



FCC PART 15E TEST REPORT No.24T04Z102397-013

for

TCL Communication Ltd.

GSM/UMTS/LTE/NR Mobile phone

T440W

FCC ID:2ACCJH185

with

Hardware Version: 04

Software Version: 7ASK

Issued Date: 2024-12-31

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.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
24T04Z102397-013	Rev.0	1st edition	2024-12-09
24T04Z102397-013	Rev.1	Modified the antenna gain from average gain to peak gain in page 13. Add the plot of duty cycle on page 16. Add the Average power measurement procedures in page 48.	2024-12-31

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

CONTENTS

1. TEST LABORATORY	5
1.1. INTRODUCTION & ACCREDITATION	5
1.2. TESTING LOCATION	5
1.3. TESTING ENVIRONMENT	5
1.4. PROJECT DATE	5
1.5. SIGNATURE	5
2. CLIENT INFORMATION	6
2.1. APPLICANT INFORMATION	6
2.2. MANUFACTURER INFORMATION	6
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	7
3.1. ABOUT EUT	7
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST	7
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST	7
3.4. GENERAL DESCRIPTION	7
3.5. INTERPRETATION OF THE TEST ENVIRONMENT	8
4. REFERENCE DOCUMENTS	8
4.1. DOCUMENTS SUPPLIED BY APPLICANT	8
4.2. REFERENCE DOCUMENTS FOR TESTING	8
5. LABORATORY ENVIRONMENT	8
6. TEST RESULTS	9
6.1. SUMMARY OF TEST RESULTS	9
6.2. STATEMENTS	9
6.3. TEST CONDITIONS	9
7. TEST FACILITIES UTILIZED	10
8. MEASUREMENT UNCERTAINTY	11
8.1 TRANSMITTER OUTPUT POWER	11
8.2 PEAK POWER SPECTRAL DENSITY	11
8.3 26dB EMISSION BANDWIDTH	11
8.4 BAND EDGES COMPLIANCE	11
8.5 SPURIOUS EMISSIONS	11
8.6 AC POWER-LINE CONDUCTED EMISSION	11
ANNEX A: DETAILED TEST RESULTS	12
A.1. MEASUREMENT METHOD	12
A.2. MAXIMUM OUTPUT POWER	13
A.2.1 ANTENNA GAIN	13
A.2.2 MAXIMUM OUTPUT POWER-CONDUCTED	13

A.3. PEAK POWER SPECTRAL DENSITY (CONDUCTED)	17
A.4. 26dB EMISSION BANDWIDTH (CONDUCTED)	19
A.5. BAND EDGES COMPLIANCE	34
A5.1 BAND EDGES - RADIATED	34
A.6. TRANSMITTER SPURIOUS EMISSION	48
A.7. AC POWERLINE CONDUCTED EMISSION (150kHz- 30MHz)	73
A.8. 99% OCCUPIED BANDWIDTH	77
A.8. ANTENNA REQUIREMENT	82
A.9. POWER CONTROL	82
ANNEX B: EUT PARAMETERS	82
ANNEX C: ACCREDITATION CERTIFICATE	83

1. Test Laboratory

1.1. Introduction & Accreditation

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

1.2. Testing Location

Conducted testing Location: CTTL(Huayuan North Road)

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

Radiated testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
100191, P. R. China

1.3. Testing Environment

Normal Temperature: 15-35°C

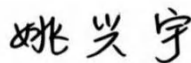
Relative Humidity: 20-75%

1.4. Project date

Testing Start Date: 2024-10-24

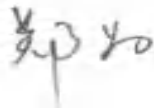
Testing End Date: 2024-12-09

1.5. Signature



Yao Xingyu

(Prepared this test report)



Zheng Wei

(Reviewed this test report)



Pang Shuai

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
Address/Post: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Contact Person: Ting Wang
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Fax: 0086-755-36612000-81722

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address/Post: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Contact Person: Ting Wang
Contact Email: ting.wang.hz@tcl.com
Telephone: +86 752 2639091
Fax: 0086-755-36612000-81722

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

3.1. About EUT

Description	GSM/UMTS/LTE/NR Mobile phone
Model name	T440W
FCC ID	2ACCJH185
WLAN Frequency Band	ISM Bands: -5150MHz~5250MHz -5250MHz~5350MHz -5470MHz~5725MHz
Type of modulation	OFDM
Antenna	Integral Antenna
Nominal Voltage	3.87V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.6V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
UT41a	016601000004058/ 016601000004066	04	7ASK	2024-10-22
UT39a	016601000003852/ 016601000003860	04	7ASK	2024-10-24

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

UT41a is used for Conduction test, UT39a is used for Radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Note	Manufacturer
AE1-1	Battery	TLp029M9	FENGHUA
AE1-2	Battery	TLp029M7	VEKEN
AE2	Charger	/	/
AE3	USB cable	CDA0000302C1	Juwei
AE4	Headset	/	/

*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 GSM/UMTS/LTE/NR Mobile phone with integrated antenna and inbuilt battery.

It consists of normal options: travel charger, USB cable.

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

Samples undergoing test were selected by the client.

3.5. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor $k=2$.

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

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	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices	2021
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033 D02	General U-NII Test Procedures New Rules v02r01	2017-12

5. Laboratory Environment

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

6. Test Results

6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	Sub-clause of IC	Verdict
Maximum Output Power	15.407	/	P
Peak Power Spectral Density	15.407	/	P
Occupied 26dB Bandwidth	15.403	/	P
Band edge compliance (Radiated)	15.209	/	P
Transmitter spurious emissions (Radiated)	15.407	/	P
AC Powerline Conducted Emission (150kHz- 30MHz)	15.407	/	P
99% Occupied bandwidth	/	/	P
Transmit Power Control	15.407	/	NA

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

Terms used in Verdict column

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

6.2. Statements

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

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

6.3. Test Conditions

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

Temperature	26°C
Voltage	3.87V
Humidity	44%

7. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2025-08-12
2	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2025-04-01
3	Test Receiver	ESCI	100344	R&S	1 year	2025-04-01
4	LISN	ENV216	101200	R&S	1 year	2025-05-16
5	Attenuator	10dB/2W	/	Rosenberger	/	/
6	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103023	R&S	1 year	2025-06-06
2	Test Receiver	ESW44	103015	R&S	1 year	2025-01-18
3	EMI Antenna	HFH2-Z2	829324/007	R&S	1 year	2025-01-04
4	EMI Antenna	VULB 9163	01222	SCHWARZBECK	1 year	2025-09-11
5	EMI Antenna	3115	00167250	ETS-Lindgren	1 year	2025-04-11
6	EMI Antenna	3116	2663	ETS-Lindgren	1 year	2025-02-21

Test Item	Test Software and Version	Software Vendor
Conducted emission	EMC32 V8.53.0	R&S
Radiated emission	EMC32 V11.50.00	R&S

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 26dB Emission 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	4.92
$30\text{MHz} \leq f \leq 1\text{GHz}$	4.72
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.84
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.12

8.6 AC Power-line Conducted Emission

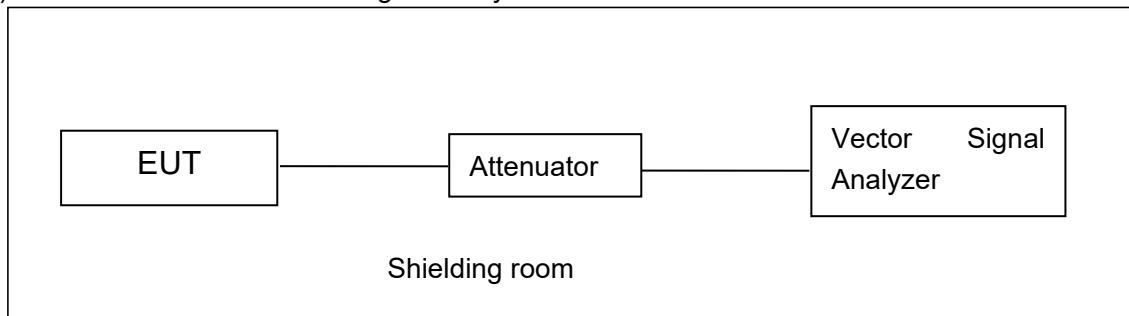
Measurement Uncertainty : 3.08dB,k=2

ANNEX A: Detailed Test 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

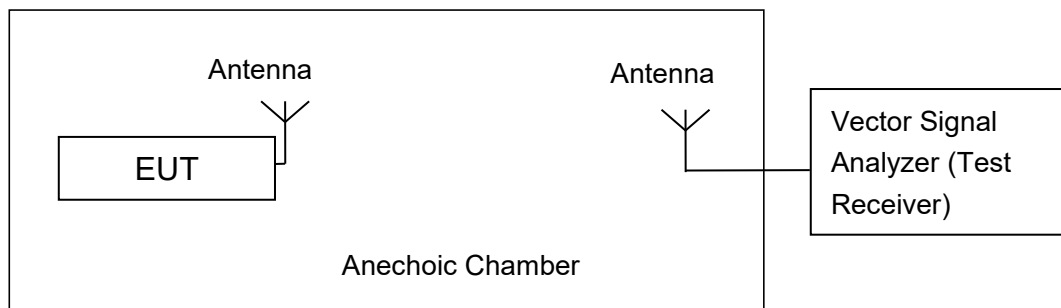


A.1.2. Radiated Emission Measurements

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 = 3MHz;



The measurement is made according to KDB 789033

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 output Power

Measurement Limit and Method:

Standard	Frequency (MHz)	Limit (dBm)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	24dBm
	5250MHz~5350MHz	24dBm or 11+10logB
	5470MHz~5725MHz	24dBm or 11+10logB

Limit use the less value, and B is the 26dB bandwidth.

The measurement method SA-2 is made according to KDB 789033

A.2.1 Antenna Gain

Antenna peak gain is -2.2dBi and the value is supplied by the applicant or manufacturer.

A.2.2 Maximum output Power-Conducted

EUT ID: UT41a

Measurement Results:

802.11a mode

Mode	Frequency	Test Result (dBm)							
		Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
802.11a	5180MHz	18.78	/	/	/	/	/	/	/
	5200MHz	19.17	/	/	/	/	/	/	/
	5240MHz	19.25	/	/	/	/	/	/	/
	5260MHz	19.24	/	/	/	/	/	/	/
	5280MHz	19.32	/	/	/	/	/	/	/
	5320MHz	19.19	/	/	/	/	/	/	/
	5500MHz	19.42	/	/	/	/	/	/	/
	5580MHz	18.40	/	/	/	/	/	/	/
	5700MHz	19.29	/	/	/	/	/	/	/
	5720MHz	19.17	/	/	/	/	/	/	/

The data rate 6Mbps is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT20 mode

Mode	Frequency	Test Result (dBm)							
		Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n (HT20)	5180MHz	18.72	/	/	/	/	/	/	/
	5200MHz	19.07	/	/	/	/	/	/	/
	5240MHz	19.20	/	/	/	/	/	/	/
	5260MHz	19.16	/	/	/	/	/	/	/
	5280MHz	19.23	/	/	/	/	/	/	/
	5320MHz	19.11	/	/	/	/	/	/	/
	5500MHz	19.32	/	/	/	/	/	/	/

	5580MHz	18.29	/	/	/	/	/	/	/
	5700MHz	19.14	/	/	/	/	/	/	/
	5720MHz	19.07	/	/	/	/	/	/	/

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

802.11ac-VHT20 mode

Mode	Frequency	Test Result (dBm)								
		Data Rate								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
802.11ac (VHT20)	5180MHz	18.74	/	/	/	/	/	/	/	/
	5200MHz	19.09	/	/	/	/	/	/	/	/
	5240MHz	19.25	/	/	/	/	/	/	/	/
	5260MHz	19.20	/	/	/	/	/	/	/	/
	5280MHz	19.26	/	/	/	/	/	/	/	/
	5320MHz	19.11	/	/	/	/	/	/	/	/
	5500MHz	19.36	/	/	/	/	/	/	/	/
	5580MHz	18.32	/	/	/	/	/	/	/	/
	5700MHz	19.21	/	/	/	/	/	/	/	/
	5720MHz	19.10	/	/	/	/	/	/	/	/

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

802.11n-HT40 mode

Mode	Frequency	Test Result (dBm)							
		Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n (HT40)	5190MHz	17.07	/	/	/	/	/	/	/
	5230MHz	17.36	/	/	/	/	/	/	/
	5270MHz	17.35	/	/	/	/	/	/	/
	5310MHz	17.40	/	/	/	/	/	/	/
	5510MHz	17.87	/	/	/	/	/	/	/
	5550MHz	17.36	/	/	/	/	/	/	/
	5670MHz	16.83	/	/	/	/	/	/	/
	5710MHz	17.39	/	/	/	/	/	/	/

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

802.11ac-VHT40 mode

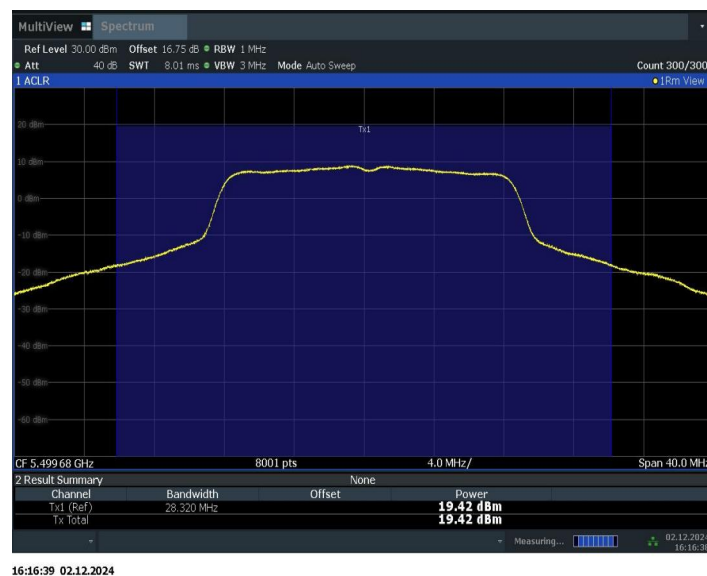
Mode	Frequency	Test Result (dBm)									
		Data Rate									
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
802.11ac (VHT40)	5190MHz	17.08	/	/	/	/	/	/	/	/	/
	5230MHz	17.34	/	/	/	/	/	/	/	/	/
	5270MHz	17.35	/	/	/	/	/	/	/	/	/
	5310MHz	17.43	/	/	/	/	/	/	/	/	/
	5510MHz	17.90	/	/	/	/	/	/	/	/	/
	5550MHz	17.39	/	/	/	/	/	/	/	/	/
	5670MHz	16.81	/	/	/	/	/	/	/	/	/
	5710MHz	17.38	/	/	/	/	/	/	/	/	/

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

802.11ac-VHT80 mode

Mode	Frequency	Test Result (dBm)									
		Data Rate									
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
802.11ac (VHT80)	5210MHz	16.21	/	/	/	/	/	/	/	/	/
	5290MHz	16.69	/	/	/	/	/	/	/	/	/
	5530MHz	16.87	/	/	/	/	/	/	/	/	/
	5610MHz	15.54	/	/	/	/	/	/	/	/	/
	5690MHz	16.41	/	/	/	/	/	/	/	/	/

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



Maximum output Power: 11a CH100

The duty cycle of all mode are 98%



Duty cycle

Conclusion: PASS

A.3. Peak Power Spectral Density (conducted)

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	11
	5250MHz~5350MHz	11
	5470MHz~5725MHz	11

The output power measurement method Section F is made according to KDB 789033

EUT ID: UT41a

Measurement Results:

TestMode	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	5180	8.27	≤11.00	PASS
	5200	8.60	≤11.00	PASS
	5240	8.81	≤11.00	PASS
	5260	8.60	≤11.00	PASS
	5280	8.73	≤11.00	PASS
	5320	8.71	≤11.00	PASS
	5500	9.16	≤11.00	PASS
	5580	8.13	≤11.00	PASS
	5700	8.79	≤11.00	PASS
	5720	8.65	≤11.00	PASS
11AC20SISO	5180	8.34	≤11.00	PASS
	5200	8.29	≤11.00	PASS
	5240	8.57	≤11.00	PASS
	5260	8.26	≤11.00	PASS
	5280	8.49	≤11.00	PASS
	5320	8.33	≤11.00	PASS
	5500	8.47	≤11.00	PASS
	5580	7.37	≤11.00	PASS
	5700	8.41	≤11.00	PASS
	5720	8.17	≤11.00	PASS
11AC40SISO	5190	3.36	≤11.00	PASS
	5230	3.55	≤11.00	PASS
	5270	3.23	≤11.00	PASS
	5310	3.51	≤11.00	PASS
	5510	3.81	≤11.00	PASS
	5550	3.48	≤11.00	PASS
	5670	2.82	≤11.00	PASS
	5710	3.55	≤11.00	PASS
11AC80SISO	5210	-0.71	≤11.00	PASS
	5290	-0.28	≤11.00	PASS
	5530	0.30	≤11.00	PASS

	5610	-1.06	≤ 11.00	PASS
	5690	-0.27	≤ 11.00	PASS



Peak Power Spectral Density:11a CH100

Conclusion: PASS

A.4. 26dB Emission Bandwidth (conducted)

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.403 (i)	/

The measurement is made according to KDB 789033

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz
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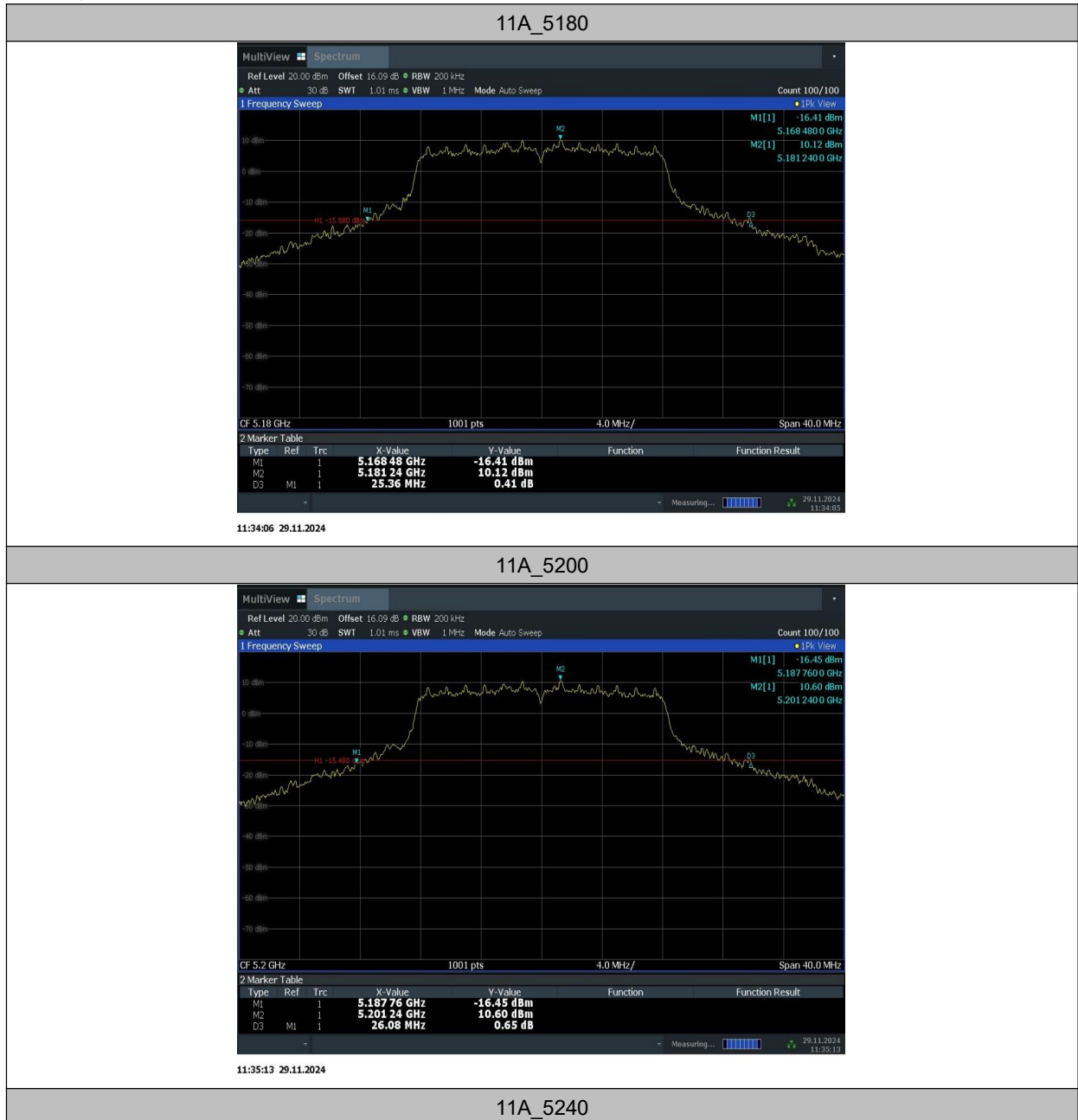
EUT ID: UT41a

Measurement Result:

TestMode	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	5180	25.36	5168.48	5193.84	---	---
	5200	26.08	5187.76	5213.84	---	---
	5240	25.56	5228.28	5253.84	---	---
	5260	26.04	5247.84	5273.88	---	---
	5280	26.72	5267.12	5293.84	---	---
	5320	25.92	5307.96	5333.88	---	---
	5500	28.32	5485.52	5513.84	---	---
	5580	26.84	5567.00	5593.84	---	---
	5700	26.80	5687.00	5713.80	---	---
	5720	26.84	5707.00	5733.84	---	---
11AC20SISO	5180	27.04	5167.36	5194.40	---	---
	5200	27.44	5186.96	5214.40	---	---
	5240	26.24	5227.32	5253.56	---	---
	5260	28.00	5246.48	5274.48	---	---
	5280	26.72	5266.76	5293.48	---	---
	5320	27.76	5306.64	5334.40	---	---
	5500	29.56	5484.88	5514.44	---	---
	5580	27.92	5565.88	5593.80	---	---
	5700	27.88	5685.88	5713.76	---	---
	5720	27.20	5706.12	5733.32	---	---
11AC40SISO	5190	42.00	5168.88	5210.88	---	---
	5230	42.08	5208.72	5250.80	---	---
	5270	42.16	5248.64	5290.80	---	---
	5310	42.24	5288.80	5331.04	---	---
	5510	54.56	5476.48	5531.04	---	---
	5550	50.56	5520.48	5571.04	---	---
	5670	50.96	5640.24	5691.20	---	---
	5710	48.64	5682.48	5731.12	---	---
11AC80SISO	5210	93.60	5162.64	5256.24	---	---
	5290	93.92	5242.32	5336.24	---	---

	5530	102.40	5470.48	5572.88	---	---
	5610	104.96	5550.48	5655.44	---	---
	5690	105.28	5630.80	5736.08	---	---

Test graphs as below:





11:36:17 29.11.2024

11A_5260



11:37:17 29.11.2024

11A_5280



11:38:28 29.11.2024

11A_5320



11:39:32 29.11.2024

11A_5500



11:40:33 29.11.2024

11A_5580



11:41:51 29.11.2024

11A_5700



11:43:09 29.11.2024

11A_5720



11:44:20 29.11.2024

11AC20SISO_5180



12:16:16 29.11.2024

11AC20SISO 5200



12:17:23 29.11.2024

11AC20SISO_5240



12:18:34 29.11.2024

11AC20SISO_5260



12:19:39 29.11.2024

11AC20SISO_5280



12:21:36 29.11.2024

11AC20SISO_5320



12:36:03 29.11.2024

11AC20SISO_5500



12:37:10 29.11.2024

11AC20SISO_5580



12:38:26 29.11.2024

11AC20SISO_5700



12:39:38 29.11.2024

11AC20SISO_5720



12:48:00 29.11.2024

11AC40SISO_5190



13:09:22 29.11.2024

11AC40SISO_5230



13:12:38 29.11.2024

11AC40SISO_5270



13:14:23 29.11.2024

11AC40SISO_5310



15:08:37 29.11.2024

11AC40SISO_5510



15:09:45 29.11.2024

11AC40SISO_5550



15:11:08 29.11.2024

11AC40SISO_5670



15:12:13 29.11.2024

11AC40SISO_5710



11AC80SISO_5210



11AC80SISO_5290



11AC80SISO_5530



15:24:45 29.11.2024

11AC80SISO_5610



15:25:48 29.11.2024

11AC80SISO_5690



Conclusion: PASS

A.5. Band Edges Compliance

A5.1 Band Edges - Radiated

Measurement Limit:

Standard	Limit (dB μ V/m)	
FCC 47 CFR Part 15.209	Peak	74
	Average	54

The measurement is made according to KDB 789033

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	5180 MHz	Fig.1	P
	5320 MHz	Fig.2	P
	5500 MHz	Fig.3	P
	5700 MHz	Fig.4	P
802.11n HT20	5180 MHz	Fig.5	P
	5320 MHz	Fig.6	P
	5500 MHz	Fig.7	P
	5700 MHz	Fig.8	P
802.11n HT40	5190 MHz	Fig.9	P
	5310 MHz	Fig.10	P
	5510 MHz	Fig.11	P
	5670 MHz	Fig.12	P
802.11ac HT20	5180 MHz	Fig.13	P
	5320 MHz	Fig.14	P
	5500 MHz	Fig.15	P
	5700 MHz	Fig.16	P
802.11ac HT40	5190 MHz	Fig.17	P
	5310 MHz	Fig.18	P
	5510 MHz	Fig.19	P
	5670 MHz	Fig.20	P
802.11ac HT80	5210MHz	Fig.21	P
	5290MHz	Fig.22	P

	5530MHz	Fig.23	P
	5610MHz	Fig.24	P

Conclusion: PASS

Test graphs as below:

Full Spectrum

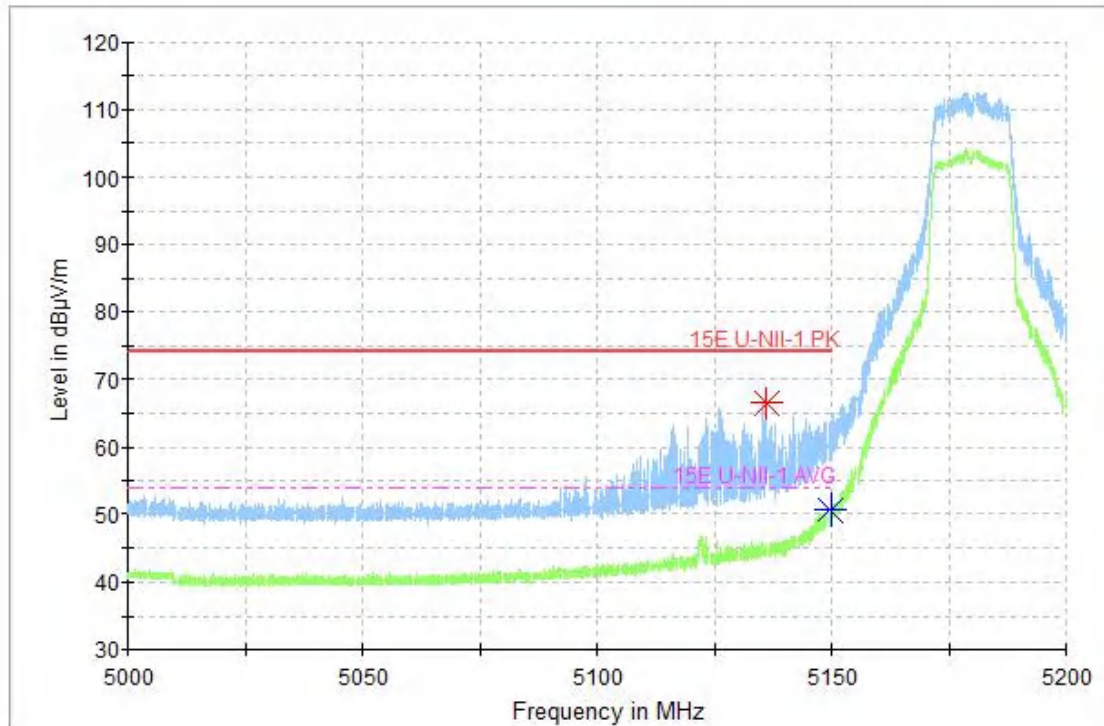
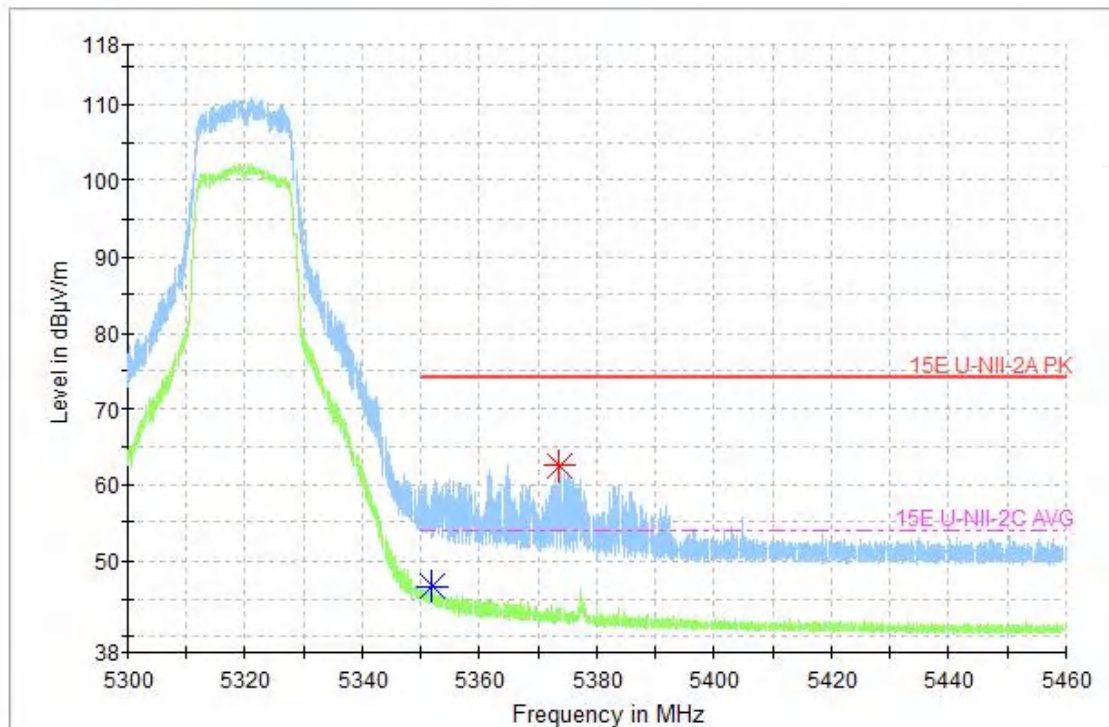
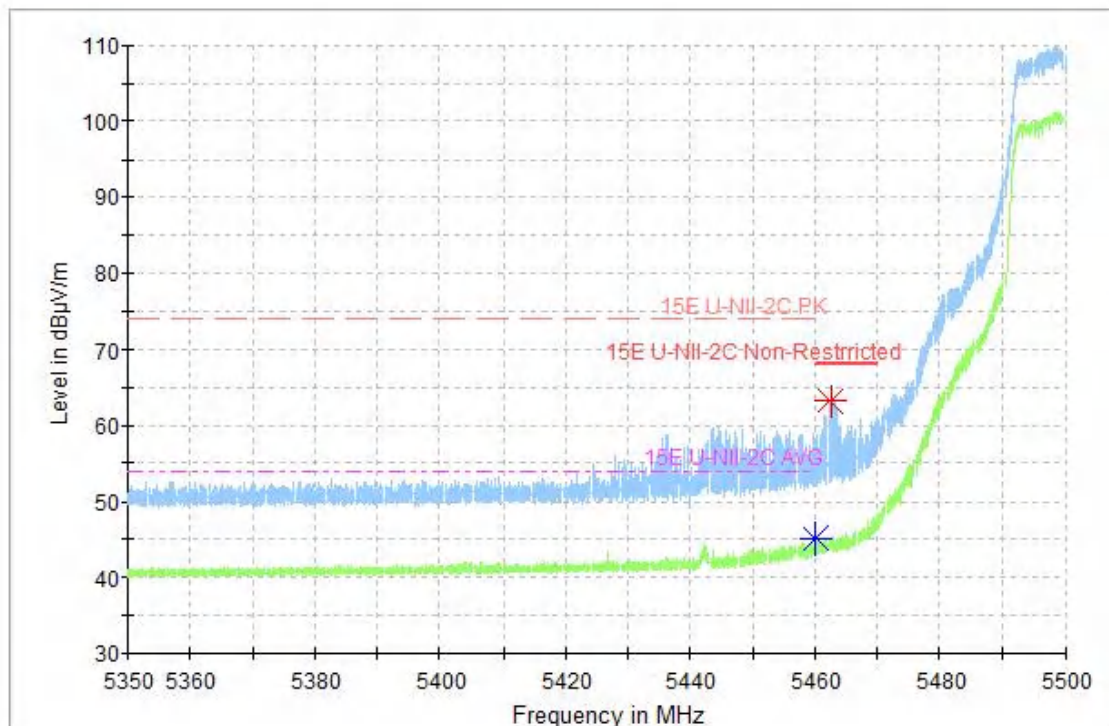


Fig. 1 Band Edges (802.11a Ch36, 5180MHz)

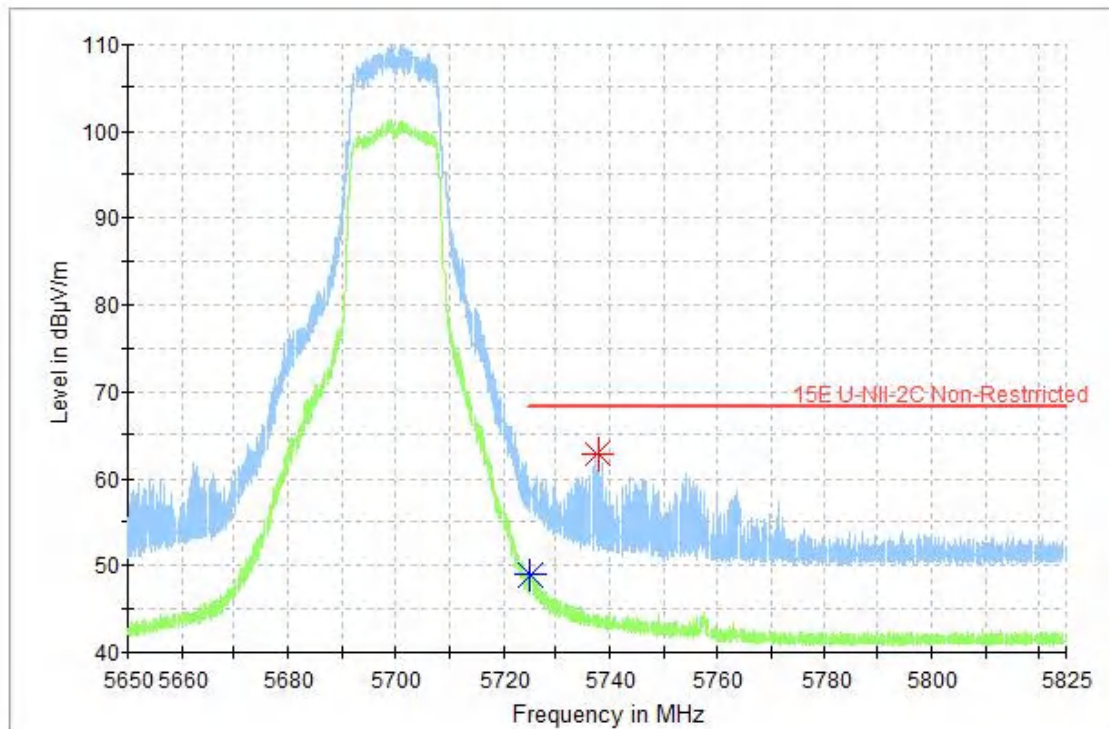
Full Spectrum


Fig. 2 Band Edges (802.11a Ch64, 5320MHz)

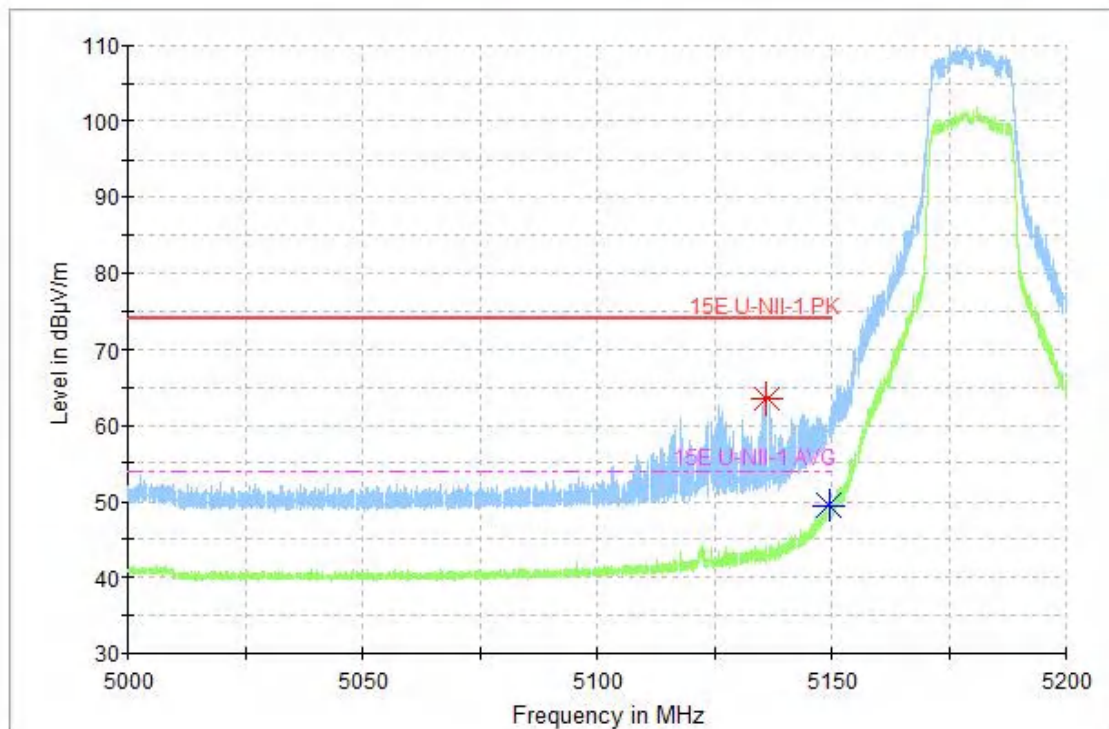
Full Spectrum


Fig. 3 Band Edges (802.11a Ch100, 5500MHz)

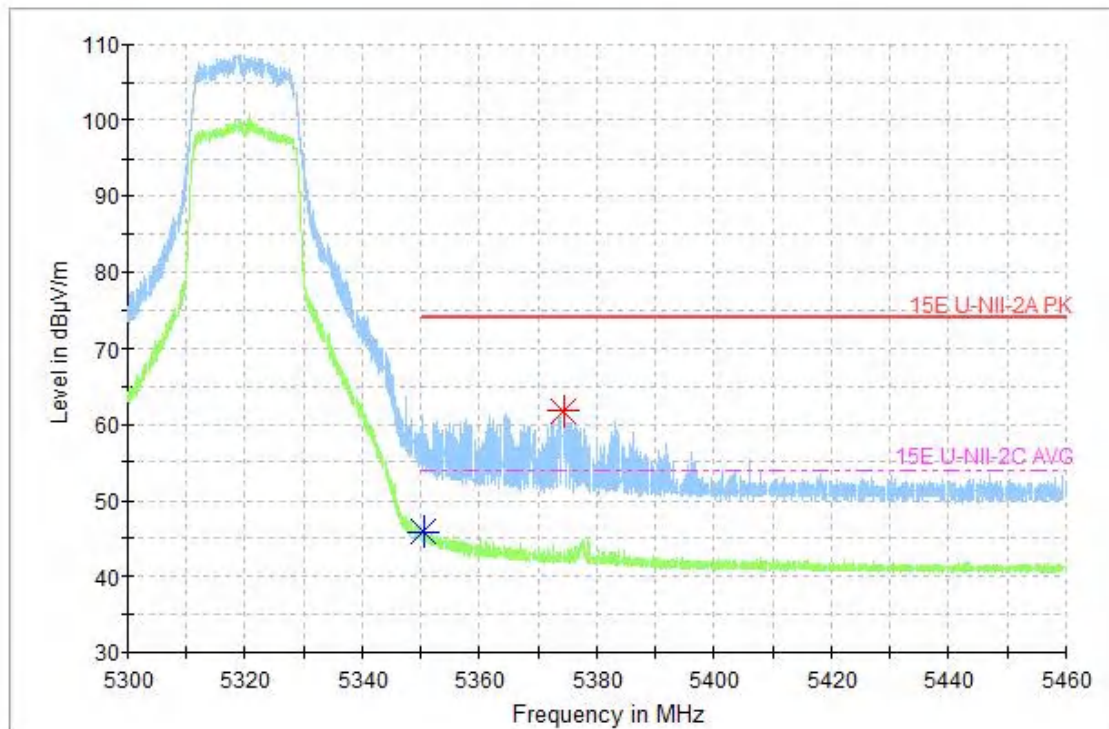
Full Spectrum


Fig. 4 Band Edges (802.11a Ch140, 5700MHz)

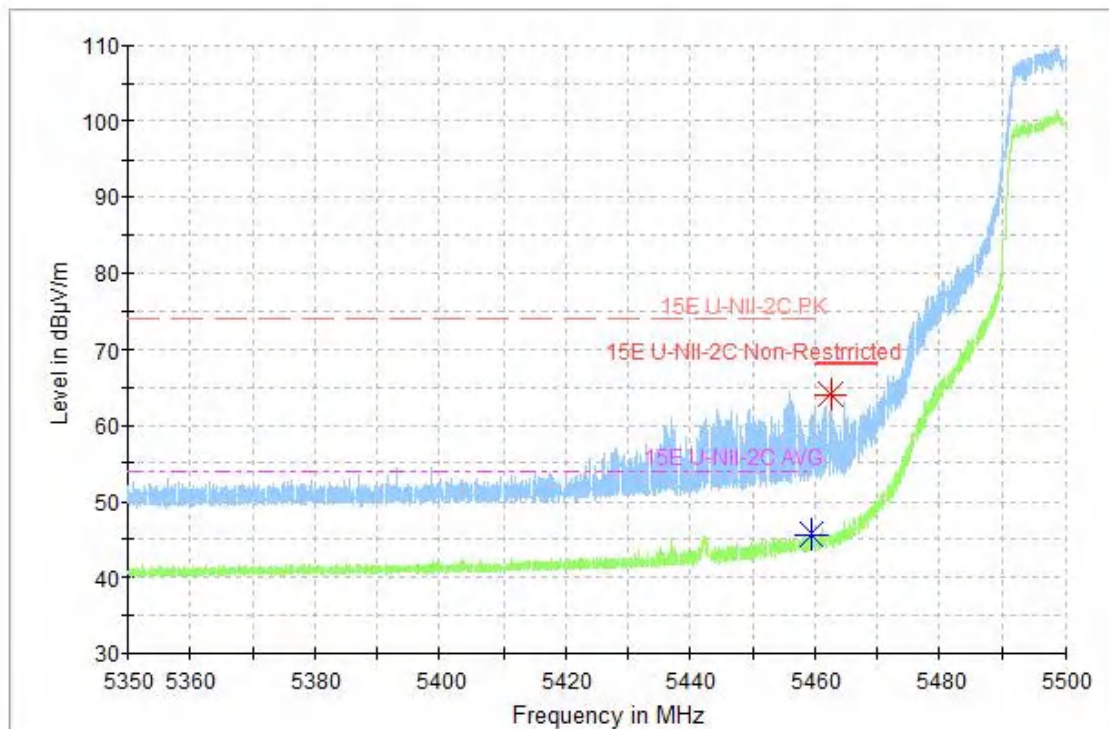
Full Spectrum


Fig. 5 Band Edges (802.11n-HT20 Ch36, 5180MHz)

Full Spectrum


Fig. 6 Band Edges (802.11n-HT20 Ch64, 5320MHz)

Full Spectrum


Fig. 7 Band Edges (802.11n-HT20 Ch100, 5500MHz)

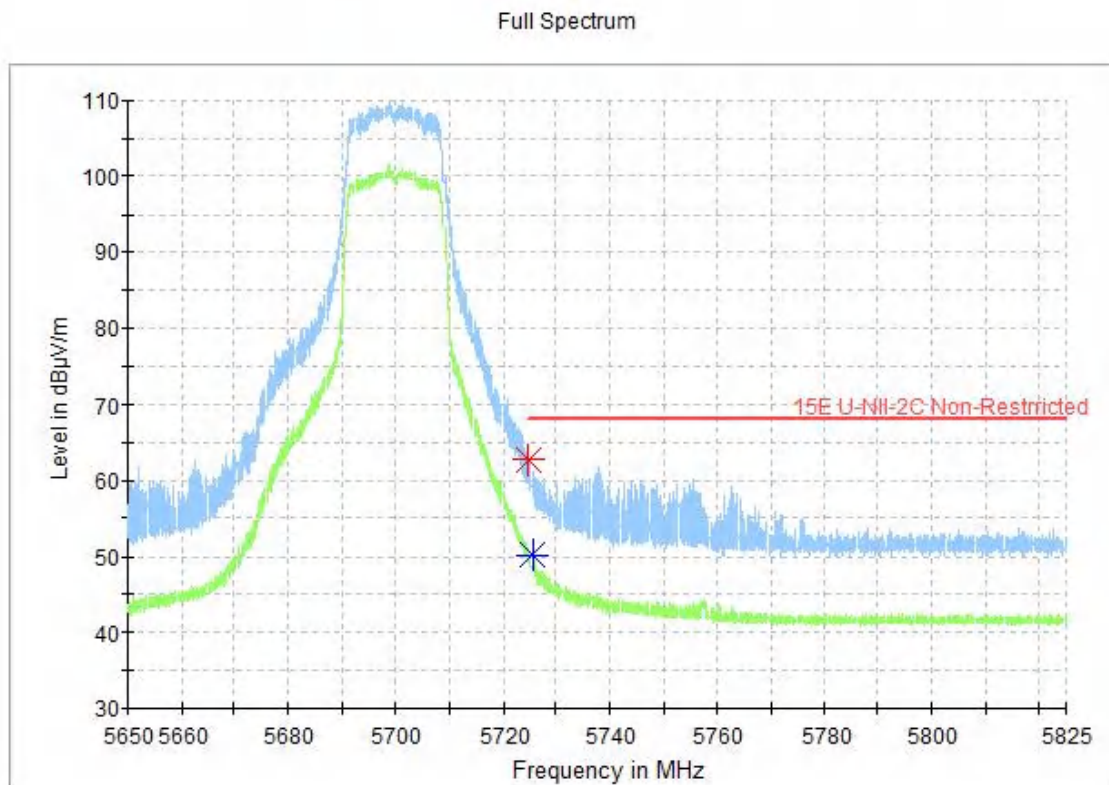


Fig. 8 Band Edges (802.11n-HT20 Ch140, 5700MHz)

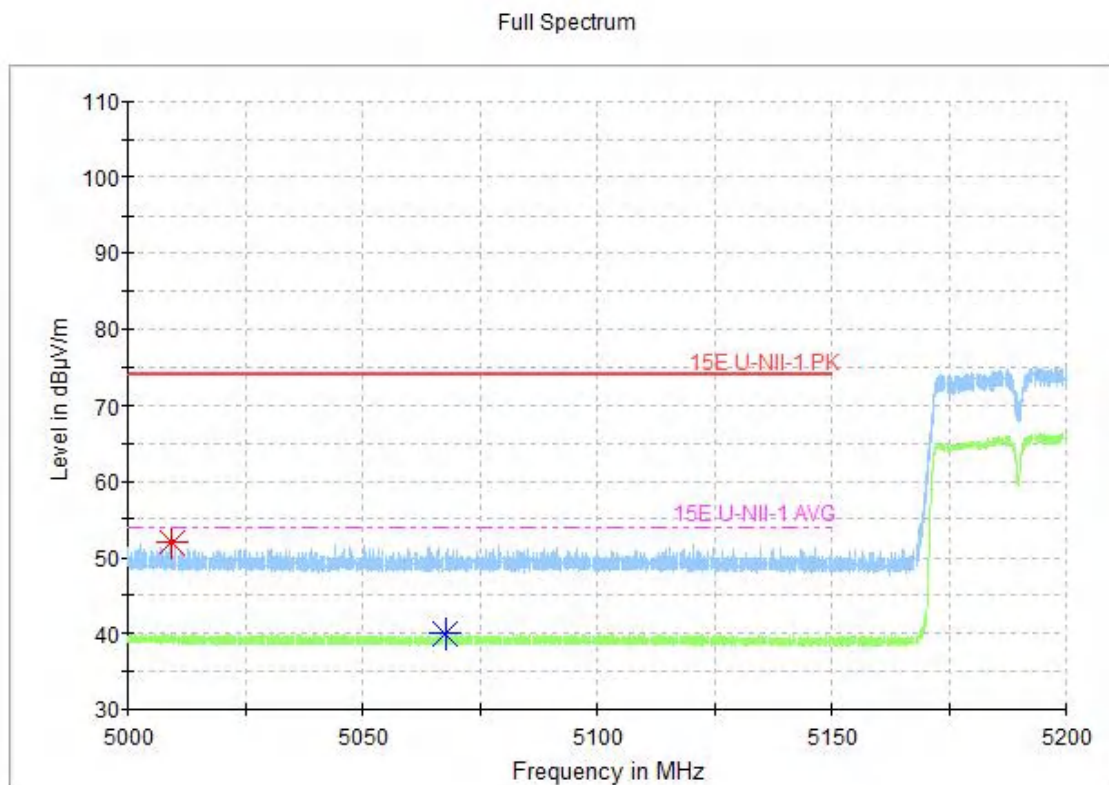


Fig. 9 Band Edges (802.11n-HT40 Ch38, 5190MHz)

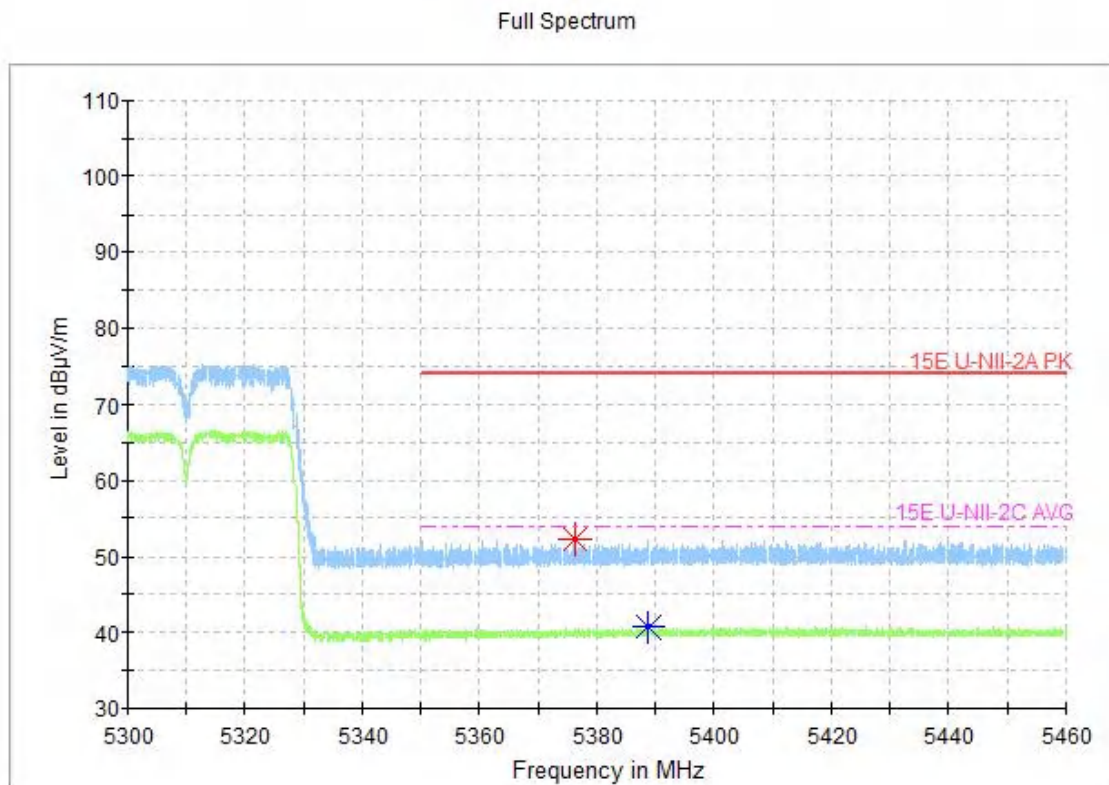


Fig. 10 Band Edges (802.11n-HT40 Ch62, 5310MHz)

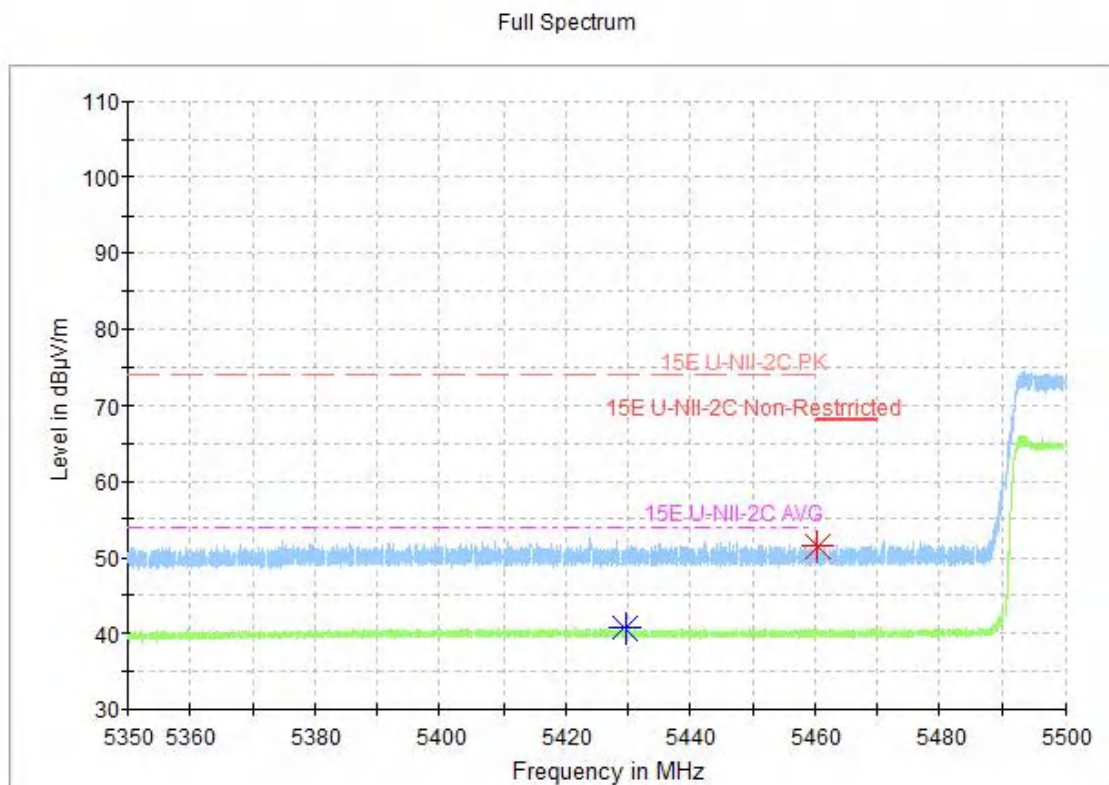


Fig. 11 Band Edges (802.11n-HT40 Ch102, 5510MHz)

Full Spectrum

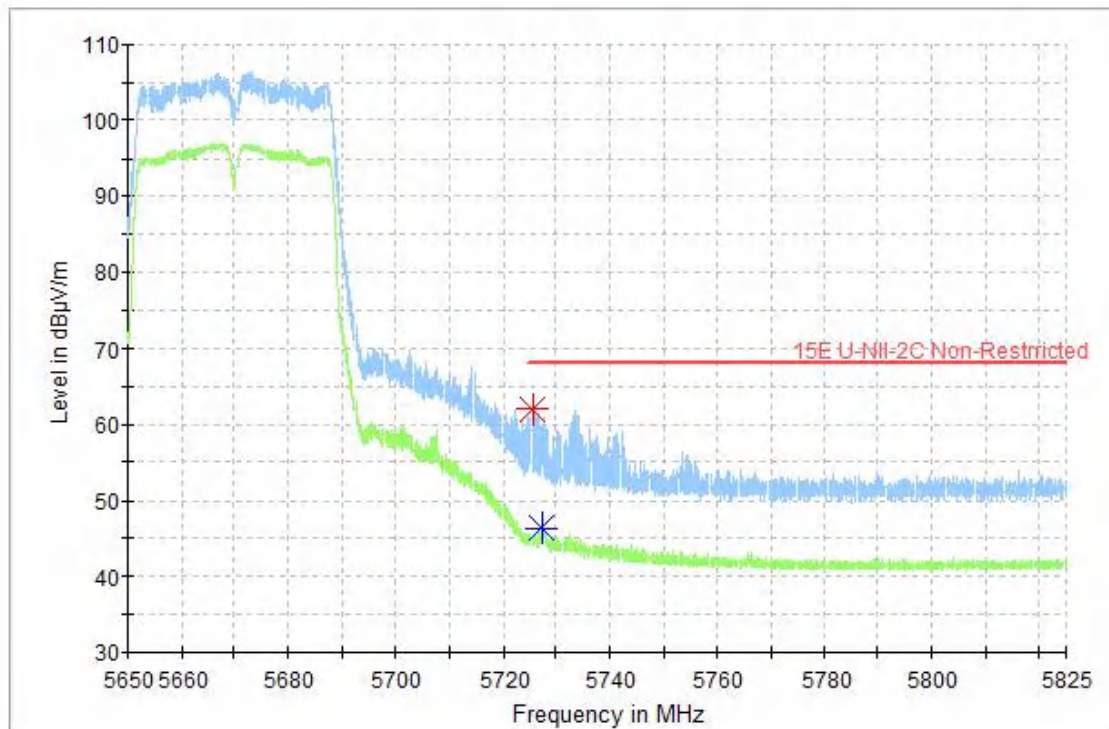


Fig. 12 Band Edges (802.11n-HT40 Ch134, 5670MHz)

Full Spectrum

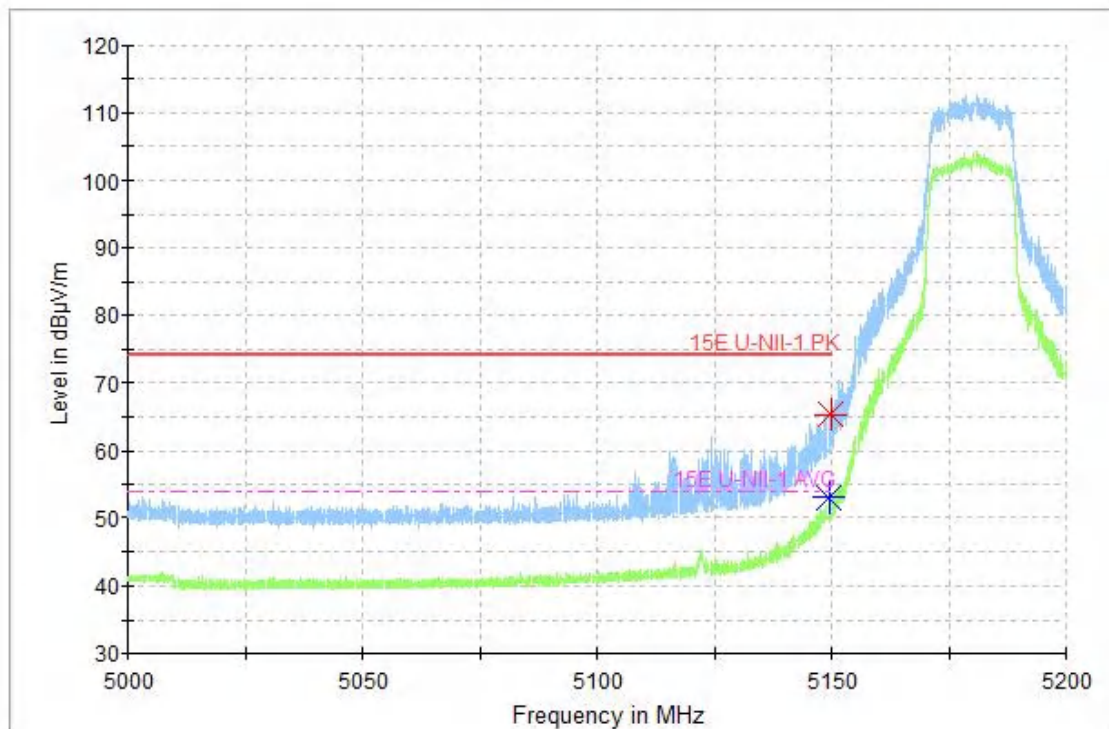


Fig. 13 Band Edges (802.11ac-HT20 Ch36, 5180MHz)

Full Spectrum

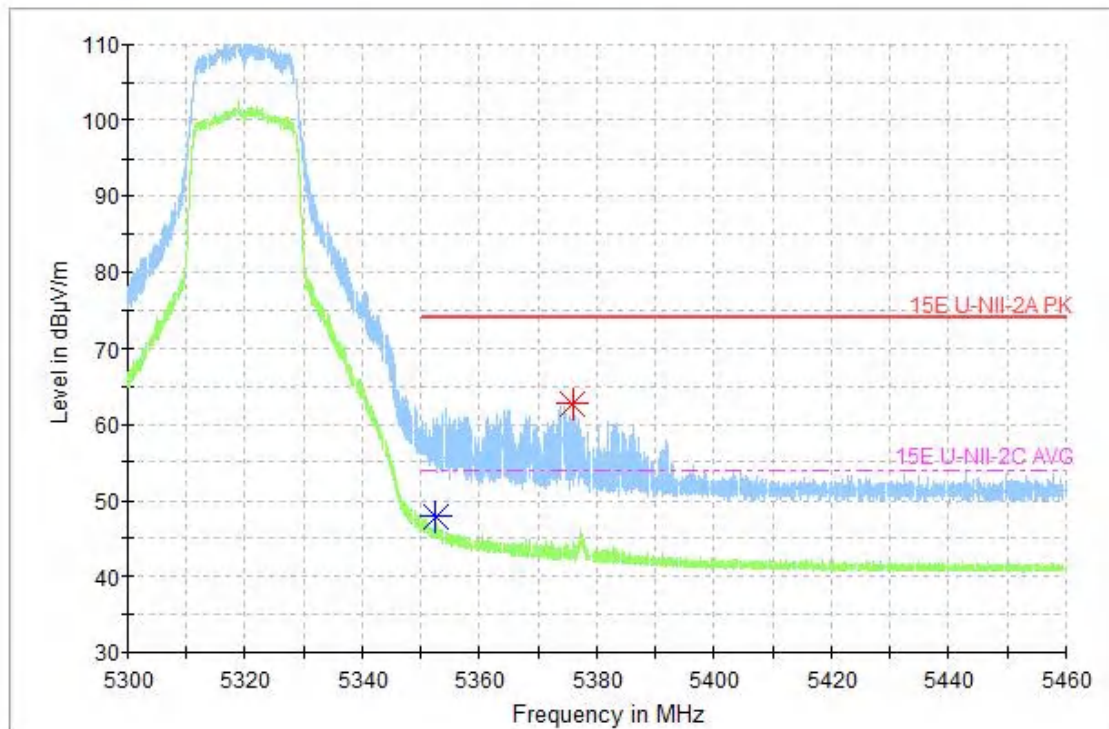


Fig. 14 Band Edges (802.11ac-HT20 Ch64, 5320MHz)

Full Spectrum

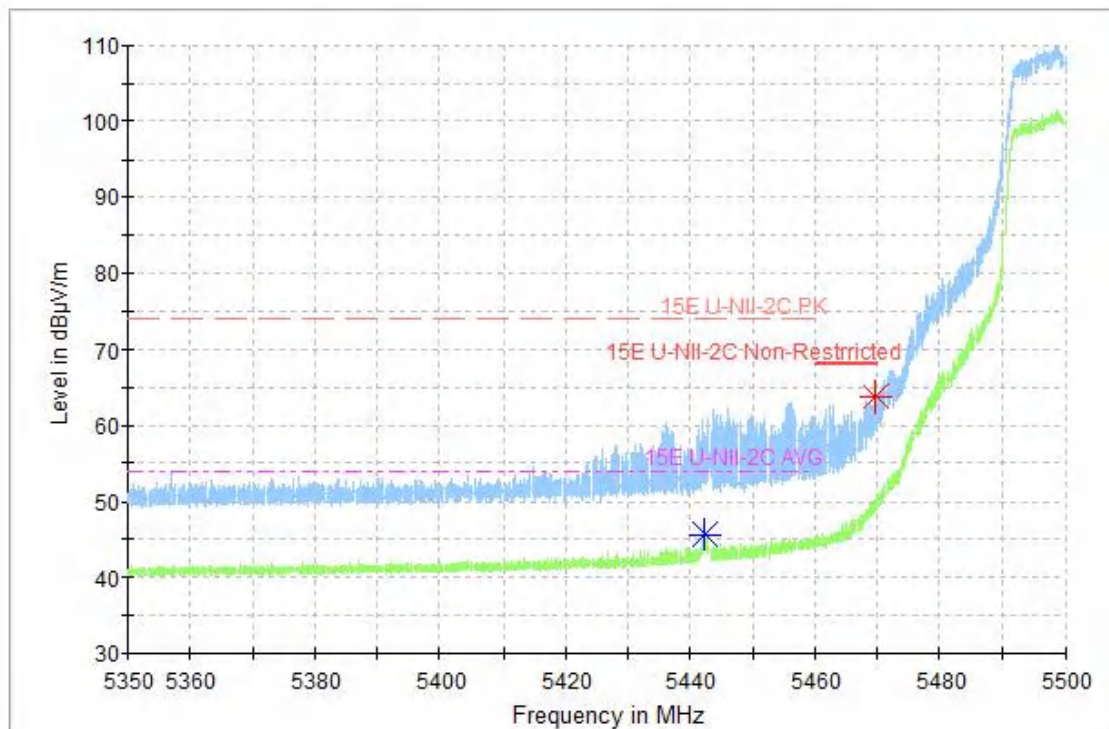


Fig. 15 Band Edges (802.11ac-HT20 Ch100, 5500MHz)

Full Spectrum

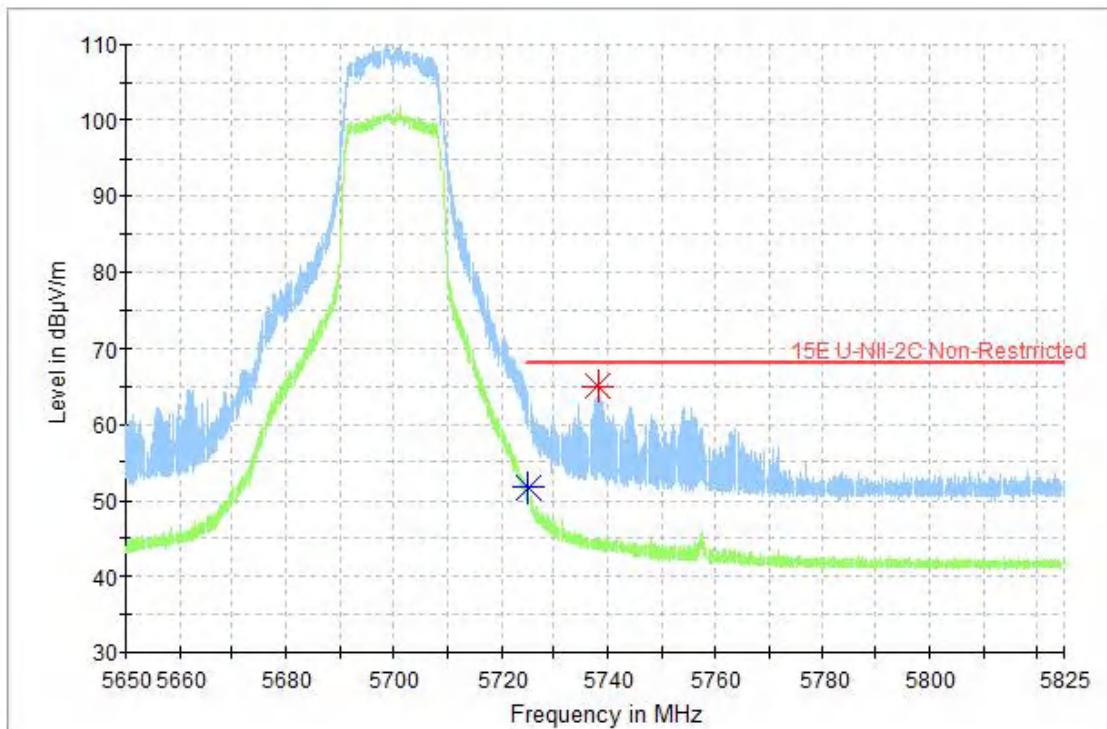


Fig. 16 Band Edges (802.11ac-HT20 Ch140, 5700MHz)

Full Spectrum

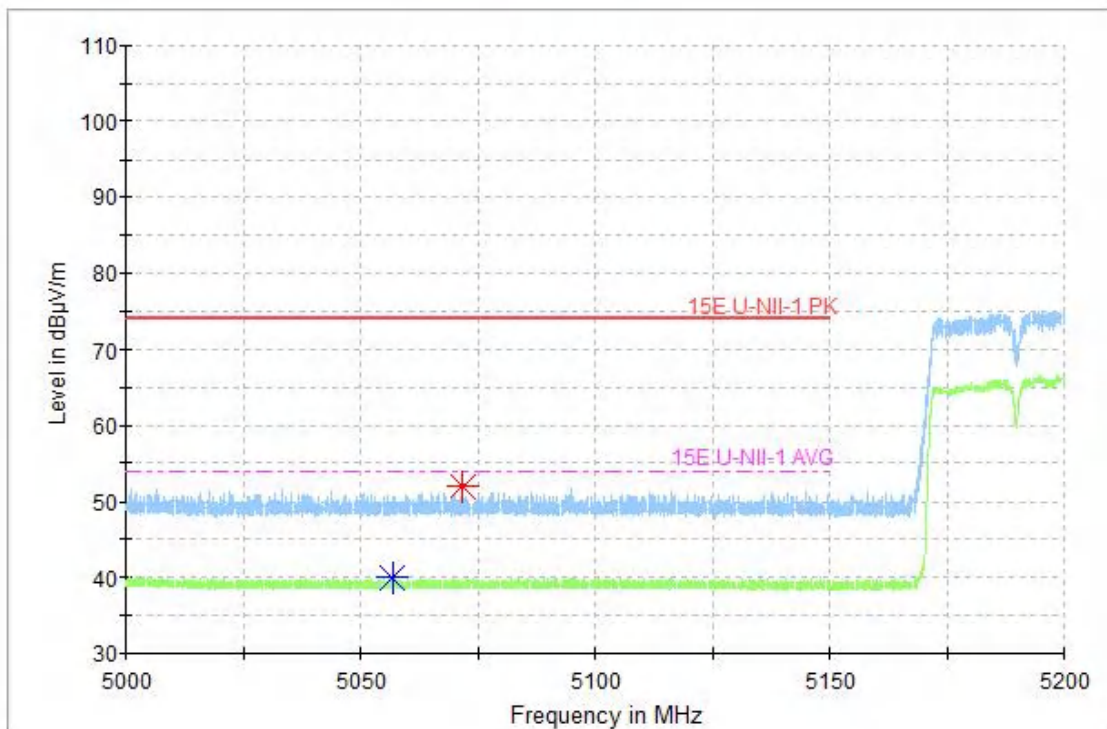


Fig. 17 Band Edges (802.11ac-HT40 Ch38, 5190MHz)

Full Spectrum

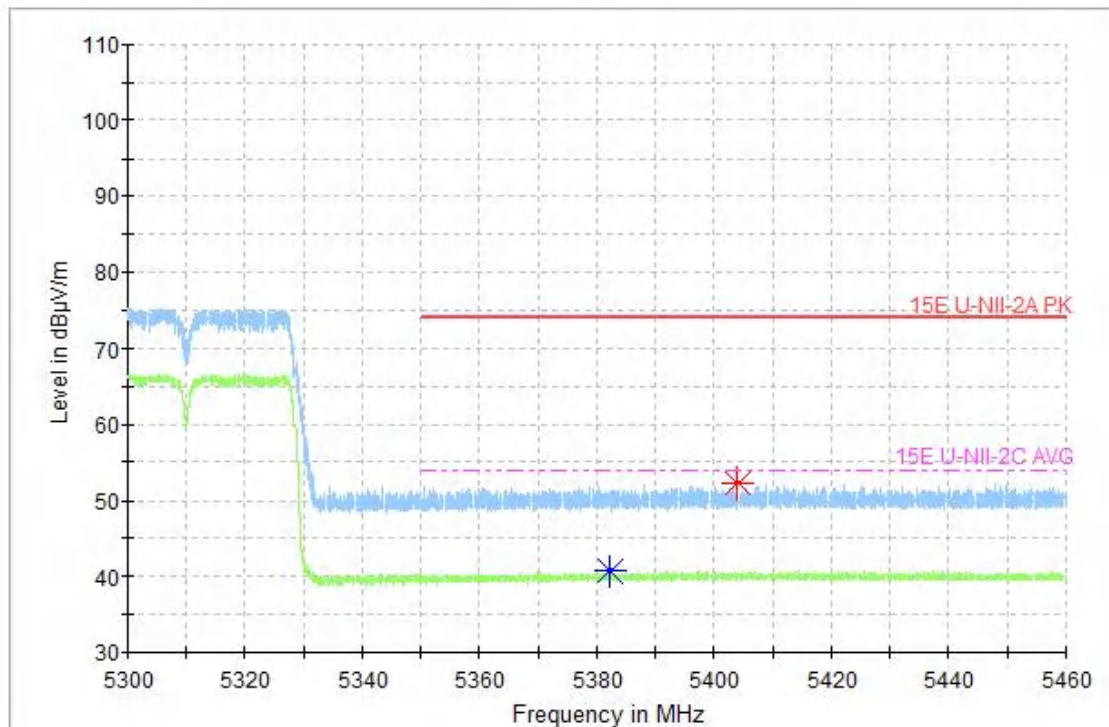


Fig. 18 Band Edges (802.11ac-HT40 Ch62, 5310MHz)

Full Spectrum

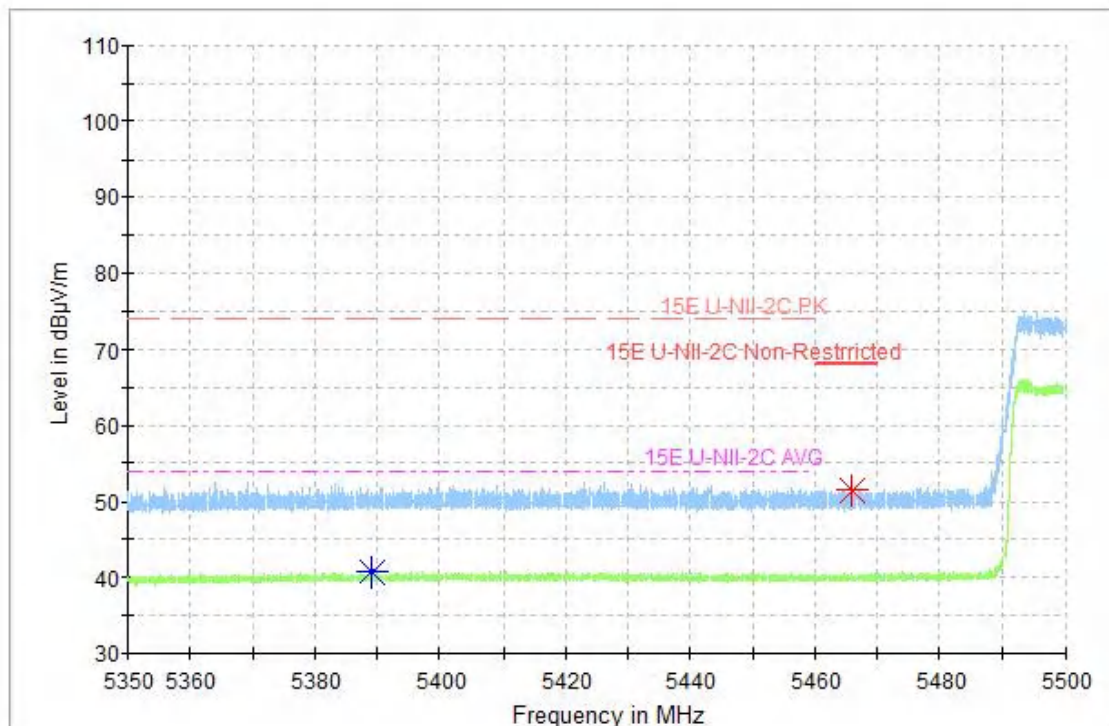


Fig. 19 Band Edges (802.11ac-HT40 Ch102, 5510MHz)

Full Spectrum

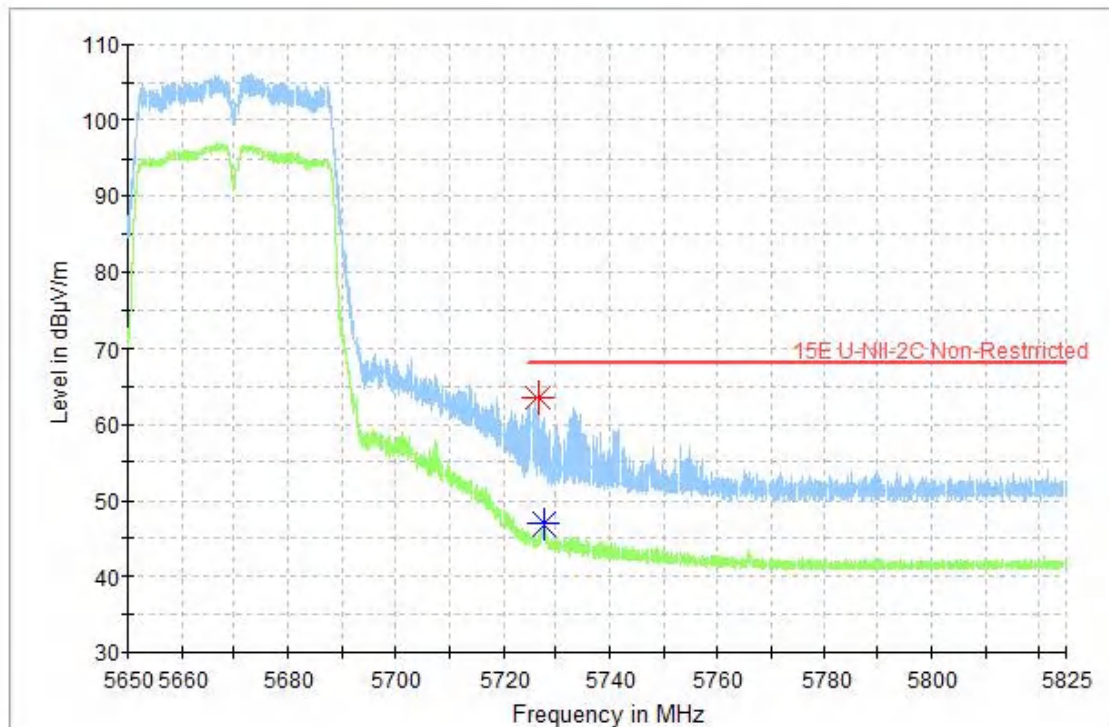


Fig. 20 Band Edges (802.11ac-HT40 Ch134, 5670MHz)

Full Spectrum

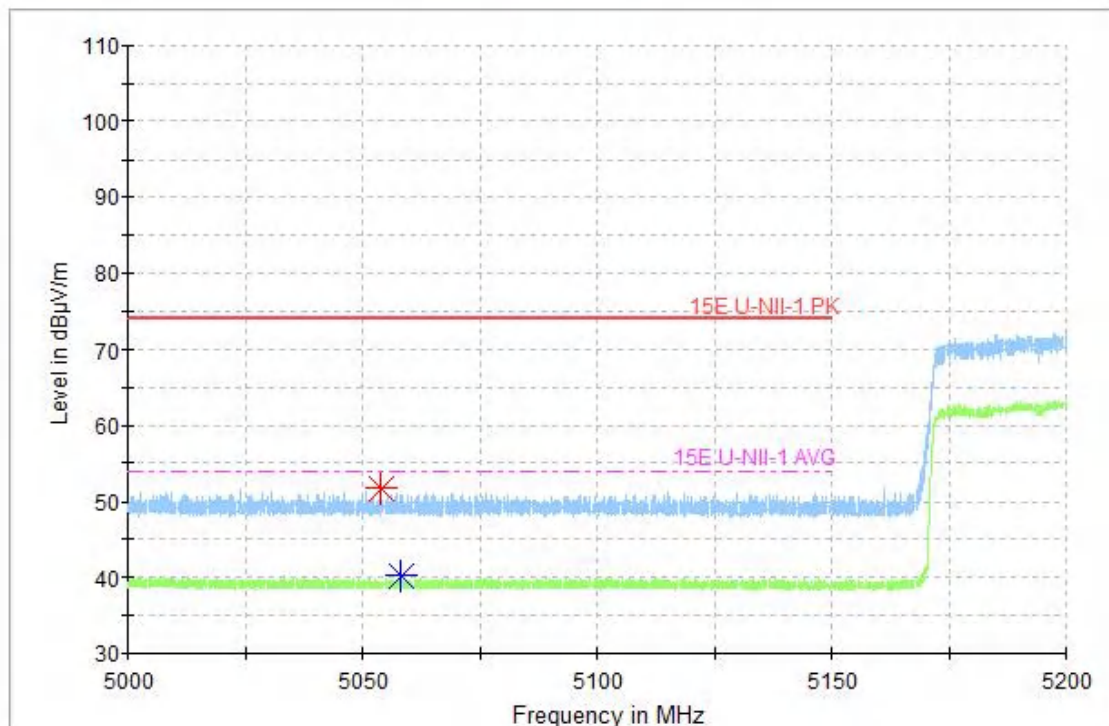


Fig. 21 Band Edges (802.11ac-HT80 Ch42, 5210MHz)

Full Spectrum

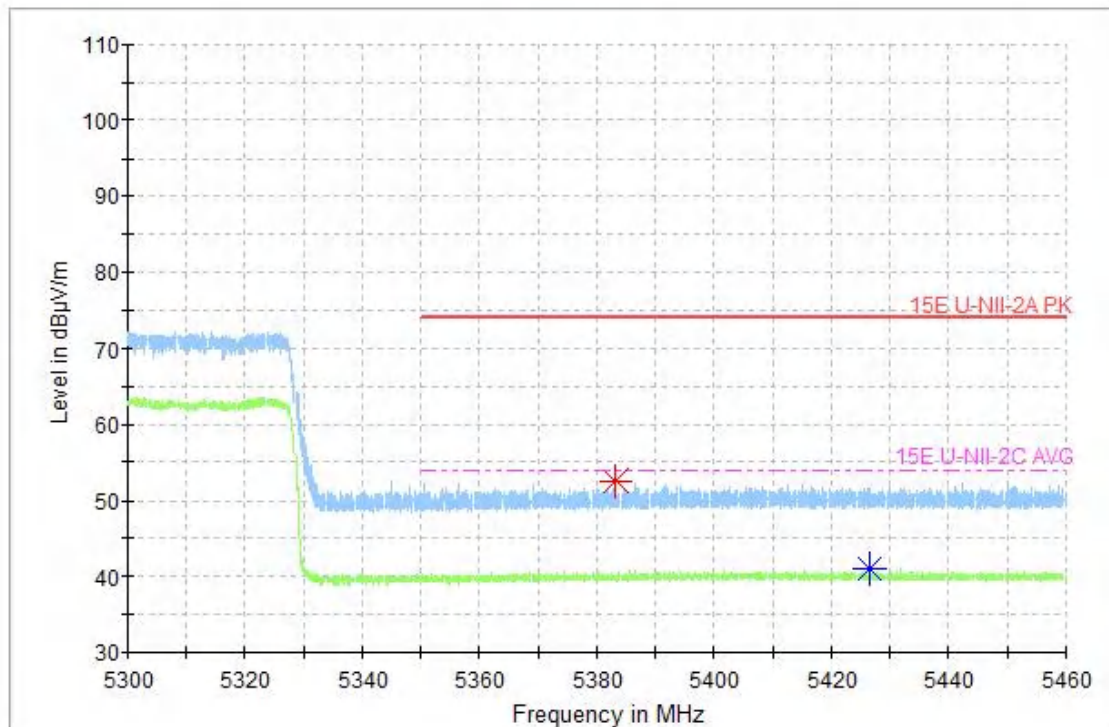


Fig. 22 Band Edges (802.11ac-HT80 Ch58, 5290MHz)

Full Spectrum

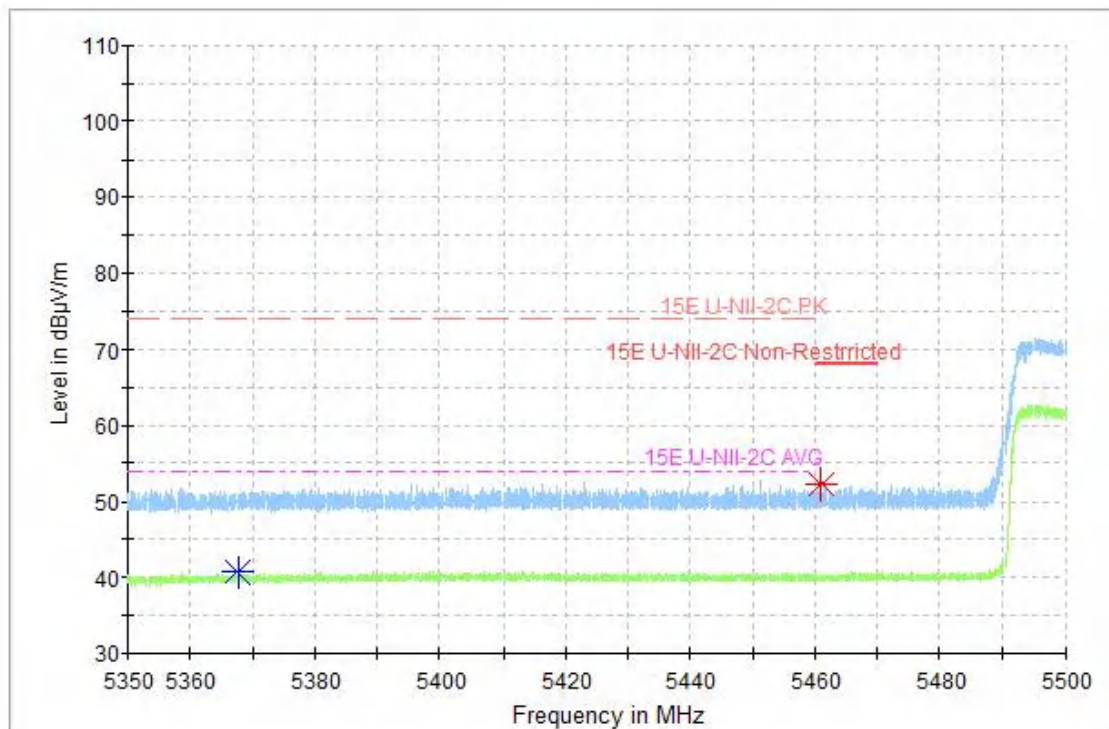


Fig. 23 Band Edges (802.11ac-HT80 Ch106, 5530MHz)

Full Spectrum

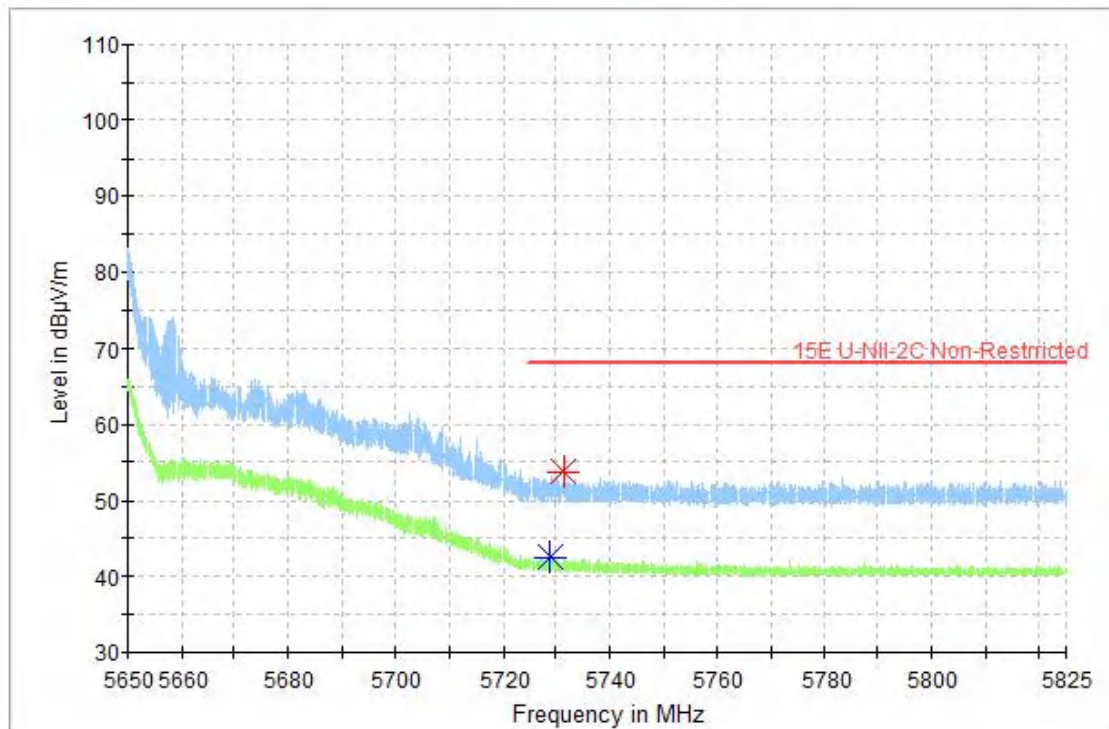


Fig. 24 Band Edges (802.11ac-HT80 Ch122, 5610MHz)

A.6. Transmitter Spurious Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407	-27 dBm/MHz

The measurement is made according to KDB 789033

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(dBμV/m)	Measurement distance(m)
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

Note: for frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m.

Average power measurement procedures

According to clause 6.6 and 12.7.8 in ANSI C63.10-2013 and II.G.5, II.G.6 in KDB 789033.

The procedure for method AD is as follows:

- a) RBW = 1 MHz.
- b) VBW $\geq [3 \times \text{RBW}]$.
- c) Detector = RMS (power averaging),
- d) Averaging type = power (i.e., rms)
- e) Sweep time = auto.
- f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of $1 / D$, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
- g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
If power averaging (rms) mode was used in the preceding step e), then the correction factor is $[10 \log (1 / D)]$, where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

The duty cycle is 98%.

Measurement Results:**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.

The measurement results are obtained as described below:

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

Conclusion: PASS

Average Results:

802.11a

Channel 36

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)
17936.750	45.28	-25.55	42.30	28.53	54.00	8.72	V
17926.850	45.13	-25.55	42.30	28.38	54.00	8.87	H
14499.250	39.18	-28.78	40.00	27.96	54.00	14.82	V
14494.850	39.12	-28.78	40.00	27.90	54.00	14.88	H
5149.980	50.66	-27.27	32.70	45.23	54.00	3.34	H
5147.800	50.21	-27.34	32.70	44.85	54.00	3.79	H

Channel 64

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)
17924.650	45.09	-25.55	42.30	28.34	54.00	8.91	V
17923.550	45.05	-25.55	42.30	28.30	54.00	8.95	V
14496.500	39.12	-28.78	40.00	27.90	54.00	14.88	H
13322.800	39.10	-30.08	40.30	28.88	54.00	14.90	V
5351.792	46.61	-27.08	33.50	40.19	54.00	7.39	H
5377.360	46.54	-27.08	33.50	40.12	54.00	7.46	H

Channel 100

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)
7332.750	48.50	-34.16	37.50	45.16	54.00	5.50	V
7333.300	48.47	-34.16	37.50	45.13	54.00	5.53	V
17907.050	45.10	-25.55	42.30	28.35	54.00	8.90	V
17909.800	44.97	-25.55	42.30	28.22	54.00	9.03	H
5459.935	44.97	-27.06	33.70	38.33	54.00	9.03	V
5459.905	44.41	-27.06	33.70	37.77	54.00	9.59	V

Channel 144

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)
17929.050	45.35	-25.55	42.30	28.60	54.00	8.65	H
17931.800	45.25	-25.55	42.30	28.50	54.00	8.75	V
7626.450	44.77	-34.29	37.30	41.76	54.00	9.23	V
7625.900	42.31	-34.29	37.30	39.30	54.00	11.69	V
13322.250	39.45	-30.08	40.30	29.23	54.00	14.55	H
13256.800	39.44	-29.75	40.20	28.99	54.00	14.56	V

802.11n-HT20

Channel 36

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)
17921.350	45.21	-25.55	42.30	28.46	54.00	8.79	H
17942.250	45.17	-25.55	42.30	28.42	54.00	8.83	H
14495.400	39.02	-28.78	40.00	27.80	54.00	14.98	V
14494.300	38.88	-28.78	40.00	27.66	54.00	15.12	V
5149.740	49.47	-27.27	32.70	44.04	54.00	4.53	H
5149.840	49.38	-27.27	32.70	43.95	54.00	4.62	H

Channel 64

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)
17932.900	45.00	-25.55	42.30	28.25	54.00	9.00	H
17930.150	44.99	-25.55	42.30	28.24	54.00	9.01	V
14495.400	39.15	-28.78	40.00	27.93	54.00	14.85	H
14480.550	38.89	-28.78	40.00	27.67	54.00	15.11	H
5350.576	45.76	-27.08	33.50	39.34	54.00	8.24	H
5350.224	45.69	-27.08	33.50	39.27	54.00	8.31	V

Channel 100

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)
7333.300	47.68	-34.16	37.50	44.34	54.00	6.32	V
7332.750	47.42	-34.16	37.50	44.08	54.00	6.58	V
17925.200	45.35	-25.55	42.30	28.60	54.00	8.65	V
17901.000	44.94	-25.55	42.30	28.19	54.00	9.06	H
5458.090	45.25	-27.06	33.70	38.61	54.00	8.75	V
5442.310	45.24	-27.18	33.60	38.82	54.00	8.76	H

Channel 144

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)
17923.000	45.19	-25.55	42.30	28.44	54.00	8.81	H
17928.500	45.10	-25.55	42.30	28.35	54.00	8.90	H
7626.450	44.75	-34.29	37.30	41.74	54.00	9.25	V
7625.900	42.07	-34.29	37.30	39.06	54.00	11.93	V
14485.500	39.60	-28.78	40.00	28.38	54.00	14.40	V
14496.500	39.49	-28.78	40.00	28.27	54.00	14.51	H

802.11n-HT40

Channel 38

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)
17920.800	45.32	-25.55	42.30	28.57	54.00	8.68	V
17910.350	45.07	-25.55	42.30	28.32	54.00	8.93	V
14494.850	39.17	-28.78	40.00	27.95	54.00	14.83	V
14491.550	39.08	-28.78	40.00	27.86	54.00	14.92	H
5021.400	39.93	-27.48	32.90	34.51	54.00	14.07	V
5067.740	39.93	-27.44	32.80	34.57	54.00	14.07	H

Channel 62

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)
17909.250	45.10	-25.55	42.30	28.35	54.00	8.90	V
17914.200	45.07	-25.55	42.30	28.32	54.00	8.93	H
13274.400	39.03	-29.75	40.30	28.48	54.00	14.97	V
14492.100	38.89	-28.78	40.00	27.67	54.00	15.11	V
5388.848	40.79	-27.08	33.50	34.37	54.00	13.21	V
5417.376	40.69	-27.18	33.60	34.27	54.00	13.31	V

Channel 102

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)
7346.500	47.27	-34.16	37.50	43.93	54.00	6.73	V
7345.950	45.41	-34.16	37.50	42.07	54.00	8.59	V
17898.800	45.37	-25.55	42.30	28.62	54.00	8.63	H
17921.350	45.32	-25.55	42.30	28.57	54.00	8.68	H
5429.725	40.73	-27.18	33.60	34.31	54.00	13.27	H
5404.660	40.57	-27.18	33.60	34.15	54.00	13.43	H

Channel 142

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)
17924.100	45.28	-25.55	42.30	28.53	54.00	8.72	V
17907.050	45.27	-25.55	42.30	28.52	54.00	8.73	V
7613.250	43.94	-34.34	37.40	40.88	54.00	10.06	V
7612.700	42.29	-34.34	37.40	39.23	54.00	11.71	V
13269.450	39.02	-29.75	40.30	28.47	54.00	14.98	V
13305.200	38.96	-29.75	40.30	28.41	54.00	15.04	V

802.11ac-HT20

Channel 36

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)
17922.450	45.33	-25.55	42.30	28.58	54.00	8.67	V
17919.700	45.22	-25.55	42.30	28.47	54.00	8.78	H
14494.300	39.20	-28.78	40.00	27.98	54.00	14.80	H
13268.900	38.98	-29.75	40.30	28.43	54.00	15.02	H
5150.000	53.60	-27.27	32.70	48.17	54.00	0.40	H
5149.320	53.48	-27.27	32.70	48.05	54.00	0.52	H

Channel 64

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)
17910.900	45.32	-25.55	42.30	28.57	54.00	8.68	V
17912.000	45.25	-25.55	42.30	28.50	54.00	8.75	V
13271.100	39.06	-29.75	40.30	28.51	54.00	14.94	V
13292.550	39.06	-29.75	40.30	28.51	54.00	14.94	H
5352.704	47.93	-27.08	33.50	41.51	54.00	6.07	V
5350.560	47.47	-27.08	33.50	41.05	54.00	6.53	V

Channel 100

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)
7333.300	47.04	-34.16	37.50	43.70	54.00	6.96	V
7332.750	46.91	-34.16	37.50	43.57	54.00	7.09	V
17924.650	45.12	-25.55	42.30	28.37	54.00	8.88	V
17919.150	45.04	-25.55	42.30	28.29	54.00	8.96	V
5442.505	45.69	-27.18	33.60	39.27	54.00	8.31	H
5442.355	45.60	-27.18	33.60	39.18	54.00	8.40	H

Channel 144

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)
17948.850	45.36	-25.55	42.30	28.61	54.00	8.64	V
17935.100	45.24	-25.55	42.30	28.49	54.00	8.76	H
7626.450	44.21	-34.29	37.30	41.20	54.00	9.79	V
7625.900	41.84	-34.29	37.30	38.83	54.00	12.16	V
14491.000	39.15	-28.78	40.00	27.93	54.00	14.85	V
13268.900	39.06	-29.75	40.30	28.51	54.00	14.94	V

802.11ac-HT40
Channel 38

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)
17915.300	45.09	-25.55	42.30	28.34	54.00	8.91	V
17926.300	45.07	-25.55	42.30	28.32	54.00	8.93	V
14486.600	39.04	-28.78	40.00	27.82	54.00	14.96	H
13284.850	38.94	-29.75	40.30	28.39	54.00	15.06	H
5057.000	40.08	-27.44	32.80	34.72	54.00	13.92	H
5003.880	39.91	-27.48	32.90	34.49	54.00	14.09	V

Channel 62

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)
17930.150	45.20	-25.55	42.30	28.45	54.00	8.80	V
17910.900	45.13	-25.55	42.30	28.38	54.00	8.87	V
14495.950	39.16	-28.78	40.00	27.94	54.00	14.84	V
14473.950	39.13	-28.78	40.00	27.91	54.00	14.87	V
5414.528	40.73	-27.18	33.60	34.31	54.00	13.27	V
5437.424	40.71	-27.18	33.60	34.29	54.00	13.29	V

Channel 102

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)
7346.500	47.66	-34.16	37.50	44.32	54.00	6.34	V
7345.950	45.88	-34.16	37.50	42.54	54.00	8.12	V
17915.300	45.34	-25.55	42.30	28.59	54.00	8.66	H
17917.500	45.23	-25.55	42.30	28.48	54.00	8.77	H
5407.945	40.62	-27.18	33.60	34.20	54.00	13.38	H
5410.330	40.61	-27.18	33.60	34.19	54.00	13.39	H

Channel 142

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)
17893.300	45.35	-25.55	42.30	28.60	54.00	8.65	H
17915.850	45.10	-25.55	42.30	28.35	54.00	8.90	H
7613.250	43.90	-34.34	37.40	40.84	54.00	10.10	V
7612.700	42.76	-34.34	37.40	39.70	54.00	11.24	V
14491.000	39.24	-28.78	40.00	28.02	54.00	14.76	V
14491.550	39.17	-28.78	40.00	27.95	54.00	14.83	H

802.11ac-HT80
Channel 42

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)
17915.300	45.21	-25.55	42.30	28.46	54.00	8.79	V
17930.150	45.05	-25.55	42.30	28.30	54.00	8.95	H
13288.700	39.11	-29.75	40.30	28.56	54.00	14.89	H
13295.300	39.00	-29.75	40.30	28.45	54.00	15.00	V
5058.120	40.15	-27.44	32.80	34.79	54.00	13.85	V
5033.540	40.11	-27.48	32.90	34.69	54.00	13.89	H

Channel 58

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)
17919.150	45.39	-25.55	42.30	28.64	54.00	8.61	V
17920.800	45.36	-25.55	42.30	28.61	54.00	8.64	V
13288.150	39.24	-29.75	40.30	28.69	54.00	14.76	V
13276.600	39.22	-29.75	40.30	28.67	54.00	14.78	V
5426.528	40.99	-27.18	33.60	34.57	54.00	13.01	V
5431.760	40.90	-27.18	33.60	34.48	54.00	13.10	H

Channel 106

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)
7372.900	46.98	-34.16	37.50	43.64	54.00	7.02	V
7373.450	45.66	-34.16	37.50	42.32	54.00	8.34	V
17917.500	45.34	-25.55	42.30	28.59	54.00	8.66	V
17909.250	45.11	-25.55	42.30	28.36	54.00	8.89	V
5367.670	40.85	-27.08	33.50	34.43	54.00	13.15	H
5394.370	40.69	-27.08	33.50	34.27	54.00	13.31	V

Channel 138

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)
17913.650	45.40	-25.55	42.30	28.65	54.00	8.60	H
17903.200	45.13	-25.55	42.30	28.38	54.00	8.87	V
7586.300	43.38	-34.34	37.40	40.32	54.00	10.62	V
7586.850	40.98	-34.34	37.40	37.92	54.00	13.02	V
13275.500	39.16	-29.75	40.30	28.61	54.00	14.84	H
14490.450	39.02	-28.78	40.00	27.80	54.00	14.98	H

PEAK Results:
802.11a
Channel 36

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)
17939.500	56.13	-25.55	42.30	39.38	74.00	17.87	V
17916.950	55.68	-25.55	42.30	38.93	74.00	18.32	H
13696.250	51.93	-29.88	40.70	41.11	68.20	16.27	V
13643.450	51.40	-29.88	40.60	40.68	68.20	16.80	V
5136.220	66.49	-27.34	32.70	61.13	74.00	7.51	H
5135.580	66.33	-27.34	32.70	60.97	74.00	7.67	H

Channel 64

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)
17919.700	56.51	-25.55	42.30	39.76	74.00	17.49	H
17916.400	56.06	-25.55	42.30	39.31	74.00	17.94	V
13711.100	51.94	-29.88	40.70	41.12	68.20	16.26	V
14192.900	51.75	-28.86	40.40	40.21	68.20	16.45	H
5373.840	62.52	-27.08	33.50	56.10	74.00	11.48	H
5364.720	62.47	-27.08	33.50	56.05	74.00	11.53	H

Channel 100

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)
17903.200	55.98	-25.55	42.30	39.23	74.00	18.02	H
17935.100	55.93	-25.55	42.30	39.18	74.00	18.07	H
14156.600	51.95	-28.86	40.50	40.31	68.20	16.25	H
14121.400	51.65	-28.86	40.50	40.01	68.20	16.55	H
5444.515	59.97	-27.18	33.60	53.55	74.00	14.03	V
5462.410	63.31	-27.06	33.70	56.67	68.20	4.89	V

Channel 144

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)
17990.650	56.31	-25.55	42.30	39.56	74.00	17.69	H
17920.800	55.93	-25.55	42.30	39.18	74.00	18.07	H
14076.300	52.09	-28.98	40.50	40.57	68.20	16.11	V
13747.950	52.02	-29.41	40.70	40.73	68.20	16.18	H
7626.450	49.09	-34.29	37.30	46.08	74.00	24.91	V
11921.400	48.63	-31.75	38.80	41.58	74.00	25.37	V

802.11n-HT20

Channel 36

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)
17990.100	56.49	-25.55	42.30	39.74	74.00	17.51	H
17915.850	56.10	-25.55	42.30	39.35	74.00	17.90	V
13578.000	51.69	-29.88	40.60	40.97	68.20	16.51	V
14118.650	51.25	-28.86	40.50	39.61	68.20	16.95	V
5136.320	63.50	-27.34	32.70	58.14	74.00	10.50	H
5136.000	63.30	-27.34	32.70	57.94	74.00	10.70	H

Channel 64

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)
17935.100	56.70	-25.55	42.30	39.95	74.00	17.30	V
17924.100	56.53	-25.55	42.30	39.78	74.00	17.47	H
13689.650	51.68	-29.88	40.70	40.86	68.20	16.52	H
14185.200	51.48	-28.86	40.40	39.94	68.20	16.72	H
5374.368	61.82	-27.08	33.50	55.40	74.00	12.18	V
5364.480	61.47	-27.08	33.50	55.05	74.00	12.53	V

Channel 100

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)
17914.200	57.26	-25.55	42.30	40.51	74.00	16.74	V
17930.700	56.13	-25.55	42.30	39.38	74.00	17.87	V
14167.050	51.85	-28.86	40.40	40.31	68.20	16.35	H
14098.300	51.71	-28.98	40.50	40.19	68.20	16.49	V
5455.915	64.24	-27.06	33.70	57.60	74.00	9.76	V
5462.425	64.12	-27.06	33.70	57.48	68.20	4.08	H

Channel 144

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)
17836.100	56.75	-25.55	42.30	40.00	74.00	17.25	V
17892.200	56.47	-25.55	42.30	39.72	74.00	17.53	H
14046.050	51.95	-28.98	40.70	40.23	68.20	16.25	V
14121.400	51.94	-28.86	40.50	40.30	68.20	16.26	V
7626.450	49.89	-34.29	37.30	46.88	74.00	24.11	V
7625.900	48.03	-34.29	37.30	45.02	74.00	25.97	V

802.11n-HT40
Channel 38

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)
17904.300	56.52	-25.55	42.30	39.77	74.00	17.48	V
17900.450	55.78	-25.55	42.30	39.03	74.00	18.22	V
13771.600	51.98	-29.41	40.90	40.49	68.20	16.22	V
14136.800	51.60	-28.86	40.50	39.96	68.20	16.60	V
5009.500	51.85	-27.48	32.90	46.43	74.00	22.15	V
5120.820	51.70	-27.34	32.70	46.34	74.00	22.30	H

Channel 62

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)
17937.850	56.15	-25.55	42.30	39.40	74.00	17.85	H
17908.700	55.80	-25.55	42.30	39.05	74.00	18.20	V
14120.300	51.78	-28.86	40.50	40.14	68.20	16.42	H
13685.800	51.47	-29.88	40.70	40.65	68.20	16.73	H
5376.288	52.32	-27.08	33.50	45.90	74.00	21.68	V
5408.768	52.03	-27.18	33.60	45.61	74.00	21.97	H

Channel 102

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)
17912.000	56.77	-25.55	42.30	40.02	74.00	17.23	H
17921.900	56.18	-25.55	42.30	39.43	74.00	17.82	H
13735.850	51.67	-29.41	40.70	40.38	68.20	16.53	V
13769.400	51.67	-29.41	40.90	40.18	68.20	16.53	V
5424.220	52.54	-27.18	33.60	46.12	74.00	21.46	V
5460.295	51.58	-27.06	33.70	44.94	68.20	16.62	H

Channel 142

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)
17945.550	56.31	-25.55	42.30	39.56	74.00	17.69	H
17795.950	55.89	-25.55	42.30	39.14	74.00	18.11	V
14196.750	52.23	-28.86	40.40	40.69	68.20	15.97	H
14139.000	51.94	-28.86	40.50	40.30	68.20	16.26	H
11846.050	49.27	-31.75	38.90	42.12	74.00	24.73	H
11806.450	48.53	-31.84	38.90	41.47	74.00	25.47	V

802.11ac-HT20

Channel 36

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)
17898.800	56.03	-25.55	42.30	39.28	74.00	17.97	H
17911.450	55.67	-25.55	42.30	38.92	74.00	18.33	V
14158.800	52.25	-28.86	40.40	40.71	68.20	15.95	H
14113.150	51.78	-28.86	40.50	40.14	68.20	16.42	H
5138.760	65.06	-27.34	32.70	59.70	74.00	8.94	H
5149.160	64.72	-27.27	32.70	59.29	74.00	9.28	H

Channel 64

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)
17910.900	55.96	-25.55	42.30	39.21	74.00	18.04	H
17926.850	55.88	-25.55	42.30	39.13	74.00	18.12	H
7093.500	55.48	-33.80	37.10	52.18	68.20	12.72	V
7092.950	54.52	-33.80	37.10	51.22	68.20	13.68	V
5376.016	62.78	-27.08	33.50	56.36	74.00	11.22	V
5374.336	62.22	-27.08	33.50	55.80	74.00	11.78	V

Channel 100

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)
17908.150	55.88	-25.55	42.30	39.13	74.00	18.12	H
17907.050	55.71	-25.55	42.30	38.96	74.00	18.29	V
14089.500	51.49	-28.98	40.50	39.97	68.20	16.71	V
14102.150	51.40	-28.98	40.50	39.88	68.20	16.80	H
5456.155	63.02	-27.06	33.70	56.38	74.00	10.98	V
5469.760	63.77	-27.06	33.70	57.13	68.20	4.43	V

Channel 144

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)
17939.500	55.98	-25.55	42.30	39.23	74.00	18.02	V
17916.400	55.75	-25.55	42.30	39.00	74.00	18.25	H
14140.100	51.38	-28.86	40.50	39.74	68.20	16.82	V
13720.450	51.25	-29.41	40.70	39.96	68.20	16.95	V
11875.750	48.95	-31.75	38.90	41.80	74.00	25.05	V
7626.450	48.87	-34.29	37.30	45.86	74.00	25.13	V

802.11ac-HT40

Channel 38

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)
17974.700	56.09	-25.55	42.30	39.34	74.00	17.91	H
17920.250	55.98	-25.55	42.30	39.23	74.00	18.02	H
14144.500	51.62	-28.86	40.50	39.98	68.20	16.58	V
14038.350	51.45	-28.98	40.70	39.73	68.20	16.75	V
5072.100	51.97	-27.44	32.80	46.61	74.00	22.03	H
5033.440	51.53	-27.48	32.90	46.11	74.00	22.47	V

Channel 62

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)
17834.450	55.90	-25.55	42.30	39.15	74.00	18.10	V
17927.950	55.75	-25.55	42.30	39.00	74.00	18.25	V
14139.000	51.85	-28.86	40.50	40.21	68.20	16.35	V
14077.950	51.71	-28.98	40.50	40.19	68.20	16.49	V
5404.000	52.14	-27.18	33.60	45.72	74.00	21.86	V
5447.968	52.02	-27.06	33.70	45.38	74.00	21.98	H

Channel 102

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)
17930.700	56.46	-25.55	42.30	39.71	74.00	17.54	V
17927.400	55.67	-25.55	42.30	38.92	74.00	18.33	V
14151.650	51.90	-28.86	40.50	40.26	68.20	16.30	H
7346.500	51.55	-34.16	37.50	48.21	74.00	22.45	V
5426.305	52.59	-27.18	33.60	46.17	74.00	21.41	V
5465.830	51.49	-27.06	33.70	44.85	68.20	16.71	V

Channel 142

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)
17913.650	56.24	-25.55	42.30	39.49	74.00	17.76	H
17909.250	56.05	-25.55	42.30	39.30	74.00	17.95	V
14118.100	52.33	-28.86	40.50	40.69	68.20	15.87	V
13751.250	51.80	-29.41	40.70	40.51	68.20	16.40	V
10751.550	48.10	-32.78	38.80	42.08	74.00	25.90	H
7613.250	47.91	-34.34	37.40	44.85	74.00	26.09	V

802.11ac-HT80

Channel 42

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)
17905.400	57.18	-25.55	42.30	40.43	74.00	16.82	V
17938.400	55.92	-25.55	42.30	39.17	74.00	18.08	H
14101.600	52.52	-28.98	40.50	41.00	68.20	15.68	V
14142.850	51.83	-28.86	40.50	40.19	68.20	16.37	H
5054.280	51.78	-27.44	32.80	46.42	74.00	22.22	H
5023.940	51.39	-27.48	32.90	45.97	74.00	22.61	V

Channel 58

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)
7053.350	60.11	-33.95	36.90	57.16	68.20	8.09	V
7052.800	59.01	-33.95	36.90	56.06	68.20	9.19	V
17916.950	56.38	-25.55	42.30	39.63	74.00	17.62	H
17906.500	56.27	-25.55	42.30	39.52	74.00	17.73	V
5383.344	52.57	-27.08	33.50	46.15	74.00	21.43	H
5442.512	52.34	-27.18	33.60	45.92	74.00	21.66	V

Channel 106

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)
17917.500	55.98	-25.55	42.30	39.23	74.00	18.02	H
17946.100	55.83	-25.55	42.30	39.08	74.00	18.17	V
13707.250	51.57	-29.88	40.70	40.75	68.20	16.63	V
14137.900	51.36	-28.86	40.50	39.72	68.20	16.84	V
5451.430	52.68	-27.06	33.70	46.04	74.00	21.32	V
5460.940	52.19	-27.06	33.70	45.55	68.20	16.01	H

Channel 138

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)
17904.850	55.54	-25.55	42.30	38.79	74.00	18.46	V
17963.150	55.53	-25.55	42.30	38.78	74.00	18.47	V
13802.950	51.76	-29.41	40.90	40.27	68.20	16.44	H
13747.400	51.40	-29.41	40.70	40.11	68.20	16.80	H
11975.300	48.49	-31.07	38.80	40.76	74.00	25.51	H
11681.050	48.39	-31.77	38.90	41.26	74.00	25.61	H

Conclusion: PASS

A.7. AC Powerline Conducted Emission (150kHz- 30MHz)

Test Condition:

Summary

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

Method of Measurement:

See Clause 6.2 of ANSI C63.10 specifically.

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

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

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

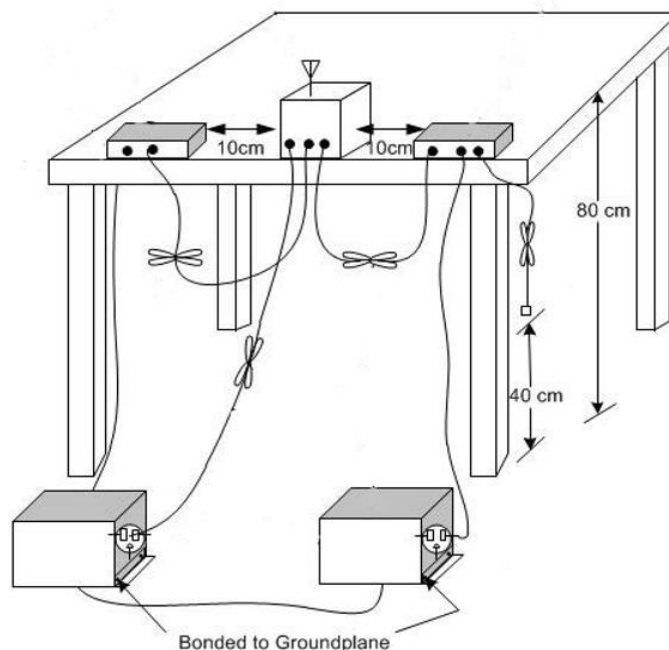
The measurement bandwidth is:

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

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Test setup



Measurement Result and limit:
WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		11a mode	Idle	
0.15 to 0.5	66 to 56	Fig.25	Fig.26	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		
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.25	Fig.26	P
0.5 to 5	46			
5 to 30	50			

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

Conclusion: PASS

Test graphs as below:

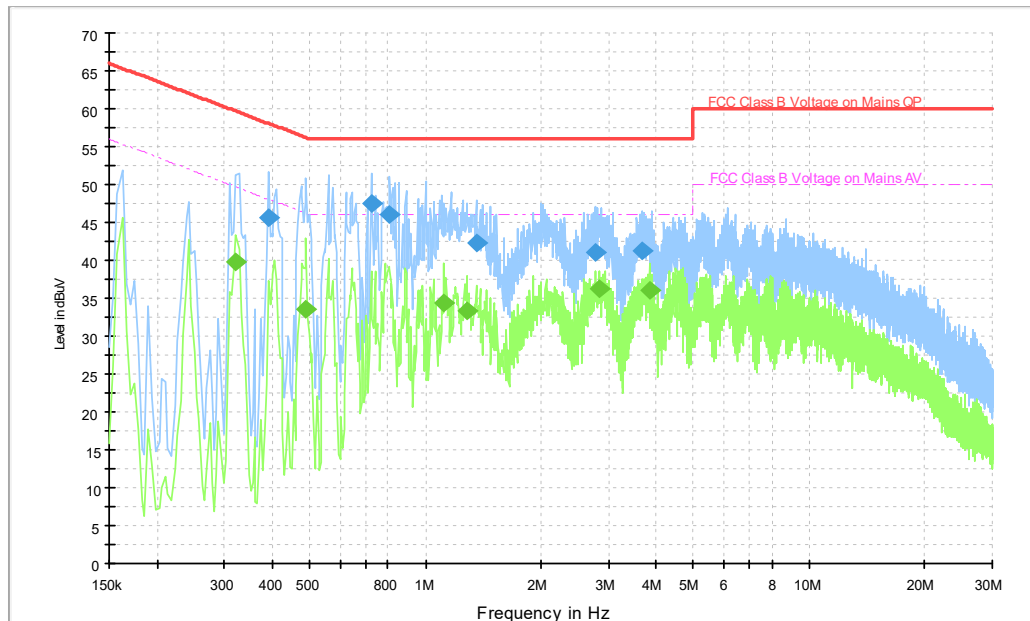


Fig.25 Conducted Emission(802.11a, Ch40, TX)

Note: 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)
0.390000	45.7	2000.	9.000	On	L1	19.9	12.4	58.1
0.722000	47.5	2000.	9.000	On	N	19.8	8.5	56.0
0.806000	46.0	2000.	9.000	On	L1	19.9	10.0	56.0
1.354000	42.4	2000.	9.000	On	N	19.7	13.6	56.0
2.762000	40.9	2000.	9.000	On	L1	19.8	15.1	56.0
3.654000	41.3	2000.	9.000	On	N	19.6	14.8	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.322000	39.7	2000.	9.000	On	L1	19.9	10.0	49.7
0.490000	33.5	2000.	9.000	On	L1	20.0	12.7	46.2
1.118000	34.3	2000.	9.000	On	L1	19.9	11.7	46.0
1.286000	33.3	2000.	9.000	On	N	19.7	12.7	46.0
2.846000	36.2	2000.	9.000	On	N	19.6	9.8	46.0
3.826000	36.0	2000.	9.000	On	N	19.6	10.0	46.0

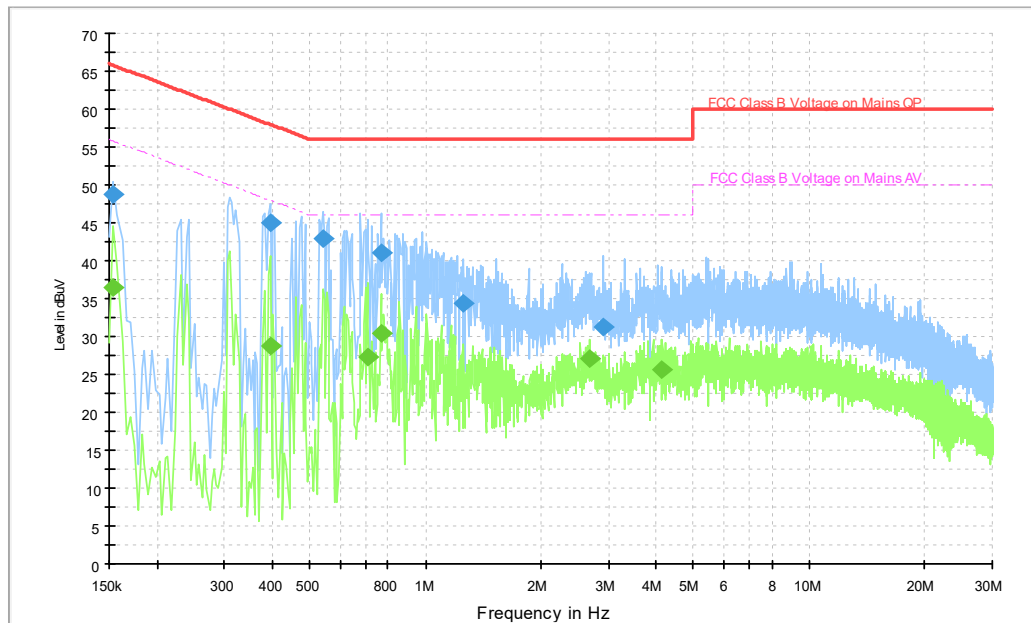


Fig.26 Conducted Emission(802.11a, IDLE)

Note: 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)
0.154000	48.8	2000.	9.000	On	N	20.0	17.0	65.8
0.394000	45.1	2000.	9.000	On	L1	20.0	12.9	58.0
0.542000	43.0	2000.	9.000	On	N	19.9	13.0	56.0
0.766000	41.1	2000.	9.000	On	L1	19.9	14.9	56.0
1.262000	34.3	2000.	9.000	On	L1	19.9	21.7	56.0
2.906000	31.2	2000.	9.000	On	L1	19.8	24.8	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	36.4	2000.	9.000	On	N	20.0	19.4	55.8
0.394000	28.7	2000.	9.000	On	L1	20.0	19.3	48.0
0.706000	27.4	2000.	9.000	On	N	19.8	18.6	46.0
0.766000	30.5	2000.	9.000	On	L1	19.9	15.5	46.0
2.686000	27.0	2000.	9.000	On	L1	19.8	19.0	46.0
4.146000	25.5	2000.	9.000	On	L1	19.8	20.5	46.0

A.8. 99% Occupied bandwidth

Method of Measurement: See ANSI C63.10-2013-clause 12.4.2.

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz
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EUT ID: UT41a

Measurement Result:

TestMode	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	5180	17.446	5171.3831	5188.8288	---	---
	5200	17.418	5191.3348	5208.7524	---	---
	5240	17.483	5231.3222	5248.8053	---	---
11AC20SISO	5180	18.69	5170.8096	5189.4994	---	---
	5200	18.623	5190.7710	5209.3941	---	---
	5240	18.594	5230.7925	5249.3867	---	---
11AC40SISO	5190	36.478	5171.7937	5208.2716	---	---
	5230	36.563	5211.7278	5248.2911	---	---
11AC80SISO	5210	75.896	5172.1578	5248.0541	---	---

Test graphs as below:

11A_5180



11:34:12 29.11.2024

11A_5200



11:35:20 29.11.2024

11A_5240



11:36:25 29.11.2024

11AC20SISO_5180



12:16:22 29.11.2024

11AC20SISO_5200



12:17:30 29.11.2024

11AC20SISO_5240



12:18:42 29.11.2024

11AC40SISO_5190



11AC40SISO_5230



11AC80SISO_5210



Conclusion: PASS

A.8. Antenna Requirement

The antenna of the device is permanently attached. There are no provisions for connection to an external antenna.

The unit complies with the requirement of FCC Part 15.203.

A.9. Power control

A Transmission Power Control mechanism is not required for systems with an e.i.r.p. of less than 27dBm (500 mW).

ANNEX B: EUT parameters

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

ANNEX C: Accreditation Certificate



Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT

Beijing, People's Republic of China

for technical competence in the field of

Electrical Testing

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



Presented this 23rd day of July 2024.



Mr. Trace McInturf, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2026

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

*** END OF REPORT BODY ***