NCC Test Report

Equipment	:	**Multy X** 三頻全覆蓋無線延伸系統
Model No.	:	**WSQ50**
Brand Name	:	**ZYXEL**
Applicant	:	合勤科技股份有限公司
Address	:	新北市新店區北新路 **3** 段 **223** 號 **11** 樓
Standard	:	**LP0002 Section 3.10.1 (2016-08-23)**
Received Date	:	**May 26, 2017**
Tested Date	:	**May 26 ~ Aug. 21, 2017**

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:

Along Chen / Assistant Manager

Approved by:

Gary Chang / Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
TR760801-01AC	Rev. 01	Initial issue	Nov. 06, 2017

Summary of Test Results

NCC Rules	Test Items	Measured	Result
2.3	Conducted Emissions	[dBuV]: 0.494MHz 31.69 (Margin -14.41dB) - AV	Pass
3.10.1.5 2.8	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 53.85 (Margin -0.15dB) - AV	Pass
3.10.1.2(1)(C)	Maximum Output Power	Max Power [dBm]: 29.52	Pass
3.10.1.6(2)(A)	6dB Bandwidth	Meet the requirement of limit	Pass
3.10.1.6(2)(B)	Power Spectral Density	Meet the requirement of limit	Pass
3.10.1.4	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 Conducted (Average) 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 Main Chipset / RF Chipset

Function	Model No.
Main Chipset	IPQ4019
2.4G	IPQ4019
5G 2T2R	IPQ4019
5G 4T4R	QCA9984
Bluetooth LE	CSR8811

1.1.3 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequency (MHz) / Gain (dBi)		
				2400~2483.5	**5150~5250**	**5725~5850**
1	ALX17M-126XX3-A	PIFA	UFL	0	0	0.43

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter

1.1.5 Accessories

Accessories		
No.	**Equipment**	**Description**
1	Adapter	Brand Name: APD Model Name: WA-36A12FU I/P: 100-240Vac, 50-60Hz 0.9 Max O/P: 12Vdc, 3A Power line: 1.75m non-shielded without core

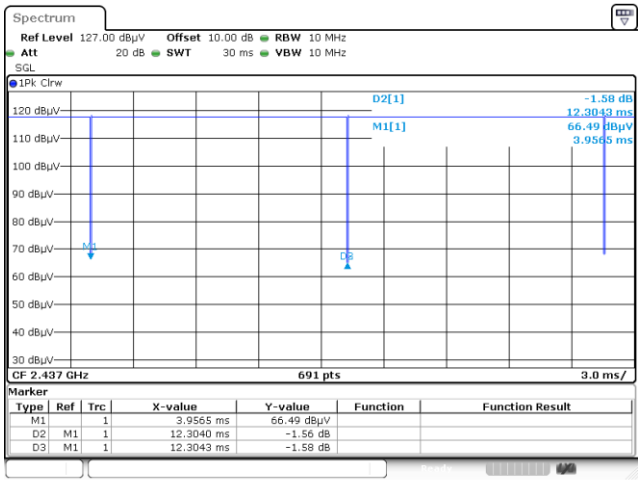
1.1.6 Channel List

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	---	---

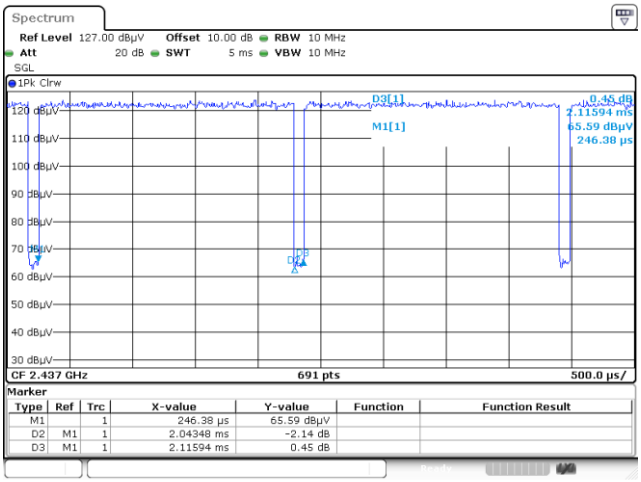
1.1.7 Test Tool and Duty Cycle

Test Tool	QRCT, V3.0.144.0		
Duty Cycle and Duty Factor	**Mode**	**Duty cycle (%)**	**Duty factor (dB)**
	11b	100.00%	0.00
	11g	96.58%	0.15
	HT20	98.91%	0.05
	HT40	97.33%	0.12

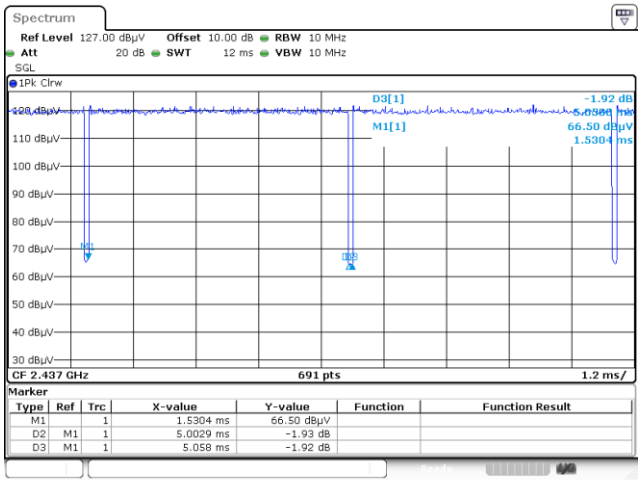
11b



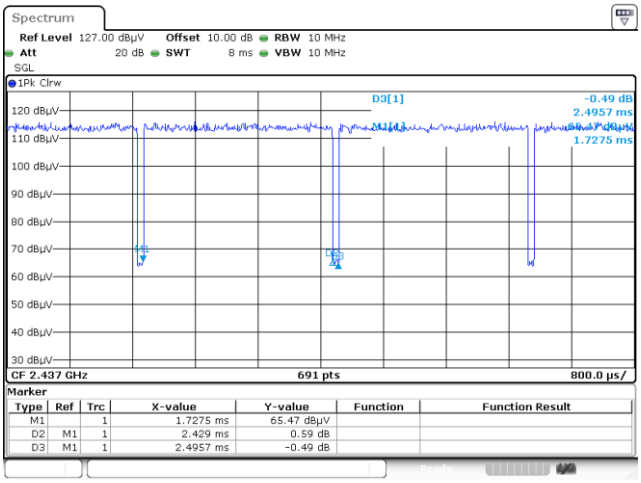
11g



11n HT20



11n HT40



1.1.8 Power Setting

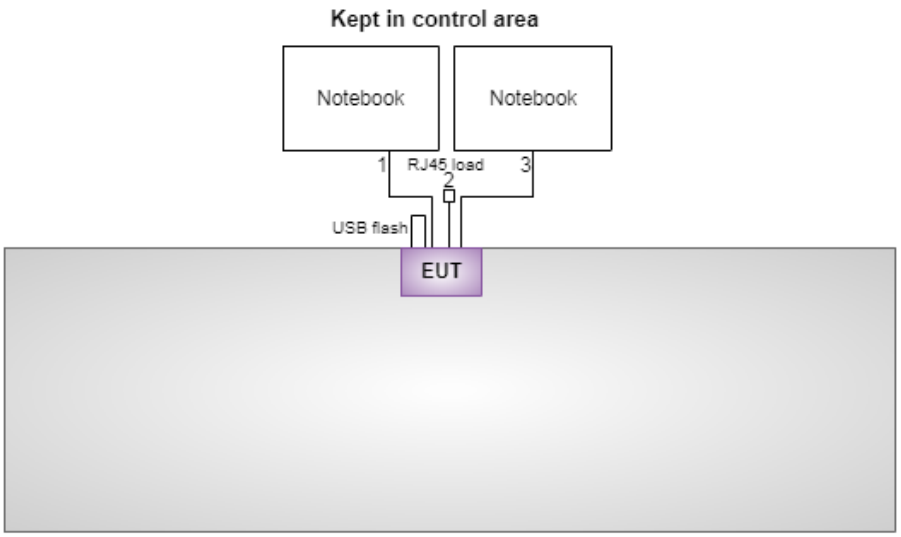
Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	26
11b	2437	27
11b	2462	25.5
11g	2412	21.5
11g	2437	26
11g	2462	20
HT20	2412	21.5
HT20	2437	26
HT20	2462	20
HT40	2422	19
HT40	2437	21.5
HT40	2452	17.5

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, 10m non-shielded.
2	Notebook	DELL	Latitude E5420	DoC	RJ45, 10m non-shielded.
3	USB Flash	Kingston	DTSE9	---	---

1.3 Test Setup Chart

Test Setup Diagram



1. RJ45, 10m non-shielded.
2. RJ45, 1m(x2) non-shielded with load.
3. RJ45, 10m non-shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Dec. 21, 2016	Dec. 20, 2017
LISN	R&S	ENV216	101579	Jan. 19, 2017	Jan. 18, 2018
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 20, 2016	Dec. 19, 2017
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)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Oct. 13, 2016	Oct. 12, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 21, 2016	Dec. 20, 2017
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. 09, 2016	Dec. 08, 2017
Preamplifier	EMC	EMC02325	980146	Oct. 08, 2016	Oct. 07, 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. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 09, 2016	Dec. 08, 2017
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 09, 2016	Dec. 08, 2017
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 09, 2016	Dec. 08, 2017
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 09, 2016	Dec. 08, 2017
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)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Mar. 15, 2017	Mar. 14, 2018
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.

LP0002 Section 3.10.1 (2016-08-23)
ANSI C63.10-2013
ANSI C63.4-2014
FCC KDB 558074 D01 DTS Meas Guidance v04
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	23°C / 57%	Alex Tsai
Radiated Emissions	03CH01-WS	22-24°C / 60%	Vincent Yeh Kevin Lee
RF Conducted	TH01-WS	22°C / 62%	Felix Sung

- 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	11b	2437	6 Mbps	TX
Radiated Emissions ≤1GHz	11b	2437	6 Mbps	TX
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	TX

Test item	Modulation Mode	Test Frequency (MHz)	Mode
Conducted Emissions	11b	2437	RX
Radiated Emissions	11b	2437	RX

3 Transmitter Test Results

3.1 Conducted Emissions

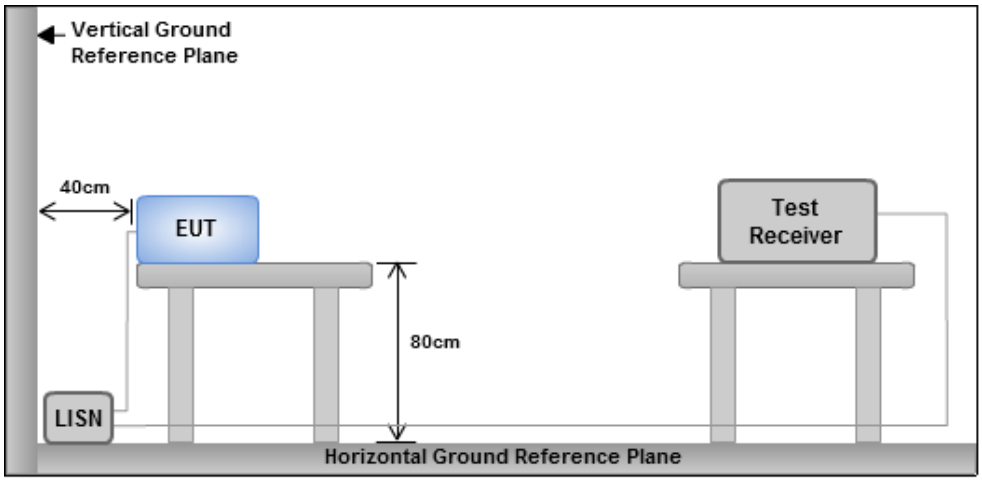
3.1.1 Limit of Conducted Emissions

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.

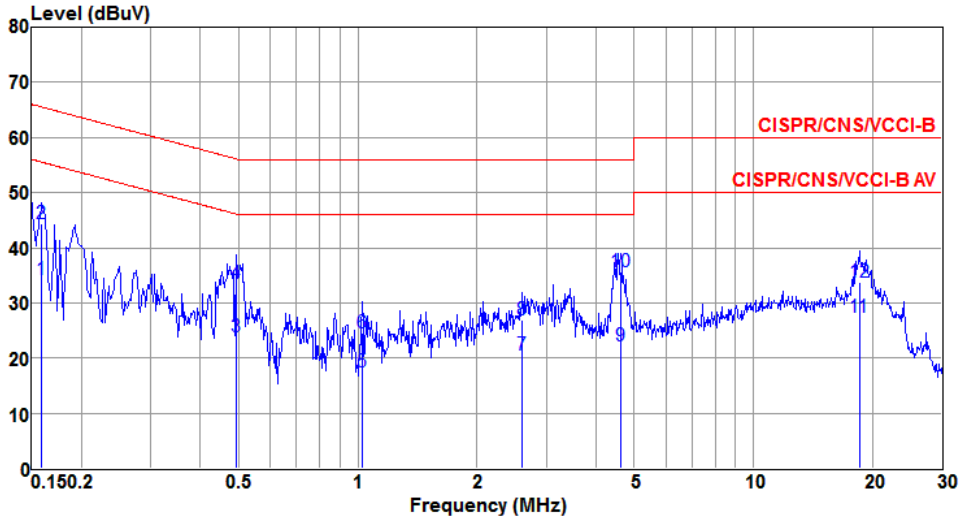
3.1.3 Test Setup



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

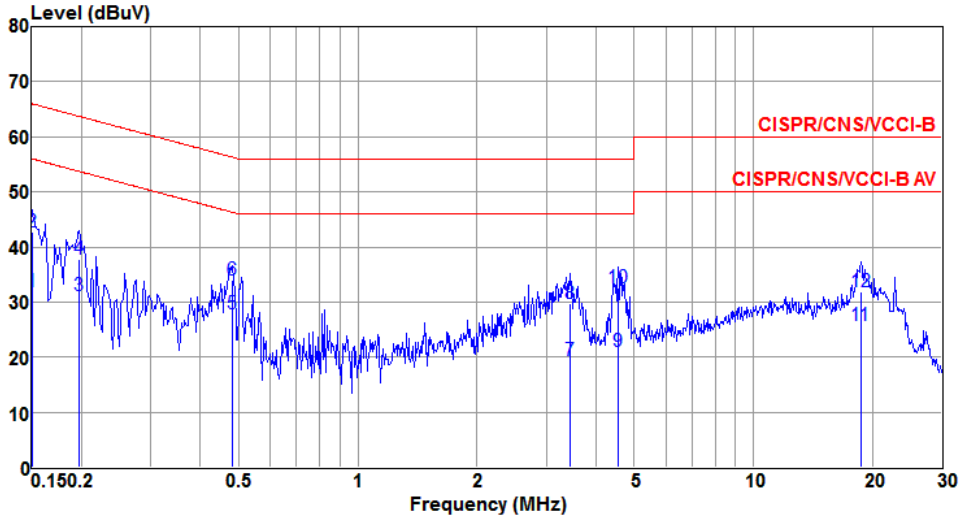
Modulation	11b	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.159	34.24	55.52	-21.28	24.70	9.50	0.04	Average
2	0.159	44.29	65.52	-21.23	34.75	9.50	0.04	QP
3	0.491	23.94	46.14	-22.20	14.33	9.57	0.04	Average
4	0.491	33.52	56.14	-22.62	23.91	9.57	0.04	QP
5	1.027	17.38	46.00	-28.62	7.87	9.47	0.04	Average
6	1.027	24.66	56.00	-31.34	15.15	9.47	0.04	QP
7	2.608	20.50	46.00	-25.50	10.83	9.58	0.09	Average
8	2.608	26.81	56.00	-29.19	17.14	9.58	0.09	QP
9	4.624	22.25	46.00	-23.75	12.57	9.51	0.17	Average
10@	4.624	35.56	56.00	-20.44	25.88	9.51	0.17	QP
11	18.524	27.50	50.00	-22.50	17.54	9.71	0.25	Average
12	18.524	33.84	60.00	-26.16	23.88	9.71	0.25	QP

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

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



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.150	31.96	56.00	-24.04	22.34	9.58	0.04	Average
2	0.150	42.84	66.00	-23.16	33.22	9.58	0.04	QP
3	0.198	31.10	53.71	-22.61	21.46	9.60	0.04	Average
4	0.198	37.79	63.71	-25.92	28.15	9.60	0.04	QP
5@	0.481	27.86	46.32	-18.46	18.25	9.57	0.04	Average
6	0.481	34.04	56.32	-22.28	24.43	9.57	0.04	QP
7	3.454	19.34	46.00	-26.66	9.53	9.68	0.13	Average
8	3.454	29.67	56.00	-26.33	19.86	9.68	0.13	QP
9	4.549	20.92	46.00	-25.08	11.04	9.71	0.17	Average
10	4.549	32.57	56.00	-23.43	22.69	9.71	0.17	QP
11	18.721	25.62	50.00	-24.38	15.66	9.71	0.25	Average
12	18.721	31.82	60.00	-28.18	21.86	9.71	0.25	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

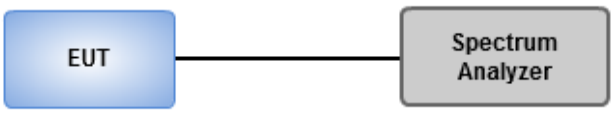
6dB Bandwidth

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.

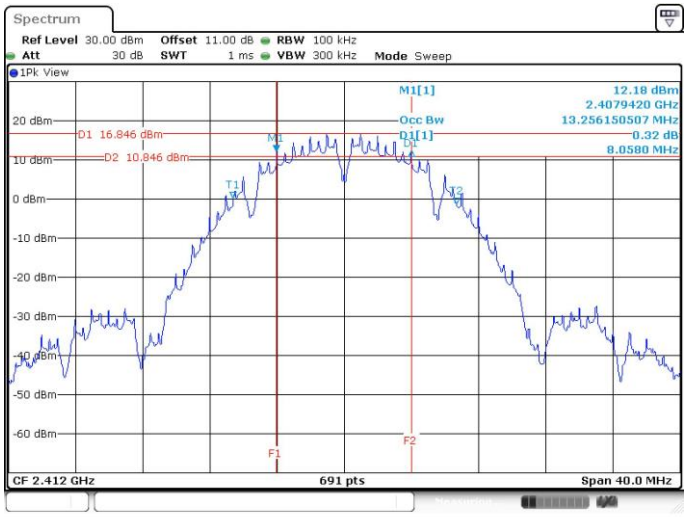
3.2.3 Test Setup



3.2.4 Test Result of 6dB and Occupied Bandwidth

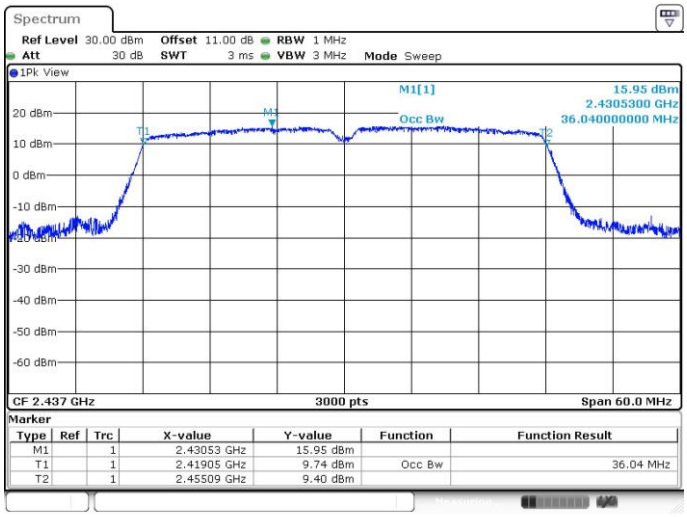
Modulation Mode	N_{TX}	Freq. (MHz)	6dB Bandwidth (MHz)				Limit (kHz)
			Chain 0	Chain 1	Chain 2	Chain 3	
11b	2	2412	8.06	8.06	---	---	500
11b	2	2437	8.06	8.06	---	---	500
11b	2	2462	8.06	8.06	---	---	500
11g	2	2412	16.35	16.29	---	---	500
11g	2	2437	16.29	16.29	---	---	500
11g	2	2462	16.35	16.35	---	---	500
HT20	2	2412	17.22	17.57	---	---	500
HT20	2	2437	17.57	17.57	---	---	500
HT20	2	2462	17.57	17.57	---	---	500
HT40	2	2422	35.25	35.25	---	---	500
HT40	2	2437	35.25	35.25	---	---	500
HT40	2	2452	35.25	35.25	---	---	500

Worst Plot



Modulation Mode	N_{TX}	Freq. (MHz)	99% Occupied Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3
11b	2	2412	13.44	13.20	---	---
11b	2	2437	14.05	13.90	---	---
11b	2	2462	13.21	13.11	---	---
11g	2	2412	16.43	16.47	---	---
11g	2	2437	16.69	16.69	---	---
11g	2	2462	16.42	16.45	---	---
HT20	2	2412	17.61	17.60	---	---
HT20	2	2437	17.87	17.79	---	---
HT20	2	2462	17.62	17.61	---	---
HT40	2	2422	35.96	36.00	---	---
HT40	2	2437	36.04	36.02	---	---
HT40	2	2452	35.96	35.96	---	---

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)	Conducted (Average) Output Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
11b	2	2412	24.88	25.26	---	---	643.347	28.08	30
11b	2	2437	26.42	26.59	---	---	894.568	**29.52**	30
11b	2	2462	24.76	25.08	---	---	621.333	27.93	30
11g	2	2412	20.62	20.81	---	---	235.849	23.73	30
11g	2	2437	24.99	24.82	---	---	618.890	27.92	30
11g	2	2462	19.49	19.76	---	---	183.544	22.64	30
HT20	2	2412	20.51	20.78	---	---	232.135	23.66	30
HT20	2	2437	24.92	24.76	---	---	609.682	27.85	30
HT20	2	2462	19.37	19.65	---	---	178.754	22.52	30
HT40	2	2422	18.32	18.71	---	---	142.222	21.53	30
HT40	2	2437	20.97	21.53	---	---	267.259	24.27	30
HT40	2	2452	17.23	17.41	---	---	107.925	20.33	30

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

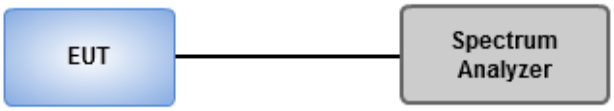
☐ Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.

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 = 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.

3.4.3 Test Setup

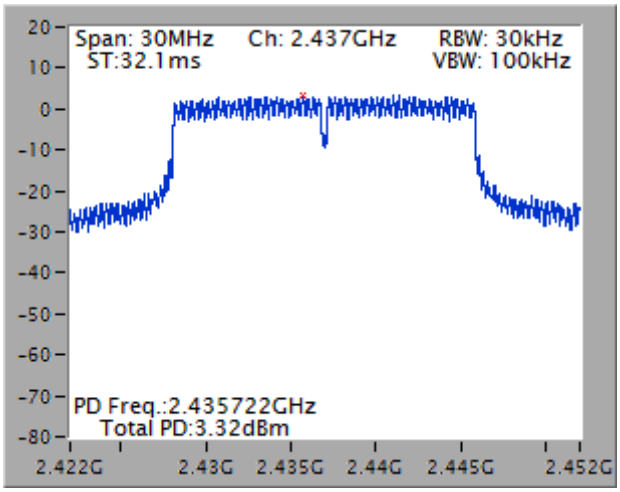


3.4.4 Test Result of Power Spectral Density

Modulation Mode	N_{TX}	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
11b	2	2412	1.80	8.00
11b	2	2437	3.00	8.00
11b	2	2462	1.74	8.00
11g	2	2412	-1.07	8.00
11g	2	2437	3.11	8.00
11g	2	2462	-2.23	8.00
HT20	2	2412	-1.03	8.00
HT20	2	2437	3.32	8.00
HT20	2	2462	-1.77	8.00
HT40	2	2422	-6.22	8.00
HT40	2	2437	-3.45	8.00
HT40	2	2452	-7.43	8.00

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

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

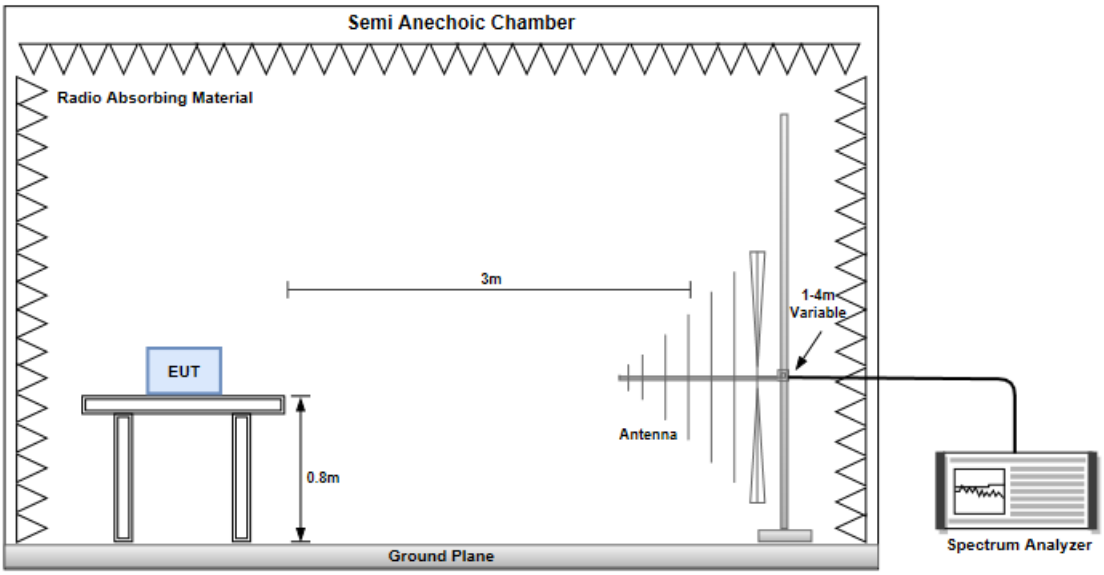
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

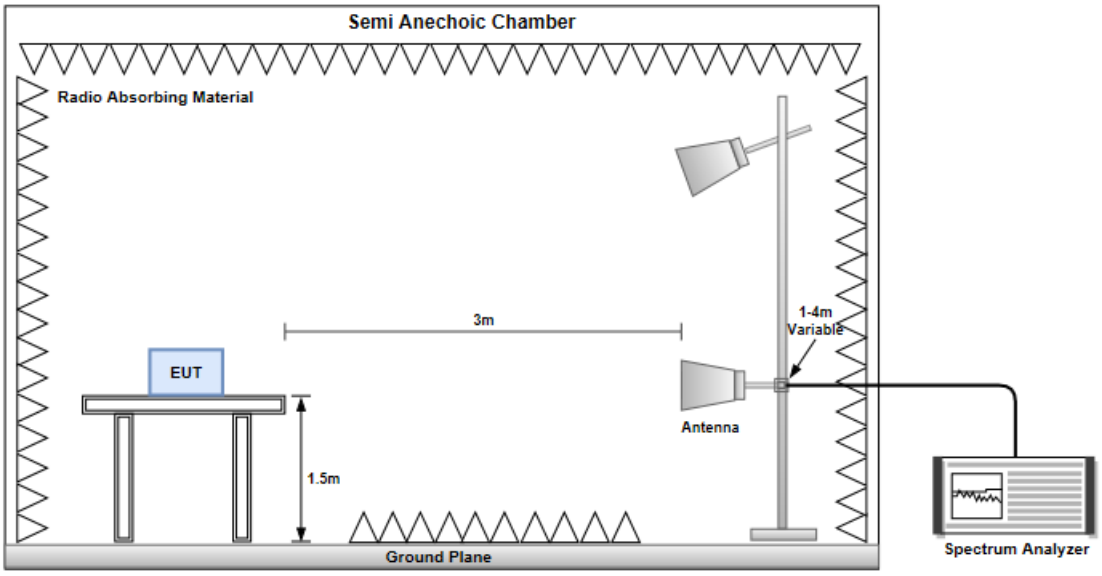
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

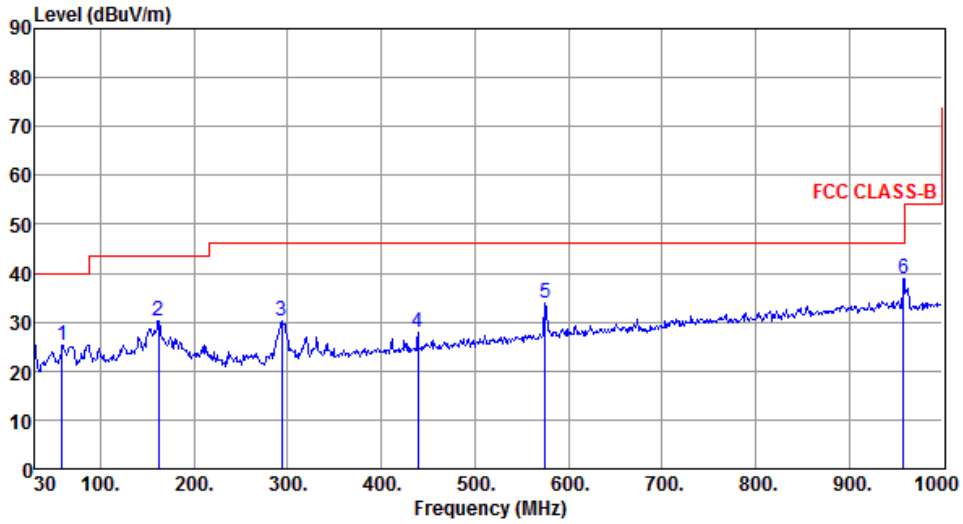


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

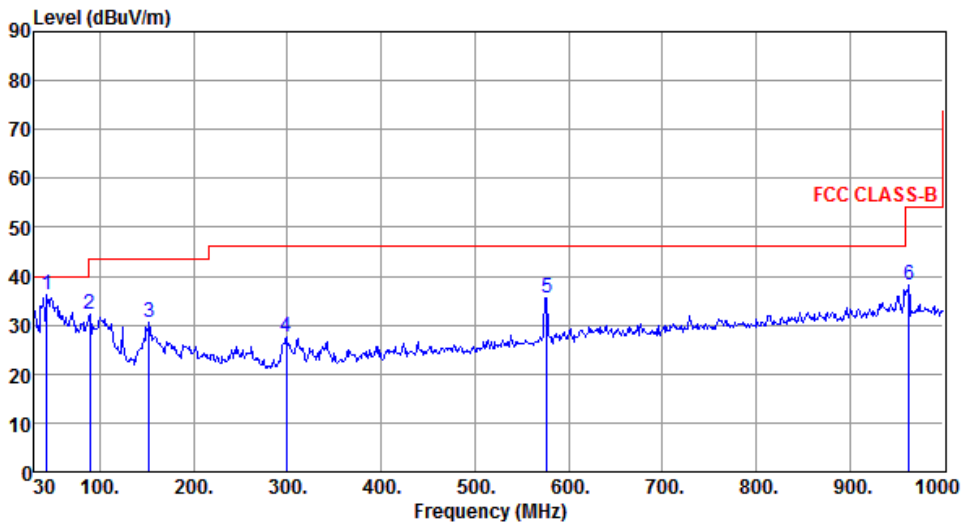
Modulation	11b	**Test Freq. (MHz)**	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	59.10	25.18	40.00	-14.82	33.98	-8.80	Peak	---	---
2	161.92	30.19	43.50	-13.31	38.36	-8.17	Peak	---	---
3	293.84	30.37	46.00	-15.63	38.01	-7.64	Peak	---	---
4	439.34	27.86	46.00	-18.14	31.87	-4.01	Peak	---	---
5	575.14	34.01	46.00	-11.99	35.26	-1.25	Peak	---	---
6	958.29	38.88	46.00	-7.12	33.91	4.97	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	11b	Test Freq. (MHz)	2437
Polarization	Vertical		

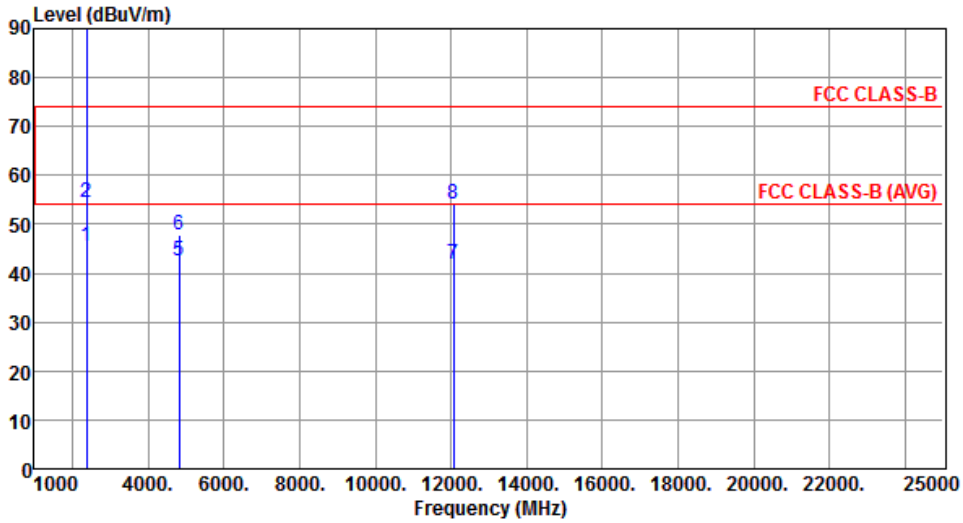


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	43.58	36.04	40.00	-3.96	43.67	-7.63	Peak	---	---
2	89.17	32.18	43.50	-11.32	46.46	-14.28	Peak	---	---
3	152.22	30.39	43.50	-13.11	38.56	-8.17	Peak	---	---
4	298.69	27.46	46.00	-18.54	35.00	-7.54	Peak	---	---
5	577.08	35.62	46.00	-10.38	36.82	-1.20	Peak	---	---
6	963.14	38.13	54.00	-15.87	33.09	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

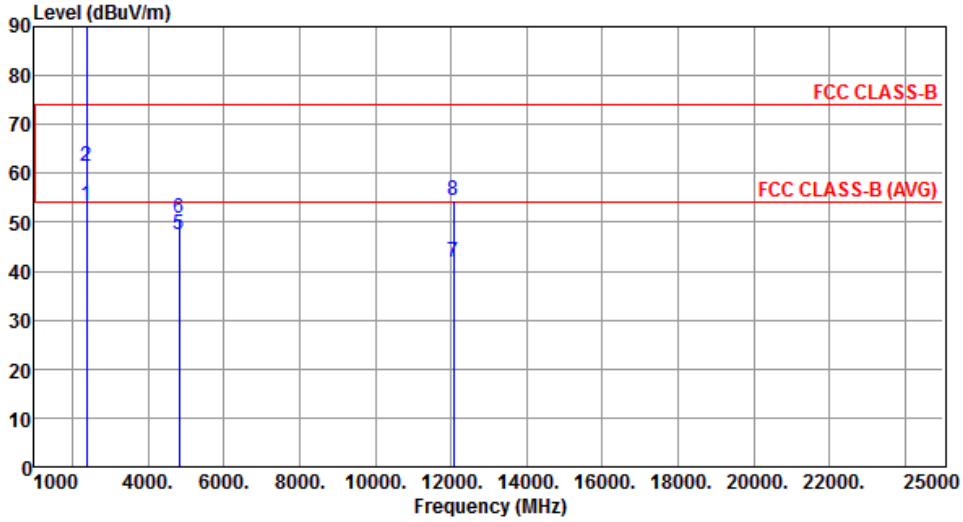
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		



		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	45.42	54.00	-8.58	48.60	-3.18	Average	100	161
2		2390.00	54.59	74.00	-19.41	57.77	-3.18	Peak	100	161
3	*	2412.00	109.18			112.27	-3.09	Average	100	161
4	*	2412.00	111.82			114.91	-3.09	Peak	100	161
5		4824.00	42.53	54.00	-11.47	38.75	3.78	Average	100	96
6		4824.00	47.73	74.00	-26.27	43.95	3.78	Peak	100	96
7		12060.00	41.91	54.00	-12.09	28.33	13.58	Average	100	63
8		12060.00	54.11	74.00	-19.89	40.53	13.58	Peak	100	63

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:"*" is Peak / Average value of fundamental frequency

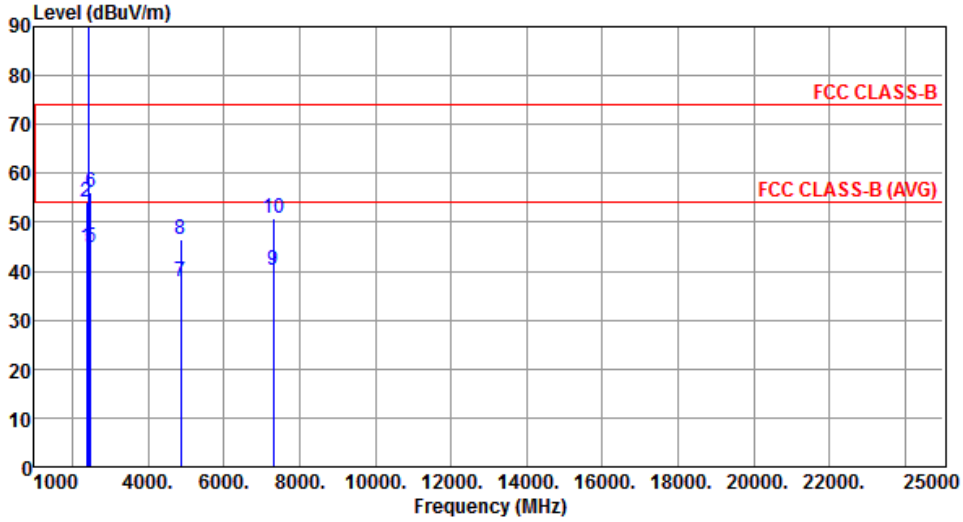
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		



		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	53.57	54.00	-0.43	56.75	-3.18	Average	224	197
2		2390.00	61.42	74.00	-12.58	64.60	-3.18	Peak	224	197
3	*	2412.00	113.30			116.39	-3.09	Average	224	166
4	*	2412.00	115.95			119.04	-3.09	Peak	224	166
5		4824.00	47.39	54.00	-6.61	43.61	3.78	Average	110	137
6		4824.00	50.91	74.00	-23.09	47.13	3.78	Peak	110	137
7		12060.00	41.74	54.00	-12.26	28.16	13.58	Average	100	266
8		12060.00	54.61	74.00	-19.39	41.03	13.58	Peak	100	266

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:"*" is Peak / Average value of fundamental frequency

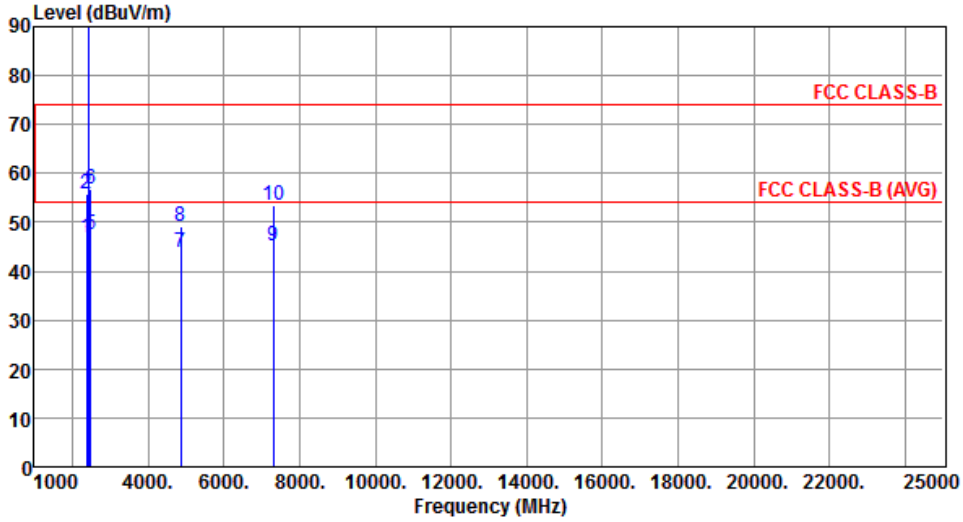
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



		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	44.70	54.00	-9.30	47.88	-3.18	Average	100	158
2		2390.00	54.28	74.00	-19.72	57.46	-3.18	Peak	100	158
3	*	2437.00	110.54			113.52	-2.98	Average	100	329
4	*	2437.00	113.61			116.59	-2.98	Peak	100	329
5		2483.50	44.76	54.00	-9.24	47.56	-2.80	Average	100	185
6		2483.50	56.00	74.00	-18.00	58.80	-2.80	Peak	100	185
7		4874.00	37.91	54.00	-16.09	33.97	3.94	Average	100	94
8		4874.00	46.43	74.00	-27.57	42.49	3.94	Peak	100	94
9		7311.00	40.18	54.00	-13.82	31.77	8.41	Average	100	64
10		7311.00	50.94	74.00	-23.06	42.53	8.41	Peak	100	64

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:"*" is Peak / Average value of fundamental frequency

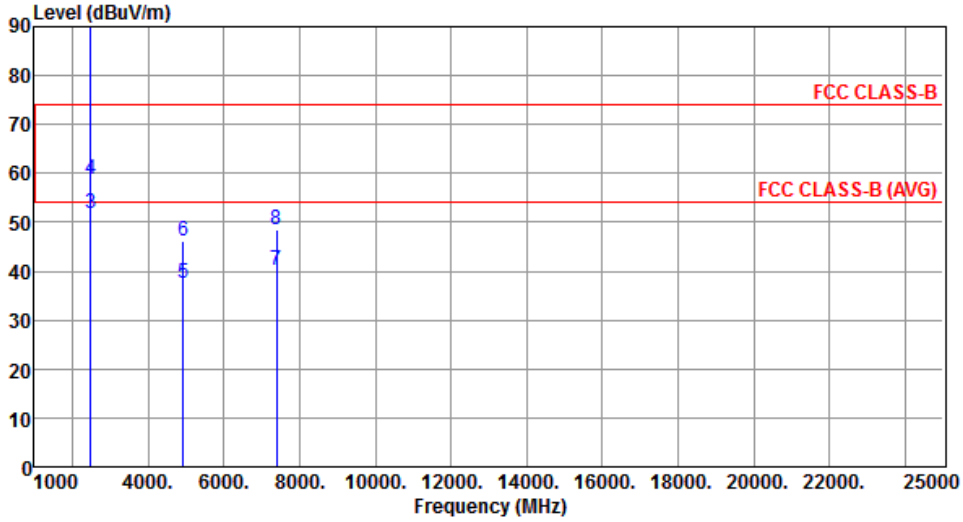
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		



		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	46.70	54.00	-7.30	49.88	-3.18	Average	276	172
2		2390.00	55.64	74.00	-18.36	58.82	-3.18	Peak	276	172
3	*	2437.00	114.63			117.61	-2.98	Average	276	187
4	*	2437.00	117.77			120.75	-2.98	Peak	276	187
5		2483.50	47.44	54.00	-6.56	50.24	-2.80	Average	276	156
6		2483.50	56.64	74.00	-17.36	59.44	-2.80	Peak	276	156
7		4874.00	43.81	54.00	-10.19	39.87	3.94	Average	100	135
8		4874.00	49.27	74.00	-24.73	45.33	3.94	Peak	100	135
9		7311.00	45.20	54.00	-8.80	36.79	8.41	Average	100	138
10		7311.00	53.35	74.00	-20.65	44.94	8.41	Peak	100	138

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:"*" is Peak / Average value of fundamental frequency

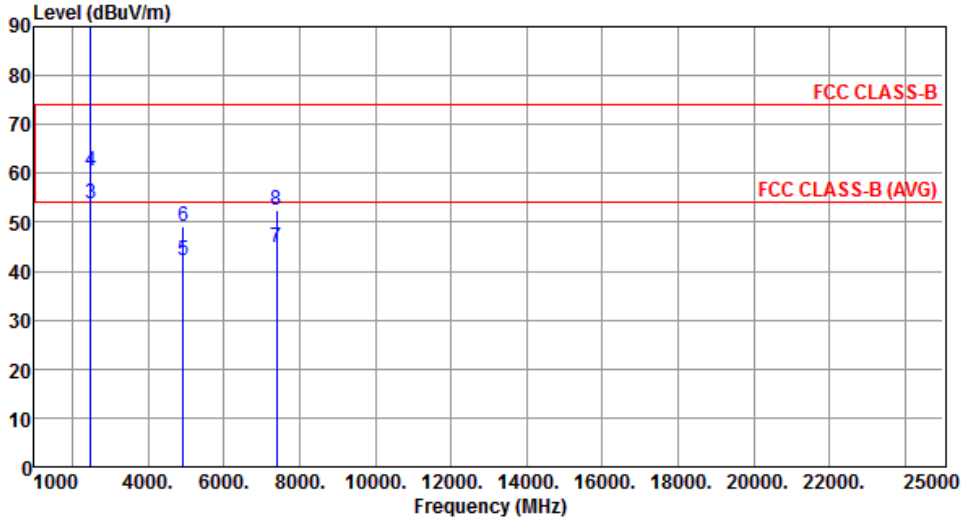
Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		



		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2462.00	109.45			112.34	-2.89	Average	100	167
2	*	2462.00	112.14			115.03	-2.89	Peak	100	167
3		2483.50	51.93	54.00	-2.07	54.73	-2.80	Average	100	167
4		2483.50	58.63	74.00	-15.37	61.43	-2.80	Peak	100	167
5		4924.00	37.38	54.00	-16.62	33.28	4.10	Average	100	91
6		4924.00	46.11	74.00	-27.89	42.01	4.10	Peak	100	91
7		7386.00	40.15	54.00	-13.85	31.71	8.44	Average	100	71
8		7386.00	48.49	74.00	-25.51	40.05	8.44	Peak	100	71

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:"*" is Peak / Average value of fundamental frequency

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

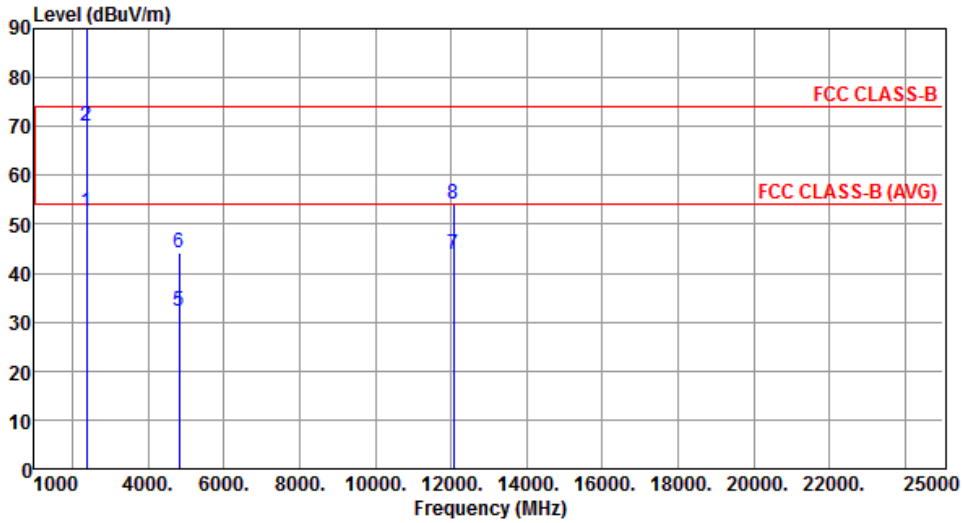


		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2462.00	113.51			116.40	-2.89	Average	384	195
2	*	2462.00	116.21			119.10	-2.89	Peak	384	195
3		2483.50	53.85	54.00	-0.15	56.65	-2.80	Average	384	158
4		2483.50	60.52	74.00	-13.48	63.32	-2.80	Peak	384	158
5		4924.00	42.30	54.00	-11.70	38.20	4.10	Average	100	135
6		4924.00	49.28	74.00	-24.72	45.18	4.10	Peak	100	135
7		7386.00	44.94	54.00	-9.06	36.50	8.44	Average	100	136
8		7386.00	52.51	74.00	-21.49	44.07	8.44	Peak	100	136

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:"*" is Peak / Average value of fundamental frequency

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

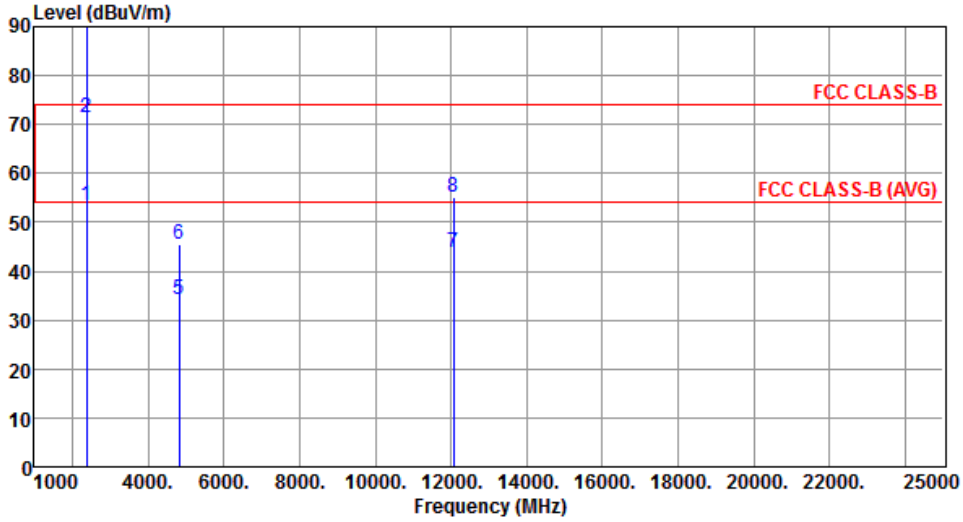
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		



		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	52.48	54.00	-1.52	55.66	-3.18	Average	325	0
2		2390.00	70.15	74.00	-3.85	73.33	-3.18	Peak	325	0
3	*	2412.00	100.52			103.61	-3.09	Average	325	0
4	*	2412.00	111.49			114.58	-3.09	Peak	325	0
5		4824.00	32.05	54.00	-21.95	28.27	3.78	Average	100	162
6		4824.00	44.15	74.00	-29.85	40.37	3.78	Peak	100	162
7		12060.00	43.71	54.00	-10.29	30.13	13.58	Average	100	266
8		12060.00	54.19	74.00	-19.81	40.61	13.58	Peak	100	266

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:"*" is Peak / Average value of fundamental frequency

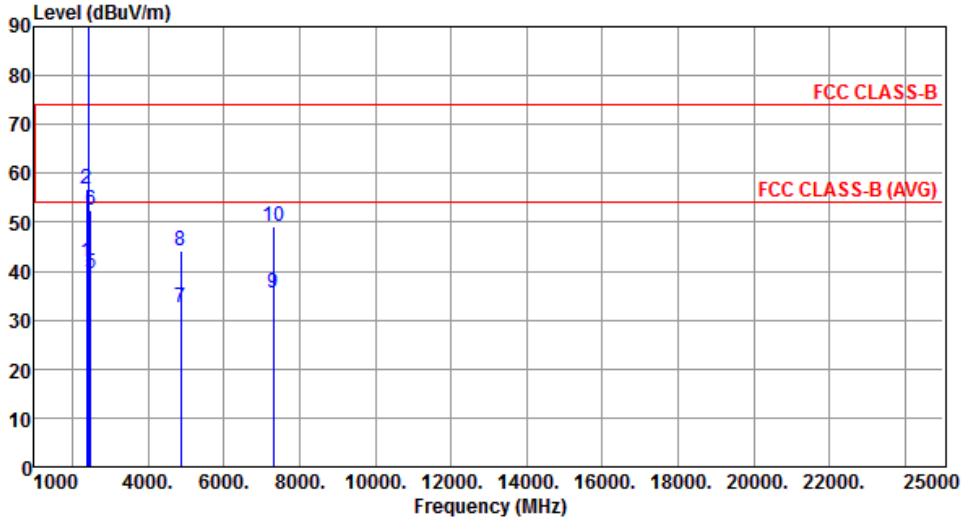
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		



		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	53.62	54.00	-0.38	56.80	-3.18	Average	290	169
2		2390.00	71.32	74.00	-2.68	74.50	-3.18	Peak	290	169
3	*	2412.00	102.66			105.75	-3.09	Average	290	169
4	*	2412.00	113.68			116.77	-3.09	Peak	290	169
5		4824.00	34.07	54.00	-19.93	30.29	3.78	Average	100	295
6		4824.00	45.55	74.00	-28.45	41.77	3.78	Peak	100	295
7		12060.00	43.85	54.00	-10.15	30.27	13.58	Average	100	137
8		12060.00	55.11	74.00	-18.89	41.53	13.58	Peak	100	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).
Note 3:"*" is Peak / Average value of fundamental frequency

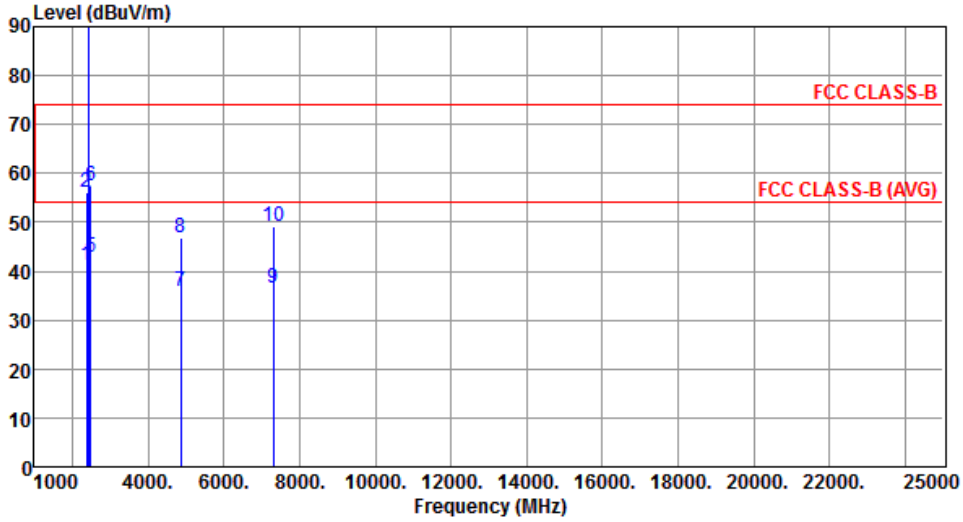
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



		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	41.82	54.00	-12.18	45.00	-3.18	Average	323	1
2		2390.00	56.88	74.00	-17.12	60.06	-3.18	Peak	323	1
3	*	2437.00	103.67			106.65	-2.98	Average	323	1
4	*	2437.00	114.11			117.09	-2.98	Peak	323	1
5		2483.50	39.53	54.00	-14.47	42.33	-2.80	Average	323	1
6		2483.50	52.40	74.00	-21.60	55.20	-2.80	Peak	323	1
7		4874.00	32.55	54.00	-21.45	28.61	3.94	Average	100	168
8		4874.00	44.15	74.00	-29.85	40.21	3.94	Peak	100	168
9		7311.00	35.61	54.00	-18.39	27.20	8.41	Average	100	270
10		7311.00	49.01	74.00	-24.99	40.60	8.41	Peak	100	270

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:"*" is Peak / Average value of fundamental frequency

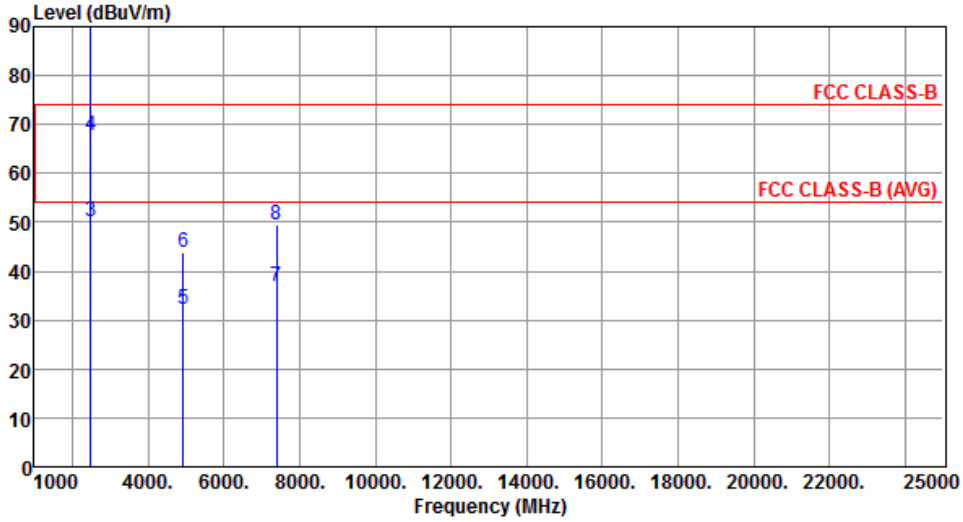
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		



		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	41.34	54.00	-12.66	44.52	-3.18	Average	381	17
2		2390.00	56.28	74.00	-17.72	59.46	-3.18	Peak	381	17
3	*	2437.00	105.93			108.91	-2.98	Average	381	17
4	*	2437.00	116.54			119.52	-2.98	Peak	381	17
5		2483.50	42.90	54.00	-11.10	45.70	-2.80	Average	381	17
6		2483.50	57.42	74.00	-16.58	60.22	-2.80	Peak	381	17
7		4874.00	35.75	54.00	-18.25	31.81	3.94	Average	100	294
8		4874.00	46.75	74.00	-27.25	42.81	3.94	Peak	100	294
9		7311.00	36.53	54.00	-17.47	28.12	8.41	Average	100	48
10		7311.00	49.24	74.00	-24.76	40.83	8.41	Peak	100	48

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:"*" is Peak / Average value of fundamental frequency

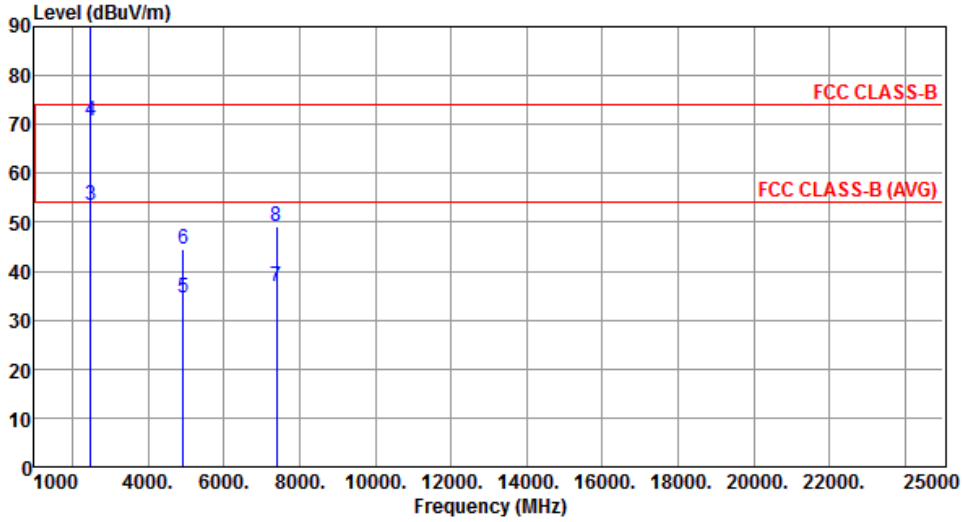
Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		



		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2462.00	100.53			103.42	-2.89	Average	318	3
2	*	2462.00	111.22			114.11	-2.89	Peak	318	3
3		2483.50	50.26	54.00	-3.74	53.06	-2.80	Average	318	3
4		2483.50	67.72	74.00	-6.28	70.52	-2.80	Peak	318	3
5		4924.00	32.26	54.00	-21.74	28.16	4.10	Average	100	158
6		4924.00	43.96	74.00	-30.04	39.86	4.10	Peak	100	158
7		7386.00	36.95	54.00	-17.05	28.51	8.44	Average	100	282
8		7386.00	49.37	74.00	-24.63	40.93	8.44	Peak	100	282

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:"*" is Peak / Average value of fundamental frequency

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

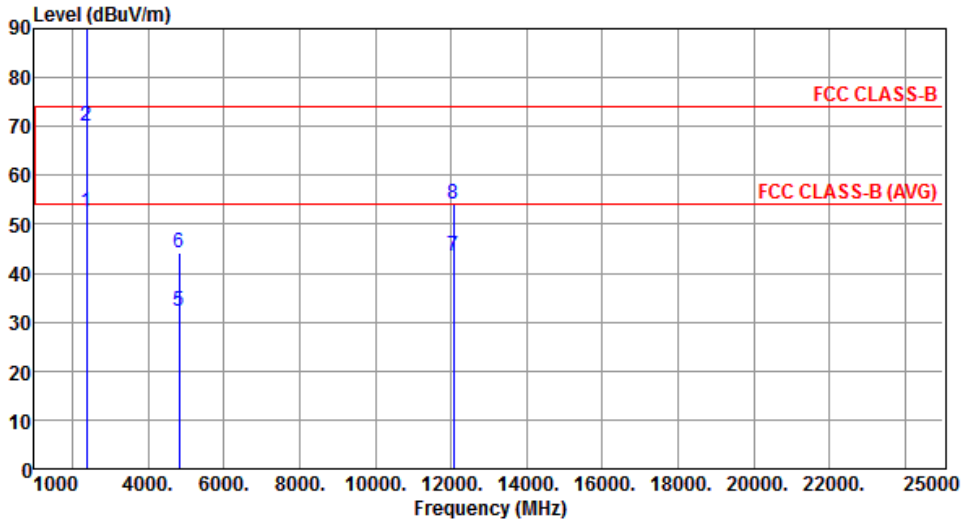


		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2462.00	102.89			105.78	-2.89	Average	390	196
2	*	2462.00	113.49			116.38	-2.89	Peak	390	196
3		2483.50	53.55	54.00	-0.45	56.35	-2.80	Average	390	153
4		2483.50	70.60	74.00	-3.40	73.40	-2.80	Peak	390	153
5		4924.00	34.49	54.00	-19.51	30.39	4.10	Average	100	290
6		4924.00	44.37	74.00	-29.63	40.27	4.10	Peak	100	290
7		7386.00	36.75	54.00	-17.25	28.31	8.44	Average	100	41
8		7386.00	49.12	74.00	-24.88	40.68	8.44	Peak	100	41

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:"*" is Peak / Average value of fundamental frequency

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

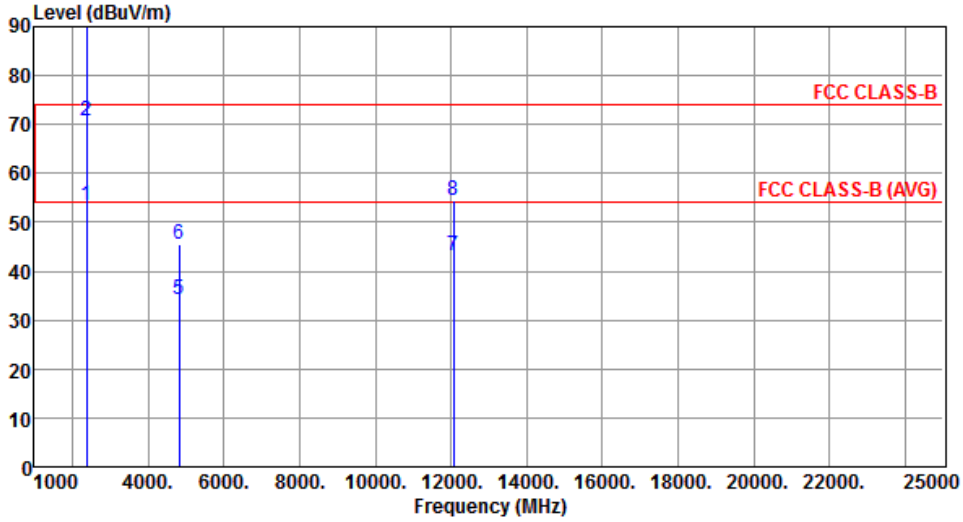
Modulation	HT20	**Test Freq. (MHz)**	2412
Polarization	Horizontal		



		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	52.37	54.00	-1.63	55.55	-3.18	Average	331	2
2		2390.00	70.06	74.00	-3.94	73.24	-3.18	Peak	331	2
3	*	2412.00	100.38			103.47	-3.09	Average	331	2
4	*	2412.00	111.38			114.47	-3.09	Peak	331	2
5		4824.00	32.13	54.00	-21.87	28.35	3.78	Average	100	172
6		4824.00	44.24	74.00	-29.76	40.46	3.78	Peak	100	172
7		12060.00	43.65	54.00	-10.35	30.07	13.58	Average	100	263
8		12060.00	54.28	74.00	-19.72	40.70	13.58	Peak	100	263

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:"*" is Peak / Average value of fundamental frequency

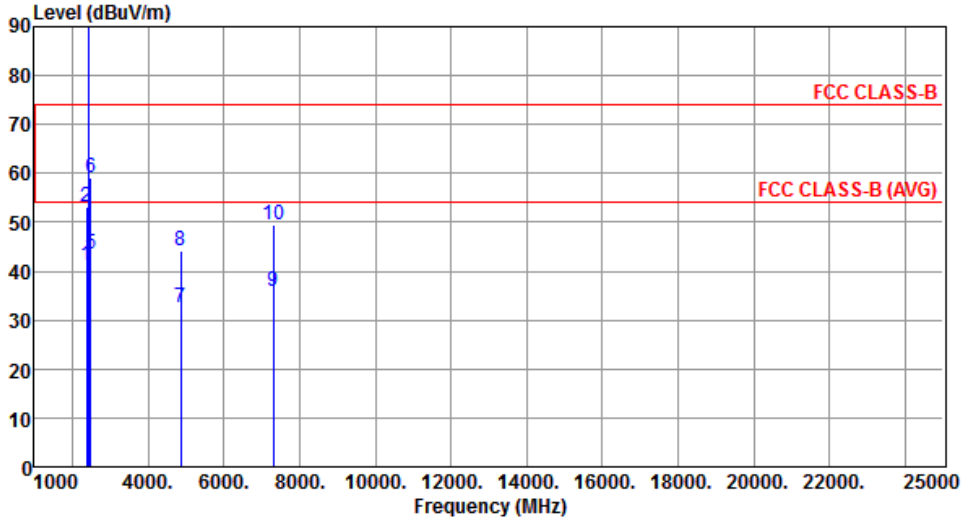
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		



		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	53.52	54.00	-0.48	56.70	-3.18	Average	372	351
2		2390.00	70.68	74.00	-3.32	73.86	-3.18	Peak	372	351
3	*	2412.00	102.22			105.31	-3.09	Average	372	18
4	*	2412.00	114.82			117.91	-3.09	Peak	372	18
5		4824.00	34.22	54.00	-19.78	30.44	3.78	Average	100	292
6		4824.00	45.41	74.00	-28.59	41.63	3.78	Peak	100	292
7		12060.00	43.22	54.00	-10.78	29.64	13.58	Average	100	133
8		12060.00	54.54	74.00	-19.46	40.96	13.58	Peak	100	133

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:"*" is Peak / Average value of fundamental frequency

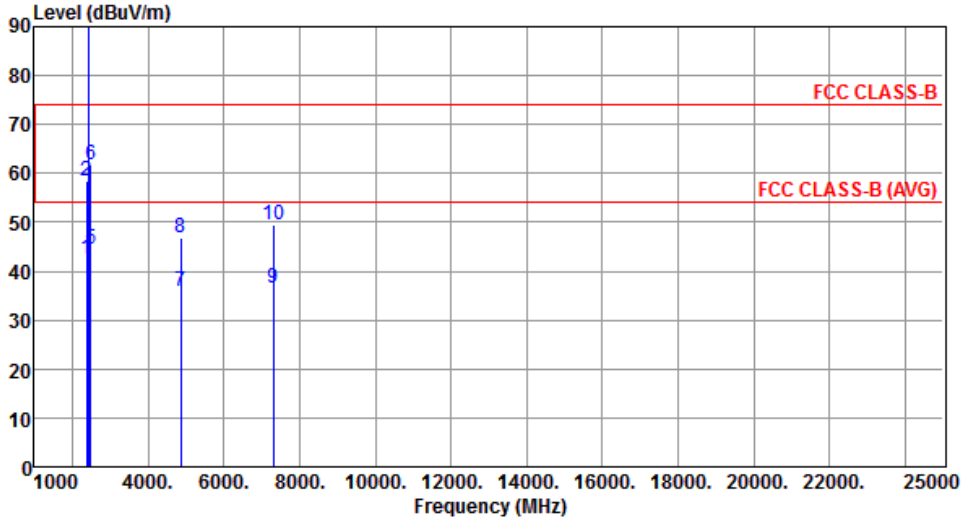
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		



		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	41.34	54.00	-12.66	44.52	-3.18	Average	324	70
2		2390.00	53.04	74.00	-20.96	56.22	-3.18	Peak	324	70
3	*	2437.00	104.79			107.77	-2.98	Average	324	180
4	*	2437.00	117.48			120.46	-2.98	Peak	324	180
5		2483.50	43.57	54.00	-10.43	46.37	-2.80	Average	324	180
6		2483.50	59.25	74.00	-14.75	62.05	-2.80	Peak	324	180
7		4874.00	32.68	54.00	-21.32	28.74	3.94	Average	100	159
8		4874.00	44.32	74.00	-29.68	40.38	3.94	Peak	100	159
9		7311.00	35.71	54.00	-18.29	27.30	8.41	Average	100	283
10		7311.00	49.53	74.00	-24.47	41.12	8.41	Peak	100	283

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:"*" is Peak / Average value of fundamental frequency

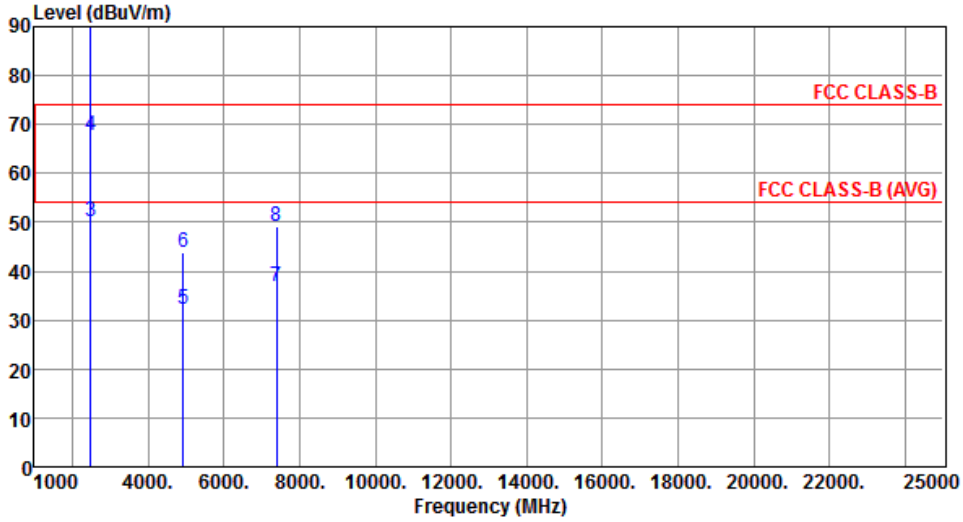
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		



		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	42.58	54.00	-11.42	45.76	-3.18	Average	376	15
2		2390.00	58.42	74.00	-15.58	61.60	-3.18	Peak	376	15
3	*	2437.00	106.59			109.57	-2.98	Average	376	15
4	*	2437.00	118.64			121.62	-2.98	Peak	376	15
5		2483.50	44.50	54.00	-9.50	47.30	-2.80	Average	376	15
6		2483.50	61.70	74.00	-12.30	64.50	-2.80	Peak	376	15
7		4874.00	35.81	54.00	-18.19	31.87	3.94	Average	100	311
8		4874.00	46.90	74.00	-27.10	42.96	3.94	Peak	100	311
9		7311.00	36.62	54.00	-17.38	28.21	8.41	Average	100	62
10		7311.00	49.50	74.00	-24.50	41.09	8.41	Peak	100	62

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:"*" is Peak / Average value of fundamental frequency

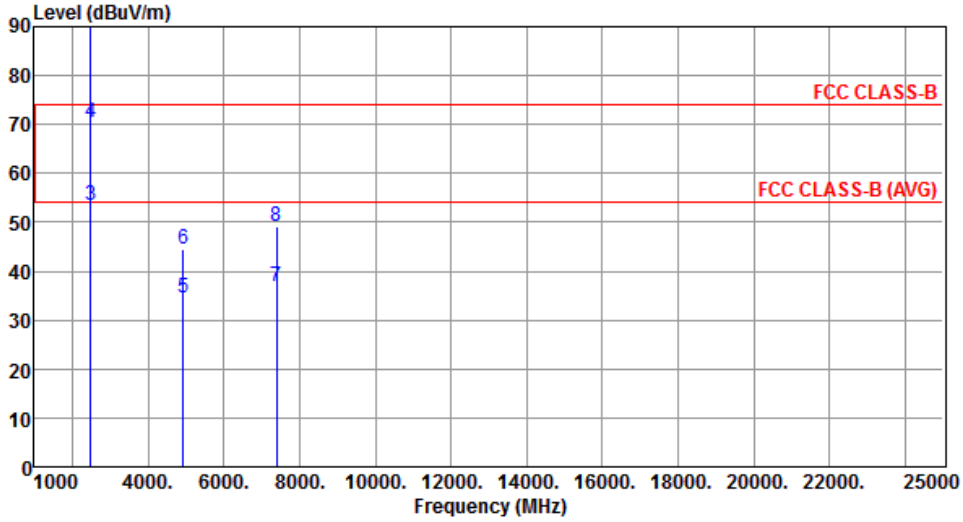
Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		



		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2462.00	100.37			103.26	-2.89	Average	323	1
2	*	2462.00	111.18			114.07	-2.89	Average	323	1
3		2483.50	50.12	54.00	-3.88	52.92	-2.80	Average	323	1
4		2483.50	67.64	74.00	-6.36	70.44	-2.80	Peak	323	1
5		4924.00	32.18	54.00	-21.82	28.08	4.10	Average	100	163
6		4924.00	43.85	74.00	-30.15	39.75	4.10	Peak	100	163
7		7386.00	36.82	54.00	-17.18	28.38	8.44	Average	100	278
8		7386.00	49.26	74.00	-24.74	40.82	8.44	Peak	100	278

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:"*" is Peak / Average value of fundamental frequency

Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Vertical		

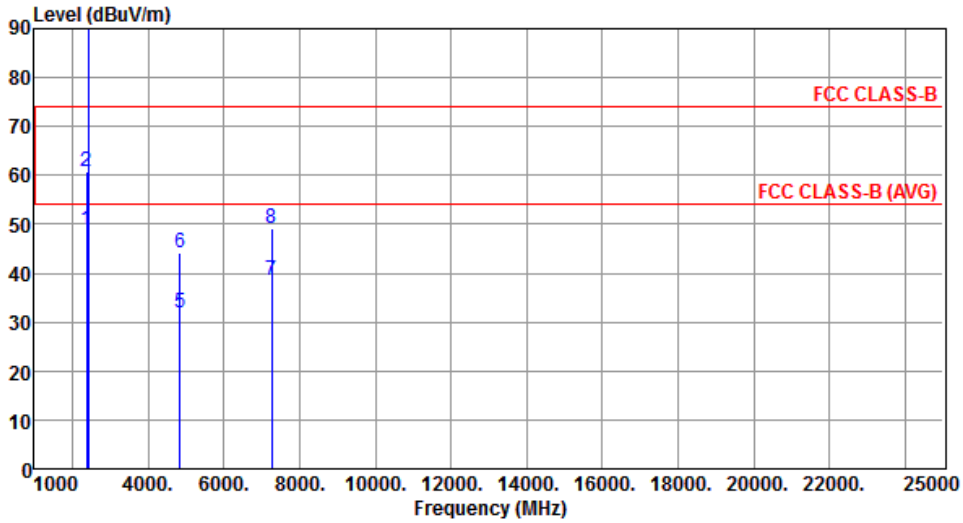


		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2462.00	102.38			105.27	-2.89	Average	390	199
2	*	2462.00	114.45			117.34	-2.89	Peak	390	199
3		2483.50	53.56	54.00	-0.44	56.36	-2.80	Average	390	189
4		2483.50	70.47	74.00	-3.53	73.27	-2.80	Peak	390	189
5		4924.00	34.58	54.00	-19.42	30.48	4.10	Average	100	297
6		4924.00	44.51	74.00	-29.49	40.41	4.10	Peak	100	297
7		7386.00	36.94	54.00	-17.06	28.50	8.44	Average	100	37
8		7386.00	49.16	74.00	-24.84	40.72	8.44	Peak	100	37

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:"*" is Peak / Average value of fundamental frequency

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

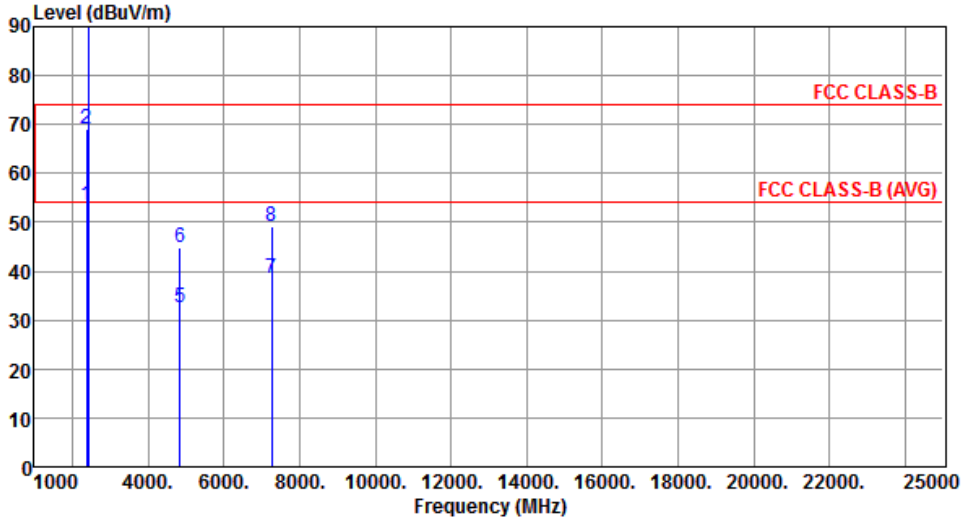
Modulation	HT40	**Test Freq. (MHz)**	2422
Polarization	Horizontal		



		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	48.74	54.00	-5.26	51.92	-3.18	Average	308	175
2		2390.00	60.91	74.00	-13.09	64.09	-3.18	Peak	308	175
3	*	2422.00	97.32			100.37	-3.05	Average	308	175
4	*	2422.00	108.08			111.13	-3.05	Peak	308	175
5		4844.00	32.01	54.00	-21.99	28.16	3.85	Average	100	165
6		4844.00	44.14	74.00	-29.86	40.29	3.85	Peak	100	165
7		7266.00	38.65	54.00	-15.35	30.26	8.39	Average	100	292
8		7266.00	49.02	74.00	-24.98	40.63	8.39	Peak	100	292

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:"*" is Peak / Average value of fundamental frequency

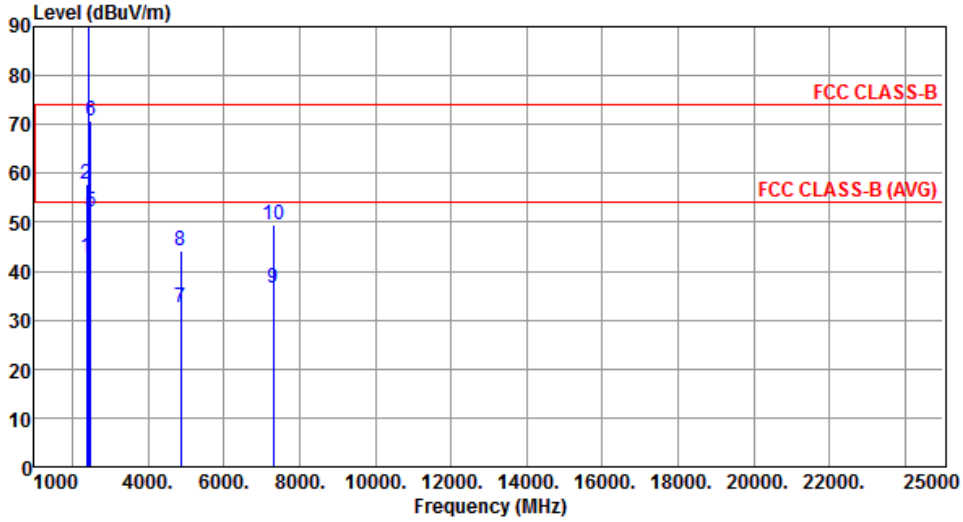
Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Vertical		



		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	53.56	54.00	-0.44	56.74	-3.18	Average	221	162
2		2390.00	69.18	74.00	-4.82	72.36	-3.18	Peak	221	162
3	*	2422.00	97.86			100.91	-3.05	Average	286	270
4	*	2422.00	108.45			111.50	-3.05	Peak	286	270
5		4844.00	32.42	54.00	-21.58	28.57	3.85	Average	100	285
6		4844.00	44.77	74.00	-29.23	40.92	3.85	Peak	100	285
7		7266.00	38.47	54.00	-15.53	30.08	8.39	Average	100	138
8		7266.00	49.22	74.00	-24.78	40.83	8.39	Peak	100	138

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:"*" is Peak / Average value of fundamental frequency

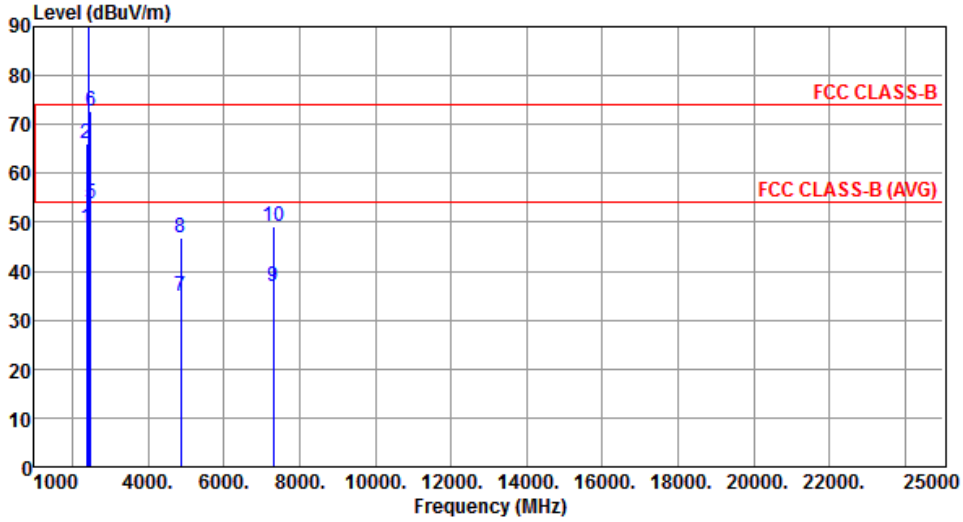
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		



		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	42.92	54.00	-11.08	46.10	-3.18	Average	314	182
2		2390.00	57.70	74.00	-16.30	60.88	-3.18	Peak	314	182
3	*	2437.00	101.14			104.12	-2.98	Average	314	182
4	*	2437.00	111.78			114.76	-2.98	Peak	314	182
5		2483.50	52.24	54.00	-1.76	55.04	-2.80	Average	314	182
6		2483.50	70.60	74.00	-3.40	73.40	-2.80	Peak	314	182
7		4874.00	32.56	54.00	-21.44	28.62	3.94	Average	100	157
8		4874.00	44.24	74.00	-29.76	40.30	3.94	Peak	100	157
9		7311.00	36.63	54.00	-17.37	28.22	8.41	Average	100	286
10		7311.00	49.38	74.00	-24.62	40.97	8.41	Peak	100	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).
Note 3:"*" is Peak / Average value of fundamental frequency

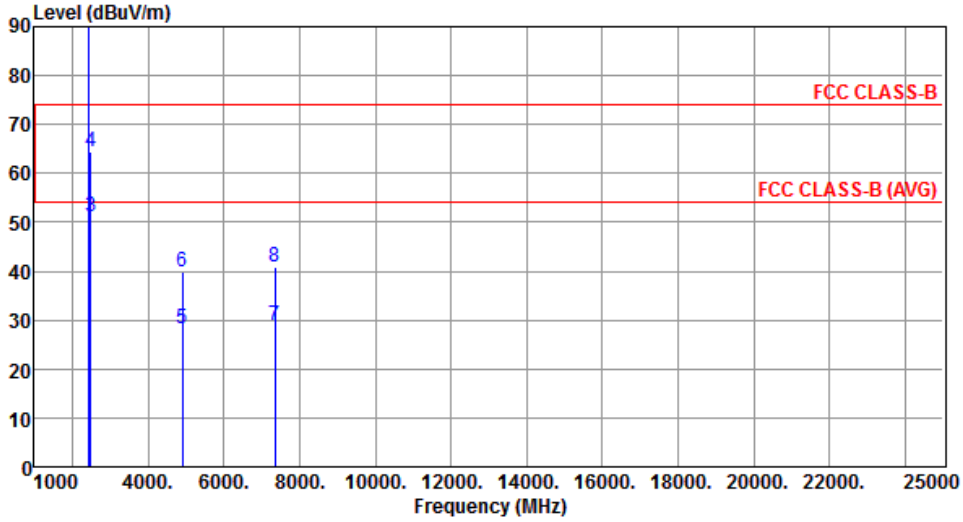
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Vertical		



		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	48.86	54.00	-5.14	52.04	-3.18	Average	381	16
2		2390.00	65.95	74.00	-8.05	69.13	-3.18	Peak	381	16
3	*	2437.00	101.13			104.11	-2.98	Average	381	16
4	*	2437.00	111.33			114.31	-2.98	Peak	381	16
5		2483.50	53.74	54.00	-0.26	56.54	-2.80	Average	381	16
6		2483.50	72.61	74.00	-1.39	75.41	-2.80	Peak	381	16
7		4874.00	34.88	54.00	-19.12	30.94	3.94	Average	100	315
8		4874.00	46.83	74.00	-27.17	42.89	3.94	Peak	100	315
9		7311.00	36.78	54.00	-17.22	28.37	8.41	Average	100	64
10		7311.00	49.09	74.00	-24.91	40.68	8.41	Peak	100	64

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:"*" is Peak / Average value of fundamental frequency

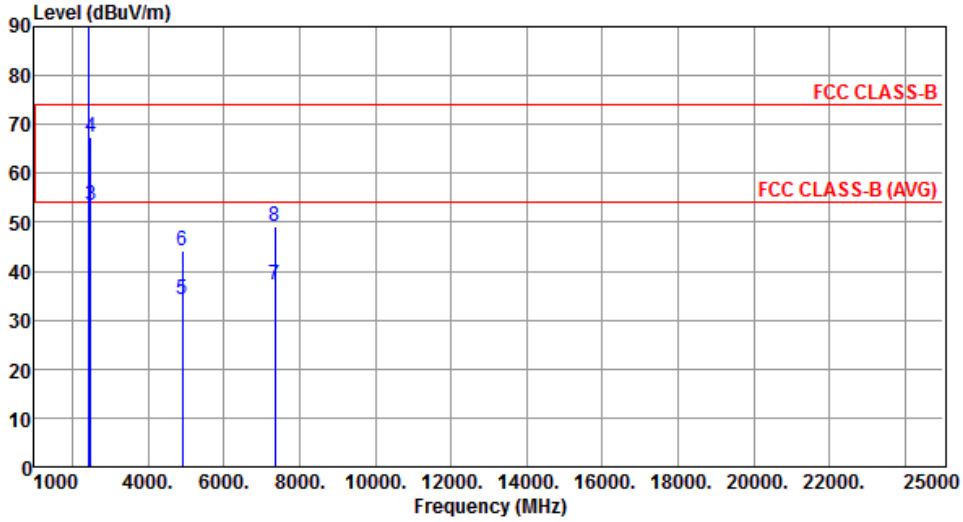
Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Horizontal		



		Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	*	2452.00	96.26			99.18	-2.92	Average	310	177
2	*	2452.00	106.93			109.85	-2.92	Peak	310	177
3		2483.50	51.16	54.00	-2.84	53.96	-2.80	Average	310	177
4		2483.50	64.48	74.00	-9.52	67.28	-2.80	Peak	310	177
5		4904.00	28.37	54.00	-25.63	24.32	4.05	Average	100	163
6		4904.00	39.92	74.00	-34.08	35.87	4.05	Peak	100	163
7		7356.00	28.83	54.00	-25.17	20.40	8.43	Average	100	53
8		7356.00	40.72	74.00	-33.28	32.29	8.43	Peak	100	53

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:"*" is Peak / Average value of fundamental frequency

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	*	2452.00	96.62			99.54	-2.92	Average	313	292
2	*	2452.00	107.10			110.02	-2.92	Peak	313	292
3		2483.50	53.52	54.00	-0.48	56.32	-2.80	Average	323	6
4		2483.50	67.37	74.00	-6.63	70.17	-2.80	Peak	323	6
5		4904.00	34.10	54.00	-19.90	30.05	4.05	Average	100	302
6		4904.00	44.28	74.00	-29.72	40.23	4.05	Peak	100	302
7		7356.00	37.06	54.00	-16.94	28.63	8.43	Average	100	41
8		7356.00	49.28	74.00	-24.72	40.85	8.43	Peak	100	41

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:"*" is Peak / Average value of fundamental frequency

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 30 dB relative to the maximum in-band peak PSD level in 100 kHz

3.6.2 Test Procedures

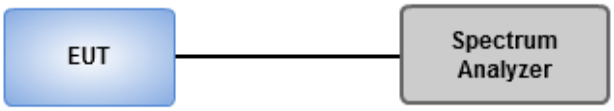
Reference level measurement

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

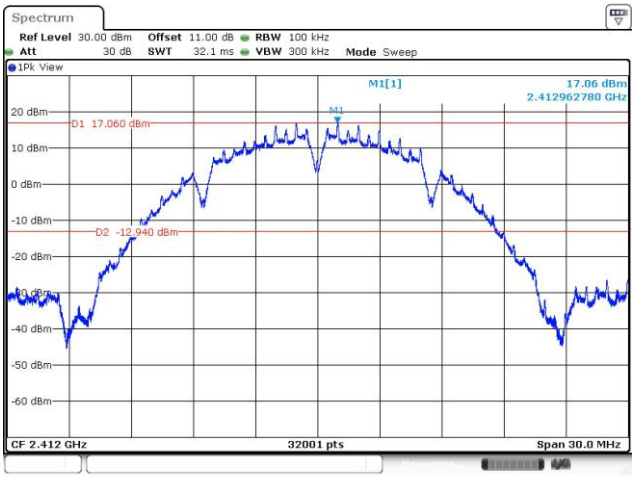
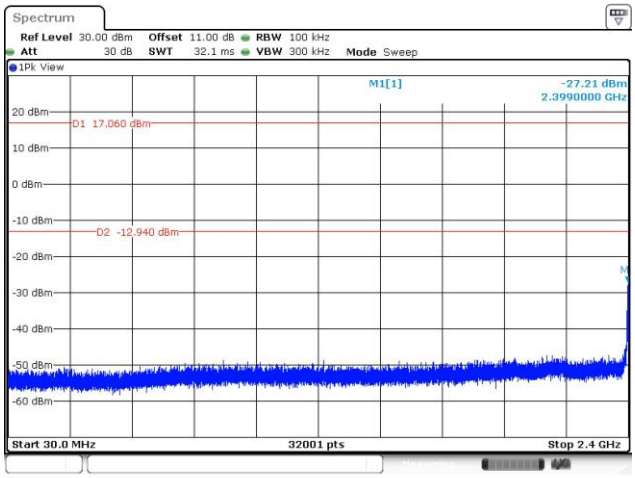
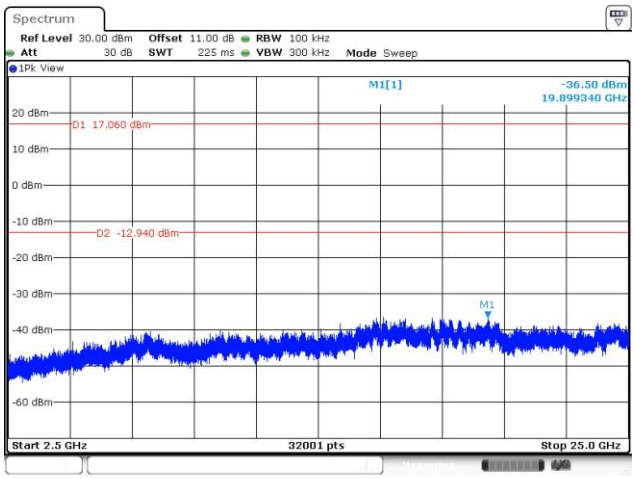
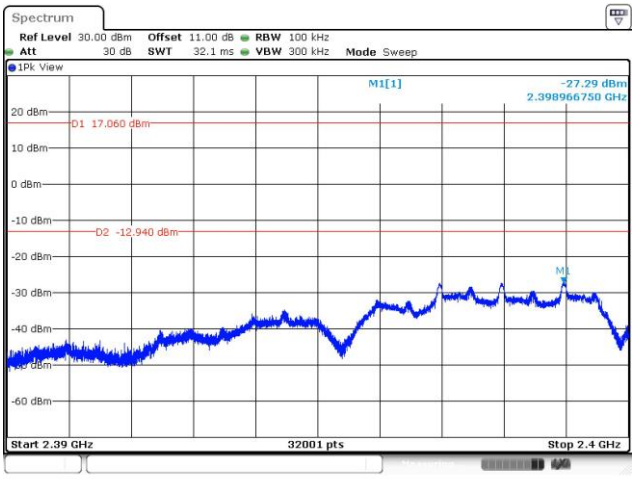
3.6.3 Test Setup

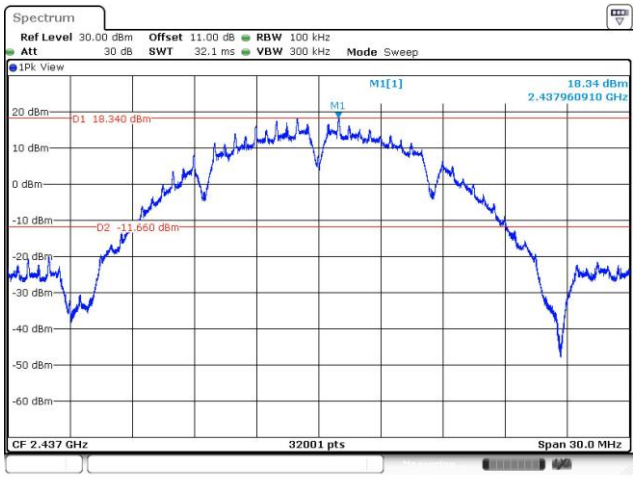
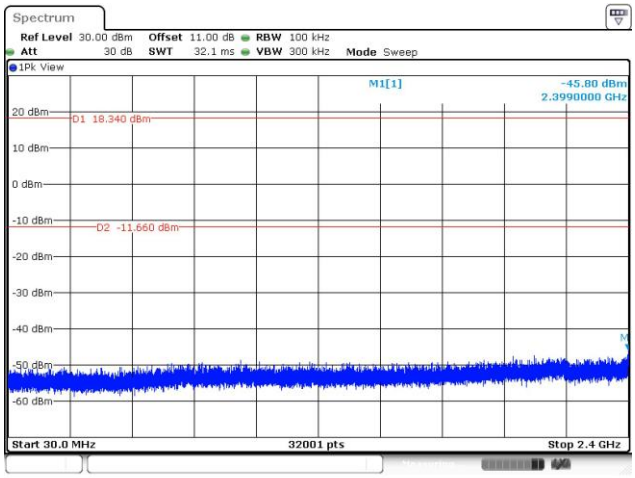
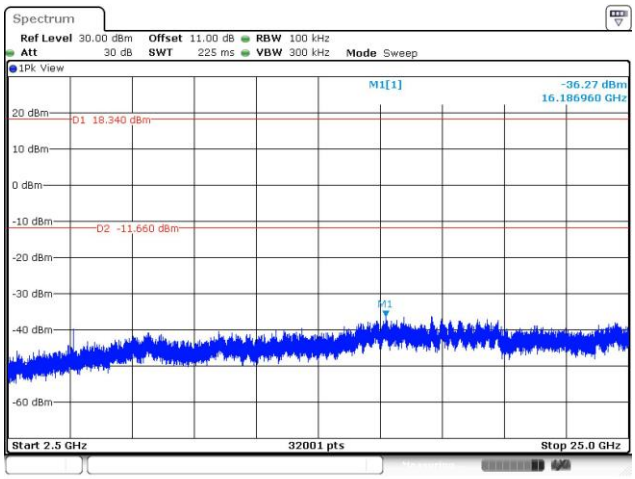
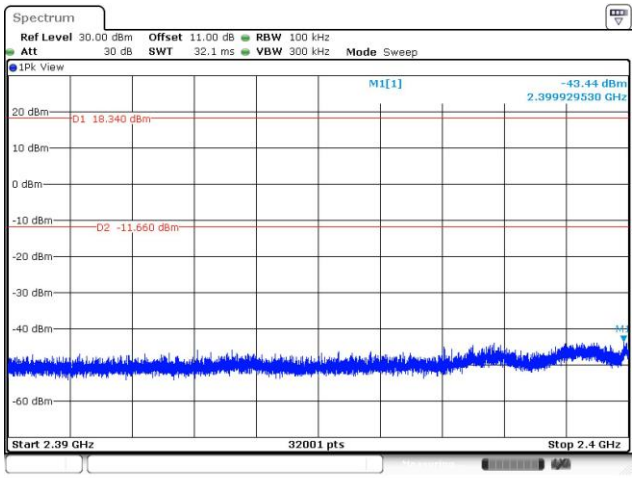


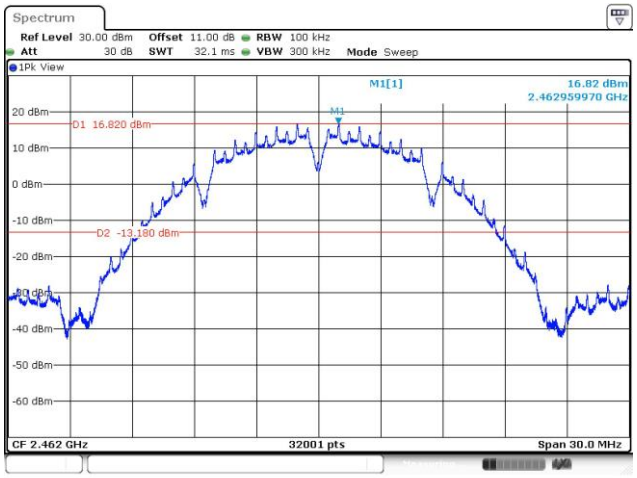
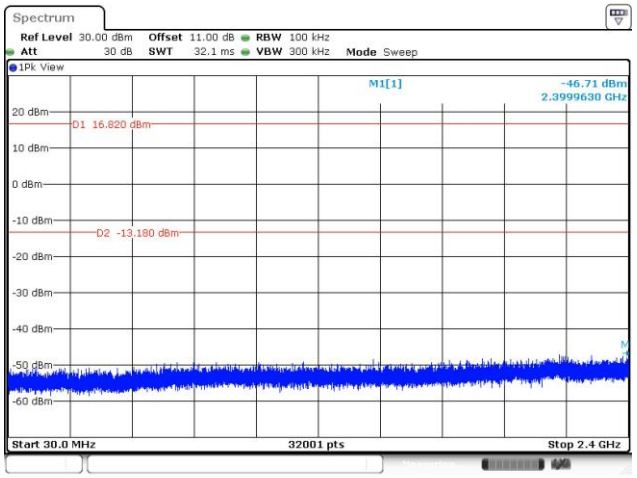
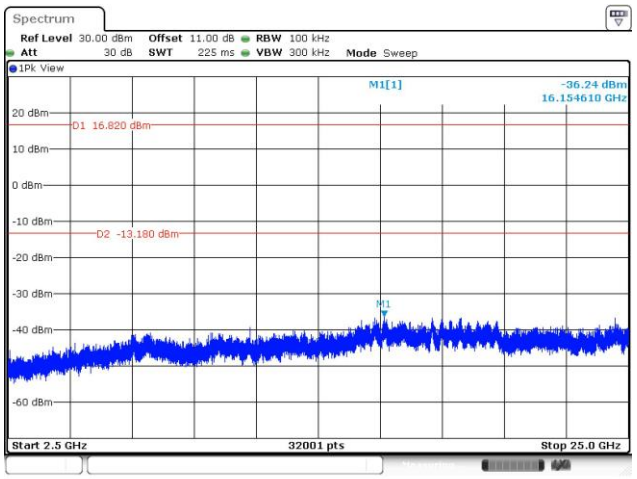
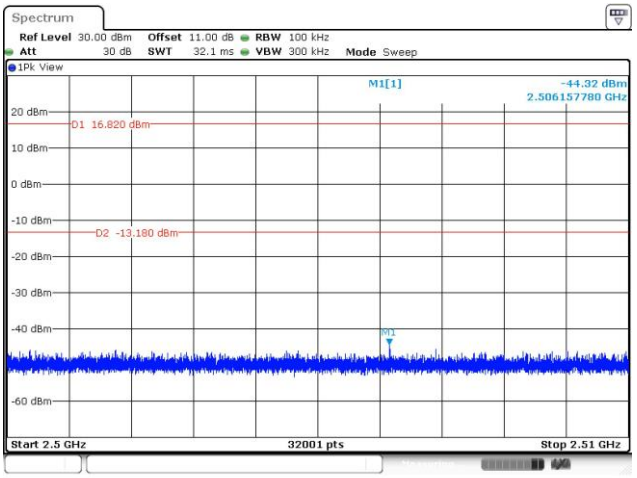
3.6.4 Test Result of Emissions in non-restricted frequency bands

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.

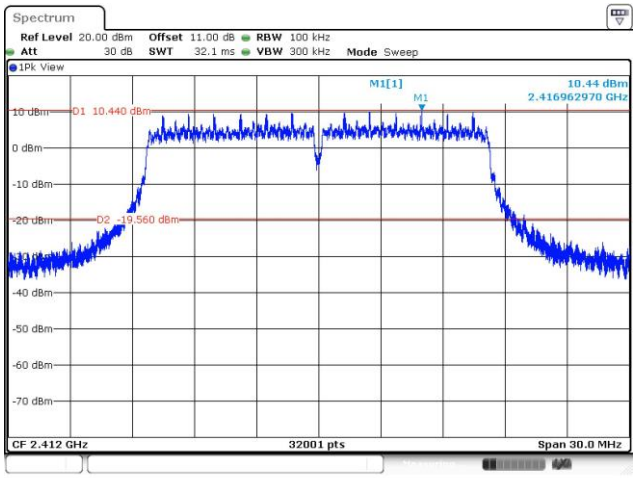
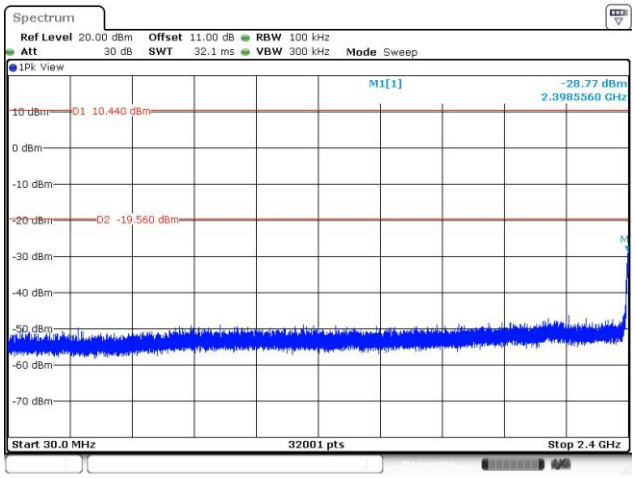
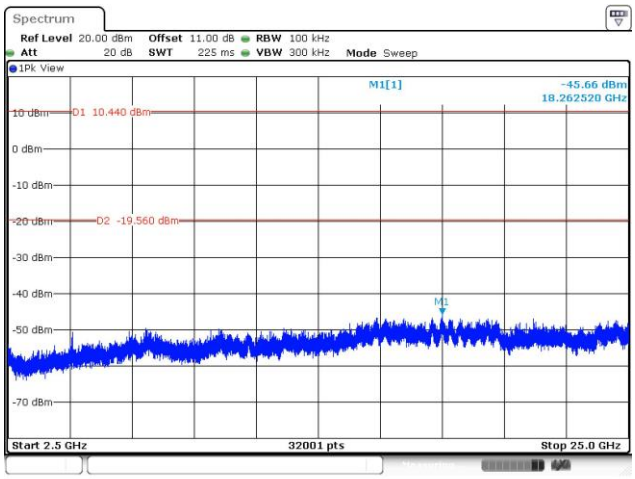
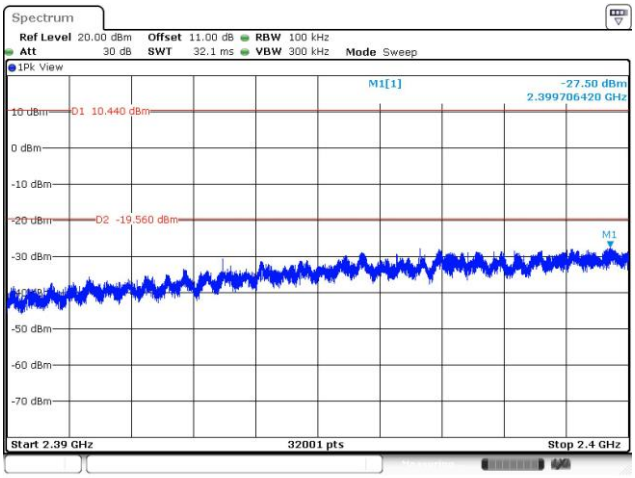
802.11b

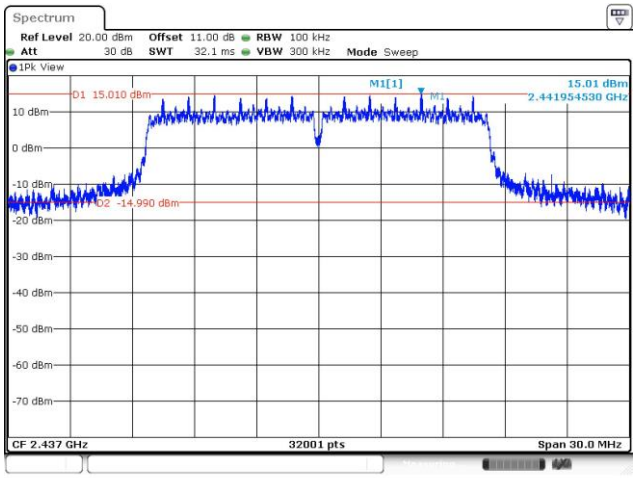
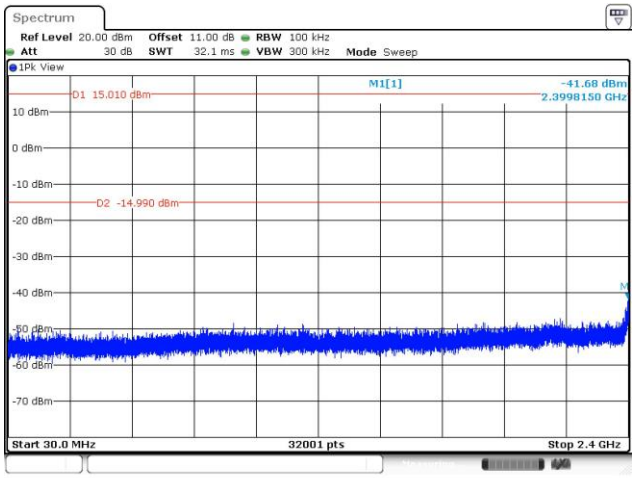
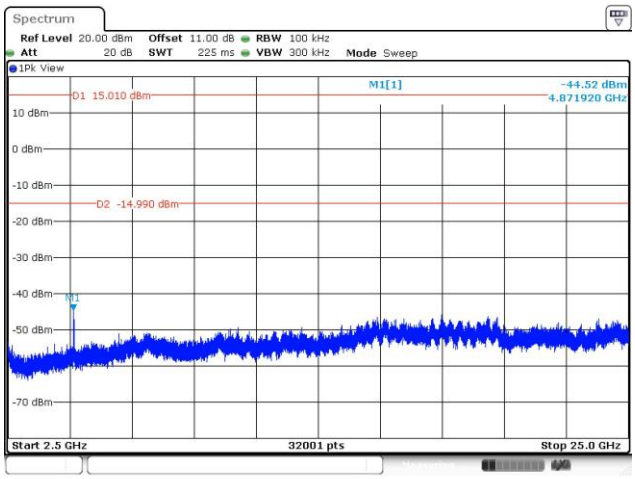
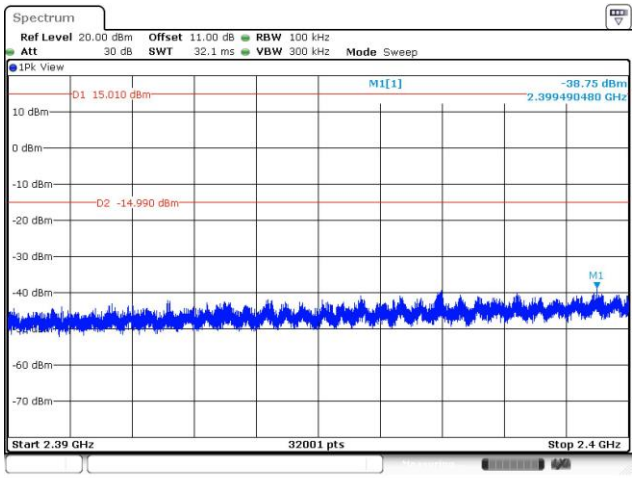
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

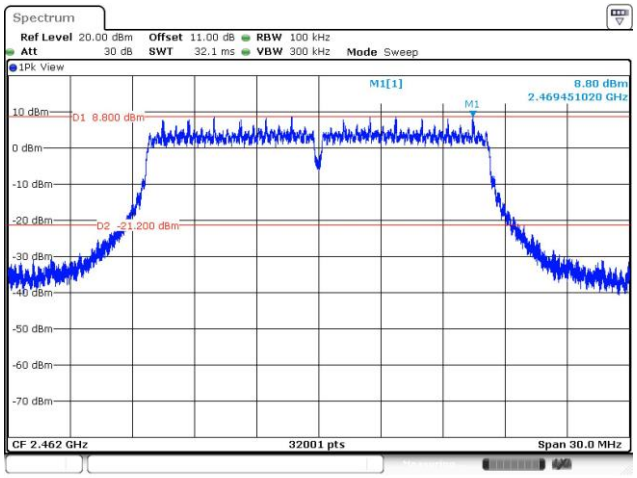
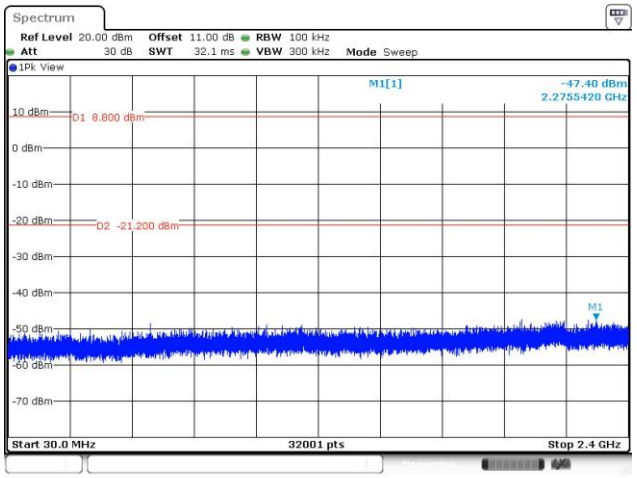
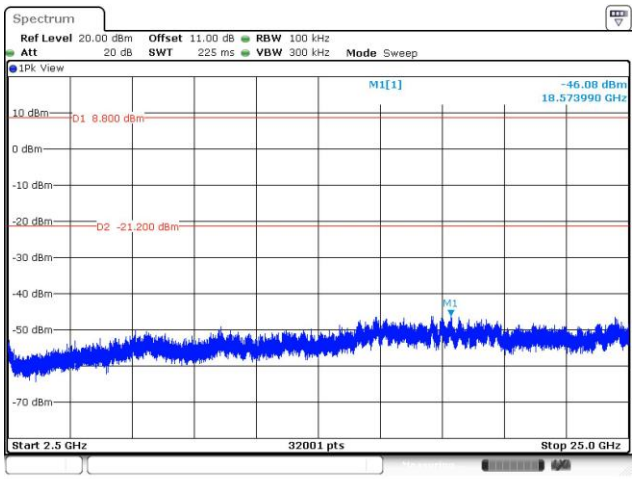
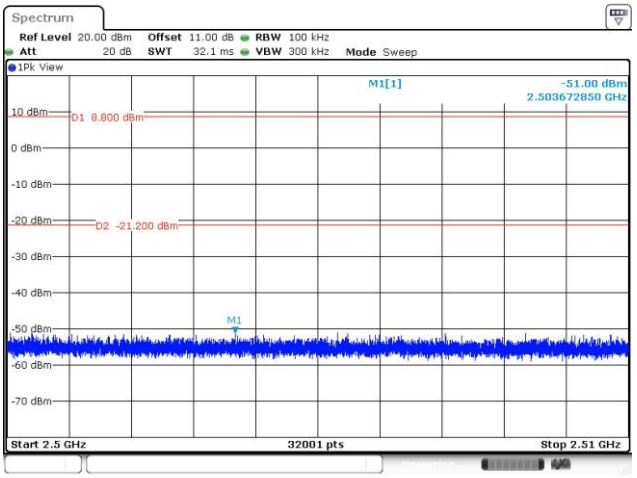
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

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

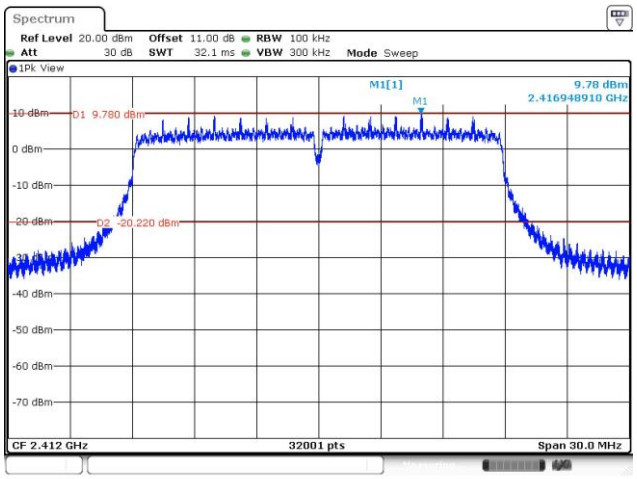
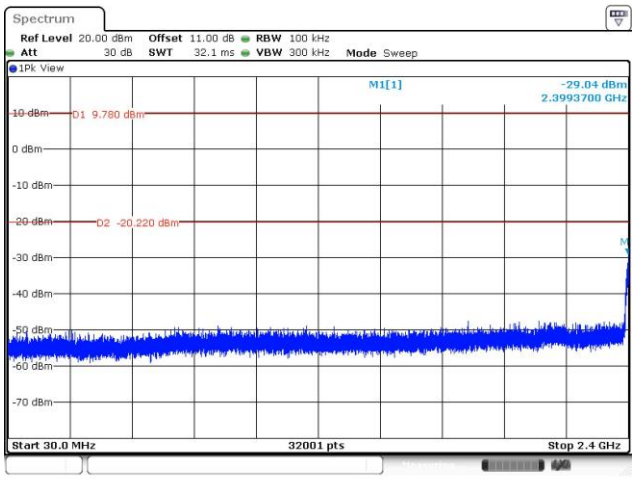
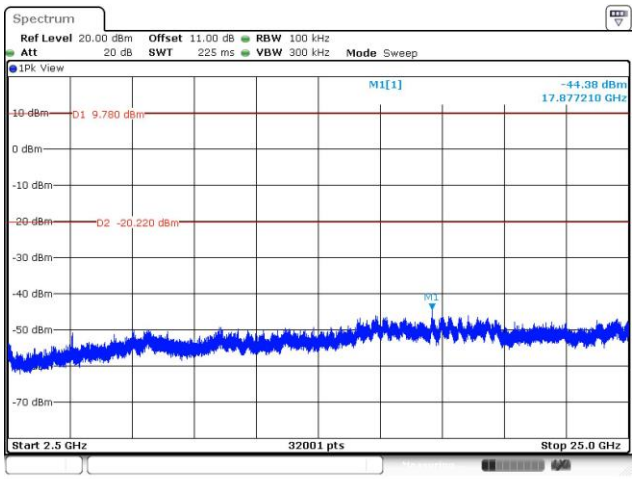
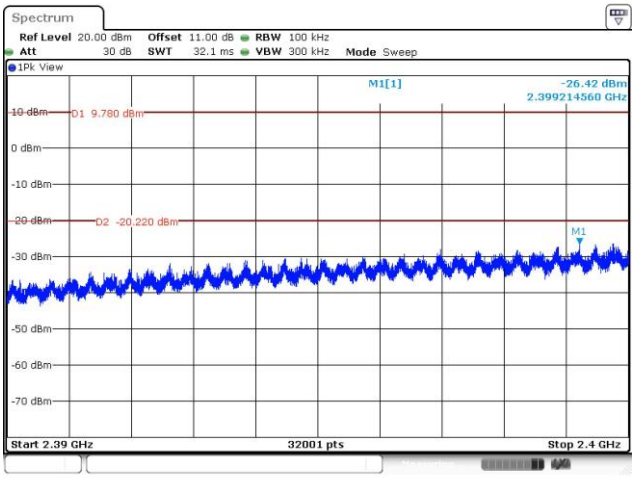
802.11g

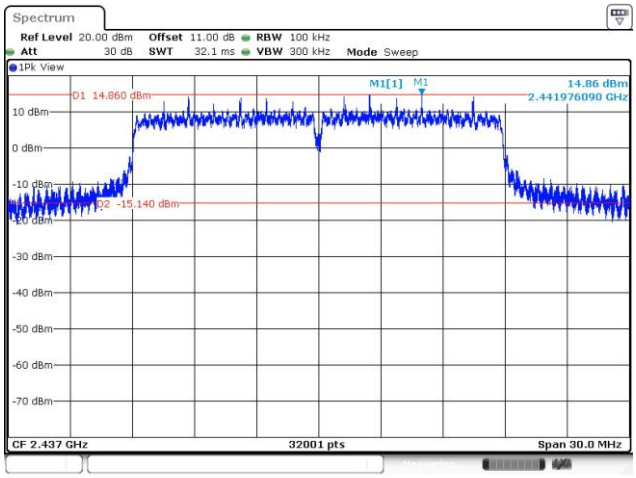
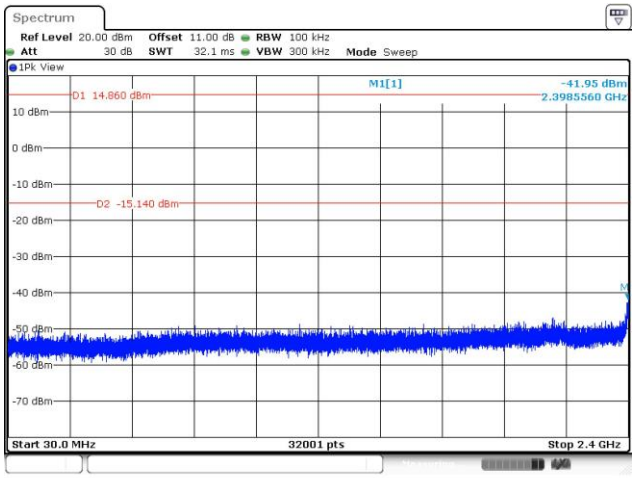
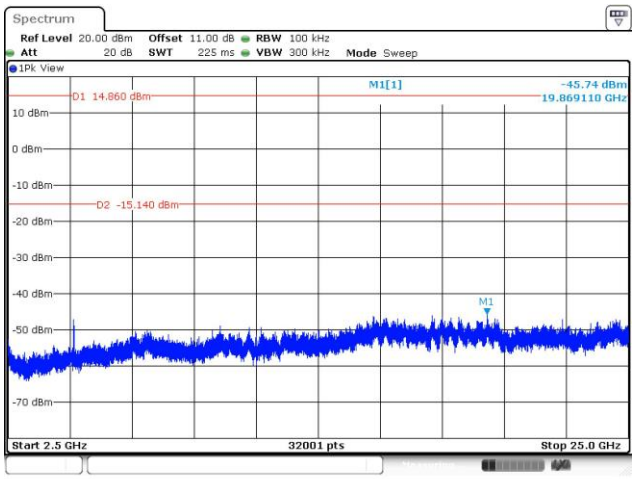
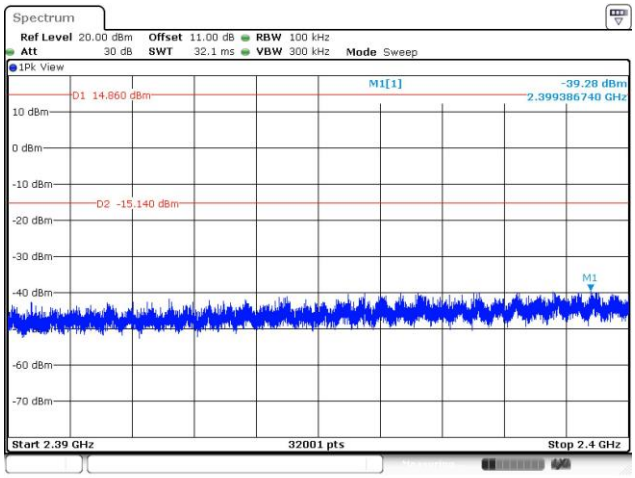
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

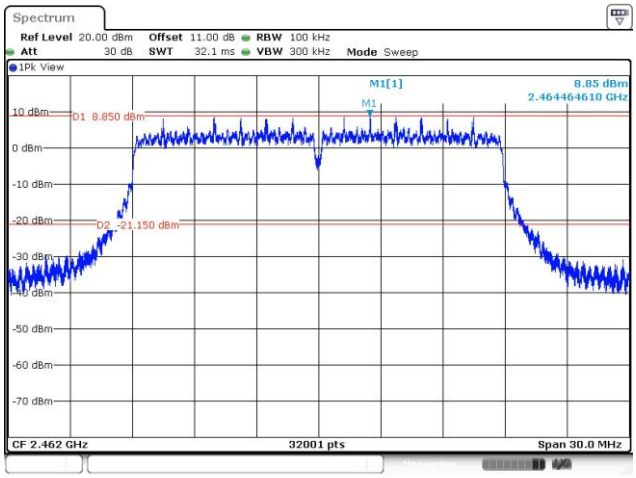
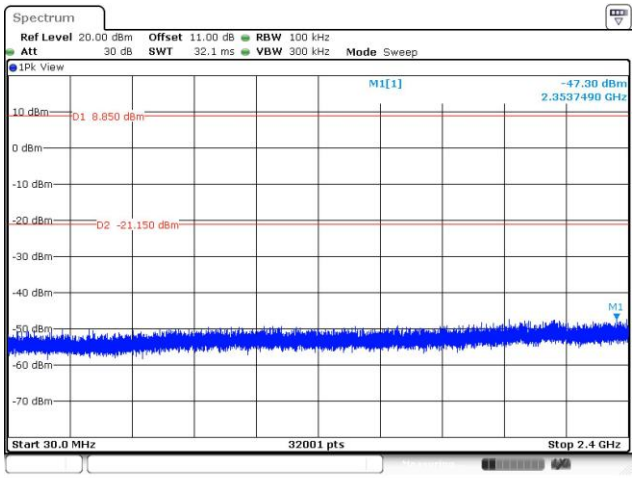
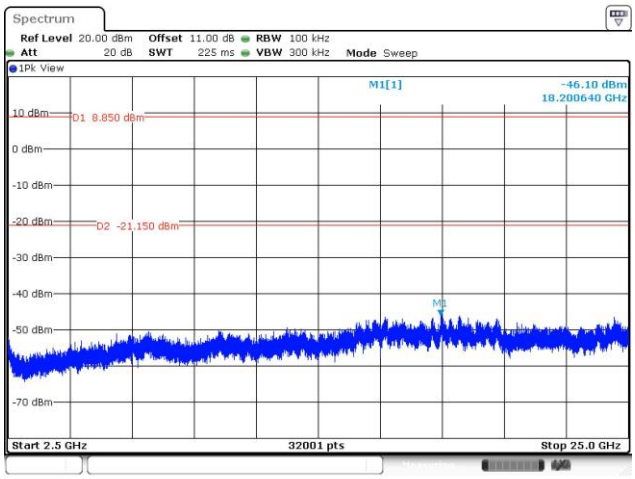
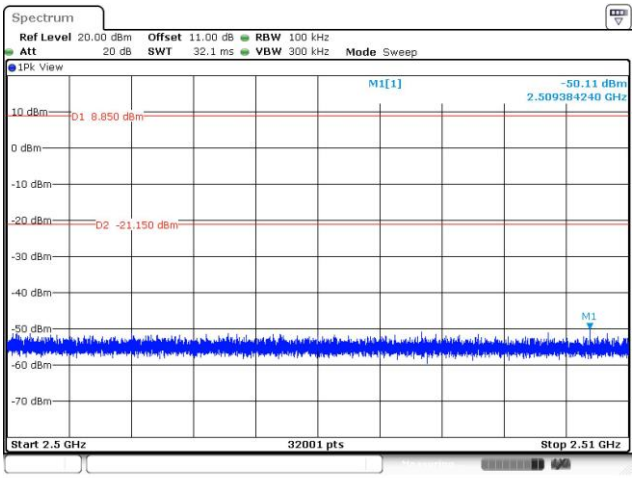
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

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

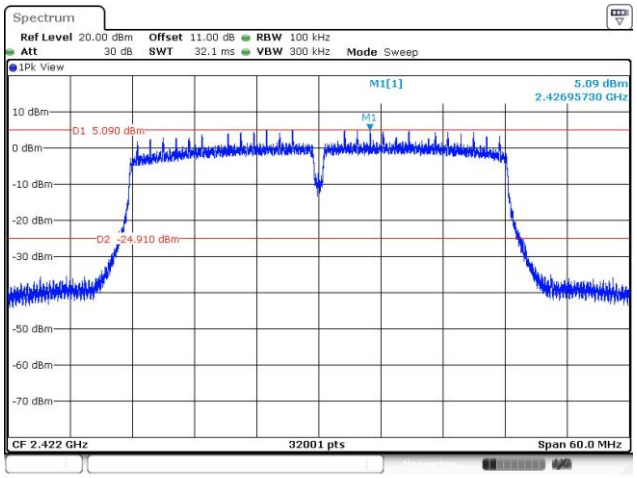
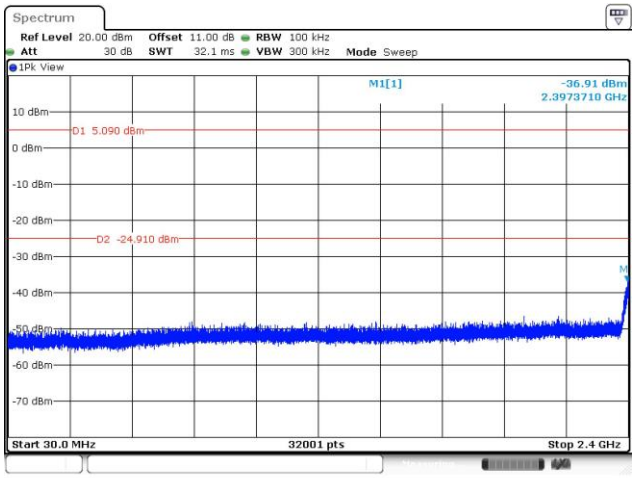
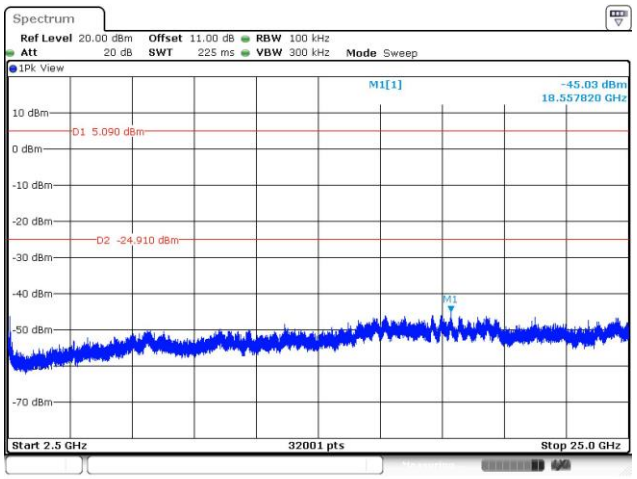
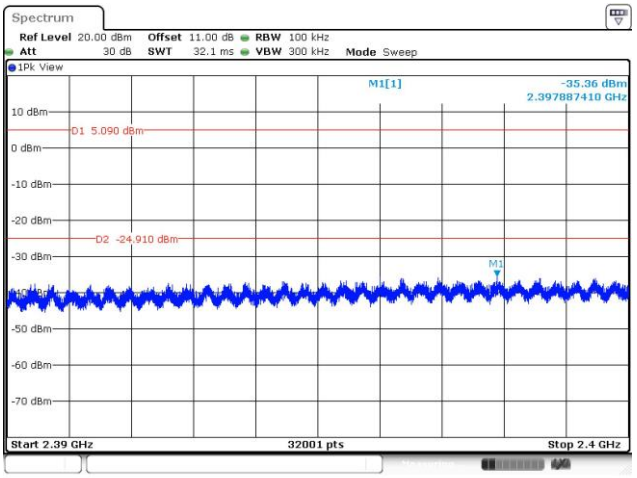
802.11n HT20

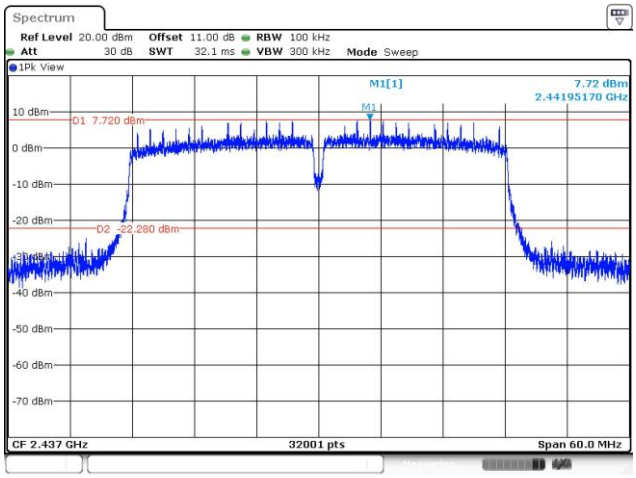
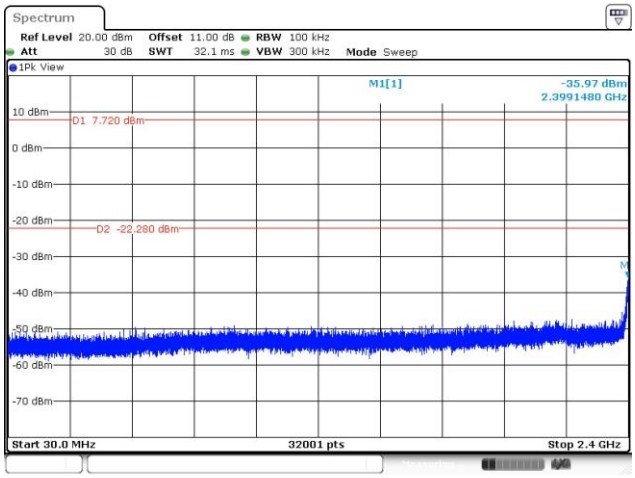
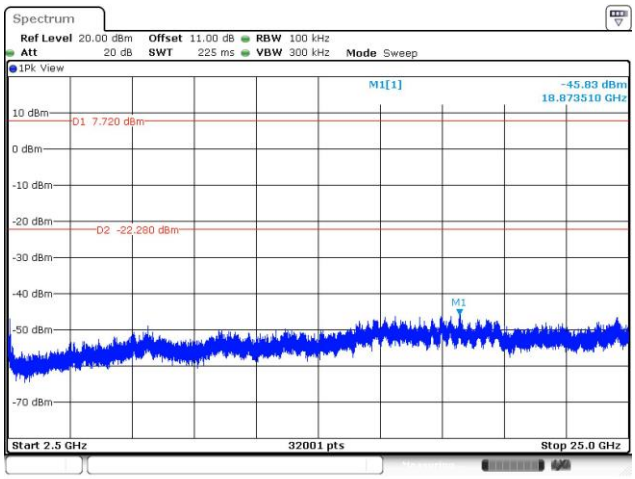
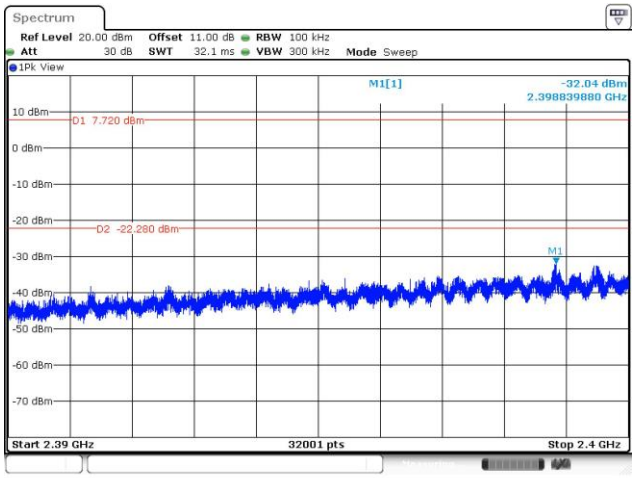
Reference Level	Tx 2412MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

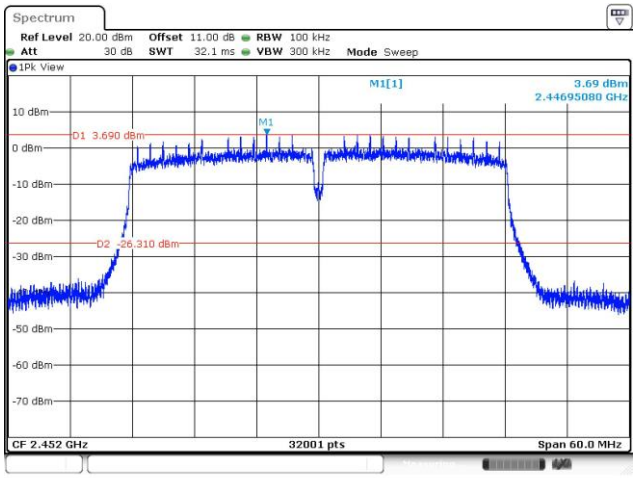
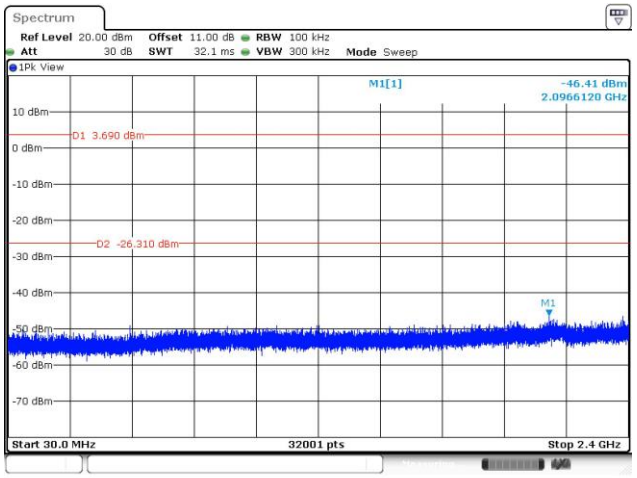
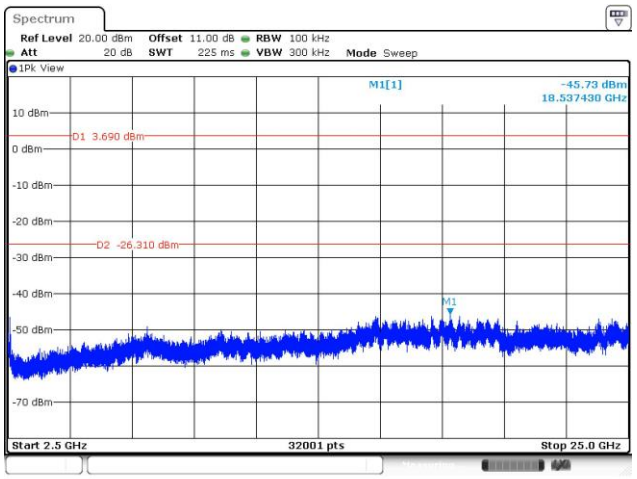
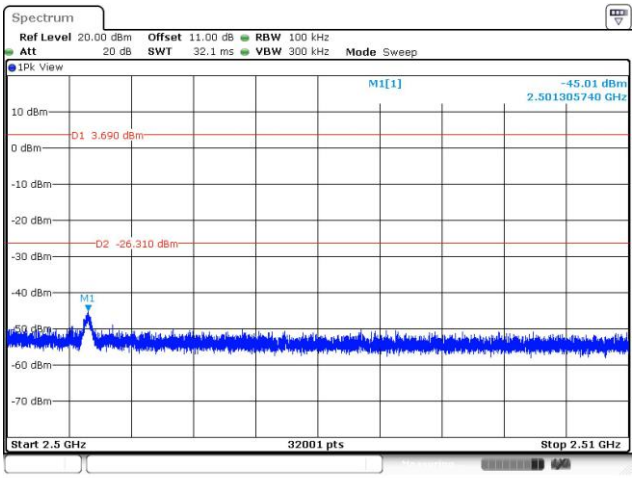
Reference Level	Tx 2437MHz / 30MHz~25GHz (down 20dBc)
	
---	
---	

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 Receiver Test Results

4.1 Conducted Emissions

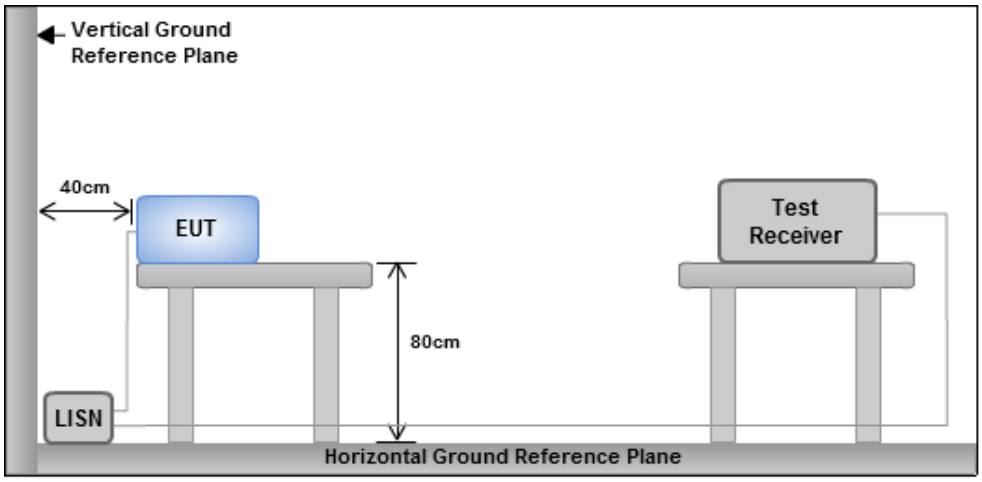
4.1.1 Limit of Conducted Emissions

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.		

4.1.2 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.

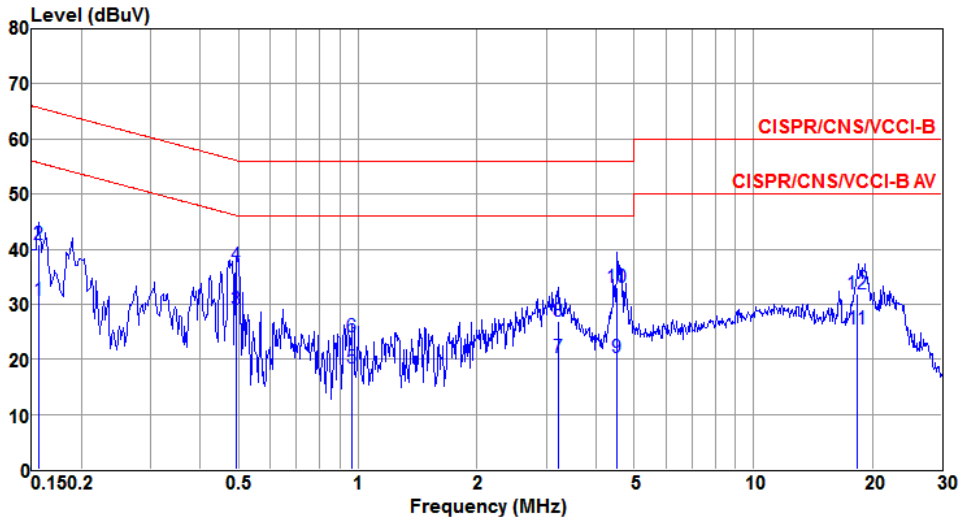
4.1.3 Test Setup



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

4.1.4 Test Result of Conducted Emissions

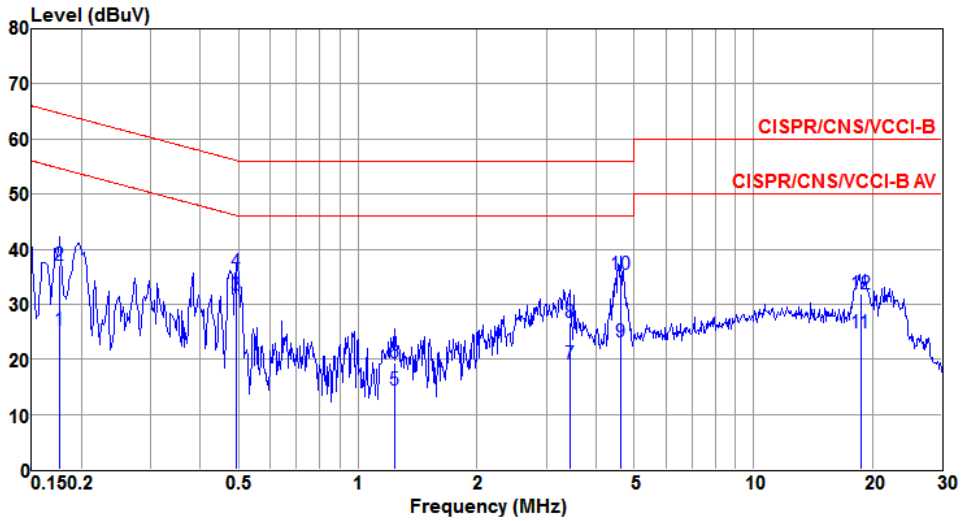
Modulation	11b	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.156	30.70	55.69	-24.99	21.16	9.50	0.04	Average
2	0.156	40.73	65.69	-24.96	31.19	9.50	0.04	QP
3@	0.491	29.10	46.14	-17.04	19.49	9.57	0.04	Average
4	0.491	37.15	56.14	-18.99	27.54	9.57	0.04	QP
5	0.968	18.33	46.00	-27.67	8.83	9.46	0.04	Average
6	0.968	24.14	56.00	-31.86	14.64	9.46	0.04	QP
7	3.224	20.39	46.00	-25.61	10.74	9.53	0.12	Average
8	3.224	26.89	56.00	-29.11	17.24	9.53	0.12	QP
9	4.525	20.23	46.00	-25.77	10.55	9.51	0.17	Average
10	4.525	33.09	56.00	-22.91	23.41	9.51	0.17	QP
11	18.334	25.61	50.00	-24.39	15.66	9.70	0.25	Average
12	18.334	31.89	60.00	-28.11	21.94	9.70	0.25	QP

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

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



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.177	25.27	54.64	-29.37	15.64	9.59	0.04	Average
2	0.177	37.00	64.64	-27.64	27.37	9.59	0.04	QP
3@	0.494	31.69	46.10	-14.41	22.08	9.57	0.04	Average
4	0.494	35.82	56.10	-20.28	26.21	9.57	0.04	QP
5	1.242	14.29	46.00	-31.71	4.63	9.62	0.04	Average
6	1.242	19.28	56.00	-36.72	9.62	9.62	0.04	QP
7	3.436	19.19	46.00	-26.81	9.38	9.68	0.13	Average
8	3.436	26.75	56.00	-29.25	16.94	9.68	0.13	QP
9	4.622	23.04	46.00	-22.96	13.16	9.71	0.17	Average
10	4.622	35.51	56.00	-20.49	25.63	9.71	0.17	QP
11	18.661	24.71	50.00	-25.29	14.75	9.71	0.25	Average
12	18.661	31.77	60.00	-28.23	21.81	9.71	0.25	QP

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

4.2 Radiated Emissions

4.2.1 Limit of Radiated Emissions

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.

4.2.2 Test Procedures

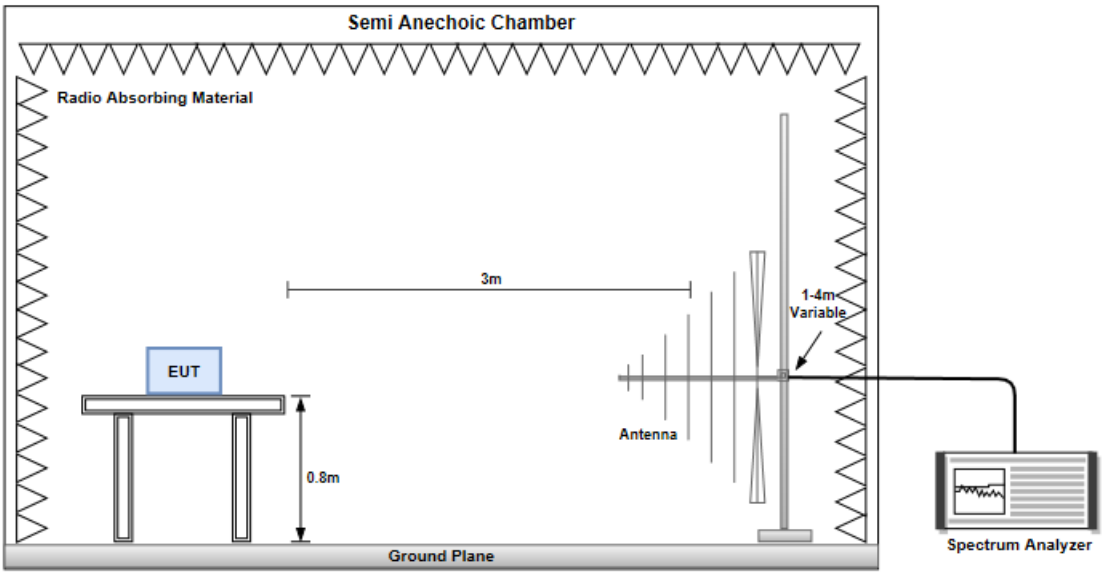
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

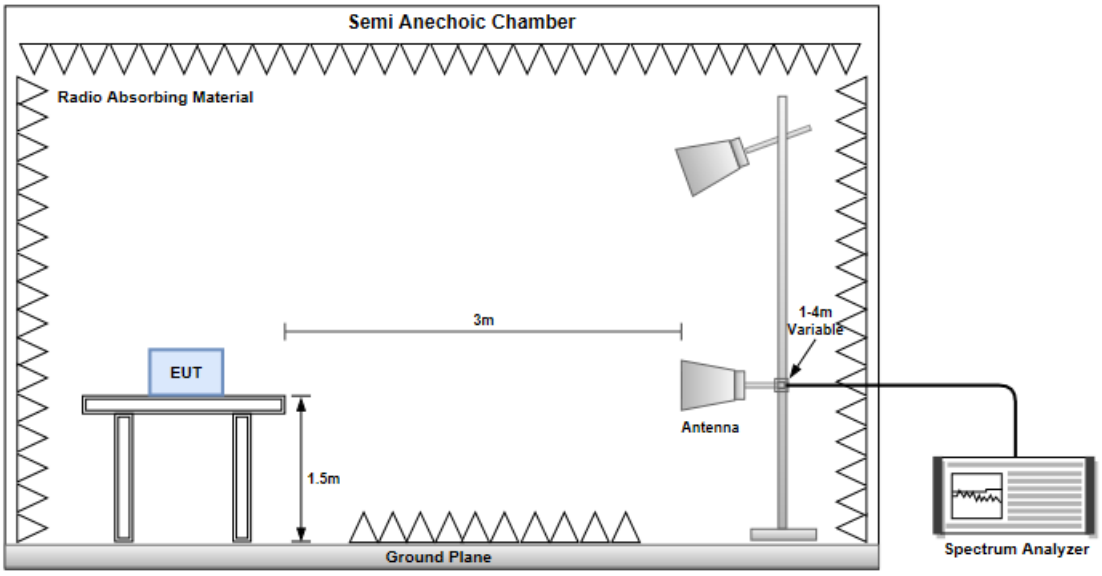
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=3MHz and RMS detector is for average measured value of radiated emission above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

4.2.3 Test Setup

Radiated Emissions below 1 GHz

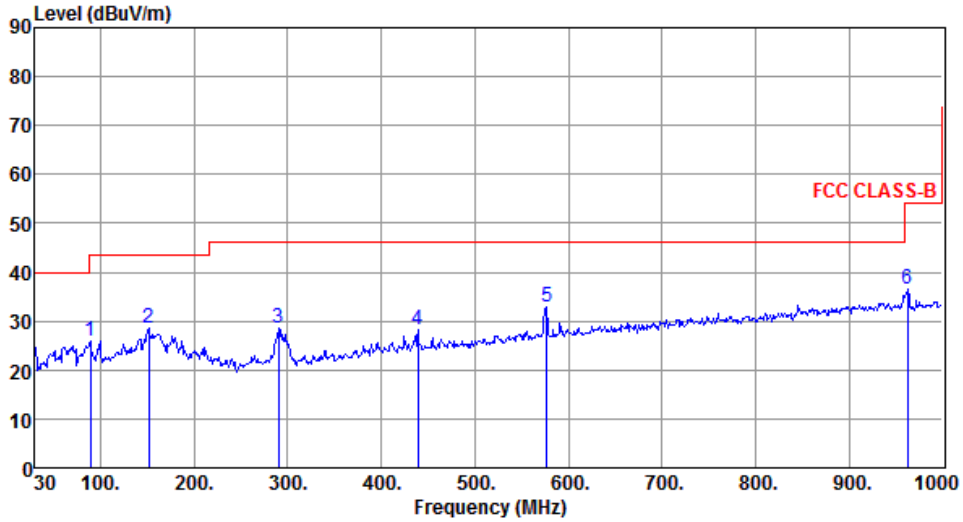


Radiated Emissions above 1 GHz



4.2.4 Receiver Emissions (Below 1GHz)

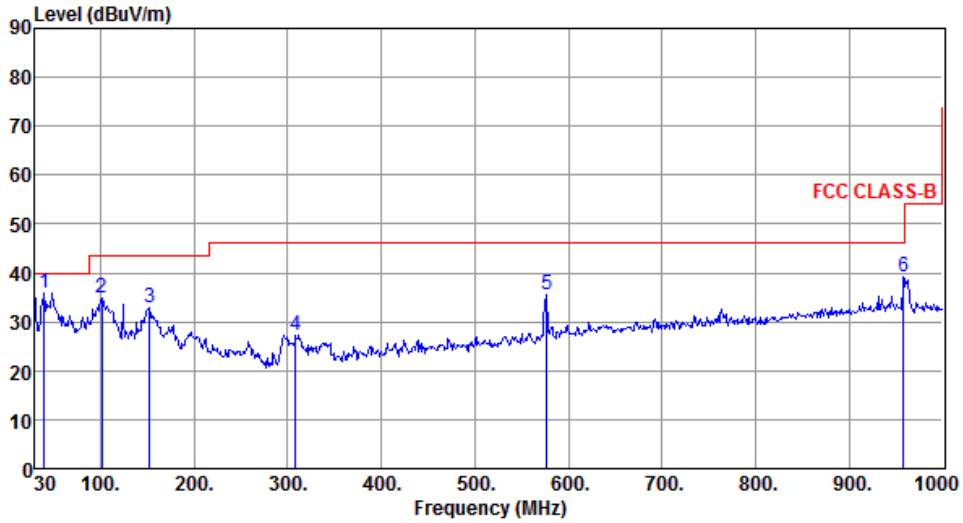
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	89.17	26.05	43.50	-17.45	40.33	-14.28	Peak	---	---
2	151.25	28.64	43.50	-14.86	36.82	-8.18	Peak	---	---
3	289.96	28.40	46.00	-17.60	36.13	-7.73	Peak	---	---
4	439.34	28.16	46.00	-17.84	32.17	-4.01	Peak	---	---
5	577.08	33.01	46.00	-12.99	34.21	-1.20	Peak	---	---
6	962.17	36.43	54.00	-17.57	31.41	5.02	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	11b	Test Freq. (MHz)	2437
Polarization	Vertical		

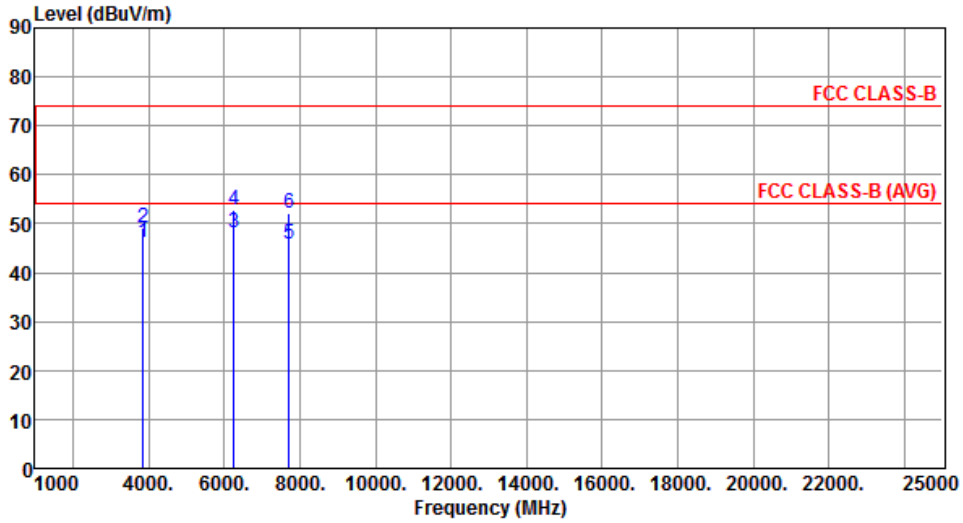


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	39.70	35.98	40.00	-4.02	43.83	-7.85	Peak	---	---
2	101.78	34.79	43.50	-8.71	47.36	-12.57	Peak	---	---
3	152.22	33.04	43.50	-10.46	41.21	-8.17	Peak	---	---
4	308.39	27.38	46.00	-18.62	34.68	-7.30	Peak	---	---
5	577.08	35.48	46.00	-10.52	36.68	-1.20	Peak	---	---
6	958.29	39.11	46.00	-6.89	34.14	4.97	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.

4.2.5 Receiver Emissions (Above 1GHz)

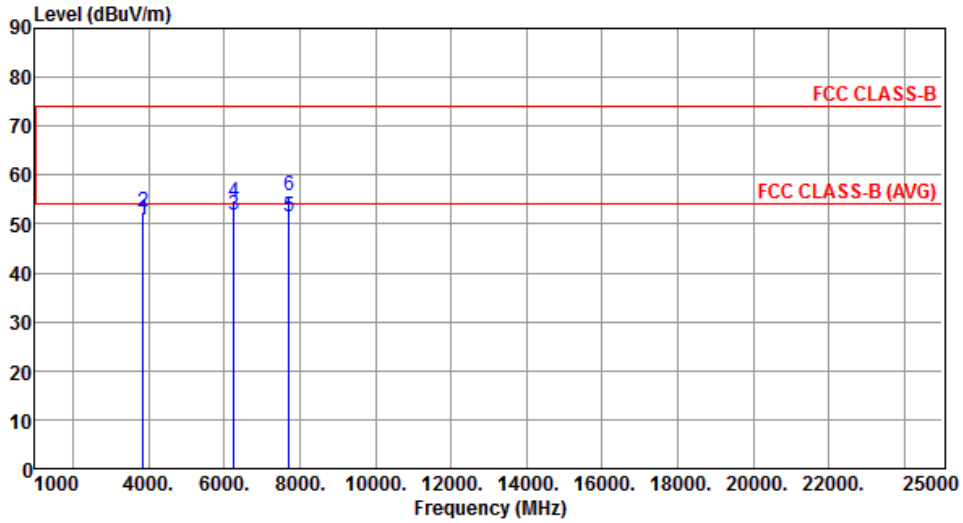
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3856.00	46.16	54.00	-7.84	45.36	0.80	Average	100	308
2	3856.00	49.02	74.00	-24.98	48.22	0.80	Peak	100	308
3	6249.60	48.28	54.00	-5.72	41.94	6.34	Average	100	119
4	6249.60	52.92	74.00	-21.08	46.58	6.34	Peak	100	119
5	7713.00	45.71	54.00	-8.29	36.94	8.77	Average	100	4
6	7713.00	52.18	74.00	-21.82	43.41	8.77	Peak	100	4

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	3856.00	50.72	54.00	-3.28	49.92	0.80	Average	100	324
2	3856.00	52.46	74.00	-21.54	51.66	0.80	Peak	100	324
3	6249.60	51.72	54.00	-2.28	45.38	6.34	Average	100	185
4	6249.60	54.43	74.00	-19.57	48.09	6.34	Peak	100	185
5	7713.00	51.33	54.00	-2.67	42.56	8.77	Average	100	4
6	7713.00	55.80	74.00	-18.20	47.03	8.77	Peak	100	4

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).

5 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
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