

Project No.: TM-2305000172P
Report No.: TMWK2307002175KR

FCC ID: 2AKZA-IW416
IC: 22364-IW416

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Rev.: 00

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART E

INDUSTRY CANADA RSS-247

Test Standard	FCC Part 15.407 RSS-247 issue 2 and RSS-GEN issue 5
Product name	WiFi+Bluetooth 5.2 System on Module
Brand Name	TechNexion
Model No.	PIXI-IW416
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:



Shawn Wu
Supervisor

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 7, 2023	Initial Issue	ALL	Allison Chen

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	TechNexion Ltd. 16F-5, No. 736, Zhongzheng Road, ZhongHe District, 23511, New Taipei City, Taiwan
Manufacturer	TechNexion Ltd. 16F-5, No. 736, Zhongzheng Road, ZhongHe District, 23511, New Taipei City, Taiwan
Equipment	WiFi+Bluetooth 5.2 System on Module
Model No.	PIXI-IW416
Model Discrepancy	N/A
Trade Name	TechNexion
Received Date	May 16, 2023
Date of Test	May 19 ~ June 29, 2023
Power Supply	Power from host system. (DC 3.3V)
HW Version	A1
SW Version	1.0

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.2 EUT CHANNEL INFORMATION

Frequency Range	UNII-1	
	IEEE 802.11a	5180 ~ 5240 MHz
	IEEE 802.11n HT20	5180 ~ 5240 MHz
	IEEE 802.11n HT40	5190 ~ 5230 MHz
	UNII-3	
	IEEE 802.11a	5745 ~ 5825 MHz
	IEEE 802.11n HT20	5745 ~ 5825 MHz
	IEEE 802.11n HT40	5755 ~ 5795 MHz
Modulation Type	1. IEEE 802.11a mode: OFDM 2. IEEE 802.11n HT20 mode: OFDM 3. IEEE 802.11n HT40 mode: OFDM	

Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☐ PCB ☒ PIFA ☒ Dipole ☐ Coils
Antenna Gain	1. PIFA Antenna Gain: 3 dBi 2. Dipole Antenna Gain: 6 dBi
Brand / Model	1. PIFA Antenna: TechNexion / VM2450-25523-OOX-180 2. Dipole Antenna: TechNexion / VM2450-ASSY1005
Antenna connector	MHF

Notes:

1. The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203 and RSS-Gen §6.8.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.213 dB
Channel Bandwidth	± 2.7 %
RF output power (Spectrum)	± 2.440 dB
Power Spectral density	± 2.739 dB
AC Powerline Conducted Emission	± 2.213 dB
Radiated Emission_9kHz-30MHz	± 3.115 dB
Radiated Emission_30MHz-200MHz	± 4.071 dB
Radiated Emission_200MHz-1GHz	± 4.419 dB
Radiated Emission_1GHz-6GHz	± 5.023 dB
Radiated Emission_6GHz-18GHz	± 5.068 dB
Radiated Emission_18GHz-26GHz	± 3.349 dB
Radiated Emission_26GHz-40GHz	± 3.229 dB

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

AC Powerline Conducted Emission and Conducted:

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

Radiated emission 9kHz to 40GHz:

☐ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

☒ No. 12, Ln. 116, Wugong 3rd Rd., Wugu Dist., New Taipei City, Taiwan 24803

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Tony Chao	-
Radiation	Czerny Lin	-
RF Conducted	David Li	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309.

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Power Sensor	Anritsu	MA2411B	1911386	2022-08-08	2023-08-07
Power Sensor	Anritsu	MA2411B	1911387	2022-08-08	2023-08-07
EXA Signal Analyzer	Keysight	N9010B	MY60242460	2023-02-20	2024-02-01
Power Meter	Anritsu	ML2496A	2136002	2022-11-24	2023-11-23
Software	Radio Test Software Ver. 21 & E3-Ver: 6.11-20180413				

Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Required.

3M 966 Chamber Test Site (966D_Radiated)					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Antenna	SHWARZBECK	VULB 9168	1277	2023-01-13	2024-01-12
Pre-Amplifier	EMCI	EMC118A45SE	980820	2022-12-23	2023-12-22
Pre-Amplifier	EMCI	EMC330N	980853	2022-12-23	2023-12-22
Coaxial Cable	EMC	EMC101G-KM-K M-9000	220407+211228+ 230205	2023-03-21	2024-03-20
Signal Generator	Agilent	N9010A	MY52220817	2023-03-09	2024-03-08
Coaxial Cable	EMC	EMCCFD400	211212+211222+ 211020	2023-03-21	2024-03-20
High Pass Filter	TITAN	T04H300018000 70S01	211215-7-1	2023-02-02	2024-02-01
Thermo-Hygro Meter	EDSDS	EDS-A49	966D1	2023-05-11	2024-05-10
Pre-Amplifier	EMCI	EMC184045SE	980872	2023-01-03	2024-01-02
Horn Antenna	RF SPIN	DRH18-E	210301A18ES	2023-02-03	2024-02-02
Horn Antenna	SHWARZBECK	BBHA 9170	1134	2022-12-30	2023-12-29
Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2022-12-27	2023-12-26
Software	e3 V9-210616c				

AC Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
EMI Test Receiver	R&S	ESCI	100064	2023-06-07	2024-06-06
Cable	EMCI	CFD300-NL	CERF	2023-06-26	2024-06-25
LISN	TESEQ	LN2-16N	22012	2023-03-08	2024-03-07
Software	EZ-EMC(CCS-3A1-CE-wugu)				

Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Required.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
	N/A					

Support Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
1	NB(E)	Lenovo	T460	N/A	N/A	N/A
	N/A					

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.407, KDB 789033 D02, RSS-247 Issue 2 and RSS-GEN Issue 5.

2. TEST SUMMARY

FCC Standard Section	IC Standard Section	Report Section	Test Item	Result
15.203	RSS-Gen (6.8)	1.3	Antenna Requirement	Pass
15.207	RSS-Gen (8.8)	4.1	AC Conducted Emission	Pass
15.407(a)	-	4.2	26dB Bandwidth	Pass
15.407(e)	RSS-247(6.2.4.1)	4.2	6dB Bandwidth	Pass
2.1049	RSS-Gen (6.7)	4.2	Occupied Bandwidth (99%)	Pass
15.407(a)	RSS-247(6.2.1.1) RSS-247(6.2.4.1)	4.3	Output Power Measurement	Pass
15.407(a)	RSS-247(6.2.1.1) RSS-247(6.2.4.1)	4.4	Power Spectral Density	Pass
15.407(b)	RSS-247(6.2.1.2) RSS-247(6.2.4.2)	4.5	Radiation Band Edge	Pass
15.407(b)	RSS-247(6.2.1.2) RSS-247(6.2.4.2)	4.5	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE EUT CHANNEL NUMBER OF OPERATING CONDITION

Operation mode	1. IEEE 802.11a mode: 6Mbps 2. IEEE 802.11n HT20 mode: MCS0 3. IEEE 802.11n HT40 mode: MCS0																	
Operating Frequency	<table><tr><th></th><th>Mode</th><th>Frequency Range (MHz)</th></tr><tr><td rowspan="3">U-NII-1</td><td>IEEE 802.11a</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11n HT20</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11n HT40</td><td>5190, 5230</td></tr><tr><td rowspan="3">U-NII-3</td><td>IEEE 802.11a</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11n HT20</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11n HT40</td><td>5755, 5795</td></tr></table>		Mode	Frequency Range (MHz)	U-NII-1	IEEE 802.11a	5180, 5220, 5240	IEEE 802.11n HT20	5180, 5220, 5240	IEEE 802.11n HT40	5190, 5230	U-NII-3	IEEE 802.11a	5745, 5785, 5825	IEEE 802.11n HT20	5745, 5785, 5825	IEEE 802.11n HT40	5755, 5795
	Mode	Frequency Range (MHz)																
U-NII-1	IEEE 802.11a	5180, 5220, 5240																
	IEEE 802.11n HT20	5180, 5220, 5240																
	IEEE 802.11n HT40	5190, 5230																
U-NII-3	IEEE 802.11a	5745, 5785, 5825																
	IEEE 802.11n HT20	5745, 5785, 5825																
	IEEE 802.11n HT40	5755, 5795																

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT power by NB. (Dipole Antenna) Mode 2: EUT power by NB. (PIFA Antenna)
Worst Mode	☒ Mode 1 ☒ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by System. (Dipole Antenna) Mode 2: EUT power by System. (PIFA Antenna)
Worst Mode	☒ Mode 1 ☒ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☐ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☒ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by System. (Dipole Antenna) Mode 2: EUT power by System. (PIFA Antenna)
Worst Mode	☒ Mode 1 ☒ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

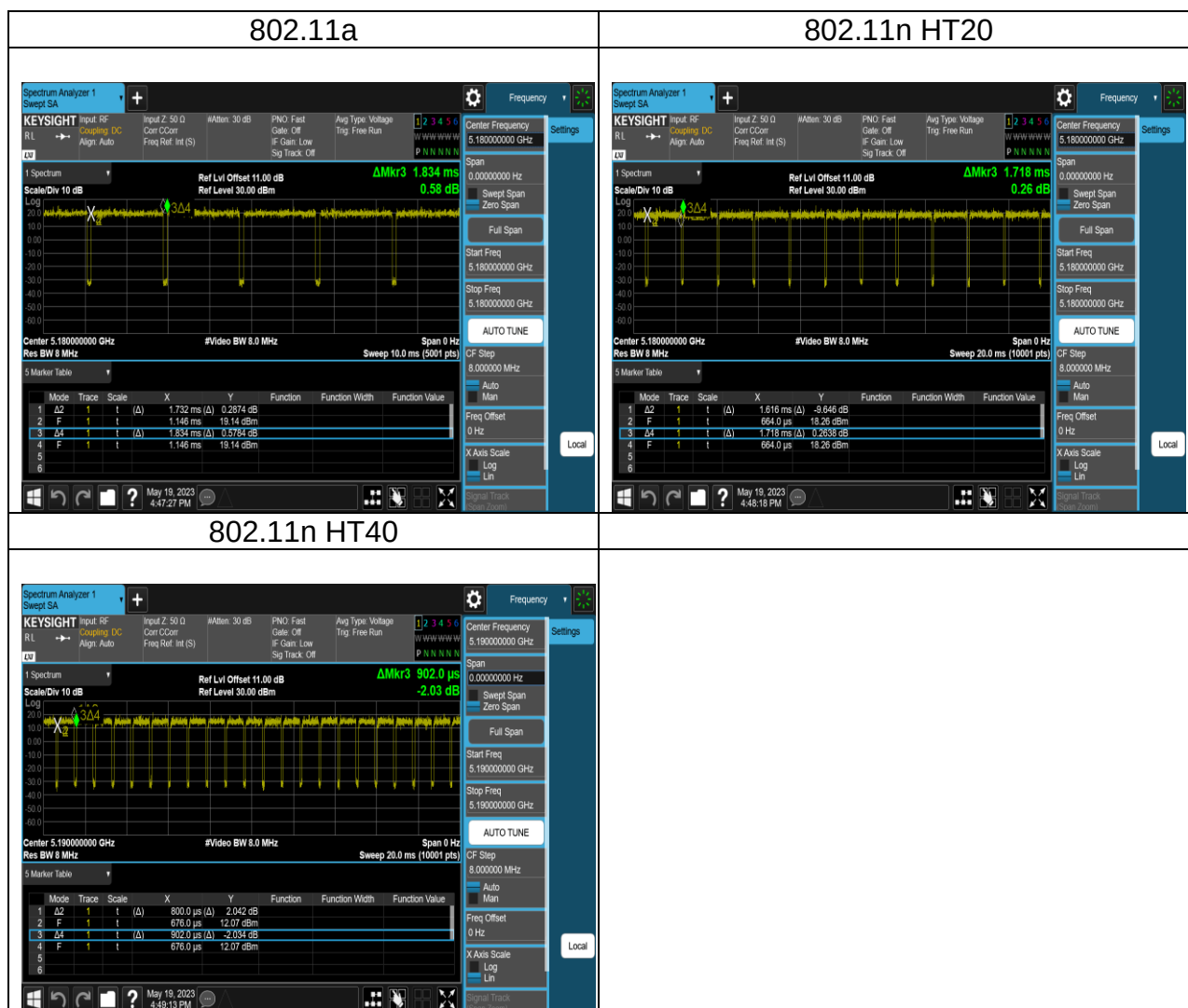
Report No.: TMWK2307002175KR

3.3 EUT DUTY CYCLE

Temperature: 22.8~27.1°C
Humidity: 50~64% RH

Test date: May 19~June 19, 2023
Tested by: David Li

Duty Cycle				
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	94.44	0.25	0.58	1.00
802.11n_20	94.06	0.27	0.62	1.00
802.11n_40	88.69	0.52	1.25	2.00



4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a)(2), RSS-GEN section 8.8,

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

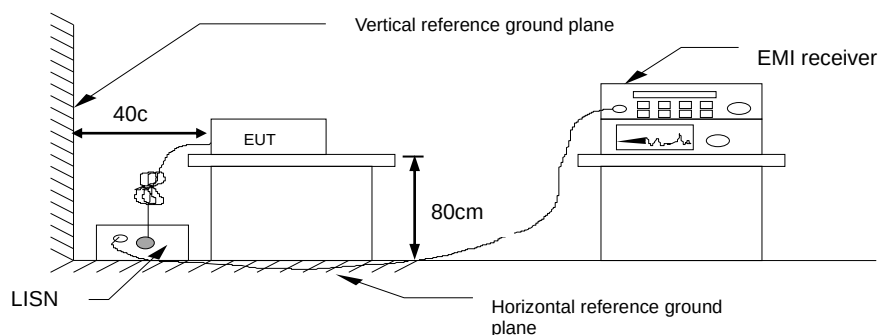
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

4.1.3 Test Setup

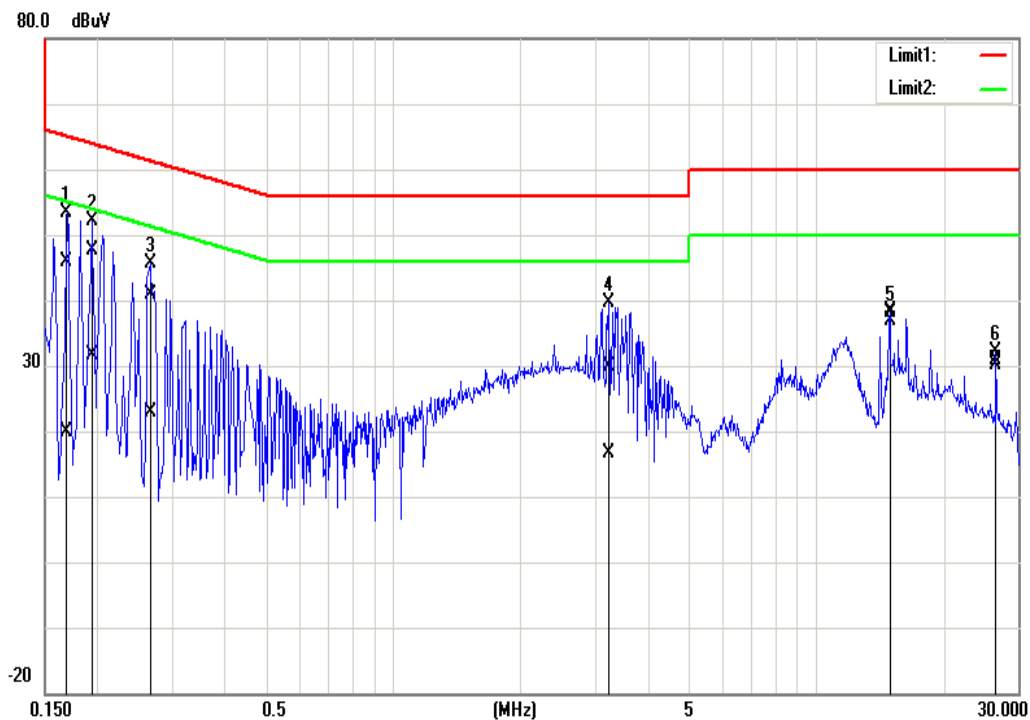


4.1.4 Test Result

Pass.

Test Data

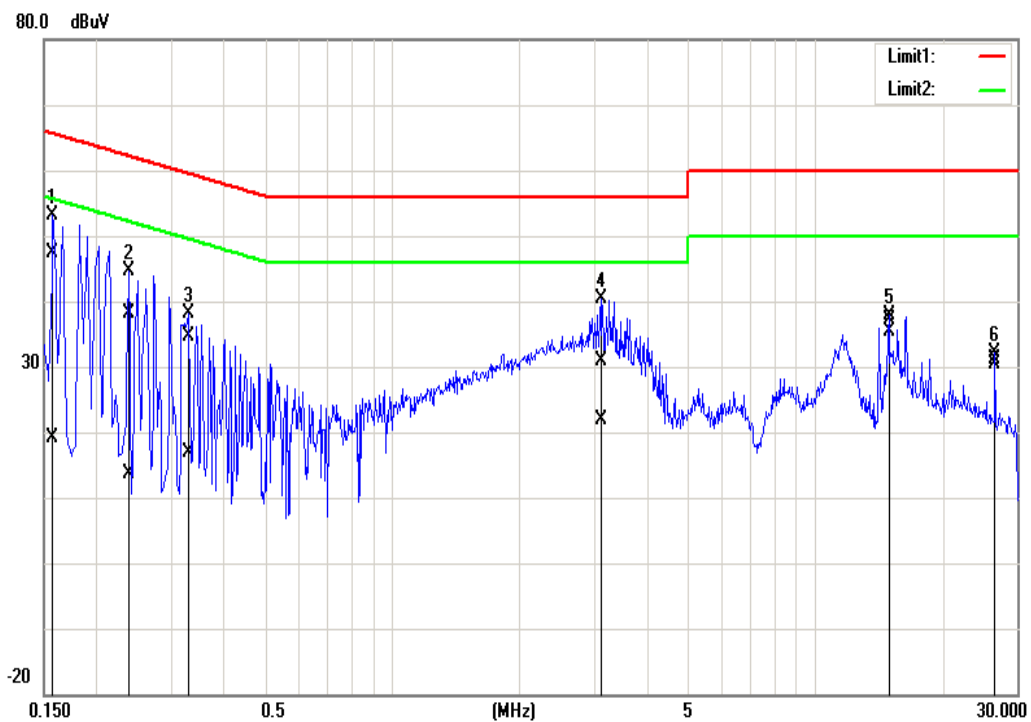
Test Mode:	Mode 1	Temp/Hum	24.3(°C)/ 61%RH
Phase:	Line	Test Date	June 27, 2023
Test Voltage:	120Vac, 60Hz	Test Engineer	Tony Chao



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1700	45.71	19.67	0.15	45.86	19.82	64.96	54.96	-19.10	-35.14	Pass
0.1940	47.54	31.37	0.15	47.69	31.52	63.86	53.86	-16.17	-22.34	Pass
0.2660	40.74	22.72	0.15	40.89	22.87	61.24	51.24	-20.35	-28.37	Pass
3.2260	29.76	16.47	0.24	30.00	16.71	56.00	46.00	-26.00	-29.29	Pass
14.9100	38.04	36.39	0.43	38.47	36.82	60.00	50.00	-21.53	-13.18	Pass
26.6220	30.20	29.56	0.61	30.81	30.17	60.00	50.00	-29.19	-19.83	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

Test Mode:	Mode 1	Temp/Hum	24.3(°C)/ 61%RH
Phase:	Neutral	Test Date	June 27, 2023
Test Voltage:	120Vac, 60Hz	Test Engineer	Tony Chao

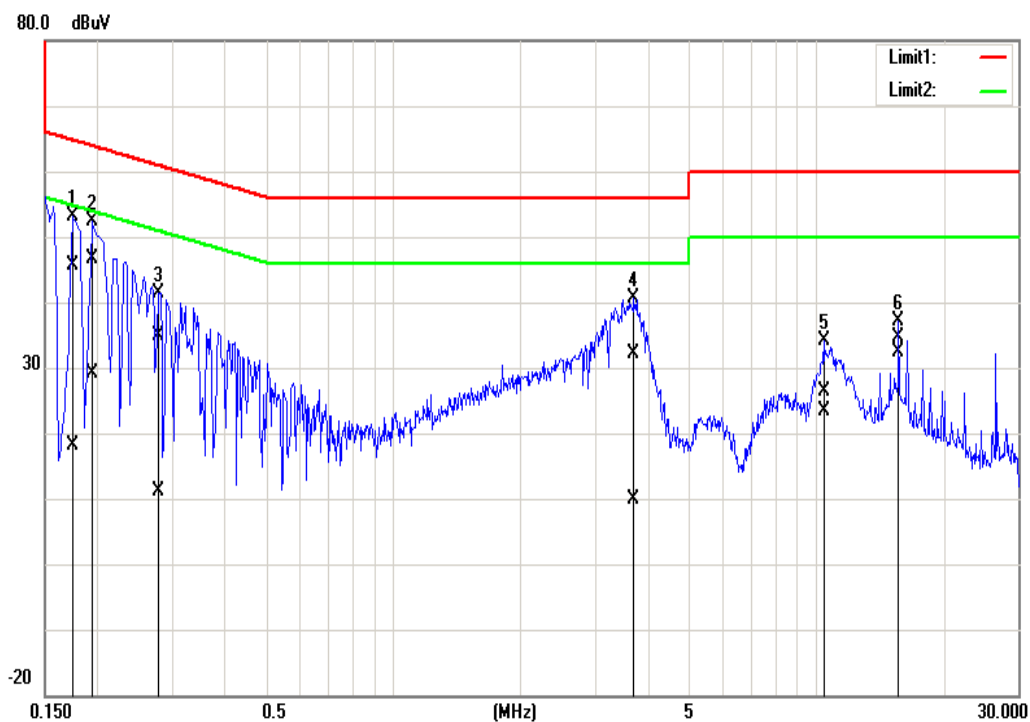


Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1580	47.26	18.91	0.20	47.46	19.11	65.56	55.57	-18.10	-36.46	Pass
0.2380	38.03	13.45	0.19	38.22	13.64	62.16	52.17	-23.94	-38.53	Pass
0.3300	34.35	16.72	0.19	34.54	16.91	59.45	49.45	-24.91	-32.54	Pass
3.1180	30.65	21.54	0.29	30.94	21.83	56.00	46.00	-25.06	-24.17	Pass
14.9100	36.80	34.95	0.45	37.25	35.40	60.00	50.00	-22.75	-14.60	Pass
26.6220	30.47	29.81	0.58	31.05	30.39	60.00	50.00	-28.95	-19.61	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

Test Data

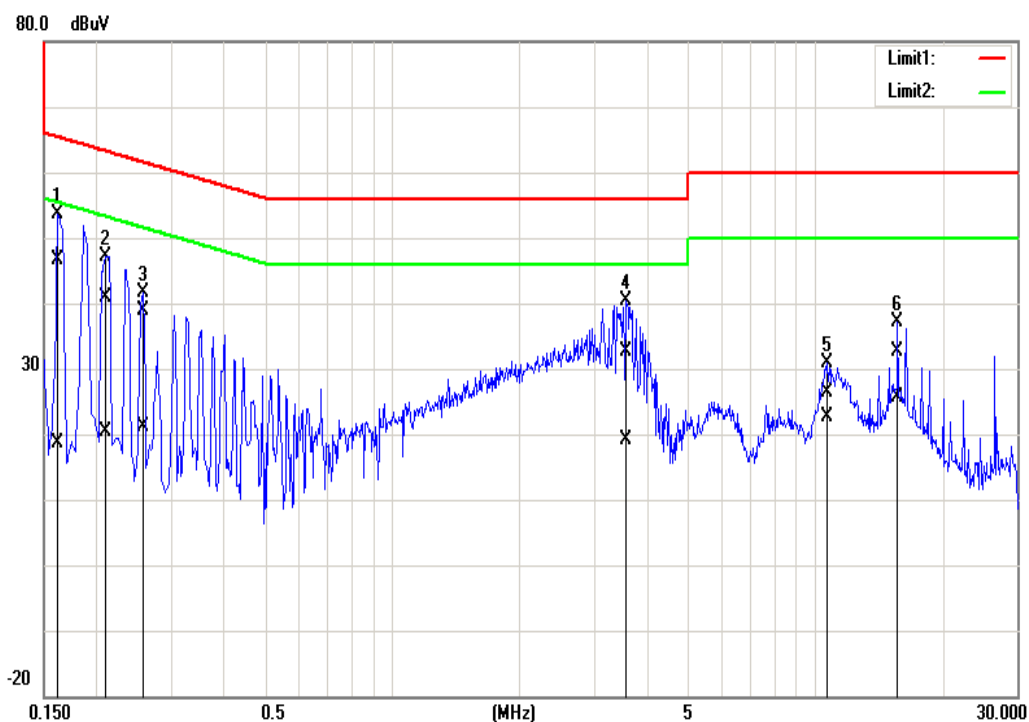
Test Mode:	Mode 2	Temp/Hum	24.3(°C)/ 61%RH
Phase:	Line	Test Date	June 27, 2023
Test Voltage:	120Vac, 60Hz	Test Engineer	Tony Chao



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (d uV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1740	45.39	17.97	0.15	45.54	18.12	64.77	54.77	-19.23	-36.65	Pass
0.1940	46.58	29.06	0.15	46.73	29.21	63.86	53.86	-17.13	-24.65	Pass
0.2803	34.64	10.88	0.15	34.79	11.03	60.81	50.81	-26.02	-39.78	Pass
3.7060	31.96	9.62	0.26	32.22	9.88	56.00	46.00	-23.78	-36.12	Pass
10.4180	25.90	22.91	0.36	26.26	23.27	60.00	50.00	-33.74	-26.73	Pass
15.6620	34.30	31.99	0.45	34.75	32.44	60.00	50.00	-25.25	-17.56	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

Test Mode:	Mode 2	Temp/Hum	24.3(°C)/ 61%RH
Phase:	Neutral	Test Date	June 27, 2023
Test Voltage:	120Vac, 60Hz	Test Engineer	Tony Chao



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1620	46.49	18.34	0.20	46.69	18.54	65.36	55.36	-18.67	-36.82	Pass
0.2100	40.76	20.23	0.19	40.95	20.42	63.21	53.21	-22.26	-32.79	Pass
0.2580	38.70	20.82	0.19	38.89	21.01	61.50	51.50	-22.61	-30.49	Pass
3.5820	32.28	18.92	0.30	32.58	19.22	56.00	46.00	-23.42	-26.78	Pass
10.7060	25.95	22.12	0.40	26.35	22.52	60.00	50.00	-33.65	-27.48	Pass
15.6660	32.17	25.08	0.47	32.64	25.55	60.00	50.00	-27.36	-24.45	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

4.2 26dB BANDWIDTH, 6dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

4.2.1 Test Limit

26 dB Bandwidth : For reporting purposes only.

6 dB Bandwidth : Least 500kHz.

Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

26dB

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW: approximately 1% of the emission bandwidth.
3. Set the VBW>RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26dB down from the peak of the emission. Compare this with the RBW setting of the analyser. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6dB

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW = 100 kHz.
3. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

99%

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set center frequency to the nominal EUT channel center frequency.
3. Set span = 1.5 times to 5.0 times the OBW.
4. Set RBW = 1 % to 5% of the OBW.
5. Set VBW $\geq$ 3 xRBW

4.2.3 Test Setup



4.2.4 Test Result

Temperature: 22.8~27.1°C

Test date: May 19~June 19, 2023

Humidity: 50~64% RH

Tested by: David Li

UNII-1 5150-5250 MHz

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	OBW(99%) (MHz)	26dB BW (MHz)
36	5180	16.603	19.38
44	5220	16.574	19.23
48	5240	16.624	19.22

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	OBW(99%) (MHz)	26dB BW (MHz)
36	5180	17.648	19.86
44	5220	17.625	19.96
48	5240	16.575	19.53

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	OBW(99%) (MHz)	26dB BW (MHz)
38	5190	36.154	40.53
46	5230	36.125	40.24

UNII-3 5750-5825 MHz

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	OBW(99%) (MHz)	6dB BW (MHz) Limit: > 500 KHz
149	5745	16.574	16.41
157	5785	16.592	16.36
165	5825	16.574	16.44

Test mode: IEEE 802.11n HT20 mode

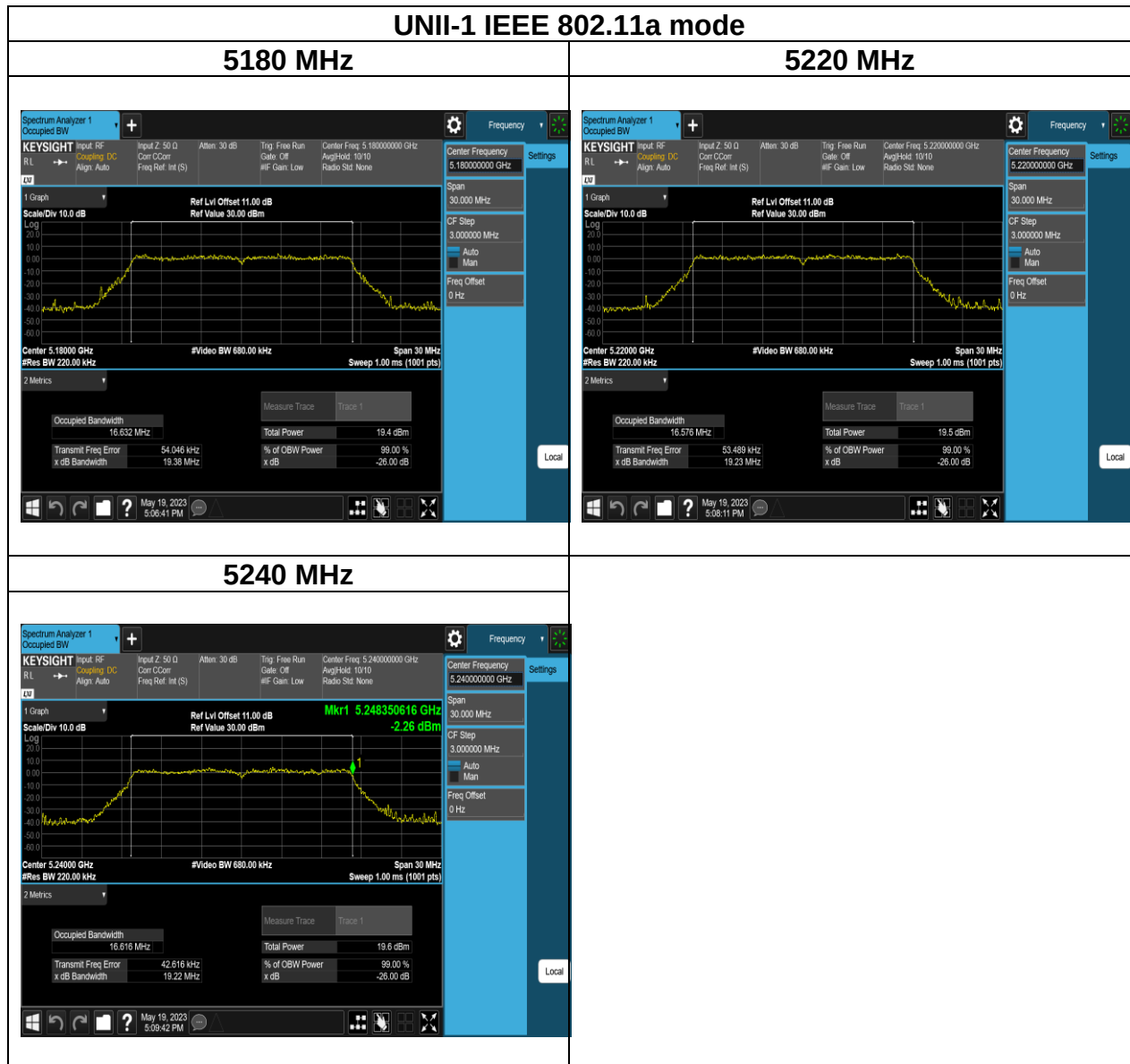
Channel	Frequency (MHz)	OBW(99%) (MHz)	6dB BW (MHz) Limit: > 500 KHz
149	5745	17.643	17.57
157	5785	17.643	17.59
165	5825	17.651	17.20

Test mode: IEEE 802.11n HT40 mode

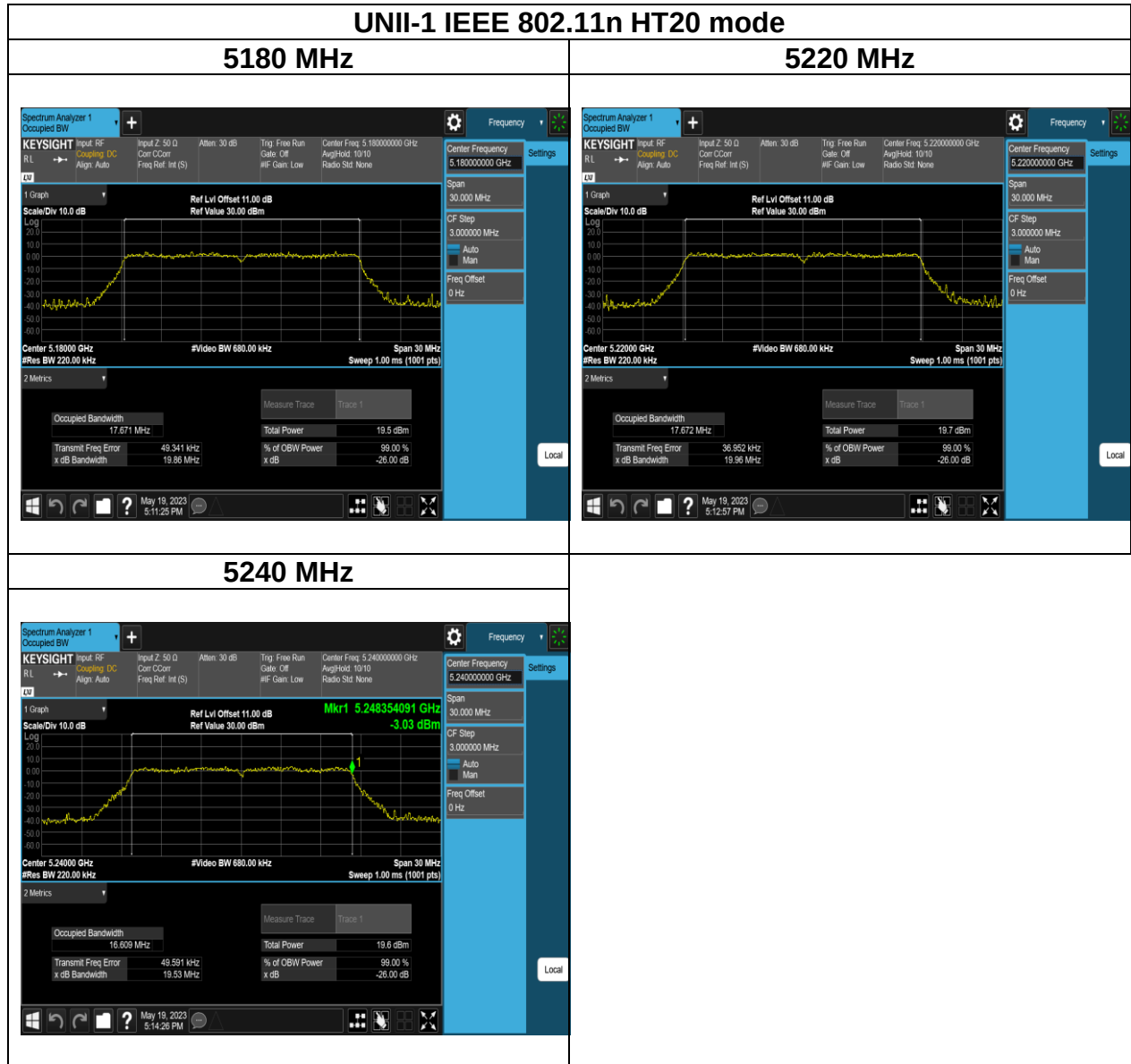
Channel	Frequency (MHz)	OBW(99%) (MHz)	6dB BW (MHz) Limit: > 500 KHz
151	5755	36.175	35.32
159	5795	36.210	35.37

Report No.: TMWK2307002175KR

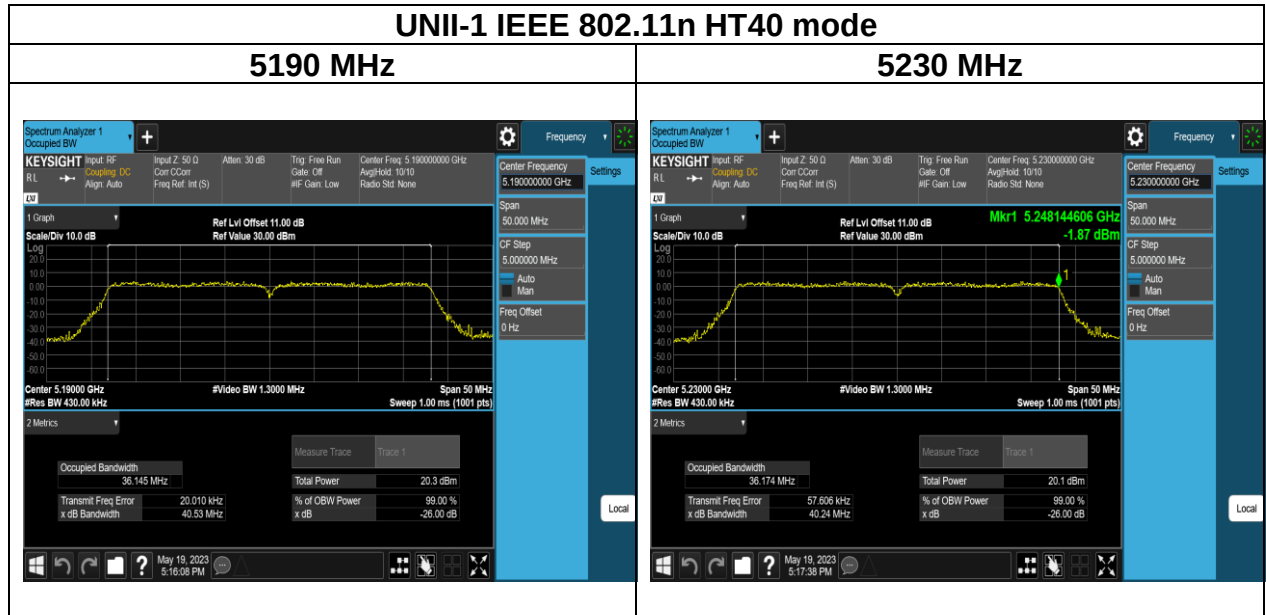
Test Plots (26dB BANDWIDTH)



Report No.: TMWK2307002175KR

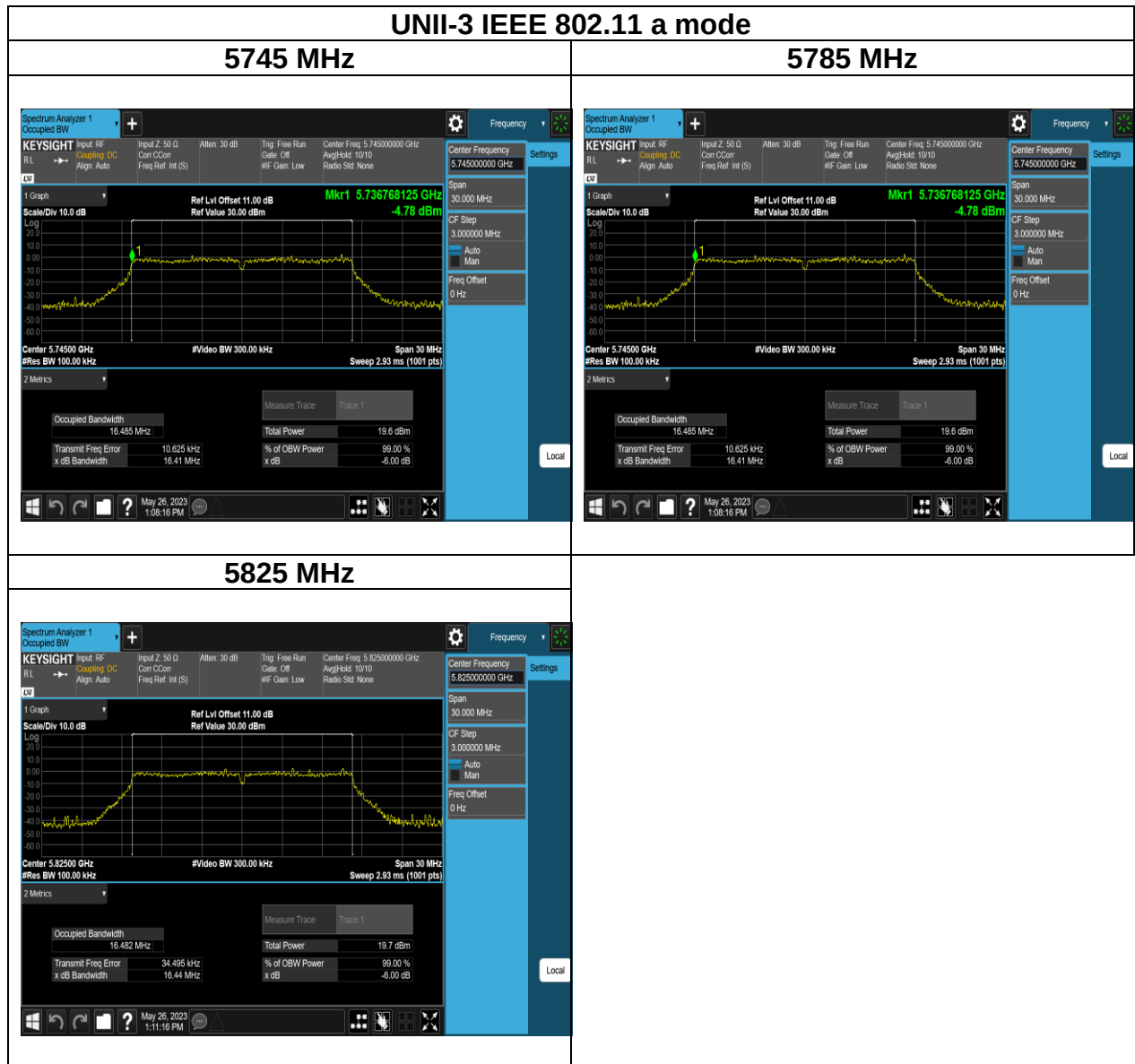


Report No.: TMWK2307002175KR

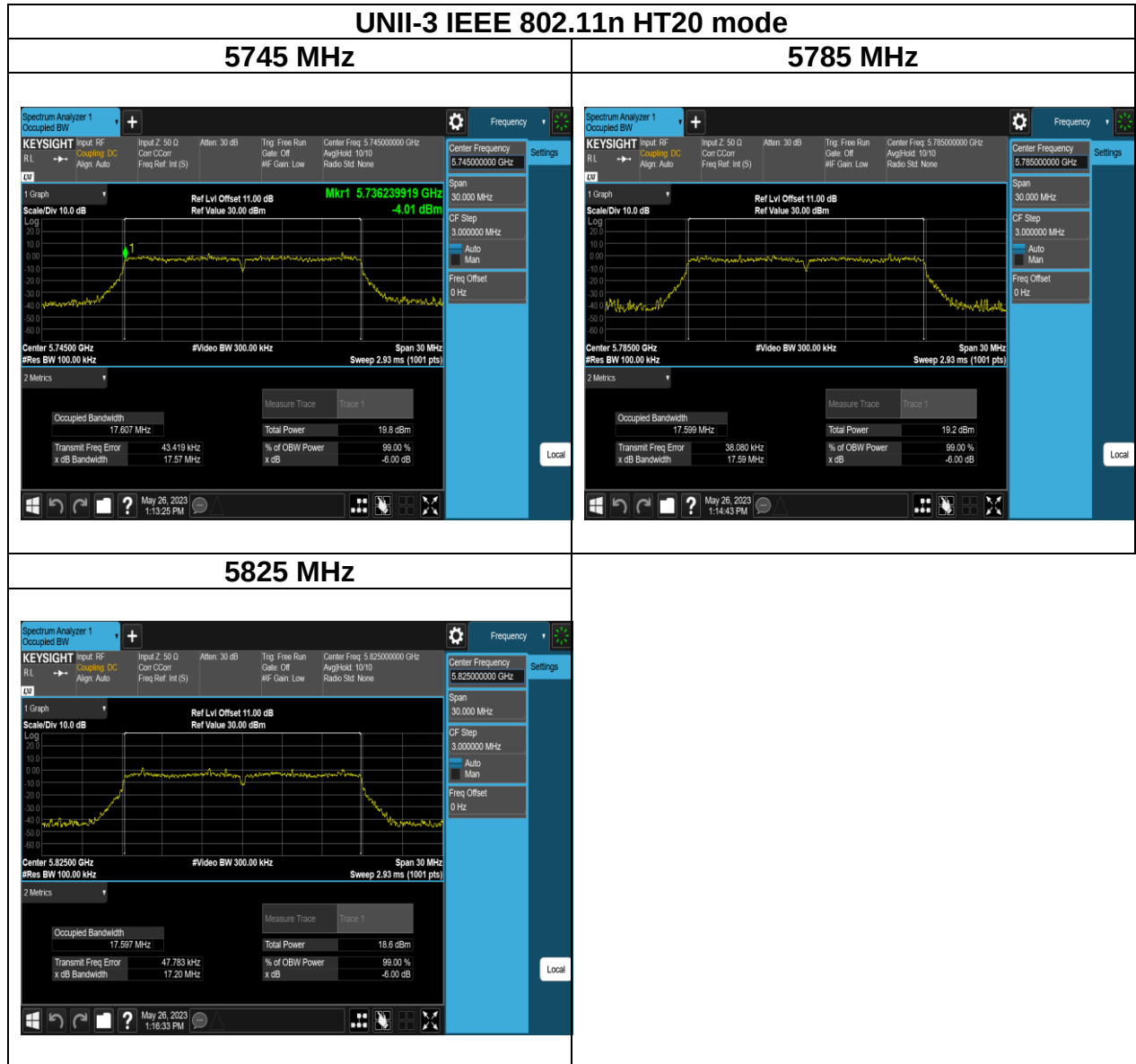


Report No.: TMWK2307002175KR

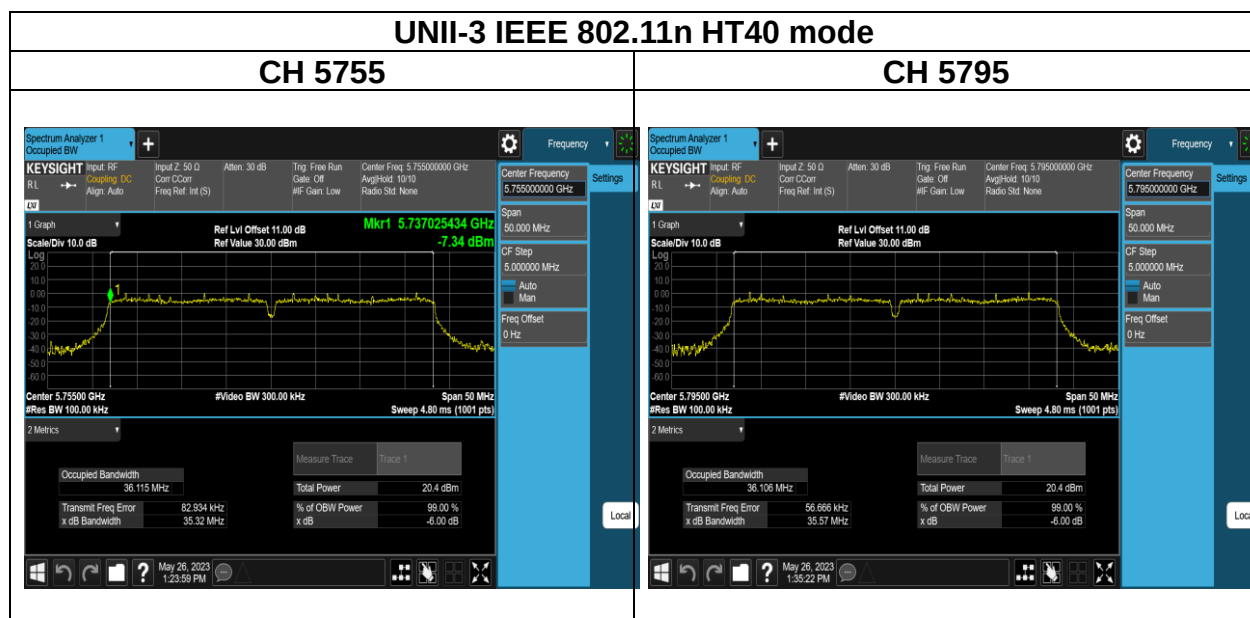
Test Plots (6dB BANDWIDTH)



Report No.: TMWK2307002175KR

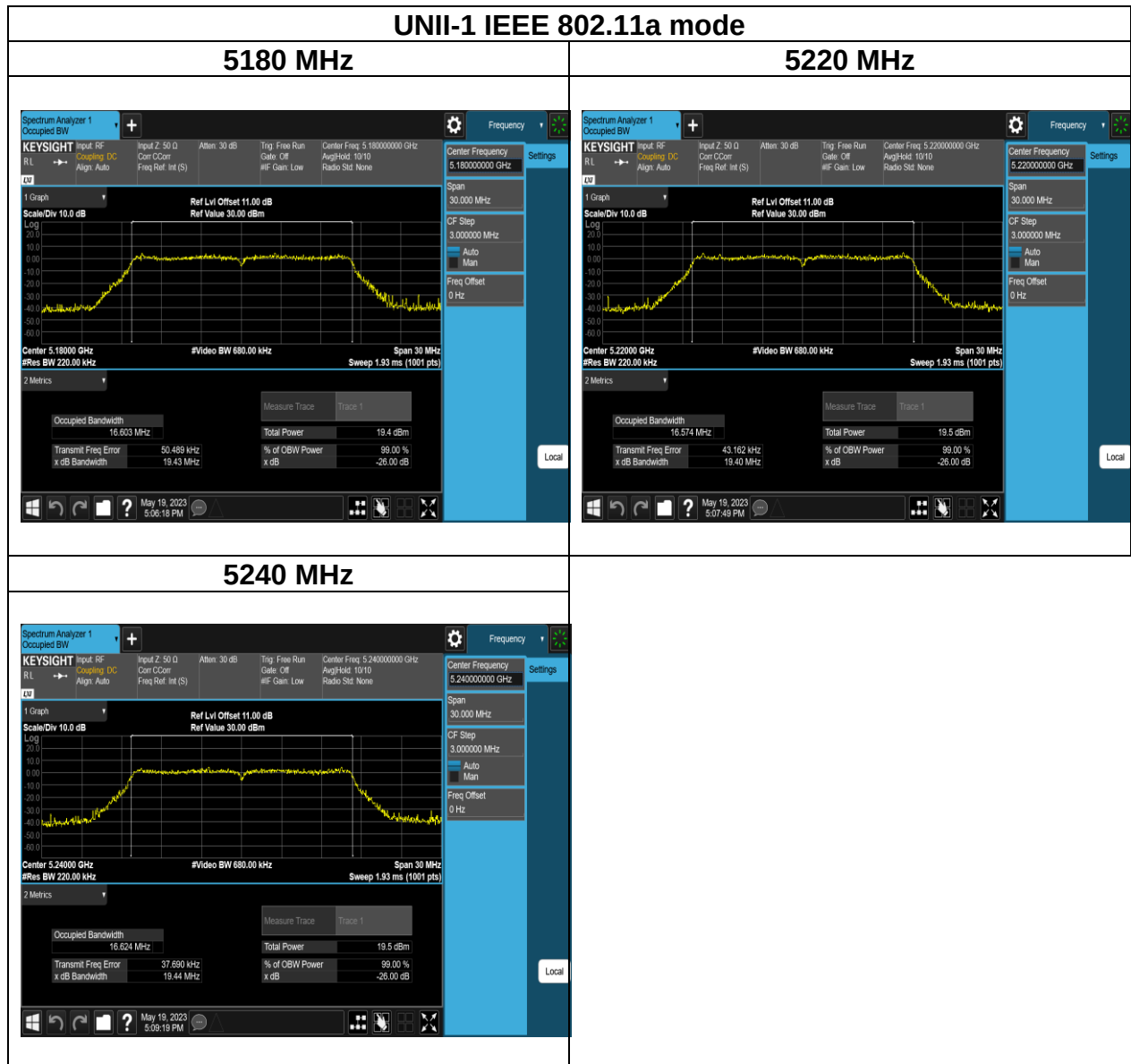


Report No.: TMWK2307002175KR

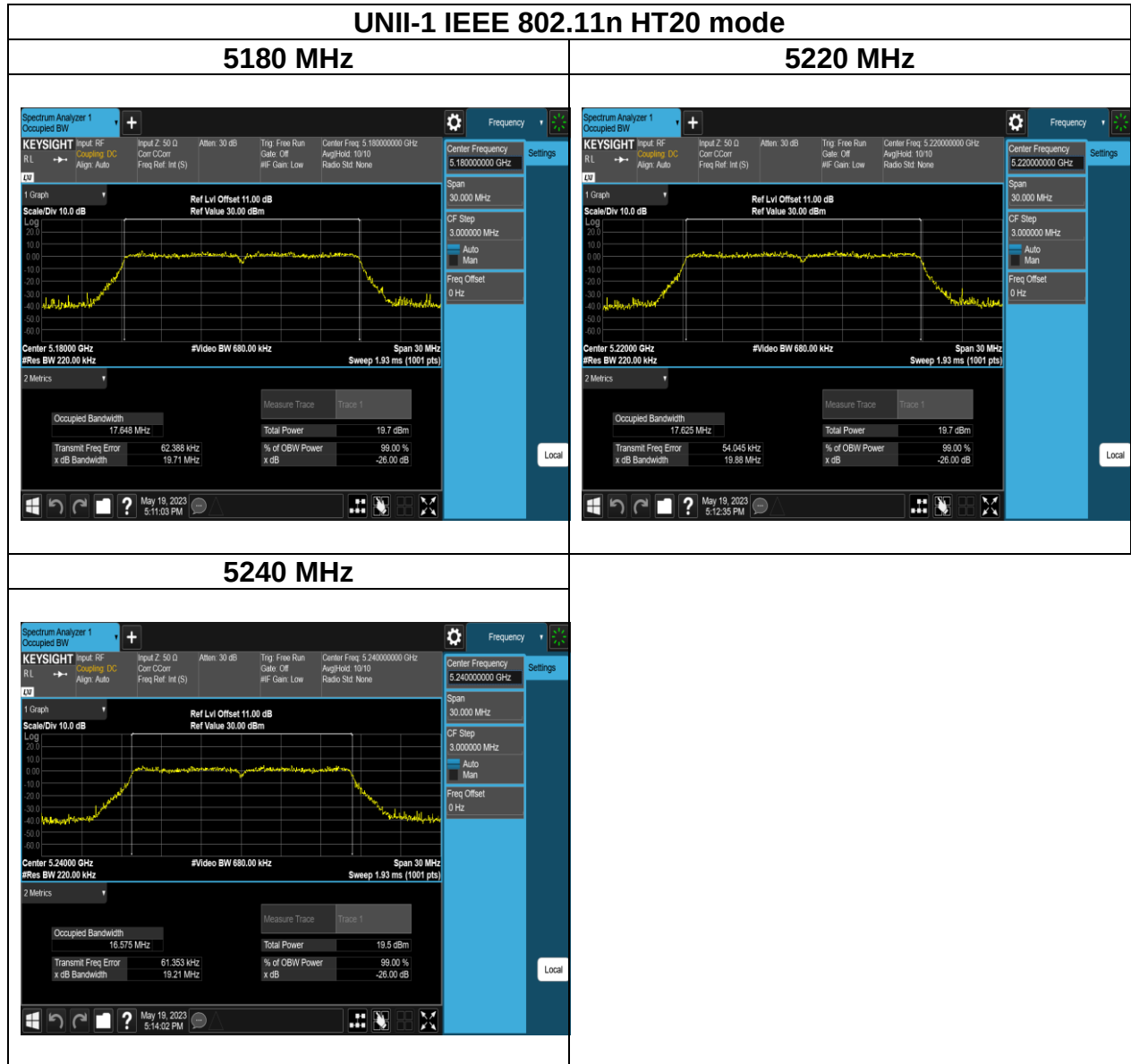


Report No.: TMWK2307002175KR

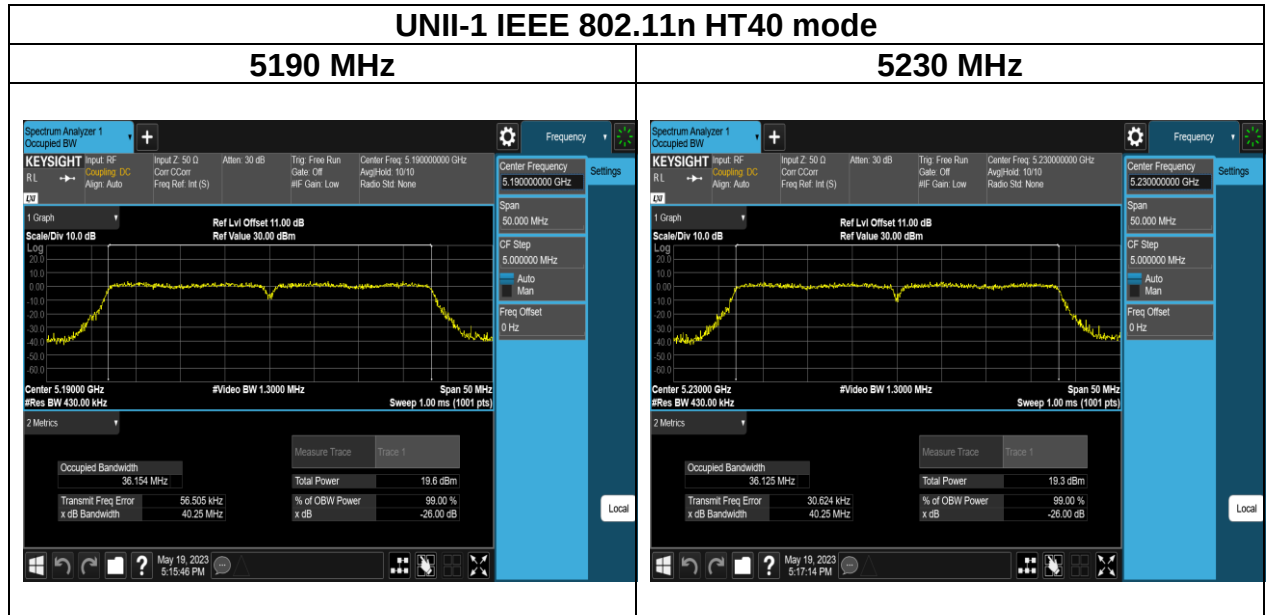
Test Plots (OBW 99%)



Report No.: TMWK2307002175KR

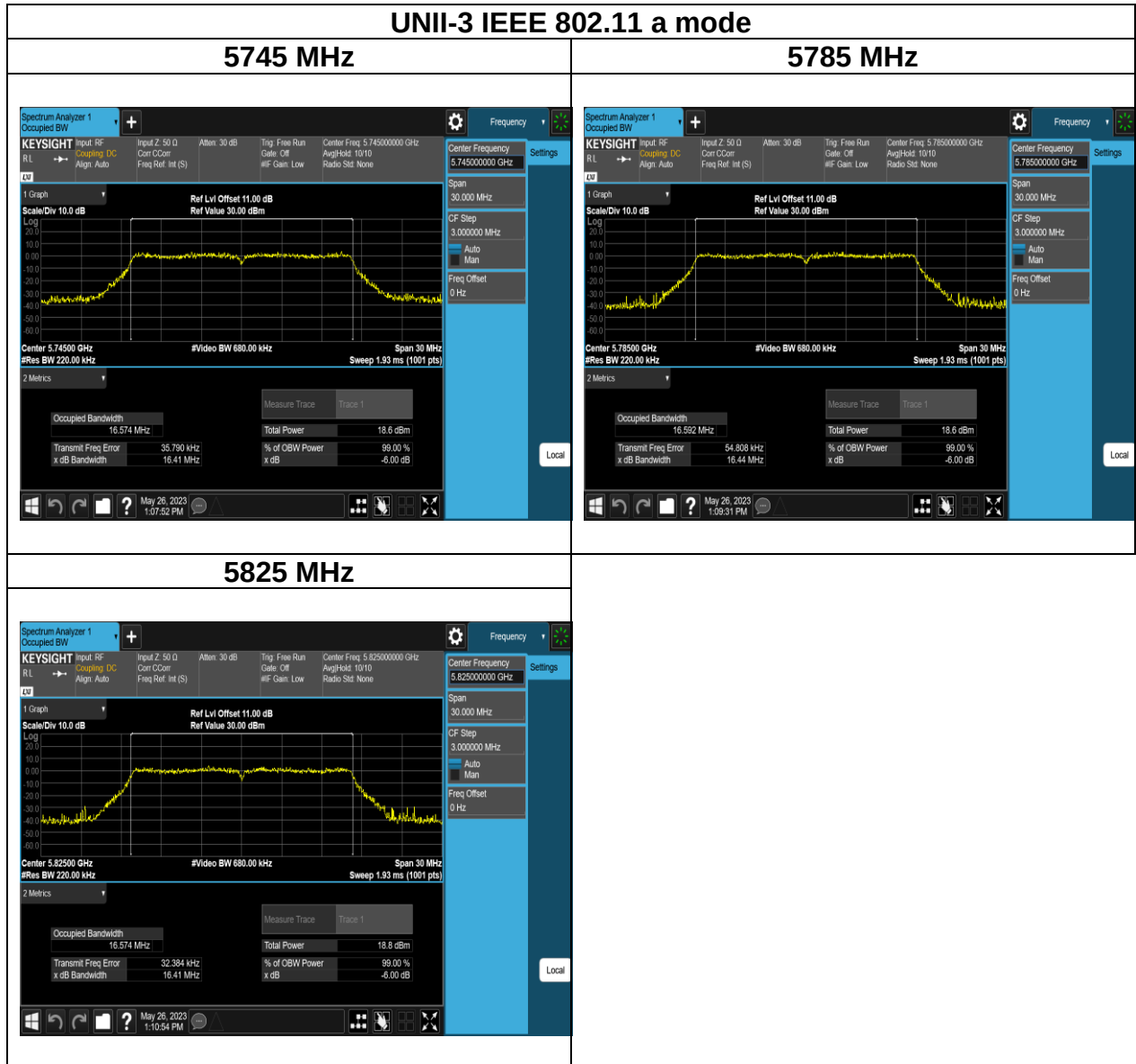


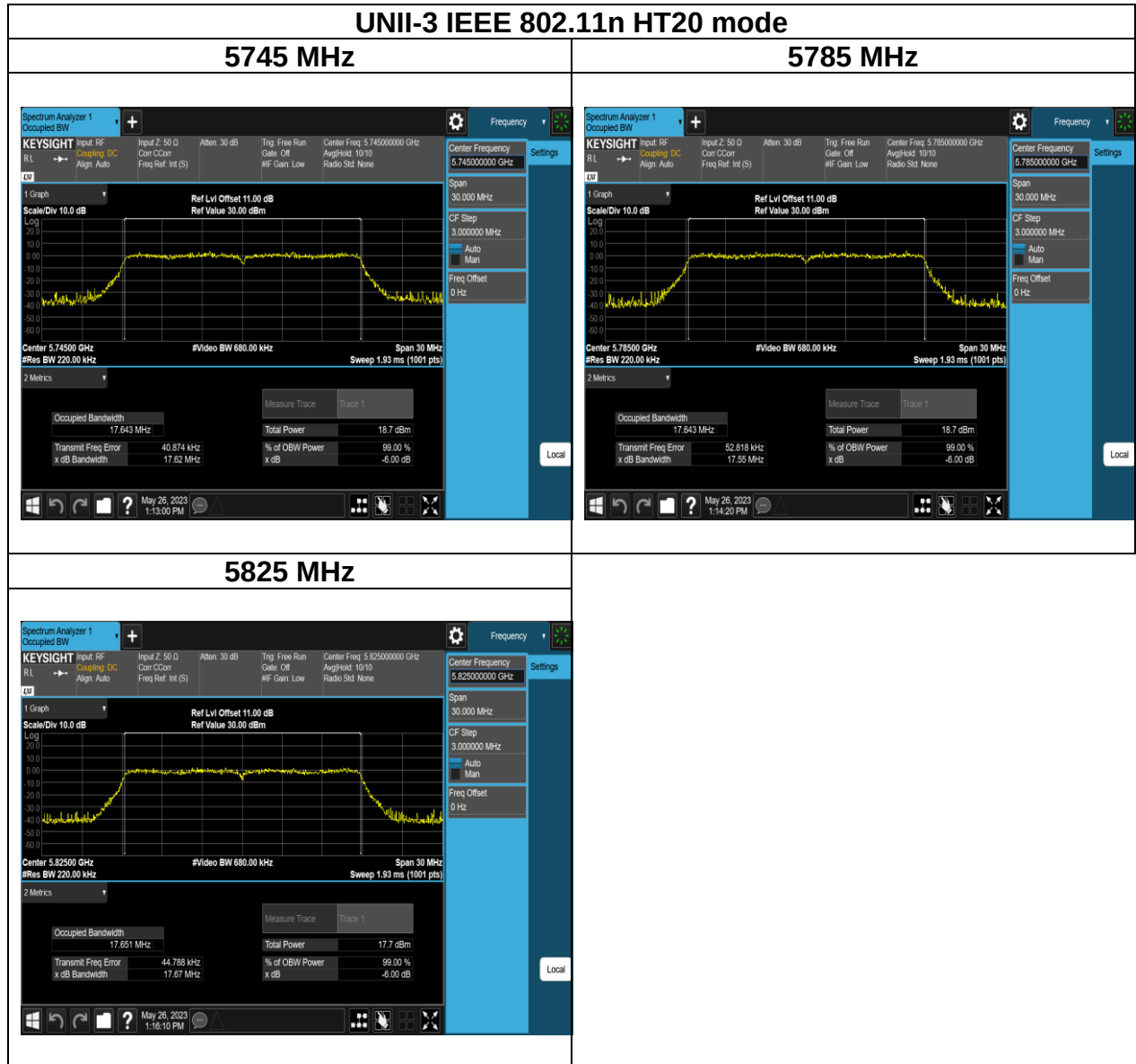
Report No.: TMWK2307002175KR

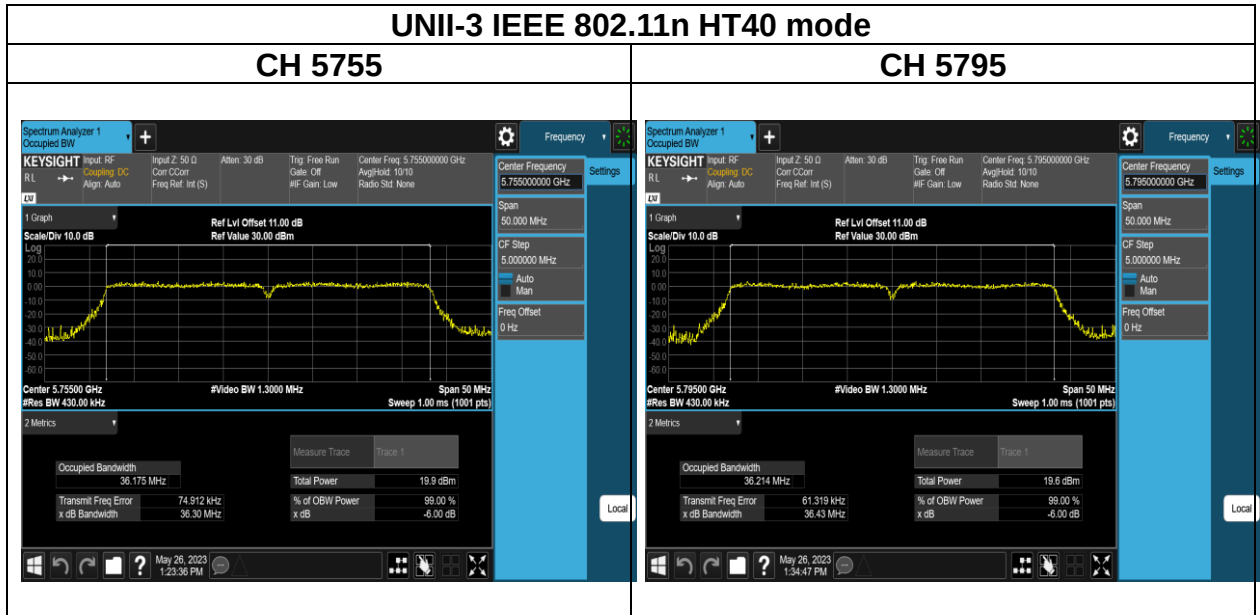


Report No.: TMWK2307002175KR

Test Plots (OBW 99%)







4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.407 (a)(1) and 15.407(a)(3)

According to RSS-247 section 6.2.1.1 and section 6.2.4.1

UNII-1 :

FCC

The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24 dBm), whichever power is less. B is the 99% emission bandwidth in megahertz, provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or $1.76 + 10 \log_{10} B$, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

UNII-3:

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-1 Limit	☒ Antenna not exceed 6 dBi : 24dBm (EIRP: 200mW or $10 + 10 \log_{10} B$ for IC) ☐ Antenna with DG greater than 6 dBi : [Limit = $24 - (DG - 6)$]
UNII-3 Limit	☒ Antenna not exceed 6 dBi : 30dBm ☐ Antenna with DG greater than 6 dBi : [Limit = $30 - (DG - 6)$]

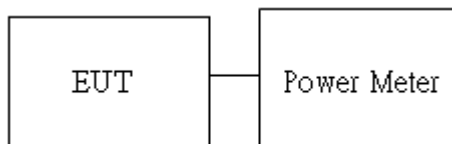
4.3.2 Test Procedure

Test method Refer as KDB 789033 D02, Section E.3.b for BW 20MHz, 40MHz and 80MHz, E.2.b for BW 160MHz.

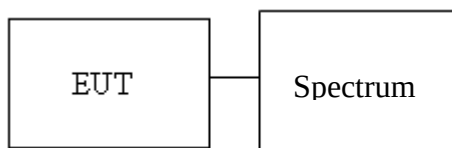
1. The EUT RF output connected to the power meter or spectrum by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Average output power. in the test report.

4.3.3 Test Setup

For BW 20MHz ,40MHz and 80MHz



For BW 160MHz



4.3.4 Test Result

Temperature: 22.8~27.1℃
Humidity: 50~64% RH

Test date: May 19~June 19, 2023
Tested by: David Li

Conducted output power

Test Mode: IEEE 802.11a mode

802.11a_Ch0							
CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	12.5	14.37	27.343	23.98	PASS
44	5220	6	12.5	14.32	27.030	23.98	PASS
48	5240	6	12.5	14.37	27.343	23.98	PASS
149	5745	6	13	14.79	30.119	30	PASS
157	5785	6	13	14.78	30.050	30	PASS
165	5825	6	13	14.85	30.538	30	PASS

Test Mode: IEEE 802.11n HT20 mode

802.11n_HT20_Ch0							
CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.5	14.58	28.681	23.98	PASS
44	5220	MCS0	12.5	14.52	28.288	23.98	PASS
48	5240	MCS0	12.5	14.57	28.615	23.98	PASS
149	5745	MCS0	13	14.85	30.521	30	PASS
157	5785	MCS0	13	14.93	31.088	30	PASS
165	5825	MCS0	12.5	14.07	25.503	30	PASS

Test Mode: IEEE 802.11n HT40 mode

802.11n_HT40_Ch0							
CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	10	12.65	18.413	23.98	PASS
46	5230	MCS0	12.5	14.40	27.550	23.98	PASS
151	5755	MCS0	13	14.78	30.069	30	PASS
159	5795	MCS0	13	14.95	31.270	30	PASS

Note: Since DG<6dBi, there is no need to modify the limit value.

EIRP

Test Mode: IEEE 802.11a mode

802.11a_Ch0							
CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	14.37	6.00	20.37	108.893	22.2	PASS
44	5220	14.32	6.00	20.32	107.647	22.19	PASS
48	5240	14.37	6.00	20.37	108.893	22.21	PASS

Test Mode: IEEE 802.11n HT20 mode

802.11n_HT20_Ch0							
CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	14.58	6.00	20.58	114.288	22.47	PASS
44	5220	14.52	6.00	20.52	112.720	22.46	PASS
48	5240	14.57	6.00	20.57	114.025	22.19	PASS

Test Mode: IEEE 802.11n HT40 mode

802.11n_HT40_Ch0							
CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	12.65	6.00	18.65	73.282	23.01	PASS
46	5230	14.40	6.00	20.40	109.648	23.01	PASS