Dental Imaging Technologies Corporation

RF TEST REPORT

Report Type:
FCC Part 15.407 & ISED RSS-247 RF report

Model:
WNFB-265AXI(BT)

REPORT NUMBER:
2407B0784SHA-001

ISSUE DATE:
December 4, 2024

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 2407B0784SHA-001

Applicant	:	Dental Imaging Technologies Corporation 450 Commerce Drive Quakertown, PA USA 18951
Manufacturer	:	Dental Imaging Technologies Corporation 450 Commerce Drive Quakertown, PA USA 18951
FCC ID	:	2A7FYWNFB265AXIBT
IC	:	28659-NFB265AXIBT

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2023): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2020): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-247 Issue 3 (August 2023): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 5 (February 2021) Amendment 2: General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
Project Engineer Erick Liu	Reviewer Wakeyou Wang

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Revision History

Report No.	Version	Description	Issued Date
2407B0784SHA-001	Rev. 01	Initial issue of report	December 4, 2024

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Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
26 dB Bandwidth & 99% Occupied Bandwidth	15.407(a)	RSS-247 Issue 3 Clause 6	NT
Minimum 6dB Bandwidth	15.407(e)	RSS-247 Issue 3 Clause 6	NT
Maximum Conducted Output Power	15.407(a)	RSS-247 Issue 3 Clause 6	NT
Power spectral density	15.407(a)	RSS-247 Issue 3 Clause 6	NT
Radiated emission	15.407(b) 15.205 15.209	RSS-247 Issue 3 Clause 6 RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Power line conducted emission	15.407(b) 15.207	RSS-Gen Issue 5 Clause 8.8	NT
Frequency Stability	15.407(g)	RSS-Gen Issue 5 Clause 8.11	NT
Antenna requirement	15.203	-	NT

Notes: 1: NA =Not Applicable, NT=Not Tested
2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.
3: Additions, Deviations and Exclusions from Standards: None.

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module
Type/Model:	WNFB-265AXI(BT)
Description of EUT:	EUT is a WIFI module, it has only one model. This is a C2PC test report with the following update: Added new chip antenna, disable some RF function by update the firmware, only the 802.11AC80/AX80 MIMO, channel 5210MHz and 5775Mhz are retained.
Rating:	3.3V DC
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample ID:	/
Sample received date:	September 13, 2024
Date of test:	September 13, 2024 – October 11, 2024

1.2 Technical Specification

FCC

Frequency Band:	5150 ~ 5250MHz 5725 ~ 5850MHz
Support Standards:	802.11ac(VHT80) , 802.11ax(HE80)
Type of Modulation:	OFDM, OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Number:	For 5150 ~ 5250MHz band: Channel 42 For 5725 ~ 5850MHz band: Channel 155

IC

Frequency Band:	5150 ~ 5250MHz 5725 ~ 5850MHz
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Type of Modulation:	OFDM, OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Number:	For 5150 ~ 5250MHz band: Channel 42 For 5725 ~ 5850MHz band: Channel 155

1.3 Working Frequencies for this report

802.11ac(VHT80)			
42	5210MHz	155	5775MHz
802.11ax(HE80)			
42	5210MHz	155	5775MHz

1.4 Antenna information

Antenna information:			
No.	Antenna Type	Gain	Note
1	Chip Antenna	4.8 dBi	**Model: 2344657-5**
2	Chip Antenna	4.5 dBi	**Model: 2344657-6**

Note: 1. This information is supplied by the applicant. Any change on this value would result in different test data / conclusion.

2. The antenna 2344657-5 and 2344657-6 are the same except for the cable length and the gain. After technology evaluation, the max gain antenna 2344657-5 was chosen for all tests.

Mode	Tx/Rx Function	Beamforming function	CDD function	Directional gain (dBi)
802.11ac (VHT80)	2Tx/2Rx	NO	NO	-
802.11ax (HE80)	2Tx/2Rx	NO	NO	-

1.5 Description of Test Facility

Name:	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L21189
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier: CN0014
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2023)
ANSI C63.10 (2020)
KDB 662911 D01 (v02r01)
KDB 558074 (v05r02)
RSS-247 Issue 3 (August 2023)
RSS-Gen Issue 5 (February 2021) Amendment 2

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the continuously transmission was applied by following software. EUT only support MIMO mode, so all tests were performed under MIMO mode.

Software name	Manufacturer	Version	Supplied by
WinSCP	-	-	Applicant

The lowest, middle and highest channel for the following modes were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
5150 - 5250	802.11ac (VHT80)	5210	/	/
	802.11ax (HE80)	5210	/	/
5725 - 5850	802.11ac (VHT80)	5775	/	/
	802.11ax (HE80)	5775	/	/

Data rate and Power setting:
The pre-scan for the conducted power with all data rates in each modulation and band was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rata as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate
5150 - 5250	802.11ac (VHT80)	MCS8
	802.11ax (HE80)	MCS8
5725 - 5850	802.11ac (VHT80)	MCS8
	802.11ax (HE80)	MCS8

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	e3	Audix	9.160323
Radiated emission	e3	Audix	9.160323

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	RF cable	/	0.2m length; 0.5dB loss

2.5 Test environment condition

Test items	Temperature	Humidity
Radiated Emissions in restricted frequency bands	24°C	52%RH

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2.6 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2025-09-14
☑	Test Receiver	Keysight	N9030B	EC 6078	2025-06-15
☑	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2025-10-24
☑	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2025-06-10
☐	Horn antenna	R&S	HF 906	EC 3049	2025-01-16
☑	Horn antenna	ETS	3117	EC 4792-1	2025-03-14
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2025-07-07
☐	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2025-03-23
☑	Horn antenna	ETS	3116c	Ec5955	2025-01-16
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3442	2025-01-09

2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB

3 Radiated Emissions

Test result: **Pass**

3.1 Limit

The radiated emissions which fall in the restricted bands, and the radiated emissions below 1GHz, must comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

The radiated emissions which fall outside the restrict bands, should comply with the EIRP limit as below:

For transmitters operating in the 5.15 - 5.25 / 5.25 - 5.35 / 5.47 - 5.725GHz band:

Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength (3m) (dBµV/m)
<5150	-27	68.20
>5350		
<5470		
>5725		

For transmitters operating in the 5.725 - 5.85GHz band:

Frequency (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength (3m) (dBµV/m)
<5650	-27	68.20
5650 ~ 5700	-27 ~ 10	68.20 ~ 105.20
5700 ~ 5720	10 ~ 15.6	105.20 ~ 110.80
5720 ~ 5725	15.6 ~ 27	110.80 ~ 122.20
5850 ~ 5855	27 ~ 15.6	122.20 ~ 110.80
5855 ~ 5875	15.6 ~ 10	110.80 ~ 105.20
5875 ~ 5925	10 ~ -27	105.20 ~ 68.20
>5925	-27	68.20

3.2 Measurement Procedure

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to peak or quasi-peak detect function and specified bandwidth with maximum hold mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz:

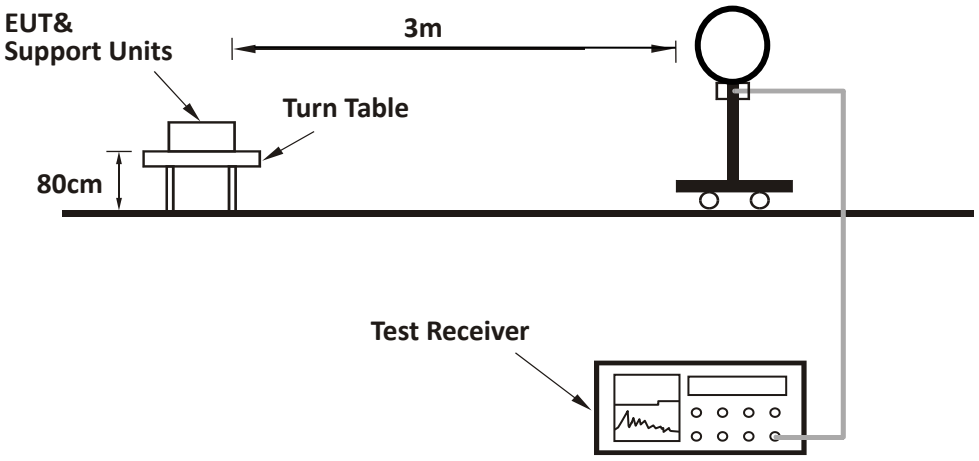
a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to peak or quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

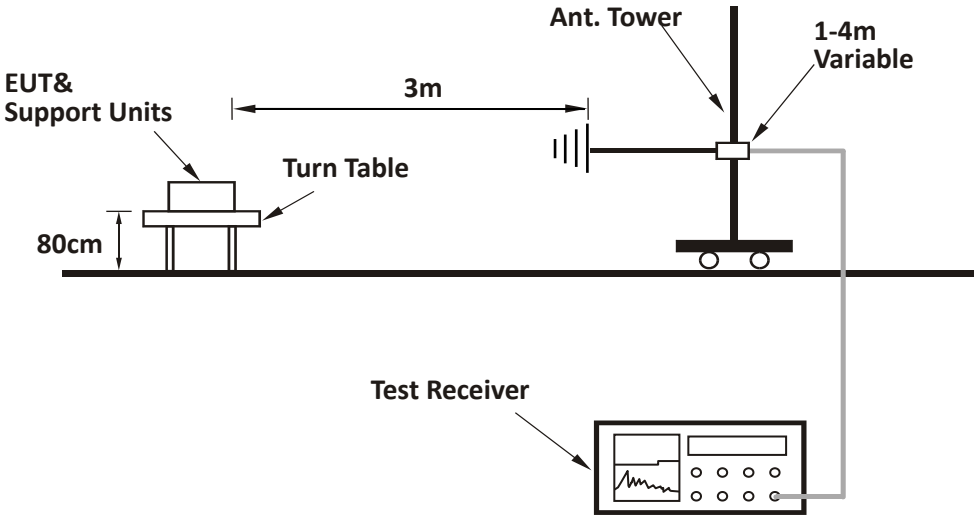
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for peak or quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz at frequency above 1GHz for peak detection above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

3.3 Test Configuration

For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



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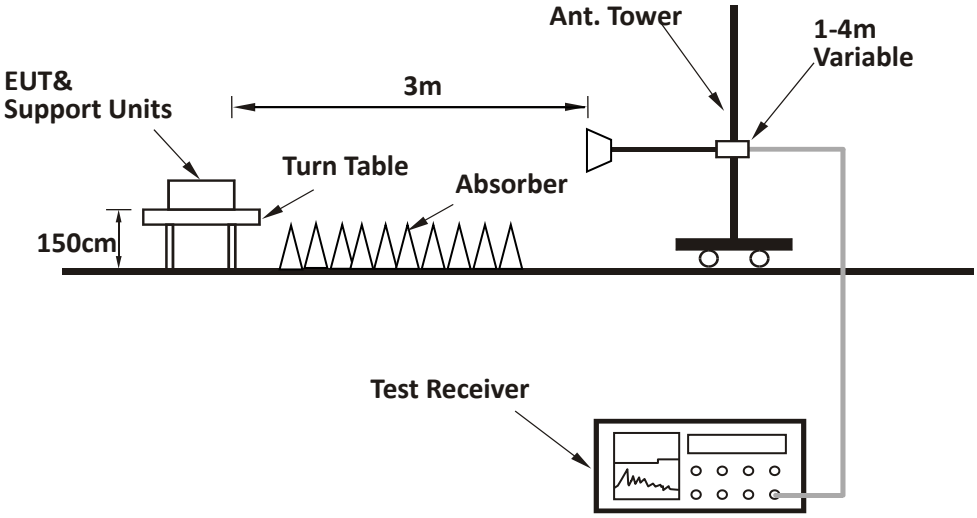
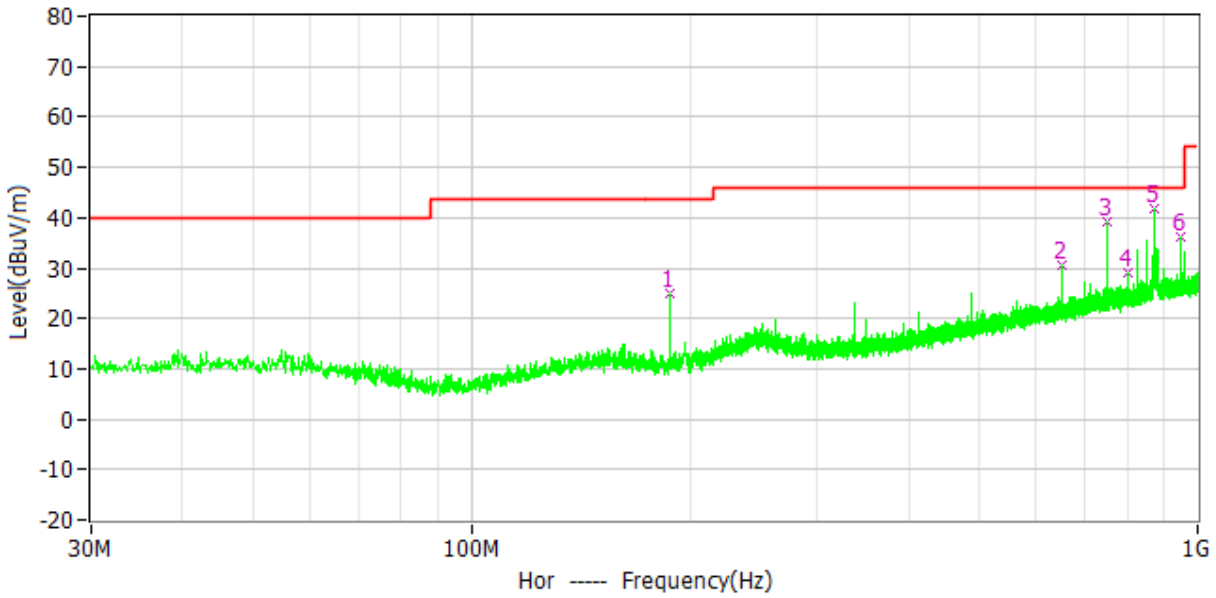
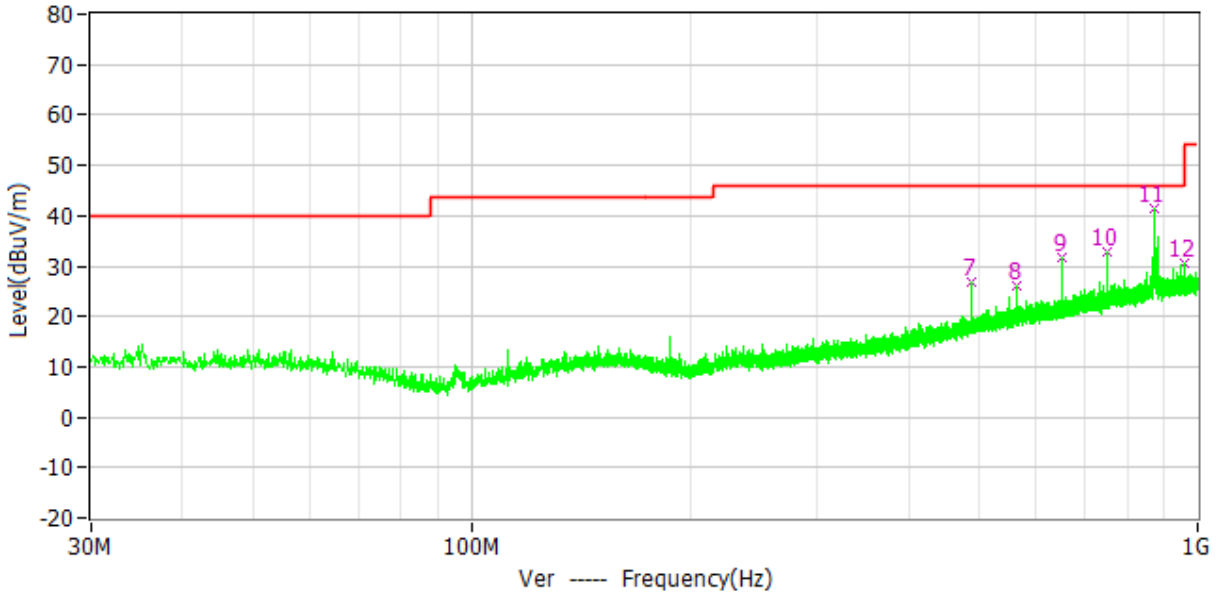
For Radiated emission above 1GHz:



3.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.





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No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar
1*	187.431MHz	43.50	24.90	-18.60	12.28	12.62	PK	Hor
2*	650.024MHz	46.00	30.56	-15.44	7.19	23.37	PK	Hor
3*	750.031MHz	46.00	39.00	-7.00	14.06	24.94	PK	Hor
4*	800.180MHz	46.00	29.09	-16.91	3.33	25.76	PK	Hor
5*	869.147MHz	46.00	41.89	-4.11	15.16	26.73	PK	Hor
6*	950.045MHz	46.00	36.10	-9.90	8.58	27.52	PK	Hor
7*	487.549MHz	46.00	26.83	-19.17	6.59	20.24	PK	Ver
8*	562.530MHz	46.00	26.17	-19.83	4.32	21.85	PK	Ver
9*	650.024MHz	46.00	31.71	-14.29	8.34	23.37	PK	Ver
10*	750.031MHz	46.00	32.94	-13.06	8.00	24.94	PK	Ver
11*	869.147MHz	46.00	41.40	-4.60	14.67	26.73	PK	Ver
12*	959.648MHz	46.00	30.41	-15.59	2.83	27.58	PK	Ver

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Delta = Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

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Test result above 1GHz:

The emission was conducted from 1GHz to 40GHz

11ac VHT80 5210MHz MIMO:

Polarity	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5150.00	32.30	68.20	35.90	Peak
V	5150.00	39.90	68.20	28.30	Peak
H	10420.00	31.60	74.00	42.40	Peak
H	10420.00	32.10	74.00	41.90	Peak

11ax HE80 5775MHz MIMO:

Polarity	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5725.00	32.10	68.20	36.10	Peak
V	5725.00	39.50	68.20	28.70	Peak
H	11550 .00	31.50	74.00	42.50	Peak
V	11550 .00	32.20	74.00	41.80	Peak

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (- Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

********** END **********