FCC Test Report

Equipment	:	**300Mbps Wireless N USB Adapter**
Brand Name	:	**TP-LINK**
Model No.	:	**TL-WN821N**
FCC ID	:	**TE7WN821NV5**
Standard	:	**47 CFR FCC Part 15.247**
Operating Band	:	**2400 MHz – 2483.5 MHz**
FCC Classification	:	**DTS**
Applicant Manufacturer	:	**TP-LINK TECHNOLOGIES CO., LTD.** Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park,Shennan Rd, Nanshan, Shenzhen City,Guangdong Province,P.R. China

The product sample received on Sep. 30, 2015 and completely tested on Feb. 23, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

James Huang

Prepared by: James Huang / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory 2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

Table of Contents

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Support Equipment 8
1.3 Testing Applied Standards 8
1.4 Testing Location Information 8
1.5 Measurement Uncertainty 9

2 TEST CONFIGURATION OF EUT 10

2.1 The Worst Case Modulation Configuration 10
2.2 The Worst Case Power Setting Parameter 10
2.3 The Worst Case Measurement Configuration 11
2.4 Test Setup Diagram 12

3 TRANSMITTER TEST RESULT 13

3.1 AC Power-line Conducted Emissions 13
3.2 6dB Bandwidth 16
3.3 RF Output Power 18
3.4 Power Spectral Density 22
3.5 Transmitter Radiated Bandedge Emissions 24
3.6 Radiated Unwanted Emissions 52

4 TEST EQUIPMENT AND CALIBRATION DATA 81

APPENDIX A. RADIATED TEST RESULTS

APPENDIX B. TEST PHOTOS

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]: 0.1500000 MHz 49.40 (Margin 16.60dB) - QP 25.33 (Margin 30.67dB) - AV	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz] 20M: 9.07 / 40M: 36.08	≥500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm]: 27.32	Power [dBm]:30	Complied
3.4	15.247(e)	Power Spectral Density	PSD [dBm/100kHz]: -7.01	PSD [dBm/3kHz]:8	Complied
3.5	15.247(d)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2400.000 MHz: 29.02 dB Restricted Bands [dBuV/m at 3m]: 2484.08 MHz 63.99 (Margin 10.01 dB) - PK 52.99 (Margin 1.01 dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(d)	Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 4924.00 MHz 52.40 (Margin 1.60 dB) – AV 55.00 (Margin 19.00 dB) – PK	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied

Revision History

Report No.	Version	Description	Issued Date
FR592701	Rev. 01	Initial issue of report	Mar. 23, 2016
FR592701	Rev. 02	1, Added the test plots of duty cycle on page 6 and page 7. 2, Added the remark about the test setting comply with 15.247(d) on page 24.	Mar. 29, 2016
FR592701	Rev. 03	Added the test plots of Transmitter Radiated Bandedge Emissions and list the Radiated unwanted emission test results on Appendix A.	Apr. 08, 2016

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)
2400-2483.5	b	2412-2462	1-11 [11]	1	21.71
2400-2483.5	g	2412-2462	1-11 [11]	1	21.58
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	27.32
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	26.91

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.
Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

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.

Antenna General Information			
No.	Ant. Cat.	Ant. Type	Gain (dBi)
1	Integral	PIFA	2.12
2	Integral	PIFA	2.00

Remark:
1. This EUT supports 1TX and Port 1 for emission in modulation mode 11b, 11g.
2. This EUT supports 2TX in modulation mode 11n.

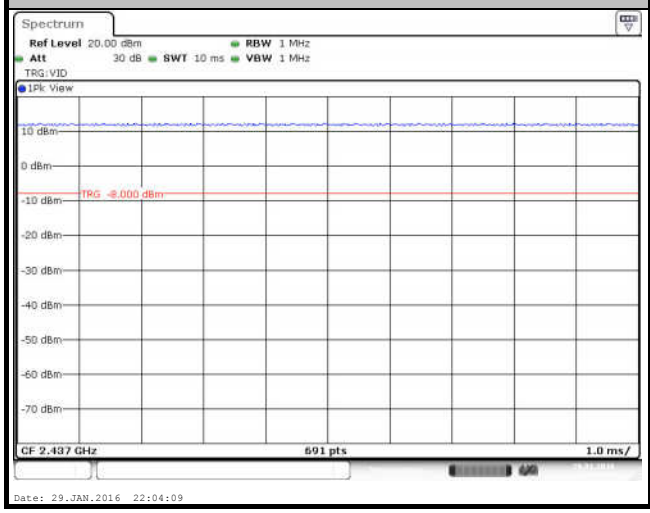
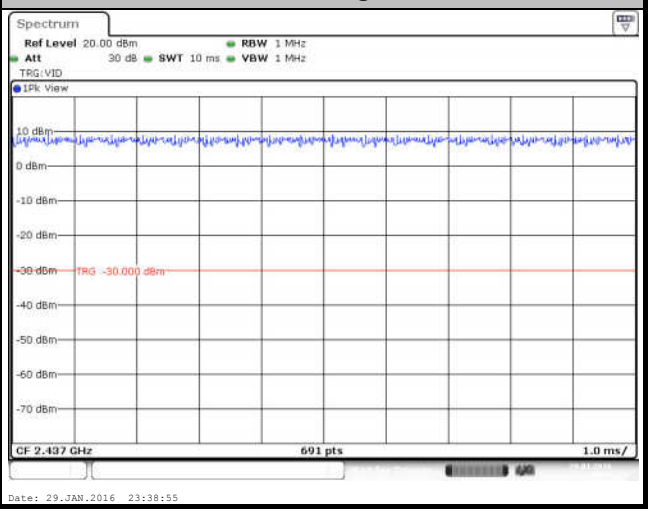
1.1.3 Type of EUT

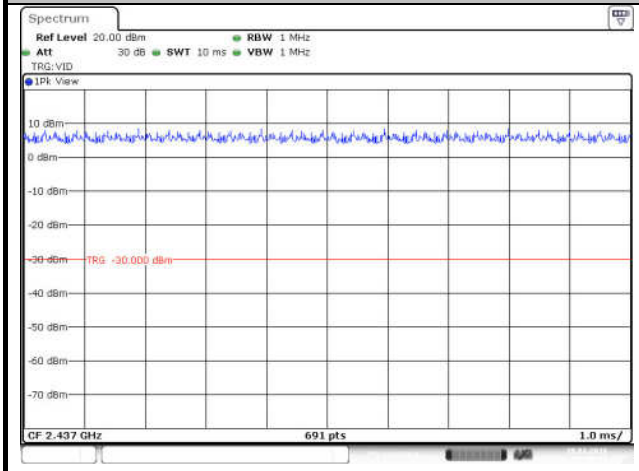
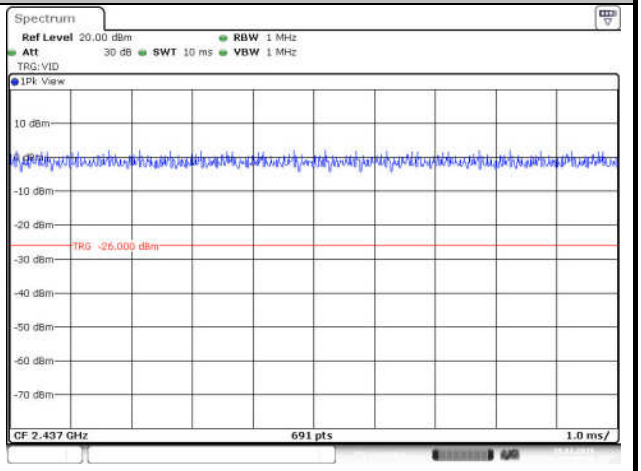
Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	☐ Production ; ☐ Pre-Production ; ☒ Prototype

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 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)**
☒ 100.00% - IEEE 802.11b	0.00
☒ 100.00%- IEEE 802.11g	0.00
☒ 100.00%- IEEE 802.11n (HT20)	0.00
☒ 100.00%- IEEE 802.11n (HT40)	0.00

Plots of Duty cycle	
802.11b	**802.11g**
	

802.11n (HT20)	802.11n (HT40)
	

1.1.5 EUT Operational Condition

Supply Voltage	☐ AC mains	☒ DC	
Type of DC Source	☐ Internal DC supply	☒ From system	☐ External DC adapter

1.2 Support Equipment

Support Equipment - AC Conducted and Radiated Emission				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5530	DoC
2	Adapter for NB	DELL	LA65NS2-01	DoC

Support Equipment - RF Conducted				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5520	DoC
2	Adapter for NB	DELL	HA65NM130	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 558074 D01 v03r04

1.4 Testing Location Information

Testing Location							
☒	HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.			
		TEL	:	886-3-327-3456	FAX	:	886-3-327-0973
Test site registered number [636805] with FCC.							
Test Condition		**Test Site No.**		**Test Engineer**		**Test Environment**	
AC Conduction		CO04-HY		Anthony		20°C / 55%	
RF Conducted		TH01-HY		Candy		23°C / 63%	
Radiated Emission		03CH09-HY		Joe		22.3°C / 59%	

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**
AC power-line conducted emissions		±2.3 dB
Emission bandwidth, 6dB bandwidth		±0.6 %
RF output power, conducted		±0.1 dB
Power density, conducted		±0.6 dB
Unwanted emissions, conducted	9 – 150 kHz	±0.4 dB
	0.15 – 30 MHz	±0.4 dB
	30 – 1000 MHz	±0.6 dB
	1 – 18 GHz	±0.5 dB
	18 – 40 GHz	±0.5 dB
	40 – 200 GHz	N/A
All emissions, radiated	9 – 150 kHz	±2.5 dB
	0.15 – 30 MHz	±2.3 dB
	30 – 1000 MHz	±2.6 dB
	1 – 18 GHz	±3.6 dB
	18 – 40 GHz	±3.8 dB
	40 – 200 GHz	N/A
Temperature		±0.8 °C
Humidity		±5 %
DC and low frequency voltages		±0.9%
Time		±1.4 %
Duty Cycle		±0.6 %

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**
11b	1	1-11 Mbps	1 Mbps
11g	1	6-54 Mbps	6 Mbps
HT20	2	MCS 8-15	MCS 8
HT40	2	MCS 8-15	MCS 8

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). The EUT supports HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 800ns.
Note 2: Modulation modes consist below configuration:
11b: IEEE 802.11b, 11g: IEEE 802.11g, HT20/HT40: IEEE 802.11n
Note 3: RF output power specifies that Maximum Peak Conducted Output Power.

2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (2400-2483.5MHz band)							
Test Software Version	Realtek 11n 8192E USB WLAN MP Diagnostic Program_ 0.0022.06.20140731						
Modulation Mode	**N_{TX}**	**Test Frequency (MHz)**					
		NCB: 20MHz			**NCB: 40MHz**		
		2412	**2437**	**2462**	**2422**	**2437**	**2452**
11b	1	40	40	38	-	-	-
11g	1	43	43	44	-	-	-
HT20	2	40,40	41,41	43,43	-	-	-
HT40	2	-	-	-	42,42	44,44	45,45

2.3 The Worst Case Measurement Configuration

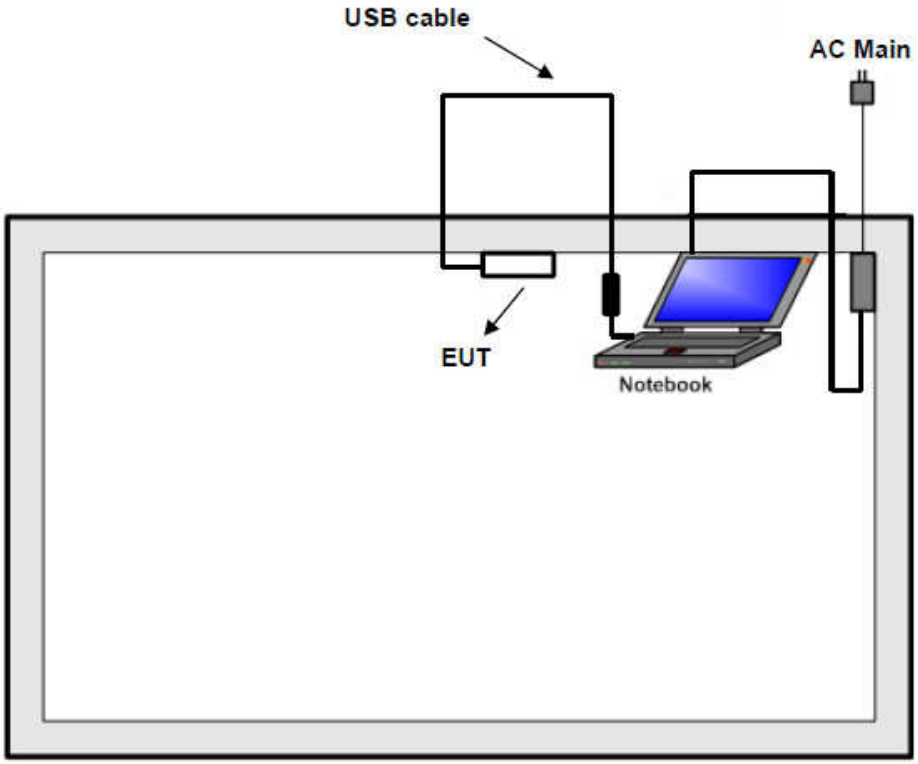
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	EUT with notebook via USB Cable

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power, Power Spectral Density, 6 dB Bandwidth
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11b, 11g, HT20, HT40

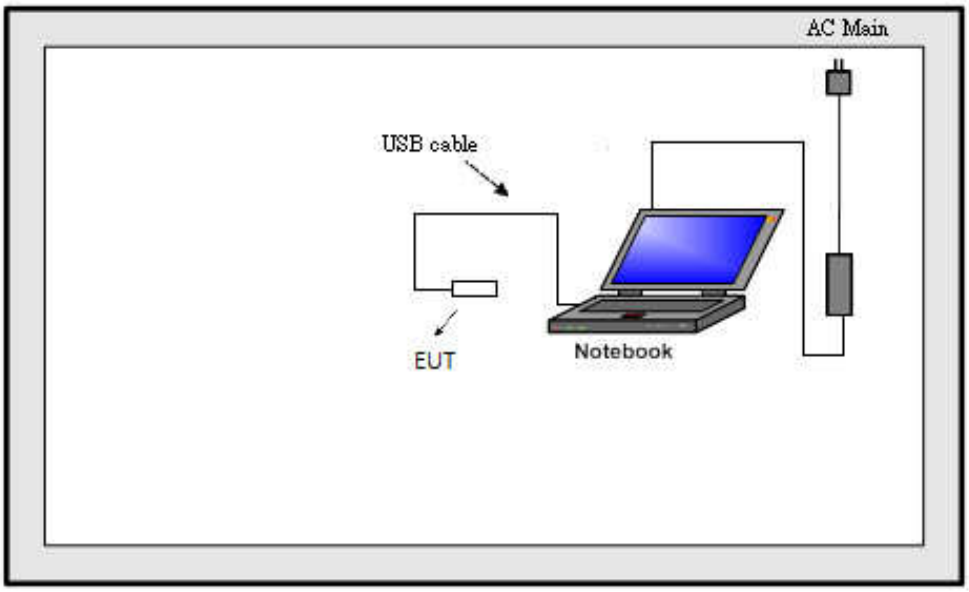
The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions		
Test Condition	Radiated measurement		
User Position	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions.		
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed three orthogonal planes.		
Operating Mode	Operating Mode Description		
Radiated Emissions	1. EUT with notebook via USB Cable		
Modulation Mode	11b, 11g, HT20, HT40		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
Worst Planes of EUT	V		

2.4 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Test Setup Diagram - Radiated 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

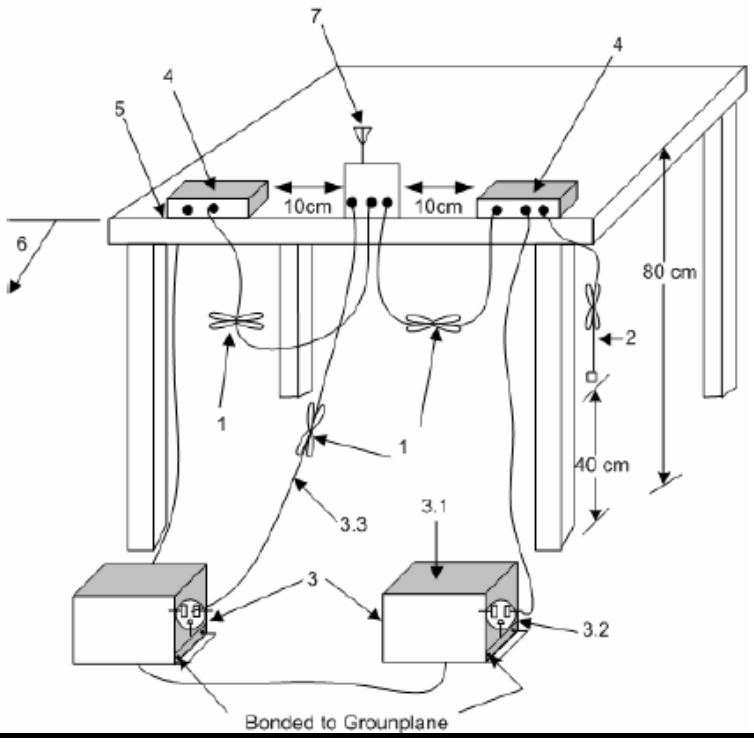
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

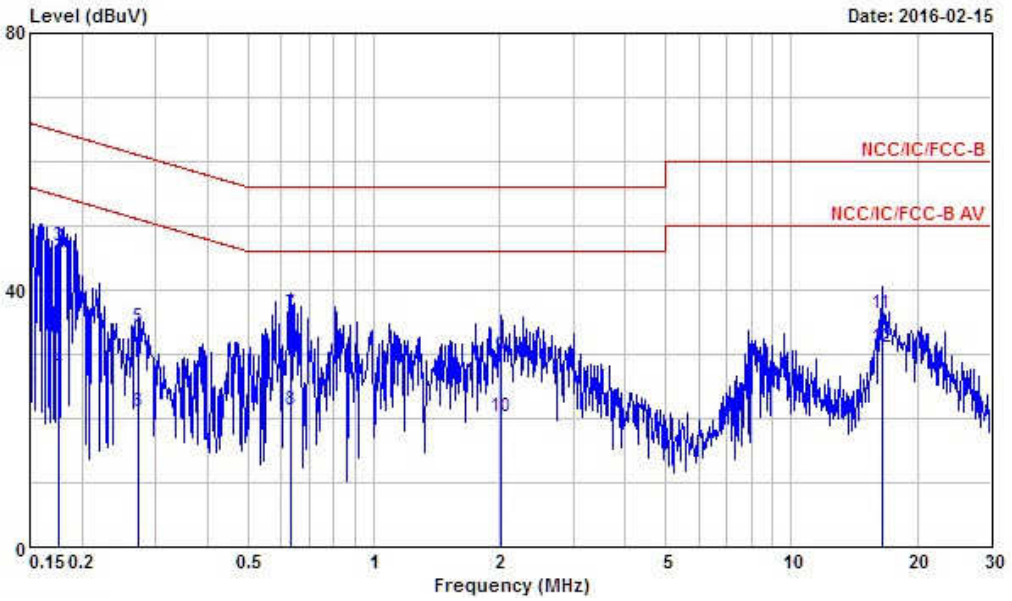
3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

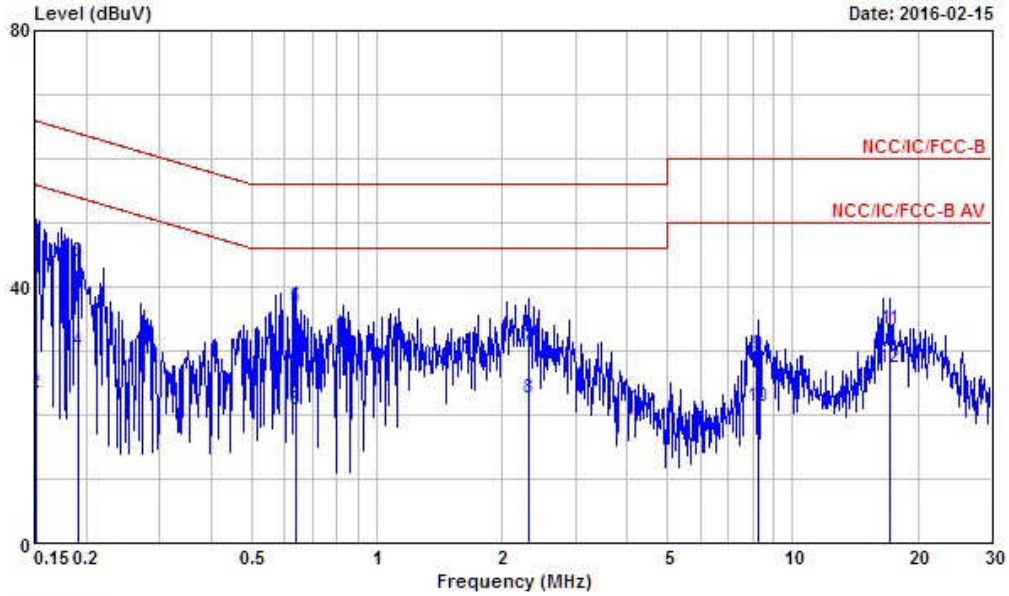
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	EUT with notebook via USB Cable		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.1500000	49.40	-16.60	66.00	49.08	0.10	0.22	QP
2	0.1500000	25.33	-30.67	56.00	25.01	0.10	0.22	Average
3	@0.1758420	46.96	-17.72	64.68	46.59	0.11	0.26	QP
4	0.1758420	27.52	-27.16	54.68	27.15	0.11	0.26	Average
5	0.2715230	34.28	-26.79	61.07	33.96	0.11	0.21	QP
6	0.2715230	21.06	-30.01	51.07	20.74	0.11	0.21	Average
7	0.6338280	36.36	-19.64	56.00	36.14	0.12	0.10	QP
8	0.6338280	21.39	-24.61	46.00	21.17	0.12	0.10	Average
9	2.020	29.63	-26.37	56.00	29.18	0.15	0.30	QP
10	2.020	20.37	-25.63	46.00	19.92	0.15	0.30	Average
11	16.490	36.26	-23.74	60.00	35.71	0.35	0.20	QP
12	16.490	30.94	-19.06	50.00	30.39	0.35	0.20	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
Operating Function	EUT with notebook via USB Cable		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.1515980	47.03	-18.88	65.91	46.70	0.11	0.22	QP
2	0.1515980	23.31	-32.60	55.91	22.98	0.11	0.22	Average
3	0.1903870	43.90	-20.12	64.02	43.50	0.11	0.29	QP
4	0.1903870	30.13	-23.89	54.02	29.73	0.11	0.29	Average
5	0.6371950	36.78	-19.22	56.00	36.55	0.13	0.10	QP
6	0.6371950	20.88	-25.12	46.00	20.65	0.13	0.10	Average
7	2.310	30.55	-25.45	56.00	30.14	0.15	0.26	QP
8	2.310	22.50	-23.50	46.00	22.09	0.15	0.26	Average
9	8.280	29.49	-30.51	60.00	29.07	0.24	0.18	QP
10	8.280	21.21	-28.79	50.00	20.79	0.24	0.18	Average
11	17.200	33.36	-26.64	60.00	32.83	0.33	0.20	QP
12	17.200	27.29	-22.71	50.00	26.76	0.33	0.20	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 6dB Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
☒ 6 dB bandwidth ≥ 500 kHz.

3.2.2 Measuring Instruments

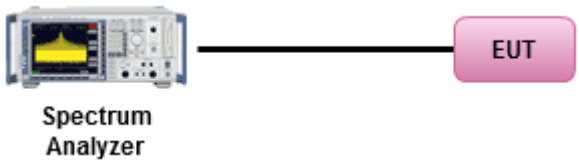
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method			
☒	For the emission bandwidth shall be measured using one of the options below:		
	☒	Refer as FCC KDB 558074 D01 v03r04, clause 8.1 Option 1 for 6 dB bandwidth measurement.	
	☐	Refer as FCC KDB 558074 D01 v03r04, clause 8.2 Option 2 for 6 dB bandwidth measurement.	
	☐	Refer as ANSI C63.10, clause 6.9 for occupied bandwidth testing.	
☒	For conducted measurement.		
	☒	The EUT supports single transmit chain and measurements performed on this transmit chain 1.	
	☐	The EUT supports diversity transmitting and the results on transmit chain port 2 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

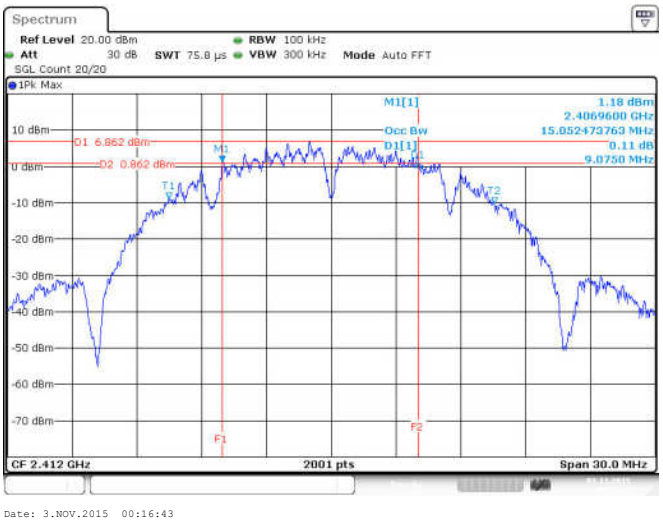
Emission Bandwidth



3.2.5 Test Result of Emission Bandwidth

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 1	Chain Port 2
11b	1	2412	15.05	-	9.07	-
11b	1	2437	15.00	-	9.82	-
11b	1	2462	14.78	-	10.05	-
11g	1	2412	16.46	-	16.56	-
11g	1	2437	16.52	-	16.54	-
11g	1	2462	16.46	-	16.51	-
HT20	2	2412	17.66	17.64	17.79	17.73
HT20	2	2437	17.70	17.76	17.73	17.61
HT20	2	2462	17.70	17.70	17.82	17.73
HT40	2	2422	36.06	36.14	36.32	36.40
HT40	2	2437	36.14	36.10	36.32	36.08
HT40	2	2452	36.06	36.10	36.32	36.32
Limit			N/A		≥500 kHz	
Result			Complied			
Note 1: N_{TX} = Number of Transmit Chains						

Worst Emission Bandwidth Plots



3.3 RF Output Power

3.3.1 RF Output Power Limit

RF Output Power Limit			
Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit			
☒	2400-2483.5 MHz Band:		
	☒	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)	
	☐	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)$ dBm	
	☐	Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm	
	☐	Smart antenna system (SAS):	
		☐	Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		☐	Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		☐	Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3 + 8$dB dBm
e.i.r.p. Power Limit:			
☒	2400-2483.5 MHz Band		
	☒	Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)	
	☐	Point-to-point systems (P2P): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}])$ dBm	
	☐	Smart antenna system (SAS)	
		☐	Single beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm
		☐	Overlap beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm
		☐	Aggregate power on all beams: $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX} + 8])$ dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in dBi. **P_{eirp}** = e.i.r.p. Power in dBm.			

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 Peak Conducted Output Power
	☐ Refer as FCC KDB 558074 D01 v03r04, clause 9.1.1 (RBW ≥ EBW method).
	☒ Refer as FCC KDB 558074 D01 v03r04, clause 9.1.2 (peak power meter for VBW ≥ DTS BW).
☒	Maximum Conducted Output Power
	[duty cycle ≥ 98% or external video / power trigger]
	☐ Refer as FCC KDB 558074 D01 v03r04, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).
	☐ Refer as FCC KDB 558074 D01 v03r04, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)
	duty cycle < 98% and average over on/off periods with duty factor
	☐ Refer as FCC KDB 558074 D01 v03r04, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
	☐ Refer as FCC KDB 558074 D01 v03r04, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
	RF power meter and average over on/off periods with duty factor or gated trigger
	☒ Refer as FCC KDB 558074 D01 v03r04, clause 9.2.3 Method AVGPM (using an RF average power meter).
☒	For conducted measurement.
	☐ The EUT supports single transmit chain and measurements performed on this transmit chain 1.
	☐ The EUT supports diversity transmitting and the results on transmit chain port 2 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)		2.12	2.00	-	-
Modulation Mode	**DG (dBi)**	**N_{TX}**	**N_{SS} (Min.)**	**STBC**	**Array Gain (dB)**
11b	2.12	1	1	-	0
11g	2.12	1	1	-	0
HT20	5.07	2	1	-	3.01 (Note3)
HT40	5.07	2	1	-	3.01 (Note3)

Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows:
Any transmit signals are correlated, Directional Gain = $G_{ANT} + 10 \log(N_{TX})$
All transmit signals are completely uncorrelated, Directional Gain = G_{ANT}

Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows:
Any transmit signals are correlated, Directional Gain $=10 \log[(10^{G1/20} +\ldots + 10^{GN/20})^2 /N_{TX}]$
All transmit signals are completely uncorrelated, Directional Gain $= 10 \log[(10^{G1/10} +\ldots + 10^{GN/10)}/N_{TX}]$

Note 3: For Spatial Multiplexing, Directional Gain (DG) = $G_{ANT} + 10 \log(N_{TX}/N_{SS})$,
where Nss = the number of independent spatial streams data.

Note 4: 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 Peak Conducted Output Power

Maximum Peak Conducted Output Power Result									
Modulation Mode	N_{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit
11b	1	2412	21.41	-	21.41	30.00	2.12	23.53	36.00
11b	1	2437	21.71	-	21.71	30.00	2.12	23.83	36.00
11b	1	2462	21.01	-	21.01	30.00	2.12	23.13	36.00
11g	1	2412	21.58	-	21.58	30.00	2.12	23.70	36.00
11g	1	2437	21.41	-	21.41	30.00	2.12	23.53	36.00
11g	1	2462	21.52	-	21.52	30.00	2.12	23.64	36.00
HT20	2	2412	23.60	23.12	26.38	30.00	5.07	31.45	36.00
HT20	2	2437	24.48	24.13	27.32	30.00	5.07	32.39	36.00
HT20	2	2462	23.97	24.01	27.00	30.00	5.07	32.07	36.00
HT40	2	2422	23.27	22.87	26.08	30.00	5.07	31.16	36.00
HT40	2	2437	23.89	23.52	26.72	30.00	5.07	31.79	36.00
HT40	2	2452	24.13	23.66	26.91	30.00	5.07	31.98	36.00
Result			Complied						

3.3.7 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power Result									
Modulation Mode	N_{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit
11b	1	2412	19.33	-	19.33	30.00	2.12	21.45	36.00
11b	1	2437	19.64	-	19.64	30.00	2.12	21.76	36.00
11b	1	2462	18.73	-	18.73	30.00	2.12	20.85	36.00
11g	1	2412	16.68	-	16.68	30.00	2.12	18.80	36.00
11g	1	2437	16.58	-	16.58	30.00	2.12	18.70	36.00
11g	1	2462	16.73	-	16.73	30.00	2.12	18.85	36.00
HT20	2	2412	15.33	14.73	18.05	30.00	5.07	23.12	36.00
HT20	2	2437	16.69	16.17	19.45	30.00	5.07	24.52	36.00
HT20	2	2462	16.07	16.24	19.17	30.00	5.07	24.24	36.00
HT40	2	2422	14.79	14.62	17.72	30.00	5.07	22.79	36.00
HT40	2	2437	15.74	15.57	18.67	30.00	5.07	23.74	36.00
HT40	2	2452	16.02	15.93	18.99	30.00	5.07	24.06	36.00
Result			Complied						

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
☒ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

3.4.2 Measuring Instruments

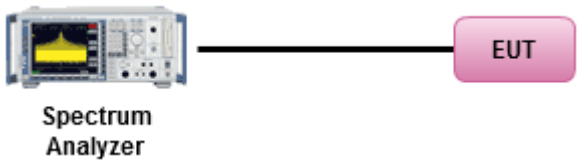
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method			
☒	Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒	Refer as FCC KDB 558074 D01 v03r04, clause 10.2 Method PKPSD (RBW=3-100kHz;detector=peak).	
	[duty cycle ≥ 98% or external video / power trigger]		
	☐	Refer as FCC KDB 558074 D01 v03r04, clause 10.3 Method AVGPSD-1 (spectral trace averaging).	
	☐	Refer as FCC KDB 558074 D01 v03r04, clause 10.4 Method AVGPSD-1 Alt. (slow sweep speed)	
	duty cycle < 98% and average over on/off periods with duty factor		
	☐	Refer as FCC KDB 558074 D01 v03r04, clause 10.5 Method AVGPSD-2 (spectral trace averaging).	
	☐	Refer as FCC KDB 558074 D01 v03r04, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)	
☒	For conducted measurement.		
	☒	The EUT supports single transmit chain and measurements performed on this transmit chain 1.	
	☐	The EUT supports diversity transmitting and the results on transmit chain port 2 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 spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N_{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
		☐	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.

3.4.4 Test Setup

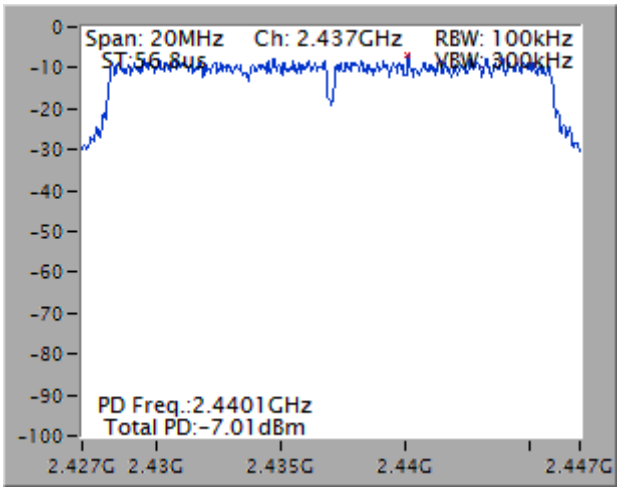
Power Spectral Density



3.4.5 Test Result of Power Spectral Density

Power Spectral Density Result				
Condition			Power Spectral Density	
Modulation Mode	N_{TX}	Freq. (MHz)	Sum Chain (dBm/100kHz)	PSD Limit (dBm/3kHz)
11b	1	2412	-7.72	8.00
11b	1	2437	-7.26	8.00
11b	1	2462	-7.55	8.00
11g	1	2412	-13.27	8.00
11g	1	2437	-13.41	8.00
11g	1	2462	-12.94	8.00
HT20	2	2412	-10.47	8.00
HT20	2	2437	-7.01	8.00
HT20	2	2462	-9.67	8.00
HT40	2	2422	-13.93	8.00
HT40	2	2437	-10.96	8.00
HT40	2	2452	-12.85	8.00
Result			Complied	

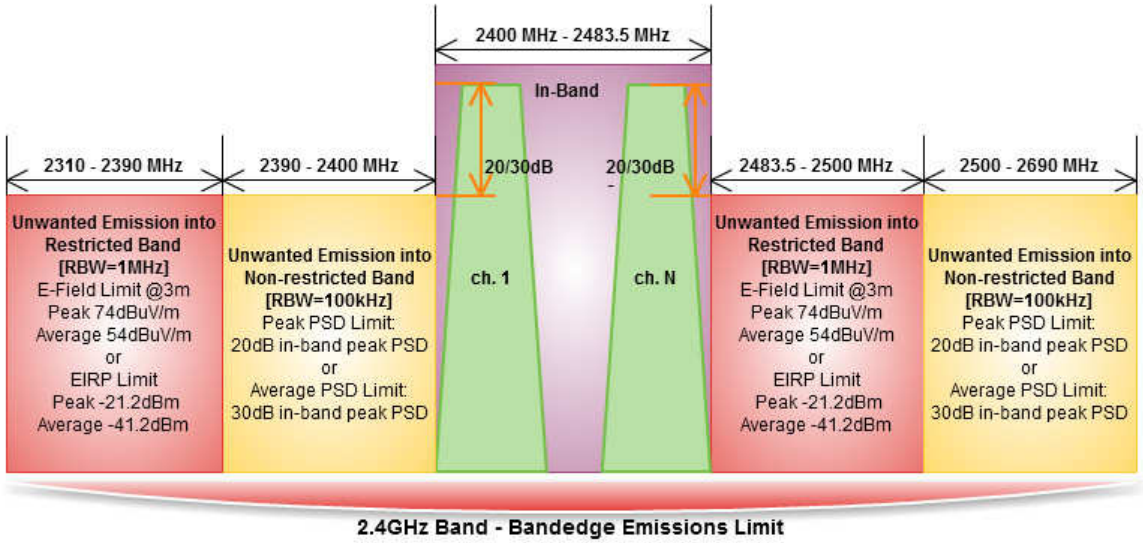
Worst Power Spectral Density Plots



3.5 Transmitter Radiated Bandedge Emissions

3.5.1 Transmitter Radiated Bandedge Emissions Limit

Transmitter Radiated Bandedge Emissions Limit



Remark: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits per 15.247(d).

3.5.2 Measuring Instruments

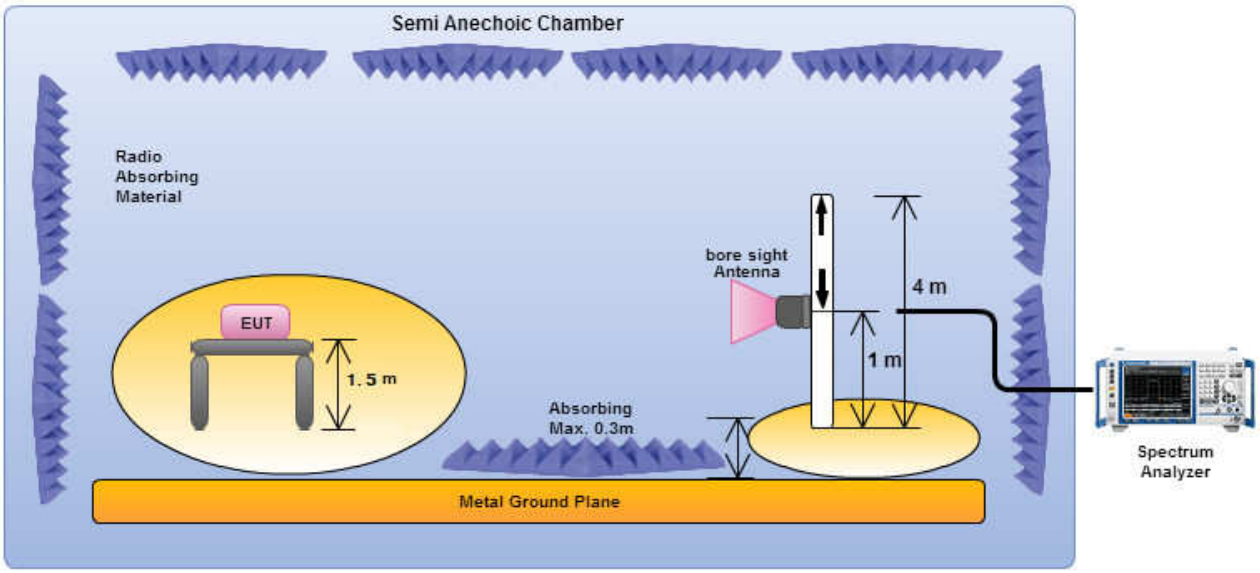
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method			
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].		
☒	Refer as ANSI C63.10.3, clause 6.10.3 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.		
☒	For the transmitter unwanted emissions shall be measured using following options below:		
	☒	Refer as FCC KDB 558074 D01 v03r04, clause 11 for unwanted emissions into non-restricted bands.	
	☒	Refer as FCC KDB 558074 D01 v03r04, clause 12 for unwanted emissions into restricted bands.	
		☒	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		☐	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		☐	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		☐	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074 D01 v03r04, clause 11.3 and 12.2.4 measurement procedure peak limit.
☒	For the transmitter bandedge emissions shall be measured using following options below:		
	☐	Refer as FCC KDB 558074 D01 v03r04, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).	
	☒	Refer as ANSI C63.10, clause 6.10 for band-edge testing.	
	☒	Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.	
☒	For radiated measurement, refer as FCC KDB 558074 D01 v03r04, clause 12.2.7 and ANSI C63.10, clause 6.6. Test distance is 3m.		

3.5.4 Test Setup

Transmitter Radiated Bandedge Emissions



Electric field tests shall be performed in transmitter bandedge emissions using a calibrated horn antenna.

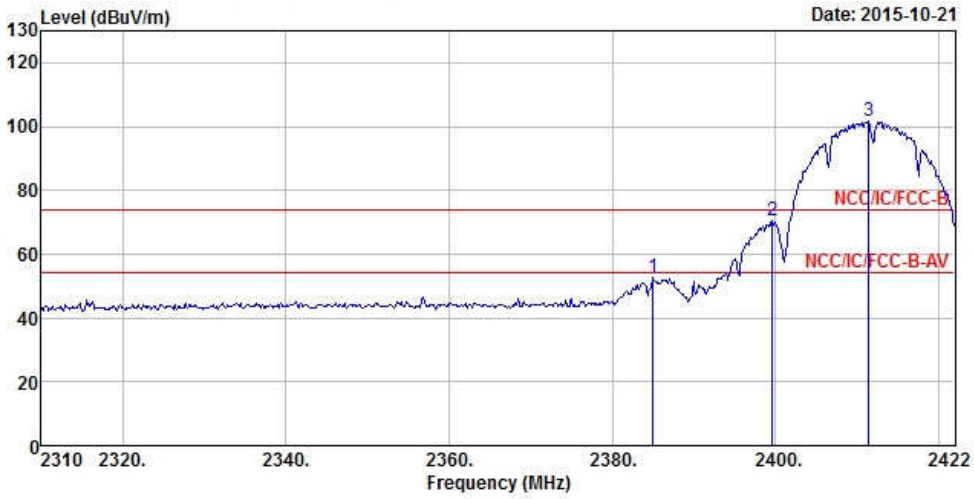
3.5.5 Test Result of Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)								
Modulation	N_{TX}	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	101.51	2399.60	70.30	31.21	20	H
11b	1	2462	101.18	2515.00	47.26	53.92	20	H
11g	1	2412	95.70	2399.94	62.90	32.80	20	H
11g	1	2462	95.36	2503.40	46.30	49.06	20	H
HT20	2	2412	96.63	2400.00	63.29	33.34	20	H
HT20	2	2462	94.42	2500.60	46.18	48.24	20	H
HT40	2	2422	92.86	2400.00	63.84	29.02	20	H
HT40	2	2452	91.63	2502.08	45.94	45.69	20	H
Note 1: Measurement worst emissions of receive antenna polarization								

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
Modulation Mode	N_{TX}	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
11b	1	2412	3	2385.49	61.22	74	2386.61	52.46	54	H
11b	1	2462	3	2488.20	57.84	74	2487.40	47.09	54	H
11g	1	2412	3	2389.52	64.01	74	2389.74	52.02	54	H
11g	1	2462	3	2483.60	65.55	74	2483.60	52.09	54	H
HT20	2	2412	3	2389.52	63.25	74	2389.97	52.67	54	H
HT20	2	2462	3	2485.60	64.48	74	2483.50	52.34	54	H
HT40	2	2422	3	2388.67	63.97	74	2389.99	52.89	54	H
HT40	2	2452	3	2484.80	63.99	74	2484.08	52.99	54	H
Note 1: Measurement worst emissions of receive antenna polarization.										

3.5.6 Test Plots of Transmitter Radiated Bandedge Emissions

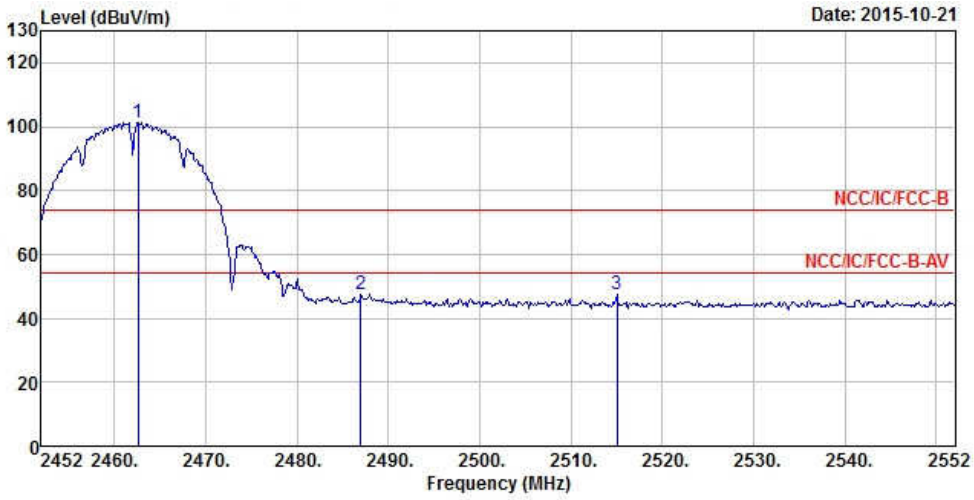
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2385.04	52.80	-21.20	74.00	51.55	31.80	4.00	34.55	Peak
2	2399.60	70.30			68.96	31.90	4.00	34.56	Peak
3	2411.47	101.51	27.51	74.00	100.07	32.00	4.00	34.56	Peak

Note: 2399.60 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

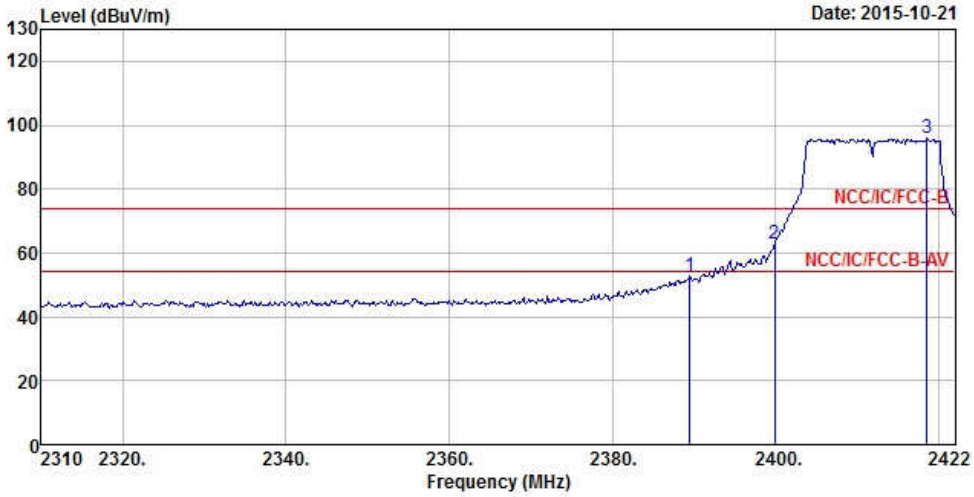
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11b	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2462.60	101.18	27.18	74.00	99.39	32.30	4.07	34.58	Peak
2	2487.00	47.58	-26.42	74.00	45.70	32.40	4.07	34.59	Peak
3	2515.00	47.26			45.29	32.46	4.11	34.60	Peak

Note: 2515.00 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

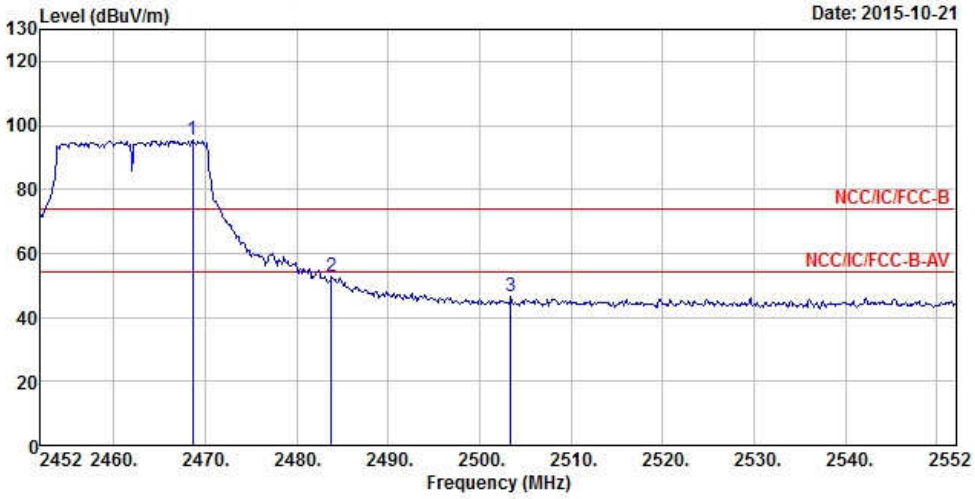
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.52	52.97	-21.03	74.00	51.62	31.90	4.00	34.55	Peak
2	2399.94	62.90			61.56	31.90	4.00	34.56	Peak
3	2418.64	95.70	21.70	74.00	94.27	32.00	4.00	34.57	Peak

Note: 2399.94 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

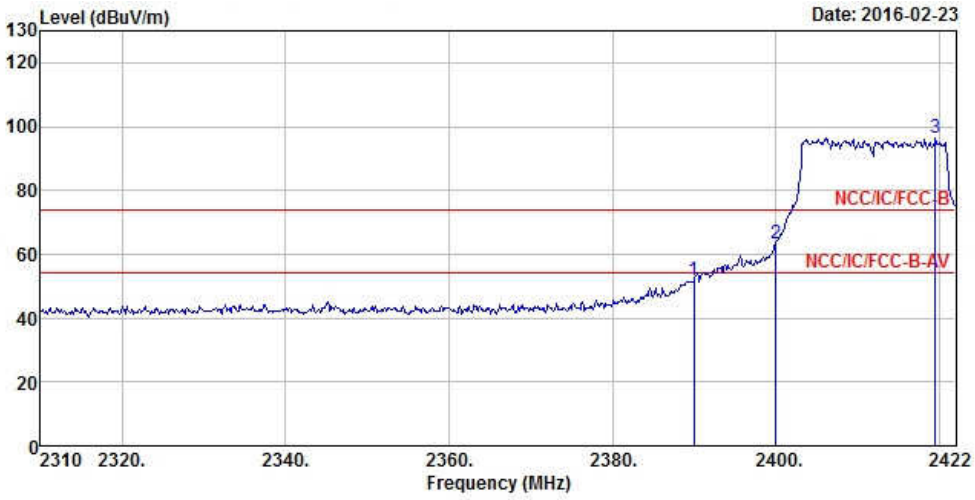
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11g	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2468.60	95.36	21.36	74.00	93.58	32.30	4.07	34.59	Peak
2	2483.80	52.59	-21.41	74.00	50.71	32.40	4.07	34.59	Peak
3	2503.40	46.30			44.29	32.50	4.11	34.60	Peak

Note: 2503.40 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

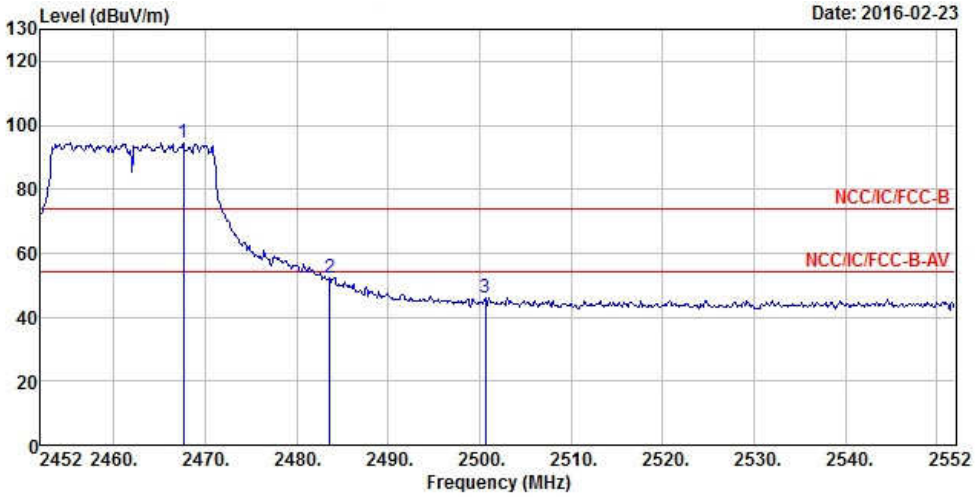
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11n HT20	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.97	51.57	-22.43	74.00	51.61	31.22	4.28	35.54	Peak
2	2400.00	63.29			63.33	31.22	4.28	35.54	Peak
3	2419.54	96.63	22.63	74.00	96.52	31.38	4.28	35.55	Peak

Note: 2400.00 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

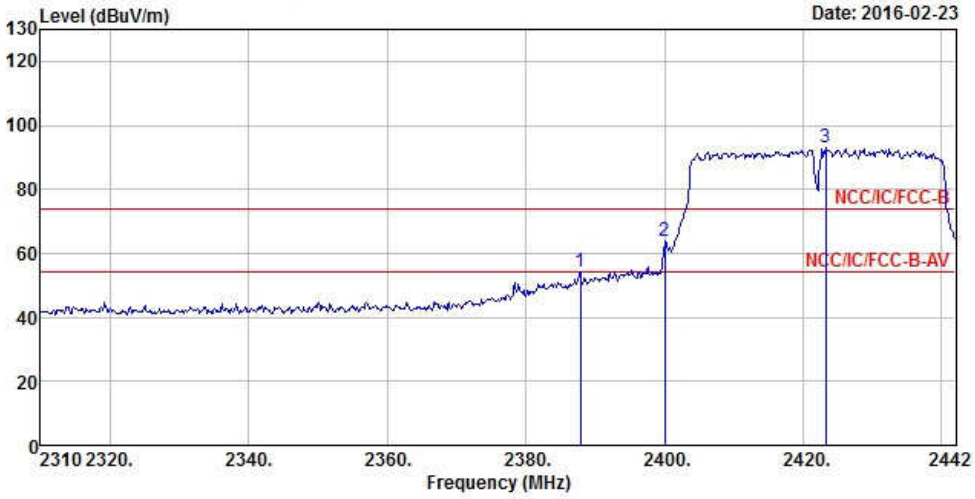
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11n HT20	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2467.60	94.42	20.42	74.00	94.10	31.54	4.35	35.57	Peak
2	2483.60	52.42	-21.58	74.00	52.02	31.62	4.35	35.57	Peak
3	2500.60	46.18			45.70	31.70	4.35	35.57	Peak

Note: 2500.60 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

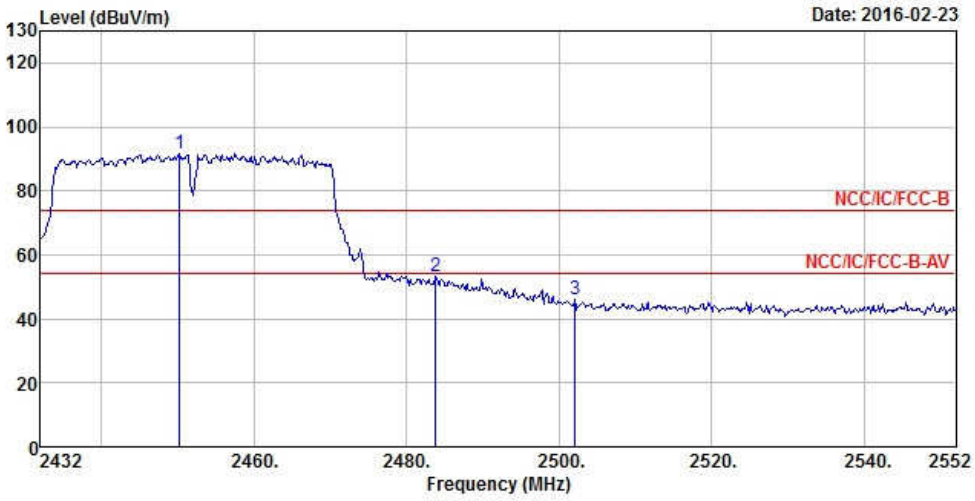
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11n HT40	**Test Freq. (MHz)**	2422
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2387.88	54.00	-20.00	74.00	54.03	31.22	4.28	35.53	Peak
2	2400.00	63.84			63.88	31.22	4.28	35.54	Peak
3	2423.26	92.86	18.86	74.00	92.75	31.38	4.28	35.55	Peak

Note: 2400.00 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

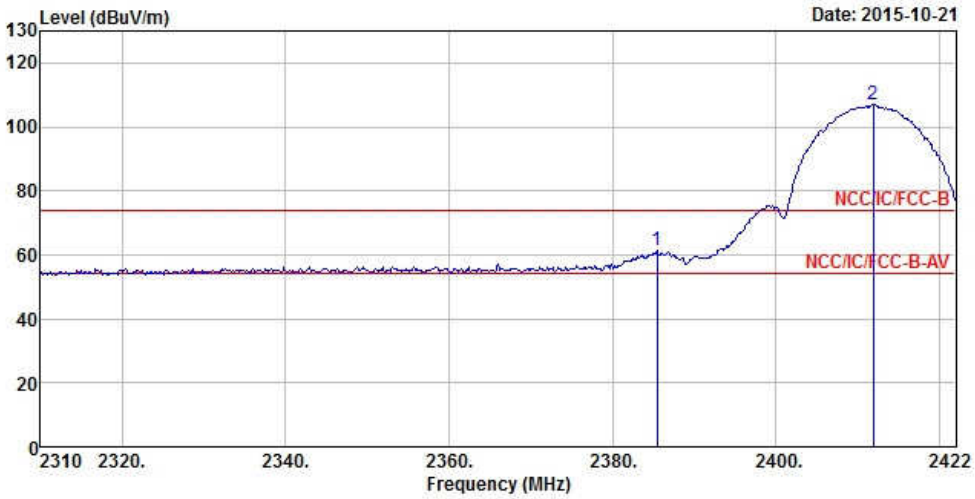
Radiated Bandedge Emissions (Non-restricted Band)			
Modulation Mode	11n HT40	**Test Freq. (MHz)**	2452
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2450.24	91.63	17.63	74.00	91.41	31.46	4.32	35.56	Peak
2	2483.84	53.24	-20.76	74.00	52.84	31.62	4.35	35.57	Peak
3	2502.08	45.94			45.43	31.70	4.38	35.57	Peak

Note: 2502.08 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.

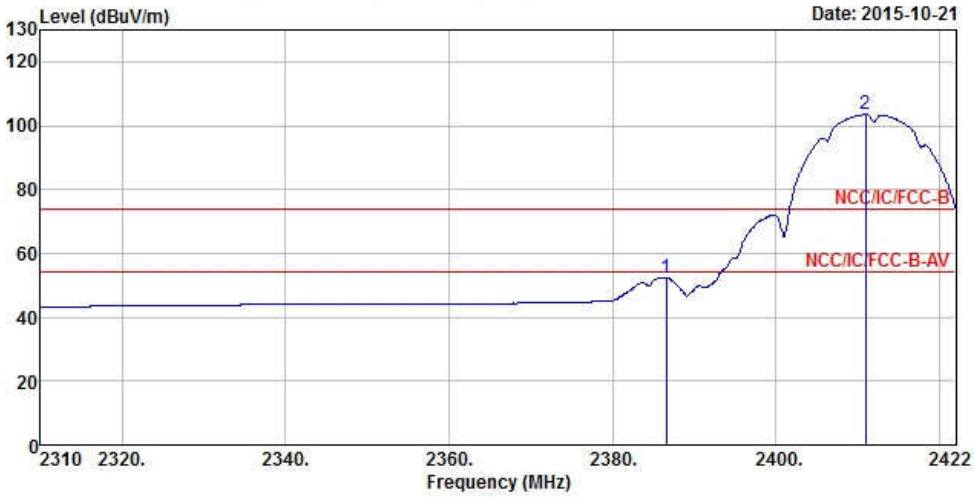
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2385.49	61.22	-12.78	74.00	59.97	31.80	4.00	34.55	Peak
2	2411.92	107.16			105.72	32.00	4.00	34.56	Peak

Note: 2411.92 MHz is fundamental signal which can be ignored.

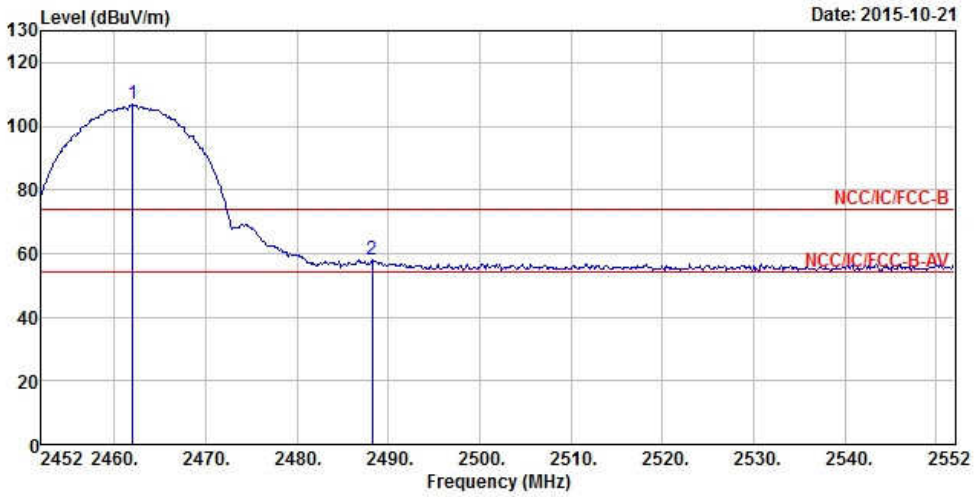
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2386.61	52.46	-1.54	54.00	51.11	31.90	4.00	34.55	Average
2	2411.02	103.59			102.15	32.00	4.00	34.56	Average

Note: 2411.02 MHz is fundamental signal which can be ignored.

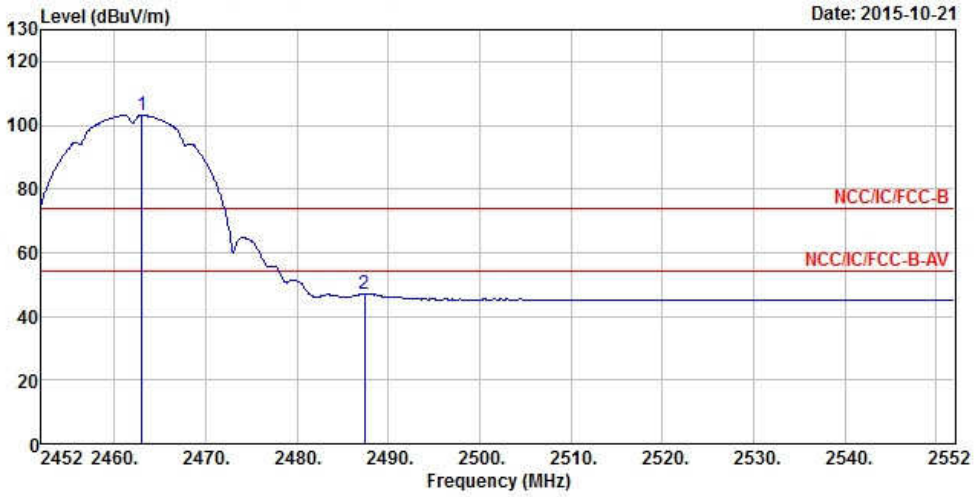
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11b	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2462.00	106.79	-----	-----	105.04	32.30	4.03	34.58	Peak
2	2488.20	57.84	-16.16	74.00	55.86	32.50	4.07	34.59	Peak

Note: 2462.00 MHz is fundamental signal which can be ignored.

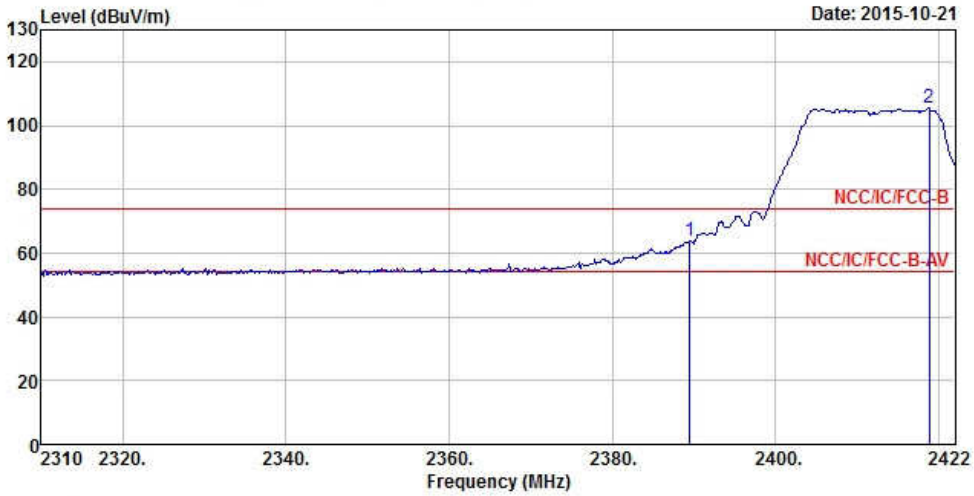
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11b	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2463.00	103.24			101.45	32.30	4.07	34.58	Average
2	2487.40	47.09	-6.91	54.00	45.21	32.40	4.07	34.59	Average

Note: 2463.00 MHz is fundamental signal which can be ignored.

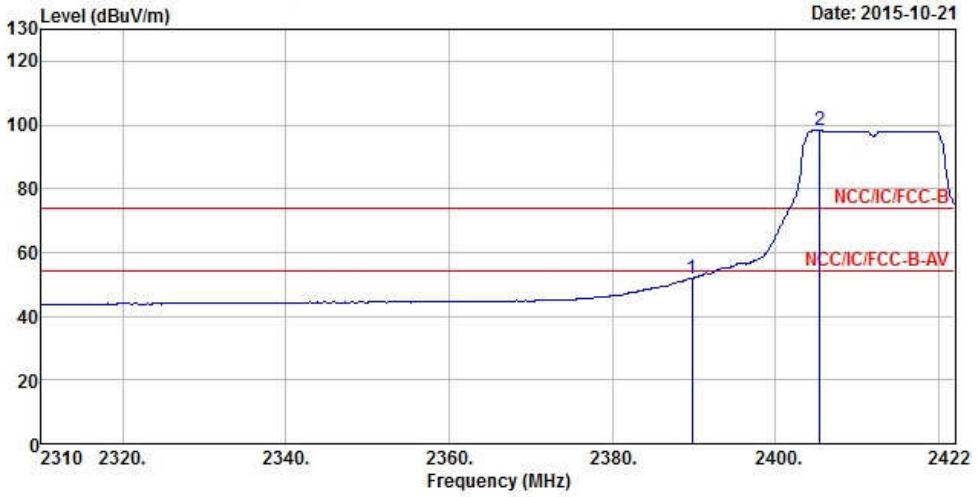
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.52	64.01	-9.99	74.00	62.66	31.90	4.00	34.55	Peak
2	2418.86	105.33			103.90	32.00	4.00	34.57	Peak

Note: 2418.86 MHz is fundamental signal which can be ignored.

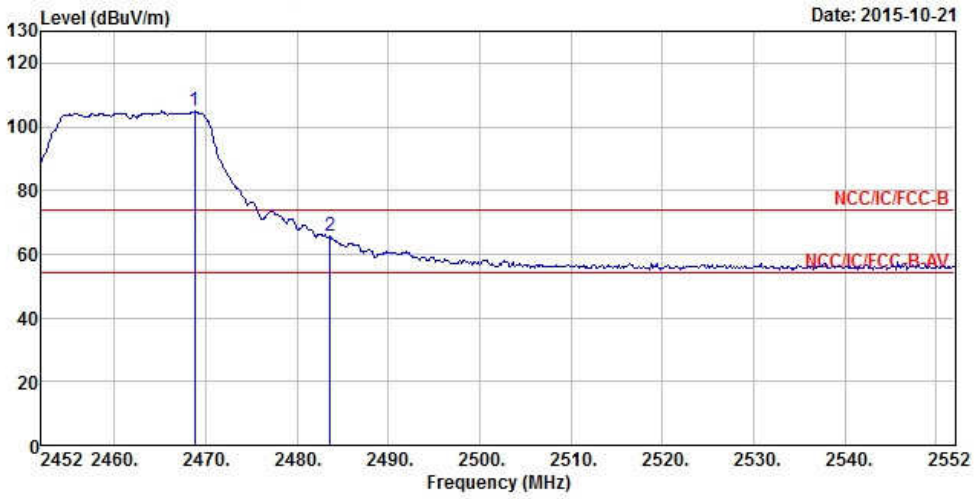
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.74	52.02	-1.98	54.00	50.67	31.90	4.00	34.55	Average
2	2405.42	98.16			96.72	32.00	4.00	34.56	Average

Note: 2405.42 MHz is fundamental signal which can be ignored.

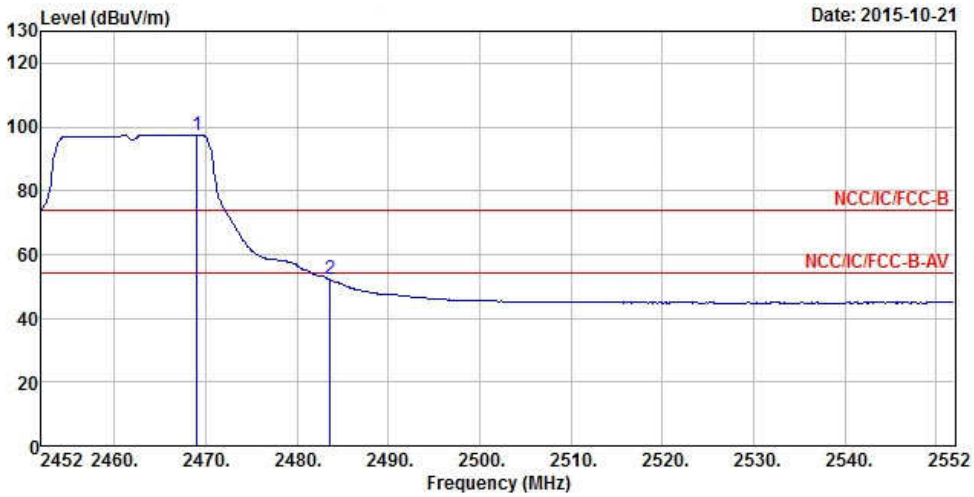
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11g	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2468.80	104.91			103.13	32.30	4.07	34.59	Peak
2	2483.60	65.55	-8.45	74.00	63.67	32.40	4.07	34.59	Peak

Note: 2468.80 MHz is fundamental signal which can be ignored.

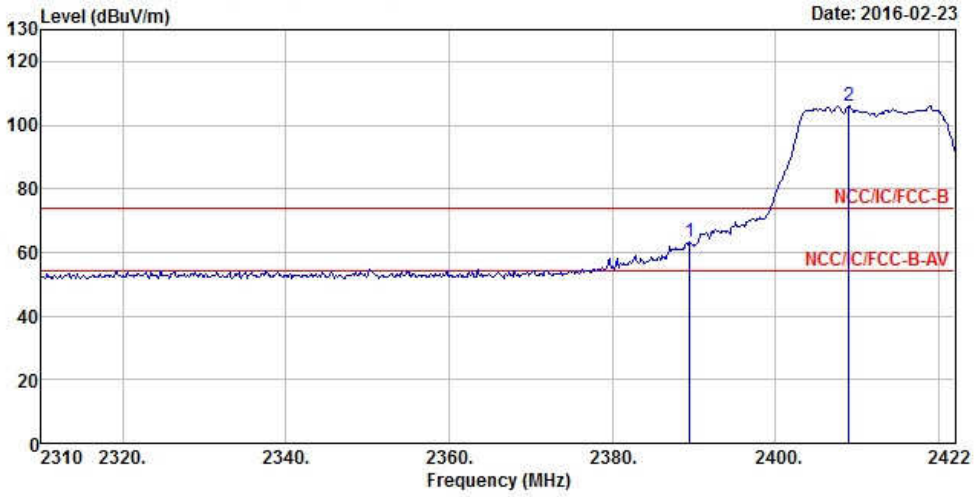
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11g	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2469.00	97.51			95.73	32.30	4.07	34.59	Average
2	2483.60	52.09	-1.91	54.00	50.21	32.40	4.07	34.59	Average

Note: 2469.00 MHz is fundamental signal which can be ignored.

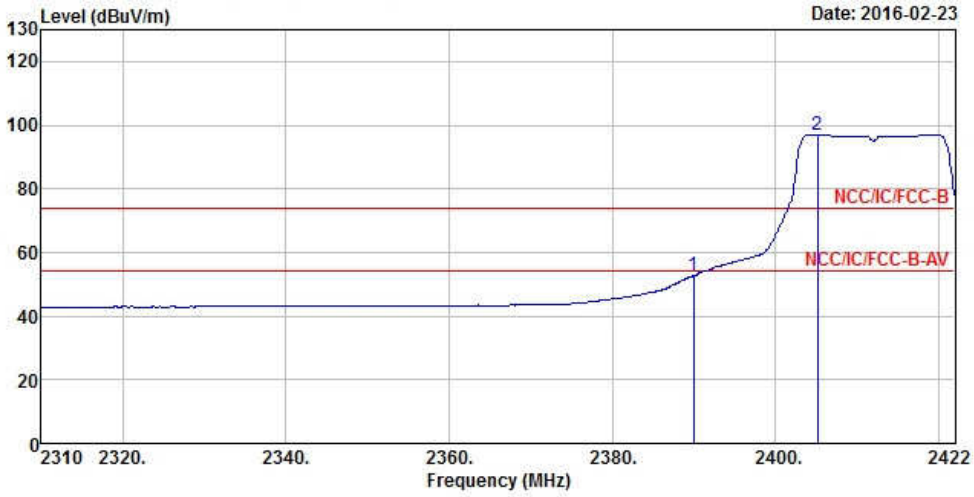
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT20	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.52	63.25	-10.75	74.00	63.28	31.22	4.28	35.53	Peak
2	2409.01	106.11			106.07	31.30	4.28	35.54	Peak

Note: 2409.01 MHz is fundamental signal which can be ignored.

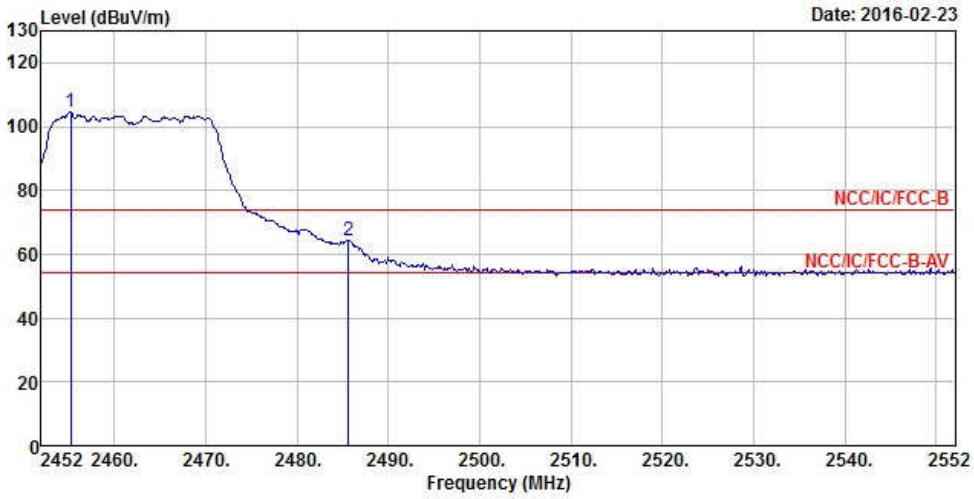
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT20	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.97	52.67	-1.33	54.00	52.71	31.22	4.28	35.54	Average
2	2405.20	97.03			96.99	31.30	4.28	35.54	Average

Note: 2405.20 MHz is fundamental signal which can be ignored.

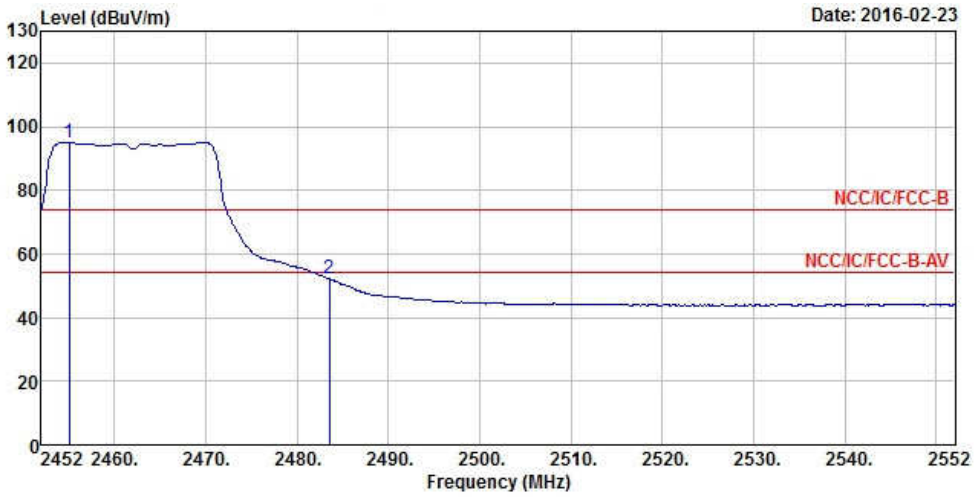
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT20	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2455.20	104.73			104.43	31.54	4.32	35.56	Peak
2	2485.60	64.48	-9.52	74.00	64.08	31.62	4.35	35.57	Peak

Note: 2455.20 MHz is fundamental signal which can be ignored.

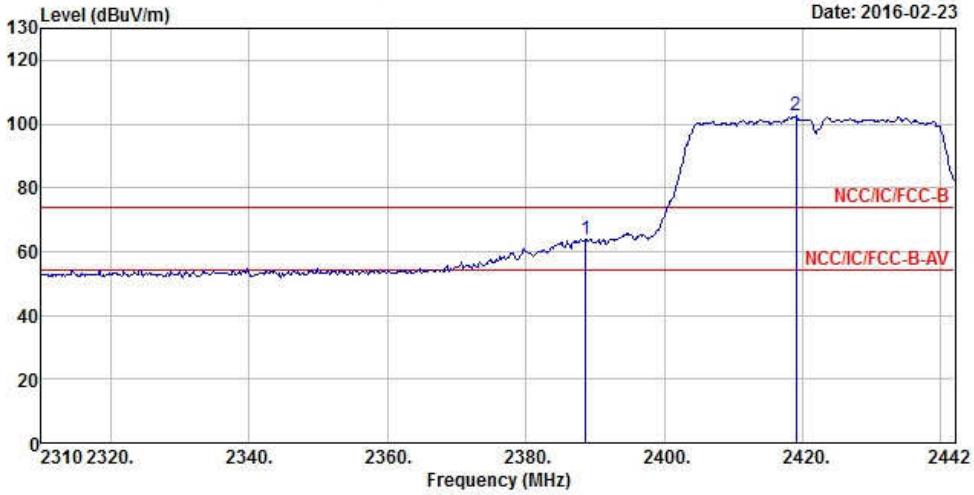
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT20	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2455.00	94.95			94.65	31.54	4.32	35.56	Average
2	2483.50	52.34	-1.66	54.00	51.94	31.62	4.35	35.57	Average

Note: 2455.00 MHz is fundamental signal which can be ignored.

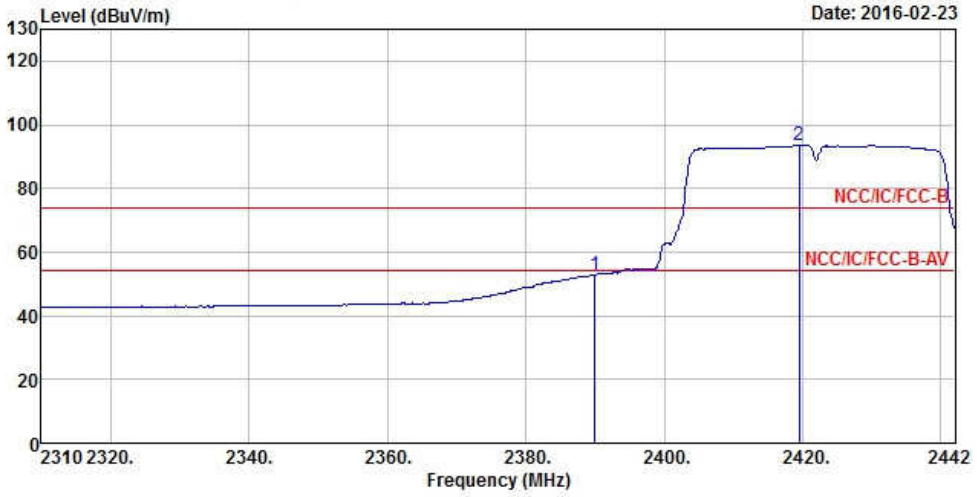
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT40	**Test Freq. (MHz)**	2422
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2388.67	63.97	-10.03	74.00	64.00	31.22	4.28	35.53	Peak
2	2419.03	102.47			102.44	31.30	4.28	35.55	Peak

Note: 2419.03 MHz is fundamental signal which can be ignored.

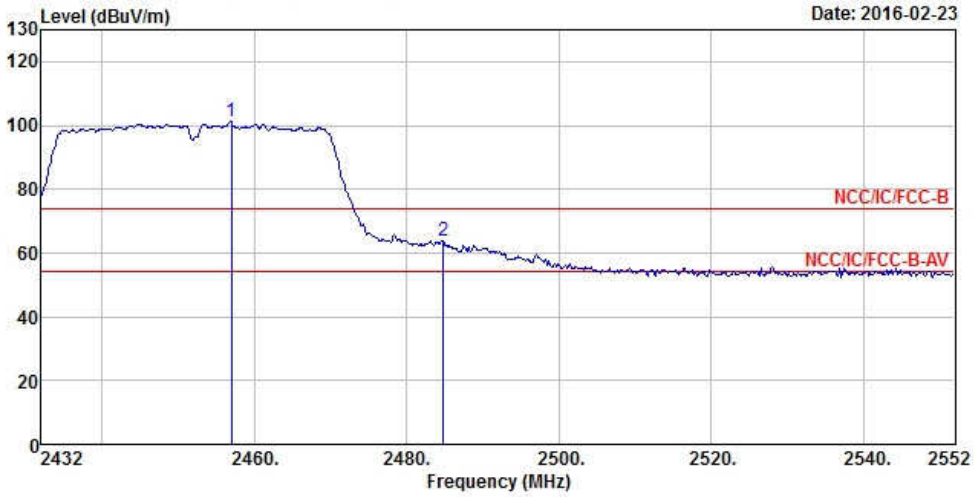
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT40	**Test Freq. (MHz)**	2422
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2389.99	52.89	-1.11	54.00	52.93	31.22	4.28	35.54	Average
2	2419.56	93.41			93.30	31.38	4.28	35.55	Average

Note: 2419.56 MHz is fundamental signal which can be ignored.

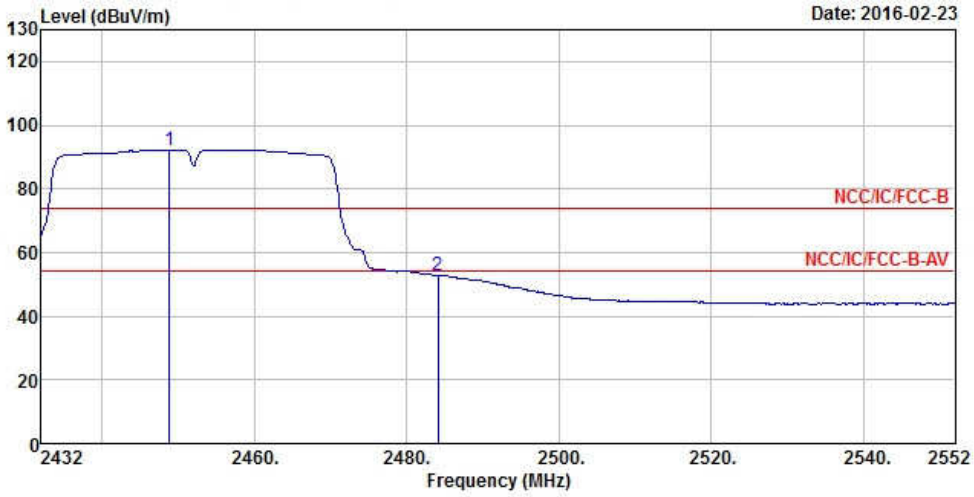
Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT40	**Test Freq. (MHz)**	2452
N_{TX}	1	**Polarization**	H
Remark	Peak		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2456.96	101.08			100.78	31.54	4.32	35.56	Peak
2	2484.80	63.99	-10.01	74.00	63.59	31.62	4.35	35.57	Peak

Note: 2456.96 MHz is fundamental signal which can be ignored.

Radiated Bandedge Emissions (Restricted Band)			
Modulation Mode	11n HT40	**Test Freq. (MHz)**	2452
N_{TX}	1	**Polarization**	H
Remark	Average		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2448.80	92.29			92.07	31.46	4.32	35.56	Average
2	2484.08	52.99	-1.01	54.00	52.59	31.62	4.35	35.57	Average

Note: 2448.80 MHz is fundamental signal which can be ignored.

3.6 Radiated Unwanted Emissions

3.6.1 Radiated Unwanted Emissions Limit

Restricted Band Emissions 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 Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

3.6.2 Measuring Instruments

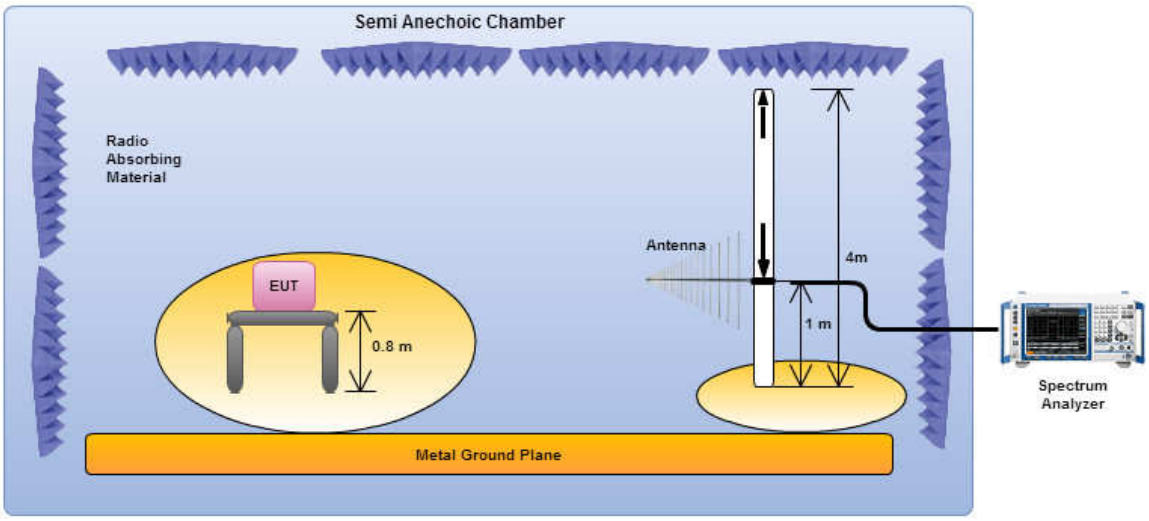
Refer a test equipment and calibration data table in this test report.

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. 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 558074 D01 v03r04, clause 11 for unwanted emissions into non-restricted bands.	
	☒	Refer as FCC KDB 558074 D01 v03r04, clause 12 for unwanted emissions into restricted bands.	
		☒	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		☐	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		☐	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		☐	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074 D01 v03r04, clause 11.3 and 12.2.4 measurement procedure peak limit.
		☒	Refer as FCC KDB 558074 D01 v03r04, clause 12.2.3 measurement procedure Quasi-Peak limit.
☒	For radiated measurement, refer as FCC KDB 558074 D01 v03r04, clause 12.2.7.		
	☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.	
	☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.	
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.	
☒	The any unwanted emissions level shall not exceed the fundamental emission level.		
☒	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.		

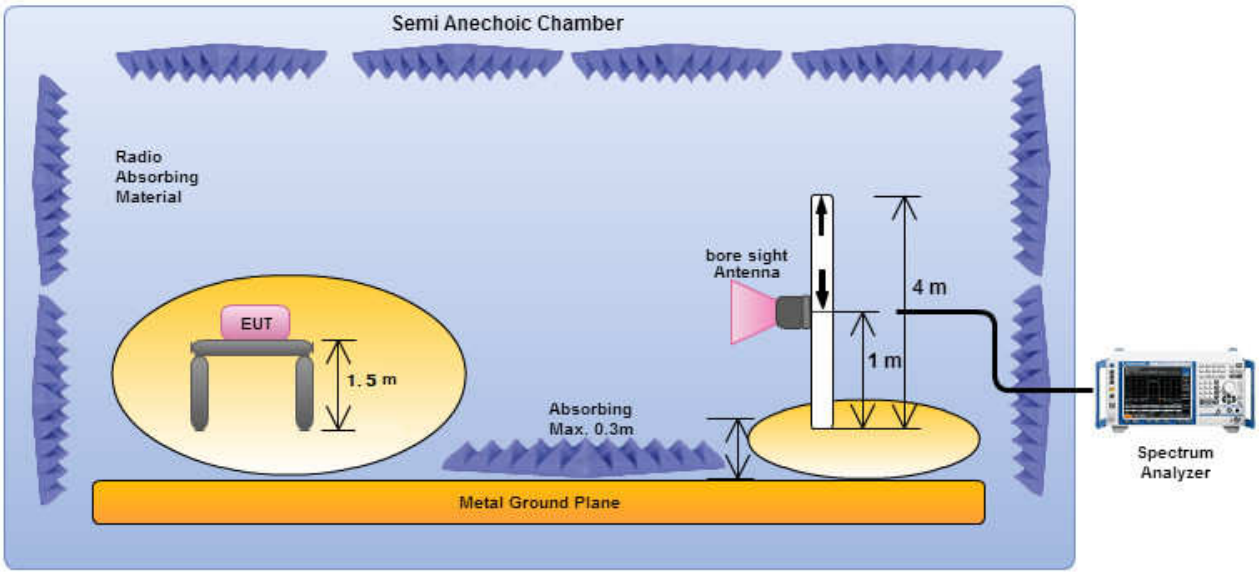
3.6.4 Test Setup

Transmitter Radiated Unwanted Emissions (below 1GHz)



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.

Transmitter Radiated Unwanted Emissions (Above 1GHz)



- Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

3.6.5 Radiated Unwanted Emissions (Below 30MHz)

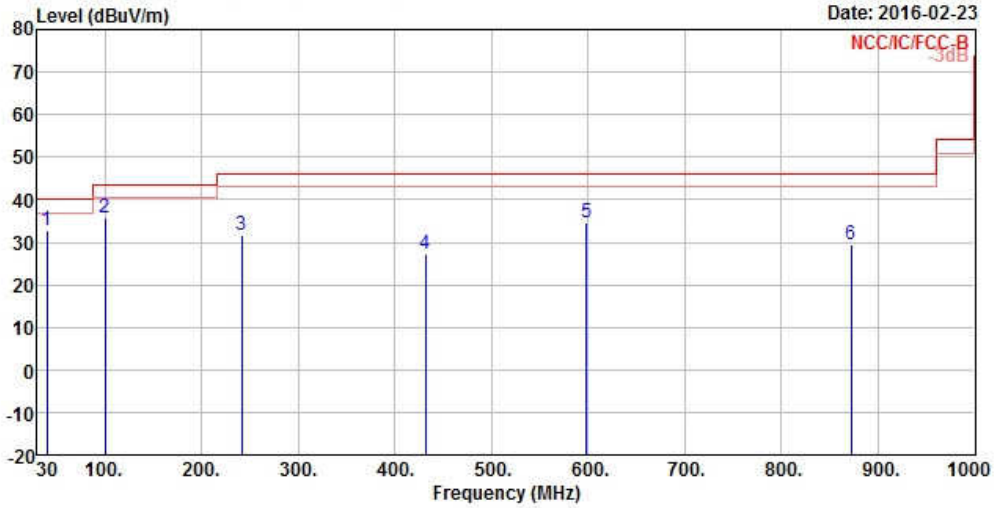
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

3.6.6 Test Result of Radiated Unwanted Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix A.

3.6.7 Radiated Unwanted Emissions (Below 1GHz)

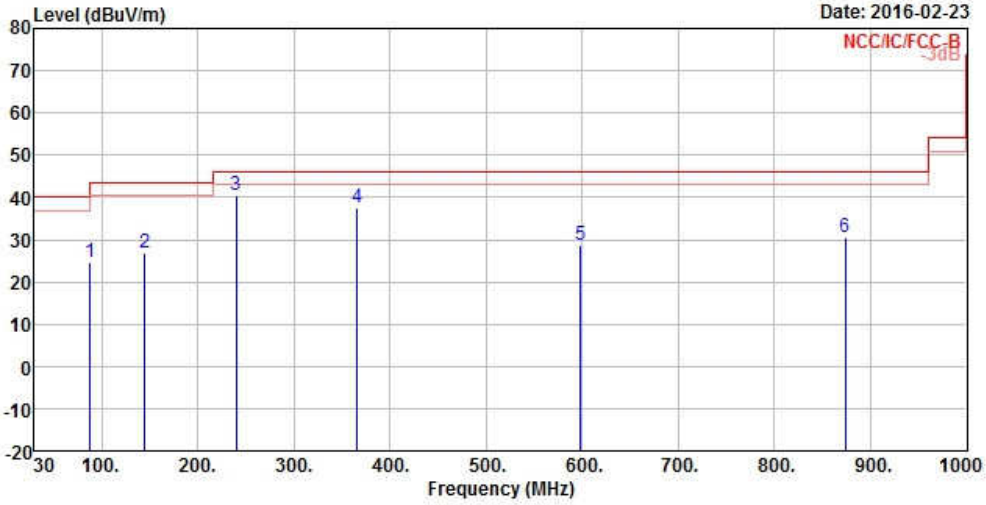
Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	1	**Polarization**	V
Operating Function	EUT with notebook via USB Cable		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.70	32.78	-7.22	40.00	50.58	19.13	0.37	37.30	Peak
2	99.84	35.68	-7.82	43.50	56.61	15.33	0.56	36.82	Peak
3	241.46	31.59	-14.41	46.00	50.24	16.88	0.86	36.39	Peak
4	431.58	27.34	-18.66	46.00	40.94	21.99	1.17	36.76	Peak
5	598.42	34.55	-11.45	46.00	45.71	24.69	1.41	37.26	Peak
6	871.96	29.58	-16.42	46.00	37.32	28.15	1.76	37.65	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)

Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	1	**Polarization**	H
Operating Function	EUT with notebook via USB Cable		

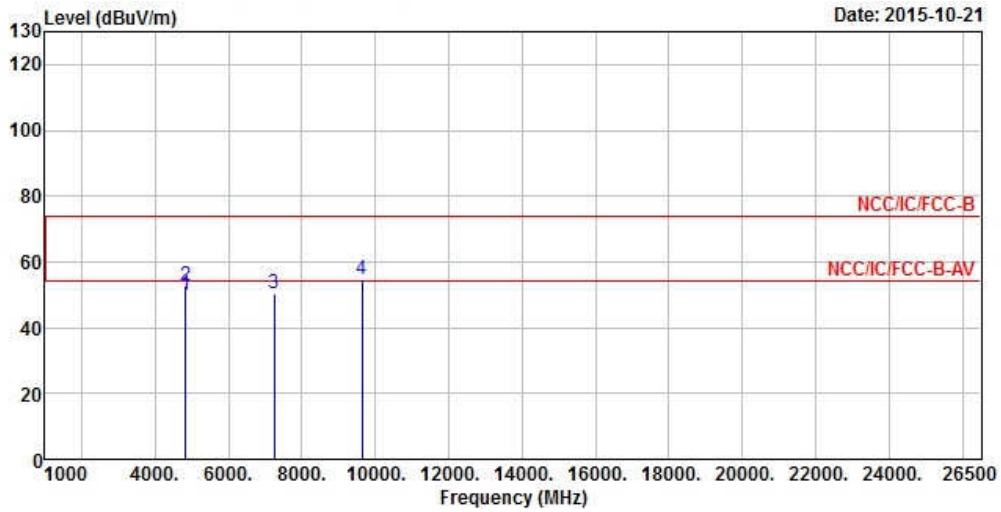


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	88.20	24.55	-18.95	43.50	47.14	13.78	0.54	36.91	Peak
2	144.46	26.84	-16.66	43.50	46.25	16.55	0.67	36.63	Peak
3	239.52	40.42	-5.58	46.00	59.24	16.71	0.86	36.39	Peak
4	365.62	37.49	-8.51	46.00	52.40	20.59	1.07	36.57	Peak
5	598.42	28.82	-17.18	46.00	39.98	24.69	1.41	37.26	Peak
6	873.90	30.43	-15.57	46.00	38.16	28.16	1.76	37.65	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)

3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz)

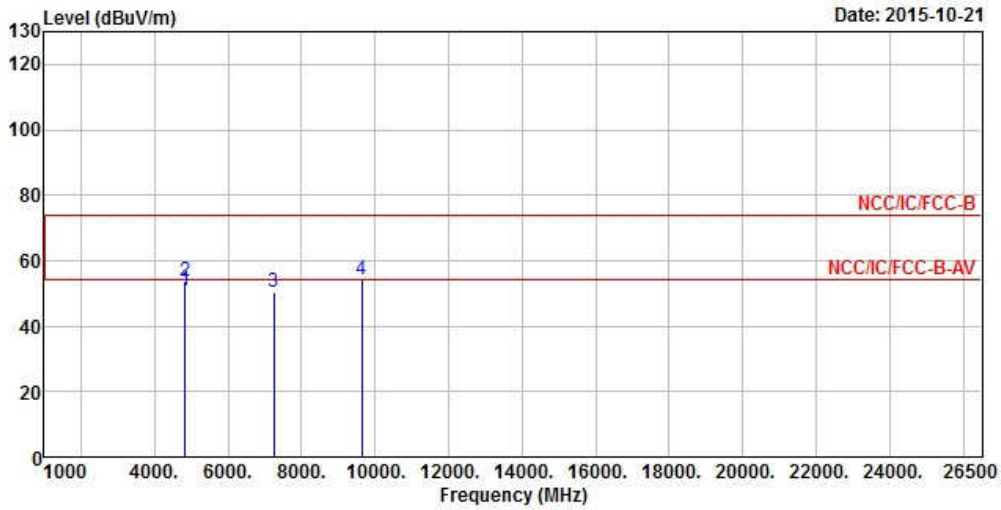
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.00	49.73	-4.27	54.00	45.29	33.33	5.70	34.59	Average
2	4824.00	52.84	-21.16	74.00	48.40	33.33	5.70	34.59	Peak
3	7236.00	50.39			41.95	36.24	7.09	34.89	Peak
4	9648.00	54.63			44.13	37.57	8.21	35.28	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (107.16 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

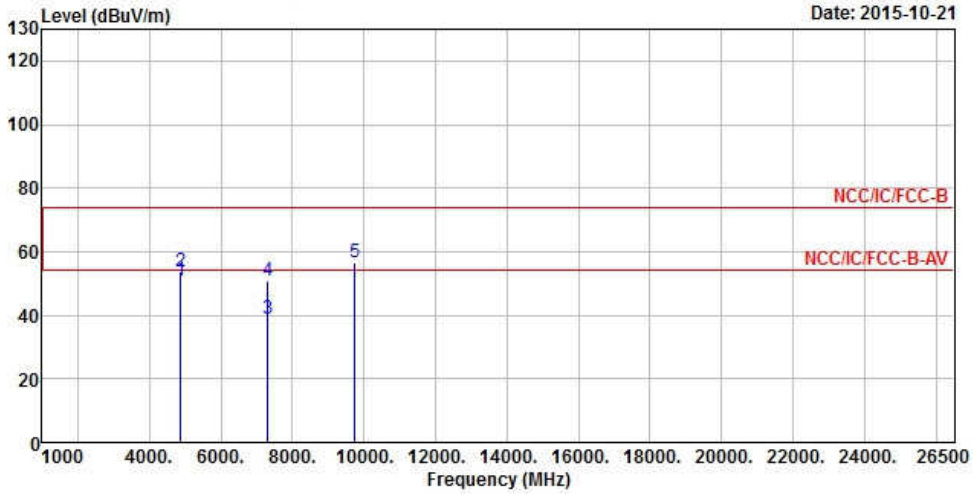
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.00	50.74	-3.26	54.00	46.30	33.33	5.70	34.59	Average
2	4824.00	53.59	-20.41	74.00	49.15	33.33	5.70	34.59	Peak
3	7236.00	50.46			42.02	36.24	7.09	34.89	Peak
4	9648.00	54.12			43.62	37.57	8.21	35.28	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (107.16 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

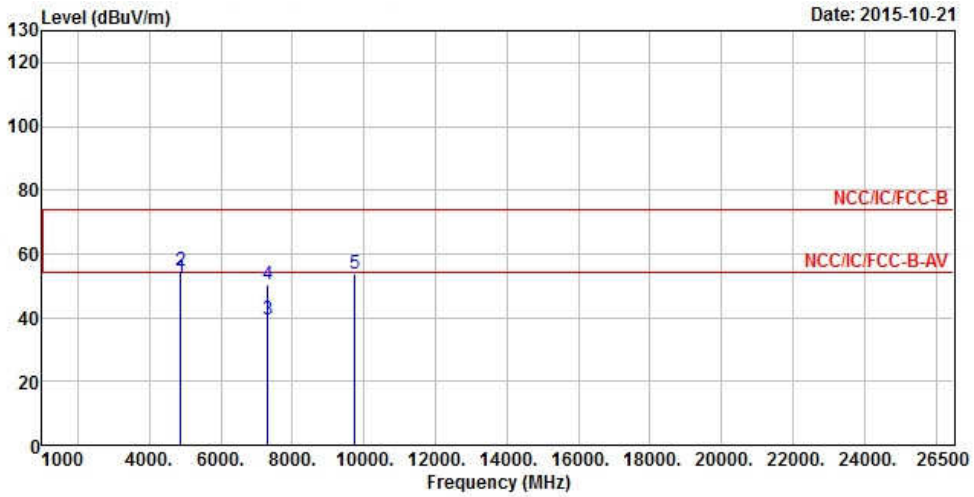
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2437
N_{TX}	1	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	50.82	-3.18	54.00	46.30	33.38	5.72	34.58	Average
2	4874.00	53.92	-20.08	74.00	49.40	33.38	5.72	34.58	Peak
3	7311.00	38.82	-15.18	54.00	30.25	36.33	7.14	34.90	Average
4	7311.00	50.74	-23.26	74.00	42.17	36.33	7.14	34.90	Peak
5	9748.00	56.63			46.11	37.55	8.26	35.29	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (109.55 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

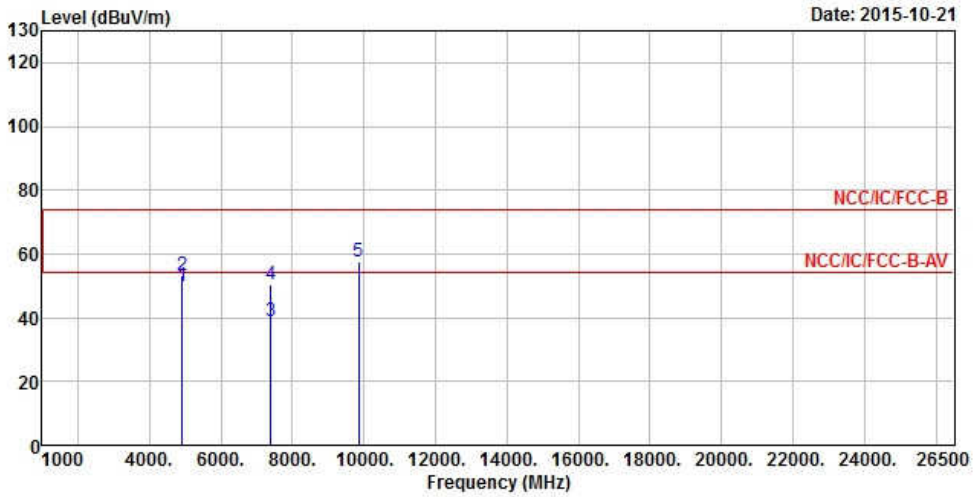
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2437
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	52.19	-1.81	54.00	47.67	33.38	5.72	34.58	Average
2	4874.00	54.64	-19.36	74.00	50.12	33.38	5.72	34.58	Peak
3	7311.00	39.29	-14.71	54.00	30.72	36.33	7.14	34.90	Average
4	7311.00	50.33	-23.67	74.00	41.76	36.33	7.14	34.90	Peak
5	9748.00	53.90			43.38	37.55	8.26	35.29	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (109.55 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

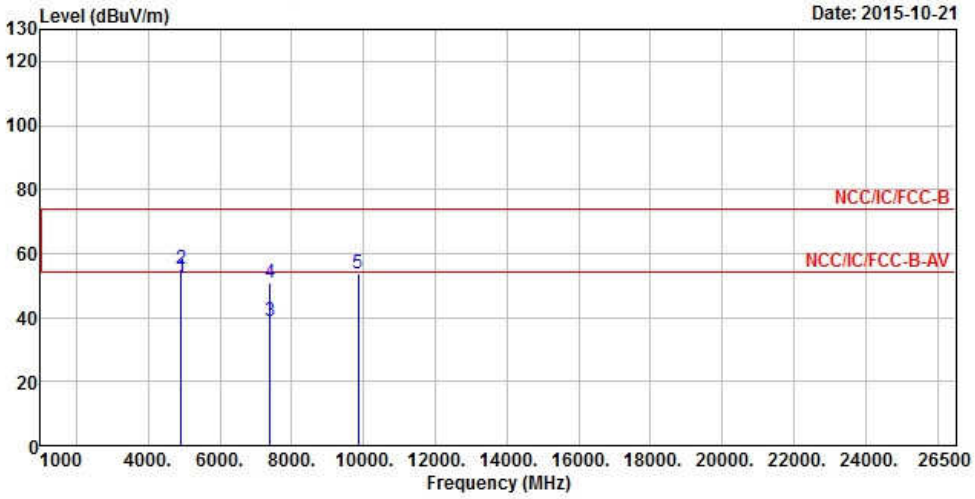
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.00	49.99	-4.01	54.00	45.37	33.43	5.76	34.57	Average
2	4924.00	53.31	-20.69	74.00	48.69	33.43	5.76	34.57	Peak
3	7386.00	38.91	-15.09	54.00	30.18	36.46	7.19	34.92	Average
4	7386.00	50.57	-23.43	74.00	41.84	36.46	7.19	34.92	Peak
5	9848.00	57.56			47.01	37.53	8.33	35.31	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (106.79 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

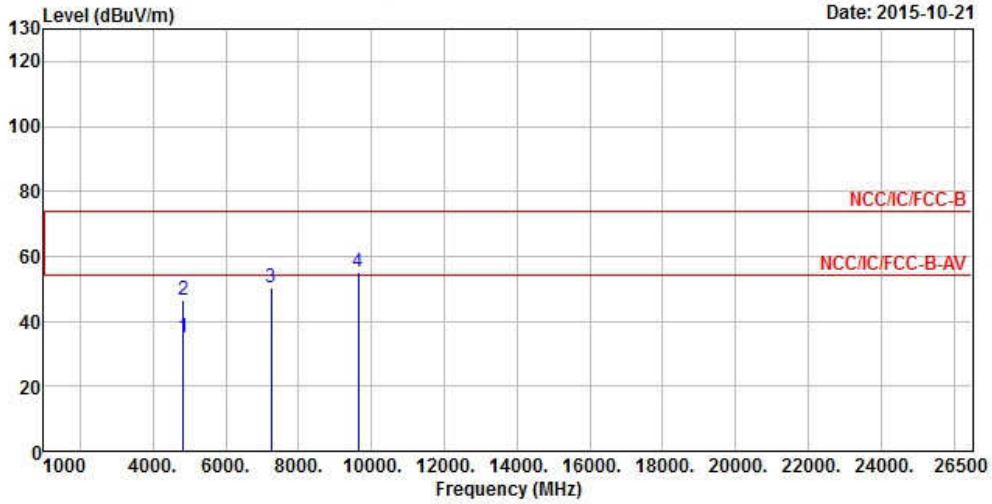
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.00	52.40	-1.60	54.00	47.78	33.43	5.76	34.57	Average
2	4924.00	55.00	-19.00	74.00	50.38	33.43	5.76	34.57	Peak
3	7386.00	38.93	-15.07	54.00	30.20	36.46	7.19	34.92	Average
4	7386.00	50.99	-23.01	74.00	42.26	36.46	7.19	34.92	Peak
5	9848.00	53.83			43.28	37.53	8.33	35.31	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (106.79 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

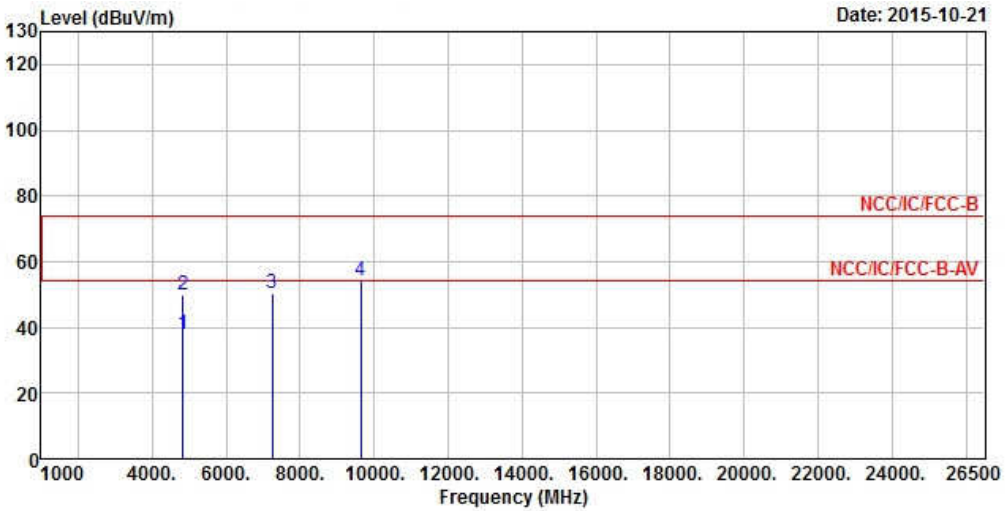
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.00	34.95	-19.05	54.00	30.51	33.33	5.70	34.59	Average
2	4824.00	46.59	-27.41	74.00	42.15	33.33	5.70	34.59	Peak
3	7236.00	50.60			42.16	36.24	7.09	34.89	Peak
4	9648.00	55.33			44.83	37.57	8.21	35.28	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (105.33 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

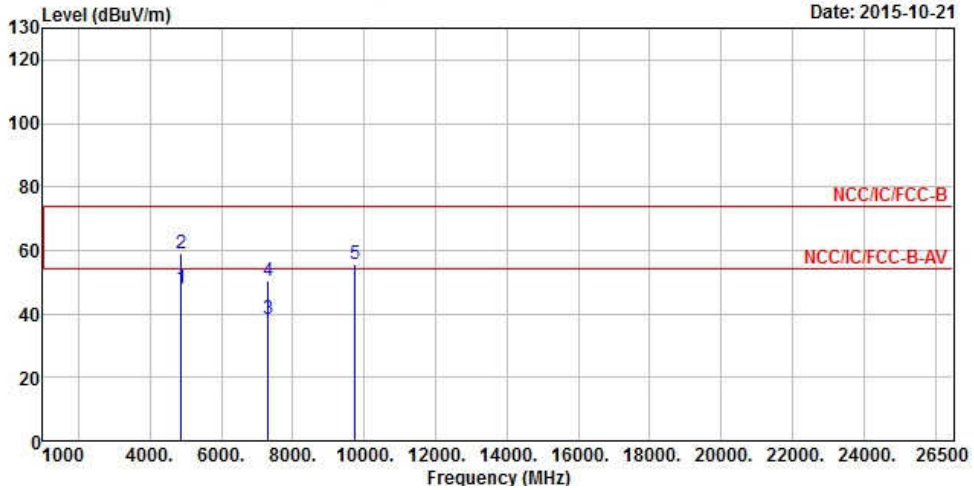
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2412
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.00	37.69	-16.31	54.00	33.25	33.33	5.70	34.59	Average
2	4824.00	50.00	-24.00	74.00	45.56	33.33	5.70	34.59	Peak
3	7236.00	50.15			41.71	36.24	7.09	34.89	Peak
4	9648.00	54.32			43.82	37.57	8.21	35.28	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (105.33 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

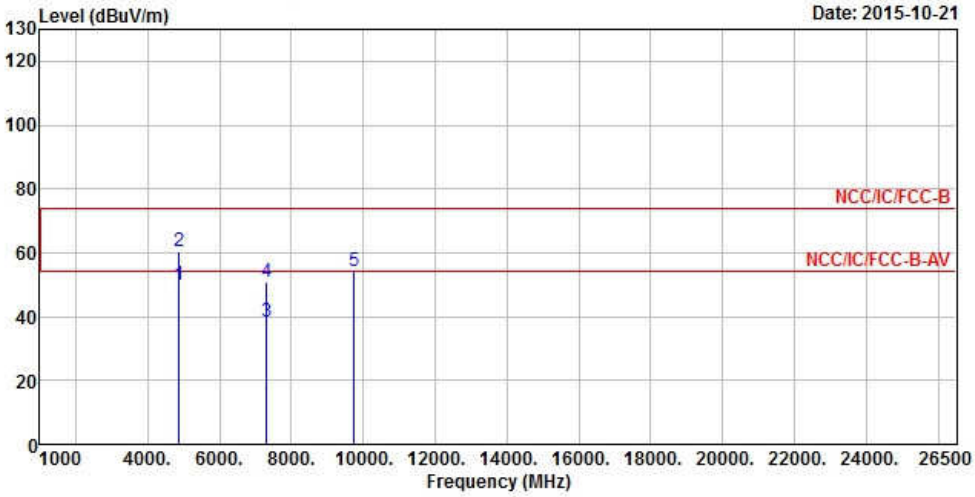
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2437
N_{TX}	1	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	48.13	-5.87	54.00	43.61	33.38	5.72	34.58	Average
2	4874.00	59.21	-14.79	74.00	54.69	33.38	5.72	34.58	Peak
3	7311.00	38.18	-15.82	54.00	29.61	36.33	7.14	34.90	Average
4	7311.00	50.42	-23.58	74.00	41.85	36.33	7.14	34.90	Peak
5	9748.00	55.42			44.90	37.55	8.26	35.29	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (112.42 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

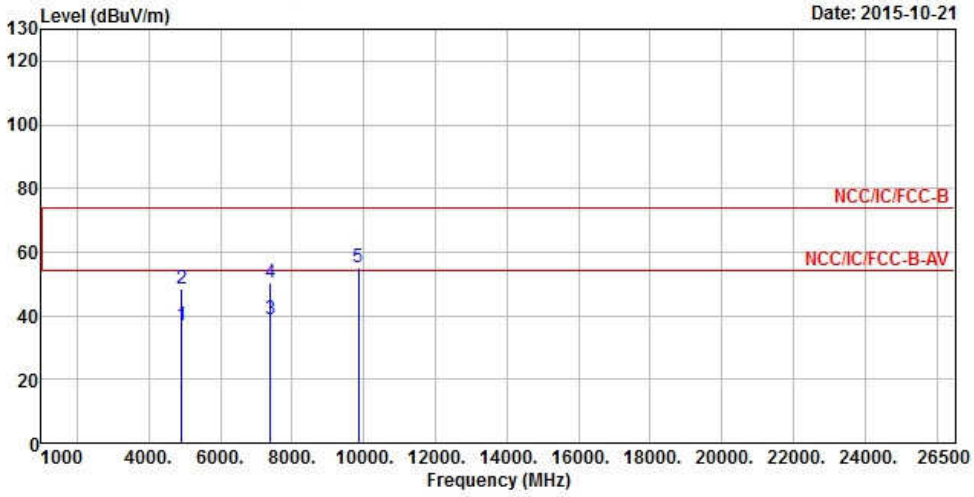
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2437
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	49.81	-4.19	54.00	45.29	33.38	5.72	34.58	Average
2	4874.00	60.65	-13.35	74.00	56.13	33.38	5.72	34.58	Peak
3	7311.00	38.16	-15.84	54.00	29.59	36.33	7.14	34.90	Average
4	7311.00	50.66	-23.34	74.00	42.09	36.33	7.14	34.90	Peak
5	9748.00	54.22			43.70	37.55	8.26	35.29	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (112.42 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

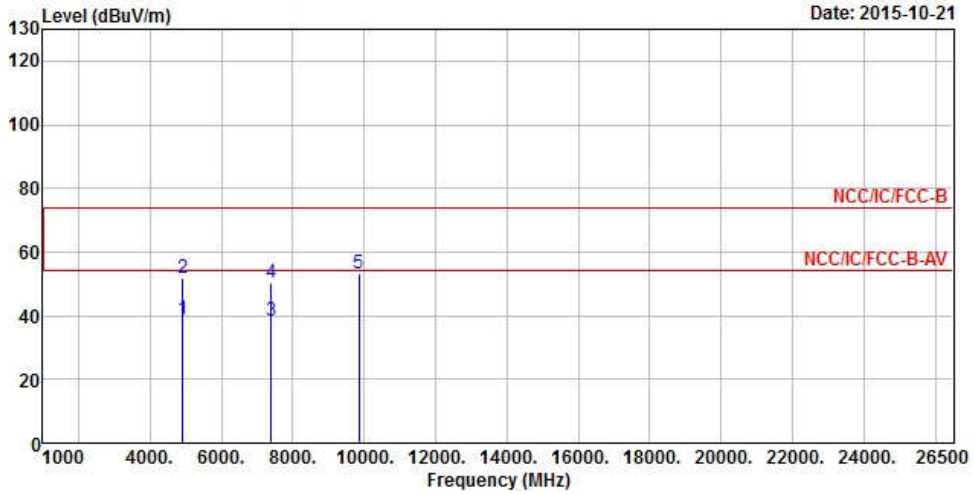
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.00	36.77	-17.23	54.00	32.15	33.43	5.76	34.57	Average
2	4924.00	48.68	-25.32	74.00	44.06	33.43	5.76	34.57	Peak
3	7386.00	38.93	-15.07	54.00	30.20	36.46	7.19	34.92	Average
4	7386.00	50.45	-23.55	74.00	41.72	36.46	7.19	34.92	Peak
5	9848.00	54.94			44.39	37.53	8.33	35.31	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (104.91 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

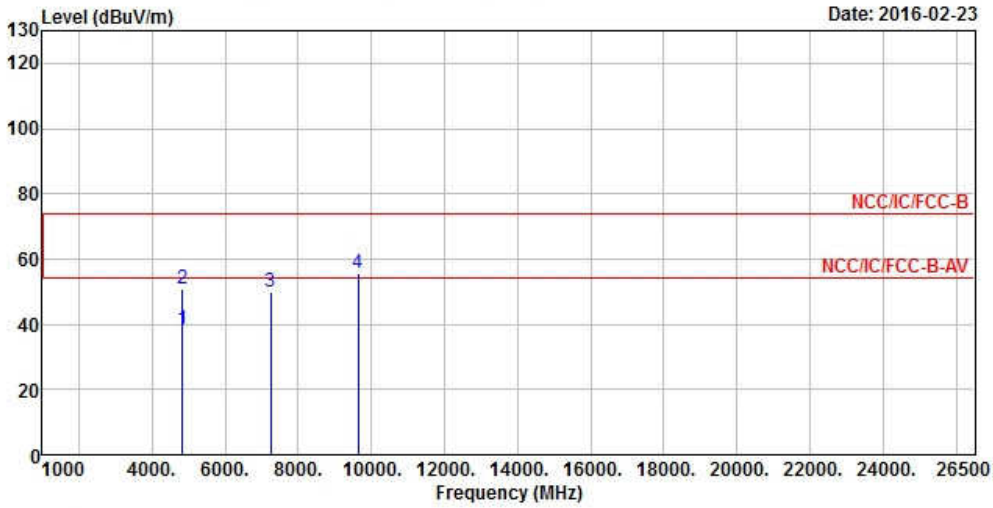
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11g	**Test Freq. (MHz)**	2462
N_{TX}	1	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.00	38.81	-15.19	54.00	34.19	33.43	5.76	34.57	Average
2	4924.00	51.67	-22.33	74.00	47.05	33.43	5.76	34.57	Peak
3	7386.00	38.49	-15.51	54.00	29.76	36.46	7.19	34.92	Average
4	7386.00	50.48	-23.52	74.00	41.75	36.46	7.19	34.92	Peak
5	9848.00	53.14			42.59	37.53	8.33	35.31	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (104.91 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

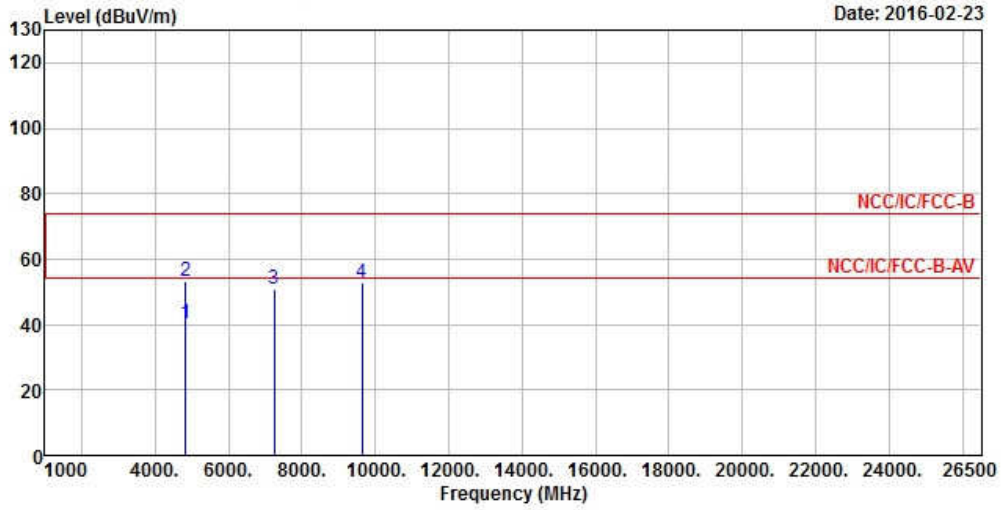
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2412
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.00	38.57	-15.43	54.00	35.12	32.99	6.11	35.65	Average
2	4824.00	51.01	-22.99	74.00	47.56	32.99	6.11	35.65	Peak
3	7236.00	50.09			42.03	36.48	7.57	35.99	Peak
4	9648.00	55.47			45.75	37.27	8.80	36.35	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (106.11 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

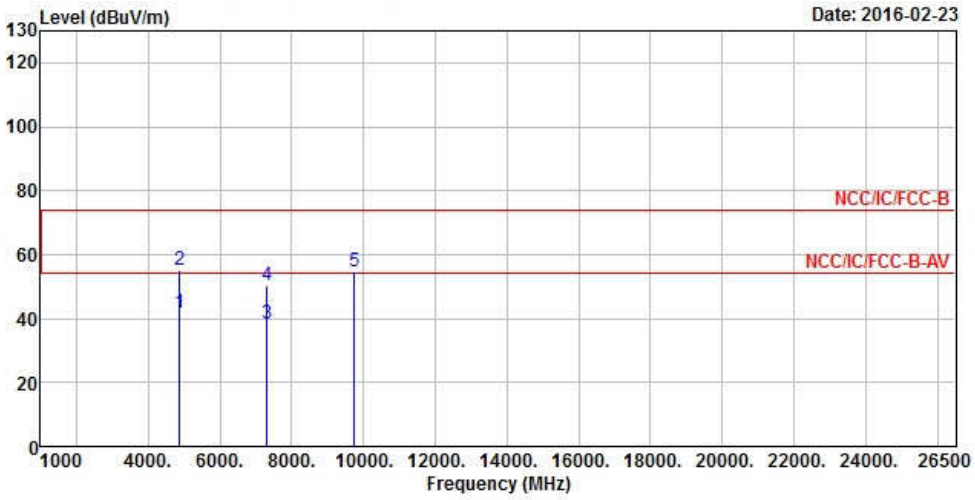
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2412
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.00	40.47	-13.53	54.00	37.02	32.99	6.11	35.65	Average
2	4824.00	53.19	-20.81	74.00	49.74	32.99	6.11	35.65	Peak
3	7236.00	50.80			42.74	36.48	7.57	35.99	Peak
4	9648.00	52.73			43.01	37.27	8.80	36.35	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (106.11 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

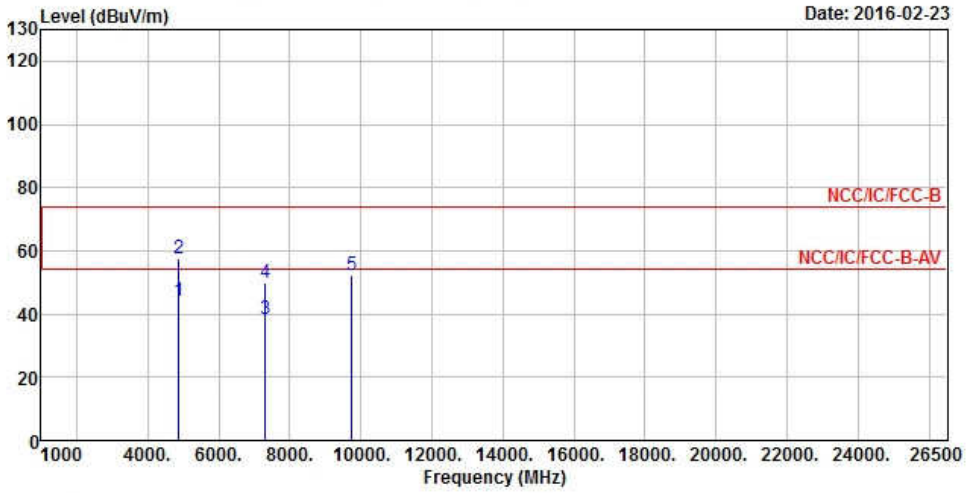
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2437
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	41.54	-12.46	54.00	38.01	33.06	6.13	35.66	Average
2	4874.00	55.05	-18.95	74.00	51.52	33.06	6.13	35.66	Peak
3	7311.00	38.29	-15.71	54.00	30.02	36.67	7.60	36.00	Average
4	7311.00	50.14	-23.86	74.00	41.87	36.67	7.60	36.00	Peak
5	9748.00	54.78			45.02	37.25	8.89	36.38	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (110.73 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

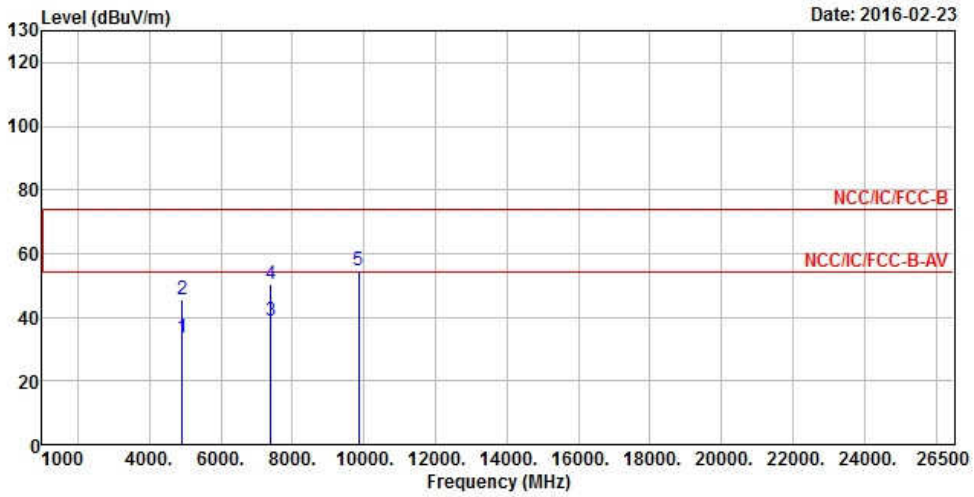
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2437
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	44.04	-9.96	54.00	40.51	33.06	6.13	35.66	Average
2	4874.00	57.48	-16.52	74.00	53.95	33.06	6.13	35.66	Peak
3	7311.00	38.29	-15.71	54.00	30.02	36.67	7.60	36.00	Average
4	7311.00	50.05	-23.95	74.00	41.78	36.67	7.60	36.00	Peak
5	9748.00	52.44			42.68	37.25	8.89	36.38	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (110.73 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

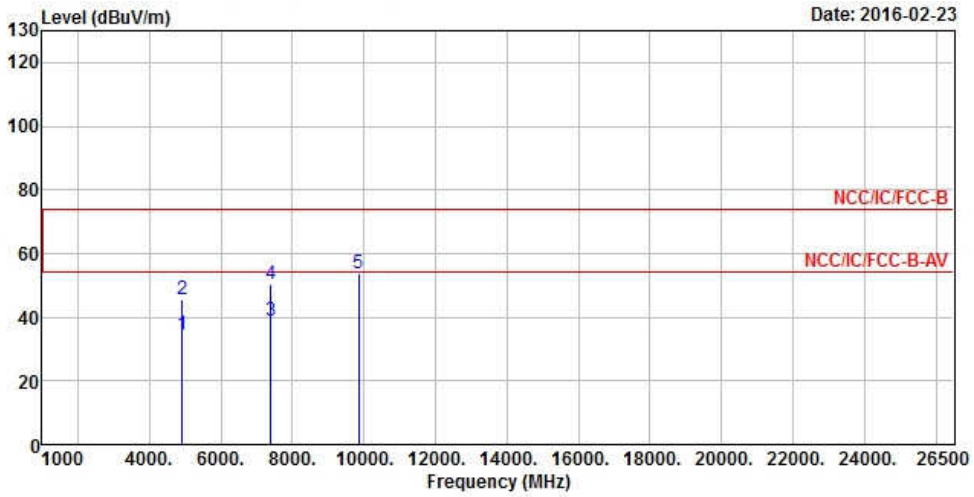
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2462
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.00	33.64	-20.36	54.00	30.01	33.12	6.17	35.66	Average
2	4924.00	45.67	-28.33	74.00	42.04	33.12	6.17	35.66	Peak
3	7386.00	38.95	-15.05	54.00	30.42	36.91	7.63	36.01	Average
4	7386.00	50.58	-23.42	74.00	42.05	36.91	7.63	36.01	Peak
5	9848.00	54.85			44.99	37.23	9.03	36.40	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (104.73 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

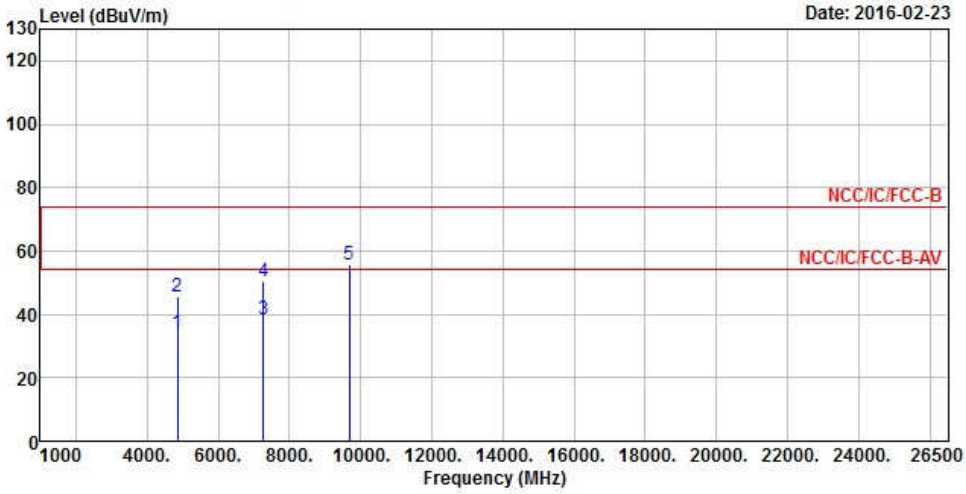
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	**Test Freq. (MHz)**	2462
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.00	34.51	-19.49	54.00	30.88	33.12	6.17	35.66	Average
2	4924.00	45.40	-28.60	74.00	41.77	33.12	6.17	35.66	Peak
3	7386.00	39.05	-14.95	54.00	30.52	36.91	7.63	36.01	Average
4	7386.00	50.55	-23.45	74.00	42.02	36.91	7.63	36.01	Peak
5	9848.00	53.61			43.75	37.23	9.03	36.40	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (104.73 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

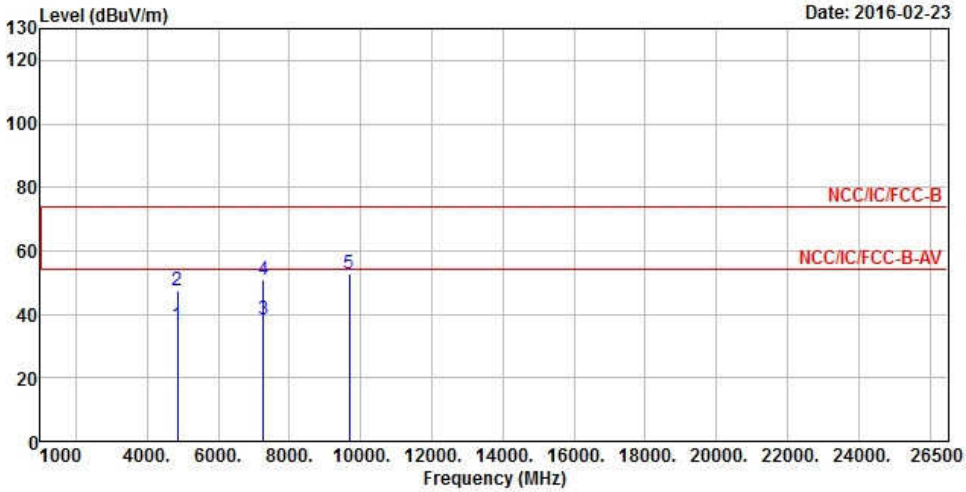
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2422
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4844.00	34.27	-19.73	54.00	30.78	33.01	6.13	35.65	Average
2	4844.00	45.54	-28.46	74.00	42.05	33.01	6.13	35.65	Peak
3	7266.00	38.18	-15.82	54.00	30.02	36.57	7.59	36.00	Average
4	7266.00	50.17	-23.83	74.00	42.01	36.57	7.59	36.00	Peak
5	9688.00	55.73			45.99	37.26	8.84	36.36	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (102.47 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

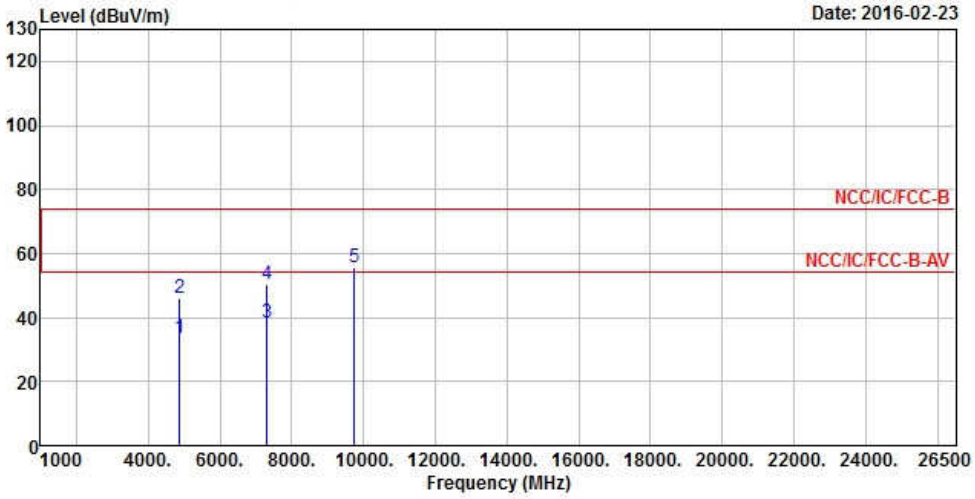
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2422
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4844.00	36.34	-17.66	54.00	32.85	33.01	6.13	35.65	Average
2	4844.00	47.47	-26.53	74.00	43.98	33.01	6.13	35.65	Peak
3	7266.00	38.15	-15.85	54.00	29.99	36.57	7.59	36.00	Average
4	7266.00	51.05	-22.95	74.00	42.89	36.57	7.59	36.00	Peak
5	9688.00	52.75			43.01	37.26	8.84	36.36	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (102.47 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

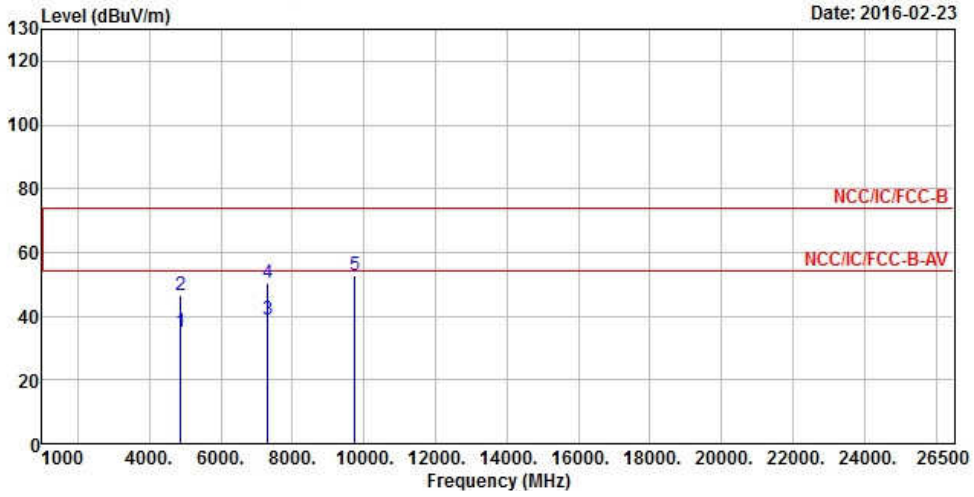
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2437
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	33.77	-20.23	54.00	30.24	33.06	6.13	35.66	Average
2	4874.00	46.26	-27.74	74.00	42.73	33.06	6.13	35.66	Peak
3	7311.00	38.29	-15.71	54.00	30.02	36.67	7.60	36.00	Average
4	7311.00	50.25	-23.75	74.00	41.98	36.67	7.60	36.00	Peak
5	9748.00	55.61			45.85	37.25	8.89	36.38	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (105.69 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

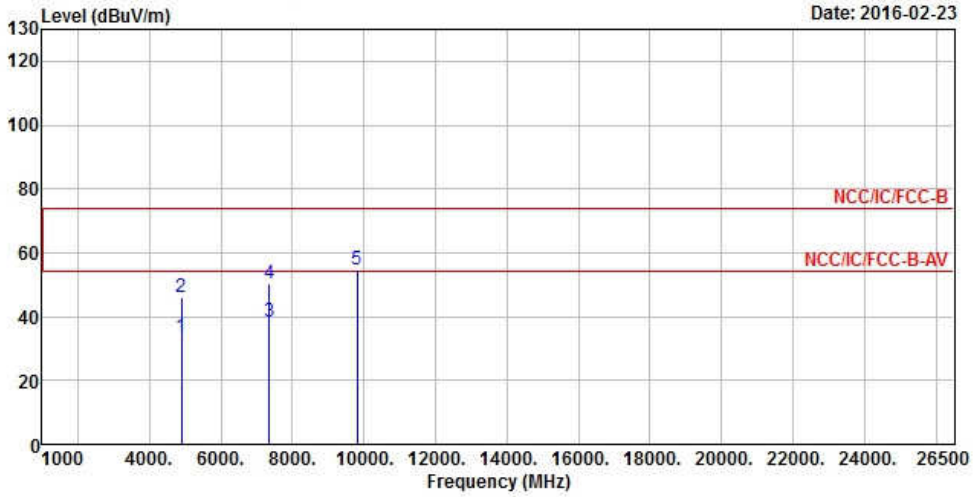
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2437
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.00	34.93	-19.07	54.00	31.40	33.06	6.13	35.66	Average
2	4874.00	46.39	-27.61	74.00	42.86	33.06	6.13	35.66	Peak
3	7311.00	38.79	-15.21	54.00	30.52	36.67	7.60	36.00	Average
4	7311.00	50.30	-23.70	74.00	42.03	36.67	7.60	36.00	Peak
5	9748.00	52.78			43.02	37.25	8.89	36.38	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (105.69 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

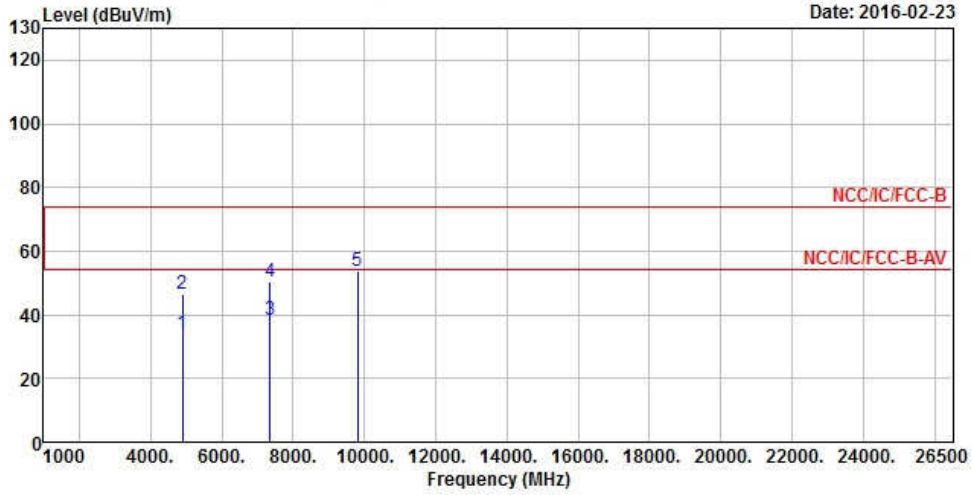
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2452
N_{TX}	2	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4904.00	33.57	-20.43	54.00	29.98	33.10	6.15	35.66	Average
2	4904.00	46.23	-27.77	74.00	42.64	33.10	6.15	35.66	Peak
3	7356.00	38.27	-15.73	54.00	29.86	36.81	7.61	36.01	Average
4	7356.00	50.32	-23.68	74.00	41.91	36.81	7.61	36.01	Peak
5	9808.00	54.86			45.02	37.24	8.99	36.39	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (101.08 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	**Test Freq. (MHz)**	2452
N_{TX}	2	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4904.00	33.93	-20.07	54.00	30.34	33.10	6.15	35.66	Average
2	4904.00	46.32	-27.68	74.00	42.73	33.10	6.15	35.66	Peak
3	7356.00	38.43	-15.57	54.00	30.02	36.81	7.61	36.01	Average
4	7356.00	50.41	-23.59	74.00	42.00	36.81	7.61	36.01	Peak
5	9808.00	53.81			43.97	37.24	8.99	36.39	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.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (101.08 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

4 Test Equipment and Calibration Data

AC Conducted

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Next Calibration Date
EMC Receiver	R&S	ESCS 30	100174	9kHz ~ 2.75GHz	Apr. 15, 2015	Apr. 14, 2016
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 26, 2016	Jan. 25, 2017
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	Oct. 30, 2015	Oct. 29, 2016
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	NCR

RF Conducted

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Next Calibration Date
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	May 06, 2015	May 05, 2016
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 28, 2015	Jul. 27, 2016
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	Feb. 17, 2015	Feb. 16, 2016
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Feb. 17, 2015	Feb. 16, 2016

Radiated Emission

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Next Calibration Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz ~ 1GHz 3m	Jul. 01, 2015	Jun. 30, 2016
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz ~ 18GHz 3m	Jul. 01, 2015	Jun. 30, 2016
Amplifier	EMC	EMC9135	980209	9kHz ~ 1.0GHz	Dec. 25, 2015	Dec. 24, 2016
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	Apr. 09, 2015	Apr. 08, 2016
Spectrum	KEYSIGHT	N9010A	MY54200885	10Hz ~ 44GHz	Jul. 15, 2015	Jul. 14, 2016
Bilog Antenna	TESEQ	CBL 6112D	35418	30MHz ~ 1GHz	Mar. 30, 2015	Mar. 29, 2016
Horn Antenna	AARONIA AG	POWERLOG 70180	05192	1GHz ~ 18GHz	Jan. 05, 2015	Jan. 04, 2016
Horn Antenna	AARONIA AG	POWERLOG 70180	05192	1GHz ~ 18GHz	Jan. 08, 2016	Jan. 07, 2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170614	18GHz ~ 40GHz	Dec. 29, 2014	Dec. 28, 2015
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170614	18GHz ~ 40GHz	Jan. 04, 2016	Jan. 03, 2017
Loop Antenna	ROHDE&SCHWARZ	HFH2-Z2	100330	9 kHz~30 MHz	Nov. 10, 2014	Nov. 09, 2016

Appendix A. Radiated Unwanted Emission

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	53.59	-20.41	74	49.15	33.33	5.7	34.59			P	H
		4824	50.74	-3.26	54	46.3	33.33	5.7	34.59			A	H
		7236	50.46	-23.54	74	42.02	36.24	7.09	34.89			P	H
		9648	54.12	-33.04	87.16	43.62	37.57	8.21	35.28			P	H
		4824	52.84	-21.16	74	48.4	33.33	5.7	34.59			P	V
		4824	49.73	-4.27	54	45.29	33.33	5.7	34.59			A	V
		7236	50.39	-23.61	74	41.95	36.24	7.09	34.89			P	V
		9648	54.63	-32.53	87.16	44.13	37.57	8.21	35.28			P	V
802.11b CH 06 2437MHz		4874	54.64	-19.36	74	50.12	33.38	5.72	34.58			P	H
		4874	52.19	-1.81	54	47.67	33.38	5.72	34.58			A	H
		7311	50.33	-23.67	74	41.76	36.33	7.14	34.9			P	H
		7311	39.29	-14.71	54	30.72	36.33	7.14	34.9			A	H
		9748	53.9	-35.65	89.55	43.38	37.55	8.26	35.29			P	H
		4874	53.92	-20.08	74	49.4	33.38	5.72	34.58			P	V
		4874	50.82	-3.18	54	46.3	33.38	5.72	34.58			A	V
		7311	50.74	-23.26	74	42.17	36.33	7.14	34.9			P	V
		7311	38.82	-15.18	54	30.25	36.33	7.14	34.9			A	V
		9748	56.63	-32.92	89.55	46.11	37.55	8.26	35.29			P	V

802.11b CH 11 2462MHz		4924	55	-19	74	50.38	33.43	5.76	34.57			P	H
		4924	52.4	-1.6	54	47.78	33.43	5.76	34.57			A	H
		7386	50.99	-23.01	74	42.26	36.46	7.19	34.92			P	H
		7386	38.93	-15.07	54	30.2	36.46	7.19	34.92			A	H
		9848	53.83	-32.96	86.79	43.28	37.53	8.33	35.31			P	H
		4924	53.31	-20.69	74	48.69	33.43	5.76	34.57			P	V
		4924	49.99	-4.01	54	45.37	33.43	5.76	34.57			A	V
		7386	50.57	-23.43	74	41.84	36.46	7.19	34.92			P	V
		7386	38.91	-15.09	54	30.18	36.46	7.19	34.92			A	V
		9848	57.56	-29.32	86.79	47.01	37.53	8.33	35.31			P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		4824	50	-24	74	45.56	33.33	5.7	34.59			P	H
		4824	37.69	-16.31	54	33.25	33.33	5.7	34.59			A	H
		7236	50.15	-23.85	74	41.71	36.24	7.09	34.89			P	H
		9648	54.32	-31.01	85.33	43.82	37.57	8.21	35.28			P	H
		4824	46.59	-27.41	74	42.15	33.33	5.7	34.59			P	V
		4824	34.95	-19.05	54	30.51	33.33	5.7	34.59			A	V
		7236	50.6	-23.4	74	42.16	36.24	7.09	34.89			P	V
		9648	55.33	-30	85.33	44.83	37.57	8.21	35.28			P	V
802.11g CH 06 2437MHz		4874	60.65	-13.35	74	56.13	33.38	5.72	34.58			P	H
		4874	49.81	-4.19	54	45.29	33.38	5.72	34.58			A	H
		7311	50.66	-23.34	74	42.09	36.33	7.14	34.9			P	H
		7311	38.16	-15.84	54	29.59	36.33	7.14	34.9			A	H
		9748	54.22	-38.2	92.42	43.7	37.55	8.26	35.29			P	H
		4874	59.21	-14.79	74	54.69	33.38	5.72	34.58			P	V
		4874	48.13	-5.87	54	43.61	33.38	5.72	34.58			A	V
		7311	50.42	-23.58	74	41.85	36.33	7.14	34.9			P	V
		7311	38.18	-15.82	54	29.61	36.33	7.14	34.9			A	V
		9748	55.42	-37	92.42	44.9	37.55	8.26	35.29			P	V

802.11g CH 11 2462MHz		4924	51.67	-22.33	74	47.05	33.43	5.76	34.57			P	H
		4924	38.81	-15.19	54	34.19	33.43	5.76	34.57			A	H
		7386	50.48	-23.52	74	41.75	36.46	7.19	34.92			P	H
		7386	38.49	-15.51	54	29.76	36.46	7.19	34.92			A	H
		9848	53.14	-31.77	84.91	42.59	37.53	8.33	35.31			P	H
		4924	48.68	-25.32	74	44.06	33.43	5.76	34.57			P	V
		4924	36.77	-17.23	54	32.15	33.43	5.76	34.57			A	V
		7386	50.45	-23.55	74	41.72	36.46	7.19	34.92			P	V
		7386	38.93	-15.07	54	30.2	36.46	7.19	34.92			A	V
		9848	54.94	-29.97	84.91	44.39	37.53	8.33	35.31			P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		4824	53.19	-20.81	74	49.74	32.99	6.11	35.65			P	H
		4824	40.47	-13.53	54	37.02	32.99	6.11	35.65			A	H
		7236	50.8	-23.2	74	42.74	36.48	7.57	35.99			P	H
		9648	52.73	-33.38	86.11	43.01	37.27	8.8	36.35			P	H
		4824	51.01	-22.99	74	47.56	32.99	6.11	35.65			P	V
		4824	38.57	-15.43	54	35.12	32.99	6.11	35.65			A	V
		7236	50.09	-23.91	74	42.03	36.48	7.57	35.99			P	V
		9648	55.47	-30.64	86.11	45.75	37.27	8.8	36.35			P	V
802.11n HT20 CH 06 2437MHz		4874	57.48	-16.52	74	53.95	33.06	6.13	35.66			P	H
		4874	44.04	-9.96	54	40.51	33.06	6.13	35.66			A	H
		7311	50.05	-23.95	74	41.78	36.67	7.6	36			P	H
		7311	38.29	-15.71	54	30.02	36.67	7.6	36			A	H
		9748	52.44	-38.29	90.73	42.68	37.25	8.89	36.38			P	H
		4874	55.05	-18.95	74	51.52	33.06	6.13	35.66			P	V
		4874	41.54	-12.46	54	38.01	33.06	6.13	35.66			A	V
		7311	50.14	-23.86	74	41.87	36.67	7.6	36			P	V
		7311	38.29	-15.71	54	30.02	36.67	7.6	36			A	V
		9748	54.78	-35.95	90.73	45.02	37.25	8.89	36.38			P	V

802.11n HT20 CH 11 2462MHz		4924	45.4	-28.6	74	41.77	33.12	6.17	35.66			P	H
		4924	34.51	-19.49	54	30.88	33.12	6.17	35.66			A	H
		7386	50.55	-23.45	74	42.02	36.91	7.63	36.01			P	H
		7386	39.05	-14.95	54	30.52	36.91	7.63	36.01			A	H
		9848	53.61	-31.12	84.73	43.75	37.23	9.03	36.4			P	H
		4924	45.67	-28.33	74	42.04	33.12	6.17	35.66			P	V
		4924	33.64	-20.36	54	30.01	33.12	6.17	35.66			A	V
		7386	50.58	-23.42	74	42.05	36.91	7.63	36.01			P	V
		7386	38.95	-15.05	54	30.42	36.91	7.63	36.01			A	V
		9848	54.85	-29.88	84.73	44.99	37.23	9.03	36.4			P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 03 2422MHz		4844	47.47	-26.53	74	43.98	33.01	6.13	35.65			P	H
		4844	36.34	-17.66	54	32.85	33.01	6.13	35.65			A	H
		7266	51.05	-22.95	74	42.89	36.57	7.59	36			P	H
		7266	38.15	-15.85	54	29.99	36.57	7.59	36			A	H
		9688	52.75	-29.72	82.47	43.01	37.26	8.84	36.36			P	H
		4844	45.54	-28.46	74	42.05	33.01	6.13	35.65			P	V
		4844	34.27	-19.73	54	30.78	33.01	6.13	35.65			A	V
		7266	50.17	-23.83	74	42.01	36.57	7.59	36			P	V
		7266	38.18	-15.82	54	30.02	36.57	7.59	36			A	V
		9688	55.73	-26.74	82.47	45.99	37.26	8.84	36.36			P	V
802.11n HT40 CH 06 2437MHz		4874	46.39	-27.61	74	42.86	33.06	6.13	35.66			P	H
		4874	34.93	-19.07	54	31.4	33.06	6.13	35.66			A	H
		7311	50.3	-23.7	74	42.03	36.67	7.6	36			P	H
		7311	38.79	-15.21	54	30.52	36.67	7.6	36			A	H
		9748	52.78	-32.91	85.69	43.02	37.25	8.89	36.38			P	H
		4874	46.26	-27.74	74	42.73	33.06	6.13	35.66			P	V
		4874	33.77	-20.23	54	30.24	33.06	6.13	35.66			A	V
		7311	50.25	-23.75	74	41.98	36.67	7.6	36			P	V
		7311	38.29	-15.71	54	30.02	36.67	7.6	36			A	V
		9748	55.61	-30.08	85.69	45.85	37.25	8.89	36.38			P	V

802.11n HT40 CH 09 2452MHz		4904	46.32	-27.68	74	42.73	33.1	6.15	35.66			P	H
		4904	33.93	-20.07	54	30.34	33.1	6.15	35.66			A	H
		7356	50.41	-23.59	74	42	36.81	7.61	36.01			P	H
		7356	38.43	-15.57	54	30.02	36.81	7.61	36.01			A	H
		9808	53.81	-27.27	81.08	43.97	37.24	8.99	36.39			P	H
		4904	46.23	-27.77	74	42.64	33.1	6.15	35.66			P	V
		4904	33.57	-20.43	54	29.98	33.1	6.15	35.66			A	V
		7356	50.32	-23.68	74	41.91	36.81	7.61	36.01			P	V
		7356	38.27	-15.73	54	29.86	36.81	7.61	36.01			A	V
		9808	54.86	-26.22	81.08	45.02	37.24	8.99	36.39			P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c).
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.