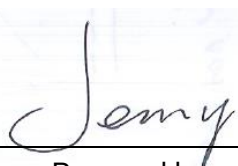


FCC RADIO TEST REPORT

Applicant..... : Robert Bosch GmbH
Address..... : Robert-Bosch-Strasse 200, 31139 Hildesheim, Germany
Manufacturer..... : Robert Bosch GmbH
Address..... : Robert-Bosch-Strasse 200, 31139 Hildesheim, Germany
Factory..... : Bosch Car Multimedia Portugal, S.A.
Address..... : Rua Max Grundig, 35-Lomar, 4705-820 Braga
Product Name..... : Multimedia device with Bluetooth and WLAN
Brand Name..... : BOSCH
Model No. : PSA AIO2
FCC ID..... : 2AUXS-PSAAIO2
Measurement Standard..... : 47 CFR FCC PART 15 Subpart E (section 407)
Receipt Date of Samples.... : August 22, 2022
Date of Tested..... : August 22, 2022 to September 23, 2022
Date of Report..... : November 30, 2022

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.



Prepared by
Jenny Liu / Project Engineer

Approved by
Iori Fan / Authorized Signatory

Table of Contents

1. Summary of Test Result.....	4
2. General Description of EUT	5
3. Test Channels and Modes Detail	8
4. Configuration of EUT	8
5. Modification of EUT	8
6. Description of Support Device.....	9
7. Test Facility and Location	10
8. Applicable Standards and References.....	10
9. Deviations and Abnormalities from Standard Conditions	11
10. Test Conditions	11
11. Measurement Uncertainty	12
12. Sample Calculations	13
13. Duty cycle	14
14. Test Items and Results	15
14.1 Conducted Emissions Measurement	15
14.2 Maximum Conducted Output Power Measurement.....	17
14.3 6dB Bandwidth Measurement.....	19
14.4 Power Spectral Density.....	22
14.5 Band Edge.....	26
14.6 Frequency Stability.....	29
14.7 Radiated Spurious Emissions and Restricted Bands Measurement and Band Edge.....	31
14.8 Antenna Requirement	39
15. Test Equipment List.....	40

Revision History

Report Number	Description	Issued Date
NTC2209505FV00	Initial Issue	2022-11-17
NTC2209505FV01	Updated address of the applicant and manufacturer	2022-11-25
NTC2209505FV02	Updated address of the manufacturer	2022-11-30

1. Summary of Test Result

FCC Rules	Description of Test	Result	Remarks
§15.207 (a)	AC Power Conducted Emission	N/A	Vehicle Environment using
§15.407(a)	Max. Conducted Output Power	PASS	---
§15.407(e)	6dB Bandwidth	PASS	---
§15.407(a)	Power Spectral Density	PASS	---
§15.407(b) §15.205	Radiated Emissions	PASS	---
§15.407(b)	Band Edge Emissions	PASS	---
§15.407(g)	Frequency Stability	PASS	---
§15.203	Antenna Requirement	PASS	---

2. General Description of EUT

Product Information	
Product name:	Multimedia device with Bluetooth and WLAN
Main Model Name:	PSA AIO2
Additional Model Name:	N/A
Model Difference:	N/A
S/N:	750390033105
Brand Name	BOSCH
Hardware version:	03
Software version:	031C
Rating:	DC 9V to 16 V come from vehicle environment
Classification:	Class B
Typical arrangement:	Table-top
I/O Port:	Refer to user's manual
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional Information	
Note:	N/A
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

Technical Specification	
Frequency Range:	5745MHz / 5755MHz / 5775MHz
Modulation Technology:	OFDM
Modulation Type:	64-QAM,16-QAM, QPSK, BPSK
Number of Channel:	1
Antenna Type:	Integral
Antenna Gain:	5.4dBi

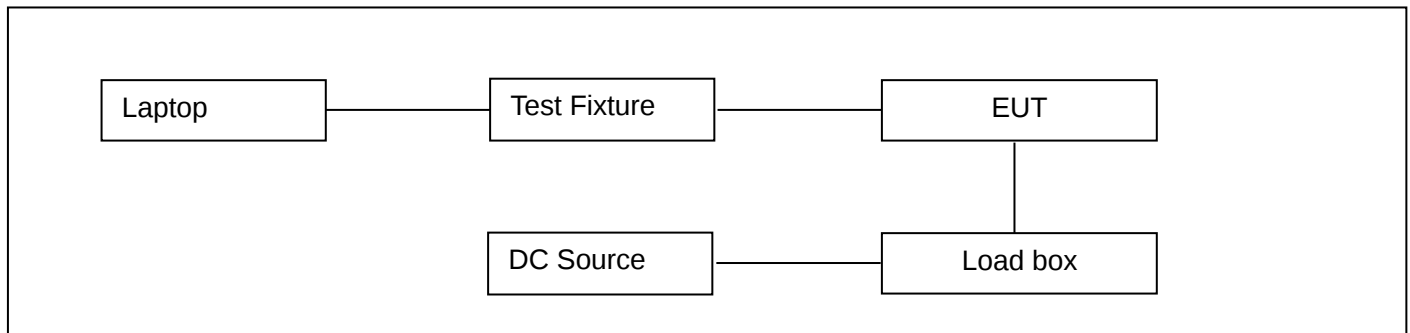
Channel List					
U-NII-3 Band 5745~5825MHz					
IEEE 802.11a/n(HT20))		IEEE 802.11n(HT40)/ac(VHT40)		IEEE 802.11 ac (VHT80)	
Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
149	5745	151	5755	155	5775

3. Test Channels and Modes Detail

No.	Mode	Channel	Frequency (MHz)	Remark
1	TX	149	5745	IEEE 802.11a/n(HT20)
		151	5755	IEEE 802.11n(HT40) /ac(VHT40)
		155	5775	IEEE 802.11ac(VHT80)
2.	Normal Mode	---	---	---

Note: TX mode means that the EUT was programmed to be in continuously transmitting mode.

4. Configuration of EUT



5. Modification of EUT

No modifications are made to the EUT during all test items.

6. Description of Support Device

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks
1.	Laptop	ThinkPad	T480	---	---	Provided by manufacturer.
2.	Test Fixture	D-Link	DUB-E100	S7291GC000687	Ethernet /0.5m / unshielded	Provided by manufacturer.
3.	Load Box	BOSCH	---	---	---	Provided by the manufacturer
4.	Laptop	Lenovo	R720-151KBN	PF0Z35FH	---	Provided by the lab

Software	Power Setting	
DutApi_w8887_BrdigeEth	---	U-NII-3
	IEEE 802.11a	20
	IEEE 802.11n(HT20)	20
	IEEE 802.11n(HT40)	20
	IEEE 802.11ac(VHT40)	10
	IEEE 802.11ac(VHT80)	12

7. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and Authorizations	:	The Laboratory has been assessed and proved to be in compliance with CNAS/CL01 Listed by CNAS, August 13, 2018 The Certificate Registration Number is L5795. The Certificate is valid until August 13, 2024 The Laboratory has been assessed and proved to be in compliance with ISO17025 Listed by A2LA, November 01, 2017 The Certificate Registration Number is 4429.01 The Certificate is valid until December 31, 2023 Listed by FCC, November 06, 2017 Test Firm Registration Number is 907417 Listed by Industry Canada, June 08, 2017 The Certificate Registration Number is 46405-9743A
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

8. Applicable Standards and References

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

Test Standards:

47 CFR Part 15, Subpart E, 15.407

ANSI C63.10-2013

References Test Guidance:

KDB 789033 D02 v02r01

9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

10. Test Conditions

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks
1.	AC Power Conducted Emission	---	---	---	See note 2
2.	Max. Conducted Output Power	1	DC 13.5V	Sean	See note 1
3.	6dB Bandwidth	1	DC 13.5V	Sean	See note 1
4.	Power Spectral Density	1	DC 13.5V	Sean	See note 1
5.	Radiated Emissions	1, 2	DC 13.5V	Sean	See note 1,3
6.	Band Edge Emissions	1	DC 13.5V	Sean	See note 1
7.	Frequency Stability	1	DC 13.5V	Sean	See note 1
8.	Antenna Requirement	---	---	---	---

Note:

1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35℃, 30~70%, 86~106kPa.
2. Not applicable.
3. Only the worst case was recorded.

11. Measurement Uncertainty

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	---
2.	Radiated Emission Test	9KHz ~ 30MHz	±2.60 dB	---
		30MHz ~ 1GHz	±5.04 dB	---
		1GHz ~ 18GHz	±5.23 dB	---
		18GHz ~ 40GHz	±5.23 dB	---
3.	RF Conducted Test	10Hz ~ 40GHz	±1.06 dB	---

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The measurement uncertainty levels above are estimated and calculated according to CISPR 16-4-2.
3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

12. Sample Calculations

Conducted Emission						
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
0.1500	30.00	10.60	40.60	66.00	-25.40	QP
Where, Freq. = Emission frequency in MHz Reading Level = Analyzer/Receiver reading Corrector Factor = Insertion loss of LISN + Cable Loss + RF Switching Unit attenuation Measurement = Reading + Corrector Factor Limit = Limit stated in standard Margin = Measurement - Limit Detector = Reading for Quasi-Peak / Average / Peak						

Radiated Spurious Emissions and Restricted Bands						
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
60.0700	45.88	-18.38	27.50	49.00	-21.50	QP
Where, Freq. = Emission frequency in MHz Reading Level = Analyzer/Receiver reading Corrector Factor = Antenna Factor + Cable Loss - Pre-amplifier Measurement = Reading + Corrector Factor Limit = Limit stated in standard Over = Margin, which calculated by Measurement - Limit Detector = Reading for Quasi-Peak / Average / Peak						

Note: For all conducted test items, the spectrum analyzer offset or transducer is derived from RF cable loss and attenuator factor. The offset or transducer is equal to the RF cable loss plus attenuator factor.

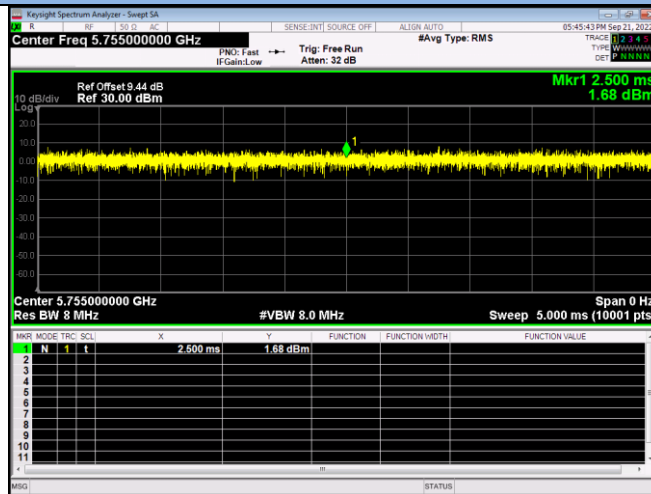
13. Duty cycle

Operation Band (MHz)	Mode	Duty Cycle (%)	1/T minimum VBW (kHz)	Duty Cycle Factor (dB)
U-NII-3	802.11a	100%	1.00	0
	802.11n(HT20)	100%	1.00	0
	802.11n(HT40)	100%	1.00	0
	802.11ac(VHT40)	100%	1.00	0
	802.11ac(VHT80)	100%	1.00	0

Remark: Duty Cycle= (Ton/ Ton+off)*100%

Duty Cycle factor=10*log(1/ Duty cycle)

U-NII-3 Band



14. Test Items and Results

14.1 Conducted Emissions Measurement

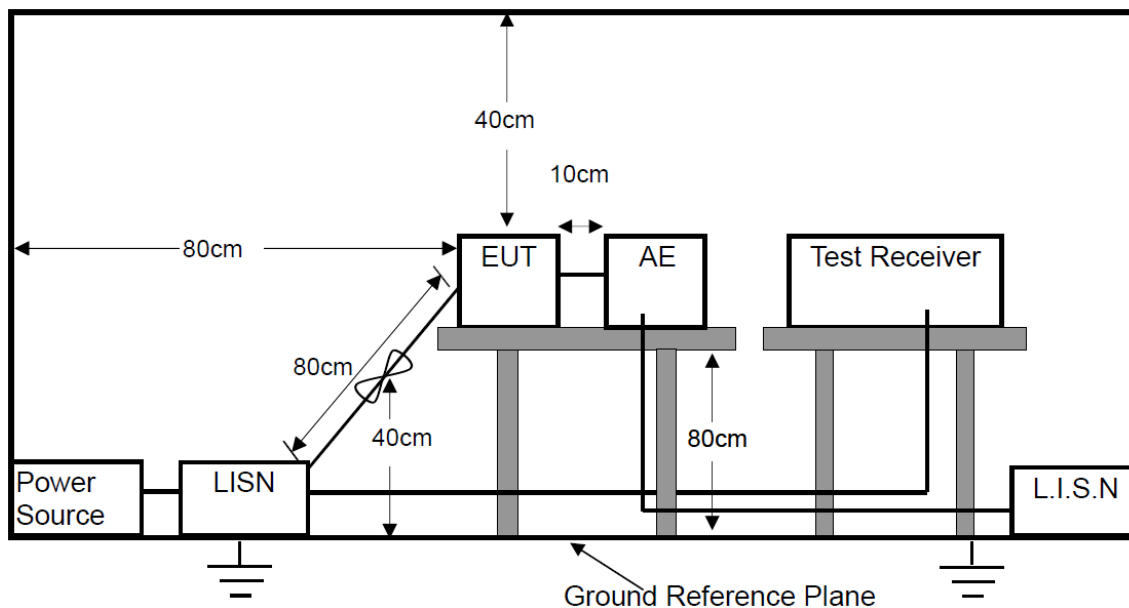
LIMITS

According to the requirements of FCC PART 15.207, the limits are as follows:

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

Note: 1. If the limits for the average detector are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.
2. The lower limit shall apply at the transition frequencies.
3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The EUT was placed on a wooden table 0.8m height from the metal ground plan and 0.4m from the conducting wall of the shielding room and it was kept at 0.8m from any other grounded conducting surface.
- b. All I/O cables and support devices were positioned as per ANSI C63.10.
- c. Connect mains power port of the EUT to a line impedance stabilization network (LISN).
- d. Connect all support devices to the other LISN and AAN, if needed.
- e. Scan the frequency range from 150KHz to 30MHz at both sides of AC line for maximum conducted interference checking and record the test data.

TEST RESULTS

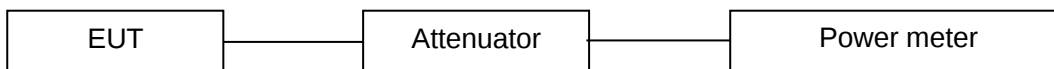
Not Applicable

14.2 Maximum Conducted Output Power Measurement

LIMITS

Operation Band	EUT category	Limit
☐ 5180~5240MHz	☐ Outdoor Access Point	1 Watt (30dBm) (Max. e.i.r.p $\leq$ 125mW (21dBm) at any elevation angle above 30 degrees as measured from the horizon)
	☐ Fixed point-to-point Access Point	1 Watt (30dBm)
	☐ Indoor Access Point	1 Watt (30dBm)
	☐ Mobile and Portable client device	250mW (24dBm)
☐ 5260~5320MHz	-	250mW (24dBm)
☐ 5500~5700MHz	-	250mW (24dBm)
☒ 5745~5825MHz	-	1 Watt (30dBm)

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 v02r01 for compliance testing of Unlicensed National Information Infrastructure (U-NII) Device -section (E) Maximum conducted output power.
3. Measurement using a power meter (PM) =b Method PM-G (Measurement using a gated RF average power meter).

TEST RESULTS

PASS

Please refer to the following table.

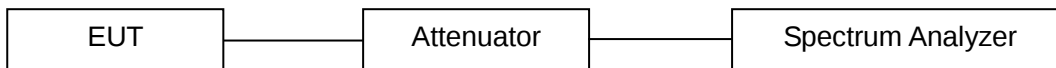
U-NII-3			
Frequency MHz	Data Rate Mbps	Average Output Power dBm	Limit dBm
IEEE 802.11a Mode (OFDM, Antenna Gain=5.4dBi)			
Channel: 5745	6	4.525	30
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=5.4dBi)			
Channel: 5745	MCS0	4.554	30
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=5.4dBi)			
Channel: 5755	MCS0	3.908	30
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=5.4dBi)			
Channel: 5755	MCS0	1.557	30
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=5.4dBi)			
Channel: 5775	MCS0	1.371	30
Note: Cable loss was considered during the test.			

14.3 6dB Bandwidth Measurement

LIMITS

The minimum 6dB bandwidth shall be at least 500 kHz

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to ANSI C63.10 clause 11.8.1:

- a. Set the RBW = 100KHz.
- b. Set the VBW $\geq 3 \times$ RBW
- c. Set the Detector = peak.
- d. Set the Sweep time = auto couple.
- e. Set the Trace mode = max hold.
- f. Allow trace to fully stabilize.
- g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST RESULTS

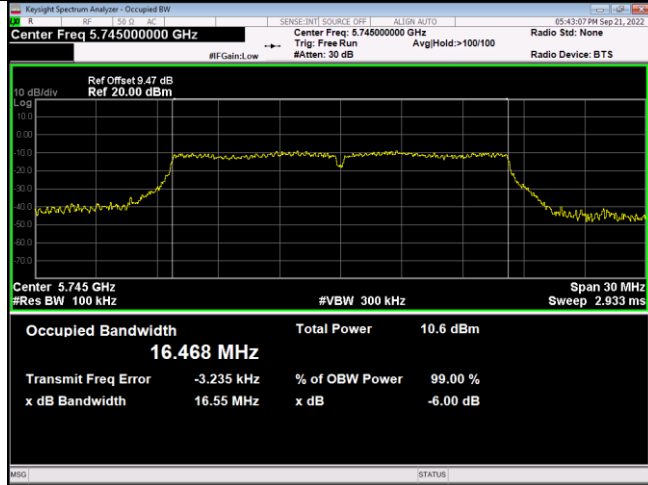
PASS

Please refer to the following tables.

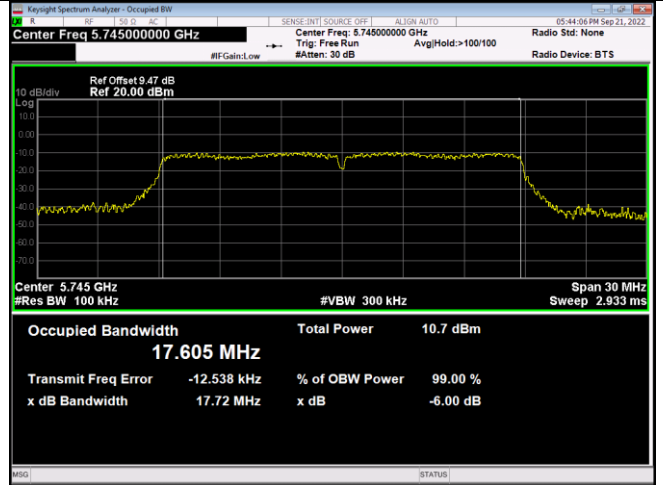
U-NII-3 Band			
Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	Limit
IEEE 802.11a Mode (OFDM)			
Channel: 5745	6	16.55	>500KHz
IEEE 802.11n(HT20) Mode (OFDM)			
Channel: 5745	MCS0	17.72	>500KHz
IEEE 802.11n(HT40) Mode (OFDM)			
Channel: 5755	MCS0	36.45	>500KHz
IEEE 802.11ac (VHT40) Mode (OFDM)			
Channel: 5755	MCS0	36.45	>500KHz
IEEE 802.11ac (VHT80) Mode (OFDM)			
Channel: 5775	MCS0	76.65	>500KHz

U-NII-3

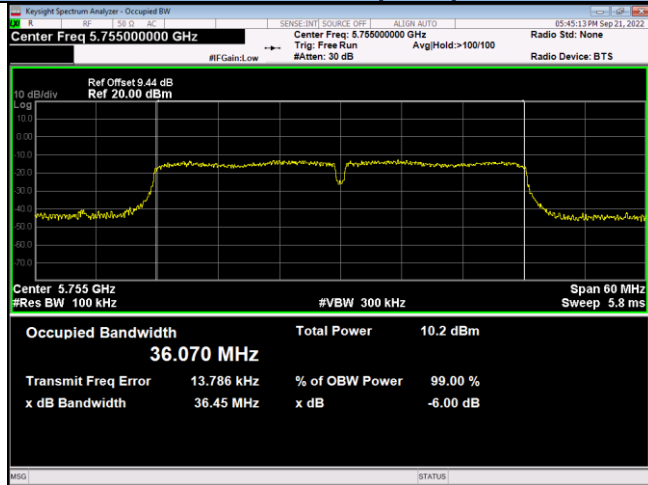
IEEE 802.11a Low Channel



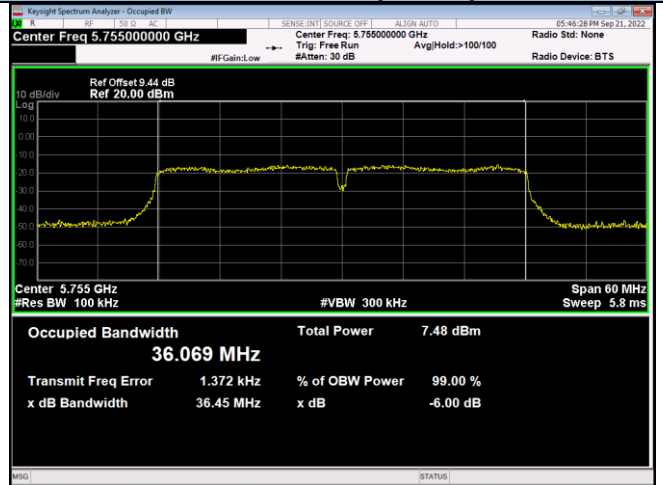
IEEE 802.11n(HT20)



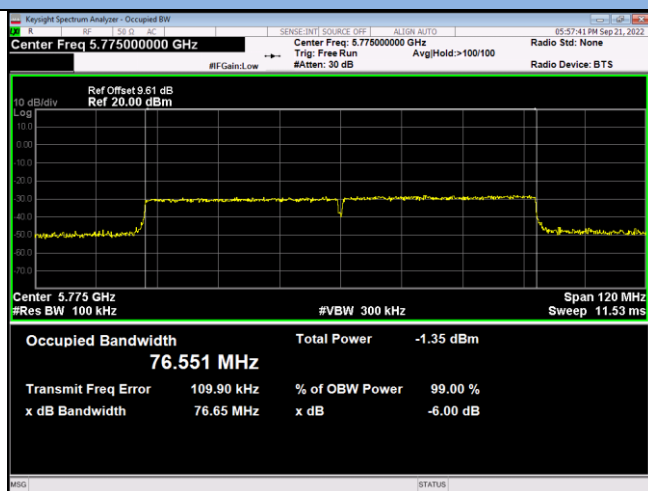
IEEE 802.11n(HT40)



IEEE 802.11ac(VHT40)



IEEE 802.11ac(VHT80)



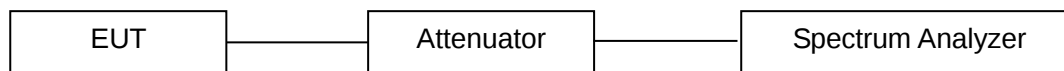
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14.4 Power Spectral Density

LIMITS

Operation Band		Limit
☐ 5180~5240MHz	☐ Outdoor access point	17 dBm/MHz
	☐ Indoor access point	17 dBm/MHz
	☐ Fixed point-to-point access points	17 dBm/MHz
	☐ Client devices	11 dBm/MHz
☐ 5260~5320MHz	-	11 dBm/MHz
☐ 5500~5700MHz	-	11 dBm/MHz
☒ 5745~5825MHz	-	30 dBm/500kHz

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

The antenna port of the EUT was connected to the input of a spectrum analyzer.

Analyzer was set as below according to FCC KDB789033 (v02r01):

- Set analyzer center frequency to center frequency
- Set the RBW to: 1MHz
- Set the VBW to: 3MHz
- Detector = RMS
- Sweep time = auto couple
- Trace Average = 100 times
- If measured bandwidth of Maximum PSD is specified in 500kHz, add $10\log(500\text{kHz}/\text{RBW})$ to the measured result, whereas RBW (<500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement. Allow trace to fully stabilize.

TEST RESULTS

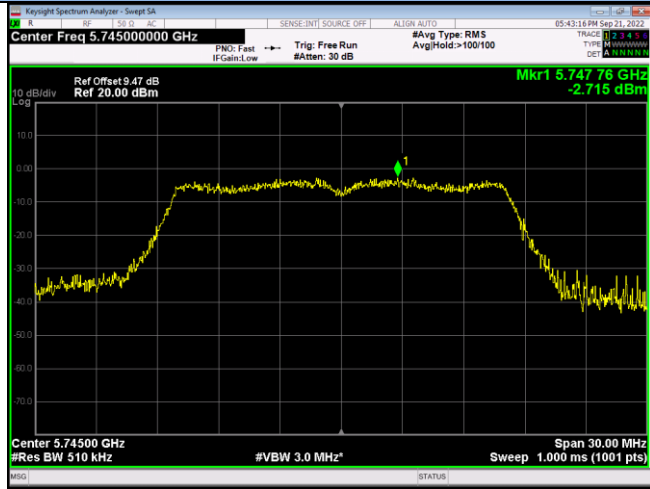
PASS

Please refer to the following test plots.

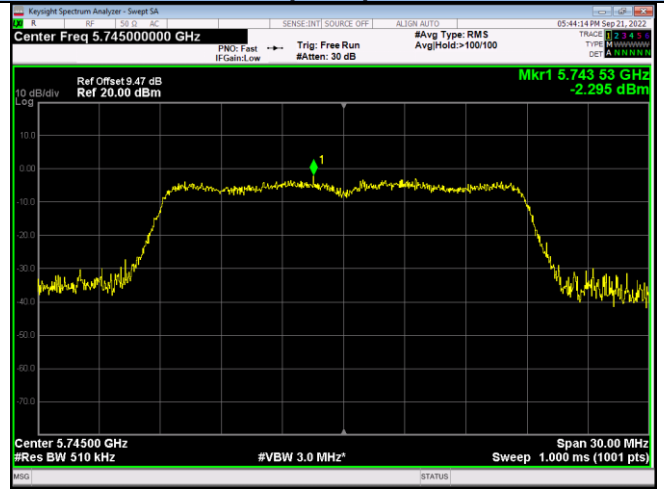
U-NII-3 Band						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz	PSD dBm/500kHz	Total PSD with duty cycle factor	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=5.4dBi)						
Channel: 5745	6	0	---	-2.715	-2.715	30
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=5.4dBi)						
Channel: 5745	MCS0	0	---	-2.295	-2.295	30
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=5.4Bi)						
Channel: 5755	MCS0	0	---	-7.046	-7.046	30
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=5.4dBi)						
Channel: 5755	MCS0	0	---	-9.063	-9.063	30
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=5.4dBi)						
Channel: 5775	MCS0	0	---	-21.568	-21.568	30
Note: Cable loss was considered during the test.						

U-NII-3 Band

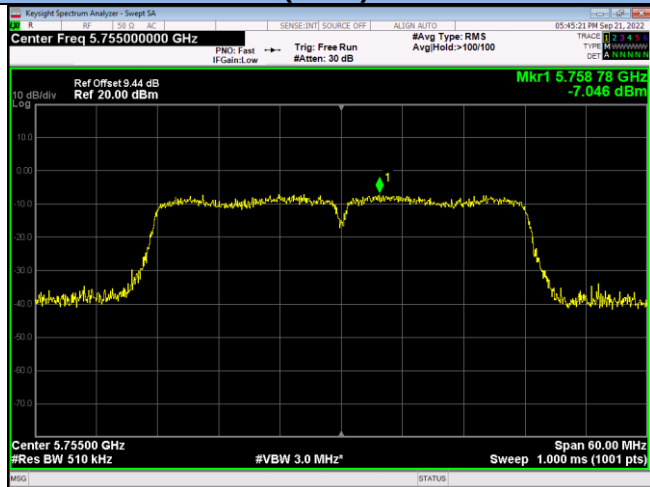
IEEE 802.11a Low Channel



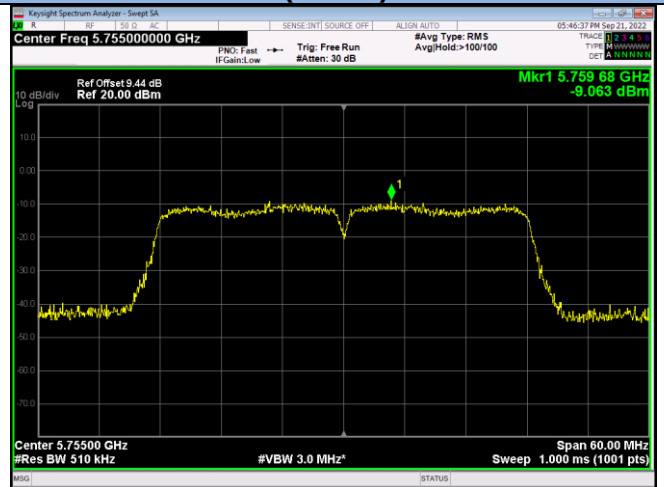
IEEE 802.11n(HT20) Low Channel



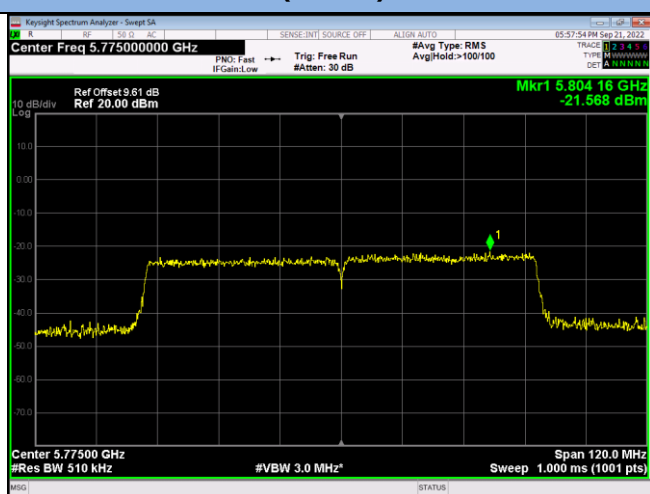
IEEE 802.11n(HT40) Low Channel



IEEE 802.11ac(VHT40) Low Channel



IEEE 802.11ac(VHT80) Low Channel



blank

14.5 Band Edge

LIMITS

For transmitters operating in the 5.15-5.25 GHz band:

All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band:

All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

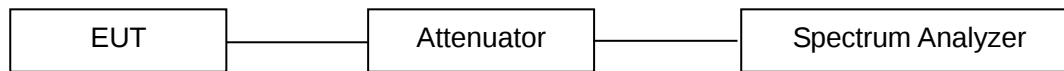
For transmitters operating in the 5.47-5.725 GHz band:

All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

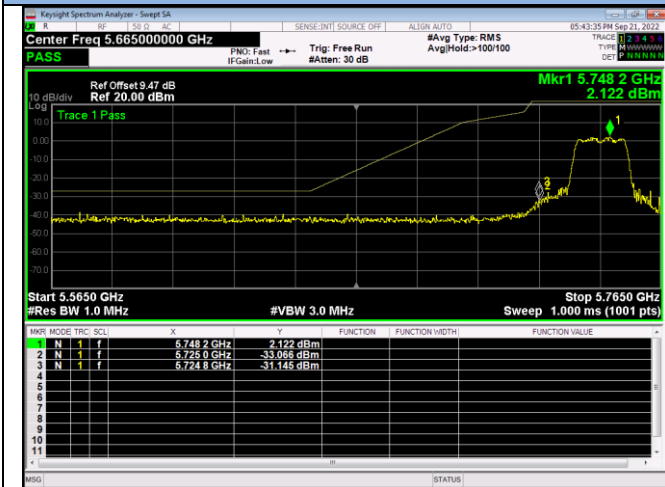
- Check the calibration of the measuring instrument using either an internal calibration or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- Set RBW to 1MHz and VBW to 3MHz of spectrum analyzer.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.

TEST RESULTS

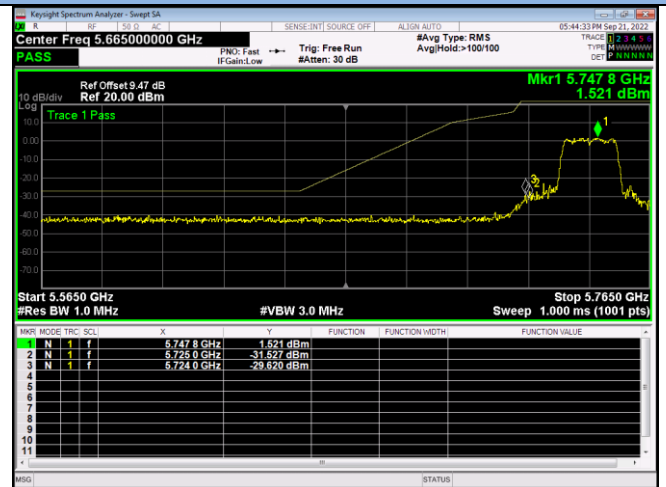
PASS

Please refer to the following pages.

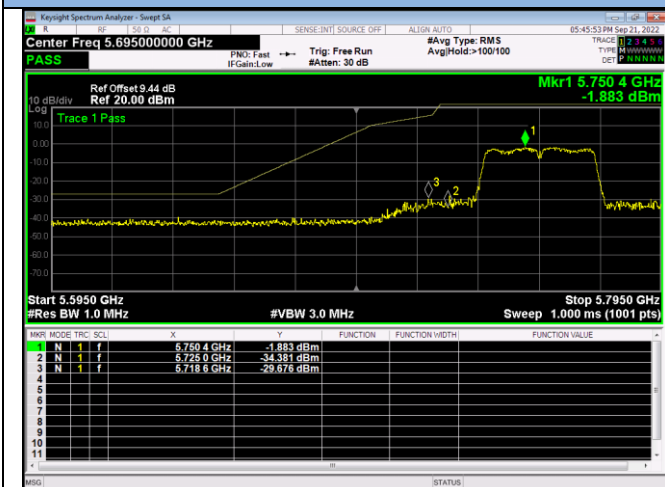
IEEE 802.11a Low Channel



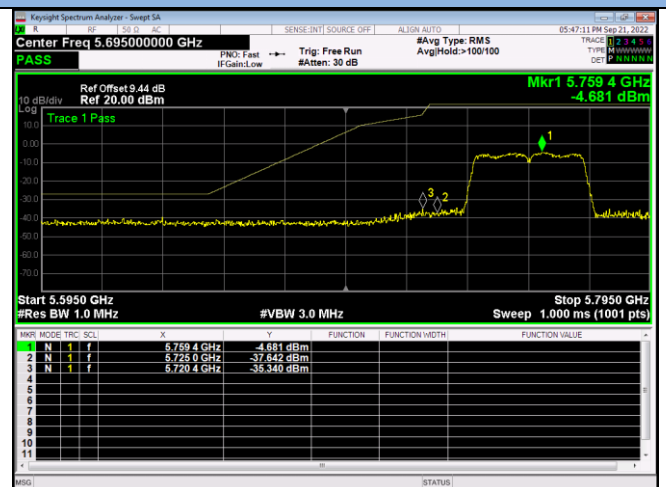
IEEE 802.11n(HT20) Low Channel



IEEE 802.11n(HT40) Low Channel



IEEE 802.11ac(VHT40) Low Channel



IEEE 802.11ac(VHT80) Low Channel



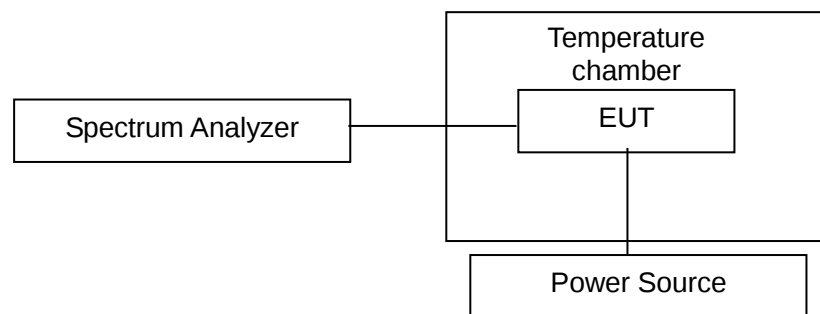
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14.6 Frequency Stability

LIMITS

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- The EUT was placed inside the environmental test chamber and powered by Power source.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The 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.

Note: The EUT set at un-modulation mode during frequency stability test.

TEST RESULTS

PASS

5745~5825MHz Band						
Lowest channel 5745MHz						
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-30	13.5	5745.0112	5745.0132	5745.0146	5745.0126	Pass
-10		5745.0147	5745.0109	5745.0123	5745.0129	Pass
0		5745.0132	5745.0148	5745.0144	5745.0135	Pass
20		5745.0111	5745.0119	5745.0126	5745.010	Pass
40		5745.0119	5745.0125	5745.0119	5745.0138	Pass
60		5745.0123	5745.0132	5745.0138	5745.0129	Pass
70		5745.0124	5745.0136	5745.0140	5745.0116	Pass
20	9.0	5745.0118	5745.0127	5745.0117	5745.0121	Pass
20	16	5745.0125	5745.0119	5745.0122	5745.0127	Pass

Note: EUT temperature working range is between -30 to 70.

14.7 Radiated Spurious Emissions and Restricted Bands Measurement and Band Edge

LIMITS

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)
		$\mu\text{V/m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

- Remark:
- (1) Emission level (dB) μV = 20 log Emission level $\mu\text{V/m}$
 - (2) The smaller limit shall apply at the cross point between two frequency bands.
 - (3) As shown in 15.35(b), 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.
 - (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
 - (5) §15.407 specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

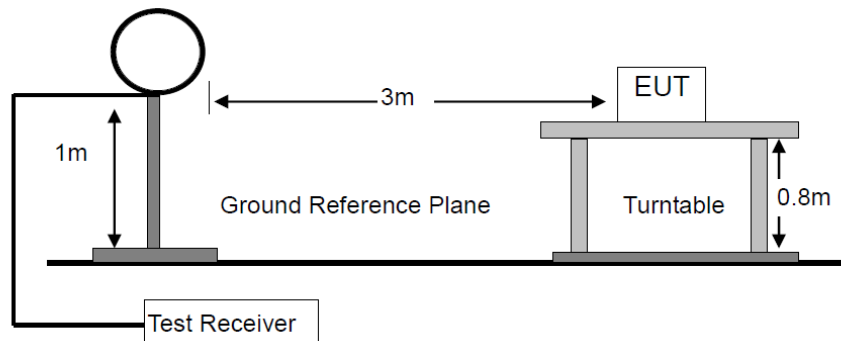
For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band:

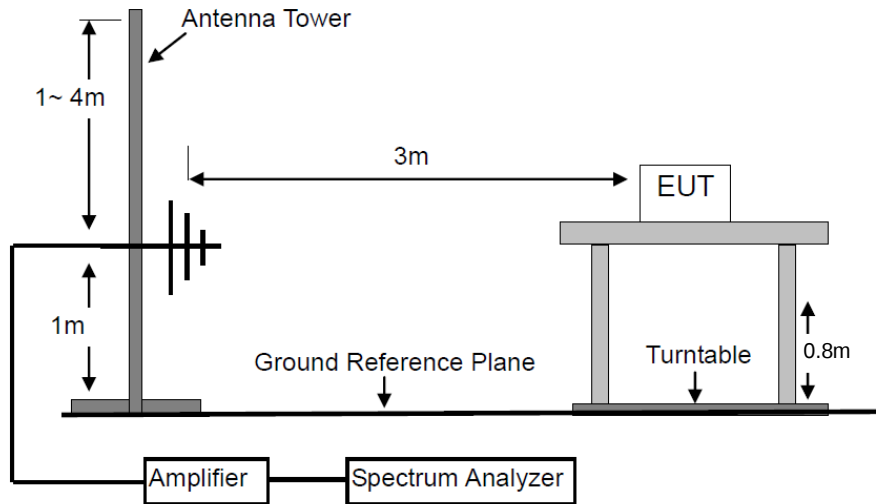
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

BLOCK DIAGRAM OF TEST SETUP

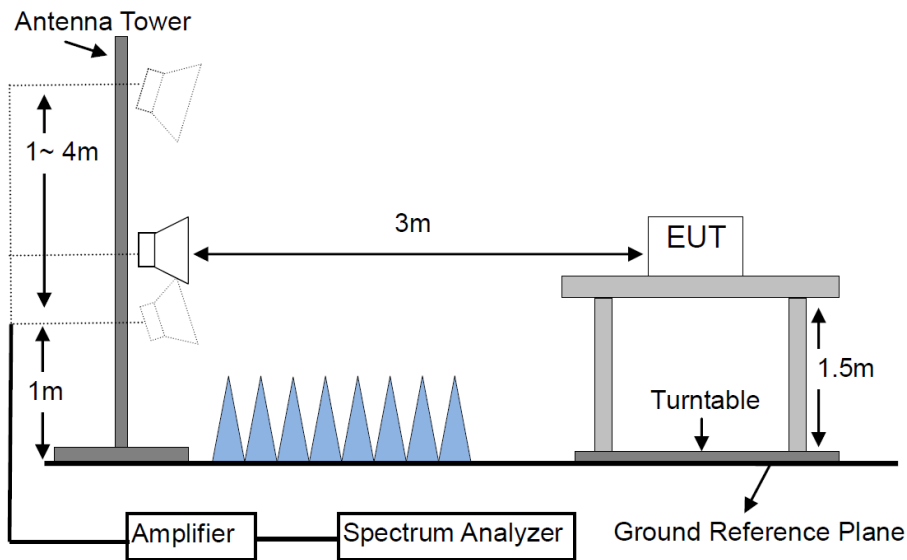
For Radiated Emission below 30MHz



For Radiated Emission 30-1000MHz



For Radiated Emission Above 1000MHz.



TEST PROCEDURES

- a. Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- b. For the radiated emission test above 1GHz:
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. 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.
- e. 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. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

TEST RESULTS

PASS

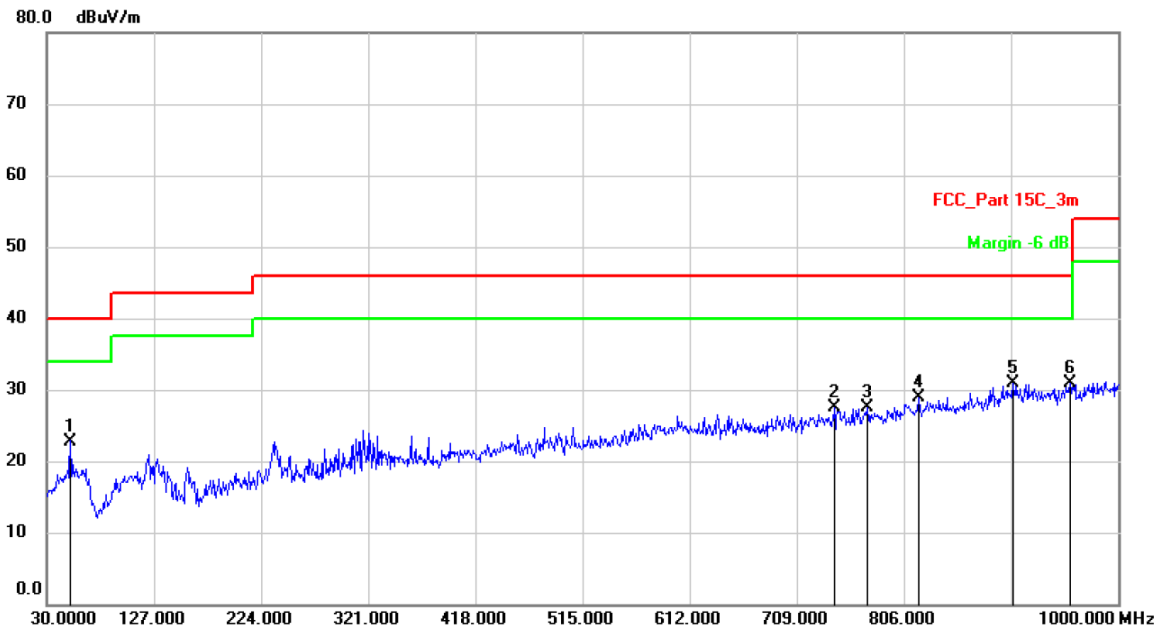
Please refer to the following pages of the worst case.

M/N: PSA AIO2	Testing Voltage: DC 13.5V
Polarization: Horizontal	Detector: QP
Test Mode: 1	Distance: 3m

Radiated Emission Measurement

Date: 2022/9/20

Time: 18:24:09



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		51.3400	29.85	-7.05	22.80	40.00	-17.20	QP	
2		742.9500	24.52	2.92	27.44	46.00	-18.56	QP	
3		773.0200	24.07	3.46	27.53	46.00	-18.47	QP	
4		819.5800	24.61	4.32	28.93	46.00	-17.07	QP	
5	*	904.9400	24.75	6.20	30.95	46.00	-15.05	QP	
6		956.3500	24.55	6.29	30.84	46.00	-15.16	QP	

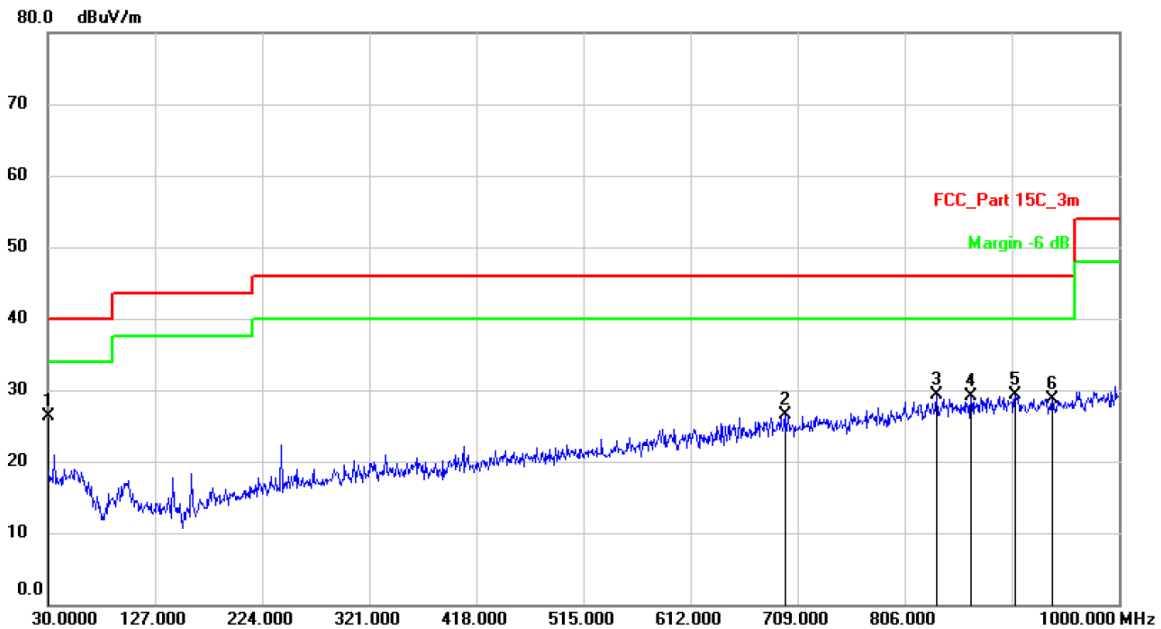
Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

M/N: PSA AIO2	Testing Voltage: DC 13.5V
Polarization: Vertical	Detector: QP
Test Mode: 1	Distance: 3m

Radiated Emission Measurement

Date: 2022/9/20

Time: 18:30:22



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	30.0000	36.95	-10.69	26.26	40.00	-13.74	QP	
2		697.3600	24.35	2.12	26.47	46.00	-19.53	QP	
3		835.1000	24.65	4.56	29.21	46.00	-16.79	QP	
4		866.1400	24.23	4.90	29.13	46.00	-16.87	QP	
5		905.9100	24.29	4.96	29.25	46.00	-16.75	QP	
6		939.8600	23.65	5.02	28.67	46.00	-17.33	QP	

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Modulation: N-Ull-3 (5745-5825 MHz) TX (IEEE 802.11n(HT20) the worst case)				Test Result: PASS			Test frequency range: 1-40GHz			
Freq. (MHz)	Ant. Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV/m)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
5615	V	49.40	---	6.85	56.25	---	68.20	---	-11.95	---
11490	V	46.55	33.33	16.86	63.41	50.19	74.00	54.00	-10.59	-3.81
17235	V	42.05	---	22.23	64.28	---	68.20	---	-3.92	---

5615	H	50.15	---	6.85	57.00	---	68.20	---	-11.20	---
11490	H	46.38	32.66	16.81	63.19	49.47	74.00	54.00	-10.81	-4.53
17235	H	41.88	---	22.23	64.11	---	68.20	---	-4.09	---

Spurious Emission in restricted band:										
5460	V	47.76	34.75	6.70	54.46	41.45	74.00	54.00	-19.54	-12.55
5460	H	48.67	35.41	6.70	55.37	42.11	74.00	54.00	-18.63	-11.89
Remark: 1. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits. 2. Others emissions are attenuated 20dB below the limits, so it does not record in report.										

14.8 Antenna Requirement

STANDARD APPLICABLE

According to of FCC part 15C section 15.203:

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. The structure and application of the EUT were analyzed to determine compliance with section 15.203 of the rules.

And according to 47 CFR section 15.407(a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

ANTENNA CONNECTED CONSTRUCTION

The antenna is integrated that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 5.4dBi, therefore, the antenna is consider meet the requirement.

15. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2022	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2022	2 Year
3.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2022	1 Year
4.	Spectrum Analyzer	Keysight	N9010B	MY62170254	Sep. 06, 2022	1 Year
5.	Horn Antenna & Pre-Amplifier	COM-Power	AHA-840	10100020	Sep. 08, 2022	2 Year
6.	Power Sensor	DARE	RPR3006W	15I00041SNO 64	Mar. 13, 2022	1 Year
7.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2022	2 Year
8.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2022	1 Year
9.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2022	1 Year
10.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2022	2 Year
11.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 13, 2022	1 Year
12.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2022	1 Year
13.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2022	1 Year
14.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
15.	Test Software	EZ	EZ_EMC	N/A	N/A	N/A

Note: For photographs of EUT and measurement, please refer to appendix in separate documents.

---End--