8.74 | AVG |
| 2 | 2486.900 | 11.54 | 33.72 | 45.26 | 54.00 | -8.74 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.
Note: Both antennas have been tested, only the worst data was recorded in the report.

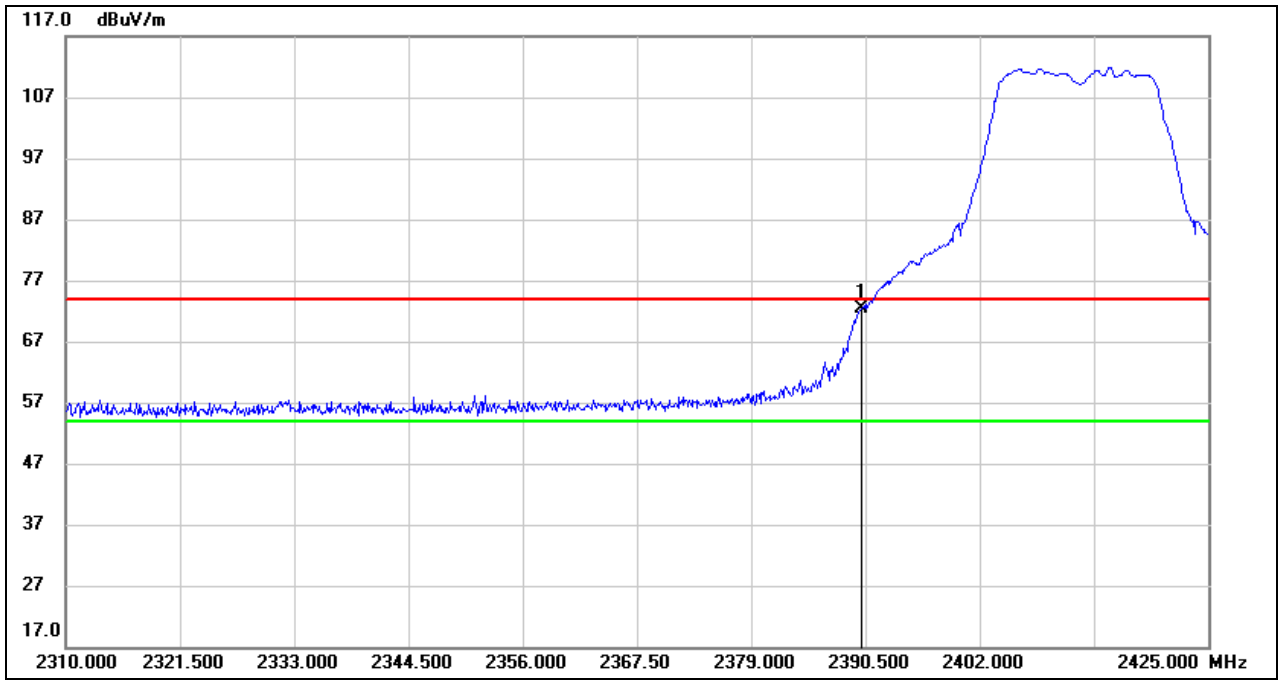

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 8.1.2. 802.11g SISO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**

**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

**PEAK**

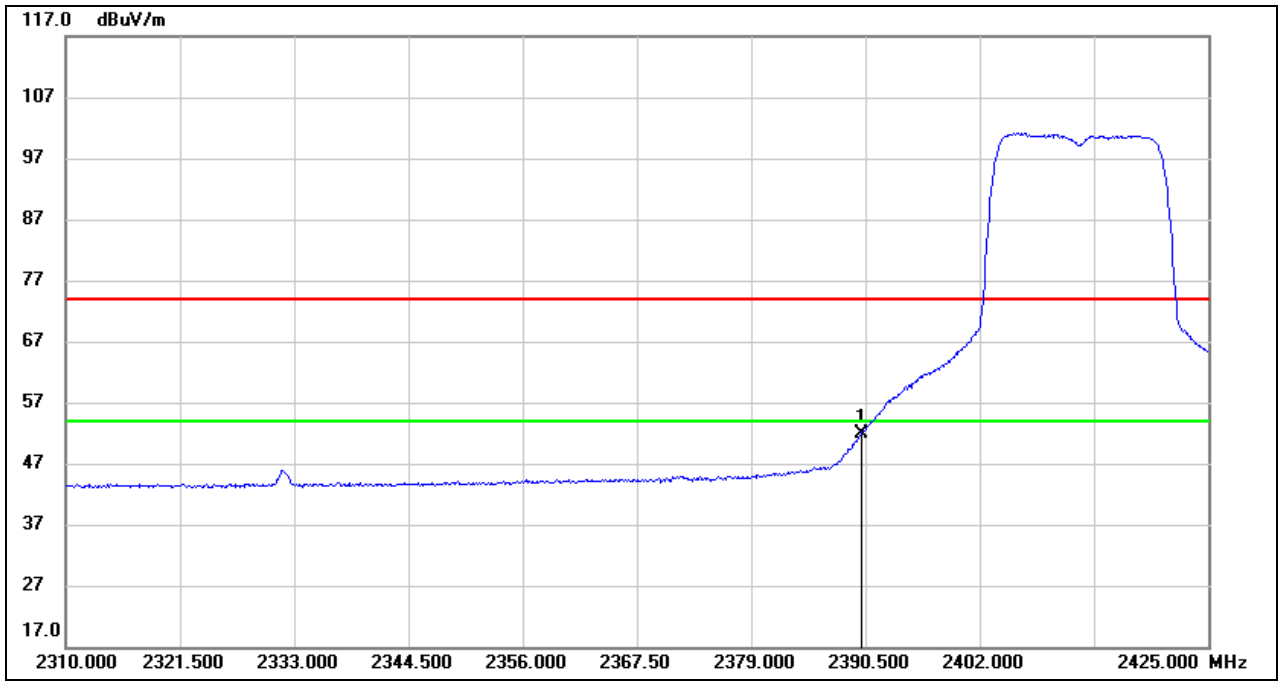



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 38.95 | 33.35 | 72.30 | 74.00 | -1.70 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**



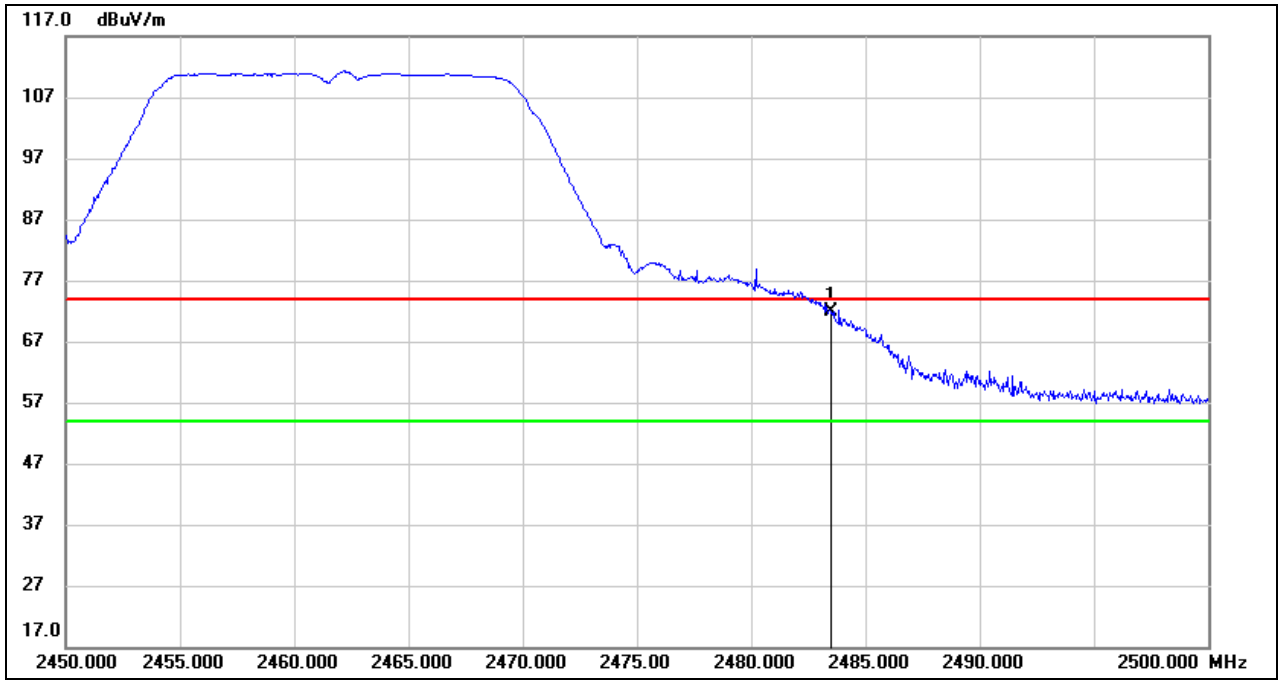

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 18.47 | 33.35 | 51.82 | 54.00 | -2.18 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
3. For the transmitting duration, please refer to clause 7.1.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

**PEAK**

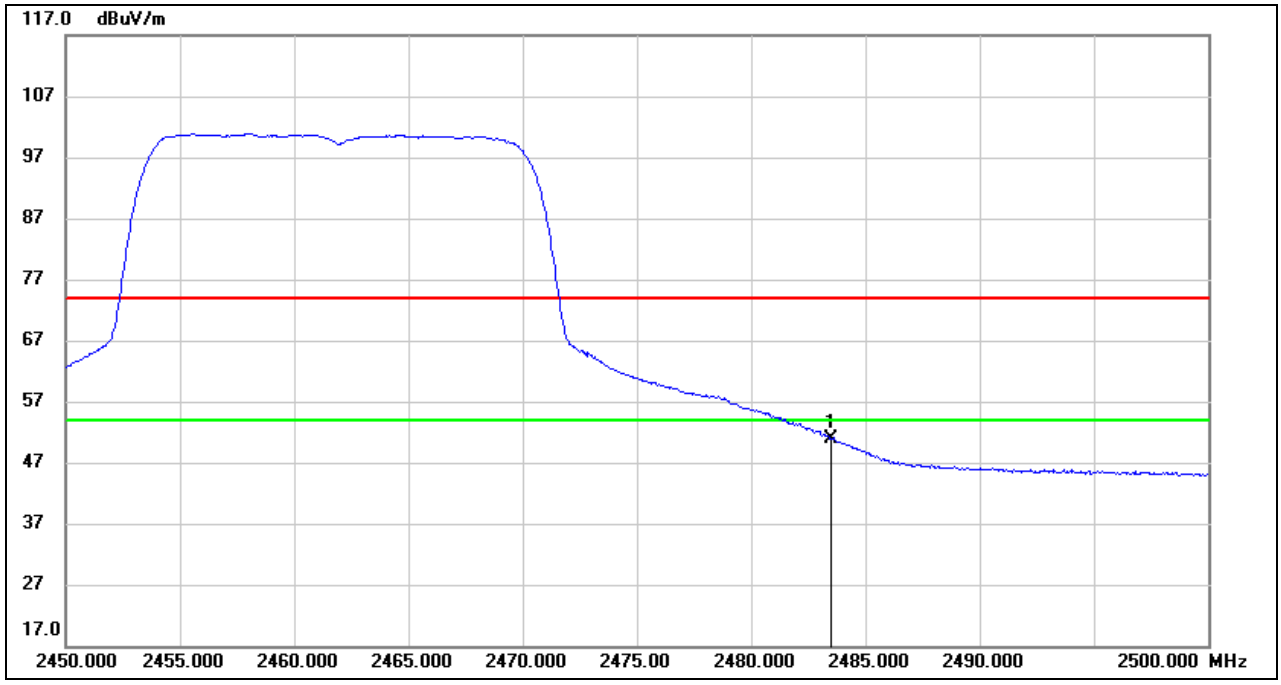



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2483.500 | 38.06 | 33.71 | 71.77 | 74.00 | -2.23 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 17.24 | 33.71 | 50.95 | 54.00 | -3.05 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
3. For the transmitting duration, please refer to clause 7.1.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

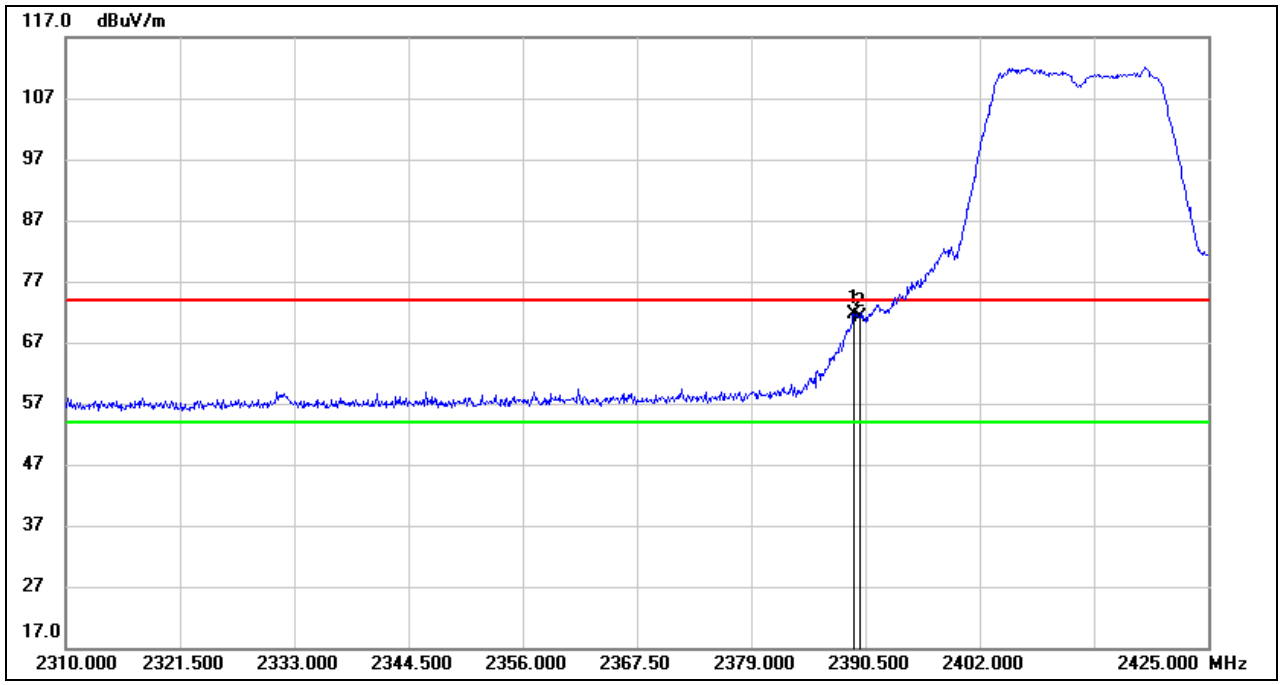
Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.
Note: Both antennas have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 8.1.3. 802.11n HT20 MIMO MODE

**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

**PEAK**

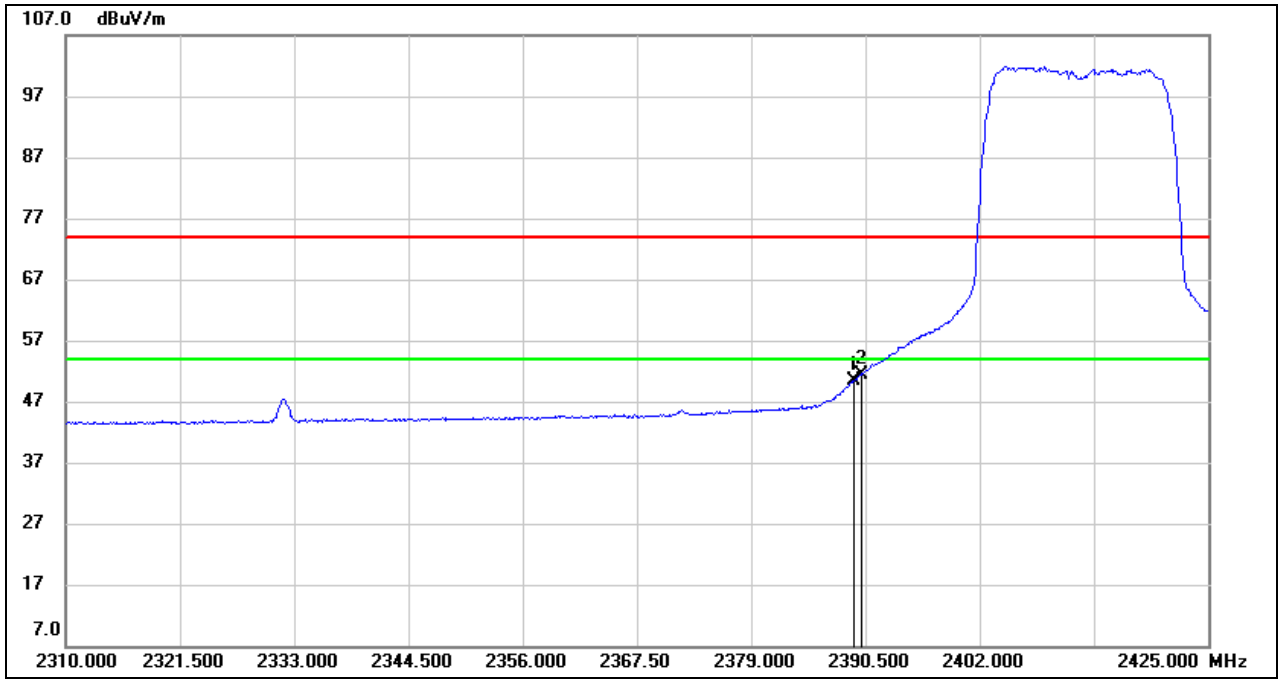



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2389.350 | 38.24 | 33.35 | 71.59 | 74.00 | -2.41 | peak |
| 2 | 2390.000 | 37.87 | 33.35 | 71.22 | 74.00 | -2.78 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**



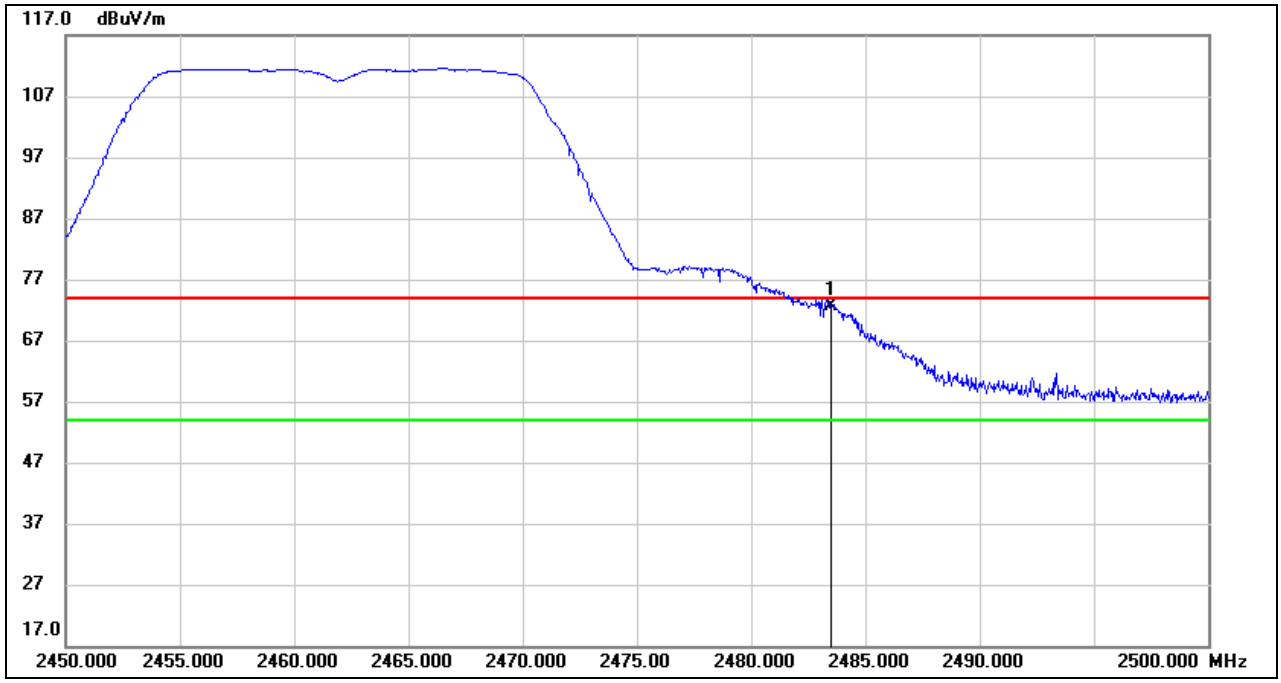

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2389.350 | 17.09 | 33.35 | 50.44 | 54.00 | -3.56 | AVG |
| 2 | 2390.000 | 18.01 | 33.35 | 51.36 | 54.00 | -2.64 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
3. For the transmitting duration, please refer to clause 7.1.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

**PEAK**

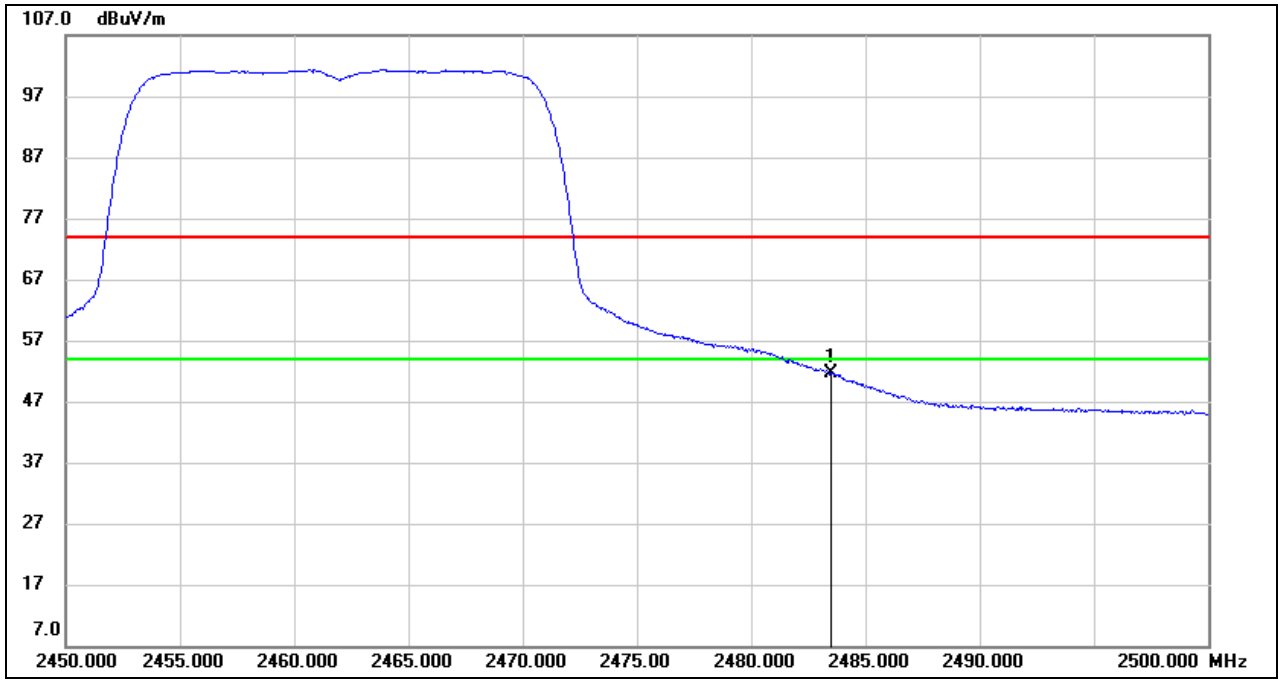



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 38.85 | 33.71 | 72.56 | 74.00 | -1.44 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 17.95 | 33.71 | 51.66 | 54.00 | -2.34 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
3. For the transmitting duration, please refer to clause 7.1.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

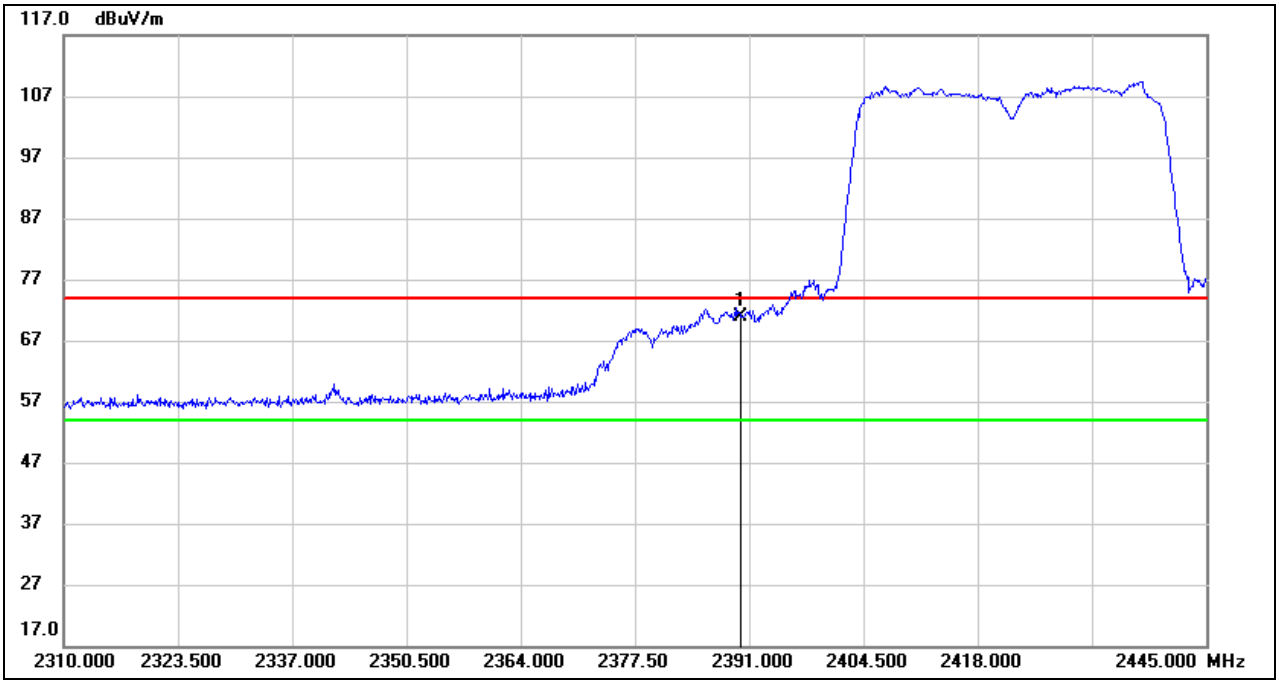
Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.
Note: All modes have been tested, only the worst data was recorded in the report.

### 8.1.4. 802.11n HT40 MIMO MODE

**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

**PEAK**


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

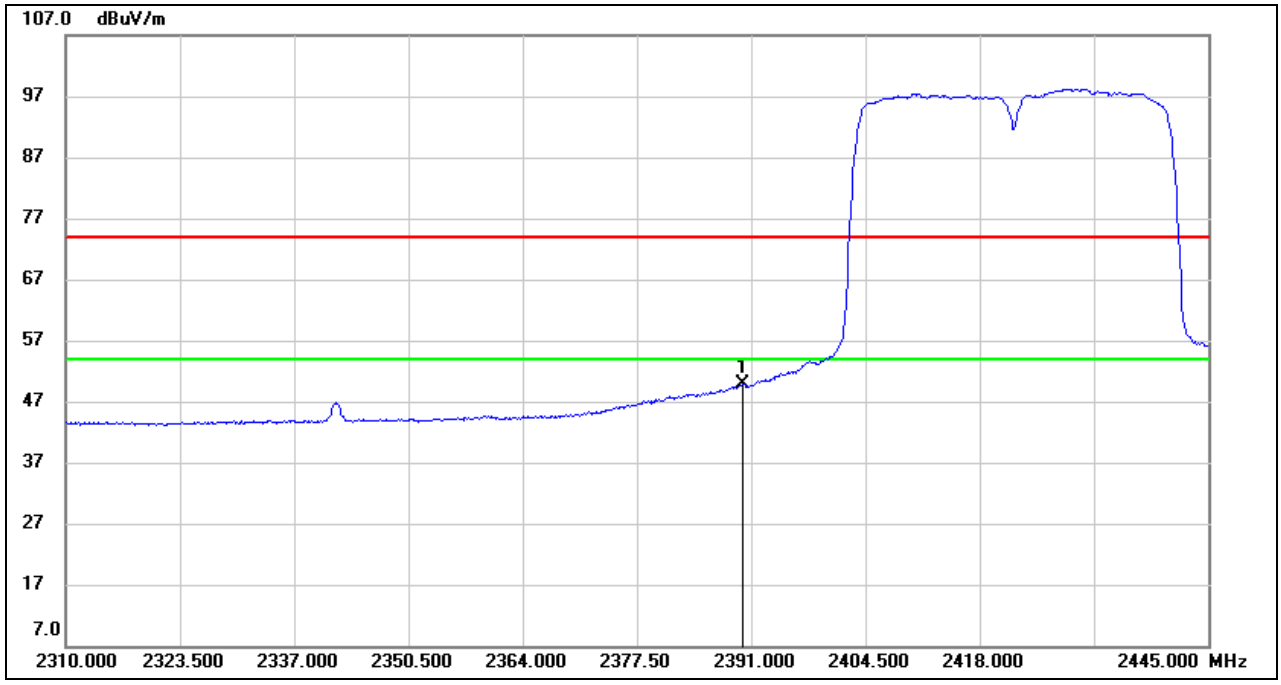



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 37.56 | 33.35 | 70.91 | 74.00 | -3.09 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**



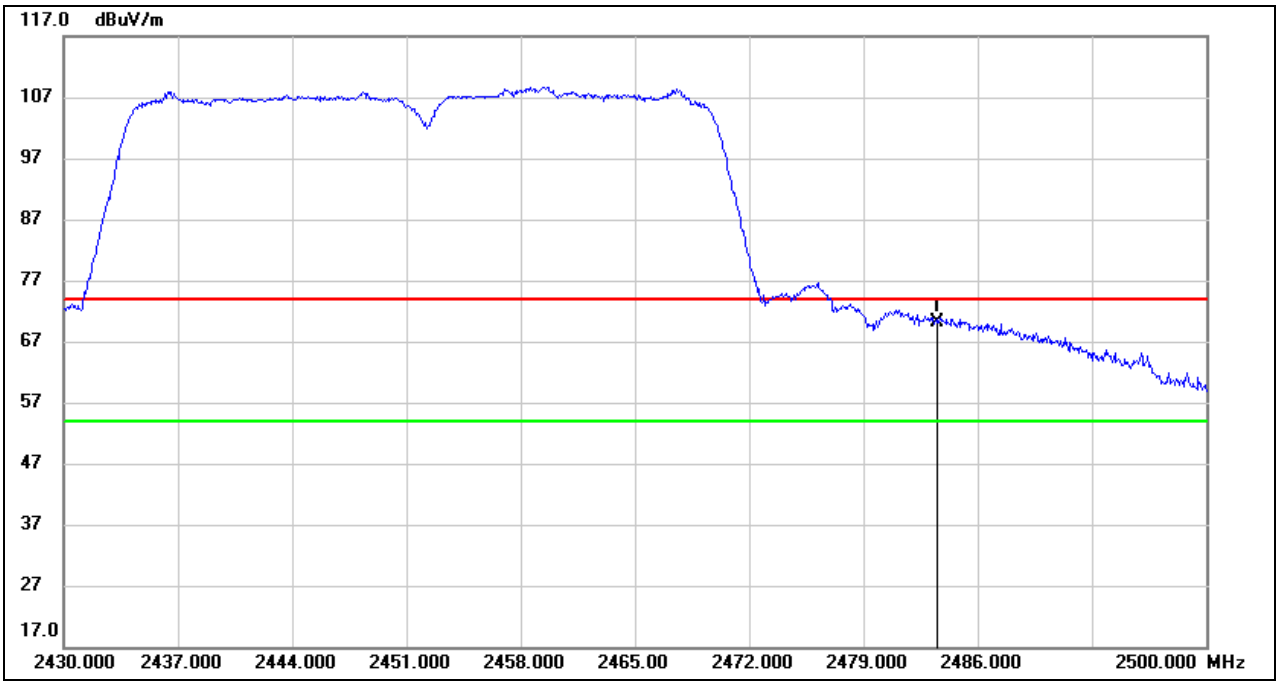

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2390.000 | 16.43 | 33.35 | 49.78 | 54.00 | -4.22 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
3. For the transmitting duration, please refer to clause 7.1.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

**PEAK**

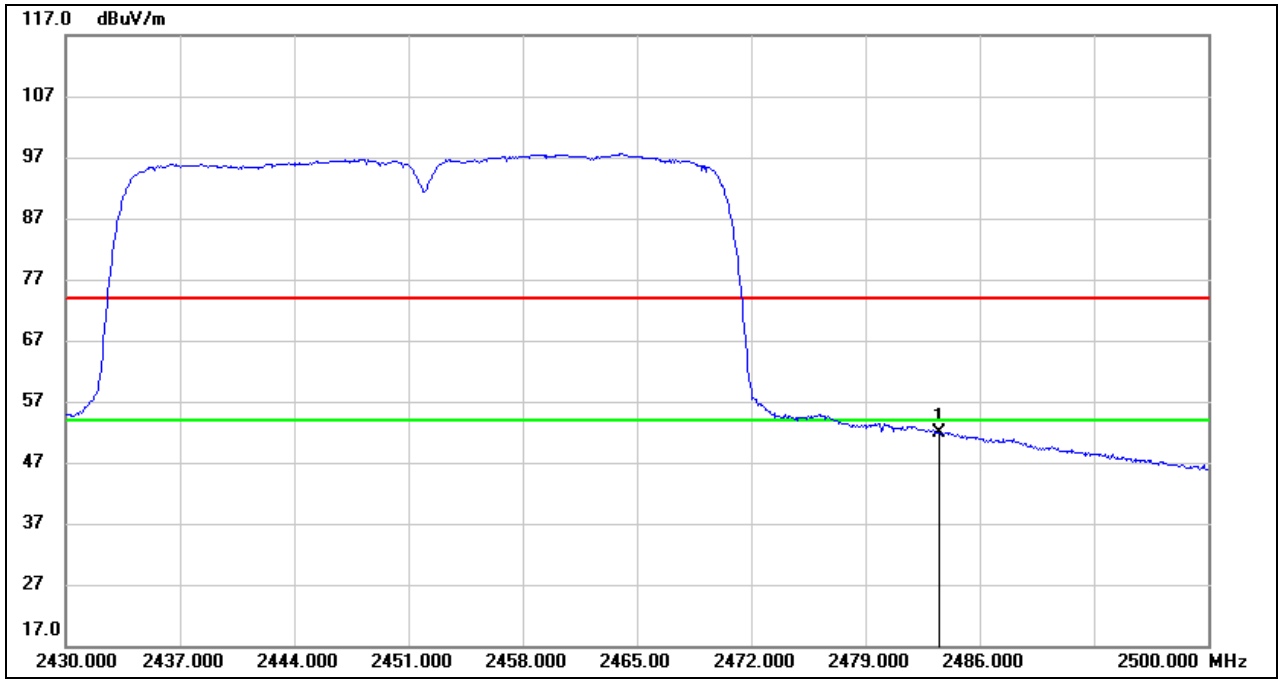



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 36.35 | 33.71 | 70.06 | 74.00 | -3.94 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**AVG**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 18.11 | 33.71 | 51.82 | 54.00 | -2.18 | AVG |

Note: 1. Measurement = Reading Level + Correct Factor.
2. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
3. For the transmitting duration, please refer to clause 7.1.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.
Note: All modes have been tested, only the worst data was recorded in the report.

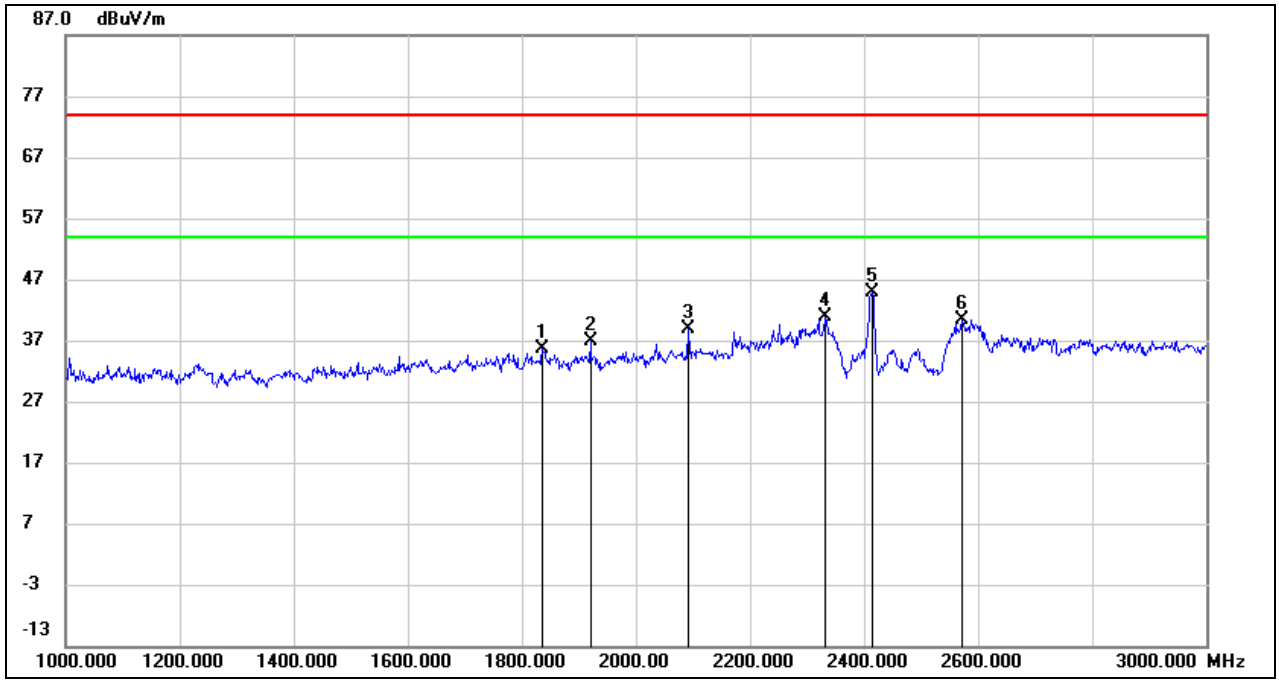

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 8.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz)

### 8.2.1. 802.11b SISO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)**

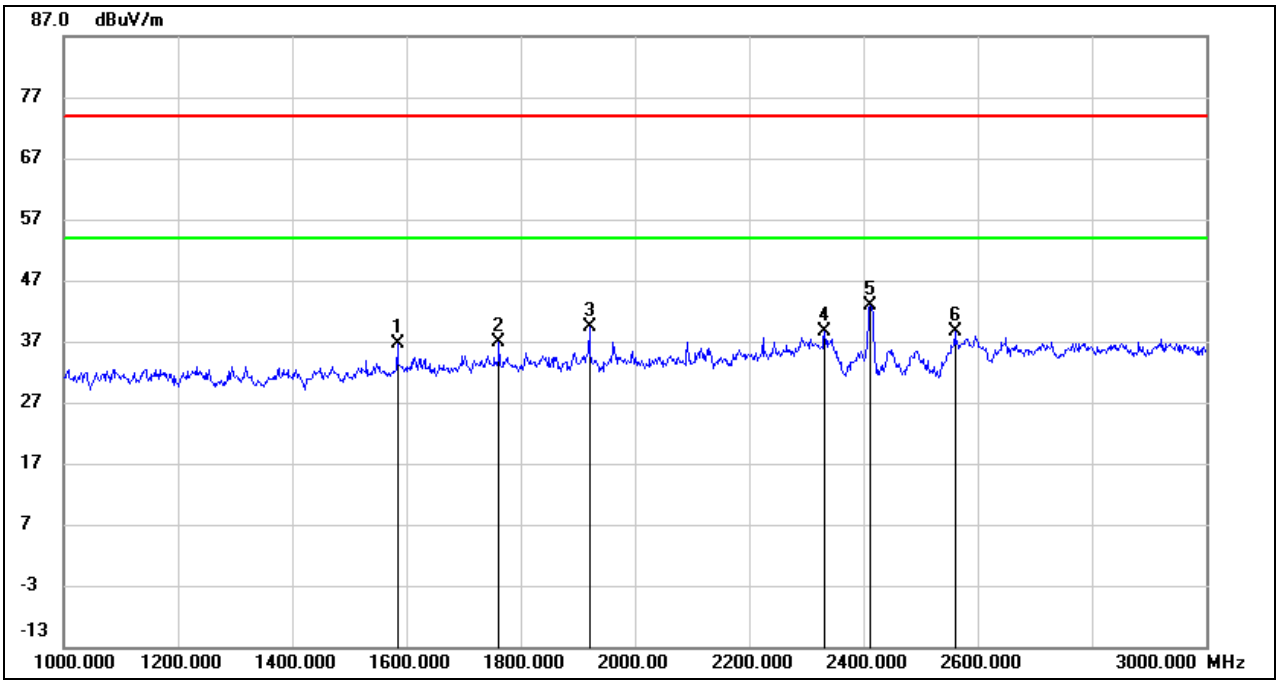



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1836.000 | 45.78 | -10.07 | 35.71 | 74.00 | -38.29 | peak |
| 2 | 1920.000 | 47.03 | -10.13 | 36.90 | 74.00 | -37.10 | peak |
| 3 | 2092.000 | 48.51 | -9.66 | 38.85 | 74.00 | -35.15 | peak |
| 4 | 2332.000 | 49.39 | -8.61 | 40.78 | 74.00 | -33.22 | peak |
| 5 | 2412.000 | 53.27 | -8.36 | 44.91 | / | / | Fundamental |
| 6 | 2572.000 | 48.36 | -7.96 | 40.40 | 74.00 | -33.60 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**

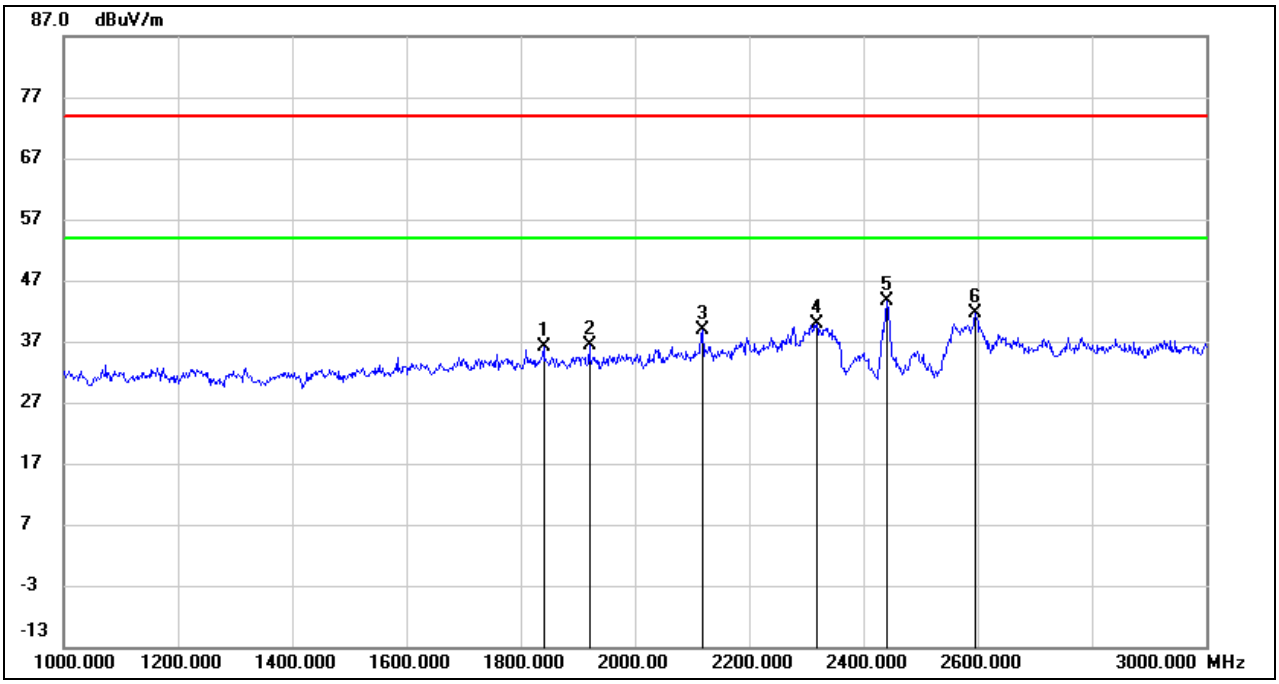



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1584.000 | 48.39 | -11.66 | 36.73 | 74.00 | -37.27 | peak |
| 2 | 1762.000 | 47.14 | -10.33 | 36.81 | 74.00 | -37.19 | peak |
| 3 | 1920.000 | 49.52 | -10.13 | 39.39 | 74.00 | -34.61 | peak |
| 4 | 2332.000 | 47.16 | -8.61 | 38.55 | 74.00 | -35.45 | peak |
| 5 | 2412.000 | 51.23 | -8.37 | 42.86 | / | / | Fundamental |
| 6 | 2560.000 | 46.51 | -8.00 | 38.51 | 74.00 | -35.49 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

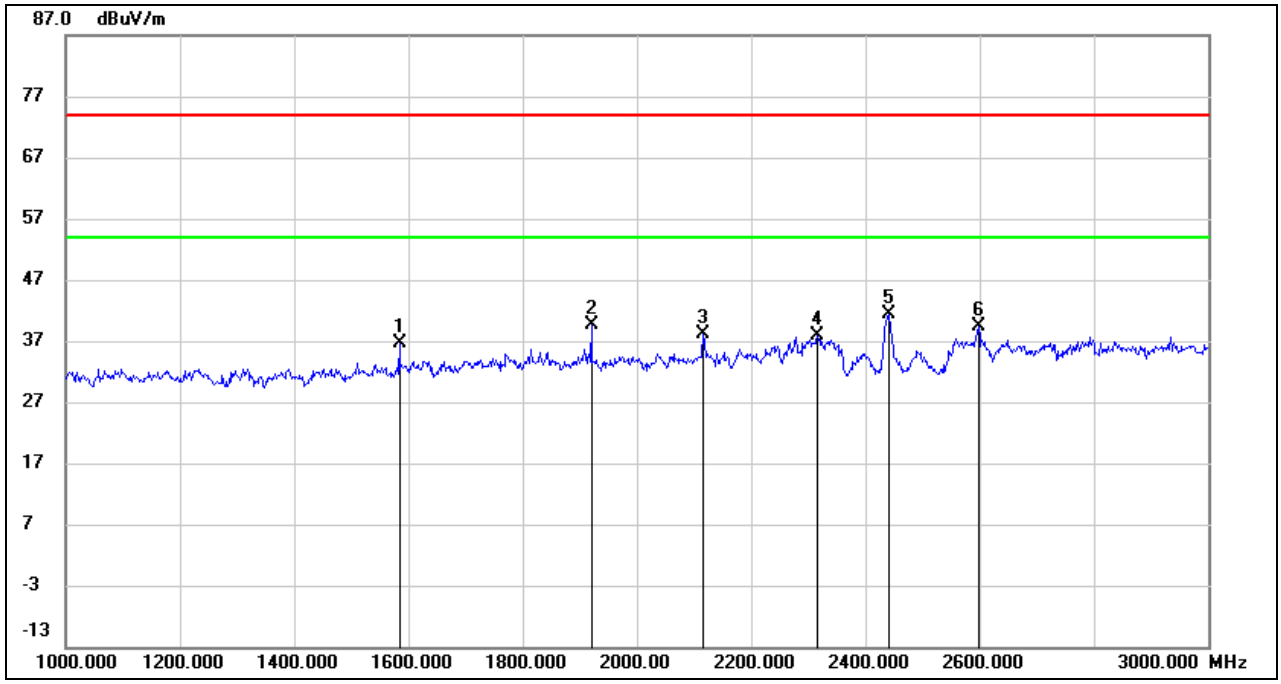



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1840.000 | 46.18 | -10.08 | 36.10 | 74.00 | -37.90 | peak |
| 2 | 1920.000 | 46.60 | -10.13 | 36.47 | 74.00 | -37.53 | peak |
| 3 | 2118.000 | 48.44 | -9.52 | 38.92 | 74.00 | -35.08 | peak |
| 4 | 2318.000 | 48.49 | -8.66 | 39.83 | 74.00 | -34.17 | peak |
| 5 | 2437.000 | 51.85 | -8.32 | 43.53 | / | / | Fundamental |
| 6 | 2596.000 | 49.55 | -7.88 | 41.67 | 74.00 | -32.33 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

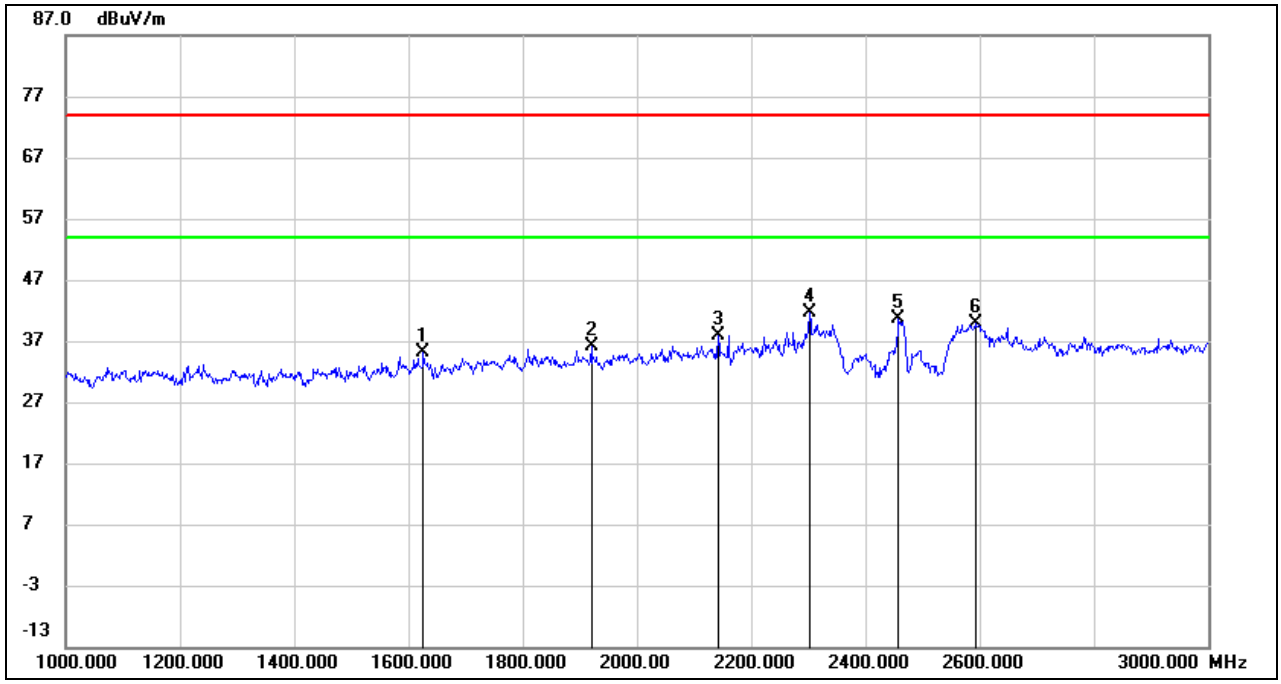



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1584.000 | 48.40 | -11.66 | 36.74 | 74.00 | -37.26 | peak |
| 2 | 1920.000 | 49.69 | -10.13 | 39.56 | 74.00 | -34.44 | peak |
| 3 | 2116.000 | 47.68 | -9.53 | 38.15 | 74.00 | -35.85 | peak |
| 4 | 2316.000 | 46.53 | -8.67 | 37.86 | 74.00 | -36.14 | peak |
| 5 | 2437.000 | 49.78 | -8.33 | 41.45 | / | / | Fundamental |
| 6 | 2598.000 | 47.28 | -7.88 | 39.40 | 74.00 | -34.60 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)**

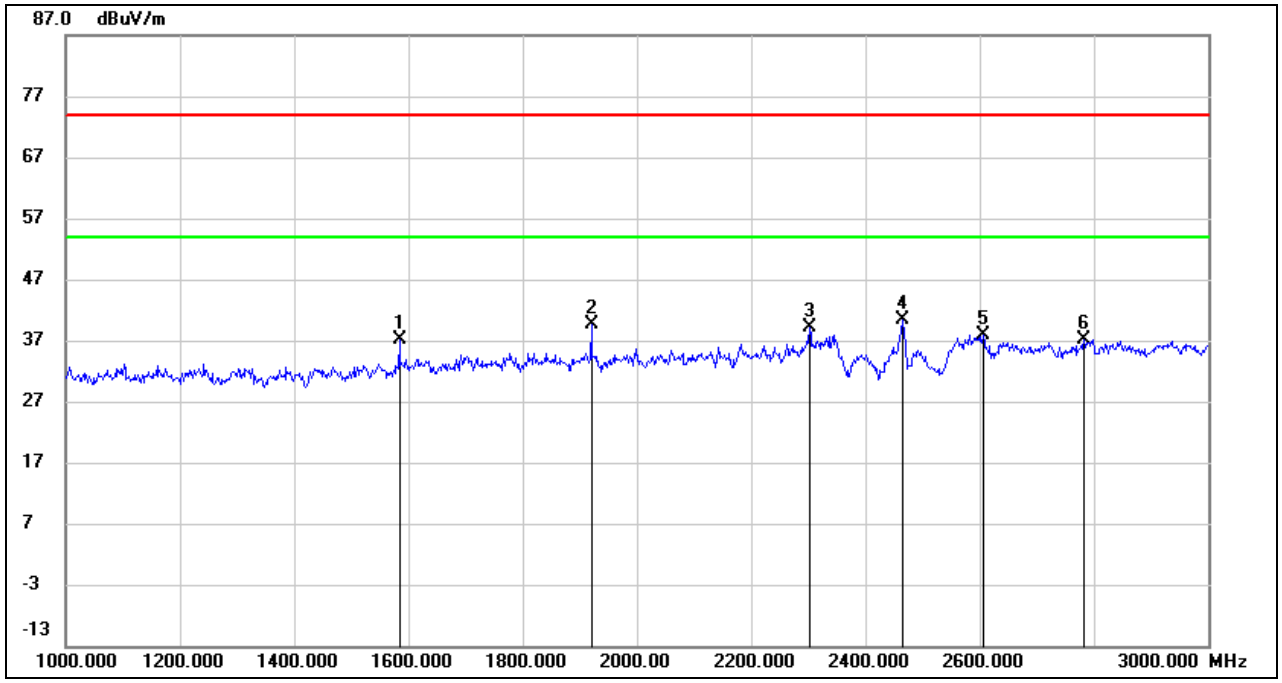



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1626.000 | 46.48 | -11.36 | 35.12 | 74.00 | -38.88 | peak |
| 2 | 1920.000 | 46.14 | -10.13 | 36.01 | 74.00 | -37.99 | peak |
| 3 | 2142.000 | 47.34 | -9.37 | 37.97 | 74.00 | -36.03 | peak |
| 4 | 2302.000 | 50.39 | -8.72 | 41.67 | 74.00 | -32.33 | peak |
| 5 | 2462.000 | 48.86 | -8.30 | 40.56 | / | / | Fundamental |
| 6 | 2592.000 | 47.76 | -7.89 | 39.87 | 74.00 | -34.13 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1584.000 | 48.80 | -11.66 | 37.14 | 74.00 | -36.86 | peak |
| 2 | 1920.000 | 49.72 | -10.13 | 39.59 | 74.00 | -34.41 | peak |
| 3 | 2302.000 | 47.91 | -8.72 | 39.19 | 74.00 | -34.81 | peak |
| 4 | 2462.000 | 48.63 | -8.27 | 40.36 | / | / | Fundamental |
| 5 | 2606.000 | 45.80 | -7.83 | 37.97 | 74.00 | -36.03 | peak |
| 6 | 2782.000 | 43.78 | -6.67 | 37.11 | 74.00 | -36.89 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

Note: Both antennas have been tested, only the worst data was recorded in the report.

Note: All modes, channels and antenna have been tested, only the worst data was recorded in the report.

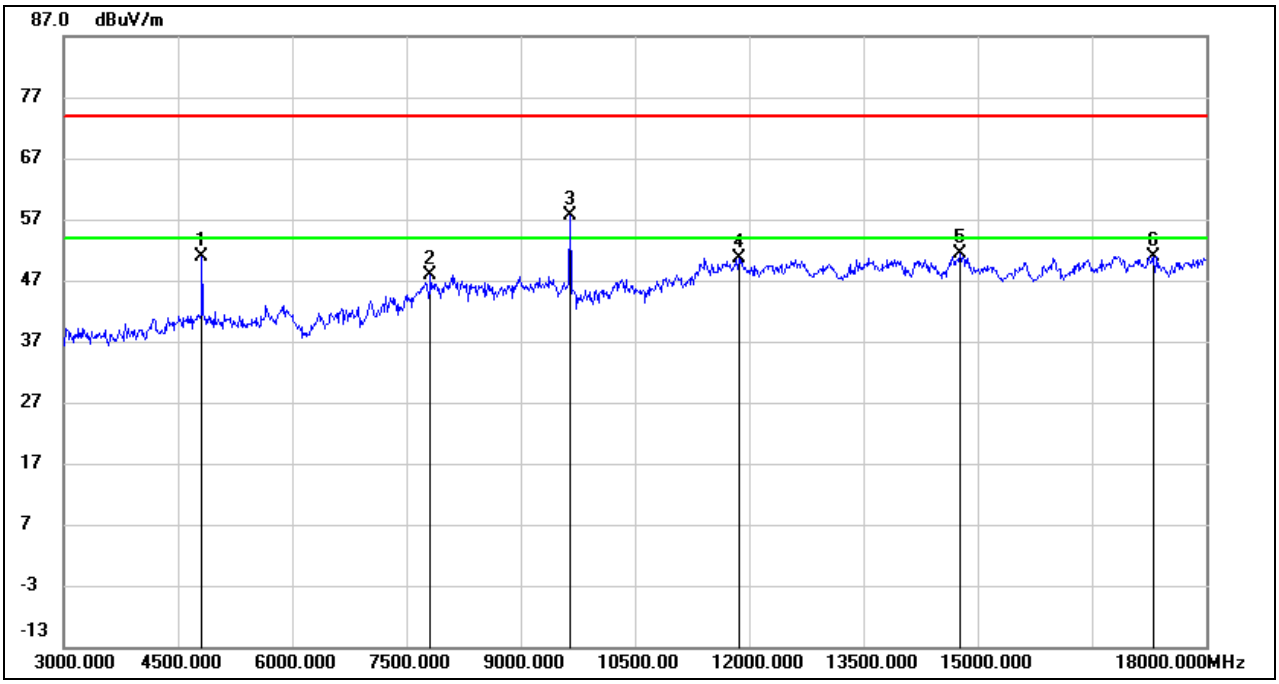

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 8.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz)

### 8.3.1. 802.11b SISO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)**

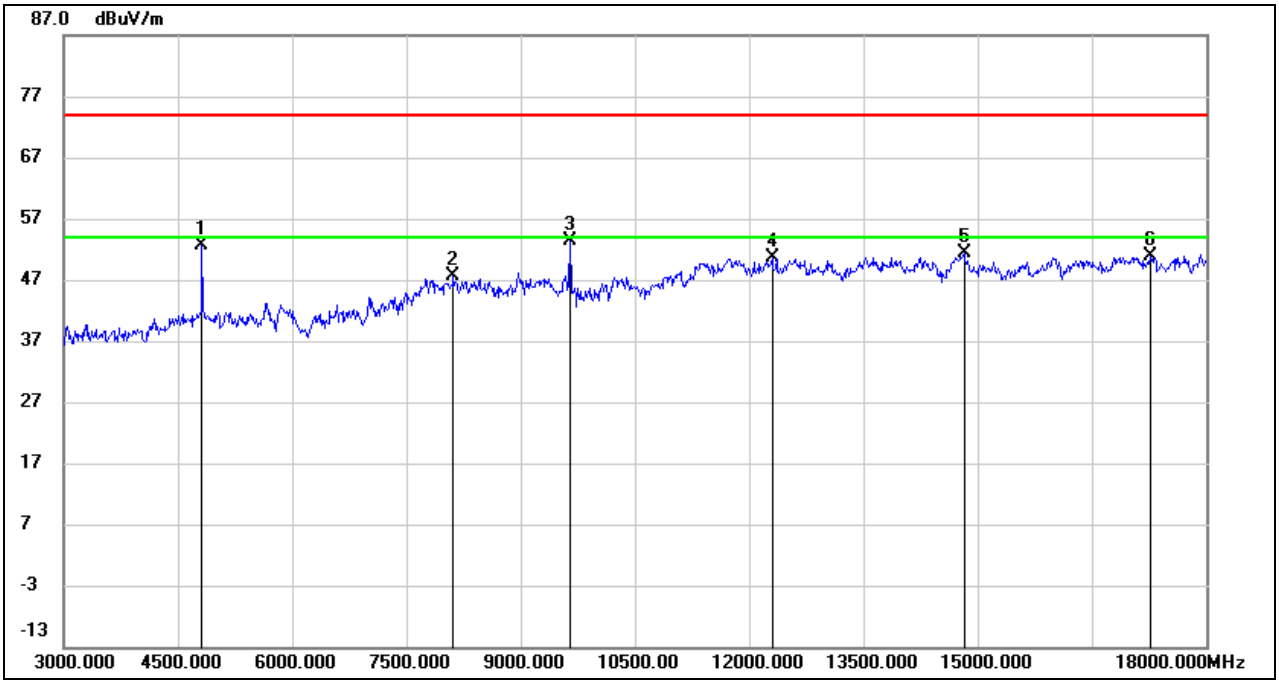



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4815.000 | 49.55 | 1.38 | 50.93 | 74.00 | -23.07 | peak |
| 2 | 7815.000 | 38.62 | 9.28 | 47.90 | 74.00 | -26.10 | peak |
| 3* | 9645.000 | 46.88 | 10.81 | 57.69 | 74.00 | -16.31 | peak |
| 4 | 11865.000 | 35.33 | 15.42 | 50.75 | 74.00 | -23.25 | peak |
| 5 | 14775.000 | 33.54 | 17.95 | 51.49 | 74.00 | -22.51 | peak |
| 6 | 17310.000 | 28.38 | 22.54 | 50.92 | 74.00 | -23.08 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
8. *-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 7.5.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**

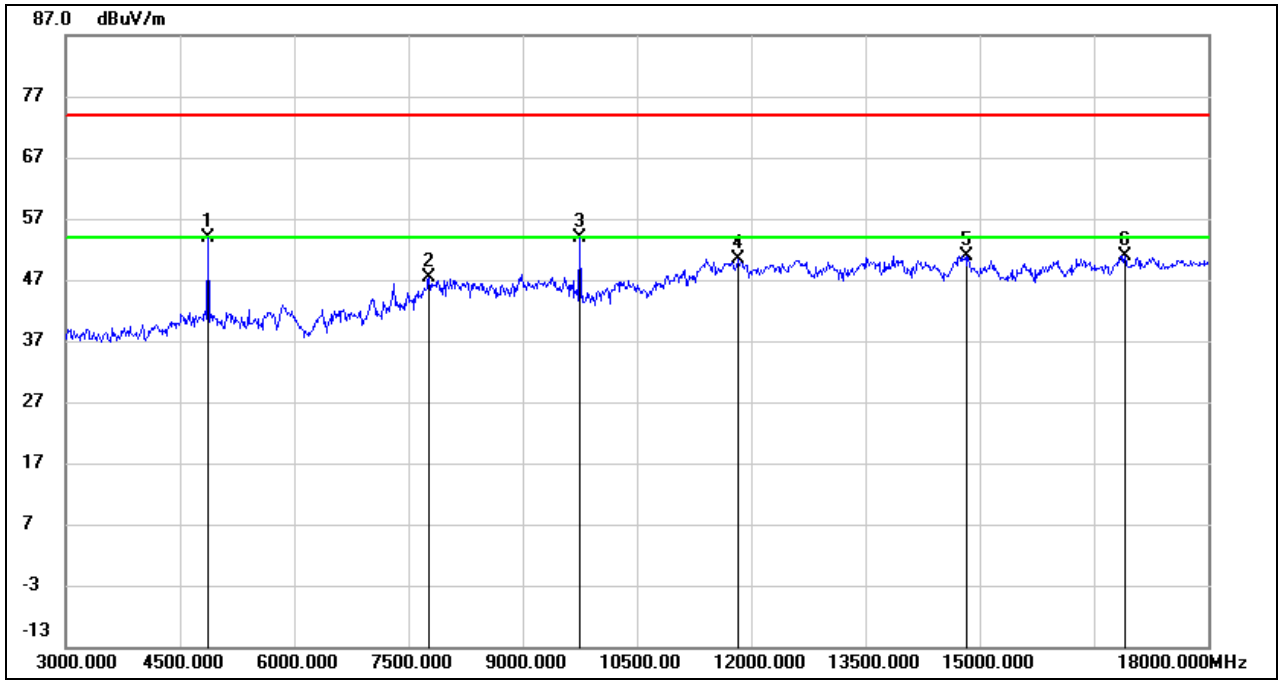



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4815.000 | 51.35 | 1.38 | 52.73 | 74.00 | -21.27 | peak |
| 2 | 8115.000 | 37.60 | 10.13 | 47.73 | 74.00 | -26.27 | peak |
| 3 | 9645.000 | 42.68 | 10.81 | 53.49 | 74.00 | -20.51 | peak |
| 4 | 12300.000 | 34.64 | 16.09 | 50.73 | 74.00 | -23.27 | peak |
| 5 | 14820.000 | 33.45 | 17.91 | 51.36 | 74.00 | -22.64 | peak |
| 6 | 17265.000 | 28.58 | 22.39 | 50.97 | 74.00 | -23.03 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

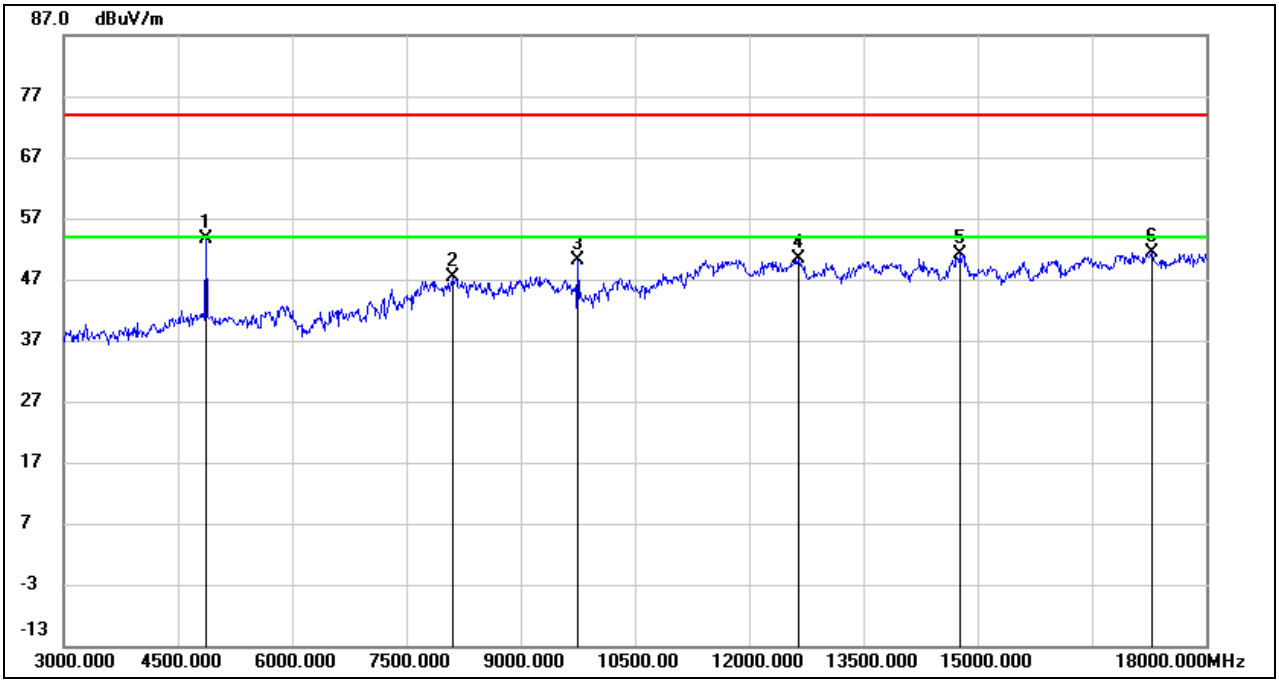



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4875.000 | 52.56 | 1.32 | 53.88 | 74.00 | -20.12 | peak |
| 2 | 7770.000 | 38.17 | 9.09 | 47.26 | 74.00 | -26.74 | peak |
| 3 | 9750.000 | 43.57 | 10.29 | 53.86 | 74.00 | -20.14 | peak |
| 4 | 11842.500 | 35.02 | 15.36 | 50.38 | 74.00 | -23.62 | peak |
| 5 | 14820.000 | 33.03 | 17.91 | 50.94 | 74.00 | -23.06 | peak |
| 6 | 16912.500 | 29.29 | 21.53 | 50.82 | 74.00 | -23.18 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

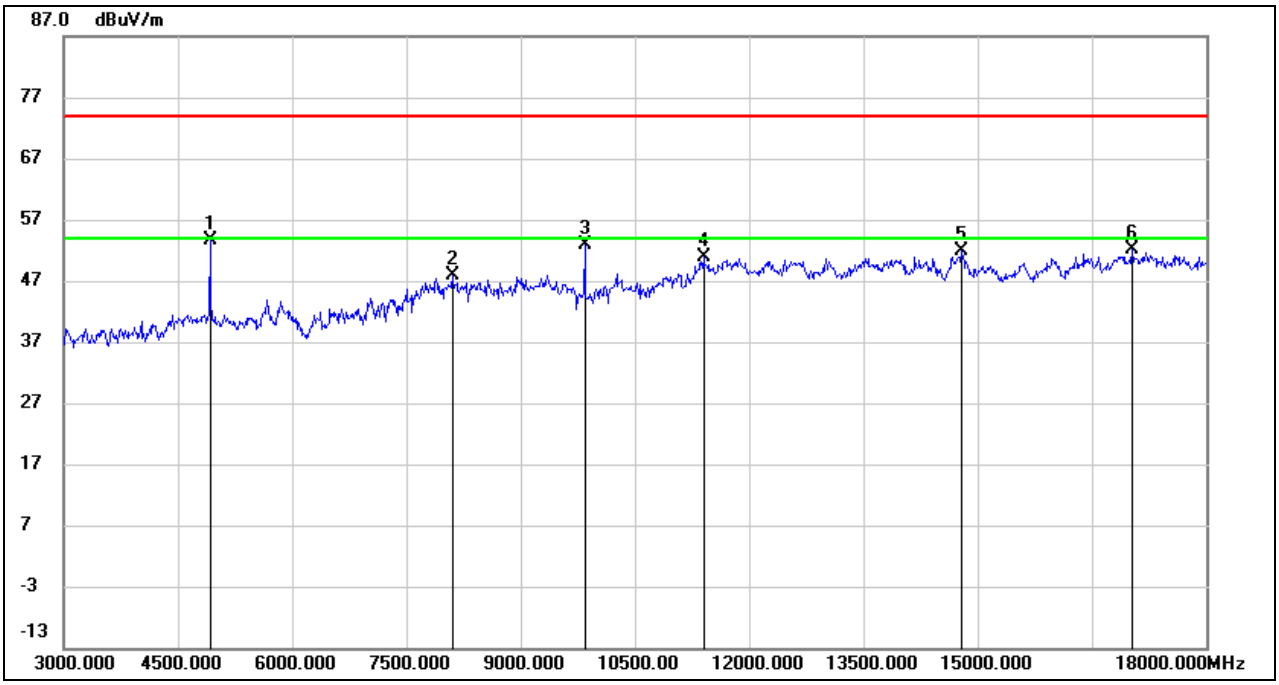



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4875.000 | 52.37 | 1.32 | 53.69 | 74.00 | -20.31 | peak |
| 2 | 8115.000 | 37.30 | 10.13 | 47.43 | 74.00 | -26.57 | peak |
| 3 | 9750.000 | 39.79 | 10.29 | 50.08 | 74.00 | -23.92 | peak |
| 4 | 12645.000 | 34.76 | 15.71 | 50.47 | 74.00 | -23.53 | peak |
| 5 | 14767.500 | 33.25 | 17.93 | 51.18 | 74.00 | -22.82 | peak |
| 6 | 17280.000 | 28.98 | 22.48 | 51.46 | 74.00 | -22.54 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)**

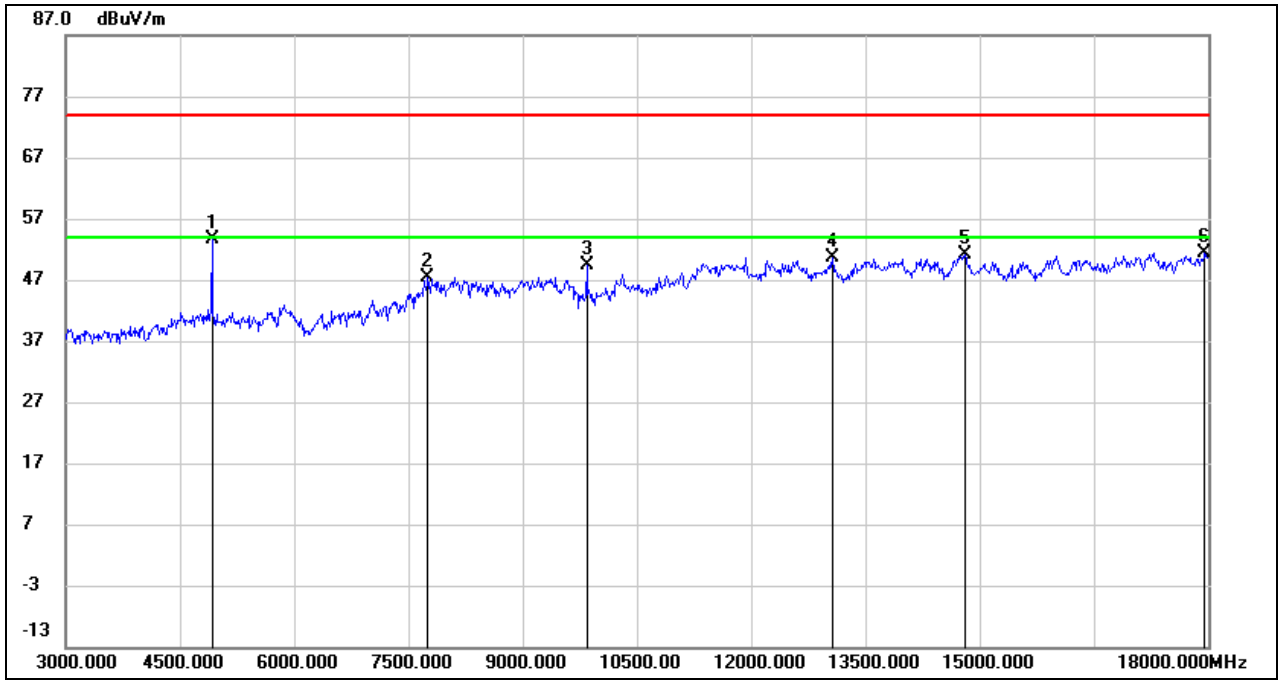



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 52.30 | 1.45 | 53.75 | 74.00 | -20.25 | peak |
| 2 | 8107.500 | 37.64 | 10.15 | 47.79 | 74.00 | -26.21 | peak |
| 3 | 9847.500 | 42.29 | 10.55 | 52.84 | 74.00 | -21.16 | peak |
| 4 | 11407.500 | 36.12 | 14.75 | 50.87 | 74.00 | -23.13 | peak |
| 5 | 14797.500 | 33.77 | 18.03 | 51.80 | 74.00 | -22.20 | peak |
| 6 | 17025.000 | 30.85 | 21.40 | 52.25 | 74.00 | -21.75 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 52.09 | 1.45 | 53.54 | 74.00 | -20.46 | peak |
| 2 | 7755.000 | 38.54 | 8.94 | 47.48 | 74.00 | -26.52 | peak |
| 3 | 9847.500 | 38.87 | 10.55 | 49.42 | 74.00 | -24.58 | peak |
| 4 | 13072.500 | 34.73 | 16.01 | 50.74 | 74.00 | -23.26 | peak |
| 5 | 14805.000 | 33.04 | 18.00 | 51.04 | 74.00 | -22.96 | peak |
| 6 | 17962.500 | 27.35 | 24.13 | 51.48 | 74.00 | -22.52 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

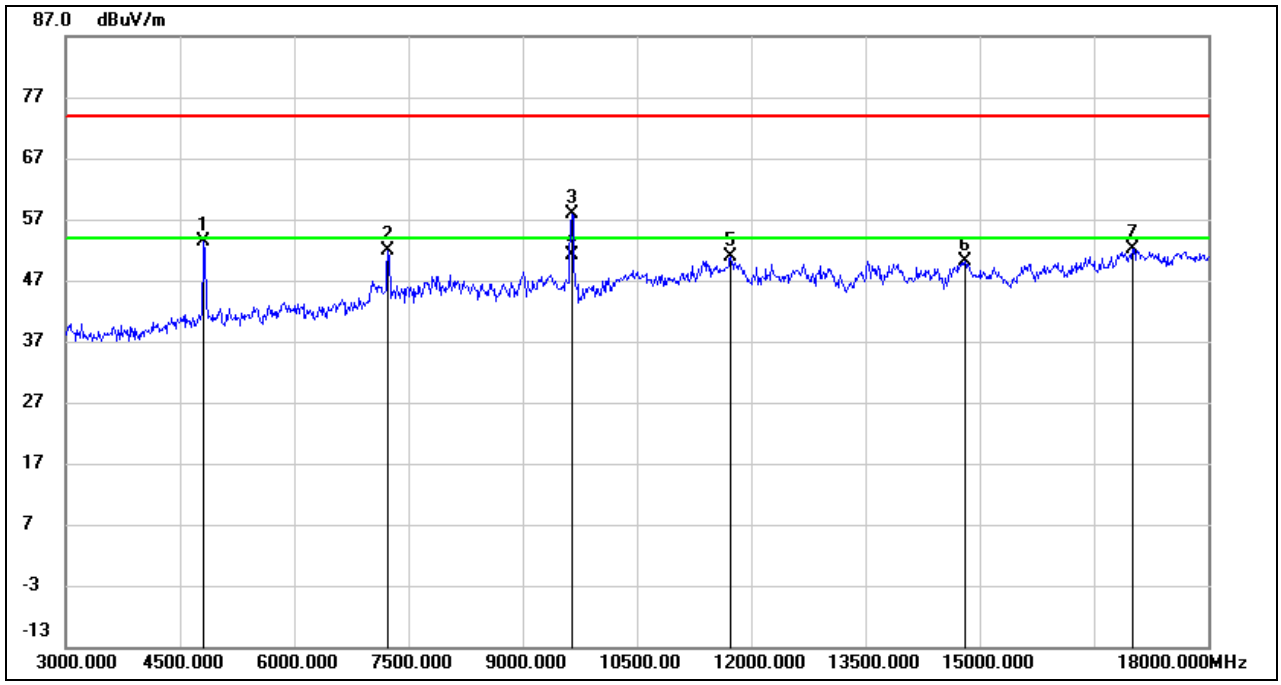
Note: Both antennas have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 8.3.2. 802.11g SISO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)**

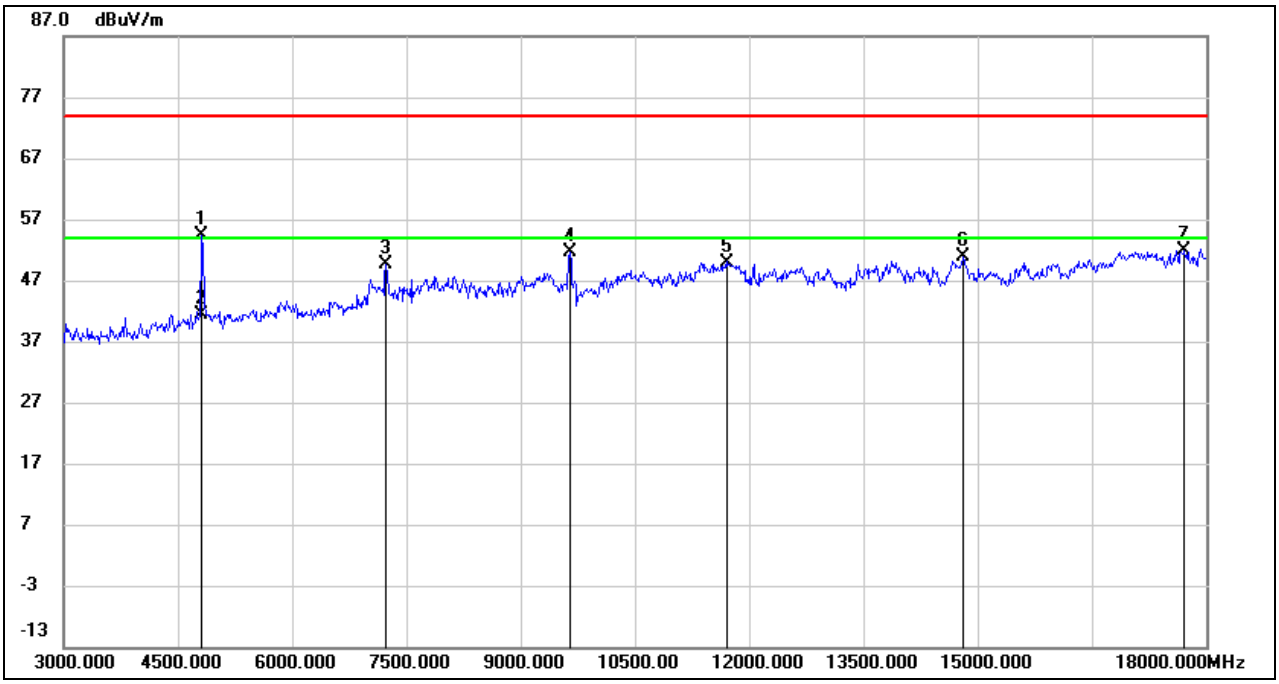



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4815.000 | 51.92 | 1.38 | 53.30 | 74.00 | -20.70 | peak |
| 2 | 7230.000 | 44.63 | 7.28 | 51.91 | 74.00 | -22.09 | peak |
| 3 | 9645.000 | 47.10 | 10.81 | 57.91 | 74.00 | -16.09 | peak |
| 4 | 9645.000 | 40.42 | 10.81 | 51.23 | 54.00 | -2.77 | AVG |
| 5 | 11730.000 | 35.56 | 15.32 | 50.88 | 74.00 | -23.12 | peak |
| 6 | 14805.000 | 32.25 | 18.00 | 50.25 | 74.00 | -23.75 | peak |
| 7 | 17010.000 | 30.91 | 21.31 | 52.22 | 74.00 | -21.78 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**

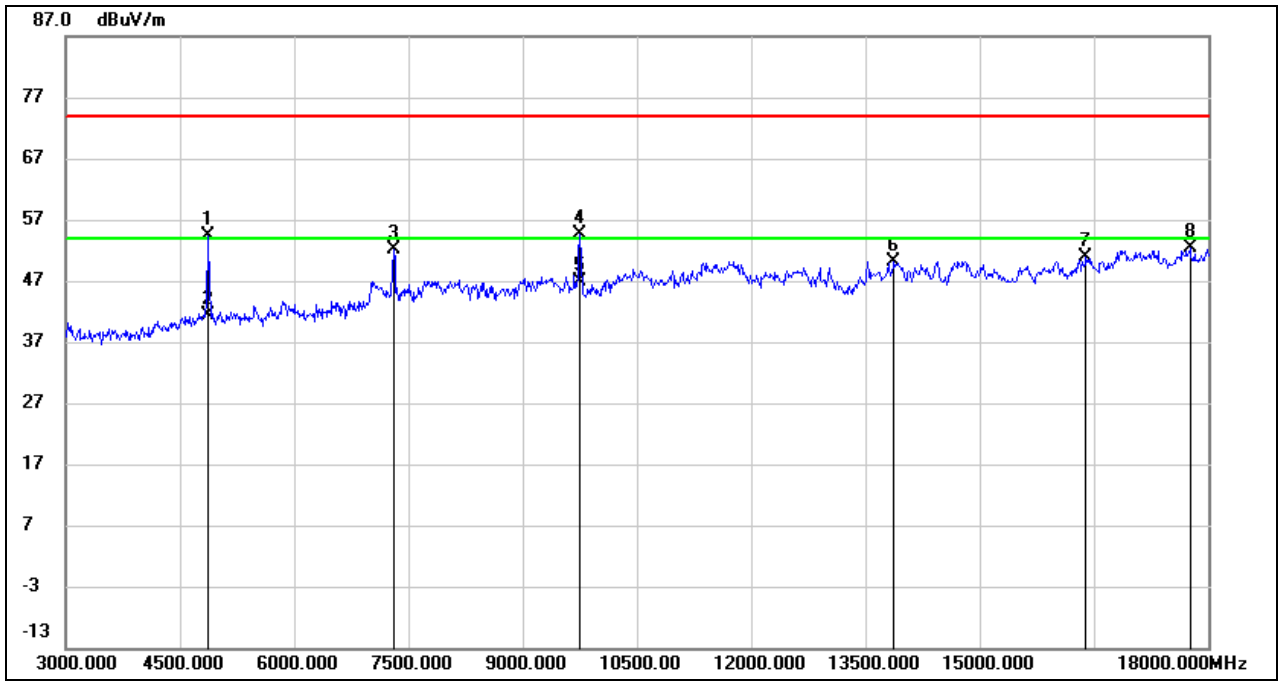



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4815.000 | 52.92 | 1.38 | 54.30 | 74.00 | -19.70 | peak |
| 2 | 4815.000 | 40.05 | 1.38 | 41.43 | 54.00 | -12.57 | AVG |
| 3 | 7230.000 | 42.24 | 7.28 | 49.52 | 74.00 | -24.48 | peak |
| 4 | 9645.000 | 40.92 | 10.81 | 51.73 | 74.00 | -22.27 | peak |
| 5 | 11700.000 | 34.65 | 15.35 | 50.00 | 74.00 | -24.00 | peak |
| 6 | 14805.000 | 32.83 | 18.00 | 50.83 | 74.00 | -23.17 | peak |
| 7 | 17715.000 | 28.27 | 23.56 | 51.83 | 74.00 | -22.17 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

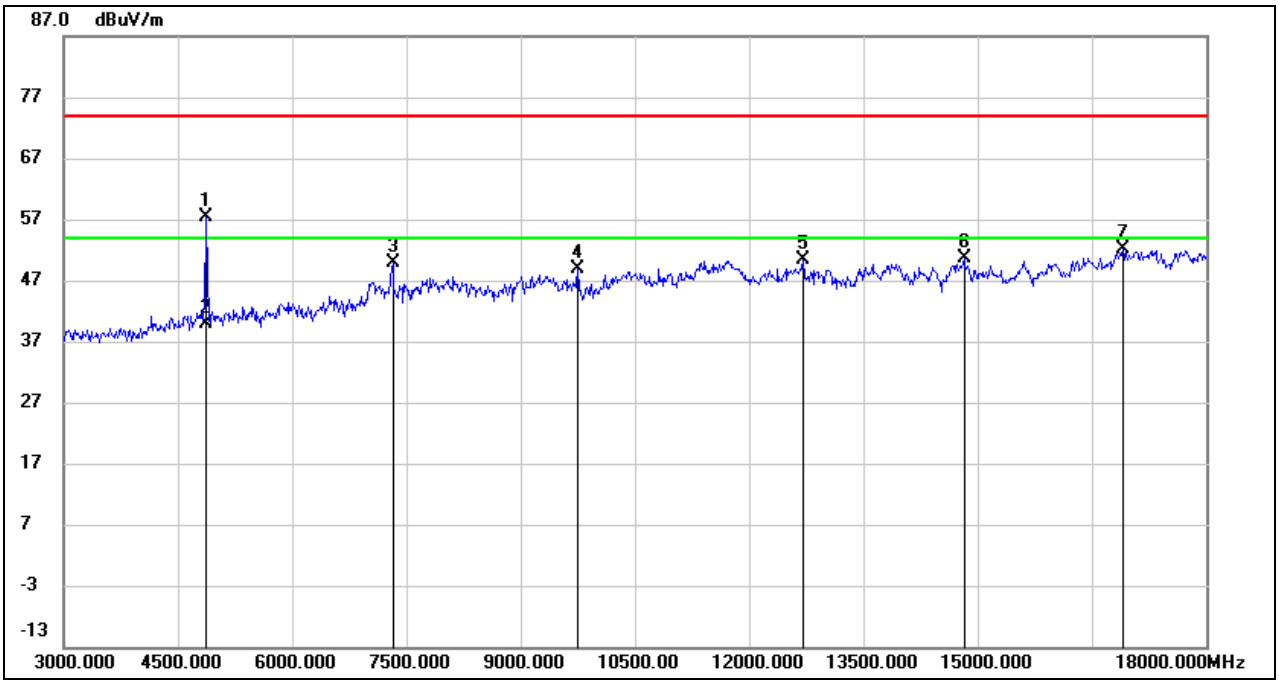



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4875.000 | 53.03 | 1.32 | 54.35 | 74.00 | -19.65 | peak |
| 2 | 4875.000 | 40.13 | 1.32 | 41.45 | 54.00 | -12.55 | AVG |
| 3 | 7305.000 | 45.04 | 7.14 | 52.18 | 74.00 | -21.82 | peak |
| 4 | 9750.000 | 44.41 | 10.29 | 54.70 | 74.00 | -19.30 | peak |
| 5 | 9750.000 | 36.64 | 10.29 | 46.93 | 54.00 | -7.07 | AVG |
| 6 | 13875.000 | 32.68 | 17.55 | 50.23 | 74.00 | -23.77 | peak |
| 7 | 16395.000 | 31.23 | 19.68 | 50.91 | 74.00 | -23.09 | peak |
| 8 | 17760.000 | 28.61 | 23.82 | 52.43 | 74.00 | -21.57 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

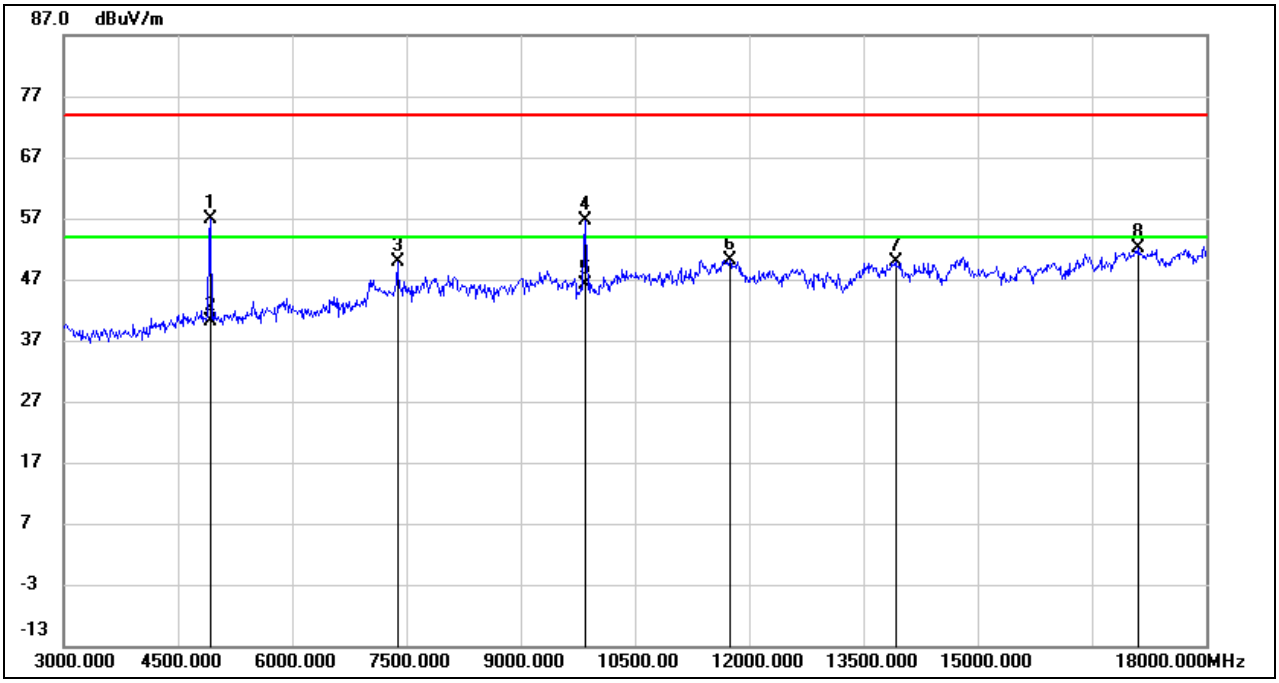



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4875.000 | 56.15 | 1.32 | 57.47 | 74.00 | -16.53 | peak |
| 2 | 4875.000 | 38.57 | 1.32 | 39.89 | 54.00 | -14.11 | AVG |
| 3 | 7320.000 | 42.57 | 7.28 | 49.85 | 74.00 | -24.15 | peak |
| 4 | 9750.000 | 38.62 | 10.29 | 48.91 | 74.00 | -25.09 | peak |
| 5 | 12705.000 | 34.80 | 15.64 | 50.44 | 74.00 | -23.56 | peak |
| 6 | 14820.000 | 32.77 | 17.91 | 50.68 | 74.00 | -23.32 | peak |
| 7 | 16905.000 | 30.51 | 21.55 | 52.06 | 74.00 | -21.94 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)**

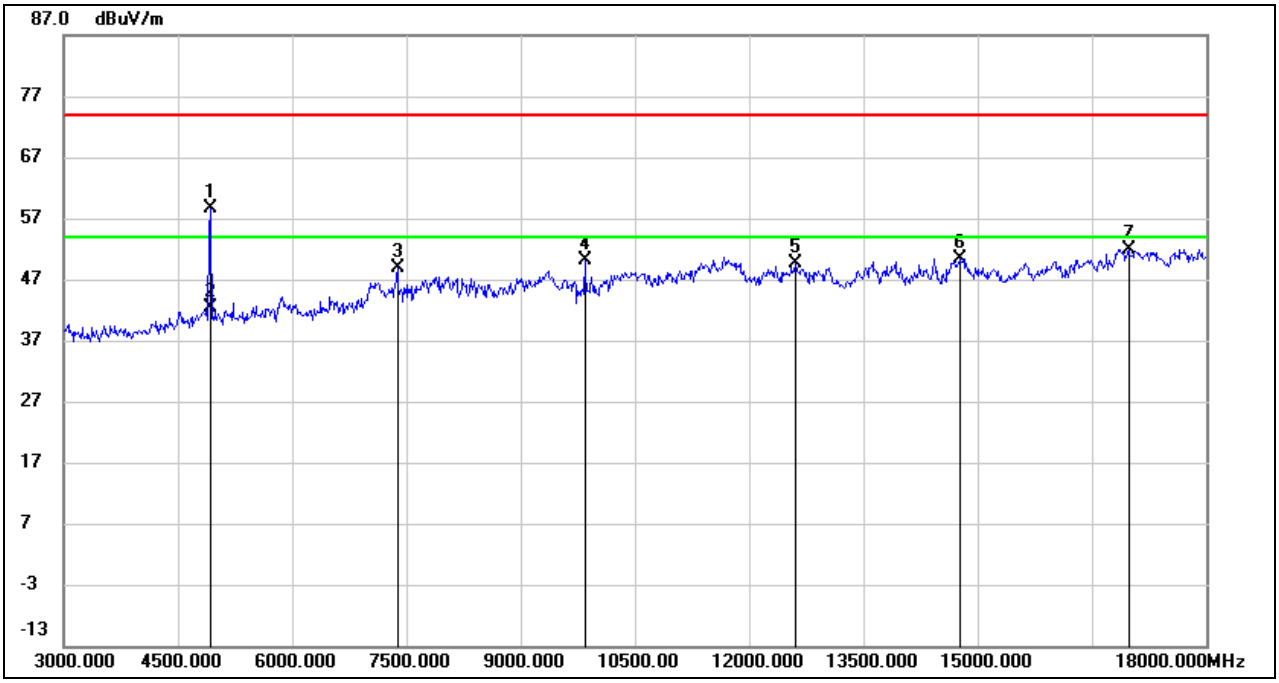



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 55.49 | 1.45 | 56.94 | 74.00 | -17.06 | peak |
| 2 | 4920.000 | 38.76 | 1.45 | 40.21 | 54.00 | -13.79 | AVG |
| 3 | 7380.000 | 42.18 | 7.79 | 49.97 | 74.00 | -24.03 | peak |
| 4 | 9840.000 | 46.07 | 10.48 | 56.55 | 74.00 | -17.45 | peak |
| 5 | 9840.000 | 35.77 | 10.48 | 46.25 | 54.00 | -7.75 | AVG |
| 6 | 11745.000 | 34.76 | 15.30 | 50.06 | 74.00 | -23.94 | peak |
| 7 | 13920.000 | 32.30 | 17.55 | 49.85 | 74.00 | -24.15 | peak |
| 8 | 17115.000 | 30.21 | 21.91 | 52.12 | 74.00 | -21.88 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 57.30 | 1.45 | 58.75 | 74.00 | -15.25 | peak |
| 2 | 4920.000 | 41.04 | 1.45 | 42.49 | 54.00 | -11.51 | AVG |
| 3 | 7380.000 | 41.14 | 7.79 | 48.93 | 74.00 | -25.07 | peak |
| 4 | 9840.000 | 39.62 | 10.48 | 50.10 | 74.00 | -23.90 | peak |
| 5 | 12615.000 | 33.93 | 15.75 | 49.68 | 74.00 | -24.32 | peak |
| 6 | 14775.000 | 32.53 | 17.95 | 50.48 | 74.00 | -23.52 | peak |
| 7 | 16980.000 | 30.69 | 21.30 | 51.99 | 74.00 | -22.01 | peak |

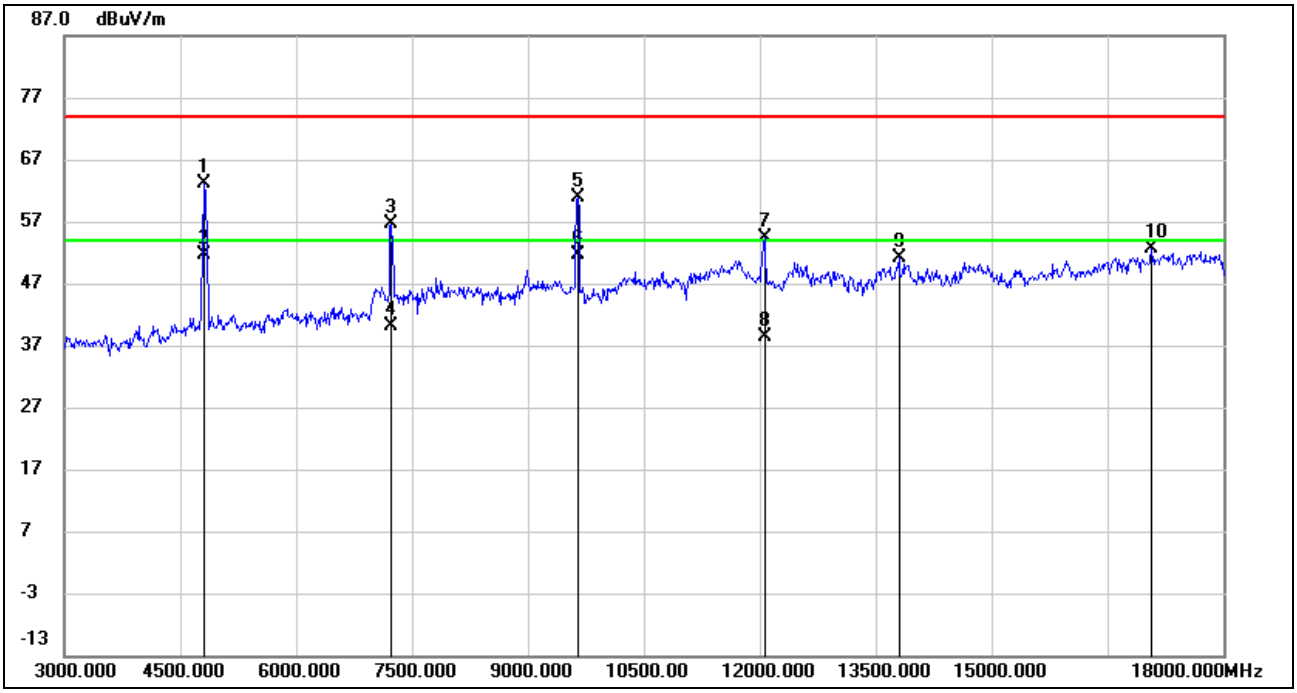
Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

Note: Both antennas have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 8.3.3. 802.11n HT20 MIMO MODE

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)**

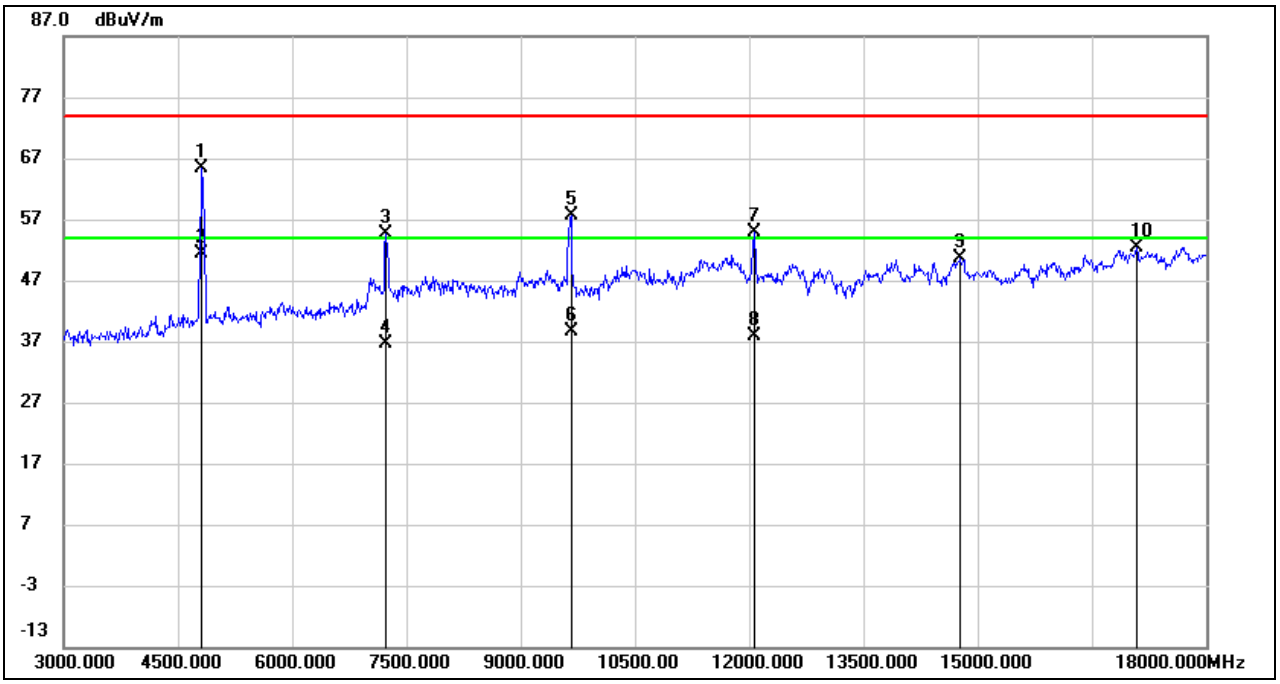



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4824.000 | 61.84 | 1.37 | 63.21 | 74.00 | -10.79 | peak |
| 2 | 4824.000 | 50.38 | 1.37 | 51.75 | 54.00 | -2.25 | AVG |
| 3 | 7230.000 | 49.43 | 7.28 | 56.71 | 74.00 | -17.29 | peak |
| 4 | 7230.000 | 32.87 | 7.28 | 40.15 | 54.00 | -13.85 | AVG |
| 5 | 9650.500 | 50.20 | 10.78 | 60.98 | 74.00 | -13.02 | peak |
| 6 | 9650.500 | 40.84 | 10.78 | 51.62 | 54.00 | -2.38 | AVG |
| 7 | 12072.500 | 39.05 | 15.41 | 54.46 | 74.00 | -19.54 | peak |
| 8 | 12072.500 | 22.85 | 15.41 | 38.26 | 54.00 | -15.74 | AVG |
| 9 | 13807.000 | 33.42 | 17.60 | 51.02 | 74.00 | -22.98 | peak |
| 10 | 17080.500 | 30.75 | 21.77 | 52.52 | 74.00 | -21.48 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)

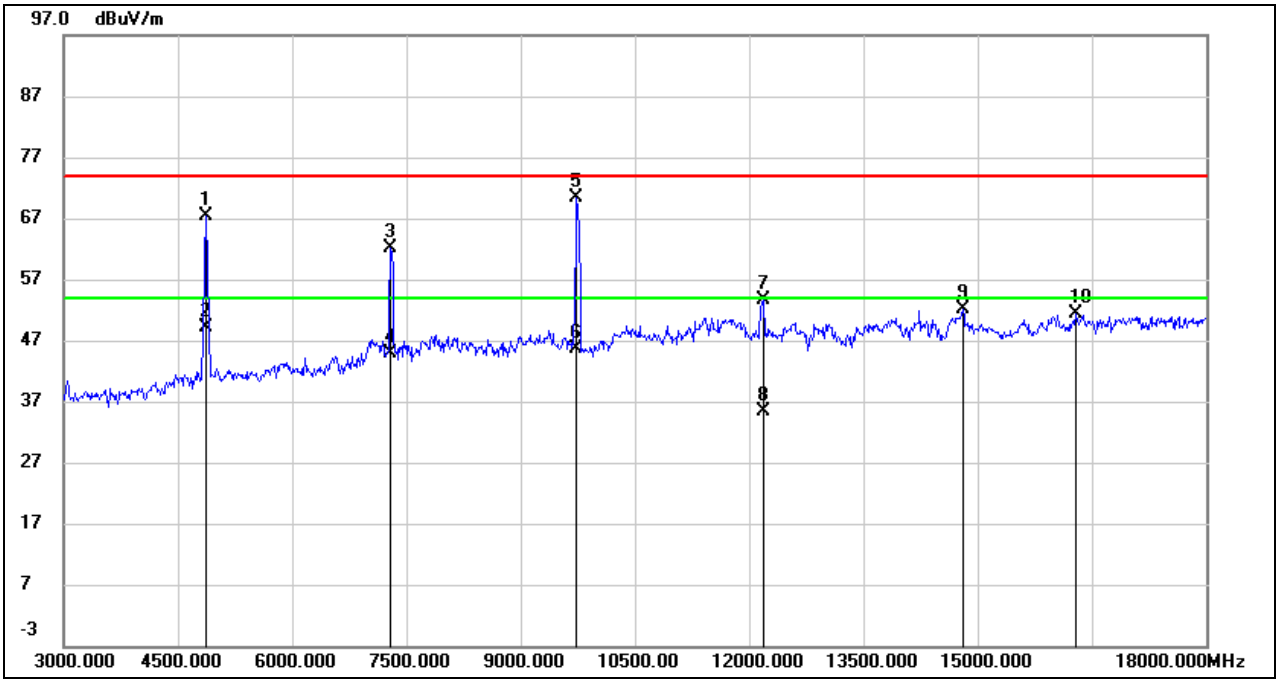



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4815.000 | 63.95 | 1.38 | 65.33 | 74.00 | -8.67 | peak |
| 2 | 4815.000 | 49.94 | 1.38 | 51.32 | 54.00 | -2.68 | AVG |
| 3 | 7230.000 | 47.29 | 7.28 | 54.57 | 74.00 | -19.43 | peak |
| 4 | 7230.000 | 29.37 | 7.28 | 36.65 | 54.00 | -17.35 | AVG |
| 5 | 9660.000 | 46.95 | 10.74 | 57.69 | 74.00 | -16.31 | peak |
| 6 | 9660.000 | 28.01 | 10.74 | 38.75 | 54.00 | -15.25 | AVG |
| 7 | 12060.000 | 39.53 | 15.44 | 54.97 | 74.00 | -19.03 | peak |
| 8 | 12060.000 | 22.35 | 15.44 | 37.79 | 54.00 | -16.21 | AVG |
| 9 | 14775.000 | 32.57 | 17.95 | 50.52 | 74.00 | -23.48 | peak |
| 10 | 17085.000 | 30.49 | 21.80 | 52.29 | 74.00 | -21.71 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

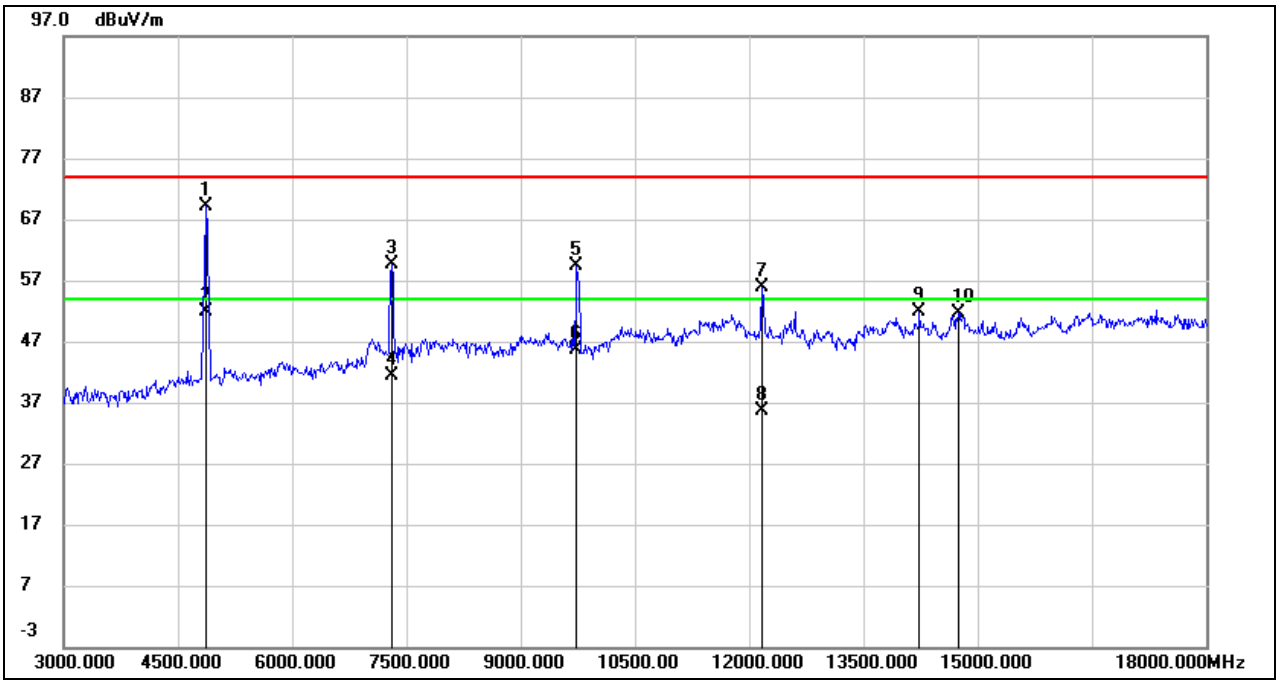



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4867.500 | 66.14 | 1.32 | 67.46 | 74.00 | -6.54 | peak |
| 2 | 4867.500 | 47.83 | 1.32 | 49.15 | 54.00 | -4.85 | AVG |
| 3 | 7297.500 | 55.08 | 7.11 | 62.19 | 74.00 | -11.81 | peak |
| 4 | 7297.500 | 37.78 | 7.11 | 44.89 | 54.00 | -9.11 | AVG |
| 5 | 9735.000 | 59.97 | 10.37 | 70.34 | 74.00 | -3.66 | peak |
| 6 | 9735.000 | 35.36 | 10.37 | 45.73 | 54.00 | -8.27 | AVG |
| 7 | 12195.000 | 37.72 | 15.93 | 53.65 | 74.00 | -20.35 | peak |
| 8 | 12195.000 | 19.49 | 15.93 | 35.42 | 54.00 | -18.58 | AVG |
| 9 | 14812.500 | 34.12 | 17.96 | 52.08 | 74.00 | -21.92 | peak |
| 10 | 16290.000 | 31.96 | 19.52 | 51.48 | 74.00 | -22.52 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

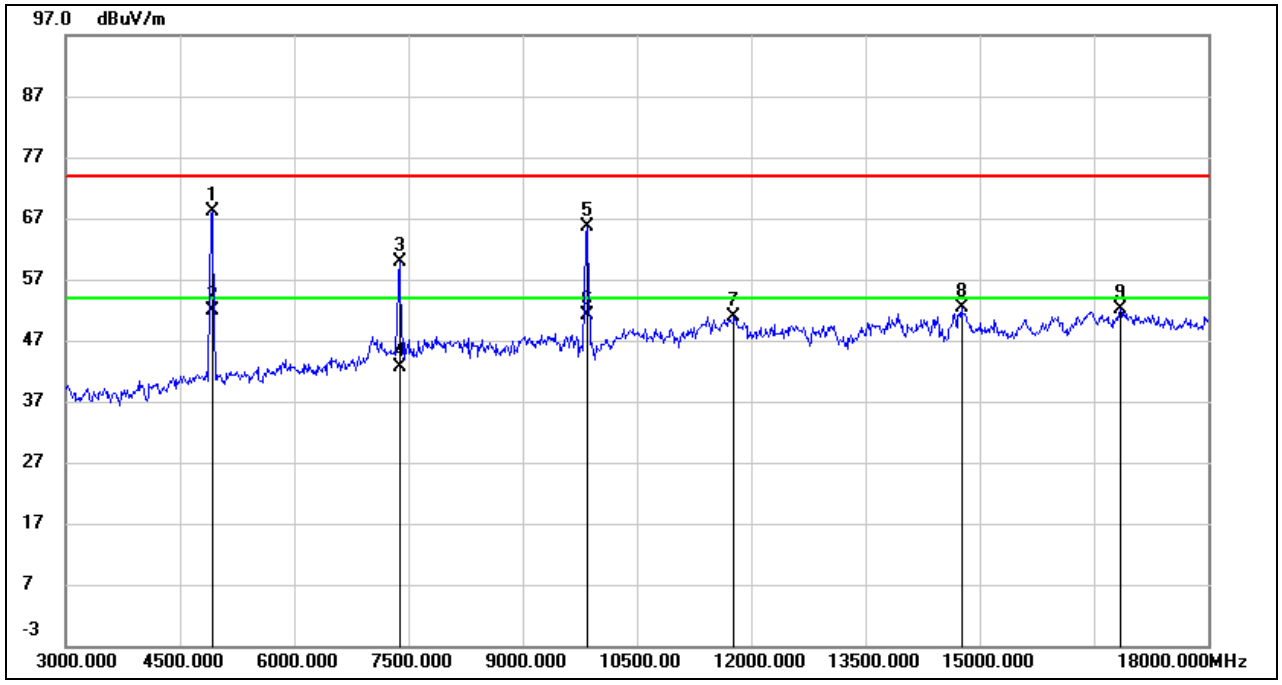



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4875.000 | 67.93 | 1.32 | 69.25 | 74.00 | -4.75 | peak |
| 2 | 4875.000 | 50.53 | 1.32 | 51.85 | 54.00 | -2.15 | AVG |
| 3 | 7305.000 | 52.54 | 7.14 | 59.68 | 74.00 | -14.32 | peak |
| 4 | 7305.000 | 34.32 | 7.14 | 41.46 | 54.00 | -12.54 | AVG |
| 5 | 9735.000 | 49.01 | 10.37 | 59.38 | 74.00 | -14.62 | peak |
| 6 | 9735.000 | 35.31 | 10.37 | 45.68 | 54.00 | -8.32 | AVG |
| 7 | 12165.000 | 40.15 | 15.74 | 55.89 | 74.00 | -18.11 | peak |
| 8 | 12165.000 | 19.82 | 15.74 | 35.56 | 54.00 | -18.44 | AVG |
| 9 | 14242.500 | 33.85 | 17.93 | 51.78 | 74.00 | -22.22 | peak |
| 10 | 14745.000 | 33.74 | 17.84 | 51.58 | 74.00 | -22.42 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)**

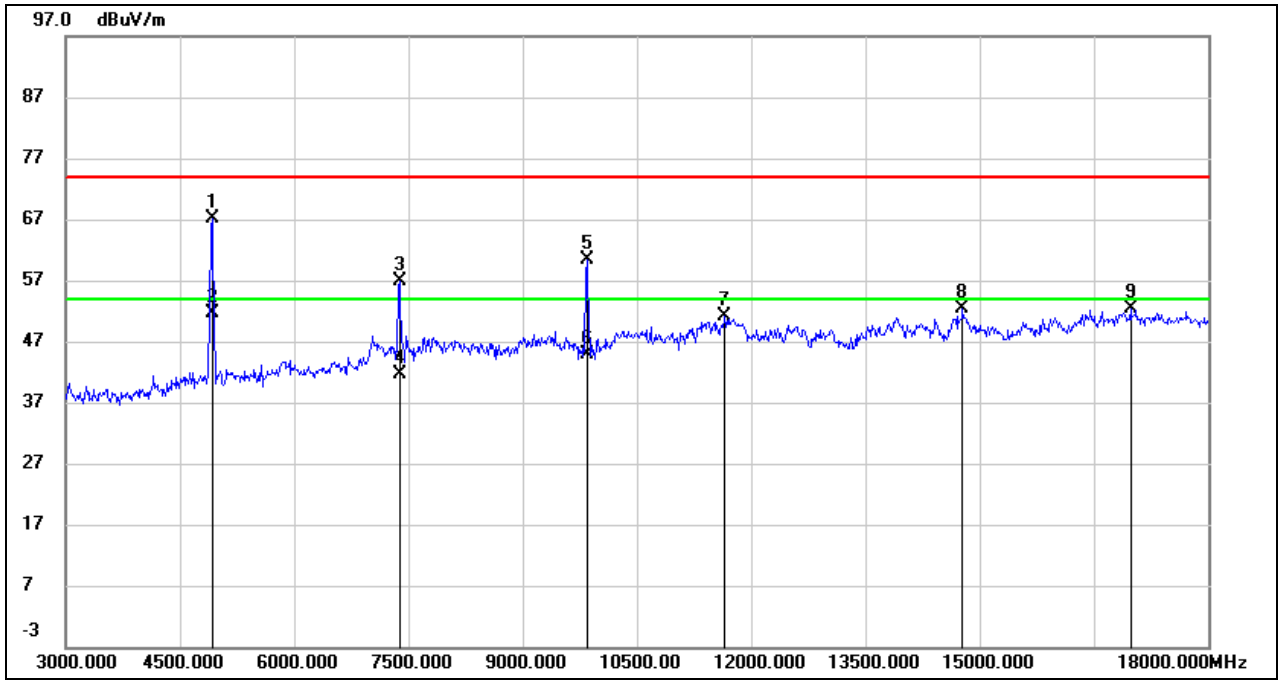



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 66.61 | 1.45 | 68.06 | 74.00 | -5.94 | peak |
| 2 | 4920.000 | 50.48 | 1.45 | 51.93 | 54.00 | -2.07 | AVG |
| 3 | 7387.500 | 52.03 | 7.86 | 59.89 | 74.00 | -14.11 | peak |
| 4 | 7387.500 | 34.71 | 7.86 | 42.57 | 54.00 | -11.43 | AVG |
| 5 | 9840.000 | 55.18 | 10.48 | 65.66 | 74.00 | -8.34 | peak |
| 6 | 9840.000 | 40.66 | 10.48 | 51.14 | 54.00 | -2.86 | AVG |
| 7 | 11782.500 | 35.61 | 15.26 | 50.87 | 74.00 | -23.13 | peak |
| 8 | 14767.500 | 34.37 | 17.93 | 52.30 | 74.00 | -21.70 | peak |
| 9 | 16845.000 | 31.15 | 21.10 | 52.25 | 74.00 | -21.75 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**



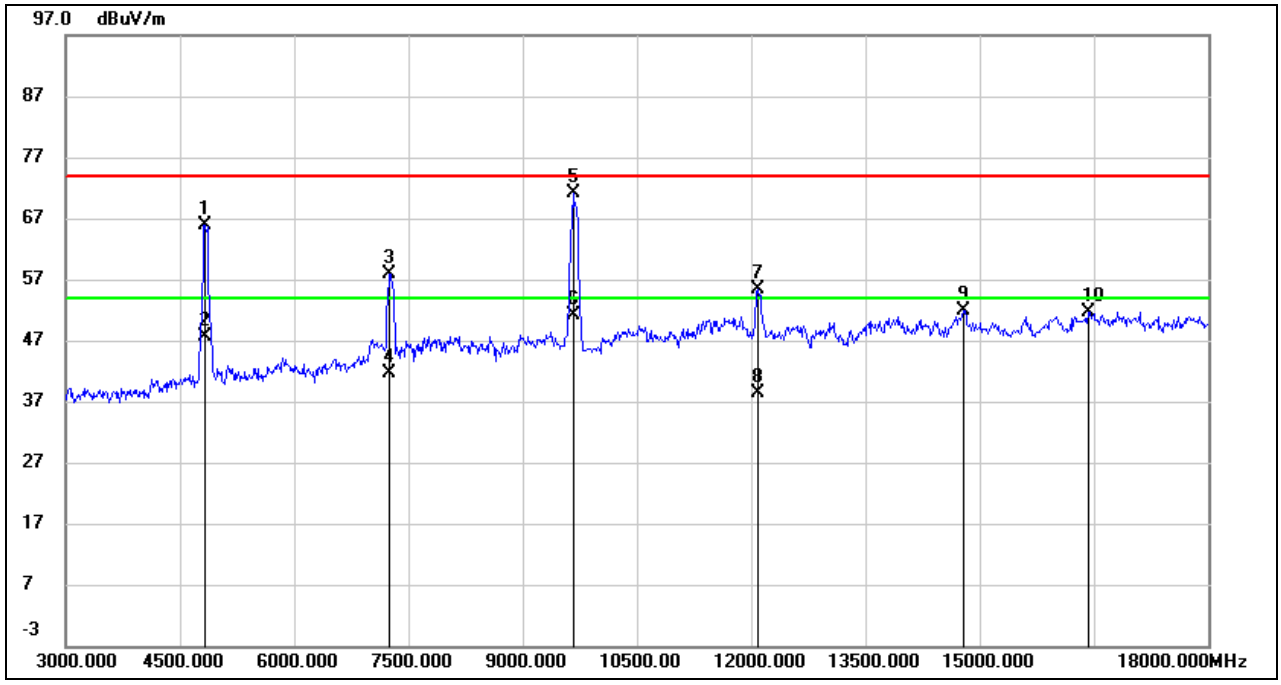

| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 65.63 | 1.45 | 67.08 | 74.00 | -6.92 | peak |
| 2 | 4920.000 | 50.28 | 1.45 | 51.73 | 54.00 | -2.27 | AVG |
| 3 | 7380.000 | 49.17 | 7.79 | 56.96 | 74.00 | -17.04 | peak |
| 4 | 7380.000 | 33.73 | 7.79 | 41.52 | 54.00 | -12.48 | AVG |
| 5 | 9847.500 | 49.72 | 10.55 | 60.27 | 74.00 | -13.73 | peak |
| 6 | 9847.500 | 34.42 | 10.55 | 44.97 | 54.00 | -9.03 | AVG |
| 7 | 11655.000 | 35.98 | 15.07 | 51.05 | 74.00 | -22.95 | peak |
| 8 | 14775.000 | 34.34 | 17.95 | 52.29 | 74.00 | -21.71 | peak |
| 9 | 16987.500 | 31.08 | 21.28 | 52.36 | 74.00 | -21.64 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 8.3.4. 802.11n HT40 MIMO MODE

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)**

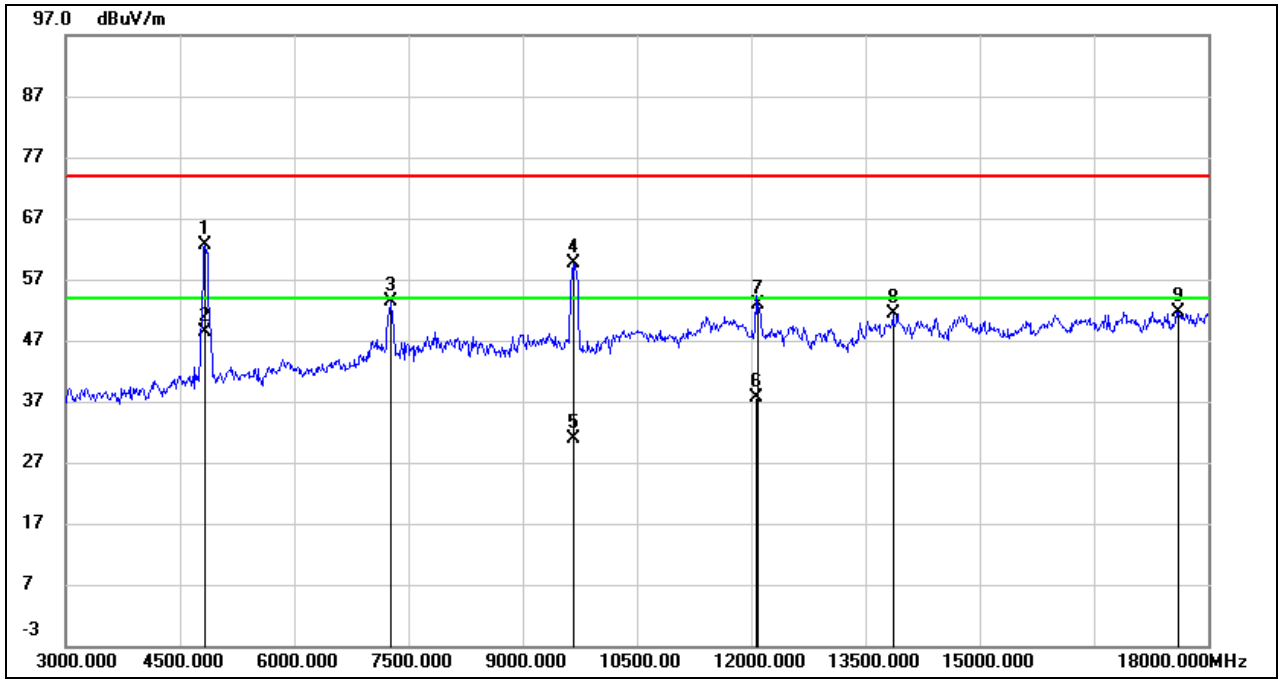



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4837.500 | 64.51 | 1.35 | 65.86 | 74.00 | -8.14 | peak |
| 2 | 4837.500 | 46.16 | 1.35 | 47.51 | 54.00 | -6.49 | AVG |
| 3 | 7252.500 | 50.73 | 7.22 | 57.95 | 74.00 | -16.05 | peak |
| 4 | 7252.500 | 34.51 | 7.22 | 41.73 | 54.00 | -12.27 | AVG |
| 5 | 9660.000 | 60.36 | 10.74 | 71.10 | 74.00 | -2.90 | peak |
| 6 | 9660.000 | 40.38 | 10.74 | 51.12 | 54.00 | -2.88 | AVG |
| 7 | 12097.500 | 40.14 | 15.35 | 55.49 | 74.00 | -18.51 | peak |
| 8 | 12097.500 | 22.91 | 15.35 | 38.26 | 54.00 | -15.74 | AVG |
| 9 | 14797.500 | 33.81 | 18.03 | 51.84 | 74.00 | -22.16 | peak |
| 10 | 16432.500 | 31.94 | 19.68 | 51.62 | 74.00 | -22.38 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)**

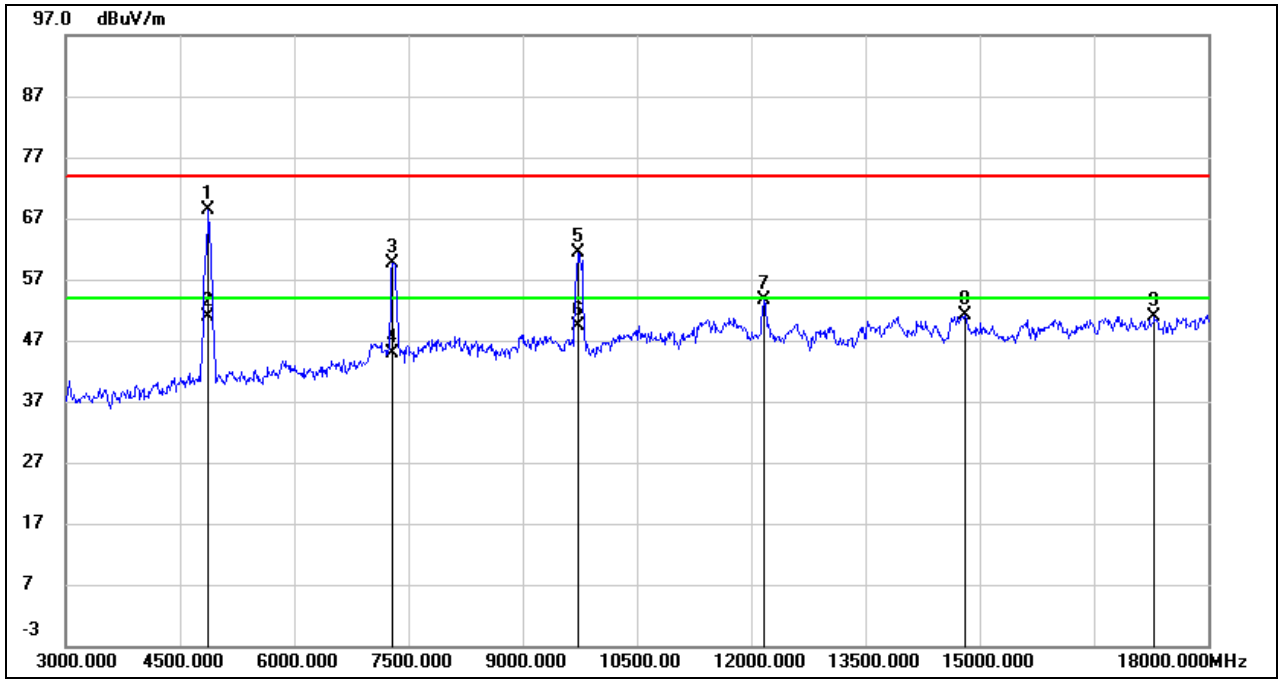



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4837.500 | 61.29 | 1.35 | 62.64 | 74.00 | -11.36 | peak |
| 2 | 4837.500 | 46.91 | 1.35 | 48.26 | 54.00 | -5.74 | AVG |
| 3 | 7260.000 | 46.07 | 7.21 | 53.28 | 74.00 | -20.72 | peak |
| 4 | 9675.000 | 48.90 | 10.66 | 59.56 | 74.00 | -14.44 | peak |
| 5 | 9675.000 | 20.10 | 10.66 | 30.76 | 54.00 | -23.24 | AVG |
| 6 | 12097.500 | 22.08 | 15.44 | 37.52 | 54.00 | -16.48 | AVG |
| 7 | 12097.500 | 37.64 | 15.35 | 52.99 | 74.00 | -21.01 | peak |
| 8 | 13860.000 | 33.87 | 17.55 | 51.42 | 74.00 | -22.58 | peak |
| 9 | 17617.500 | 28.86 | 22.86 | 51.72 | 74.00 | -22.28 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

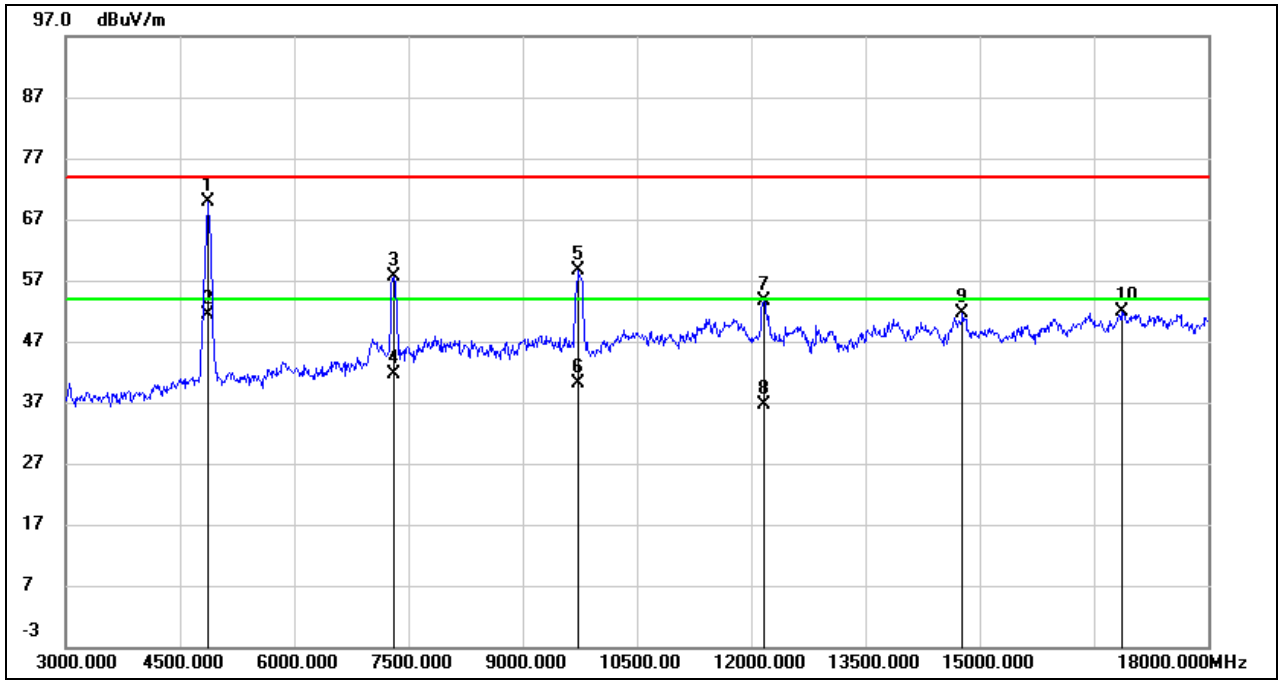



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4875.000 | 66.98 | 1.32 | 68.30 | 74.00 | -5.70 | peak |
| 2 | 4875.000 | 49.52 | 1.32 | 50.84 | 54.00 | -3.16 | AVG |
| 3 | 7297.500 | 52.53 | 7.11 | 59.64 | 74.00 | -14.36 | peak |
| 4 | 7297.500 | 37.71 | 7.11 | 44.82 | 54.00 | -9.18 | AVG |
| 5 | 9742.500 | 51.09 | 10.33 | 61.42 | 74.00 | -12.58 | peak |
| 6 | 9742.500 | 38.99 | 10.33 | 49.32 | 54.00 | -4.68 | AVG |
| 7 | 12165.000 | 37.95 | 15.74 | 53.69 | 74.00 | -20.31 | peak |
| 8 | 14812.500 | 33.08 | 17.96 | 51.04 | 74.00 | -22.96 | peak |
| 9 | 17302.500 | 28.38 | 22.59 | 50.97 | 74.00 | -23.03 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

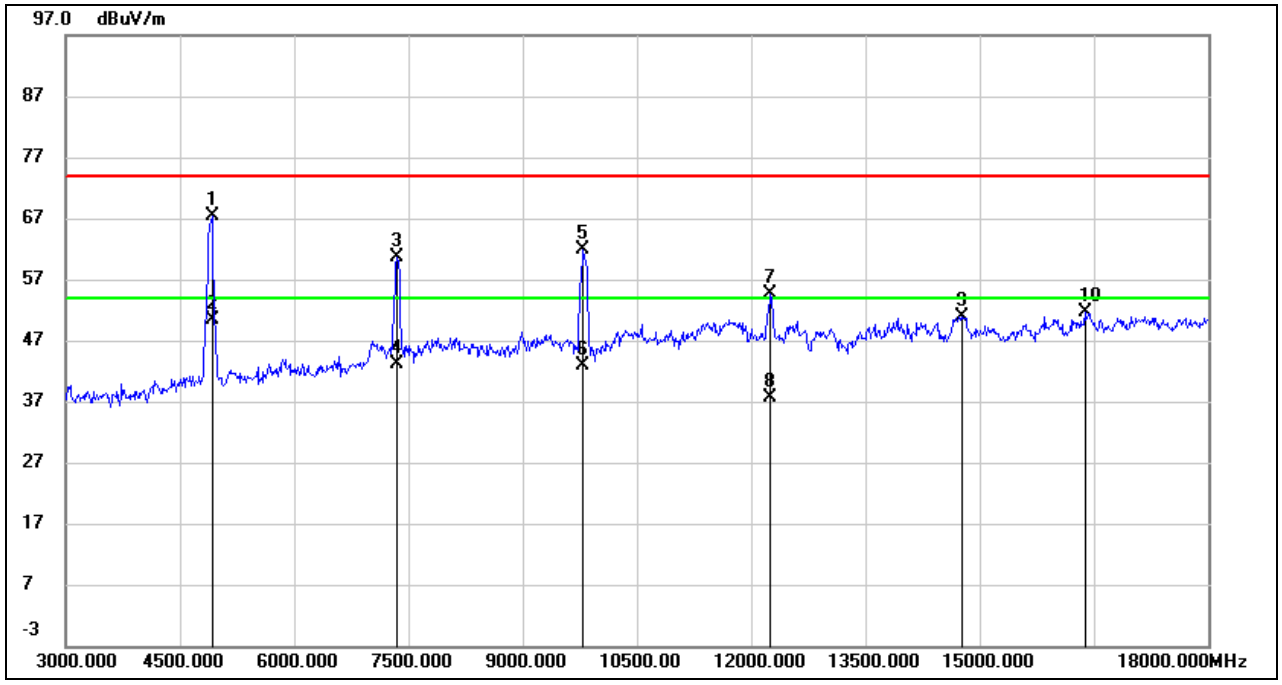



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4867.500 | 68.60 | 1.32 | 69.92 | 74.00 | -4.08 | peak |
| 2 | 4867.500 | 50.16 | 1.32 | 51.48 | 54.00 | -2.52 | AVG |
| 3 | 7305.000 | 50.37 | 7.14 | 57.51 | 74.00 | -16.49 | peak |
| 4 | 7305.000 | 34.48 | 7.14 | 41.62 | 54.00 | -12.38 | AVG |
| 5 | 9742.500 | 48.19 | 10.33 | 58.52 | 74.00 | -15.48 | peak |
| 6 | 9742.500 | 29.88 | 10.33 | 40.21 | 54.00 | -13.79 | AVG |
| 7 | 12165.000 | 37.99 | 15.74 | 53.73 | 74.00 | -20.27 | peak |
| 8 | 12165.000 | 20.84 | 15.74 | 36.58 | 54.00 | -17.42 | AVG |
| 9 | 14782.500 | 33.56 | 17.98 | 51.54 | 74.00 | -22.46 | peak |
| 10 | 16867.500 | 30.66 | 21.29 | 51.95 | 74.00 | -22.05 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)

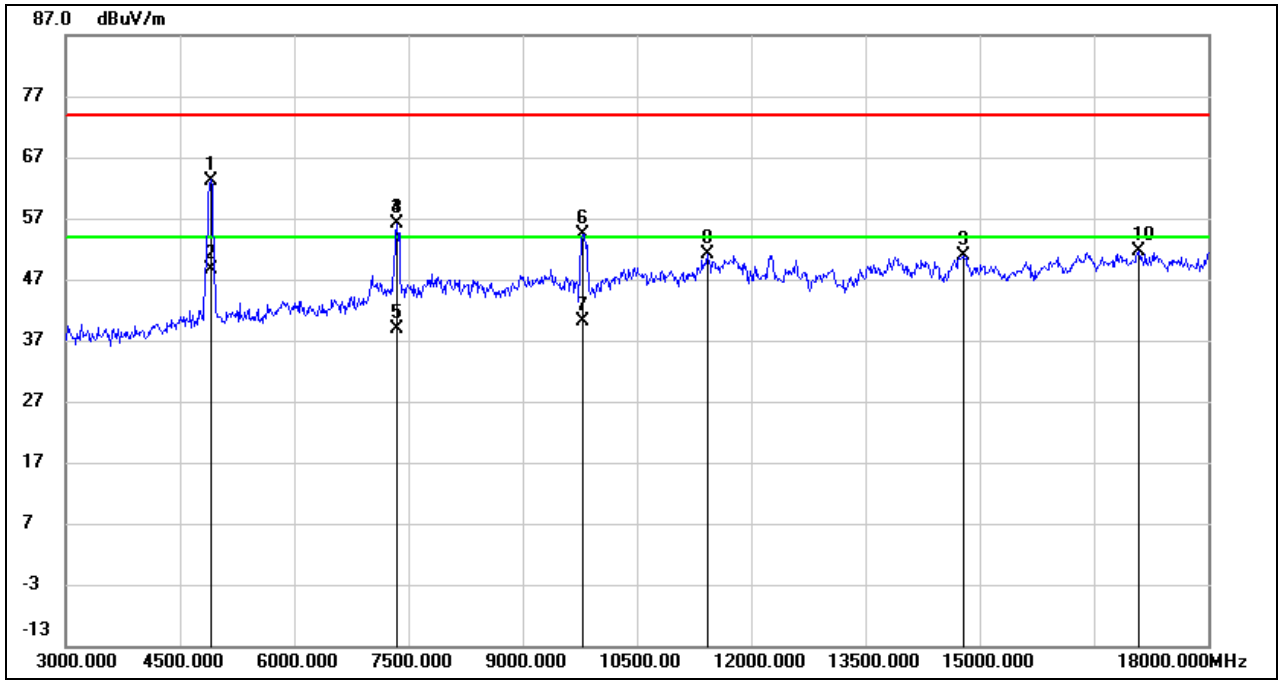



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4920.000 | 65.86 | 1.45 | 67.31 | 74.00 | -6.69 | peak |
| 2 | 4920.000 | 48.97 | 1.45 | 50.42 | 54.00 | -3.58 | AVG |
| 3 | 7350.000 | 53.13 | 7.53 | 60.66 | 74.00 | -13.34 | peak |
| 4 | 7350.000 | 35.59 | 7.53 | 43.12 | 54.00 | -10.88 | AVG |
| 5 | 9802.500 | 51.88 | 10.10 | 61.98 | 74.00 | -12.02 | peak |
| 6 | 9802.500 | 32.67 | 10.10 | 42.77 | 54.00 | -11.23 | AVG |
| 7 | 12262.500 | 38.52 | 16.04 | 54.56 | 74.00 | -19.44 | peak |
| 8 | 12262.500 | 21.52 | 16.04 | 37.56 | 54.00 | -16.44 | AVG |
| 9 | 14767.500 | 32.90 | 17.93 | 50.83 | 74.00 | -23.17 | peak |
| 10 | 16387.500 | 31.89 | 19.67 | 51.56 | 74.00 | -22.44 | peak |

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 4905.000 | 61.92 | 1.33 | 63.25 | 74.00 | -10.75 | peak |
| 2 | 4905.000 | 47.29 | 1.33 | 48.62 | 54.00 | -5.38 | AVG |
| 3 | 7350.000 | 48.58 | 7.53 | 56.11 | 74.00 | -17.89 | peak |
| 5 | 7350.000 | 31.40 | 7.53 | 38.93 | 54.00 | -15.07 | AVG |
| 6 | 9787.500 | 44.33 | 10.13 | 54.46 | 74.00 | -19.54 | peak |
| 7 | 9787.500 | 30.04 | 10.13 | 40.17 | 54.00 | -13.83 | AVG |
| 8 | 11430.000 | 36.53 | 14.72 | 51.25 | 74.00 | -22.75 | peak |
| 9 | 14797.500 | 32.84 | 18.03 | 50.87 | 74.00 | -23.13 | peak |
| 10 | 17092.500 | 29.68 | 21.85 | 51.53 | 74.00 | -22.47 | peak |

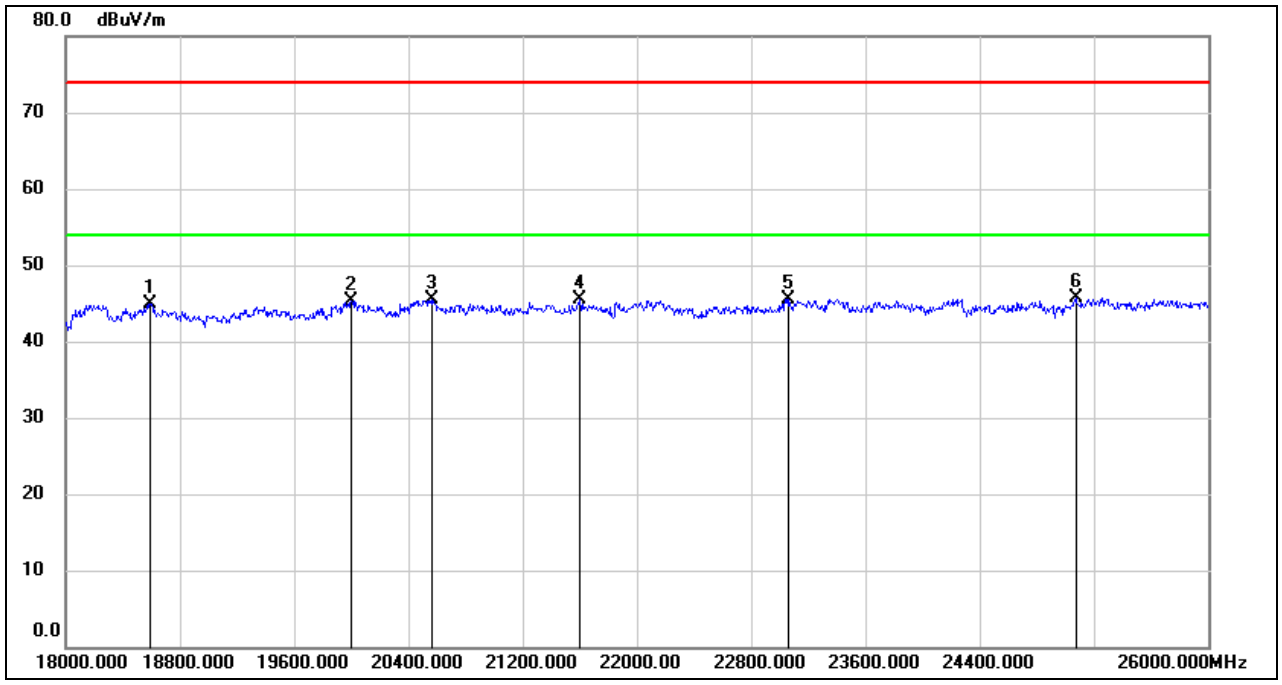
Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 8.5. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

### 8.5.1. 802.11n HT20 MIMO MODE

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)**

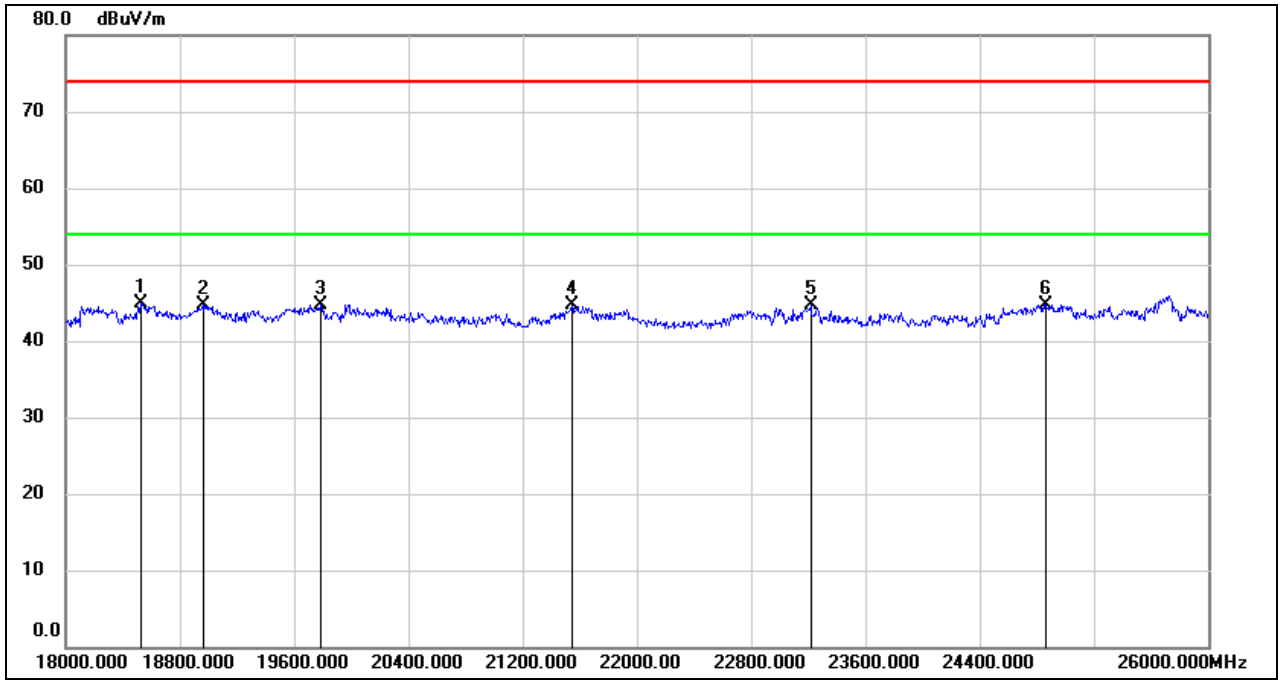



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 18592.000 | 50.25 | -5.31 | 44.94 | 74.00 | -29.06 | peak |
| 2 | 20000.000 | 50.81 | -5.45 | 45.36 | 74.00 | -28.64 | peak |
| 3 | 20560.000 | 50.73 | -5.30 | 45.43 | 74.00 | -28.57 | peak |
| 4 | 21600.000 | 50.02 | -4.54 | 45.48 | 74.00 | -28.52 | peak |
| 5 | 23064.000 | 48.99 | -3.42 | 45.57 | 74.00 | -28.43 | peak |
| 6 | 25072.000 | 47.67 | -1.97 | 45.70 | 74.00 | -28.30 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 18528.000 | 50.11 | -5.26 | 44.85 | 74.00 | -29.15 | peak |
| 2 | 18960.000 | 50.01 | -5.25 | 44.76 | 74.00 | -29.24 | peak |
| 3 | 19784.000 | 50.07 | -5.28 | 44.79 | 74.00 | -29.21 | peak |
| 4 | 21544.000 | 49.26 | -4.63 | 44.63 | 74.00 | -29.37 | peak |
| 5 | 23216.000 | 48.01 | -3.38 | 44.63 | 74.00 | -29.37 | peak |
| 6 | 24864.000 | 47.03 | -2.23 | 44.80 | 74.00 | -29.20 | peak |

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

Note: All modes, channels and antenna have been tested, only the worst data was recorded in the report.

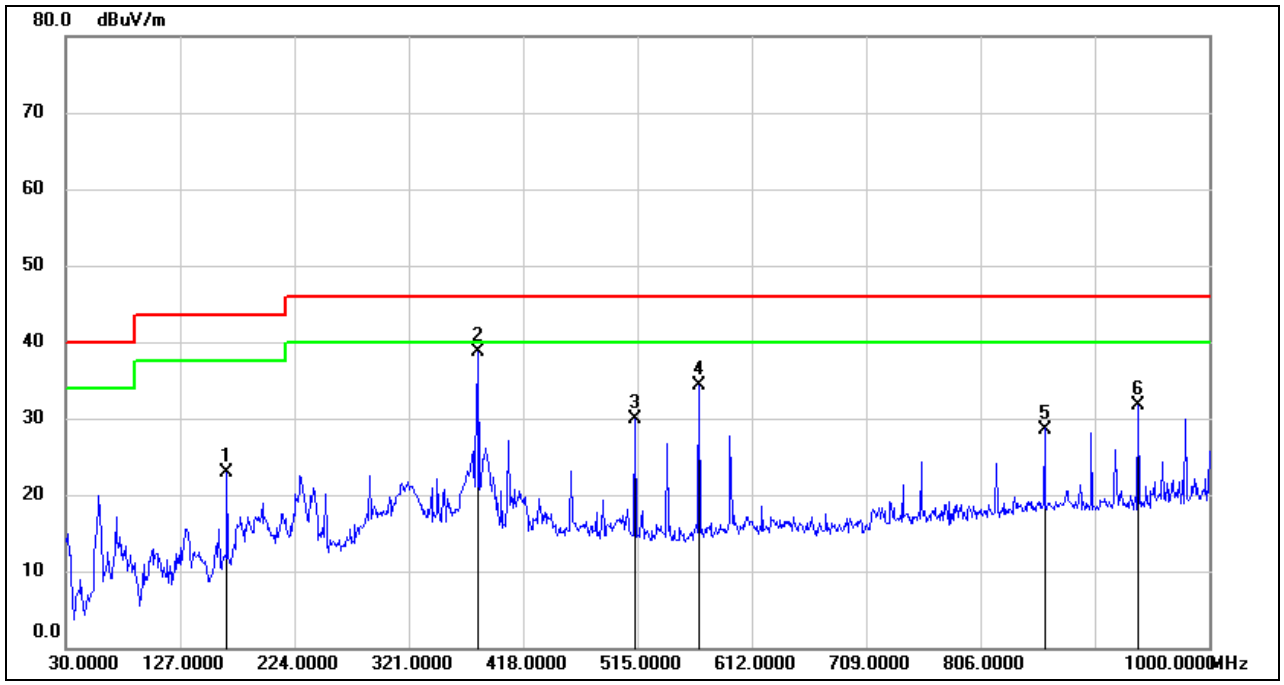

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 8.6. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

### 8.6.1. 802.11n HT20 MIMO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)**

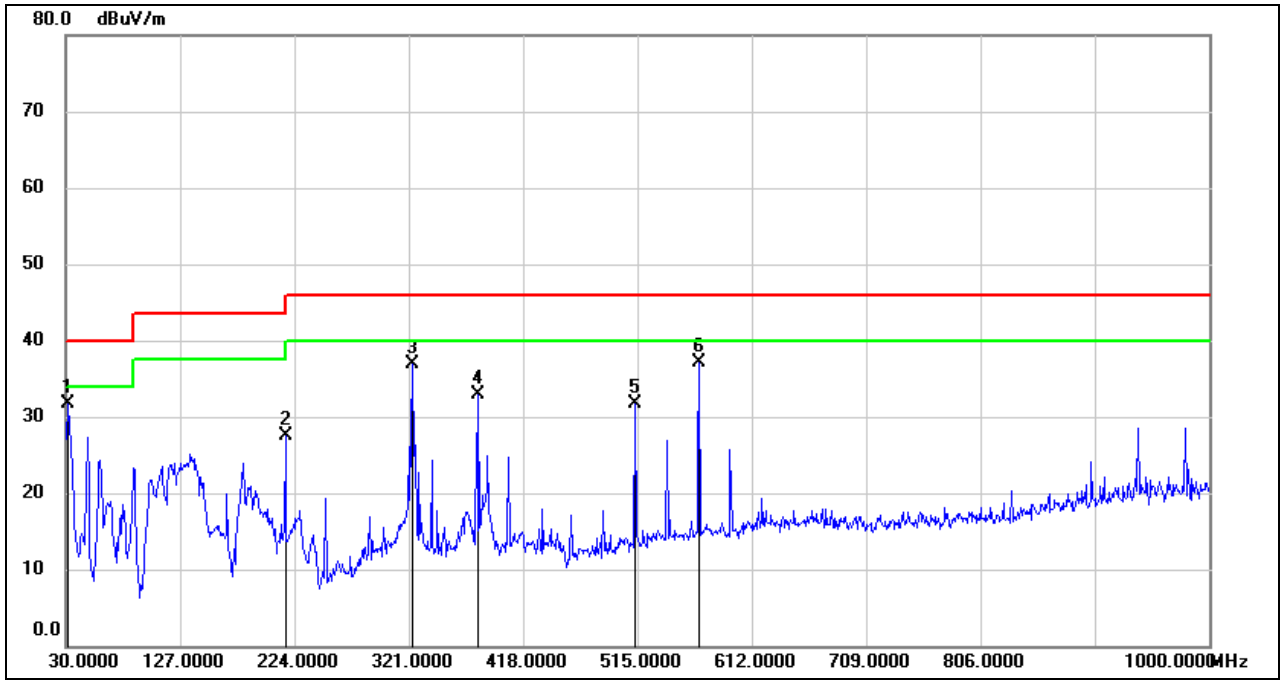



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 166.7700 | 40.46 | -17.47 | 22.99 | 43.50 | -20.51 | QP |
| 2 | 380.1700 | 52.42 | -13.64 | 38.78 | 46.00 | -7.22 | QP |
| 3 | 513.0600 | 41.05 | -11.20 | 29.85 | 46.00 | -16.15 | QP |
| 4 | 567.3800 | 44.48 | -10.13 | 34.35 | 46.00 | -11.65 | QP |
| 5 | 860.3200 | 34.59 | -5.99 | 28.60 | 46.00 | -17.40 | QP |
| 6 | 939.8600 | 36.18 | -4.49 | 31.69 | 46.00 | -14.31 | QP |

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 31.9400 | 50.92 | -19.13 | 31.79 | 40.00 | -8.21 | QP |
| 2 | 216.2400 | 45.41 | -17.84 | 27.57 | 46.00 | -18.43 | QP |
| 3 | 323.9100 | 51.57 | -14.74 | 36.83 | 46.00 | -9.17 | QP |
| 4 | 380.1700 | 46.51 | -13.64 | 32.87 | 46.00 | -13.13 | QP |
| 5 | 513.0600 | 43.00 | -11.20 | 31.80 | 46.00 | -14.20 | QP |
| 6 | 567.3800 | 47.33 | -10.13 | 37.20 | 46.00 | -8.80 | QP |

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note: All modes, channels and antenna have been tested, only the worst data was recorded in the report.

## 8.7. SPURIOUS EMISSIONS BELOW 30 MHz

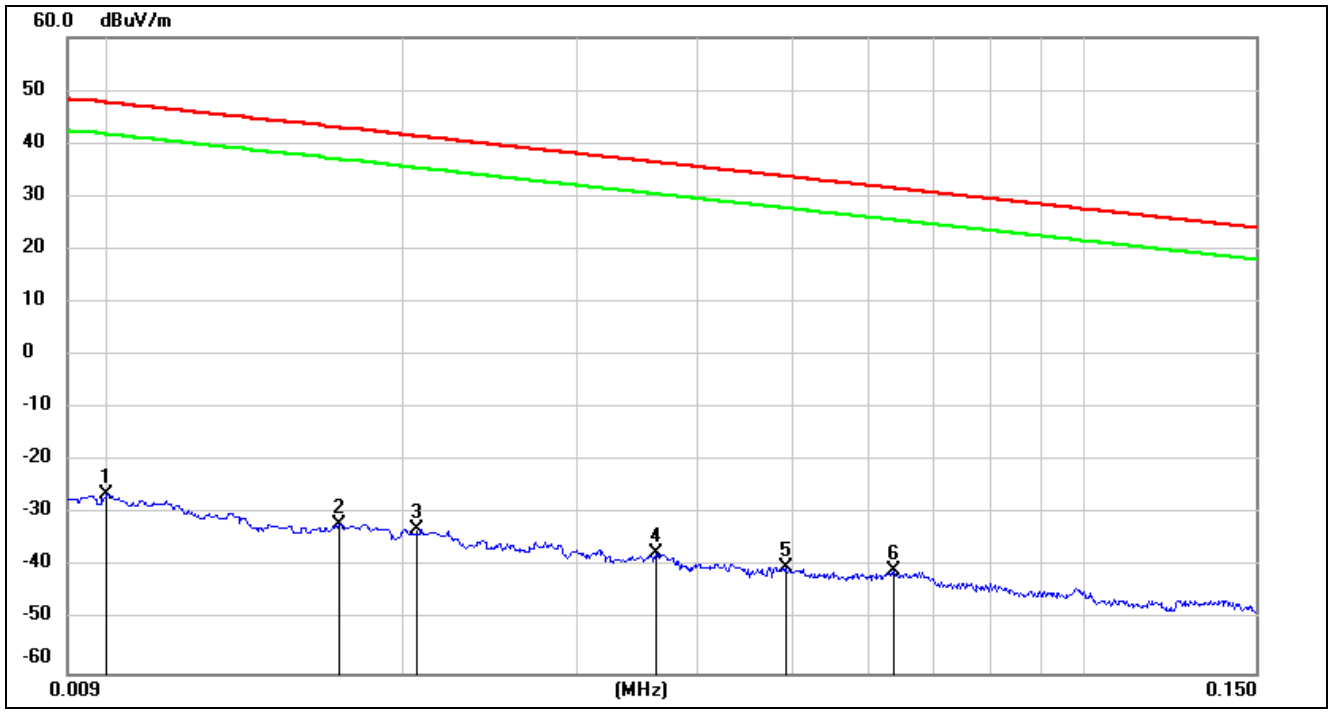
### 8.7.1. 802.11n HT20 MIMO MODE

**ANTENNA 1 TEST RESULTS (WORST CASE)**


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**SPURIOUS EMISSIONS (LOW CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)**

**9 kHz~ 150 kHz**




| No. | Frequency | Reading | Correct | FCC Result | FCC Limit | ISED Result | ISED Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuA/m) | (dBuA/m) | (dB) | |
| 1 | 0.0100 | 75.22 | -101.40 | -26.18 | 47.6 | -77.68 | -3.90 | -73.78 | peak |
| 2 | 0.0171 | 69.38 | -101.36 | -31.98 | 42.94 | -83.48 | -8.56 | -74.92 | peak |
| 3 | 0.0206 | 68.42 | -101.35 | -32.93 | 41.32 | -84.43 | -10.18 | -74.25 | peak |
| 4 | 0.0362 | 64.01 | -101.42 | -37.41 | 36.43 | -88.91 | -15.07 | -73.84 | peak |
| 5 | 0.0492 | 61.55 | -101.47 | -39.92 | 33.76 | -91.42 | -17.74 | -73.68 | peak |
| 6 | 0.0636 | 60.81 | -101.54 | -40.73 | 31.53 | -92.23 | -19.97 | -72.26 | peak |

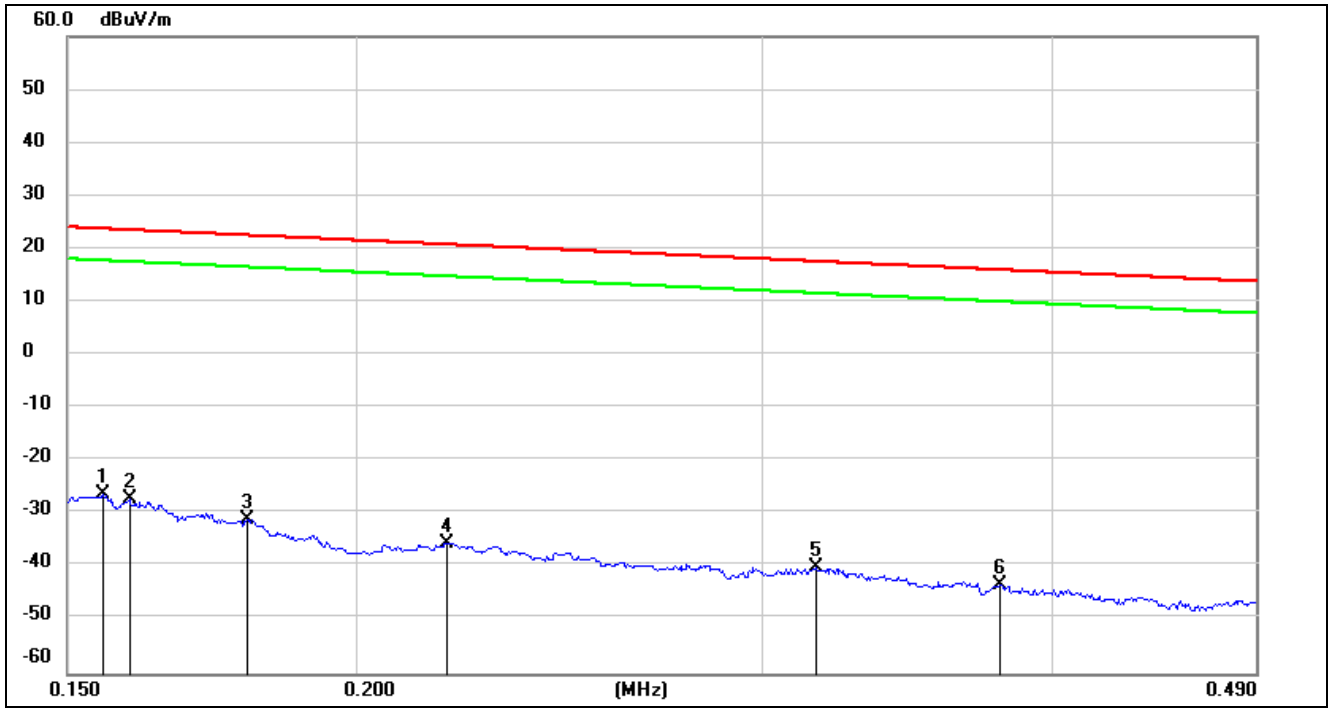
Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**150 kHz ~ 490 kHz**




| No. | Frequency | Reading | Correct | FCC Result | FCC Limit | ISED Result | ISED Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuA/m) | (dBuA/m) | (dB) | |
| 1 | 0.1554 | 75.27 | -101.65 | -26.38 | 23.77 | -77.88 | -27.73 | -50.15 | peak |
| 2 | 0.1595 | 74.36 | -101.65 | -27.29 | 23.55 | -78.79 | -27.95 | -50.84 | peak |
| 3 | 0.1794 | 70.77 | -101.68 | -30.91 | 22.53 | -82.41 | -28.97 | -53.44 | peak |
| 4 | 0.2190 | 66.27 | -101.75 | -35.48 | 20.79 | -86.98 | -30.71 | -56.27 | peak |
| 5 | 0.3163 | 61.70 | -101.87 | -40.17 | 17.6 | -91.67 | -33.90 | -57.77 | peak |
| 6 | 0.3800 | 58.52 | -101.94 | -43.42 | 16.01 | -94.92 | -35.49 | -59.43 | peak |

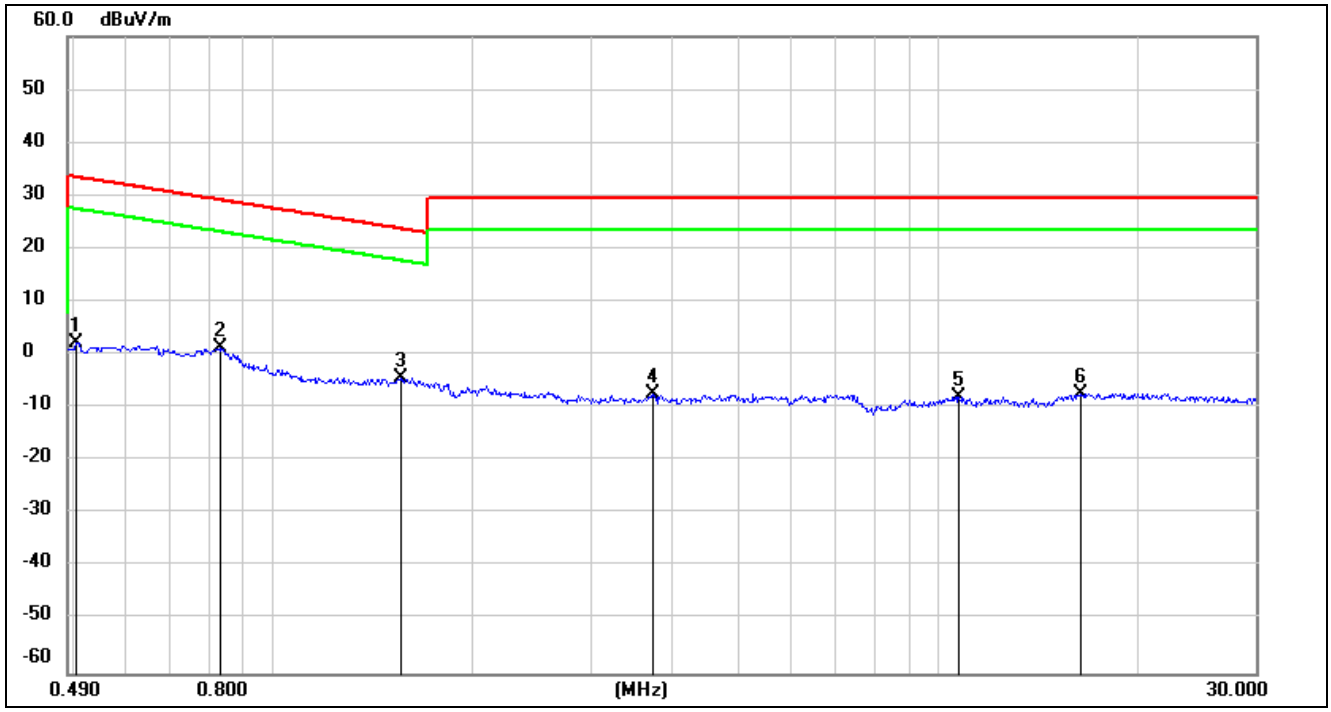
Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**490 kHz ~ 30 MHz**




| No. | Frequency | Reading | Correct | FCC Result | FCC Limit | ISED Result | ISED Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuA/m) | (dBuA/m) | (dB) | |
| 1 | 0.5039 | 64.44 | -62.07 | 2.37 | 33.56 | -49.13 | -17.94 | -31.19 | peak |
| 2 | 0.8296 | 63.44 | -62.17 | 1.27 | 29.23 | -50.23 | -22.27 | -27.96 | peak |
| 3 | 1.5564 | 57.68 | -62.02 | -4.34 | 23.76 | -55.84 | -27.74 | -28.10 | peak |
| 4 | 3.7100 | 54.20 | -61.41 | -7.21 | 29.54 | -58.71 | -21.96 | -36.75 | peak |
| 5 | 10.7299 | 52.98 | -60.83 | -7.85 | 29.54 | -59.35 | -21.96 | -37.39 | peak |
| 6 | 16.3959 | 53.67 | -60.96 | -7.29 | 29.54 | -58.79 | -21.96 | -36.83 | peak |

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All modes, channels and antenna have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 9. AC POWER LINE CONDUCTED EMISSIONS

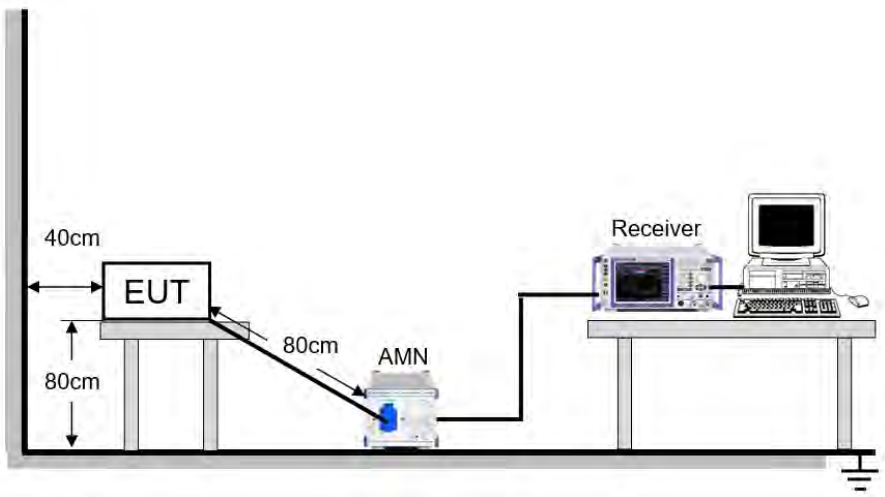
**LIMITS**

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8

| FREQUENCY (MHz) | Quasi-peak | Average |
|---|---|---|
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 56.00 | 46.00 |
| 5.0 -30.0 | 60.00 | 50.00 |

**TEST SETUP AND PROCEDURE**

Refer to ANSI C63.10-2013 clause 6.2.




The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

**TEST ENVIRONMENT**

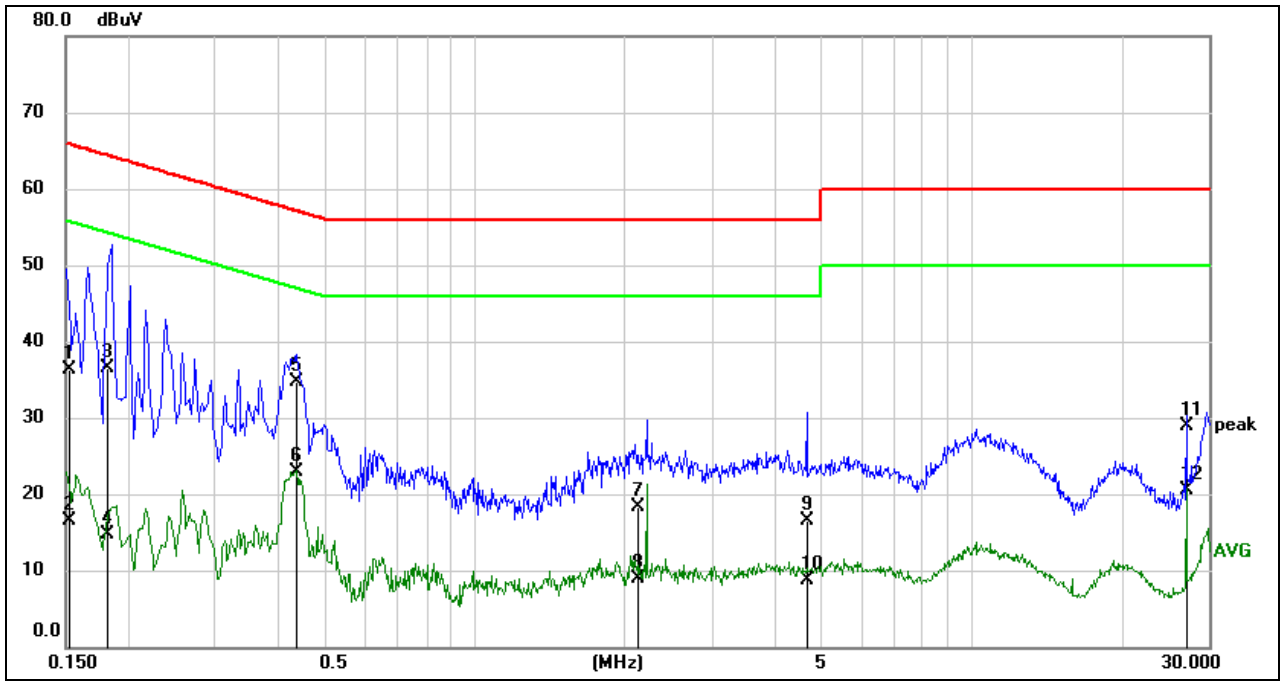
| | | | |
|---|---|---|---|
| Temperature | 26.3 °C | Relative Humidity | 64.4 % |
| Atmosphere Pressure | 101 kPa | Test Voltage | AC 120 V, 60 Hz |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**RESULTS**

### 9.1.1. 802.11n HT20 MIMO MODE

**LINE L RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)**

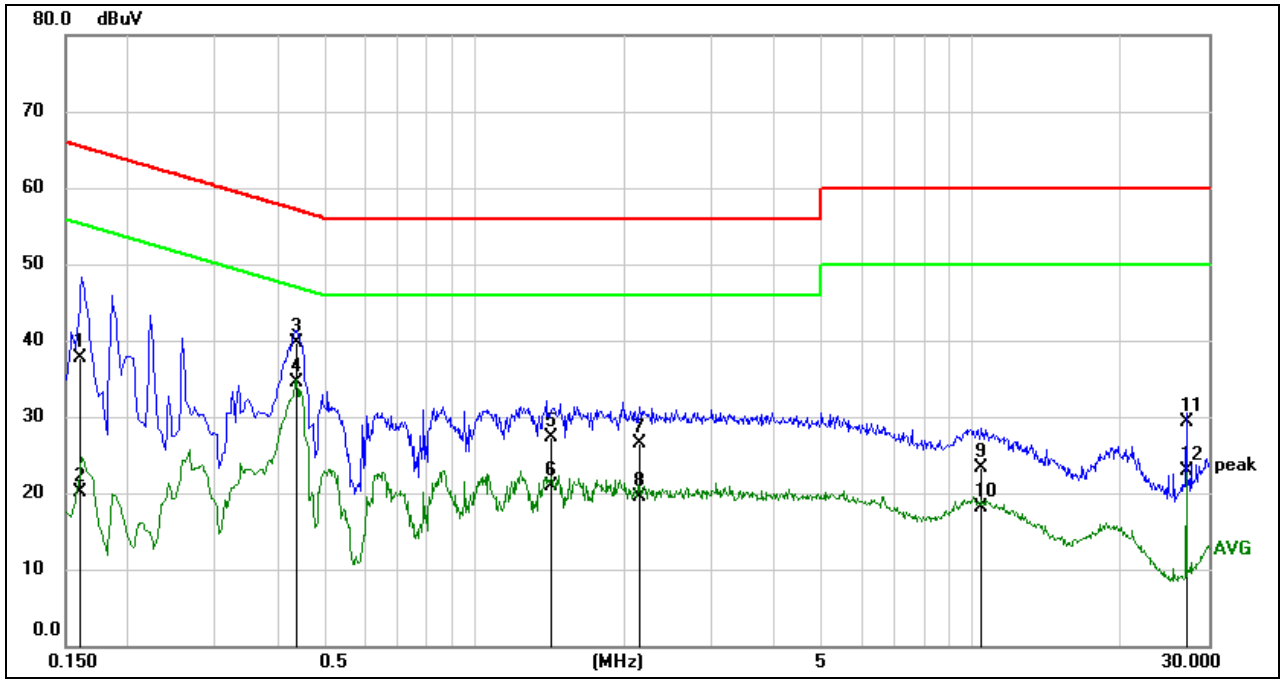



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.1527 | 26.79 | 9.59 | 36.38 | 65.85 | -29.47 | QP |
| 2 | 0.1527 | 6.84 | 9.59 | 16.43 | 55.85 | -39.42 | AVG |
| 3 | 0.1819 | 26.88 | 9.59 | 36.47 | 64.40 | -27.93 | QP |
| 4 | 0.1819 | 5.21 | 9.59 | 14.80 | 54.40 | -39.60 | AVG |
| 5 | 0.4376 | 25.03 | 9.60 | 34.63 | 57.11 | -22.48 | QP |
| 6 | 0.4376 | 13.38 | 9.60 | 22.98 | 47.11 | -24.13 | AVG |
| 7 | 2.1517 | 8.61 | 9.63 | 18.24 | 56.00 | -37.76 | QP |
| 8 | 2.1517 | -0.77 | 9.63 | 8.86 | 46.00 | -37.14 | AVG |
| 9 | 4.6642 | 6.85 | 9.61 | 16.46 | 56.00 | -39.54 | QP |
| 10 | 4.6642 | -0.93 | 9.61 | 8.68 | 46.00 | -37.32 | AVG |
| 11 | 26.9997 | 19.09 | 9.78 | 28.87 | 60.00 | -31.13 | QP |
| 12 | 26.9997 | 10.73 | 9.78 | 20.51 | 50.00 | -29.49 | AVG |

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

**LINE N RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)**




| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.1596 | 28.09 | 9.59 | 37.68 | 65.48 | -27.80 | QP |
| 2 | 0.1596 | 10.50 | 9.59 | 20.09 | 55.48 | -35.39 | AVG |
| 3 | 0.4356 | 30.03 | 9.60 | 39.63 | 57.15 | -17.52 | QP |
| 4 | 0.4356 | 24.86 | 9.60 | 34.46 | 47.15 | -12.69 | AVG |
| 5 | 1.4144 | 17.67 | 9.62 | 27.29 | 56.00 | -28.71 | QP |
| 6 | 1.4144 | 11.38 | 9.62 | 21.00 | 46.00 | -25.00 | AVG |
| 7 | 2.1414 | 16.84 | 9.63 | 26.47 | 56.00 | -29.53 | QP |
| 8 | 2.1414 | 9.80 | 9.63 | 19.43 | 46.00 | -26.57 | AVG |
| 9 | 10.4321 | 13.65 | 9.63 | 23.28 | 60.00 | -36.72 | QP |
| 10 | 10.4321 | 8.47 | 9.63 | 18.10 | 50.00 | -31.90 | AVG |
| 11 | 26.9997 | 19.61 | 9.78 | 29.39 | 60.00 | -30.61 | QP |
| 12 | 26.9997 | 13.15 | 9.78 | 22.93 | 50.00 | -27.07 | AVG |

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All modes, channels and antenna have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 10. ANTENNA REQUIREMENTS

**APPLICABLE REQUIREMENTS**

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**RESULTS**

Complies


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

# 11. Appendix

## 11.1. Appendix A: DTS Bandwidth

### 11.1.1. Test Result

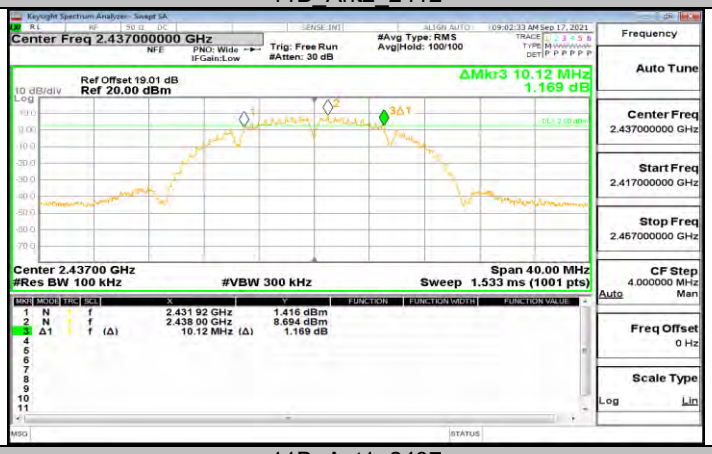
| Test Mode | Antenna | Channel | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| 11B | Ant1 | 2412 | 9.640 | 2406.920 | 2416.560 | 0.5 | PASS |
| | Ant2 | 2412 | 10.120 | 2406.920 | 2417.040 | 0.5 | PASS |
| | Ant1 | 2437 | 10.120 | 2431.920 | 2442.040 | 0.5 | PASS |
| | Ant2 | 2437 | 9.600 | 2432.480 | 2442.080 | 0.5 | PASS |
| | Ant1 | 2462 | 10.120 | 2456.920 | 2467.040 | 0.5 | PASS |
| | Ant2 | 2462 | 8.680 | 2457.400 | 2466.080 | 0.5 | PASS |
| 11G | Ant1 | 2412 | 16.440 | 2403.760 | 2420.200 | 0.5 | PASS |
| | Ant2 | 2412 | 16.440 | 2403.760 | 2420.200 | 0.5 | PASS |
| | Ant1 | 2437 | 16.400 | 2428.800 | 2445.200 | 0.5 | PASS |
| | Ant2 | 2437 | 16.560 | 2428.680 | 2445.240 | 0.5 | PASS |
| | Ant1 | 2462 | 16.400 | 2453.800 | 2470.200 | 0.5 | PASS |
| | Ant2 | 2462 | 16.400 | 2453.800 | 2470.200 | 0.5 | PASS |
| 11N20MIMO | Ant1 | 2412 | 17.640 | 2403.160 | 2420.800 | 0.5 | PASS |
| | Ant2 | 2412 | 17.400 | 2403.160 | 2420.560 | 0.5 | PASS |
| | Ant1 | 2437 | 17.080 | 2428.440 | 2445.520 | 0.5 | PASS |
| | Ant2 | 2437 | 17.640 | 2428.160 | 2445.800 | 0.5 | PASS |
| | Ant1 | 2462 | 17.640 | 2453.160 | 2470.800 | 0.5 | PASS |
| | Ant2 | 2462 | 17.600 | 2453.200 | 2470.800 | 0.5 | PASS |
| 11N40MIMO | Ant1 | 2422 | 35.760 | 2404.160 | 2439.920 | 0.5 | PASS |
| | Ant2 | 2422 | 35.440 | 2404.160 | 2439.600 | 0.5 | PASS |
| | Ant1 | 2437 | 35.280 | 2419.320 | 2454.600 | 0.5 | PASS |
| | Ant2 | 2437 | 35.280 | 2419.320 | 2454.600 | 0.5 | PASS |
| | Ant1 | 2452 | 35.760 | 2434.000 | 2469.760 | 0.5 | PASS |
| | Ant2 | 2452 | 35.520 | 2434.080 | 2469.600 | 0.5 | PASS |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 11.1.2. Test Graphs

11B_Ant1_2412

11B_Ant2_2412




11B_Ant1_2437

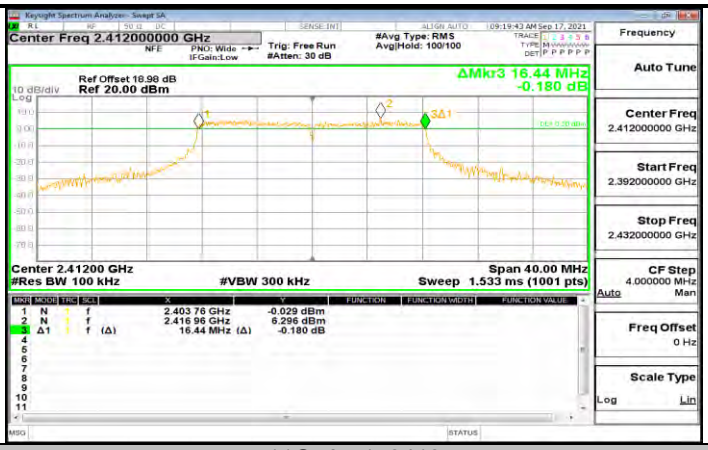

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11B_Ant2_2437

11B_Ant1_2462

11B_Ant2_2462


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11G_Ant1_2412

11G_Ant2_2412

11G_Ant1_2437

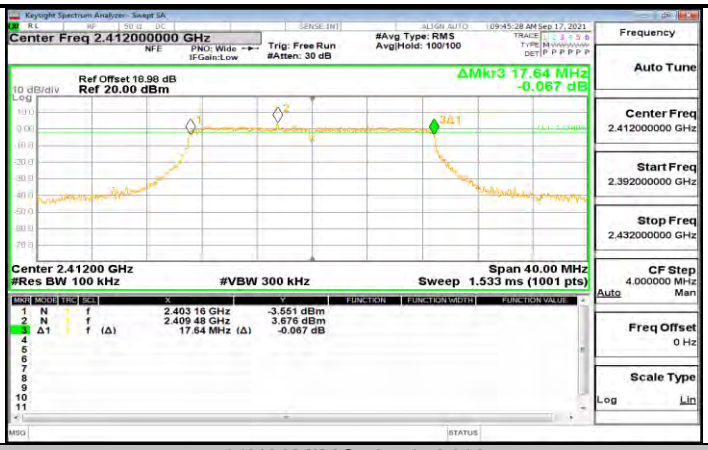

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11G_Ant2_2437

11G_Ant1_2462

11G_Ant2_2462


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

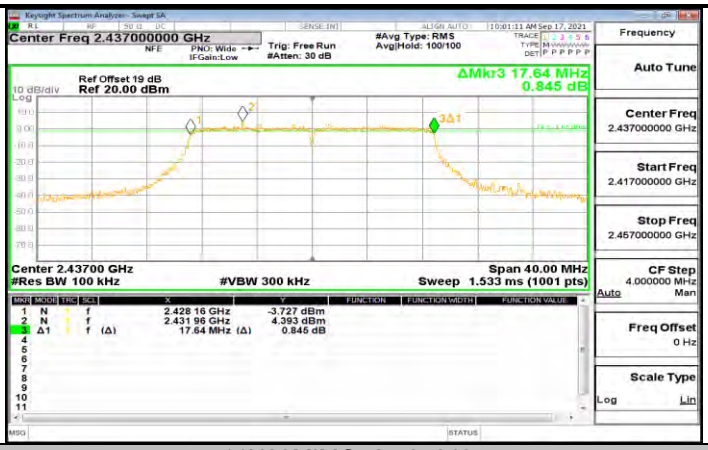



11N20MIMO_Ant1_2412

11N20MIMO_Ant2_2412

11N20MIMO_Ant1_2437


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

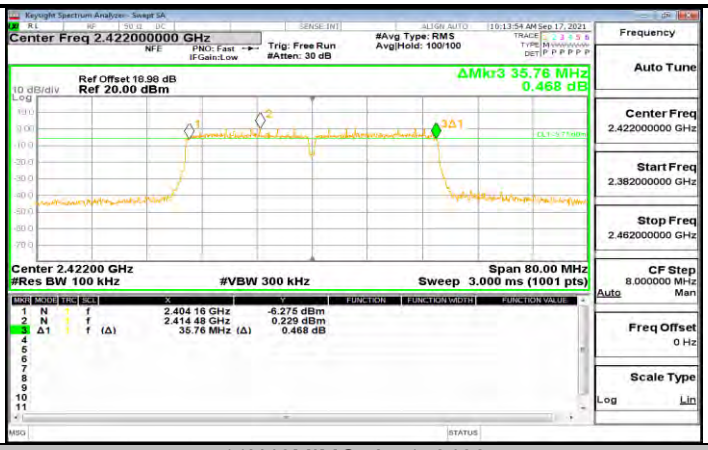



11N20MIMO_Ant2_2437

11N20MIMO_Ant1_2462

11N20MIMO_Ant2_2462


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*



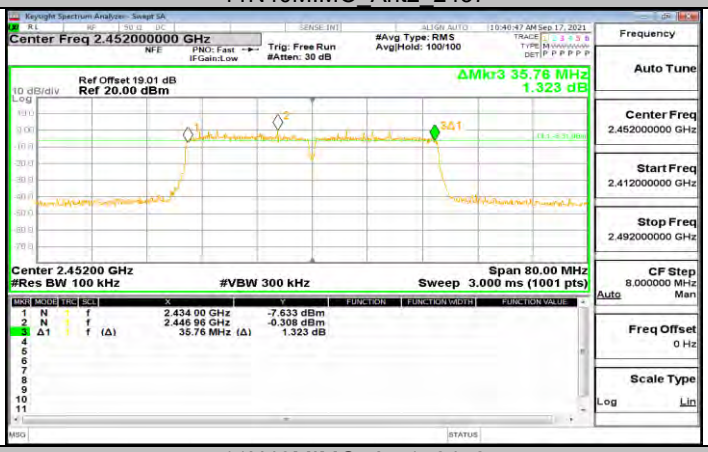

11N40MIMO_Ant1_2422

11N40MIMO_Ant2_2422

11N40MIMO_Ant1_2437


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N40MIMO_Ant2_2437




11N40MIMO_Ant1_2452

11N40MIMO_Ant2_2452


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

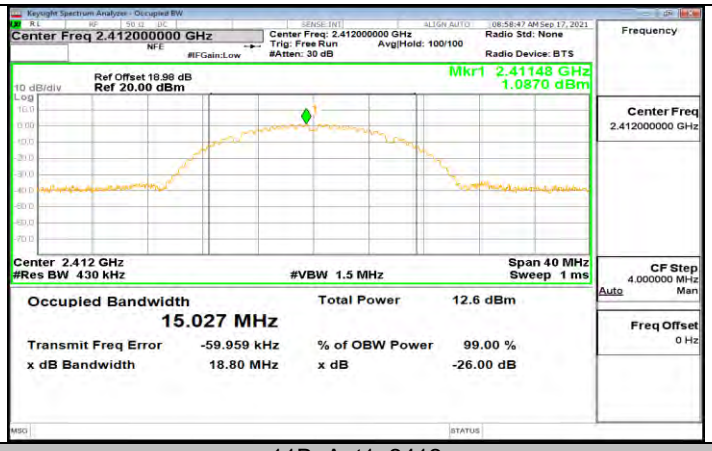
## 11.2. Appendix B: Occupied Channel Bandwidth

### 11.2.1. Test Result

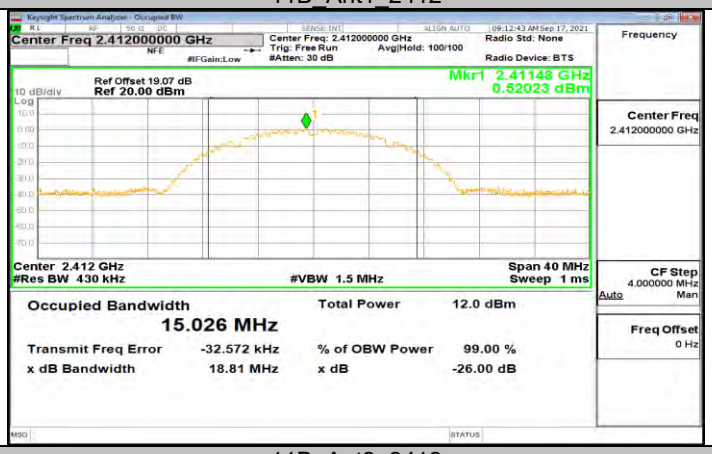
| Test Mode | Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Verdict |
|---|---|---|---|---|---|---|
| 11B | Ant1 | 2412 | 15.027 | 2404.427 | 2419.454 | PASS |
| | Ant2 | 2412 | 15.026 | 2404.454 | 2419.480 | PASS |
| | Ant1 | 2437 | 14.866 | 2429.523 | 2444.389 | PASS |
| | Ant2 | 2437 | 14.938 | 2429.532 | 2444.470 | PASS |
| | Ant1 | 2462 | 15.057 | 2454.457 | 2469.514 | PASS |
| | Ant2 | 2462 | 15.069 | 2454.467 | 2469.536 | PASS |
| 11G | Ant1 | 2412 | 17.093 | 2403.401 | 2420.494 | PASS |
| | Ant2 | 2412 | 17.068 | 2403.368 | 2420.436 | PASS |
| | Ant1 | 2437 | 17.004 | 2428.435 | 2445.439 | PASS |
| | Ant2 | 2437 | 17.027 | 2428.424 | 2445.451 | PASS |
| | Ant1 | 2462 | 17.017 | 2453.478 | 2470.495 | PASS |
| | Ant2 | 2462 | 17.004 | 2453.461 | 2470.465 | PASS |
| 11N20MIMO | Ant1 | 2412 | 17.903 | 2403.011 | 2420.914 | PASS |
| | Ant2 | 2412 | 17.929 | 2402.991 | 2420.920 | PASS |
| | Ant1 | 2437 | 17.889 | 2427.992 | 2445.881 | PASS |
| | Ant2 | 2437 | 17.884 | 2427.986 | 2445.870 | PASS |
| | Ant1 | 2462 | 17.913 | 2453.015 | 2470.928 | PASS |
| | Ant2 | 2462 | 17.931 | 2453.025 | 2470.956 | PASS |
| 11N40MIMO | Ant1 | 2422 | 36.009 | 2403.979 | 2439.988 | PASS |
| | Ant2 | 2422 | 36.012 | 2403.971 | 2439.983 | PASS |
| | Ant1 | 2437 | 35.924 | 2418.998 | 2454.922 | PASS |
| | Ant2 | 2437 | 35.959 | 2418.977 | 2454.936 | PASS |
| | Ant1 | 2452 | 35.989 | 2433.949 | 2469.938 | PASS |
| | Ant2 | 2452 | 35.990 | 2433.955 | 2469.945 | PASS |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

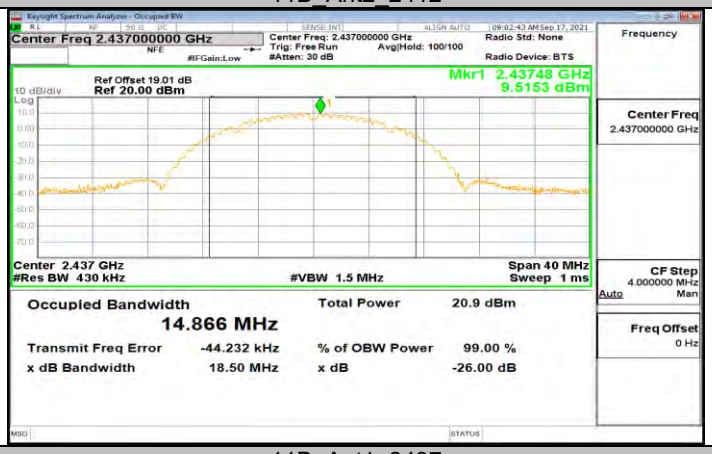
### 11.2.2. Test Graphs




11B_Ant1_2412

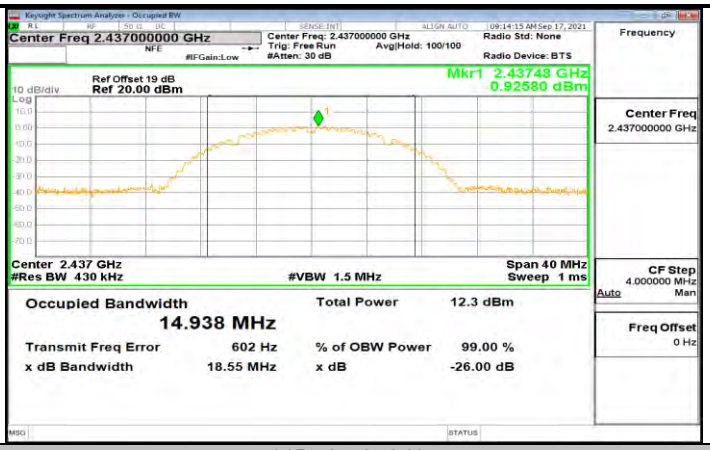



11B_Ant2_2412

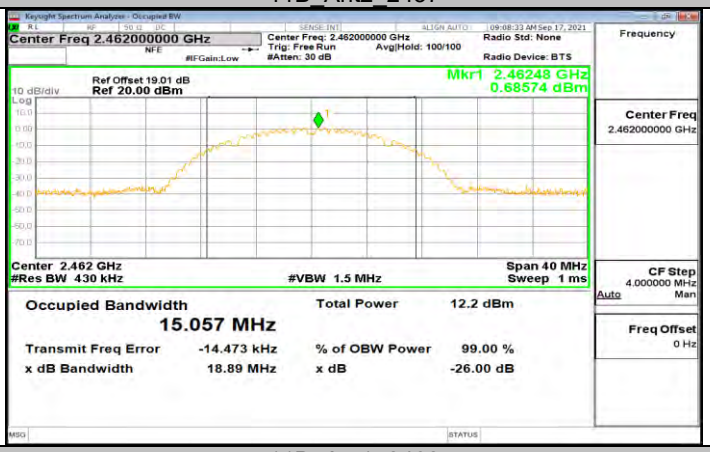



11B_Ant1_2437

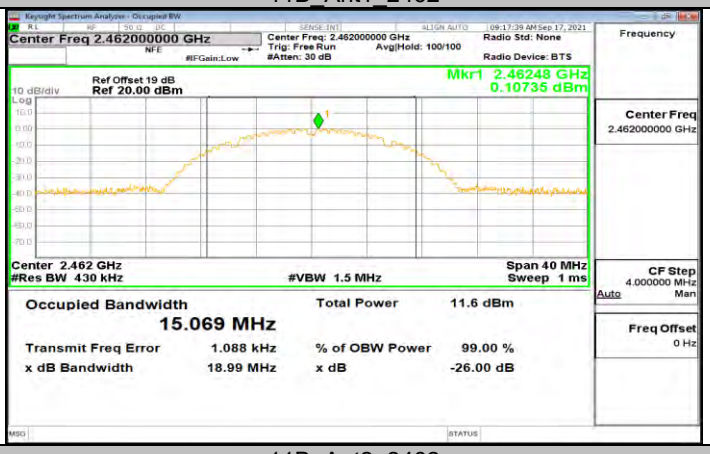

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11B_Ant2_2437

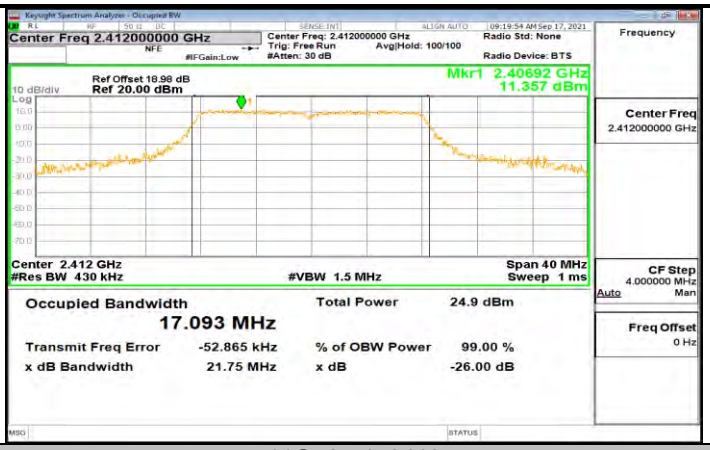



11B_Ant1_2462

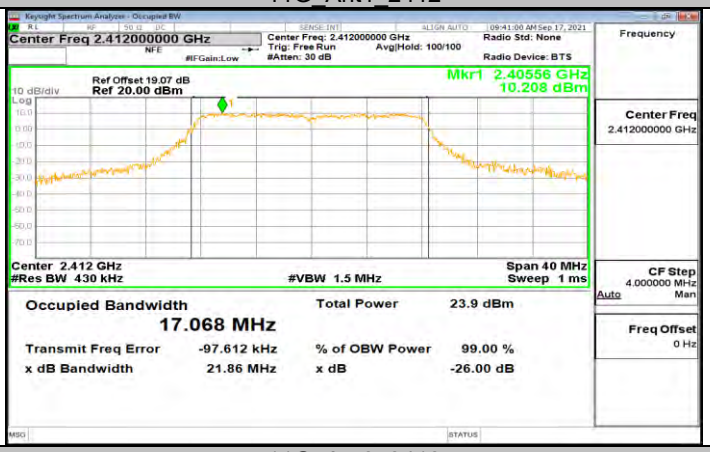



11B_Ant2_2462

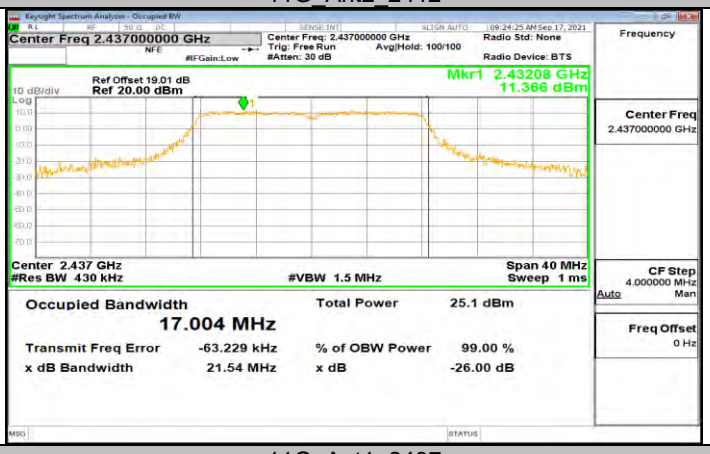

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11G_Ant1_2412

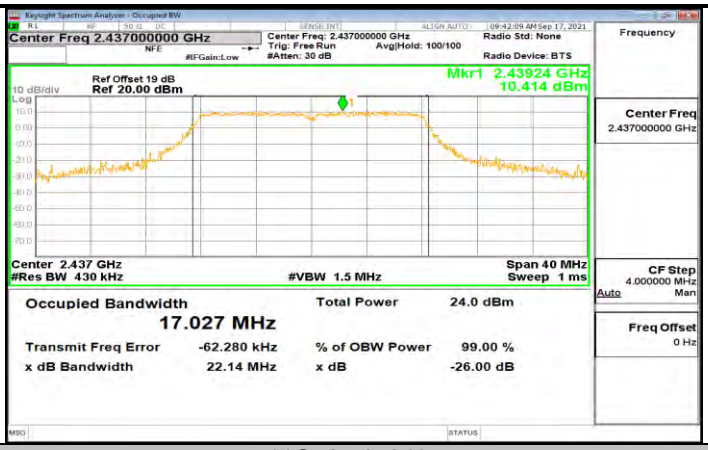



11G_Ant2_2412

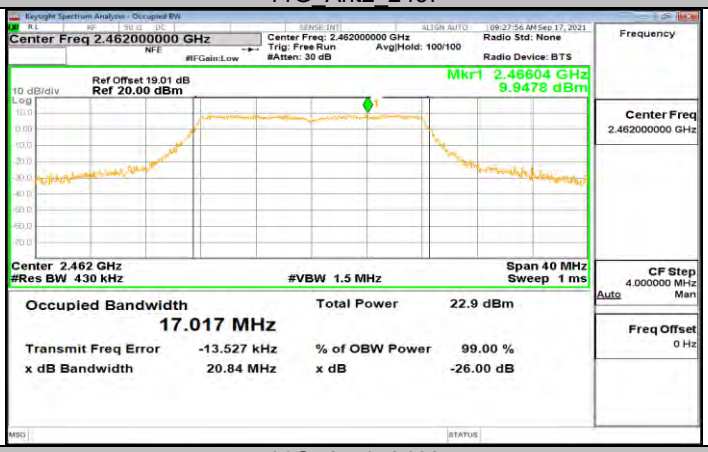



11G_Ant1_2437

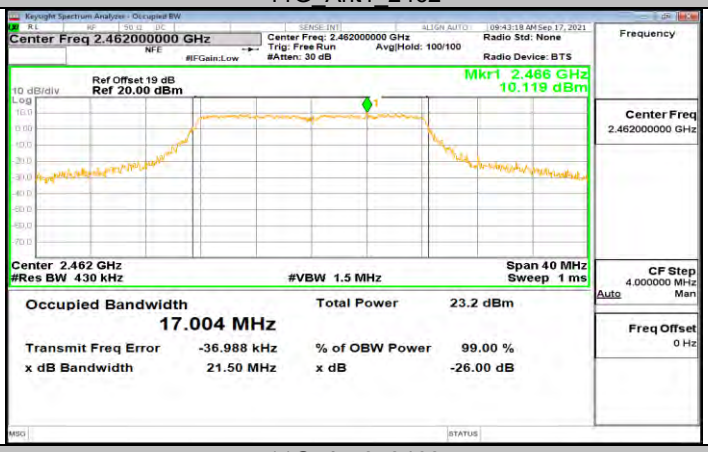

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11G_Ant2_2437

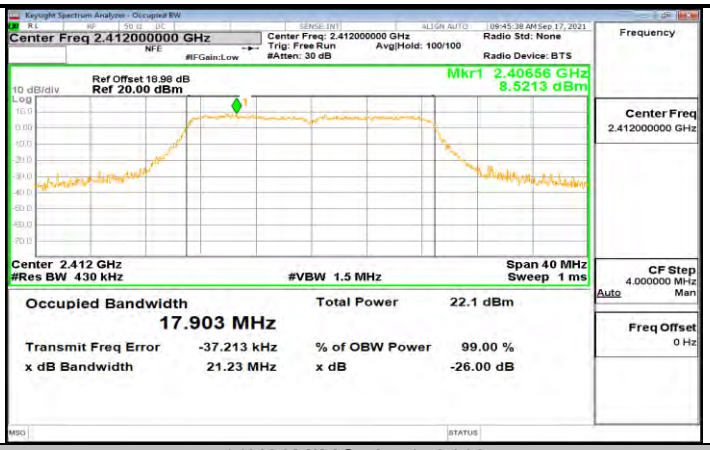



11G_Ant1_2462

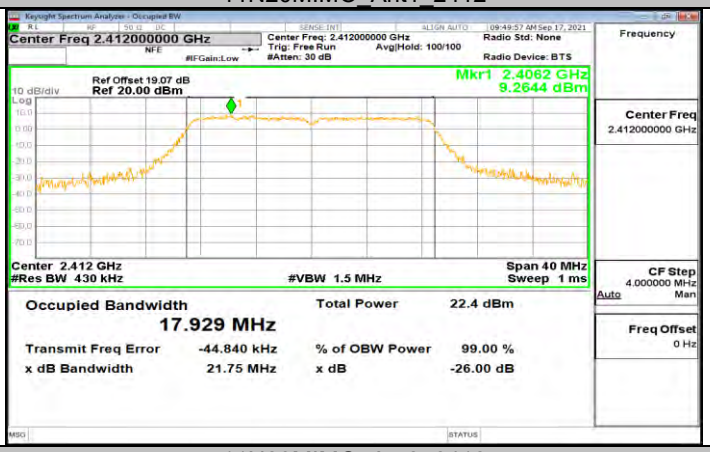



11G_Ant2_2462

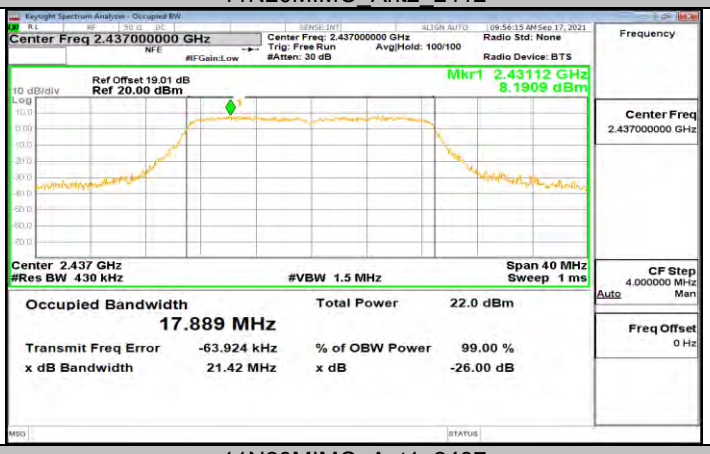

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N20MIMO_Ant1_2412

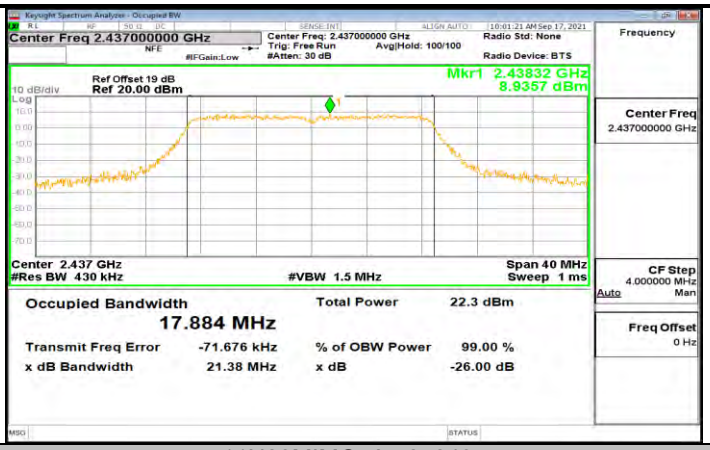



11N20MIMO_Ant2_2412

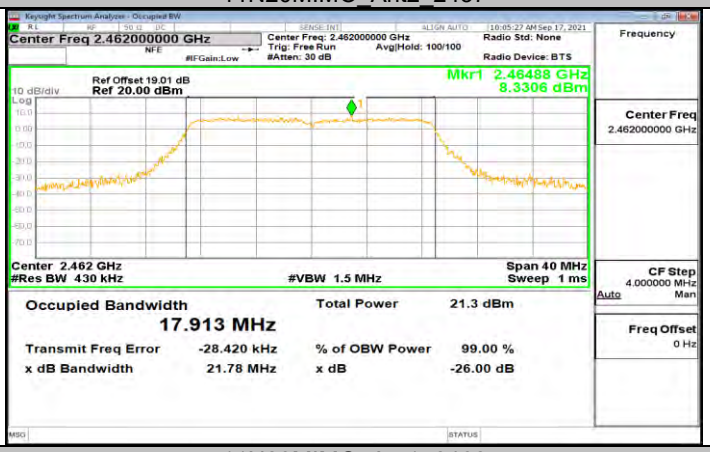



11N20MIMO_Ant1_2437

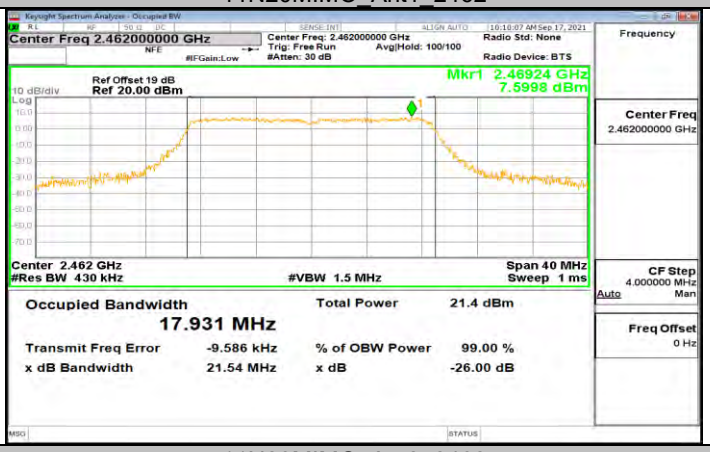

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N20MIMO_Ant2_2437

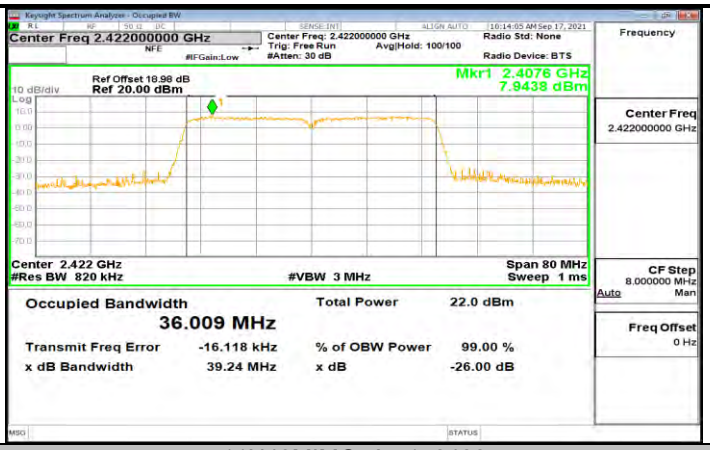



11N20MIMO_Ant1_2462

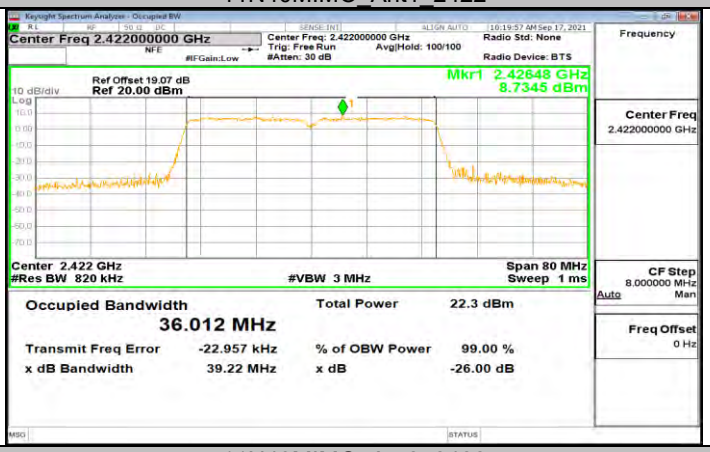



11N20MIMO_Ant2_2462

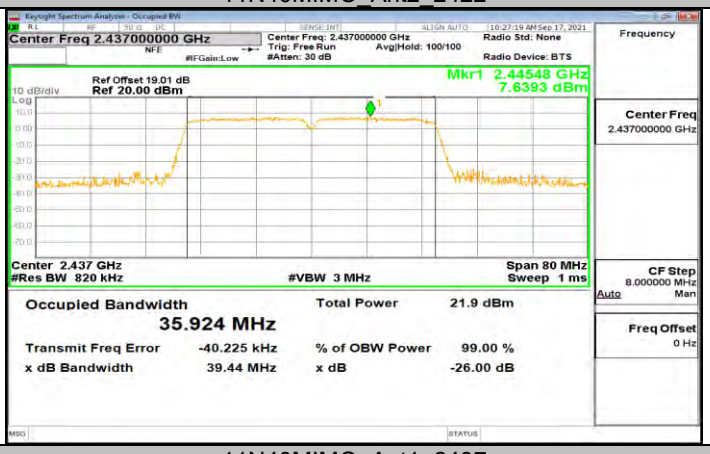

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant1_2422

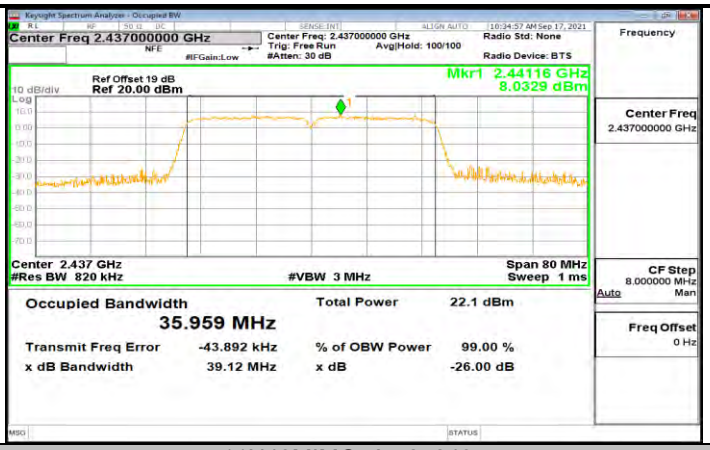



11N40MIMO_Ant2_2422

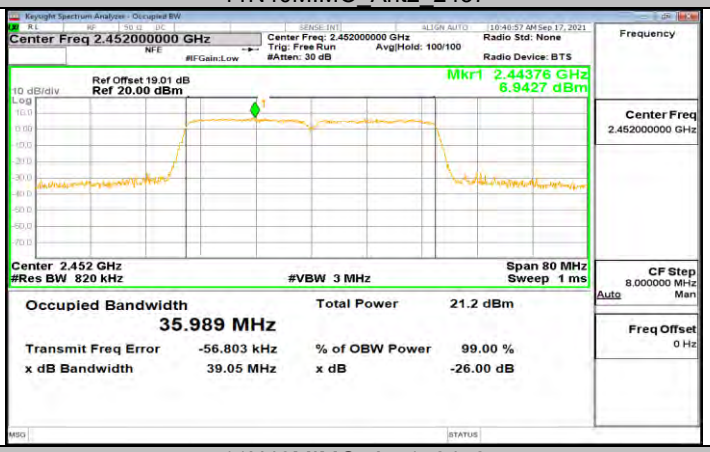



11N40MIMO_Ant1_2437

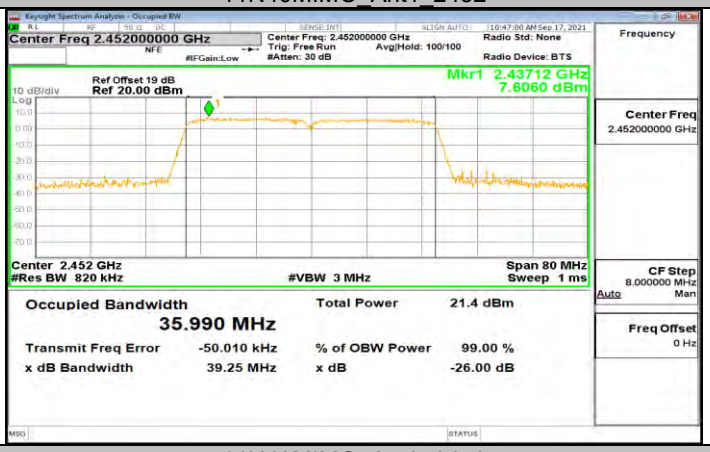

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant2_2437




11N40MIMO_Ant1_2452




11N40MIMO_Ant2_2452


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 11.3. Appendix C: Maximum conducted output power

### 11.3.1. Test Result

| Test Mode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|
| 11B | Ant1 | 2412 | 17.87 | <=30 | PASS |
| | Ant2 | 2412 | 16.94 | <=30 | PASS |
| | Ant1 | 2437 | 17.56 | <=30 | PASS |
| | Ant2 | 2437 | 16.62 | <=30 | PASS |
| | Ant1 | 2462 | 17.01 | <=30 | PASS |
| | Ant2 | 2462 | 16.09 | <=30 | PASS |
| 11G | Ant1 | 2412 | 17.39 | <=30 | PASS |
| | Ant2 | 2412 | 17.86 | <=30 | PASS |
| | Ant1 | 2437 | 17.58 | <=30 | PASS |
| | Ant2 | 2437 | 18.02 | <=30 | PASS |
| | Ant1 | 2462 | 16.71 | <=30 | PASS |
| | Ant2 | 2462 | 17.13 | <=30 | PASS |
| 11N20MIMO | Ant1 | 2412 | 15.84 | <=30 | PASS |
| | Ant2 | 2412 | 16.38 | <=30 | PASS |
| | total | 2412 | 19.13 | <=30 | PASS |
| | Ant1 | 2437 | 15.97 | <=30 | PASS |
| | Ant2 | 2437 | 16.13 | <=30 | PASS |
| | total | 2437 | 19.06 | <=30 | PASS |
| | Ant1 | 2462 | 15.27 | <=30 | PASS |
| | Ant2 | 2462 | 15.45 | <=30 | PASS |
| | total | 2462 | 18.37 | <=30 | PASS |
| 11N40MIMO | Ant1 | 2422 | 14.78 | <=30 | PASS |
| | Ant2 | 2422 | 15.32 | <=30 | PASS |
| | total | 2422 | 18.07 | <=30 | PASS |
| | Ant1 | 2437 | 15.22 | <=30 | PASS |
| | Ant2 | 2437 | 14.91 | <=30 | PASS |
| | total | 2437 | 18.08 | <=30 | PASS |
| | Ant1 | 2452 | 14.33 | <=30 | PASS |
| | Ant2 | 2452 | 14.56 | <=30 | PASS |
| | total | 2452 | 17.46 | <=30 | PASS |

Note: 1. Conducted Power=Meas. Level+ Correction Factor
2. The Duty Cycle Factor (refer to section 7.1) had already compensated to the test data.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 11.4. Appendix D: Maximum power spectral density

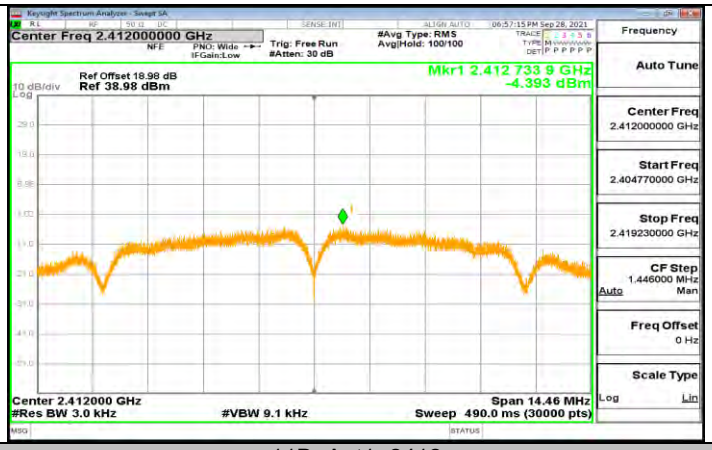
### 11.4.1. Test Result

| Test Mode | Antenna | Channel | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 11B | Ant1 | 2412 | -4.39 | <=8 | PASS |
| | | 2437 | -5.27 | <=8 | PASS |
| | | 2462 | -5.05 | <=8 | PASS |
| 11G | Ant1 | 2412 | -7.75 | <=8 | PASS |
| | | 2437 | -7.54 | <=8 | PASS |
| | | 2462 | -7.98 | <=8 | PASS |
| 11N20MIMO | Ant1 | 2412 | -9.4 | <=8 | PASS |
| | Ant2 | 2412 | -9.49 | <=8 | PASS |
| | total | 2412 | -6.43 | <=8 | PASS |
| | Ant1 | 2437 | -7.81 | <=8 | PASS |
| | Ant2 | 2437 | -7.76 | <=8 | PASS |
| | total | 2437 | -4.77 | <=8 | PASS |
| | Ant1 | 2462 | -10.38 | <=8 | PASS |
| | Ant2 | 2462 | -9.49 | <=8 | PASS |
| | total | 2462 | -6.90 | <=8 | PASS |
| 11N40MIMO | Ant1 | 2422 | -13.36 | <=8 | PASS |
| | Ant2 | 2422 | -13.25 | <=8 | PASS |
| | total | 2422 | -10.29 | <=8 | PASS |
| | Ant1 | 2437 | -13.23 | <=8 | PASS |
| | Ant2 | 2437 | -13.11 | <=8 | PASS |
| | total | 2437 | -10.16 | <=8 | PASS |
| | Ant1 | 2452 | -14.04 | <=8 | PASS |
| | Ant2 | 2452 | -13.91 | <=8 | PASS |
| | total | 2452 | -10.96 | <=8 | PASS |

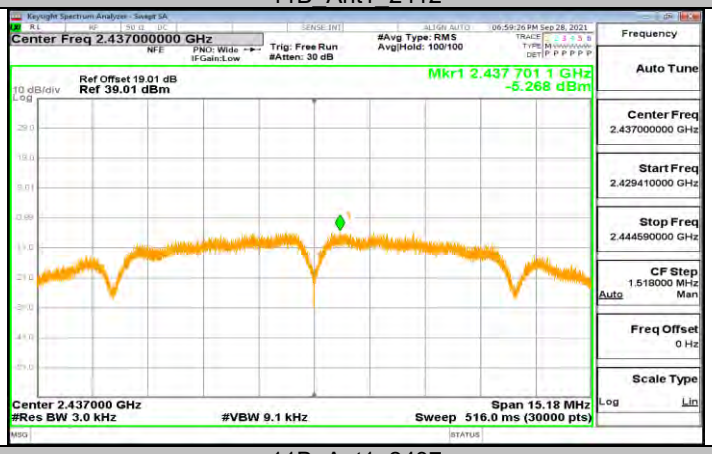
Note: All modes and antenna have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

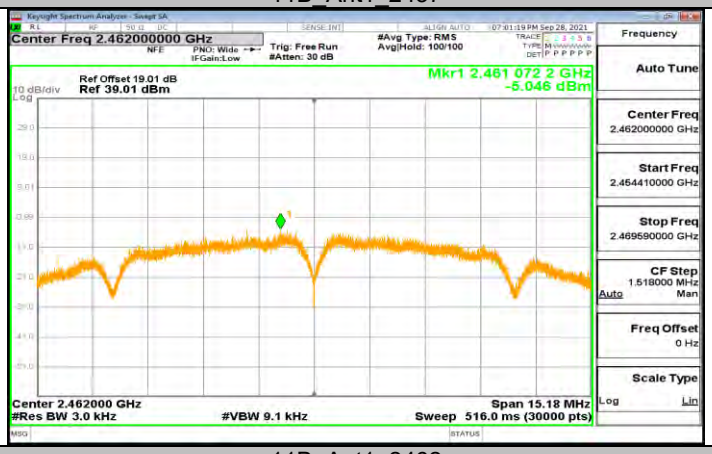
### 11.4.2. Test Graphs




11B_Ant1_2412

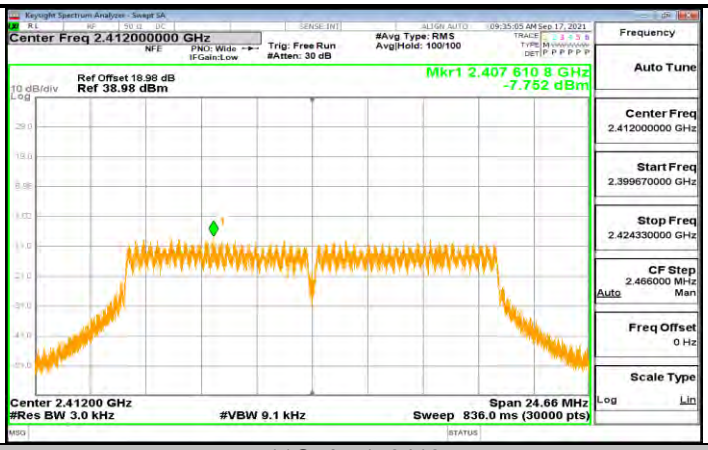



11B_Ant1_2437

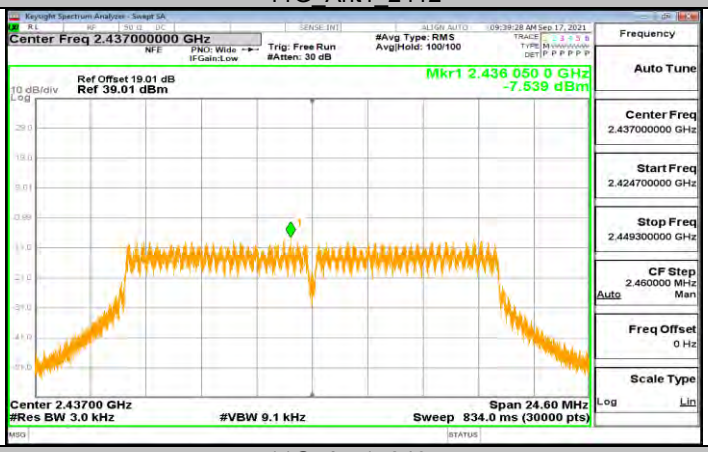



11B_Ant1_2462

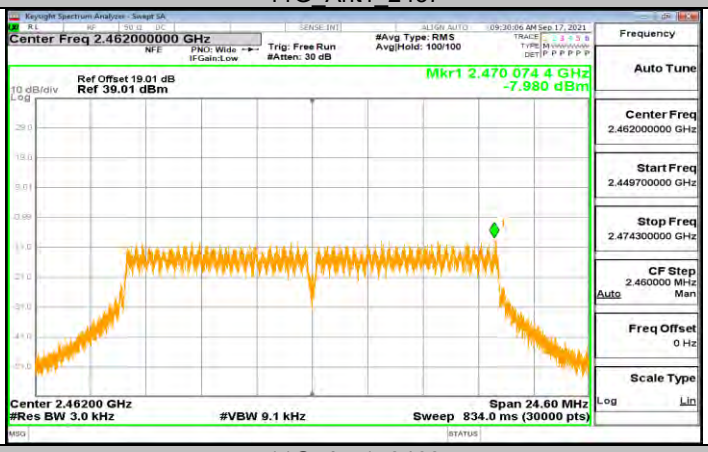

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11G_Ant1_2412

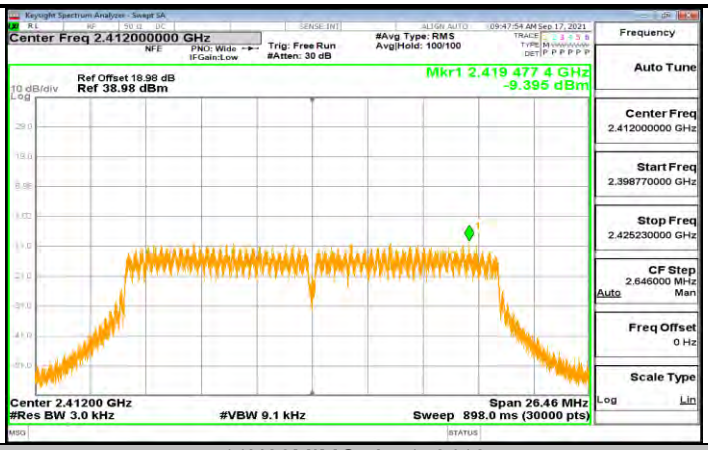



11G_Ant1_2437

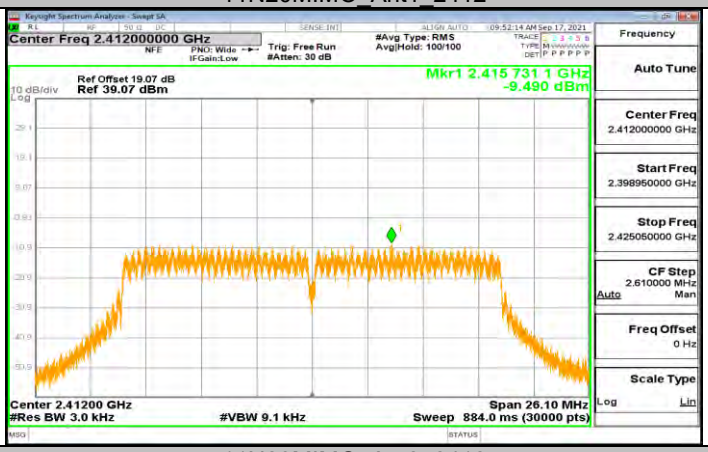



11G_Ant1_2462

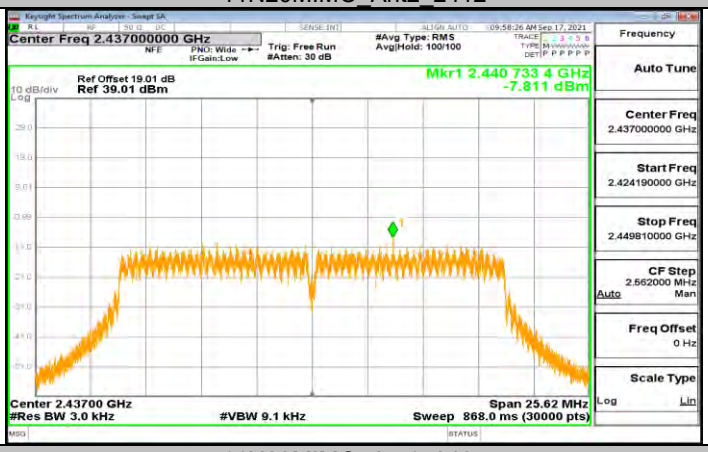

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N20MIMO_Ant1_2412

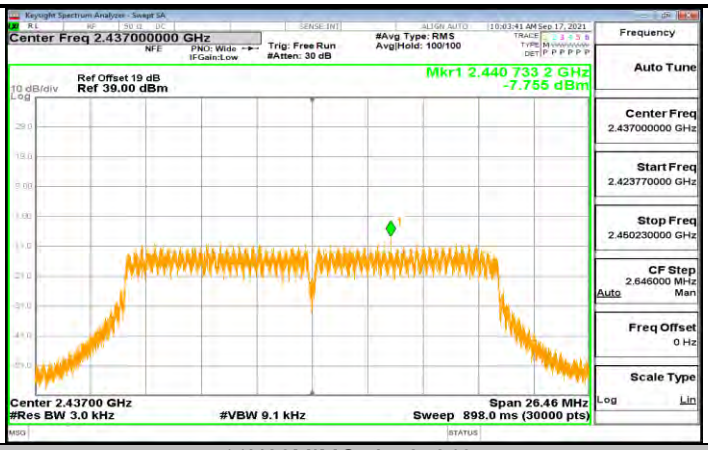



11N20MIMO_Ant2_2412

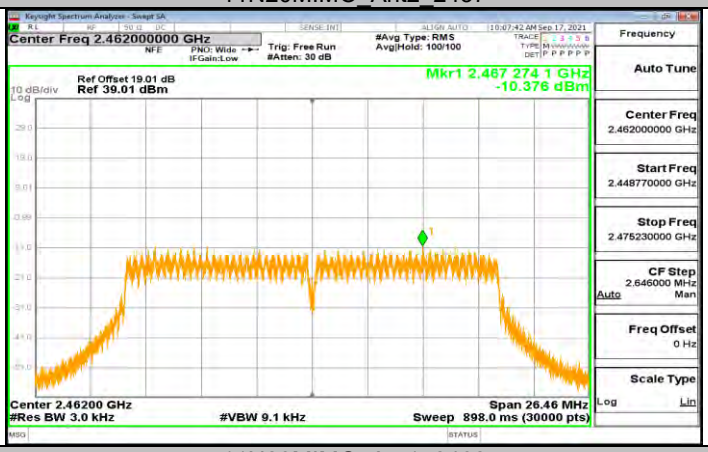



11N20MIMO_Ant1_2437


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*



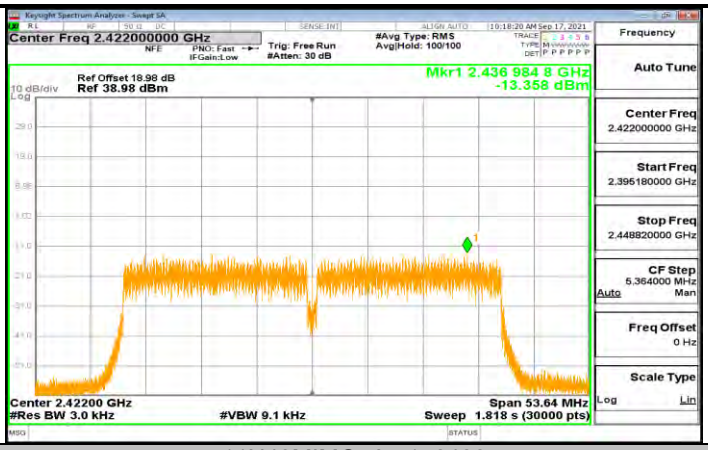

11N20MIMO_Ant2_2437



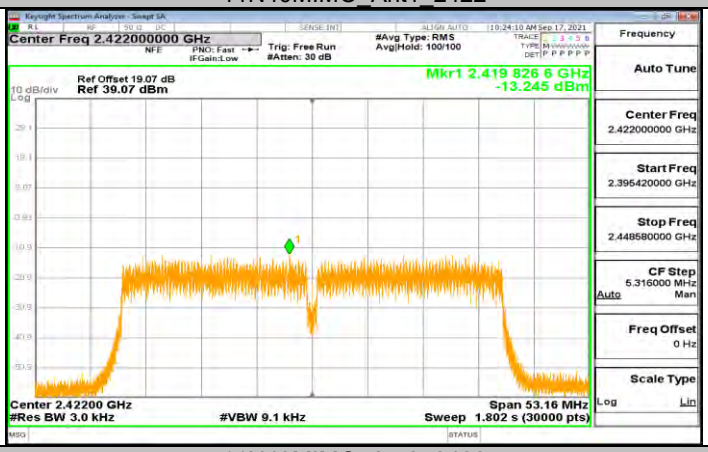

11N20MIMO_Ant1_2462

11N20MIMO_Ant2_2462

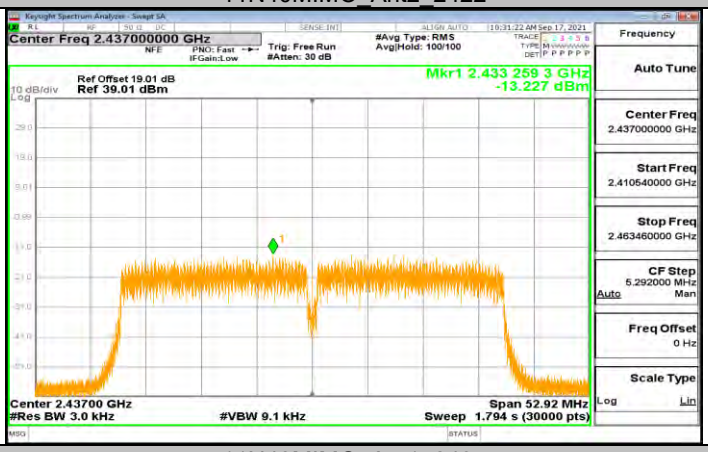

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant1_2422

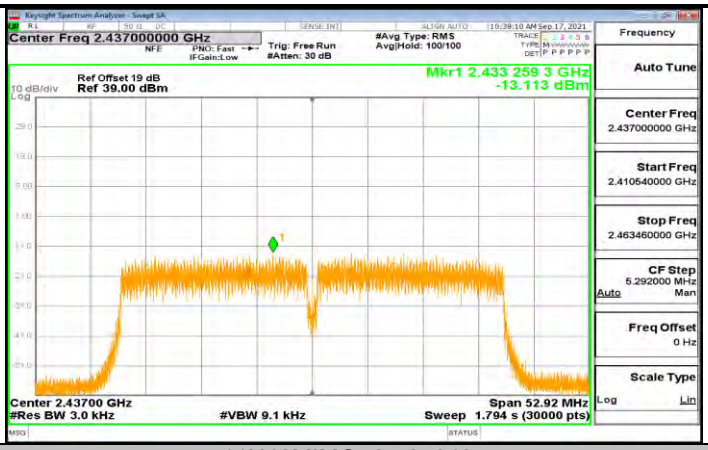



11N40MIMO_Ant2_2422

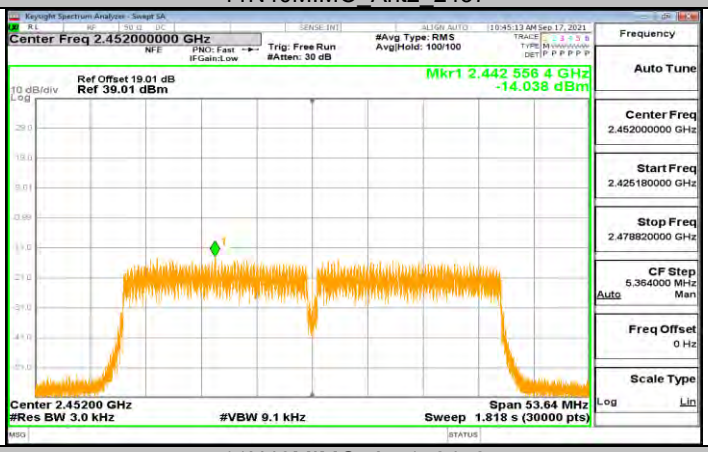



11N40MIMO_Ant1_2437

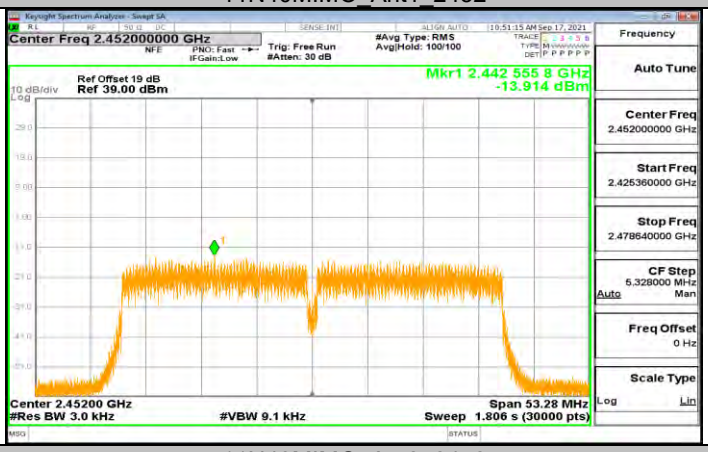

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant2_2437




11N40MIMO_Ant1_2452




11N40MIMO_Ant2_2452


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 11.5. Appendix E: Band edge measurements

### 11.5.1. Test Result

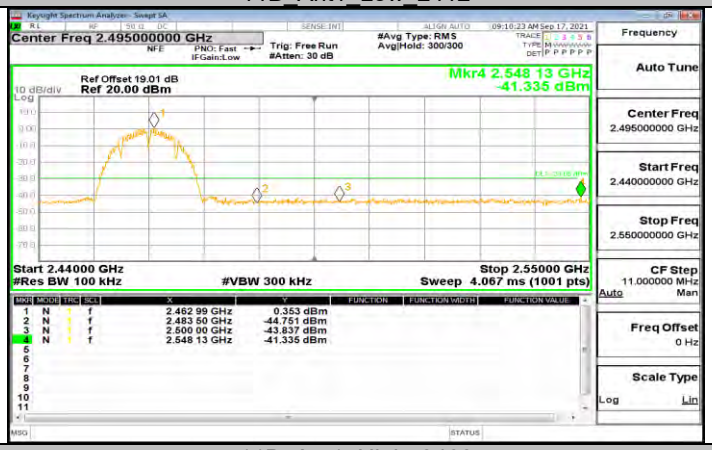
| Test Mode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| 11B | Ant1 | Low | 2412 | 0.55 | -41.07 | <=-29.45 | PASS |
| | | High | 2462 | 0.35 | -41.34 | <=-29.65 | PASS |
| 11G | Ant1 | Low | 2412 | 7.57 | -24.64 | <=-22.43 | PASS |
| | | High | 2462 | 5.71 | -39.71 | <=-24.29 | PASS |
| 11N20MIMO | Ant1 | Low | 2412 | 4.98 | -32.22 | <=-25.02 | PASS |
| | Ant2 | Low | 2412 | 4.79 | -31.09 | <=-25.21 | PASS |
| | Ant1 | High | 2462 | 3.84 | -41.14 | <=-26.16 | PASS |
| | Ant2 | High | 2462 | 6.17 | -38.71 | <=-23.83 | PASS |
| 11N40MIMO | Ant1 | Low | 2422 | 0.68 | -39.52 | <=-29.32 | PASS |
| | Ant2 | Low | 2422 | 0.94 | -38.45 | <=-29.07 | PASS |
| | Ant1 | High | 2452 | 0.23 | -40.65 | <=-29.78 | PASS |
| | Ant2 | High | 2452 | 0.48 | -40.28 | <=-29.52 | PASS |

Note: All modes and antenna have been tested, only the worst data was recorded in the report.

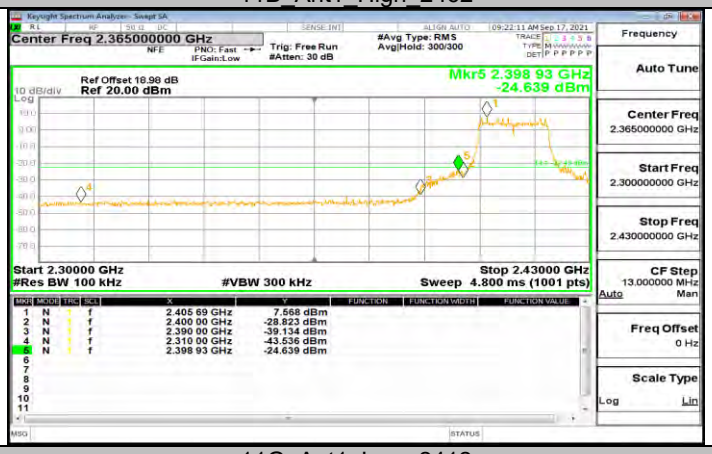

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 11.5.2. Test Graphs

11B_Ant1_Low_2412

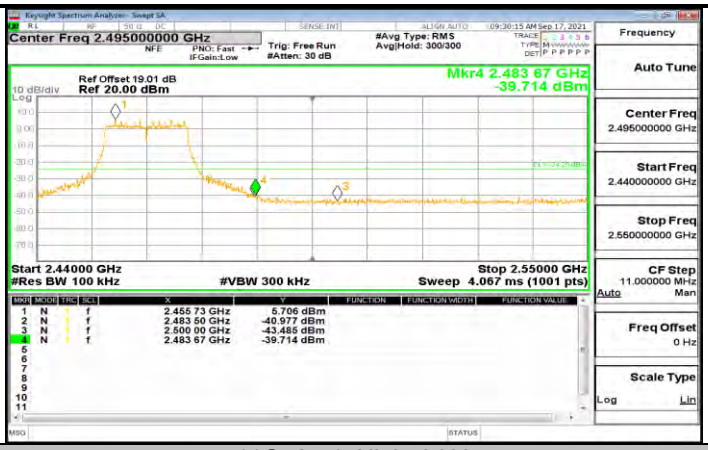



11B_Ant1_High_2462




11G_Ant1_Low_2412


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

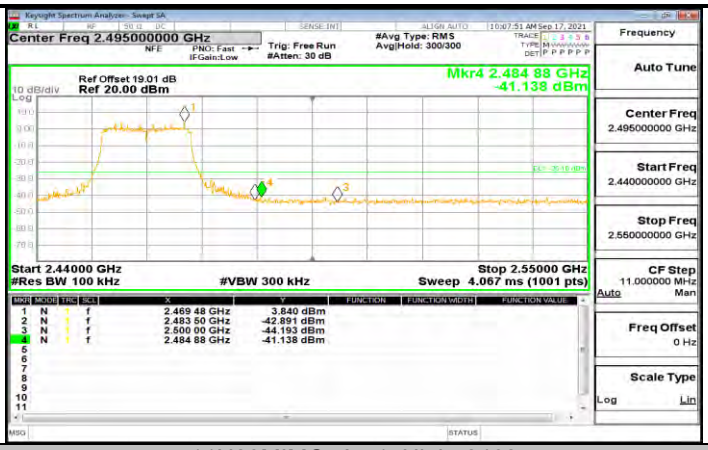



11G_Ant1_High_2462

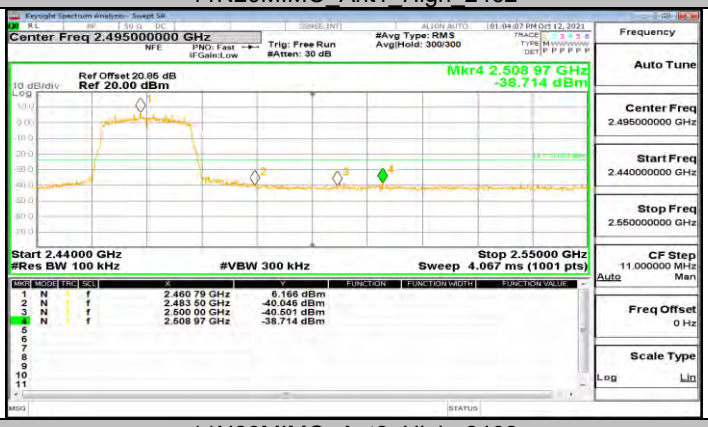
11N20MIMO_Ant1_Low_2412

11N20MIMO_Ant2_Low_2412

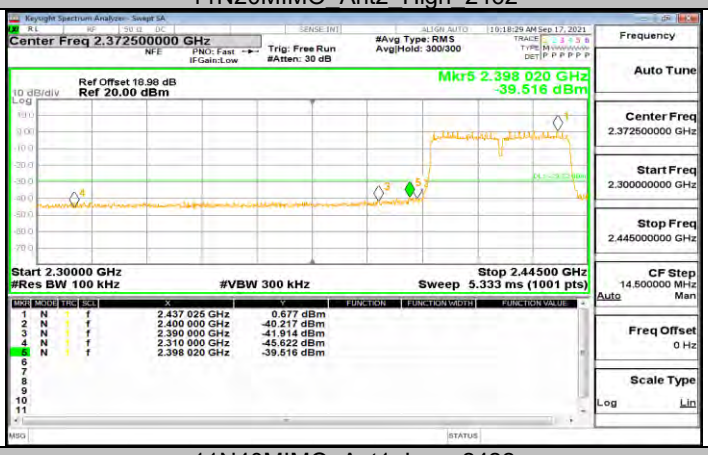

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N20MIMO_Ant1_High_2462




11N20MIMO_Ant2_High_2462




11N40MIMO_Ant1_Low_2422


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N40MIMO_Ant2_Low_2422

11N40MIMO_Ant1_High_2452

11N40MIMO_Ant2_High_2452


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 11.6. Appendix F: Conducted Spurious Emission

### 11.6.1. Test Result

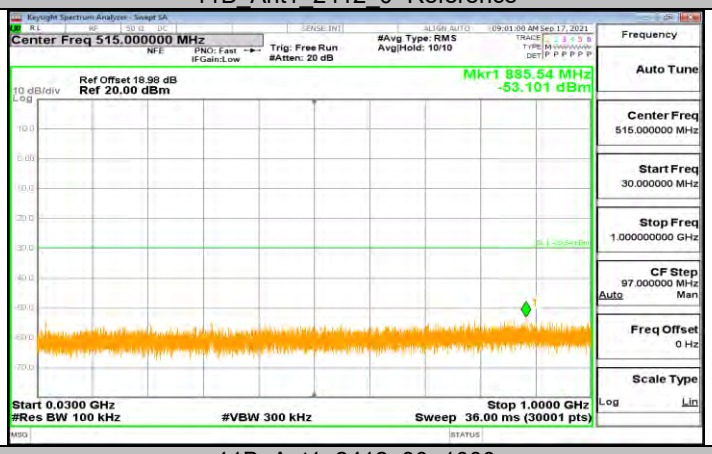
| Test Mode | Antenna | Channel | FreqRange [Mhz] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| 11B | Ant1 | 2412 | Reference | 0.46 | --- | PASS |
| | | | 30~1000 | -53.1 | <=-29.54 | PASS |
| | | | 1000~26500 | -45.65 | <=-29.54 | PASS |
| | | 2437 | Reference | 1.16 | --- | PASS |
| | | | 30~1000 | -53.9 | <=-28.84 | PASS |
| | | | 1000~26500 | -45.22 | <=-28.84 | PASS |
| | | 2462 | Reference | -0.65 | --- | PASS |
| | | | 30~1000 | -53.39 | <=-30.65 | PASS |
| | | | 1000~26500 | -45.19 | <=-30.65 | PASS |
| 11G | Ant1 | 2412 | Reference | 7.92 | --- | PASS |
| | | | 30~1000 | -50.99 | <=-22.09 | PASS |
| | | | 1000~26500 | -44.68 | <=-22.09 | PASS |
| | | 2437 | Reference | 6.43 | --- | PASS |
| | | | 30~1000 | -49.98 | <=-23.57 | PASS |
| | | | 1000~26500 | -45.21 | <=-23.57 | PASS |
| | | 2462 | Reference | 5.62 | --- | PASS |
| | | | 30~1000 | -51.91 | <=-24.38 | PASS |
| | | | 1000~26500 | -45.05 | <=-24.38 | PASS |
| 11N20MIMO | Ant1 | 2412 | Reference | 4.55 | --- | PASS |
| | | | 30~1000 | -51.03 | <=-25.45 | PASS |
| | | | 1000~26500 | -44.94 | <=-25.45 | PASS |
| | Ant2 | 2412 | Reference | 4.61 | --- | PASS |
| | | | 30~1000 | -53.27 | <=-25.39 | PASS |
| | | | 1000~26500 | -45.05 | <=-25.39 | PASS |
| | Ant1 | 2437 | Reference | 4.05 | --- | PASS |
| | | | 30~1000 | -50.02 | <=-25.96 | PASS |
| | | | 1000~26500 | -45.47 | <=-25.96 | PASS |
| | Ant2 | 2437 | Reference | 4.98 | --- | PASS |
| | | | 30~1000 | -53.63 | <=-25.02 | PASS |
| | | | 1000~26500 | -45.49 | <=-25.02 | PASS |
| | Ant1 | 2462 | Reference | 2.68 | --- | PASS |
| | | | 30~1000 | -51.35 | <=-27.32 | PASS |
| | | | 1000~26500 | -44.5 | <=-27.32 | PASS |
| | Ant2 | 2462 | Reference | 3.63 | --- | PASS |
| | | | 30~1000 | -53.83 | <=-26.38 | PASS |
| | | | 1000~26500 | -45.56 | <=-26.38 | PASS |
| 11N40MIMO | Ant1 | 2422 | Reference | 0.71 | --- | PASS |
| | | | 30~1000 | -50.37 | <=-29.29 | PASS |
| | | | 1000~26500 | -45.83 | <=-29.29 | PASS |
| | Ant2 | 2422 | Reference | 1.11 | --- | PASS |
| | | | 30~1000 | -53.39 | <=-28.89 | PASS |
| | | | 1000~26500 | -44.88 | <=-28.89 | PASS |
| | Ant1 | 2437 | Reference | 0.72 | --- | PASS |
| | | | 30~1000 | -52.39 | <=-29.28 | PASS |
| | | | 1000~26500 | -43.7 | <=-29.28 | PASS |
| | Ant2 | 2437 | Reference | 0.86 | --- | PASS |
| | | | 30~1000 | -53.4 | <=-29.14 | PASS |
| | | | 1000~26500 | -45.28 | <=-29.14 | PASS |
| | Ant1 | 2452 | Reference | -0.09 | --- | PASS |
| | | | 30~1000 | -51.9 | <=-30.09 | PASS |
| | | | 1000~26500 | -45.28 | <=-30.09 | PASS |
| | Ant2 | 2452 | Reference | 0.31 | --- | PASS |
| | | | 30~1000 | -54.18 | <=-29.69 | PASS |
| | | | 1000~26500 | -44.43 | <=-29.69 | PASS |

Note: All modes and antenna have been tested, only the worst data was recorded in the report.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 11.6.2. Test Graphs

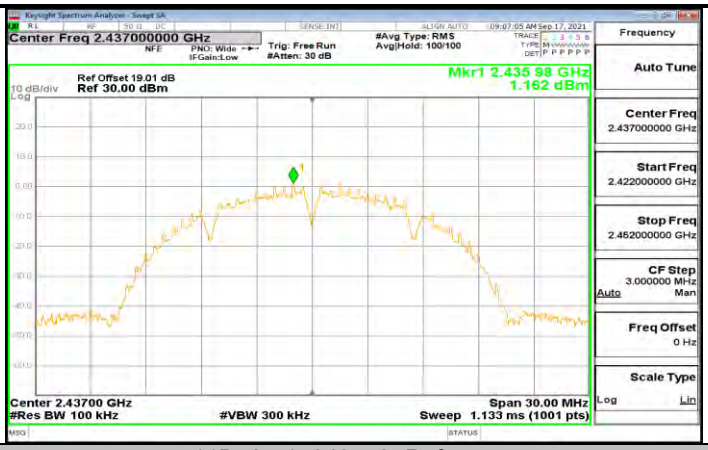
11B_Ant1_2412_0~Reference



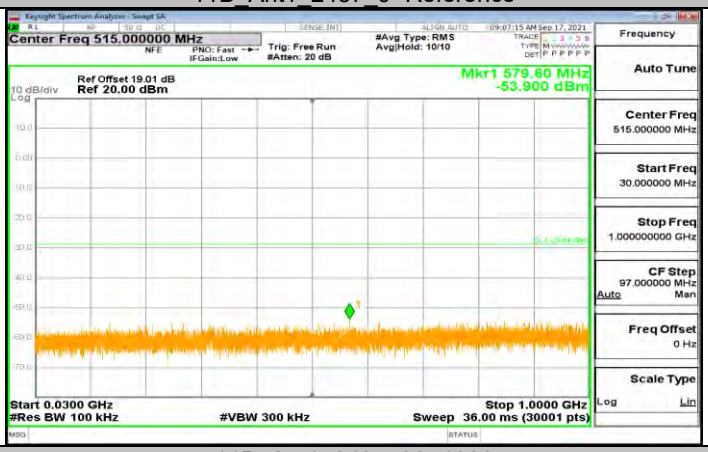

11B_Ant1_2412_30~1000

11B_Ant1_2412_1000~26500

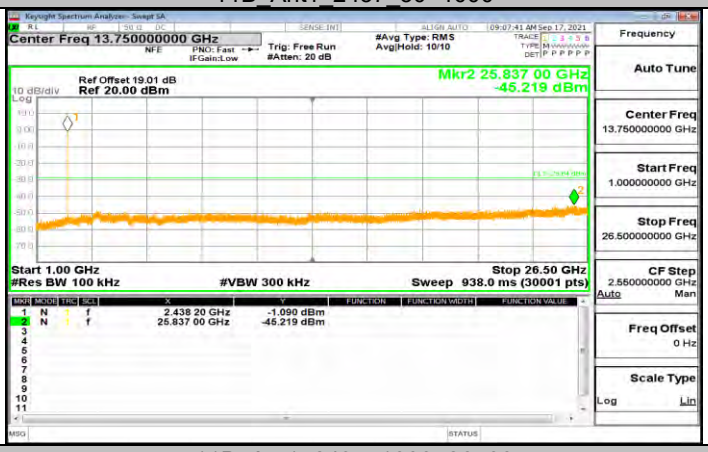

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11B_Ant1_2437_0~Reference



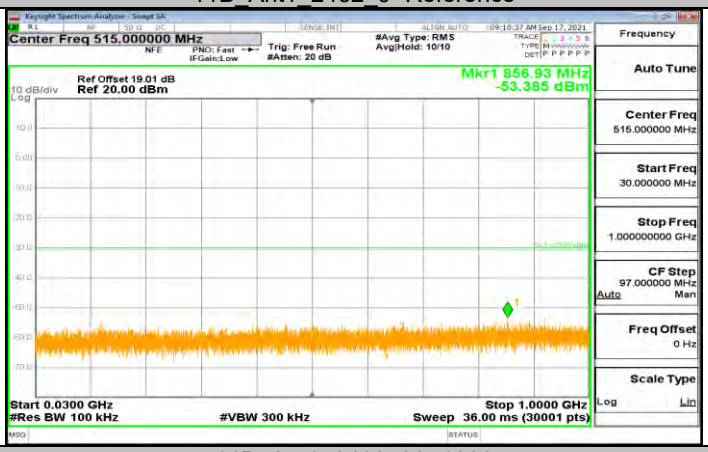

11B_Ant1_2437_30~1000



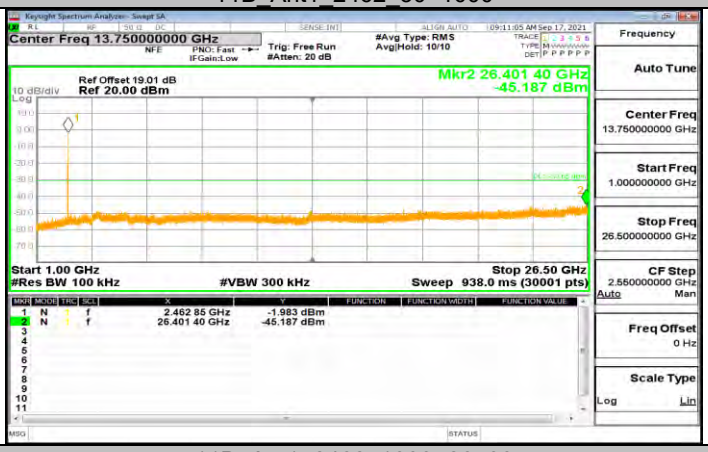

11B_Ant1_2437_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11B_Ant1_2462_0~Reference



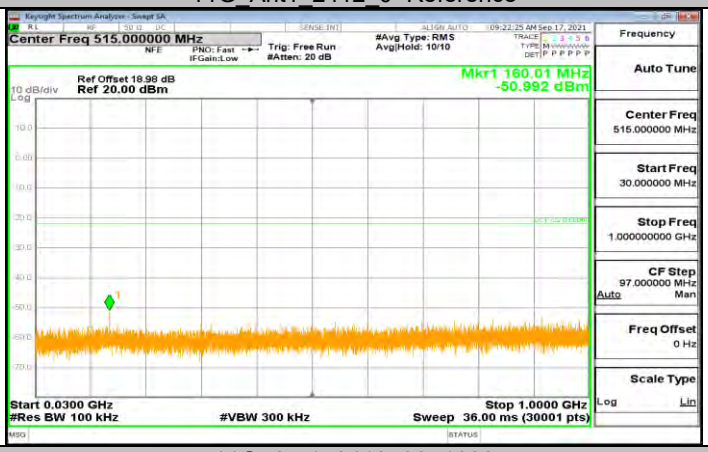

11B_Ant1_2462_30~1000



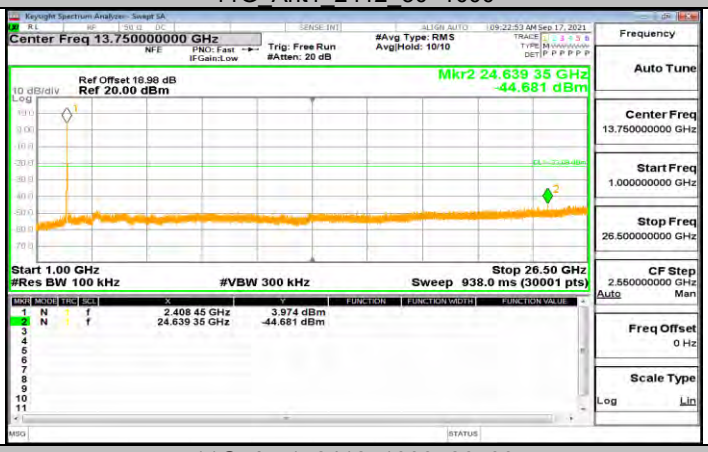

11B_Ant1_2462_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11G_Ant1_2412_0~Reference




11G_Ant1_2412_30~1000

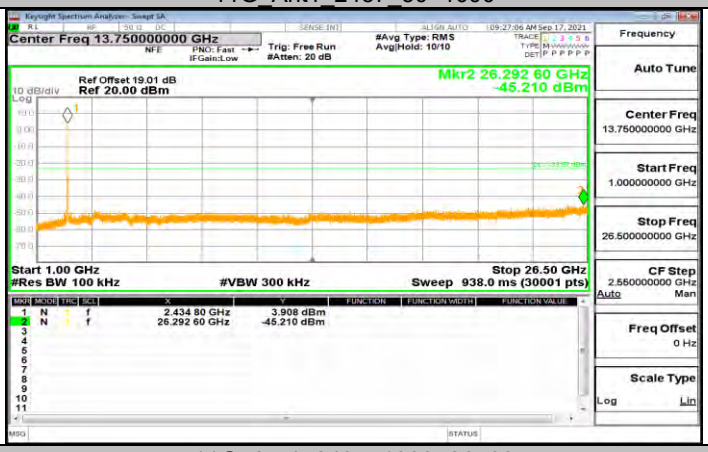



11G_Ant1_2412_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11G_Ant1_2437_0~Reference

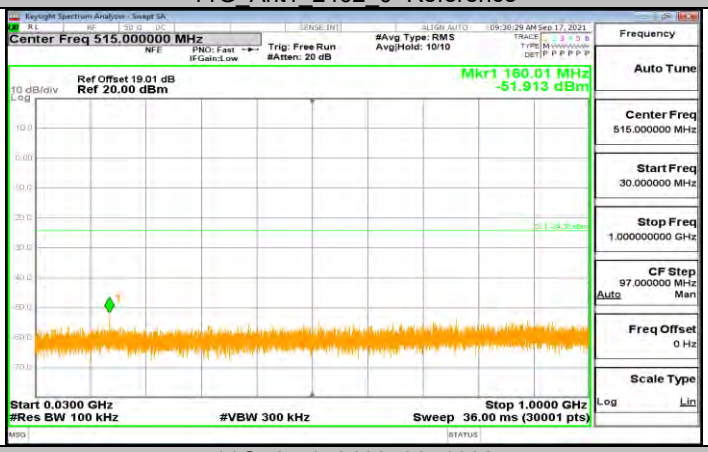
11G_Ant1_2437_30~1000



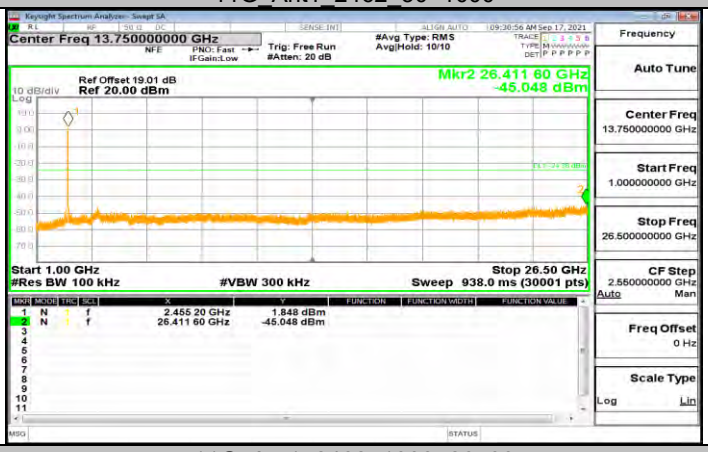

11G_Ant1_2437_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11G_Ant1_2462_0~Reference



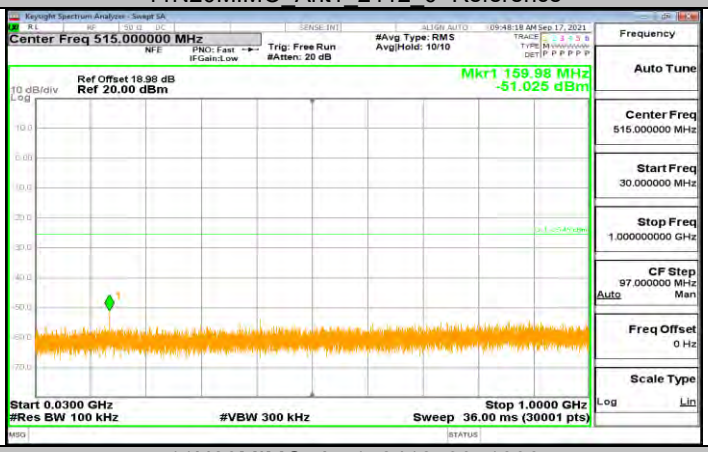

11G_Ant1_2462_30~1000



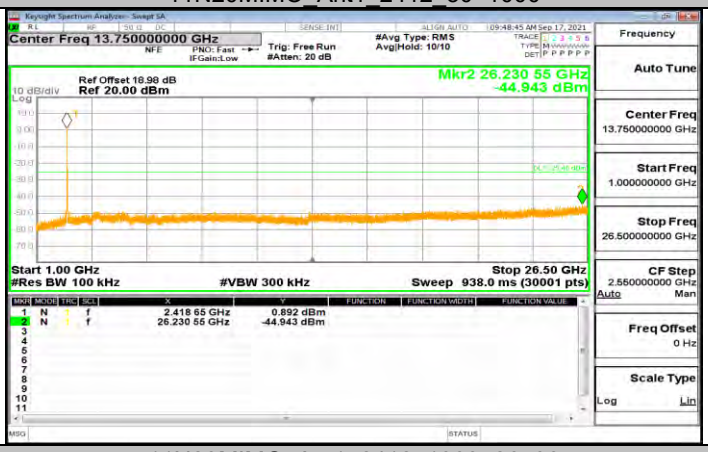

11G_Ant1_2462_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N20MIMO_Ant1_2412_0~Reference



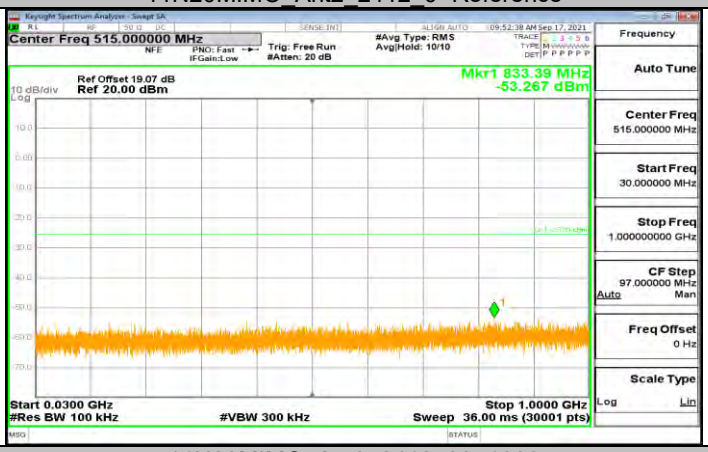

11N20MIMO_Ant1_2412_30~1000




11N20MIMO_Ant1_2412_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N20MIMO_Ant2_2412_0~Reference

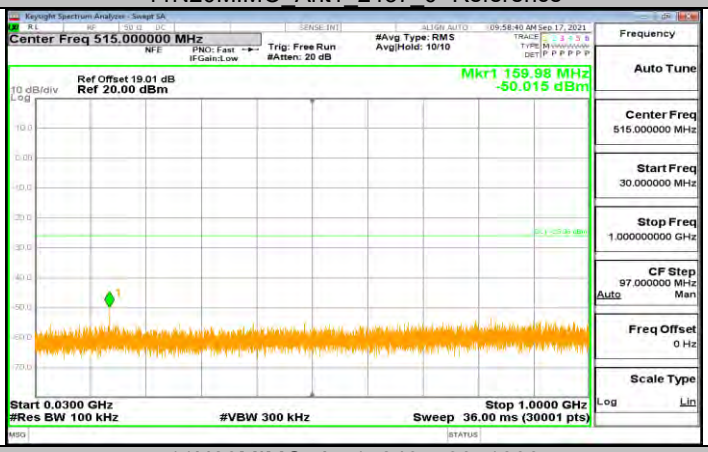



11N20MIMO_Ant2_2412_30~1000

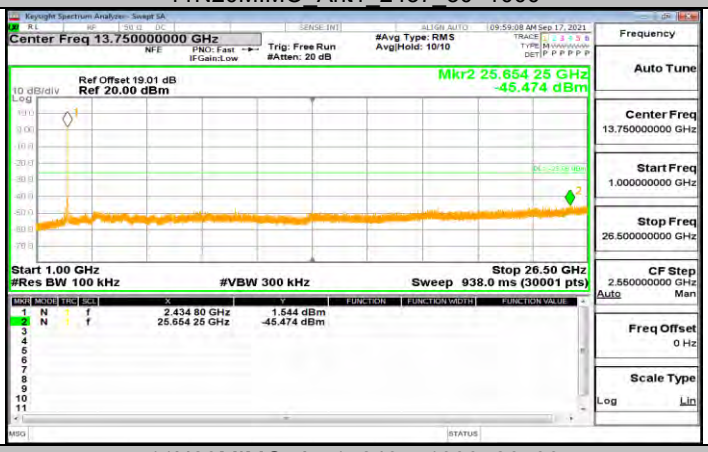
11N20MIMO_Ant2_2412_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N20MIMO_Ant1_2437_0~Reference



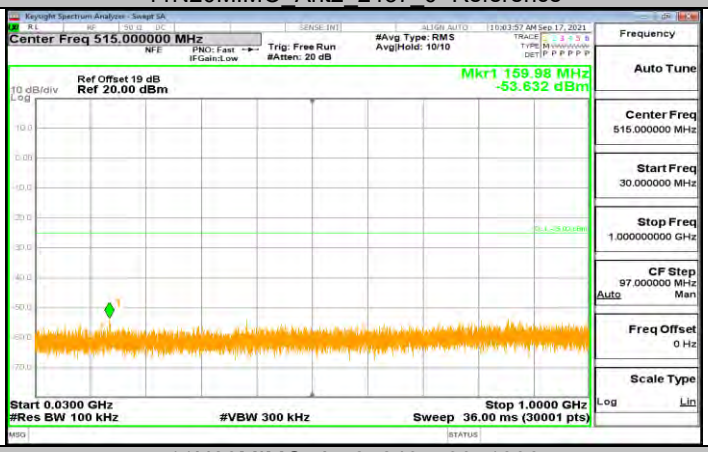

11N20MIMO_Ant1_2437_30~1000



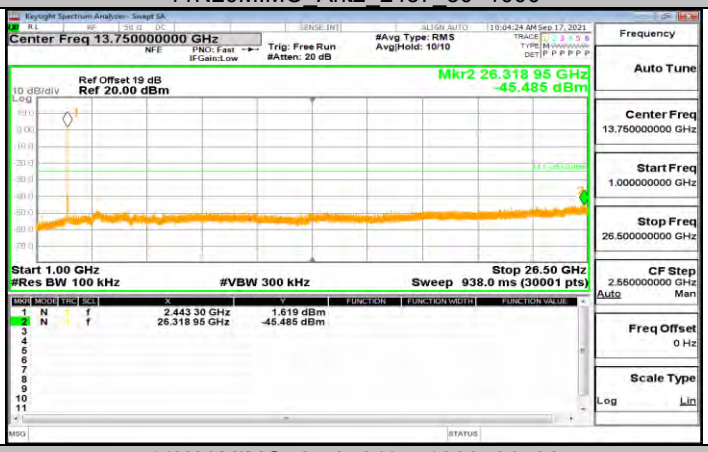

11N20MIMO_Ant1_2437_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N20MIMO_Ant2_2437_0~Reference



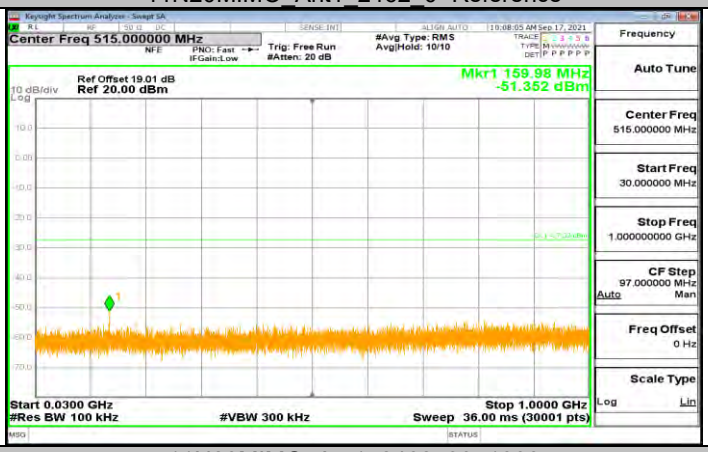

11N20MIMO_Ant2_2437_30~1000



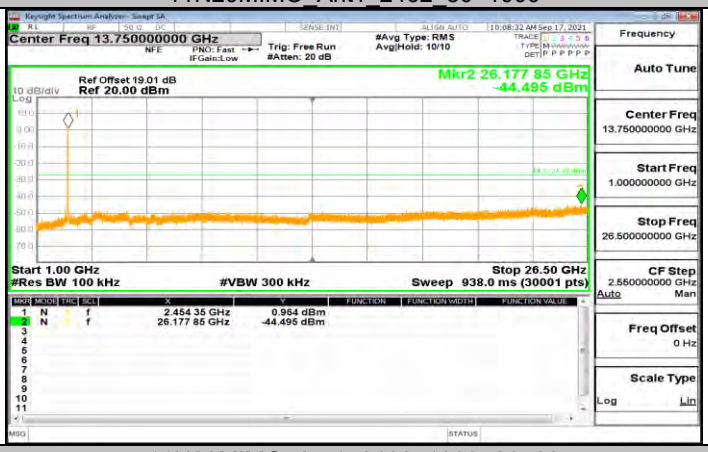

11N20MIMO_Ant2_2437_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N20MIMO_Ant1_2462_0~Reference



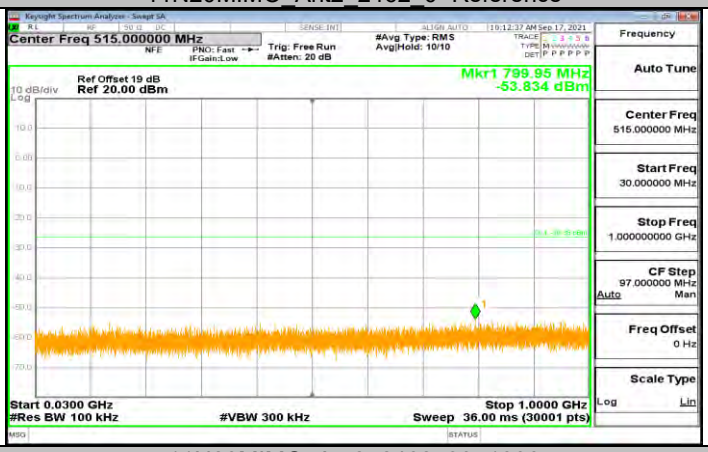

11N20MIMO_Ant1_2462_30~1000



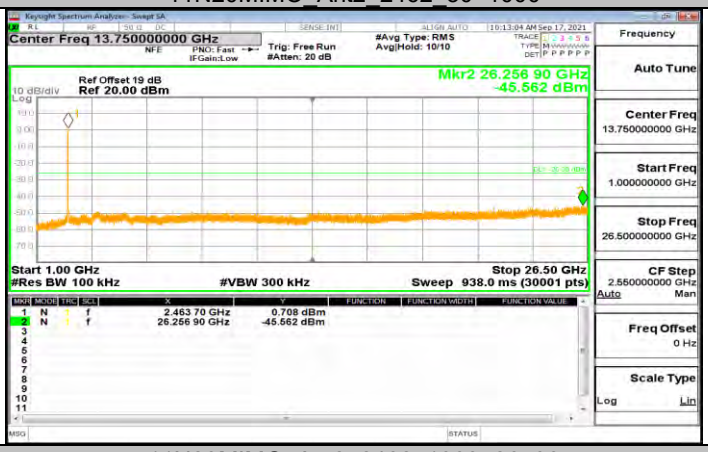

11N20MIMO_Ant1_2462_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N20MIMO_Ant2_2462_0~Reference

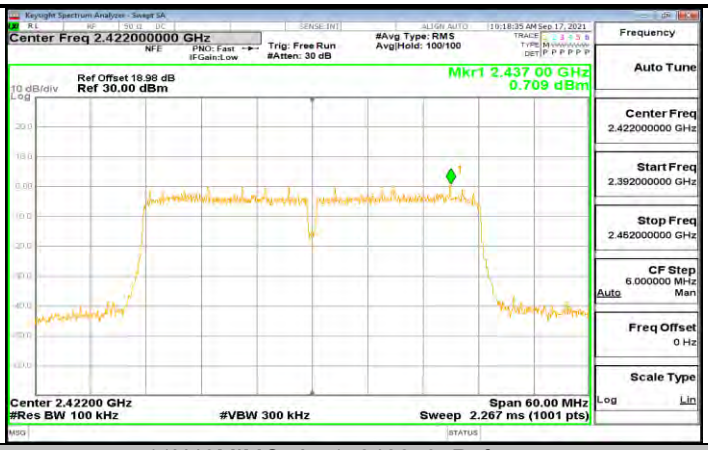



11N20MIMO_Ant2_2462_30~1000

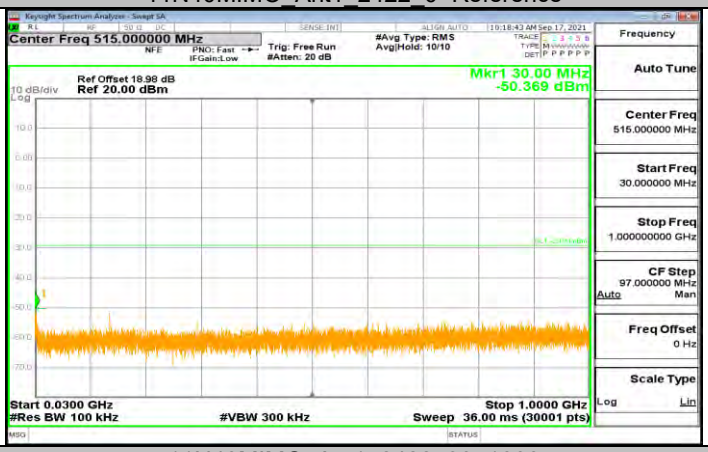



11N20MIMO_Ant2_2462_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant1_2422_0~Reference

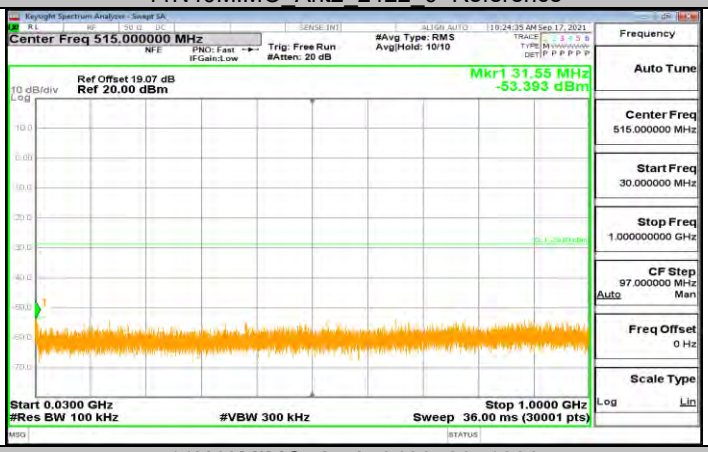



11N40MIMO_Ant1_2422_30~1000

11N40MIMO_Ant1_2422_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

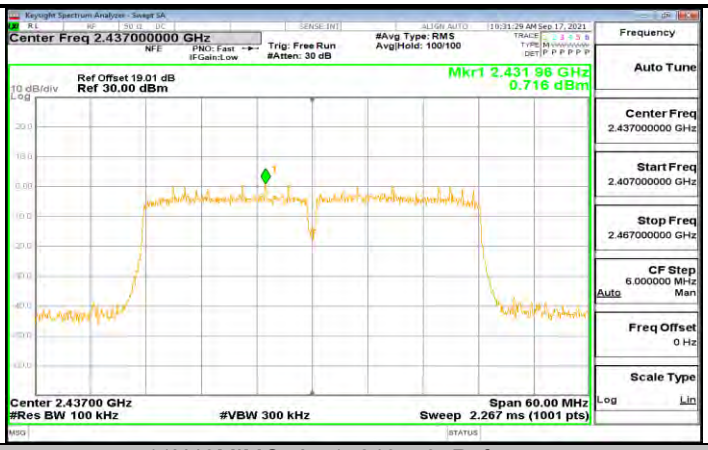
11N40MIMO_Ant2_2422_0~Reference



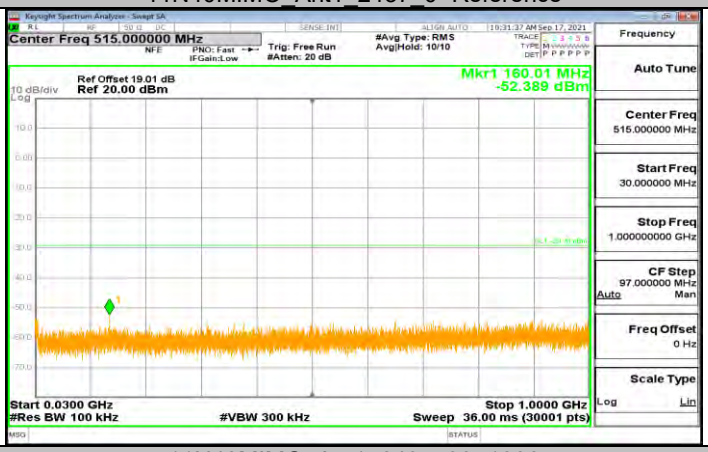

11N40MIMO_Ant2_2422_30~1000

11N40MIMO_Ant2_2422_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant1_2437_0~Reference




11N40MIMO_Ant1_2437_30~1000

11N40MIMO_Ant1_2437_1000~26500

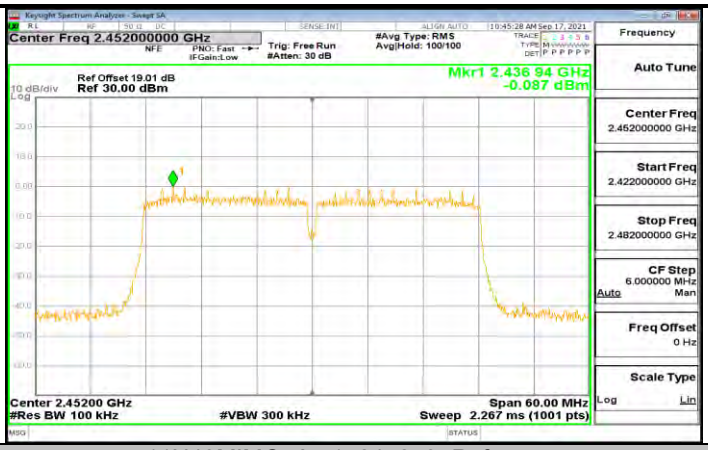

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N40MIMO_Ant2_2437_0~Reference

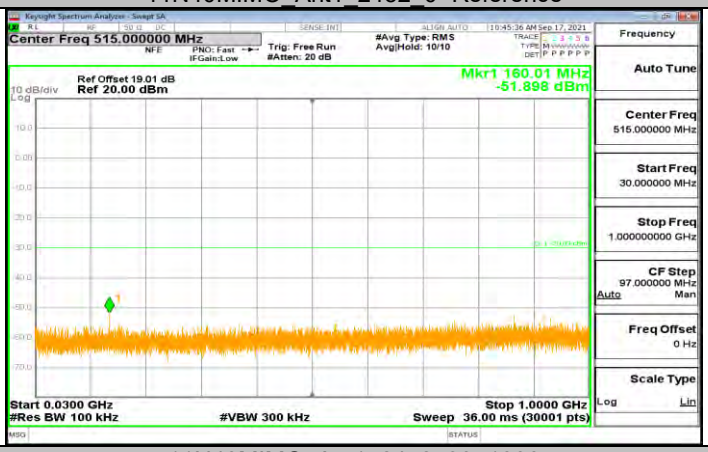
11N40MIMO_Ant2_2437_30~1000

11N40MIMO_Ant2_2437_1000~26500

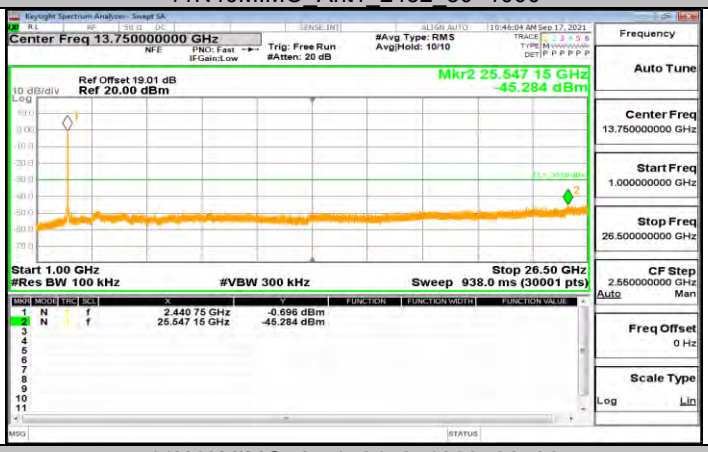

*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant1_2452_0~Reference



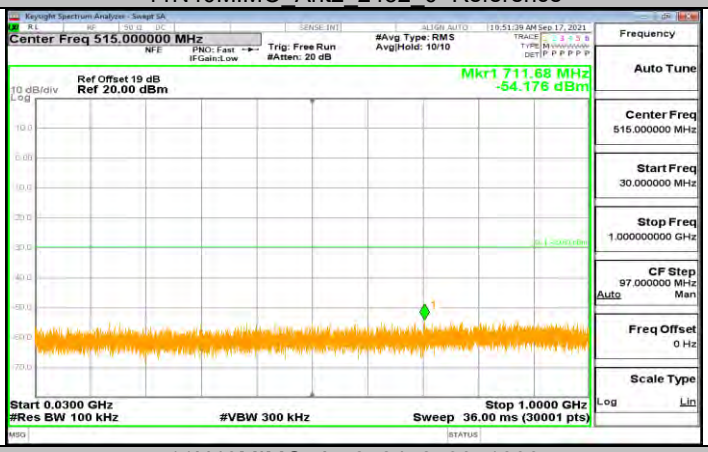

11N40MIMO_Ant1_2452_30~1000



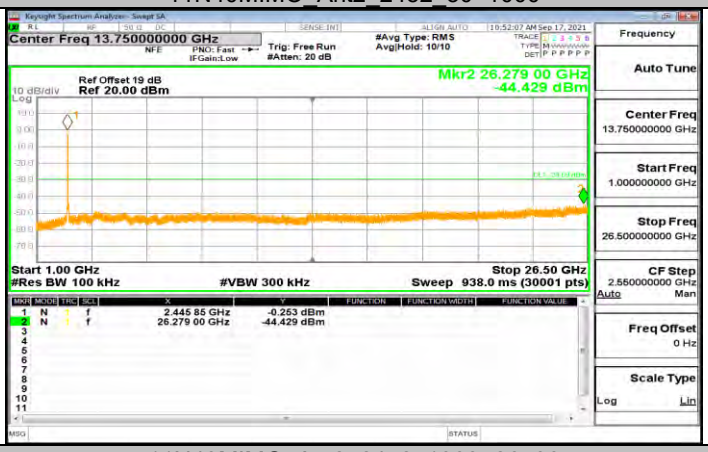

11N40MIMO_Ant1_2452_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

11N40MIMO_Ant2_2452_0~Reference




11N40MIMO_Ant2_2452_30~1000




11N40MIMO_Ant2_2452_1000~26500


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

## 11.7. Appendix G: Duty Cycle

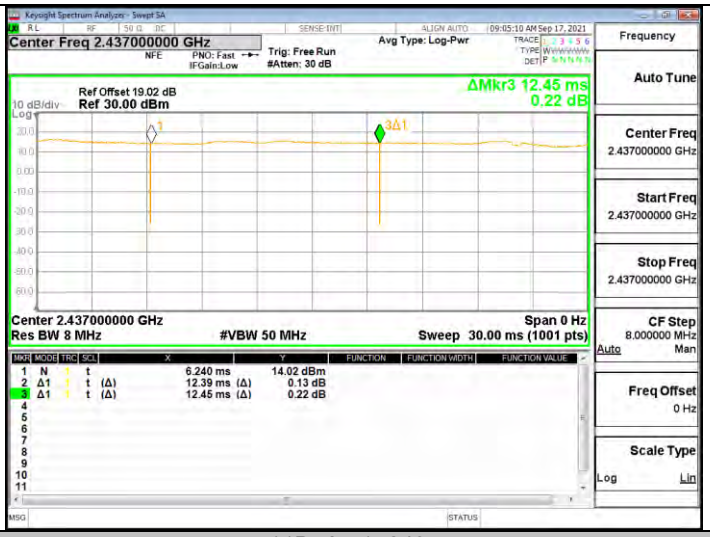
### 11.7.1. Test Result

| Mode | On Time (msec) | Period (msec) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/T Minimum VBW (kHz) | Final setting For VBW (kHz) |
|---|---|---|---|---|---|---|---|
| 11B | 12.39 | 12.45 | 0.9952 | 99.52 | 0.02 | 0.08 | 0.01 |
| 11G | 2.06 | 2.18 | 0.9450 | 94.50 | 0.25 | 0.49 | 0.5 |
| 11N20MIMO | 1.92 | 2.00 | 0.9600 | 96.00 | 0.18 | 0.52 | 1 |
| 11N40MIMO | 0.94 | 1.07 | 0.8785 | 87.85 | 0.56 | 1.06 | 2 |

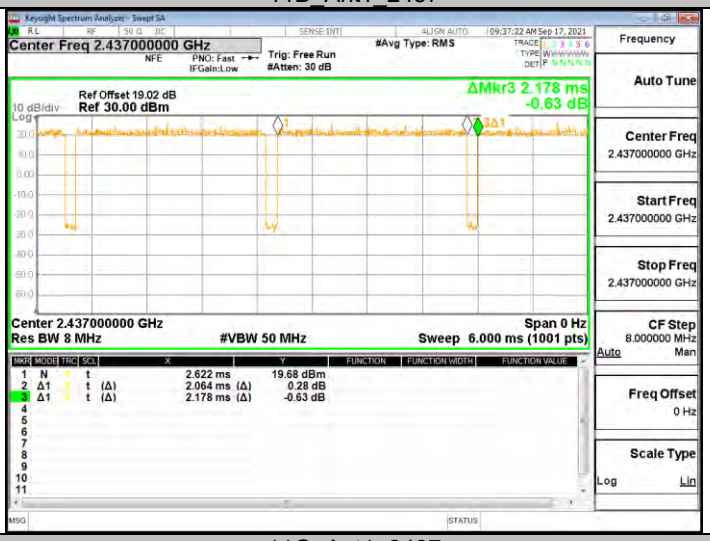
Note:
Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*

### 11.7.2. Test Graphs



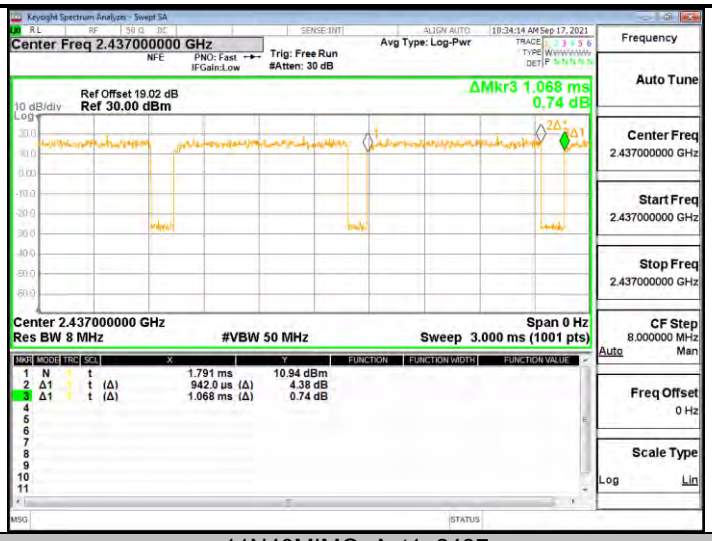

11B_Ant1_2437




11G_Ant1_2437

11N20MIMO_Ant1_2437


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*




11N40MIMO_Ant1_2437

## END OF REPORT


*This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.*