RADIO TEST REPORT

Product	:	Digital Media Receiver
Model Name	:	DMXMG121
FCC ID	:	IOMJ314
Test Regulation	:	FCC 47 CFR Part 15 Subpart E (Section 15.407)
Received Date	:	2024/7/5
Test Date	:	2024/7/9~2024/7/10
Issued Date	:	2025/7/22
Applicant	:	JVCKENWOOD corporation 3-12, Moriya-cho, Kanagawa-ku, Yokohama-shi, Kanagawa, 221-0022, Japan
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

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REVISION HISTORY

Original Test Report No.: 4791806088-US-R0-V0

Revision	Test report No.	Date	Page revised	Contents
Original	4791806088-US-R0-V0	2025/7/22	-	Initial issue

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1. Attestation of Test Results

APPLICANT:	JVCKENWOOD corporation 3-12, Moriya-cho, Kanagawa-ku, Yokohama-shi, Kanagawa, 221-0022, Japan
MANUFACTURER:	JVCKENWOOD corporation 3-12, Moriya-cho, Kanagawa-ku, Yokohama-shi, Kanagawa, 221-0022, Japan
EUT DESCRIPTION:	Digital Media Receiver
BRAND:	KENWOOD
MODEL:	DMXMG121
SAMPLE STAGE:	Engineering Verification Test sample
DATE of TESTED:	2024/7/9~2024/7/10

APPLICABLE STANDARDS	
STANDARD	**Test Results**
FCC 47 CFR PART 15 Subpart E (Section 15.407)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Cindy Hsin Date : 2025/7/22
Project Handler

Approved and Authorized By:

Kent Liu Date : 2025/7/22
Senior Laboratory Engineer

2. Summary of Test Results

Summary of Test Results		
FCC Clause	**Test Items**	**Result**
15.407(e)	6dB Bandwidth	PASS
2.1049	Occupied Bandwidth	See Note 1
15.407(a)(1/2/3)	Conducted Output Power	PASS
15.407(a)(1/2/3)	Power Spectral Density	PASS
15.407(g)	Frequency Stability	PASS
15.407(b) (1/2/3/4/5/9)	Radiated Emissions and Band Edge Measurement	PASS
15.407(b)(9)	AC Power Conducted Emission	See Note 2
15.203	Antenna Requirement	PASS
15.407(h)	Dynamic Frequency Selection & Transmit power control	N/A

Note:
1. The Occupied Bandwidth was reference only.
2. The EUT will not be directly or indirectly connected to the AC power network system in the actual application. Therefore, AC power conducted emission is not evaluated.

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB 789033 D02 General UNII Test Procedure New Rules v02r01, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

5. Measurement Uncertainty

For statement of conformity, Simple acceptance (Section 3.1.4 of IEC Guide 115) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Determining compliance based on the results of the compliance measurement, not considering measurement instrumentation uncertainty.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	3.1 dB
RF Conducted	9 kHz - 40GHz	2.3 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	3.2 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	6.1 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	5.1 dB

6. Equipment under Test

6.1. Description of EUT

Product	Digital Media Receiver
Brand Name	KENWOOD
Model Name	DMXMG121
Normal Voltage	12Vdc

Operating Frequency	5755 ~ 5795 MHz
Modulation	256QAM, 64QAM, 16QAM, QPSK, BPSK
Transfer Rate	802.11n: up to MCS7 802.11ac: up to MCS9
Maximum Output Power	5755 ~ 5795 MHz: 9.96 dBm
Sample ID	Conducted Test: 6825842 Radiated Test: 6825840

Note:

1. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

Modulation Mode	Tx,Rx Function
802.11n (HT40)	1TX,1RX
802.11ac (VHT40)	1TX,1RX

* The modulation and bandwidth are similar for 802.11n mode for HT40 and 802.11ac mode for VHT40, therefore investigated worst case to representative mode in test report.

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
GNSS Antenna	Forever Innovation	GA005	1.5 meter, Shielded cable, w/o ferrite core

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual, the laboratory shall not be held responsible.

6.2. Channel List

FOR 5755 ~ 5795MHz:

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	24°C/ 62%RH	12Vdc	2024/07/10	Ethan Hsu
Radiated Spurious Emission	966-2	22~26°C/ 62~68%RH	12Vdc	2024/07/09~ 2024/07/10	Rex Chen

FCC Test Firm Registration Number: 498077
IC Company Number: 23421

Sample Calculation:

Antenna Port Conducted Measurement:

- Where relevant, the follow sample calculation is provided:
  Result Value (dBm) = Reading Value (dBm) +Attenuator Factor (dB) + Cable Loss (dB).
  Example: Result Value (10dBm) = Reading Value (-2dBm) +Attenuator Factor (10dB) + Cable Loss(2dB).
  *Test plot only shown the "Result Value".

Radiated Spurious Emission:

- Where relevant, the follow sample calculation is provided:
  Result Value (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).
  Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Preamp Factor (dB).
  Example: Result Value (34.5dBuV/m) = Reading Value (40.1dBuV) + Antenna Factor (18.7dB/m) + Cable Loss (4.2dB) - Preamp Factor (28.5dB).

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	E-LEAD	EL-827C-FMA1	Couple antenna	1.3

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual, the laboratory shall not be held responsible.

6.5. Test Mode Applicability and Tested Channel Detail

- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Bandedge	802.11ac40	5755-5795	OFDM	151 to 159	151, 159	MCS0 Nss1
Radiated Emissions (Above 1GHz)	802.11ac40	5755-5795	OFDM	151 to 159	151, 159	MCS0 Nss1
Radiated Emissions (Below 1GHz)	802.11ac40	5755-5795	OFDM	151 to 159	151	MCS0 Nss1
Antenna Port Conducted Measurement	802.11ac40	5755-5795	OFDM	151 to 159	151, 159	MCS0 Nss1

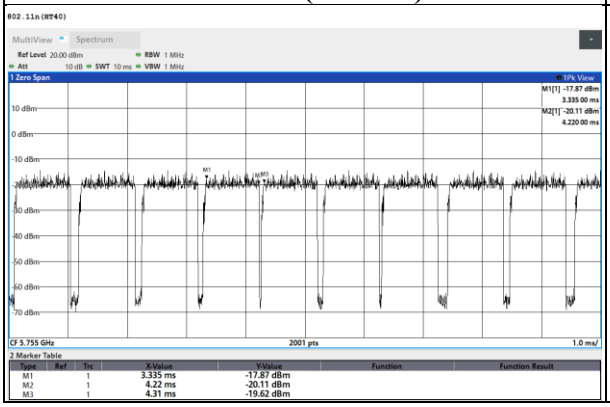
Simultaneously transmission condition:

Condition	Technology	
1	BT	WLAN (5GHz)

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11ac(VHT40)	0.885	0.975	0.9077	0.42	2kHz

802.11ac(VHT40)	
	

7. Test Equipment

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2024/3/29	2025/3/28
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2023/11/22	2024/11/21
Loop Antenna	ETS lindgren	6502	00213440	2023/12/13	2024/12/12
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2024/1/5	2025/1/4
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2023/12/8	2024/12/7
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2023/12/27	2024/12/26
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2024/5/28	2025/5/27
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2024/1/23	2025/1/22
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2024/4/16	2025/4/15
Cables (9k-18 GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2023/11/29	2024/11/28
Cables (18-40GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2023/11/29	2024/11/28
Antenna Port Conducted Measurement					
Signal Analyzer	Rohde & Schwarz	FSVA3044	101281	2024/3/18	2025/3/17
Signal Analyzer	Rohde & Schwarz	FSV40	101490	2023/9/13	2024/9/12
Attenuator	EMCI	EMC-40ATK2W10	17002	2023/11/15	2024/11/14
USB Power Sensor	Anritsu	MA24408A	12031	2023/7/12	2024/7/11
Temperature &Humidity Test Chamber	GIANT FORCE	GTH-150- 40-CP-AR	MAA1701-010	2024/3/6	2025/3/5

UL Software		
Description	**Name**	**Version**
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF-Conducted-FCC 15407	ver 1.1

8. Description of Test Setup

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	DC Power Supply	GW INSTEK	GPD-2303S	GEQ902325	Provide by Lab
B	Test Tool	N/A	N/A	N/A	Provide by Client
C	Laptop	DELL	Latitude E5470	3JFKWF2	Provide by lab

I/O Cables

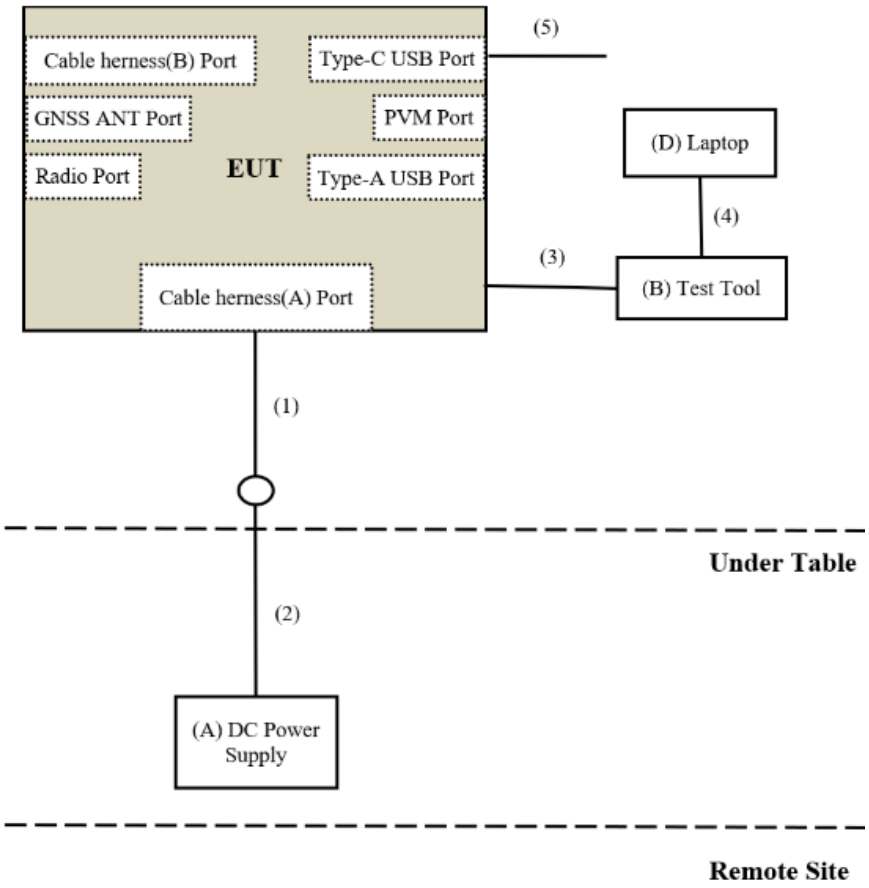
ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	Main Cable Harness-1	E-LEAD	N/A	0.45	Provide by Client
2	DC Cable	ASHATA	7535wfouggvy9361	2	Provided by Lab
3	Flexible Cable	N/A	N/A	0.1	Provide by Client
4	Mini USB Cable	CPU	USB-194	1.5	Provided by Lab
5	USB Type C	ZMI	AL-701	1	Provided by Lab

Test Setup

The EUT was worked in engineering mode to transmit signal.

Controlled using a bespoke application (RTLBTAPP_Version 5.2.1.21) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



9. Test Results

9.1. 6dB Bandwidth

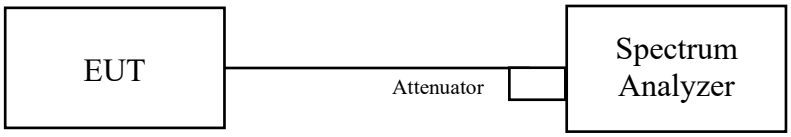
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
f. The plot of the test result only shows the worst case of channels as a representative.

Test Setup

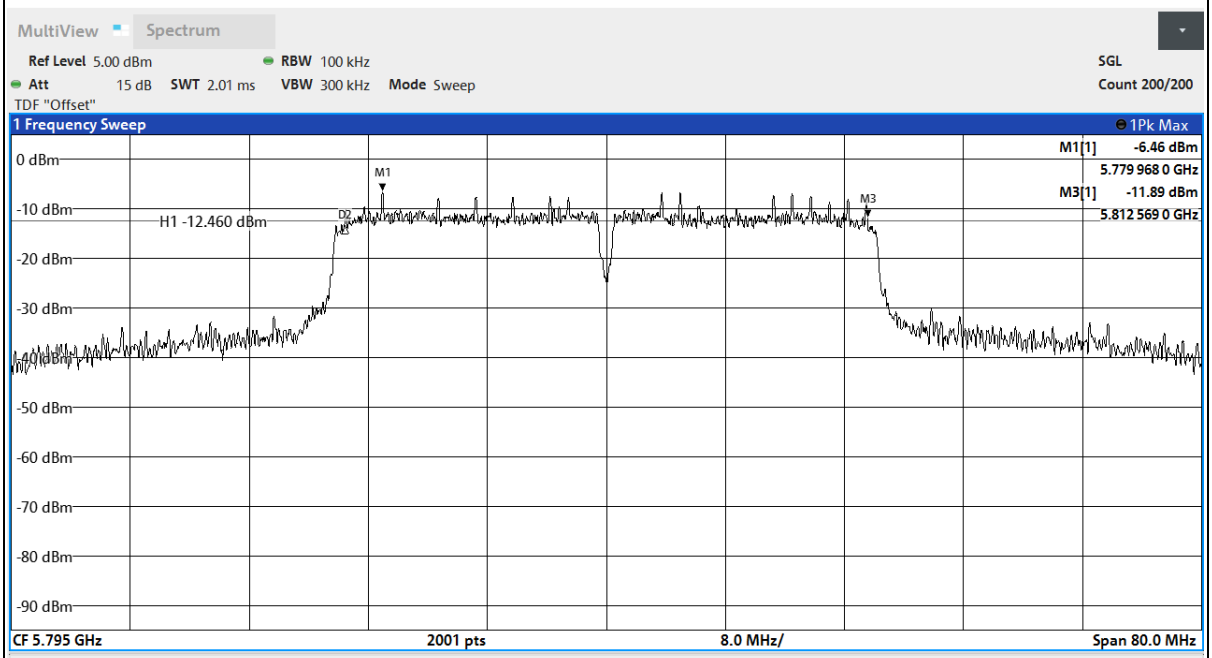


The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

Mode	CH	Freq (MHz)	6dB BW (MHz) Chain 0	Limit (MHz)	Result
802.11ac(VHT40)	151	5755	35.196	0.5	PASS
	159	5795	35.157	0.5	PASS

802.11ac(VHT40), CH159, Chain 0

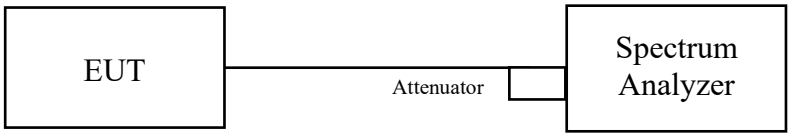


9.2. Occupied Bandwidth

Test procedure

a. Set center frequency to the nominal EUT channel center frequency.
b. Set span = 1.5 times to 5.0 times the OBW.
c. Set RBW = 1% to 5% of the OBW
d. Set VBW ≥ 3 x RBW
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).
g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. 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% occupied bandwidth is the difference between these two frequencies.
h. The plot of the test result only shows the worst case of channels as a representative.

Test Setup

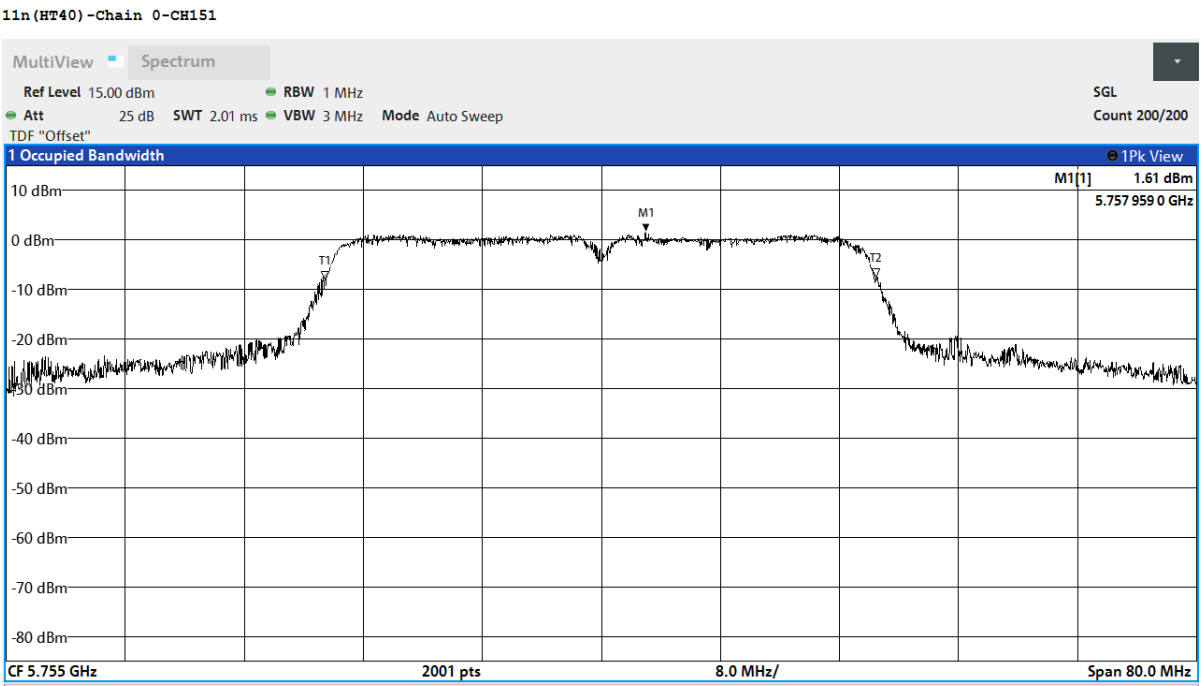


The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

Mode	CH	Freq (MHz)	OBW (MHz) Chain 0	Limit (MHz)	Result
802.11ac(VHT40)	151	5755	37.037	N/A	PASS
	159	5795	37.016	N/A	PASS

802.11ac(VHT40), CH151, Chain 0



9.3. Conducted output power

Requirements

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)
		Fixed point-to-point Access Point	1 Watt (30 dBm) If G_{TX} > 23 dBi, then P_{Out} = 30 – (G_{TX} – 23)
		Indoor Access Point	1 Watt (30 dBm) If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)
		Client device	250mW (24 dBm) If G_{TX} > 6 dBi, then P_{Out} = 23.98 – (G_{TX} – 6)
U-NII-2A	---		250mW (24 dBm) or 11 dBm+10 log B* If G_{TX} > 6 dBi, then P_{Out} = 23.98 – (G_{TX} – 6)
U-NII-2C	---		250mW (24 dBm) or 11 dBm+10 log B* If G_{TX} > 6 dBi, then P_{Out} = 23.98 – (G_{TX} – 6)
U-NII-3	---		For Point-to-multipoint systems (P2M): 1 Watt (30 dBm). If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6) For Point-to-point systems (P2P): 1 Watt (30 dBm)
U-NII-4		Indoor Access Point	Maximum e.i.r.p. 4 W
		Subordinate Device	Maximum e.i.r.p. 4 W
		Client Device	Maximum e.i.r.p. 1 W

Note:
1. P_{Out} = maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi, B is the 26 dB emission bandwidth in megahertz
2. If EUT with Multiple Transmitter Output:
   a. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{Gn/20})^2$ / Nant] dBi.
   Nant: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas
   Example: two antenna and gain 5 dBi / 3dBi, so if it was used for TxBF power measurement
   Directional Gain = 10 log[(105/20 + 103/20)2 / 2] dBi = 7.07 dBi
   b. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices, CDD
   Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
   Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
   Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.
   Example: Maximum antenna gain = 5 dBi and NANT ≤ 4, so if it was used for CDD power measurement
   Directional Gain = 5 dBi + Array Gain = 5 dBi + 0 dB = 5 dBi
   c. For power measurement of KDB 662911 is used with multiple transmitter output. Total conducted power is the sum of the conducted power levels measured at the various output ports.

Test Procedure

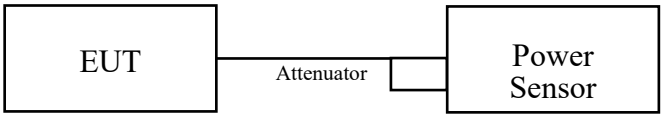
For Average Power Measurement

Test method PM

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to AVERAGE. Duty factor is not added to measured value.

Test Setup

For Average Power Measurement



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

Test Data

802.11ac (VHT40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
151	5755	9.908	9.96	30	PASS
159	5795	9.616	9.83	30	PASS

9.4. Power Spectral Density

Requirements

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz If G_{TX} > 6 dBi, then PSD = 17 – (G_{TX} – 6)
		Fixed point-to-point Access Point	17dBm/ MHz If G_{TX} > 23 dBi, then PSD = 17 – (G_{TX} – 23)
		Indoor Access Point	17dBm/ MHz If G_{TX} > 6 dBi, then PSD = 17 – (G_{TX} – 6)
		Client device	11dBm/ MHz If G_{TX} > 6 dBi, then PSD = 11 – (G_{TX} – 6)
U-NII-2A	---		11dBm/ MHz If G_{TX} > 6 dBi, then PSD = 11 – (G_{TX} – 6)
U-NII-2C	---		11dBm/ MHz If G_{TX} > 6 dBi, then PSD = 11 – (G_{TX} – 6)
U-NII-3	---		For Point-to-multipoint systems (P2M): 30dBm/ 500kHz. If G_{TX} > 6 dBi, then PSD = 30 – (G_{TX} – 6) For Point-to-point systems (P2P): 30dBm/ 500kHz
U-NII-4		Indoor Access Point	Maximum e.i.r.p. PSD 20 dBm/MHz
		Subordinate Device	Maximum e.i.r.p. PSD 20 dBm/MHz
		Client Device	Maximum e.i.r.p. PSD 14 dBm/MHz

Note:

1. PSD = power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. If EUT with Multiple Transmitter Output:
   a. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{Gn/20})^2$ / Nant] dBi.
   Nant: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas
   Example: two antenna and gain 5 dBi / 3dBi, so if it was used for power density measurement
   Directional Gain = 10 log[$(10^{5/20} + 10^{3/20})^2$ / 2] dBi = 7.07 dBi
   b. "PSD per chain" of the report shown is maximum value for each chain, at the "Total PSD" is summing entire spectra across corresponding frequency bins on the various outputs by computer, refer KDB 662911 Method a) for calculating total power density.
   c. Method a) of power density measurement of KDB 662911 is used for calculating total power density with multiple transmitter output. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
4. Refer to section 6.6 for duty cycle spectrum plot. (If duty cycle<98%)

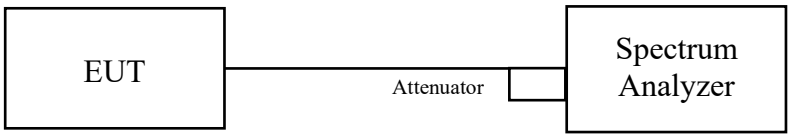
Test procedure

For U-NII-3 band:

Using method as below:

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
d. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10 log (500 kHz/300kHz)
e. Sweep time = auto, trigger set to "free run".
f. Trace average at least 100 traces in power averaging mode.
g. Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))
h. The plot of the test result only shows the worst case of channels as a representative.

Test Setup



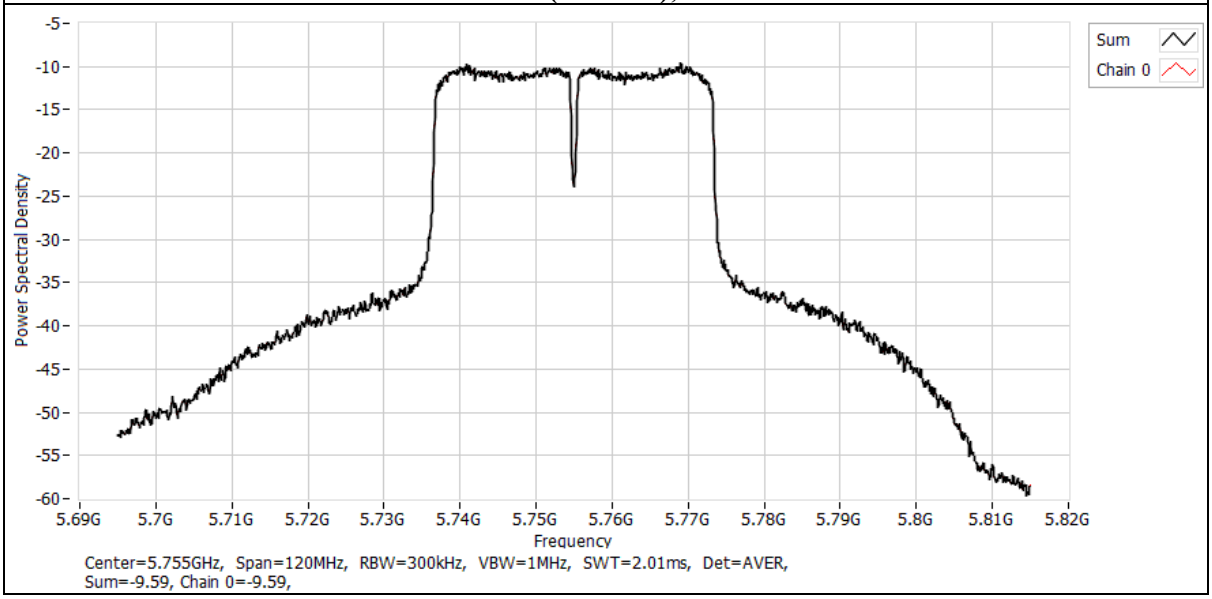
The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT40)	151	5755	2.22	1.3	-7.37	30	PASS
	159	5795	2.22	1.3	-7.96	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)
			Chain 0
802.11ac(VHT40)	151	5755	-9.59
	159	5795	-10.17

802.11ac(VHT40), CH151



9.5. Frequency Stability

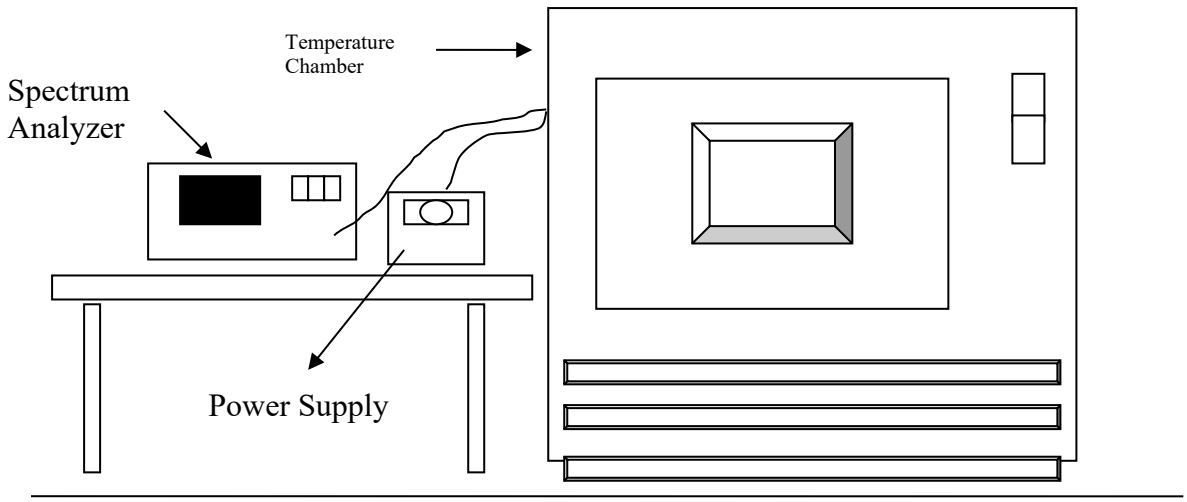
Requirements

The frequency of the carrier signal shall be maintained within band of operation.

Test procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Test Setup



Test Data

Frequency Stability Versus Temp.									
Operating Frequency: 5755 MHz									
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
50	12	5755.0144	2.50	5755.0123	2.14	5755.011	1.91	5755.0107	1.86
40	12	5755.0167	2.90	5755.0194	3.37	5755.0164	2.85	5755.0164	2.85
30	12	5755.018	3.13	5755.0164	2.85	5755.0192	3.34	5755.0187	3.25
20	12	5755.0198	3.44	5755.0226	3.93	5755.0189	3.28	5755.0199	3.46
10	12	5754.9987	-0.23	5754.9971	-0.50	5754.9969	-0.54	5754.9965	-0.61
0	12	5755.024	4.17	5755.0231	4.01	5755.0268	4.66	5755.0238	4.14
-10	12	5755.016	2.78	5755.0153	2.66	5755.0168	2.92	5755.0164	2.85
-20	12	5754.9885	-2.00	5755.9889	171.83	5754.9886	-1.98	5754.9906	-1.63
-30	12	5755.0147	2.55	5755.0138	2.40	5755.0112	1.95	5755.0138	2.40
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
20	13.8	5755.0198	3.44	5755.0227	3.94	5755.0186	3.23	5755.0202	3.51
20	10.2	5755.0198	3.44	5755.0226	3.93	5755.0189	3.28	5755.0199	3.46

9.6. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequency(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

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	**Applicable To**	**EIRP Limit**	**Equivalent Field Strength at 3m**
5150~5250 MHz	15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
	*1 beyond 75 MHz or more above of the band edge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		
5850~5895 MHz	RSS-247 clause 6.2.5.3	**5725 MHz and below:** PK:27 (dBm/MHz) *1 PK:15.6 (dBm/MHz) *2 PK:10 (dBm/MHz) *3 PK:-27 (dBm/MHz) *4 **5895 MHz and above:** AV:-27 (dBm/MHz) *a AV:15&-7 (dBm/MHz) *b AV:-5&-27 (dBm/MHz) *c	**5725 MHz and below:** PK:122.2 (dBμV/m) *1 PK:110.8 (dBμV/m) *2 PK:105.2 (dBμV/m) *3 PK:68.2 (dBμV/m) *4 **5895 MHz and above:** AV: 68.2 (dBμV/m) *a AV:110.2&88.2 (dBμV/m) *b AV:90.2&68.2 (dBμV/m) *c
	*1 5 MHz below the 5725 MHz band edge. *2 5 MHz below the 5725 MHz band edge decreasing linearly to 10 dBm/MHz at 25 MHz below *3 25 MHz below the 5725 MHz band edge decreasing linearly to -27 dBm/MHz at 75 MHz below *4 More than 75 MHz below the 5725 MHz band edge. *a Fixed outdoor access points and fixed outdoor client devices shall not exceed -27 dBm/MHz e.i.r.p. spectral density at or above the 5895 MHz band edge. *b Indoor access points or indoor subordinate devices shall not exceed 15 dBm/MHz e.i.r.p. spectral density at the 5895 MHz band edge and shall decrease linearly to not exceed -7 dBm/MHz e.i.r.p. spectral density at or above 5925 MHz. *c Client devices shall not exceed -5 dBm/MHz e.i.r.p. spectral density at the 5895 MHz band edge and shall decrease linearly to not exceed -27 dBm/MHz e.i.r.p. spectral density at or above 5925 MHz.		

Note:
The following formula is used to convert the effective isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

Test Procedures

[For 9 kHz ~ 30 MHz]

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter 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. Parallel, perpendicular, and ground-parallel orientations 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. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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

[For above 30 MHz]

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 meter 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. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
f. The test-receiver system was set to peak and average detects 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:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

Peak

Frequency	RBW	VBW
9 kHz~150 kHz	200 Hz	600 Hz
150 kHz~30 MHz	10 kHz	30 kHz
30 MHz~1 GHz	120 kHz	360 kHz
Above 1GHz	1 MHz	3 MHz

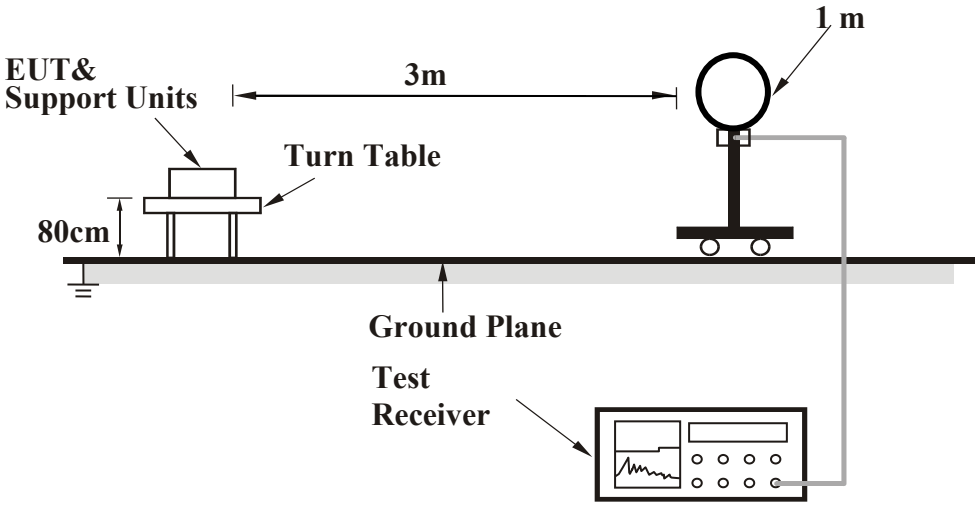
Average for above 1GHz

RBW	VBW
1MHz	Refer to section 6.6 for duty cycle.

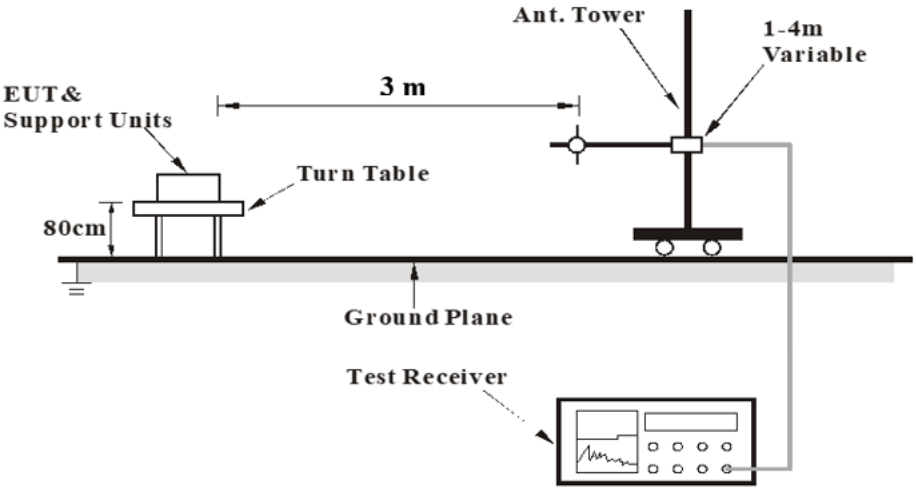
d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
h. Test data of Notation "@" = Fundamental Frequency
i. Test data of Notation " * " = Only required peak limit or the peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

Test Setup

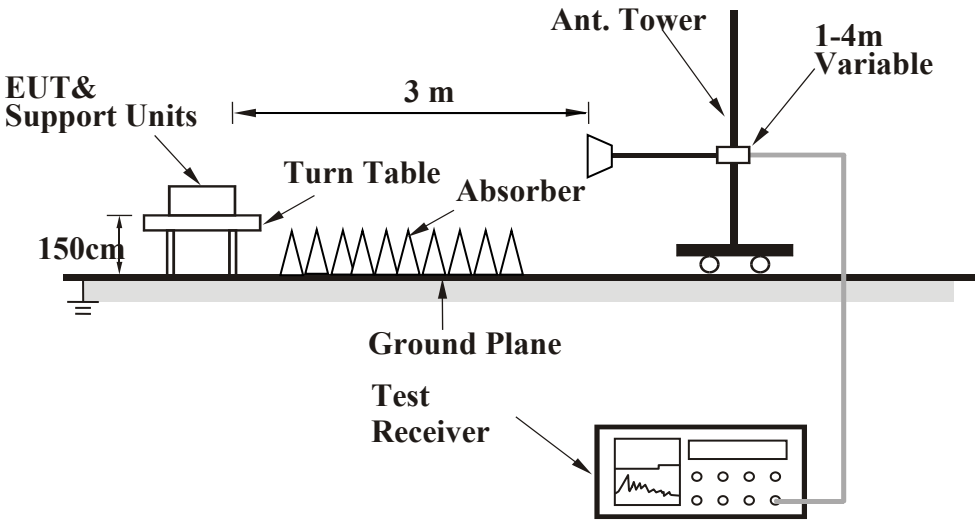
<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

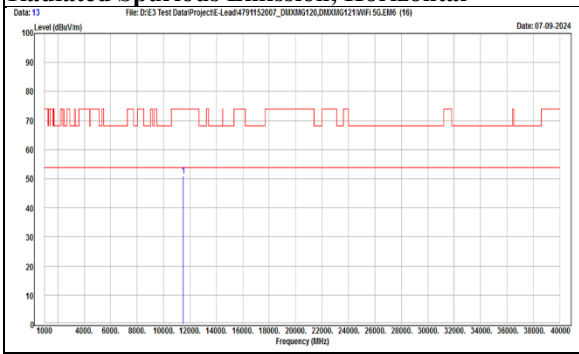
Test Data

Above 1 GHz

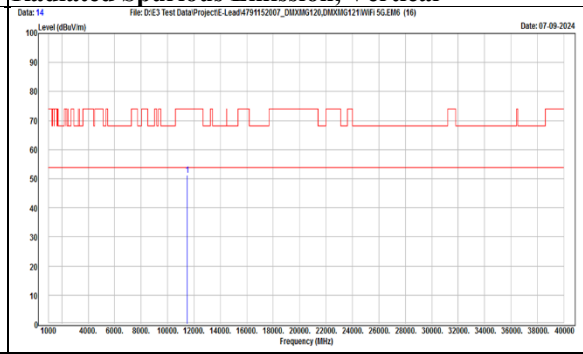
Mode	802.11ac(VHT40)	Channel	151

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5537	41.64	20.56	62.2	68.2	-6	PK
		5658	40.83	20.41	61.24	74.14	-12.9	PK
	@	5755	77.07	20.68	97.75	N/A	N/A	PK
	*	11510	31.31	19.77	51.08	74	-22.92	PK
Vertical		5641	42.5	20.46	62.96	68.2	-5.24	PK
		5664	41.36	20.39	61.75	78.59	-16.84	PK
	@	5755	75.1	20.68	95.78	N/A	N/A	PK
	*	11510	31.39	19.77	51.16	74	-22.84	PK

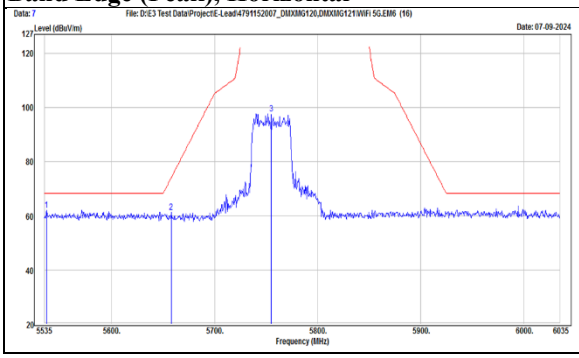
TX, 802.11ac(VHT40) (Ch 151)
Radiated Spurious Emission, Horizontal



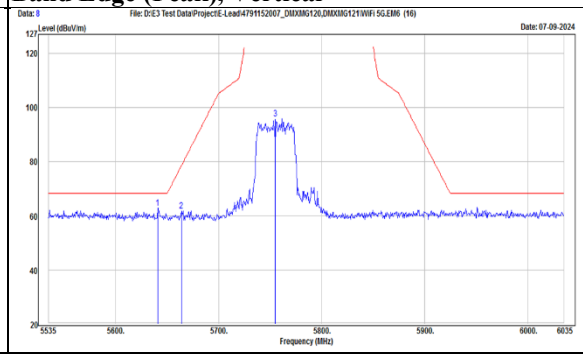
TX, 802.11ac(VHT40) (Ch 151)
Radiated Spurious Emission, Vertical



TX, 802.11ac(VHT40) (Ch 151)
Band Edge (Peak), Horizontal



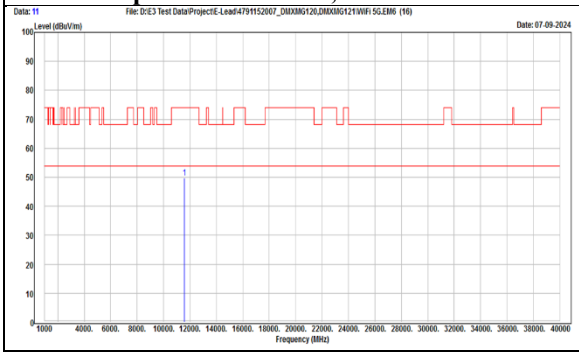
TX, 802.11ac(VHT40) (Ch 151)
Band Edge (Peak), Vertical



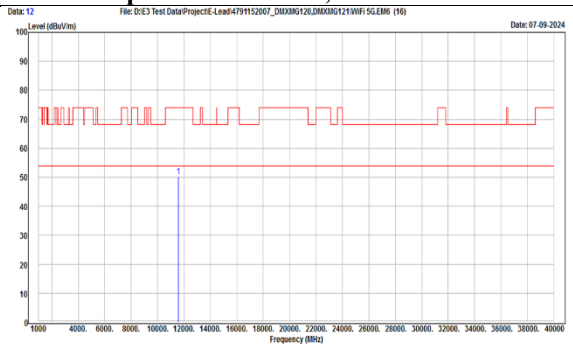
Mode	802.11ac(VHT40)	Channel	159

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5795	75.91	20.97	96.88	N/A	N/A	PK
		5918	41.46	21.54	63	73.36	-10.36	PK
		5975	40.86	21.66	62.52	68.2	-5.68	PK
	*	11590	30.17	19.7	49.87	74	-24.13	PK
Vertical	@	5795	73.84	20.97	94.81	N/A	N/A	PK
		5899	41.52	21.52	63.04	87.4	-24.36	PK
		5925	40.32	21.55	61.87	68.2	-6.33	PK
	*	11590	30.58	19.7	50.28	74	-23.72	PK

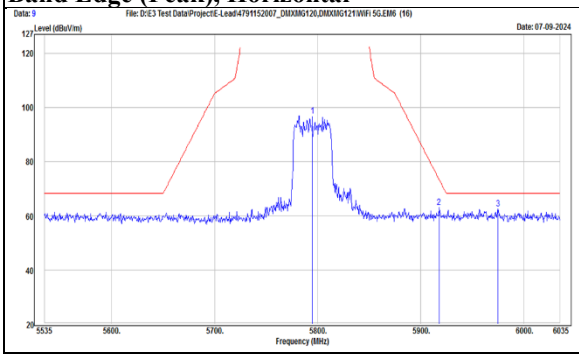
TX, 802.11ac(VHT40) (Ch 159)
Radiated Spurious Emission, Horizontal



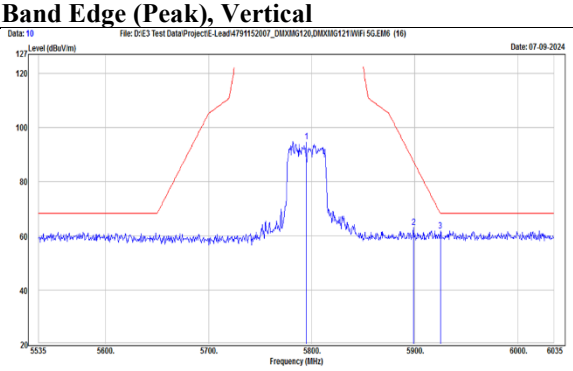
TX, 802.11ac(VHT40) (Ch 159)
Radiated Spurious Emission, Vertical



TX, 802.11ac(VHT40) (Ch 159)
Band Edge (Peak), Horizontal



TX, 802.11ac(VHT40) (Ch 159)
Band Edge (Peak), Vertical

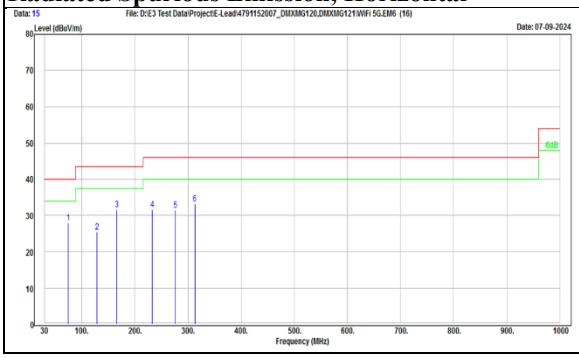


Below 1 GHz

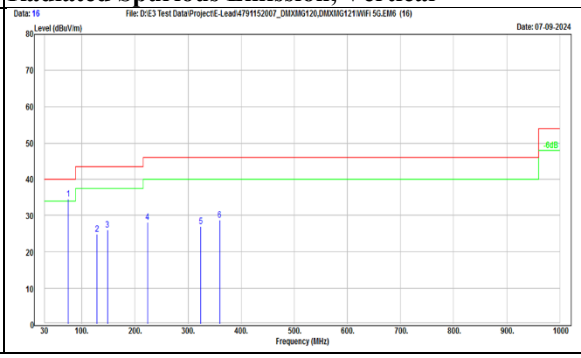
Mode	802.11ac(VHT40)	Channel	151

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		74.62	42.37	-14.36	28.01	40	-11.99	PK
		128.94	38.94	-13.43	25.51	43.5	-17.99	PK
		165.8	43.22	-11.51	31.71	43.5	-11.79	PK
		232.73	45.2	-13.48	31.72	46	-14.28	PK
		276.38	42.42	-11.04	31.38	46	-14.62	PK
		313.24	42.95	-9.83	33.12	46	-12.88	PK
Vertical		74.62	48.95	-14.36	34.59	40	-5.41	PK
		128.94	38.19	-13.43	24.76	43.5	-18.74	PK
		148.34	37.92	-11.84	26.08	43.5	-17.42	PK
		224	42.3	-14.24	28.06	46	-17.94	PK
		323.91	36.55	-9.52	27.03	46	-18.97	PK
		359.8	37.44	-8.76	28.68	46	-17.32	PK

TX, 802.11ac(VHT40) (Ch 151)
Radiated Spurious Emission, Horizontal



TX, 802.11ac(VHT40) (Ch 151)
Radiated Spurious Emission, Vertical



9 kHz ~ 30 MHz Data:

For 9 kHz to 30 MHz radiated emission have performed all modes of operation were investigated. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

No non-compliance noted:

KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

END OF REPORT