



FCC PART 15C TEST REPORT No.I22Z70098-IOT05

for

Samsung Electronics Co., Ltd.

Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN

SM-A045M/DS, SM-A045M

With

FCC ID: ZCasma045M

Hardware Version: REV1.0

Software Version: A045M.001

Issued Date: 2022-06-27

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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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REPORT HISTORY

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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 NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP 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: CTTL (BDA)

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

1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

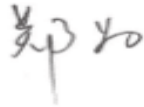
Testing Start Date: 2022-04-15

Testing End Date: 2022-06-25

1.5. Signature

谢秀珍

Xie Xiuzhen
(Prepared this test report)



Zheng Wei
(Reviewed this test report)

胡晓宇

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(Approved this test report)



2. CLIENT INFORMATION

2.1. Applicant Information

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2.2. Manufacturer Information

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Telephone: +82-10-2722-4159
Fax: /

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT(AE)

3.1. About EUT

| | |
|---------------------|---|
| Description | Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN |
| Model name | SM-A045M/DS, SM-A045M |
| FCC ID | ZCASMA045M |
| WLAN Frequency Band | ISM Band: 5725MHz~5850MHz |
| Type of modulation | OFDM |
| Voltage | 3.85V |

3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version |
|---------|--------------|------------|------------|
| UT18a | 2270098UT18a | REV1.0 | A045M.001 |
| UT22a | 2270098UT22a | REV1.0 | A045M.001 |

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

3.3. Internal Identification of AE used during the test

| AE ID* | Description | Remark |
|-----------------|-------------|----------------------|
| AE1 | Adapter1 | / |
| AE2 | Adapter2 | / |
| AE3 | Adapter3 | / |
| AE4 | Data Cable1 | / |
| AE5 | Data Cable2 | / |
| AE6 | Headset1 | / |
| AE7 | Headset2 | |
| AE8 | Battery | / |
| AE1 | | |
| Model | | EP-TA200JWE |
| Manufacturer | | HAEM Co.,Ltd |
| Length of cable | | / |
| AE2 | | |
| Model | | EP-TA200JWE |
| Manufacturer | | SoluM Co.,Ltd. |
| Length of cable | | / |
| AE3 | | |
| Model | | EP-TA200JWE |
| Manufacturer | | RFTECH Co., Ltd. |
| Length of cable | | / |
| AE4 | | |
| Model | | EP-DR140AWE |
| Manufacturer | | DONGGUAN KSD CO.,LTD |
| Length of cable | | / |

AE5

Model EP-DR140AWE
 Manufacturer CRESYN HANOI Co., Ltd
 Length of cable /

AE6

Model EHS61ASFWE
 Manufacturer DONGGUAN YOUNGBO ELECTRONICS CO.,LTD
 Length of cable /

AE7

Model EHS61ASFWE
 Manufacturer Shenzhen Grandsound Electronics Co.,Ltd
 Length of cable /

AE8

Model /
 Manufacturer /
 Length of cable /

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

3.4. General Description

Equipment Under Test (EUT) is a model of Multi-band GSM/WCDMA/LTE 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 | 2018 |
| 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. SUMMARY OF TEST RESULTS

6.1. Summary of Test Results

| SUMMARY OF MEASUREMENT RESULTS | Sub-clause of Part15C | 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 |
| Band Edges Compliance - Conducted& Radiated | 15.407 (b) | / | P |
| Transmitter Spurious Emission - Conducted | 15.407 | / | P |
| Transmitter Spurious Emission - Radiated | 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 requested by the client/manufacturer 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 4.1.

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 EQUIPMENTS 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 | 2023-05-15 |
| 2 | Shielding Room | S81 | / | ETS-Lindgren | / | / |

Radiated emission test system

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Period | Calibration Due date |
|-----|---------------|-------------------|---------------|--------------|--------------------|----------------------|
| 1 | Test Receiver | ESU26 | 100376 | R&S | 1 year | 2022-09-15 |
| 2 | Test Receiver | ESW44 | 103015 | R&S | 1 year | 2022-09-02 |
| 3 | EMI Antenna | VULB9163 | 01176 | Schwarzbeck | 1 year | 2022-11-15 |
| 4 | EMI Antenna | 3117 | 00139065 | ETS-Lindgren | 1 year | 2022-09-13 |
| 5 | EMI Antenna | 3115 | 00146404 | ETS-Lindgren | 1 year | 2023-02-23 |
| 6 | EMI Antenna | LB-180400-25-C-KF | J211060826 | A-INFO | 1 year | 2023-02-27 |
| 7 | Loop Antenna | HFH2-Z2 | 829324/007 | R&S | 1 year | 2022-12-22 |

AC Power Line Conducted Emission

| No. | Equipment | Model | Manufacturer | Serial Number | Calibration Period | Calibration Due date |
|-----|---------------|--------|--------------|---------------|--------------------|----------------------|
| 1 | LISN | ENV216 | 101459 | R&S | 1 year | 2023-03-26 |
| 2 | Test Receiver | ESCI | 100766 | R&S | 1 year | 2023-03-02 |

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. Occupied 6dB Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

8.5. 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 |

Radiated (k=2)

| Frequency Range | Uncertainty(dB) |
|---|-----------------|
| 9kHz-30MHz | / |
| $30\text{MHz} \leq f \leq 1\text{GHz}$ | 5.73 |
| $1\text{GHz} \leq f \leq 18\text{GHz}$ | 5.58 |
| $18\text{GHz} \leq f \leq 40\text{GHz}$ | 3.37 |

8.6. AC Power-line Conducted Emission

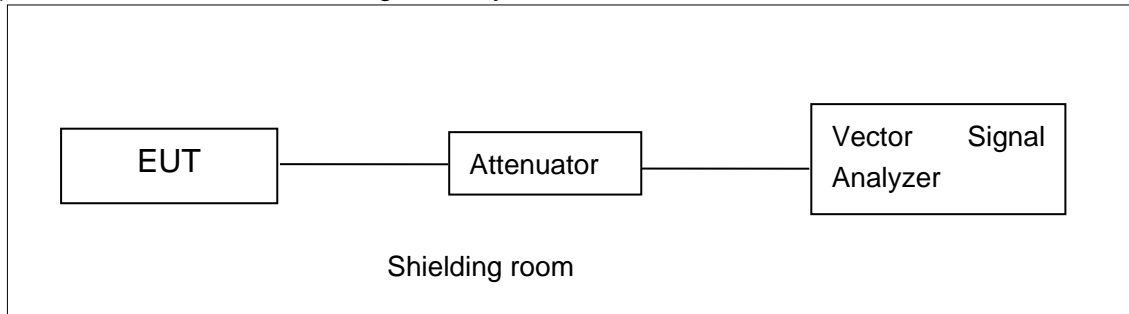
Measurement Uncertainty : 3.10dB,k=2

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

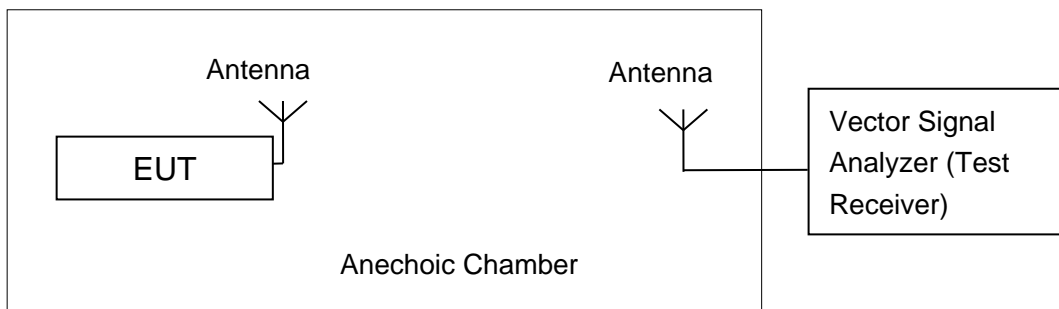


A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to ANSI C63.10.

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. 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 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

A.2. Maximum Peak Output Power

Measurement Limit and Method:

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

A.2.1 Antenna Gain

Antenna gain is -1.91dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Peak Output Power-conducted

Measurement Results:

802.11a mode

| Mode | Data Rate (Mbps) | Test Result (dBm) | | |
|---------|------------------|-------------------|-----------------|-----------------|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz (Ch165) |
| 802.11a | 6 | 14.46 | 14.76 | 14.86 |
| | 9 | 14.18 | / | / |
| | 12 | 14.12 | / | / |
| | 18 | 13.93 | / | / |
| | 24 | 13.86 | / | / |
| | 36 | 13.94 | / | / |
| | 48 | 13.72 | / | / |
| | 54 | 13.87 | / | / |

The data rate 6Mbps is selected as worse 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 | 14.39 | 14.67 | 14.74 |
| | MCS1 | 13.89 | / | / |
| | MCS2 | 13.86 | / | / |
| | MCS3 | 13.88 | / | / |
| | MCS4 | 13.86 | / | / |
| | MCS5 | 13.88 | / | / |
| | MCS6 | 13.83 | / | / |
| | MCS7 | 13.72 | / | / |

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

802.11ac-HT20 mode

| Mode | Data Rate (Index) | Test Result (dBm) | | |
|------------------|-------------------|-------------------|-----------------|-----------------|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz (Ch165) |
| 802.11ac (20MHz) | MCS0 | 14.46 | 14.58 | 14.63 |
| | MCS1 | 14.15 | / | / |
| | MCS2 | 14.07 | / | / |
| | MCS3 | 14.03 | / | / |
| | MCS4 | 13.91 | / | / |
| | MCS5 | 13.82 | / | / |
| | MCS6 | 13.99 | / | / |
| | MCS7 | 12.74 | / | / |
| | MCS8 | 12.33 | / | / |

The data rate MCS0 is selected as worse 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 | 14.36 | 14.47 |
| | MCS1 | 13.88 | / |
| | MCS2 | 13.83 | / |
| | MCS3 | 13.68 | / |
| | MCS4 | 13.65 | / |
| | MCS5 | 13.68 | / |
| | MCS6 | 13.66 | / |
| | MCS7 | 12.78 | / |

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

802.11ac-HT40 mode

| Mode | Data Rate (Index) | Test Result (dBm) | |
|------------------|-------------------|-------------------|-----------------|
| | | 5755MHz (Ch151) | 5795MHz (Ch159) |
| 802.11ac (40MHz) | MCS0 | 14.39 | 14.50 |
| | MCS1 | 14.04 | / |
| | MCS2 | 13.93 | / |
| | MCS3 | 13.92 | / |
| | MCS4 | 13.71 | / |
| | MCS5 | 13.70 | / |
| | MCS6 | 13.78 | / |
| | MCS7 | 12.73 | / |

| | | | |
|--|------|-------|---|
| | MCS8 | 12.21 | / |
| | MCS9 | 11.25 | / |

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

802.11ac-HT80 mode

| Mode | Data Rate (Index) | Test Result (dBm) |
|------------------|-------------------|-------------------|
| | | 5775MHz (Ch155) |
| 802.11ac (80MHz) | MCS0 | 14.09 |
| | MCS1 | 13.66 |
| | MCS2 | 13.69 |
| | MCS3 | 13.63 |
| | MCS4 | 13.62 |
| | MCS5 | 13.81 |
| | MCS6 | 13.72 |
| | MCS7 | 12.54 |
| | MCS8 | 11.93 |
| | MCS9 | 9.97 |

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

The duty cycle of all mode are 100%.

Conclusion: PASS

A.3. Peak Power Spectral Density

Measurement Limit:

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

The measurement is made according to ANSI C63.10 and KDB789033 D02

Measurement Uncertainty:

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

Measurement Results:

| Mode | Channel | Power Spectral Density (dBm/500kHz) | Conclusion |
|------------------|---------|--|------------|
| 802.11a | 149 | 1.18 | P |
| | 157 | 1.28 | P |
| | 165 | 1.44 | P |
| 802.11n HT20 | 149 | 1.08 | P |
| | 157 | 0.95 | P |
| | 165 | 1.14 | P |
| 802.11ac HT40 | 151 | -2.05 | P |
| | 159 | -2.15 | P |
| 802.11ac HT80 | 155 | -5.38 | P |

Conclusion: PASS

A.4. Occupied 6dB Bandwidth

Measurement Limit:

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

The measurement is made according to KDB789033 D02 .

Measurement Uncertainty:

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

Measurement Result:

| Mode | Channel | Occupied 6dB Bandwidth (MHz) | | conclusion |
|------------------|---------|-------------------------------|-------|------------|
| | | Fig. | Value | |
| 802.11a | 149 | Fig.1 | 16.40 | P |
| | 157 | Fig.2 | 16.30 | P |
| | 165 | Fig.3 | 16.40 | P |
| 802.11n HT20 | 149 | Fig.4 | 17.60 | P |
| | 157 | Fig.5 | 17.60 | P |
| | 165 | Fig.6 | 17.60 | P |
| 802.11ac HT40 | 151 | Fig.7 | 36.32 | P |
| | 159 | Fig.8 | 35.68 | P |
| 802.11ac HT80 | 155 | Fig.9 | 76.16 | P |

Conclusion: PASS

Test graphs as below:

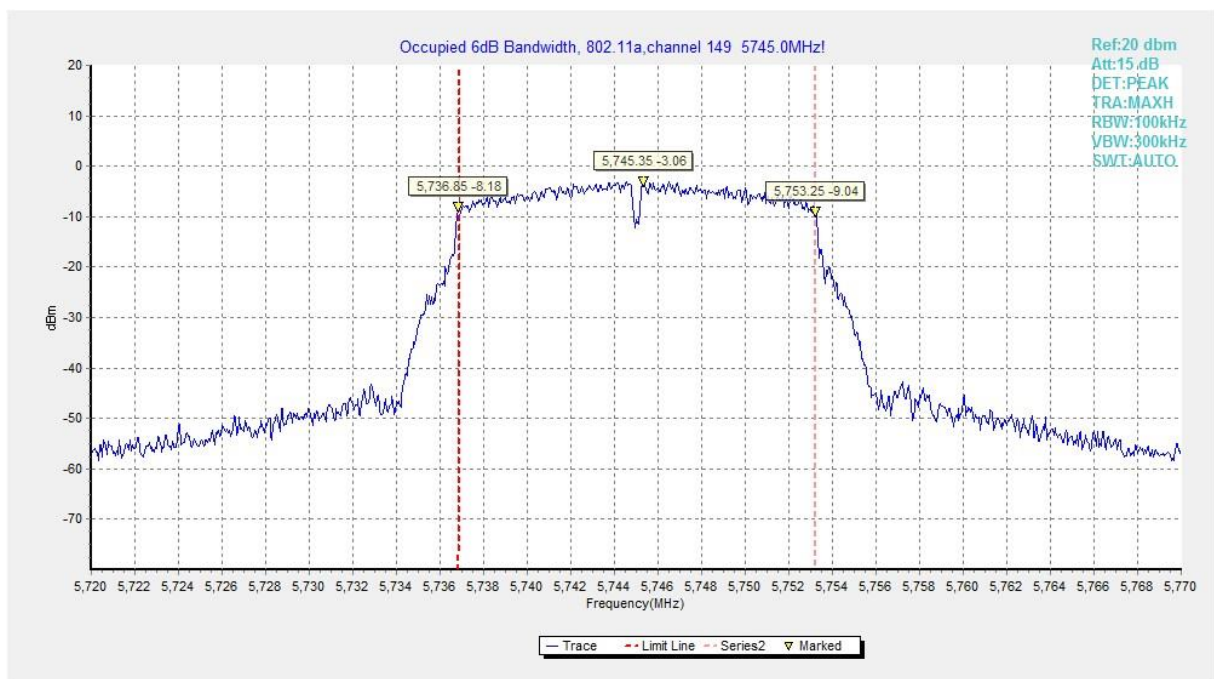


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

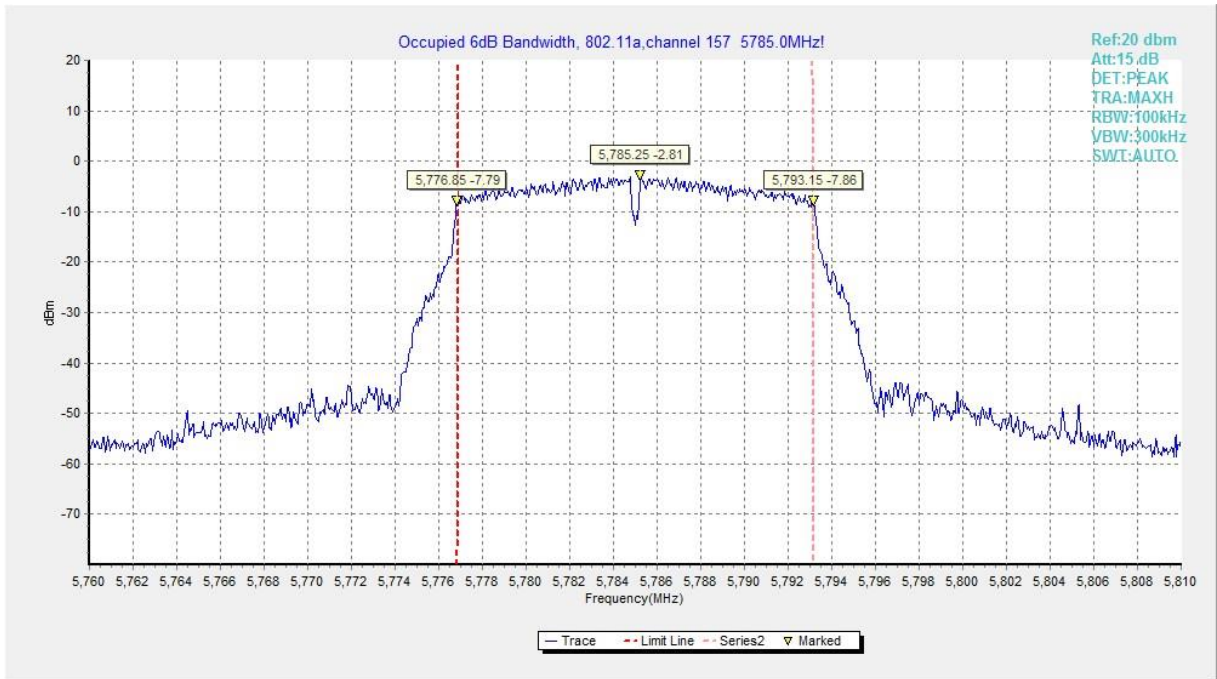


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

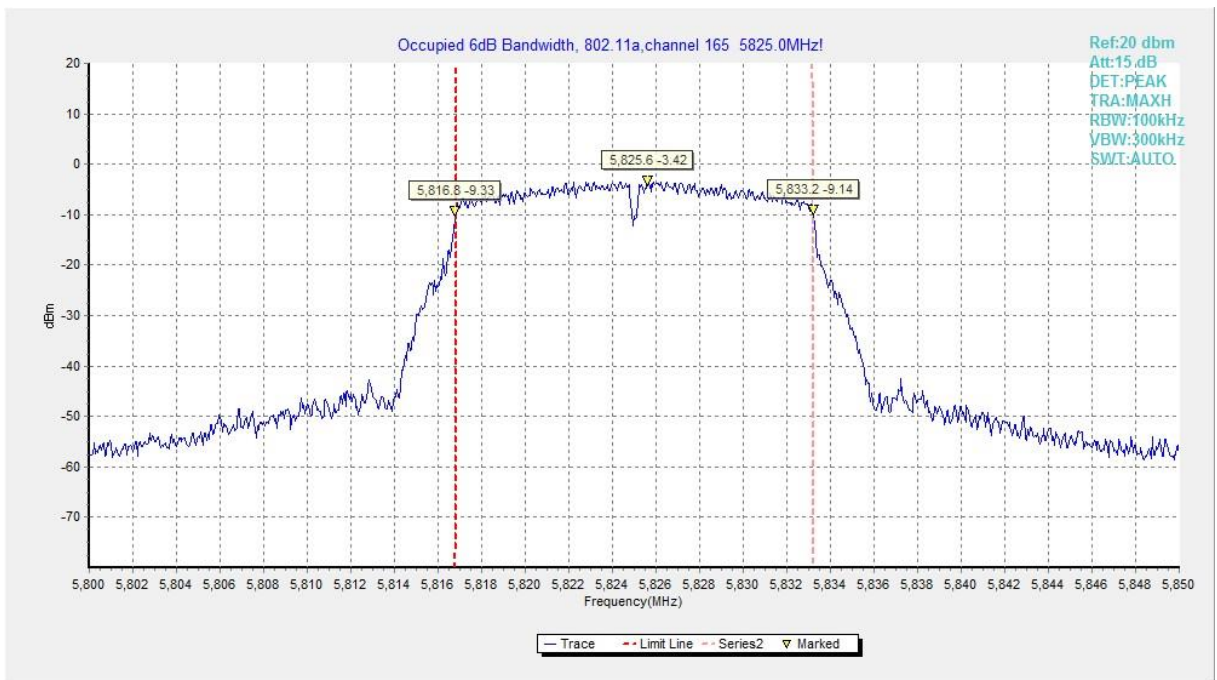


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

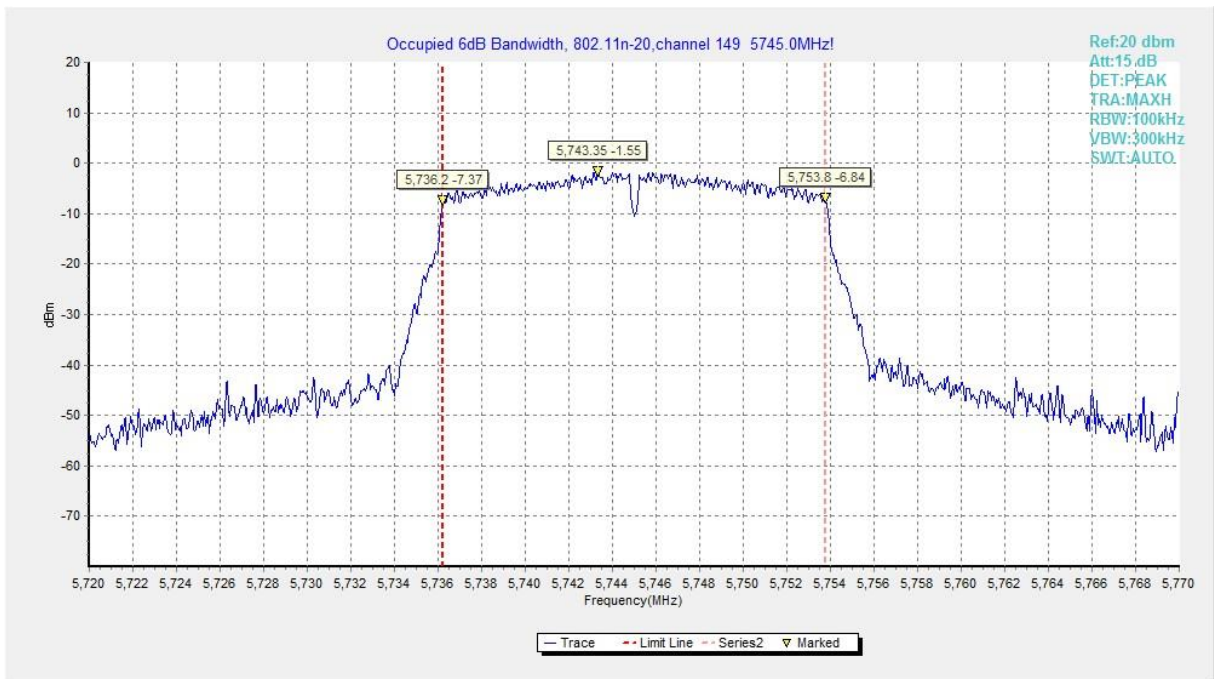


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

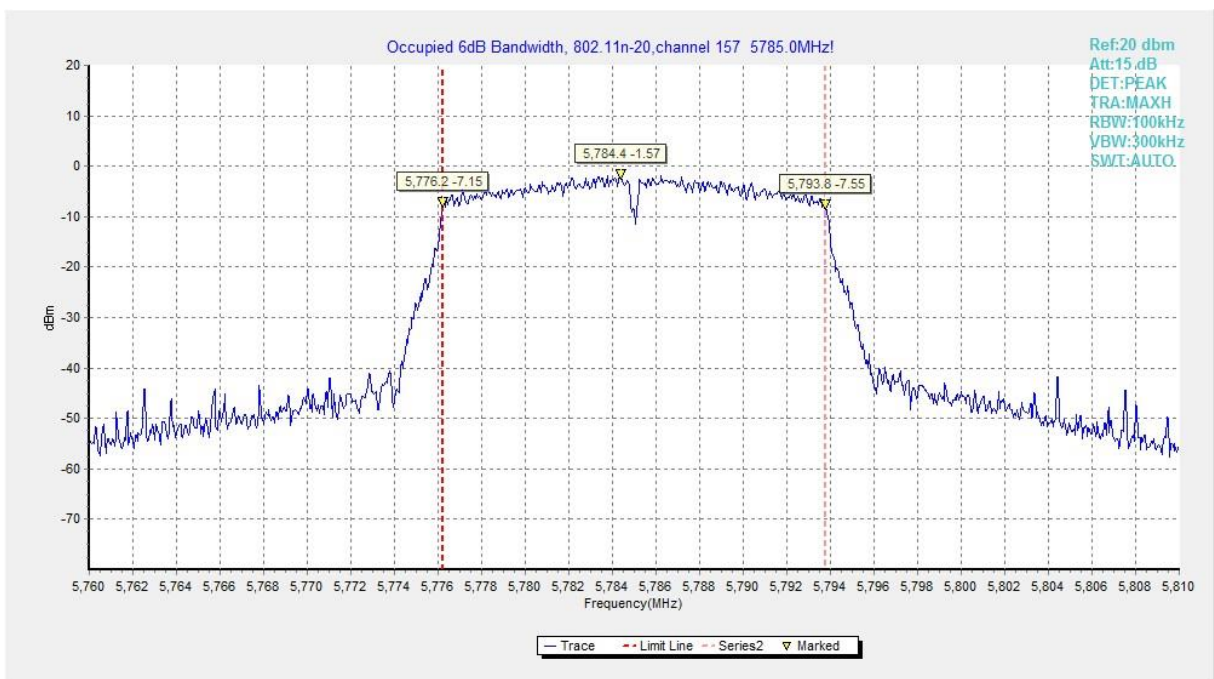


Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

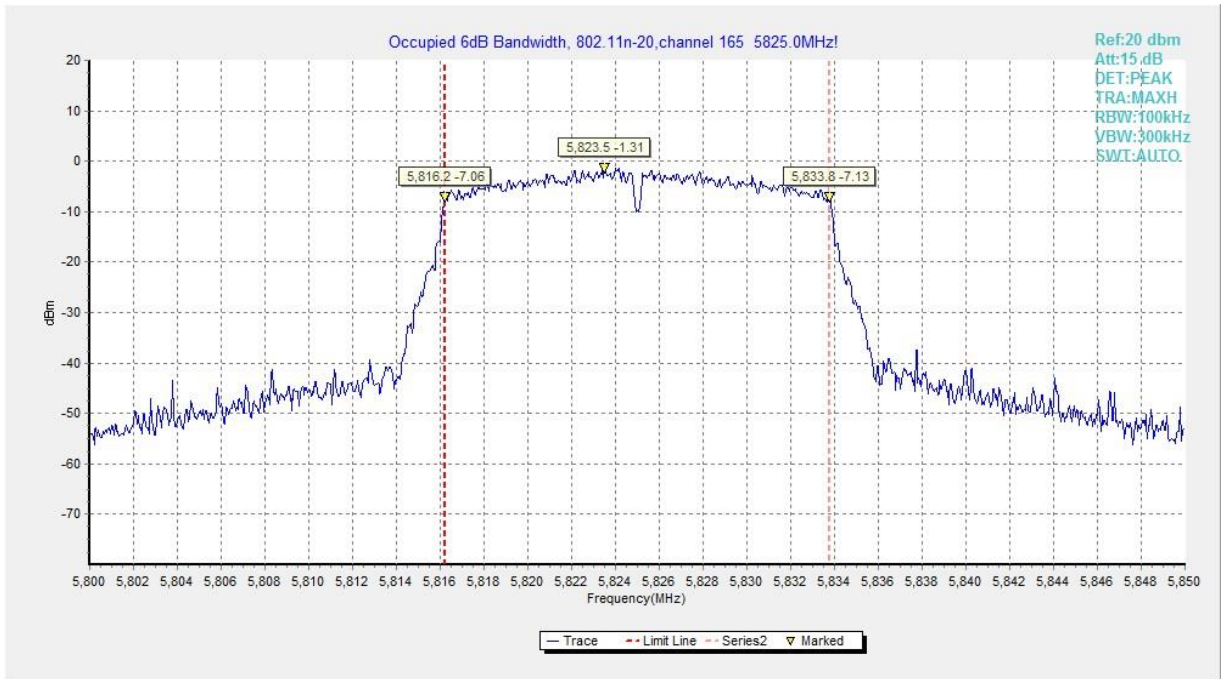


Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

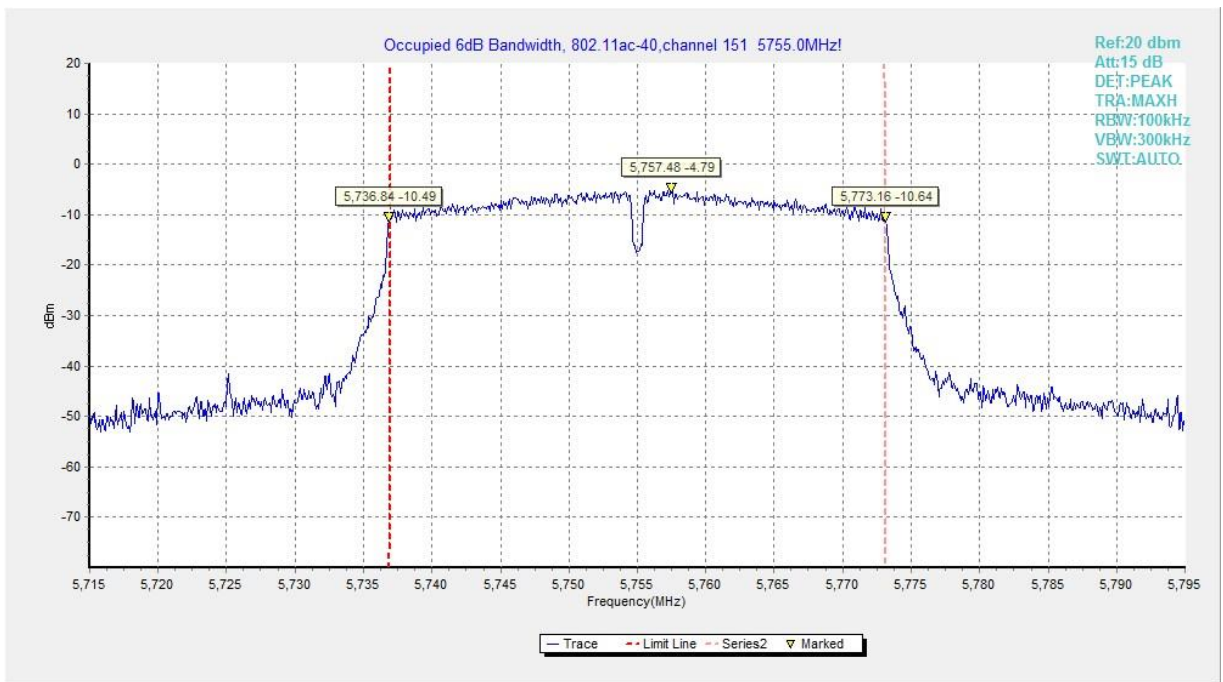


Fig. 7 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 151)

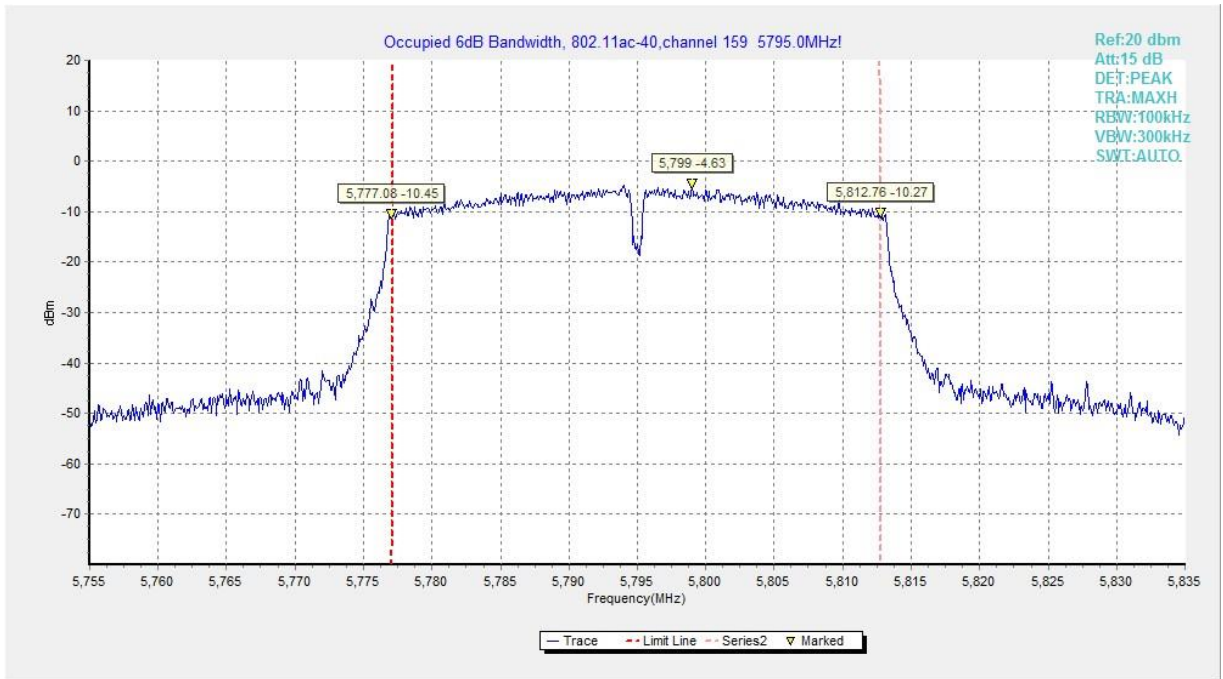


Fig. 8 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 159)

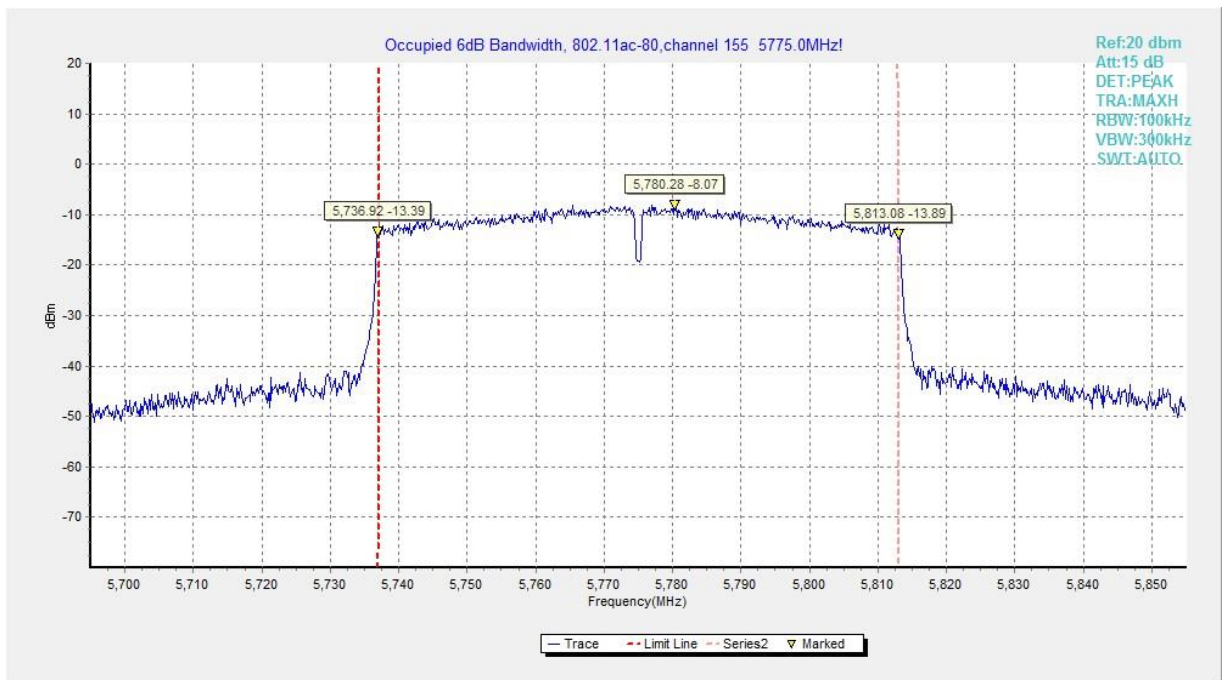


Fig. 9 Occupied 6dB Bandwidth (802.11ac-HT80, Ch 155)

A.5. Transmitter Spurious Emission

A.5.1 Transmitter Spurious Emission – Radiated

Measurement Limit:

| 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. | |

The measurement is made according to KDB 789033

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)).

Limit in restricted band:

| 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 |

Set up:

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m

The EUT and transmitting antenna shall be centered on the turntable.

Test Procedure

The EUT was placed on a non-conductive table. 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 360° and the measurement antenna is moved from 1m to 4m to get the maximization result. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The receiver references:

| Frequency of emission (MHz) | RBW/VBW | Sweep Time(s) |
|-----------------------------|---------------|---------------|
| 30-1000 | 100kHz/300kHz | 5 |
| 1000-4000 | 1MHz/3MHz | 15 |
| 4000-18000 | 1MHz/3MHz | 40 |
| 18000-26500 | 1MHz/3MHz | 20 |

Sample Calculations

1. 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

2. The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}} + \text{Cable Loss} + \text{Antenna Factor}$$

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

Measurement Results:
802.11a mode

| Mode | Channel | Frequency Range | Test Results | Conclusion |
|---------|---------|-------------------|--------------|------------|
| 802.11a | 149 | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P |
| | 157 | 9kHz ~30 MHz | --- | P |
| | | 30 MHz ~1 GHz | --- | P |
| | | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P |
| | | 18 GHz ~ 26.5 GHz | --- | P |
| | 165 | 26.5 GHz~ 40 GHz | --- | P |
| | | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P |

802.11n-HT20 mode

| Mode | Channel | Frequency Range | Test Results | Conclusion | |
|-------------------|---------|-------------------|----------------|------------|---|
| 802.11n (HT20) | 149 | 1 GHz ~ 3 GHz | --- | P | |
| | | 3 GHz ~ 7 GHz | --- | P | |
| | | 7 GHz ~ 18 GHz | --- | P | |
| | 157 | 9kHz ~30 MHz | --- | P | |
| | | 30 MHz ~1 GHz | --- | P | |
| | | 1 GHz ~ 3 GHz | --- | P | |
| | | 3 GHz ~ 7 GHz | --- | P | |
| | | 7 GHz ~ 18 GHz | --- | P | |
| | | 18 GHz ~ 26.5 GHz | --- | P | |
| | 165 | 26.5 GHz~ 40 GHz | --- | P | |
| | | 1 GHz ~ 3 GHz | --- | P | |
| | | 3 GHz ~ 7 GHz | --- | P | |
| | | | 7 GHz ~ 18 GHz | --- | P |

802.11n-HT40 mode

| Mode | Channel | Frequency Range | Test Results | Conclusion |
|-------------------|---------|-------------------|--------------|------------|
| 802.11n (HT40) | 151 | 9kHz ~30 MHz | --- | P |
| | | 30 MHz ~1 GHz | --- | P |
| | | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P |
| | | 18 GHz ~ 26.5 GHz | --- | P |
| | | 26.5 GHz~ 40 GHz | --- | P |
| | 159 | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | | | |

| | | | | |
|--|--|----------------|-----|---|
| | | 7 GHz ~ 18 GHz | --- | P |
|--|--|----------------|-----|---|

802.11ac-HT20 mode

| Mode | Channel | Frequency Range | Test Results | Conclusion | |
|--------------------|---------|-----------------|-------------------|------------|---|
| 802.11ac (HT20) | 149 | 1 GHz ~ 3 GHz | --- | P | |
| | | 3 GHz ~ 7 GHz | --- | P | |
| | | 7 GHz ~ 18 GHz | --- | P | |
| | 157 | 157 | 9kHz ~30 MHz | --- | P |
| | | | 30 MHz ~1 GHz | --- | P |
| | | | 1 GHz ~ 3 GHz | --- | P |
| | | | 3 GHz ~ 7 GHz | --- | P |
| | | | 7 GHz ~ 18 GHz | --- | P |
| | | | 18 GHz ~ 26.5 GHz | --- | P |
| | 165 | 165 | 26.5 GHz~ 40 GHz | --- | P |
| | | | 1 GHz ~ 3 GHz | --- | P |
| | | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P | |

802.11ac-HT40 mode

| Mode | Channel | Frequency Range | Test Results | Conclusion | |
|--------------------|---------|-------------------|----------------|------------|---|
| 802.11ac (HT40) | 151 | 9kHz ~30 MHz | --- | P | |
| | | 30 MHz ~1 GHz | --- | P | |
| | | 1 GHz ~ 3 GHz | --- | P | |
| | | 3 GHz ~ 7 GHz | --- | P | |
| | | 7 GHz ~ 18 GHz | --- | P | |
| | | 18 GHz ~ 26.5 GHz | --- | P | |
| | | 26.5 GHz~ 40 GHz | --- | P | |
| | 159 | 159 | 1 GHz ~ 3 GHz | --- | P |
| | | | 3 GHz ~ 7 GHz | --- | P |
| | | | 7 GHz ~ 18 GHz | --- | P |

802.11ac-HT80 mode

| Mode | Channel | Frequency Range | Test Results | Conclusion |
|--------------------|---------|-------------------|--------------|------------|
| 802.11ac (HT80) | 155 | 9kHz ~30 MHz | --- | P |
| | | 30 MHz ~1 GHz | --- | P |
| | | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P |
| | | 18 GHz ~ 26.5 GHz | --- | P |
| | | 26.5 GHz~ 40 GHz | --- | P |

Conclusion: PASS

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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5453.800 | 39.84 | -25.36 | 34.56 | 30.64 | 54.00 | 14.16 | V |
| 5457.000 | 39.90 | -25.35 | 34.56 | 30.69 | 54.00 | 14.10 | V |
| 11490.200 | 33.36 | -32.54 | 38.19 | 27.71 | 54.00 | 20.64 | V |
| 15927.600 | 36.87 | -27.79 | 40.60 | 24.06 | 54.00 | 17.13 | V |
| 17758.000 | 37.68 | -26.51 | 41.11 | 23.08 | 54.00 | 16.32 | H |
| 17846.000 | 37.98 | -26.36 | 41.18 | 23.16 | 54.00 | 16.02 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5451.600 | 40.04 | -25.37 | 34.55 | 30.86 | 54.00 | 13.96 | V |
| 5458.400 | 40.10 | -25.34 | 34.56 | 30.87 | 54.00 | 13.90 | V |
| 11570.500 | 33.46 | -32.29 | 38.29 | 27.47 | 54.00 | 20.54 | H |
| 16123.400 | 36.20 | -28.18 | 40.82 | 23.56 | 54.00 | 17.80 | V |
| 17748.100 | 37.83 | -26.52 | 41.10 | 23.25 | 54.00 | 16.17 | V |
| 17954.900 | 38.32 | -26.10 | 41.26 | 23.15 | 54.00 | 15.68 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5454.600 | 40.03 | -25.36 | 34.56 | 30.83 | 54.00 | 13.97 | V |
| 5459.400 | 40.07 | -25.33 | 34.56 | 30.84 | 54.00 | 13.93 | V |
| 11649.700 | 33.65 | -32.11 | 38.38 | 27.37 | 54.00 | 20.35 | V |
| 15940.800 | 37.03 | -27.74 | 40.62 | 24.14 | 54.00 | 16.97 | V |
| 17891.100 | 38.07 | -26.25 | 41.21 | 23.11 | 54.00 | 15.93 | H |
| 17953.800 | 38.34 | -26.11 | 41.26 | 23.18 | 54.00 | 15.66 | V |

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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5456.000 | 39.98 | -25.35 | 34.56 | 30.77 | 54.00 | 14.02 | V |
| 5458.400 | 39.99 | -25.34 | 34.56 | 30.77 | 54.00 | 14.01 | V |
| 11490.200 | 33.54 | -32.54 | 38.19 | 27.89 | 54.00 | 20.46 | H |
| 16027.700 | 37.19 | -27.86 | 40.73 | 24.32 | 54.00 | 16.81 | H |
| 17754.700 | 38.12 | -26.51 | 41.11 | 23.53 | 54.00 | 15.88 | H |
| 17887.800 | 38.42 | -26.26 | 41.21 | 23.47 | 54.00 | 15.58 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5452.600 | 39.92 | -25.37 | 34.55 | 30.73 | 54.00 | 14.08 | V |
| 5456.600 | 39.88 | -25.35 | 34.56 | 30.67 | 54.00 | 14.12 | V |
| 11570.500 | 33.62 | -32.29 | 38.29 | 27.63 | 54.00 | 20.38 | V |
| 15977.100 | 38.07 | -27.69 | 40.67 | 25.09 | 54.00 | 15.93 | H |
| 17752.500 | 38.54 | -26.51 | 41.10 | 23.95 | 54.00 | 15.46 | H |
| 17881.200 | 38.96 | -26.27 | 41.21 | 24.03 | 54.00 | 15.04 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5450.200 | 39.85 | -25.38 | 34.55 | 30.68 | 54.00 | 14.15 | V |
| 5453.400 | 39.99 | -25.36 | 34.56 | 30.80 | 54.00 | 14.01 | V |
| 11649.700 | 34.10 | -32.11 | 38.38 | 27.82 | 54.00 | 19.90 | V |
| 16020.000 | 37.43 | -27.83 | 40.72 | 24.55 | 54.00 | 16.57 | H |
| 17761.300 | 38.32 | -26.50 | 41.11 | 23.71 | 54.00 | 15.68 | H |
| 17902.100 | 38.53 | -26.23 | 41.22 | 23.53 | 54.00 | 15.47 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5456.000 | 39.90 | -25.35 | 34.56 | 30.70 | 54.00 | 14.10 | V |
| 5458.000 | 39.96 | -25.34 | 34.56 | 30.74 | 54.00 | 14.04 | V |
| 11510.000 | 33.46 | -32.50 | 38.21 | 27.75 | 54.00 | 20.54 | H |
| 17857.650 | 38.20 | -26.33 | 41.19 | 23.34 | 54.00 | 15.80 | H |
| 17863.240 | 38.16 | -26.32 | 41.19 | 23.28 | 54.00 | 15.84 | V |
| 17948.840 | 38.37 | -26.12 | 41.26 | 23.22 | 54.00 | 15.63 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5451.400 | 39.91 | -25.38 | 34.55 | 30.73 | 54.00 | 14.09 | V |
| 5453.400 | 39.89 | -25.36 | 34.56 | 30.70 | 54.00 | 14.11 | V |
| 11590.300 | 33.50 | -32.23 | 38.31 | 27.42 | 54.00 | 20.50 | V |
| 16005.700 | 38.00 | -27.79 | 40.71 | 25.08 | 54.00 | 16.00 | H |
| 17758.000 | 38.14 | -26.51 | 41.11 | 23.54 | 54.00 | 15.86 | H |
| 17910.900 | 38.16 | -26.20 | 41.23 | 23.13 | 54.00 | 15.84 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5450.600 | 39.84 | -25.38 | 34.55 | 30.67 | 54.00 | 14.16 | V |
| 5456.400 | 39.90 | -25.35 | 34.56 | 30.69 | 54.00 | 14.10 | V |
| 11490.200 | 34.08 | -32.54 | 38.19 | 28.43 | 54.00 | 19.92 | V |
| 15962.800 | 37.96 | -27.64 | 40.65 | 24.95 | 54.00 | 16.04 | H |
| 17749.200 | 38.12 | -26.52 | 41.10 | 23.54 | 54.00 | 15.88 | V |
| 17879.000 | 38.46 | -26.28 | 41.20 | 23.53 | 54.00 | 15.54 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5454.400 | 39.87 | -25.36 | 34.56 | 30.67 | 54.00 | 14.13 | V |
| 5458.400 | 39.90 | -25.34 | 34.56 | 30.67 | 54.00 | 14.10 | V |
| 11570.500 | 33.56 | -32.29 | 38.29 | 27.57 | 54.00 | 20.44 | H |
| 15994.700 | 38.21 | -27.75 | 40.69 | 25.26 | 54.00 | 15.79 | H |
| 17749.200 | 38.35 | -26.52 | 41.10 | 23.77 | 54.00 | 15.65 | V |
| 17899.900 | 38.80 | -26.23 | 41.22 | 23.81 | 54.00 | 15.20 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5449.400 | 39.86 | -25.39 | 34.55 | 30.69 | 54.00 | 14.14 | V |
| 5458.600 | 39.95 | -25.34 | 34.56 | 30.73 | 54.00 | 14.05 | V |
| 11649.700 | 34.26 | -32.11 | 38.38 | 27.98 | 54.00 | 19.74 | H |
| 16020.000 | 37.38 | -27.83 | 40.72 | 24.49 | 54.00 | 16.62 | H |
| 17758.000 | 38.43 | -26.51 | 41.11 | 23.83 | 54.00 | 15.57 | V |
| 17895.500 | 38.62 | -26.24 | 41.22 | 23.64 | 54.00 | 15.38 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5455.800 | 39.90 | -25.35 | 34.56 | 30.69 | 54.00 | 14.10 | V |
| 5459.000 | 39.97 | -25.33 | 34.56 | 30.75 | 54.00 | 14.03 | V |
| 11549.600 | 33.55 | -32.37 | 38.26 | 27.65 | 54.00 | 20.45 | H |
| 16011.200 | 38.32 | -27.80 | 40.71 | 25.41 | 54.00 | 15.68 | H |
| 17767.900 | 38.42 | -26.49 | 41.12 | 23.79 | 54.00 | 15.58 | V |
| 17919.700 | 38.44 | -26.18 | 41.24 | 23.38 | 54.00 | 15.56 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5451.400 | 39.90 | -25.38 | 34.55 | 30.72 | 54.00 | 14.10 | V |
| 5456.000 | 39.91 | -25.35 | 34.56 | 30.70 | 54.00 | 14.09 | V |
| 11590.300 | 33.64 | -32.23 | 38.31 | 27.56 | 54.00 | 20.36 | V |
| 16002.400 | 38.22 | -27.77 | 40.70 | 25.29 | 54.00 | 15.78 | V |
| 17765.700 | 38.25 | -26.50 | 41.11 | 23.64 | 54.00 | 15.75 | V |
| 17915.300 | 38.42 | -26.19 | 41.23 | 23.38 | 54.00 | 15.58 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5449.400 | 39.84 | -25.39 | 34.55 | 30.68 | 54.00 | 14.16 | V |
| 5458.000 | 39.96 | -25.34 | 34.56 | 30.74 | 54.00 | 14.04 | V |
| 11550.150 | 33.24 | -32.36 | 38.26 | 27.34 | 54.00 | 20.76 | V |
| 16028.250 | 37.28 | -27.86 | 40.73 | 24.41 | 54.00 | 16.72 | H |
| 17856.450 | 38.93 | -26.33 | 41.19 | 24.08 | 54.00 | 15.07 | V |
| 17955.450 | 39.10 | -26.10 | 41.26 | 23.94 | 54.00 | 14.90 | V |

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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.742 | 55.48 | -24.77 | 34.76 | 45.50 | 68.75 | 13.27 | V |
| 5650.857 | 55.44 | -24.77 | 34.76 | 45.46 | 68.83 | 13.39 | H |
| 11490.200 | 46.01 | -32.54 | 38.19 | 40.36 | 74.00 | 27.99 | V |
| 17234.950 | 49.48 | -26.91 | 41.32 | 35.07 | 68.30 | 18.82 | H |
| 17319.650 | 52.17 | -26.86 | 41.19 | 37.84 | 68.30 | 16.13 | V |
| 17644.700 | 51.70 | -26.65 | 41.02 | 37.34 | 68.30 | 16.60 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5743.400 | 57.22 | -24.78 | 34.85 | 47.15 | 68.30 | 11.08 | V |
| 5825.400 | 57.28 | -24.94 | 34.93 | 47.29 | 68.30 | 11.02 | V |
| 11569.950 | 45.04 | -32.30 | 38.29 | 39.05 | 74.00 | 28.96 | V |
| 17354.850 | 50.59 | -26.84 | 41.13 | 36.29 | 68.30 | 17.71 | H |
| 17621.600 | 51.11 | -26.67 | 41.00 | 36.78 | 68.30 | 17.19 | H |
| 17687.600 | 51.07 | -26.60 | 41.05 | 36.62 | 68.30 | 17.23 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5924.396 | 51.68 | -25.21 | 35.03 | 41.86 | 68.65 | 16.97 | V |
| 5924.672 | 55.55 | -25.21 | 35.03 | 45.73 | 68.44 | 12.89 | V |
| 11650.250 | 45.30 | -32.11 | 38.38 | 39.02 | 74.00 | 28.70 | H |
| 17474.750 | 48.78 | -26.75 | 40.94 | 34.59 | 68.30 | 19.52 | V |
| 17579.250 | 49.93 | -26.70 | 40.96 | 35.66 | 68.30 | 18.37 | V |
| 17652.400 | 51.46 | -26.64 | 41.02 | 37.08 | 68.30 | 16.84 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.305 | 54.71 | -24.77 | 34.75 | 44.73 | 68.43 | 13.71 | H |
| 5650.575 | 54.70 | -24.77 | 34.76 | 44.72 | 68.63 | 13.92 | H |
| 11490.000 | 46.22 | -32.54 | 38.19 | 40.57 | 68.30 | 22.08 | V |
| 17235.000 | 51.14 | -26.91 | 41.32 | 36.73 | 68.30 | 17.16 | H |
| 17320.250 | 51.83 | -26.86 | 41.18 | 37.51 | 68.30 | 16.47 | H |
| 17645.800 | 52.04 | -26.65 | 41.02 | 37.67 | 68.30 | 16.26 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5742.600 | 58.23 | -24.78 | 34.85 | 48.17 | 68.30 | 10.07 | V |
| 5826.600 | 58.79 | -24.95 | 34.93 | 48.81 | 68.30 | 9.51 | V |
| 11569.900 | 46.32 | -32.30 | 38.29 | 40.33 | 68.30 | 21.98 | V |
| 17354.850 | 51.37 | -26.84 | 41.13 | 37.08 | 68.30 | 16.93 | V |
| 17620.500 | 51.45 | -26.68 | 41.00 | 37.13 | 68.30 | 16.85 | H |
| 17685.540 | 52.34 | -26.60 | 41.05 | 37.89 | 68.30 | 15.96 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5924.373 | 56.65 | -25.21 | 35.03 | 46.83 | 68.66 | 12.02 | H |
| 5924.730 | 54.79 | -25.21 | 35.03 | 44.97 | 68.40 | 13.61 | V |
| 11650.250 | 45.40 | -32.11 | 38.38 | 39.12 | 68.30 | 22.90 | V |
| 17475.650 | 51.08 | -26.75 | 40.94 | 36.88 | 68.30 | 17.22 | H |
| 17579.550 | 51.62 | -26.70 | 40.96 | 37.35 | 68.30 | 16.68 | V |
| 17653.500 | 52.34 | -26.64 | 41.02 | 37.96 | 68.30 | 15.96 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.368 | 55.79 | -24.77 | 34.75 | 45.81 | 68.47 | 12.68 | H |
| 5650.886 | 54.92 | -24.77 | 34.76 | 44.94 | 68.86 | 13.93 | V |
| 11510.000 | 47.15 | -32.50 | 38.21 | 41.43 | 68.30 | 21.15 | H |
| 16461.650 | 51.86 | -27.62 | 41.16 | 38.31 | 68.30 | 16.44 | V |
| 16944.550 | 51.20 | -27.13 | 41.65 | 36.69 | 68.30 | 17.10 | V |
| 17265.200 | 50.94 | -26.90 | 41.27 | 36.56 | 68.30 | 17.36 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5924.483 | 55.03 | -25.21 | 35.03 | 45.21 | 68.58 | 13.55 | V |
| 5924.730 | 55.12 | -25.21 | 35.03 | 45.30 | 68.40 | 13.28 | V |
| 11589.750 | 47.38 | -32.23 | 38.31 | 41.30 | 68.30 | 20.92 | V |
| 16539.700 | 51.78 | -27.61 | 41.24 | 38.14 | 68.30 | 16.52 | H |
| 16836.200 | 51.09 | -27.26 | 41.54 | 36.81 | 68.30 | 17.21 | V |
| 17385.100 | 51.44 | -26.81 | 41.08 | 37.17 | 68.30 | 16.86 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.494 | 54.64 | -24.77 | 34.76 | 44.66 | 68.57 | 13.92 | V |
| 5651.001 | 54.63 | -24.77 | 34.76 | 44.64 | 68.94 | 14.31 | H |
| 11490.200 | 47.25 | -32.54 | 38.19 | 41.60 | 68.30 | 21.05 | H |
| 16623.350 | 51.38 | -27.58 | 41.32 | 37.63 | 68.30 | 16.92 | H |
| 17234.950 | 51.44 | -26.91 | 41.32 | 37.02 | 68.30 | 16.86 | V |
| 17387.850 | 51.63 | -26.81 | 41.08 | 37.36 | 68.30 | 16.67 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5743.800 | 57.83 | -24.78 | 34.85 | 47.77 | 68.30 | 10.47 | H |
| 5825.800 | 58.84 | -24.95 | 34.93 | 48.86 | 68.30 | 9.45 | H |
| 11569.950 | 47.41 | -32.30 | 38.29 | 41.42 | 68.30 | 20.89 | V |
| 16741.600 | 51.25 | -27.38 | 41.44 | 37.19 | 68.30 | 17.05 | H |
| 17354.850 | 51.84 | -26.84 | 41.13 | 37.55 | 68.30 | 16.46 | V |
| 17666.150 | 51.48 | -26.63 | 41.03 | 37.07 | 68.30 | 16.82 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5923.735 | 55.37 | -25.21 | 35.03 | 45.55 | 69.14 | 13.77 | V |
| 5924.247 | 55.45 | -25.21 | 35.03 | 45.63 | 68.76 | 13.31 | V |
| 11650.250 | 47.13 | -32.11 | 38.38 | 40.85 | 68.30 | 21.17 | H |
| 16499.050 | 51.63 | -27.61 | 41.20 | 38.04 | 68.30 | 16.67 | V |
| 16940.700 | 51.28 | -27.14 | 41.64 | 36.78 | 68.30 | 17.02 | V |
| 17474.750 | 51.76 | -26.75 | 40.94 | 37.57 | 68.30 | 16.54 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.638 | 54.89 | -24.77 | 34.76 | 44.91 | 68.67 | 13.78 | V |
| 5651.041 | 54.38 | -24.77 | 34.76 | 44.39 | 68.97 | 14.59 | H |
| 11550.150 | 47.66 | -32.36 | 38.26 | 41.76 | 68.30 | 20.64 | H |
| 16502.350 | 51.84 | -27.61 | 41.20 | 38.25 | 68.30 | 16.46 | V |
| 17049.600 | 51.42 | -27.02 | 41.62 | 36.82 | 68.30 | 16.88 | H |
| 17325.150 | 51.97 | -26.86 | 41.18 | 37.65 | 68.30 | 16.33 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5924.632 | 54.36 | -25.21 | 35.03 | 44.54 | 68.58 | 14.23 | V |
| 5924.902 | 54.39 | -25.21 | 35.03 | 44.57 | 68.40 | 14.01 | H |
| 11589.750 | 48.72 | -32.23 | 38.31 | 42.63 | 68.30 | 19.58 | H |
| 16483.100 | 51.25 | -27.62 | 41.18 | 37.68 | 68.30 | 17.05 | V |
| 17011.650 | 51.64 | -27.06 | 41.68 | 37.02 | 68.30 | 16.66 | V |
| 17385.100 | 52.23 | -26.81 | 41.08 | 37.96 | 68.30 | 16.07 | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|----------------|-------------|--------------------|
| 5650.581 | 57.16 | -24.77 | 34.76 | 47.18 | 68.63 | 11.47 | V |
| 5650.886 | 56.92 | -24.77 | 34.76 | 46.93 | 68.86 | 11.94 | H |
| 11550.150 | 45.99 | -32.36 | 38.26 | 40.09 | 74.00 | 28.01 | H |
| 17325.150 | 49.83 | -26.86 | 41.18 | 35.52 | 68.30 | 18.47 | H |
| 17507.750 | 51.71 | -26.73 | 40.91 | 37.54 | 68.30 | 16.59 | V |
| 17637.550 | 52.06 | -26.66 | 41.01 | 37.72 | 68.30 | 16.24 | H |

Note:

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

A.6. Band Edges Compliance

A6.1 Band Edges - Radiated

Measurement Limit:

| 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. | |

Set up:

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m and the table height shall be 1.5 m.

The EUT and transmitting antenna shall be centered on the turntable.

Test Procedure

The EUT was placed on a non-conductive table. 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 360° and the measurement antenna is moved from 1m to 4m to get the maximization result. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The receiver references:

| Frequency of emission (MHz) | RBW/VBW | Sweep Time(s) |
|-----------------------------|---------------|---------------|
| 30-1000 | 100kHz/300kHz | 5 |
| 1000-4000 | 1MHz/3MHz | 15 |
| 4000-18000 | 1MHz/3MHz | 40 |
| 18000-26500 | 1MHz/3MHz | 20 |

Sample Calculations

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

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

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

Measurement Result:

| 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:

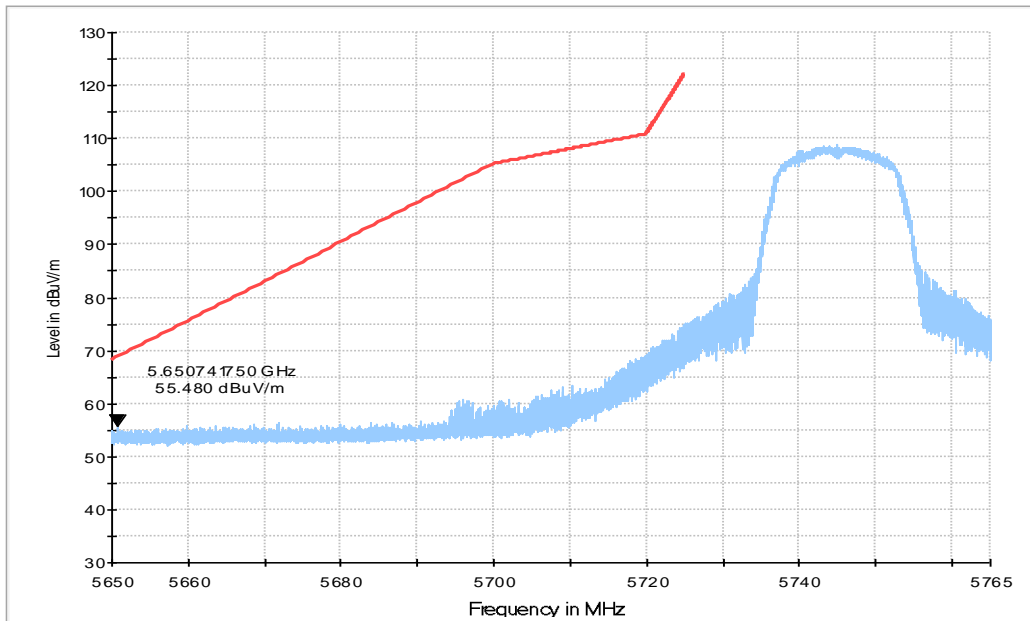


Fig. 10 Band Edges (802.11a Ch149,5745MHz)

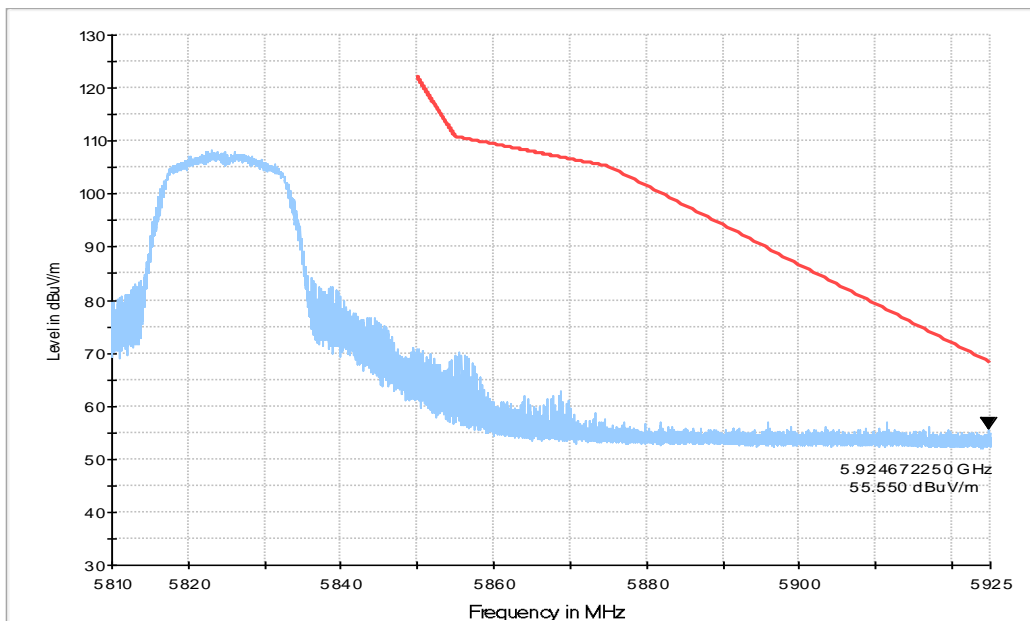


Fig. 11 Band Edges (802.11a Ch165, 5825MHz)

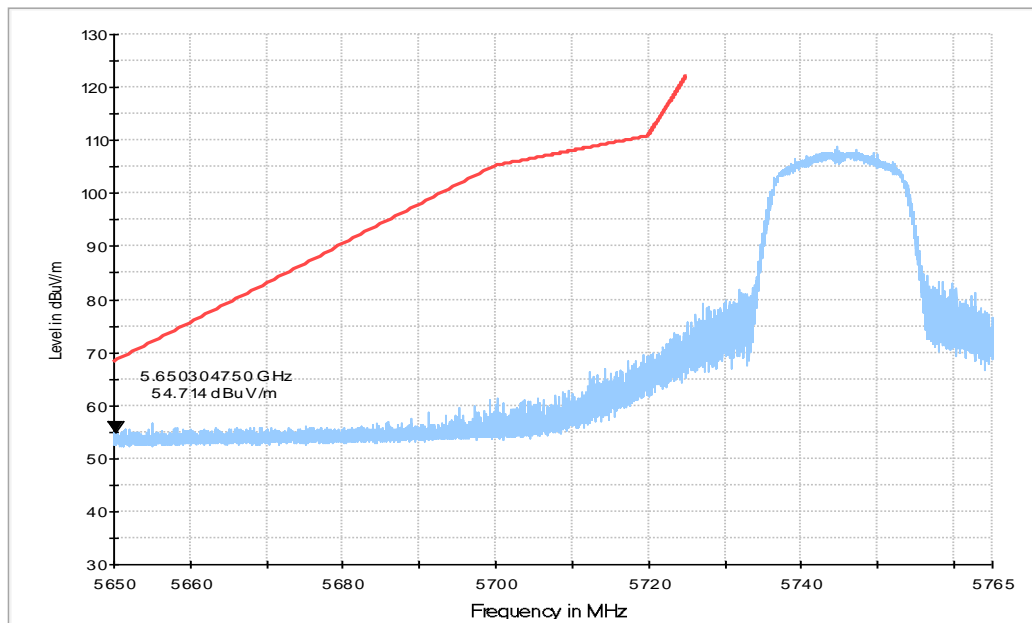


Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)

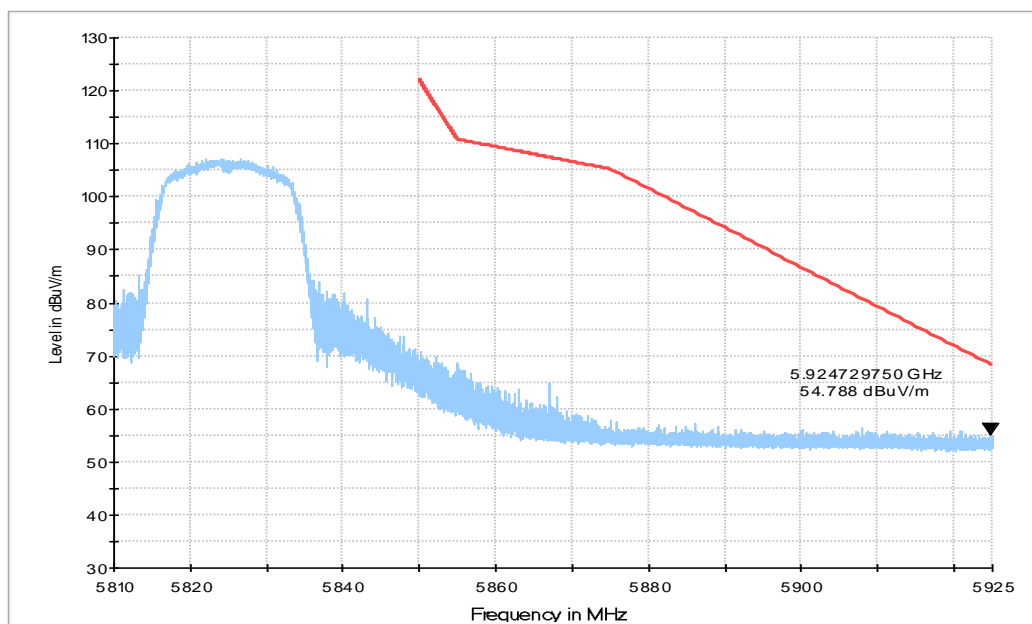


Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)

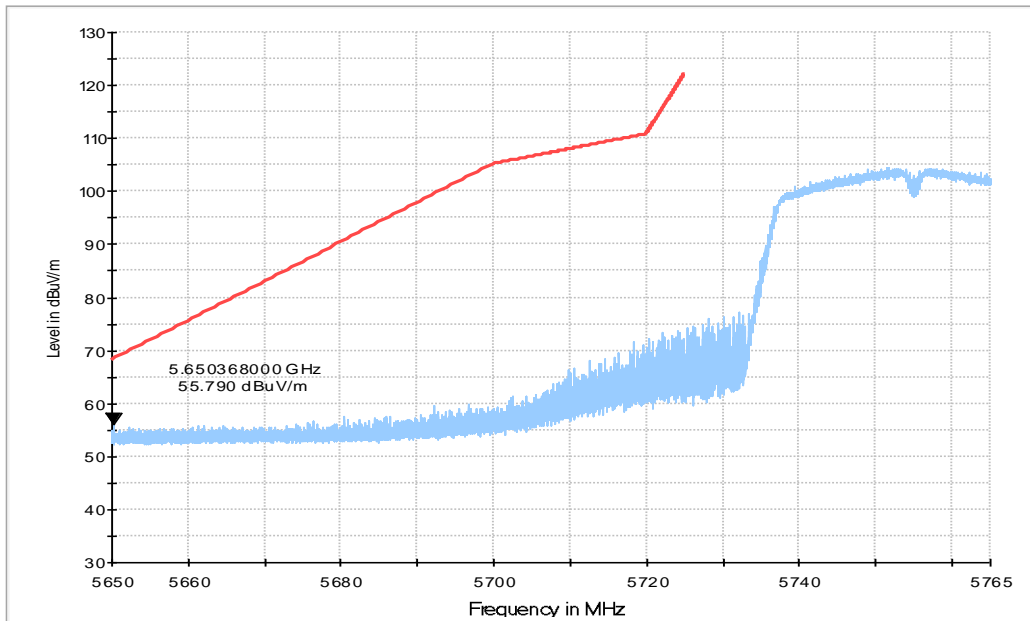


Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)

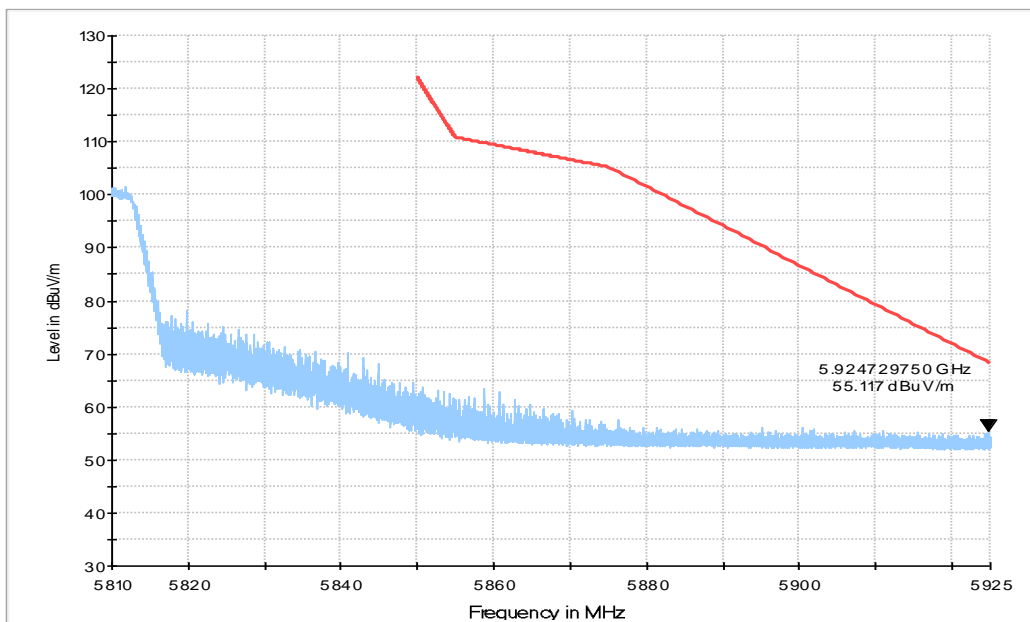


Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)

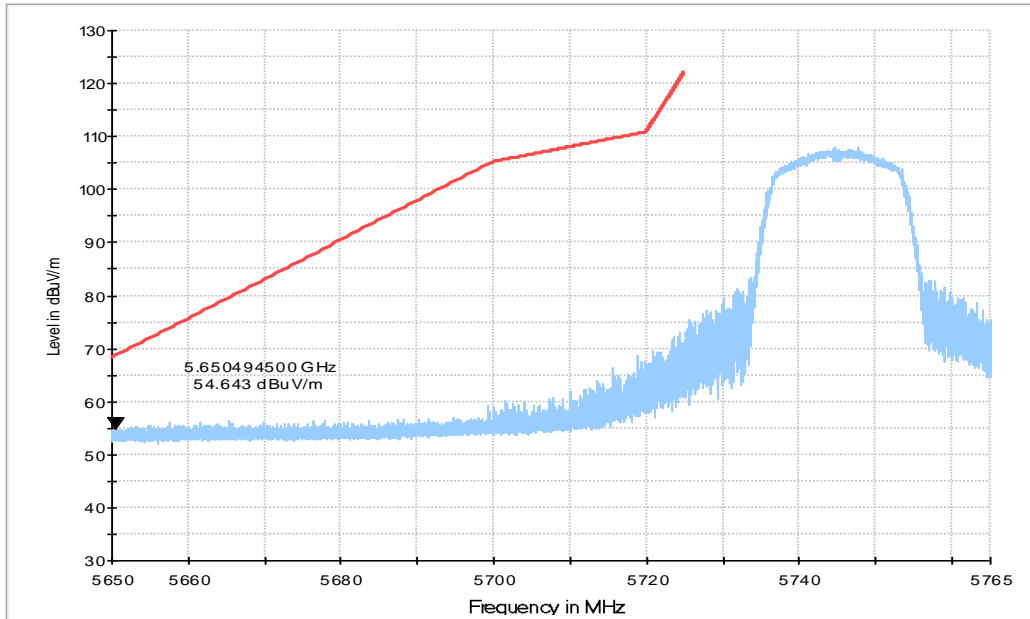


Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

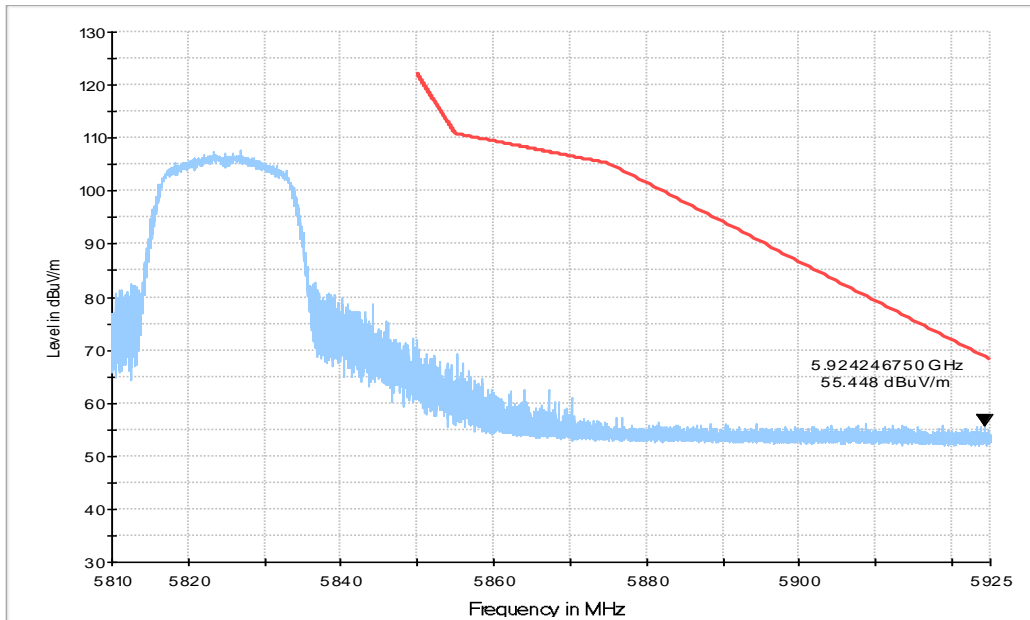


Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

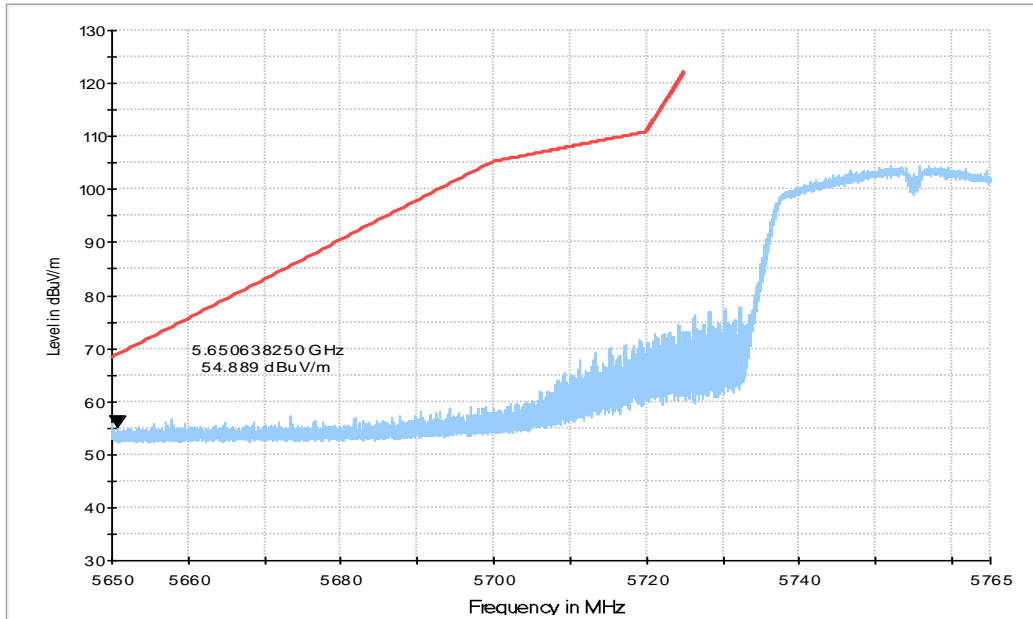


Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

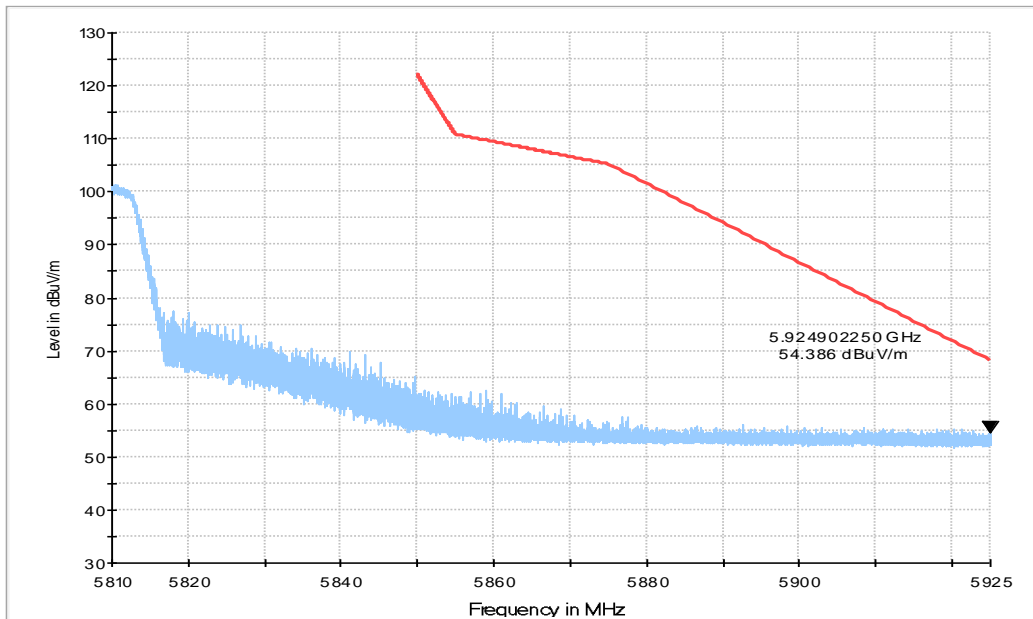


Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

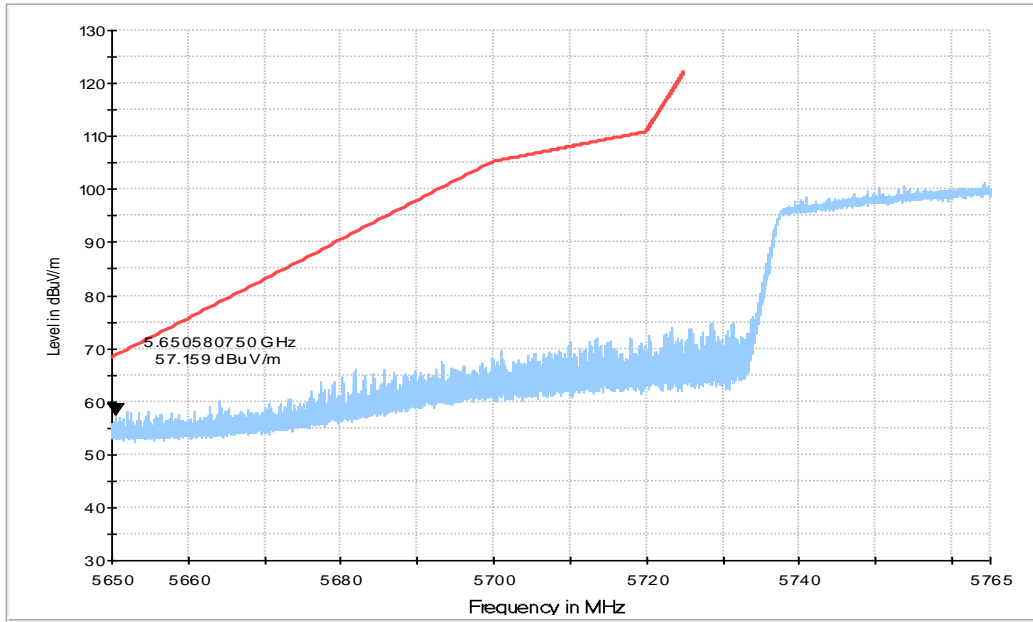


Fig. 20 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

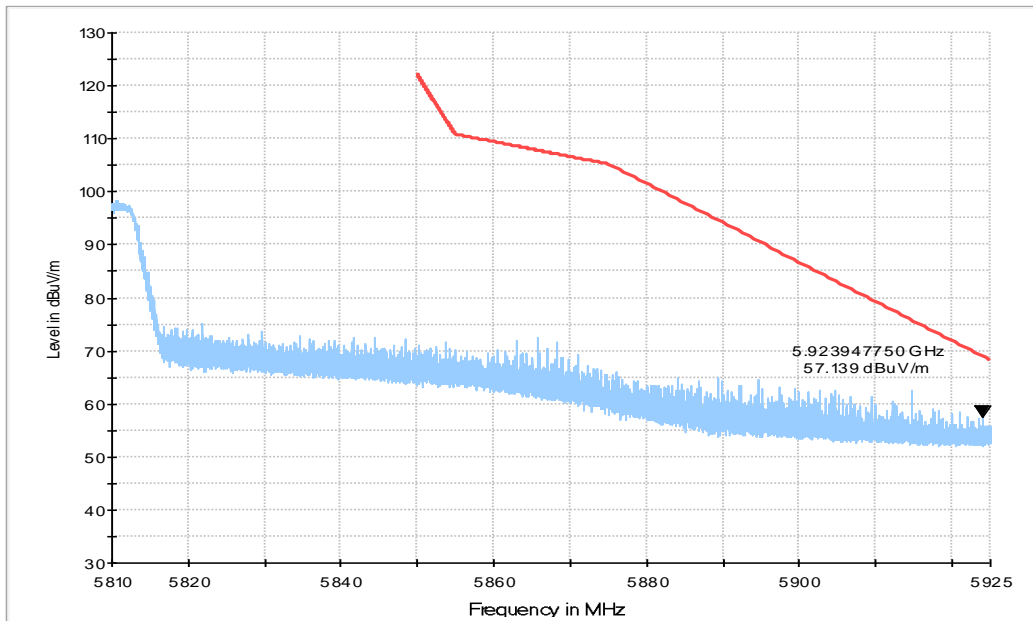


Fig. 21 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

A.7. AC Powerline Conducted Emission

Method of Measurement:

See Clause 6.2 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 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.

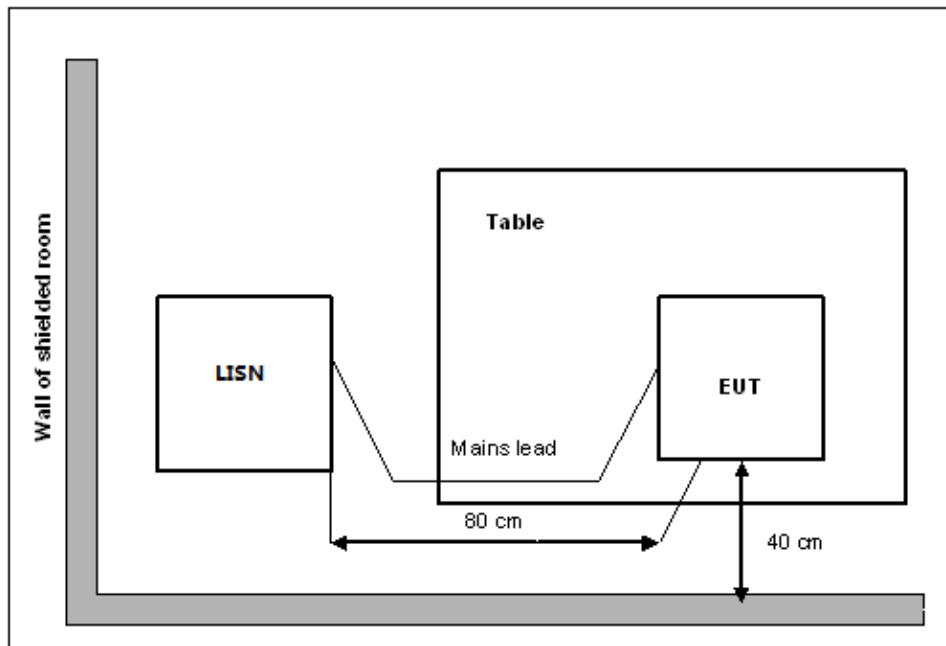
The measurement bandwidth is:

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

Test Condition:

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

Measurement Setup



Measurement Result and limit:

WLAN (Quasi-peak Limit)

| Frequency range (MHz) | Quasi-peak Limit (dB μ V) | Result (dB μ V) | | Conclusion |
|-----------------------|-------------------------------|---------------------|--------|------------|
| | | With charger | | |
| | | 802.11a | Idle | |
| 0.15 to 0.5 | 66 to 56 | Fig.22 | Fig.23 | 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.

WLAN (Average Limit)

| Frequency range (MHz) | Average Limit (dB μ V) | Result (dB μ V) | | Conclusion |
|-----------------------|----------------------------|---------------------|--------|------------|
| | | With charger | | |
| | | 802.11a | Idle | |
| 0.15 to 0.5 | 56 to 46 | Fig.22 | Fig.23 | 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.

The measurement is made according to ANSI C63.10 .

Conclusion: PASS
Test graphs as below:

Traffic:

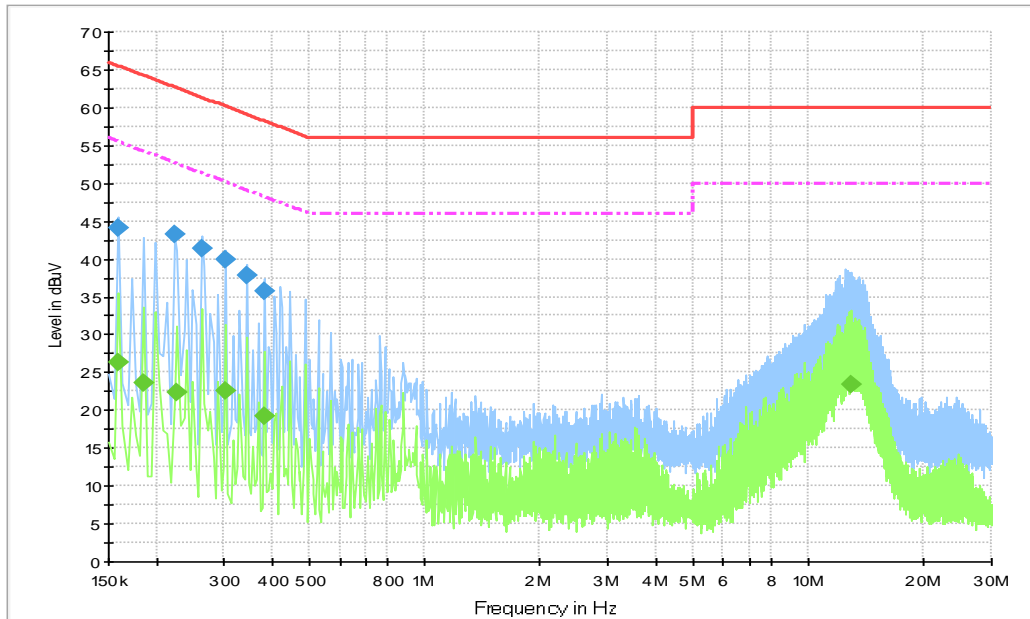


Fig. 22 AC Power line Conducted Emission-802.11a

Note1: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|------------|-----------------|--------|------|------------|-------------|--------------|
| 0.159000 | 44.1 | 3000 | 9.000 | On | N | 19.9 | 21.4 | 65.5 |
| 0.222000 | 43.2 | 3000 | 9.000 | On | N | 19.8 | 19.5 | 62.7 |
| 0.262500 | 41.3 | 3000 | 9.000 | On | L1 | 19.5 | 20.0 | 61.4 |
| 0.303000 | 39.9 | 3000 | 9.000 | On | N | 19.8 | 20.3 | 60.2 |
| 0.343500 | 37.9 | 3000 | 9.000 | On | N | 19.8 | 21.2 | 59.1 |
| 0.384000 | 35.7 | 3000 | 9.000 | On | N | 19.8 | 22.5 | 58.2 |

Final Result 2

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|------------|-----------------|--------|------|------------|-------------|--------------|
| 0.159000 | 26.3 | 3000 | 9.000 | On | L1 | 19.5 | 29.2 | 55.5 |
| 0.186000 | 23.6 | 3000 | 9.000 | On | L1 | 19.5 | 30.6 | 54.2 |
| 0.226500 | 22.4 | 3000 | 9.000 | On | N | 19.8 | 30.2 | 52.6 |
| 0.303000 | 22.5 | 3000 | 9.000 | On | N | 19.8 | 27.7 | 50.2 |
| 0.384000 | 19.3 | 3000 | 9.000 | On | N | 19.8 | 28.9 | 48.2 |
| 12.87600 | 23.3 | 3000 | 9.000 | On | N | 19.8 | 26.7 | 50.0 |

Idle:

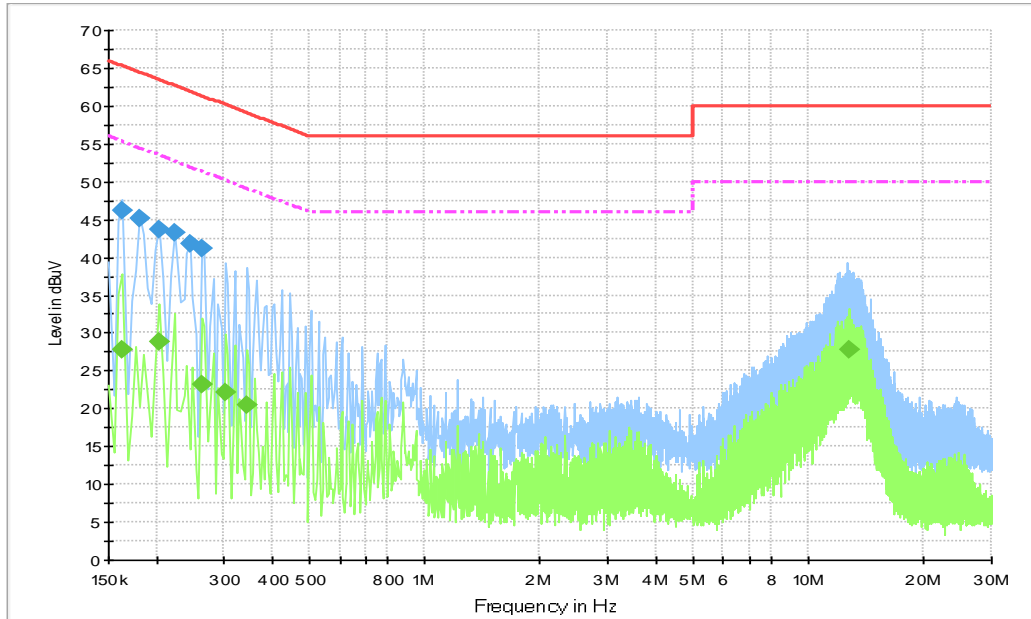


Fig. 23 AC Power line Conducted Emission-Idle

Note1: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|------------|-----------------|--------|------|------------|-------------|--------------|
| 0.163500 | 46.2 | 3000 | 9.000 | On | L1 | 19.5 | 19.1 | 65.3 |
| 0.181500 | 45.2 | 3000 | 9.000 | On | N | 19.8 | 19.2 | 64.4 |
| 0.204000 | 43.6 | 3000 | 9.000 | On | L1 | 19.5 | 19.8 | 63.4 |
| 0.222000 | 43.2 | 3000 | 9.000 | On | L1 | 19.5 | 19.6 | 62.7 |
| 0.244500 | 41.7 | 3000 | 9.000 | On | L1 | 19.5 | 20.2 | 61.9 |
| 0.262500 | 41.2 | 3000 | 9.000 | On | N | 19.8 | 20.1 | 61.4 |

Final Result 2

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|
| 0.163500 | 27.8 | 3000.0 | 9.000 | On | L1 | 19.5 | 27.5 | 55.3 |
| 0.204000 | 28.9 | 3000.0 | 9.000 | On | N | 19.7 | 24.5 | 53.4 |
| 0.262500 | 23.2 | 3000.0 | 9.000 | On | N | 19.8 | 28.2 | 51.4 |
| 0.303000 | 22.1 | 3000.0 | 9.000 | On | N | 19.8 | 28.1 | 50.2 |
| 0.343500 | 20.5 | 3000.0 | 9.000 | On | N | 19.8 | 28.6 | 49.1 |
| 12.786000 | 27.8 | 3000.0 | 9.000 | On | L1 | 19.8 | 22.2 | 50.0 |

Note: The measurement results showed here are worst cases of the combination of different AE.

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

**United States Department of Commerce
National Institute of Standards and Technology**

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2021-09-29 through 2022-09-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program

*** END OF REPORT BODY ***