FCC C2PC Test Report

Equipment	:	802.11 an PCIe Module
Brand Name	:	Senao
Model No.	:	PCE3500AH
FCC ID	:	U2M-PCE3500AH
Standard	:	47 CFR FCC Part 15.407
Operating Band	:	5150 MHz – 5250 MHz
FCC Classification	:	NII
Applicant	:	Senao Networks, Inc. 3F, No. 529, Chung Cheng Rd., Hsintien,Taipei,Taiwan

The product sample received on Jun. 22, 2013 and completely tested on Aug. 16, 2013. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 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:

Gary Chang / Manager

Testing Laboratory
1190

Table of Contents

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]: 0489MHz 40.69 (Margin 5.50dB) - AV 43.32 (Margin 12.87dB) - QP	FCC 15.207	Complied
3.2	15.407(a)	Emission Bandwidth	Bandwidth [MHz] 20M: 23.94 / 40M: 49.86	Information only	Complied
3.3	15.407(a)	RF Output Power (Maximum Conducted Output Power)	Power [dBm] 5150-5250MHz: 13.85	Power [dBm] 5150-5250MHz: 17	Complied
3.4	15.407(a)	Peak Power Spectral Density	PPSD [dBm/MHz] 5150-5250MHz: -1.80	PPSD [dBm/MHz] 5150-5250MHz: 4	Complied
3.5	15.407(a)	Peak Excursion	9.11 dB	13 dB	Complied
3.6	15.407(b)	Transmitter Unwanted Emissions and Band Edge	Restricted Bands [dBuV/m at 3m]:5150.00MHz 52.52 (Margin 1.48dB) - AV	Non-Restricted Bands: ≤ -27dBm (68.3dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
3.7	15.407(g)	Frequency Stability	3.6 ppm	Signal shall remain in-band	Complied

Revision History

Report No.	Version	Description	Issued Date
FR371207AN	Rev. 01	Initial issue of report	Sep. 23, 2013

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
5150-5250	a	5180-5240	36-48 [4]	3	10.25	N/A
5150-5250	n (HT20)	5180-5240	36-48 [4]	3	10.11	N/A
5150-5250	n (HT40)	5190-5230	38-46 [2]	3	13.85	N/A
Note 1: RF output power specifies that Maximum Conducted Output Power. Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.						

Note:
This is a C2PC report. The difference between original and C2PC report is only measurement guidance (KDB 789033) version. This report is using latest version of measurement guidance which published at Apr. 08, 2013.

1.1.2 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☐	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.	Ant. Cat.	Model	Ant. Type	Gain (dBi)	Manufacturer	Transmit Chains (N_{TX})	Application
1	External	98618UNXX000	Dipole	7	Master Wave Technology Co.,Ltd	3	P to MP

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)
☒	Plug-in radio
☐	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☐	Operated normally 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)
☒	100% - IEEE 802.11a	0
☒	100% - IEEE 802.11n (HT20)	0
☒	100% - IEEE 802.11n (HT40)	0

1.1.5 EUT Operational Condition

Supply Voltage	☐	AC mains	☒	DC (5 Vdc)		
Type of DC Source	☐	Internal DC supply	☐	External DC adapter	☒	From Host
Test Voltage	☒	Vnom (110 V)	☒	Vmax (126.5 V)	☒	Vmin (93.5 V)
Test Climatic	☒	Tnom (20°C)	☒	Tmax (55°C)	☒	Tmin (-30°C)

1.2 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Notebook	DELL	E6430	DoC
2	Power Supply	GW	GPL-6030D	--
3	Extender card	N/A	adapter	N/A

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 C63.10-2009
- FCC KDB 789033 v01r03
- FCC KDB 662911 v02

1.4 Testing Location Information

Testing Location					
☒	Sporton Lab	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055			
☒	ICC Lab	ADD : No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsein 333, Taiwan (R.O.C.) TEL : 886-3-271-8666 FAX : 886-3-318-0155			
Test Condition	**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**	
RF Conducted	TH01-HY	Ian Du	22.1°C / 61%	Jul. 24 ~ Aug. 16, 2013	
*AC Conduction	CO01-WS	Skys Huang	23°C / 65%	Aug. 13, 2013	
*Radiated Emission	03CH01-WS	Mark Liao Anderson Hong	22°C / 65~69%	Jul. 23 ~ Aug. 09, 2013	
Test site registered number [657002] with FCC. Test site registered number [10807A-1] with IC.					

Note: * Sporton Lab subcontracts this test item to ICC lab (TAF: 2732).
ICC lab is a TAF accreditation test firm and also is an approved provider of Sporton lab.

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
All emissions, radiated	30 – 1000 MHz	±3.9 dB	N/A
	Above 1GHz	±4.2 dB	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			
Modulation Mode	**Transmit Chains (N_{TX})**	**Data Rate / MCS**	**Worst Data Rate / MCS**
11a	3	6-54 Mbps	6 Mbps
HT20	3	M0-23	MCS 0
HT40	3	M0-23	MCS 0

2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (5150-5250MHz band)							
Test Software Version	ART2-GUI V2.3						
Modulation Mode	**N_{TX}**	**Test Frequency (MHz)**					
		NCB: 20MHz			**NCB: 40MHz**		**-**
		5180	**5200**	**5240**	**5190**	**5230**	**-**
11a	3	5.5	5.5	5.5	-	-	-
HT20	3	5.5	5.5	5.5	-	-	-
HT40	3	-	-	-	8	9	-

2.3 The Worst Case Measurement Configuration

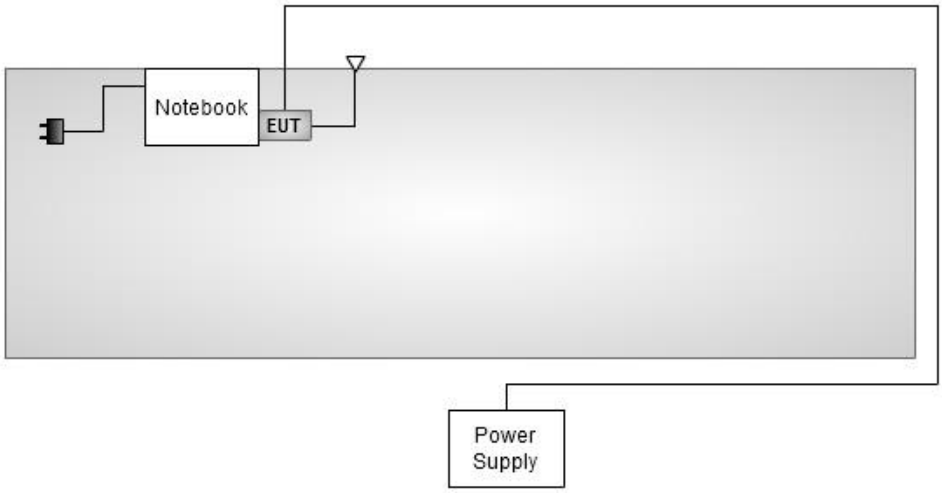
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	Radio link(WLAN)

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power, Peak Power Spectral Density, Emission Bandwidth, Peak Excursion
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11a, HT20, HT40

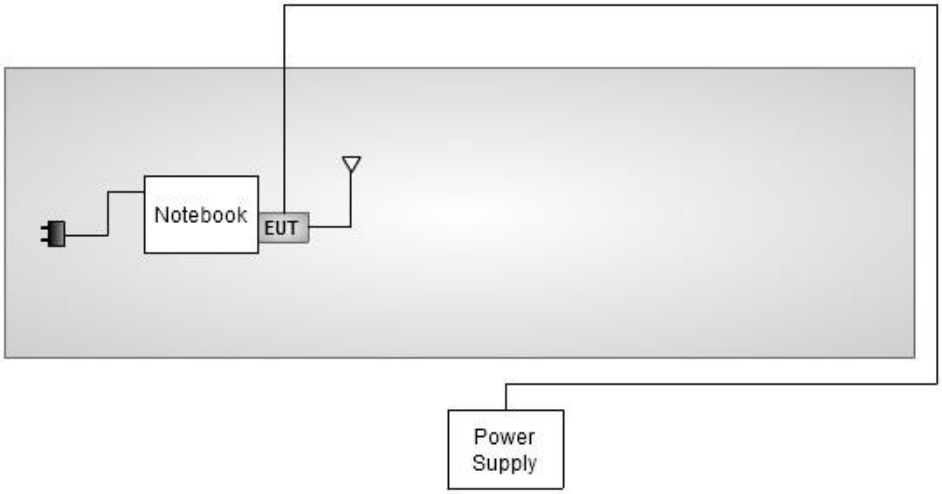
The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO 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 two orthogonal planes. The worst plane is X.		
	☒ 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 plane is X.		
	☒ Radio link(WLAN)		
Modulation Mode	11a, HT20, HT40		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			

2.4 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



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

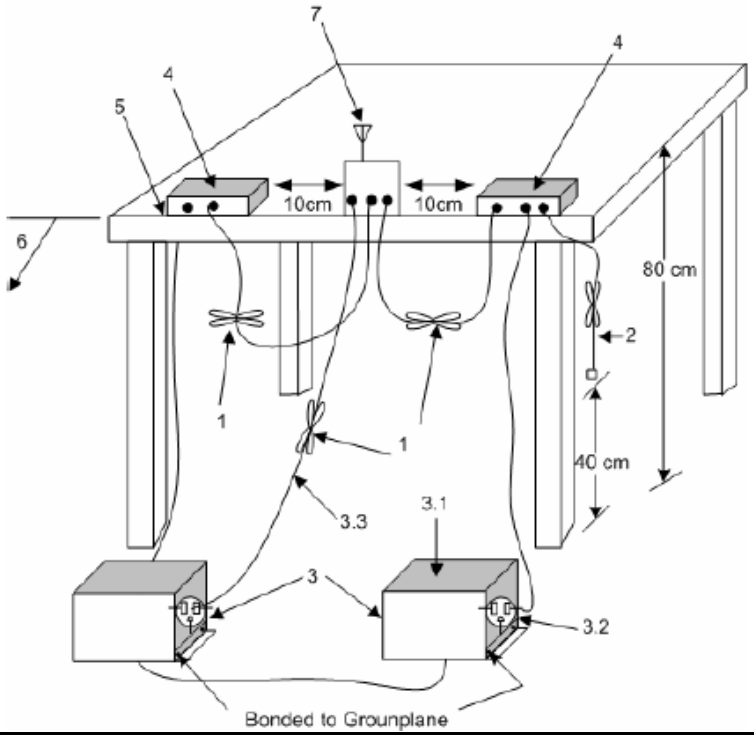
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

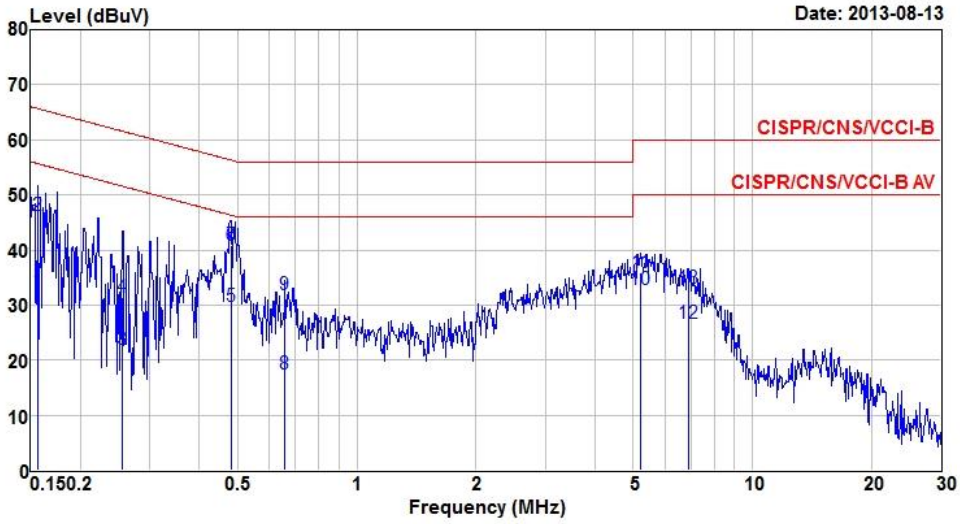
3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

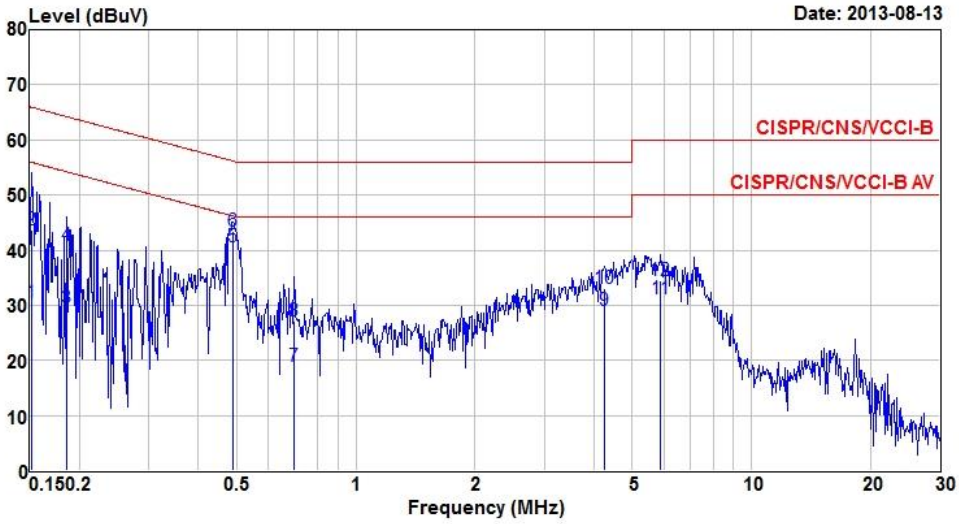
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	Radio link(WLAN)		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.156	32.48	55.65	-23.17	32.36	0.04	0.08	Average
2	0.156	46.35	65.65	-19.30	46.23	0.04	0.08	QP
3	0.255	21.96	51.60	-29.64	21.78	0.05	0.13	Average
4	0.255	31.29	61.60	-30.31	31.11	0.05	0.13	QP
5	0.481	29.72	46.32	-16.60	29.59	0.08	0.05	Average
6	0.481	40.78	56.32	-15.54	40.65	0.08	0.05	QP
7	0.481	40.94	56.32	-15.38	40.81	0.08	0.05	QP
8	0.658	17.57	46.00	-28.43	17.40	0.13	0.04	Average
9	0.658	31.86	56.00	-24.14	31.69	0.13	0.04	QP
10	5.221	32.72	50.00	-17.28	32.32	0.20	0.20	Average
11	5.221	35.80	60.00	-24.20	35.40	0.20	0.20	QP
12	6.878	26.62	50.00	-23.38	26.16	0.30	0.16	Average
13	6.878	33.06	60.00	-26.94	32.60	0.30	0.16	QP

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
Operating Function	Radio link(WLAN)		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.152	30.55	55.91	-25.36	30.44	0.05	0.06	Average
2	0.152	43.59	65.91	-22.32	43.48	0.05	0.06	QP
3	0.185	29.43	54.24	-24.81	29.23	0.05	0.15	Average
4	0.185	40.87	64.24	-23.37	40.67	0.05	0.15	QP
5	0.489	40.69	46.19	-5.50	40.56	0.08	0.05	Average
6	0.489	43.32	56.19	-12.87	43.19	0.08	0.05	QP
7	0.697	18.89	46.00	-27.11	18.74	0.11	0.04	Average
8	0.697	27.23	56.00	-28.77	27.08	0.11	0.04	QP
9	4.247	28.97	46.00	-17.03	28.56	0.18	0.23	Average
10	4.247	33.14	56.00	-22.86	32.73	0.18	0.23	QP
11	5.898	31.22	50.00	-18.78	30.77	0.26	0.19	Average
12	5.898	34.47	60.00	-25.53	34.02	0.26	0.19	QP

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	
UNII Devices	
☒	For the 5.15-5.25 GHz band, the maximum conducted output power shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
☐	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
☐	For the 5.47-5.725 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
☐	For the 5.725-5.825 GHz band, the maximum conducted output power shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz
LE-LAN Devices	
☒	For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☐	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
☐	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
☐	For the 5.725-5.825 GHz band, the maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

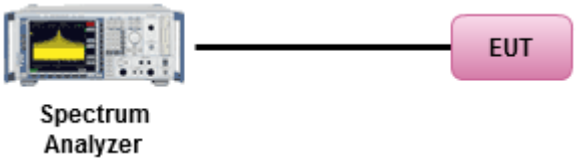
3.2.2 Measuring Instruments

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 v01r03, clause C for EBW and clause D for OBW measurement.	
	☐	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.	
	☒	Refer as IC RSS-Gen, clause 4.6 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.

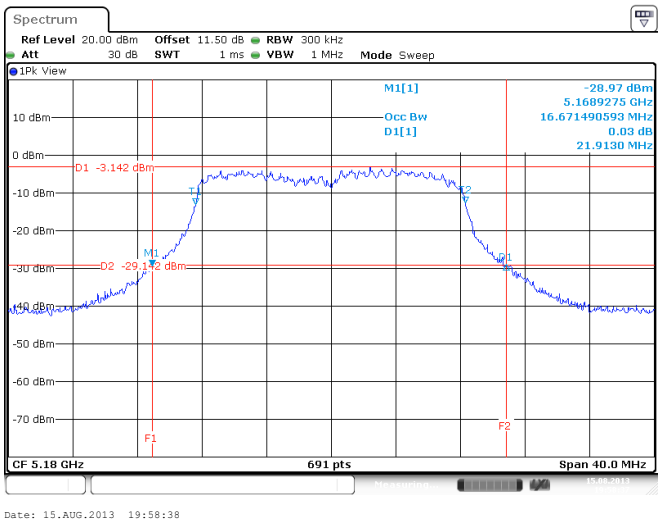
3.2.4 Test Setup

Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

UNII Emission Bandwidth Result (5150-5250MHz band)												
Condition			Emission Bandwidth (MHz)									
Modulation Mode	N_{TX}	Freq. (MHz)	99% Bandwidth				26dB Bandwidth				Power Limit	
			Chain-Port 1	Chain-Port 2	Chain-Port 3	Chain-Port 4	Chain-Port 1	Chain-Port 2	Chain-Port 3	Chain-Port 4	99% BW	26dB BW
11a	3	5180	16.90	16.48	16.67	-	23.01	22.49	21.91	-	16.17	17.00
11a	3	5200	16.96	16.79	16.73	-	22.90	21.97	22.03	-	16.23	17.00
11a	3	5240	16.96	16.79	16.73	-	23.13	22.20	22.32	-	16.23	17.00
HT20	3	5180	18.06	18.00	17.95	-	23.94	22.43	23.13	-	16.54	17.00
HT20	3	5200	18.06	17.83	17.89	-	23.94	22.96	23.48	-	16.51	17.00
HT20	3	5240	18.00	18.06	17.89	-	23.88	23.54	23.59	-	16.53	17.00
HT40	3	5190	37.63	37.63	37.40	-	49.86	46.79	47.30	-	17.00	17.00
HT40	3	5230	37.86	37.40	37.51	-	49.28	47.07	48.70	-	17.00	17.00
Result			Complied									

Worst Emission Bandwidth Plots



3.3 RF Output Power

3.3.1 RF Output Power Limit

Maximum Conducted Output Power Limit	
UNII Devices	
☒	For the 5.15-5.25 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 6 dBi, then P_{Out} = 17 – (G_{TX} – 6).
☐	For the 5.25-5.35 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 6 dBi, then P_{Out} = 24 – (G_{TX} – 6).
☐	For the 5.47-5.725 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 6 dBi, then P_{Out} = 24 – (G_{TX} – 6).
☐	For the 5.725-5.825 GHz band:
	☐ Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6).
	☐ Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 23 dBi, then P_{Out} = 30 – (G_{TX} – 23).
LE-LAN Devices	
☒	For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☐	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
☐	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
☐	For the 5.725-5.825 GHz band, the maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
	☐ Point-to-multipoint systems (P2M): the maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
	☐ Point-to-point systems (P2P): the maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. If e.i.r.p. > 36 dBm, $G_{TX} \leq P_{Out}$
P_{Out} = maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in 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
	[duty cycle ≥ 98% or external video / power trigger]
	☐ Refer as FCC KDB 789033 v01r03, clause E Method SA-1 (spectral trace averaging).
	☐ Refer as FCC KDB 789033 v01r03, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty cycle < 98% and average over on/off periods with duty factor
	☐ Refer as FCC KDB 789033 v01r03, clause E Method SA-2 (spectral trace averaging).
	☐ Refer as FCC KDB 789033 v01r03, 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 v01r03, clause E Method PM (using an 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	3	-
Maximum G_{ANT} (dBi)		7	7	7	-
Modulation Mode	**DG (dBi)**	**N_{TX}**	**N_{SS}**	**STBC**	**Array Gain (dB)**
11a,6-54Mbps	7	3	1	-	-
HT20,M0-23	7	3	1	-	-
HT40,M0-23	7	3	1	-	-

Note 1: For CDD transmissions, directional gain is calculated as power measurements:
Directional Gain (DG) = G_{ANT} + Array Gain, where Array Gain is as follows:
Array Gain = 0 dB (i.e., no array gain) for $N_{TX} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{TX};

3.3.6 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power (5150-5250MHz band)											
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	3	5180	5.92	4.67	4.14	-	9.75	16.00	7.00	16.75	23.00
11a	3	5200	6.52	5.15	4.51	-	10.25	16.00	7.00	17.25	23.00
11a	3	5240	6.60	4.20	4.06	-	9.89	16.00	7.00	16.89	23.00
HT20	3	5180	6.01	4.58	4.02	-	9.72	16.00	7.00	16.72	23.00
HT20	3	5200	6.52	5.04	4.12	-	10.11	16.00	7.00	17.11	23.00
HT20	3	5240	6.38	4.36	4.11	-	9.85	16.00	7.00	16.85	23.00
HT40	3	5190	8.73	8.51	6.52	-	12.80	16.00	7.00	19.80	23.00
HT40	3	5230	10.24	9.14	7.39	-	13.85	16.00	7.00	20.85	23.00
Result			Complied								

3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

Peak Power Spectral Density Limit	
UNII Devices	
☒	For the 5.15-5.25 GHz band, the peak power spectral density (PPSD) ≤ 4 dBm/MHz. If G_{TX} > 6 dBi, then PPSD = 4 – (G_{TX} – 6).
☐	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G_{TX} > 6 dBi, then PPSD= 11 – (G_{TX} – 6).
☐	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G_{TX} > 6 dBi, then PPSD= 11 – (G_{TX} – 6).
☐	For the 5.725-5.825 GHz band:
☐	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 17 dBm/MHz. If G_{TX} > 6 dBi, then PPSD= 17 – (G_{TX} – 6).
☐	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 17 dBm/MHz. If G_{TX} > 23 dBi, then PPSD = 17 – (G_{TX} – 23).
LE-LAN Devices	
☒	For the 5.15-5.25 GHz band, the peak power spectral density (PPSD) ≤ 4 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.
☐	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 17 dBm/MHz.
☐	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 17 dBm/MHz.
☐	For the 5.725-5.825 GHz band, the peak power spectral density (PPSD) ≤ 17 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 23 dBm/MHz.
PPSD = peak power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz **G_{TX}** = the maximum transmitting antenna directional gain in dBi.	

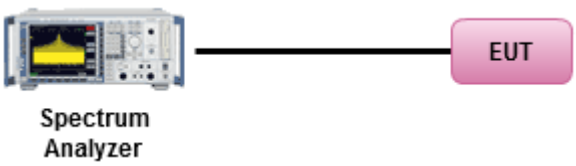
3.4.2 Measuring Instruments

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 v01r03, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth	
	[duty cycle ≥ 98% or external video / power trigger]		
	☒	Refer as FCC KDB 789033 v01r03, clause E Method SA-1 (spectral trace averaging).	
	☐	Refer as FCC KDB 789033 v01r03, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)	
	duty cycle < 98% and average over on/off periods with duty factor		
	☐	Refer as FCC KDB 789033 v01r03, clause E Method SA-2 (spectral trace averaging).	
	☐	Refer as FCC KDB 789033 v01r03, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)	
☒	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

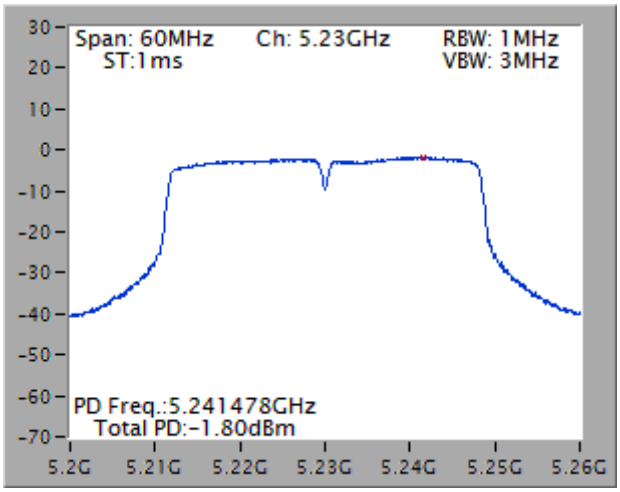
Power Spectral Density


3.4.5 Test Result of Peak Power Spectral Density

Power Spectral Density Result				
Condition			Peak Power Spectral Density	
Modulation Mode	N_{TX}	Freq. (MHz)	Sum Chain (dBm/1MHz)	Power Limit (dBm/1MHz)
11a	3	5180	-1.95	-1.77
11a	3	5200	-1.86	-1.77
11a	3	5240	-2.14	-1.77
HT20	3	5180	-1.88	-1.77
HT20	3	5200	-2.04	-1.77
HT20	3	5240	-2.03	-1.77
HT40	3	5190	-2.79	-1.77
HT40	3	5230	-1.80	-1.77
Result			Complied	

Note:
1. Test result is bin-by-bin summing measured value of each TX port
2. Directional gain = 7 + 10*log(3/1)=11.77 dBi > 6 dBi
   Limit shall be reduced to 4 dBm – (11.77 dBi – 6 dBi) = -1.77 dBm

Worst Power Spectral Density Plots



3.5 Peak Excursion

3.5.1 Peak Excursion Limit

Peak Excursion Limit
UNII Devices
☒ Peak excursion ≤ 13 dB. The ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission does not exceed 13 dB. (Earlier procedures that required computing the ratio of the two spectra at each frequency across the emission bandwidth can lead to unintended failures at band edges and will no longer be required.)
LE-LAN Devices
☒ N/A

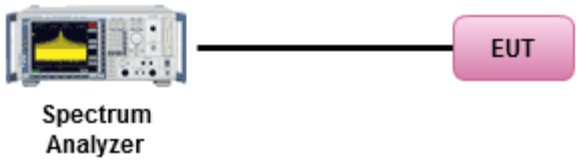
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
☒	Refer as FCC KDB 789033 v01r03, clause G peak excursion method.
☒	Testing each modulation mode on a single channel is sufficient to demonstrate compliance with the peak excursion requirement
☒	For conducted measurement.
	☒ Testing a single output port is sufficient to demonstrate compliance with the peak excursion .

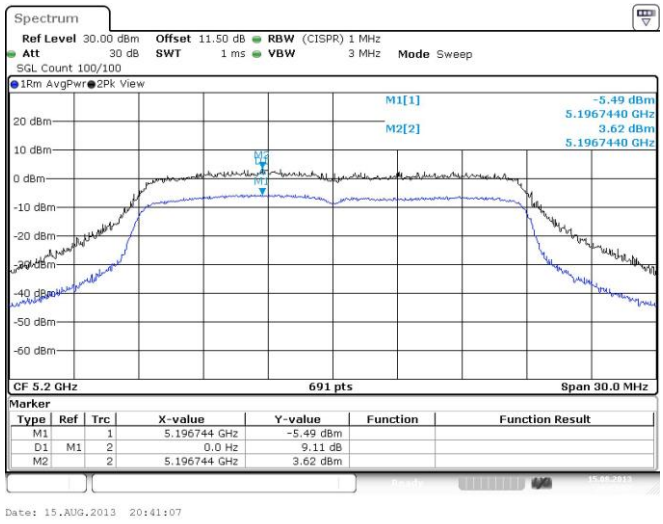
3.5.4 Test Setup

Peak Excursion


3.5.5 Test Result of Peak Excursion

UNII Peak Excursion Result								
Condition			Peak Excursion (dB)					
Modulation Mode	N_{TX}	Freq. (MHz)	BPSK	QPSK	16QAM	64QAM	256QAM	Limit
11a	3	5240	8.22	8.69	8.89	8.54	-	13.0
HT20	3	5200	7.41	8.15	8.31	9.11	-	13.0
HT40	3	5230	8.01	8.14	8.73	9.00	-	13.0
Result			Complied					

Worst Peak Excursion Plots



Note: Peak excursion = Mark2 value – Mark1 value

3.6 Transmitter Radiated Unwanted Emissions and Band Edge

3.6.1 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 - 5.825 GHz	5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.825 5.835 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).

3.6.2 Measuring Instruments

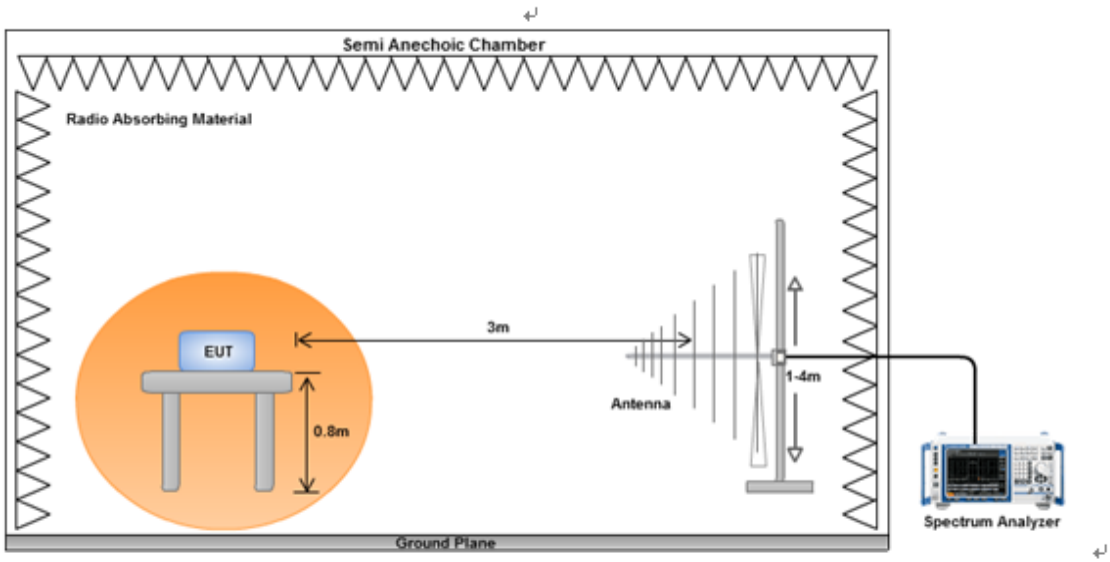
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

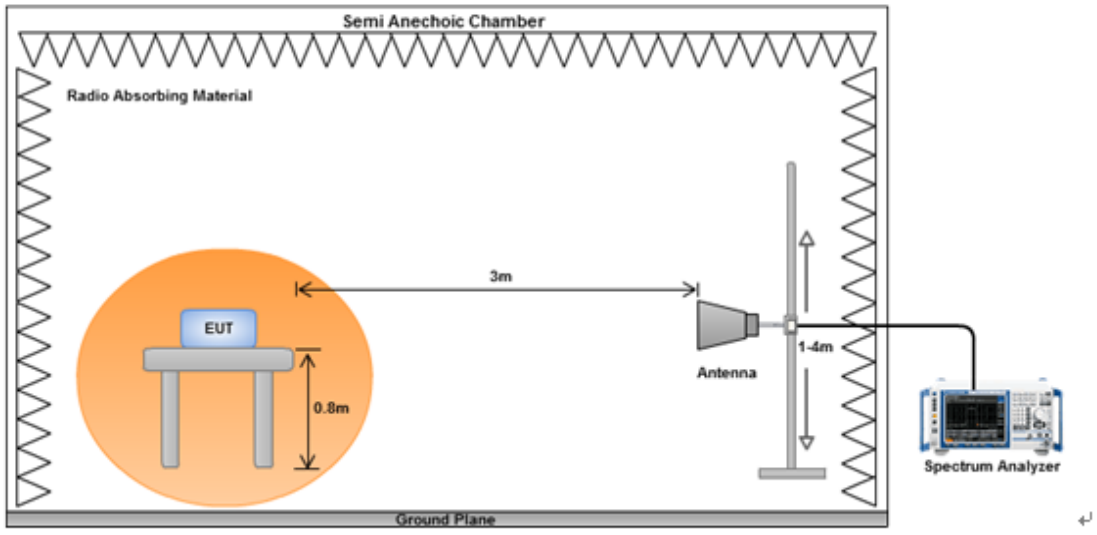
Test Method			
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies 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).		
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].		
☒	For the transmitter unwanted emissions shall be measured using following options below:		
	☒	Refer as FCC KDB 789033 v01r03, clause H)2) for unwanted emissions into non-restricted bands.	
	☒	Refer as FCC KDB 789033 v01r03, clause H)1) for unwanted emissions into restricted bands.	
		☐	Refer as FCC KDB 789033 v01r03, H)6) Method AD (Trace Averaging).
		☐	Refer as FCC KDB 789033 v01r03, H)6) Method VB (Reduced VBW).
		☒	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
		☒	Refer as FCC KDB 789033 v01r03, clause H)5) measurement procedure peak limit.
		☐	Refer as ANSI C63.10, clause 4.2.3.2.2 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 v01r03, clause H)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.	

3.6.4 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz

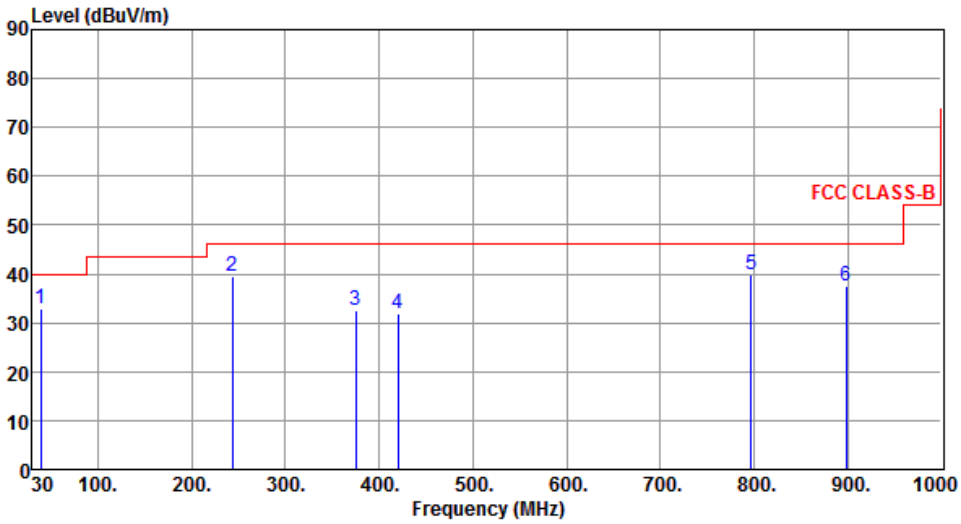


3.6.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 30 dB below the permissible value has no need to be reported.

3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

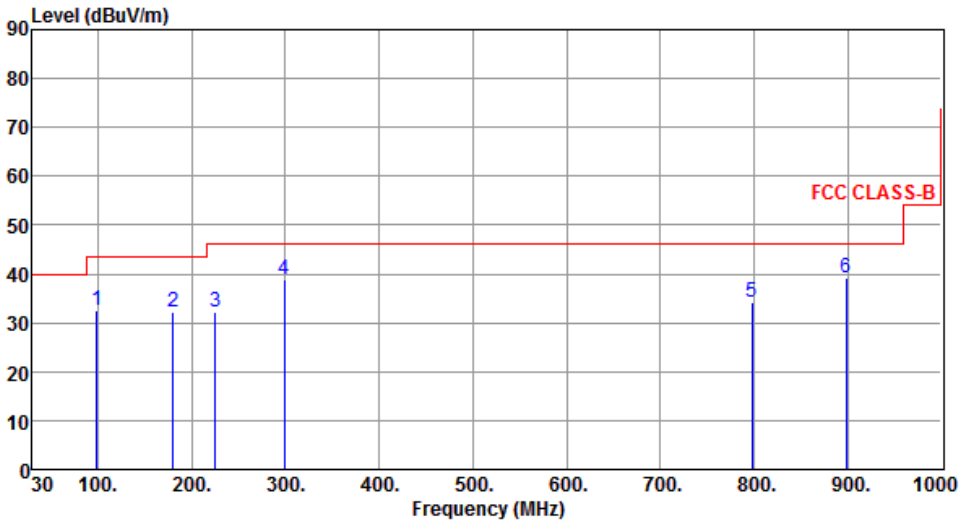
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	5230
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	38.73	33.01	40.00	-6.99	49.50	-16.49	Peak	---	---
2	243.40	39.62	46.00	-6.38	57.06	-17.44	Peak	---	---
3	375.32	32.52	46.00	-13.48	46.22	-13.70	Peak	---	---
4	419.94	31.78	46.00	-14.22	44.32	-12.54	Peak	---	---
5	797.27	39.82	46.00	-6.18	45.93	-6.11	Peak	---	---
6	898.15	37.64	46.00	-8.36	42.58	-4.94	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	HT40	**Test Freq. (MHz)**	5230
Operating Mode	1	**Polarization**	H

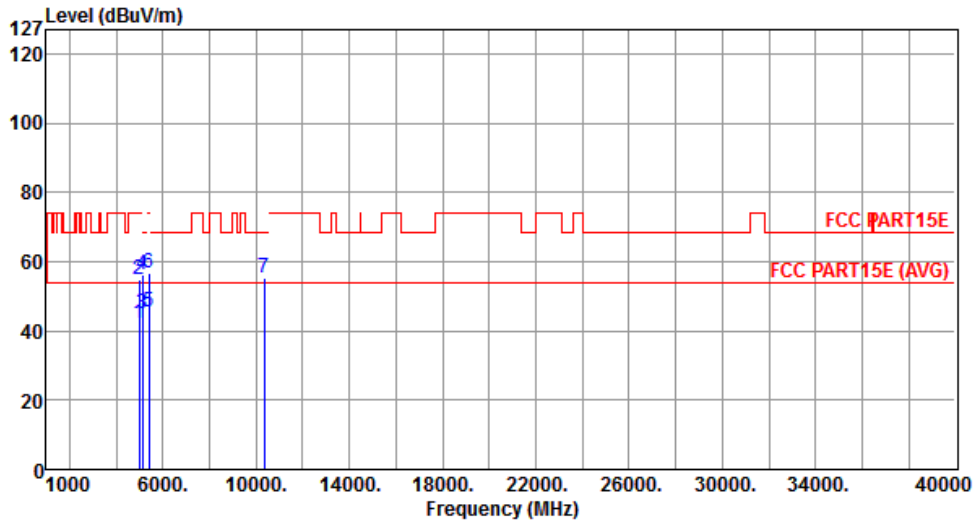


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	98.87	32.45	43.50	-11.05	53.87	-21.42	Peak	---	---
2	180.35	32.09	43.50	-11.41	50.32	-18.23	Peak	---	---
3	224.97	32.20	46.00	-13.80	50.55	-18.35	Peak	---	---
4	298.69	38.86	46.00	-7.14	54.47	-15.61	Peak	---	---
5	798.24	34.37	46.00	-11.63	40.47	-6.10	Peak	---	---
6	898.15	39.22	46.00	-6.78	44.16	-4.94	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)

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

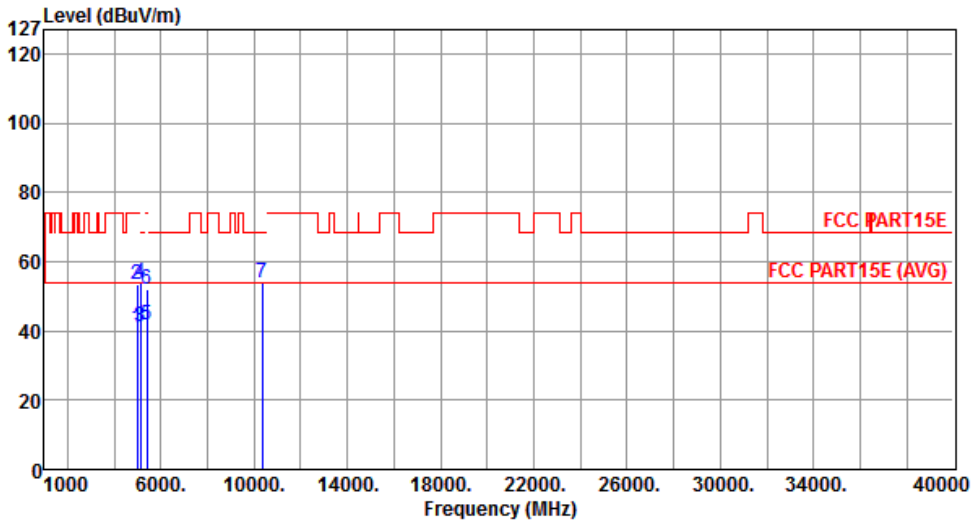
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5180
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.13	54.00	-11.87	37.17	4.96	Average	---	---
2	4988.00	55.01	74.00	-18.99	50.05	4.96	Peak	---	---
3	5120.00	45.01	54.00	-8.99	39.81	5.20	Average	---	---
4	5120.00	56.14	74.00	-17.86	50.94	5.20	Peak	---	---
5	5400.00	45.34	54.00	-8.66	39.92	5.42	Average	---	---
6	5400.00	56.83	74.00	-17.17	51.41	5.42	Peak	---	---
7	10360.00	55.14	68.30	-13.16	41.59	13.55	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.

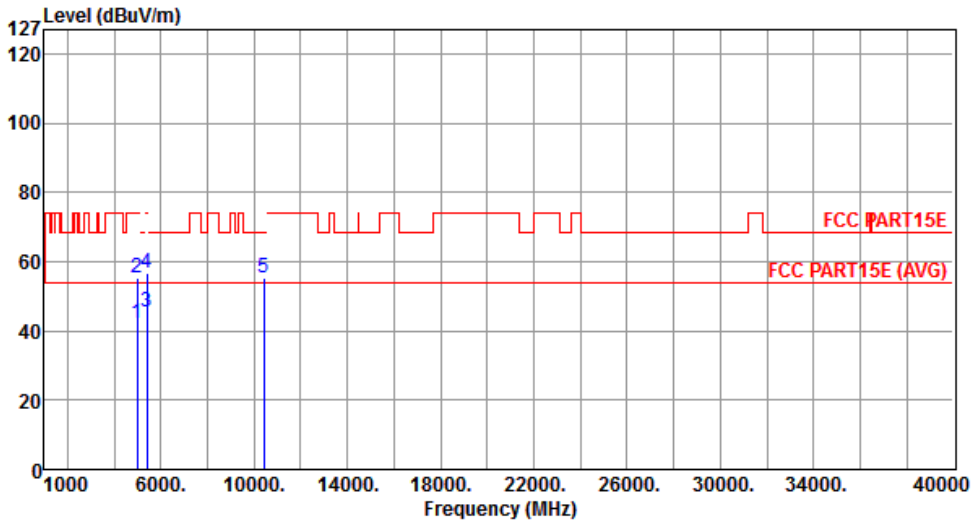
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5180
Operating Mode	1	**Polarization**	H



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.81	54.00	-13.19	35.85	4.96	Average	---	---
2	4988.00	53.56	74.00	-20.44	48.60	4.96	Peak	---	---
3	5120.00	41.38	54.00	-12.62	36.18	5.20	Average	---	---
4	5120.00	54.02	74.00	-19.98	48.82	5.20	Peak	---	---
5	5400.00	41.79	54.00	-12.21	36.37	5.42	Average	---	---
6	5400.00	52.12	74.00	-21.88	46.70	5.42	Peak	---	---
7	10360.00	54.12	68.30	-14.18	40.57	13.55	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.

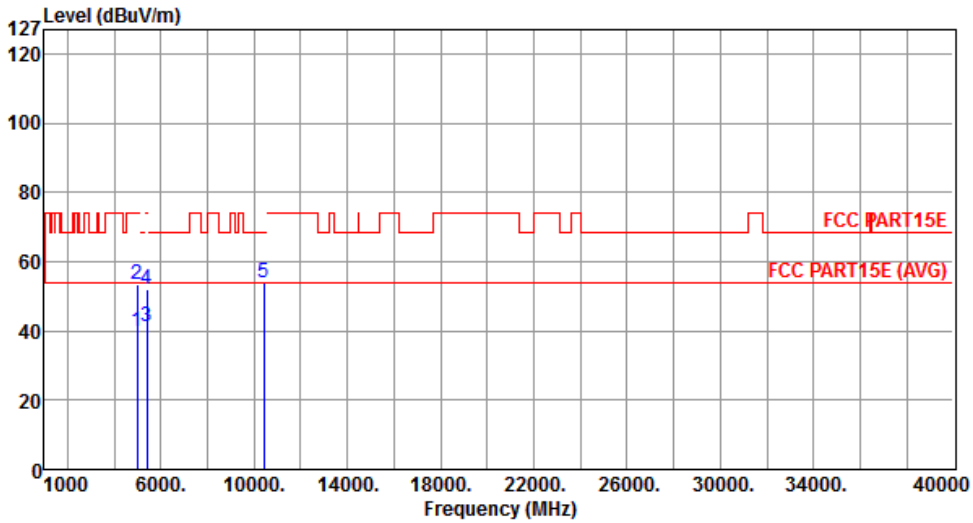
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5200
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.01	54.00	-11.99	37.05	4.96	Average	---	---
2	4988.00	55.12	74.00	-18.88	50.16	4.96	Peak	---	---
3	5400.00	45.45	54.00	-8.55	40.03	5.42	Average	---	---
4	5400.00	56.91	74.00	-17.09	51.49	5.42	Peak	---	---
5	10400.00	55.29	68.30	-13.01	41.66	13.63	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.

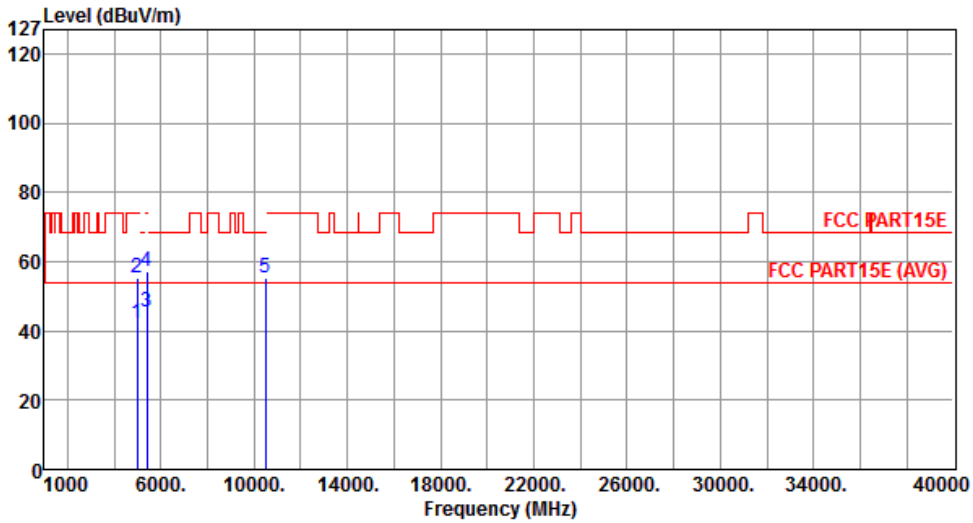
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5200
Operating Mode	1	**Polarization**	H



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.03	54.00	-13.97	35.07	4.96	Average	---	---
2	4988.00	53.34	74.00	-20.66	48.38	4.96	Peak	---	---
3	5400.00	41.43	54.00	-12.57	36.01	5.42	Average	---	---
4	5400.00	51.94	74.00	-22.06	46.52	5.42	Peak	---	---
5	10400.00	54.09	68.30	-14.21	40.46	13.63	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.

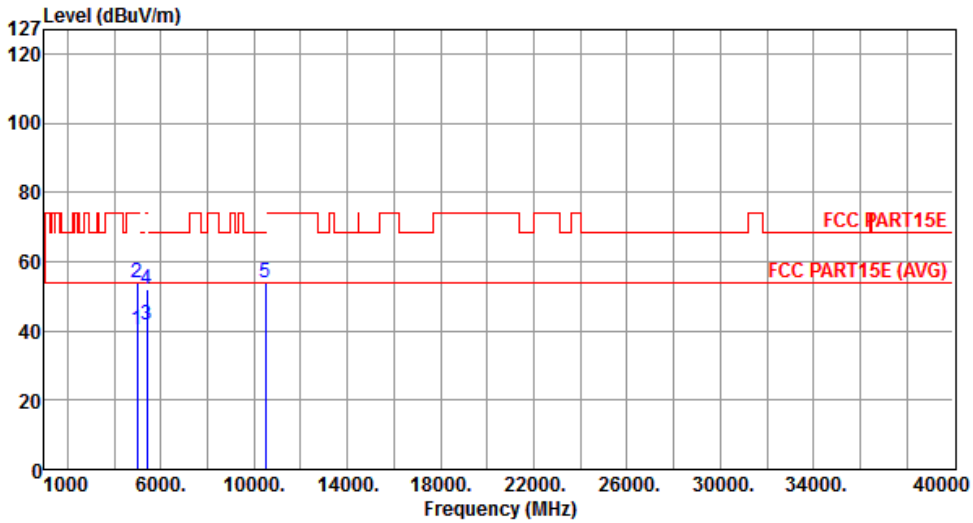
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11a	**Test Freq. (MHz)**	5240
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.28	54.00	-11.72	37.32	4.96	Average	---	---
2	4988.00	55.17	74.00	-18.83	50.21	4.96	Peak	---	---
3	5400.00	45.49	54.00	-8.51	40.07	5.42	Average	---	---
4	5400.00	56.95	74.00	-17.05	51.53	5.42	Peak	---	---
5	10480.00	55.34	68.30	-12.96	41.54	13.80	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)**	5240
Operating Mode	1	**Polarization**	H

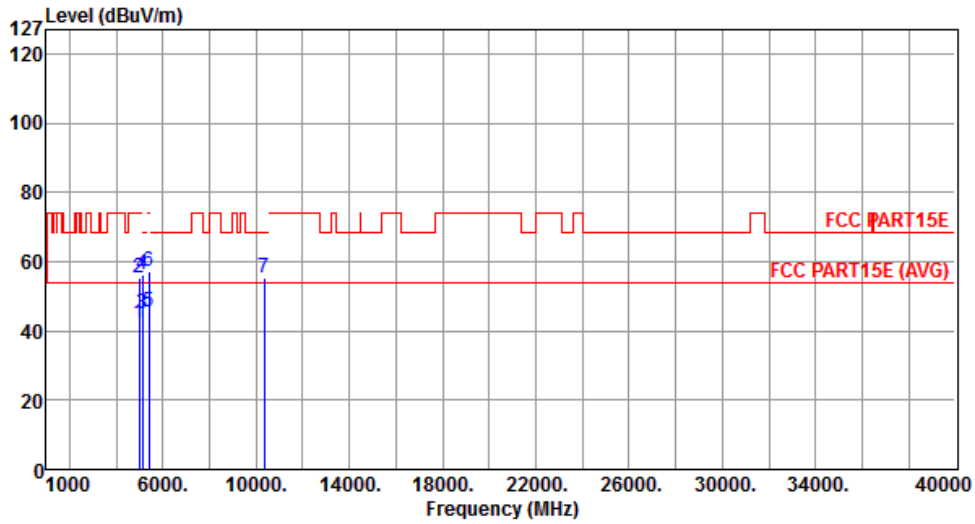


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.21	54.00	-13.79	35.25	4.96	Average	---	---
2	4988.00	53.69	74.00	-20.31	48.73	4.96	Peak	---	---
3	5400.00	41.61	54.00	-12.39	36.19	5.42	Average	---	---
4	5400.00	52.03	74.00	-21.97	46.61	5.42	Peak	---	---
5	10480.00	53.94	68.30	-14.36	40.14	13.80	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.

3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20

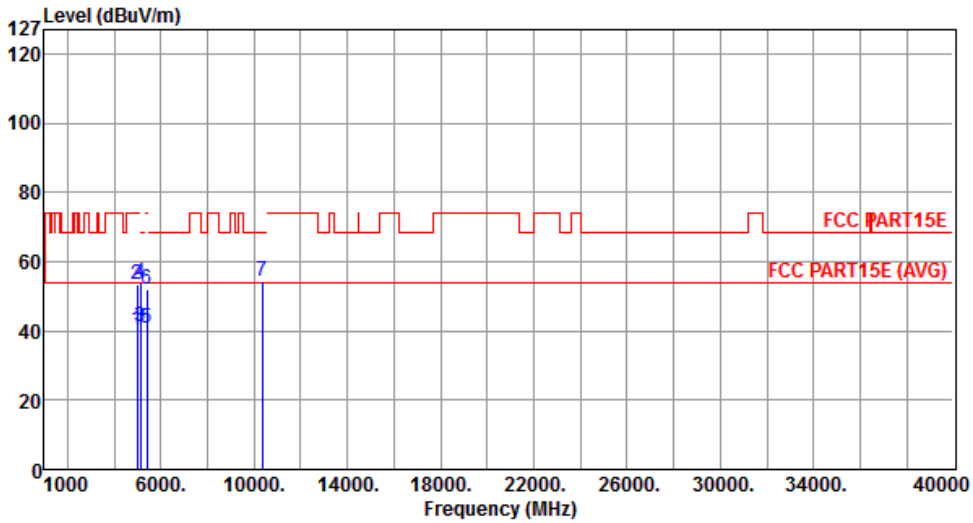
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	5180
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.23	54.00	-11.77	37.27	4.96	Average	---	---
2	4988.00	55.17	74.00	-18.83	50.21	4.96	Peak	---	---
3	5120.00	44.89	54.00	-9.11	39.69	5.20	Average	---	---
4	5120.00	56.03	74.00	-17.97	50.83	5.20	Peak	---	---
5	5400.00	45.45	54.00	-8.55	40.03	5.42	Average	---	---
6	5400.00	56.99	74.00	-17.01	51.57	5.42	Peak	---	---
7	10360.00	55.41	68.30	-12.89	41.86	13.55	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.

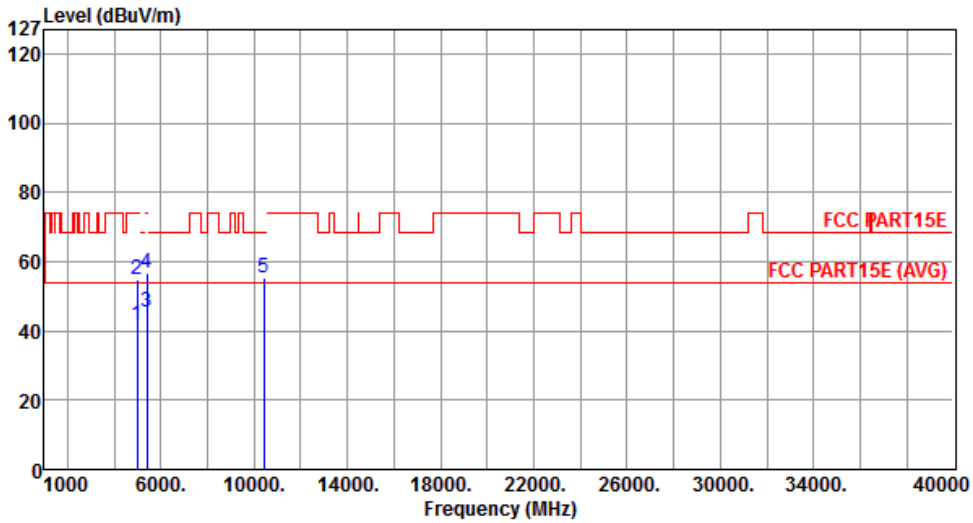
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	5180
Operating Mode	1	**Polarization**	H



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.22	54.00	-13.78	35.26	4.96	Average	---	---
2	4988.00	53.48	74.00	-20.52	48.52	4.96	Peak	---	---
3	5120.00	41.22	54.00	-12.78	36.02	5.20	Average	---	---
4	5120.00	53.74	74.00	-20.26	48.54	5.20	Peak	---	---
5	5400.00	40.55	54.00	-13.45	35.13	5.42	Average	---	---
6	5400.00	51.89	74.00	-22.11	46.47	5.42	Peak	---	---
7	10360.00	54.16	68.30	-14.14	40.61	13.55	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.

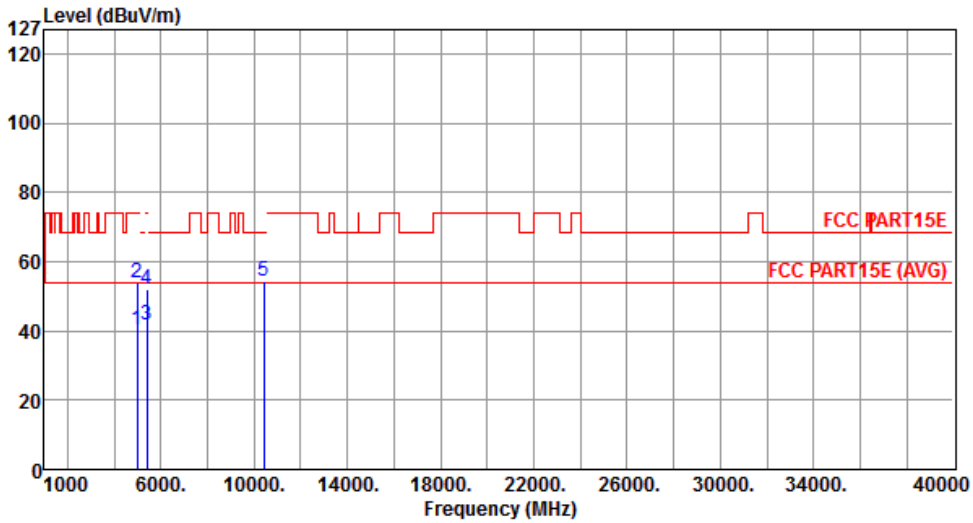
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	5200
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	41.89	54.00	-12.11	36.93	4.96	Average	---	---
2	4988.00	54.81	74.00	-19.19	49.85	4.96	Peak	---	---
3	5400.00	45.47	54.00	-8.53	40.05	5.42	Average	---	---
4	5400.00	56.75	74.00	-17.25	51.33	5.42	Peak	---	---
5	10400.00	55.52	68.30	-12.78	41.89	13.63	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.

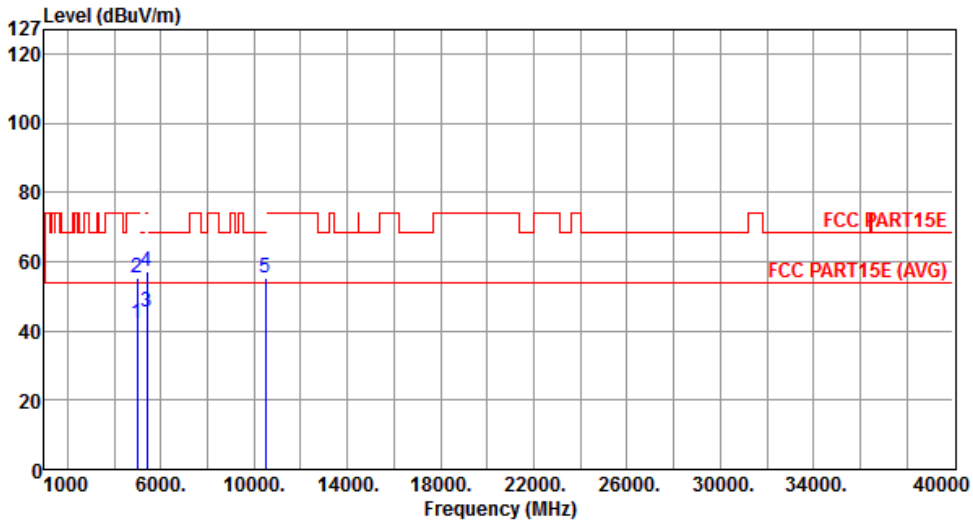
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	5200
Operating Mode	1	**Polarization**	H



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.36	54.00	-13.64	35.40	4.96	Average	---	---
2	4988.00	53.81	74.00	-20.19	48.85	4.96	Peak	---	---
3	5400.00	41.49	54.00	-12.51	36.07	5.42	Average	---	---
4	5400.00	51.91	74.00	-22.09	46.49	5.42	Peak	---	---
5	10400.00	54.29	68.30	-14.01	40.66	13.63	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.

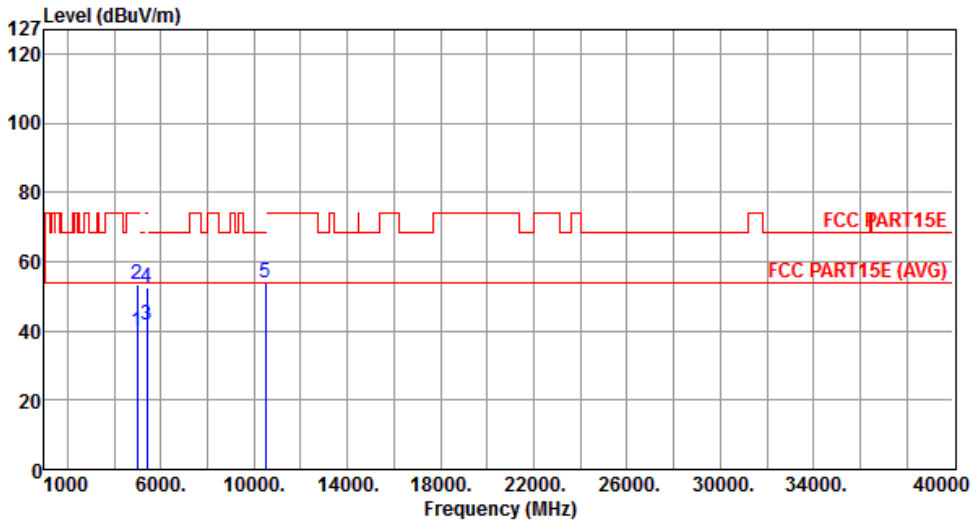
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	5240
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.28	54.00	-11.72	37.32	4.96	Average	---	---
2	4988.00	55.41	74.00	-18.59	50.45	4.96	Peak	---	---
3	5400.00	45.49	54.00	-8.51	40.07	5.42	Average	---	---
4	5400.00	56.96	74.00	-17.04	51.54	5.42	Peak	---	---
5	10480.00	55.31	68.30	-12.99	41.51	13.80	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	HT20	**Test Freq. (MHz)**	5240
Operating Mode	1	**Polarization**	H

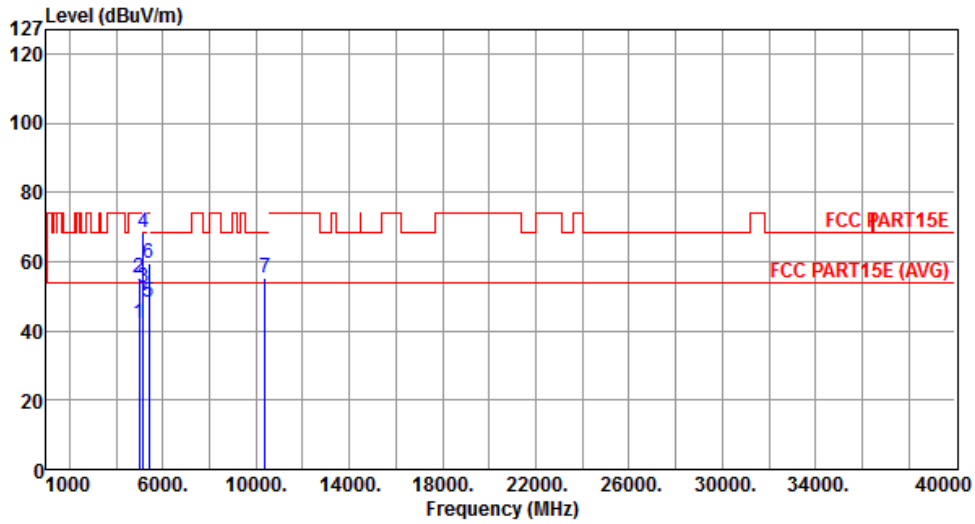


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.03	54.00	-13.97	35.07	4.96	Average	---	---
2	4988.00	53.41	74.00	-20.59	48.45	4.96	Peak	---	---
3	5400.00	41.86	54.00	-12.14	36.44	5.42	Average	---	---
4	5400.00	52.28	74.00	-21.72	46.86	5.42	Peak	---	---
5	10480.00	54.03	68.30	-14.27	40.23	13.80	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.

3.6.9 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40

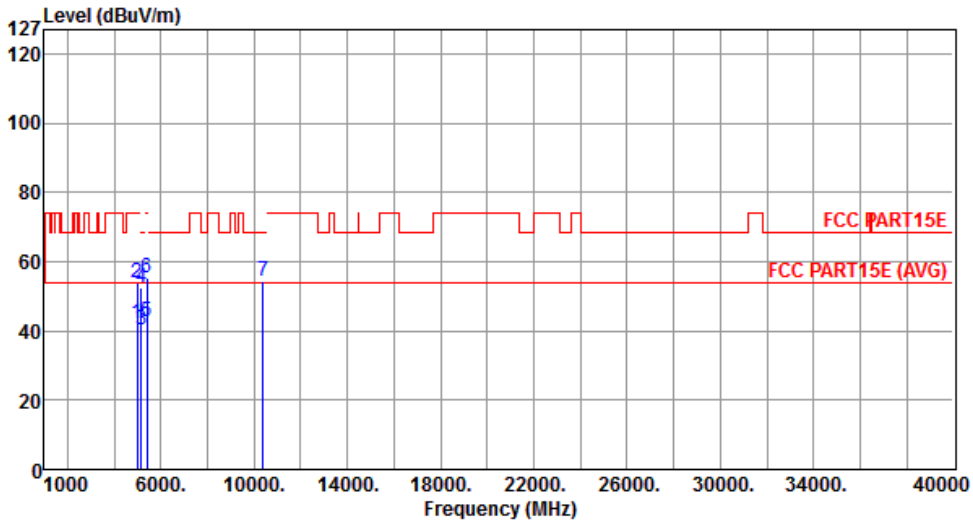
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	5190
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.32	54.00	-11.68	37.36	4.96	Average	---	---
2	4988.00	55.14	74.00	-18.86	50.18	4.96	Peak	---	---
3	5150.00	52.52	54.00	-1.48	47.27	5.25	Average	---	---
4	5150.00	68.48	74.00	-5.52	63.23	5.25	Peak	---	---
5	5400.00	48.46	54.00	-5.54	43.04	5.42	Average	---	---
6	5400.00	59.45	74.00	-14.55	54.03	5.42	Peak	---	---
7	10380.00	55.41	68.30	-12.89	41.82	13.59	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.

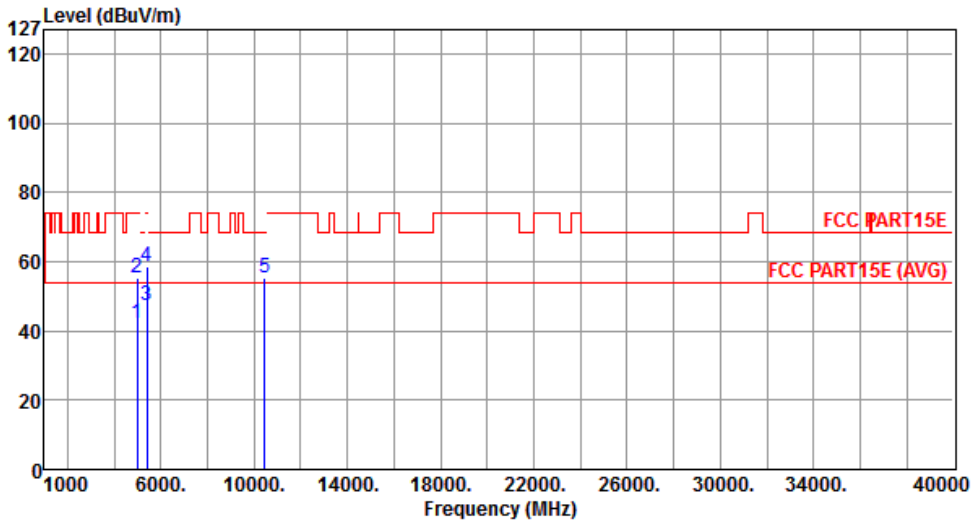
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	5190
Operating Mode	1	**Polarization**	H



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.15	54.00	-11.85	37.19	4.96	Average	---	---
2	4988.00	53.67	74.00	-20.33	48.71	4.96	Peak	---	---
3	5150.00	40.52	54.00	-13.48	35.27	5.25	Average	---	---
4	5150.00	52.40	74.00	-21.60	47.15	5.25	Peak	---	---
5	5400.00	42.50	54.00	-11.50	37.08	5.42	Average	---	---
6	5400.00	55.44	74.00	-18.56	50.02	5.42	Peak	---	---
7	10380.00	54.22	68.30	-14.08	40.63	13.59	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.

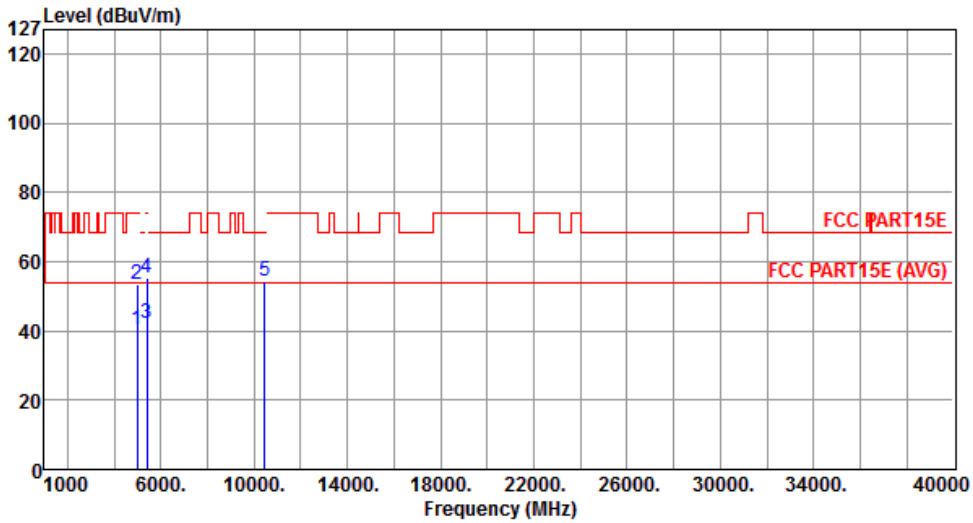
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	5230
Operating Mode	1	**Polarization**	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	42.27	54.00	-11.73	37.31	4.96	Average	---	---
2	4988.00	55.12	74.00	-18.88	50.16	4.96	Peak	---	---
3	5400.00	47.23	54.00	-6.77	41.81	5.42	Average	---	---
4	5400.00	58.66	74.00	-15.34	53.24	5.42	Peak	---	---
5	10460.00	55.33	68.30	-12.97	41.58	13.75	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	HT40	**Test Freq. (MHz)**	5230
Operating Mode	1	**Polarization**	H



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4988.00	40.29	54.00	-13.71	35.33	4.96	Average	---	---
2	4988.00	53.63	74.00	-20.37	48.67	4.96	Peak	---	---
3	5400.00	42.12	54.00	-11.88	36.70	5.42	Average	---	---
4	5400.00	55.29	74.00	-18.71	49.87	5.42	Peak	---	---
5	10460.00	54.30	68.30	-14.00	40.55	13.75	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.

3.7 Frequency Stability

3.7.1 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.

3.7.2 Measuring Instruments

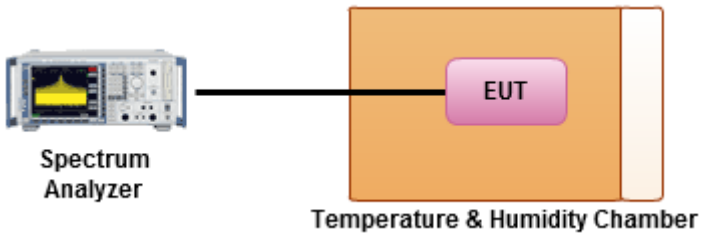
Refer a test equipment and calibration data table in this test report.

3.7.3 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.

3.7.4 Test Setup

Frequency Stability



3.7.5 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	5200	5200.01484	2.8538
$T_{20°C}$Vmin	5200	5200.01659	3.1904
$T_{55°C}$Vnom	5200	5200.01563	3.0058
$T_{50°C}$Vnom	5200	5200.01480	2.8462
$T_{40°C}$Vnom	5200	5200.00824	1.5846
$T_{30°C}$Vnom	5200	5200.01872	3.6000
$T_{20°C}$Vnom	5200	5200.01037	1.9942
$T_{10°C}$Vnom	5200	5200.01576	3.0308
$T_{0°C}$Vnom	5200	5200.01789	3.4404
$T_{-10°C}$Vnom	5200	5200.01819	3.4981
$T_{-20°C}$Vnom	5200	5200.01139	2.1904
$T_{-30°C}$Vnom	5200	5200.01854	3.5654
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

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
EMC Receiver	R&S	ESCS 30	100169	Oct. 02, 2012	Oct. 01, 2013
LISN	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-667	Dec. 04, 2012	Dec. 03, 2013
LISN (Support Unit)	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-666	Dec. 04, 2012	Dec. 03, 2013
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 25, 2012	Dec. 24, 2013
50 ohm terminal	NA	50	01	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal	NA	50	02	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal	NA	50	03	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal (Support Unit)	NA	50	04	Apr. 22, 2013	Apr. 21, 2014
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission above 1GHz				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
3m semi-anechoic chamber	CHAMPRO	SAC-03	03CH01-WS	Jan. 04, 2013	Jan. 03, 2014
Spectrum Analyzer	R&S	FSV40	101498	Jan. 24, 2013	Jan. 23, 2014
Receiver	R&S	ESR3	101658	Jan. 28, 2013	Jan. 27, 2014
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 11, 2013	Jan. 10, 2014
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 18, 2013	Feb. 17, 2014
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Jan. 14, 2013	Jan. 13, 2014
Amplifier	Burgeon	BPA-530	100219	Nov. 28, 2012	Nov. 27, 2013
Amplifier	Agilent	83017A	MY39501308	Dec. 18, 2012	Dec. 17, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R03m	Woken	CFD400NL-LW	CFD400NL-001	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R10m	Woken	CFD400NL-LW	CFD400NL-002	Dec. 25, 2012	Dec. 24, 2013
control	EM Electronics	EM1000	60612	N/A	N/A
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Amplifier	MITEQ	AMF-6F-260400	9121372	Apr. 19, 2013	Apr. 18, 2015
Note: Calibration Interval of instruments listed above is two year.					

Test Item	RF Conducted				
Test Site	TH01-HY				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV 40	101063	Feb. 18, 2013	Feb. 17, 2014
Spectrum Analyzer	R&S	FSP 40	100305	Mar. 20, 2013	Mar. 19, 2014
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	Nov. 21, 2012	Nov. 20, 2013
Signal Generator	R&S	SMB100A	175727	Jan. 14, 2013	Jan. 13, 2014
Power Sensor	Anritsu	MA2411B	0917017	Feb. 02, 2013	Feb. 01, 2014
Power Meter	Anritsu	ML2495A	0949003	Feb. 02, 2013	Feb. 01, 2014
DC Power Source	G.W.	GPC-6030D	C671845	Jun. 21, 2013	Jun. 20, 2014
AC Power Source	G.W	APS-9102	EL920581	Jul. 16, 2013	Jul. 15, 2014
Note: Calibration Interval of instruments listed above is one year.					