FCC Test Report

Equipment	:	**AC1200 Wi-Fi Range Extender**
Brand Name	:	**D-Link**
Model No.	:	**DAP-1620**
FCC ID	:	**KA2AP1620A1**
Standard	:	**47 CFR FCC Part 15.407**
Operating Band	:	**5725 MHz – 5850 MHz**
FCC Classification	:	**NII**
Applicant	:	**D-Link Corporation** **No. 289, Xinhu 3rd Rd., Neihu District, Taipei City 11494, Taiwan, R. O. C.**

The product sample received on Jul. 09, 2015 and completely tested on Jul. 30, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

James Fan / Assistant Manager

Testing Laboratory
1190

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APPENDIX A. TEST PHOTOS A1-A5

Summary of Test Result

Conformance Test Specifications					
Report Clause	**Ref. Std. Clause**	**Description**	**Measured**	**Limit**	**Result**
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.1590020MHz 49.56 (Margin 15.96dB) – QP 32.90 (Margin 22.62dB) – AV	FCC 15.207	Complied
3.2	15.407(a)	Emission Bandwidth	99% Bandwidth [MHz] 20M: 25.60 / 40M: 37.22 80M: 75.24 6dB Bandwidth [MHz] 20M: 15.94 / 40M: 35.13 80M: 75.13	Information only for 99% bandwidth 500kHz for 6dB bandwidth	Complied
3.3	15.407(a)	RF Output Power (Maximum Conducted (Average) Output Power)	Power [dBm] 5725-5850MHz: 24.00	Power [dBm] 5725-5850MHz: 30	Complied
3.4	15.407(a)	Peak Power Spectral Density	PPSD [dBm/500kHz] 5725-5850MHz: 10.88	PPSD [dBm/500kHz] 5725-5850MHz: 30	Complied
3.5	15.407(b)	Transmitter Unwanted Emissions and Band Edge	Restricted Bands [dBuV/m at 3m]: 5725.00MHz 77.19 (Margin 1.01dB) – PK	Non-Restricted Bands: ≤ -27dBm (68.2dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
3.6	15.407(g)	Frequency Stability	4.5255 ppm	Signal shall remain in-band	Complied

Revision History

Report No.	Version	Description	Issued Date
FR571625AI	Rev. 01	Initial issue of report	Sep. 02, 2015

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information						
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N_{TX})	RF Output Power (dBm)	Co-location
5725-5850	a	5745-5825	149-165 [5]	2	23.85	Yes
5725-5850	n(HT20)	5745-5825	149-165 [5]	2	23.90	Yes
5725-5850	n(HT40)	5755-5795	151-159 [2]	2	21.17	Yes
5725-5850	ac(VHT20)	5745-5825	149-165 [5]	2	24.00	Yes
5725-5850	ac(VHT40)	5755-5795	151-159 [2]	2	21.29	Yes
5725-5850	ac(VHT80)	5775	155 [1]	2	12.34	Yes

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.
Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)

1.1.2 Antenna Information

Antenna Category			
☒	Integral antenna (antenna permanently attached)		
	☒	Temporary RF connector provided	
	☐	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.	
☐	External antenna (dedicated antennas)		
	☐	Single power level with corresponding antenna(s).	
	☐	Multiple power level and corresponding antenna(s).	
	☐	RF connector provided	
		☐	Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type…)
		☐	Standard antenna connector. (e.g., SMA, N, BNC, and TNC type…)

Antenna General Information					
No.	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)		
			2400~2483.5	5150~5250	5725~5850
1	PIFA	UFL	1	2	2

1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	☐ Production ; ☒ Pre-Production ; ☐ Prototype

Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: …
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: …
☐	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☒ Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	**Power Duty Factor [dB] – (10 log 1/x)**
☒ 98.28% - IEEE 802.11a	0.08
☒ 98.19% - IEEE 802.11ac (VHT20)	0.08
☒ 96.43% - IEEE 802.11ac (VHT40)	0.16
☒ 91.41% - IEEE 802.11ac (VHT80)	0.39

1.1.5 EUT Operational Condition

Supply Voltage	☒ 100-240V, 50-60Hz, 0.5A		
Test Voltage	☒ Vnom (120 V)	☒ Vmax (138 V)	☒ Vmin (102 V)
Test Climatic	☒ Tnom (20°C)	☒ Tmax (50°C)	☒ Tmin (-30°C)

1.2 Support Equipment

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	Latitude E6440	DoC

1.3 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01
- FCC KDB 644545 D03 Guidance for IEEE 802.11ac New rule v01
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01
- FCC KDB 412172 Determining ERP and EIRP v01r01

1.4 Testing Location Information

Testing Location					
☒	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973			
Test Condition	**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**	
RF Conducted	TH01-HY	Mark Liao	22°C / 63%	Jul. 30, 2015	
AC Conduction	CO04-HY	Skys Huang	21°C / 58%	Jul. 21, 2015	
Radiated Emission	03CH03-HY	Jack Li	21-26°C / 60-63%	Jul. 09 ~ Jul. 13, 2015	
Test site registered number [643075] with FCC Test site registered number [4086B-1] with IC					

1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty			
Test Item		**Uncertainty**	**Limit**
AC power-line conducted emissions		±2.26 dB	N/A
Emission bandwidth		±1.42 %	N/A
RF output power, conducted		±0.63 dB	N/A
Power density, conducted		±0.81 dB	N/A
Unwanted emissions, conducted	30 – 1000 MHz	±0.51 dB	N/A
	1 – 18 GHz	±0.67 dB	N/A
	18 – 40 GHz	±0.83 dB	N/A
	40 – 200 GHz	N/A	N/A
All emissions, radiated	30 – 1000 MHz	±2.56 dB	N/A
	1 – 18 GHz	±3.59 dB	N/A
	18 – 40 GHz	±3.82 dB	N/A
	40 – 200 GHz	N/A	N/A
Temperature		±0.8 °C	N/A
Humidity		±3 %	N/A
DC and low frequency voltages		±3 %	N/A
Time		±1.42 %	N/A
Duty Cycle		±1.42 %	N/A

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing (5725-5850 MHz)			
Modulation Mode	**Transmit Chains (N_{TX})**	**Data Rate / MCS**	**Worst Data Rate / MCS**
11a	2	6-54Mbps	6 Mbps
HT20	2	MCS 0-15	MCS 0
HT40	2	MCS 0-15	MCS 0
VHT20	2	MCS 0-9	MCS 0
VHT40	2	MCS 0-9	MCS 0
VHT80	2	MCS 0-9	MCS 0

2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter							
Test Software	MT7620QA						
Test Software Version	V1.0.3.4						
Modulation Mode	**N_{TX}**	**Test Frequency (MHz)**					
		NCB: 20MHz			**NCB: 40MHz**		**NCB: 80MHz**
		5745	**5785**	**5825**	**5755**	**5795**	**5775**
11a,6-54Mbps	2	18/17	23/23	1B/1A	--	--	--
HT20,M0-15	2	16/15	23/23	1B/1A	--	--	--
HT40,M0-15	2	--	--	--	0E/0D	1D/1C	--
VHT20,M0-9	2	16/15	23/23	1B/1A	--	--	--
VHT40,M0-9	2	--	--	--	0E/0D	1D/1C	--
VHT80,M0-9	2	--	--	--		--	0A/09

2.3 The Worst Case Measurement Configuration

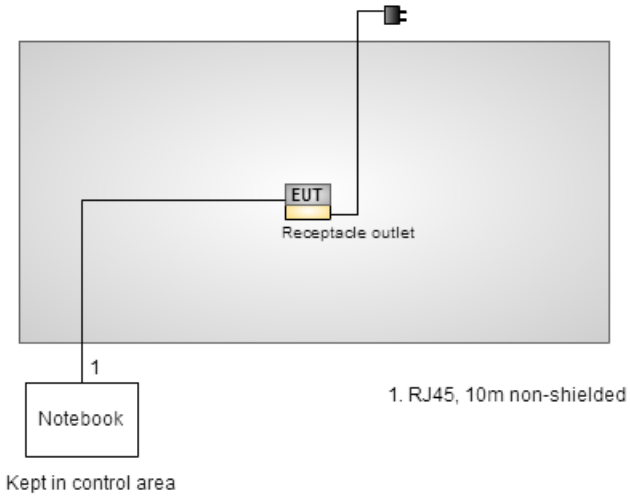
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	AC Power & Radio link (WLAN)

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11a, HT20, HT40, VHT20, VHT40, VHT80
Operating Mode	Operating Mode Description
1	AC Power & Radio link (WLAN)

The Worst Case Mode for Following Conformance Tests	
Tests Item	Peak Power Spectral Density, Emission Bandwidth
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11a, VHT20, VHT40, VHT80
Operating Mode	Operating Mode Description
1	AC Power & Radio link (WLAN)

The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
User Position	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. The worst planes is X-axis, antenna close.		
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes. The worst planes is X.		
Operating Mode	☒ 1. AC Power & Radio link (WLAN)		
Modulation Mode	11a, VHT20, VHT40, VHT80		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**

2.4 Test Setup Diagram

Test Setup Diagram –Radiated Emission Test


3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

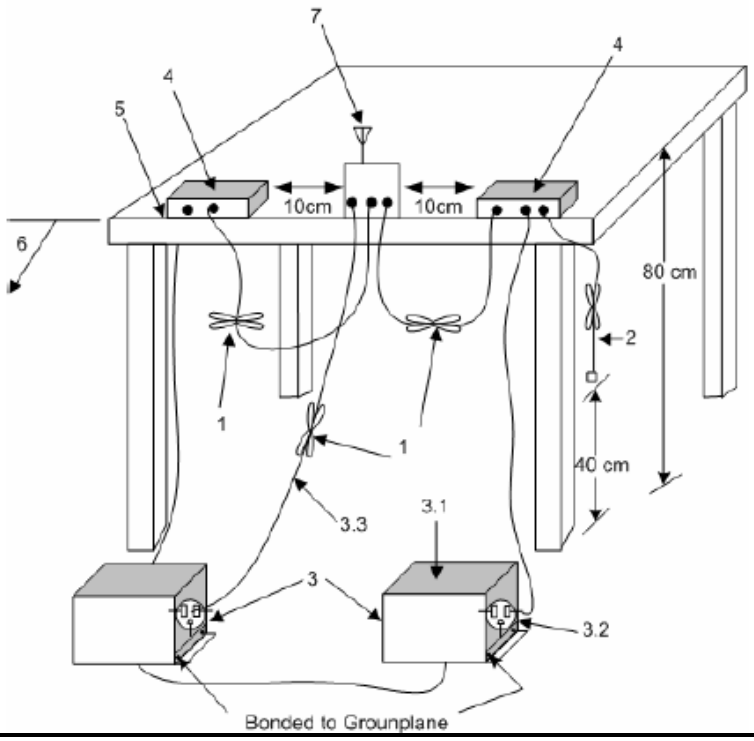
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

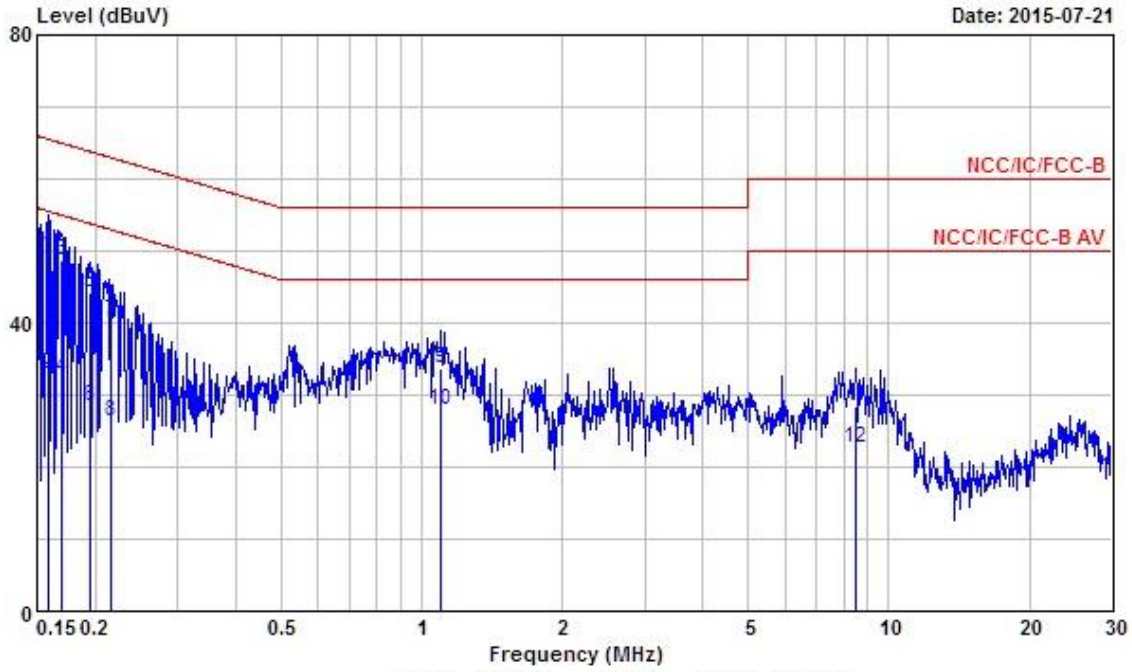
3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

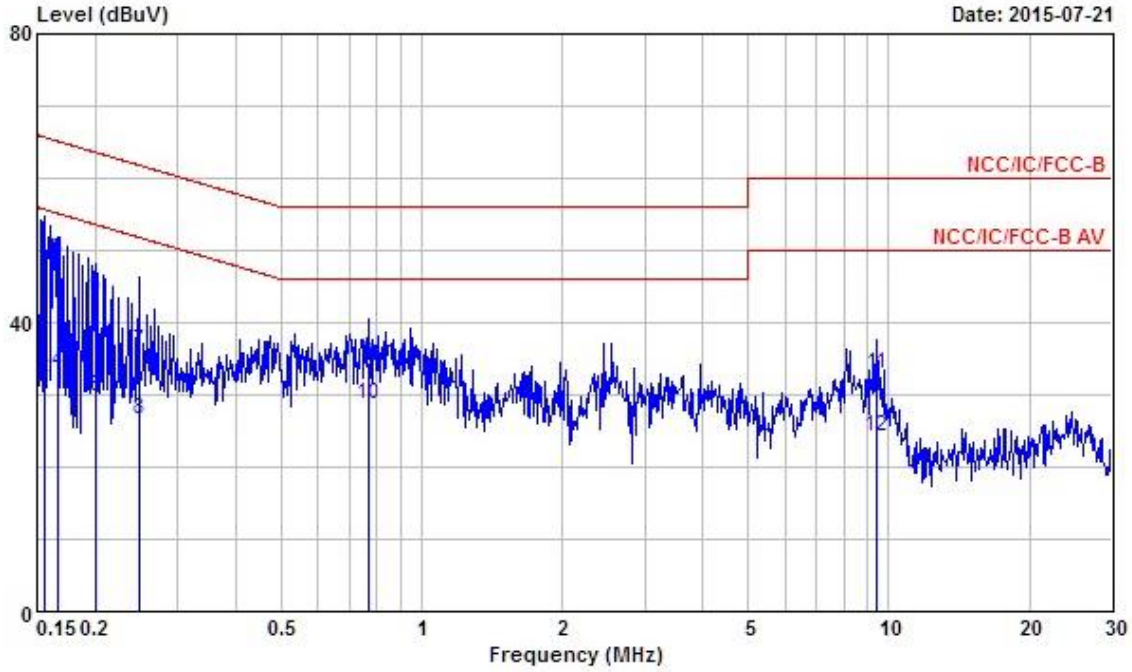
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.1590020	49.56	-15.96	65.52	49.12	0.07	0.37	QP
2	0.1590020	32.90	-22.62	55.52	32.46	0.07	0.37	Average
3	@0.1694400	48.80	-16.19	64.99	48.32	0.07	0.41	QP
4	0.1694400	32.25	-22.74	54.99	31.77	0.07	0.41	Average
5	0.1944650	44.32	-19.52	63.84	43.76	0.07	0.49	QP
6	0.1944650	28.33	-25.51	53.84	27.77	0.07	0.49	Average
7	0.2162030	40.34	-22.62	62.96	39.76	0.07	0.51	QP
8	0.2162030	26.39	-26.57	52.96	25.81	0.07	0.51	Average
9	1.100	33.56	-22.44	56.00	32.67	0.09	0.80	QP
10	1.100	27.86	-18.14	46.00	26.97	0.09	0.80	Average
11	8.500	28.37	-31.63	60.00	27.37	0.22	0.78	QP
12	8.500	22.50	-27.50	50.00	21.50	0.22	0.78	Average

Note 1: “>20dB” means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.1556680	48.81	-16.88	65.69	48.41	0.05	0.35	QP
2	0.1556680	32.48	-23.21	55.69	32.08	0.05	0.35	Average
3	@0.1658860	48.82	-16.34	65.16	48.38	0.05	0.39	QP
4	0.1658860	33.27	-21.89	55.16	32.83	0.05	0.39	Average
5	0.1996860	43.66	-19.96	63.62	43.10	0.06	0.50	QP
6	0.1996860	29.65	-23.97	53.62	29.09	0.06	0.50	Average
7	0.2481360	35.99	-25.83	61.82	35.40	0.06	0.53	QP
8	0.2481360	26.59	-25.23	51.82	26.00	0.06	0.53	Average
9	0.7670230	34.40	-21.60	56.00	33.58	0.08	0.74	QP
10	@0.7670230	28.66	-17.34	46.00	27.84	0.08	0.74	Average
11	9.450	32.89	-27.11	60.00	31.88	0.22	0.79	QP
12	9.450	24.32	-25.68	50.00	23.31	0.22	0.79	Average

Note 1: “>20dB” means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found emissions (No emissions were detected.)

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth (EBW) Limit

Emission Bandwidth (EBW) Limit
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

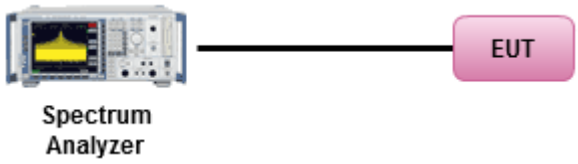
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method			
☒	For the emission bandwidth shall be measured using one of the options below:		
	☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause C for EBW / 6dB bandwidth and clause D for OBW measurement.	
	☐	Refer as ANSI C63.10, clause 6.9 for occupied bandwidth testing.	
	☐	Refer as IC RSS-Gen, clause 6.6 for bandwidth testing.	
☒	For conducted measurement.		
	☐	The EUT supports single transmit chain and measurements performed on this transmit chain.	
	☐	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.	
	☒	The EUT supports multiple transmit chains using options given below:	
		☐	Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
		☒	Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.

3.2.4 Test Setup

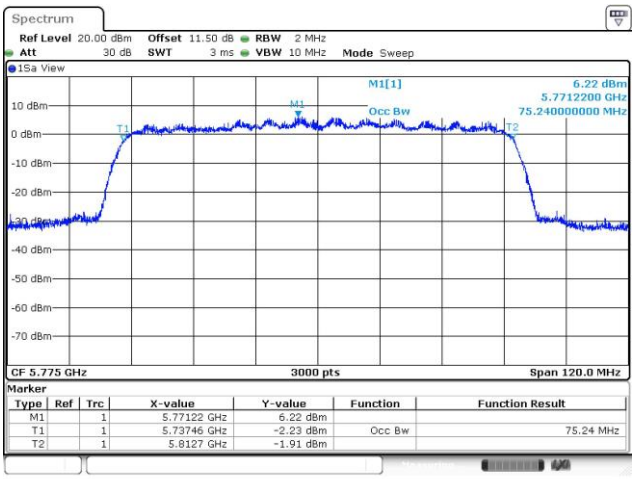
Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

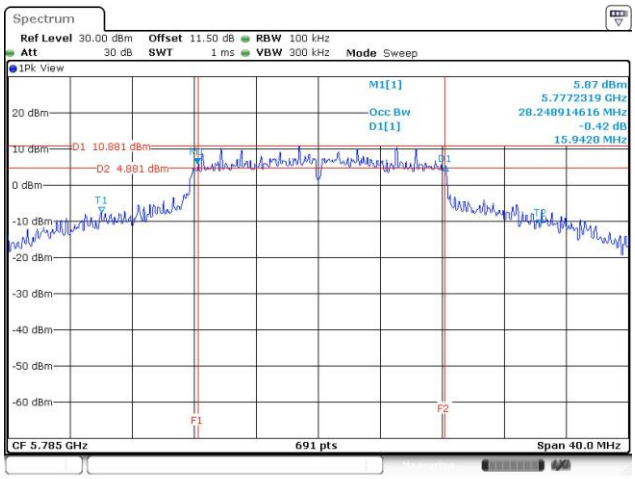
UNII Emission Bandwidth Result										
Condition			Emission Bandwidth (MHz)							
Modulation Mode	N_{TX}	Freq. (MHz)	99% Bandwidth				6dB Bandwidth			
			Chain-Port 1	Chain-Port 2	Chain-Port 3	Chain-Port 4	Chain-Port 1	Chain-Port 2	Chain-Port 3	Chain-Port 4
11a	2	5745	16.98	16.95	--	--	16.29	16.06	--	--
11a	2	5785	25.60	25.01	--	--	16.29	15.94	--	--
11a	2	5825	17.17	17.13	--	--	16.06	16.06	--	--
VHT20	2	5745	17.75	17.73	--	--	16.29	16.87	--	--
VHT20	2	5785	25.25	25.15	--	--	17.57	17.57	--	--
VHT20	2	5825	17.94	17.94	--	--	17.04	16.52	--	--
VHT40	2	5755	36.18	36.18	--	--	35.13	35.13	--	--
VHT40	2	5795	37.22	37.08	--	--	35.13	35.13	--	--
VHT80	2	5775	75.24	75.20	--	--	75.13	75.13	--	--
Result			Complied							

Worst Emission Bandwidth Plots

99% Bandwidth



6dB Bandwidth



3.3 RF Output Power

3.3.1 RF Output Power Limit

Maximum Conducted Output Power Limit
The maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method		
☒	Maximum Conducted Output Power	
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 (spectral trace averaging).
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 (spectral trace averaging).
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
	Wideband RF power meter and average over on/off periods with duty factor	
	☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method PM-G (using a gated RF average power meter).
☒	For conducted measurement.	
	☐	The EUT supports single transmit chain and measurements performed on this transmit chain.
	☐	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
	☒	The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	☒	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

RF Output Power (Power Meter)

3.3.5 Directional Gain for Power Measurement

Directional Gain (DG) Result					
Transmit Chains No.		1	2	-	-
Maximum G_{ANT} (dBi)		2	2	-	-
Modulation Mode	**DG (dBi)**	**N_{TX}**	**N_{SS}**	**STBC**	**Array Gain (dB)**
11a,6-54Mbps	2	2	1	-	-
HT20,M0-15	2	2	1	-	-
HT20,M0-15	2	2	1	-	-
VHT20,M0-9	2	2	1	-	-
VHT40,M0-9	2	2	1	-	-
VHT80,M0-9	2	2	1		-

3.3.6 Test Result of Maximum Conducted Output Power

Maximum Conducted (Average) Output Power											
Condition			RF Output Power (dBm)								
Modulation Mode	N_{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Chain Port 3	Chain Port 4	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit
11a	2	5745	15.58	15.63	--	--	18.62	30.00	2.00	20.62	36.00
11a	2	5785	20.72	20.95	--	--	23.85	30.00	2.00	25.85	36.00
11a	2	5825	17.38	17.02	--	--	20.21	30.00	2.00	22.21	36.00
HT20	2	5745	14.85	14.74	--	--	17.81	30.00	2.00	19.81	36.00
HT20	2	5785	20.95	20.82	--	--	23.90	30.00	2.00	25.90	36.00
HT20	2	5825	17.15	17.06	--	--	20.12	30.00	2.00	22.12	36.00
HT40	2	5755	10.81	11.02	--	--	13.93	30.00	2.00	15.93	36.00
HT40	2	5795	18.06	18.25	--	--	21.17	30.00	2.00	23.17	36.00
VHT20	2	5745	14.96	14.82	--	--	17.90	30.00	2.00	19.90	36.00
VHT20	2	5785	21.06	20.91	--	--	**24.00**	30.00	2.00	26.00	36.00
VHT20	2	5825	17.26	17.11	--	--	20.20	30.00	2.00	22.20	36.00
VHT40	2	5755	10.92	11.10	--	--	14.02	30.00	2.00	16.02	36.00
VHT40	2	5795	18.19	18.36	--	--	21.29	30.00	2.00	23.29	36.00
VHT80	2	5775	9.21	9.45	--	--	12.34	30.00	2.00	14.34	36.00
Result			Complied								

3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

Peak Power Spectral Density Limit
The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

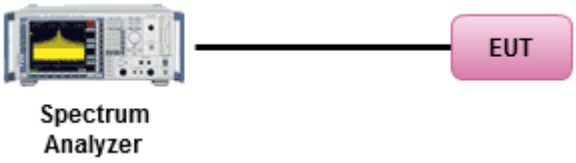
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method			
☒	Peak power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the peak power spectral density and use the peak search function on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density shall be measured using below options:		
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth	
	☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 (spectral trace averaging). (For 11a / 11ac VHT20)	
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)	
	☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 (spectral trace averaging).	
	☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed) (For 11ac VHT40 / VHT80)	
☒	For conducted measurement.		
	☐	The EUT supports single transmit chain and measurements performed on this transmit chain.	
	☐	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.	
	☒	The EUT supports multiple transmit chains using options given below:	
		☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
		☒	Option 2: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.
	☒	If multiple transmit chains, EIRP PPSD calculation could be following as methods: $PPSD_{total} = PPSD_1 + PPSD_2 + \ldots + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$	
	☐	Each individually PPSD plots refer as test report clause 3.3.5 with each individually PPSD plots.	

3.4.4 Test Setup

Power Spectral Density


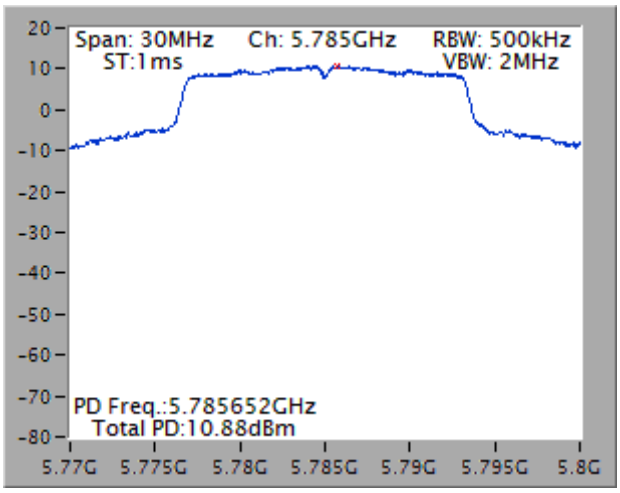
3.4.5 Test Result of Peak Power Spectral Density

Peak Power Spectral Density Result									
Condition			Peak Power Spectral Density (dBm/500kHz)						
Modulation Mode	N_{TX}	Freq. (MHz)	PSD w/o D.F (dBm)	D.F (dB)	PSD with D.F (dBm)	PSD Limit (dBm)	DG (dBi)	EIRP PSD (dBm)	EIRP Limit (dBm)
11a	2	5745	5.62	0.00	5.62	30.00	5.01	10.63	36.00
11a	2	5785	10.88	0.00	10.88	30.00	5.01	15.89	36.00
11a	2	5825	7.43	0.00	7.43	30.00	5.01	12.44	36.00
VHT20	2	5745	4.23	0.00	4.23	30.00	5.01	9.24	36.00
VHT20	2	5785	10.79	0.00	10.79	30.00	5.01	15.80	36.00
VHT20	2	5825	6.90	0.00	6.90	30.00	5.01	11.91	36.00
VHT40	2	5755	-3.65	0.16	-3.49	30.00	5.01	1.52	36.00
VHT40	2	5795	4.02	0.16	4.18	30.00	5.01	9.19	36.00
VHT80	2	5775	-8.11	0.39	-7.72	30.00	5.01	-2.71	36.00
Result			Complied						

Note:

1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.
3. Directional gain = 2+10* log(2/1) = 5.01 dBi.

Worst Power Spectral Density Plots



3.5 Transmitter Radiated Unwanted Emissions and Band Edge

3.5.1 Transmitter Radiated Unwanted Emissions and Band Edge Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Un-restricted band emissions above 1GHz Limit	
Operating Band	**Limit**
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.85 GHz	5.715~ 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.85 ~5.86 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m]

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

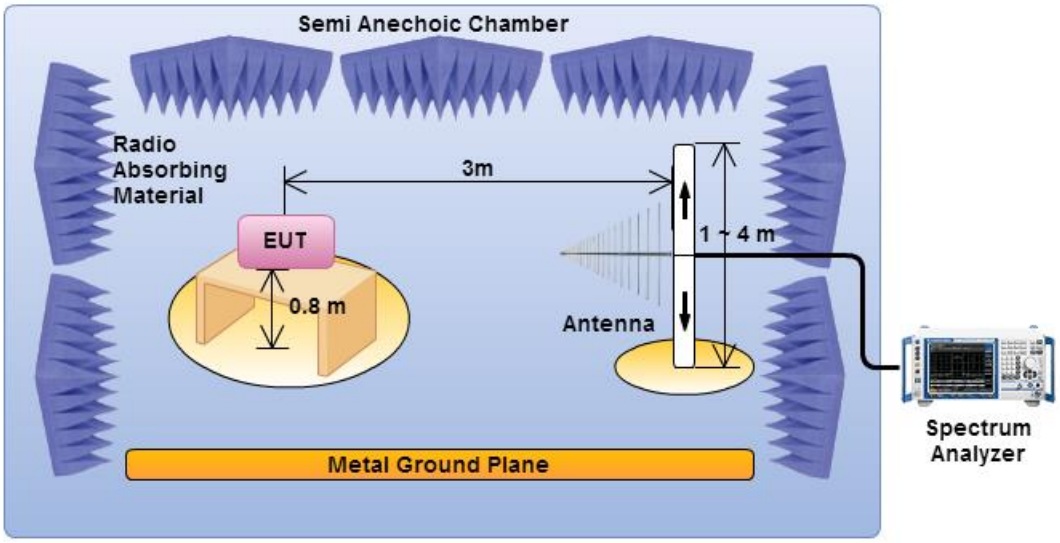
3.5.3 Test Procedures

Test Method			
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).		
☒	For the transmitter unwanted emissions shall be measured using following options below:		
	☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)2) for unwanted emissions into non-restricted bands.	
	☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)1) for unwanted emissions into restricted bands.	
		☐	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, G)6) Method AD (Trace Averaging).
		☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, G)6) Method VB (Reduced VBW).
		☐	Refer as ANSI C63.10, clause 12.7.7.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☒	Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)5) measurement procedure peak limit.
		☐	Refer as ANSI C63.10, clause 12.7.6 measurement procedure peak limit.
☒	For radiated measurement.		
	☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.	
	☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.	
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz.	
☐	For conducted and cabinet radiation measurement, refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)3).		
	☐	For conducted unwanted emissions into non-restricted bands (relative emission limits). Devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs.	
	☐	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB	
	☐	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.	

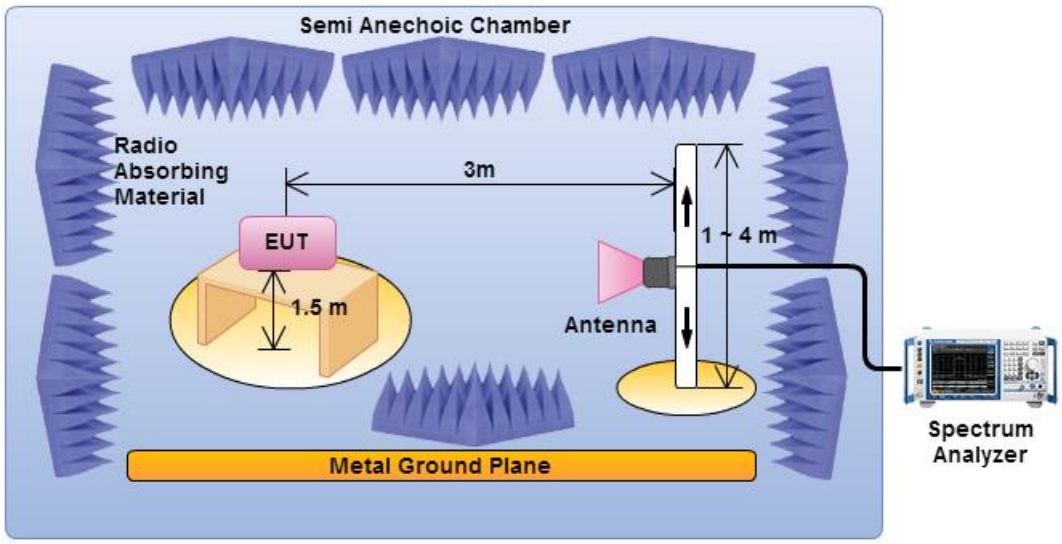
3.5.4 Test Setup

Transmitter Radiated Unwanted Emissions

Below 1GHz test:



Above 1GHz test:



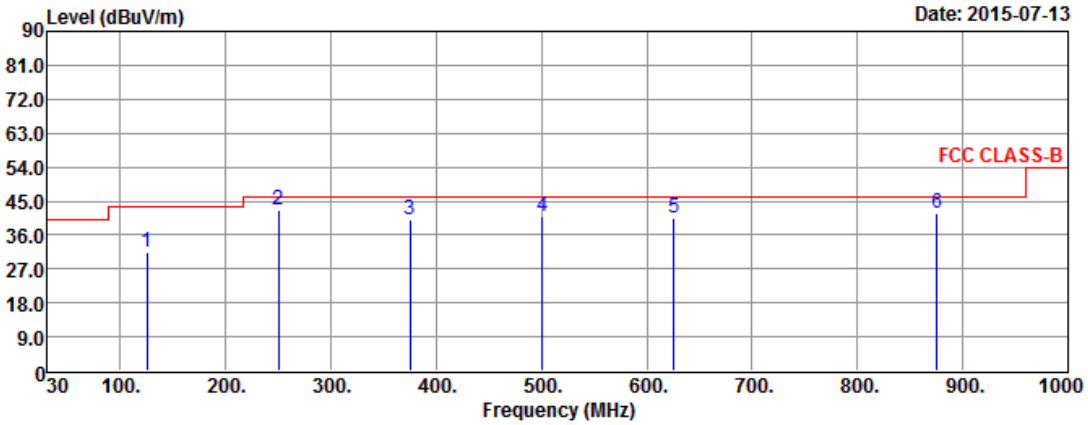
Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

3.5.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

3.5.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

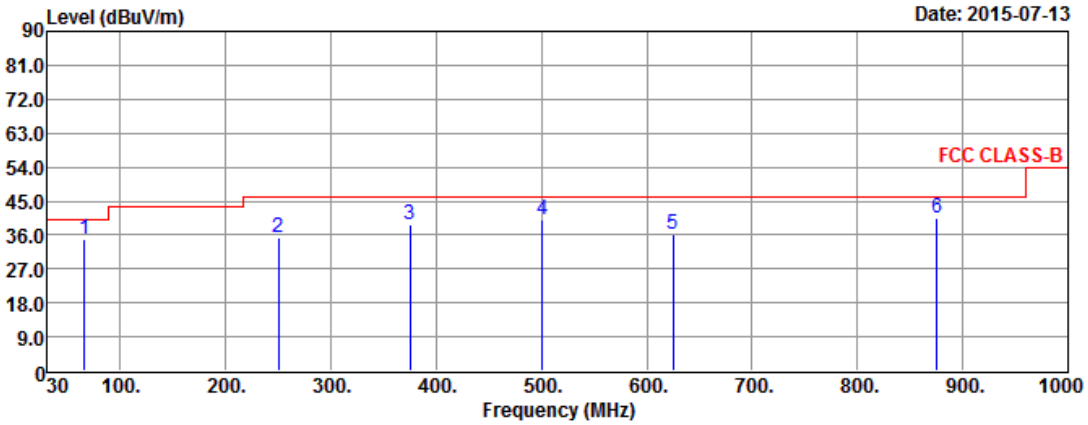
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5785
Polarization	H		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	125.13	31.36	-12.14	43.50	50.50	11.76	0.76	31.66	---	---	Peak
2	250.12	42.78	-3.22	46.00	60.65	12.60	1.01	31.48	---	---	QP
3	375.39	39.90	-6.10	46.00	54.21	15.86	1.27	31.44	---	---	Peak
4	500.51	40.78	-5.22	46.00	52.49	18.21	1.43	31.35	---	---	Peak
5	625.80	40.64	-5.36	46.00	49.90	20.51	1.61	31.38	---	---	Peak
6	875.85	41.63	-4.37	46.00	47.24	23.76	1.95	31.32	---	---	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5785
Polarization	V		

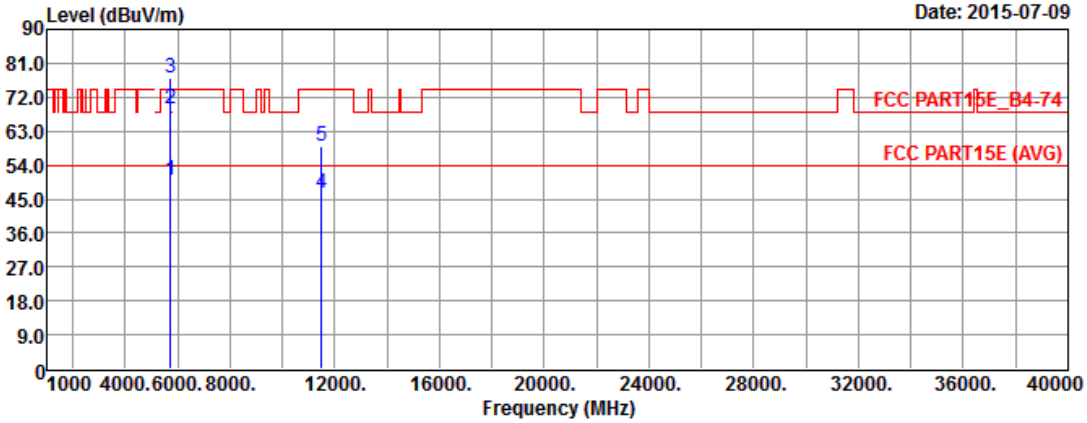


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	65.85	34.80	-5.20	40.00	53.07	12.95	0.60	31.82	---	---	QP
2	250.19	35.24	-10.76	46.00	53.10	12.61	1.01	31.48	---	---	Peak
3	375.24	38.69	-7.31	46.00	53.00	15.86	1.27	31.44	---	---	Peak
4	500.53	39.84	-6.16	46.00	51.55	18.21	1.43	31.35	---	---	Peak
5	625.26	36.36	-9.64	46.00	45.63	20.50	1.61	31.38	---	---	Peak
6	875.84	40.29	-5.71	46.00	45.90	23.76	1.95	31.32	---	---	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11a

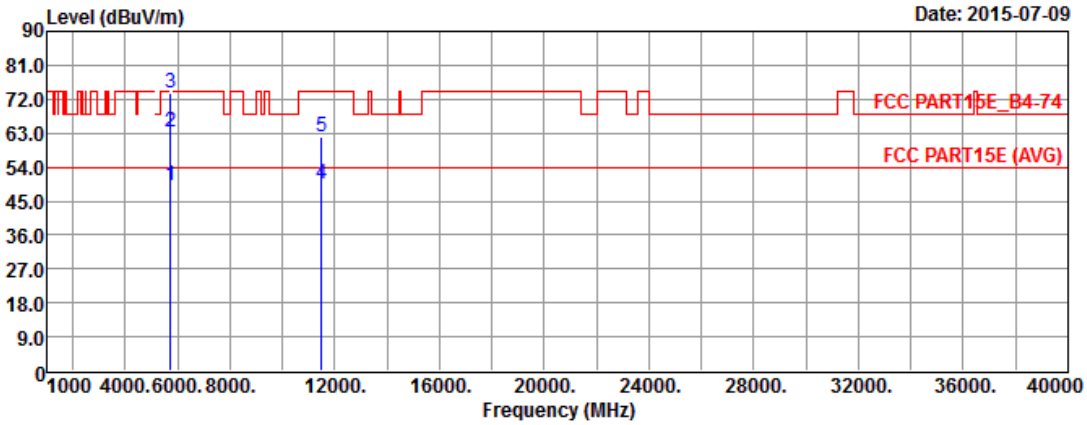
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5745
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	50.04	-3.96	54.00	43.34	32.10	7.52	32.92	348	116	Average
2	5715.00	68.93	-5.07	74.00	62.23	32.10	7.52	32.92	348	116	Peak
3	5725.00	77.17	-1.03	78.20	70.46	32.11	7.53	32.93	348	116	Peak
4	11490.00	46.34	-7.66	54.00	30.12	40.30	11.19	35.27	185	65	Average
5	11490.00	59.02	-14.98	74.00	42.80	40.30	11.19	35.27	185	65	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

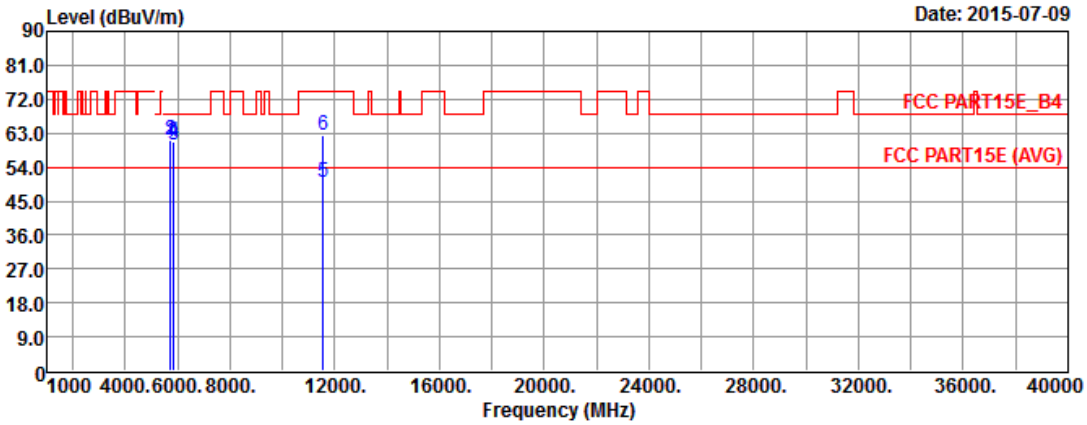
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5745
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	49.03	-4.97	54.00	42.33	32.10	7.52	32.92	329	98	Average
2	5715.00	63.48	-10.52	74.00	56.78	32.10	7.52	32.92	329	98	Peak
3	5725.00	73.76	-4.44	78.20	67.05	32.11	7.53	32.93	329	98	Peak
4	11490.00	49.49	-4.51	54.00	33.27	40.30	11.19	35.27	160	112	Average
5	11490.00	62.15	-11.85	74.00	45.93	40.30	11.19	35.27	160	112	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

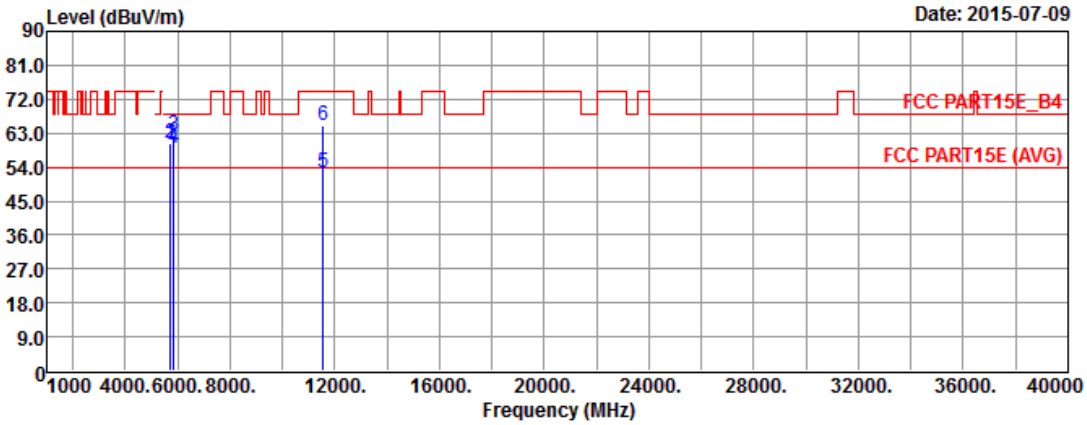
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5785
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	60.55	-7.65	68.20	53.85	32.10	7.52	32.92	348	111	Peak
2	5725.00	61.27	-16.93	78.20	54.56	32.11	7.53	32.93	348	111	Peak
3	5850.00	59.79	-18.41	78.20	52.84	32.29	7.63	32.97	348	111	Peak
4	5860.00	60.51	-7.69	68.20	53.56	32.30	7.63	32.98	348	111	Peak
5	11570.00	49.98	-4.02	54.00	33.86	40.16	11.22	35.26	255	239	Average
6	11570.00	62.55	-11.45	74.00	46.43	40.16	11.22	35.26	255	239	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

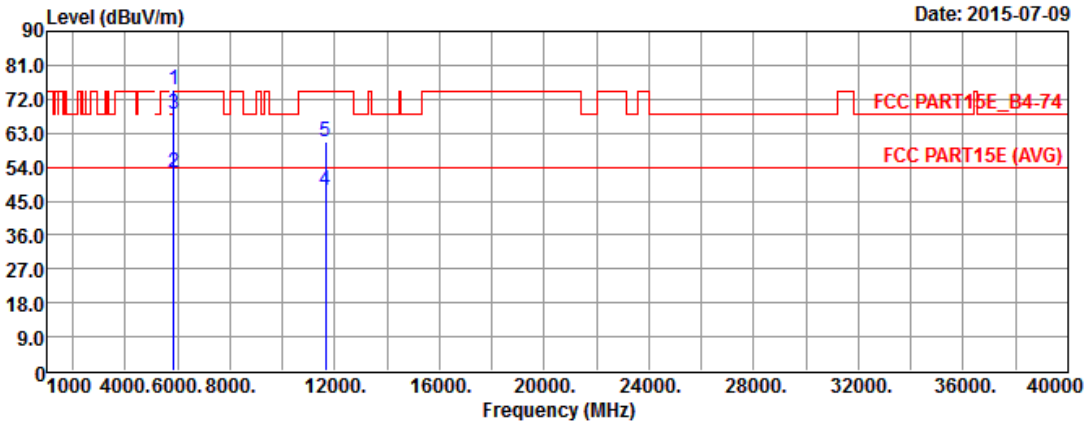
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5785
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	60.41	-7.79	68.20	53.71	32.10	7.52	32.92	307	93	Peak
2	5725.00	60.46	-17.74	78.20	53.75	32.11	7.53	32.93	307	93	Peak
3	5850.00	62.47	-15.73	78.20	55.52	32.29	7.63	32.97	307	93	Peak
4	5860.00	58.94	-9.26	68.20	51.99	32.30	7.63	32.98	307	93	Peak
5	11570.00	52.58	-1.42	54.00	36.46	40.16	11.22	35.26	199	36	Average
6	11570.00	64.85	-9.15	74.00	48.73	40.16	11.22	35.26	199	36	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

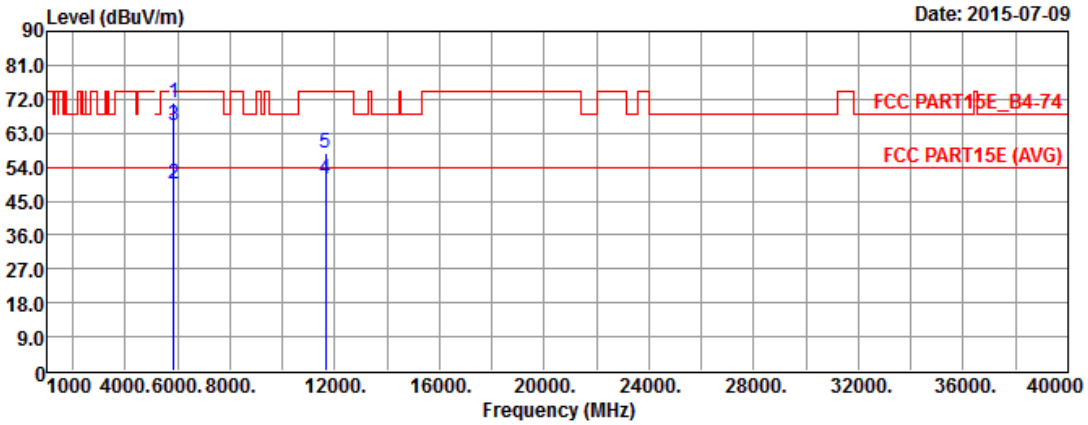
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5825
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5850.00	74.54	-3.66	78.20	67.59	32.29	7.63	32.97	373	225	Peak
2	5860.00	52.56	-1.44	54.00	45.61	32.30	7.63	32.98	373	225	Average
3	5860.00	67.88	-6.12	74.00	60.93	32.30	7.63	32.98	373	225	Peak
4	11650.00	47.88	-6.12	54.00	31.86	40.00	11.26	35.24	373	77	Average
5	11650.00	60.54	-13.46	74.00	44.52	40.00	11.26	35.24	373	77	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5825
N_{TX}	2	**Polarization**	V

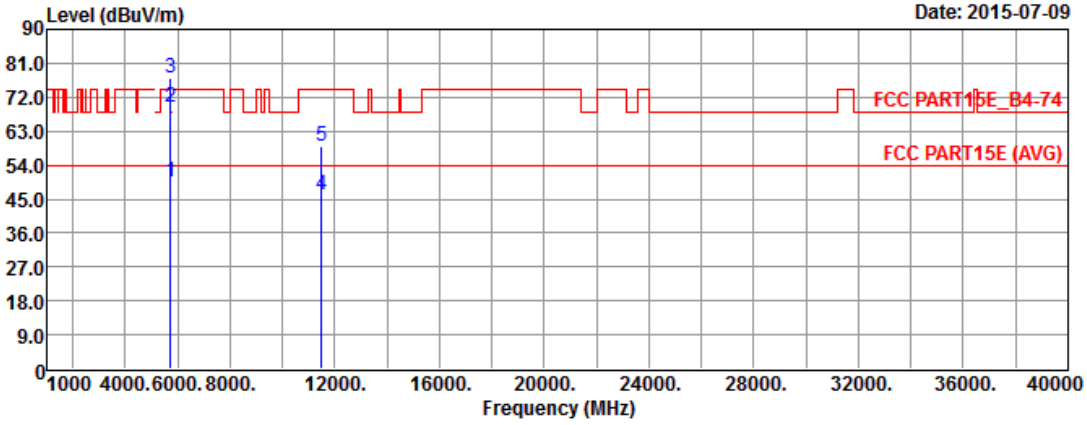


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5850.00	70.96	-7.24	78.20	64.01	32.29	7.63	32.97	298	46	Peak
2	5860.00	49.39	-4.61	54.00	42.44	32.30	7.63	32.98	371	68	Average
3	5860.00	64.85	-9.15	74.00	57.90	32.30	7.63	32.98	298	46	Peak
4	11650.00	50.78	-3.22	54.00	34.76	40.00	11.26	35.24	371	68	Average
5	11650.00	57.89	-16.11	74.00	41.87	40.00	11.26	35.24	371	68	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT20

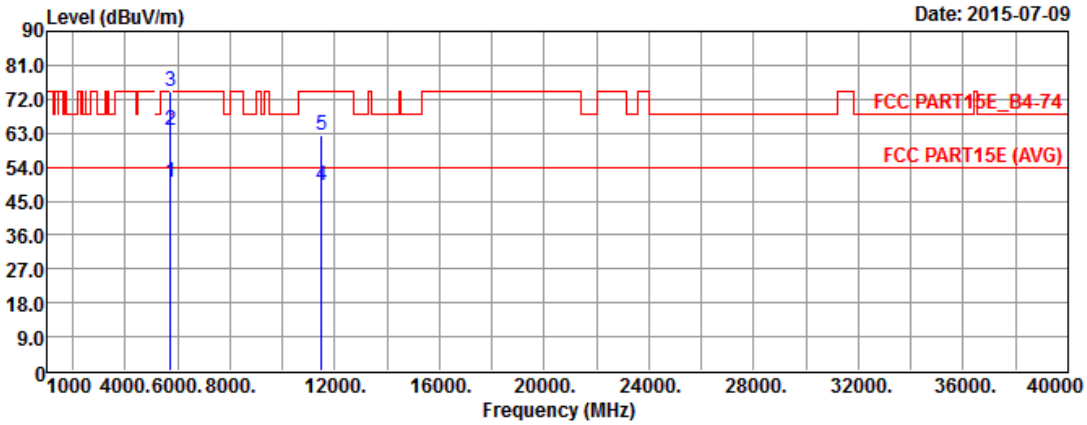
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5745
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	49.58	-4.42	54.00	42.88	32.10	7.52	32.92	333	96	Average
2	5715.00	69.26	-4.74	74.00	62.56	32.10	7.52	32.92	333	96	Peak
3	5725.00	77.19	-1.01	78.20	70.48	32.11	7.53	32.93	333	96	Peak
4	11490.00	46.11	-7.89	54.00	29.89	40.30	11.19	35.27	190	55	Average
5	11490.00	59.11	-14.89	74.00	42.89	40.30	11.19	35.27	190	55	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

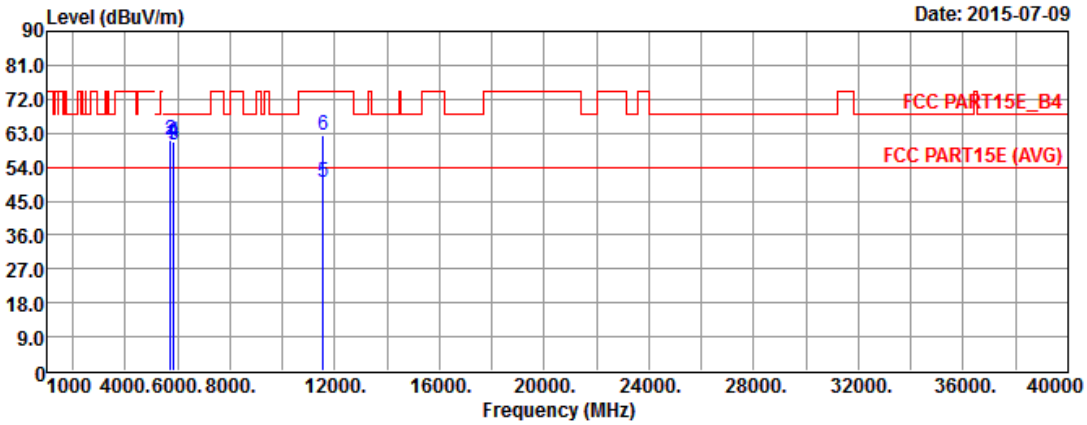
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5745
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	50.02	-3.98	54.00	43.32	32.10	7.52	32.92	335	88	Average
2	5715.00	63.80	-10.20	74.00	57.10	32.10	7.52	32.92	335	88	Peak
3	5725.00	73.99	-4.21	78.20	67.28	32.11	7.53	32.93	335	88	Peak
4	11490.00	49.02	-4.98	54.00	32.80	40.30	11.19	35.27	156	118	Average
5	11490.00	62.25	-11.75	74.00	46.03	40.30	11.19	35.27	156	118	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

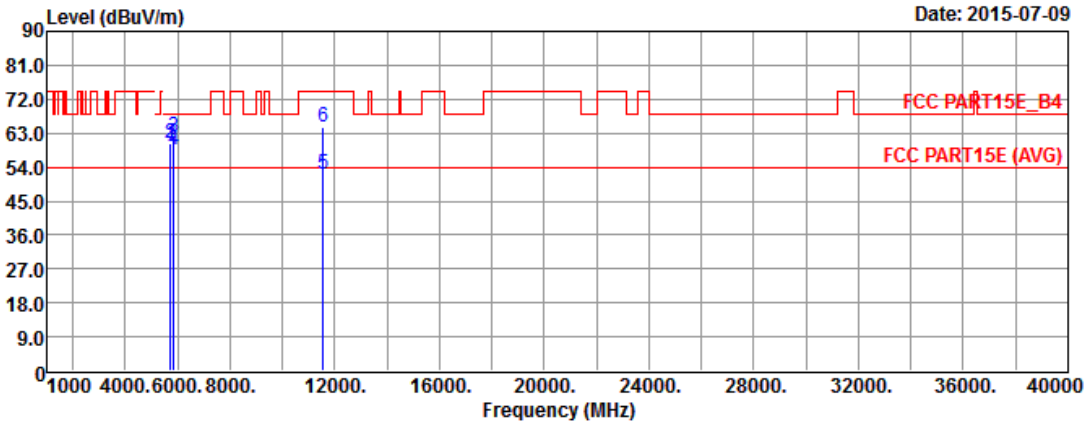
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5785
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	60.49	-7.71	68.20	53.79	32.10	7.52	32.92	343	122	Peak
2	5725.00	61.35	-16.85	78.20	54.64	32.11	7.53	32.93	343	122	Peak
3	5850.00	59.82	-18.38	78.20	52.87	32.29	7.63	32.97	343	122	Peak
4	5860.00	60.81	-7.39	68.20	53.86	32.30	7.63	32.98	343	122	Peak
5	11570.00	49.77	-4.23	54.00	33.65	40.16	11.22	35.26	260	240	Average
6	11570.00	62.57	-11.43	74.00	46.45	40.16	11.22	35.26	260	240	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

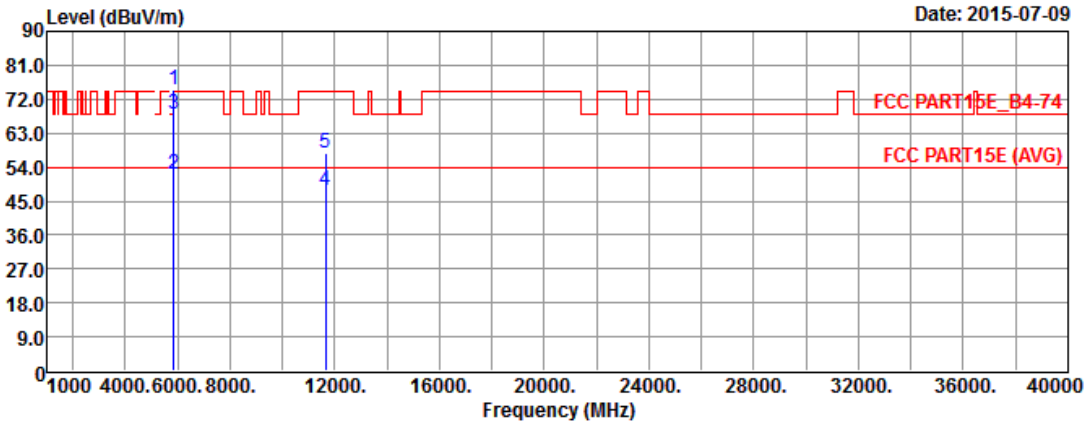
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5785
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	59.98	-8.22	68.20	53.28	32.10	7.52	32.92	300	79	Peak
2	5725.00	60.38	-17.82	78.20	53.67	32.11	7.53	32.93	300	79	Peak
3	5850.00	62.02	-16.18	78.20	55.07	32.29	7.63	32.97	300	89	Peak
4	5860.00	58.72	-9.48	68.20	51.77	32.30	7.63	32.98	300	89	Peak
5	11570.00	52.25	-1.75	54.00	36.13	40.16	11.22	35.26	188	25	Average
6	11570.00	64.71	-9.29	74.00	48.59	40.16	11.22	35.26	188	25	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

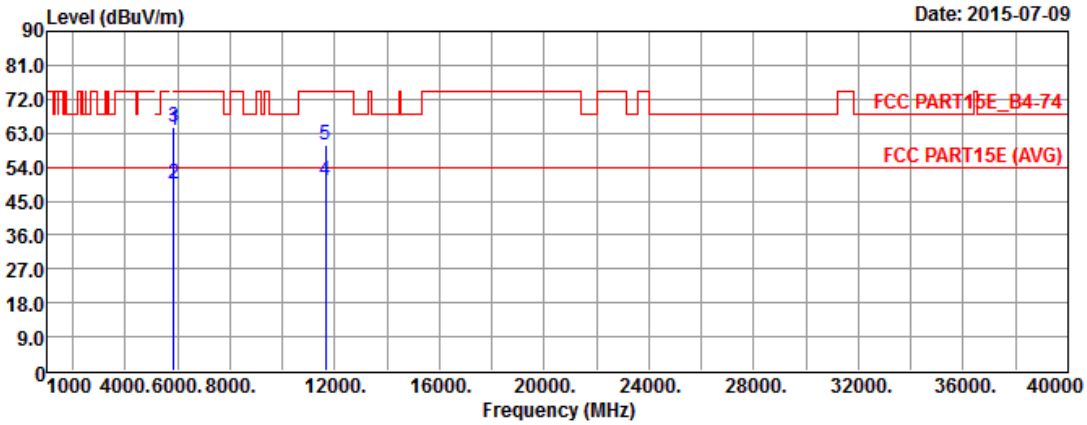
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5825
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5850.00	74.43	-3.77	78.20	67.48	32.29	7.63	32.97	365	230	Peak
2	5860.00	52.22	-1.78	54.00	45.27	32.30	7.63	32.98	365	230	Average
3	5860.00	67.91	-6.09	74.00	60.96	32.30	7.63	32.98	365	230	Peak
4	11650.00	47.71	-6.29	54.00	31.69	40.00	11.26	35.24	369	66	Average
5	11650.00	57.92	-16.08	74.00	41.90	40.00	11.26	35.24	333	70	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT20	**Test Freq. (MHz)**	5825
N_{TX}	2	**Polarization**	V

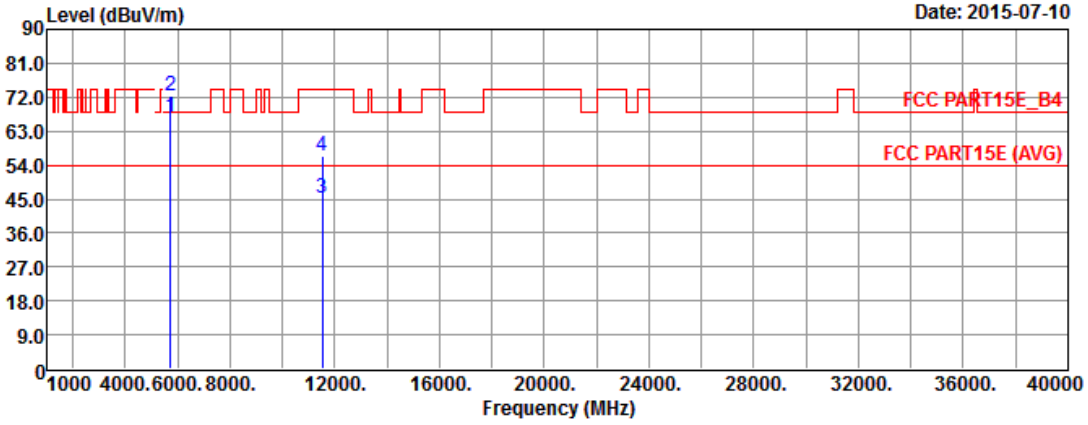


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5850.00	63.75	-14.45	78.20	56.80	32.29	7.63	32.97	287	51	Peak
2	5860.00	49.61	-4.39	54.00	42.66	32.30	7.63	32.98	287	51	Average
3	5860.00	64.58	-9.42	74.00	57.63	32.30	7.63	32.98	287	51	Peak
4	11650.00	50.57	-3.43	54.00	34.55	40.00	11.26	35.24	371	68	Average
5	11650.00	59.87	-14.13	74.00	43.85	40.00	11.26	35.24	371	68	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

3.5.9 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT40

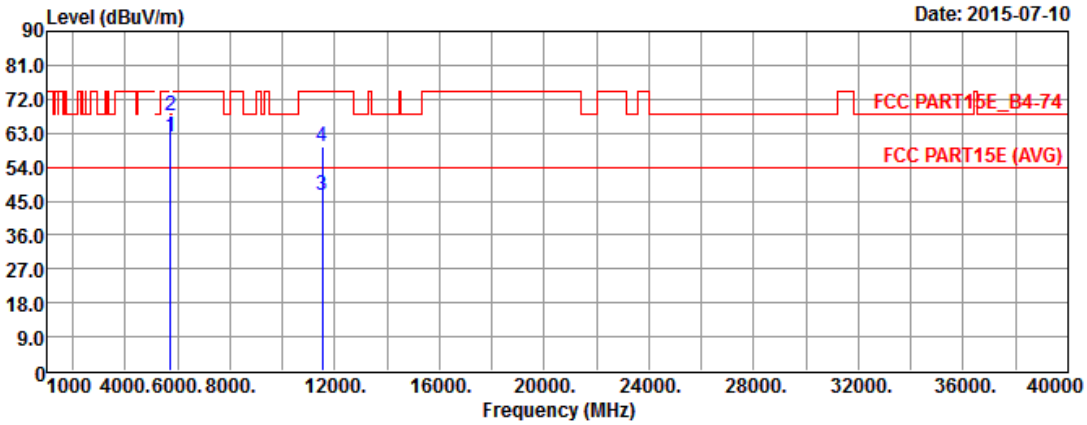
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT40	**Test Freq. (MHz)**	5755
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	66.72	-1.48	68.20	60.02	32.10	7.52	32.92	332	117	Peak
2	5725.00	72.53	-5.67	78.20	65.82	32.11	7.53	32.93	332	117	Peak
3	11510.00	45.29	-8.71	54.00	29.09	40.28	11.19	35.27	298	345	Average
4	11510.00	56.54	-17.46	74.00	40.34	40.28	11.19	35.27	298	345	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

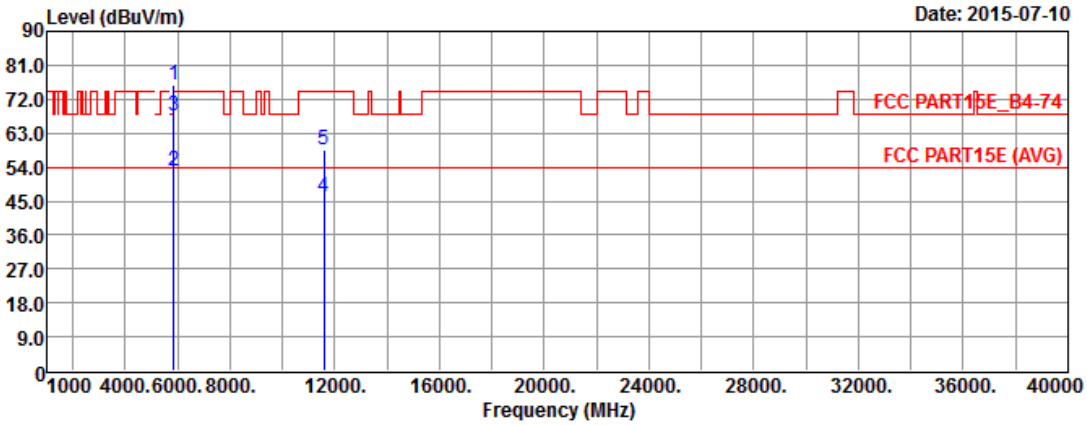
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT40	**Test Freq. (MHz)**	5755
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	62.09	-11.91	74.00	55.39	32.10	7.52	32.92	285	32	Peak
2	5725.00	67.49	-10.71	78.20	60.78	32.11	7.53	32.93	285	32	Peak
3	11510.00	46.39	-7.61	54.00	30.19	40.28	11.19	35.27	300	166	Average
4	11510.00	59.22	-14.78	74.00	43.02	40.28	11.19	35.27	300	166	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

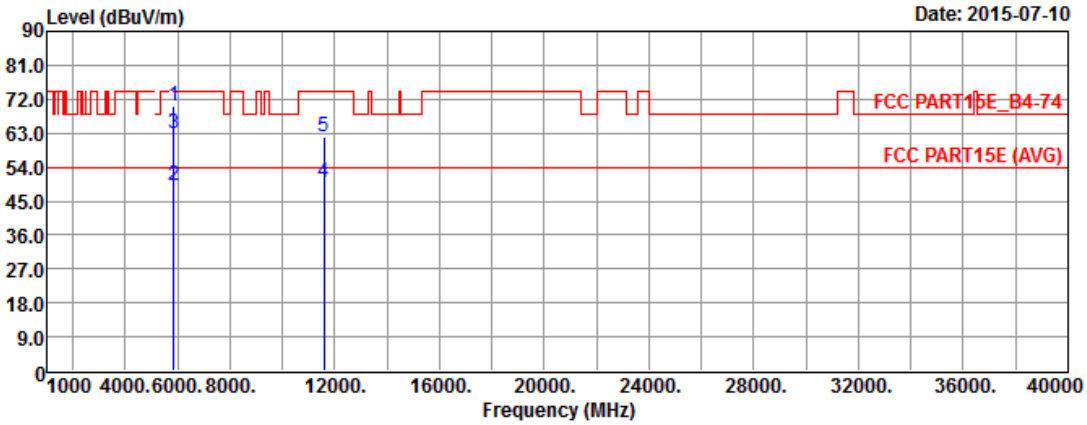
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT40	**Test Freq. (MHz)**	5795
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5850.00	75.71	-2.49	78.20	68.76	32.29	7.63	32.97	341	116	Peak
2	5860.00	52.98	-1.02	54.00	46.03	32.30	7.63	32.98	341	116	Average
3	5860.00	67.69	-6.31	74.00	60.74	32.30	7.63	32.98	341	116	Peak
4	11590.00	46.22	-7.78	54.00	30.12	40.12	11.23	35.25	315	49	Average
5	11590.00	58.43	-15.57	74.00	42.33	40.12	11.23	35.25	315	49	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition..

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT40	**Test Freq. (MHz)**	5795
N_{TX}	2	**Polarization**	V

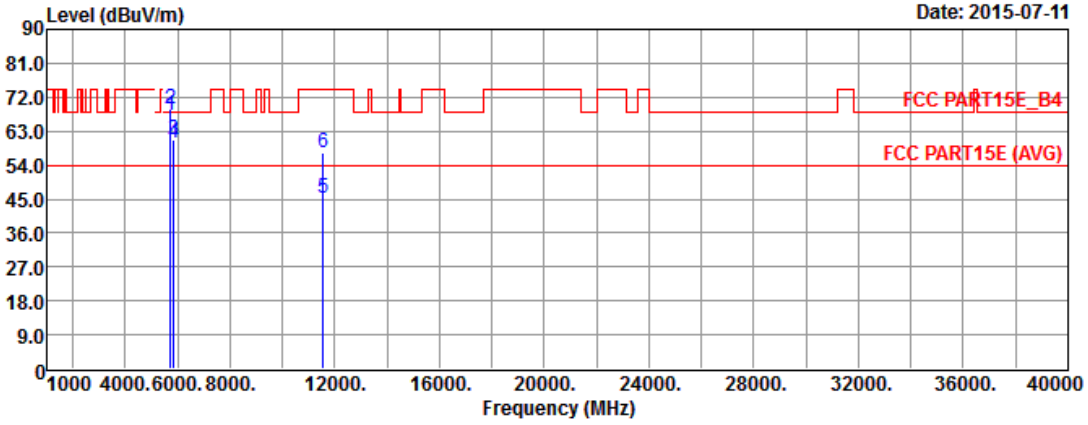


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5850.00	70.02	-8.18	78.20	63.07	32.29	7.63	32.97	269	189	Peak
2	5860.00	48.99	-5.01	54.00	42.04	32.30	7.63	32.98	269	189	Average
3	5860.00	62.85	-11.15	74.00	55.90	32.30	7.63	32.98	269	189	Peak
4	11590.00	49.87	-4.13	54.00	33.77	40.12	11.23	35.25	295	340	Average
5	11590.00	62.08	-11.92	74.00	45.98	40.12	11.23	35.25	295	340	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

3.5.10 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT80

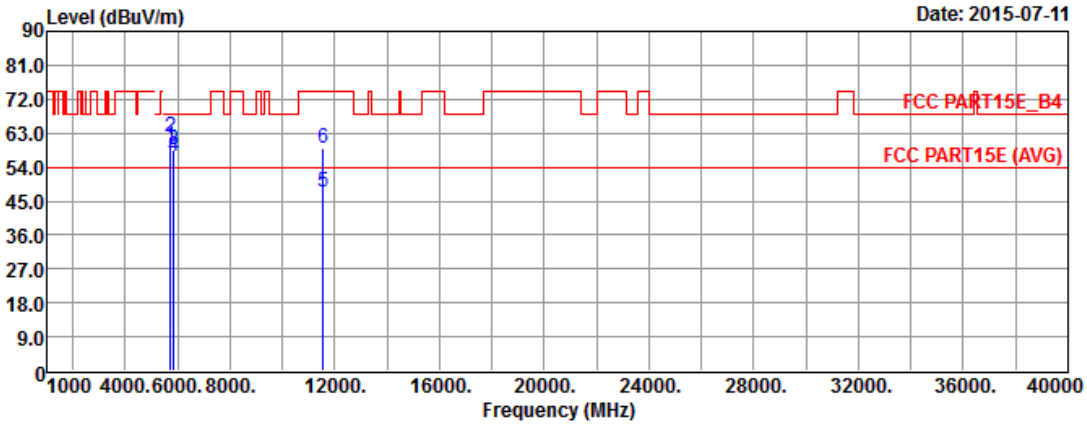
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT80	**Test Freq. (MHz)**	5775
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	67.15	-1.05	68.20	60.45	32.10	7.52	32.92	238	262	Peak
2	5725.00	68.91	-9.29	78.20	62.20	32.11	7.53	32.93	238	262	Peak
3	5850.00	60.69	-17.51	78.20	53.74	32.29	7.63	32.97	224	267	Peak
4	5860.00	60.05	-8.15	68.20	53.10	32.30	7.63	32.98	224	267	Peak
5	11550.00	45.25	-8.75	54.00	29.10	40.20	11.21	35.26	155	245	Average
6	11550.00	57.12	-16.88	74.00	40.97	40.20	11.21	35.26	155	245	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	VHT80	**Test Freq. (MHz)**	5775
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	5715.00	59.56	-8.64	68.20	52.86	32.10	7.52	32.92	232	331	Peak
2	5725.00	61.92	-16.28	78.20	55.21	32.11	7.53	32.93	232	331	Peak
3	5850.00	58.75	-19.45	78.20	51.80	32.29	7.63	32.97	232	331	Peak
4	5860.00	57.05	-11.15	68.20	50.10	32.30	7.63	32.98	232	331	Peak
5	11550.00	47.24	-6.76	54.00	31.09	40.20	11.21	35.26	122	67	Average
6	11550.00	59.17	-14.83	74.00	43.02	40.20	11.21	35.26	122	67	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition..

3.6 Frequency Stability

3.6.1 Frequency Stability Limit

Frequency Stability Limit
UNII Devices
☒ In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.
LE-LAN Devices
☒ N/A
IEEE Std. 802.11n-2009
☒ The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band and ± 25 ppm maximum for the 2.4 GHz band.

3.6.2 Measuring Instruments

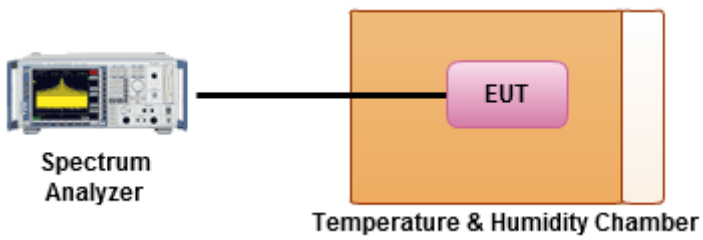
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method	
☒ Refer as ANSI C63.10, clause 6.8 for frequency stability tests	
	☒ Frequency stability with respect to ambient temperature
	☒ Frequency stability when varying supply voltage
☒ For conducted measurement.	
	☒ For conducted measurements on devices with multiple transmit chains: Measurements need only to be performed on one of the active transmit chains (antenna outputs)
☐ For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.	

3.6.4 Test Setup

Frequency Stability



3.6.5 Test Result of Frequency Stability

Frequency Stability Result			
Mode		**Frequency Stability (ppm)**	
Condition	**Freq. (MHz)**	**Test Frequency (MHz)**	**Frequency Stability (ppm)**
$T_{20°C}$Vmax	5785	5785.02339	4.0432
$T_{20°C}$Vmin	5785	5785.02080	3.5955
$T_{50°C}$Vnom	5785	5785.01878	3.2463
$T_{40°C}$Vnom	5785	5785.02618	4.5255
$T_{30°C}$Vnom	5785	5785.01761	3.0441
$T_{20°C}$Vnom	5785	5785.01270	2.1953
$T_{10°C}$Vnom	5785	5785.01412	2.4408
$T_{0°C}$Vnom	5785	5785.01404	2.4270
$T_{-10°C}$Vnom	5785	5785.01326	2.2921
$T_{-20°C}$Vnom	5785	5785.01499	2.5912
$T_{-30°C}$Vnom	5785	5785.00693	1.1979
Limit (ppm)		20	
Result		**Complied**	

Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom].
Note 2: The nominal voltage refer test report clause 1.1.5 for EUT operational condition.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Nov. 29, 2014	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 11, 2015	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Sep. 01, 2014	Radiation (03CH03-HY)
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Apr. 02, 2015	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 20, 2014	Radiation (03CH03-HY)
Horn Antenna	AARONIA AG	POWERLOG 70180	05192	1GHz ~ 18GHz	May 01, 2015	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	Jan. 27, 2015	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 15, 2014	Radiation (03CH03-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 12, 2014	Radiation (03CH03-HY)
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation (03CH03-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz ~ 2.75GHz	Apr. 15. 2015	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 22, 2015	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	Oct. 31, 2014	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
Software	Audix	E3	3	Conducted	N/A	Conduction (CO04-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	May 06, 2015	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100℃	Apr. 07, 2015	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	Feb. 17, 2015	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Feb. 17, 2015	Conducted (TH01-HY)
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	30MHz ~ 26.5GHz	Nov. 30, 2014	Conducted (TH01-HY)
RF Cable-3m	HUBER+SUHNER	SUCOFLEX_104	SN 345669/4	30MHz ~ 26.5GHz	Nov. 30, 2014	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.