



FCC PART 15E TEST REPORT No.24T04Z200128-007

for

Samsung Electronics

Multi-band GSM/WCDMA/LTE Mobile Phone with Bluetooth, WLAN

SM-A065F/DS

FCC ID: ZCASMA065F

with

Hardware Version: REV1.0

Software Version: A065F.001

Issued Date: 2024-06-21

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

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No.24T04Z200128-007

REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|----------------------|-----------------|--------------------|-------------------|
| 24T04Z200128-007 | Rev.0 | 1st edition | 2024-06-21 |
| | | | |

Note: the latest revision of the test report supersedes all previous version.

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Conducted testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China100191

Radiated testing Location: (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology
Development Area, Beijing, P. R. China 100176

1.3. TestingEnvironment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

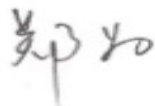
Testing Start Date: 2024-05-20

Testing End Date: 2024-06-14

1.5. Signature



Dong Jiaxuan
(Prepared this test report)



Zheng Wei
(Reviewed this test report)



Pang Shuai
(Approved this test report)



No.24T04Z200128-007

2. Client Information

2.1. Applicant Information

Company Name: SAMSUNG Electronics Co., Ltd.
Address /Post: 19 Chapin Rd., Building D Pine Brook, NJ 07058
Contact: Jenni Chun
Email: j1.chun@samsung.com
Telephone: +1-201-937-4203

2.2. Manufacturer Information

Company Name: Samsung Electronics Co., Ltd.
Address /Post: Samsung R5, Maetan dong 129, Samsung ro
Youngtong gu, Suwon city 443 742, Korea
Contact: Sunghoon Cho
Email: ggobi.cho@samsung.com
Telephone: +82-10-2722-4159

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

| | |
|---------------------|--|
| Description | Multi-band GSM/WCDMA/LTE Mobile Phone with Bluetooth, WLAN |
| Model name | SM-A065F/DS |
| FCC ID | ZCASMA065F |
| WLAN Frequency Band | ISM Band: 5725MHz~5850MHz |
| Type of modulation | OFDM |
| Nominal Voltage | 3.85V |

3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version | Date of receipt |
|----------------|-----------------|-------------------|-------------------|------------------------|
| UT12a | 2404200128UT12a | REV1.0 | A065F.001 | 2024-05-20 |
| UT11a | 2404200128UT11a | REV1.0 | A065F.001 | 2024-05-20 |

*EUT ID: is used to identify the test sample in the lab internally.

UT12a is used for Conduction test, UT11a is used for Radiation test.

3.3. Internal Identification of AE used during the test

| AE ID* | Name | Model | Manufacturer |
|---------------|-----------------|--------------|--|
| AE1-1 | Battery | HQ-7160SS | SCUD (FUJIAN) Electronics Co., Ltd. |
| AE1-2 | Battery | HQ-7160SD | SCUD (FUJIAN) Electronics Co., Ltd. |
| AE1-3 | Battery | HQ-7160NA | Ningde Amperex technology limited |
| AE2-1* | Adapter | EP-TA800 | SOLUM CO.,LTD. |
| AE2-2* | Adapter | EP-T1510 | DONGYANG E&P INC. |
| AE2-3* | Adapter | EP-TA200 | RFTECH ELECTRONICS (HUIZHOU) CO., LTD |
| AE3-1 | Date Cable1 C-C | EP-DN980BWE | RFTECH ELECTRONICS (HUIZHOU) CO., LTD |
| AE3-2 | Date Cable2 C-C | EP-DN980BWE | Guangxi Broad Telecommunication Co.,Ltd. |
| AE3-3 | Date Cable3 C-C | EP-DN980BWE | Cresyn electronics(Dongguan)Co;Ltd. |
| AE3-4 | Date Cable4 C-C | EP-DN980BWE | ASAP TECHNOLOGY(JIANGXI) CO.,LTD. |
| AE4* | Date Cable5 C-A | EP-DR140AWE | Cresyn electronics(Dongguan)Co;Ltd. |
| AE5* | Headset | EHS61ASFWE | Dongguan YoungBo Electronics |

*AE ID: is used to identify the test sample in the lab internally.

*AE2-1, AE2-2, AE2-3, AE4 and A5 are not the AE for EUT, provided by the client for relevant tests.

3.4. General Description

Equipment Under Test (EUT) is a model of Multi-band GSM/WCDMA/LTE Mobile Phone with Bluetooth, WLAN with integrated antenna. It consists of normal options: Battery and Charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

| | | |
|-------------------------|---|---------|
| FCC Part15 | FCC CFR 47, Part 15, Subpart C and E: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.407 General technical requirements | 2021 |
| ANSI C63.10 | Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | 2013 |
| UNII: KDB 789033 D02 | General U-NII Test Procedures New Rules v02r01 | 2017-12 |

5. Laboratory Environment

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

6. Test Results

6.1. Summary of Test Results

| SUMMARY OF MEASUREMENT RESULTS | Sub-clause of Part15E | Sub-clause of IC | Verdict |
|---------------------------------|------------------------|------------------|----------|
| Maximum Peak Output Power | 15.407 (a) | / | P |
| Peak Power Spectral Density | 15.407 (a) | / | P |
| Occupied 6dB Bandwidth | 15.407 (e) | / | P |
| Radiated Unwanted Emission | 15.407, 15.205, 15.209 | / | P |
| AC Powerline Conducted Emission | 15.107, 15.207 | / | P |

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

| | |
|----|---|
| P | Pass, The EUT complies with the essential requirements in the standard. |
| NM | Not measured, The test was not measured by CTTL |
| NA | Not Applicable, The test was not applicable |
| F | Fail, The EUT does not comply with the essential requirements in the standard |

6.2. Statements

CTTL has evaluated the test cases as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.

This report only deals with the WLAN function among the features described in section 3.

6.3. Test Conditions

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

| | |
|-------------|-------|
| Temperature | 26°C |
| Voltage | 3.85V |
| Humidity | 44% |

7. Test Facilities Utilized

Conducted test system

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Period | Calibration Due date |
|-----|------------------------|---------|---------------|-----------------|--------------------|----------------------|
| 1 | Vector Signal Analyzer | FSQ40 | 200089 | Rohde & Schwarz | 1 year | 2024-07-04 |
| 2 | Vector Signal Analyzer | FSW67 | 104051 | Rohde & Schwarz | 1 year | 2025-04-05 |
| 3 | Attenuator | 10dB/2W | / | Rosenberger | / | / |
| 4 | Shielding Room | S81 | / | ETS-Lindgren | / | / |

Radiated emission test system

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Period | Calibration Due date |
|-----|---------------|-----------------------|-------------------|--------------|--------------------|----------------------|
| 1 | Test Receiver | ESW44 | 103015 | R&S | 1 year | 2025-01-18 |
| 2 | Test Receiver | FSV30 | 101047 | R&S | 1 year | 2024-10-08 |
| 3 | Test Receiver | ESU26 | 100376 | R&S | 1 year | 2024-06-29 |
| 4 | Loop Antenna | HFH2-Z2 | 829324/007 | R&S | 1 year | 2025-01-04 |
| 5 | EMI Antenna | VULB9163 | 302 | Schwarzbeck | 1 year | 2024-08-28 |
| 6 | EMI Antenna | 3117 | 00139065 | ETS-Lindgren | 1 year | 2024-10-22 |
| 7 | EMI Antenna | LB-180400 -25-C-KF | 21100840000 06 | A-INFO | 1 year | 2025-05-15 |

AC Power Line Conducted Emission

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Period | Calibration Due date |
|-----|---------------|--------|---------------|--------------|--------------------|----------------------|
| 1 | LISN | ENV216 | 101459 | R&S | 1 year | 2025-05-16 |
| 2 | Test Receiver | ESCI | 100766 | R&S | 1 year | 2025-04-18 |

8. Measurement Uncertainty

8.1. Transmitter Output Power

Measurement Uncertainty: 0.387dB, k=1.96

8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB, k=1.96

8.3. 6dB Emission Bandwidth

Measurement Uncertainty: 60.80Hz, k=1.96

8.4. Spurious Emissions

Conducted (k=1.96)

| Frequency Range | Uncertainty(dB) |
|--|-----------------|
| $30\text{MHz} \leq f \leq 2\text{GHz}$ | 1.22 |
| $2\text{GHz} \leq f \leq 3.6\text{GHz}$ | 1.22 |
| $3.6\text{GHz} \leq f \leq 8\text{GHz}$ | 1.22 |
| $8\text{GHz} \leq f \leq 12.75\text{GHz}$ | 1.51 |
| $12.75\text{GHz} \leq f \leq 26\text{GHz}$ | 1.51 |
| $26\text{GHz} \leq f \leq 40\text{GHz}$ | 1.59 |

8.5. Radiated Unwanted Emission

| Frequency Range | Uncertainty(dB) |
|---|-----------------|
| 9kHz-30MHz | 3.96 |
| $30\text{MHz} \leq f \leq 1\text{GHz}$ | 5.73 |
| $1\text{GHz} \leq f \leq 18\text{GHz}$ | 5.62 |
| $18\text{GHz} \leq f \leq 40\text{GHz}$ | 3.52 |

8.6. AC Power-line Conducted Emission

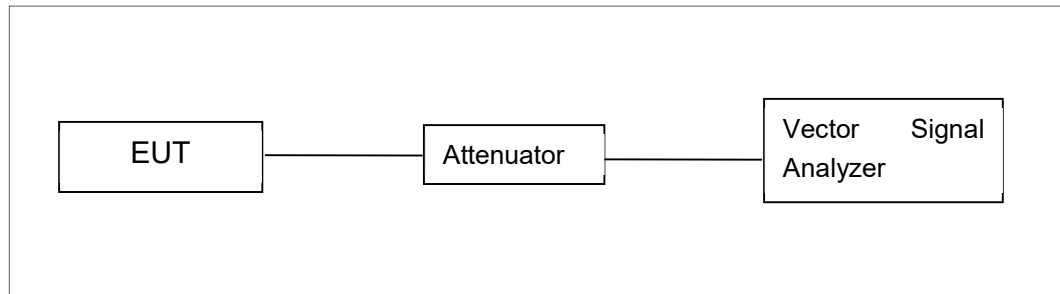
Measurement Uncertainty: 3.10dB, k=2

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

A.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer



A.1.2. Radiated Emission Measurements

Measurement performed according to Clause 6.4, 6.5, 6.6 in ANSI C63.10 and II.G.4, II.G.5, II.G.6 in KDB 789033.

The radiated emission test is performed in semi-anechoic chamber. The EUT was placed on a non-conductive table with 80cm above the ground plane for measurement below 1GHz and 1.5m above the ground plane for measurement above 1GHz. The measurement antenna was placed at a distance of 3 meters from the EUT. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated from 0° to 360° and the measurement antenna is moved from 1m to 4m to get the maximization result. The maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.2. Maximum Peak Output Power

Measurement Limit and Method:

| Standard | Limit (dBm) |
|------------------------|--------------------|
| FCC CRF Part 15.407(a) | < 30 |

Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

Set RBW = 1 MHz.

Set VBW ≥ 3 MHz.

Number of points in sweep ≥ 2 × span / RBW.

Sweep time = auto.

Detector = power averaging (rms)

Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal. Add 10 log (1/x), where x is the duty cycle

A.2.1 Antenna Gain

Antenna gain is -0.8dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Average Output Power-Conducted

EUT ID: UT12a

Measurement Results:

802.11a mode

| Mode | Data Rate (Mbps) | Test Result (dBm) | | |
|-------------|-------------------------|--------------------------|------------------------|------------------------|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz (Ch165) |
| 802.11a | 6 | 12.72 | / | / |
| | 9 | 12.86 | / | / |
| | 12 | 13.40 | 13.43 | 13.19 |
| | 18 | 13.07 | / | / |
| | 24 | 12.87 | / | / |
| | 36 | 12.63 | / | / |
| | 48 | 12.54 | / | / |
| | 54 | 12.57 | / | / |

The data rate 12Mbps is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT20 mode

| Mode | Data Rate (Index) | Test Result (dBm) | | |
|--------------------|-------------------|-------------------|-----------------|-----------------|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz (Ch165) |
| 802.11n (20MHz) | MCS0 | 12.98 | / | / |
| | MCS1 | 12.91 | / | / |
| | MCS2 | 13.01 | / | / |
| | MCS3 | 13.05 | 13.16 | 13.12 |
| | MCS4 | 12.97 | / | / |
| | MCS5 | 12.82 | / | / |
| | MCS6 | 12.63 | / | / |
| | MCS7 | 12.66 | / | / |

The data rate MCS3 is selected as worst condition, and the following cases are performed with this condition.

802.11ac-VHT20 mode

| Mode | Data Rate (Index) | Test Result (dBm) | | |
|---------------------|-------------------|-------------------|-----------------|-----------------|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz (Ch165) |
| 802.11ac (20MHz) | MCS0 | 12.73 | 12.74 | 12.68 |
| | MCS1 | 11.98 | / | / |
| | MCS2 | 11.97 | / | / |
| | MCS3 | 11.86 | / | / |
| | MCS4 | 11.81 | / | / |
| | MCS5 | 10.97 | / | / |
| | MCS6 | 10.88 | / | / |
| | MCS7 | 10.77 | / | / |
| | MCS8 | 11.03 | / | / |

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT40 mode

| Mode | Data Rate (Index) | Test Result (dBm) | |
|-----------------|-------------------|-------------------|-----------------|
| | | 5755MHz (Ch151) | 5795MHz (Ch159) |
| 802.11n (40MHz) | MCS0 | 12.97 | 12.83 |
| | MCS1 | 12.26 | / |
| | MCS2 | 12.30 | / |
| | MCS3 | 12.15 | / |
| | MCS4 | 12.48 | / |
| | MCS5 | 11.94 | / |
| | MCS6 | 12.34 | / |
| | MCS7 | 12.53 | / |

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11ac-VHT40 mode

| Mode | Data Rate (Index) | Test Result (dBm) | |
|------------------|-------------------|-------------------|-----------------|
| | | 5755MHz (Ch151) | 5795MHz (Ch159) |
| 802.11ac (40MHz) | MCS0 | 12.26 | / |
| | MCS1 | 12.35 | / |
| | MCS2 | 12.23 | / |
| | MCS3 | 12.05 | / |
| | MCS4 | 12.90 | 12.70 |
| | MCS5 | 11.37 | / |
| | MCS6 | 11.07 | / |
| | MCS7 | 10.89 | / |
| | MCS8 | 11.38 | / |
| | MCS9 | 11.39 | / |

The data rate MCS4 is selected as worst condition, and the following cases are performed with this condition.

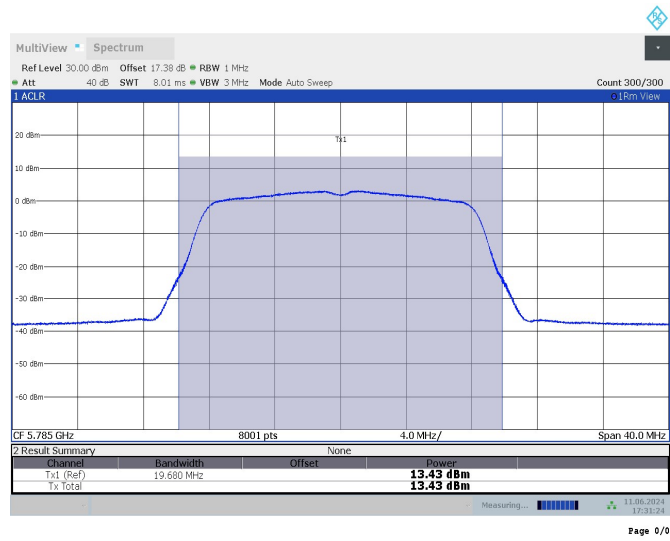
802.11ac-VHT80 mode

| Mode | Data Rate (Index) | Test Result (dBm) |
|------------------|-------------------|-------------------|
| | | 5775MHz (Ch155) |
| 802.11ac (80MHz) | MCS0 | 12.35 |
| | MCS1 | 12.29 |
| | MCS2 | 13.01 |
| | MCS3 | 12.26 |
| | MCS4 | 10.61 |
| | MCS5 | 11.20 |
| | MCS6 | 10.91 |
| | MCS7 | 10.80 |
| | MCS8 | 11.24 |
| | MCS9 | 11.36 |

The data rate MCS2 is selected as worst condition, and the following cases are performed with this condition.

Duty cycle

| | | | |
|------------|---------|---------|---------|
| Mode | 11a | | |
| Duty Cycle | 94% | | |
| Mode | 11n-20 | 11n-40 | |
| Duty Cycle | 90% | 92% | |
| Mode | 11ac-20 | 11ac-40 | 11ac-80 |
| Duty Cycle | 91% | 77% | 73% |



Maximum output Power

Conclusion: PASS

A.3. Peak Power Spectral Density

Measurement Limit:

| Standard | Limit |
|---------------------------|------------------|
| FCC 47 CFR Part 15.407(a) | < 30 dBm/500 kHz |

Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

Set RBW = 500 kHz.

Set VBW \geq 3 MHz.

Number of points in sweep $\geq 2 \times$ span / RBW.

Sweep time = auto.

Detector = power averaging (rms)

Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter. Use the peak search function on the instrument to find the peak of the spectrum and record its value. Add $10 \log(1/x)$, where x is the duty cycle.

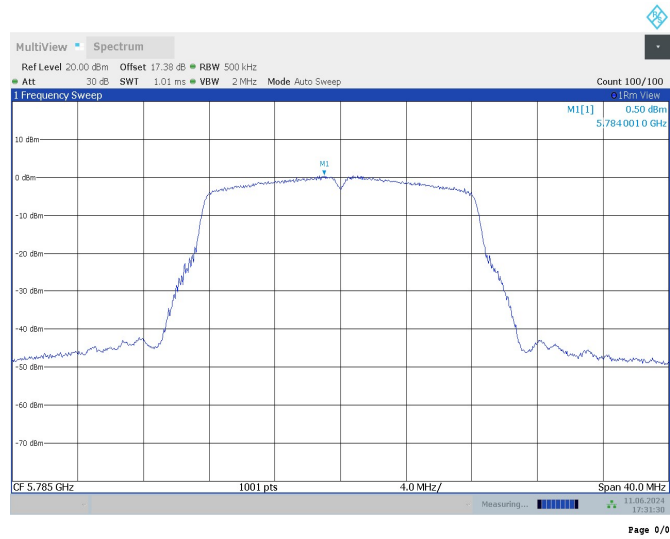
Measurement Uncertainty:

| | |
|-------------------------|--------|
| Measurement Uncertainty | 0.75dB |
|-------------------------|--------|

EUT ID: UT12a

Measurement Results:

| Mode | Channel | Power Spectral Density (dBm/500kHz) | Conclusion |
|-----------------|---------|--|------------|
| 802.11a | 149 | 0.36 | P |
| | 157 | 0.50 | P |
| | 165 | 0.41 | P |
| 802.11n HT20 | 149 | -0.13 | P |
| | 157 | 0.09 | P |
| | 165 | -0.03 | P |
| 802.11n HT40 | 151 | -2.90 | P |
| | 159 | -3.42 | P |
| 802.11ac VHT80 | 155 | -5.64 | P |



Peak Power Spectral Density

Conclusion: PASS

A.4. 6dB Emission Bandwidth

Measurement Limit:

| Standard | Limit (kHz) |
|----------------------------|-------------|
| FCC 47 CFR Part 15.407 (e) | ≥ 500 |

Set RBW = 100 kHz.

Set the video bandwidth (VBW) ≥ 3 × RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

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.

Measurement Uncertainty:

| | |
|-------------------------|---------|
| Measurement Uncertainty | 60.80Hz |
|-------------------------|---------|

EUT ID: UT12a

Measurement Result:

| Mode | Channel | 6dB Emission Bandwidth (MHz) | | conclusion |
|-------------------|---------|-------------------------------|-------|------------|
| 802.11a | 149 | Fig.1 | 15.12 | P |
| | 157 | Fig.2 | 14.76 | P |
| | 165 | Fig.3 | 14.76 | P |
| 802.11n HT20 | 149 | Fig.4 | 15.12 | P |
| | 157 | Fig.5 | 15.76 | P |
| | 165 | Fig.6 | 15.72 | P |
| 802.11n HT40 | 151 | Fig.7 | 35.12 | P |
| | 159 | Fig.8 | 32.56 | P |
| 802.11ac VHT80 | 155 | Fig.9 | 75.20 | P |

Test graphs as below:

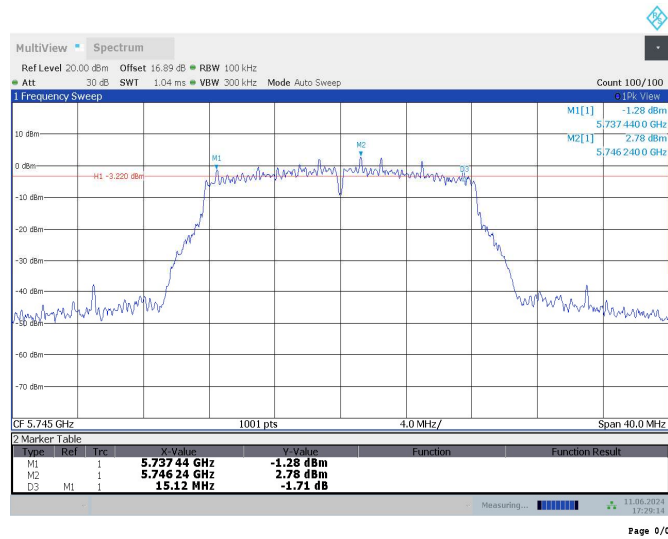


Fig. 1 6dB Emission Bandwidth (802.11a, Ch 149)

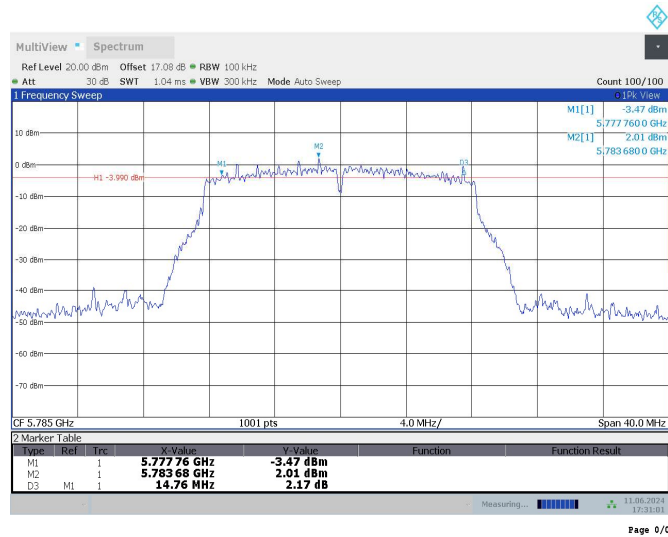


Fig. 2 6dB Emission Bandwidth (802.11a, Ch 157)

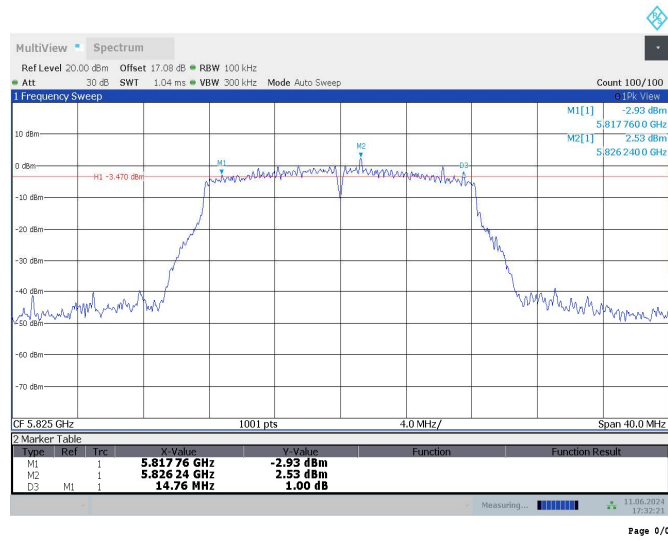


Fig. 3 6dB Emission Bandwidth (802.11a, Ch 165)

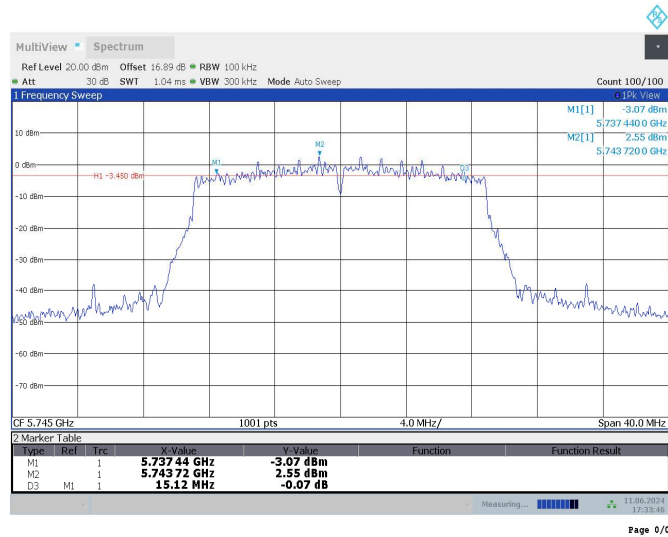


Fig. 4 6dB Emission Bandwidth (802.11n-HT20, Ch 149)

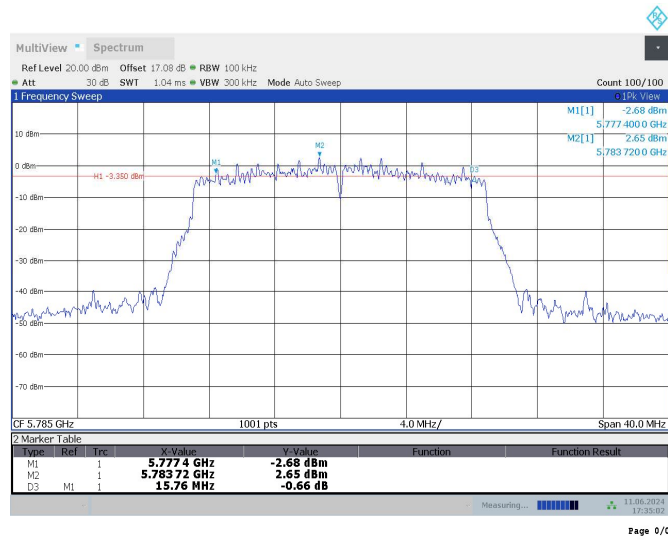


Fig. 5 6dB Emission Bandwidth (802.11n-HT20, Ch 157)

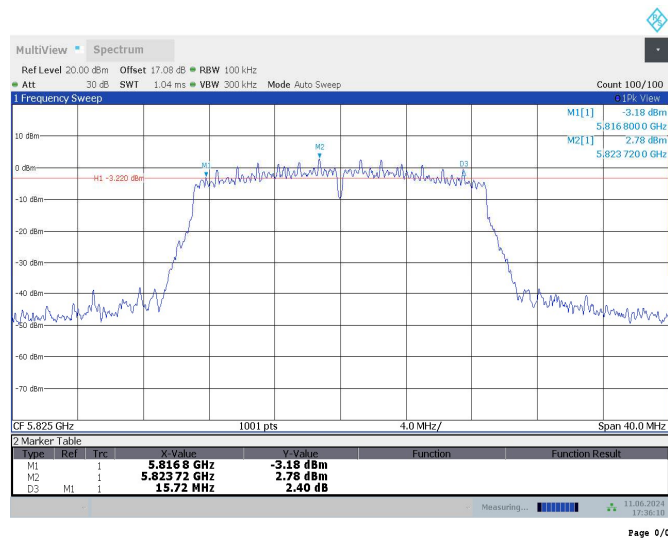


Fig. 6 6dB Emission Bandwidth (802.11n-HT20, Ch 165)

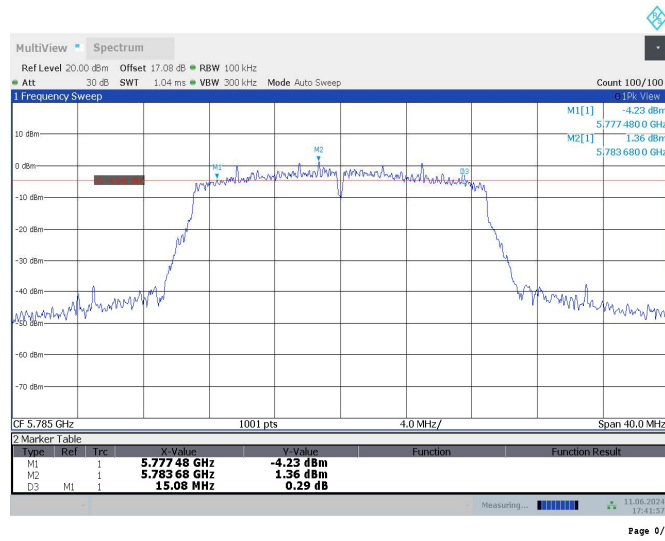


Fig. 7 6dB Emission Bandwidth (802.11n-HT40, Ch 151)

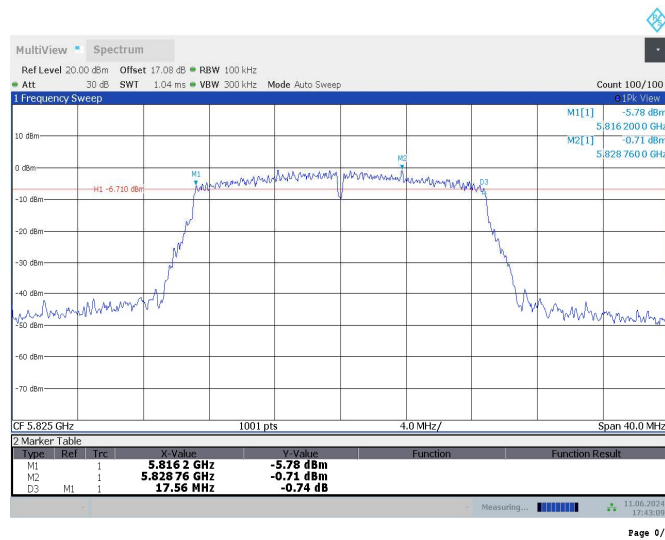


Fig. 8 6dB Emission Bandwidth (802.11n-HT40, Ch 159)

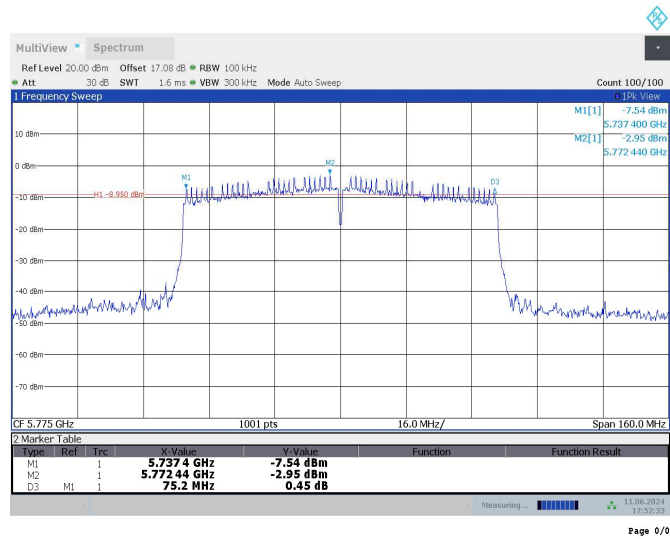


Fig. 9 6dB Emission Bandwidth (802.11ac-VHT80, Ch 155)

Conclusion: PASS

A.5. Radiated Unwanted Emission

A.5.1 Limits

Unwanted Emissions in the unrestricted bands shall not exceed the limits that shown in 15.407:

| Standard | Limit (dBm/MHz) | |
|---------------------------|--|------|
| FCC 47 CFR Part 15.407 | at the band edge | 27 |
| | at 5 MHz above or below the band edge | 15.6 |
| | at 25 MHz above or below the band edge | 10 |
| | at 75 MHz or more above or below the band edge | -27 |
| | Note: Increasing linearly from point to point. | |

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c))

| Frequency (MHz) | Field strength(μ V/m) | Measurement distance (m) |
|-----------------|----------------------------|--------------------------|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |

| Frequency of emission (MHz) | Field strength (μ V/m) | Field strength (dBuV/m) | Measurement distance (m) |
|-----------------------------|-----------------------------|-------------------------|--------------------------|
| 30-88 | 100 | 40 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Note: When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor (as defined in KDB 789033 II.G.2.d).

A.5.2 Test setup

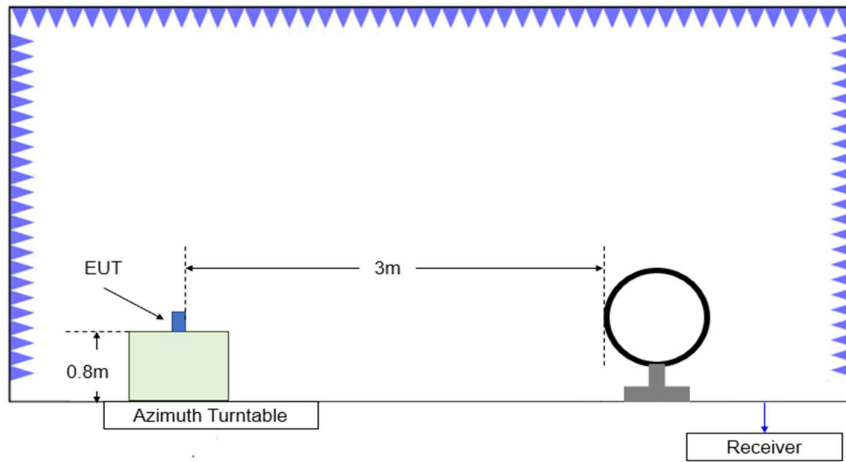


Figure A.5.1. Test Site Diagram (9kHz-30MHz)

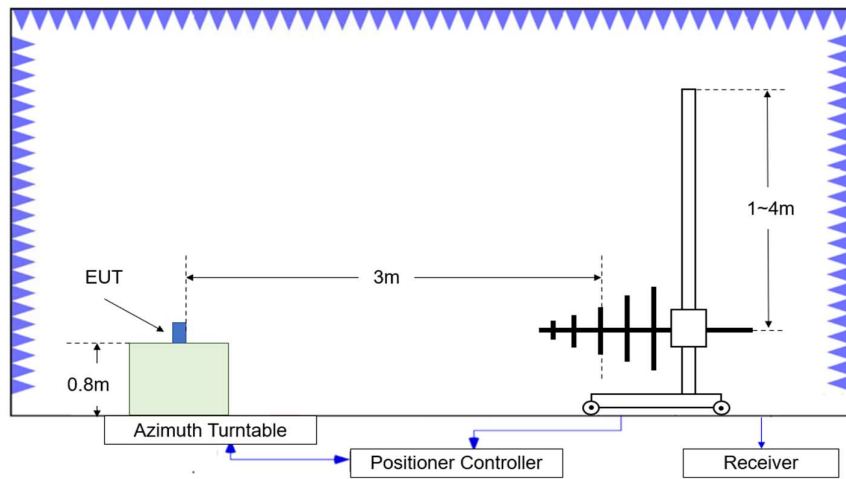


Figure A.5.2. Test Site Diagram (30MHz-1GHz)

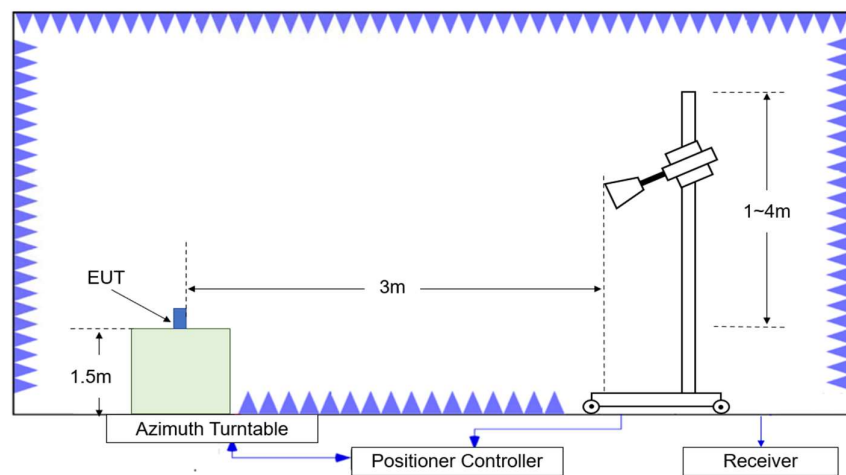


Figure A.5.3. Test Site Diagram (1GHz-40GHz)

A.5.3 Test Procedures

Radiated unwanted emissions from the EUT were measured according to ANSI C63.10 and KDB 789033 D02 v02r01.

Test setting

| Frequency of emission (MHz) | RBW/VBW |
|-----------------------------|---------------|
| 30-1000 | 100kHz/300kHz |
| 1000-4000 | 1MHz/3MHz |
| 4000-18000 | 1MHz/3MHz |
| 18000-26500 | 1MHz/3MHz |
| 26500-40000 | 1MHz/3MHz |

A.5.4 Calculation

1. The measurement results reported below is calculated by:

Measurement Results (dB μ V/m) = P_{measurement} (dB μ V) + Cable Loss (dB) + Antenna Factor (dB/m)

Where: P_{measurement} is the field strength recorded from the instrument

2. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log(D) + 104.77$$

Where:

E is the field strength in dB μ V/m

D is the measurement distance in meters

EIRP is the equivalent isotropically radiated power in dBm

Test note

1. The EUT is operating at its maximum duty cycle and its maximum power control level.
2. Investigation has been done on all modes and modulations/data rates. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.
3. Spurious emissions for all channels were investigated and almost the same below 1GHz. According to FCC 47 CFR §15.31, emission levels are not report much lower than the limit by over 20dB
4. Measurement frequencies were performed from 9 kHz to 40GHz.

A.5.5 Measurement Result

Average Results:

802.11a

Channel 149

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5373.250 | 44.51 | -22.86 | 34.95 | 32.42 | 54.00 | 9.49 | V |
| 5379.250 | 44.37 | -22.78 | 34.94 | 32.21 | 54.00 | 9.63 | V |
| 11490.000 | 34.09 | -29.46 | 38.28 | 25.27 | 54.00 | 19.91 | H |
| 15879.000 | 39.10 | -23.70 | 40.66 | 22.14 | 54.00 | 14.90 | H |
| 17983.000 | 40.29 | -23.12 | 41.20 | 22.21 | 54.00 | 13.71 | H |
| 17989.500 | 40.32 | -23.06 | 41.20 | 22.18 | 54.00 | 13.68 | V |

Channel 157

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5394.500 | 44.36 | -22.73 | 34.91 | 32.18 | 54.00 | 9.64 | V |
| 5408.750 | 44.51 | -22.41 | 34.85 | 32.07 | 54.00 | 9.49 | V |
| 11570.000 | 34.15 | -29.58 | 38.30 | 25.43 | 54.00 | 19.85 | H |
| 15879.000 | 39.23 | -23.70 | 40.66 | 22.28 | 54.00 | 14.77 | V |
| 17986.000 | 40.56 | -23.09 | 41.20 | 22.45 | 54.00 | 13.44 | V |
| 17997.000 | 40.61 | -22.85 | 41.20 | 22.26 | 54.00 | 13.39 | V |

Channel 165

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5411.375 | 44.52 | -22.41 | 34.83 | 32.11 | 54.00 | 9.48 | V |
| 5412.875 | 44.54 | -22.45 | 34.82 | 32.17 | 54.00 | 9.46 | V |
| 11650.000 | 34.26 | -29.25 | 38.40 | 25.11 | 54.00 | 19.74 | V |
| 15874.000 | 39.62 | -23.84 | 40.65 | 22.81 | 54.00 | 14.38 | V |
| 17984.500 | 40.84 | -23.11 | 41.20 | 22.75 | 54.00 | 13.16 | V |
| 17997.500 | 40.95 | -22.83 | 41.20 | 22.59 | 54.00 | 13.05 | H |

802.11n-HT20

Channel 149

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5370.250 | 44.57 | -22.90 | 34.96 | 32.51 | 54.00 | 9.43 | V |
| 5377.250 | 44.38 | -22.81 | 34.95 | 32.24 | 54.00 | 9.62 | V |
| 11490.000 | 34.01 | -29.46 | 38.28 | 25.19 | 54.00 | 19.99 | V |
| 15888.000 | 39.10 | -23.88 | 40.68 | 22.30 | 54.00 | 14.90 | H |
| 17957.000 | 40.31 | -23.17 | 41.20 | 22.29 | 54.00 | 13.69 | H |
| 17991.500 | 40.42 | -23.01 | 41.20 | 22.23 | 54.00 | 13.58 | V |

Channel 157

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5403.625 | 44.35 | -22.51 | 34.88 | 31.99 | 54.00 | 9.65 | V |
| 5411.125 | 44.54 | -22.41 | 34.83 | 32.11 | 54.00 | 9.46 | V |
| 11570.000 | 34.14 | -29.58 | 38.30 | 25.42 | 54.00 | 19.86 | H |
| 15881.000 | 39.40 | -23.70 | 40.66 | 22.44 | 54.00 | 14.60 | V |
| 17984.500 | 40.48 | -23.11 | 41.20 | 22.39 | 54.00 | 13.52 | V |
| 17996.000 | 40.72 | -22.88 | 41.20 | 22.39 | 54.00 | 13.28 | V |

Channel 165

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5374.125 | 44.46 | -22.85 | 34.95 | 32.36 | 54.00 | 9.54 | V |
| 5378.250 | 44.37 | -22.79 | 34.94 | 32.22 | 54.00 | 9.63 | V |
| 11650.000 | 30.04 | -29.25 | 38.40 | 20.89 | 54.00 | 23.96 | V |
| 15870.000 | 39.15 | -23.94 | 40.64 | 22.46 | 54.00 | 14.85 | H |
| 17984.500 | 40.45 | -23.11 | 41.20 | 22.36 | 54.00 | 13.55 | H |
| 17995.500 | 40.62 | -22.89 | 41.20 | 22.31 | 54.00 | 13.38 | V |

802.11n-HT40

Channel 151

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5404.875 | 44.41 | -22.49 | 34.87 | 32.03 | 54.00 | 9.59 | V |
| 5410.125 | 44.56 | -22.39 | 34.84 | 32.11 | 54.00 | 9.44 | V |
| 11510.000 | 34.11 | -29.64 | 38.30 | 25.45 | 54.00 | 19.89 | V |
| 15880.000 | 39.42 | -23.67 | 40.66 | 22.44 | 54.00 | 14.58 | V |
| 17984.500 | 40.61 | -23.11 | 41.20 | 22.52 | 54.00 | 13.39 | H |
| 17994.500 | 40.67 | -22.92 | 41.20 | 22.39 | 54.00 | 13.33 | H |

Channel 159

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5369.125 | 44.51 | -22.91 | 34.96 | 32.46 | 54.00 | 9.49 | V |
| 5383.750 | 44.37 | -22.80 | 34.93 | 32.24 | 54.00 | 9.63 | V |
| 11590.000 | 34.36 | -29.29 | 38.30 | 25.35 | 54.00 | 19.64 | V |
| 15888.000 | 39.12 | -23.88 | 40.68 | 22.32 | 54.00 | 14.88 | H |
| 17967.000 | 40.21 | -23.12 | 41.20 | 22.13 | 54.00 | 13.79 | H |
| 17989.000 | 40.48 | -23.07 | 41.20 | 22.34 | 54.00 | 13.52 | H |

802.11ac-HT20

Channel 149

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5402.375 | 44.30 | -22.54 | 34.89 | 31.95 | 54.00 | 9.70 | V |
| 5410.375 | 44.49 | -22.39 | 34.84 | 32.04 | 54.00 | 9.51 | V |
| 11490.000 | 34.16 | -29.46 | 38.28 | 25.34 | 54.00 | 19.84 | H |
| 15865.000 | 39.10 | -23.99 | 40.63 | 22.46 | 54.00 | 14.90 | H |
| 17939.000 | 39.94 | -23.04 | 41.20 | 21.78 | 54.00 | 14.06 | H |
| 17986.000 | 40.41 | -23.09 | 41.20 | 22.30 | 54.00 | 13.59 | H |

Channel 157

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5408.625 | 44.48 | -22.41 | 34.85 | 32.04 | 54.00 | 9.52 | V |
| 5412.875 | 44.39 | -22.45 | 34.82 | 32.01 | 54.00 | 9.61 | V |
| 11570.000 | 34.09 | -29.58 | 38.30 | 25.37 | 54.00 | 19.91 | H |
| 15905.500 | 38.86 | -24.27 | 40.71 | 22.42 | 54.00 | 15.14 | H |
| 17937.500 | 40.00 | -23.07 | 41.20 | 21.88 | 54.00 | 14.00 | V |
| 17994.500 | 40.53 | -22.92 | 41.20 | 22.25 | 54.00 | 13.47 | H |

Channel 165

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5409.875 | 44.48 | -22.39 | 34.84 | 32.03 | 54.00 | 9.52 | V |
| 5413.750 | 44.46 | -22.47 | 34.82 | 32.11 | 54.00 | 9.54 | V |
| 11650.000 | 33.95 | -29.25 | 38.40 | 24.80 | 54.00 | 20.05 | H |
| 15888.000 | 39.10 | -23.88 | 40.68 | 22.30 | 54.00 | 14.90 | V |
| 17951.500 | 40.27 | -23.15 | 41.20 | 22.22 | 54.00 | 13.73 | V |
| 17967.500 | 40.26 | -23.11 | 41.20 | 22.17 | 54.00 | 13.74 | H |

802.11ac-HT40

Channel 151

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5405.500 | 44.37 | -22.48 | 34.87 | 31.98 | 54.00 | 9.63 | V |
| 5408.750 | 44.52 | -22.41 | 34.85 | 32.08 | 54.00 | 9.48 | V |
| 11510.000 | 34.00 | -29.64 | 38.30 | 25.34 | 54.00 | 20.00 | V |
| 15879.000 | 39.12 | -23.70 | 40.66 | 22.16 | 54.00 | 14.88 | H |
| 17889.500 | 39.77 | -23.20 | 41.20 | 21.78 | 54.00 | 14.23 | H |
| 17975.500 | 40.31 | -23.12 | 41.20 | 22.23 | 54.00 | 13.69 | V |

Channel 159

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5406.500 | 44.39 | -22.46 | 34.86 | 31.98 | 54.00 | 9.61 | V |
| 5409.250 | 44.44 | -22.40 | 34.84 | 31.99 | 54.00 | 9.56 | V |
| 11590.000 | 34.20 | -29.29 | 38.30 | 25.19 | 54.00 | 19.80 | V |
| 15860.500 | 39.10 | -24.03 | 40.62 | 22.51 | 54.00 | 14.90 | H |
| 17947.500 | 40.21 | -23.11 | 41.20 | 22.12 | 54.00 | 13.79 | H |
| 17993.500 | 40.57 | -22.95 | 41.20 | 22.32 | 54.00 | 13.43 | H |

802.11ac-HT80

Channel 155

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5836.875 | 44.42 | -22.49 | 34.97 | 31.93 | 54.00 | 9.58 | V |
| 5409.500 | 44.45 | -22.39 | 34.84 | 32.00 | 54.00 | 9.55 | V |
| 11550.000 | 34.45 | -29.30 | 38.30 | 25.46 | 54.00 | 19.55 | H |
| 15877.500 | 39.43 | -23.74 | 40.66 | 22.51 | 54.00 | 14.57 | H |
| 17985.000 | 40.67 | -23.10 | 41.20 | 22.57 | 54.00 | 13.33 | H |
| 17997.000 | 40.77 | -22.85 | 41.20 | 22.42 | 54.00 | 13.23 | H |

Peak Results:
802.11a

Channel 149

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5653.047 | 58.48 | -22.27 | 34.70 | 46.06 | 70.46 | 11.97 | H |
| 5651.783 | 58.11 | -22.31 | 34.70 | 45.72 | 69.52 | 11.41 | V |
| 11490.000 | 46.00 | -29.46 | 38.28 | 37.18 | 74.00 | 28.00 | H |
| 17235.000 | 52.62 | -23.23 | 40.96 | 34.88 | 68.30 | 15.68 | V |
| 17503.000 | 53.39 | -23.36 | 41.00 | 35.75 | 68.30 | 14.91 | H |
| 17627.500 | 52.60 | -23.17 | 41.06 | 34.72 | 68.30 | 15.70 | V |

Channel 157

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5761.000 | 59.42 | -22.36 | 34.82 | 46.97 | 68.30 | 8.88 | H |
| 5808.000 | 60.28 | -22.27 | 34.92 | 47.63 | 68.30 | 8.02 | V |
| 11570.000 | 47.13 | -29.58 | 38.30 | 38.41 | 74.00 | 26.87 | H |
| 17355.000 | 52.19 | -23.36 | 40.90 | 34.64 | 68.30 | 16.11 | V |
| 17624.500 | 53.22 | -23.13 | 41.05 | 35.30 | 68.30 | 15.08 | H |
| 17679.000 | 53.34 | -23.43 | 41.16 | 35.61 | 68.30 | 14.96 | H |

Channel 165

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5921.780 | 58.78 | -22.17 | 35.10 | 45.85 | 70.58 | 11.81 | V |
| 5922.470 | 58.47 | -22.19 | 35.10 | 45.56 | 70.07 | 11.61 | V |
| 11650.000 | 46.40 | -29.25 | 38.40 | 37.25 | 68.30 | 21.90 | V |
| 17475.000 | 50.64 | -23.22 | 40.98 | 32.89 | 68.30 | 17.66 | H |
| 17530.000 | 54.04 | -23.40 | 41.00 | 36.44 | 68.30 | 14.26 | V |
| 17621.000 | 53.41 | -23.08 | 41.04 | 35.45 | 68.30 | 14.89 | H |

802.11n-HT20

Channel 149

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5651.783 | 57.95 | -22.31 | 34.70 | 45.55 | 69.52 | 11.57 | V |
| 5653.680 | 58.03 | -22.26 | 34.70 | 45.59 | 70.92 | 12.89 | V |
| 11490.000 | 47.61 | -29.46 | 38.28 | 38.79 | 74.00 | 26.39 | H |
| 17235.000 | 50.79 | -23.23 | 40.96 | 33.06 | 68.30 | 17.51 | V |
| 17505.500 | 51.35 | -23.37 | 41.00 | 33.72 | 68.30 | 16.95 | V |
| 17666.000 | 50.34 | -23.30 | 41.13 | 32.50 | 68.30 | 17.96 | H |

Channel 157

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5758.000 | 57.39 | -22.37 | 34.82 | 44.94 | 68.30 | 10.91 | H |
| 5811.500 | 57.42 | -22.20 | 34.92 | 44.69 | 68.30 | 10.88 | H |
| 11570.000 | 45.56 | -29.58 | 38.30 | 36.84 | 74.00 | 28.44 | V |
| 17355.000 | 50.91 | -23.36 | 40.90 | 33.36 | 68.30 | 17.39 | V |
| 17459.500 | 52.61 | -23.19 | 40.96 | 34.84 | 68.30 | 15.69 | V |
| 17688.000 | 52.79 | -23.40 | 41.18 | 35.01 | 68.30 | 15.51 | H |

Channel 165

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5922.757 | 59.32 | -22.20 | 35.10 | 46.42 | 69.86 | 10.54 | H |
| 5924.195 | 58.93 | -22.25 | 35.10 | 46.08 | 68.80 | 9.86 | H |
| 11650.000 | 46.45 | -29.25 | 38.40 | 37.30 | 74.00 | 27.55 | H |
| 17475.000 | 51.31 | -23.22 | 40.98 | 33.56 | 68.30 | 16.99 | V |
| 17608.000 | 54.16 | -22.94 | 41.02 | 36.09 | 68.30 | 14.14 | V |
| 17648.000 | 53.24 | -23.32 | 41.10 | 35.47 | 68.30 | 15.05 | H |

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Channel 151

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5651.035 | 57.76 | -22.32 | 34.70 | 45.38 | 68.97 | 11.21 | V |
| 5651.495 | 57.79 | -22.31 | 34.70 | 45.41 | 69.31 | 11.51 | V |
| 11510.000 | 45.22 | -29.64 | 38.30 | 36.56 | 74.00 | 28.78 | H |
| 17265.000 | 50.66 | -23.21 | 40.93 | 32.93 | 68.30 | 17.64 | V |
| 17445.000 | 52.99 | -23.18 | 40.95 | 35.23 | 68.30 | 15.31 | V |
| 17626.000 | 52.88 | -23.15 | 41.05 | 34.97 | 68.30 | 15.42 | H |

Channel 159

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5917.640 | 59.34 | -22.22 | 35.10 | 46.46 | 73.65 | 14.30 | H |
| 5923.102 | 59.31 | -22.21 | 35.10 | 46.42 | 69.60 | 10.30 | H |
| 11590.000 | 45.65 | -29.29 | 38.30 | 36.64 | 74.00 | 28.35 | V |
| 17385.000 | 51.56 | -23.39 | 40.90 | 34.05 | 68.30 | 16.74 | V |
| 17551.000 | 53.58 | -23.32 | 41.00 | 35.91 | 68.30 | 14.72 | V |
| 17651.500 | 53.55 | -23.29 | 41.10 | 35.74 | 68.30 | 14.75 | V |

802.11ac-HT20

Channel 149

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5651.438 | 58.01 | -22.31 | 34.70 | 45.63 | 69.26 | 11.25 | H |
| 5653.565 | 58.35 | -22.26 | 34.70 | 45.91 | 70.84 | 12.49 | H |
| 11490.000 | 45.45 | -29.46 | 38.28 | 36.63 | 74.00 | 28.55 | H |
| 17235.000 | 51.22 | -23.23 | 40.96 | 33.48 | 68.30 | 17.08 | V |
| 17386.500 | 53.30 | -23.38 | 40.90 | 35.78 | 68.30 | 15.00 | V |
| 17672.500 | 52.98 | -23.37 | 41.15 | 35.21 | 68.30 | 15.32 | H |

Channel 157

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5767.500 | 58.11 | -22.39 | 34.84 | 45.67 | 68.30 | 10.19 | H |
| 5807.000 | 58.34 | -22.29 | 34.91 | 45.72 | 68.30 | 9.96 | V |
| 11570.000 | 45.92 | -29.58 | 38.30 | 37.20 | 74.00 | 28.08 | V |
| 17355.000 | 50.62 | -23.36 | 40.90 | 33.08 | 68.30 | 17.68 | H |
| 17465.500 | 53.10 | -23.18 | 40.97 | 35.31 | 68.30 | 15.20 | H |
| 17623.000 | 53.54 | -23.11 | 41.05 | 35.61 | 68.30 | 14.76 | V |

Channel 165

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5922.642 | 58.48 | -22.20 | 35.10 | 45.58 | 69.94 | 11.47 | V |
| 5924.712 | 58.55 | -22.26 | 35.10 | 45.71 | 68.41 | 9.87 | V |
| 11650.000 | 45.28 | -29.25 | 38.40 | 36.13 | 74.00 | 28.72 | H |
| 17475.000 | 51.00 | -23.22 | 40.98 | 33.24 | 68.30 | 17.30 | H |
| 17569.500 | 52.22 | -23.28 | 41.00 | 34.50 | 68.30 | 16.08 | V |
| 17695.000 | 53.04 | -23.19 | 41.19 | 35.04 | 68.30 | 15.26 | V |

802.11ac-HT40

Channel 151

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.460 | 58.10 | -22.34 | 34.70 | 45.74 | 68.54 | 10.44 | V |
| 5651.265 | 58.39 | -22.32 | 34.70 | 46.01 | 69.14 | 10.74 | H |
| 11510.000 | 45.98 | -29.64 | 38.30 | 37.31 | 74.00 | 28.02 | H |
| 17265.000 | 50.67 | -23.21 | 40.93 | 32.94 | 68.30 | 17.63 | V |
| 17443.000 | 53.01 | -23.15 | 40.94 | 35.22 | 68.30 | 15.29 | V |
| 17572.000 | 53.22 | -23.28 | 41.00 | 35.50 | 68.30 | 15.08 | V |

Channel 159

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5922.182 | 59.23 | -22.19 | 35.10 | 46.32 | 70.28 | 11.05 | H |
| 5924.023 | 59.03 | -22.24 | 35.10 | 46.17 | 68.92 | 9.90 | H |
| 11590.000 | 47.01 | -29.29 | 38.30 | 38.00 | 74.00 | 26.99 | V |
| 17385.000 | 51.15 | -23.39 | 40.90 | 33.64 | 68.30 | 17.15 | V |
| 17507.500 | 52.28 | -23.38 | 41.00 | 34.66 | 68.30 | 16.02 | V |
| 17630.000 | 53.01 | -23.21 | 41.06 | 35.16 | 68.30 | 15.29 | V |

802.11ac-HT80

Channel 155

| Frequency (MHz) | Measurement Result (dBuV/m) | Cable Loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.977 | 58.45 | -22.33 | 34.70 | 46.08 | 68.30 | 9.85 | V |
| 5924.023 | 58.47 | -22.24 | 35.10 | 45.61 | 68.30 | 9.83 | H |
| 11550.000 | 45.67 | -29.30 | 38.30 | 36.67 | 68.30 | 22.63 | V |
| 17325.000 | 51.12 | -23.36 | 40.90 | 33.59 | 68.30 | 17.18 | H |
| 17423.500 | 53.62 | -23.34 | 40.92 | 36.03 | 68.30 | 14.68 | H |
| 17617.000 | 53.06 | -23.02 | 41.03 | 35.05 | 68.30 | 15.23 | V |

Conclusion: PASS
Note:

1. The spurious emission above 18G is noise only.
2. All emissions below 30MHz are more than 20 dB below the limit

Band edge compliance

| Mode | Channel | Test Results | Conclusion |
|------------------|----------|------------------|------------|
| 802.11a | 5745 MHz | Fig.10 | P |
| | 5825 MHz | Fig.11 | P |
| 802.11n HT20 | 5745 MHz | Fig.12 | P |
| | 5825 MHz | Fig.13 | P |
| 802.11n HT40 | 5755 MHz | Fig.14 | P |
| | 5795 MHz | Fig.15 | P |
| 802.11ac HT20 | 5745 MHz | Fig.16 | P |
| | 5825 MHz | Fig.17 | P |
| 802.11ac HT40 | 5755 MHz | Fig.18 | P |
| | 5795 MHz | Fig.19 | P |
| 802.11ac HT80 | 5775 MHz | Fig.20 Fig.21 | P |

Conclusion: PASS

Test graphs as below:

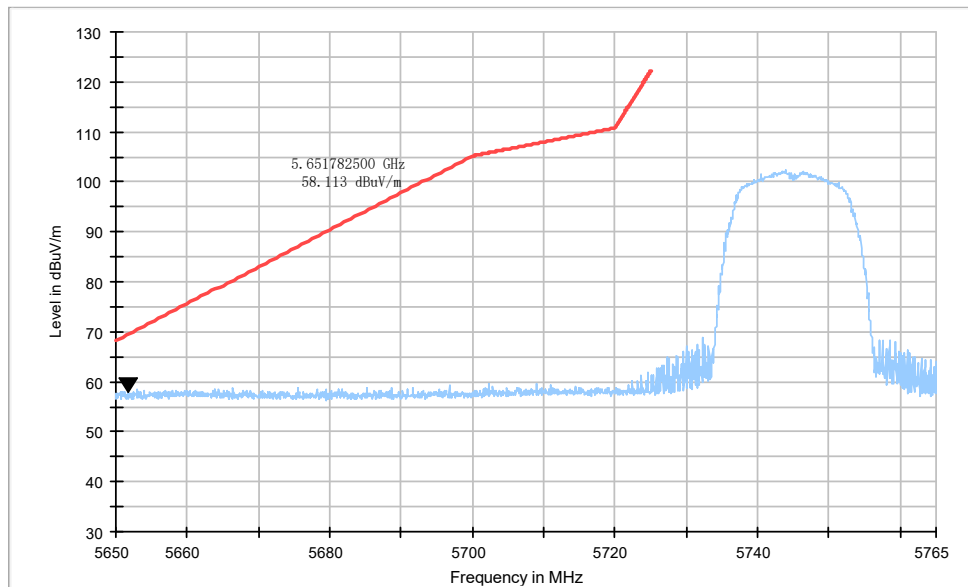


Fig. 15 Band Edges (802.11a Ch149, 5745MHz)

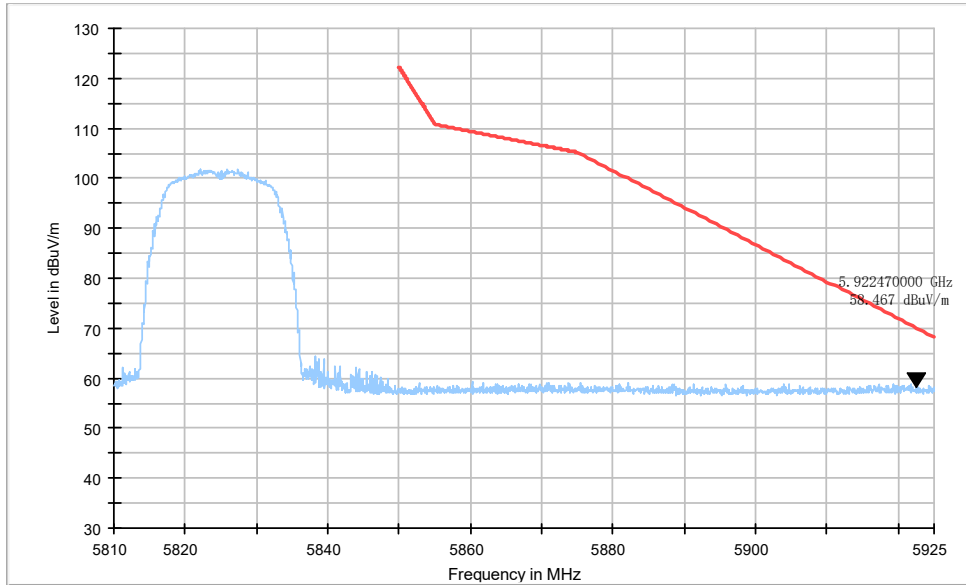


Fig. 16 Band Edges (802.11a Ch165, 5825MHz)

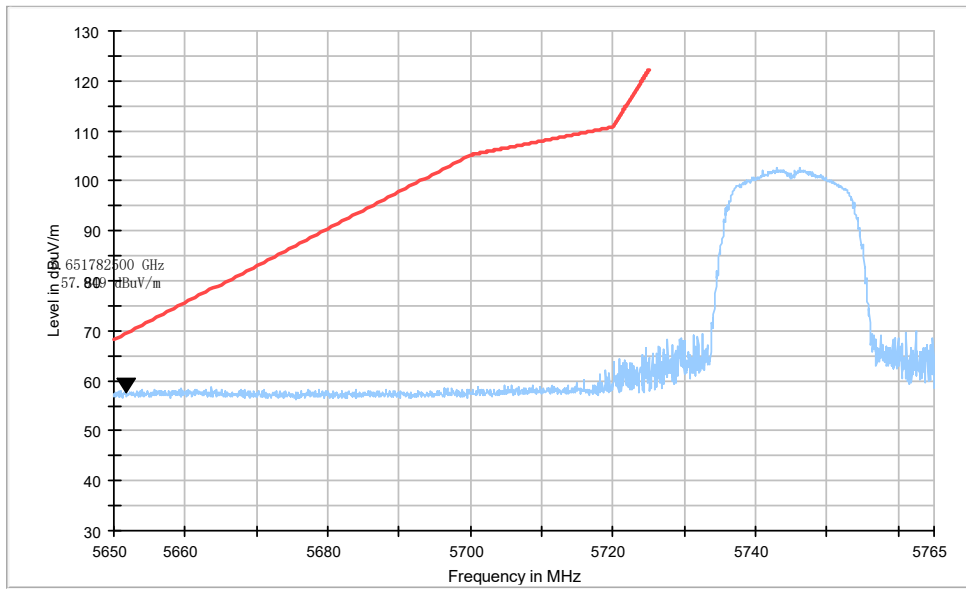


Fig. 17 Band Edges (802.11n-HT20 Ch149, 5745MHz)

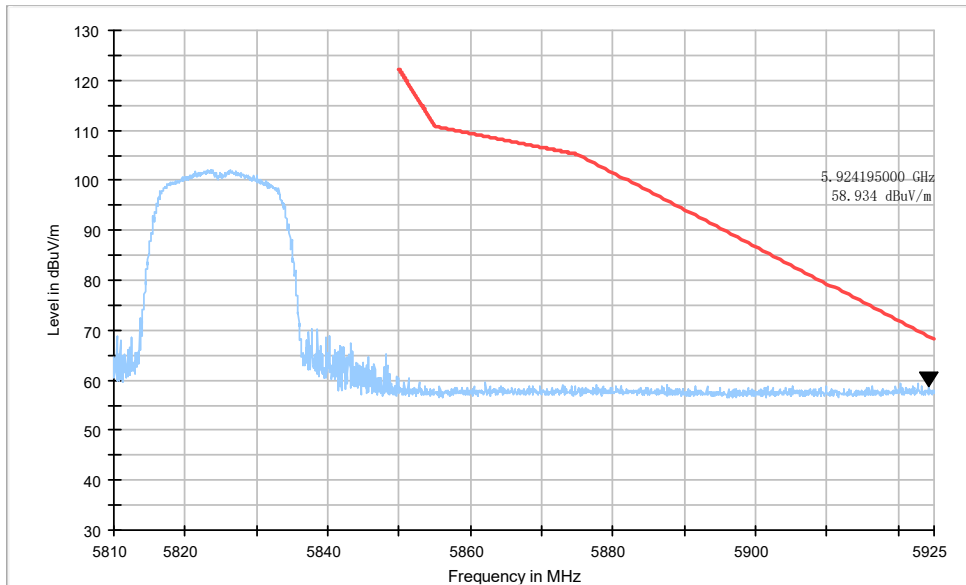


Fig. 18 Band Edges (802.11n-HT20 Ch165, 5825MHz)

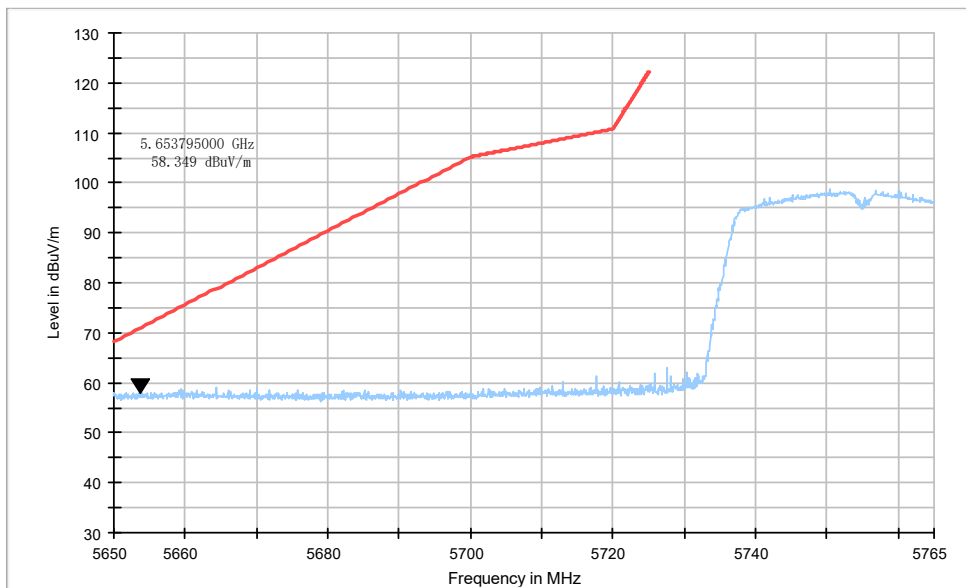


Fig. 19 Band Edges (802.11n-HT40 Ch151, 5755MHz)

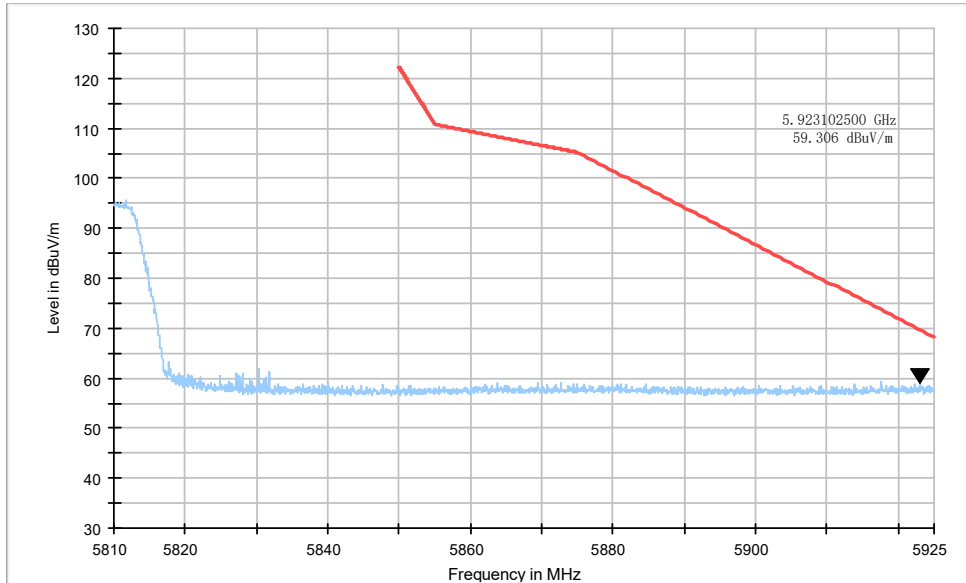


Fig. 20 Band Edges (802.11n-HT40 Ch159, 5795MHz)

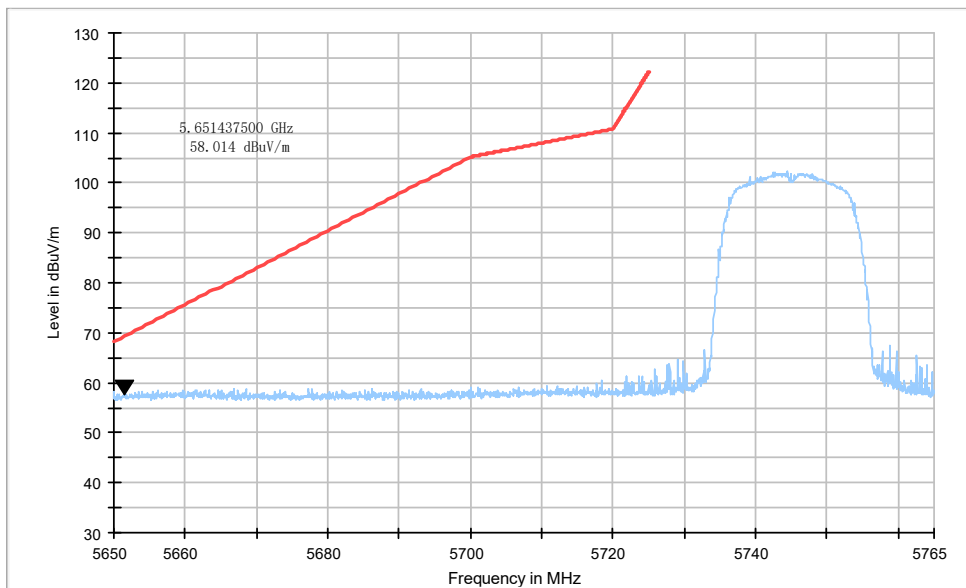


Fig. 21 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

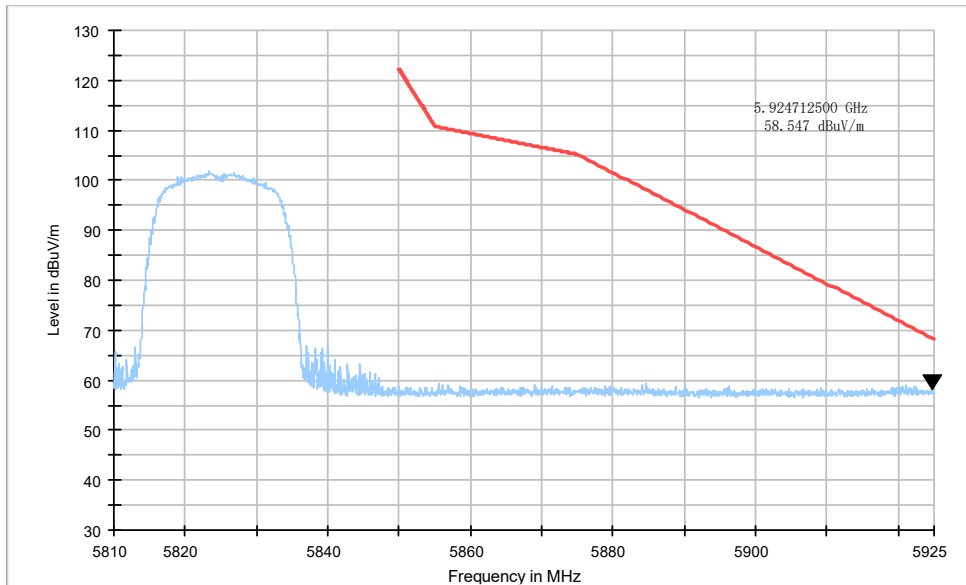


Fig. 22 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

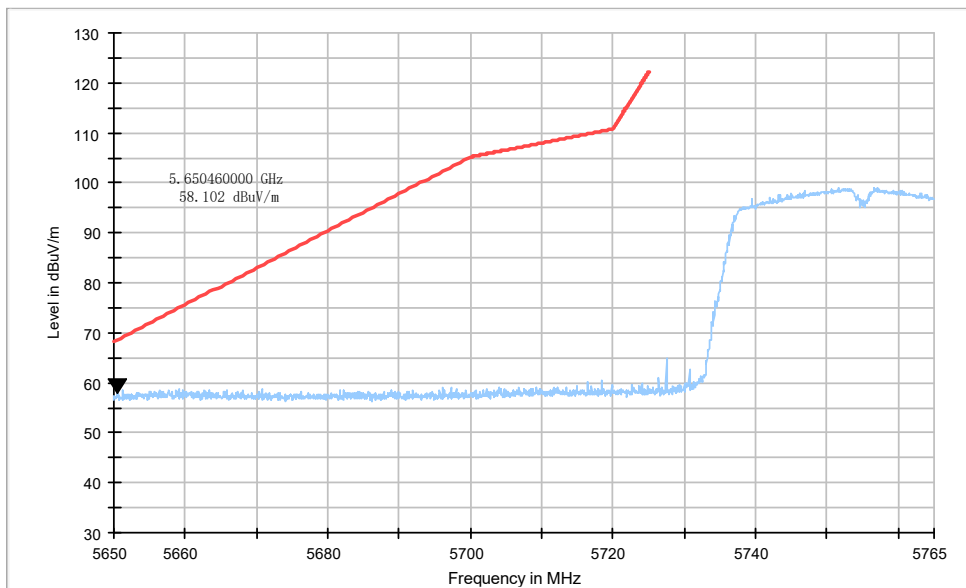


Fig. 23 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

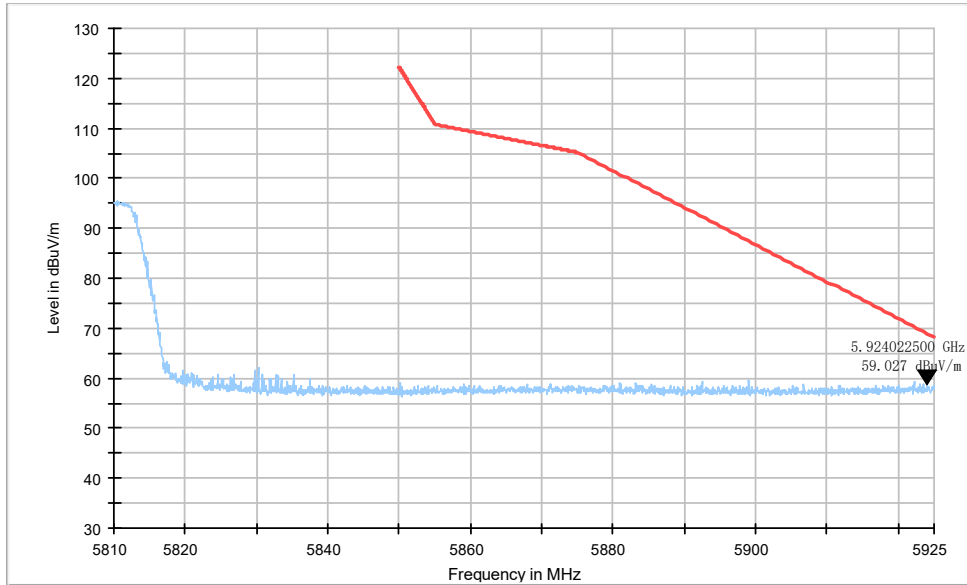


Fig. 24 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

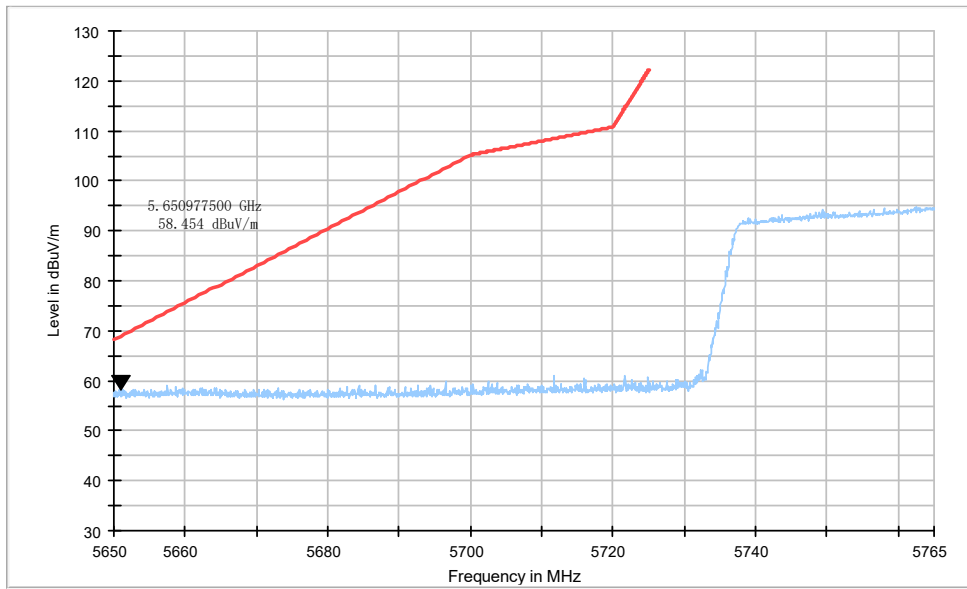


Fig. 25 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

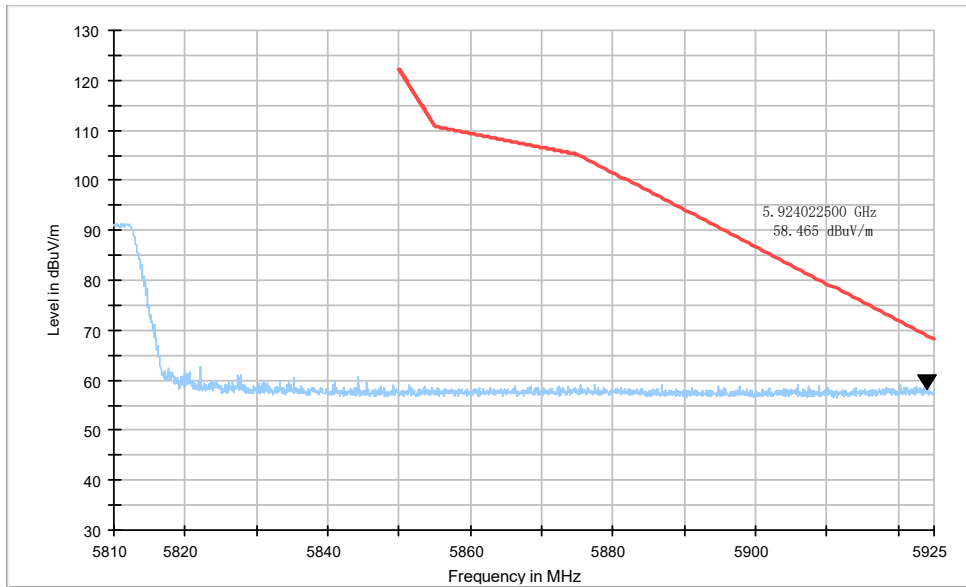


Fig. 26 Band Edges (802.11ac-HT80, 5775MHz)

A.6. AC Powerline Conducted Emission

A.6.1 Summary

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section

A.6.2 Method of Measurement

See Clause 6.2 of ANSI C63.10 specifically.

See Clause 4 and Clause 5 of ANSI C63.10 generally.

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver: Quasi-Peak / Average Detector.

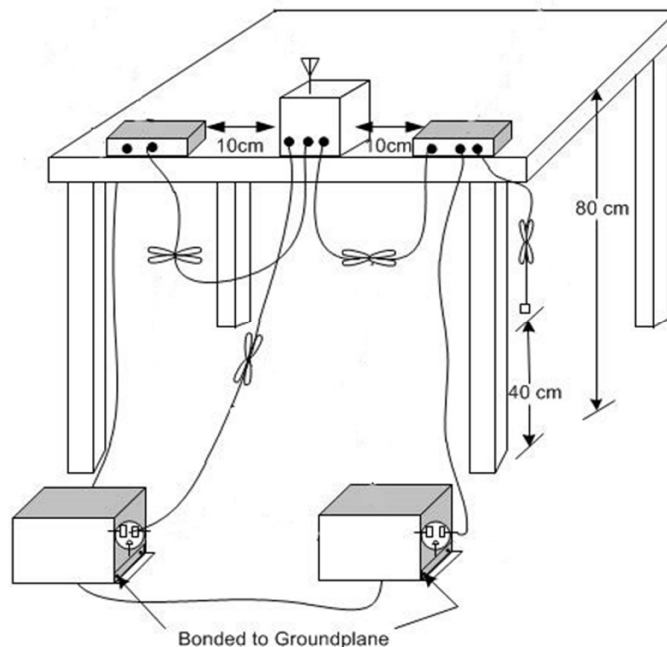
The measurement bandwidth is:

| Frequency of Emission (MHz) | RBW/IF bandwidth |
|-----------------------------|------------------|
| 0.15-30 | 9kHz |

A.6.3 Test Condition

| Voltage (V) | Frequency (Hz) |
|-------------|----------------|
| 120 | 60 |

A.6.4 Test setup



A.6.5 Measurement Result and limit

Wi-Fi (Quasi-peak Limit)

| Frequency range (MHz) | Quasi-peak Limit (dB μ V) | Result (dB μ V) | | Conclusion |
|-----------------------|-------------------------------|---------------------|------------|------------|
| | | With charger | | |
| | | Wi-Fi | Idle | |
| 0.15 to 0.5 | 66 to 56 | Fig.A.6.1 | Fig. A.6.2 | P |
| 0.5 to 5 | 56 | | | |
| 5 to 30 | 60 | | | |

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Wi-Fi (Average Limit)

| Frequency range (MHz) | Average Limit (dB μ V) | Result (dB μ V) | | Conclusion |
|-----------------------|----------------------------|---------------------|------------|------------|
| | | With charger | | |
| | | Wi-Fi | Idle | |
| 0.15 to 0.5 | 56 to 46 | Fig.A.6.1 | Fig. A.6.2 | P |
| 0.5 to 5 | 46 | | | |
| 5 to 30 | 50 | | | |

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Conclusion: Pass

Test graphs as below:

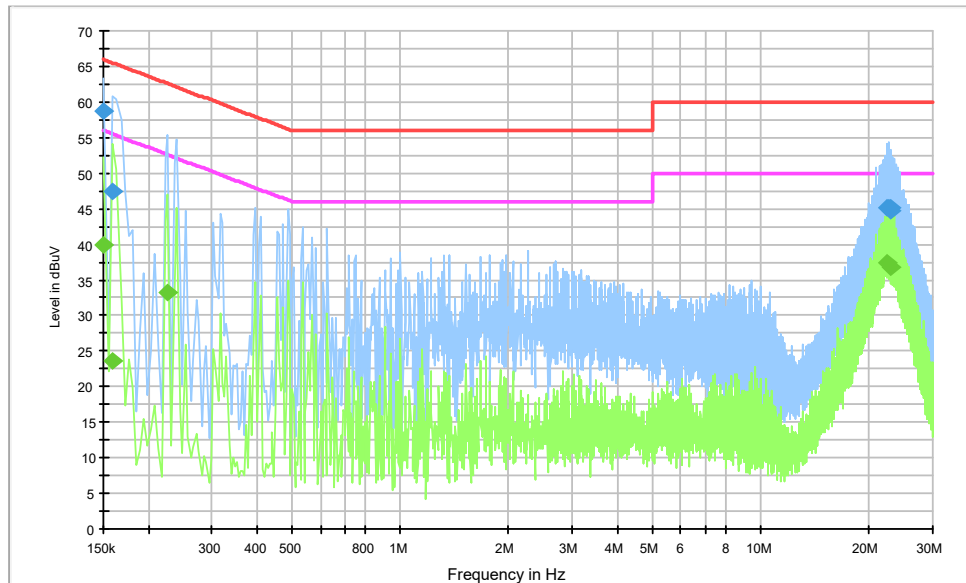


Fig.A.6.1. AC Powerline Conducted Emission-Idle

Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dB μ V) |
|-----------------|------------------------|-----------------|-----------------|--------|------|------------|-------------|--------------------|
| 0.150000 | 58.7 | 2000.0 | 9.000 | On | L1 | 20.2 | 7.3 | 66.0 |
| 0.159000 | 47.5 | 2000.0 | 9.000 | On | N | 20.1 | 18.1 | 65.5 |
| 22.492500 | 45.2 | 2000.0 | 9.000 | On | L1 | 20.1 | 14.8 | 60.0 |
| 22.551000 | 45.2 | 2000.0 | 9.000 | On | L1 | 20.1 | 14.8 | 60.0 |
| 22.830000 | 45.1 | 2000.0 | 9.000 | On | L1 | 20.1 | 14.9 | 60.0 |
| 22.983000 | 44.7 | 2000.0 | 9.000 | On | L1 | 20.1 | 15.3 | 60.0 |

Final Result 2

| Frequency (MHz) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dB μ V) |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------|--------------------|
| 0.150000 | 40.0 | 2000.0 | 9.000 | On | L1 | 20.2 | 16.0 | 56.0 |
| 0.159000 | 23.6 | 2000.0 | 9.000 | On | L1 | 20.1 | 31.9 | 55.5 |
| 0.226500 | 33.1 | 2000.0 | 9.000 | On | L1 | 20.0 | 19.4 | 52.6 |
| 22.447500 | 37.4 | 2000.0 | 9.000 | On | L1 | 20.1 | 12.6 | 50.0 |
| 22.492500 | 37.4 | 2000.0 | 9.000 | On | L1 | 20.1 | 12.6 | 50.0 |
| 22.920000 | 36.9 | 2000.0 | 9.000 | On | L1 | 20.1 | 13.1 | 50.0 |

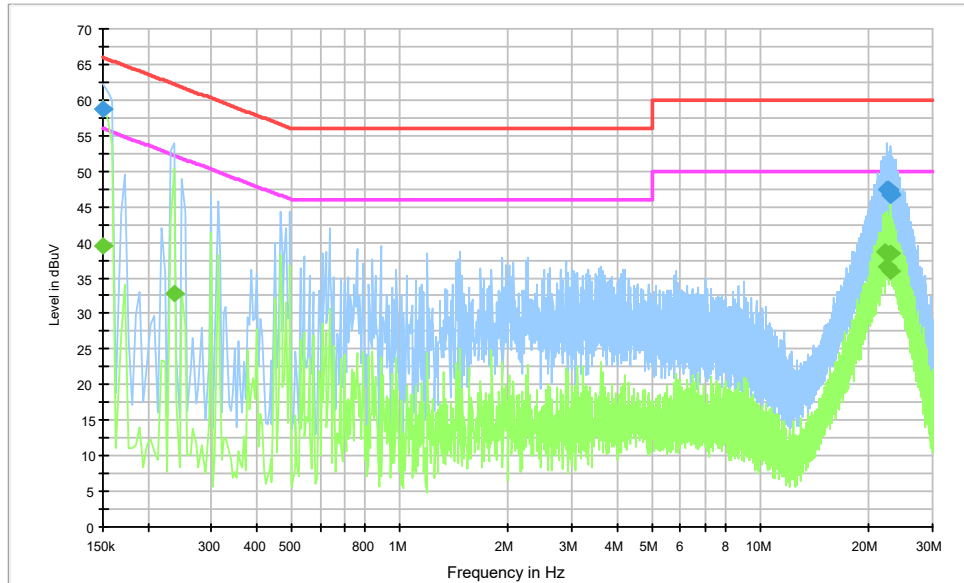


Fig.A.6.2. AC Powerline Conducted Emission-Idle

Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dB μ V) |
|-----------------|------------------------|-----------------|-----------------|--------|------|------------|-------------|--------------------|
| 0.150000 | 58.7 | 2000.0 | 9.000 | On | L1 | 20.2 | 7.3 | 66.0 |
| 22.492500 | 47.4 | 2000.0 | 9.000 | On | L1 | 20.1 | 12.6 | 60.0 |
| 22.537500 | 47.4 | 2000.0 | 9.000 | On | L1 | 20.1 | 12.6 | 60.0 |
| 22.767000 | 47.3 | 2000.0 | 9.000 | On | L1 | 20.1 | 12.7 | 60.0 |
| 22.888500 | 46.9 | 2000.0 | 9.000 | On | L1 | 20.1 | 13.1 | 60.0 |
| 23.028000 | 46.6 | 2000.0 | 9.000 | On | L1 | 20.1 | 13.4 | 60.0 |

Final Result 2

| Frequency (MHz) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dB μ V) |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------|--------------------|
| 0.150000 | 39.5 | 2000.0 | 9.000 | On | L1 | 20.2 | 16.5 | 56.0 |
| 0.235500 | 32.9 | 2000.0 | 9.000 | On | L1 | 20.0 | 19.4 | 52.3 |
| 22.141500 | 38.7 | 2000.0 | 9.000 | On | L1 | 20.1 | 11.3 | 50.0 |
| 22.492500 | 36.5 | 2000.0 | 9.000 | On | N | 20.3 | 13.5 | 50.0 |
| 22.888500 | 38.5 | 2000.0 | 9.000 | On | L1 | 20.1 | 11.5 | 50.0 |
| 23.028000 | 35.9 | 2000.0 | 9.000 | On | N | 20.3 | 14.1 | 50.0 |

ANNEX B: EUT parameters

Disclaimer: The antenna gain provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

ANNEX C: Accreditation Certificate



Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT
Beijing, People's Republic of China

for technical competence in the field of
Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 26th day of June 2023.



Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2024

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

***** END OF REPORT BODY *****