

TEST REPORT

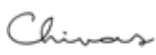
Applicant:	ChamSys Ltd
Address of Applicant:	Unit H5 Adanac North, Adanac Drive, Nursling, Southampton, SO16 0BT
Manufacturer:	ChamSys Ltd
Address of Manufacturer:	Unit H5 Adanac North, Adanac Drive, Nursling, Southampton, SO16 0BT
Product name:	MagicQ Consoles
Model(s):	MagicQ 250M
Rating(s):	POWER RATING: AC 100-240V 50-60Hz Max: 4A,351W 115V AC; Max: 2A, 351W 230V AC USB POWER OUTPUT: 5V DC 300mA
Trademark:	CHAMSYS
Standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
FCC ID:	2AQWR-MOSTAD
Data of Receipt:	2025-04-17
Date of Test:	2025-04-17~2025-10-30
Date of Issue:	2025-10-30
Test Result	Pass*

* In the configuration tested, the test item complied with the standards specified above.

Authorized for issue by:**Test by:**

Oct.30, 2025

Chivas Tsang



Project Engineer

Date

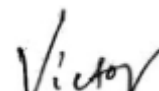
Name/Position

Signature

Reviewed by:

Oct.30, 2025

Victor Meng



Project Manager

Date

Name/Position

Signature

Testing Laboratory information:

Testing Laboratory Name : ITL Co., Ltd
Address : No. 8 Jinqianling Street 5, Huangjiang Town, Dongguan,
Guangdong, 523757 P.R.C.
Testing location : Same as above
Tel : 0086-769-39001678
Fax : 0086-20-62824387
E-mail : itl@i-testlab.com

Possible test case verdicts:

- test case does not apply to the test object... : N/A
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement . : F (Fail)

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report would be invalid test report without all the signatures of testing technician and approver.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

General product information:

The module has passed the certification, and all data were referred to the modular original report No. 4789482589-US-R1-V0, 4789482589-US-R2-V0, with the exception of Antenna requirement, Radiated Spurious Emission and Conducted Emissions.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.407](#): General technical requirements.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB789033 D02 v02r01](#): GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

[KDB662911 D01 v02r01](#): Multiple Transmitter Output

1.2. Report Version

Revision No.	Date of issue	Description
N/A	/	/

2. TEST DESCRIPTION

Test Item	FCC Rule	Result
Antenna Requirement	15.203	PASS
Line Conducted Emissions (AC Main)	15.207	PASS
Maximum Conducted Output Power	15.407(a)	PASS
Power Spectral Density	15.407(a)	PASS
-26dB Bandwidth and 99% Occupied bandwidth	15.407(a)	PASS
-6dB Bandwidth	15.407(a)	PASS
Band Edge	15.407(b)	PASS
Radiated Spurious Emissions	15.209	PASS
Frequency Stability	15.407(g)	PASS
Dynamic Frequency Selection (DFS)	15.407(h)	PASS
Radiated Emissions which fall in the restricted bands	15.209(c)	PASS

Remark: The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Client Information

Applicant:	ChamSys Ltd
Address:	Unit H5 Adanac North, Adanac Drive, Nursling, Southampton, SO16 0BT
Manufacturer:	ChamSys Ltd
Address:	Unit H5 Adanac North, Adanac Drive, Nursling, Southampton, SO16 0BT

3.2. Product Description

Name of EUT	MagicQ Consoles		
Trade Mark:	CHAMSYS		
Model No.:	MagicQ 250M		
Listed Model(s):	/		
Power supply:	AC 100-240V 50-60Hz		
5G WIFI			
Supported type:	☒ 802.11a	☒ 802.11n(HT20)	☒ 802.11n(HT40)
	☒ 802.11ac(HT20)	☒ 802.11ac(HT40)	☐ 802.11ax(HT20)
	☐ 802.11ax(HT40)		
Function:	☐ Outdoor AP	☐ Indoor AP	☐ Fixed P2P
	☒ Client		
DFS type:	☐ master devices	☐ Slave devices with radar detection	☒ Slave devices without radar detection
Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM, 256QAM		
Operation frequency:	☒ Band I:	5150MHz~5250MHz	
	☒ Band II:	5250MHz~5350MHz	
	☒ Band III:	5470MHz~5725MHz	
	☒ Band IV:	5725MHz~5850MHz	
Supported Bandwidth	20MHz:	802.11n, 802.11a, 802.11ac	
	40MHz:	802.11n, 802.11ac	
	80MHz:	802.11ac	
Antenna information			
Antenna delivery:	/		
Antenna technology:	/		
Antenna type:	IPEX Antenna		
Antenna gain:	4.2 dBi		

3.3. Operation state

➤ Frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Band	Test Channel	20MHz		40MHz		80MHz	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
I	CH _L	36	5180	38	5190	-	-
	CH _M	40	5200	-	-	42	5210
	CH _H	48	5240	46	5230	-	-
II	CH _L	52	5260	54	5270	-	-
	CH _M	56	5280	-	-	58	5290
	CH _H	64	5320	62	5310	-	-
III	CH _L	100	5500	102	5510	106	5530
	CH _M	120	5600	118	5590	-	-
	CH _H	140	5700	134	5670	122	5610
IV	CH _L	149	5745	151	5755	-	-
	CH _M	157	5785	-	-	155	5775
	CH _H	165	5825	159	5795	-	-

Only the worst case test results are provided in this test report.

➤ Data Rated

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Data rate (worst mode)
802.11a	OFDM
802.11n(HT20)/ 802.11ac(HT20)	MCS7
802.11n(HT40)/ 802.11ac(HT40)	MCS9
802.11ac(HT80)	MCS11

➤ Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to continuesly transmitted.
For Radiated suprious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit(duty cycle>98%). The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data Recorded in the report.

3.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

○	N/A	Manufacturer :	N/A
		Model No. :	N/A
○	N/A	Manufacturer :	N/A
		Model No. :	N/A

3.5. Discontinue transmitting with absence of Data or operational failure states

According to section 15.407 (c):

“The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.”

Data transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, and finally to the RF chip.

Several special packets (ACKs, CTS, PSpoll, etc...) are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which it then turns off at the end of the packet. Therefore, the transmitter will be on only while one of the aforementioned packets is being transmitted.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

All tests were performed at:

ITL Co., Ltd

No. 8 Jinqianling Street 5, Huangjiang Town, Dongguan, Guangdong, 523757 P.R.C.

0086-769-39001678

itl@i-testlab.com

No tests were sub-contracted.

4.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS Lab code:L9342**
- **FCC Designation No.:CN5035**
- **IC Registration NO.: 12593A**
- **NVLAP LAB CODE: 600199-0**

4.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050 mba

4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Parameter	Uncertainty
Radio frequency	2.25%
total RF power, conducted	±1.34 dB
RF power density, conducted	±1.49 dB
All emissions, radiated	±2.72 dB
Temperature	±5.02 dB
Humidity	±0.8°C
DC and low frequency voltages	±1.5 %

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

4.5. Equipments Used during the Test

No.	Test Equipment	Manufacturer	Model	Serial No.	Cal Data	Due Date
DGITL-115	50Ω Coaxial Cable	Mini-circuits	CBL	C001	2025.03.14	2026.03.14
DGITL-182	Test software	2.0.0.0	MTS 8310	/	/	/
DGITL-190	Filter	COM-MW	K6-2400-2483.5-100S5010-007	12230496	2025.01.10	2026.01.09
DGITL-191	Filter	COM-MW	K6-5150-5850-100S5010-003	12234382	2025.01.10	2026.01.09
DGITL- 301	Semi-Anechoic chamber	ETS•Lindgren	9*6*6	CT000874-1181	2023.08.02	2026.08.02
DGITL- 307	EMI test receiver	SCHWARZBECK	ESVS10	833616/003	2025.03.14	2026.03.14
DGITL-376	Wideband Radio Communication Tester	SCHWARZBECK	CMW500	LR114195	2025.03.14	2026.03.14
DGITL-349a	Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	259268	2025.03.14	2026.03.14
DGITL- 306	Spectrum Analyzer	Agilent Technologies	N9010A	MY54200334	2025.03.14	2026.03.14
DGITL- 352	Pre Amplifier	Mini-Circuits	ZFC-1000HX	SN292801110	2025.03.14	2026.03.14
DGITL-375	Spectrum Analyzer	SCHWARZBECK	FSV40-N	6625-01-588-5515	2025.03.14	2026.03.14
DGITL-309	Horn Antenna	ETS Lindgren	3117	SN00152265	2025.05.13	2027.05.14
DGITL-308	Bilog Antenna	ETS· Lindgren	3142E	156975	2025.05.13	2027.05.14
DGITL-350	Wideband Amplifier Super Ultra	Mini-Circuits	ZVA-183X-S+	SN986401426	2025.03.14	2026.03.14
DGITL-371	Pre Amplifier	teramicrowave	TALA-0040G35	18081001	2025.03.14	2026.03.14
DGITL-363	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00062	2024.05.15	2026.05.11

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Result:

The antenna is IPEX Antenna and no consideration of replacement. The best case gain of the antenna is 4.20 dBi.

5.2. Conducted Emissions (AC Main)

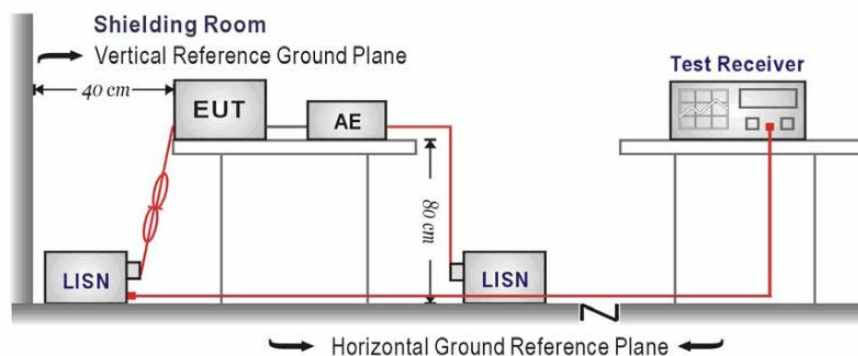
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the centre of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

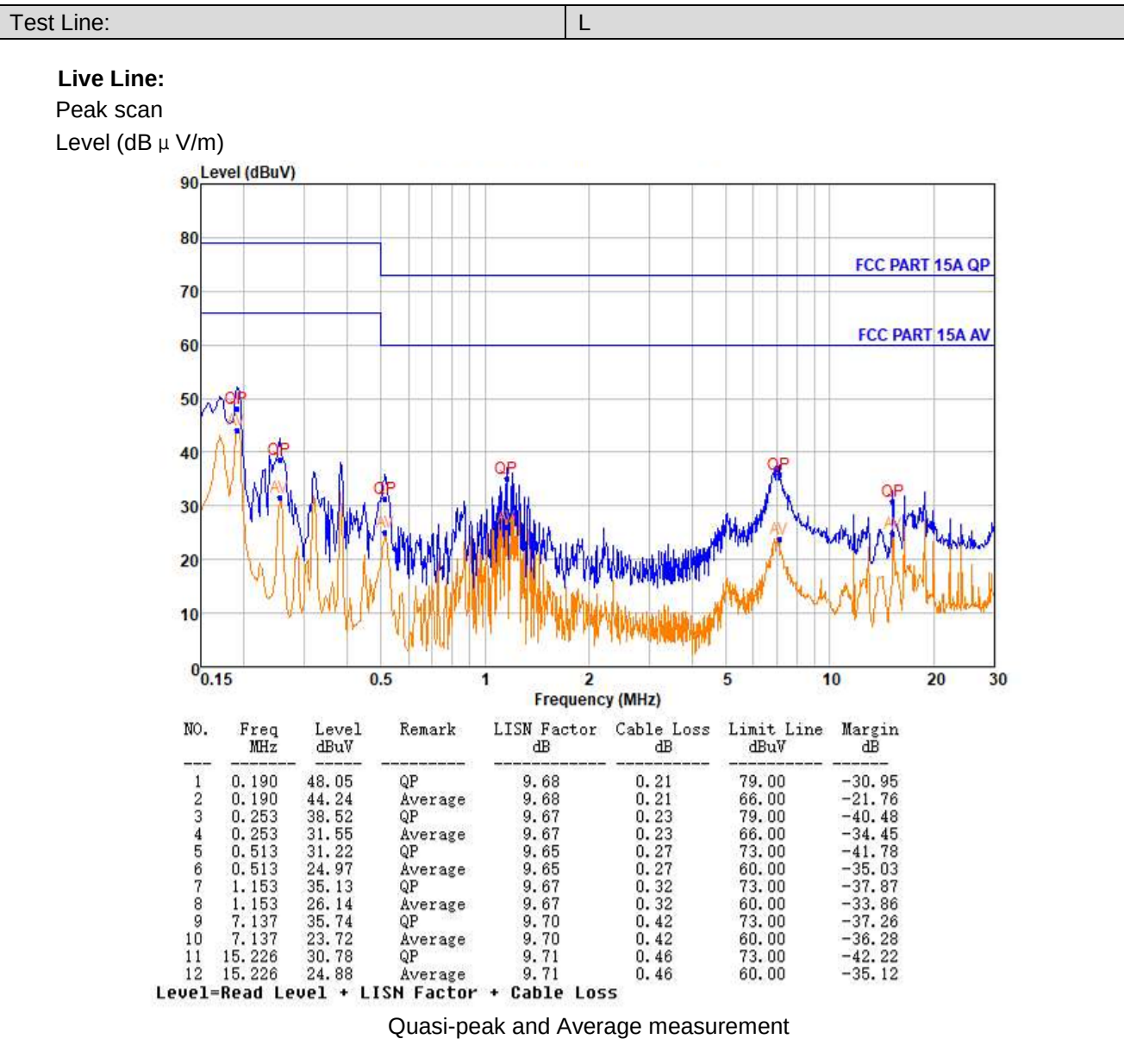
☒ Passed ☐ Not Applicable

Note:

- 1) Trans=Cable lose+ Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit - Level

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the 802.11 a mode was worst case mode.

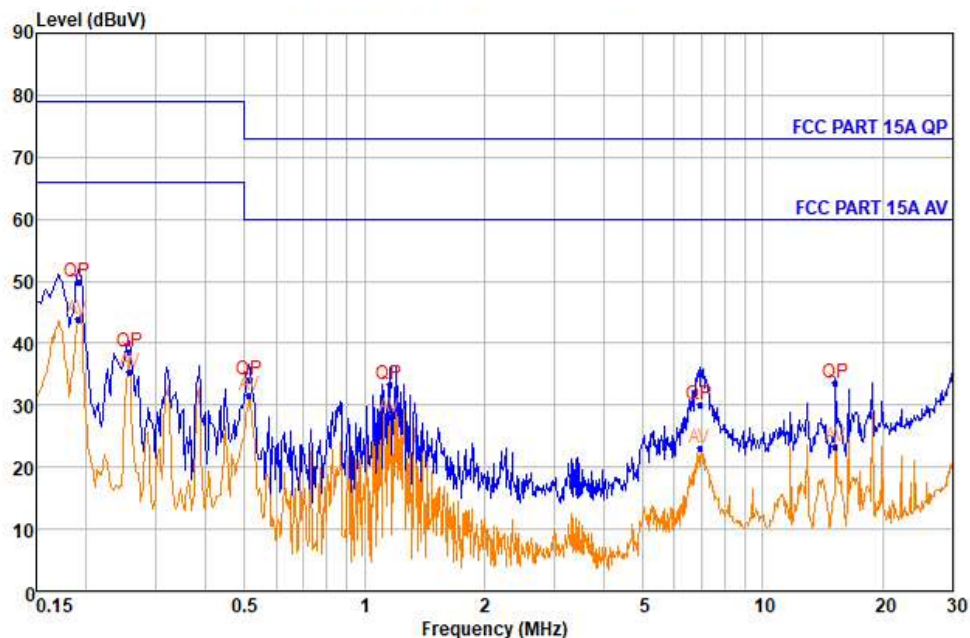


Test Line:

N

Neutral Line:

Peak scan

Level (dB μ V/m)

NO.	Freq MHz	Level dBUV	Remark	LISN Factor dB	Cable Loss dB	Limit Line dBUV	Margin dB
1	0.190	50.01	QP	9.64	0.21	79.00	-28.99
2	0.190	43.96	Average	9.64	0.21	66.00	-22.04
3	0.258	38.49	QP	9.64	0.23	79.00	-40.51
4	0.258	35.44	Average	9.64	0.23	66.00	-30.56
5	0.513	34.09	QP	9.67	0.27	73.00	-38.91
6	0.513	31.60	Average	9.67	0.27	60.00	-28.40
7	1.153	33.45	QP	9.63	0.32	73.00	-39.55
8	1.153	28.19	Average	9.63	0.32	60.00	-31.81
9	6.951	30.19	QP	9.62	0.42	73.00	-42.81
10	6.951	23.16	Average	9.62	0.42	60.00	-36.84
11	15.226	33.71	QP	9.63	0.46	73.00	-39.29
12	15.226	23.23	Average	9.63	0.46	60.00	-36.77

Level=Read Level + LISN Factor + Cable Loss

Quasi-peak and Average measurement

5.3. Maximum Conducted Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

For the 5.15~5.25GHz band:

- Outdoor AP
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
If $G_{TX} > 6\text{dBi}$, then $P_{out} = 30 - (G_{TX} - 6)$. e.i.r.p. at any elevation angle above 30 degrees $\leq 125\text{mW}$ (21dBm)
- Indoor AP
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
If $G_{TX} > 6\text{dBi}$, then $P_{out} = 30 - (G_{TX} - 6)$.
- Point-to-point AP
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
If $G_{TX} > 23\text{dBi}$, then $P_{out} = 30 - (G_{TX} - 23)$.
- Client devices
The maximum conducted output power (P_{out}) shall not exceed the lesser of 250W (24dBm).
If $G_{TX} > 6\text{dBi}$, then $P_{out} = 24 - (G_{TX} - 6)$.

For the 5.25~5.35GHz band:

The maximum conducted output power (P_{out}) shall not exceed the lesser of 250mW (24dBm) or 11dBm+10 log B, where B is the 26dB emission bandwidth in MHz.
if $G_{TX} > 6\text{dBi}$, then $P_{out} = 24 - (G_{TX} - 6)$.

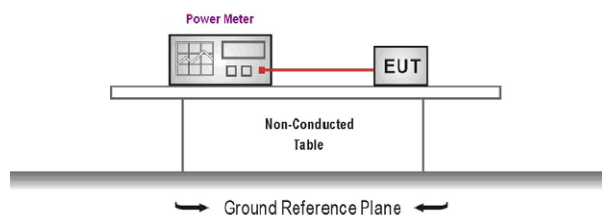
For the 5.47~5.725GHz band:

The maximum conducted output power (P_{out}) shall not exceed the lesser of 250mW (24dBm) or 11dBm+10 log B, where B is the 26dB emission bandwidth in MHz.
if $G_{TX} > 6\text{dBi}$, then $P_{out} = 24 - (G_{TX} - 6)$.

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
if $G_{TX} > 6\text{dBi}$, then $P_{out} = 30 - (G_{TX} - 6)$.
- Point-to-point systems (P2P)
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).

TEST CONFIGURATION



TEST PROCEDURE

1. The testing follows the KDB 789033 D02 v02r01 Section I.E.2.b and ANSI C63.10-2013 Section 12.3.2.2.
2. The RF output of EUT was connected to spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Power is calculated by integrating over the spectrum of the entire 99% OBW signal using the instrument's band power measurement feature.
4. Set span to encompass the entire 99% OBW of the signal.
5. Set RBW = 1MHz, VBW $\geq$ 3MHz, Sweep time = Auto, Detector = power averaging (RMS).
6. Number of points in sweep $> 2 \times \text{span} / \text{RBW}$.
7. Trace average at least 100 traces in power averaging (rms) mode.
8. Replace the EUT center frequency and repeat steps 3~7.

TEST MODE:

Please refer to the clause 3.3

TEST RESULT ☒ **Passed** ☐ **Not Applicable**

Please refer to the test report No.4789482589-US-R1-V0

5.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

For the 5.15~5.25GHz band:

- Outdoor AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 17 - (G_{TX} - 6)$.
- Indoor AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 17 - (G_{TX} - 6)$.
- Point-to-point AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
If $G_{TX} > 23\text{dBi}$, then $\text{PSD} = 17 - (G_{TX} - 23)$.
- Client devices
The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{TX} - 6)$.

For the 5.25~5.35GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{TX} - 6)$.

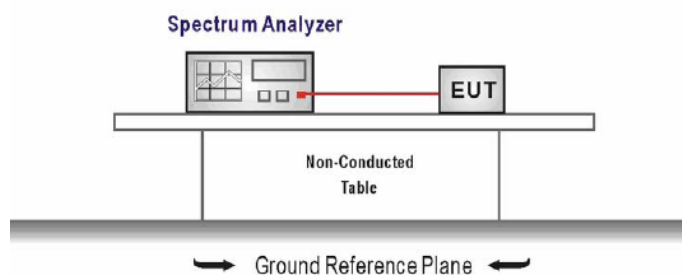
For the 5.47~5.725GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{TX} - 6)$.

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 30 - (G_{TX} - 6)$.
- Point-to-point systems (P2P)
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.

TEST CONFIGURATION



TEST PROCEDURE

1. The testing follows the ofKDB 789033 D02 v02r01 Section II.F and ANSI C63.10-2013 Section12.5.
2. The RF output of EUT was connected to spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set span to encompass the entire 99% OBW of the signal.
4. For U-NI-1, U-NI-2a, U-NI-2c Band: Set RBW = 1MHz, VBW > 3MHz, Sweep time = Auto, Detector = power averaging (RMS).
5. For U-NI-3 Band: Set RBW = 500kHz, VBW > 3MHz, Sweep time = Auto, Detector = power averaging (RMS).
6. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$,
7. Trace average at least 100 traces in power averaging (rms) mode.
8. Use the peak search function on the instrument to find the peak of the spectrum.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

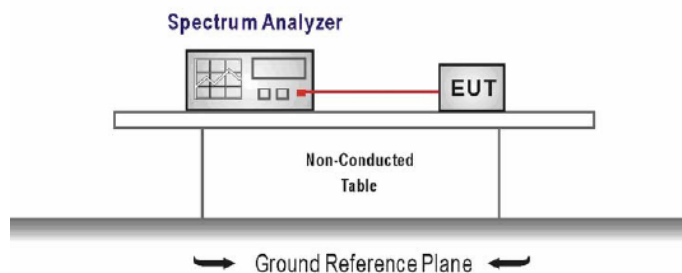
Please refer to the test report No.4789482589-US-R1-V0

5.5. -26dB&-6 bandwidth and 99% Occupied bandwidth

LIMIT

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 , and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

1. The testing follows the KDB 789033 D02 v02r01 Section I.C.D and ANSI C63.10-2013Section 12.4.
2. The RF output of EUT was connected to spectrum analyzer by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Use the spectrum analyzer "Channel Bandwidth" functions to measurement the 26dB EBW, 6dB EBW and 99% OBW.
4. Set center frequency to the nominal EUT channel center frequency.
5. Set span = 1.5 times to 5.0 times the OBW or EBW.
6. For 26dB EBW and 99% OBW Measurement: Set RBW = approximately 1% EBW or 1.5 times to 5.0 times the OBW, $VBW \geq 3 \times RBW$.
7. For 6dB EBW Measurement: Set RBW=100kHz.VBW>3x RBW.
8. Set Detector = Peak, Trace mode = max hold and Sweep time = auto couple.
9. Allow the trace to stabilize.
10. Replace the EUT center frequency and repeat steps 3~9.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to the test report No.4789482589-US-R1-V0

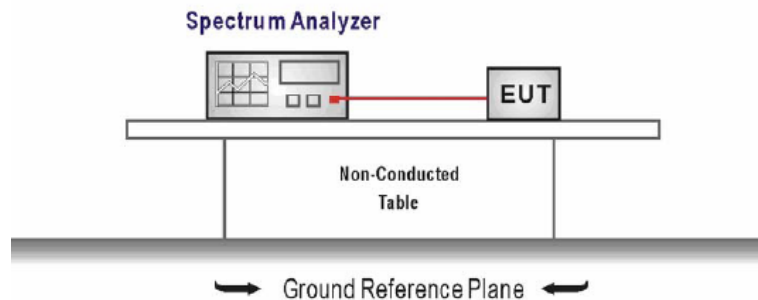
5.6. -6dB Bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(e)

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

TEST CONFIGURATION



TEST PROCEDURE

1. The testing follows the KDB 789033 D02 v02r01 Section I.C.D and ANSI C63.10-2013Section 12.4.
2. The RF output of EUT was connected to spectrum analyzer by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Use the spectrum analyzer "Channel Bandwidth" functions to measurement the 26dB EBW, 6dB EBW and 99% OBW.
4. Set center frequency to the nominal EUT channel center frequency.
5. Set span = 1.5 times to 5.0 times the OBW or EBW.
6. For 26dB EBW and 99% OBW Measurement: Set RBW = approximately 1% EBW or 1.5 times to 5.0 times the OBW, $VBW \geq 3 \times RBW$.
7. For 6dB EBW Measurement: Set RBW=100kHz. $VBW > 3 \times RBW$.
8. Set Detector = Peak, Trace mode = max hold and Sweep time = auto couple.
9. Allow the trace to stabilize.
10. Replace the EUT center frequency and repeat steps 3~9.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to the test report No.4789482589-US-R1-V0

5.7. Band Edge

LIMIT

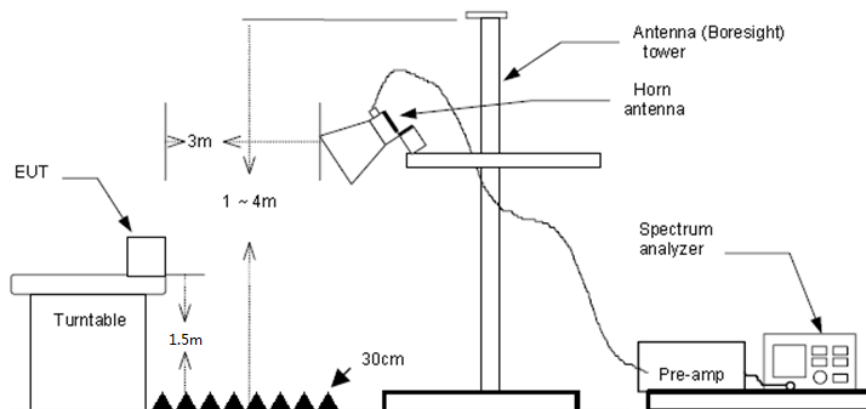
FCC CFR Title 47 Part 15 Subpart E Section 15.407(b)

Un-restricted band emissions above 1GHz			
Operating Band	Frequency	EIRP Limit	Value
5150-5250MHz	Above 1GHz	-27dBm/MHz (68.2dBuV/m@3m)	Peak
5250-5350MHz	Above 1GHz	-27dBm/MHz (68.2dBuV/m@3m)	Peak
5470-5725MHz	Above 1GHz	-27dBm/MHz (68.2dBuV/m@3m)	Peak
5725-5850 MHz	1GHz-5.65GHz	-27dBm/MHz (68.2dBuV/m@3m)	Peak
	5.65GHz-5.7GHz	-27*dBm/MHz to 10dBm/MHz (68.2* dBuV/m to 105.6dBuV/m@3m)	Peak
	5.7GHz-5.72GHz	10*dBm/MHz to 15.6dBm/MHz (105.6*dBuV/m to 110.8dBuV/m@3m)	Peak
	5.72GHz-5.725GHz	15.6*dBm/MHz to 27dBm/MHz (110.8dBuV/m to * 122.2dBuV/m@3m)	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6*dBm/MHz (122.2dBuV/m to 110.8* dBuV/m@3m)	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10*dBm/MHz (110.8dBuV/m to 105.6* dBuV/m@3m)	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27*dBm/MHz (105.6dBuV/m to 68.2* dBuV/m@3m)	Peak
	Above 5.925GHz	-27dBm/MHz (68.2dBuV/m@3m)	Peak

* Increase/Decreases with the linearity of the frequency.

For emission above 1GHz and in restricted band, according to FCC KDB 789033 D02 General UNII Test Procedure, all emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit. $E[dB\mu V/m] = EIRP[dBm] + 95.2$, for $d = 3$ meters.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
RBW=1 MHz, VBW=3 MHz Peak detector for Peak value.
RBW=1 MHz, VBW=3 MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band: I&II					Worst mode: 802.11a		Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5150	28.19	34.9	8.18	25.6	45.67	84	-38.33	Horizontal	Peak
5150	23.99	34.9	8.18	25.6	41.47	84	-42.53	Vertical	Peak
5150	15.93	34.9	8.18	25.6	33.41	64	-30.59	Horizontal	Average
5150	13.74	34.9	8.18	25.6	31.22	64	-32.78	Vertical	Average

Band: I&II					Worst mode: 802.11a		Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5460	26.42	34.1	8.18	25.6	43.1	84	-40.9	Horizontal	Peak
5460	18.77	34.1	8.18	25.6	35.45	84	-48.55	Vertical	Peak
5460	14.28	34.1	8.18	25.6	30.96	64	-33.04	Horizontal	Average
5460	6.46	34.1	8.18	25.6	23.14	64	-40.86	Vertical	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

Band: III		Worst mode: 802.11a				Test channel: CH _L			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5460	23.13	34.5	8.18	25.6	40.21	84	-43.79	Horizontal	Peak
5460	20.41	34.5	8.18	25.6	37.49	84	-46.51	Vertical	Peak
5460	11.57	34.5	8.18	25.6	28.65	64	-35.35	Horizontal	Average
5460	8.84	34.5	8.18	25.6	25.92	64	-38.08	Vertical	Average

Band: III		Worst mode: 802.11a				Test channel: CH _H			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5725	17.65	34.8	8.18	25.6	35.03	84	-48.97	Horizontal	Peak
5725	21.14	34.8	8.18	25.6	38.52	84	-45.48	Vertical	Peak
5725	6.1	34.8	8.18	25.6	23.48	64	-40.52	Horizontal	Average
5725	8.69	34.8	8.18	25.6	26.07	64	-37.93	Vertical	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

Band: IV		Worst mode: 802.11a				Test channel: CH _L			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5725	17.65	34.8	8.18	25.6	35.03	84	-48.97	Horizontal	Peak
5725	21.14	34.8	8.18	25.6	38.52	84	-45.48	Vertical	Peak
5725	6.1	34.8	8.18	25.6	23.48	64	-40.52	Horizontal	Average
5725	8.69	34.8	8.18	25.6	26.07	64	-37.93	Vertical	Average

Band: IV		Worst mode: 802.11a				Test channel: CH _H			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5850	19.84	34.7	8.18	25.6	37.12	84	-46.88	Horizontal	Peak
5850	28.91	34.7	8.18	25.6	46.19	84	-37.81	Vertical	Peak
5850	9.71	34.7	8.18	25.6	26.99	64	-37.01	Horizontal	Average
5850	17.36	34.7	8.18	25.6	34.64	64	-29.36	Vertical	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

5.8. Radiated Spurious Emissions

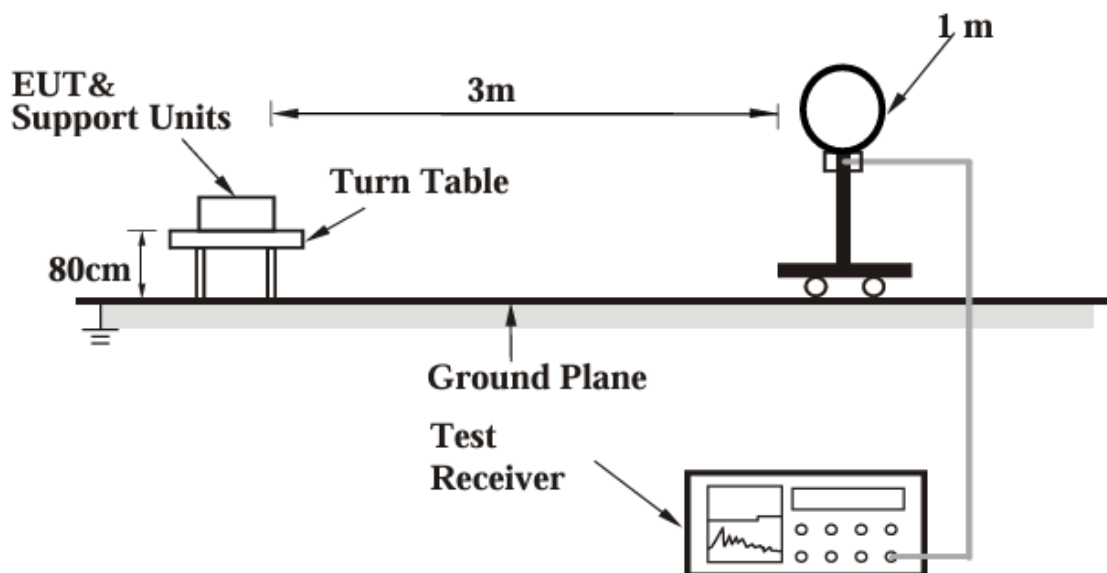
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209 and Part 15 Subpart E Section 15.407

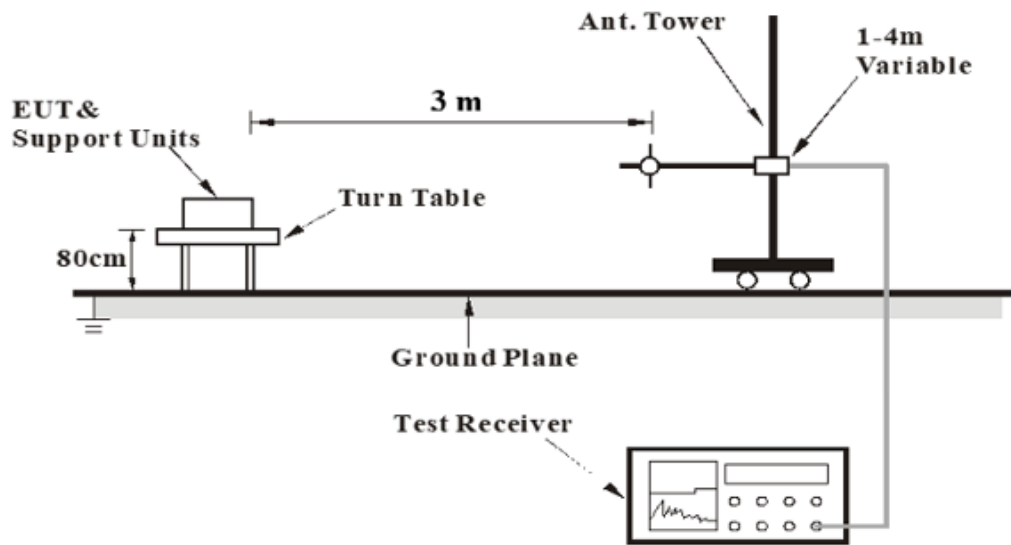
Unwanted emissions below 1GHz and Restricted band emissions above 1GHz		
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

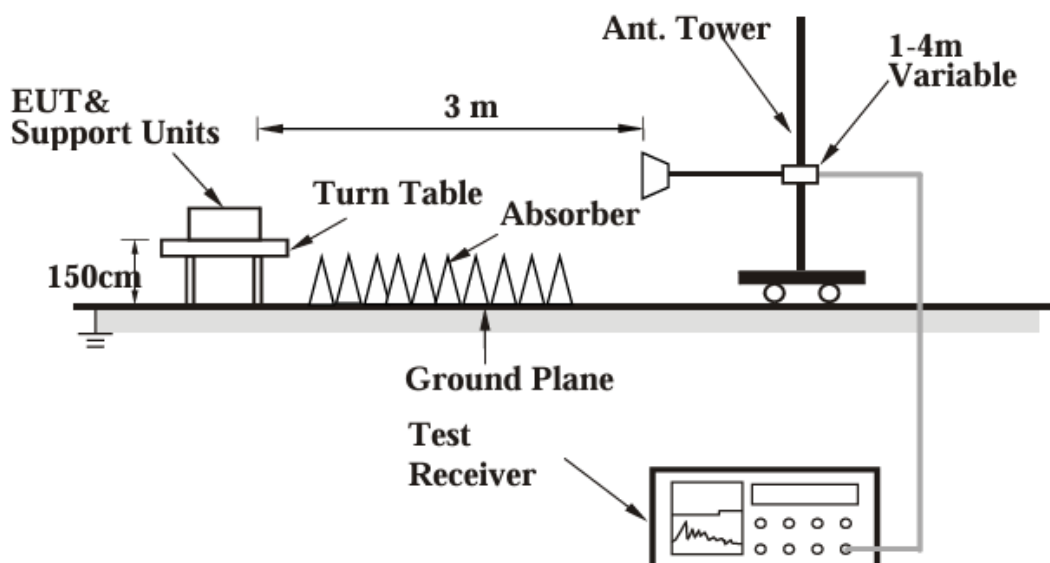
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB 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.

- (3) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

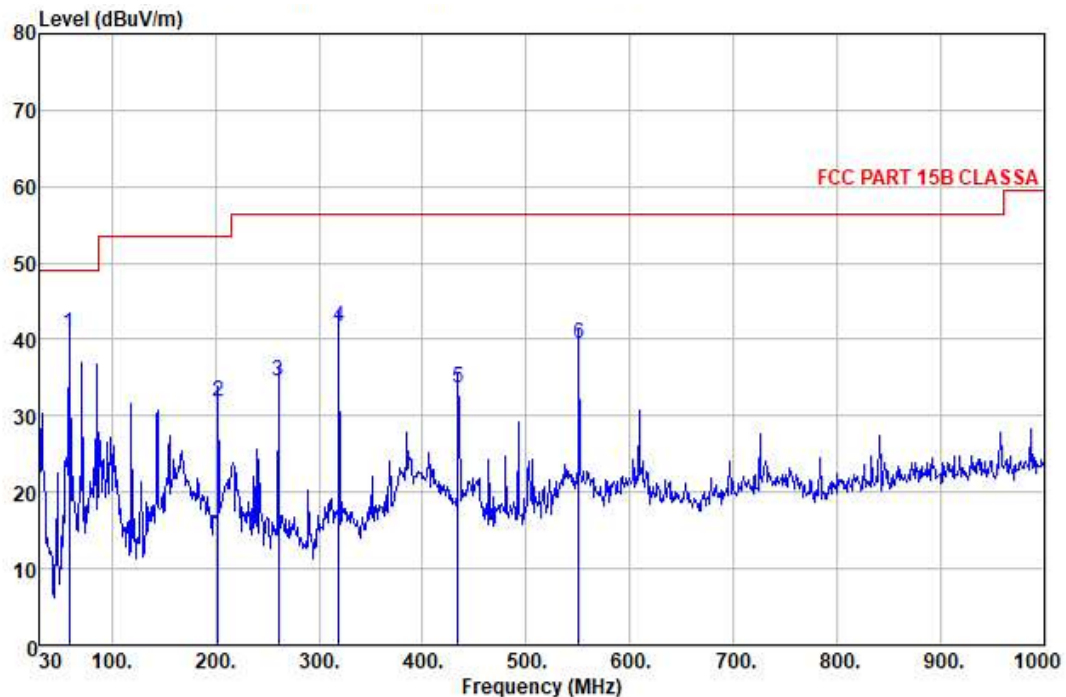
Measurement data:**■ 9kHz ~ 30MHz**

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.

■ 30MHz ~ 1GHz Spurious Emissions .Quasi-Peak Measurement

Worst Case Test Mode: 802.11 a

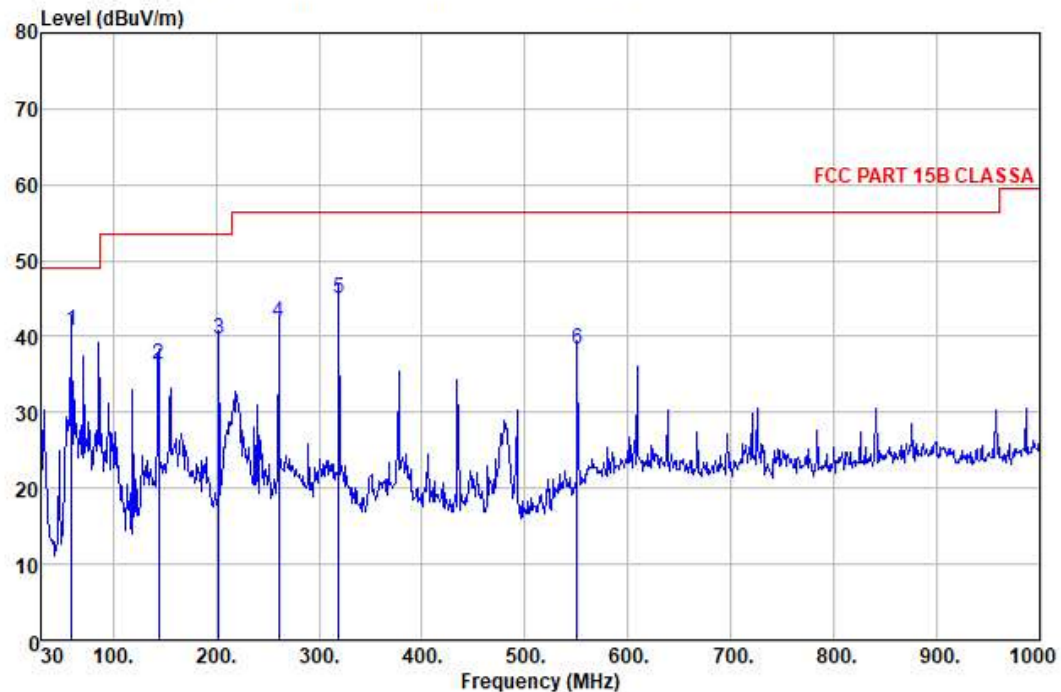
Horizontal:



No.	Freq MHz	Read Level dBuV	Antenna Factor dB	Cable Loss dB	Preamp Factor dB	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Pol/Phase	Remark
1	59.100	63.19	5.02	0.88	28.23	40.86	49.10	-8.24	HORIZONTAL	QP
2	202.660	47.69	10.31	1.72	27.79	31.93	53.50	-21.57	HORIZONTAL	QP
3	260.860	47.24	12.90	1.97	27.57	34.54	56.40	-21.86	HORIZONTAL	QP
4	319.060	53.29	13.78	2.19	27.52	41.74	56.40	-14.66	HORIZONTAL	QP
5	434.490	43.73	15.71	2.57	28.29	33.72	56.40	-22.68	HORIZONTAL	QP
6	550.890	47.39	17.95	2.92	28.89	39.37	56.40	-17.03	HORIZONTAL	QP

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor

Vertical:



No.	Freq MHz	Read Level dBuV	Antenna Factor dB	Cable Loss dB	Preamp Factor dB	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Pol/Phase	Remark
1	60.070	62.84	5.23	0.89	28.20	40.76	49.10	-8.34	VERTICAL	QP
2	144.460	55.11	8.25	1.43	28.38	36.41	53.50	-17.09	VERTICAL	QP
3	202.660	55.52	10.31	1.72	27.79	39.76	53.50	-13.74	VERTICAL	QP
4	260.860	54.57	12.90	1.97	27.57	41.87	56.40	-14.53	VERTICAL	QP
5	319.060	56.54	13.78	2.19	27.52	44.99	56.40	-11.41	VERTICAL	QP
6	550.890	46.45	17.95	2.92	28.89	38.43	56.40	-17.97	VERTICAL	QP

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor

■ Above 1GHz

Band: I					Worst mode: 802.11a		Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2082	20.57	29.3	4.83	25.9	28.8	84	-55.2	Vertical	Peak
8210	27.71	36.3	10.42	25.2	49.23	84	-34.77	Vertical	Peak
8988	24.46	36.7	10.42	25.2	46.38	84	-37.62	Vertical	Peak
9226	28.77	37	11.15	24.9	52.02	84	-31.98	Vertical	Peak
6869	20.58	36.5	10.24	25.1	42.22	84	-41.78	Horizontal	Peak
7944	19.31	38.1	10.31	25	42.72	84	-41.28	Horizontal	Peak
8523	18.17	36.7	10.42	25.2	40.09	84	-43.91	Horizontal	Peak
13796	25.88	41.3	14.17	24.9	56.45	84	-27.55	Horizontal	Peak

Band: I					Worst mode: 802.11a		Test channel: CH _M		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5325	17.85	34.1	8.18	25.6	34.53	84	-49.47	Vertical	Peak
7359	18.72	38	10.31	25	42.03	84	-41.97	Vertical	Peak
11349	21.32	41.3	12.68	24.7	50.6	84	-33.4	Vertical	Peak
12380	20.19	40	13.46	25	48.65	84	-35.35	Vertical	Peak
1178	28.43	24.6	3.38	25.7	30.71	84	-53.29	Horizontal	Peak
1506	23.75	26.4	3.38	25.7	27.83	84	-56.17	Horizontal	Peak
2229	24.59	28.5	4.83	25.9	32.02	84	-51.98	Horizontal	Peak
17228	24.85	47.6	17.08	23.5	66.03	84	-17.97	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

Band: I					Worst mode: 802.11a		Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2264	24.88	28.5	4.83	25.9	32.31	84	-51.69	Vertical	Peak
5943	24.09	34.7	8.18	25.6	41.37	84	-42.63	Vertical	Peak
9554	20.94	36.3	11.15	24.9	43.49	84	-40.51	Vertical	Peak
16281	17.8	47.9	15.9	24.2	57.4	84	-26.6	Vertical	Peak
3744	25.22	31.5	5.79	26.2	36.31	84	-47.69	Horizontal	Peak
6859	26.89	36.5	10.24	25.1	48.53	84	-35.47	Horizontal	Peak
10806	22.95	40.5	11.97	25	50.42	84	-33.58	Horizontal	Peak
13772	21.73	41.3	14.17	24.9	52.3	84	-31.7	Horizontal	Peak

Band: II					Worst mode: 802.11a		Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
7838	20.4	38.1	10.31	25	43.81	84	-40.19	Vertical	Peak
8351	17.29	36.3	10.42	25.2	38.81	84	-45.19	Vertical	Peak
11459	21.62	41.3	12.68	24.7	50.9	84	-33.1	Vertical	Peak
14108	27.55	43.1	14.57	23.6	61.62	84	-22.38	Vertical	Peak
2066	17.14	29.3	4.83	25.9	25.37	84	-58.63	Horizontal	Peak
3831	19.33	32.4	5.79	26.2	31.32	84	-52.68	Horizontal	Peak
8252	24.61	36.3	10.42	25.2	46.13	84	-37.87	Horizontal	Peak
13431	28.91	38.9	14.17	24.9	57.08	84	-26.92	Horizontal	Peak

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Measuring frequencies from 1 GHz to 40GHz.*
4. *Test 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.*

Band: II					Worst mode: 802.11a		Test channel: CH _M		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1640	20.9	24.5	3.38	25.7	23.08	84	-60.92	Vertical	Peak
7307	21.05	38	10.31	25	44.36	84	-39.64	Vertical	Peak
10231	21.78	39	11.97	25	47.75	84	-36.25	Vertical	Peak
14769	21.68	45.3	14.57	23.6	57.95	84	-26.05	Vertical	Peak
1961	26.72	27	3.38	25.7	31.4	84	-52.6	Horizontal	Peak
6072	26.98	35.7	10.24	25.1	47.82	84	-36.18	Horizontal	Peak
6860	20.36	36.5	10.24	25.1	42	84	-42	Horizontal	Peak
7189	25.25	38	10.31	25	48.56	84	-35.44	Horizontal	Peak

Band: II					Worst mode: 802.11a		Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1588	23.84	26.4	3.38	25.7	27.92	84	-56.08	Vertical	Peak
5510	23.11	34.5	8.18	25.6	40.19	84	-43.81	Vertical	Peak
7032	19.81	38	10.31	25	43.12	84	-40.88	Vertical	Peak
14213	26.93	43.1	14.57	23.6	61	84	-23	Vertical	Peak
3645	23.25	31.5	5.79	26.2	34.34	84	-49.66	Horizontal	Peak
4373	21.42	32.4	7.22	26	35.04	84	-48.96	Horizontal	Peak
13384	22.23	38.9	14.17	24.9	50.4	84	-33.6	Horizontal	Peak
17992	17.05	46.7	17.08	23.5	57.33	84	-26.67	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

Band: III				Worst mode: 802.11a			Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1336	21.72	25.1	3.38	25.7	24.5	84	-59.5	Vertical	Peak
4481	19.62	33	7.22	26	33.84	84	-50.16	Vertical	Peak
11641	17.83	41.5	12.68	24.7	47.31	84	-36.69	Vertical	Peak
17769	17.23	46.7	17.08	23.5	57.51	84	-26.49	Vertical	Peak
1660	22.45	24.5	3.38	25.7	24.63	84	-59.37	Horizontal	Peak
7011	28.76	38	10.31	25	52.07	84	-31.93	Horizontal	Peak
10333	22.71	39	11.97	25	48.68	84	-35.32	Horizontal	Peak
14652	23.43	45.3	14.57	23.6	59.7	84	-24.3	Horizontal	Peak

Band: III				Worst mode: 802.11a			Test channel: CH _M		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2593	21.06	28.7	4.83	25.9	28.69	84	-55.31	Vertical	Peak
11809	25.19	41.5	12.68	24.7	54.67	84	-29.33	Vertical	Peak
16846	20.88	48.1	15.9	24.2	60.68	84	-23.32	Vertical	Peak
17061	24.86	47.6	17.08	23.5	66.04	84	-17.96	Vertical	Peak
2223	20.73	28.5	4.83	25.9	28.16	84	-55.84	Horizontal	Peak
3287	20.16	30.3	5.79	26.2	30.05	84	-53.95	Horizontal	Peak
5173	21.45	34.9	8.18	25.6	38.93	84	-45.07	Horizontal	Peak
9667	26.2	36.3	11.15	24.9	48.75	84	-35.25	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

Band: III			Worst mode: 802.11a				Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
4456	25.01	33	7.22	26	39.23	84	-44.77	Vertical	Peak
6482	18.44	35.7	10.24	25.1	39.28	84	-44.72	Vertical	Peak
6947	28.41	36.5	10.24	25.1	50.05	84	-33.95	Vertical	Peak
11244	19.5	41.3	12.68	24.7	48.78	84	-35.22	Vertical	Peak
6283	18.19	35.7	10.24	25.1	39.03	84	-44.97	Horizontal	Peak
6625	23.73	36.5	10.24	25.1	45.37	84	-38.63	Horizontal	Peak
9842	24.03	36.3	11.15	24.9	46.58	84	-37.42	Horizontal	Peak
10383	28.18	39	11.97	25	54.15	84	-29.85	Horizontal	Peak

Band: IV			Worst mode: 802.11a				Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2204	19.39	28.5	4.83	25.9	26.82	84	-57.18	Vertical	Peak
3235	20.32	30.3	5.79	26.2	30.21	84	-53.79	Vertical	Peak
3967	22.81	32.4	5.79	26.2	34.8	84	-49.2	Vertical	Peak
11576	28.21	41.5	12.68	24.7	57.69	84	-26.31	Vertical	Peak
4168	21.49	31.7	7.22	26	34.41	84	-49.59	Horizontal	Peak
12217	20.87	40	13.46	25	49.33	84	-34.67	Horizontal	Peak
14796	23.23	45.3	14.57	23.6	59.5	84	-24.5	Horizontal	Peak
15954	26.11	47.1	15.13	23.9	64.44	84	-19.56	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

Band: IV				Worst mode: 802.11a			Test channel: CH _M		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1606	24.59	24.5	3.38	25.7	26.77	84	-57.23	Vertical	Peak
9285	20.42	37	11.15	24.9	43.67	84	-40.33	Vertical	Peak
11605	28.76	41.5	12.68	24.7	58.24	84	-25.76	Vertical	Peak
16763	20.53	48.1	15.9	24.2	60.33	84	-23.67	Vertical	Peak
6240	23.44	35.7	10.24	25.1	44.28	84	-39.72	Horizontal	Peak
6602	25.24	36.5	10.24	25.1	46.88	84	-37.12	Horizontal	Peak
12034	23.9	40	13.46	25	52.36	84	-31.64	Horizontal	Peak
15858	25.24	47.1	15.13	23.9	63.57	84	-20.43	Horizontal	Peak

Band: IV				Worst mode: 802.11a			Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2699	18.41	29.1	4.83	25.9	26.44	84	-57.56	Vertical	Peak
5630	21.67	34.8	8.18	25.6	39.05	84	-44.95	Vertical	Peak
7785	19.68	38.1	10.31	25	43.09	84	-40.91	Vertical	Peak
10261	19.09	39	11.97	25	45.06	84	-38.94	Vertical	Peak
7681	28.92	38.1	10.31	25	52.33	84	-31.67	Horizontal	Peak
12190	28.63	40	13.46	25	57.09	84	-26.91	Horizontal	Peak
17751	26.69	46.7	17.08	23.5	66.97	84	-17.03	Horizontal	Peak
17961	27.32	46.7	17.08	23.5	67.6	84	-16.4	Horizontal	Peak

Remark:

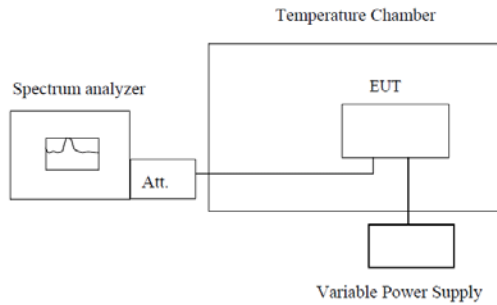
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations and antennas have been tested, only worst case is reported.

5.9. Frequency stability

LIMIT

Within Operation Band

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The testing follows the of KDB 789033 D02 v02r01 Section I.A.3 and ANSI C63.10-2013Section 6.8
2. The EUT is installed in an environment test chamber with external power source, was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results foreach measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set the chamber to operate at 50° C and external power source to output at nominal voltage of EUT
5. A sufficient stabilization period at each temperatures in used prior to each frequency measurement.
6. The test shall be performed under -30° C to 50° C and 85% to 115% ofthe nominal voltage. Changesetting of chamber and external power source to complete all conditions.
7. Replace the EUT center frequency and repeat steps 3~6.

TEST MODE:

Transmitting with unmodulation

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to the test report No.4789482589-US-R1-V0

5.10. Radiated Emissions which fall in the restricted bands

Test Requirement:	FCC Part 15 C section 15.247 (d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	ANSI C63.10:2013
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, channels and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test site:	(Semi-Anechoic Chamber)
Measurement Distance:	3m
Limit:	40.0 dB μ V/m between 30 MHz & 88MHz; 43.5 dB μ V/m between 88MHz & 216MHz; 46.0 dB μ V/m between 216MHz & 960MHz; 54.0 dB μ V/m above 960MHz.
Detector:	For PK value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW $\geq$ RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW =10Hz Sweep = auto Detector function = peak Trace = max hold

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

5.10.1 Test Result

Pre-test under all modes; choose the worst case mode record on the report.

Test mode: 802.11a

Frequency (MHz)	Reading Level (dB μ V/m)	Correct (dB/m)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization	Detector
Low Channel							
4500.000	34.62	8.15	38.96	84.00	-33.44	H	PK
4500.000	25.61	8.19	28.84	64.00	-24.85	H	AV
5150.000	37.61	8.26	39.61	84.00	-31.06	V	PK
5150.000	25.15	8.27	28.15	64.00	-28.25	V	AV
High Channel							
5350.000	37.63	8.44	39.62	84.00	-32.85	H	PK
5350.000	24.96	8.45	27.15	64.00	-24.17	H	AV
5460.000	25.12	8.96	40.39	84.00	-31.89	V	PK
5460.000	24.66	8.96	26.18	64.00	-26.5	V	AV

5.11. Dynamic Frequency Selection(DFS)

Requirement

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

LIMIT

1. DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

2. DFS Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

RADAR TEST WAVEFORMS

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup} \left\{ \left(\frac{1}{360} \right), \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μ sec is selected, the number of pulses

would be Round up $\left\{ \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{3066} \right) \right\}$ = Round up {17.2} = 18.

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chip Width (MHz)	PRI (µsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

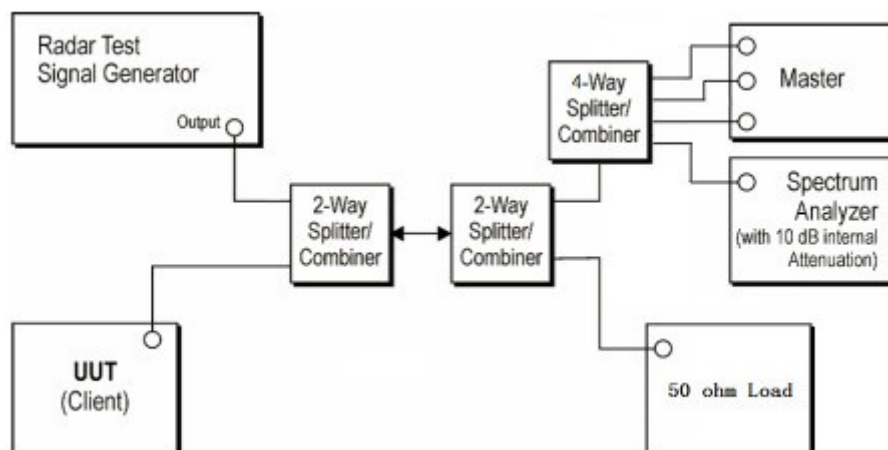
The parameters for this waveforms are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type wave forms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Calibration of Radar Waveform

Radar Waveform Calibration Procedure

- 1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master
- 2) The interference Radar Detection Threshold Level is $-62\text{dBm} + 0\text{dBi} + 1\text{dB} = -61\text{dBm}$ that had been taken into account the output power range and antenna gain.
- 3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB .
- 4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was $-62\text{dBm} + 0\text{dBi} + 1\text{dB} = -61\text{dBm}$. Capture the spectrum analyzer plots on short pulse radar waveform.

Conducted Calibration Setup

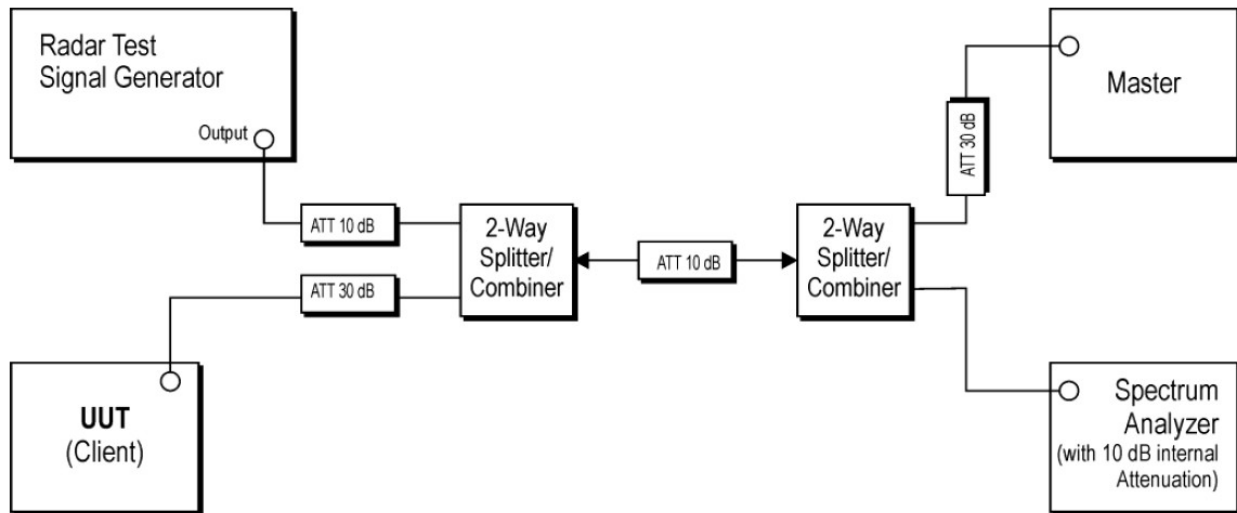


Radar Waveform Calibration Result

Please refer to the test report No.4789482589-US-R2-V0

TEST CONFIGURATION

Setup for Client with injection at the Master



TEST PROCEDURE

1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (0.3ms) = $S (12000\text{ms}) / B (4000)$; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the

aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: $C \text{ (ms)} = N \times \text{Dwell (0.3ms)}$; where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.

8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to the test report No.4789482589-US-R2-V0

-----End of Report-----