FCC Test Report

FCC ID	:	**2ACKD-WIM1200-20**
Equipment	:	**Wireless access point module**
Model No.	:	**WIM1200-20**
Brand Name	:	**SKSPRUCE**
Applicant	:	**SKSpruce Technologies Inc.**
Address	:	**1885 Lundy Ave. Suite 270, San Jose, CA, United States, 95131**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Nov. 07, 2016**
Tested Date	:	**Nov. 07 ~ Dec. 05, 2016**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

Table of Contents

Release Record

Report No.	Version	Description	Issued Date
FR6N2101AC	Rev. 01	Initial issue	Dec. 13, 2016

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.393MHz 37.04 (Margin -10.96dB) – AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 7311.000MHz 52.99 (Margin -1.01dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 25.96	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11**	**Ch. Freq. (MHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**Data Rate / MCS**
2400-2483.5	b	2412-2462	1-11 [11]	2	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	2	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	MCS 0-15
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	MCS 0-15
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 Details

Ant. No.	Brand	Model	Type	Gain (dBi)	Connector	Remark
1	ALPHA	AW3509-11	Dipole	2	UFL	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3 Vdc from host

1.1.4 Accessories

N/A

1.1.5 Channel List

Frequency band (MHz)		2400~2483.5	
802.11 b / g / n HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	3	2422
2	2417	4	2427
3	2422	5	2432
4	2427	6	2437
5	2432	7	2442
6	2437	8	2447
7	2442	9	2452
8	2447	---	---
9	2452	---	---
10	2457	---	---
11	2462	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	MT7620QA, Version: V1.0.4.2		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11b	100.00%	0.00
	11g	99.51%	0.02
	HT20	99.48%	0.02
	HT40	98.33%	0.07

1.1.7 Power Setting

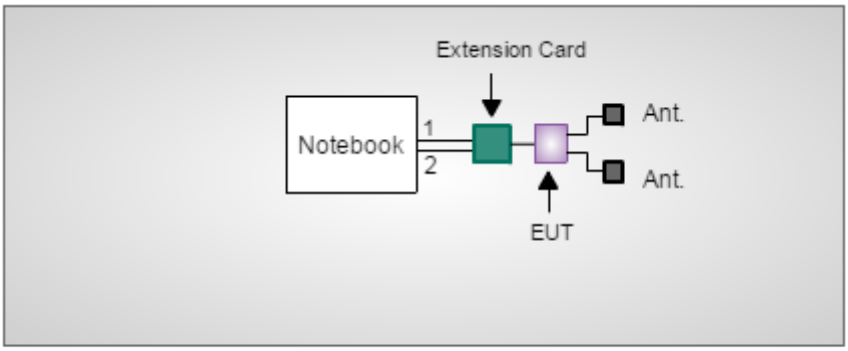
Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	0C/11
11b	2437	07/0D
11b	2462	0D/10
11g	2412	09/10
11g	2437	19/1E
11g	2462	0F/12
HT20	2412	07/0E
HT20	2437	19/1E
HT20	2462	0B/0E
HT40	2422	06/0C
HT40	2437	15/19
HT40	2452	06/0B

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6430	Doc	RJ45, 1m non-shielded. USB, 1m shielded.
2	Extension Card	---	---	---	---

1.3 Test Setup Chart

Test Setup Diagram



1. RJ45, 1m non-shielded
2. USB, 1m shielded

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested date	Dec. 05, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 08, 2016	Nov. 07, 2017
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 21, 2015	Dec. 20, 2016
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested date	Nov. 07 ~ Nov. 24, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Dec. 13, 2015	Dec. 12, 2016
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested date	Nov. 24, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Dec. 13, 2015	Dec. 12, 2016
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested date	Nov. 30 ~ Dec. 02, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 09, 2016	Sep. 08, 2017
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
AC POWER SOURCE	APC	AFC-500W	F312060012	Oct. 28, 2016	Oct. 27, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
ANSI C63.10-2013
FCC KDB 558074 D01 DTS Meas Guidance v03r05
FCC KDB 662911 D01 Multiple Transmitter Output v02r01

1.6 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	
Parameters	**Uncertainty**
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Power density	±0.463 dB
Conducted emission	±2.670 dB
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 52%	Howard Huang
Radiated Emissions	03CH01-WS	22-24°C / 62-63%	Felix Sung Vincent Yeh Kevin Lee
RF Conducted	TH01-WS	22°C / 61-64%	Alex Huang

- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	HT40	2437	6 Mbps	---
Radiated Emissions ≤1GHz	HT40	2437	6 Mbps	---
Radiated Emissions >1GHz Maximum Output Power 6dB bandwidth Power spectral density	11b 11g HT20 HT40	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0	---
NOTE: The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** results were found as the worst case and were shown in this report.				

3 Transmitter Test Results

3.1 Conducted Emissions

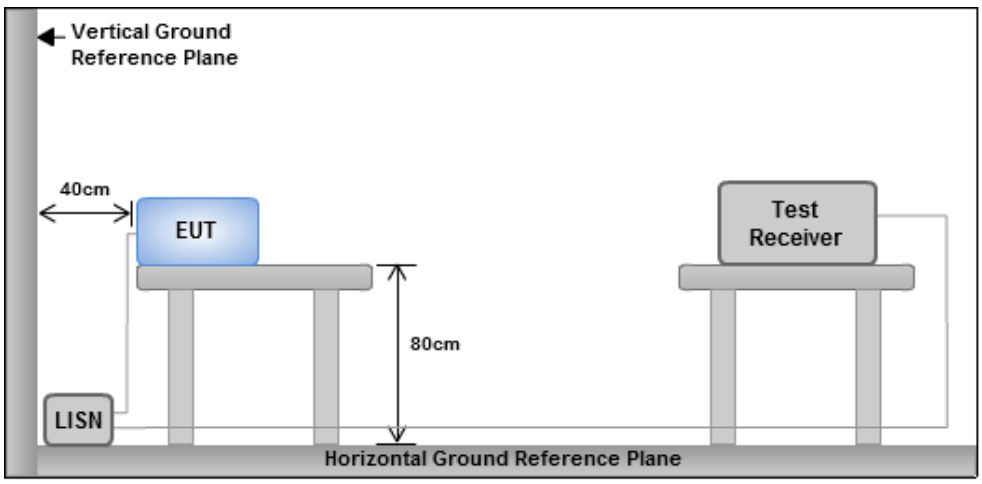
3.1.1 Limit of Conducted Emissions

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 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

3.1.3 Test Setup

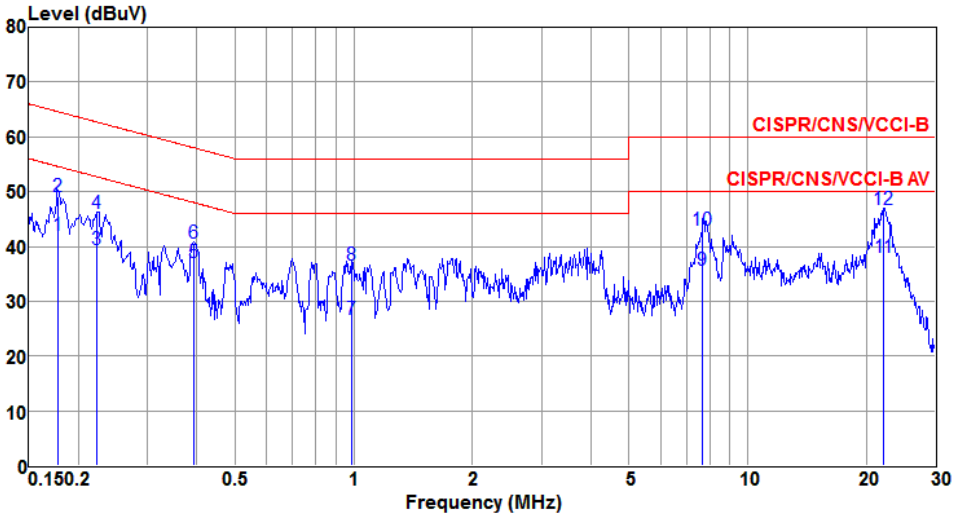


Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

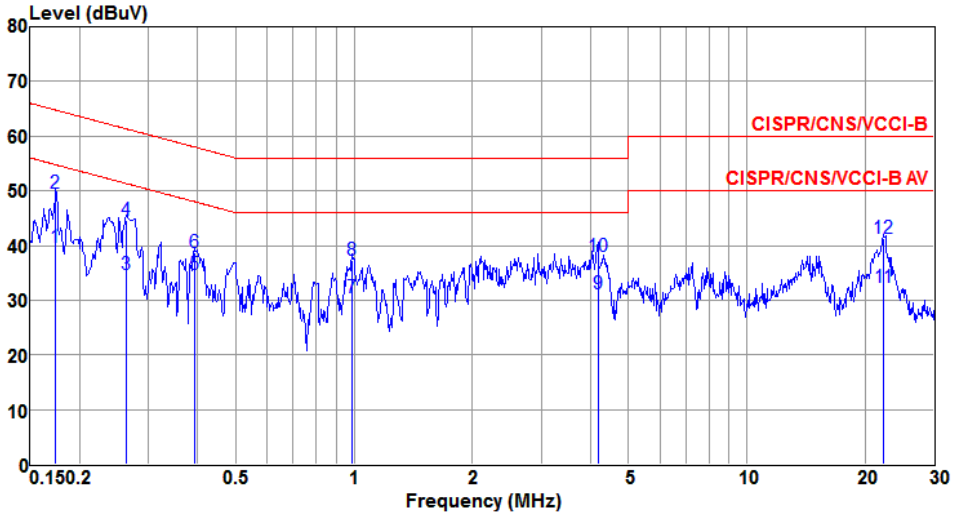
Modulation	HT40	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.177	41.99	54.63	-12.64	41.88	0.09	0.02	Average
2	0.177	49.00	64.63	-15.63	48.89	0.09	0.02	QP
3	0.222	39.45	52.75	-13.30	39.34	0.09	0.02	Average
4	0.222	46.00	62.75	-16.75	45.89	0.09	0.02	QP
5@	0.393	37.04	48.00	-10.96	36.95	0.06	0.03	Average
6	0.393	40.49	58.00	-17.51	40.40	0.06	0.03	QP
7	0.990	26.70	46.00	-19.30	26.57	0.07	0.06	Average
8	0.990	36.62	56.00	-19.38	36.49	0.07	0.06	QP
9	7.688	35.55	50.00	-14.45	35.21	0.19	0.15	Average
10	7.688	43.03	60.00	-16.97	42.69	0.19	0.15	QP
11	22.180	38.01	50.00	-11.99	37.39	0.41	0.21	Average
12	22.180	46.75	60.00	-13.25	46.13	0.41	0.21	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	HT40	Test Freq. (MHz)	2437
Power Phase	Neutral		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.174	39.70	54.76	-15.06	39.59	0.09	0.02	Average
2	0.174	49.50	64.76	-15.26	49.39	0.09	0.02	QP
3	0.263	34.81	51.33	-16.52	34.68	0.11	0.02	Average
4	0.263	44.72	61.33	-16.61	44.59	0.11	0.02	QP
5@	0.391	34.78	48.03	-13.25	34.62	0.13	0.03	Average
6	0.391	38.72	58.03	-19.31	38.56	0.13	0.03	QP
7	0.990	30.57	46.00	-15.43	30.42	0.09	0.06	Average
8	0.990	37.27	56.00	-18.73	37.12	0.09	0.06	QP
9	4.180	31.16	46.00	-14.84	30.89	0.15	0.12	Average
10	4.180	38.12	56.00	-17.88	37.85	0.15	0.12	QP
11	22.299	32.27	50.00	-17.73	31.63	0.43	0.21	Average
12	22.299	41.26	60.00	-18.74	40.62	0.43	0.21	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 6dB and Occupied Bandwidth

3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.2.2 Test Procedures

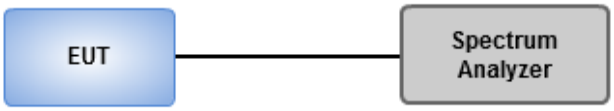
6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1 MHz, Video bandwidth = 3 MHz.
2. Detector = Sample, Trace mode = max hold.
3 Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

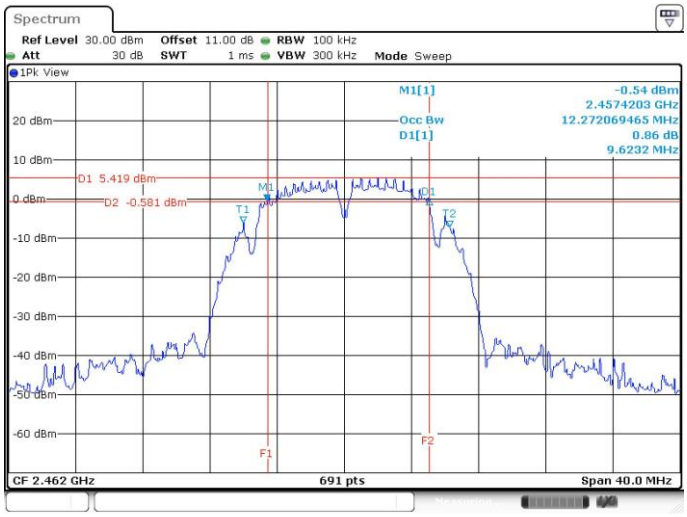
3.2.3 Test Setup



3.2.4 Test Result of 6dB and Occupied Bandwidth

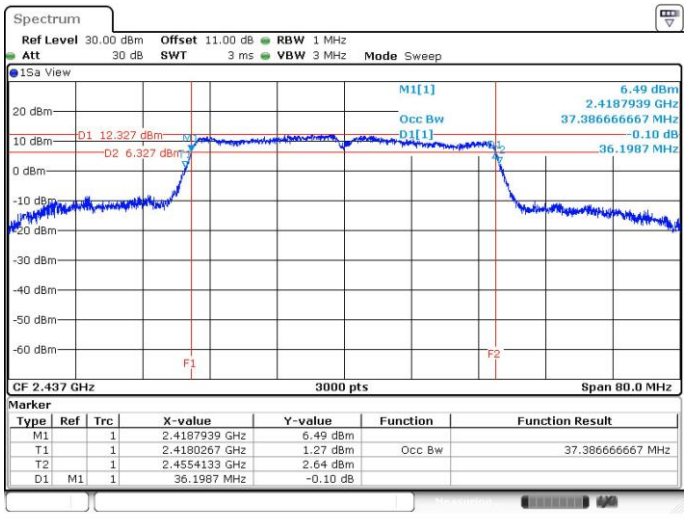
Modulation Mode	N_{TX}	Freq. (MHz)	6dB Bandwidth (MHz)				Limit (kHz)
			Chain 0	Chain 1	Chain 2	Chain 3	
11b	2	2412	9.80	10.09	---	---	500
11b	2	2437	9.74	10.03	---	---	500
11b	2	2462	10.03	9.62	---	---	500
11g	2	2412	16.35	16.35	---	---	500
11g	2	2437	16.06	16.35	---	---	500
11g	2	2462	16.35	16.35	---	---	500
HT20	2	2412	17.10	17.33	---	---	500
HT20	2	2437	16.41	16.93	---	---	500
HT20	2	2462	16.93	16.41	---	---	500
HT40	2	2422	36.06	36.29	---	---	500
HT40	2	2437	35.36	35.13	---	---	500
HT40	2	2452	35.71	36.06	---	---	500

Worst Plot



Modulation Mode	N_{TX}	Freq. (MHz)	99% Occupied Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3
11b	2	2412	12.37	12.47	---	---
11b	2	2437	12.23	12.19	---	---
11b	2	2462	12.33	12.32	---	---
11g	2	2412	17.00	17.05	---	---
11g	2	2437	19.39	20.16	---	---
11g	2	2462	17.07	17.00	---	---
HT20	2	2412	17.80	17.87	---	---
HT20	2	2437	20.81	21.55	---	---
HT20	2	2462	17.84	17.76	---	---
HT40	2	2422	36.77	36.77	---	---
HT40	2	2437	37.39	37.17	---	---
HT40	2	2452	37.07	37.07	---	---

Worst Plot



3.3 RF Output Power

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

☒ Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

☐ Antenna gain > 6dBi

☐ Non Fixed, point to point operations.
The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

☐ Fixed, point to point operations
Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations ,no any corresponding reduction is in transmitter peak output power

3.3.2 Test Procedures

☒ Maximum Peak Conducted Output Power

☐ **Spectrum analyzer**

1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

☒ **Power meter**

1. A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

☒ Maximum Conducted Output Power (For reference only)

☒ **Power meter**

1. A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.3.3 Test Setup

3.3.4 Test Result of Maximum Output Power

Modulation Mode	N_{TX}	Freq. (MHz)	Peak conducted Output Power (dBm)							Ant. Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (mW)	Total Power (dBm)	Limit (dBm)			
11b	2	2412	19.22	19.13	---	---	165.407	22.19	30.00	2.00	24.19	36.00
11b	2	2437	18.49	18.88	---	---	147.900	21.70	30.00	2.00	23.70	36.00
11b	2	2462	18.52	18.68	---	---	144.912	21.61	30.00	2.00	23.61	36.00
11g	2	2412	21.74	21.58	---	---	293.159	24.67	30.00	2.00	26.67	36.00
11g	2	2437	22.71	22.62	---	---	369.448	25.68	30.00	2.00	27.68	36.00
11g	2	2462	22.03	22.47	---	---	336.192	25.27	30.00	2.00	27.27	36.00
HT20	2	2412	21.49	21.12	---	---	270.348	24.32	30.00	2.00	26.32	36.00
HT20	2	2437	22.87	22.93	---	---	389.978	25.91	30.00	2.00	27.91	36.00
HT20	2	2462	21.05	21.87	---	---	281.166	24.49	30.00	2.00	26.49	36.00
HT40	2	2422	21.28	20.97	---	---	259.302	24.14	30.00	2.00	26.14	36.00
HT40	2	2437	23.11	22.78	---	---	394.315	**25.96**	30.00	2.00	27.96	36.00
HT40	2	2452	20.6	21.05	---	---	242.166	23.84	30.00	2.00	25.84	36.00

Modulation Mode	N_{TX}	Freq. (MHz)	Conducted (Average) Output Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
11b	2	2412	15.76	15.7	---	---	74.824	18.74	---
11b	2	2437	15.06	15.16	---	---	64.872	18.12	---
11b	2	2462	15.11	15.02	---	---	64.203	18.08	---
11g	2	2412	14.94	14.92	---	---	62.234	17.94	---
11g	2	2437	18.33	18.24	---	---	134.758	21.30	---
11g	2	2462	14.91	14.94	---	---	62.163	17.94	---
HT20	2	2412	13.93	14.12	---	---	50.540	17.04	---
HT20	2	2437	18.22	18.43	---	---	136.037	21.34	---
HT20	2	2462	13.13	13.75	---	---	44.273	16.46	---
HT40	2	2422	13.7	13.35	---	---	45.069	16.54	---
HT40	2	2437	17.69	16.98	---	---	108.637	20.36	---
HT40	2	2452	12.29	12.43	---	---	34.442	15.37	---

Note: Conducted average output power is for reference only.

3.4 Power Spectral Density

3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.4.2 Test Procedures

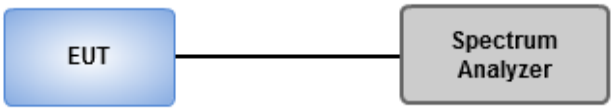
☒ Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.

1. Set the RBW = 3kHz, VBW = 10kHz.
2. Detector = Peak, Sweep time = auto couple.
3. Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

☐ Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.

1. Set the RBW = 100kHz, VBW = 300 kHz.
2. Detector = RMS, Sweep time = auto couple.
3. Set the sweep time to: ≥ 10 x (number of measurement points in sweep) x (maximum data rate per stream).
4. Perform the measurement over a single sweep.
5. Use the peak marker function to determine the maximum amplitude level.

3.4.3 Test Setup

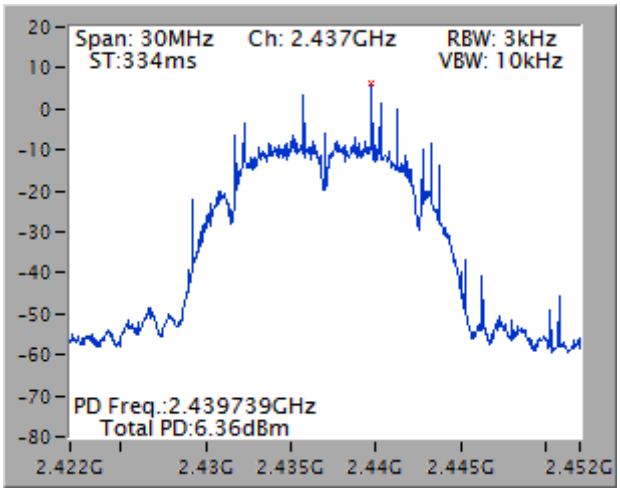


3.4.4 Test Result of Power Spectral Density

Modulation Mode	N_{TX}	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
11b	2	2412	4.48	8.00
11b	2	2437	6.36	8.00
11b	2	2462	4.00	8.00
11g	2	2412	-7.98	8.00
11g	2	2437	-3.89	8.00
11g	2	2462	-8.22	8.00
HT20	2	2412	-7.93	8.00
HT20	2	2437	-3.99	8.00
HT20	2	2462	-7.76	8.00
HT40	2	2422	-7.25	8.00
HT40	2	2437	-2.90	8.00
HT40	2	2452	-11.69	8.00

Note: Test result is bin-by-bin summing measured value of each TX port.

Worst Plots



3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

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:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.5.2 Test Procedures

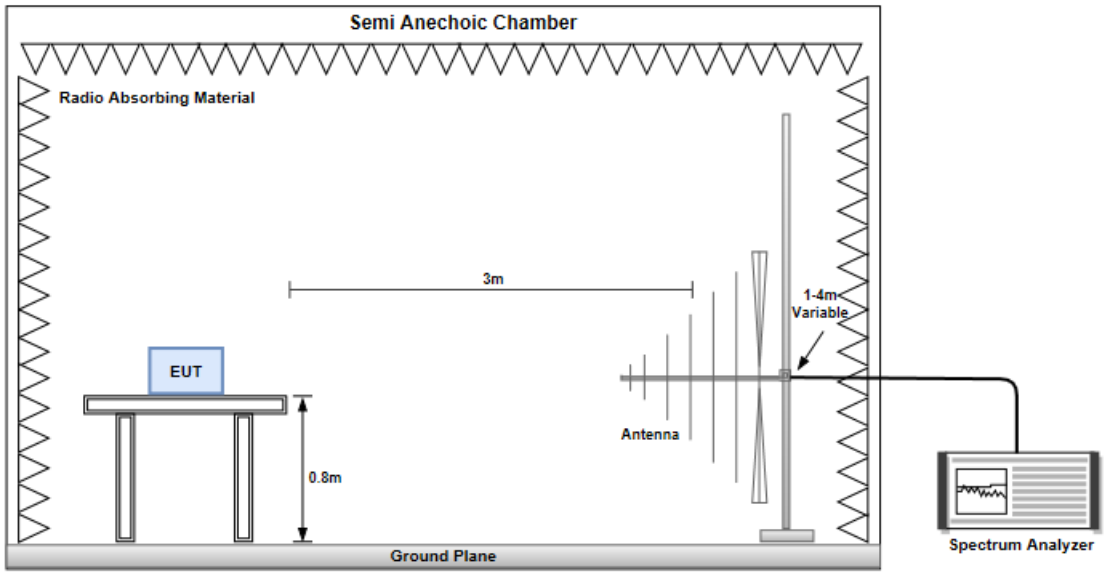
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

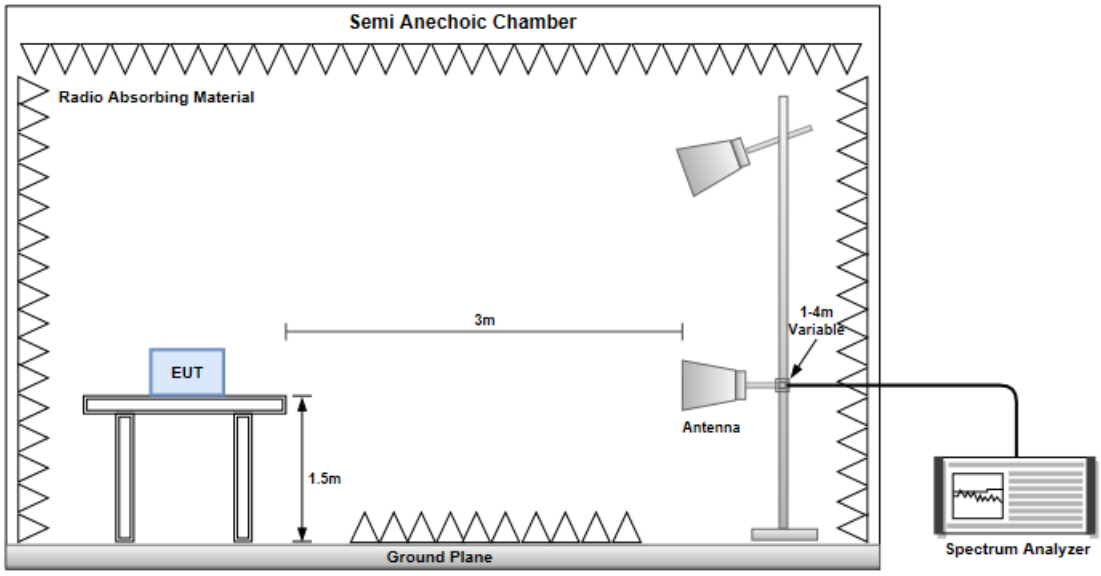
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.5.3 Test Setup

Radiated Emissions below 1 GHz

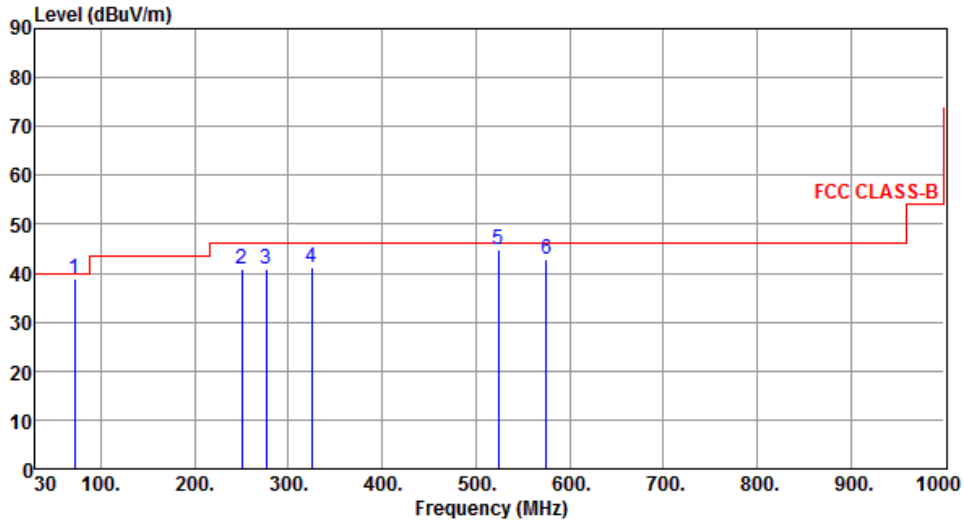


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

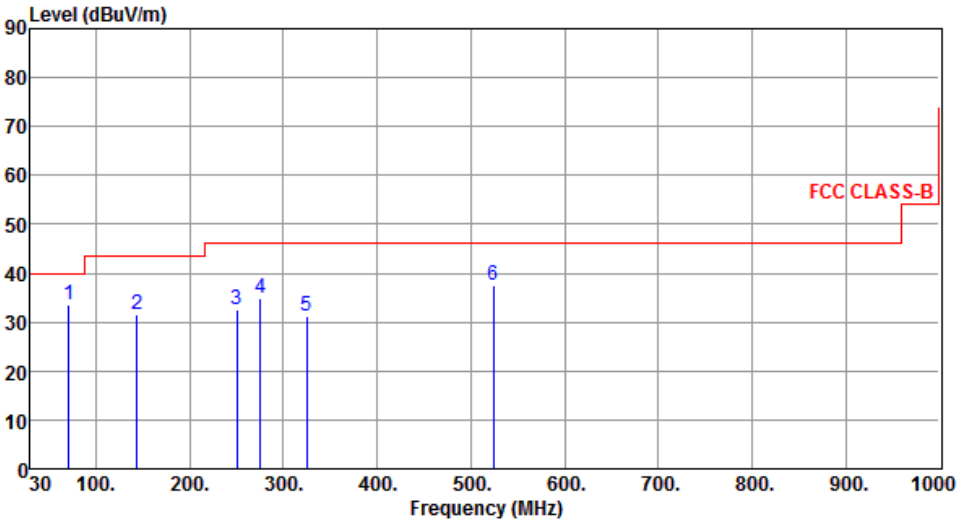
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	71.64	38.98	40.00	-1.02	49.92	-10.94	QP	128	284
2	250.57	40.83	46.00	-5.17	50.02	-9.19	Peak	---	---
3	275.97	40.93	46.00	-5.07	49.04	-8.11	Peak	---	---
4	325.14	41.06	46.00	-4.94	47.94	-6.88	Peak	---	---
5	524.24	44.82	46.00	-1.18	47.20	-2.38	QP	121	246
6	575.54	42.87	46.00	-3.13	44.16	-1.29	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Vertical		

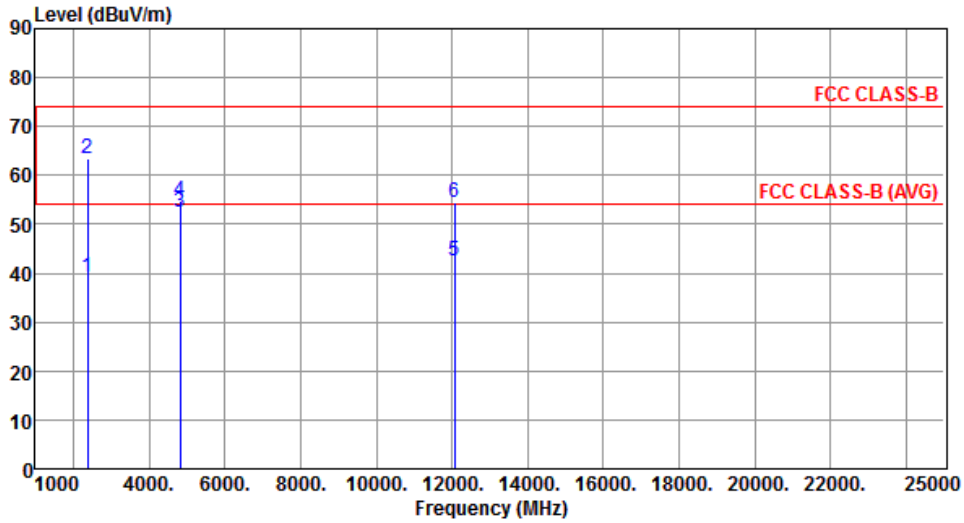


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	71.34	33.41	40.00	-6.59	44.29	-10.88	Peak	---	---
2	143.49	31.63	43.50	-11.87	39.93	-8.30	Peak	---	---
3	250.38	32.66	46.00	-13.34	41.85	-9.19	Peak	---	---
4	275.18	34.96	46.00	-11.04	43.10	-8.14	Peak	---	---
5	324.54	31.38	46.00	-14.62	38.28	-6.90	Peak	---	---
6	524.14	37.54	46.00	-8.46	39.93	-2.39	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11b

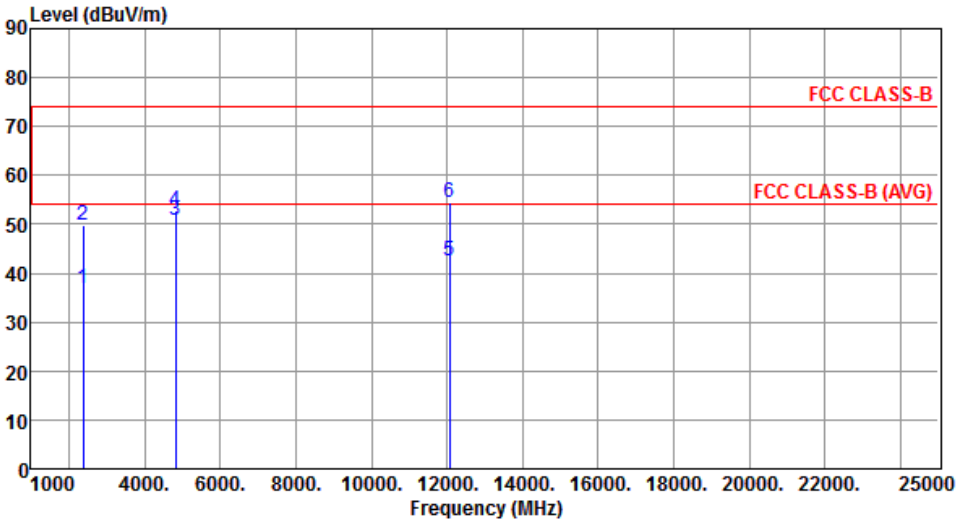
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	39.11	54.00	-14.89	42.40	-3.29	Average	254	152
2	2390.00	63.42	74.00	-10.58	66.71	-3.29	Peak	254	152
3	4824.00	52.57	54.00	-1.43	49.04	3.53	Average	315	45
4	4824.00	54.73	74.00	-19.27	51.20	3.53	Peak	315	45
5	12060.00	42.55	54.00	-11.45	28.21	14.34	Average	100	123
6	12060.00	54.60	74.00	-19.40	40.26	14.34	Peak	100	123

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

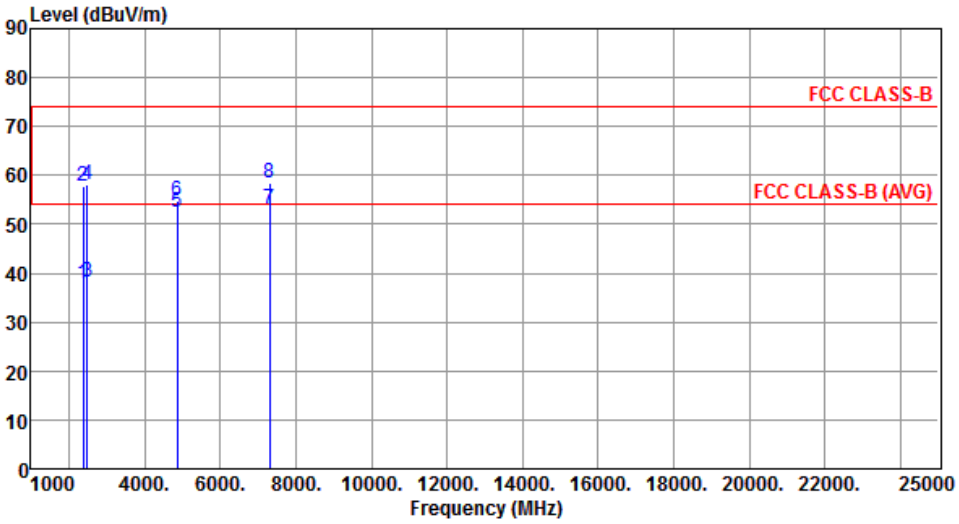
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.81	54.00	-17.19	40.10	-3.29	Average	100	215
2	2390.00	49.85	74.00	-24.15	53.14	-3.29	Peak	100	215
3	4824.00	50.74	54.00	-3.26	47.21	3.53	Average	124	311
4	4824.00	52.92	74.00	-21.08	49.39	3.53	Peak	124	311
5	12060.00	42.43	54.00	-11.57	28.09	14.34	Average	100	242
6	12060.00	54.30	74.00	-19.70	39.96	14.34	Peak	100	242

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

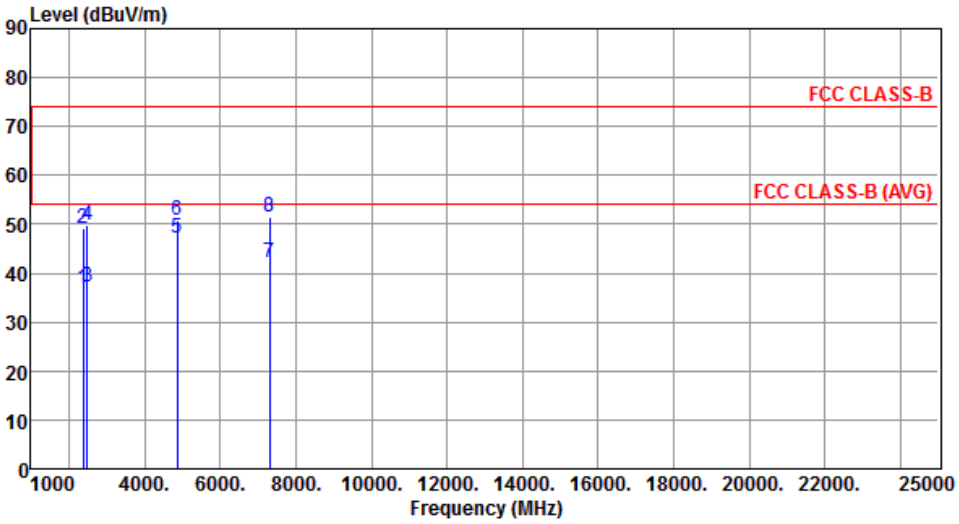
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.78	54.00	-16.22	41.07	-3.29	Average	104	196
2	2390.00	57.93	74.00	-16.07	61.22	-3.29	Peak	104	196
3	2483.50	38.08	54.00	-15.92	40.98	-2.90	Average	104	196
4	2483.50	58.10	74.00	-15.90	61.00	-2.90	Peak	104	196
5	4874.00	52.50	54.00	-1.50	48.81	3.69	Average	100	145
6	4874.00	54.66	74.00	-19.34	50.97	3.69	Peak	100	145
7	7311.00	52.99	54.00	-1.01	44.48	8.51	Average	198	311
8	7311.00	58.33	74.00	-15.67	49.82	8.51	Peak	198	311

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

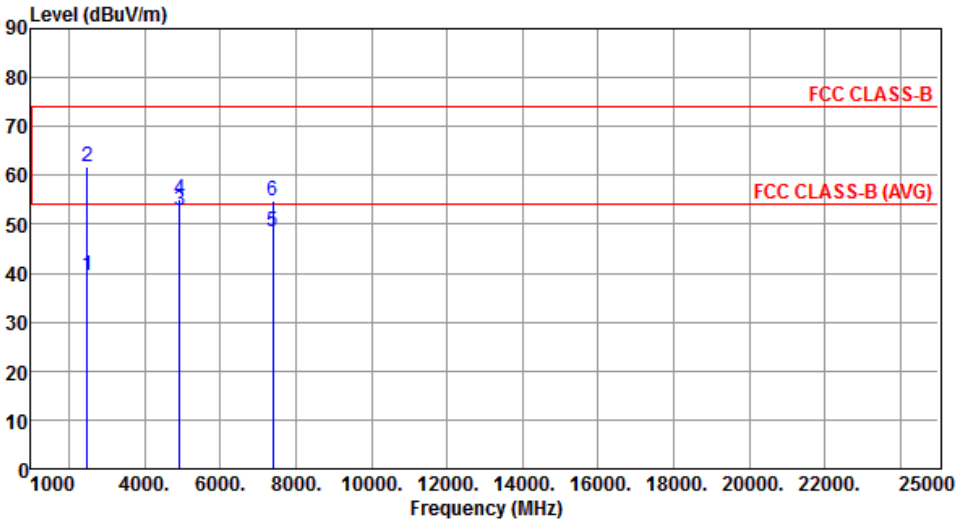
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.89	54.00	-17.11	40.18	-3.29	Average	100	137
2	2390.00	49.32	74.00	-24.68	52.61	-3.29	Peak	100	137
3	2483.50	37.13	54.00	-16.87	40.03	-2.90	Average	100	137
4	2483.50	49.93	74.00	-24.07	52.83	-2.90	Peak	100	137
5	4874.00	47.31	54.00	-6.69	43.62	3.69	Average	105	226
6	4874.00	50.85	74.00	-23.15	47.16	3.69	Peak	105	226
7	7311.00	42.23	54.00	-11.77	33.72	8.51	Average	228	326
8	7311.00	51.59	74.00	-22.41	43.08	8.51	Peak	228	326

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

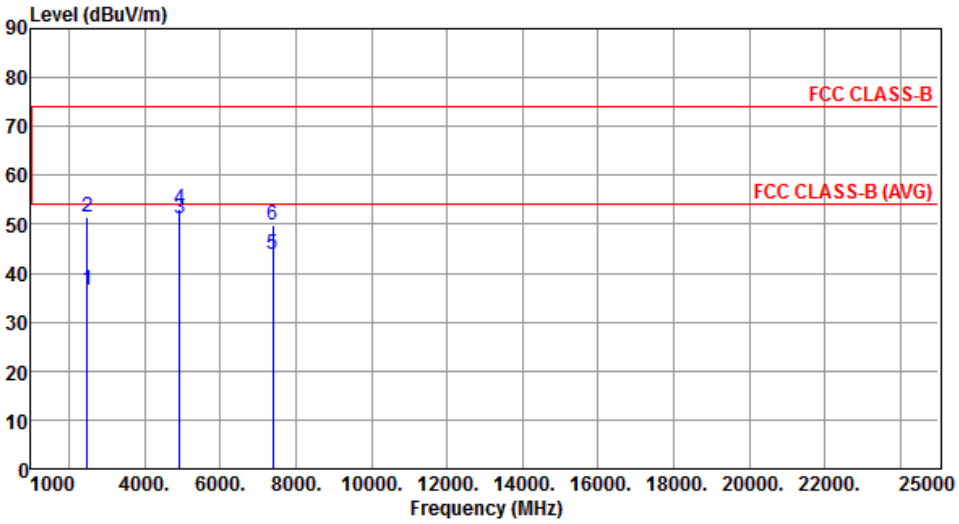
Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	39.53	54.00	-14.47	42.43	-2.90	Average	301	359
2	2483.50	61.68	74.00	-12.32	64.58	-2.90	Peak	301	359
3	4924.00	52.95	54.00	-1.05	49.09	3.86	Average	100	143
4	4924.00	55.12	74.00	-18.88	51.26	3.86	Peak	100	143
5	7386.00	48.56	54.00	-5.44	40.02	8.54	Average	179	312
6	7386.00	54.72	74.00	-19.28	46.18	8.54	Peak	179	312

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	11b	Test Freq. (MHz)	2462
Polarization	Vertical		

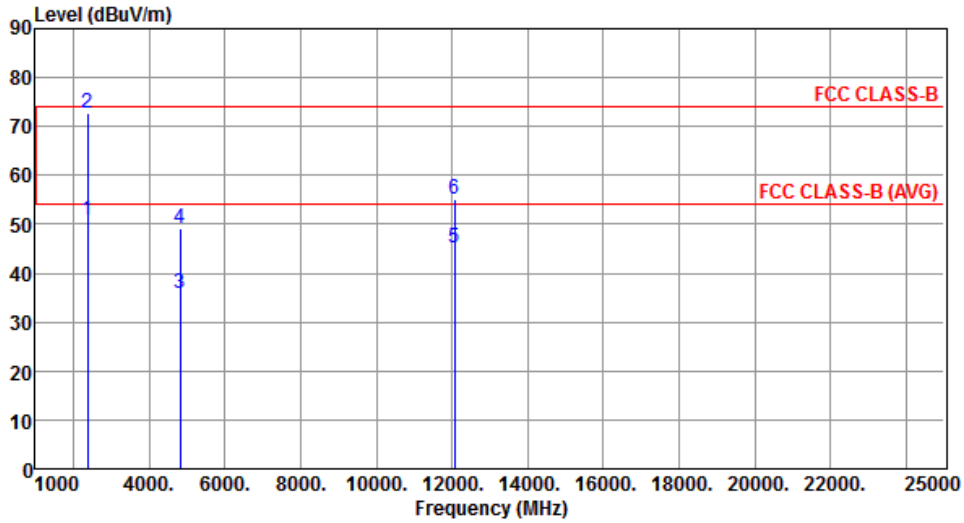


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	36.58	54.00	-17.42	39.48	-2.90	Average	116	200
2	2483.50	51.52	74.00	-22.48	54.42	-2.90	Peak	116	200
3	4924.00	50.98	54.00	-3.02	47.12	3.86	Average	100	227
4	4924.00	53.09	74.00	-20.91	49.23	3.86	Peak	100	227
5	7386.00	43.77	54.00	-10.23	35.23	8.54	Average	100	79
6	7386.00	49.85	74.00	-24.15	41.31	8.54	Peak	100	79

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11g

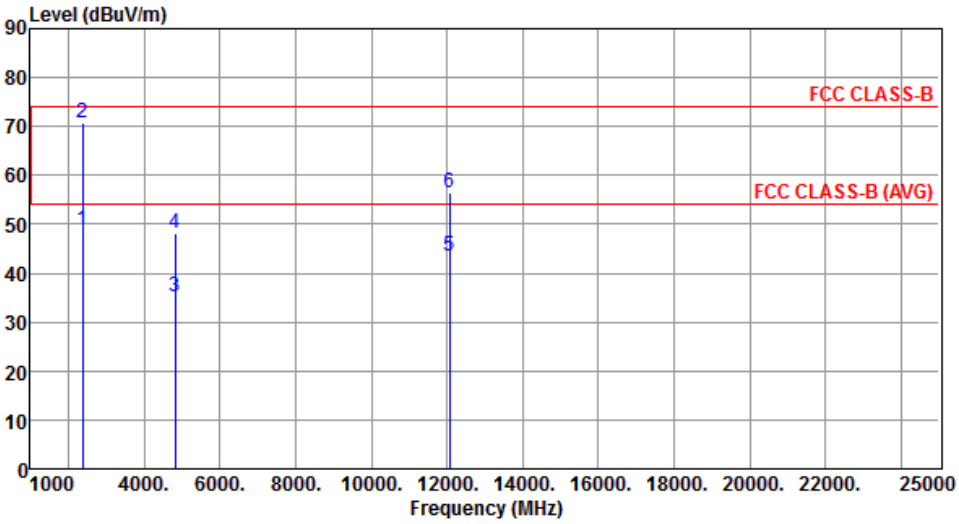
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	50.77	54.00	-3.23	54.06	-3.29	Average	227	334
2	2390.00	72.82	74.00	-1.18	76.11	-3.29	Peak	227	334
3	4824.00	35.80	54.00	-18.20	32.27	3.53	Average	316	47
4	4824.00	49.20	74.00	-24.80	45.67	3.53	Peak	316	47
5	12060.00	45.18	54.00	-8.82	30.84	14.34	Average	239	352
6	12060.00	54.98	74.00	-19.02	40.64	14.34	Peak	239	352

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

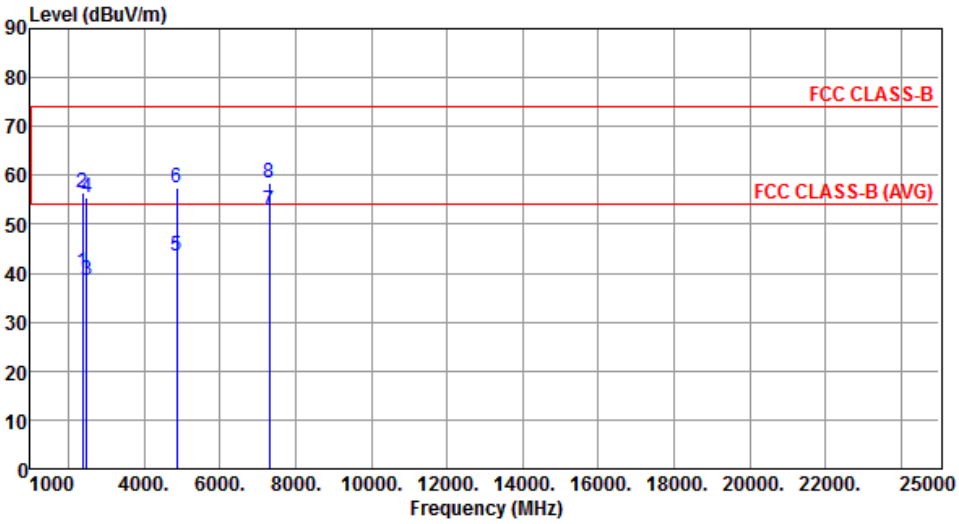
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	48.90	54.00	-5.10	52.19	-3.29	Average	217	113
2	2390.00	70.67	74.00	-3.33	73.96	-3.29	Peak	217	113
3	4824.00	35.36	54.00	-18.64	31.83	3.53	Average	294	231
4	4824.00	48.28	74.00	-25.72	44.75	3.53	Peak	294	231
5	12060.00	43.37	54.00	-10.63	29.03	14.34	Average	112	47
6	12060.00	56.31	74.00	-17.69	41.97	14.34	Peak	112	47

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

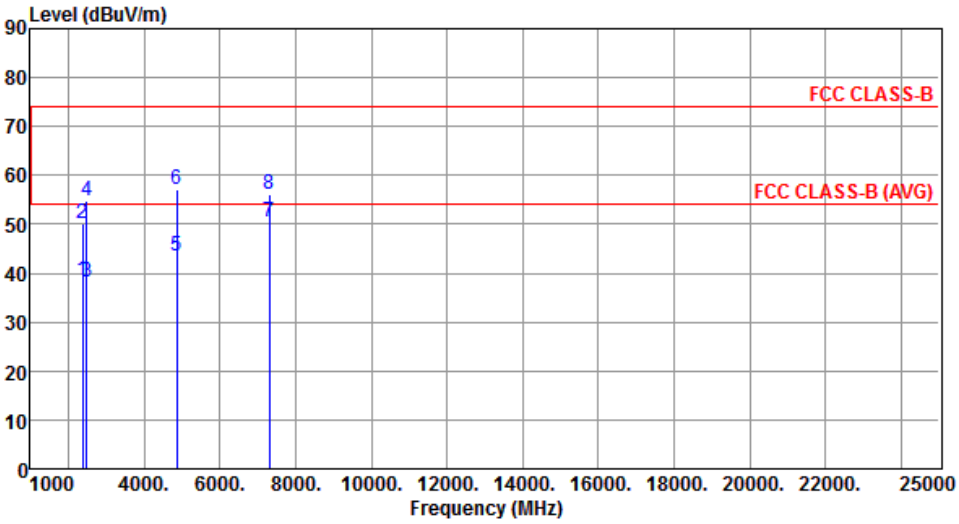
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	40.17	54.00	-13.83	43.46	-3.29	Average	134	359
2	2390.00	56.48	74.00	-17.52	59.77	-3.29	Peak	134	359
3	2483.50	38.57	54.00	-15.43	41.47	-2.90	Average	134	359
4	2483.50	55.55	74.00	-18.45	58.45	-2.90	Peak	134	359
5	4874.00	43.54	54.00	-10.46	39.85	3.69	Average	100	47
6	4874.00	57.46	74.00	-16.54	53.77	3.69	Peak	100	47
7	7311.00	52.78	54.00	-1.22	44.27	8.51	Average	205	152
8	7311.00	58.34	74.00	-15.66	49.83	8.51	Peak	205	152

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

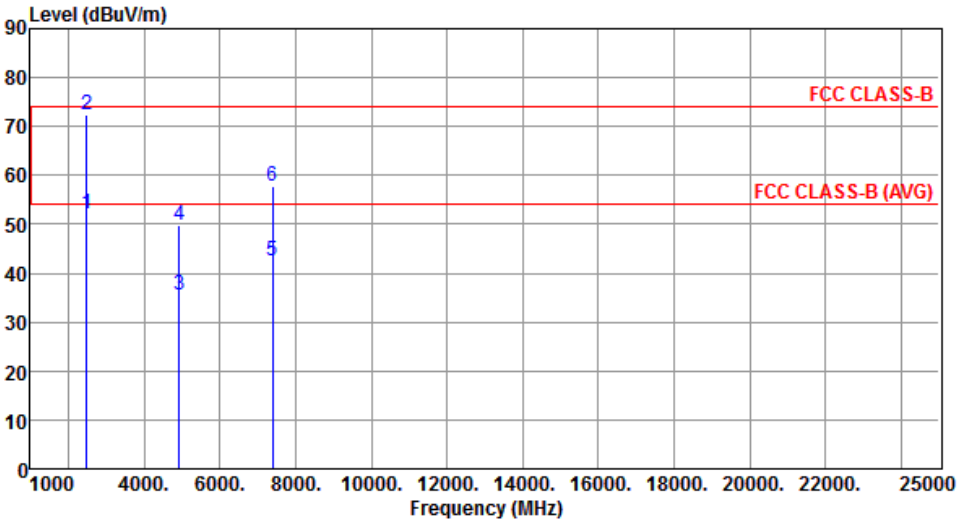
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.46	54.00	-15.54	41.75	-3.29	Average	123	203
2	2390.00	50.01	74.00	-23.99	53.30	-3.29	Peak	123	203
3	2483.50	38.25	54.00	-15.75	41.15	-2.90	Average	123	203
4	2483.50	54.93	74.00	-19.07	57.83	-2.90	Peak	123	203
5	4874.00	43.48	54.00	-10.52	39.79	3.69	Average	112	219
6	4874.00	57.18	74.00	-16.82	53.49	3.69	Peak	112	219
7	7311.00	50.64	54.00	-3.36	42.13	8.51	Average	153	242
8	7311.00	56.15	74.00	-17.85	47.64	8.51	Peak	153	242

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

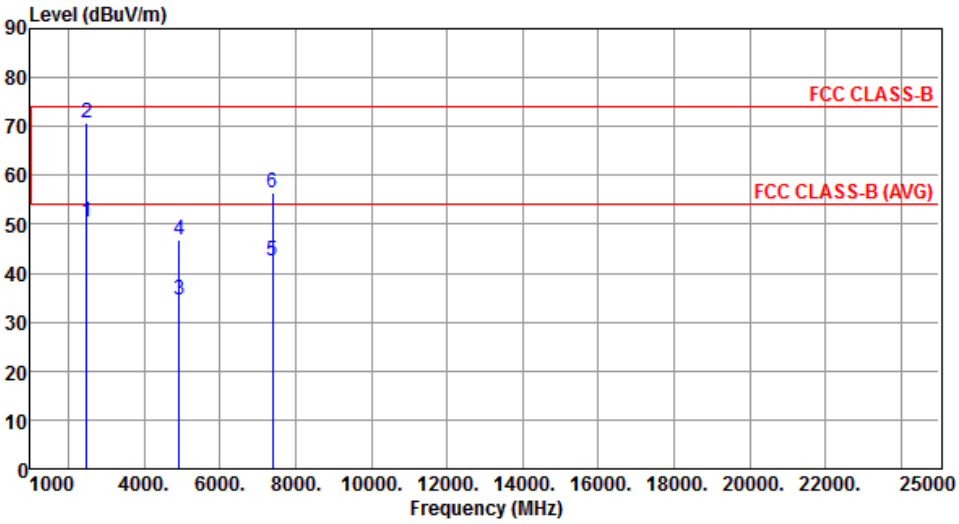
Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.02	54.00	-1.98	54.92	-2.90	Average	234	4
2	2483.50	72.28	74.00	-1.72	75.18	-2.90	Peak	234	4
3	4924.00	35.58	54.00	-18.42	31.72	3.86	Average	318	47
4	4924.00	49.84	74.00	-24.16	45.98	3.86	Peak	318	47
5	7386.00	42.61	54.00	-11.39	34.07	8.54	Average	212	308
6	7386.00	57.72	74.00	-16.28	49.18	8.54	Peak	212	308

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Vertical		

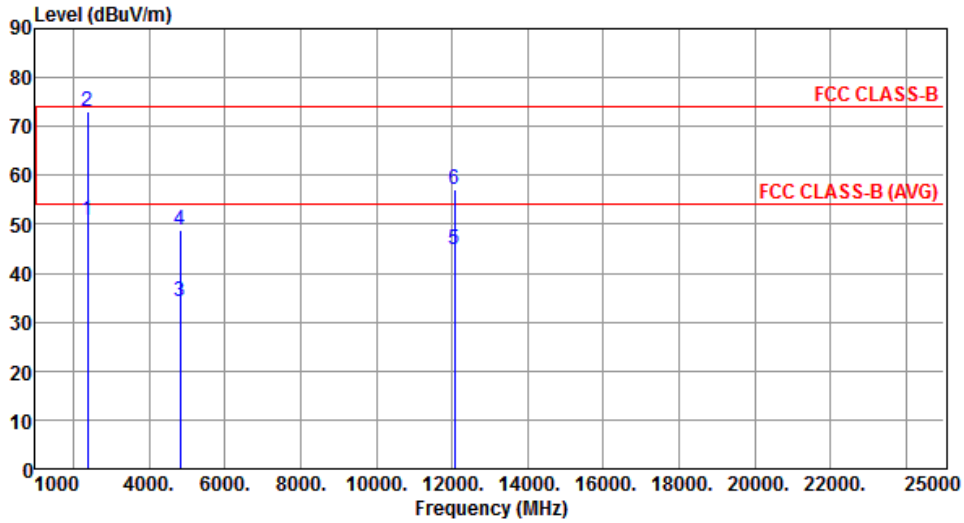


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	50.46	54.00	-3.54	53.36	-2.90	Average	227	13
2	2483.50	70.81	74.00	-3.19	73.71	-2.90	Peak	227	13
3	4924.00	34.44	54.00	-19.56	30.58	3.86	Average	294	115
4	4924.00	46.67	74.00	-27.33	42.81	3.86	Peak	294	115
5	7386.00	42.36	54.00	-11.64	33.82	8.54	Average	230	108
6	7386.00	56.46	74.00	-17.54	47.92	8.54	Peak	230	108

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

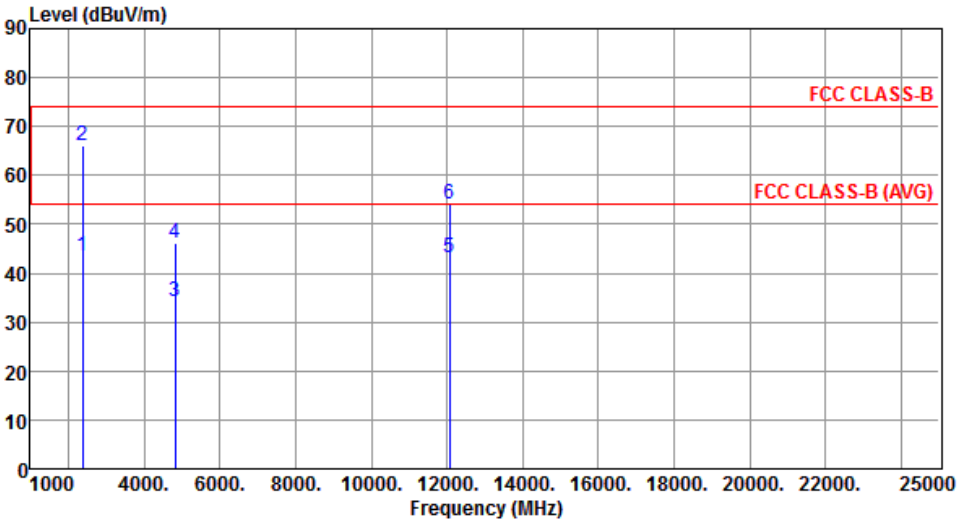
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	50.78	54.00	-3.22	54.07	-3.29	Average	226	326
2	2390.00	72.92	74.00	-1.08	76.21	-3.29	Peak	226	326
3	4824.00	34.22	54.00	-19.78	30.69	3.53	Average	100	148
4	4824.00	48.75	74.00	-25.25	45.22	3.53	Peak	100	148
5	12060.00	44.96	54.00	-9.04	30.62	14.34	Average	189	314
6	12060.00	57.19	74.00	-16.81	42.85	14.34	Peak	189	314

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

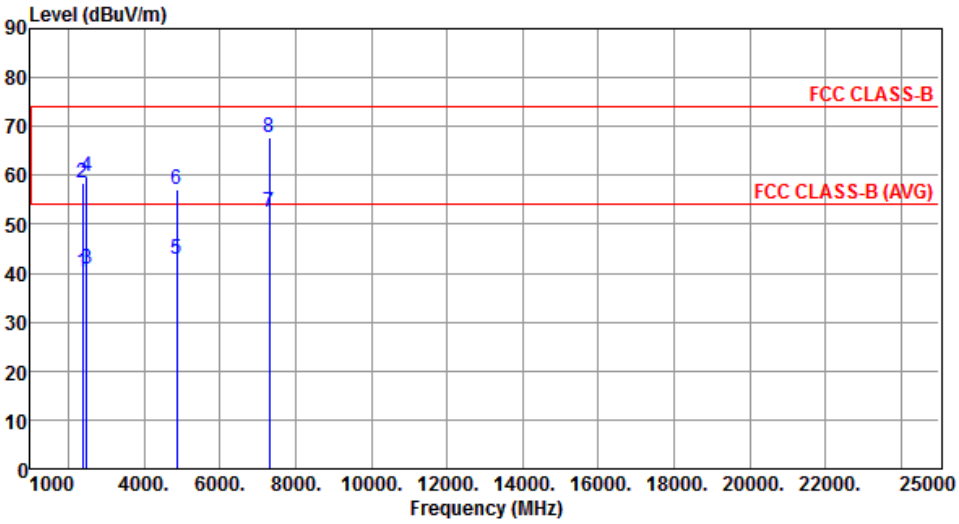
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	43.64	54.00	-10.36	46.93	-3.29	Average	388	90
2	2390.00	66.15	74.00	-7.85	69.44	-3.29	Peak	388	90
3	4824.00	34.36	54.00	-19.64	30.83	3.53	Average	284	112
4	4824.00	46.32	74.00	-27.68	42.79	3.53	Peak	284	112
5	12060.00	43.18	54.00	-10.82	28.84	14.34	Average	156	137
6	12060.00	54.05	74.00	-19.95	39.71	14.34	Peak	156	137

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

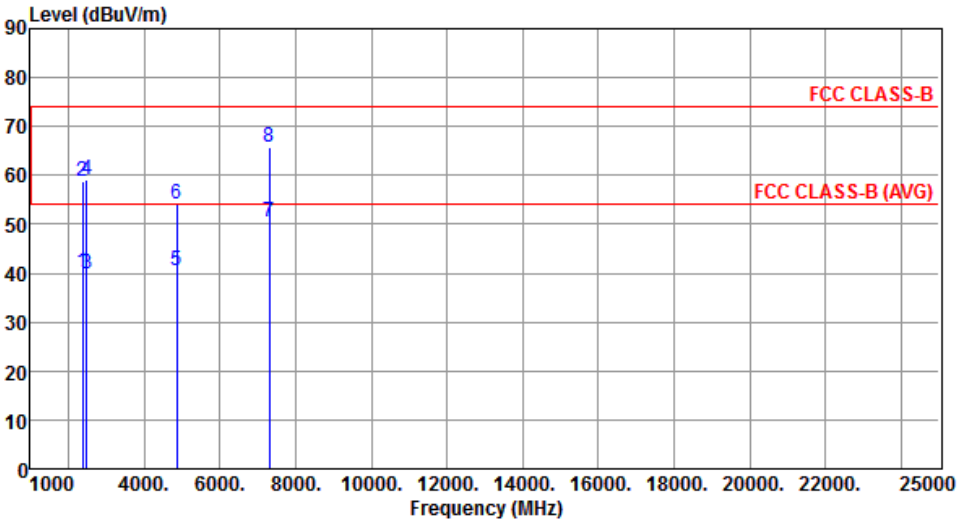
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	40.12	54.00	-13.88	43.41	-3.29	Average	275	360
2	2390.00	58.38	74.00	-15.62	61.67	-3.29	Peak	275	360
3	2483.50	40.95	54.00	-13.05	43.85	-2.90	Average	330	360
4	2483.50	59.70	74.00	-14.30	62.60	-2.90	Peak	330	360
5	4874.00	42.70	54.00	-11.30	39.01	3.69	Average	105	50
6	4874.00	57.24	74.00	-16.76	53.55	3.69	Peak	105	50
7	7311.00	52.61	54.00	-1.39	44.10	8.51	Average	212	308
8	7311.00	67.87	74.00	-6.13	59.36	8.51	Peak	212	308

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

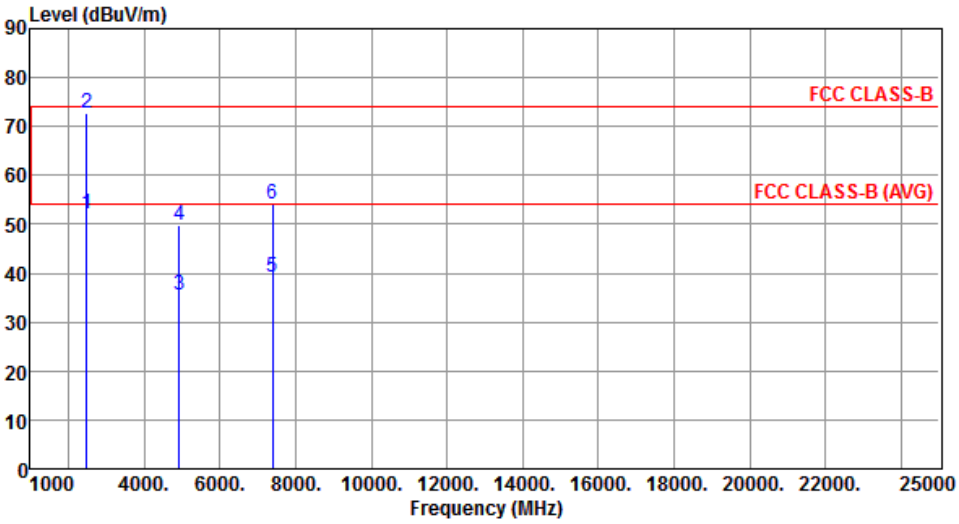
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	40.09	54.00	-13.91	43.38	-3.29	Average	262	354
2	2390.00	58.75	74.00	-15.25	62.04	-3.29	Peak	262	354
3	2483.50	39.77	54.00	-14.23	42.67	-2.90	Average	262	354
4	2483.50	59.04	74.00	-14.96	61.94	-2.90	Peak	262	354
5	4874.00	40.53	54.00	-13.47	36.84	3.69	Average	117	143
6	4874.00	54.17	74.00	-19.83	50.48	3.69	Peak	117	143
7	7311.00	50.36	54.00	-3.64	41.85	8.51	Average	275	349
8	7311.00	65.91	74.00	-8.09	57.40	8.51	Peak	212	308

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

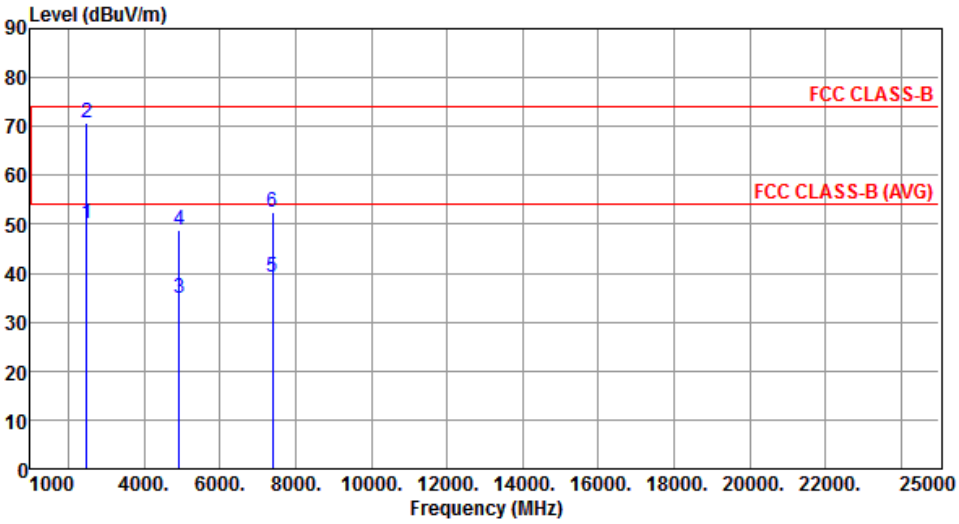
Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.05	54.00	-1.95	54.95	-2.90	Average	232	355
2	2483.50	72.69	74.00	-1.31	75.59	-2.90	Peak	232	355
3	4924.00	35.43	54.00	-18.57	31.57	3.86	Average	100	147
4	4924.00	49.83	74.00	-24.17	45.97	3.86	Peak	100	147
5	7386.00	39.18	54.00	-14.82	30.64	8.54	Average	100	280
6	7386.00	54.15	74.00	-19.85	45.61	8.54	Peak	100	280

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Vertical		

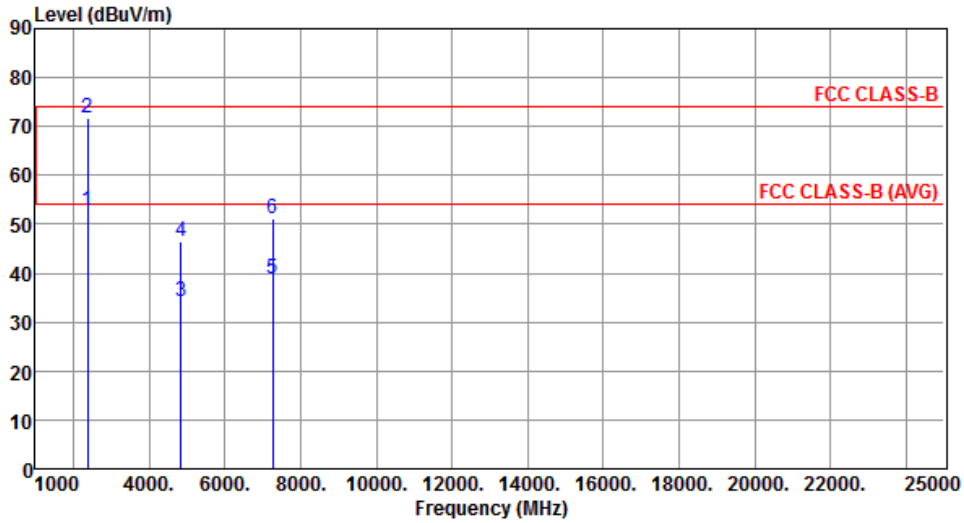


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	50.25	54.00	-3.75	53.15	-2.90	Average	208	320
2	2483.50	70.62	74.00	-3.38	73.52	-2.90	Peak	208	320
3	4924.00	34.80	54.00	-19.20	30.94	3.86	Average	120	94
4	4924.00	48.72	74.00	-25.28	44.86	3.86	Peak	120	94
5	7386.00	39.13	54.00	-14.87	30.59	8.54	Average	122	253
6	7386.00	52.37	74.00	-21.63	43.83	8.54	Peak	122	253

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

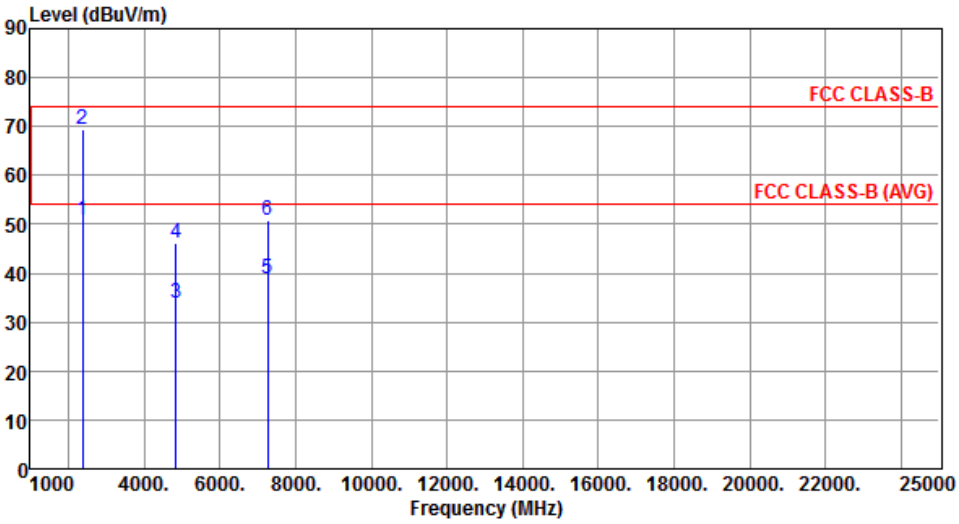
Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	52.94	54.00	-1.06	56.23	-3.29	Average	226	333
2	2390.00	71.61	74.00	-2.39	74.90	-3.29	Peak	226	333
3	4844.00	34.33	54.00	-19.67	30.73	3.60	Average	130	146
4	4844.00	46.33	74.00	-27.67	42.73	3.60	Peak	130	146
5	7266.00	38.77	54.00	-15.23	30.26	8.51	Average	159	311
6	7266.00	51.14	74.00	-22.86	42.63	8.51	Peak	159	311

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

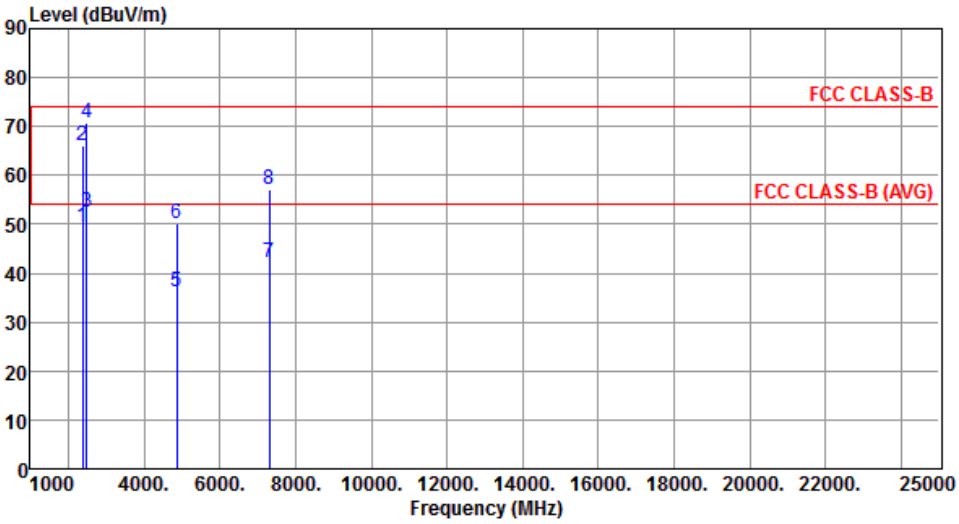
Modulation	HT40	**Test Freq. (MHz)**	2422
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	50.68	54.00	-3.32	53.97	-3.29	Average	250	357
2	2390.00	69.31	74.00	-4.69	72.60	-3.29	Peak	250	357
3	4844.00	33.86	54.00	-20.14	30.26	3.60	Average	214	185
4	4844.00	46.21	74.00	-27.79	42.61	3.60	Peak	214	185
5	7266.00	38.71	54.00	-15.29	30.20	8.51	Average	130	346
6	7266.00	50.87	74.00	-23.13	42.36	8.51	Peak	130	346

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

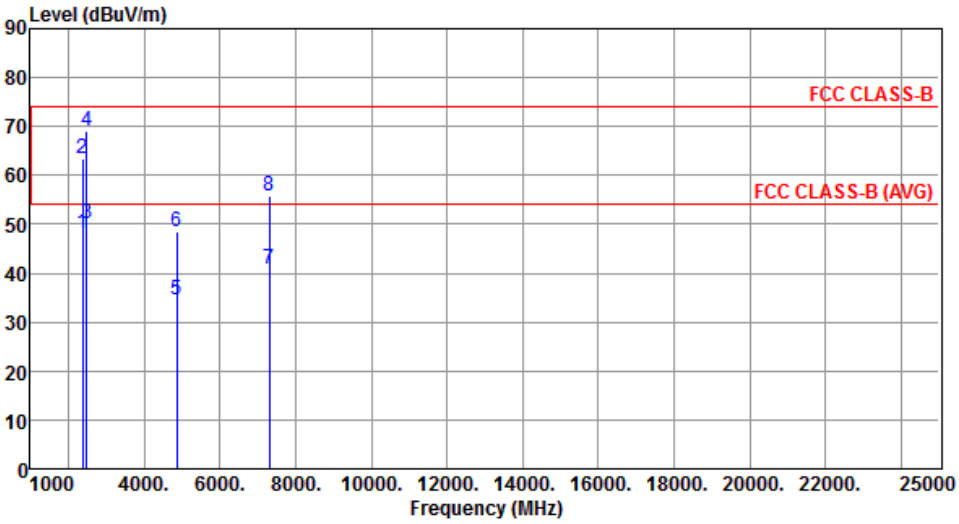
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	49.56	54.00	-4.44	52.85	-3.29	Average	163	348
2	2390.00	65.93	74.00	-8.07	69.22	-3.29	Peak	163	348
3	2483.50	52.36	54.00	-1.64	55.26	-2.90	Average	164	354
4	2483.50	70.77	74.00	-3.23	73.67	-2.90	Peak	164	354
5	4874.00	36.34	54.00	-17.66	32.65	3.69	Average	100	50
6	4874.00	50.29	74.00	-23.71	46.60	3.69	Peak	100	50
7	7311.00	42.13	54.00	-11.87	33.62	8.51	Average	199	281
8	7311.00	57.20	74.00	-16.80	48.69	8.51	Peak	199	281

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

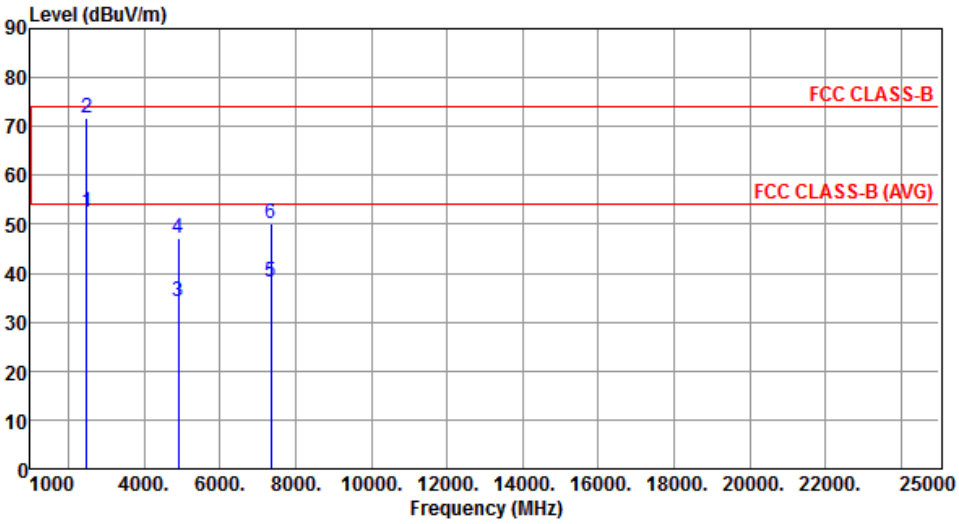
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	48.09	54.00	-5.91	51.38	-3.29	Average	155	350
2	2390.00	63.56	74.00	-10.44	66.85	-3.29	Peak	155	350
3	2483.50	50.14	54.00	-3.86	53.04	-2.90	Average	155	350
4	2483.50	68.97	74.00	-5.03	71.87	-2.90	Peak	155	350
5	4874.00	34.53	54.00	-19.47	30.84	3.69	Average	120	303
6	4874.00	48.43	74.00	-25.57	44.74	3.69	Peak	120	303
7	7311.00	41.00	54.00	-13.00	32.49	8.51	Average	173	295
8	7311.00	55.95	74.00	-18.05	47.44	8.51	Peak	173	295

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

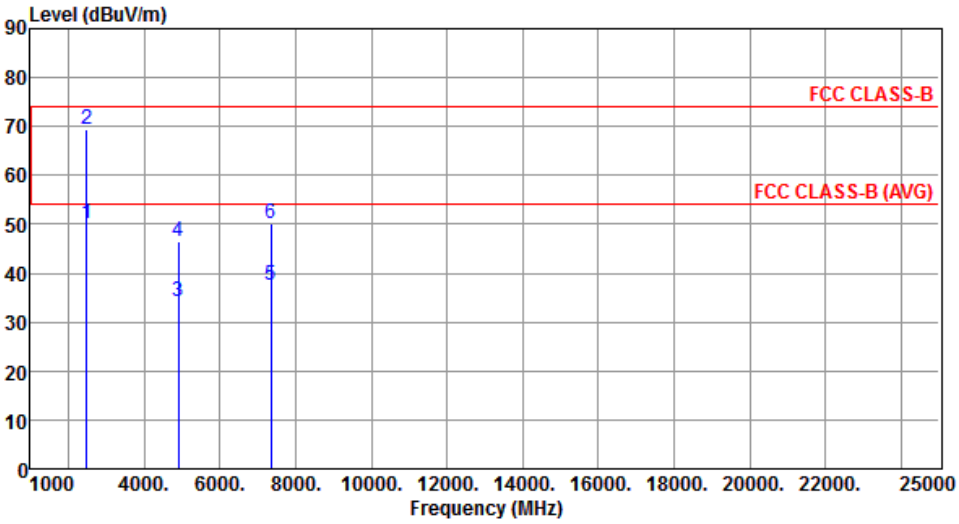
Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.58	54.00	-1.42	55.48	-2.90	Average	220	356
2	2483.50	71.79	74.00	-2.21	74.69	-2.90	Peak	220	356
3	4904.00	34.20	54.00	-19.80	30.40	3.80	Average	190	149
4	4904.00	47.27	74.00	-26.73	43.47	3.80	Peak	190	149
5	7356.00	38.23	54.00	-15.77	29.70	8.53	Average	155	286
6	7356.00	50.27	74.00	-23.73	41.74	8.53	Peak	155	286

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	50.25	54.00	-3.75	53.15	-2.90	Average	186	13
2	2483.50	69.46	74.00	-4.54	72.36	-2.90	Peak	186	13
3	4904.00	34.31	54.00	-19.69	30.51	3.80	Average	172	136
4	4904.00	46.55	74.00	-27.45	42.75	3.80	Peak	172	136
5	7356.00	37.47	54.00	-16.53	28.94	8.53	Average	183	142
6	7356.00	50.11	74.00	-23.89	41.58	8.53	Peak	183	142

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.6 Emissions in Non-Restricted Frequency Bands

3.6.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

Reference level measurement

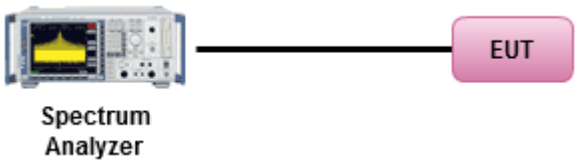
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.6.4 Test Setup

Transmitter Radiated Bandedge Emissions

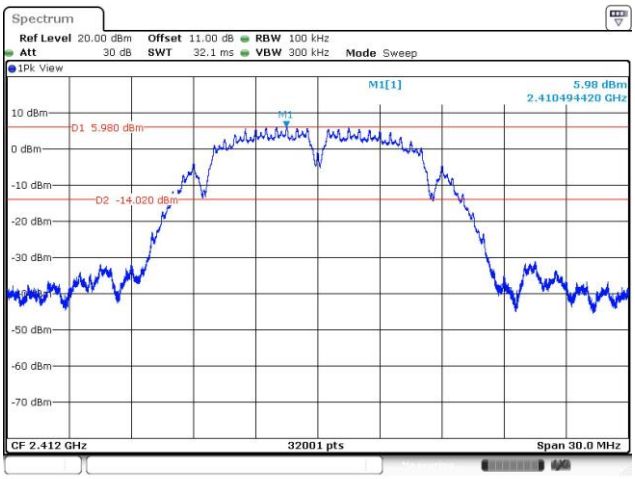
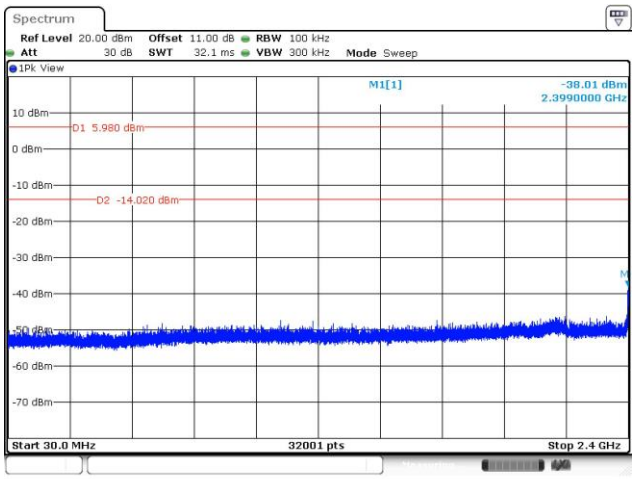
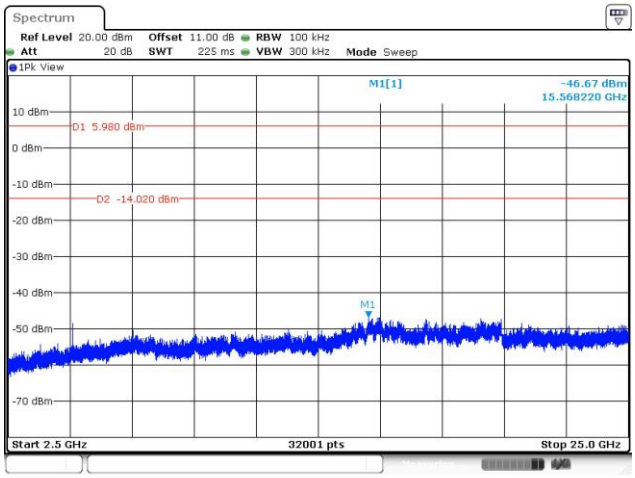
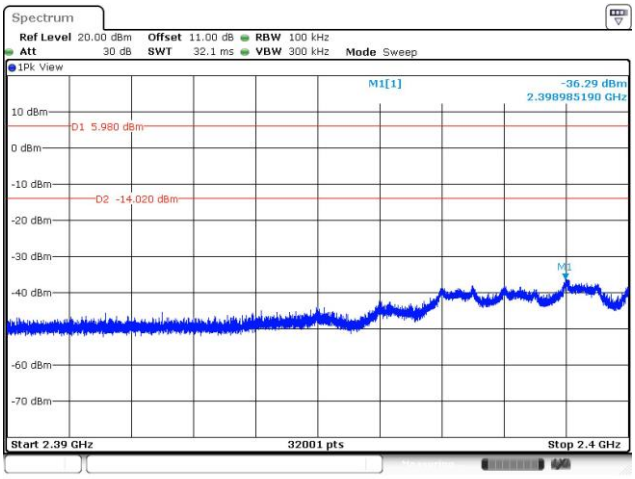


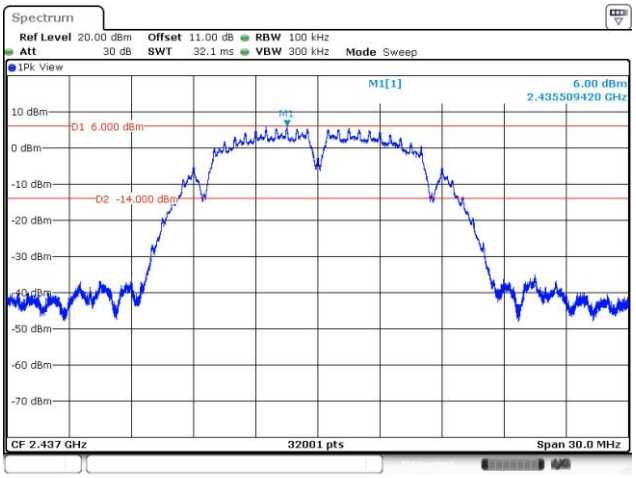
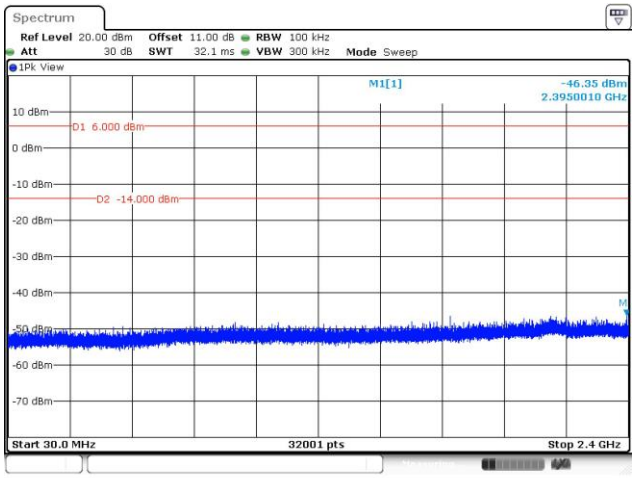
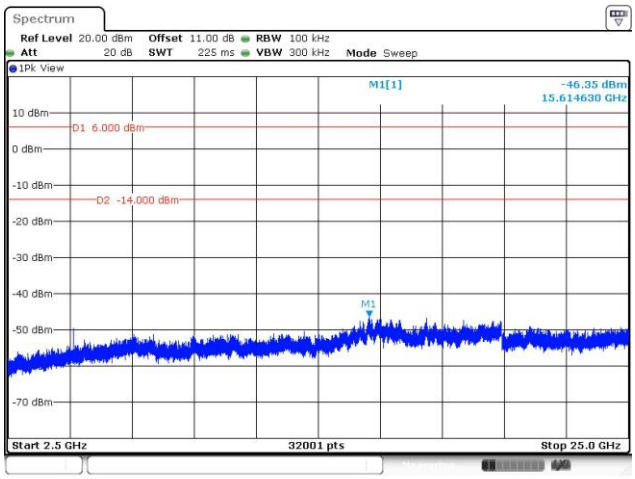
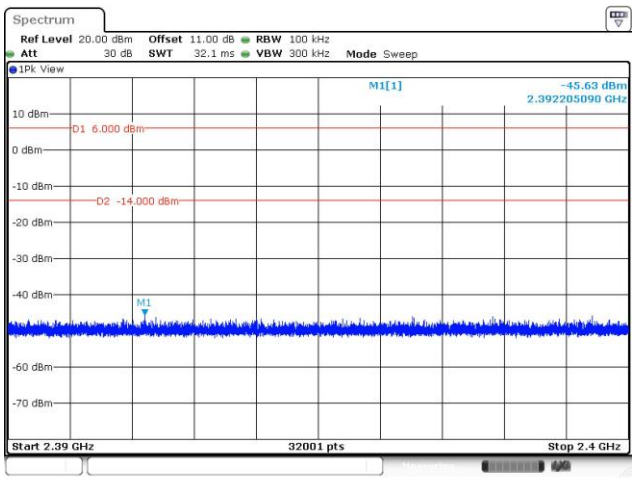
3.6.5 Test Result of Emissions in non-restricted frequency bands

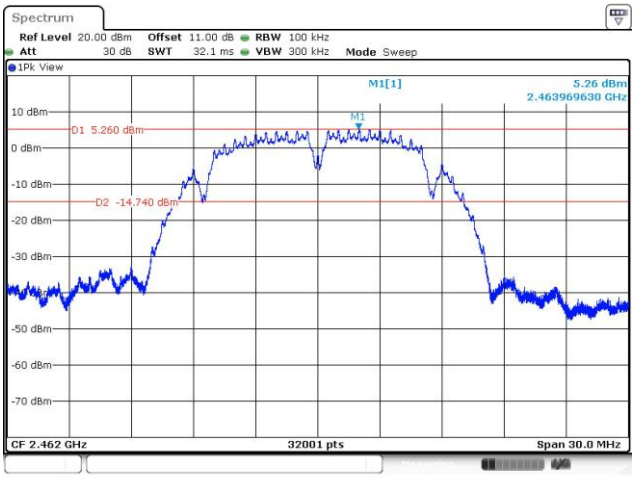
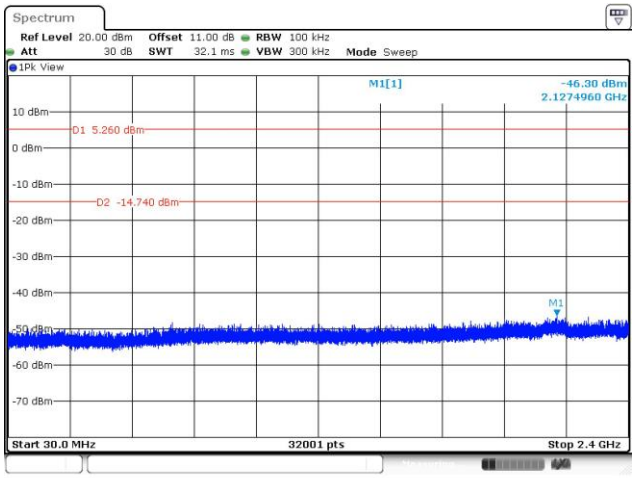
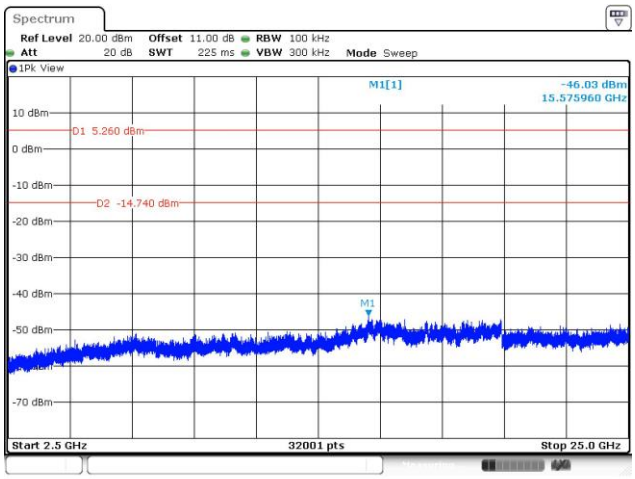
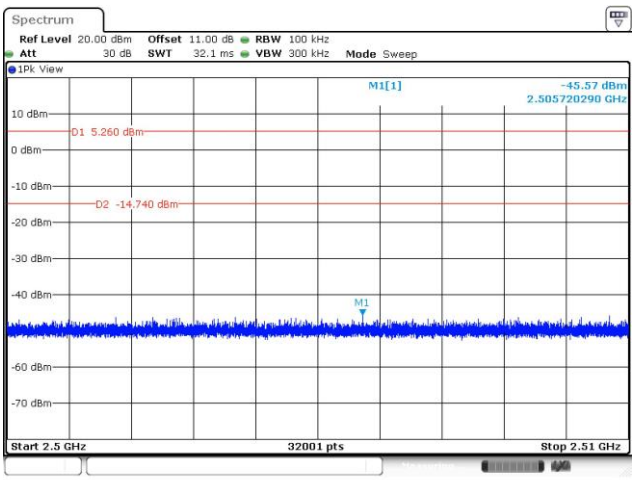
This test item is performed on each TX output individually without summing or adding 10 log(N_{ANT}) since measurements are made relative to the in-band emissions on the individual outputs. Only worst test result of each operating mode is presented.

3.6.6 Unwanted Emissions into Non-Restricted Frequency Bands

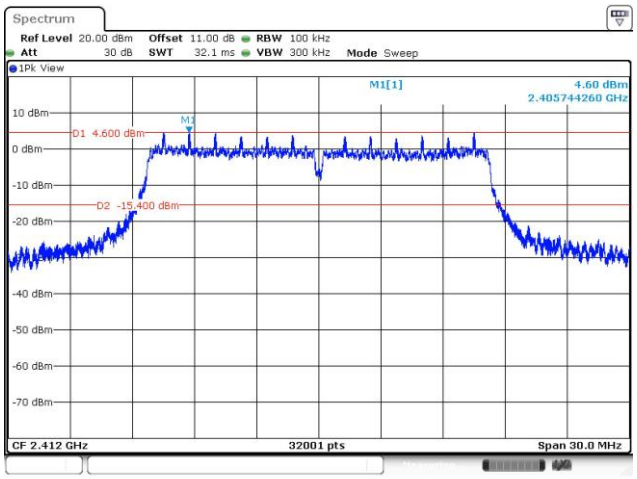
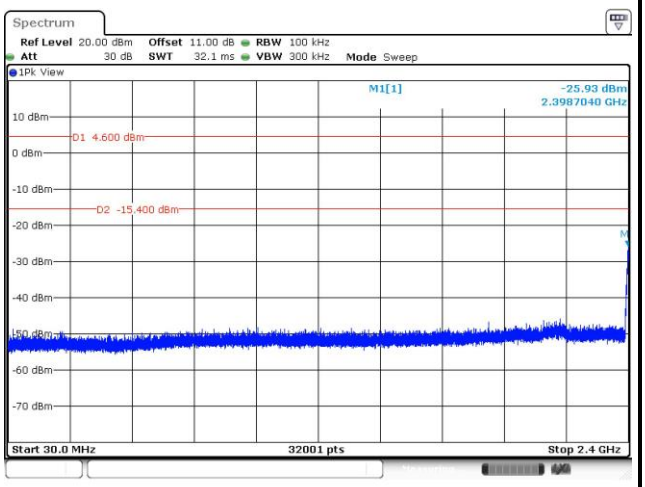
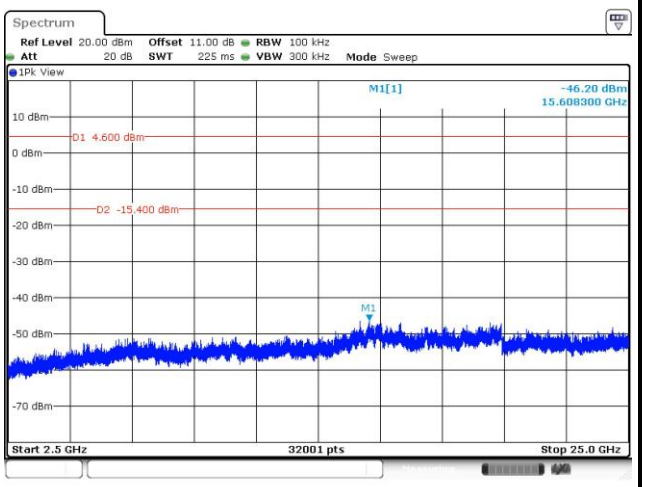
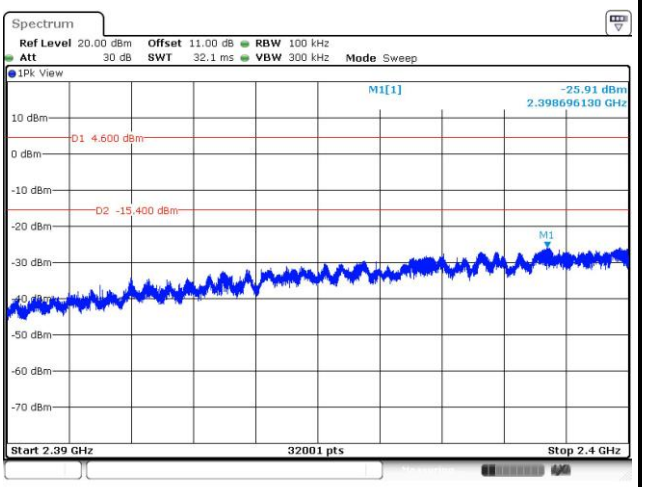
802.11b

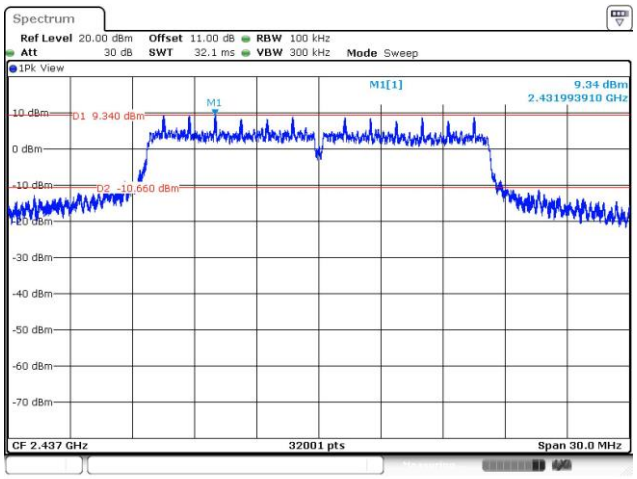
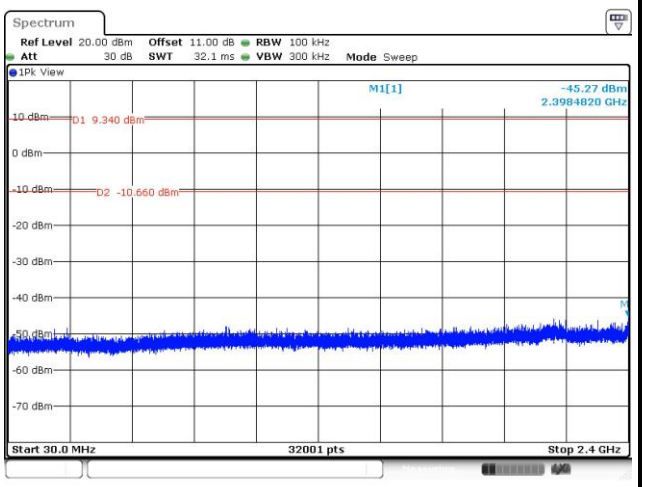
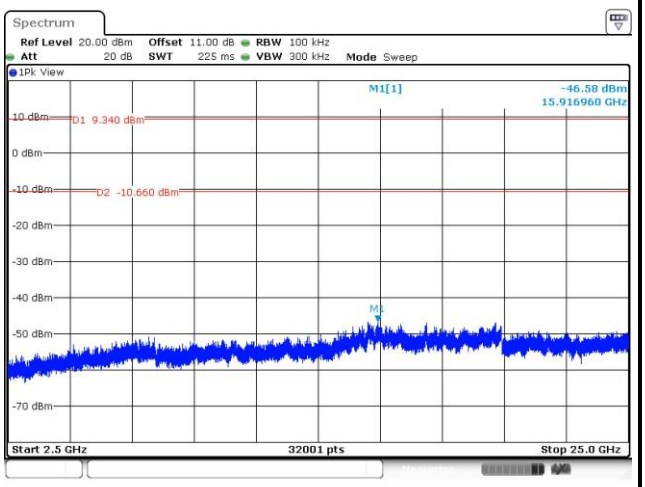
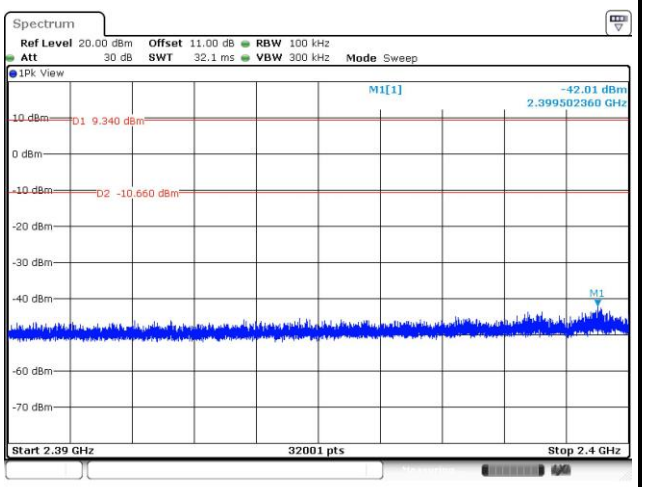
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

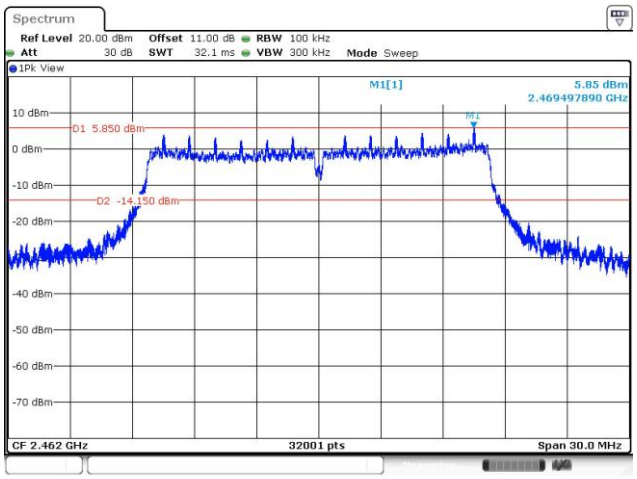
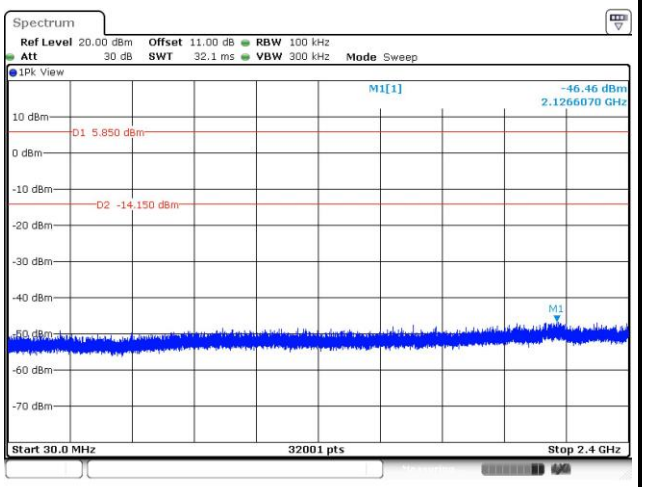
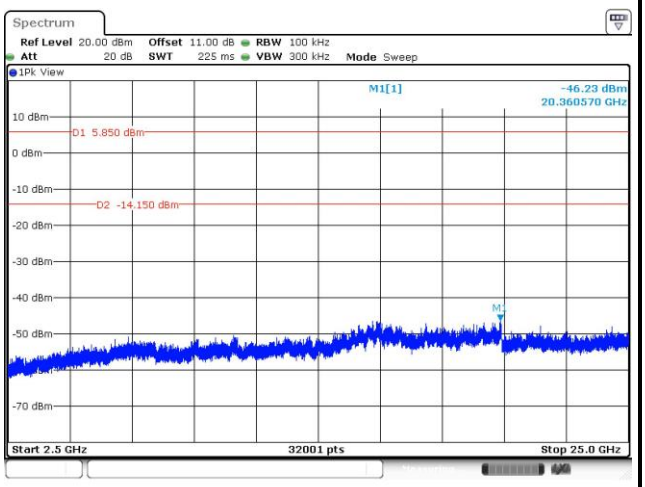
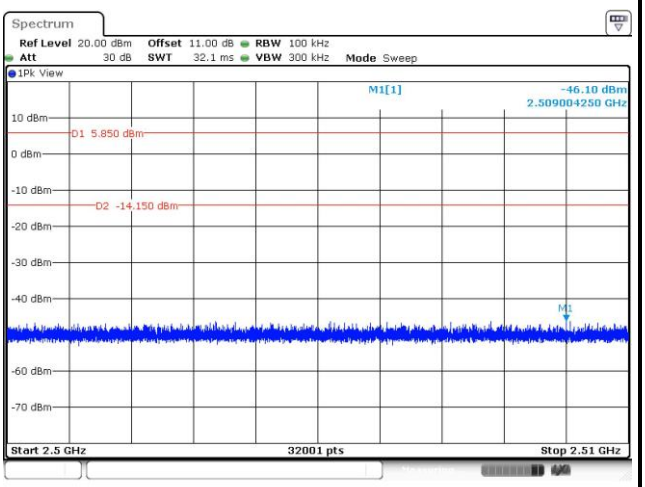
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

Reference Level	Tx 2462MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

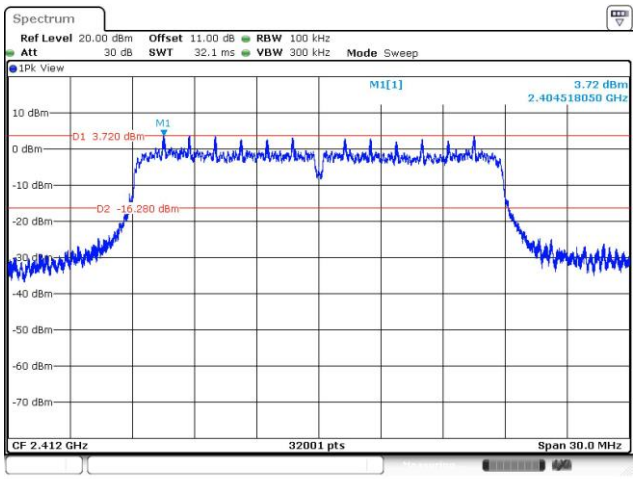
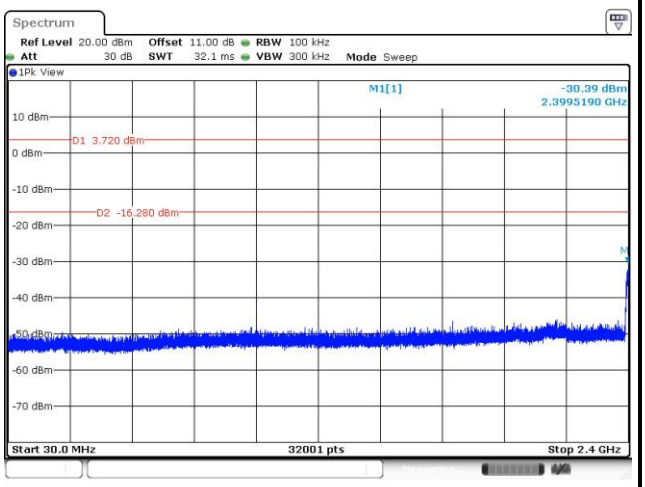
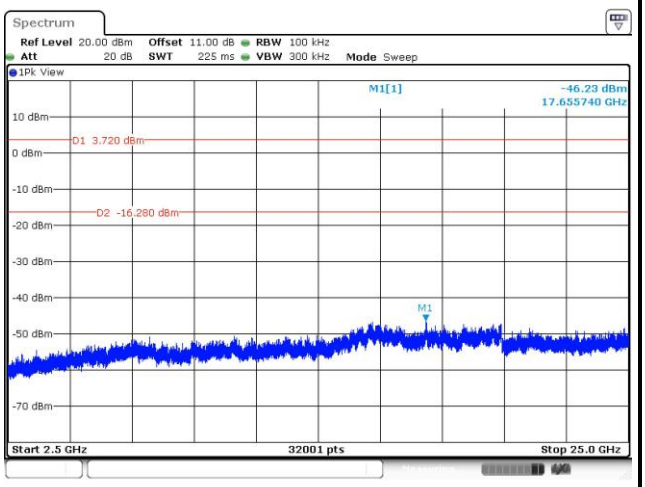
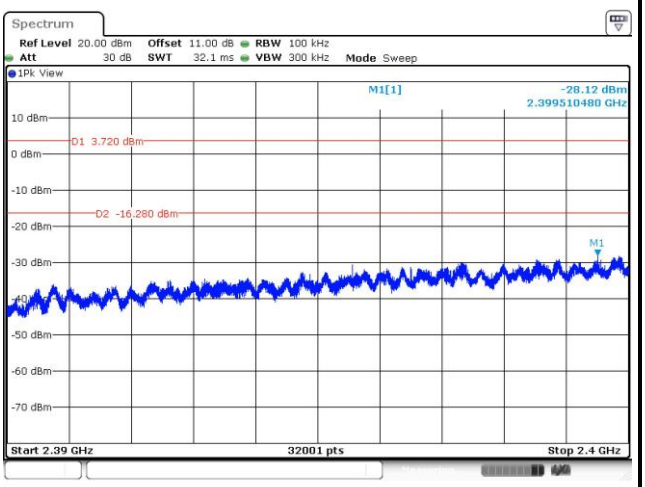
802.11g

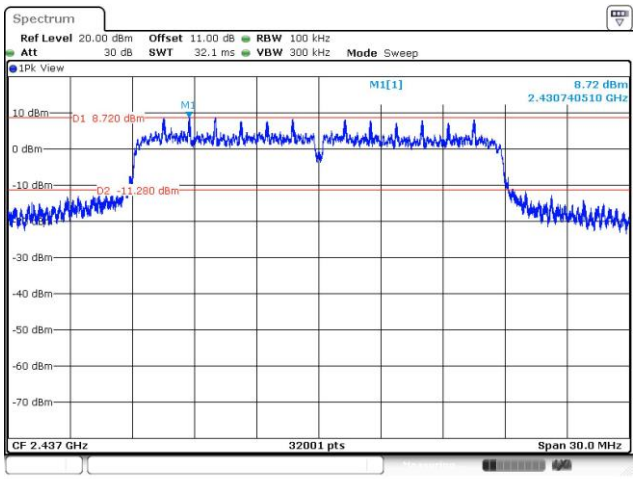
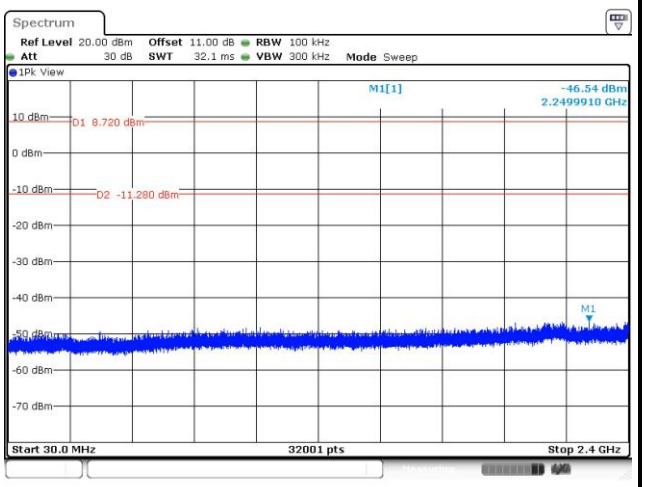
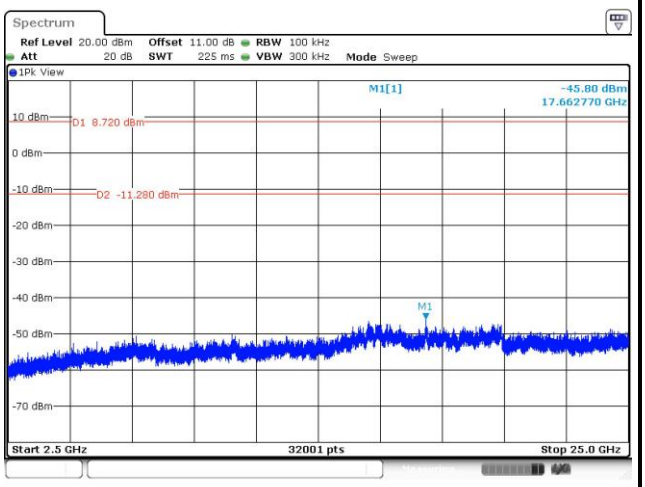
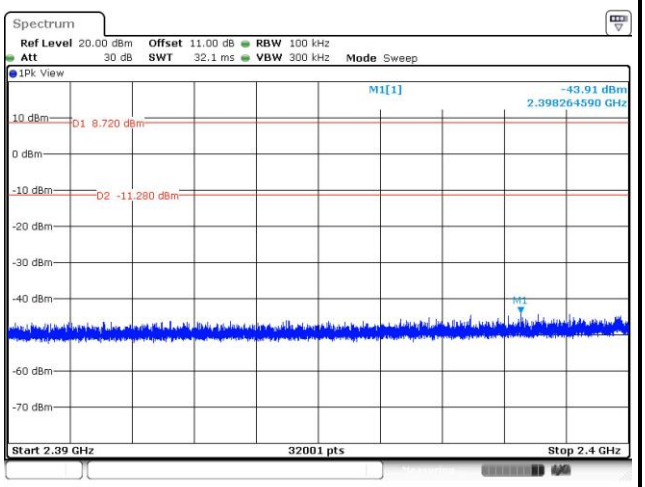
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

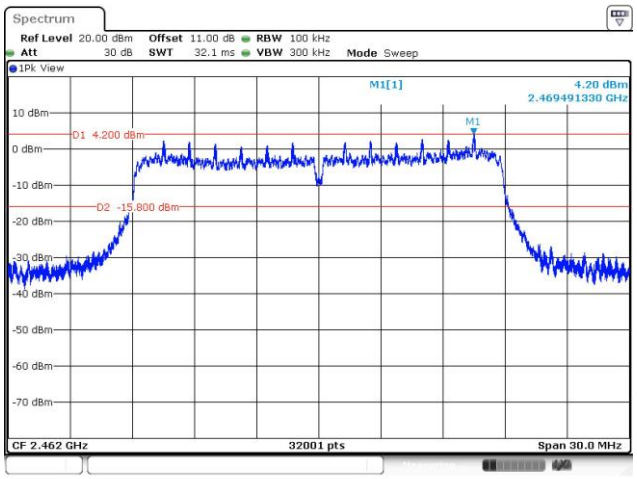
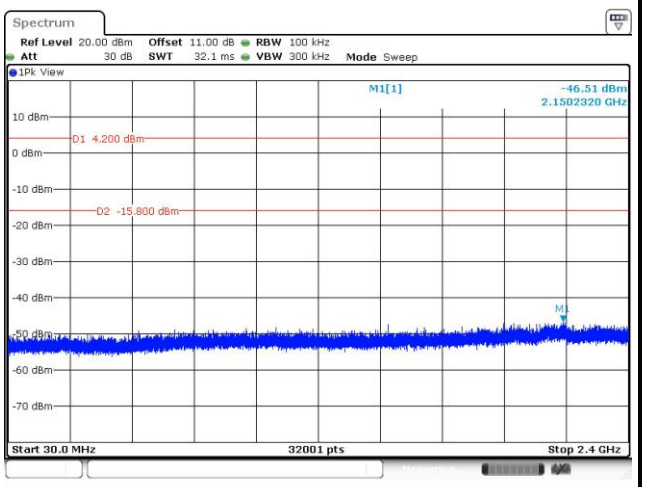
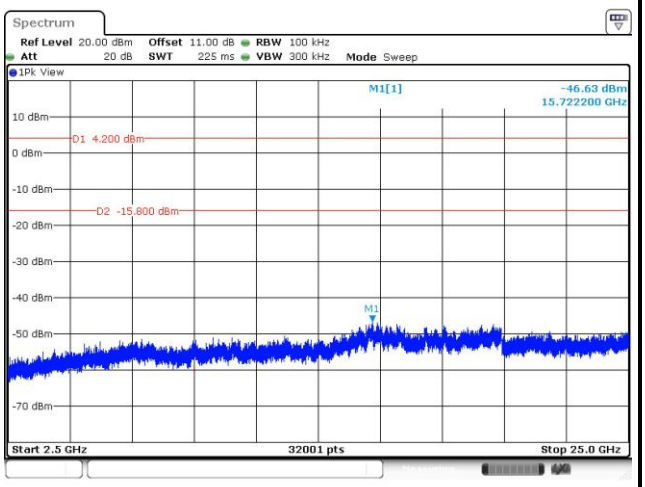
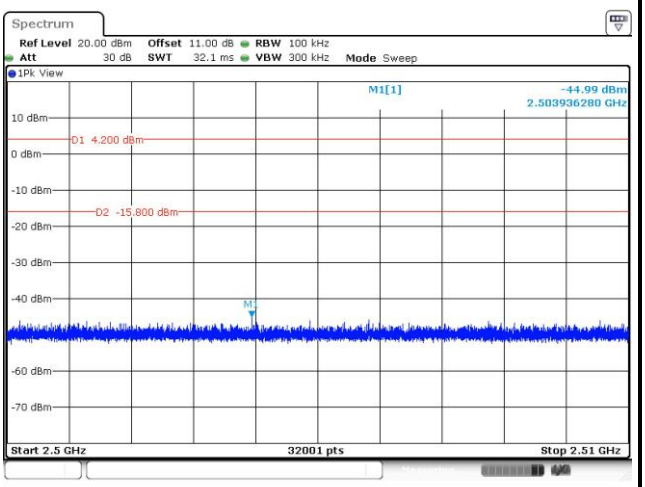
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

Reference Level	Tx 2462MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

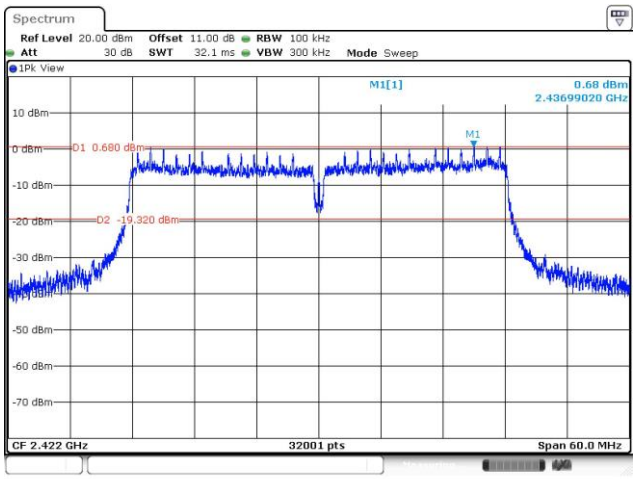
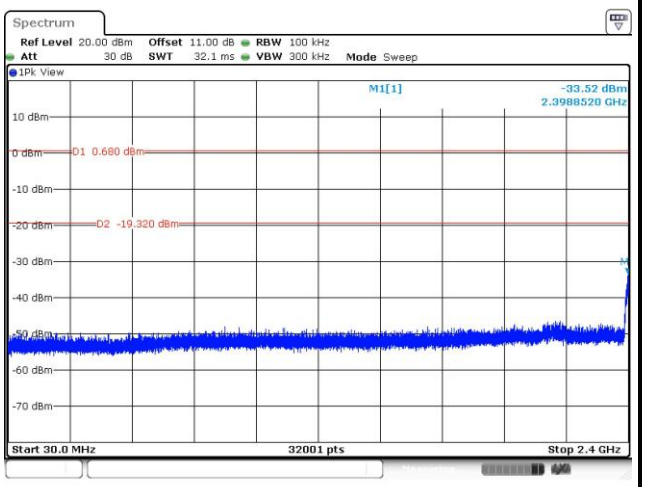
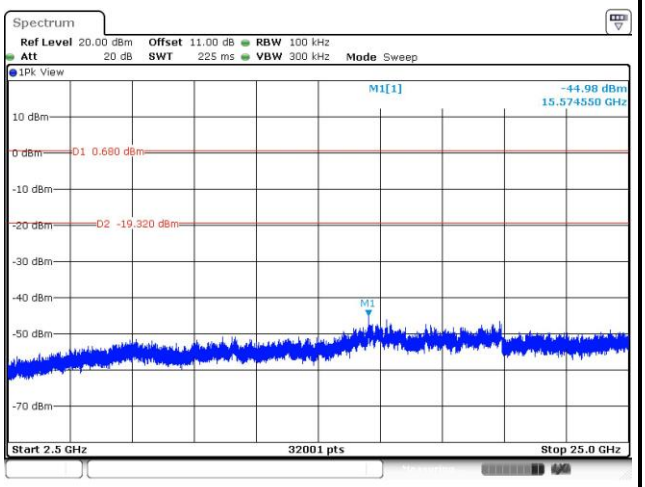
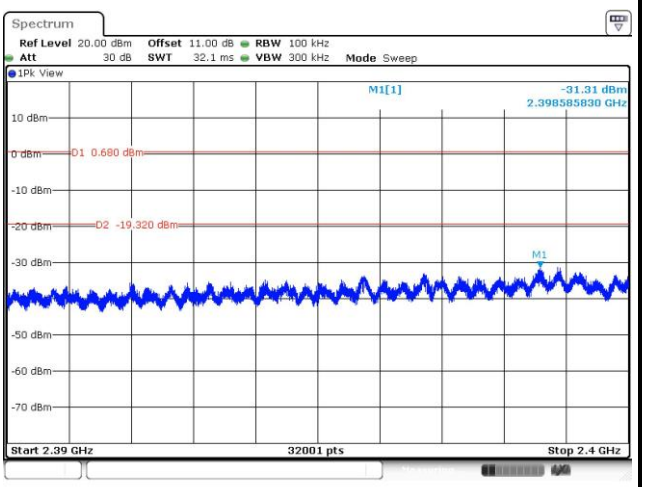
802.11n HT20

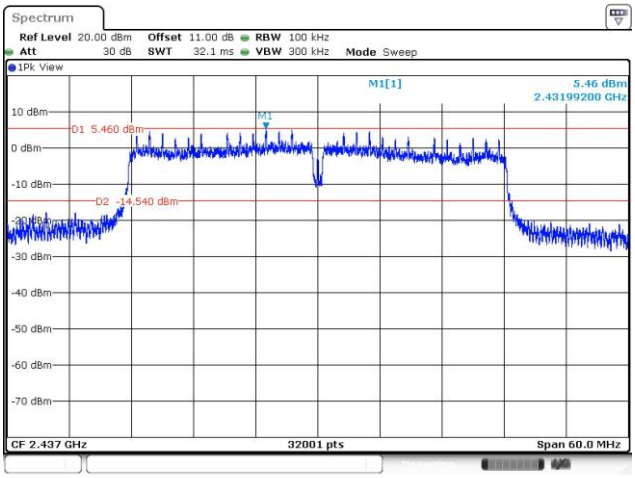
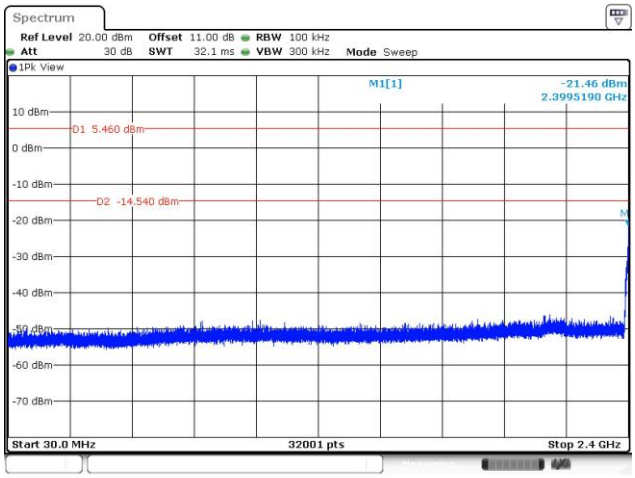
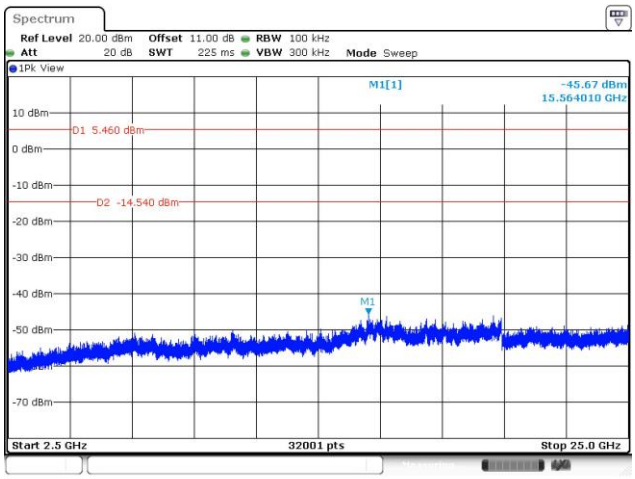
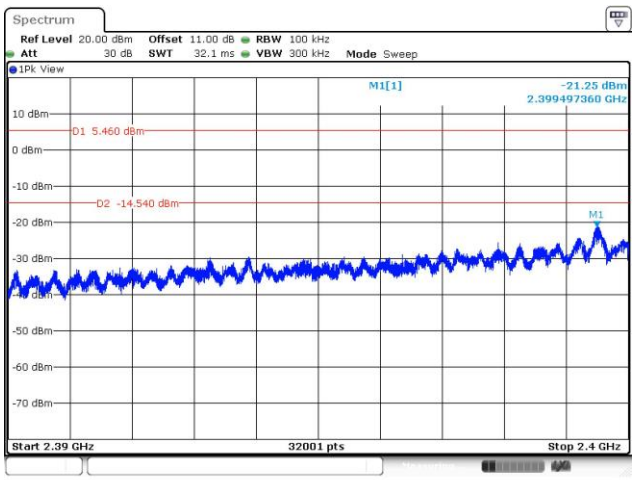
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

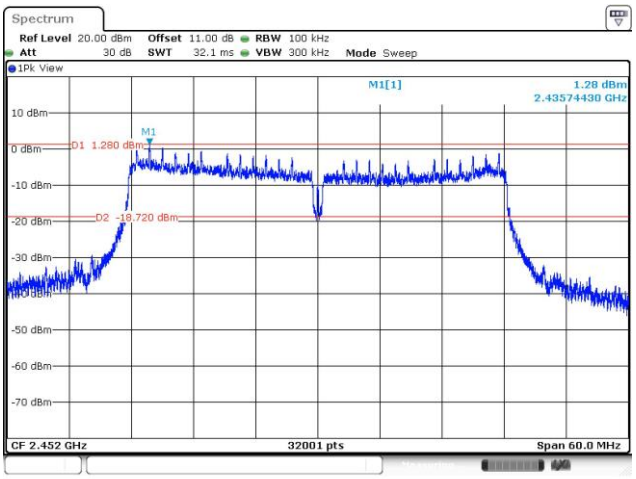
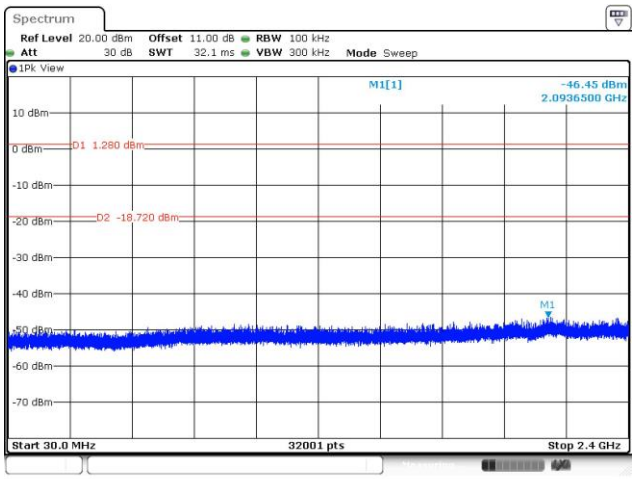
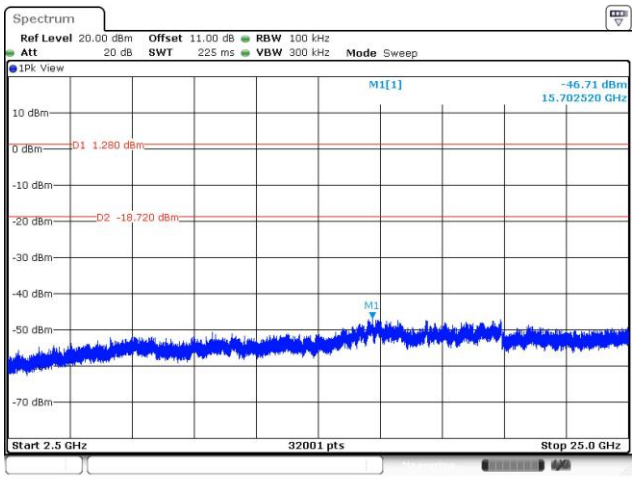
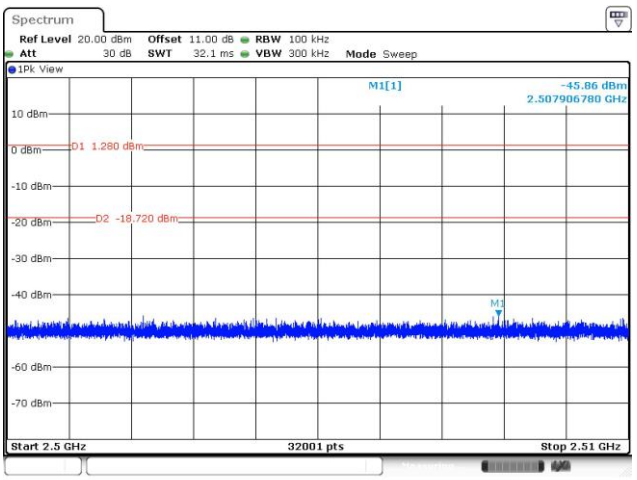
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

Reference Level	Tx 2462MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

802.11n HT40

Reference Level	Tx 2422MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

Reference Level	Tx 2452MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

==END==