# FCC PART 15C
# TEST REPORT
## No.I20Z70377-IOT05

**for**

**Samsung Electronics Co., Ltd.**

**Smart Phone**

**SM-A025U**

**FCC ID : ZCASMA025U**

**with**

**Hardware Version: REV1.0**

**Software Version: A025U.001**

**Issued Date: 2021-01-28**

**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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|---|---|---|---|
| No.I20Z70377-IOT05 | Rev.0 | 1st edition | 2021-01-28 |

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# 1. TEST LATORATORY

## 1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 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 (CN0066). 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, P. R. China 100176

## 1.3. TestingEnvironment

| | |
|---|---|
| Normal Temperature: | 15-35℃ |
| Extreme Temperature: | -20/+55℃ |
| Relative Humidity: | 20-75% |

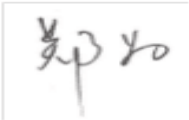
## 1.4. Project date

| | |
|---|---|
| Testing Start Date: | 2020-11-23 |
| Testing End Date: | 2021-01-28 |

## 1.5. Signature

**Feng Aiyu**

**( Prepared this test report )**



**Zheng Wei**

**(Reviewed this test report)**

**Hu Xiaoyu**

**(Approved this test report)**

# 2. CLIENT INFORMATION

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | Samsung Electronics Co., Ltd. |
| Address: | 19 Chapin Rd.,Building D Pine Brook, NJ 07058 |
| City: | / |
| Postal Code: | / |
| Country: | / |
| Contact: | Jenni Chun |
| Telephone | +1-201-937-4203 |
| E-mail: | j1.chun@samsung.com |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | Samsung Electronics Co., Ltd. |
| Address: | Samsung R5, Maetan dong 129, Samsung ro Youngtong gu, Suwon city 443 742, Korea |
| City: | Hong Kong |
| Postal Code: | / |
| Country: | Korea |
| Contact: | Sunghoon Cho |
| Telephone | +82-10-2722-4159 |
| E-mail: | ggobi.cho@samsung.com |

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

## 3.1. About EUT

| | |
|---|---|
| Description | Smart Phone |
| Model name | SM-A025U |
| FCC ID | ZCASMA025U |
| WLAN Frequency Range | ISM Band: 5725MHz~5850MHz |
| Type of modulation | OFDM |
| Voltage | 3.85 V |

Note: Photographs of EUT are shown in ANNEX C of this test report. Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

## 3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version |
|---|---|---|---|
| UT12a | 2070377UT012a | REV1.0 | A025U.001 |
| UT08a | 2070377UT08a | REV1.0 | A025U.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 | SN | Remarks |
|---|---|---|---|
| AE1 | Charger1 | / | / |
| AE2 | Charger2 | / | / |
| AE3 | Charger3 | / | / |
| AE4 | Charger4 | / | / |
| AE5 | Charger5 | / | / |
| AE6 | USB cable | / | / |
| AE7 | Headset1 | / | / |
| AE8 | Headset2 | / | / |
| AE9 | battery | / | / |

AE1

| | |
|---|---|
| Model | EP-TA50JWE |
| Manufacturer | HAEM Co.,Ltd |
| Length of cable | / |

AE2

| | |
|---|---|
| Model | EP-TA50JWE |
| Manufacturer | RFTech Electronics(HuiZhou)Co.,LTD |
| Length of cable | / |

AE3

| | |
|---|---|
| Model | EP-TA200 |
| Manufacturer | HAEM Co.,Ltd |

| | |
|---|---|
| Length of cable | / |
| AE4 | |
| Model | EP-TA200 |
| Manufacturer | RFTech Electronics(HuiZhou)Co.,LTD |
| Length of cable | / |
| AE5 | |
| Model | EP-TA200 |
| Manufacturer | SoluM Co.,Ltd |
| Length of cable | / |
| AE6 | |
| Model | EP-DR140AWE |
| Manufacturer | Samsung Electronics Co., Ltd. |
| Length of cable | / |
| AE7 | |
| Model | EHS61ASFWE |
| Manufacturer | DONGGUAN YOUNGBO ELECTRONICS CO.,LTD |
| Length of cable | / |
| AE8 | |
| Model | EHS61ASFWE |
| Manufacturer | WATA ELECTRONICS CO.,LTD |
| Length of cable | / |
| AE9 | |
| Type | HQ-50S |
| Manufacturer | SUCD(FUJIAN) Electronics Co.,Ltd |
| Length of cable | / |

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

## 3.4. General Description

The Equipment under Test (EUT) is a model of smart phone with Bluetooth, WLAN with integrated antenna and inbuilt battery..

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:<br>15.205 Restricted bands of operation;<br>15.209 Radiated emission limits, general requirements;<br>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 |
| KDB 558074 D01 | Federal Communications Commission Office of Engineering and Technology Laboratory Division<br>GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES | 2019 |

# 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℃ |
| Voltage | 3.85 V |
| 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 | 2021-05-15 |
| 2 | LISN | ENV216 | 101200 | Rohde & Schwarz | 1 year | 2021-08-03 |
| 3 | Test Receiver | ESCI | 100344 | Rohde & Schwarz | 1 year | 2021-03-15 |
| 4 | Shielding Room | S81 | / | ETS-Lindgren | / | / |
| 5 | Attenuator | K40 | / | Rosenberger | / | / |

## Radiated emission test system

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Period | Calibration Due date |
|---|---|---|---|---|---|---|
| 1 | Test Receiver | ESU26 | 100376 | Rohde & Schwarz | 1 year | 2021-09-04 |
| 2 | BiLog Antenna | VULB9163 | 9163-514 | Schwarzbeck | 1 year | 2021-02-24 |
| 3 | Dual-Ridge Waveguide Horn Antenna | 3117 | 00058888 | ETS-Lindgren | 1 year | 2021-04-08 |
| 4 | Dual-Ridge Waveguide Horn Antenna | 3116 | 2663 | ETS-Lindgren | 1 year | 2021-08-05 |
| 5 | Vector Signal Analyzer | FSV40 | 101047 | Rohde & Schwarz | 1 year | 2021-05-18 |

# 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. 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) |
|---|---|
| 30MHz ≤ f ≤ 2GHz | 1.22 |
| 2GHz ≤ f ≤3.6GHz | 1.22 |
| 3.6GHz ≤ f ≤8GHz | 1.22 |
| 8GHz ≤ f ≤12.75GHz | 1.51 |
| 12.75GHz ≤ f ≤26GHz | 1.51 |
| 26GHz ≤ f ≤40GHz | 1.59 |

**Radiated (k=2)**

| Frequency Range | Uncertainty(dB) |
|---|---|
| 9kHz-30MHz | / |
| 30MHz ≤ f ≤ 1GHz | 5.40 |
| 1GHz ≤ f ≤18GHz | 4.32 |
| 18GHz ≤ f ≤40GHz | 5.26 |

## 8.6. AC Power-line Conducted Emission

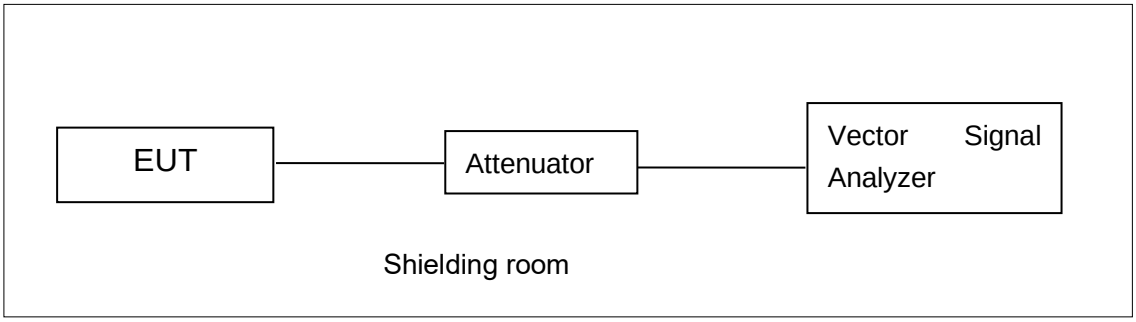
Measurement Uncertainty : 3.10dB,k=2

# ANNEX A: MEASUREMENT RESULTS

## A.1. Measurement Method

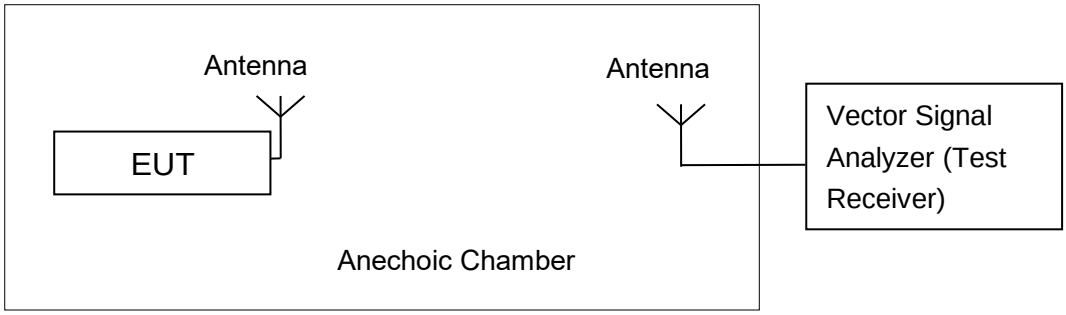
### A.1.1. Conducted Measurements

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.2.2. Maximum Average Output Power-Conducted**

**Method of Measurement: See ANSI C63.10-clause 12.3.2.2 Method SA-1**

**802.11a mode**

| Mode | Data Rate (Mbps) | Test Result (dBm) | | |
|---|---|---|---|---|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz(Ch165) |
| 802.11a | 6 | 11.67 | 11.85 | 11.75 |
| | 9 | 11.12 | / | / |
| | 12 | 11.09 | / | / |
| | 18 | 11.07 | / | / |
| | 24 | 10.55 | / | / |
| | 36 | 10.53 | / | / |
| | 48 | 9.96 | / | / |
| | 54 | 9.94 | / | / |

**802.11n-HT20 mode**

| Mode | Data Rate (Mbps) | Test Result (dBm) | | |
|---|---|---|---|---|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz(Ch165) |
| 802.11n(20MHz) | MCS0 | 11.20 | 11.37 | 11.25 |
| | MCS1 | 11.15 | / | / |
| | MCS2 | 10.67 | / | / |
| | MCS3 | 10.59 | / | / |
| | MCS4 | 10.56 | / | / |
| | MCS5 | 10.03 | / | / |
| | MCS6 | 10.01 | / | / |
| | MCS7 | 9.99 | / | / |

**802.11ac-HT20 mode**

| Mode | Data Rate (Mbps) | Test Result (dBm) | | |
|---|---|---|---|---|
| | | 5745MHz (Ch149) | 5785MHz (Ch157) | 5825MHz(Ch165) |
| 802.11ac(20MHz) | MCS0 | 11.80 | 12.12 | 11.92 |
| | MCS1 | 11.74 | / | / |
| | MCS2 | 11.25 | / | / |
| | MCS3 | 11.25 | / | / |
| | MCS4 | 11.36 | / | / |
| | MCS5 | 11.60 | / | / |
| | MCS6 | 11.52 | / | / |
| | MCS7 | 11.52 | / | / |

**802.11n-HT40 mode**

| Mode | Data Rate (Index) | Test Result (dBm) | |
|---|---|---|---|
| | | 5755MHz (Ch151) | 5795MHz (Ch159) |
| 802.11n(40MHz) | MCS0 | 12.03 | 12.11 |
| | MCS1 | 11.99 | / |
| | MCS2 | 11.97 | / |
| | MCS3 | 11.37 | / |
| | MCS4 | 11.32 | / |
| | MCS5 | 11.38 | / |
| | MCS6 | 10.74 | / |
| | MCS7 | 10.70 | / |

**802.11ac-HT40 mode**

| Mode | Data Rate (Index) | Test Result (dBm) | |
|---|---|---|---|
| | | 5755MHz (Ch151) | 5795MHz (Ch159) |
| 802.11ac(40MHz) | MCS0 | 11.97 | 12. 04 |
| | MCS1 | 12.20 | / |
| | MCS2 | 12.10 | / |
| | MCS3 | 12.04 | / |
| | MCS4 | 11.62 | / |
| | MCS5 | 11.72 | / |
| | MCS6 | 11.78 | / |
| | MCS7 | 11.95 | / |

**802.11ac-HT80 mode**

| Mode | Data Rate (Index) | Test Result (dBm) |
|---|---|---|
| | | 5775MHz (Ch155) |
| 802.11ac(80MHz) | MCS0 | 12.85 |
| | MCS1 | 12.83 |
| | MCS2 | 13.10 |
| | MCS3 | 12.59 |
| | MCS4 | 12.84 |
| | MCS5 | 12.27 |

| | | |
|---|---|---|
| | MCS6 | 12.31 |
| | MCS7 | 11.09 |
| | MCS8 | 11.15 |
| | MCS9 | 11.23 |

**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 | -2.98 | P |
| | 157 | -3.04 | P |
| | 165 | -3.14 | P |
| 802.11n HT20 | 149 | -3.74 | P |
| | 157 | -3.13 | P |
| | 165 | -3.94 | P |
| 802.11ac HT20 | 149 | -3.18 | P |
| | 157 | -3.31 | P |
| | 165 | -3.38 | P |
| 802.11n HT40 | 151 | -6.02 | P |
| | 159 | -6.17 | P |
| 802.11ac HT40 | 151 | -5.79 | P |
| | 159 | -5.99 | P |
| 802.11ac HT80 | 155 | -8.01 | 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 ( KHz) | | conclusion |
|---|---|---|---|---|
| 802.11a | 149 | Fig.1 | 16350.00 | P |
| | 157 | Fig.2 | 16350.00 | P |
| | 165 | Fig.3 | 16350.00 | P |
| 802.11n HT20 | 149 | Fig.4 | 17650.00 | P |
| | 157 | Fig.5 | 17600.00 | P |
| | 165 | Fig.6 | 17600.00 | P |
| 802.11ac HT20 | 149 | Fig.7 | 17550.00 | P |
| | 157 | Fig.8 | 17600.00 | P |
| | 165 | Fig.9 | 17550.00 | P |
| 802.11n HT40 | 151 | Fig.10 | 35680.00 | P |
| | 159 | Fig.11 | 35431.00 | P |
| 802.11ac HT40 | 151 | Fig.12 | 35360.00 | P |
| | 159 | Fig.13 | 35200.00 | P |
| 802.11ac HT80 | 155 | Fig.14 | 75200.00 | P |

**Conclusion: PASS**

**Test graphs as below:**

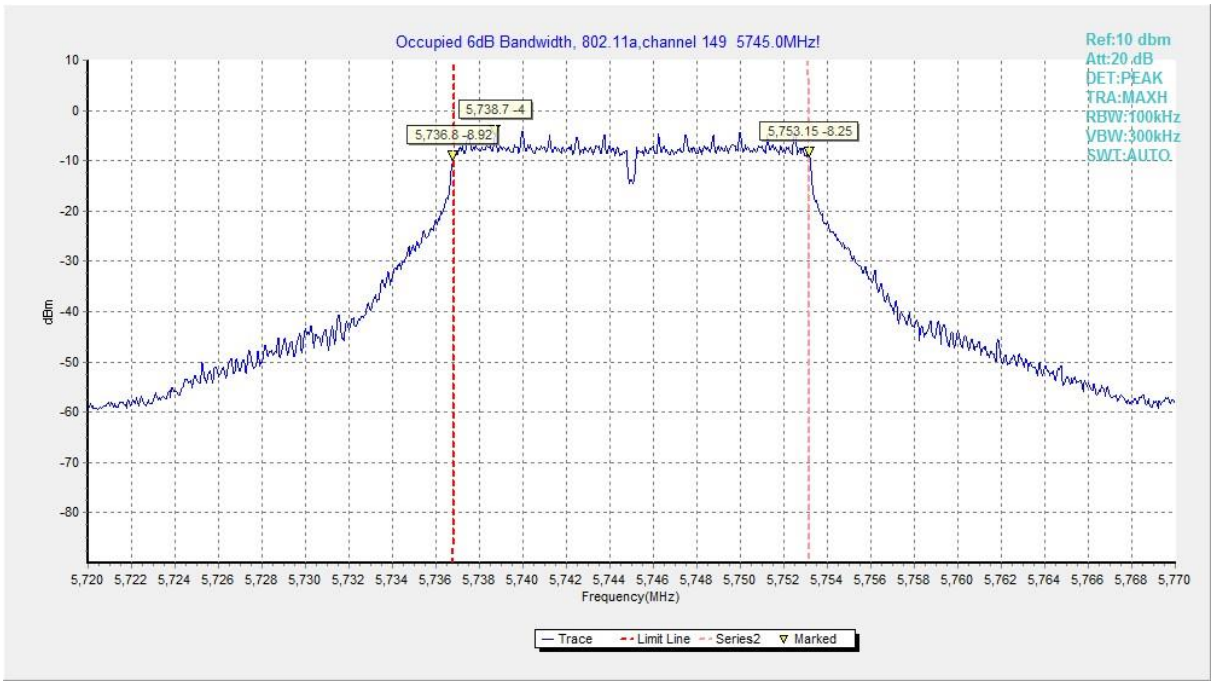



**Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)**

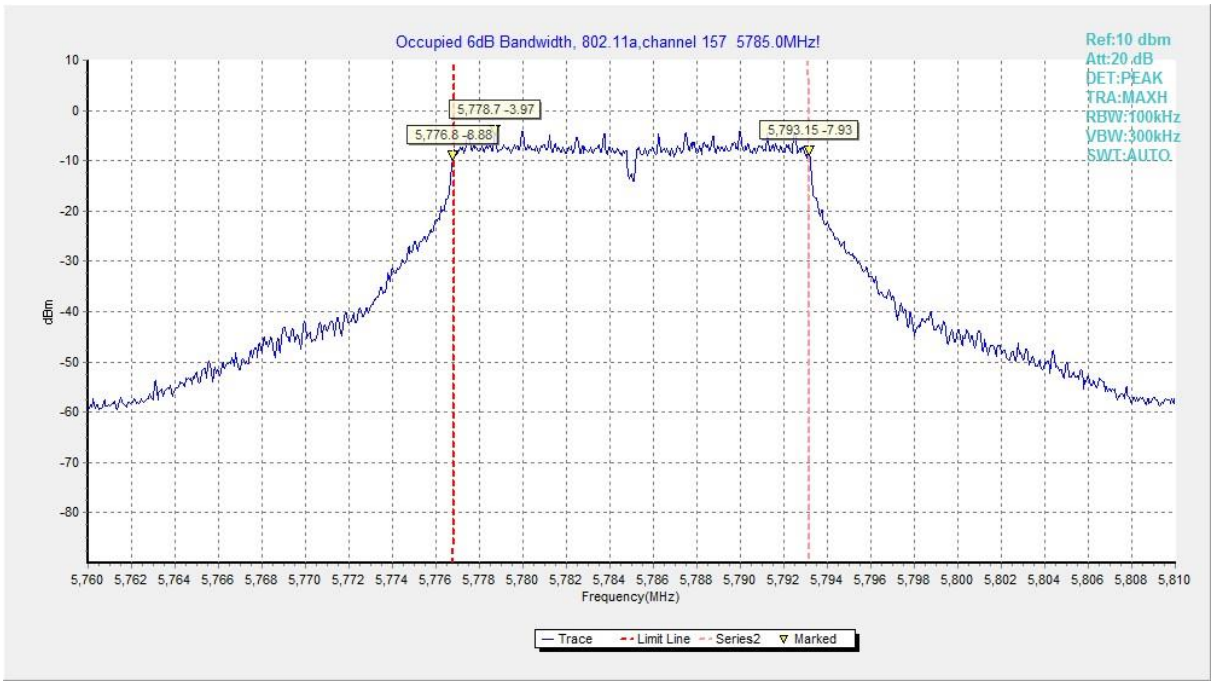



**Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)**

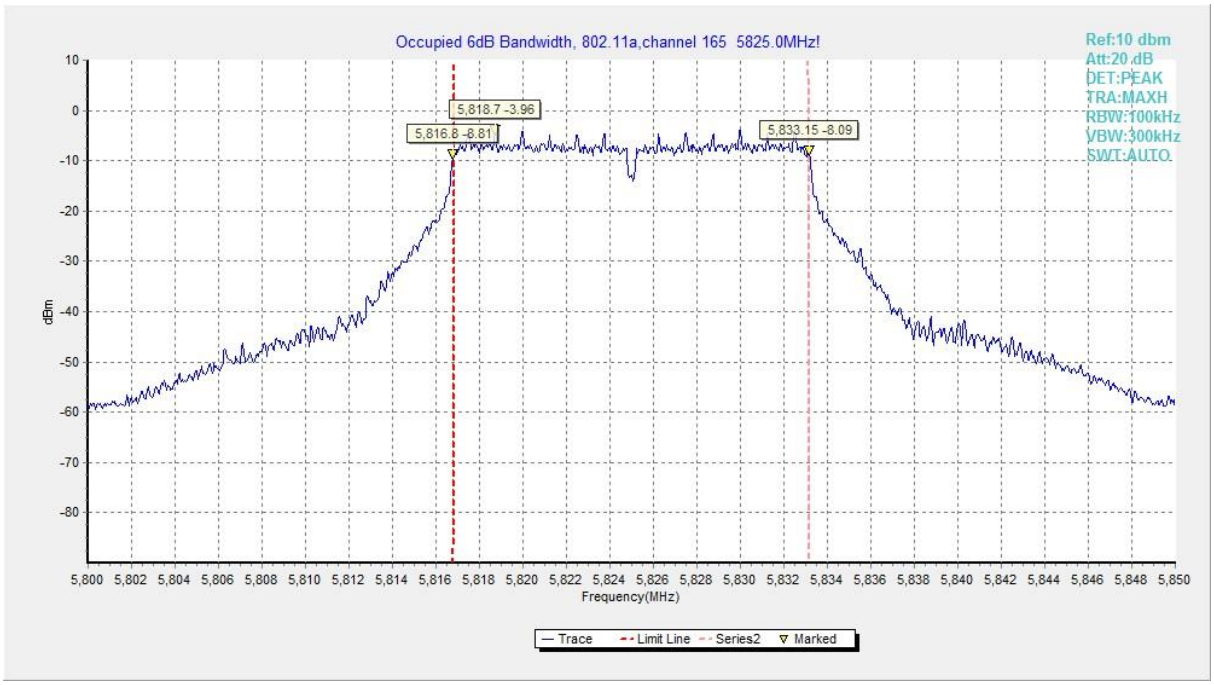



**Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)**

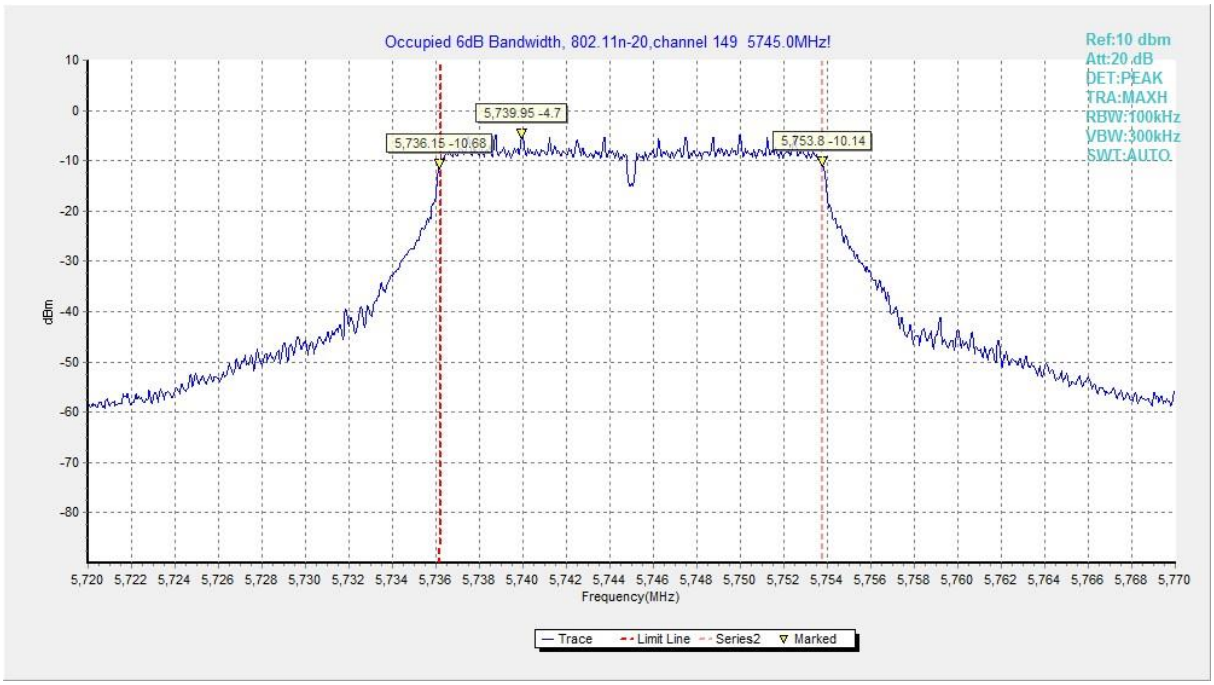



**Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)**

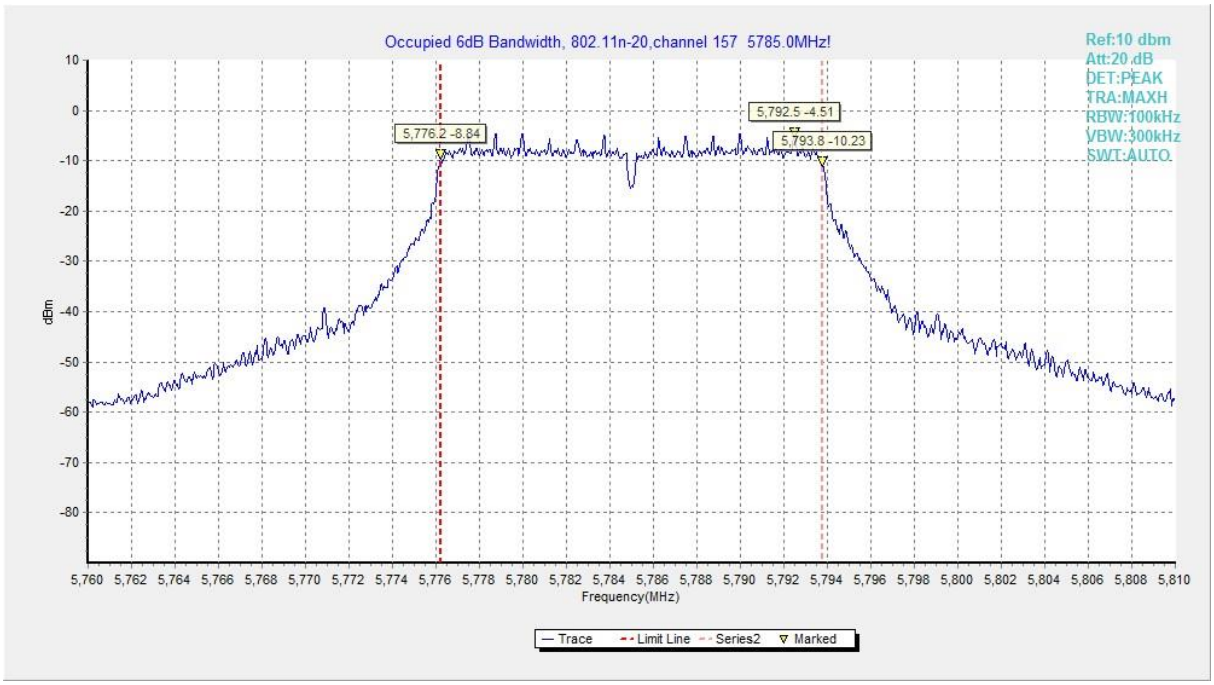



**Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)**

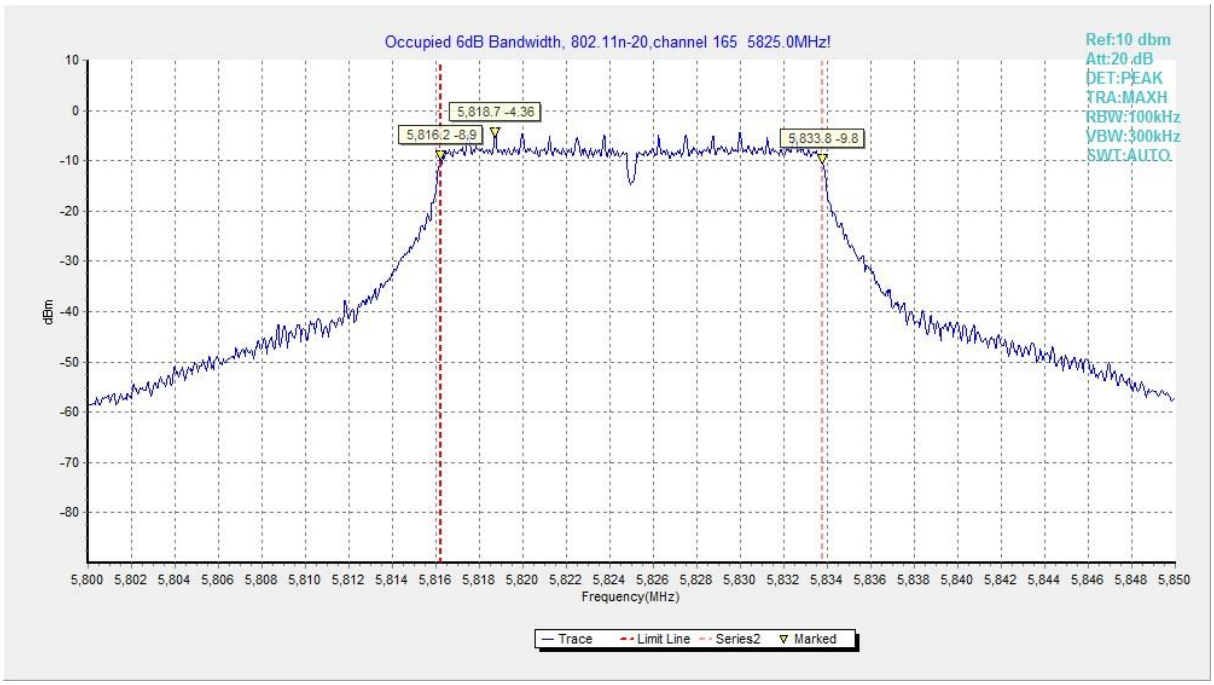



**Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)**

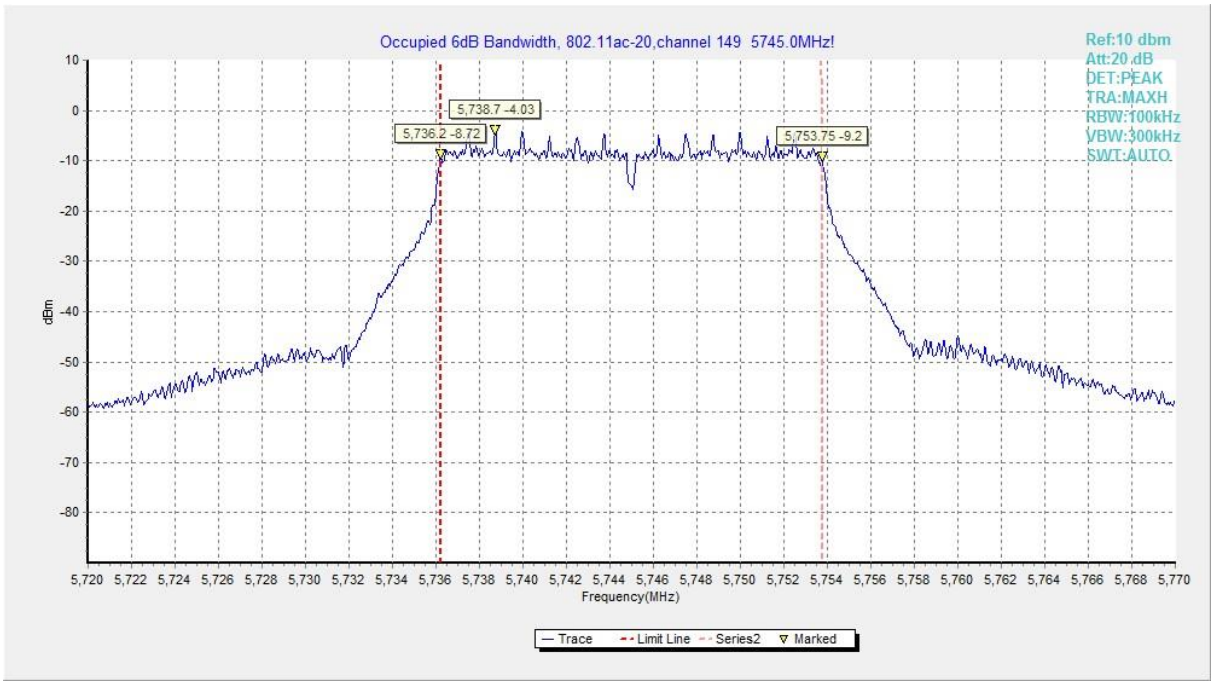



**Fig. 7 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 149)**

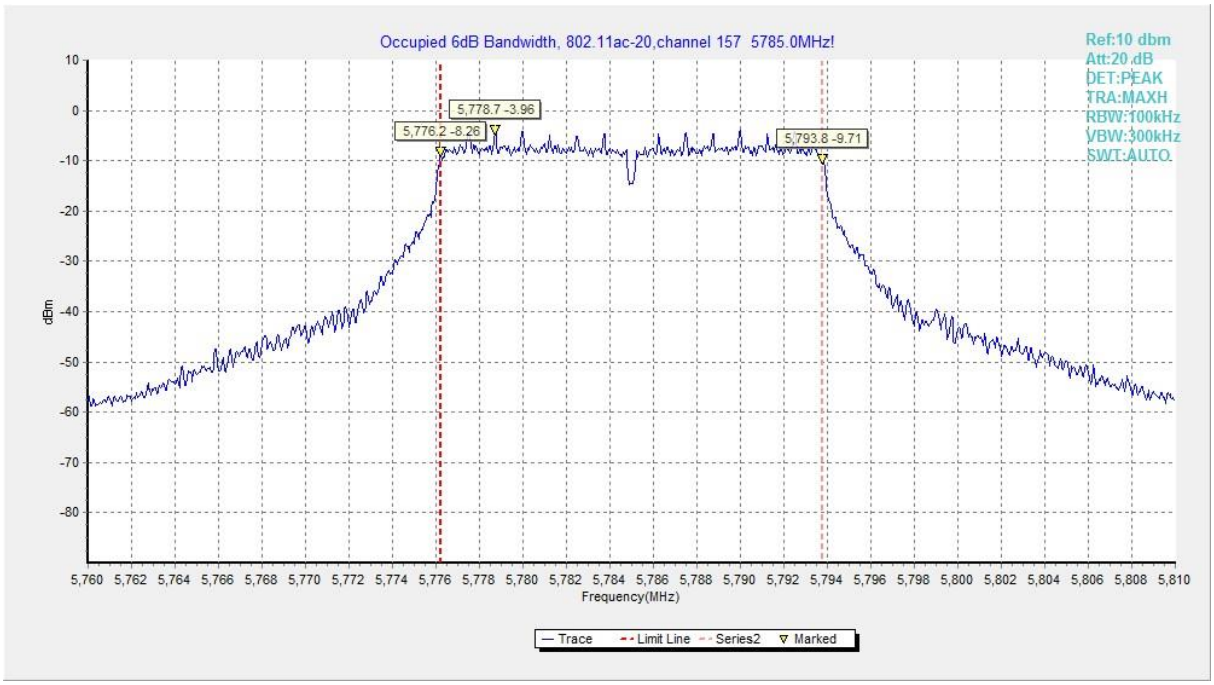



**Fig. 8 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 157)**

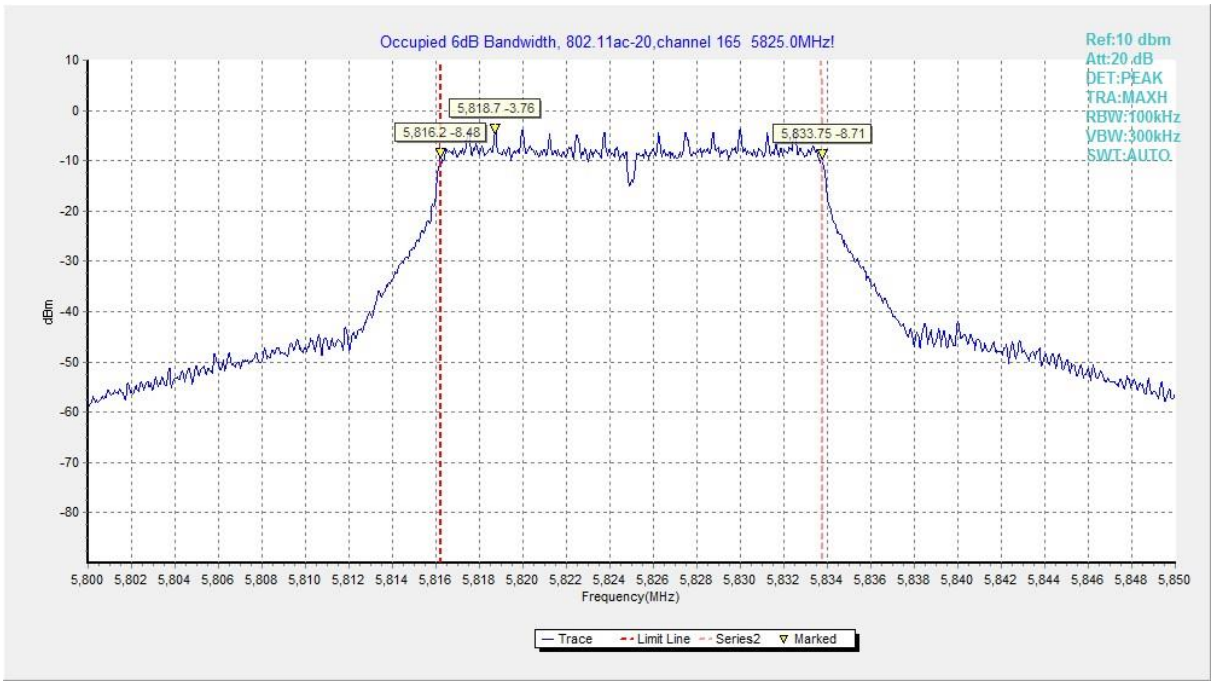



**Fig. 9 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 165)**

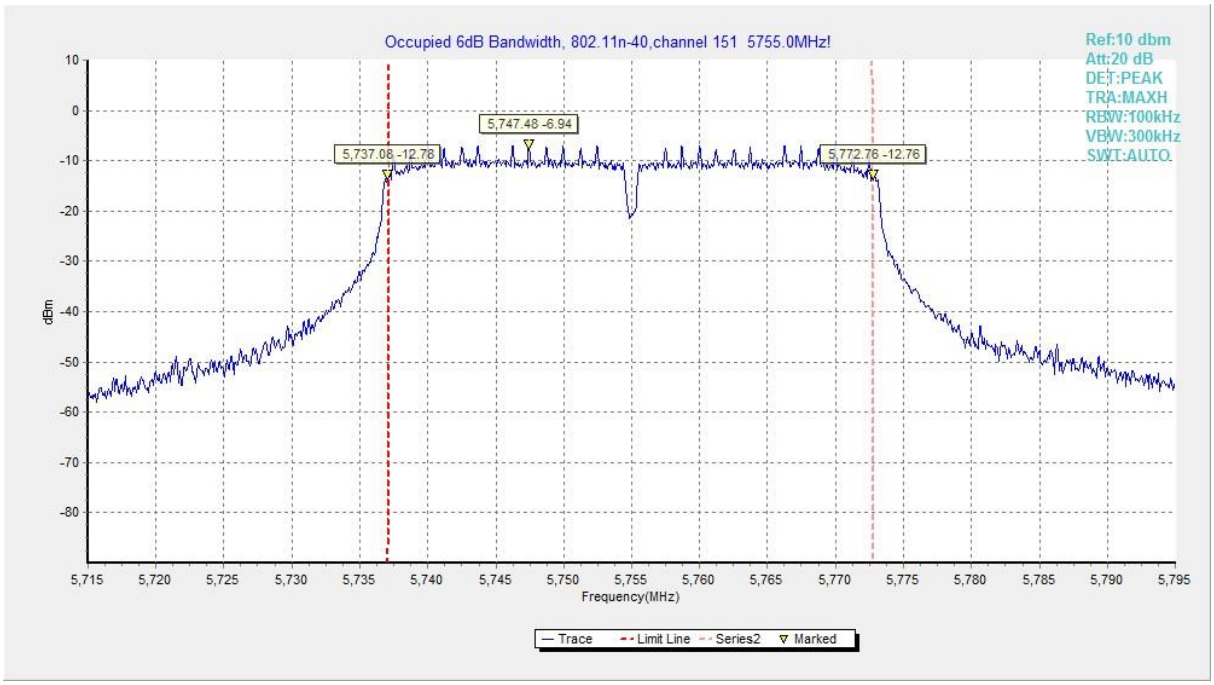



**Fig. 10 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)**

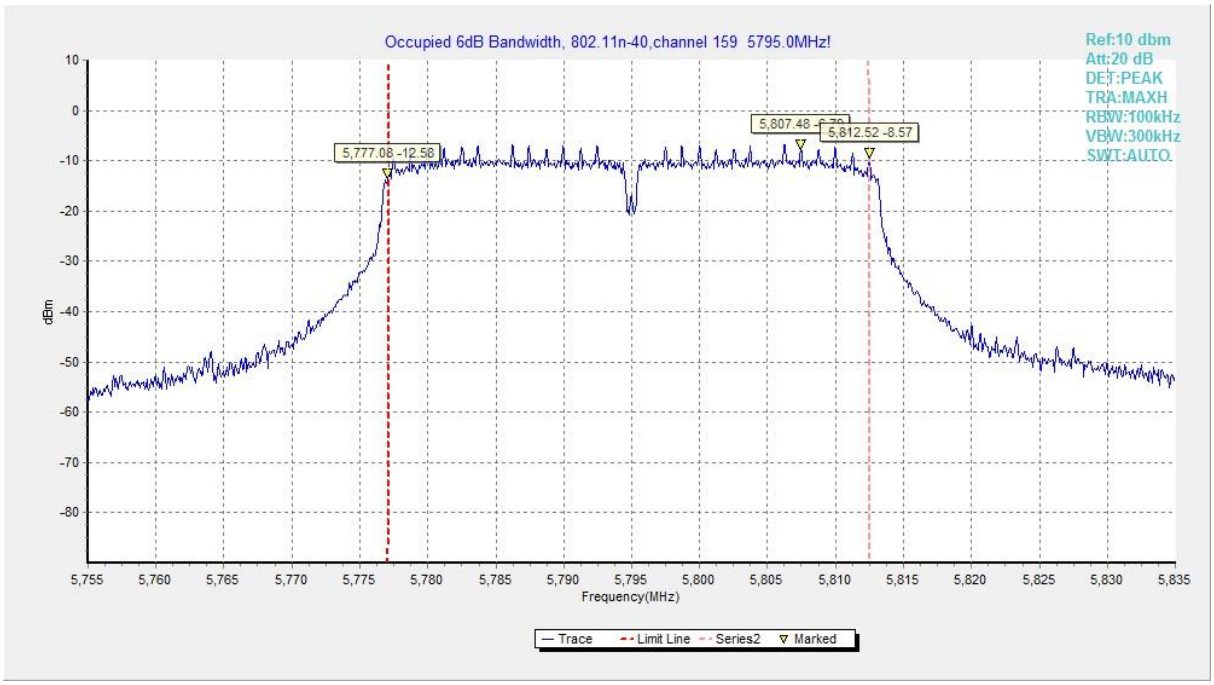



**Fig. 11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)**

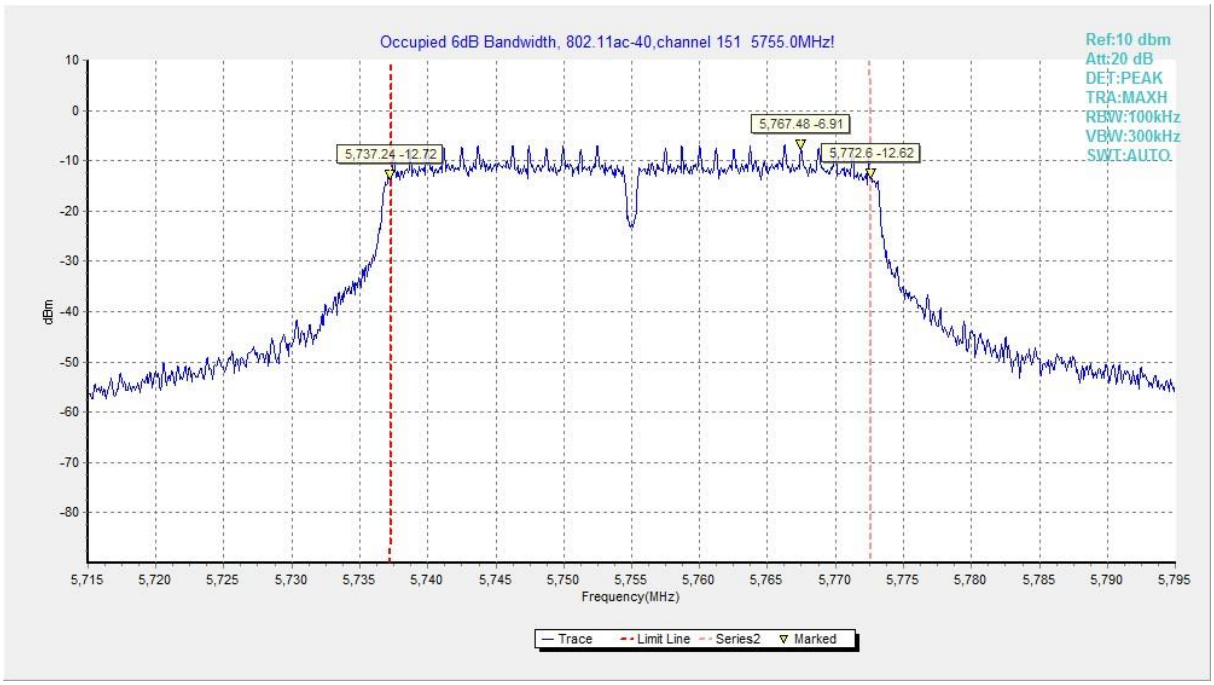



**Fig. 12 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 151)**

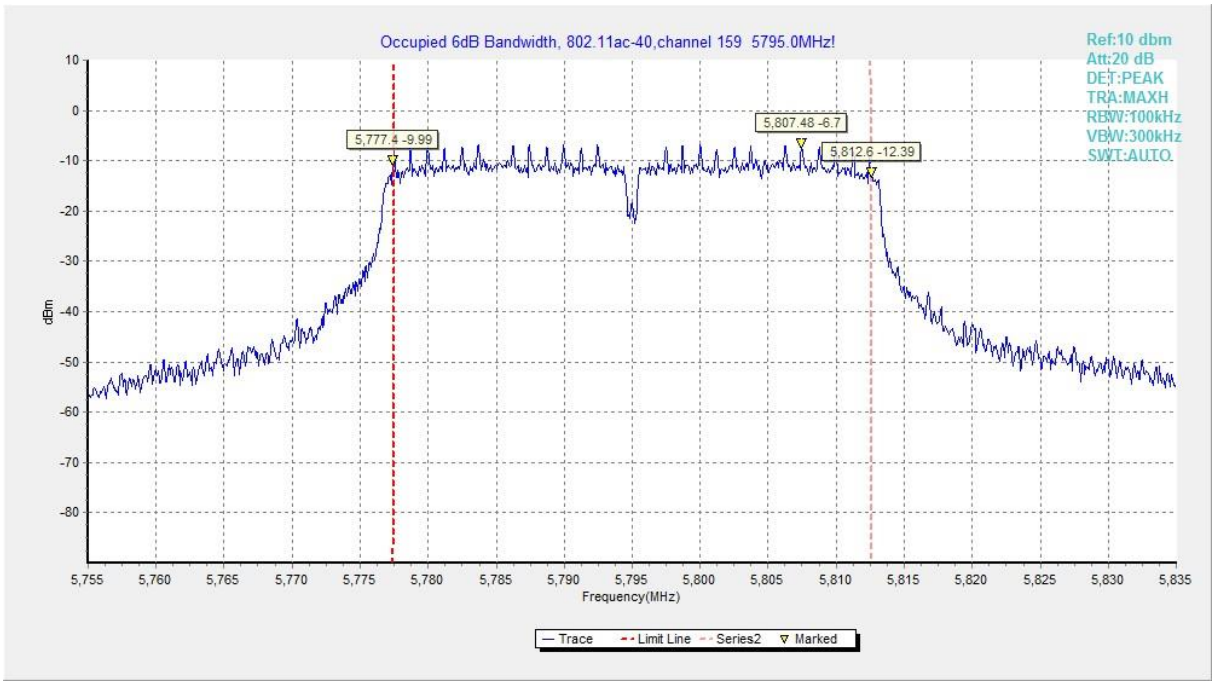



**Fig. 13 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 159)**


**Fig. 14 Occupied 6dB Bandwidth (802.11ac-HT80, Ch 155)**

### A.5.2 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. | |

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)).

**Limit in restricted band:**

| Frequency of emission (MHz) | Field strength(uV/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 |

The measurement is made according to ANSI C63.10-2013 and KDB 789033

**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 | 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 |
| | 165 | 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 | 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 |
| | 165 | 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 | 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 |
|---|---|---|---|---|
| 802.11n (HT20) | 149 | 1 GHz ~ 3 GHz | --- | P |
| | | 3 GHz ~ 7 GHz | --- | P |
| | | 7 GHz ~ 18 GHz | --- | P |
| | 157 | 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 |
| | 165 | 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 |
|---|---|---|---|---|
| 802.11n (HT40) | 151 | 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-HT80 mode**

| Mode | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| 802.11n (HT80) | 155 | 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**

**Note:**

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.

**Average Results：**

**802.11a**

Ch149

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5394.400 | 39.3 | -22.3 | 34.4 | 27.20 | 54.0 | 14.7 | H | 86 |
| 5413.200 | 39.2 | -22.4 | 34.4 | 27.25 | 54.0 | 14.8 | H | 107 |
| 11490.200 | 44.3 | -29.1 | 38.2 | 35.28 | 54.0 | 9.7 | H | 130 |
| 17749.200 | 37.5 | -22.3 | 41.5 | 18.28 | 54.0 | 16.5 | H | 152 |
| 17826.200 | 37.6 | -22.5 | 41.5 | 18.50 | 54.0 | 16.4 | H | 174 |
| 17917.500 | 37.9 | -22.7 | 41.5 | 19.03 | 54.0 | 16.1 | H | 195 |

Ch157

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5363.600 | 37.7 | -22.3 | 34.3 | 25.61 | 54.0 | 16.3 | H | 175 |
| 5389.600 | 37.9 | -22.3 | 34.4 | 25.80 | 54.0 | 16.1 | H | 194 |
| 11569.400 | 41.4 | -29.2 | 38.3 | 32.34 | 54.0 | 12.6 | H | 215 |
| 17730.500 | 37.6 | -22.2 | 41.6 | 18.27 | 54.0 | 16.4 | H | 196 |
| 17613.000 | 37.4 | -22.2 | 41.6 | 17.99 | 54.0 | 16.6 | H | 241 |
| 17835.000 | 37.6 | -22.5 | 41.5 | 18.60 | 54.0 | 16.4 | H | 259 |

Ch165

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5365.600 | 37.9 | -22.3 | 34.3 | 25.87 | 54.0 | 16.1 | H | 175 |
| 5406.000 | 38.0 | -22.4 | 34.4 | 26.02 | 54.0 | 16.0 | H | 194 |
| 11649.700 | 43.7 | -29.4 | 38.4 | 34.71 | 54.0 | 10.3 | H | 215 |
| 17733.800 | 37.7 | -22.3 | 41.6 | 18.39 | 54.0 | 16.3 | H | 196 |
| 17824.000 | 37.6 | -22.5 | 41.5 | 18.53 | 54.0 | 16.4 | H | 241 |
| 17913.100 | 38.0 | -22.6 | 41.5 | 19.16 | 54.0 | 16.0 | H | 259 |

**802.11n-HT20**

Ch149

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5361.600 | 38.2 | -22.3 | 34.3 | 26.19 | 54.0 | 15.8 | H | 40 |
| 5390.400 | 38.3 | -22.3 | 34.4 | 26.20 | 54.0 | 15.7 | H | 65 |
| 11490.200 | 44.3 | -29.1 | 38.2 | 35.26 | 54.0 | 9.7 | H | 84 |
| 17723.900 | 37.7 | -22.2 | 41.6 | 18.40 | 54.0 | 16.3 | H | 107 |
| 17743.700 | 37.7 | -22.3 | 41.6 | 18.39 | 54.0 | 16.3 | H | 135 |
| 17913.100 | 38.0 | -22.6 | 41.5 | 19.11 | 54.0 | 16.0 | H | 151 |

Ch157

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5417.600 | 38.1 | -22.5 | 34.4 | 26.23 | 54.0 | 15.9 | H | 4 |
| 5442.400 | 38.2 | -22.6 | 34.4 | 26.46 | 54.0 | 15.8 | H | 26 |
| 11569.400 | 41.3 | -29.2 | 38.3 | 32.31 | 54.0 | 12.7 | H | 356 |
| 17755.800 | 37.6 | -22.3 | 41.5 | 18.31 | 54.0 | 16.4 | H | 348 |
| 17836.100 | 37.7 | -22.5 | 41.5 | 18.61 | 54.0 | 16.3 | H | 174 |
| 17920.800 | 38.0 | -22.7 | 41.5 | 19.15 | 54.0 | 16.0 | H | 112 |

Ch165

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5380.000 | 38.3 | -22.3 | 34.4 | 26.28 | 54.0 | 15.7 | H | 8 |
| 5400.400 | 38.3 | -22.3 | 34.4 | 26.28 | 54.0 | 15.7 | H | 28 |
| 11649.700 | 43.6 | -29.4 | 38.4 | 34.63 | 54.0 | 10.4 | H | 6 |
| 17739.300 | 37.7 | -22.3 | 41.6 | 18.39 | 54.0 | 16.3 | H | 278 |
| 17832.800 | 37.7 | -22.5 | 41.5 | 18.66 | 54.0 | 16.3 | H | 122 |
| 17929.600 | 37.9 | -22.7 | 41.5 | 19.06 | 54.0 | 16.1 | H | 245 |

**802.11n-HT40**

Ch151

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5410.400 | 38.5 | -22.4 | 34.4 | 26.57 | 54.0 | 15.5 | H | 40 |
| 5438.800 | 38.6 | -22.6 | 34.4 | 26.84 | 54.0 | 15.4 | H | 65 |
| 11510.000 | 44.2 | -29.1 | 38.2 | 35.14 | 54.0 | 9.8 | H | 84 |
| 17750.300 | 37.7 | -22.3 | 41.5 | 18.45 | 54.0 | 16.3 | H | 107 |
| 17831.700 | 37.8 | -22.5 | 41.5 | 18.70 | 54.0 | 16.2 | H | 135 |
| 17903.200 | 38.1 | -22.6 | 41.5 | 19.23 | 54.0 | 15.9 | H | 151 |

Ch159

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5361.600 | 38.7 | -22.3 | 34.3 | 26.66 | 54.0 | 15.3 | H | 28 |
| 5367.600 | 38.7 | -22.3 | 34.3 | 26.60 | 54.0 | 15.3 | H | 74 |
| 11590.300 | 40.7 | -29.3 | 38.3 | 31.73 | 54.0 | 13.3 | H | 140 |
| 17736.000 | 37.8 | -22.3 | 41.6 | 18.50 | 54.0 | 16.2 | H | 8 |
| 17831.700 | 37.8 | -22.5 | 41.5 | 18.70 | 54.0 | 16.2 | H | 80 |
| 17905.400 | 38.1 | -22.6 | 41.5 | 19.17 | 54.0 | 15.9 | H | 243 |

**802.11ac-HT20**

Ch149

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5385.600 | 38.6 | -22.3 | 34.4 | 26.50 | 54.0 | 15.4 | H | 25 |
| 5394.000 | 38.5 | -22.3 | 34.4 | 26.40 | 54.0 | 15.5 | H | 49 |
| 11490.200 | 44.4 | -29.1 | 38.2 | 35.34 | 54.0 | 9.6 | H | 4 |
| 17726.100 | 37.7 | -22.2 | 41.6 | 18.36 | 54.0 | 16.3 | H | 6 |
| 17836.100 | 37.6 | -22.5 | 41.5 | 18.57 | 54.0 | 16.4 | H | 25 |
| 17908.700 | 38.1 | -22.6 | 41.5 | 19.21 | 54.0 | 15.9 | H | 186 |

Ch157

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5386.400 | 38.6 | -22.3 | 34.4 | 26.48 | 54.0 | 15.4 | H | 8 |
| 5391.600 | 38.6 | -22.3 | 34.4 | 26.49 | 54.0 | 15.4 | H | 52 |
| 11569.400 | 41.5 | -29.2 | 38.3 | 32.50 | 54.0 | 12.5 | H | 18 |
| 17835.000 | 37.8 | -22.5 | 41.5 | 18.75 | 54.0 | 16.2 | H | 6 |
| 17913.100 | 38.0 | -22.6 | 41.5 | 19.09 | 54.0 | 16.0 | H | 48 |
| 17949.400 | 37.7 | -22.7 | 41.5 | 18.89 | 54.0 | 16.3 | H | 128 |

Ch165

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5350.800 | 38.4 | -22.3 | 34.3 | 26.37 | 54.0 | 15.6 | H | 20 |
| 5389.200 | 38.6 | -22.3 | 34.4 | 26.56 | 54.0 | 15.4 | H | 248 |
| 11649.700 | 43.8 | -29.4 | 38.4 | 34.82 | 54.0 | 10.2 | H | 49 |
| 17748.100 | 37.7 | -22.3 | 41.6 | 18.42 | 54.0 | 16.3 | H | 82 |
| 17832.800 | 37.7 | -22.5 | 41.5 | 18.63 | 54.0 | 16.3 | H | 168 |
| 17919.700 | 38.0 | -22.7 | 41.5 | 19.13 | 54.0 | 16.0 | H | 8 |

**802.11ac-HT40**

Ch151

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5362.000 | 38.7 | -22.3 | 34.3 | 26.60 | 54.0 | 15.3 | H | 20 |
| 5391.200 | 38.8 | -22.3 | 34.4 | 26.74 | 54.0 | 15.2 | H | 18 |
| 11510.000 | 44.3 | -29.1 | 38.2 | 35.20 | 54.0 | 9.7 | H | 90 |
| 17719.500 | 37.8 | -22.2 | 41.6 | 18.45 | 54.0 | 16.2 | H | 114 |
| 17833.900 | 37.8 | -22.5 | 41.5 | 18.75 | 54.0 | 16.2 | H | 36 |
| 17907.600 | 38.2 | -22.6 | 41.5 | 19.29 | 54.0 | 15.8 | H | 2 |

Ch159

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5389.200 | 38.9 | -22.3 | 34.4 | 26.85 | 54.0 | 15.1 | H | 8 |
| 5404.000 | 38.8 | -22.3 | 34.4 | 26.73 | 54.0 | 15.2 | H | 46 |
| 11589.200 | 40.7 | -29.3 | 38.3 | 31.66 | 54.0 | 13.3 | H | 20 |
| 17734.900 | 37.8 | -22.3 | 41.6 | 18.53 | 54.0 | 16.2 | H | 118 |
| 17825.100 | 37.8 | -22.5 | 41.5 | 18.77 | 54.0 | 16.2 | H | 82 |
| 17909.800 | 38.0 | -22.6 | 41.5 | 19.17 | 54.0 | 16.0 | H | 46 |

**802.11ac-HT80**

Ch155

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5380.000 | 38.9 | -32.3 | 34.5 | 36.64 | 54.0 | 15.1 | H | 135 |
| 5388.800 | 38.9 | -32.3 | 34.5 | 36.62 | 54.0 | 15.1 | H | 160 |
| 16788.900 | 36.5 | -23.0 | 41.6 | 17.95 | 54.0 | 17.5 | H | 92 |
| 17733.800 | 37.6 | -22.3 | 41.2 | 18.60 | 54.0 | 16.4 | H | 115 |
| 17830.600 | 37.6 | -22.5 | 41.3 | 18.78 | 54.0 | 16.4 | H | 112 |
| 17916.400 | 37.9 | -22.7 | 41.3 | 19.25 | 54.0 | 16.1 | H | 85 |

**Peak Results：**

**802.11a**

Ch149

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5650.138 | 54.3 | -22.8 | 34.7 | 42.42 | 68.3 | 14.0 | V | 88 |
| 5652.277 | 54.8 | -22.8 | 34.7 | 42.99 | 69.9 | 15.1 | H | 110 |
| 11489.650 | 52.1 | -29.2 | 38.2 | 43.05 | 74.0 | 21.9 | V | 132 |
| 17234.950 | 53.6 | -22.8 | 41.9 | 34.55 | 68.3 | 14.7 | H | 154 |
| 17397.200 | 55.5 | -23.0 | 41.7 | 36.81 | 68.3 | 12.8 | V | 176 |
| 17508.850 | 56.6 | -22.8 | 41.6 | 37.83 | 68.3 | 11.7 | V | 198 |

Ch157

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5732.400 | 53.2 | -23.0 | 34.8 | 41.34 | 68.3 | 15.1 | V | 176 |
| 5824.400 | 53.4 | -22.6 | 35.0 | 40.95 | 68.3 | 14.9 | H | 198 |
| 11569.950 | 54.1 | -29.2 | 38.3 | 45.09 | 74.0 | 19.9 | V | 220 |
| 17354.850 | 54.8 | -22.9 | 41.8 | 35.94 | 68.3 | 13.5 | H | 198 |
| 17492.350 | 56.2 | -23.0 | 41.6 | 37.50 | 68.3 | 12.1 | H | 242 |
| 17626.500 | 57.1 | -22.1 | 41.6 | 37.62 | 68.3 | 11.2 | V | 264 |

Ch165

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5923.586 | 54.0 | -22.2 | 35.2 | 41.02 | 69.2 | 15.3 | V | 176 |
| 5924.713 | 54.0 | -22.2 | 35.2 | 41.03 | 68.4 | 14.4 | H | 198 |
| 11651.900 | 57.0 | -29.4 | 38.4 | 48.02 | 74.0 | 17.0 | V | 220 |
| 17474.750 | 53.9 | -23.1 | 41.6 | 35.38 | 68.3 | 14.4 | H | 198 |
| 17575.400 | 58.0 | -22.4 | 41.6 | 38.84 | 68.3 | 10.3 | H | 242 |
| 17621.050 | 56.3 | -22.1 | 41.6 | 36.79 | 68.3 | 12.0 | V | 264 |

**802.11n-HT20**

Ch149

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5650.058 | 53.2 | -22.8 | 34.7 | 41.36 | 68.2 | 15.0 | H | 88 |
| 5651.104 | 53.1 | -22.8 | 34.7 | 41.26 | 69.0 | 15.9 | H | 110 |
| 11489.650 | 52.5 | -29.2 | 38.2 | 43.45 | 74.0 | 21.5 | H | 88 |
| 17234.950 | 53.9 | -22.8 | 41.9 | 34.87 | 68.3 | 14.4 | V | 110 |
| 17341.100 | 56.5 | -22.9 | 41.8 | 37.62 | 68.3 | 11.8 | V | 132 |
| 17522.600 | 54.4 | -22.8 | 41.6 | 35.57 | 68.3 | 13.9 | H | 154 |

Ch157

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5732.400 | 54.9 | -23.0 | 34.8 | 43.04 | 68.3 | 13.4 | H | 0 |
| 5844.600 | 53.8 | -22.4 | 35.0 | 41.21 | 68.3 | 14.5 | V | 22 |
| 11569.400 | 53.8 | -29.2 | 38.3 | 44.82 | 74.0 | 20.2 | V | 352 |
| 17354.850 | 54.0 | -22.9 | 41.8 | 35.18 | 68.3 | 14.3 | V | 352 |
| 17530.850 | 56.8 | -22.7 | 41.6 | 37.90 | 68.3 | 11.5 | V | 176 |
| 17652.950 | 56.5 | -22.1 | 41.6 | 37.05 | 68.3 | 11.8 | V | 110 |

Ch165

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5922.217 | 54.6 | -22.2 | 35.2 | 41.63 | 70.3 | 15.7 | V | 0 |
| 5924.241 | 55.0 | -22.2 | 35.2 | 42.09 | 68.8 | 13.7 | V | 22 |
| 11659.050 | 56.2 | -29.4 | 38.4 | 47.26 | 74.0 | 17.8 | H | 0 |
| 17474.750 | 54.6 | -23.1 | 41.6 | 36.02 | 68.3 | 13.7 | H | 264 |
| 17513.250 | 56.2 | -22.8 | 41.6 | 37.39 | 68.3 | 12.1 | H | 110 |
| 17611.700 | 5.8 | -22.2 | 41.6 | -13.64 | 68.3 | 62.5 | H | 242 |

**802.11n-HT40**

Ch151

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5650.219 | 54.3 | -22.8 | 34.7 | 42.49 | 68.4 | 14.0 | V | 44 |
| 5651.024 | 54.9 | -22.8 | 34.7 | 43.04 | 69.0 | 14.1 | H | 66 |
| 11510.000 | 52.6 | -29.1 | 38.2 | 43.54 | 74.0 | 21.4 | H | 88 |
| 17454.400 | 56.7 | -23.2 | 41.7 | 38.24 | 68.3 | 11.6 | V | 110 |
| 17265.200 | 54.3 | -22.8 | 41.9 | 35.25 | 68.3 | 14.0 | V | 132 |
| 17558.900 | 56.1 | -22.5 | 41.6 | 37.00 | 68.3 | 12.2 | H | 154 |

Ch159

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5923.206 | 54.7 | -22.2 | 35.2 | 41.76 | 69.5 | 14.8 | H | 22 |
| 5924.391 | 54.9 | -22.2 | 35.2 | 41.92 | 68.7 | 13.8 | H | 66 |
| 11589.750 | 52.5 | -29.3 | 38.3 | 43.46 | 74.0 | 21.5 | V | 132 |
| 17385.100 | 54.3 | -23.0 | 41.7 | 35.61 | 68.3 | 14.0 | H | 0 |
| 17507.750 | 56.8 | -22.9 | 41.6 | 38.09 | 68.3 | 11.5 | V | 88 |
| 17580.350 | 57.0 | -22.4 | 41.6 | 37.74 | 68.3 | 11.3 | V | 242 |

**802.11ac-HT20**

Ch149

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5650.242 | 53.1 | -22.8 | 34.7 | 41.27 | 68.4 | 15.3 | H | 22 |
| 5652.197 | 54.5 | -22.8 | 34.7 | 42.63 | 69.8 | 15.3 | V | 44 |
| 11490.200 | 52.1 | -29.1 | 38.2 | 43.10 | 74.0 | 21.9 | H | 0 |
| 17234.950 | 54.2 | -22.8 | 41.9 | 35.14 | 68.3 | 14.1 | H | 0 |
| 17462.100 | 57.0 | -23.2 | 41.6 | 38.50 | 68.3 | 11.3 | H | 22 |
| 17533.050 | 56.5 | -22.7 | 41.6 | 37.63 | 68.3 | 11.8 | H | 176 |

Ch157

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5732.600 | 55.3 | -23.0 | 34.8 | 43.49 | 68.3 | 13.0 | V | 0 |
| 5847.200 | 54.0 | -22.4 | 35.0 | 41.42 | 68.3 | 14.3 | H | 44 |
| 11571.050 | 53.4 | -29.2 | 38.3 | 44.40 | 74.0 | 20.6 | V | 22 |
| 17354.850 | 53.9 | -22.9 | 41.8 | 35.07 | 68.3 | 14.4 | H | 0 |
| 17410.400 | 54.9 | -23.1 | 41.7 | 36.30 | 68.3 | 13.4 | H | 44 |
| 17441.750 | 56.3 | -23.1 | 41.7 | 37.81 | 68.3 | 12.0 | V | 132 |

Ch165

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5923.597 | 54.6 | -22.2 | 35.2 | 41.70 | 69.2 | 14.6 | H | 22 |
| 5924.897 | 55.2 | -22.2 | 35.2 | 42.19 | 68.3 | 13.1 | V | 242 |
| 11651.350 | 55.9 | -29.4 | 38.4 | 46.96 | 74.0 | 18.1 | H | 44 |
| 17474.750 | 54.2 | -23.1 | 41.6 | 35.60 | 68.3 | 14.1 | V | 88 |
| 17553.400 | 56.8 | -22.5 | 41.6 | 37.80 | 68.3 | 11.5 | V | 176 |
| 17641.400 | 57.2 | -22.0 | 41.6 | 37.70 | 68.3 | 11.1 | V | 0 |

**802.11ac-HT40**

Ch151

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5650.345 | 54.3 | -22.8 | 34.7 | 42.44 | 68.5 | 14.2 | H | 22 |
| 5650.495 | 54.1 | -22.8 | 34.7 | 42.28 | 68.6 | 14.5 | H | 22 |
| 11510.000 | 52.0 | -29.1 | 38.2 | 42.89 | 74.0 | 22.0 | H | 88 |
| 17265.200 | 55.2 | -22.8 | 41.9 | 36.15 | 68.3 | 13.1 | V | 110 |
| 17419.200 | 56.1 | -23.1 | 41.7 | 37.45 | 68.3 | 12.2 | V | 44 |
| 17549.000 | 56.8 | -22.6 | 41.6 | 37.80 | 68.3 | 11.5 | H | 0 |

Ch159

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5923.655 | 55.5 | -22.2 | 35.2 | 42.51 | 69.2 | 13.7 | H | 0 |
| 5924.954 | 54.9 | -22.2 | 35.2 | 41.94 | 68.2 | 13.3 | H | 44 |
| 11590.300 | 53.0 | -29.3 | 38.3 | 44.03 | 74.0 | 21.0 | V | 22 |
| 17385.100 | 54.2 | -23.0 | 41.7 | 35.51 | 68.3 | 14.1 | H | 110 |
| 17532.500 | 56.3 | -22.7 | 41.6 | 37.35 | 68.3 | 12.0 | H | 88 |
| 17618.300 | 56.7 | -22.1 | 41.6 | 37.20 | 68.3 | 11.6 | H | 44 |

**802.11ac-HT80**

Ch155

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) | Turntable angle (deg) |
|---|---|---|---|---|---|---|---|---|
| 5650.334 | 53.3 | -32.8 | 34.8 | 51.31 | 74.0 | 20.7 | H | 132 |
| 5651.587 | 55.1 | -32.8 | 34.8 | 53.17 | 74.0 | 18.9 | H | 154 |
| 11550.150 | 50.0 | -29.2 | 38.5 | 40.69 | 74.0 | 24.0 | V | 88 |
| 17325.150 | 54.0 | -22.9 | 41.4 | 35.48 | 68.3 | 14.3 | H | 110 |
| 17513.250 | 56.6 | -22.8 | 41.2 | 38.22 | 68.3 | 11.7 | V | 110 |
| 17639.200 | 57.1 | -22.0 | 41.2 | 37.86 | 68.3 | 11.3 | V | 88 |

**A6.2 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. | |

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)).

**Limit in restricted band:**

| Frequency of emission (MHz) | Field strength(uV/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 |

The measurement is made according to ANSI C63.10-2013 and KDB 789033

**Measurement Result:**

| Mode | Channel | Test Results | Conclusion |
|---|---|---|---|
| 802.11a | 5745 MHz | Fig.83 | P |
| | 5825 MHz | Fig.84 | P |
| 802.11n HT20 | 5745 MHz | Fig.85 | P |
| | 5825 MHz | Fig.86 | P |
| 802.11n HT40 | 5755 MHz | Fig.87 | P |
| | 5795 MHz | Fig.88 | P |
| 802.11ac HT20 | 5745 MHz | Fig.89 | P |
| | 5825 MHz | Fig.90 | P |
| 802.11ac HT40 | 5755 MHz | Fig.91 | P |
| | 5795 MHz | Fig.92 | P |
| 802.11ac HT80 | 5775 MHz | Fig.93<br>Fig.94 | P |

**Conclusion: PASS**

**Test graphs as below:**

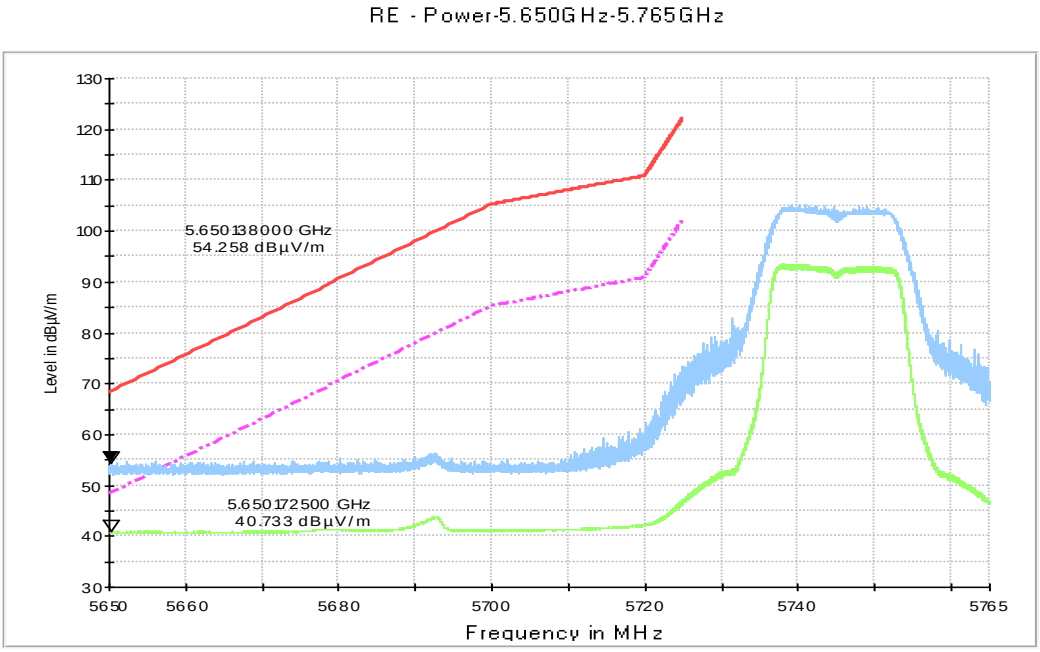



**Fig. 15 Band Edges (802.11a, 5745MHz)**

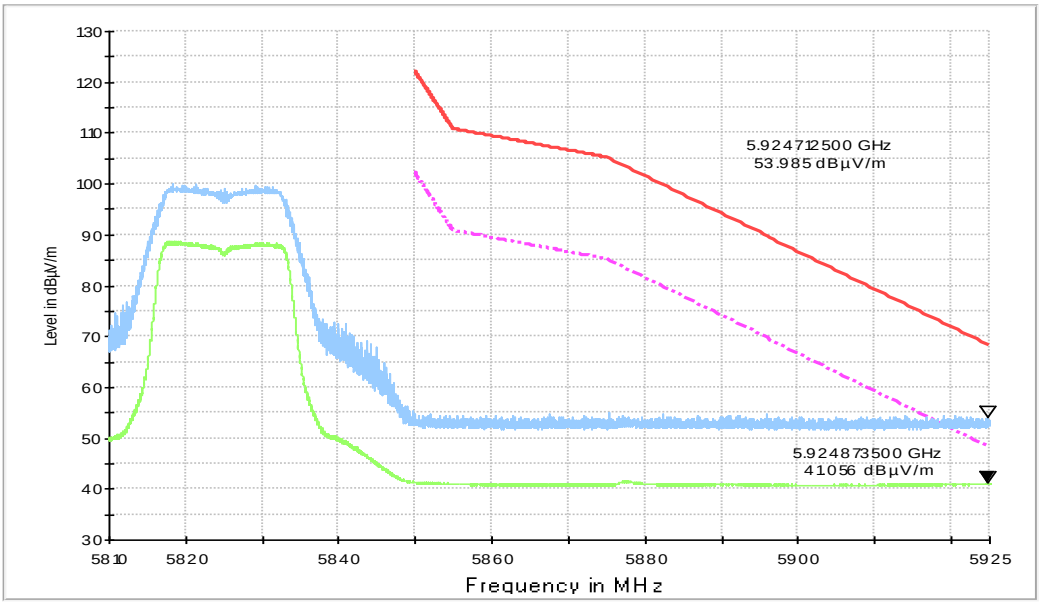



**Fig. 16 Band Edges (802.11a, 5825MHz)**

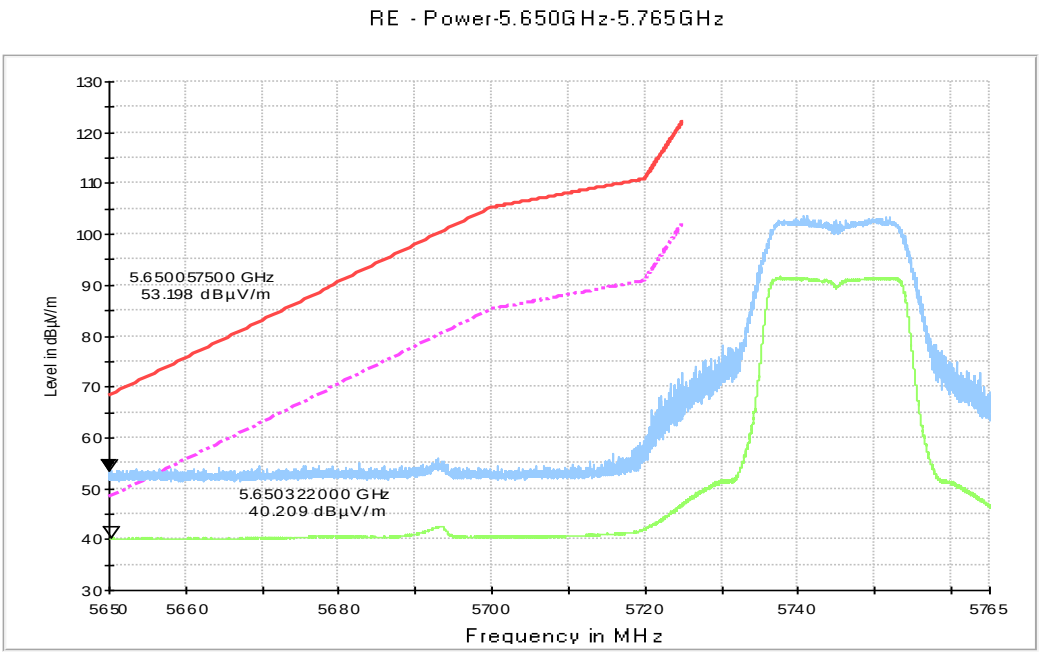



**Fig. 17 Band Edges (802.11n-HT20, 5745MHz)**

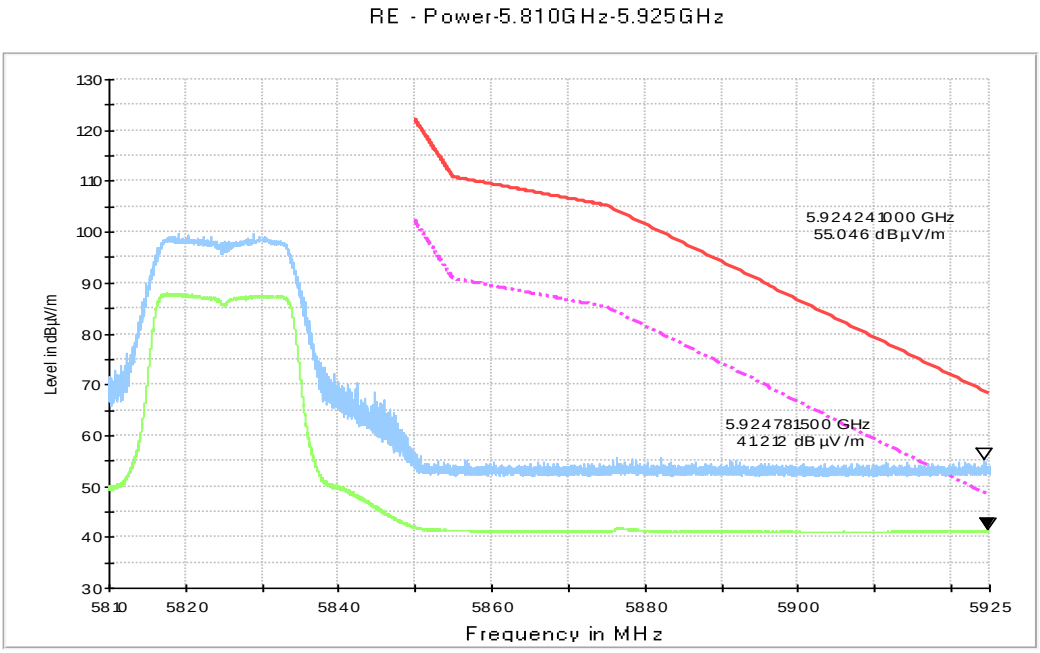



**Fig. 18 Band Edges (802.11n-HT20, 5825MHz)**

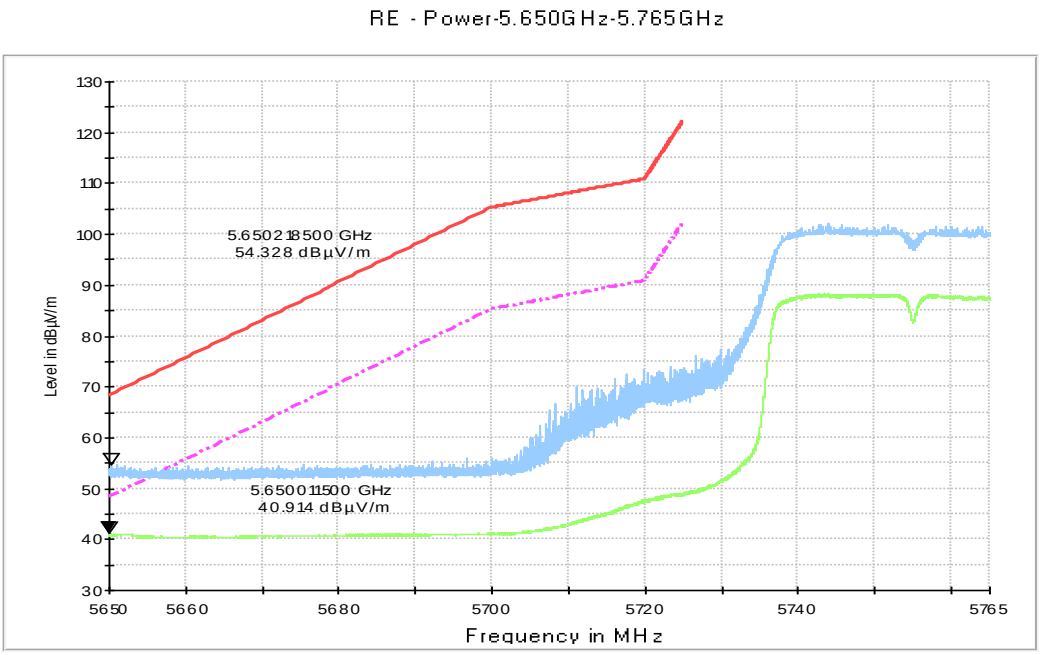



**Fig. 19 Band Edges (802.11n-HT40, 5755MHz)**

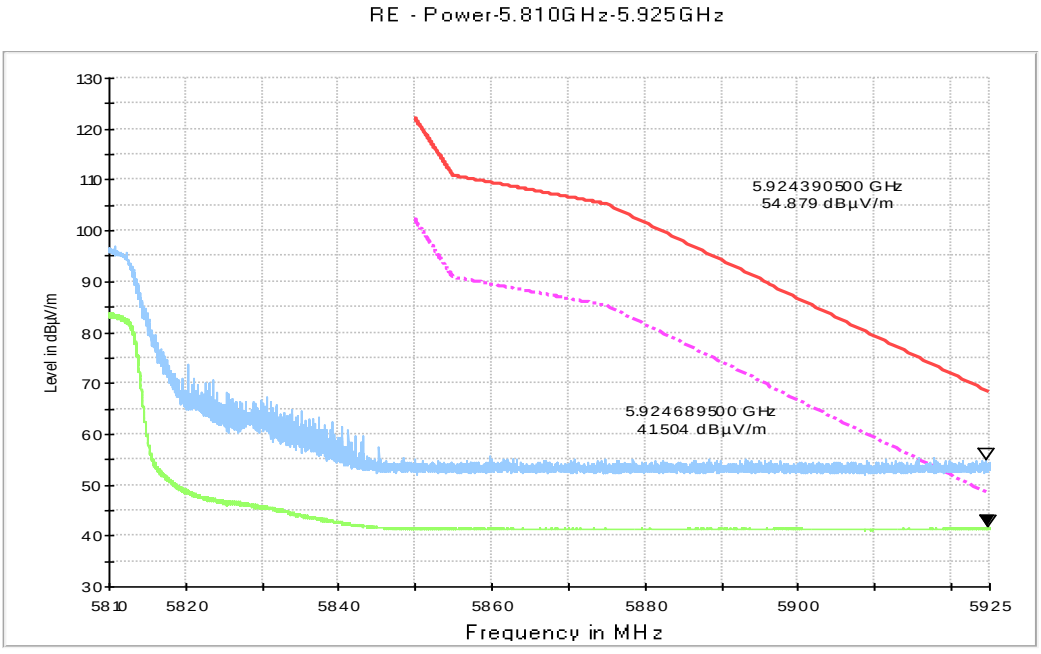



**Fig. 20 Band Edges (802.11n-HT40, 5795MHz)**

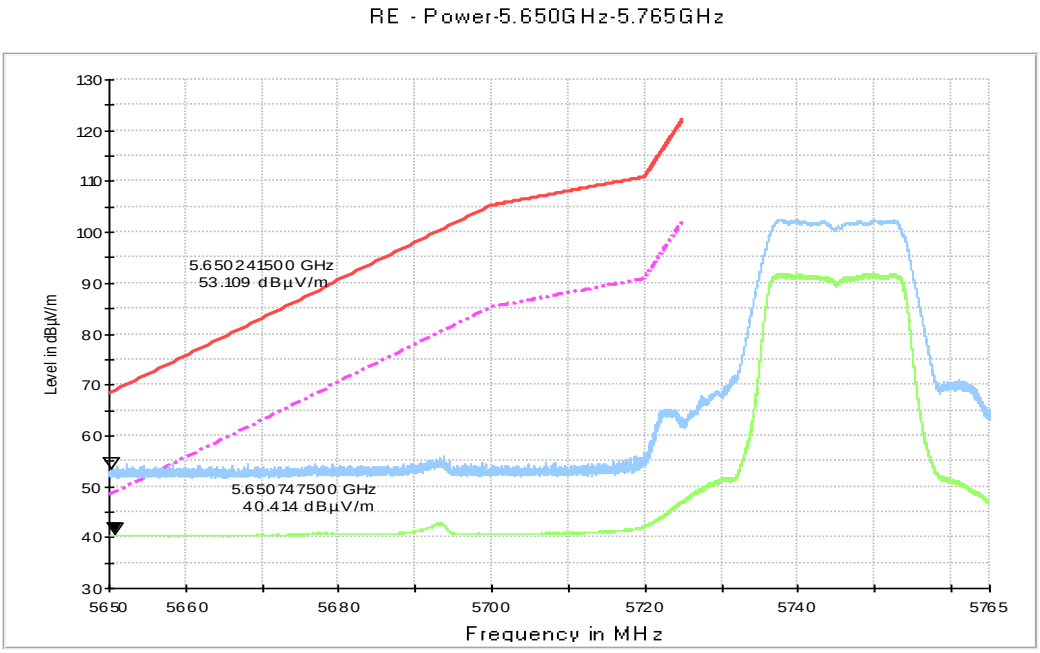



**Fig. 21 Band Edges (802.11ac-HT20, 5745MHz)**

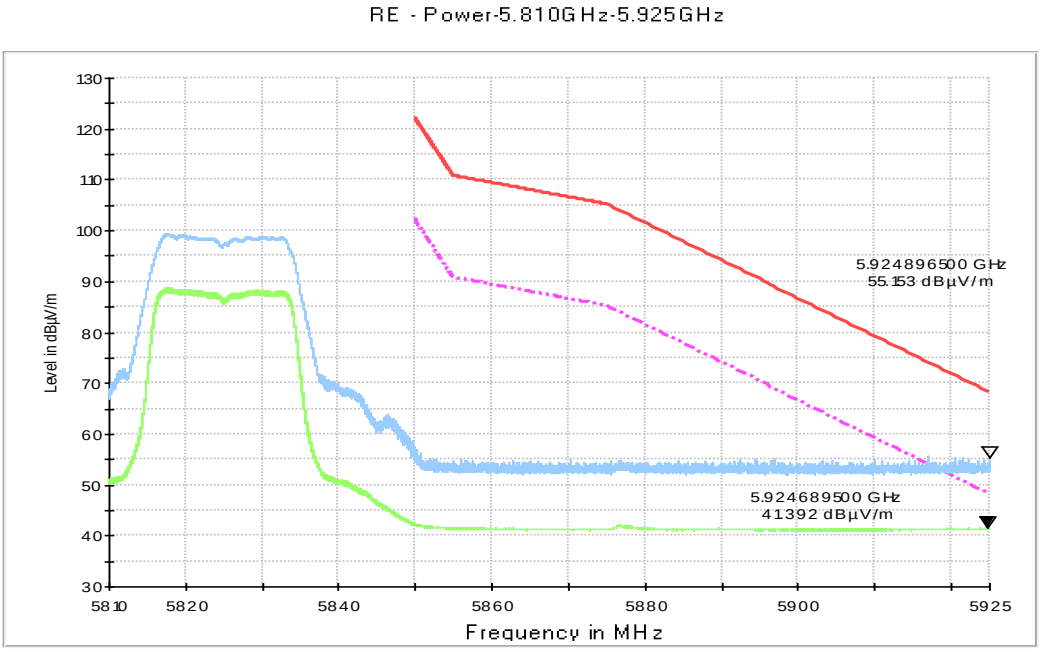



**Fig. 22 Band Edges (802.11ac-HT20, 5825MHz)**

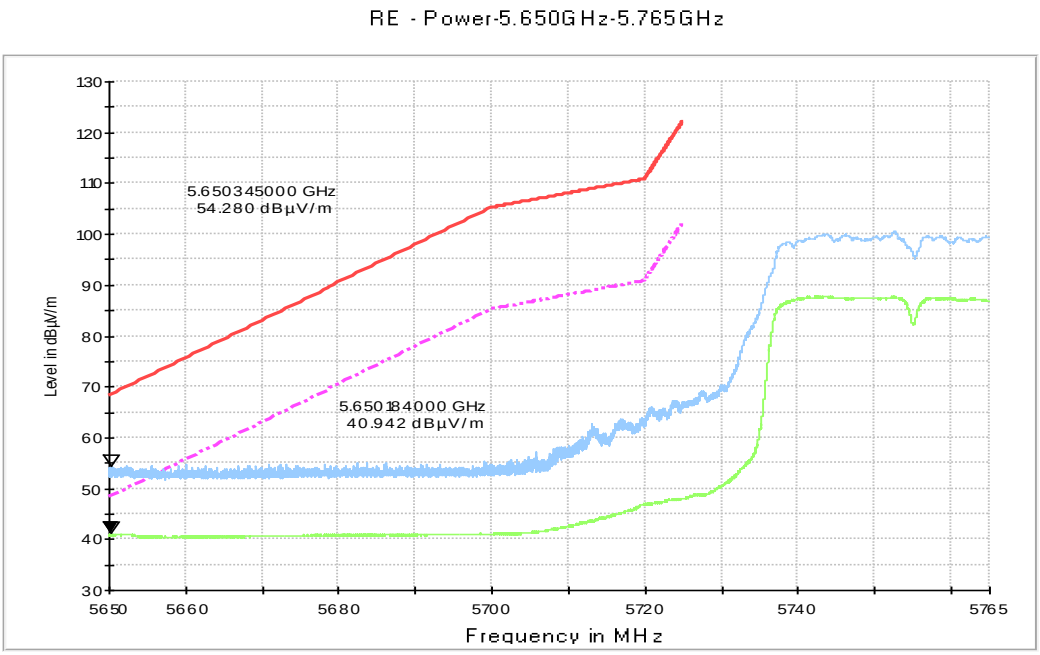



**Fig. 23 Band Edges (802.11ac-HT40, 5755MHz)**

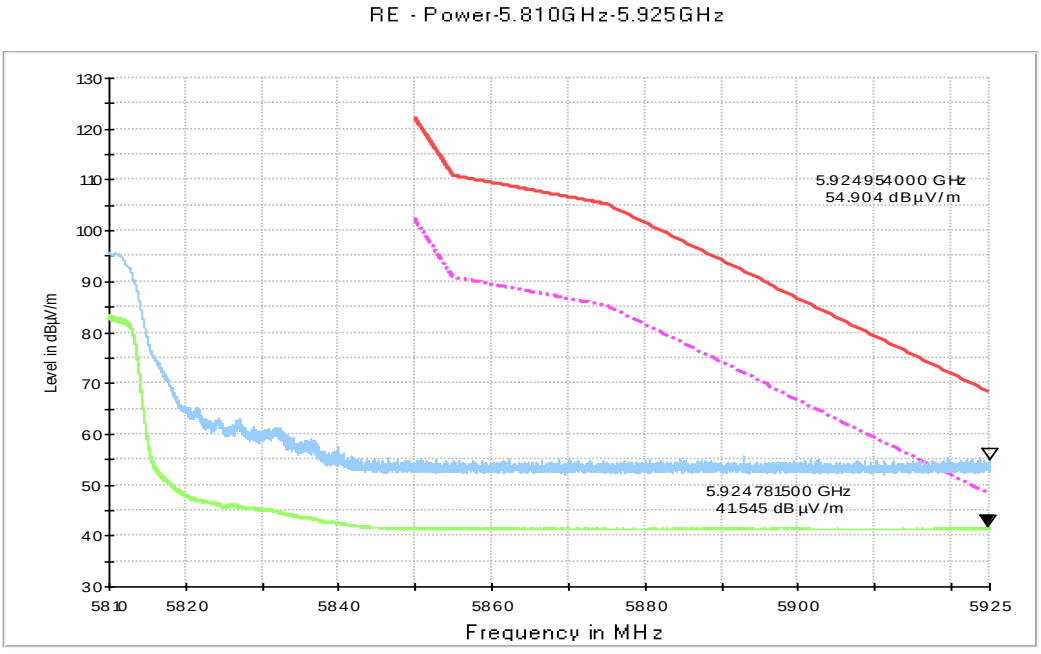



**Fig. 24 Band Edges (802.11ac-HT40, 5795MHz)**

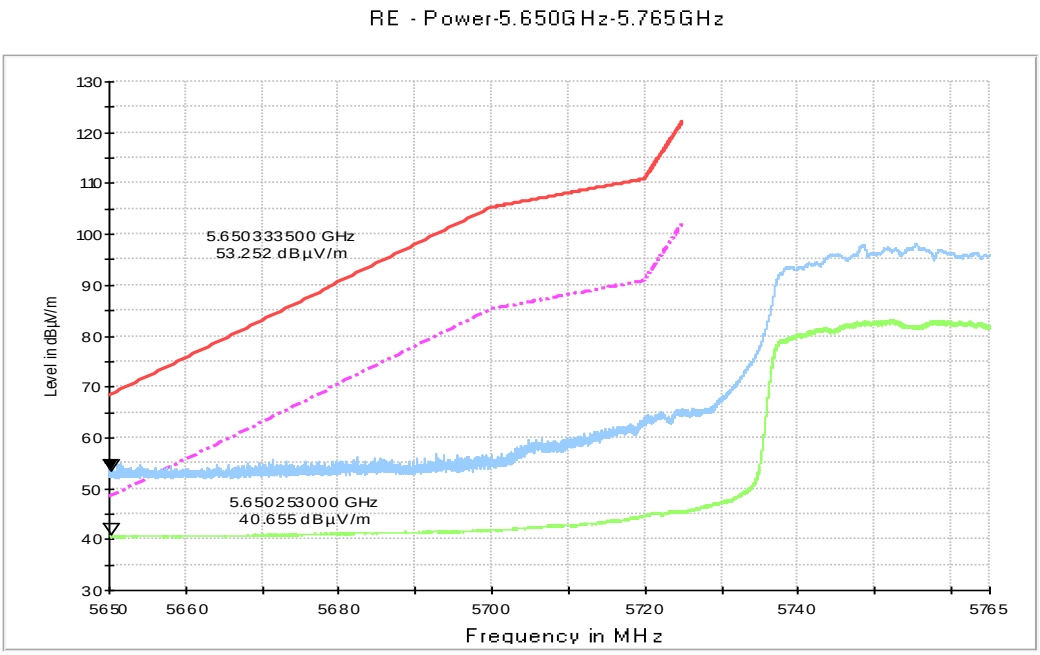



**Fig. 25 Band Edges (802.11ac-HT80, 5775MHz)**

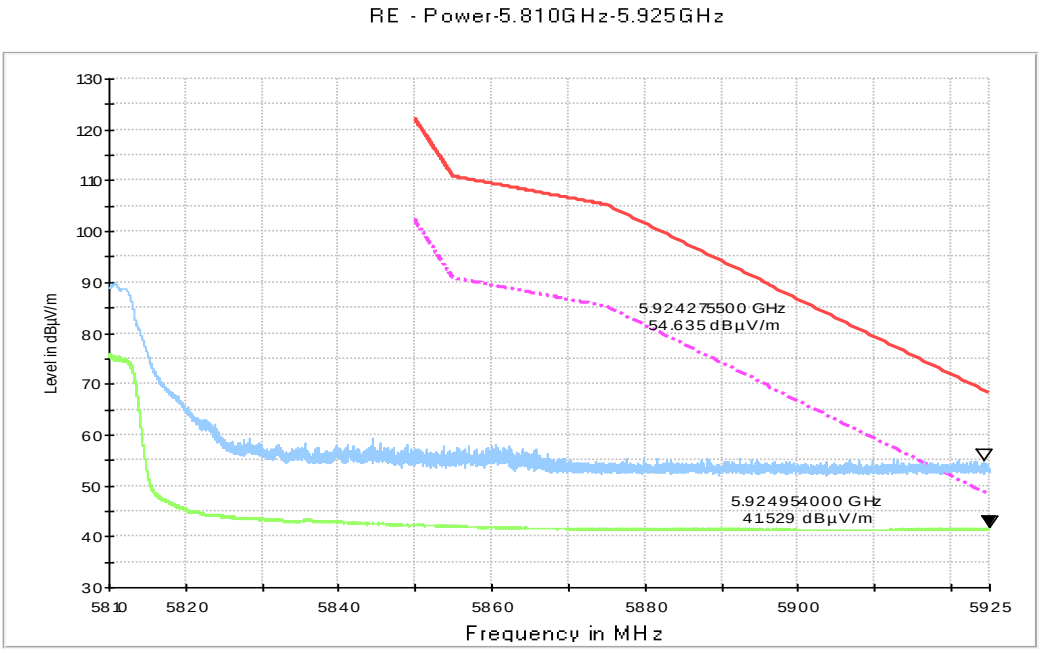



**Fig. 26 Band Edges (802.11ac-HT80, 5775MHz)**

## A.7. AC Powerline Conducted Emission

**Test Condition:**

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

**Measurement uncertainty:**

Expanded measurement uncertainty for this test item is U =3.10dB, k=2.

**Measurement Result and limit:**

WLAN (Quasi-peak Limit)

| Frequency range (MHz) | Quasi-peak Limit (dBμV) | Result (dBμV) | | Conclusion |
|---|---|---|---|---|
| | | With charger | | |
| | | 802.11a | Idle | |
| 0.15 to 0.5 | 66 to 56 | Fig.95 | Fig.96 | 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 (dBμV) | Result (dBμV) | | Conclusion |
|---|---|---|---|---|
| | | With charger | | |
| | | 802.11a | Idle | |
| 0.15 to 0.5 | 56 to 46 | Fig.95 | Fig.96 | 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:**

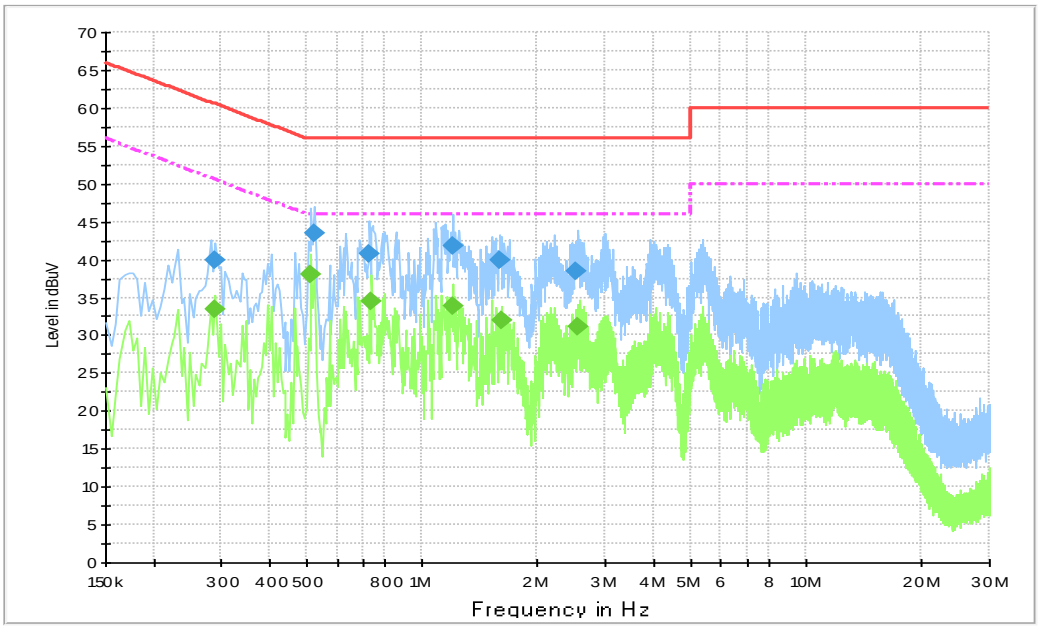



**Fig. 27 AC Power line Conducted Emission-802.11a**

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 (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|
| 0.289500 | 39.9 | 1000.0 | 9.000 | L1 | 19.9 | 20.6 | 60.5 |
| 0.523500 | 43.4 | 1000.0 | 9.000 | L1 | 20.0 | 12.6 | 56.0 |
| 0.730500 | 40.7 | 1000.0 | 9.000 | L1 | 19.9 | 15.3 | 56.0 |
| 1.203000 | 41.7 | 1000.0 | 9.000 | L1 | 19.8 | 14.3 | 56.0 |
| 1.599000 | 40.0 | 1000.0 | 9.000 | L1 | 19.8 | 16.0 | 56.0 |
| 2.521500 | 38.4 | 1000.0 | 9.000 | L1 | 19.8 | 17.6 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|
| 0.289500 | 33.3 | 1000.0 | 9.000 | L1 | 19.9 | 17.2 | 50.5 |
| 0.514500 | 38.1 | 1000.0 | 9.000 | L1 | 20.0 | 7.9 | 46.0 |
| 0.739500 | 34.5 | 1000.0 | 9.000 | L1 | 19.9 | 11.5 | 46.0 |
| 1.203000 | 33.8 | 1000.0 | 9.000 | L1 | 19.8 | 12.2 | 46.0 |
| 1.603500 | 31.9 | 1000.0 | 9.000 | L1 | 19.8 | 14.1 | 46.0 |
| 2.553000 | 31.1 | 1000.0 | 9.000 | L1 | 19.8 | 14.9 | 46.0 |

Note2: The measurement results showed here are worst cases of the combinations of different cables and chargers

**Idle:**

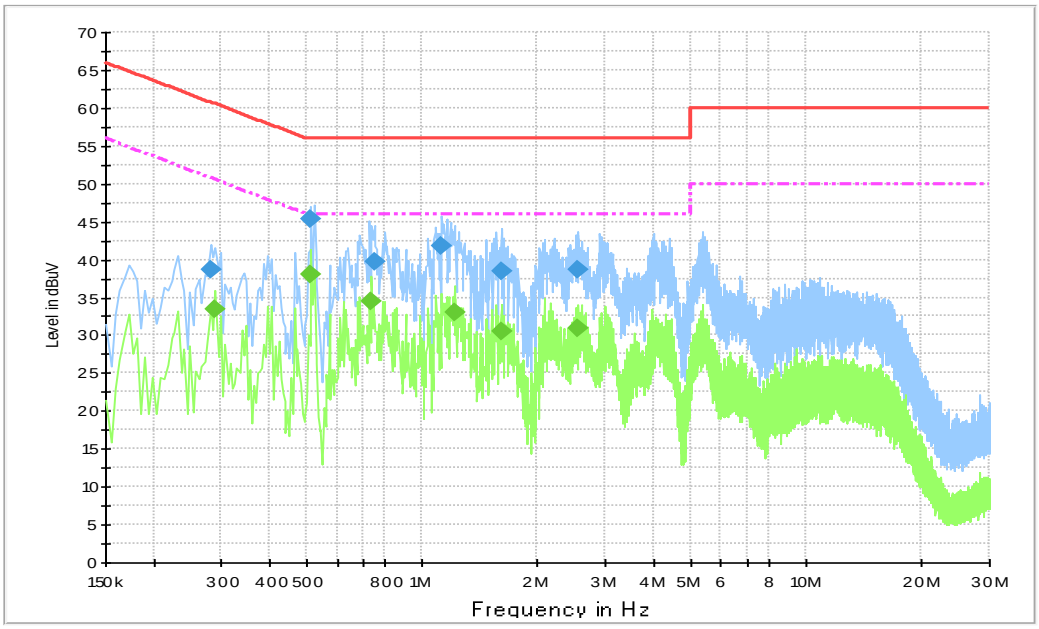



**Fig. 28 AC Power line Conducted Emission-Idle**

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 (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|
| 0.280500 | 38.6 | 1000.0 | 9.000 | L1 | 19.9 | 22.2 | 60.8 |
| 0.514500 | 45.3 | 1000.0 | 9.000 | L1 | 20.0 | 10.7 | 56.0 |
| 0.753000 | 39.6 | 1000.0 | 9.000 | L1 | 19.9 | 16.4 | 56.0 |
| 1.126500 | 41.7 | 1000.0 | 9.000 | L1 | 19.8 | 14.3 | 56.0 |
| 1.612500 | 38.4 | 1000.0 | 9.000 | L1 | 19.8 | 17.6 | 56.0 |
| 2.535000 | 38.8 | 1000.0 | 9.000 | L1 | 19.8 | 17.2 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|
| 0.289500 | 33.4 | 1000.0 | 9.000 | L1 | 19.9 | 17.2 | 50.5 |
| 0.514500 | 38.0 | 1000.0 | 9.000 | L1 | 20.0 | 8.0 | 46.0 |
| 0.739500 | 34.5 | 1000.0 | 9.000 | L1 | 19.9 | 11.5 | 46.0 |
| 1.212000 | 33.0 | 1000.0 | 9.000 | L1 | 19.8 | 13.0 | 46.0 |
| 1.612500 | 30.5 | 1000.0 | 9.000 | L1 | 19.8 | 15.5 | 46.0 |
| 2.557500 | 30.8 | 1000.0 | 9.000 | L1 | 19.8 | 15.2 | 46.0 |

Note2: The measurement results showed here are worst cases of the combinations of different cables and chargers

## ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ilac-MRA

**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).*

2020-09-29 through 2021-09-30
*Effective Dates*

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

*For the National Voluntary Laboratory Accreditation Program*

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