FCC Test Report

FCC ID	:	**NKR-DAUBF1**
Equipment	:	**Wireless LAN Adaptor**
Model No.	:	**DAUB-F1**
Brand Name	:	**PHILIPS**
Applicant	:	**Wistron NeWeb Corp.**
Address	:	**20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Aug. 06, 2015**
Tested Date	:	**Dec. 01 ~ Dec. 28, 2015**

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.

Approved & Reviewed by:

Gary Chang / Manager

Testing Laboratory
2732

Table of Contents

Release Record

Report No.	Version	Description	Issued Date
FR5N2601AC	Rev. 01	Initial issue	Jan. 14, 2016
FR5N2601AC	Rev. 02	Modified test site registration no.	Jan. 19, 2016

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.156MHz 44.91 (Margin -10.74dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2390.00MHz 52.98 (Margin -1.02dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 28.96	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]	1[NOTE 5]	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..
Note 4: 802.11n supports beamforming function.
Note 5: 802.11b supports diversity function.

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
				2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850
1	Wi Fi up	Printed	N/A	3.26	3.3	3.17	3.31	3.33
2	Wi Fi down	Printed	N/A	4.15	3.1	3.1	2.73	2.65

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from host

1.1.4 Channel List

Frequency band (MHz)		2400~2483.5	
802.11 b / g / n HT20 / ac VHT20		802.11n HT40 / ac VHT40	
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	---	---

1.1.5 Test Tool and Duty Cycle

Test Tool	Mtool, Version: 2.0.1.1		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11b	100.00%	0.00
	11g	99.51%	0.02
	VHT20	80.25%	0.96
	VHT40	55.19%	2.58

1.1.6 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	70
11b	2437	80
11b	2462	68
11g	2412	56
11g	2437	74
11g	2462	68
HT20	2412	48
HT20	2437	76
HT20	2462	68
HT40	2422	44
HT40	2437	52
HT40	2452	56

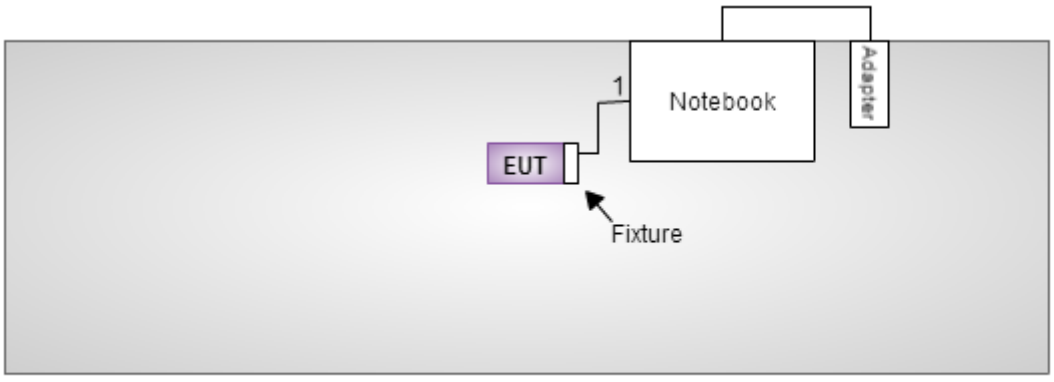
1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6440	DoC	USB, 1m shielded w/o core.
2	Fixture	---	---	---	---

Note: No.2 was supplied by applicant.

1.3 Test Setup Chart

Test Setup Diagram



1. USB, 1m shielded w/o core

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Dec. 02, 2015				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
EMC Receiver	R&S	ESCS 30	100169	Oct. 21, 2015	Oct. 20, 2016
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2015	Nov. 12, 2016
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 2015
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 chamber 3 / (03CH03-WS)				
Tested Date	Dec. 01 ~ Dec. 24, 2015				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 14, 2015	Sep. 13, 2016
Receiver	Agilent	N9038A	MY53290044	Oct. 14, 2015	Oct. 13, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-563	Dec. 30, 2014	Dec. 29, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 03, 2015	Feb. 02, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016
Preamplifier	EMC	EMC02325	980187	Sep. 21, 2015	Sep. 20, 2016
Preamplifier	Agilent	83017A	MY53270014	Sep. 07, 2015	Sep. 06, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 09, 2015	Feb. 08, 2016
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22600/4	Feb. 09, 2015	Feb. 08, 2016
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 09, 2015	Feb. 08, 2016
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 09, 2015	Feb. 08, 2016
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 09, 2015	Feb. 08, 2016
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 09, 2015	Feb. 08, 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	Dec. 24 ~ Dec. 28, 2015				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 14, 2015	Sep. 13, 2016
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
Signal Generator	R&S	SMB100A	175727	Oct. 05, 2015	Oct. 04, 2016
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 v03r03
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	±2.92 dB
Radiated emission ≤ 1GHz	±3.99 dB
Radiated emission > 1GHz	±5.52 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 52%	Peter Lin
Radiated Emissions	03CH03-WS	21-22°C / 61-68%	Morgan Chen Warren Lee Anderson Hung
RF Conducted	TH01-WS	22°C / 64%	Alex Huang

- FCC site registration No.: 390588
- IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

Non-beamforming mode

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	11g	2437	6 Mbps	---
Radiated Emissions ≤1GHz	11g	2437	6 Mbps	---
Maximum Output Power Radiated Emissions >1GHz 6dB bandwidth Power spectral density	11b 11g	2412 / 2437 / 2462 2412 / 2437 / 2462	1 Mbps 6 Mbps	---

NOTE:

1. The device supports diversity function that listed as below:
   a.) 802.11g/n, 1Tx, chain 0 or chain 1.
   After pre-testing, **chain 1** has the worst emission value, therefore the following test results came out from this.
2. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

Beamforming mode

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	HT20	2437	MCS 0	---
Radiated Emissions ≤1GHz	HT20	2437	MCS 0	---
Radiated Emissions >1GHz Maximum Output Power 6dB bandwidth Power spectral density	HT20 HT40	2412 / 2437 / 2462 2422 / 2437 / 2452	MCS 0 MCS 0	---

NOTE:

3. The device supports non-beamforming and beamforming function in 802.11n. After pre-testing, **beamforming mode** has the worst emission value, therefore the following test results came out from this.
4. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 Conducted Emissions

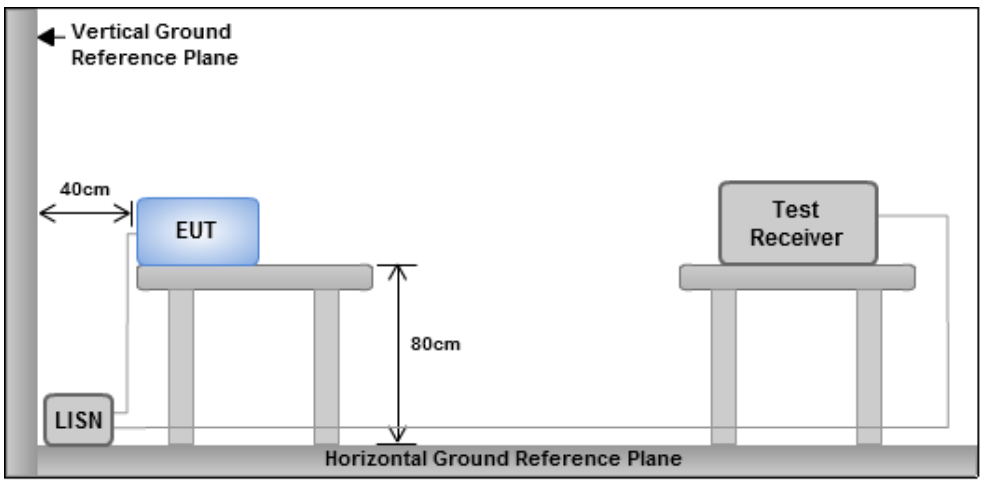
3.1.1 Limit of Conducted Emissions

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



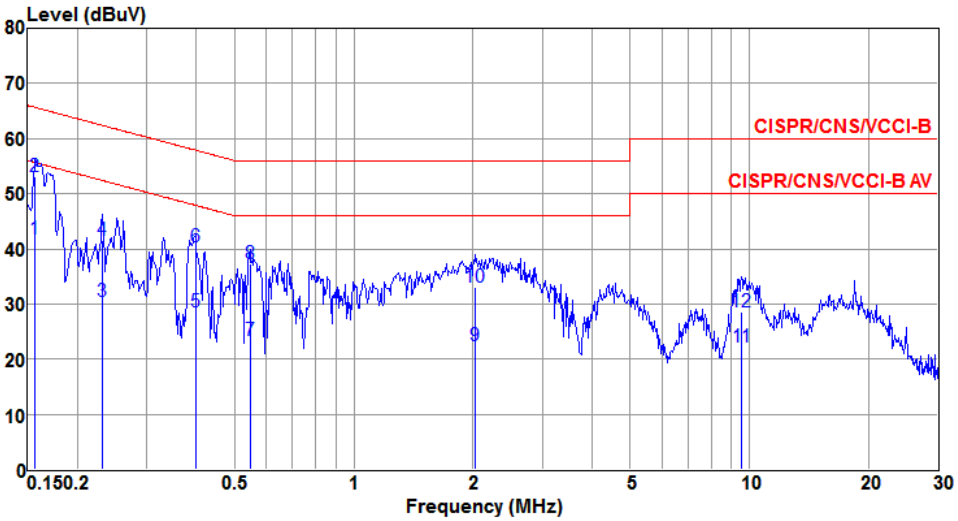
Note: 1. Support units were connected to second LISN.

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

Non-beamforming mode

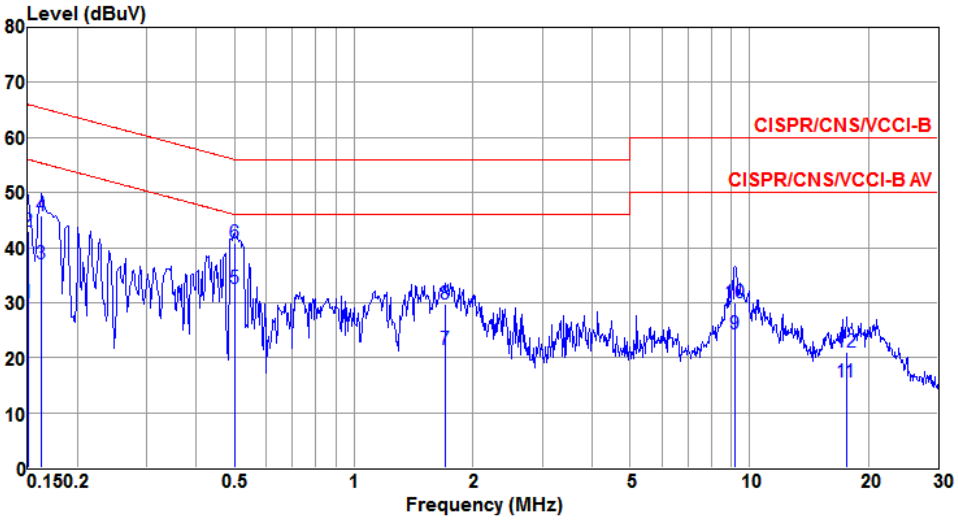
Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.156	41.81	55.65	-13.84	41.62	0.11	0.08	Average
2@	0.156	53.11	65.65	-12.54	52.92	0.11	0.08	QP
3	0.232	30.35	52.39	-22.04	30.15	0.11	0.09	Average
4	0.232	41.47	62.39	-20.92	41.27	0.11	0.09	QP
5	0.398	28.48	47.90	-19.42	28.24	0.13	0.11	Average
6	0.398	40.45	57.90	-17.45	40.21	0.13	0.11	QP
7	0.546	23.48	46.00	-22.52	23.22	0.13	0.13	Average
8	0.546	37.31	56.00	-18.69	37.05	0.13	0.13	QP
9	2.033	22.31	46.00	-23.69	21.91	0.16	0.24	Average
10	2.033	33.15	56.00	-22.85	32.75	0.16	0.24	QP
11	9.552	22.08	50.00	-27.92	21.54	0.24	0.30	Average
12	9.552	28.64	60.00	-31.36	28.10	0.24	0.30	QP

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

Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Neutral		

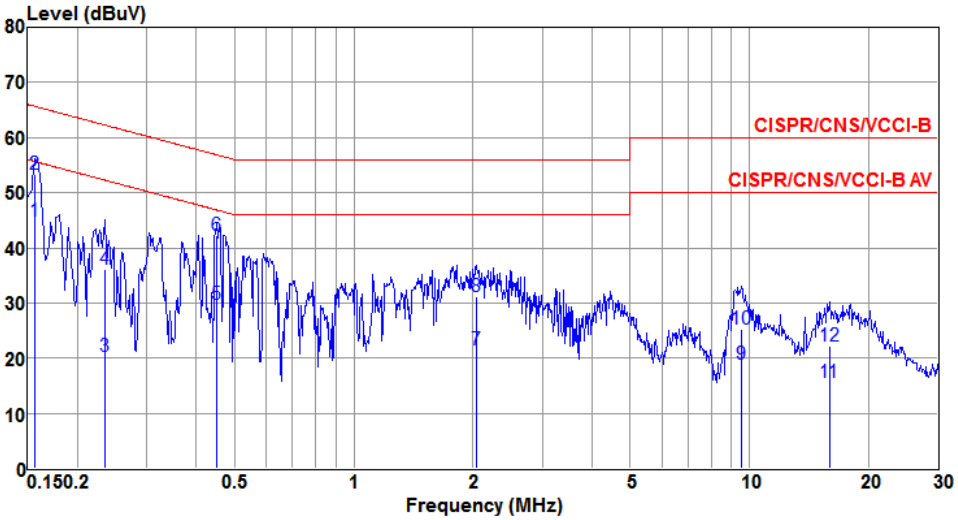


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.150	29.88	56.00	-26.12	29.67	0.13	0.08	Average
2	0.150	42.99	66.00	-23.01	42.78	0.13	0.08	QP
3	0.162	36.99	55.34	-18.35	36.79	0.12	0.08	Average
4	0.162	45.79	65.34	-19.55	45.59	0.12	0.08	QP
5@	0.499	32.67	46.01	-13.34	32.41	0.14	0.12	Average
6	0.499	40.82	56.01	-15.19	40.56	0.14	0.12	QP
7	1.698	21.47	46.00	-24.53	21.09	0.16	0.22	Average
8	1.698	29.68	56.00	-26.32	29.30	0.16	0.22	QP
9	9.204	24.28	50.00	-25.72	23.72	0.26	0.30	Average
10	9.204	30.02	60.00	-29.98	29.46	0.26	0.30	QP
11	17.568	15.49	50.00	-34.51	15.01	0.38	0.10	Average
12	17.568	20.94	60.00	-39.06	20.46	0.38	0.10	QP

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

Beamforming mode

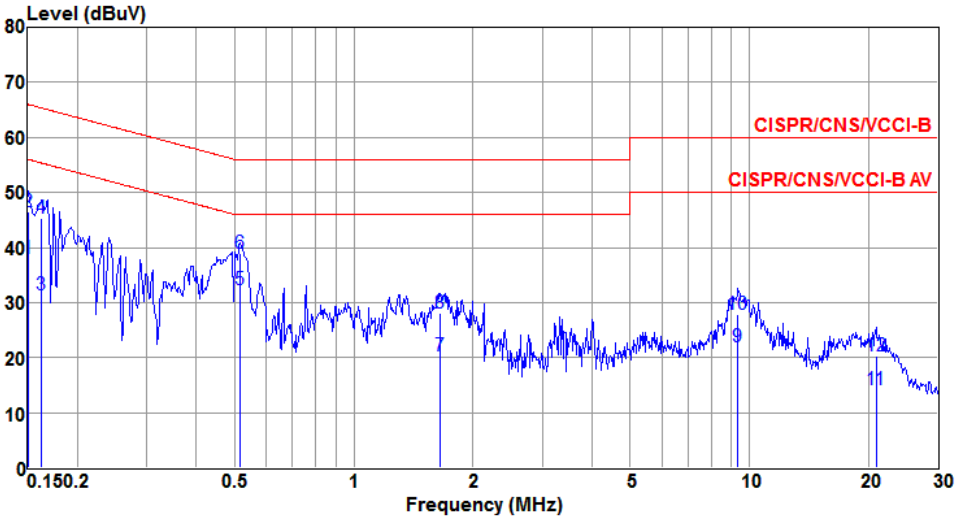
Modulation	HT20	**Test Freq. (MHz)**	2437
Power Phase	Line		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1@	0.156	44.91	55.65	-10.74	44.72	0.11	0.08	Average
2	0.156	53.29	65.65	-12.36	53.10	0.11	0.08	QP
3	0.234	20.41	52.30	-31.89	20.21	0.11	0.09	Average
4	0.234	36.23	62.30	-26.07	36.03	0.11	0.09	QP
5	0.452	29.67	46.85	-17.18	29.42	0.13	0.12	Average
6	0.452	42.28	56.85	-14.57	42.03	0.13	0.12	QP
7	2.044	21.55	46.00	-24.45	21.15	0.16	0.24	Average
8	2.044	31.22	56.00	-24.78	30.82	0.16	0.24	QP
9	9.552	18.90	50.00	-31.10	18.36	0.24	0.30	Average
10	9.552	25.27	60.00	-34.73	24.73	0.24	0.30	QP
11	15.970	15.62	50.00	-34.38	15.13	0.33	0.16	Average
12	15.970	22.30	60.00	-37.70	21.81	0.33	0.16	QP

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

Modulation	HT20	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	0.150	38.03	56.00	-17.97	37.82	0.13	0.08	Average
2	0.150	46.40	66.00	-19.60	46.19	0.13	0.08	QP
3	0.162	31.43	55.34	-23.91	31.23	0.12	0.08	Average
4	0.162	45.38	65.34	-19.96	45.18	0.12	0.08	QP
5@	0.516	32.32	46.00	-13.68	32.06	0.14	0.12	Average
6	0.516	38.87	56.00	-17.13	38.61	0.14	0.12	QP
7	1.654	20.40	46.00	-25.60	20.02	0.16	0.22	Average
8	1.654	28.15	56.00	-27.85	27.77	0.16	0.22	QP
9	9.352	22.04	50.00	-27.96	21.48	0.26	0.30	Average
10	9.352	27.85	60.00	-32.15	27.29	0.26	0.30	QP
11	20.924	14.14	50.00	-35.86	13.69	0.41	0.04	Average
12	20.924	20.20	60.00	-39.80	19.75	0.41	0.04	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

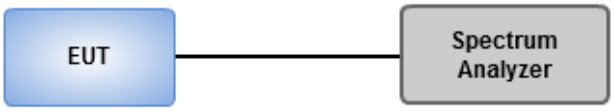
6dB Bandwidth

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) = 300kHz / 1 MHz, Video bandwidth = 1 / 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

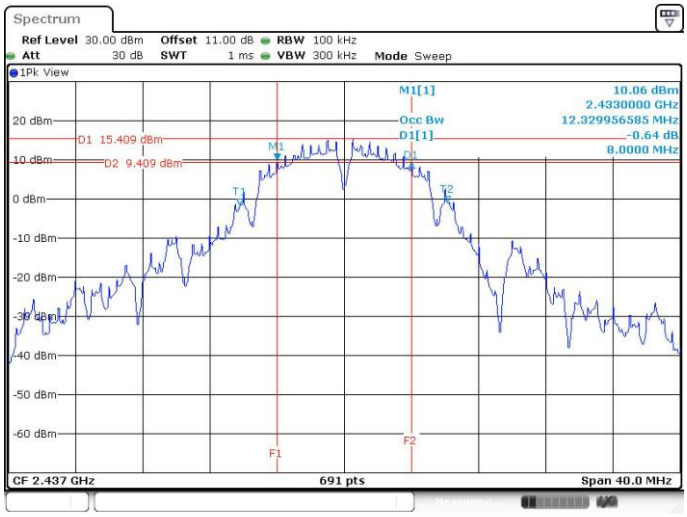


3.2.4 Test Result of 6dB and Occupied Bandwidth

Non-beamforming mode

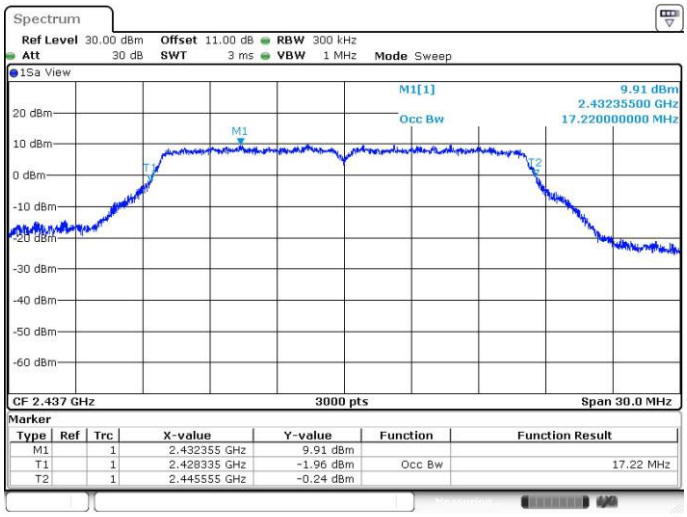
Modulation Mode	N_{TX}	Freq. (MHz)	6dB Bandwidth (MHz)				Limit (kHz)
			Chain 0	Chain 1	Chain 2	Chain 3	
11b	1	2412	---	8.06	---	---	500
11b	1	2437	---	8.00	---	---	500
11b	1	2462	---	8.58	---	---	500
11g	2	2412	16.35	16.35	---	---	500
11g	2	2437	16.35	16.35	---	---	500
11g	2	2462	16.35	16.41	---	---	500

Worst Plot



Modulation Mode	N_{TX}	Freq. (MHz)	99% Occupied Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3
11b	1	2412	---	11.05	---	---
11b	1	2437	---	12.20	---	---
11b	1	2462	---	10.96	---	---
11g	2	2412	17.11	17.06	---	---
11g	2	2437	17.22	17.22	---	---
11g	2	2462	17.14	17.01	---	---

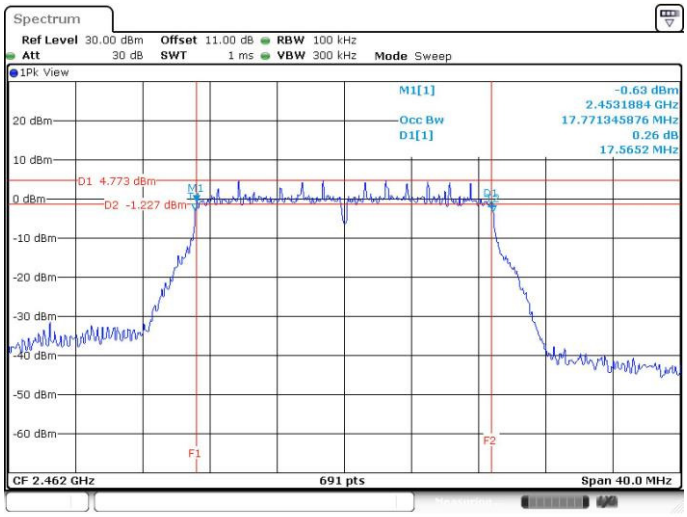
Worst Plot



Beamforming mode

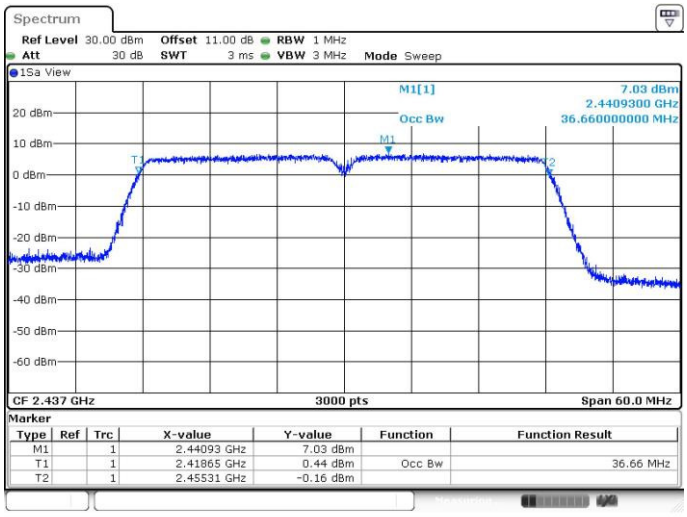
Modulation Mode	N_{TX}	Freq. (MHz)	6dB Bandwidth (MHz)				Limit (kHz)
			Chain 0	Chain 1	Chain 2	Chain 3	
HT20	2	2412	17.62	17.62	---	---	500
HT20	2	2437	17.62	17.57	---	---	500
HT20	2	2462	17.57	17.62	---	---	500
HT40	2	2422	36.29	36.41	---	---	500
HT40	2	2437	36.41	36.41	---	---	500
HT40	2	2452	36.41	36.41	---	---	500

Worst Plot



Modulation Mode	N_{TX}	Freq. (MHz)	99% Occupied Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3
HT20	2	2412	18.16	18.00	---	---
HT20	2	2437	18.34	18.20	---	---
HT20	2	2462	18.20	18.03	---	---
HT40	2	2422	36.64	36.56	---	---
HT40	2	2437	36.66	36.62	---	---
HT40	2	2452	36.60	36.64	---	---

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 (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

Non-beamforming mode

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	1	2412	---	21.75	---	---	149.624	21.75	30.00	4.15	25.90	36.00
11b	1	2437	---	25.5	---	---	354.813	25.50	30.00	4.15	29.65	36.00
11b	1	2462	---	21.04	---	---	127.057	21.04	30.00	4.15	25.19	36.00
11g	2	2412	20.88	21.42	---	---	261.137	24.17	30.00	4.15	28.32	36.00
11g	2	2437	25.3	24.54	---	---	623.290	27.95	30.00	4.15	32.10	36.00
11g	2	2462	23.12	23.54	---	---	431.060	26.35	30.00	4.15	30.50	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	1	2412	---	18.61	---	---	72.611	18.61	---
11b	1	2437	---	22.99	---	---	199.067	22.99	---
11b	1	2462	---	17.82	---	---	60.534	17.82	---
11g	2	2412	13.85	14.26	---	---	50.935	17.07	---
11g	2	2437	19.19	18.27	---	---	150.128	21.76	---
11g	2	2462	16.08	17.22	---	---	93.274	19.70	---

Note: Conducted average output power is for reference only.

Beamforming mode

Modulation Mode	N_{TX}	Freq. (MHz)	Conducted (Average) 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)			
HT20	2	2412	19.31	19.96	---	---	184.393	22.66	29.27	6.73	29.39	36.00
HT20	2	2437	25.48	26.38	---	---	787.693	**28.96**	29.27	6.73	35.69	36.00
HT20	2	2462	22.16	23.23	---	---	374.815	25.74	29.27	6.73	32.47	36.00
HT40	2	2422	17.62	18.44	---	---	127.633	21.06	29.27	6.73	27.79	36.00
HT40	2	2437	19.32	19.57	---	---	176.080	22.46	29.27	6.73	29.19	36.00
HT40	2	2452	20.68	20.86	---	---	238.849	23.78	29.27	6.73	30.51	36.00

Note:

1. Directional gain = 10 * log(($10^{3.26/20}$+$10^{4.15/20}$)^2/2)=6.73 dBi > 6 dBi.
   Limit shall be reduced to 30 dBm – (6.73 dBi – 6 dBi) = 29.27 dBm.

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			
HT20	2	2412	12.41	12.94	---	---	37.097	15.69	---
HT20	2	2437	19.12	20.33	---	---	189.553	22.78	---
HT20	2	2462	16.48	17.25	---	---	97.552	19.89	---
HT40	2	2422	11.23	11.57	---	---	27.629	14.41	---
HT40	2	2437	13.32	13.65	---	---	44.652	16.50	---
HT40	2	2452	14.2	14.21	---	---	52.666	17.22	---

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

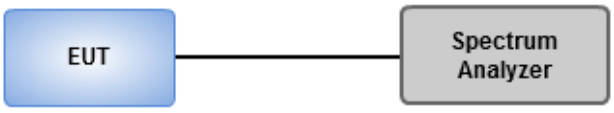
☒ Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.

1. Set the RBW = 3kHz, VBW = 10kHz.
2. Detector = RMS, Sweep time = auto couple.
3. Employ trace averaging (RMS) mode over a minimum of 100 traces.
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 = 30kHz, VBW = 100 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.
6. Add 10 log (1/x), where x is the duty cycle

3.4.3 Test Setup



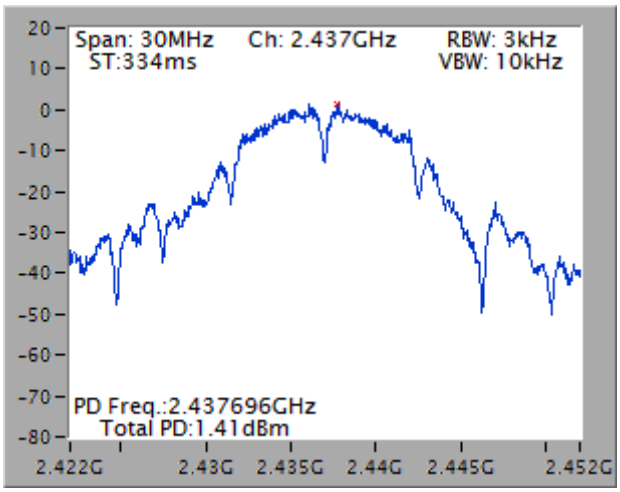
3.4.4 Test Result of Power Spectral Density

Non-beamforming mode

Modulation Mode	N_{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/3kHz)	Duty Factor (dB)	PPSD with D.F (dBm/3kHz)	Limit (dBm/3kHz)
11b	1	2412	-2.86	0.00	-2.86	8.00
11b	1	2437	1.41	0.00	1.41	8.00
11b	1	2462	-4.60	0.00	-4.60	8.00
11g	2	2412	-7.75	0.00	-7.75	8.00
11g	2	2437	-2.89	0.00	-2.89	8.00
11g	2	2462	-5.23	0.00	-5.23	8.00

Note 1: Test result of 11g is bin-by-bin summing measured value of each TX port.
Note 2: D.F is duty factor

Worst Plot



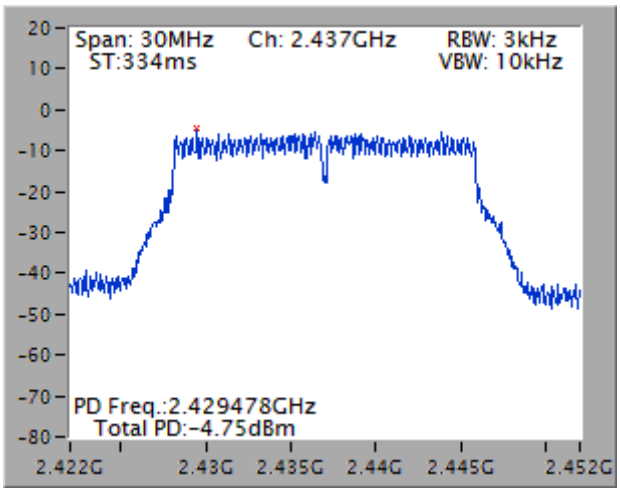
Beamforming mode

Modulation Mode	N_{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/3kHz)	Duty Factor (dB)	PPSD with D.F (dBm/3kHz)	Limit (dBm/3kHz)
HT20	2	2412	-11.05	0.00	-11.05	8.00
HT20	2	2437	-4.75	0.00	-4.75	8.00
HT20	2	2462	-7.04	0.00	-7.04	8.00
HT40	2	2422	-14.43	0.00	-14.43	8.00
HT40	2	2437	-12.11	0.00	-12.11	8.00
HT40	2	2452	-11.53	0.00	-11.53	8.00

Note 1: Test result is bin-by-bin summing measured value of each TX port.

Note 2: D.F is duty factor

Worst Plot



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

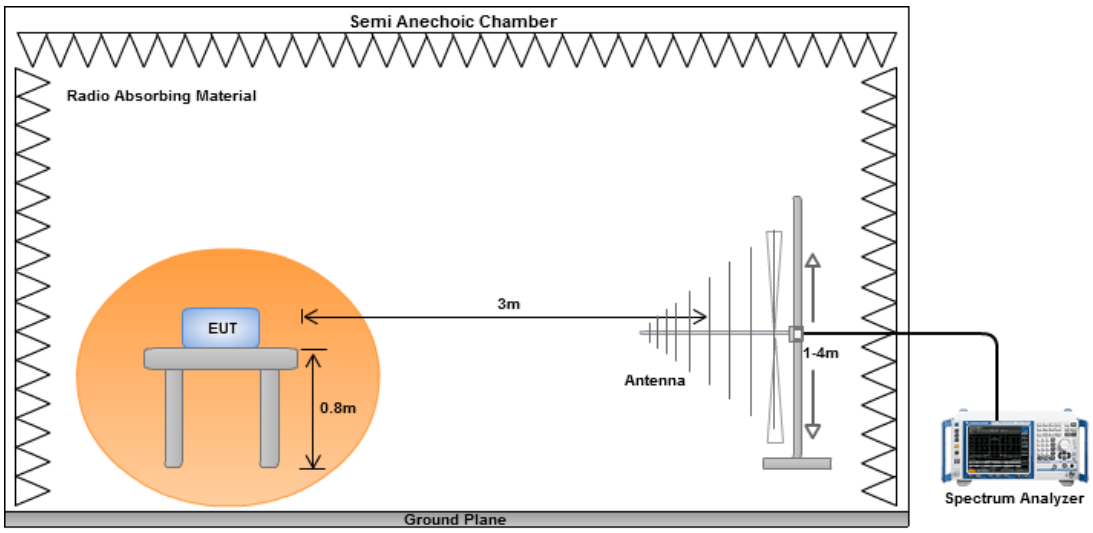
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:

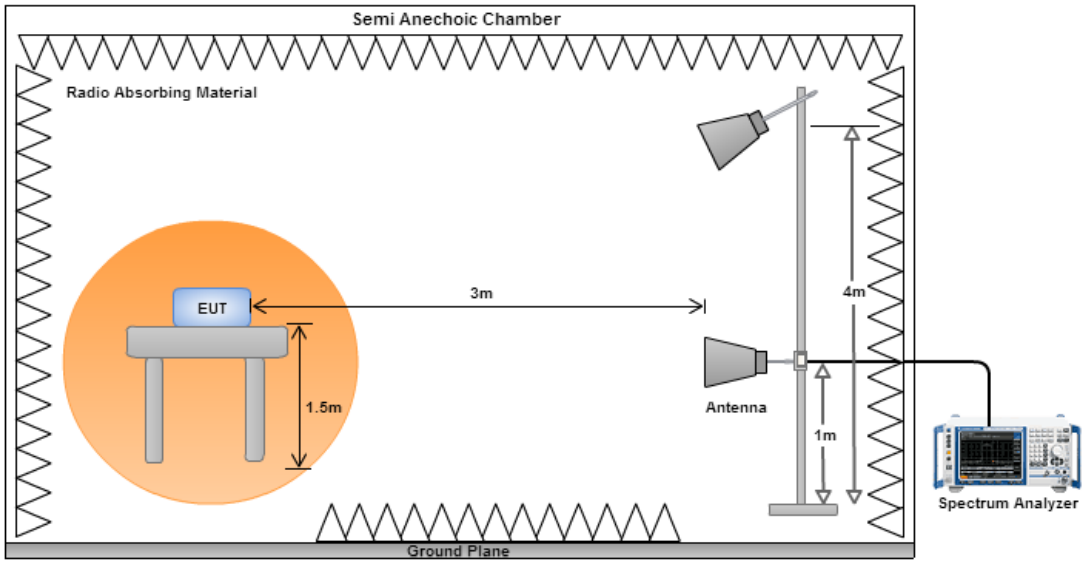
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz



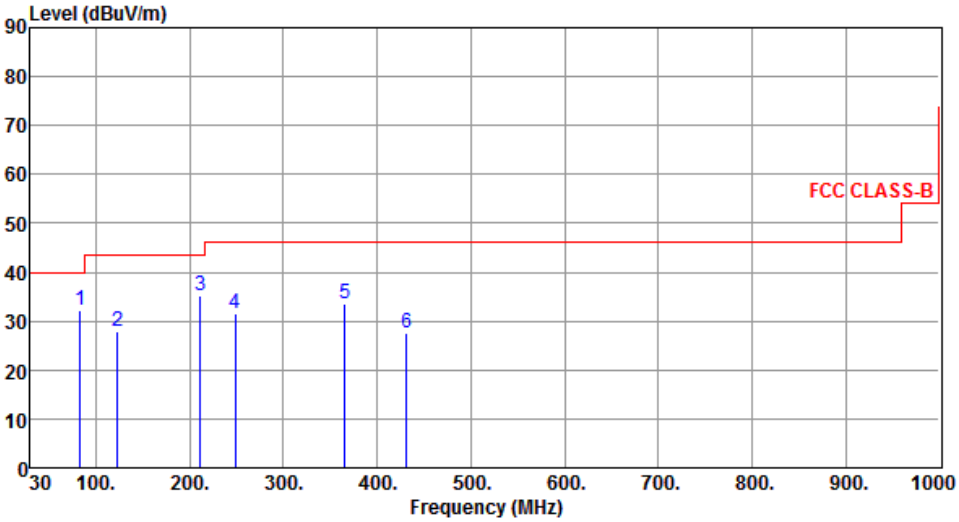
Radiated Emissions above 1 GHz



Non-beamforming mode

3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

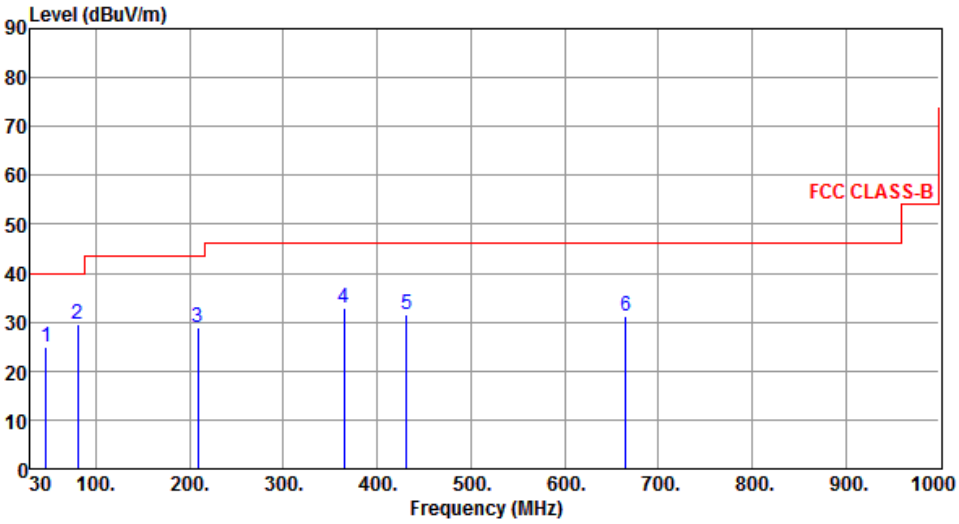
Modulation	11g	**Test Freq. (MHz)**	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	83.35	32.14	40.00	-7.86	50.46	-18.32	Peak	---	---
2	123.12	28.04	43.50	-15.46	43.31	-15.27	Peak	---	---
3	211.39	35.04	43.50	-8.46	51.21	-16.17	Peak	---	---
4	248.25	31.50	46.00	-14.50	46.18	-14.68	Peak	---	---
5	365.62	33.51	46.00	-12.49	44.58	-11.07	Peak	---	---
6	431.58	27.56	46.00	-18.44	36.84	-9.28	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	11g	Test Freq. (MHz)	2437
Polarization	Vertical		

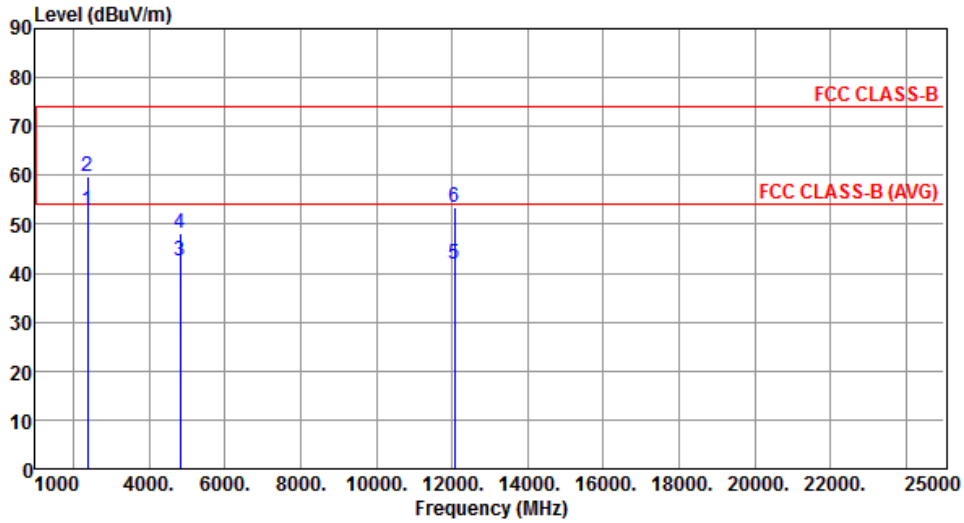


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.49	24.76	40.00	-15.24	37.82	-13.06	Peak	---	---
2	80.44	29.49	40.00	-10.51	47.21	-17.72	Peak	---	---
3	208.48	28.95	43.50	-14.55	45.19	-16.24	Peak	---	---
4	364.65	32.99	46.00	-13.01	44.08	-11.09	Peak	---	---
5	431.58	31.44	46.00	-14.56	40.72	-9.28	Peak	---	---
6	665.35	31.18	46.00	-14.82	36.22	-5.04	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

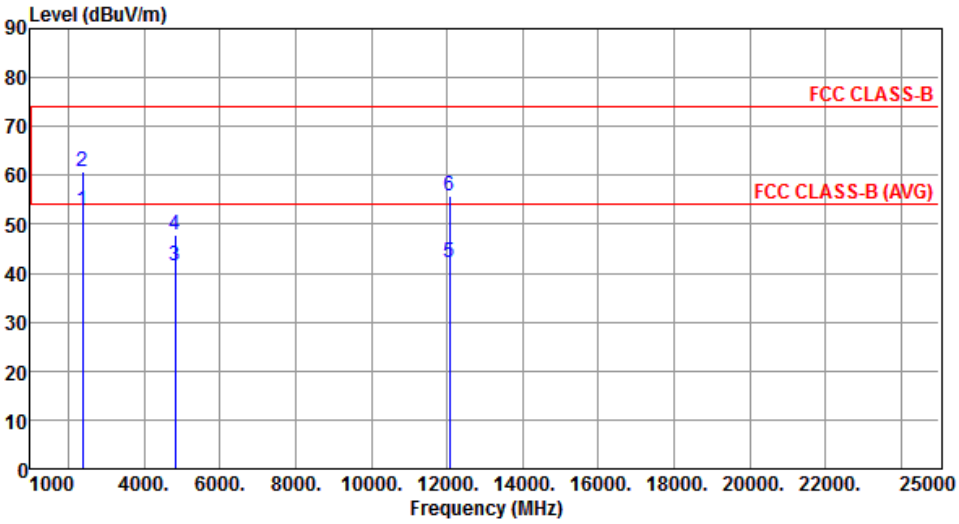
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	52.81	54.00	-1.19	54.17	-1.36	Average	320	159
2	2390.00	59.69	74.00	-14.31	61.05	-1.36	Peak	320	159
3	4824.00	42.61	54.00	-11.39	36.67	5.94	Average	182	52
4	4824.00	48.04	74.00	-25.96	42.10	5.94	Peak	182	52
5	12060.00	42.01	54.00	-11.99	26.04	15.97	Average	321	57
6	12060.00	53.37	74.00	-20.63	37.40	15.97	Peak	321	57

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).

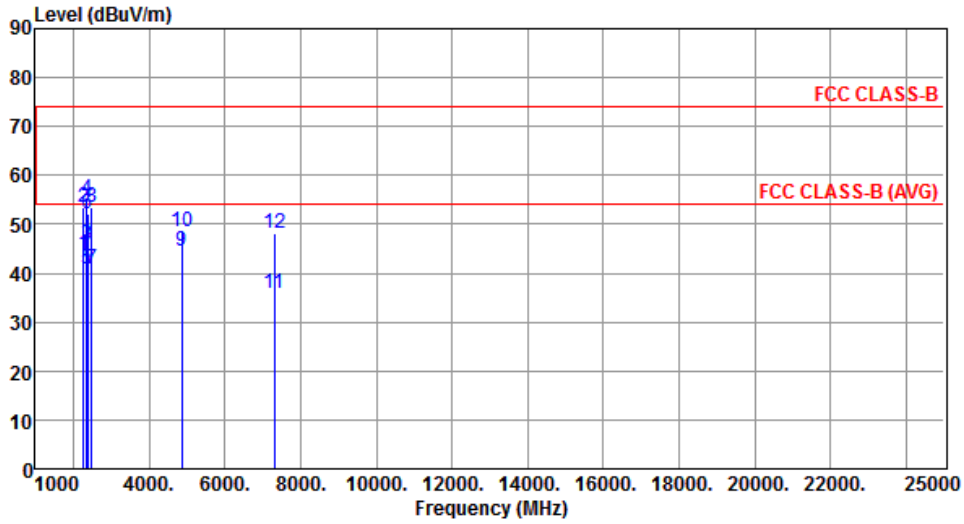
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	52.73	54.00	-1.27	54.09	-1.36	Average	276	114
2	2390.00	60.93	74.00	-13.07	62.29	-1.36	Peak	276	114
3	4824.00	41.44	54.00	-12.56	35.50	5.94	Average	187	62
4	4824.00	47.68	74.00	-26.32	41.74	5.94	Peak	187	62
5	12060.00	42.17	54.00	-11.83	26.20	15.97	Average	270	326
6	12060.00	55.75	74.00	-18.25	39.78	15.97	Peak	270	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).

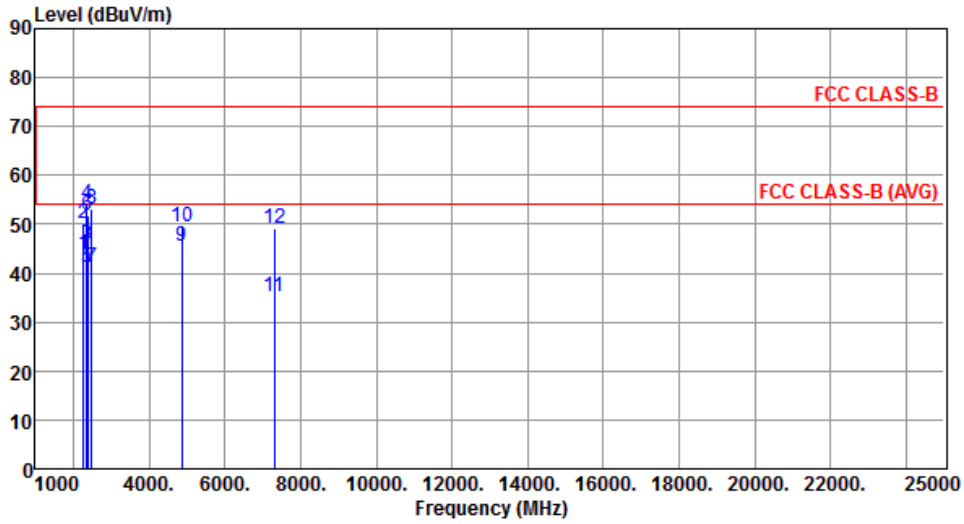
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2277.00	43.93	54.00	-10.07	45.77	-1.84	Average	257	155
2	2277.00	53.39	74.00	-20.61	55.23	-1.84	Peak	257	155
3	2355.00	45.75	54.00	-8.25	47.26	-1.51	Average	303	162
4	2355.00	55.02	74.00	-18.98	56.53	-1.51	Peak	303	162
5	2390.00	40.91	54.00	-13.09	42.27	-1.36	Average	395	146
6	2390.00	52.04	74.00	-21.96	53.40	-1.36	Peak	395	146
7	2483.50	40.92	54.00	-13.08	41.94	-1.02	Average	395	146
8	2483.50	53.61	74.00	-20.39	54.63	-1.02	Peak	395	146
9	4874.00	44.53	54.00	-9.47	38.56	5.97	Average	192	55
10	4874.00	48.43	74.00	-25.57	42.46	5.97	Peak	192	55
11	7311.00	35.80	54.00	-18.20	25.05	10.75	Average	267	115
12	7311.00	48.30	74.00	-25.70	37.55	10.75	Peak	267	115

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).

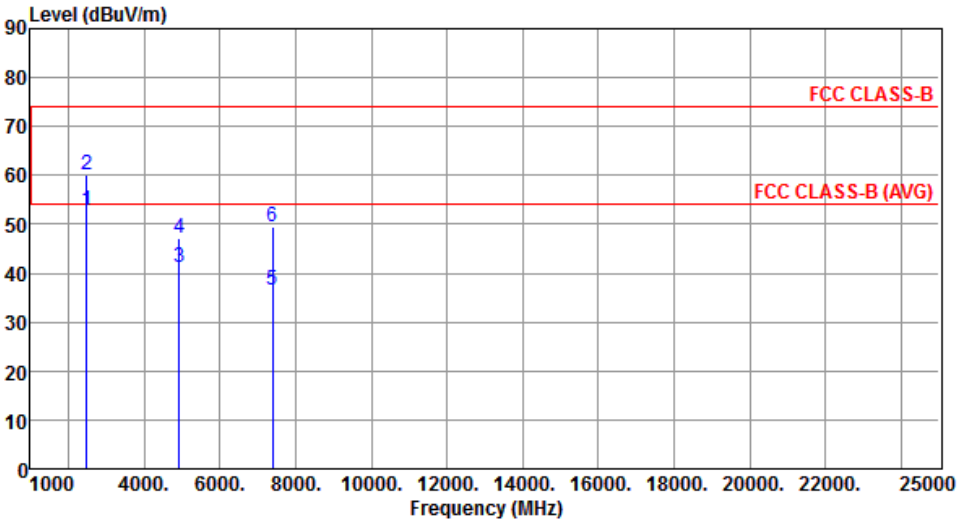
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2277.00	43.73	54.00	-10.27	45.57	-1.84	Average	250	90
2	2277.00	50.02	74.00	-23.98	51.86	-1.84	Peak	250	90
3	2355.00	45.70	54.00	-8.30	47.21	-1.51	Average	300	115
4	2355.00	54.20	74.00	-19.80	55.71	-1.51	Peak	300	115
5	2390.00	41.29	54.00	-12.71	42.65	-1.36	Average	289	16
6	2390.00	51.90	74.00	-22.10	53.26	-1.36	Peak	289	16
7	2483.50	41.10	54.00	-12.90	42.12	-1.02	Average	289	16
8	2483.50	53.23	74.00	-20.77	54.25	-1.02	Peak	289	16
9	4874.00	45.43	54.00	-8.57	39.46	5.97	Average	345	104
10	4874.00	49.39	74.00	-24.61	43.42	5.97	Peak	345	104
11	7311.00	35.21	54.00	-18.79	24.46	10.75	Average	207	186
12	7311.00	49.01	74.00	-24.99	38.26	10.75	Peak	207	186

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).

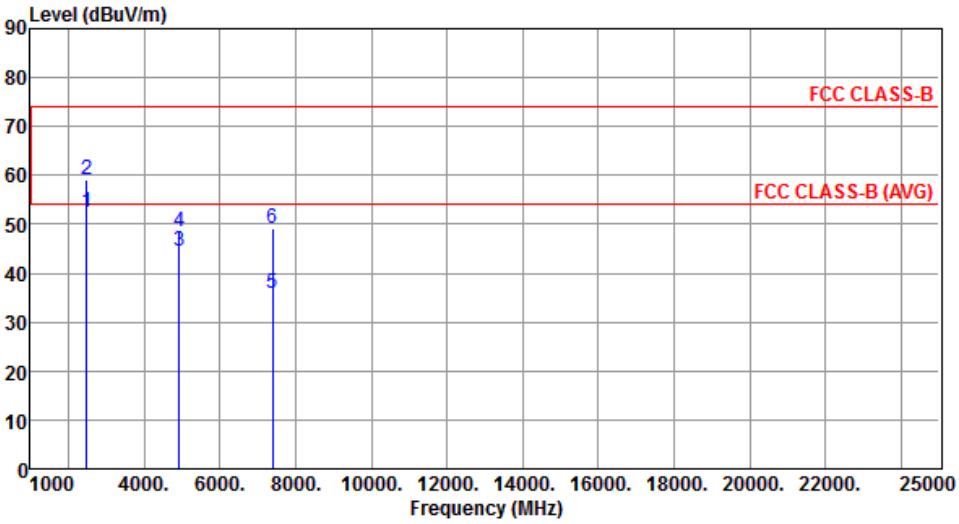
Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	52.73	54.00	-1.27	53.75	-1.02	Average	306	159
2	2483.50	60.27	74.00	-13.73	61.29	-1.02	Peak	306	159
3	4924.00	41.14	54.00	-12.86	35.13	6.01	Average	150	148
4	4924.00	47.27	74.00	-26.73	41.26	6.01	Peak	150	148
5	7386.00	36.65	54.00	-17.35	25.75	10.90	Average	320	207
6	7386.00	49.40	74.00	-24.60	38.50	10.90	Peak	320	507

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		

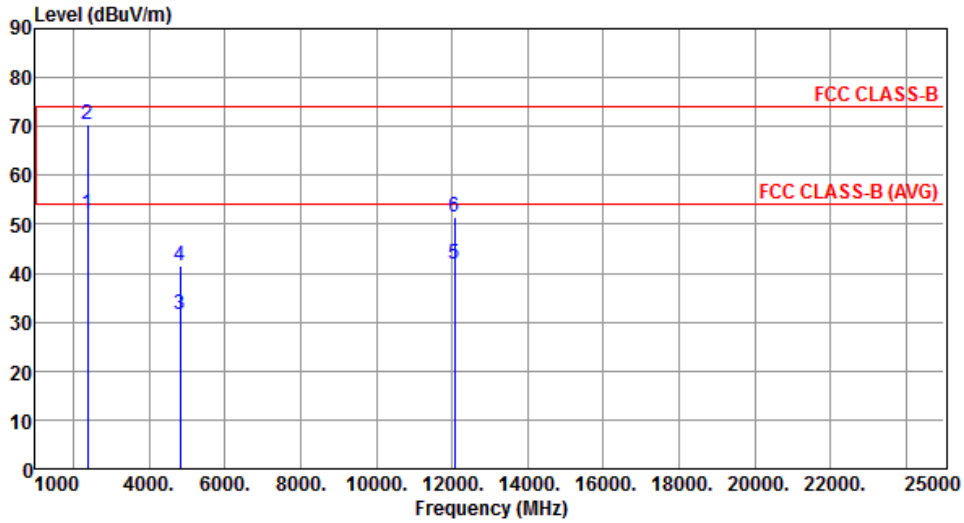


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.51	54.00	-1.49	53.53	-1.02	Average	269	114
2	2483.50	59.24	74.00	-14.76	60.26	-1.02	Peak	269	114
3	4924.00	44.54	54.00	-9.46	38.53	6.01	Average	340	105
4	4924.00	48.55	74.00	-25.45	42.54	6.01	Peak	340	105
5	7386.00	35.90	54.00	-18.10	25.00	10.90	Average	207	152
6	7386.00	49.04	74.00	-24.96	38.14	10.90	Peak	207	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).

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

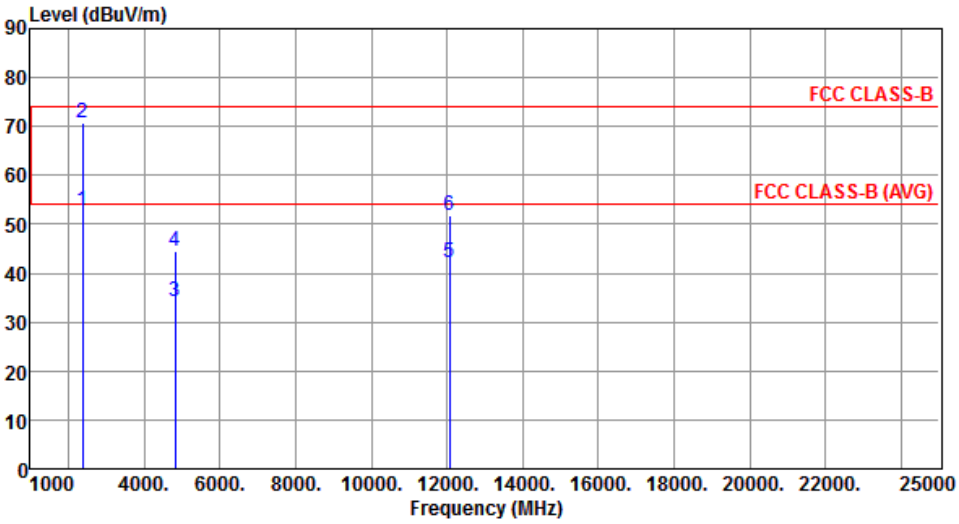
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	52.07	54.00	-1.93	53.43	-1.36	Average	259	149
2	2390.00	70.54	74.00	-3.46	71.90	-1.36	Peak	259	149
3	4824.00	31.64	54.00	-22.36	25.70	5.94	Average	175	309
4	4824.00	41.60	74.00	-32.40	35.66	5.94	Peak	175	309
5	12060.00	41.87	54.00	-12.13	25.90	15.97	Average	241	336
6	12060.00	51.36	74.00	-22.64	35.39	15.97	Peak	241	336

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).

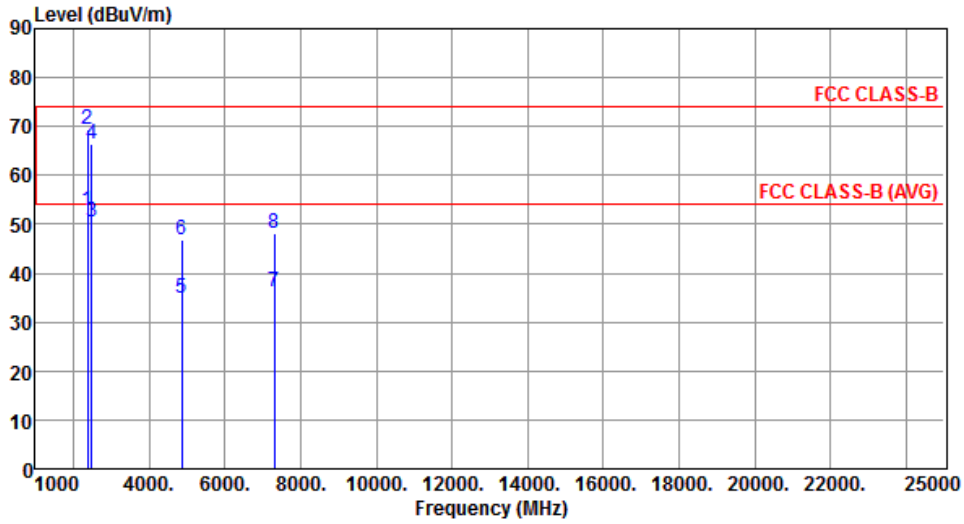
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	52.92	54.00	-1.08	54.28	-1.36	Average	258	116
2	2390.00	70.71	74.00	-3.29	72.07	-1.36	Peak	258	116
3	4824.00	34.09	54.00	-19.91	28.15	5.94	Average	150	111
4	4824.00	44.63	74.00	-29.37	38.69	5.94	Peak	150	111
5	12060.00	42.12	54.00	-11.88	26.15	15.97	Average	385	42
6	12060.00	51.72	74.00	-22.28	35.75	15.97	Peak	385	42

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).

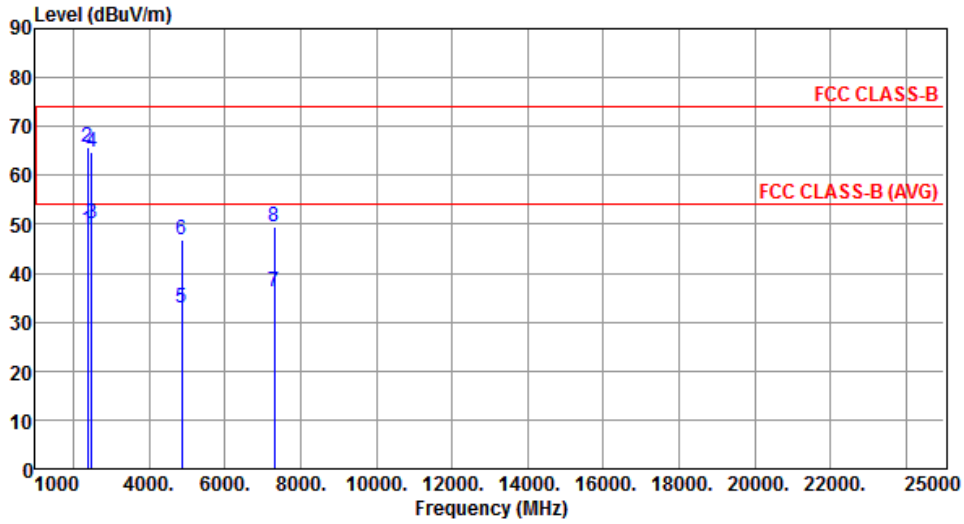
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	52.74	54.00	-1.26	54.10	-1.36	Average	261	149
2	2390.00	69.29	74.00	-4.71	70.65	-1.36	Peak	261	149
3	2483.50	50.60	54.00	-3.40	51.62	-1.02	Average	304	155
4	2483.50	66.46	74.00	-7.54	67.48	-1.02	Peak	304	155
5	4874.00	34.80	54.00	-19.20	28.83	5.97	Average	214	314
6	4874.00	46.87	74.00	-27.13	40.90	5.97	Peak	214	314
7	7311.00	36.20	54.00	-17.80	25.45	10.75	Average	289	104
8	7311.00	48.01	74.00	-25.99	37.26	10.75	Peak	289	104

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).

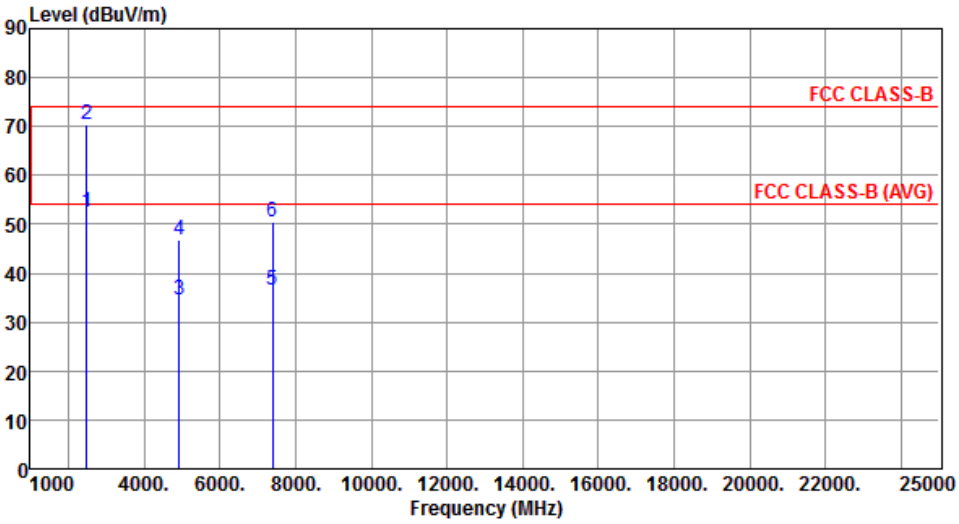
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	48.68	54.00	-5.32	50.04	-1.36	Average	244	124
2	2390.00	65.61	74.00	-8.39	66.97	-1.36	Peak	244	124
3	2483.50	50.08	54.00	-3.92	51.10	-1.02	Average	245	120
4	2483.50	64.89	74.00	-9.11	65.91	-1.02	Peak	245	120
5	4874.00	32.84	54.00	-21.16	26.87	5.97	Average	261	250
6	4874.00	46.91	74.00	-27.09	40.94	5.97	Peak	261	250
7	7311.00	36.11	54.00	-17.89	25.36	10.75	Average	231	226
8	7311.00	49.35	74.00	-24.65	38.60	10.75	Peak	231	226

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).

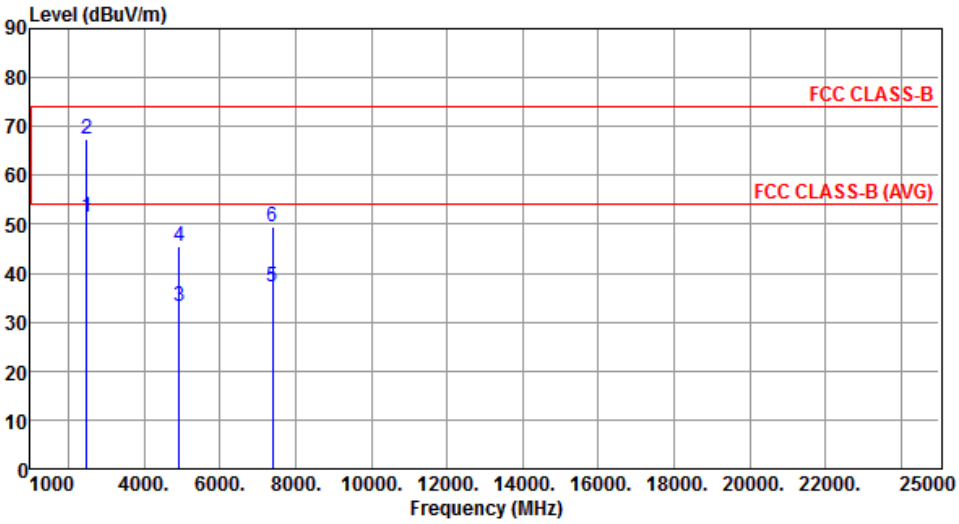
Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	52.41	54.00	-1.59	53.43	-1.02	Average	245	146
2	2483.50	70.36	74.00	-3.64	71.38	-1.02	Peak	245	146
3	4924.00	34.64	54.00	-19.36	28.63	6.01	Average	227	203
4	4924.00	46.69	74.00	-27.31	40.68	6.01	Peak	227	203
5	7386.00	36.43	54.00	-17.57	25.53	10.90	Average	207	55
6	7386.00	50.50	74.00	-23.50	39.60	10.90	Peak	207	55

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		



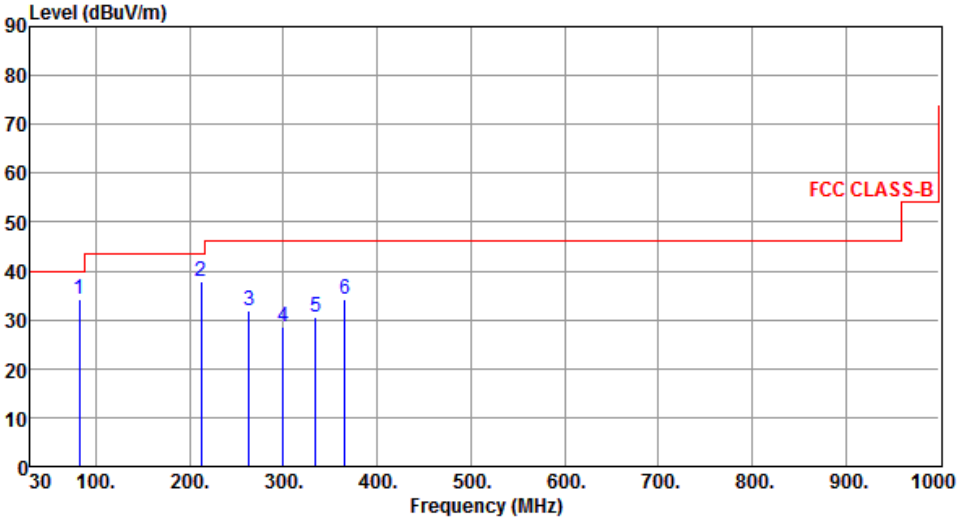
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	51.56	54.00	-2.44	52.58	-1.02	Average	245	114
2	2483.50	67.53	74.00	-6.47	68.55	-1.02	Peak	245	114
3	4924.00	33.32	54.00	-20.68	27.31	6.01	Average	268	117
4	4924.00	45.33	74.00	-28.67	39.32	6.01	Peak	268	117
5	7386.00	37.16	54.00	-16.84	26.26	10.90	Average	175	81
6	7386.00	49.50	74.00	-24.50	38.60	10.90	Peak	175	81

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).

Beamforming mode

3.5.7 Transmitter Radiated Unwanted Emissions (Below 1GHz)

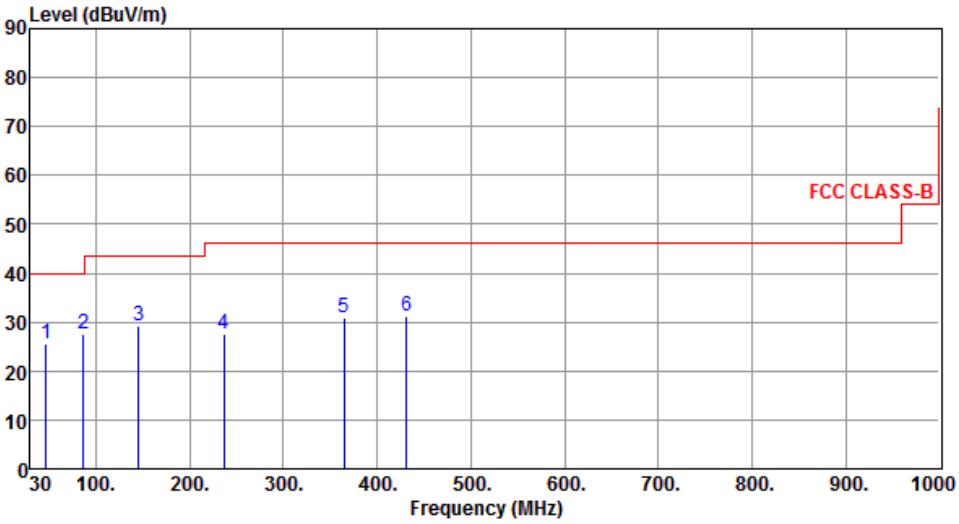
Modulation	HT20	**Test Freq. (MHz)**	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	82.38	34.35	40.00	-5.65	52.46	-18.11	Peak	---	---
2	212.36	37.81	43.50	-5.69	53.97	-16.16	Peak	---	---
3	263.77	31.72	46.00	-14.28	45.89	-14.17	Peak	---	---
4	299.66	28.52	46.00	-17.48	41.42	-12.90	Peak	---	---
5	334.58	30.61	46.00	-15.39	42.53	-11.92	Peak	---	---
6	365.62	34.06	46.00	-11.94	45.13	-11.07	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	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		

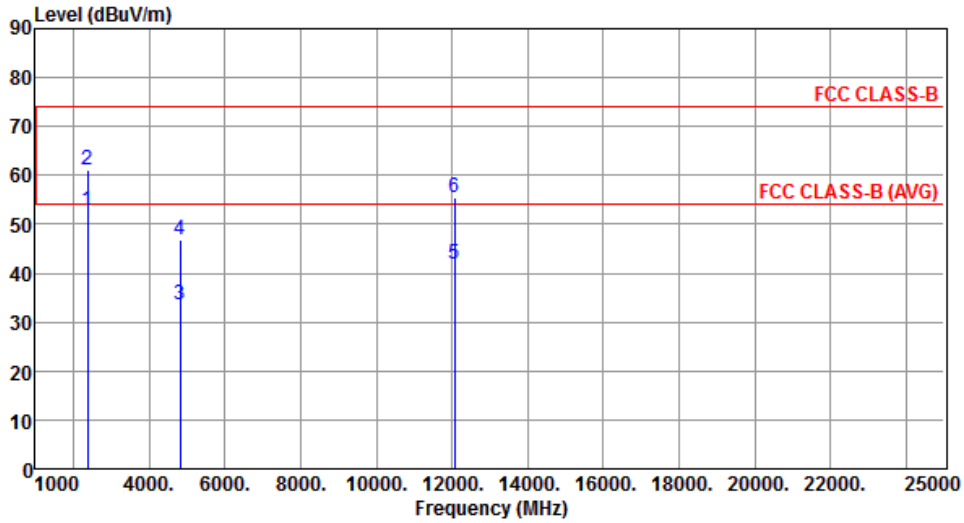


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.49	25.67	40.00	-14.33	38.73	-13.06	Peak	---	---
2	86.26	27.65	40.00	-12.35	46.54	-18.89	Peak	---	---
3	145.43	29.19	43.50	-14.31	42.68	-13.49	Peak	---	---
4	236.61	27.70	46.00	-18.30	42.73	-15.03	Peak	---	---
5	364.65	31.00	46.00	-15.00	42.09	-11.09	Peak	---	---
6	431.58	31.23	46.00	-14.77	40.51	-9.28	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.

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

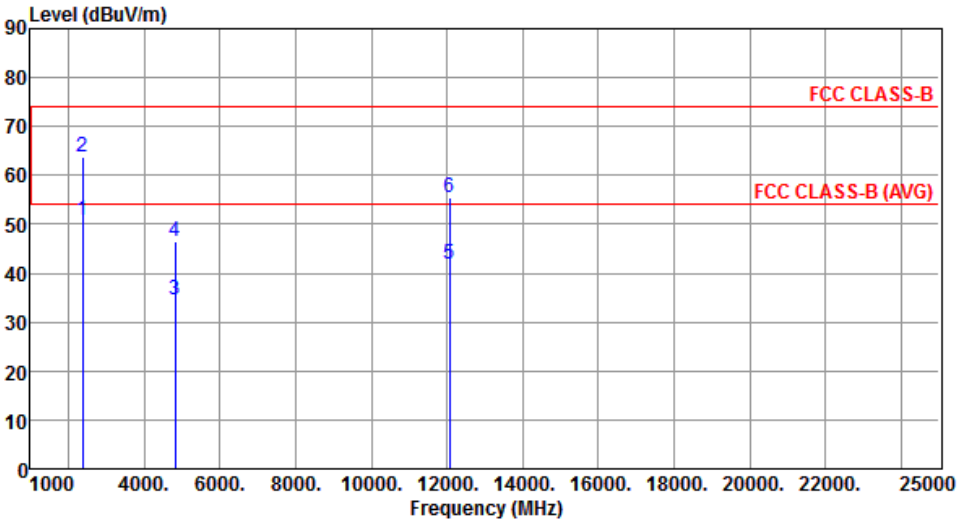
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	52.90	54.00	-1.10	54.26	-1.36	Average	195	136
2	2390.00	61.25	74.00	-12.75	62.61	-1.36	Peak	195	136
3	4824.00	33.54	54.00	-20.46	27.60	5.94	Average	177	209
4	4824.00	46.90	74.00	-27.10	40.96	5.94	Peak	177	209
5	12060.00	41.90	54.00	-12.10	25.93	15.97	Average	281	271
6	12060.00	55.37	74.00	-18.63	39.40	15.97	Peak	281	271

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).

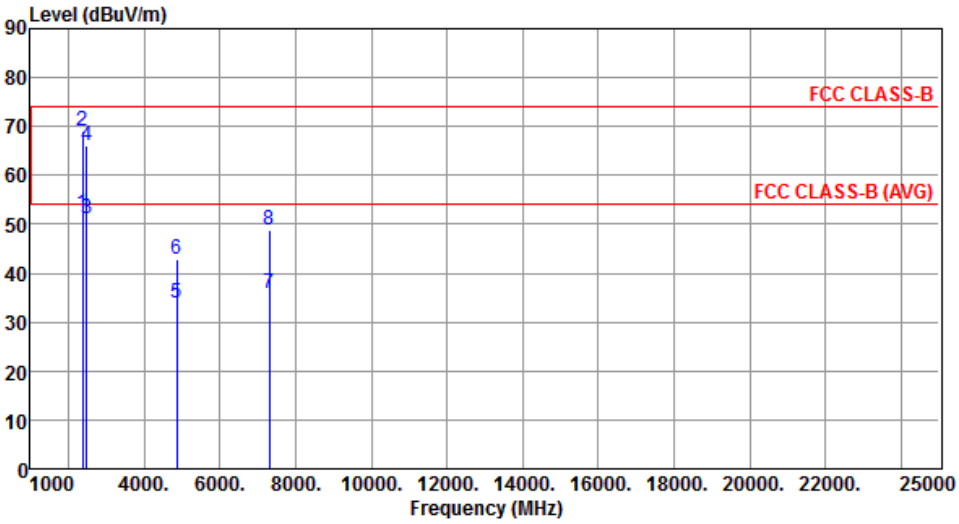
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	50.85	54.00	-3.15	52.21	-1.36	Average	286	104
2	2390.00	63.72	74.00	-10.28	65.08	-1.36	Peak	286	104
3	4824.00	34.54	54.00	-19.46	28.60	5.94	Average	197	267
4	4824.00	46.64	74.00	-27.36	40.70	5.94	Peak	197	267
5	12060.00	41.97	54.00	-12.03	26.00	15.97	Average	197	267
6	12060.00	55.51	74.00	-18.49	39.54	15.97	Peak	197	267

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).

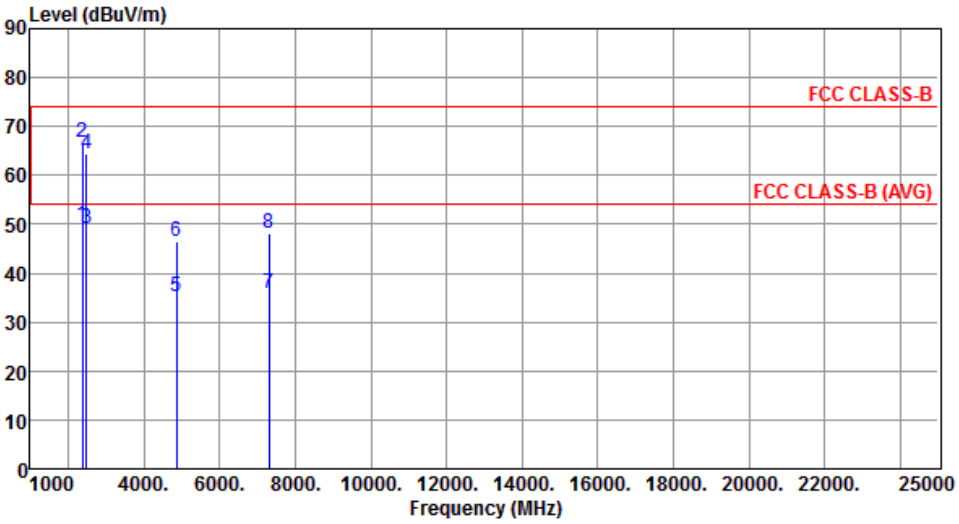
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	52.10	54.00	-1.90	53.46	-1.36	Average	189	49
2	2390.00	69.21	74.00	-4.79	70.57	-1.36	Peak	189	49
3	2483.50	51.21	54.00	-2.79	52.23	-1.02	Average	380	142
4	2483.50	66.12	74.00	-7.88	67.14	-1.02	Peak	380	142
5	4874.00	33.91	54.00	-20.09	27.94	5.97	Average	221	235
6	4874.00	42.86	74.00	-31.14	36.89	5.97	Peak	221	235
7	7311.00	36.00	54.00	-18.00	25.25	10.75	Average	198	203
8	7311.00	48.78	74.00	-25.22	38.03	10.75	Peak	198	203

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).

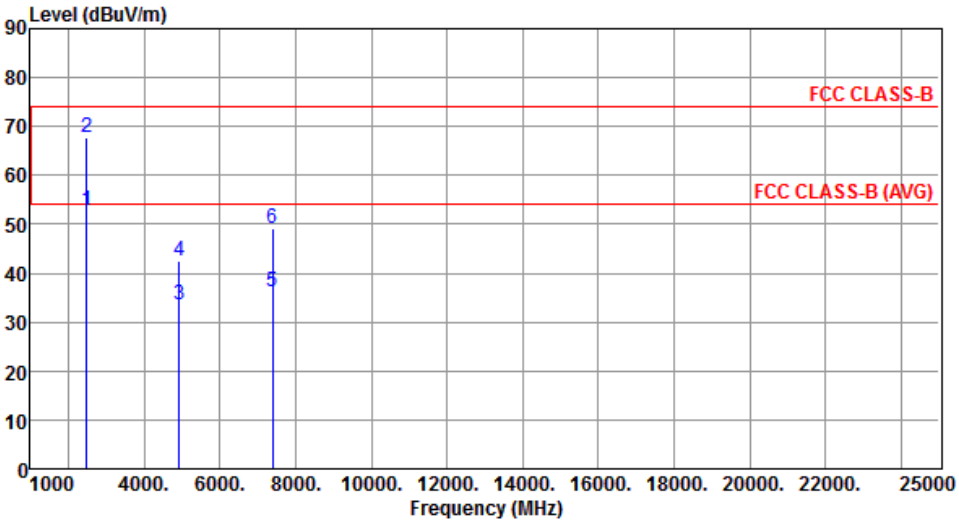
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	49.88	54.00	-4.12	51.24	-1.36	Average	270	116
2	2390.00	66.84	74.00	-7.16	68.20	-1.36	Peak	270	116
3	2483.50	49.25	54.00	-4.75	50.27	-1.02	Average	267	117
4	2483.50	64.34	74.00	-9.66	65.36	-1.02	Peak	267	117
5	4874.00	35.08	54.00	-18.92	29.11	5.97	Average	197	72
6	4874.00	46.37	74.00	-27.63	40.40	5.97	Peak	197	72
7	7311.00	36.00	54.00	-18.00	25.25	10.75	Average	209	175
8	7311.00	48.01	74.00	-25.99	37.26	10.75	Peak	209	175

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).

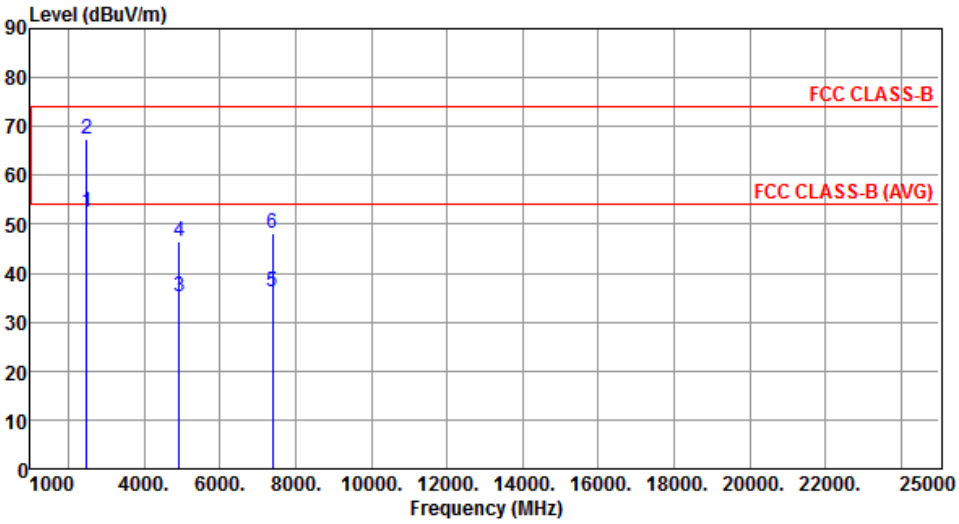
Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	52.71	54.00	-1.29	53.73	-1.02	Average	255	20
2	2483.50	67.75	74.00	-6.25	68.77	-1.02	Peak	255	20
3	4924.00	33.65	54.00	-20.35	27.64	6.01	Average	213	231
4	4924.00	42.53	74.00	-31.47	36.52	6.01	Peak	213	231
5	7386.00	36.22	54.00	-17.78	25.32	10.90	Average	193	208
6	7386.00	49.00	74.00	-25.00	38.10	10.90	Peak	193	208

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		

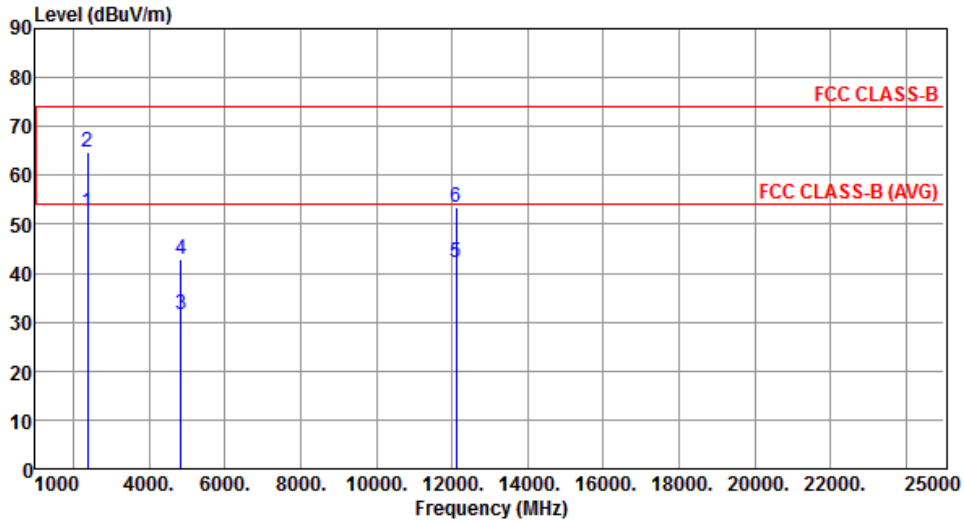


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.55	54.00	-1.45	53.57	-1.02	Average	194	19
2	2483.50	67.49	74.00	-6.51	68.51	-1.02	Peak	194	19
3	4924.00	35.34	54.00	-18.66	29.33	6.01	Average	175	78
4	4924.00	46.58	74.00	-27.42	40.57	6.01	Peak	175	78
5	7386.00	36.33	54.00	-17.67	25.43	10.90	Average	203	171
6	7386.00	48.24	74.00	-25.76	37.34	10.90	Peak	203	171

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).

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

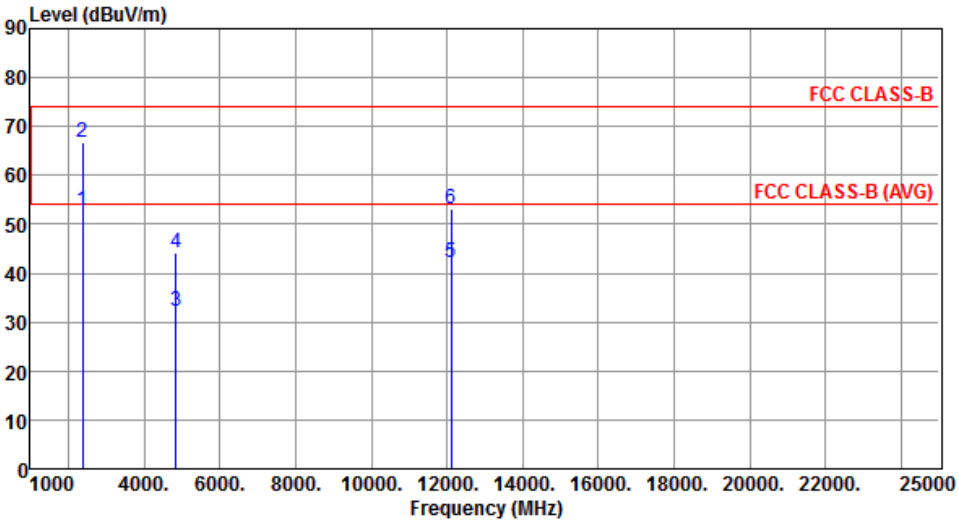
Modulation	HT40	**Test Freq. (MHz)**	2422
Polarization	Horizontal		



	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	52.54	54.00	-1.46	53.90	-1.36	Average	259	15
2	2390.00	64.74	74.00	-9.26	66.10	-1.36	Peak	259	15
3	4844.00	31.66	54.00	-22.34	25.71	5.95	Average	239	15
4	4844.00	42.83	74.00	-31.17	36.88	5.95	Peak	239	15
5	12110.00	42.19	54.00	-11.81	26.28	15.91	Average	204	308
6	12110.00	53.58	74.00	-20.42	37.67	15.91	Peak	204	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).

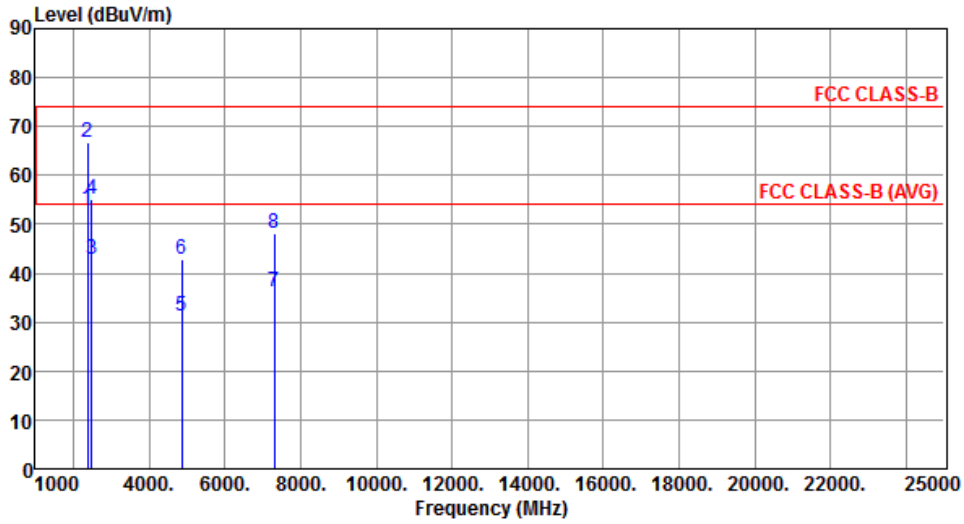
Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Vertical		



	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	52.86	54.00	-1.14	54.22	-1.36	Average	150	7
2	2390.00	66.64	74.00	-7.36	68.00	-1.36	Peak	150	7
3	4844.00	32.28	54.00	-21.72	26.33	5.95	Average	255	342
4	4844.00	44.05	74.00	-29.95	38.10	5.95	Peak	255	342
5	12110.00	42.06	54.00	-11.94	26.15	15.91	Average	163	34
6	12110.00	53.17	74.00	-20.83	37.26	15.91	Peak	163	34

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).

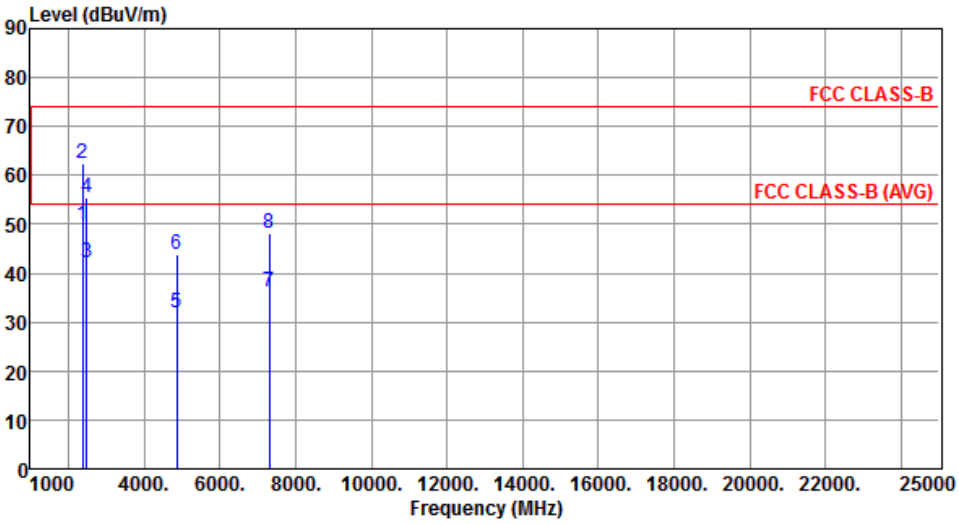
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	52.98	54.00	-1.02	54.34	-1.36	Average	192	18
2	2390.00	66.75	74.00	-7.25	68.11	-1.36	Peak	192	18
3	2483.50	42.87	54.00	-11.13	43.89	-1.02	Average	193	131
4	2483.50	54.96	74.00	-19.04	55.98	-1.02	Peak	193	131
5	4874.00	31.37	54.00	-22.63	25.40	5.97	Average	235	14
6	4874.00	42.69	74.00	-31.31	36.72	5.97	Peak	235	14
7	7311.00	36.26	54.00	-17.74	25.51	10.75	Average	124	259
8	7311.00	48.15	74.00	-25.85	37.40	10.75	Peak	124	259

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).

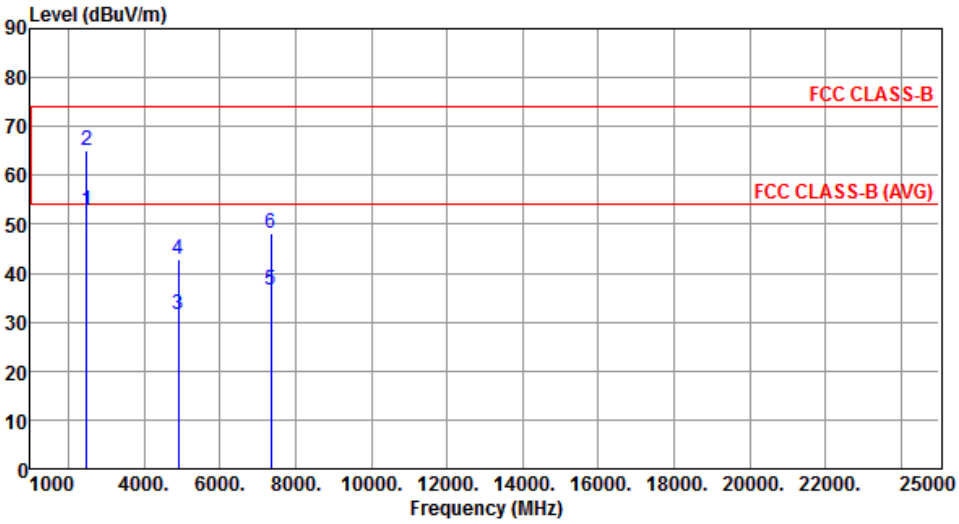
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	49.73	54.00	-4.27	51.09	-1.36	Average	226	34
2	2390.00	62.44	74.00	-11.56	63.80	-1.36	Peak	226	34
3	2483.50	42.10	54.00	-11.90	43.12	-1.02	Average	226	34
4	2483.50	55.42	74.00	-18.58	56.44	-1.02	Peak	226	34
5	4874.00	32.04	54.00	-21.96	26.07	5.97	Average	252	351
6	4874.00	43.92	74.00	-30.08	37.95	5.97	Peak	252	351
7	7311.00	36.23	54.00	-17.77	25.48	10.75	Average	183	122
8	7311.00	48.07	74.00	-25.93	37.32	10.75	Peak	183	122

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).

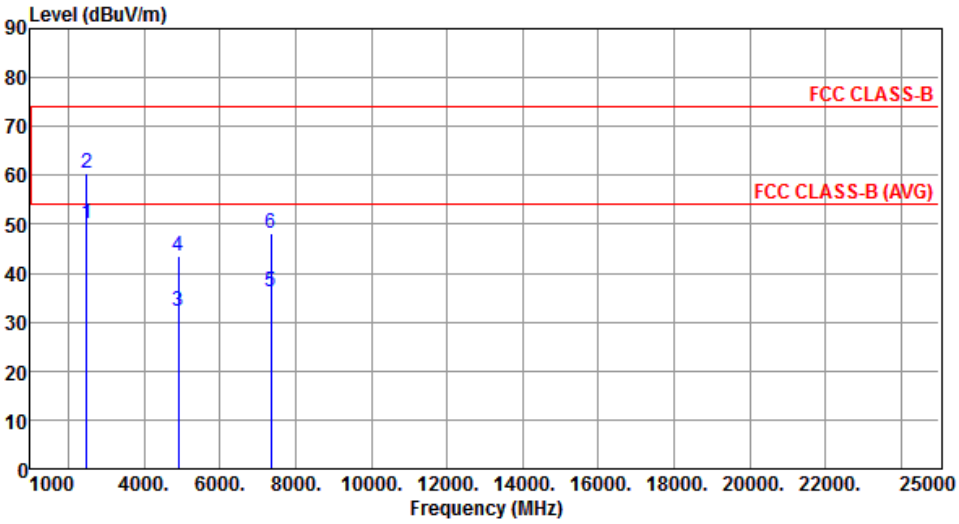
Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Horizontal		



	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	52.65	54.00	-1.35	53.67	-1.02	Average	277	37
2	2483.50	65.05	74.00	-8.95	66.07	-1.02	Peak	277	37
3	4904.00	31.45	54.00	-22.55	25.45	6.00	Average	231	19
4	4904.00	42.80	74.00	-31.20	36.80	6.00	Peak	231	19
5	7356.00	36.44	54.00	-17.56	25.60	10.84	Average	130	254
6	7356.00	48.29	74.00	-25.71	37.45	10.84	Peak	130	254

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	50.20	54.00	-3.80	51.22	-1.02	Average	172	11
2	2483.50	60.38	74.00	-13.62	61.40	-1.02	Peak	172	11
3	4904.00	32.22	54.00	-21.78	26.22	6.00	Average	243	348
4	4904.00	43.65	74.00	-30.35	37.65	6.00	Peak	243	348
5	7356.00	36.34	54.00	-17.66	25.50	10.84	Average	178	127
6	7356.00	48.26	74.00	-25.74	37.42	10.84	Peak	178	127

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

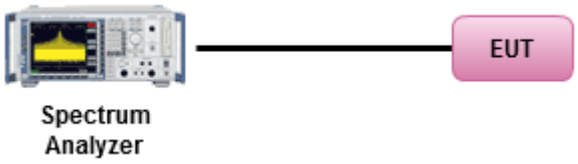
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

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



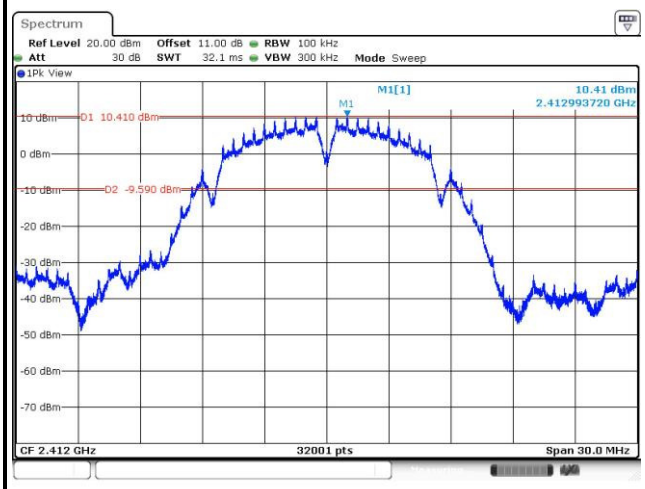
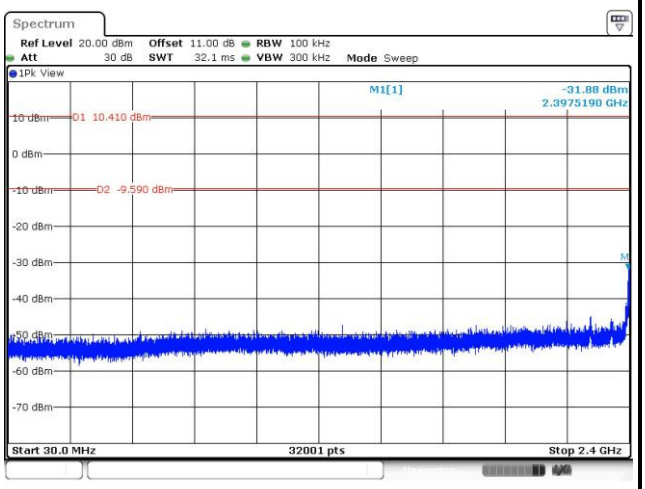
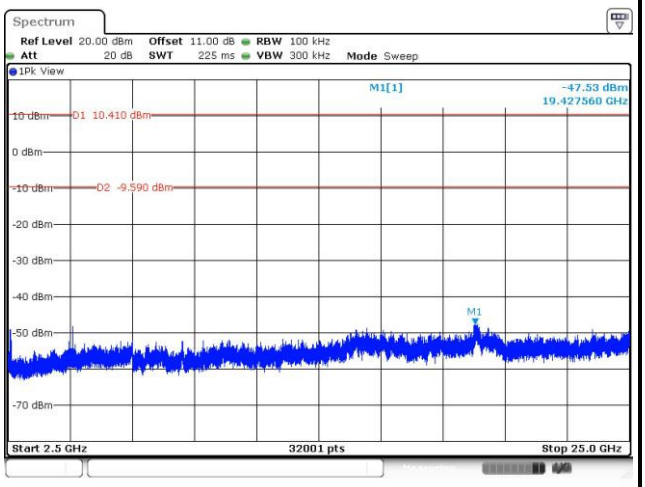
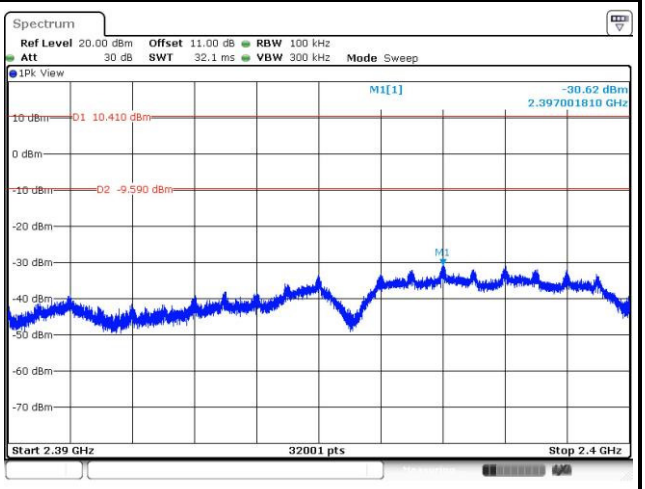
3.6.5 Test Result of Emissions in non-restricted frequency bands

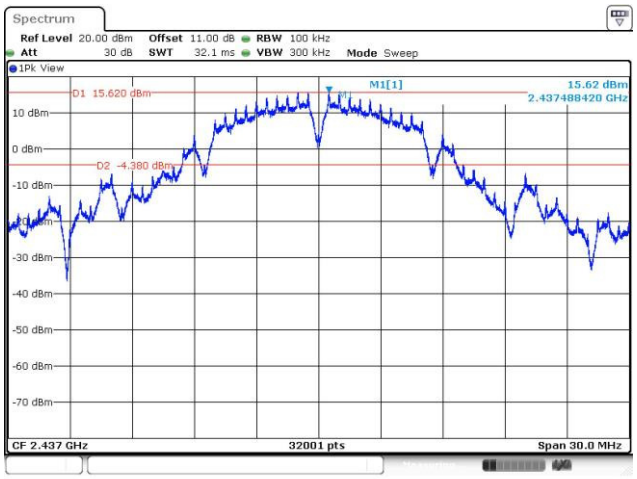
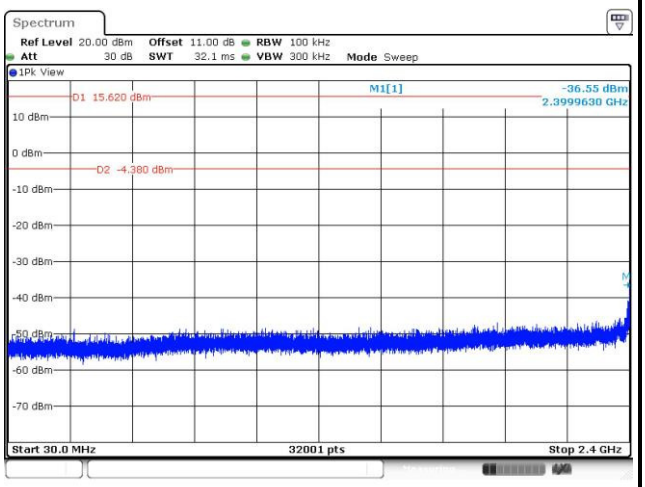
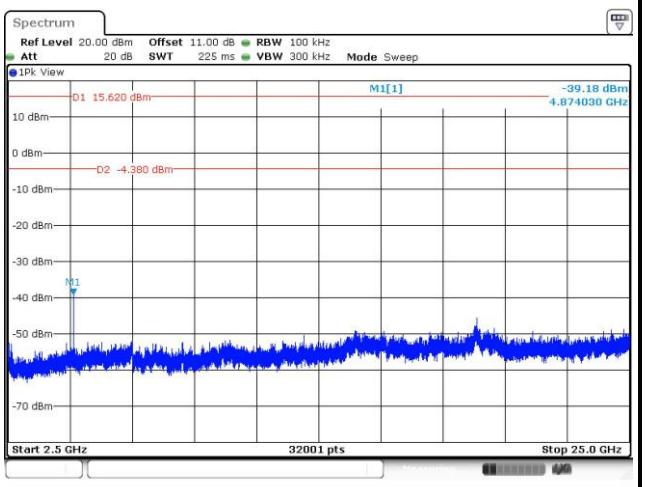
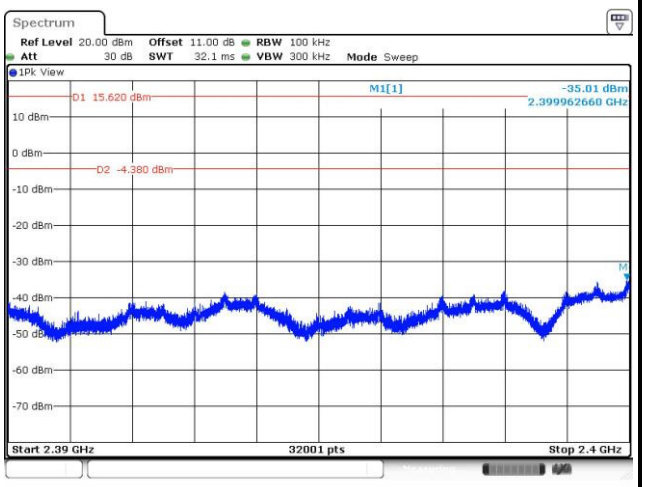
This test item is performed on each TX output individually without summing or adding 10 log(N_{ANT}) since measurements are made relative to the in-band emissions on the individual outputs. Only worst test result of each operating mode is presented.

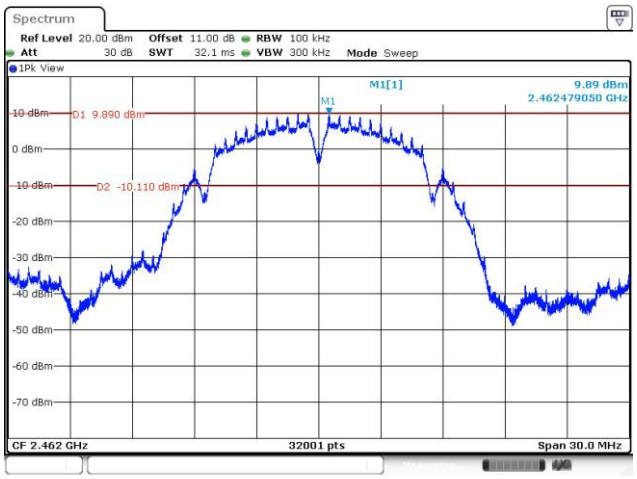
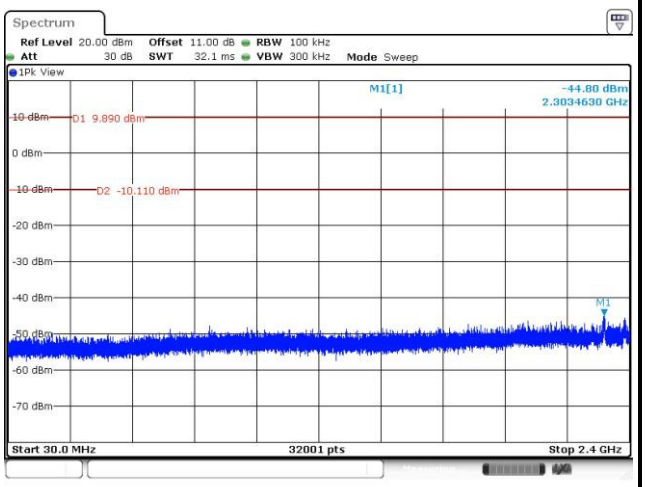
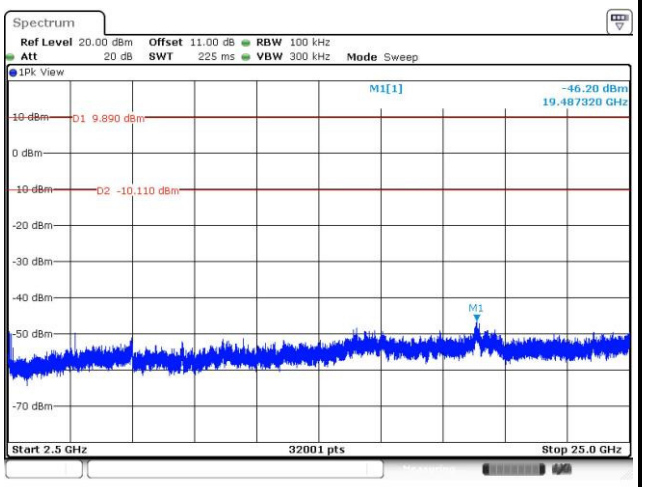
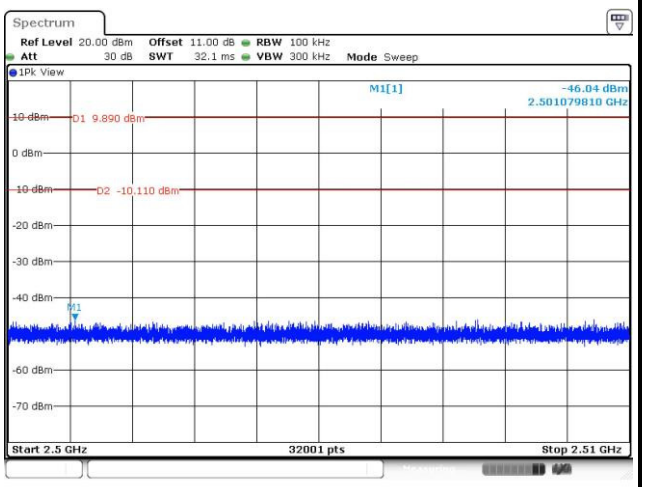
Non-beamforming mode

3.6.6 Unwanted Emissions into Non-Restricted Frequency Bands

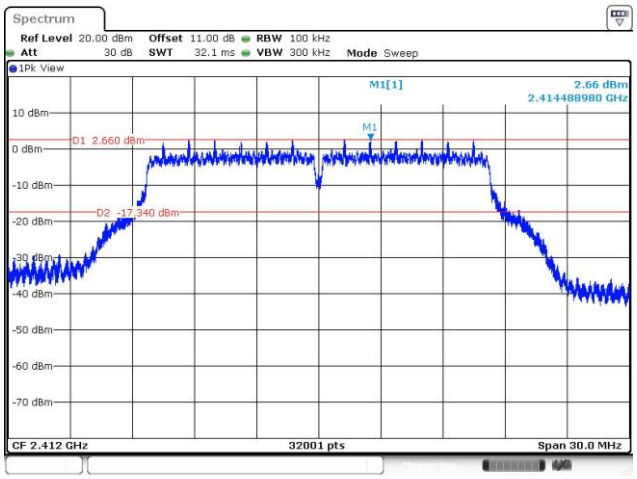
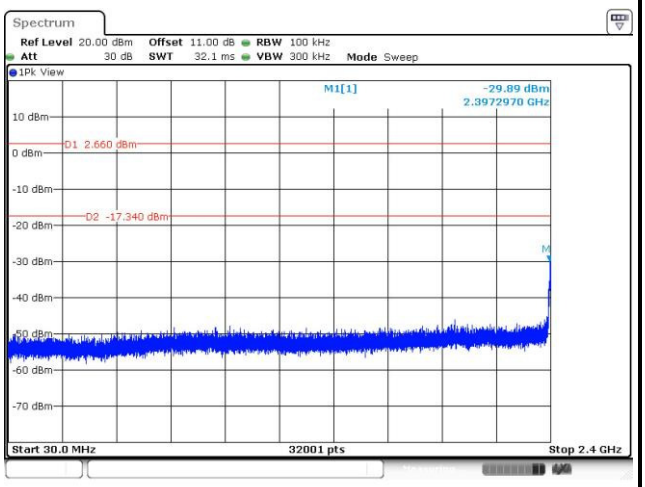
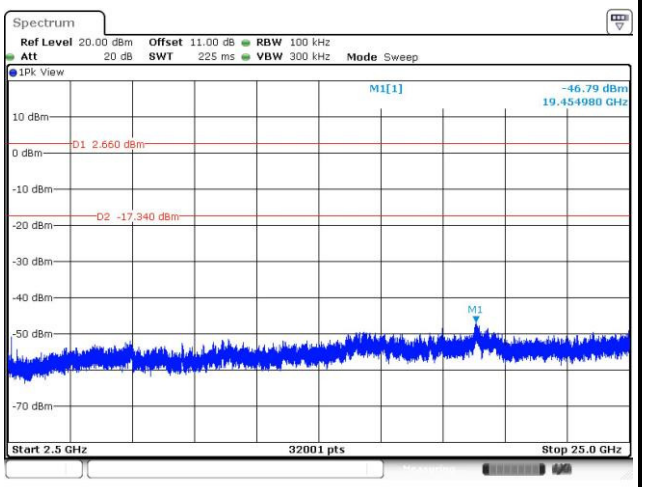
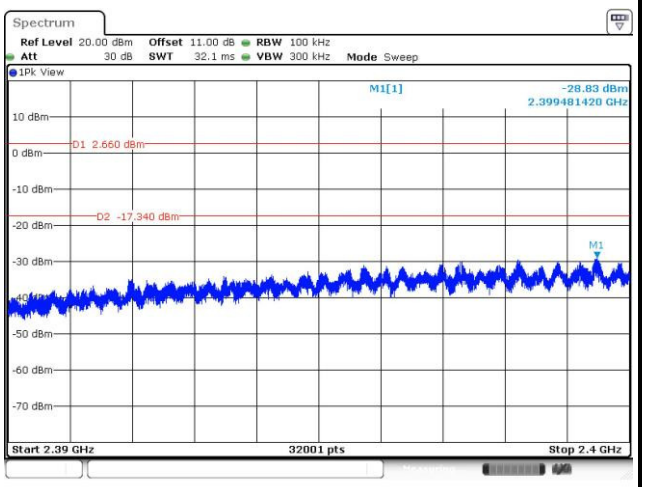
802.11b

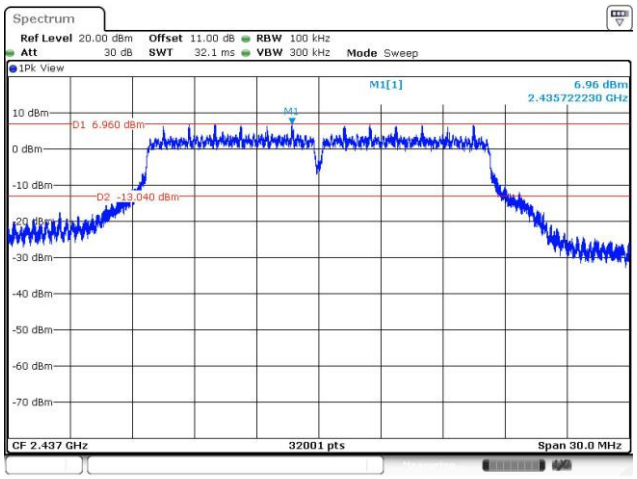
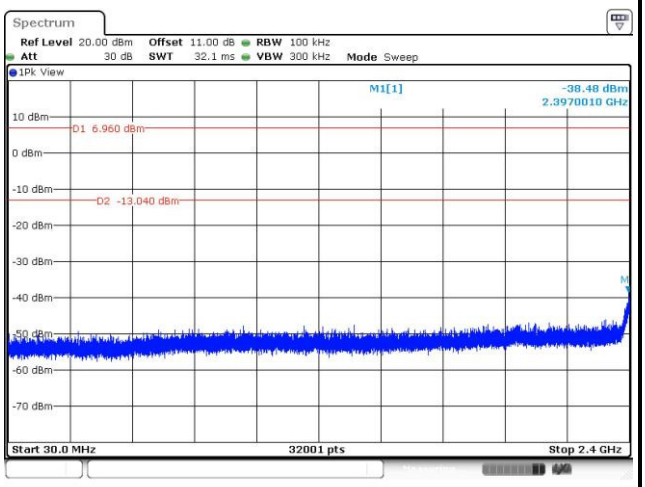
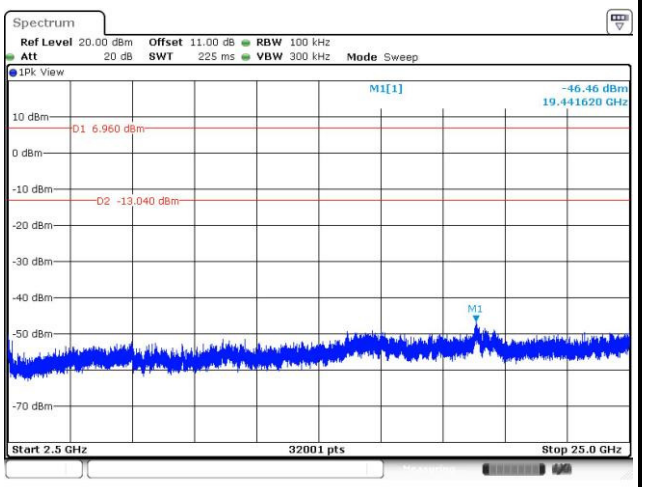
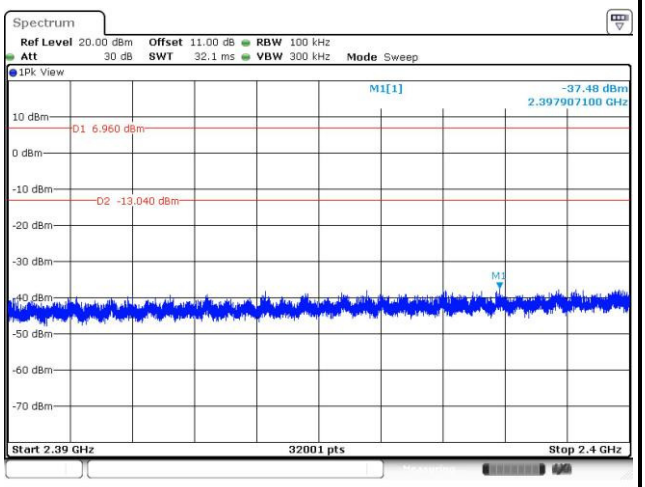
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

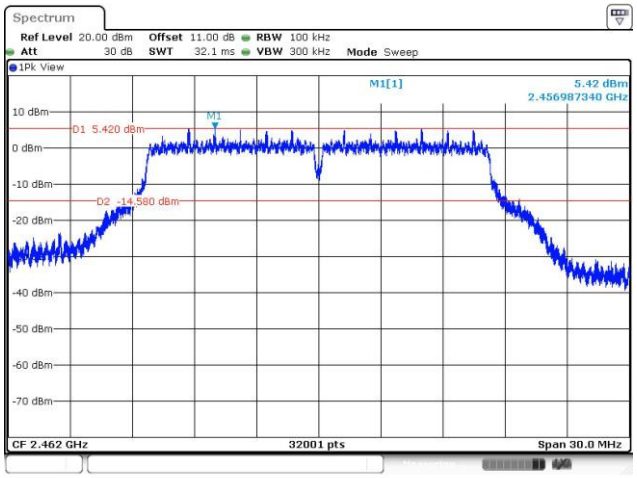
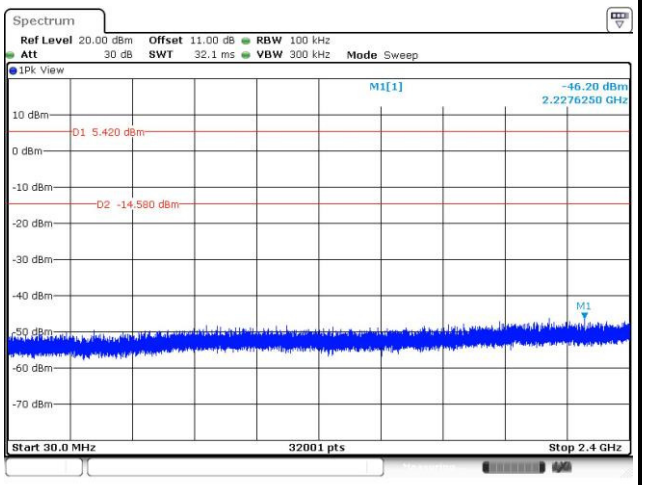
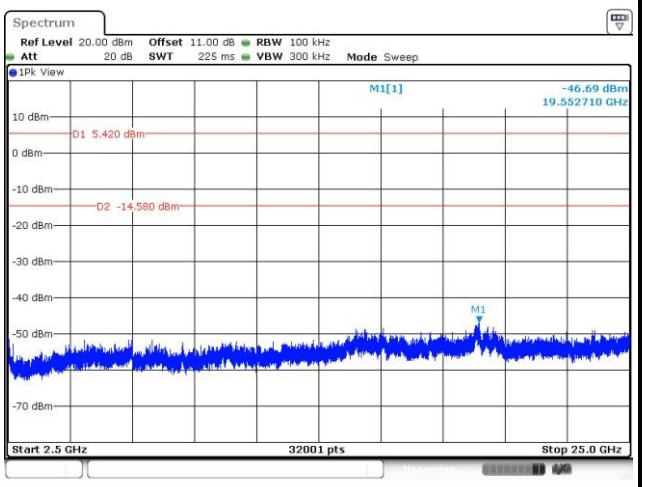
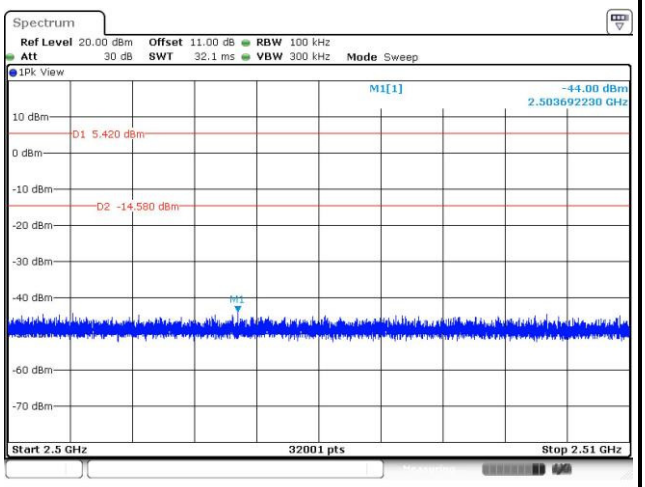
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

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

802.11g

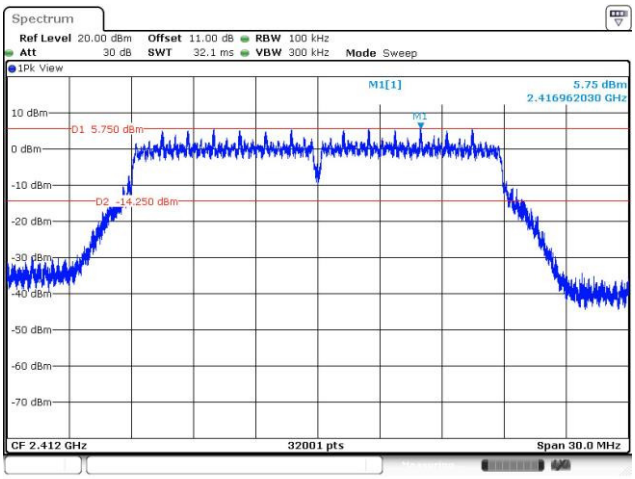
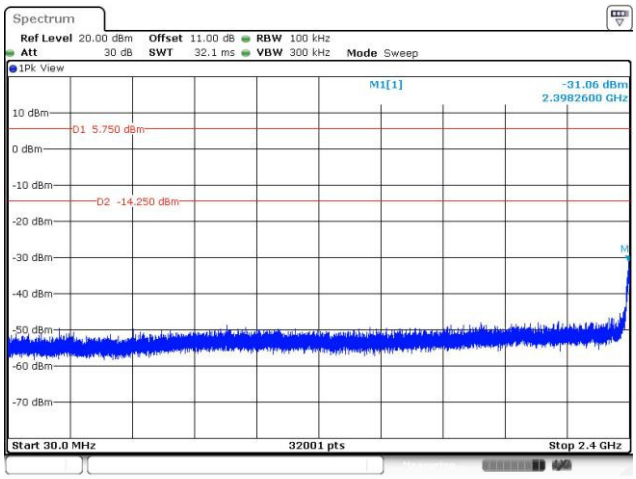
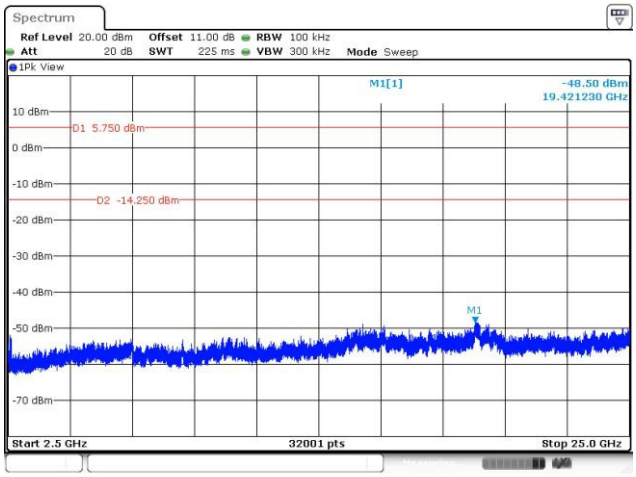
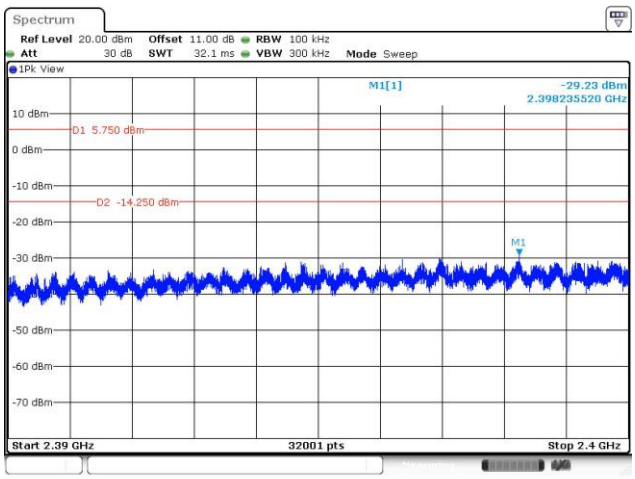
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

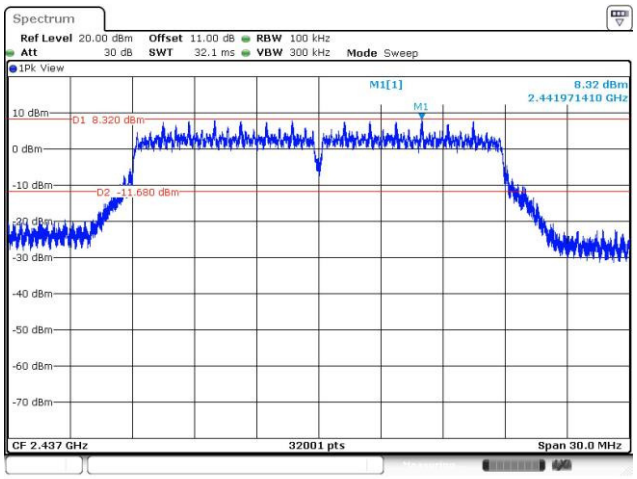
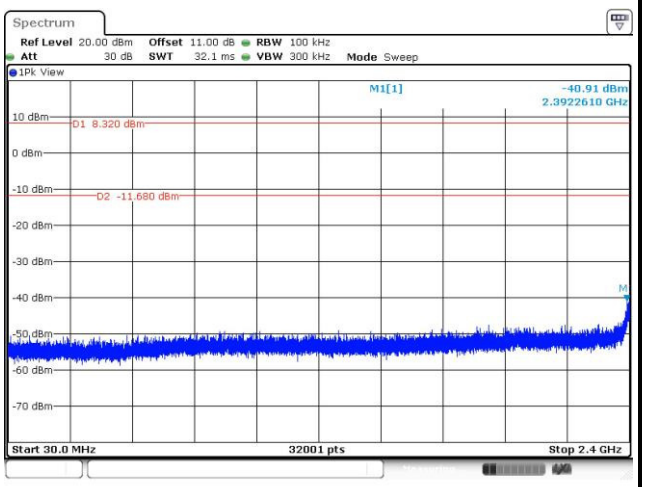
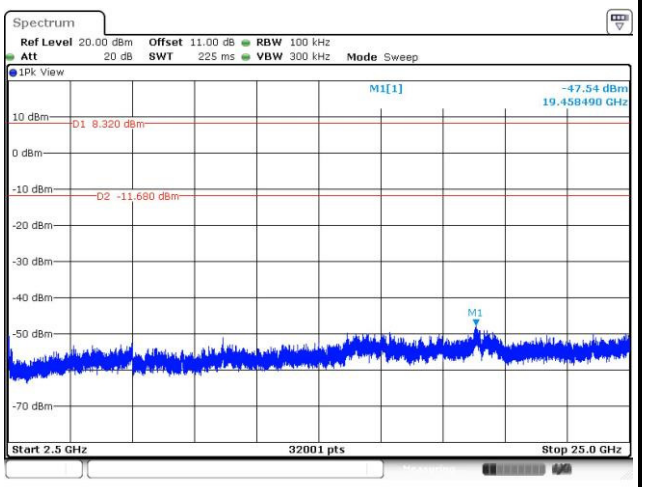
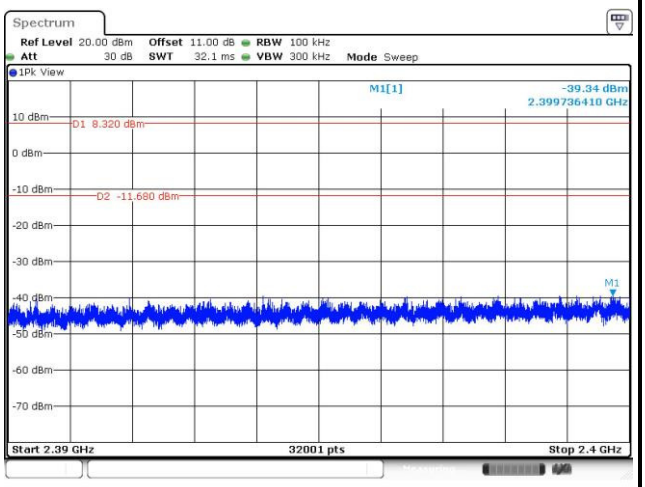
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

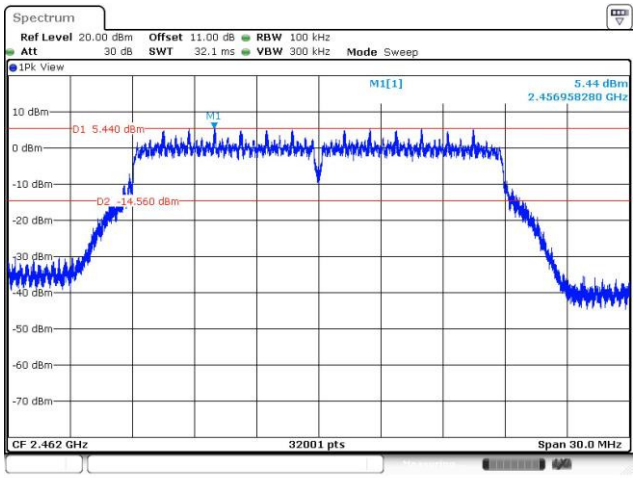
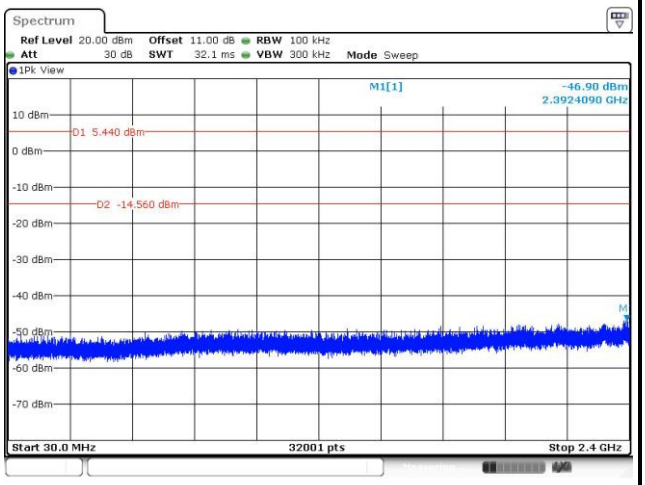
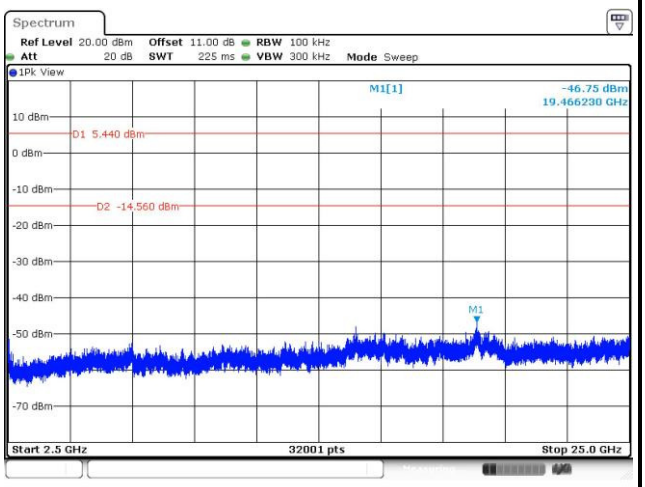
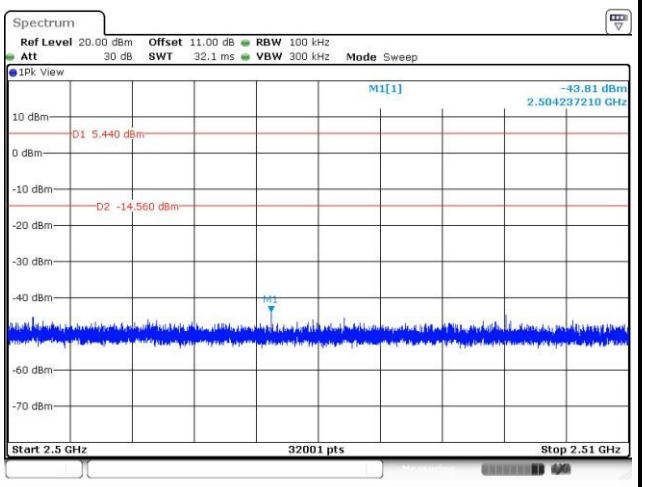
Reference Level	Tx 2462MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

Beamforming mode

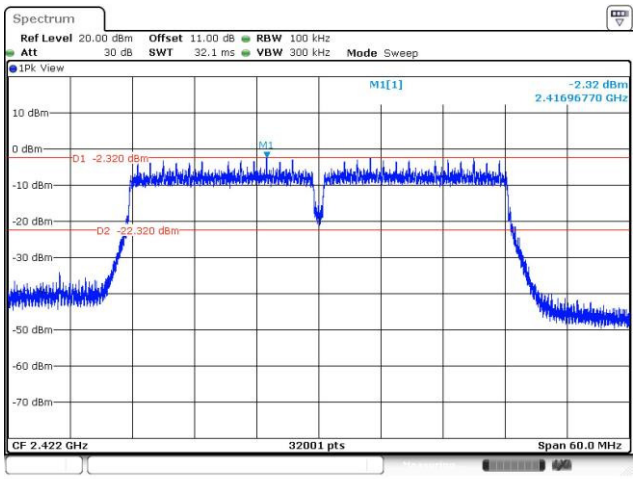
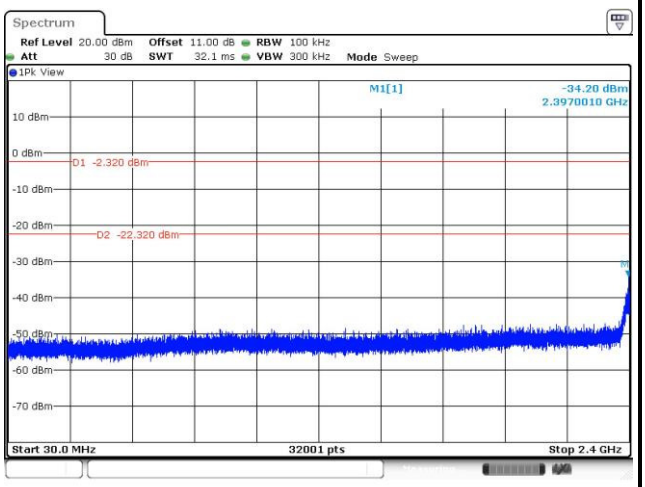
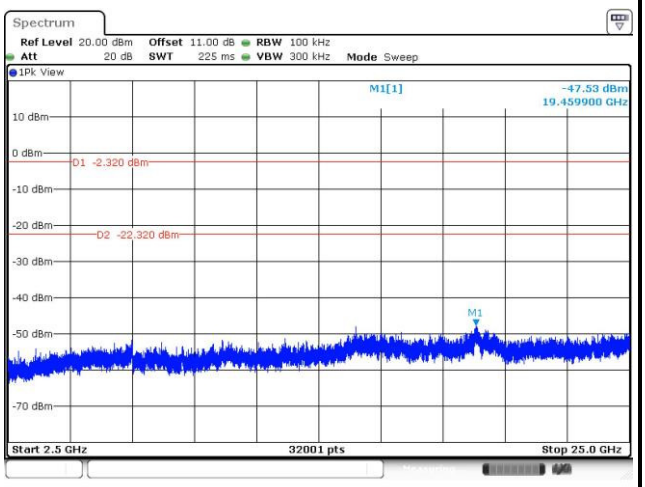
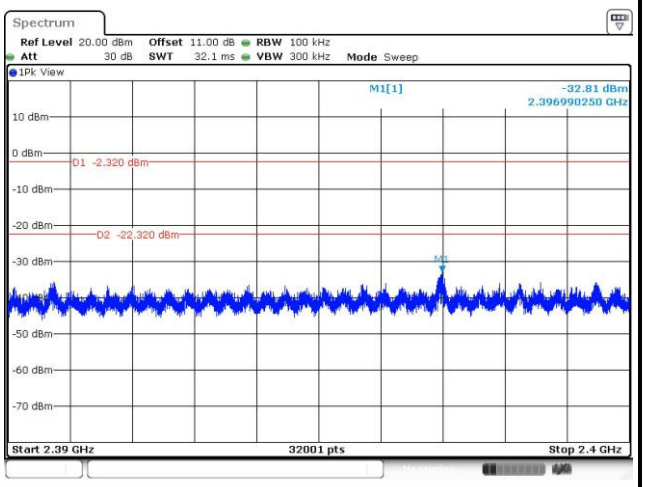
802.11n HT20

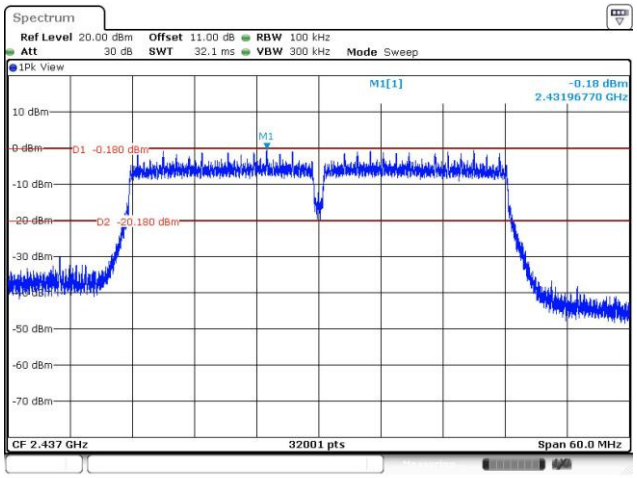
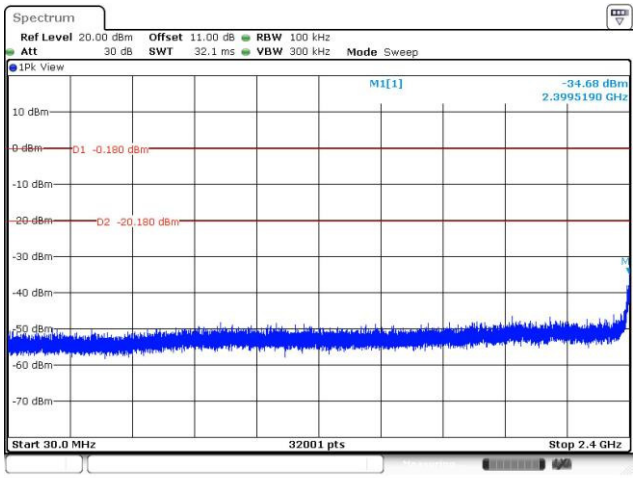
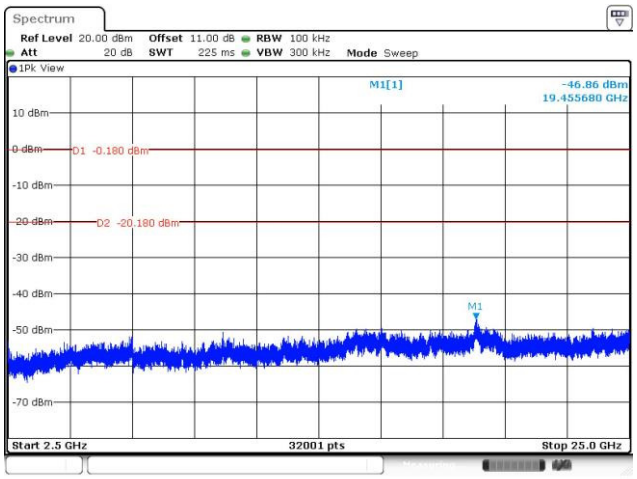
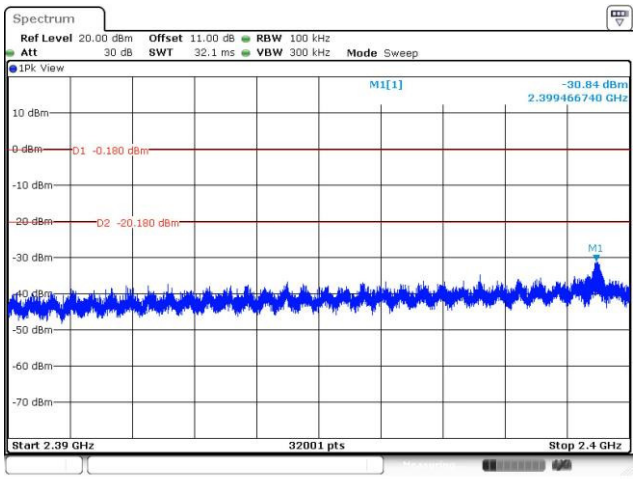
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

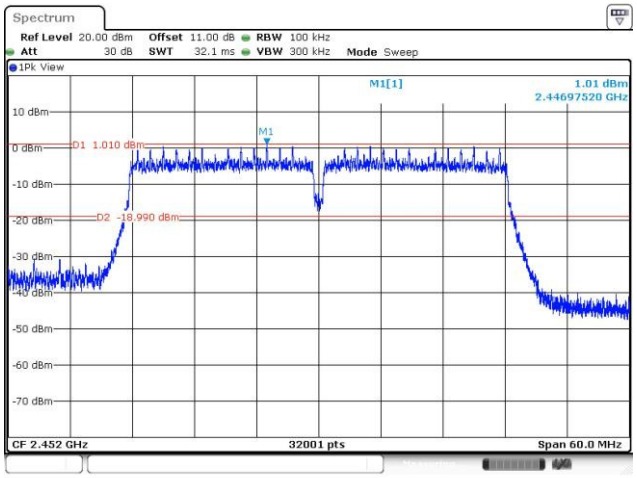
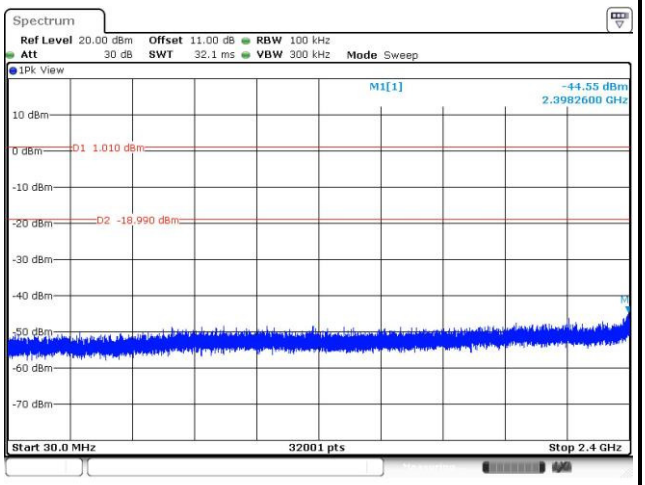
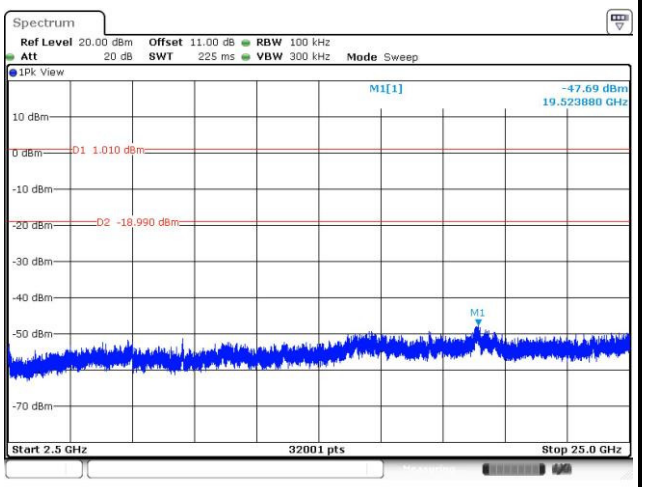
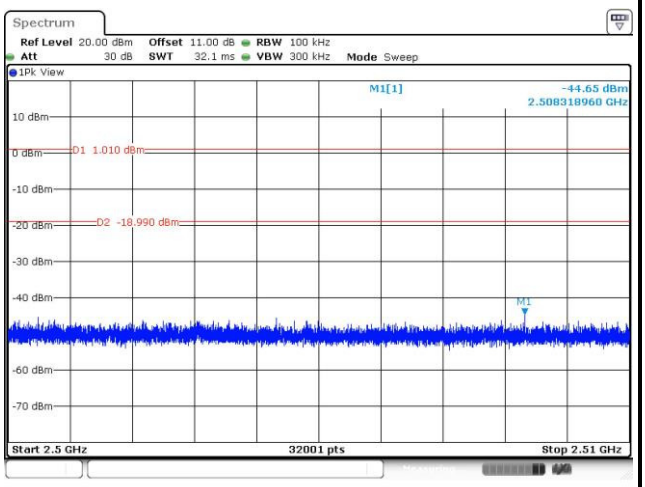
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

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, 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 Hsiang. 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 Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 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==