

FCC Test Report

FCC ID : XNAWBS06
Equipment : Body
Model No. : WBS06
Brand Name : Nokia
Applicant : Withings
Address : 2 rue Maurice Hartmann, 92130
Issy-les-Moulineaux, FRANCE
Standard : 47 CFR FCC Part 15.247
Received Date : Dec. 16, 2016
Tested Date : Dec. 20 ,2016 ~ Jan. 10, 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



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	7
1.3	Test Setup Chart	7
1.4	The Equipment List	8
1.5	Test Standards	9
1.6	Measurement Uncertainty	9
2	TEST CONFIGURATION	10
2.1	Testing Condition	10
2.2	The Worst Test Modes and Channel Details	10
3	TRANSMITTER TEST RESULTS.....	11
3.1	6dB and Occupied Bandwidth	11
3.2	RF Output Power.....	14
3.3	Power Spectral Density	16
3.4	Unwanted Emissions into Restricted Frequency Bands	18
3.5	Emissions in Non-Restricted Frequency Bands.....	40
4	TEST LABORATORY INFORMATION	50

Release Record

Report No.	Version	Description	Issued Date
FR5D1801-03AC	Rev. 01	Initial issue	May 12, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	Note	N/A
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 72.88 (Margin -1.12dB) - PK	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 23.35	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

Note: The EUT consumes DC power from battery, so the test is not required.

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	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	1	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	MCS 0-7

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

1.1.2 Antenna Details

Ant. No.	Brand	Model	Type	Gain (dBi)	Connector	Remarks
1	BROADCOM	BCM9Fractal64	PCB	2.8	N/A	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	6Vdc from battery (1.5Vdc AAA battery x4).
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1.1.4 Accessories

N/A

1.1.5 Channel List

Channel	Frequency(MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

1.1.6 Test Tool and Duty Cycle

Test Tool	Tera Term, Version: 4.74		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11b	99.71%	0.01
	11g	94.95%	0.23
	HT20	94.29%	0.26

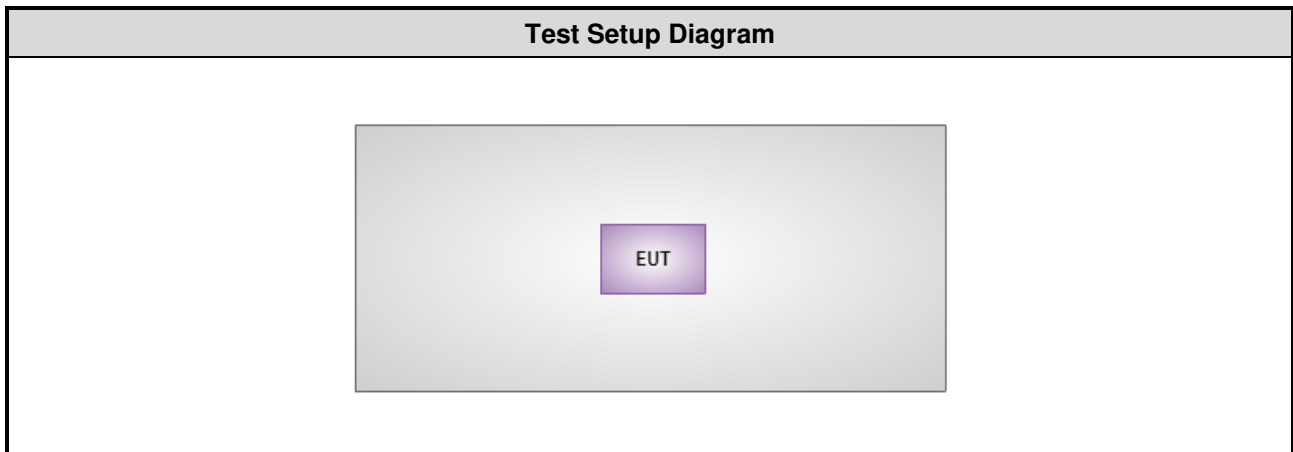
1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	16
11b	2437	16
11b	2462	16
11g	2412	15
11g	2437	15
11g	2462	15
HT20	2412	15
HT20	2437	15
HT20	2462	14

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	---

1.3 Test Setup Chart



Note: The support notebook is disconnected from EUT and removed from test table when EUT is set to transmit continuously.

1.4 The Equipment List

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	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	ETS-LINDGREN	3115	00149268	Aug. 31, 2016	Aug. 30, 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	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 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-N M-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	Feb. 17, 2016	Feb. 16, 2017
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA

Note: Calibration Interval of instruments listed above is one year.

1.5 Test Standards

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

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 DTS Meas Guidance v03r05

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
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	24°C / 62-66%	Kevin Lee
RF Conducted	TH01-WS	22°C / 63%	Brad Wu

- FCC Designation No.: TW2732
- 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
Radiated Emissions ≤1GHz	11g	2462	6 Mbps	---
Radiated Emissions >1GHz				
Maximum Output Power	11b	2412 / 2437 / 2462	1 Mbps	
6dB bandwidth	11g	2412 / 2437 / 2462	6 Mbps	---
Power spectral density	HT20	2412 / 2437 / 2462	MCS 0	

3 Transmitter Test Results

3.1 6dB and Occupied Bandwidth

3.1.1 Limit of 6dB Bandwidth

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

3.1.2 Test Procedures

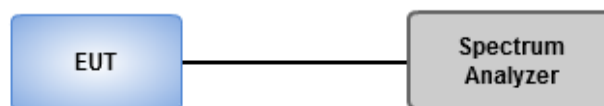
6dB Bandwidth

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

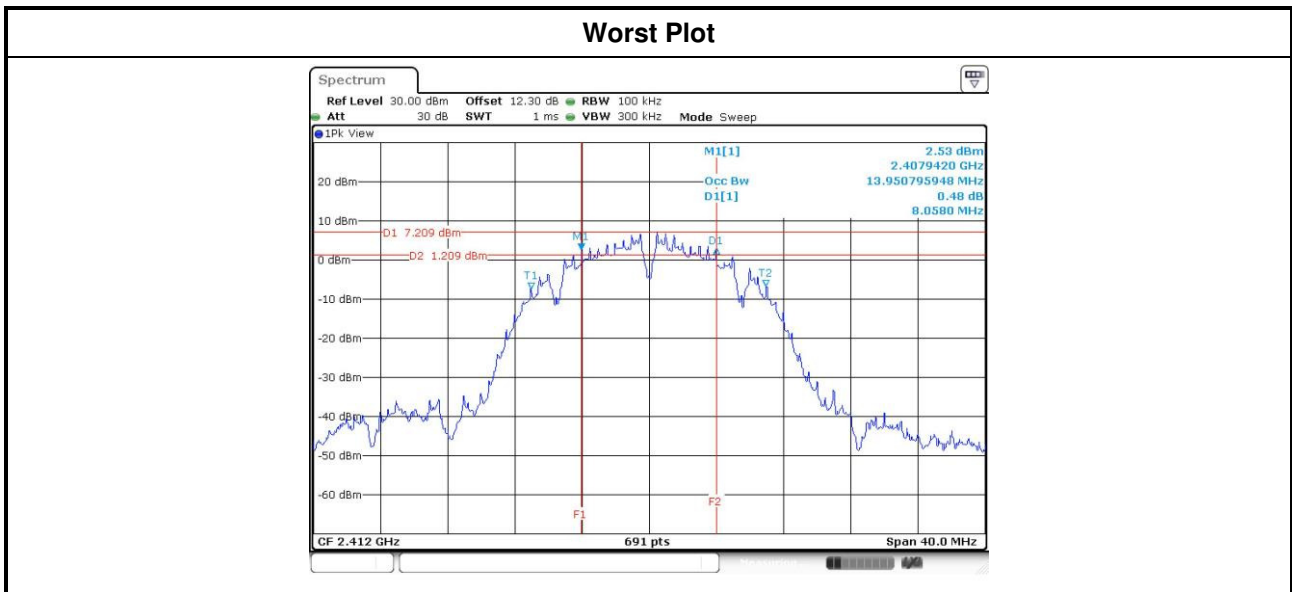
1. Set resolution bandwidth (RBW) = 1 MHz, Video bandwidth = 3 MHz.
2. Detector = Sample, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

3.1.3 Test Setup

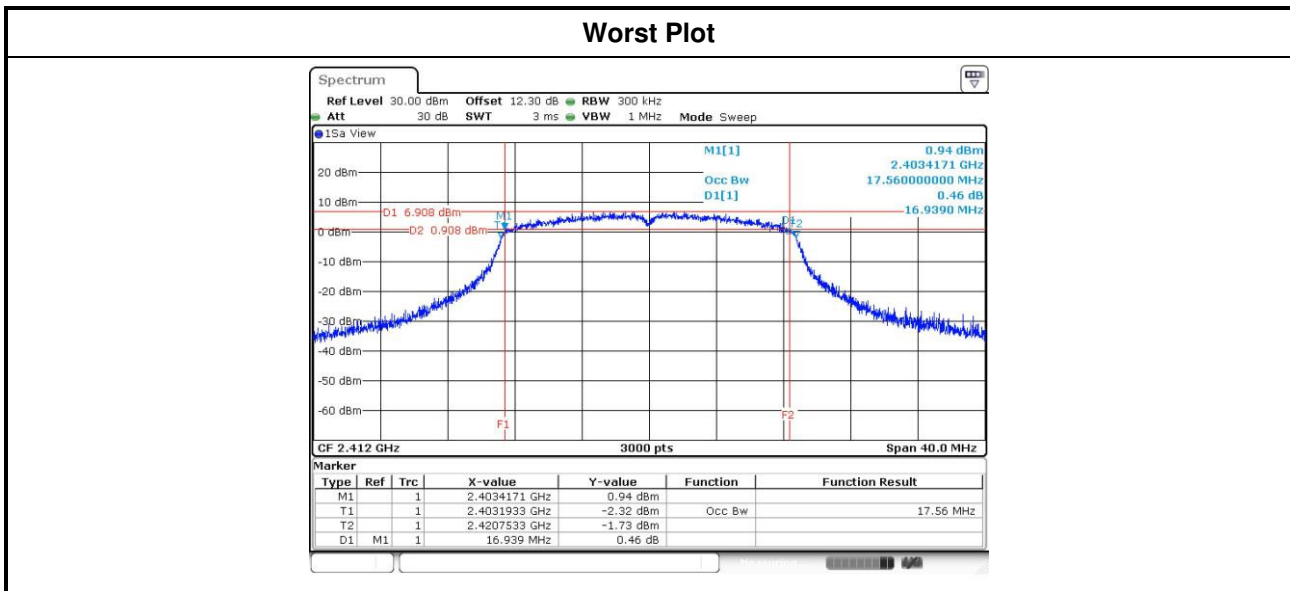


3.1.4 Test Result of 6dB and Occupied Bandwidth

Modulation Mode	N _{TX}	Freq. (MHz)	6dB Bandwidth (MHz)				Limit (kHz)
			Chain 0	Chain 1	Chain 2	Chain 3	
11b	1	2412	8.06	---	---	---	500
11b	1	2437	8.06	---	---	---	500
11b	1	2462	8.06	---	---	---	500
11g	1	2412	15.07	---	---	---	500
11g	1	2437	15.13	---	---	---	500
11g	1	2462	13.16	---	---	---	500
HT20	1	2412	15.13	---	---	---	500
HT20	1	2437	13.86	---	---	---	500
HT20	1	2462	15.07	---	---	---	500



Modulation Mode	N _{TX}	Freq. (MHz)	99% Occupied Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3
11b	1	2412	13.99	---	---	---
11b	1	2437	14.00	---	---	---
11b	1	2462	14.00	---	---	---
11g	1	2412	16.45	---	---	---
11g	1	2437	16.47	---	---	---
11g	1	2462	16.47	---	---	---
HT20	1	2412	17.56	---	---	---
HT20	1	2437	17.56	---	---	---
HT20	1	2462	17.56	---	---	---



3.2 RF Output Power

3.2.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

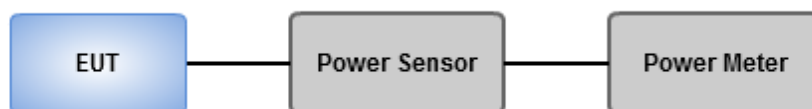
- Antenna gain \leq 6dBi, no any corresponding reduction is in output power limit.
- Antenna gain $>$ 6dBi
 - Non Fixed, point to point operations.
The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB
 - Fixed, 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

3.2.2 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.

3.2.3 Test Setup



3.2.4 Test Result of Maximum Output Power

Modulation Mode	N _{TX}	Freq. (MHz)	Peak conducted Output Power (dBm)							Ant. Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (mW)	Total Power (dBm)	Limit (dBm)			
11b	1	2412	16.76	---	---	---	47.424	16.76	30.00	2.80	19.56	36.00
11b	1	2437	16.79	---	---	---	47.753	16.79	30.00	2.80	19.59	36.00
11b	1	2462	16.87	---	---	---	48.641	16.87	30.00	2.80	19.67	36.00
11g	1	2412	21.82	---	---	---	152.055	21.82	30.00	2.80	24.62	36.00
11g	1	2437	22.3	---	---	---	169.824	22.30	30.00	2.80	25.10	36.00
11g	1	2462	23.35	---	---	---	216.272	23.35	30.00	2.80	26.15	36.00
HT20	1	2412	21.76	---	---	---	149.968	21.76	30.00	2.80	24.56	36.00
HT20	1	2437	22.19	---	---	---	165.577	22.19	30.00	2.80	24.99	36.00
HT20	1	2462	21.47	---	---	---	140.281	21.47	30.00	2.80	24.27	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	14.47	---	---	---	27.990	14.47	---
11b	1	2437	14.48	---	---	---	28.054	14.48	---
11b	1	2462	14.55	---	---	---	28.510	14.55	---
11g	1	2412	13.98	---	---	---	25.003	13.98	---
11g	1	2437	13.97	---	---	---	24.946	13.97	---
11g	1	2462	14.18	---	---	---	26.182	14.18	---
HT20	1	2412	14.11	---	---	---	25.763	14.11	---
HT20	1	2437	14.06	---	---	---	25.468	14.06	---
HT20	1	2462	13.39	---	---	---	21.827	13.39	---

Note: Conducted average output power is for reference only.

3.3 Power Spectral Density

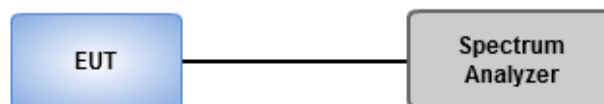
3.3.1 Limit of Power Spectral Density

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

3.3.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
 1. Set the RBW = 3kHz, VBW = 10kHz.
 2. Detector = Peak, Sweep time = auto couple.
 3. Trace mode = max hold, allow trace to fully stabilize.
 4. Use the peak marker function to determine the maximum amplitude level.
- Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
 1. Set the RBW = 100kHz, VBW = 300 kHz.
 2. Detector = RMS, Sweep time = auto couple.
 3. Set the sweep time to: $\geq 10 \times (\text{number of measurement points in sweep}) \times (\text{maximum data rate per stream})$.
 4. Perform the measurement over a single sweep.
 5. Use the peak marker function to determine the maximum amplitude level.

3.3.3 Test Setup



3.4 Unwanted Emissions into Restricted Frequency Bands

3.4.1 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.

3.4.2 Test Procedures

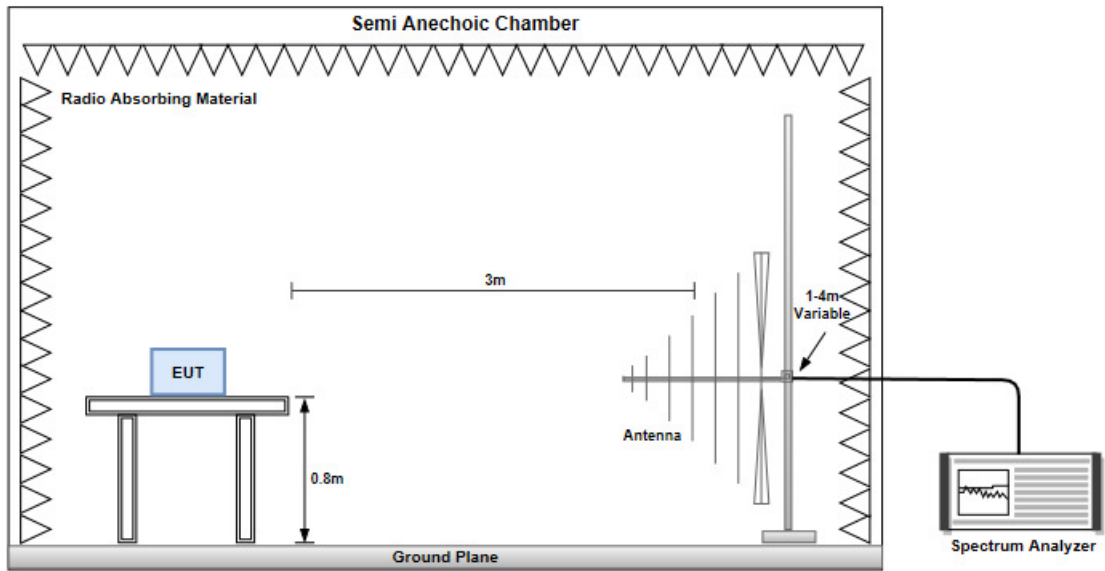
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

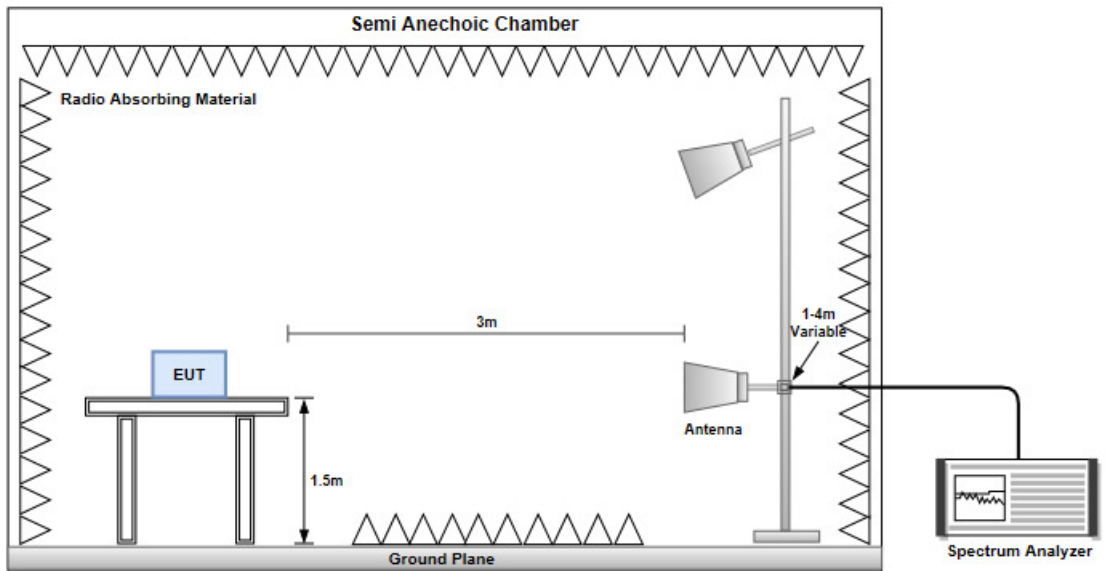
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.4.3 Test Setup

Radiated Emissions below 1 GHz



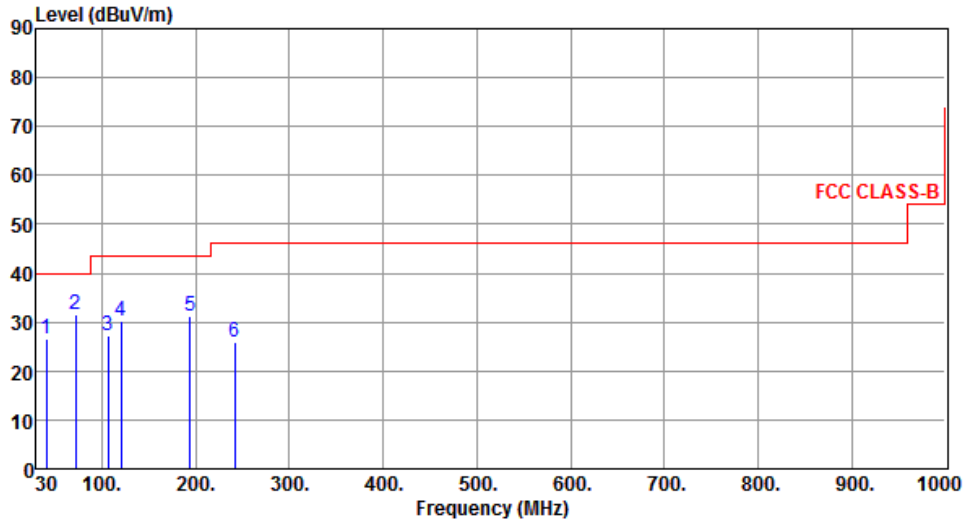
Radiated Emissions above 1 GHz



3.4.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	11g	Test Freq. (MHz)	2462																																																																						
Polarization	Horizontal																																																																								
	<table border="1"> <thead> <tr> <th>Freq.</th> <th>Emission level</th> <th>Limit</th> <th>Margin</th> <th>SA reading</th> <th>Factor</th> <th>Remark</th> <th>ANT High cm</th> <th>Turn Table deg</th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>39.70</td> <td>25.81</td> <td>40.00</td> <td>-14.19</td> <td>33.66</td> <td>-7.85</td> <td>Peak</td> <td>---</td> </tr> <tr> <td>2</td> <td>120.21</td> <td>28.74</td> <td>43.50</td> <td>-14.76</td> <td>38.87</td> <td>-10.13</td> <td>Peak</td> <td>---</td> </tr> <tr> <td>3</td> <td>144.46</td> <td>30.02</td> <td>43.50</td> <td>-13.48</td> <td>38.28</td> <td>-8.26</td> <td>Peak</td> <td>---</td> </tr> <tr> <td>4</td> <td>168.71</td> <td>29.68</td> <td>43.50</td> <td>-13.82</td> <td>38.17</td> <td>-8.49</td> <td>Peak</td> <td>---</td> </tr> <tr> <td>5</td> <td>192.96</td> <td>36.90</td> <td>43.50</td> <td>-6.60</td> <td>47.89</td> <td>-10.99</td> <td>Peak</td> <td>---</td> </tr> <tr> <td>6</td> <td>241.46</td> <td>33.77</td> <td>46.00</td> <td>-12.23</td> <td>43.17</td> <td>-9.40</td> <td>Peak</td> <td>---</td> </tr> </tbody> </table>	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High cm	Turn Table deg	MHz	dBuV/m	dBuV/m	dB	dBuV	dB				1	39.70	25.81	40.00	-14.19	33.66	-7.85	Peak	---	2	120.21	28.74	43.50	-14.76	38.87	-10.13	Peak	---	3	144.46	30.02	43.50	-13.48	38.28	-8.26	Peak	---	4	168.71	29.68	43.50	-13.82	38.17	-8.49	Peak	---	5	192.96	36.90	43.50	-6.60	47.89	-10.99	Peak	---	6	241.46	33.77	46.00	-12.23	43.17	-9.40	Peak	---
Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High cm	Turn Table deg																																																																	
MHz	dBuV/m	dBuV/m	dB	dBuV	dB																																																																				
1	39.70	25.81	40.00	-14.19	33.66	-7.85	Peak	---																																																																	
2	120.21	28.74	43.50	-14.76	38.87	-10.13	Peak	---																																																																	
3	144.46	30.02	43.50	-13.48	38.28	-8.26	Peak	---																																																																	
4	168.71	29.68	43.50	-13.82	38.17	-8.49	Peak	---																																																																	
5	192.96	36.90	43.50	-6.60	47.89	-10.99	Peak	---																																																																	
6	241.46	33.77	46.00	-12.23	43.17	-9.40	Peak	---																																																																	
<p>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.</p>																																																																									

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	40.67	26.72	40.00	-13.28	34.49	-7.77	Peak	---	---
2	71.71	31.46	40.00	-8.54	42.47	-11.01	Peak	---	---
3	106.63	27.11	43.50	-16.39	38.85	-11.74	Peak	---	---
4	120.21	30.15	43.50	-13.35	40.28	-10.13	Peak	---	---
5	193.93	31.34	43.50	-12.16	42.35	-11.01	Peak	---	---
6	241.46	25.88	46.00	-20.12	35.28	-9.40	Peak	---	---

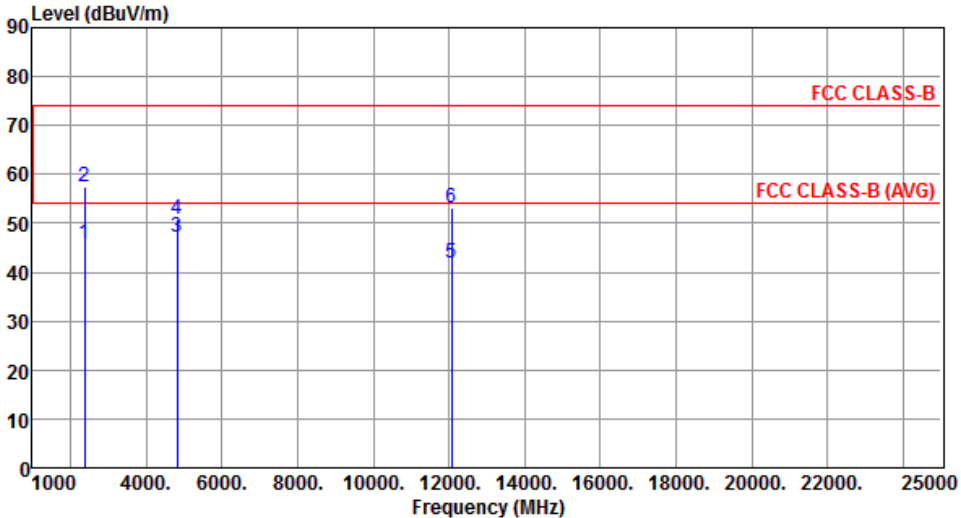
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

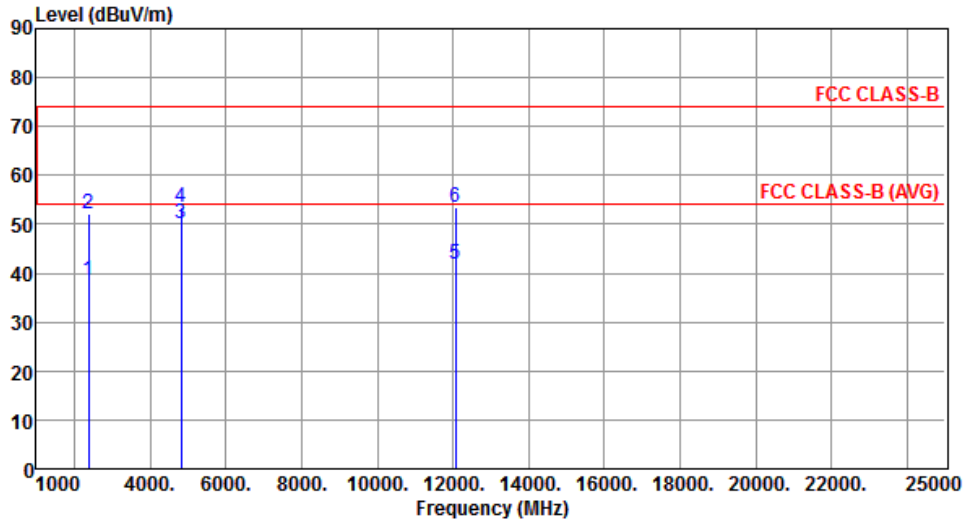
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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

Modulation	11b	Test Freq. (MHz)	2412						
Polarization	Horizontal								
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2390.00	45.79	54.00	-8.21	48.23	-2.44	Average	142	205
2	2390.00	57.38	74.00	-16.62	59.82	-2.44	Peak	142	205
3	4824.00	47.28	54.00	-6.72	42.37	4.91	Average	121	355
4	4824.00	50.79	74.00	-23.21	45.88	4.91	Peak	121	355
5	12060.00	41.84	54.00	-12.16	28.87	12.97	Average	132	56
6	12060.00	53.23	74.00	-20.77	40.26	12.97	Peak	132	56
<p>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).</p>									

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



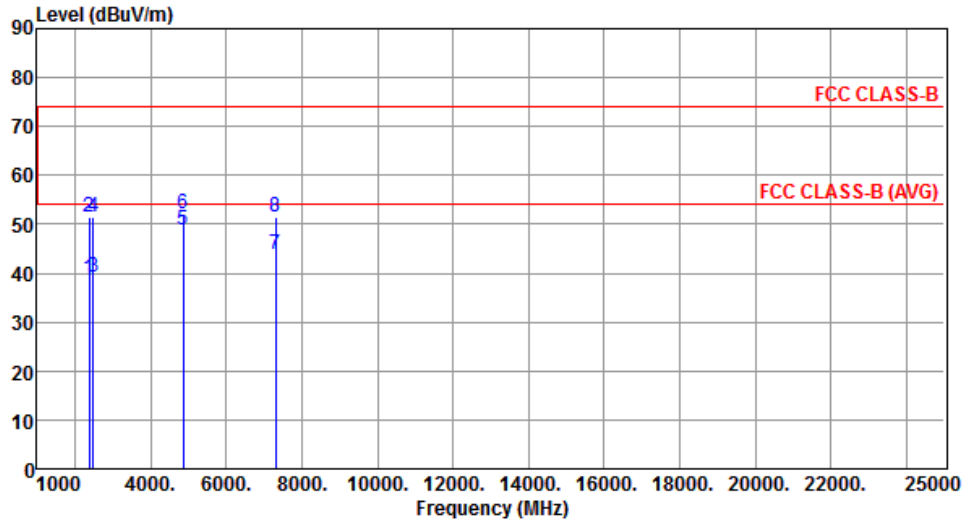
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.65	54.00	-15.35	41.09	-2.44	Average	327	136
2	2390.00	52.10	74.00	-21.90	54.54	-2.44	Peak	327	136
3	4824.00	50.16	54.00	-3.84	45.25	4.91	Average	110	161
4	4824.00	53.40	74.00	-20.60	48.49	4.91	Peak	110	161
5	12060.00	41.84	54.00	-12.16	28.87	12.97	Average	125	41
6	12060.00	53.51	74.00	-20.49	40.54	12.97	Peak	125	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).

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



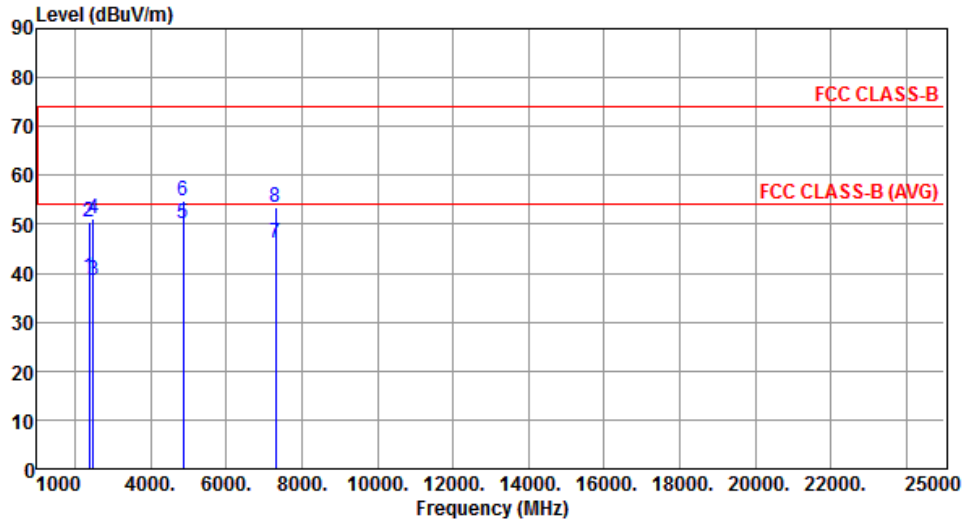
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.77	54.00	-15.23	41.21	-2.44	Average	147	207
2	2390.00	51.63	74.00	-22.37	54.07	-2.44	Peak	147	207
3	2483.50	39.11	54.00	-14.89	41.55	-2.44	Average	147	207
4	2483.50	51.56	74.00	-22.44	54.00	-2.44	Peak	147	207
5	4874.00	48.75	54.00	-5.25	43.66	5.09	Average	100	30
6	4874.00	52.28	74.00	-21.72	47.19	5.09	Peak	100	30
7	7311.00	43.94	54.00	-10.06	34.28	9.66	Average	100	284
8	7311.00	51.44	74.00	-22.56	41.78	9.66	Peak	100	284

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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



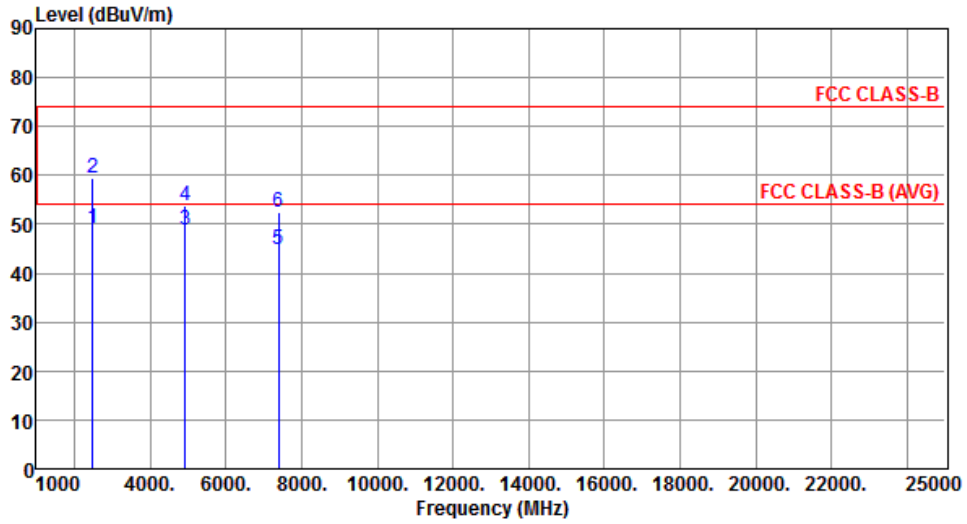
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	39.03	54.00	-14.97	41.47	-2.44	Average	329	135
2	2390.00	50.32	74.00	-23.68	52.76	-2.44	Peak	329	135
3	2483.50	38.45	54.00	-15.55	40.89	-2.44	Average	329	135
4	2483.50	51.02	74.00	-22.98	53.46	-2.44	Peak	329	135
5	4874.00	50.05	54.00	-3.95	44.96	5.09	Average	100	48
6	4874.00	54.95	74.00	-19.05	49.86	5.09	Peak	100	48
7	7311.00	46.08	54.00	-7.92	36.42	9.66	Average	100	170
8	7311.00	53.58	74.00	-20.42	43.92	9.66	Peak	100	170

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		



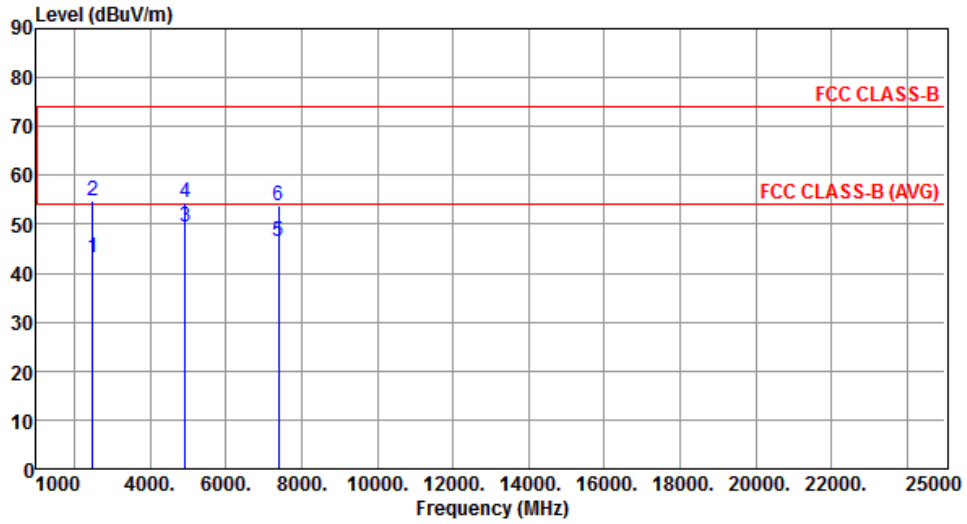
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	49.07	54.00	-4.93	51.51	-2.44	Average	144	206
2	2483.50	59.50	74.00	-14.50	61.94	-2.44	Peak	144	206
3	4924.00	48.95	54.00	-5.05	43.68	5.27	Average	100	84
4	4924.00	53.85	74.00	-20.15	48.58	5.27	Peak	100	84
5	7386.00	44.86	54.00	-9.14	35.23	9.63	Average	120	147
6	7386.00	52.37	74.00	-21.63	42.74	9.63	Peak	120	147

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		



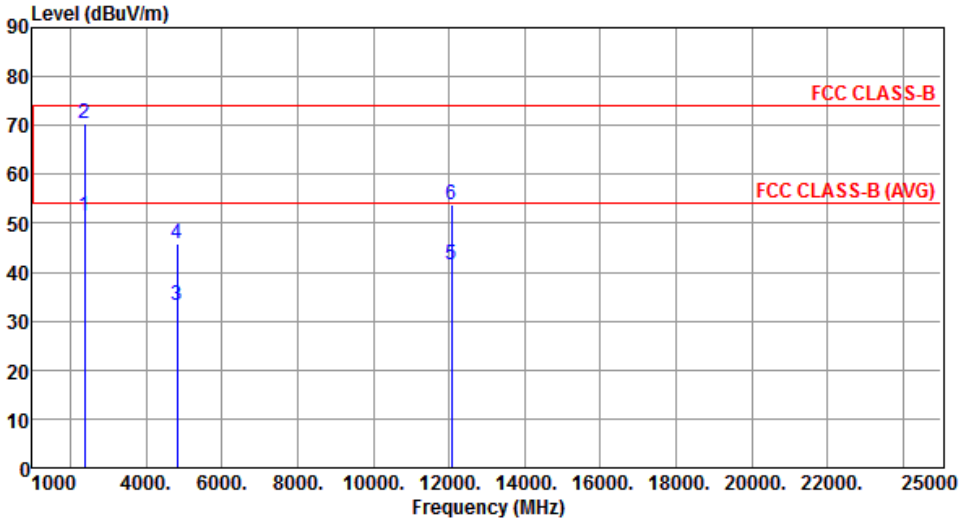
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	43.11	54.00	-10.89	45.55	-2.44	Average	328	136
2	2483.50	54.90	74.00	-19.10	57.34	-2.44	Peak	328	136
3	4924.00	49.63	54.00	-4.37	44.36	5.27	Average	120	96
4	4924.00	54.46	74.00	-19.54	49.19	5.27	Peak	120	96
5	7386.00	46.46	54.00	-7.54	36.83	9.63	Average	100	180
6	7386.00	53.68	74.00	-20.32	44.05	9.63	Peak	100	180

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

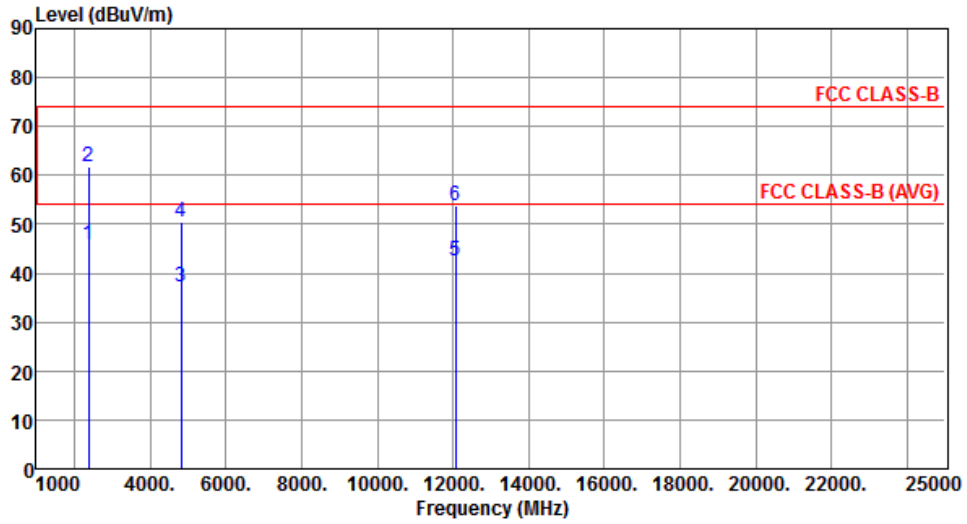
*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

Modulation	11g	Test Freq. (MHz)	2412						
Polarization	Horizontal								
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2390.00	51.38	54.00	-2.62	53.82	-2.44	Average	109	200
2	2390.00	70.37	74.00	-3.63	72.81	-2.44	Peak	109	200
3	4824.00	33.28	54.00	-20.72	28.37	4.91	Average	269	304
4	4824.00	45.87	74.00	-28.13	40.96	4.91	Peak	269	304
5	12060.00	41.58	54.00	-12.42	28.61	12.97	Average	125	83
6	12060.00	53.65	74.00	-20.35	40.68	12.97	Peak	125	83
<p>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).</p>									

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



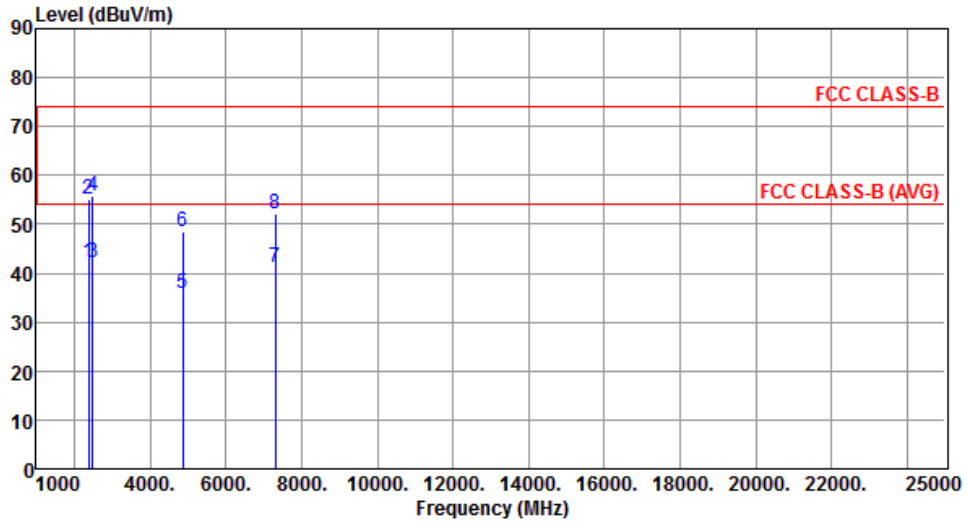
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	45.93	54.00	-8.07	48.37	-2.44	Average	376	176
2	2390.00	61.73	74.00	-12.27	64.17	-2.44	Peak	376	176
3	4824.00	37.33	54.00	-16.67	32.42	4.91	Average	130	155
4	4824.00	50.56	74.00	-23.44	45.65	4.91	Peak	130	155
5	12060.00	42.60	54.00	-11.40	29.63	12.97	Average	121	267
6	12060.00	53.80	74.00	-20.20	40.83	12.97	Peak	121	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	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



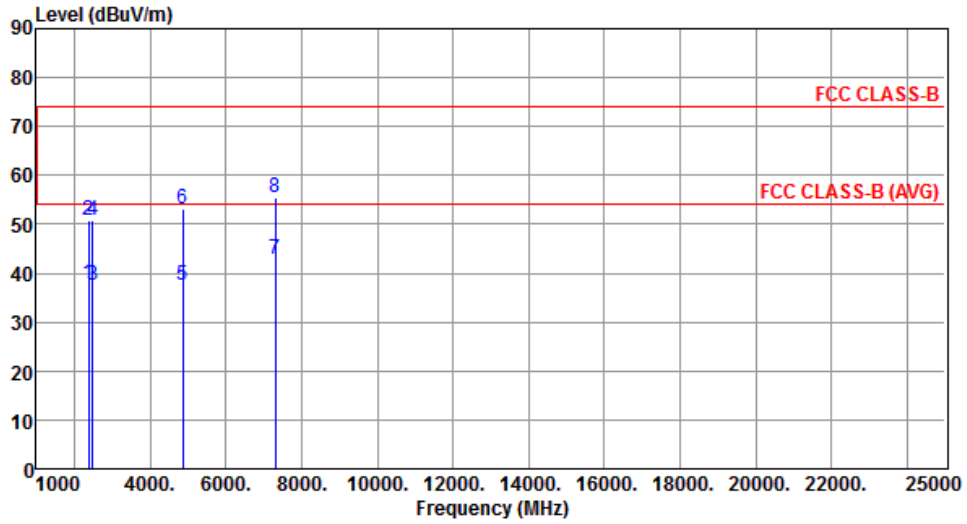
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	42.05	54.00	-11.95	44.49	-2.44	Average	141	200
2	2390.00	55.06	74.00	-18.94	57.50	-2.44	Peak	141	200
3	2483.50	42.21	54.00	-11.79	44.65	-2.44	Average	141	200
4	2483.50	55.74	74.00	-18.26	58.18	-2.44	Peak	141	200
5	4874.00	35.76	54.00	-18.24	30.67	5.09	Average	121	264
6	4874.00	48.44	74.00	-25.56	43.35	5.09	Peak	121	264
7	7311.00	41.09	54.00	-12.91	31.43	9.66	Average	130	243
8	7311.00	52.23	74.00	-21.77	42.57	9.66	Peak	130	243

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		



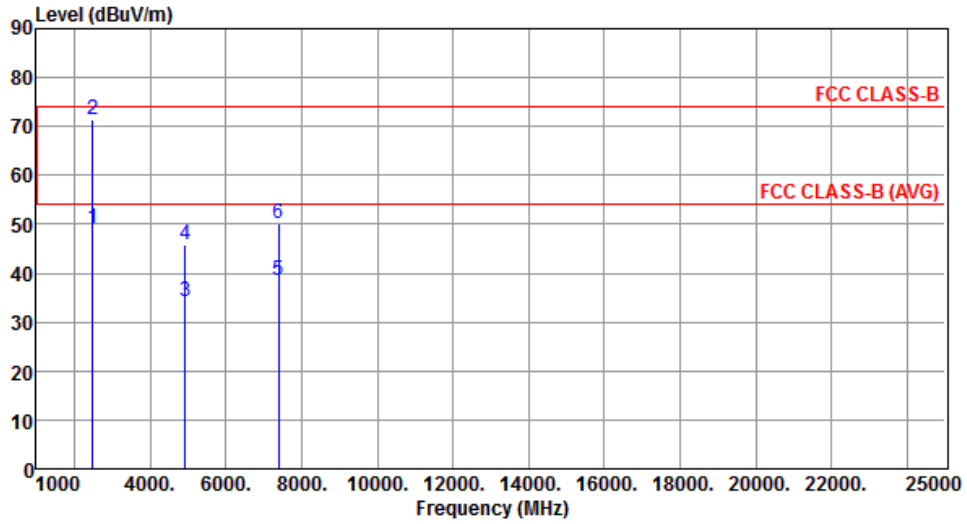
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.73	54.00	-16.27	40.17	-2.44	Average	377	376
2	2390.00	50.75	74.00	-23.25	53.19	-2.44	Peak	377	376
3	2483.50	37.64	54.00	-16.36	40.08	-2.44	Average	377	376
4	2483.50	50.75	74.00	-23.25	53.19	-2.44	Peak	377	376
5	4874.00	37.51	54.00	-16.49	32.42	5.09	Average	100	47
6	4874.00	53.27	74.00	-20.73	48.18	5.09	Peak	100	47
7	7311.00	42.96	54.00	-11.04	33.30	9.66	Average	183	168
8	7311.00	55.41	74.00	-18.59	45.75	9.66	Peak	183	168

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		



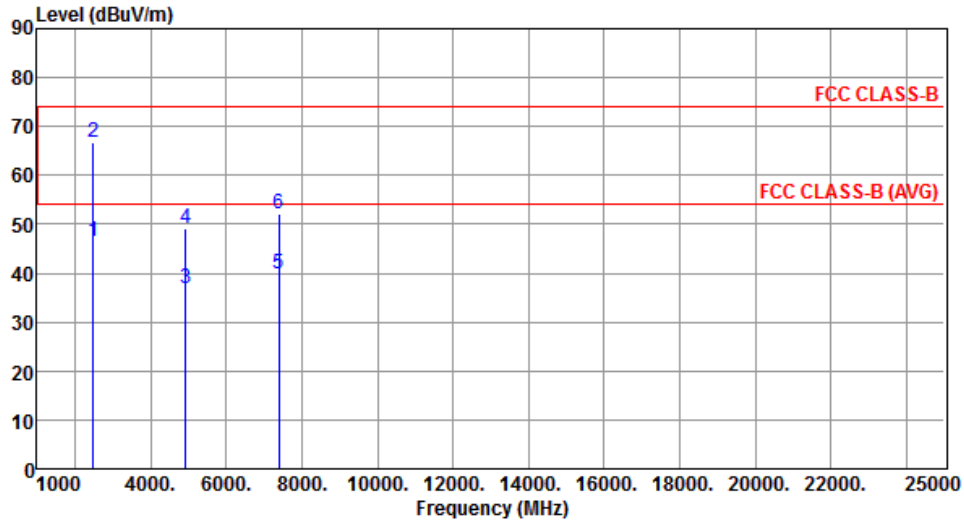
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	49.02	54.00	-4.98	51.46	-2.44	Average	136	199
2	2483.50	71.56	74.00	-2.44	74.00	-2.44	Peak	136	199
3	4924.00	34.10	54.00	-19.90	28.83	5.27	Average	100	293
4	4924.00	45.94	74.00	-28.06	40.67	5.27	Peak	100	293
5	7386.00	38.56	54.00	-15.44	28.93	9.63	Average	261	328
6	7386.00	50.27	74.00	-23.73	40.64	9.63	Peak	261	328

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		



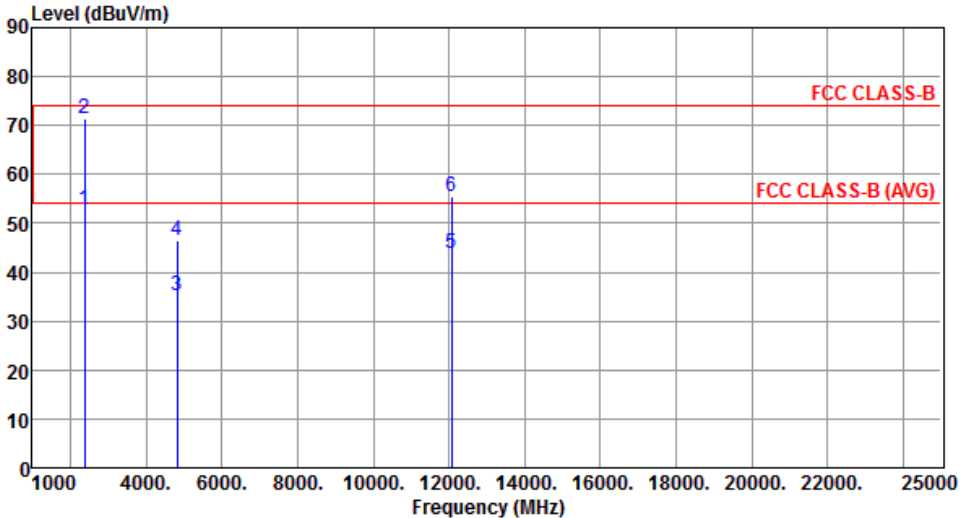
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	46.51	54.00	-7.49	48.95	-2.44	Average	100	254
2	2483.50	66.71	74.00	-7.29	69.15	-2.44	Peak	358	175
3	4924.00	36.74	54.00	-17.26	31.47	5.27	Average	203	145
4	4924.00	49.02	74.00	-24.98	43.75	5.27	Peak	203	145
5	7386.00	39.91	54.00	-14.09	30.28	9.63	Average	162	295
6	7386.00	52.22	74.00	-21.78	42.59	9.63	Peak	162	295

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

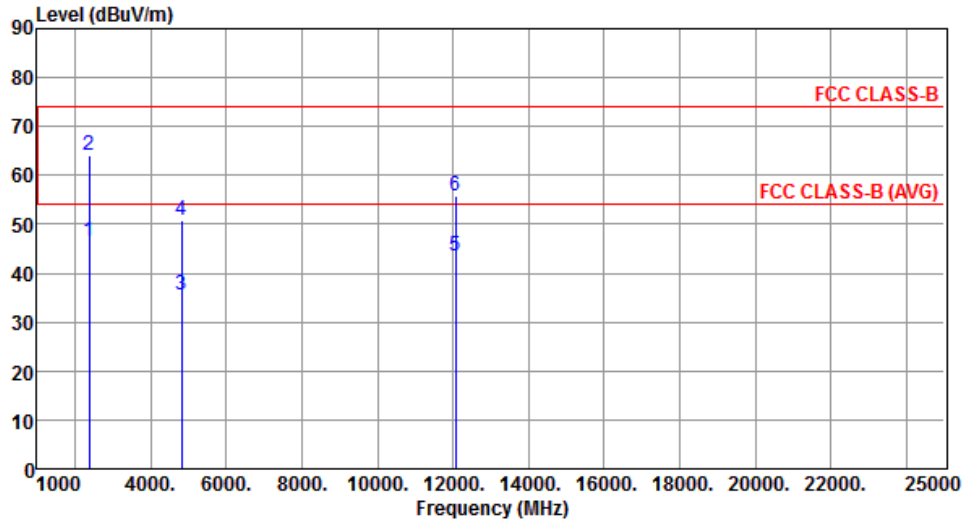
*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

Modulation	HT20	Test Freq. (MHz)	2412						
Polarization	Horizontal								
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2390.00	52.84	54.00	-1.16	55.28	-2.44	Average	114	202
2	2390.00	71.44	74.00	-2.56	73.88	-2.44	Peak	114	202
3	4824.00	35.08	54.00	-18.92	30.17	4.91	Average	162	75
4	4824.00	46.41	74.00	-27.59	41.50	4.91	Peak	162	75
5	12060.00	43.80	54.00	-10.20	30.83	12.97	Average	114	292
6	12060.00	55.34	74.00	-18.66	42.37	12.97	Peak	114	292
<p>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).</p>									

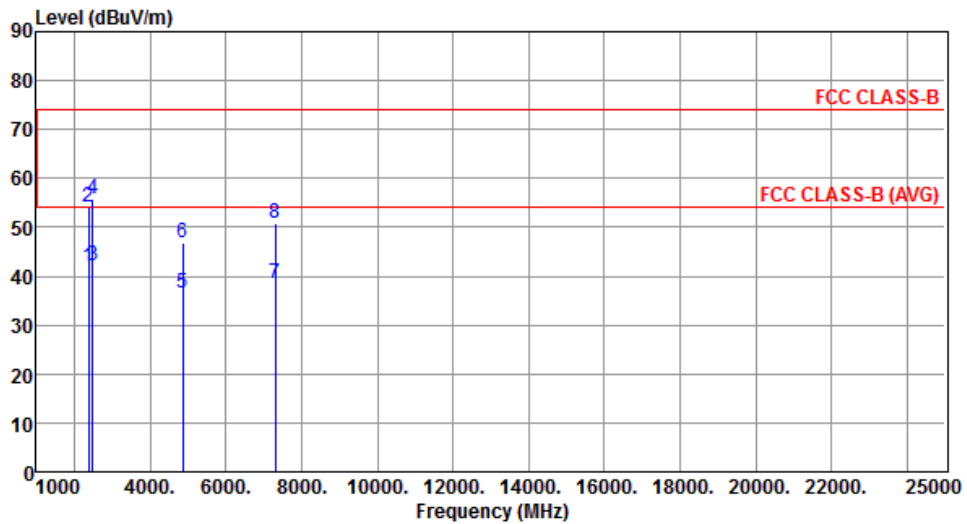
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	46.46	54.00	-7.54	48.90	-2.44	Average	376	177
2	2390.00	64.02	74.00	-9.98	66.46	-2.44	Peak	376	177
3	4824.00	35.65	54.00	-18.35	30.74	4.91	Average	120	156
4	4824.00	50.67	74.00	-23.33	45.76	4.91	Peak	120	156
5	12060.00	43.50	54.00	-10.50	30.53	12.97	Average	247	84
6	12060.00	55.65	74.00	-18.35	42.68	12.97	Peak	247	84

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		



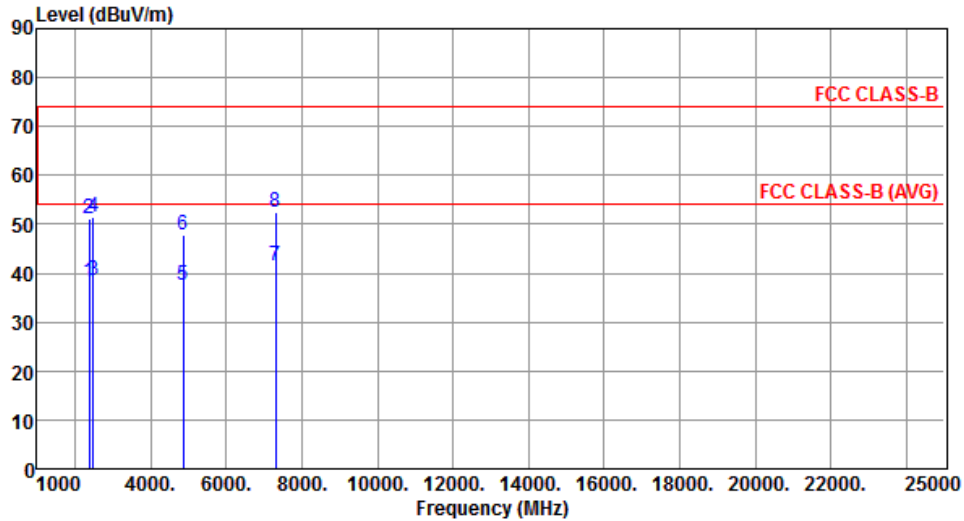
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	41.69	54.00	-12.31	44.13	-2.44	Average	140	200
2	2390.00	54.15	74.00	-19.85	56.59	-2.44	Peak	140	200
3	2483.50	42.24	54.00	-11.76	44.68	-2.44	Average	140	200
4	2483.50	55.64	74.00	-18.36	58.08	-2.44	Peak	140	200
5	4874.00	36.46	54.00	-17.54	31.37	5.09	Average	131	58
6	4874.00	46.78	74.00	-27.22	41.69	5.09	Peak	131	58
7	7311.00	38.52	54.00	-15.48	28.86	9.66	Average	124	179
8	7311.00	50.85	74.00	-23.15	41.19	9.66	Peak	124	179

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		



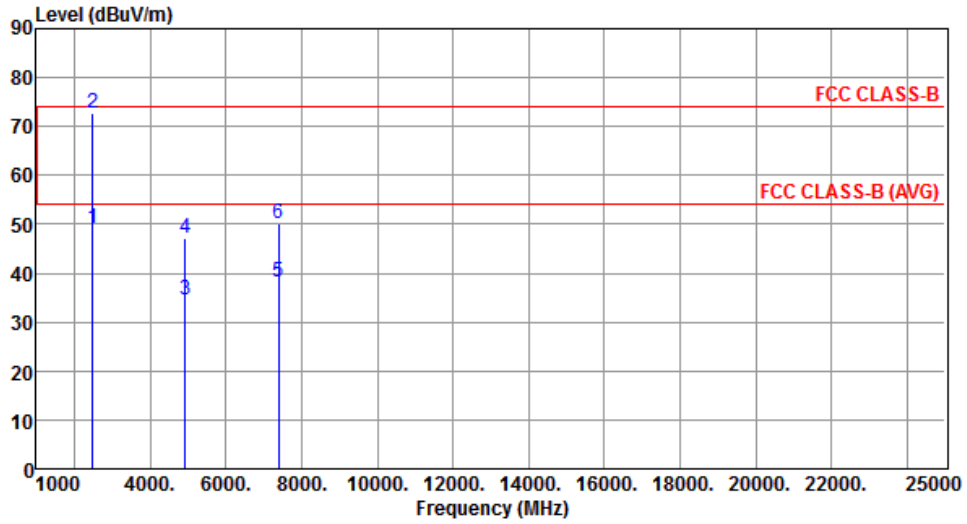
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.28	54.00	-15.72	40.72	-2.44	Average	366	175
2	2390.00	51.25	74.00	-22.75	53.69	-2.44	Peak	366	175
3	2483.50	38.49	54.00	-15.51	40.93	-2.44	Average	366	175
4	2483.50	51.41	74.00	-22.59	53.85	-2.44	Peak	366	175
5	4874.00	37.68	54.00	-16.32	32.59	5.09	Average	129	341
6	4874.00	47.95	74.00	-26.05	42.86	5.09	Peak	129	341
7	7311.00	41.62	54.00	-12.38	31.96	9.66	Average	130	291
8	7311.00	52.45	74.00	-21.55	42.79	9.66	Peak	130	291

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		



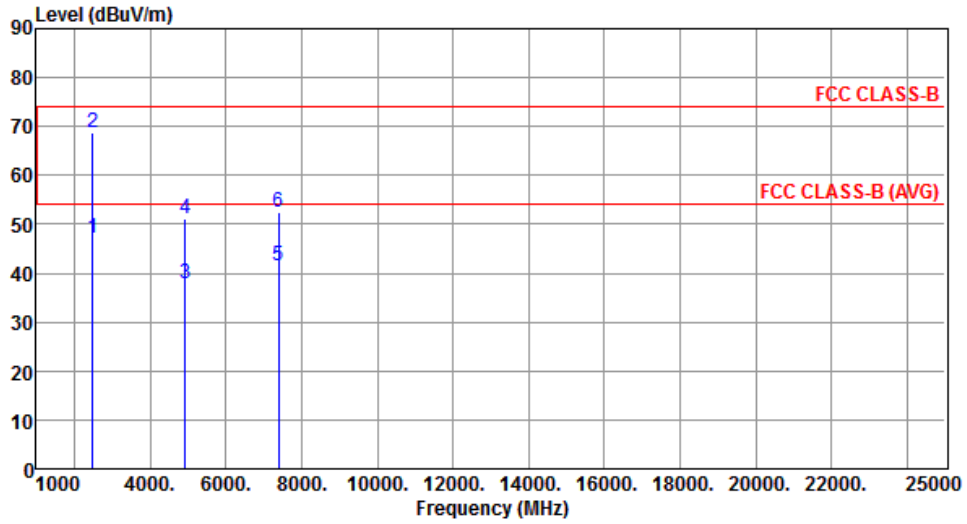
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	49.10	54.00	-4.90	51.54	-2.44	Average	138	201
2	2483.50	72.88	74.00	-1.12	75.32	-2.44	Peak	138	201
3	4924.00	34.59	54.00	-19.41	29.32	5.27	Average	161	158
4	4924.00	47.10	74.00	-26.90	41.83	5.27	Peak	161	158
5	7386.00	38.14	54.00	-15.86	28.51	9.63	Average	263	214
6	7386.00	50.31	74.00	-23.69	40.68	9.63	Peak	263	214

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	47.08	54.00	-6.92	49.52	-2.44	Average	361	175
2	2483.50	68.59	74.00	-5.41	71.03	-2.44	Peak	361	175
3	4924.00	37.85	54.00	-16.15	32.58	5.27	Average	130	165
4	4924.00	51.02	74.00	-22.98	45.75	5.27	Peak	130	165
5	7386.00	41.37	54.00	-12.63	31.74	9.63	Average	346	182
6	7386.00	52.56	74.00	-21.44	42.93	9.63	Peak	346	182

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 Emissions in Non-Restricted Frequency Bands

3.5.1 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

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

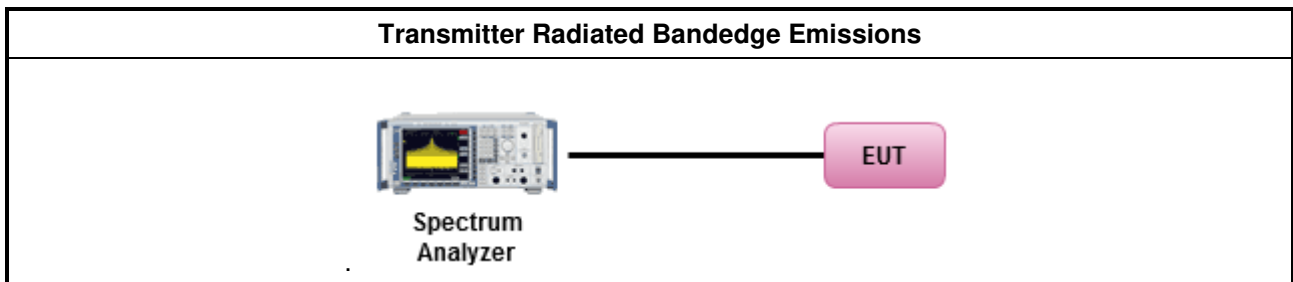
Reference level measurement

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

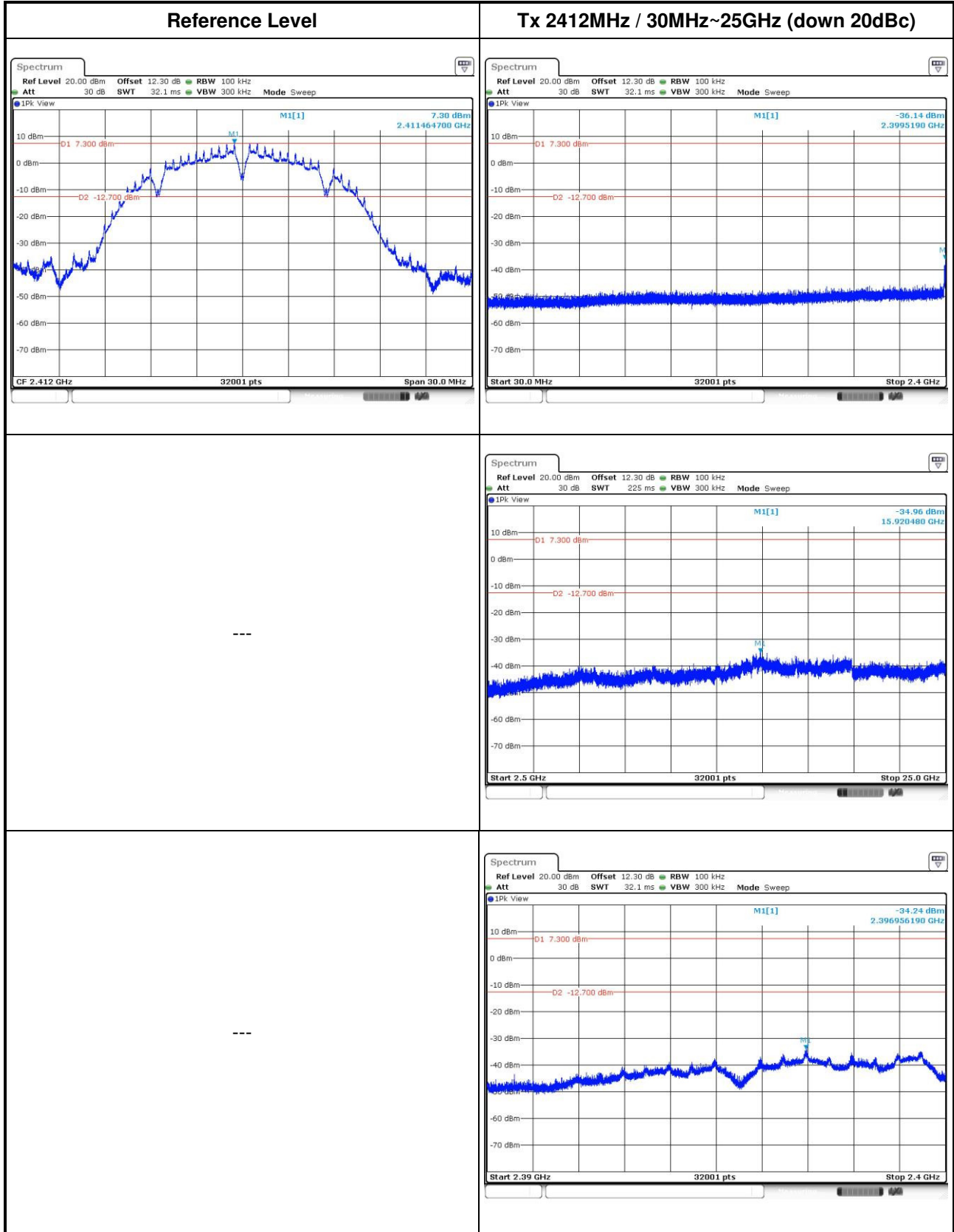
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

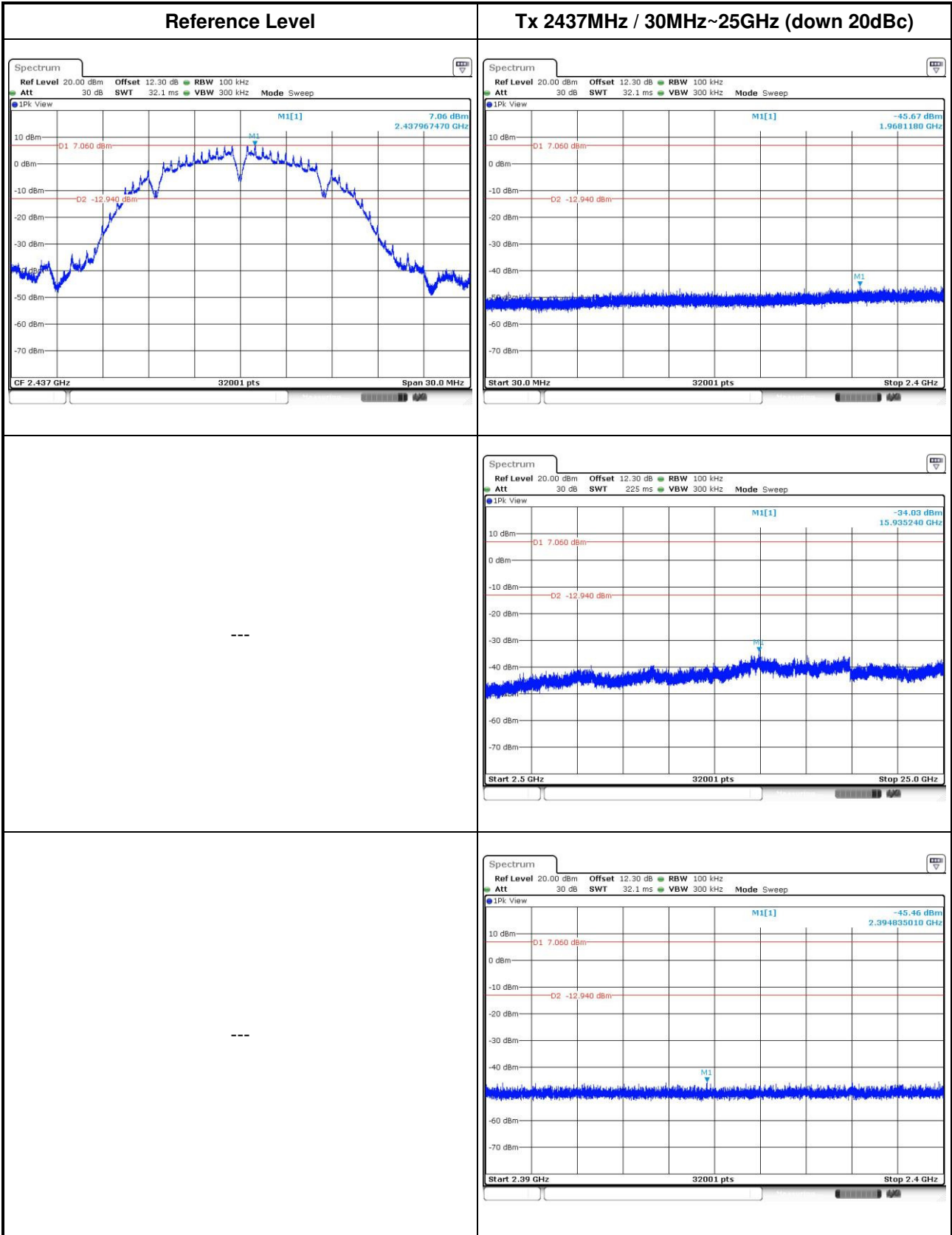
3.5.4 Test Setup

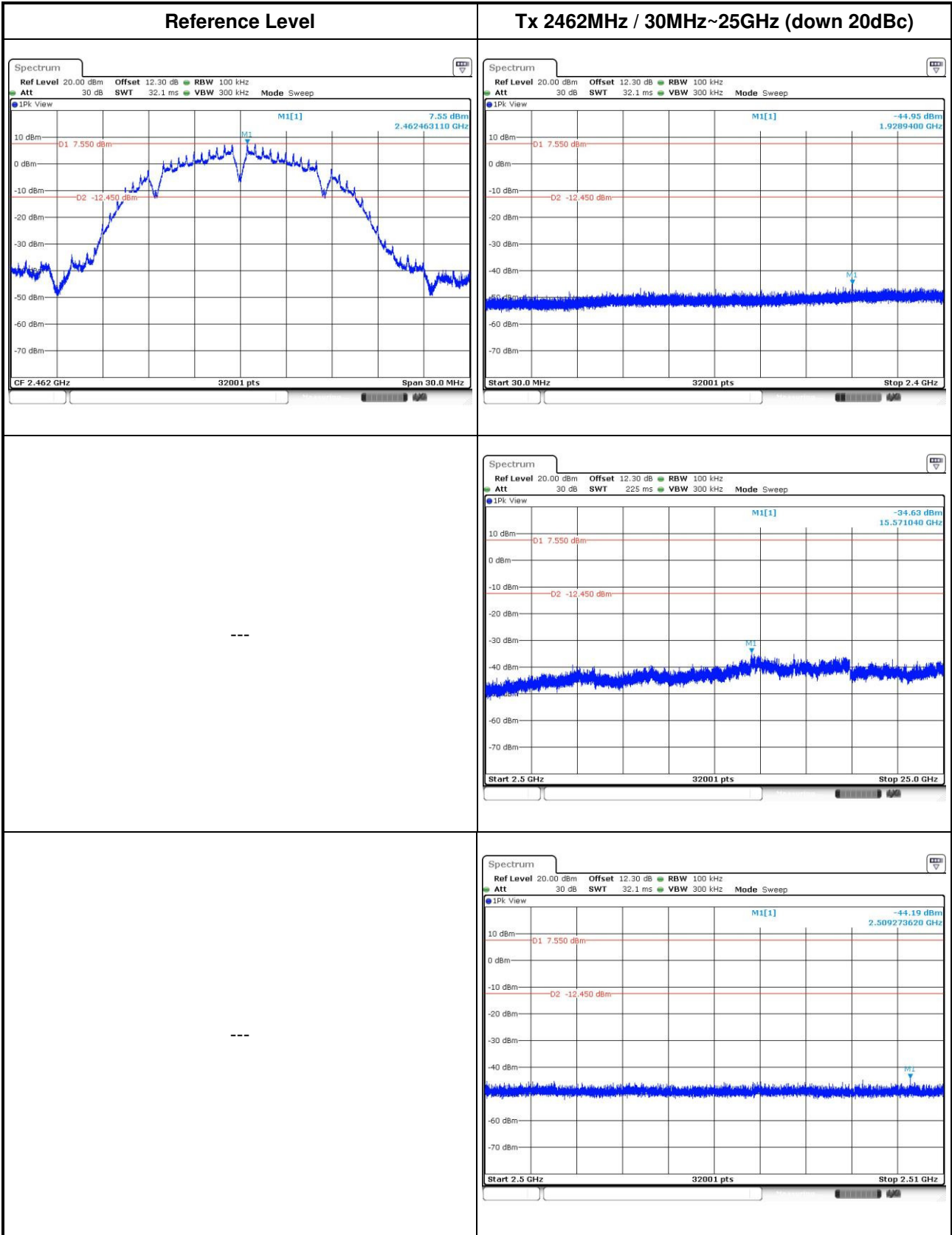


3.5.5 Unwanted Emissions into Non-Restricted Frequency Bands

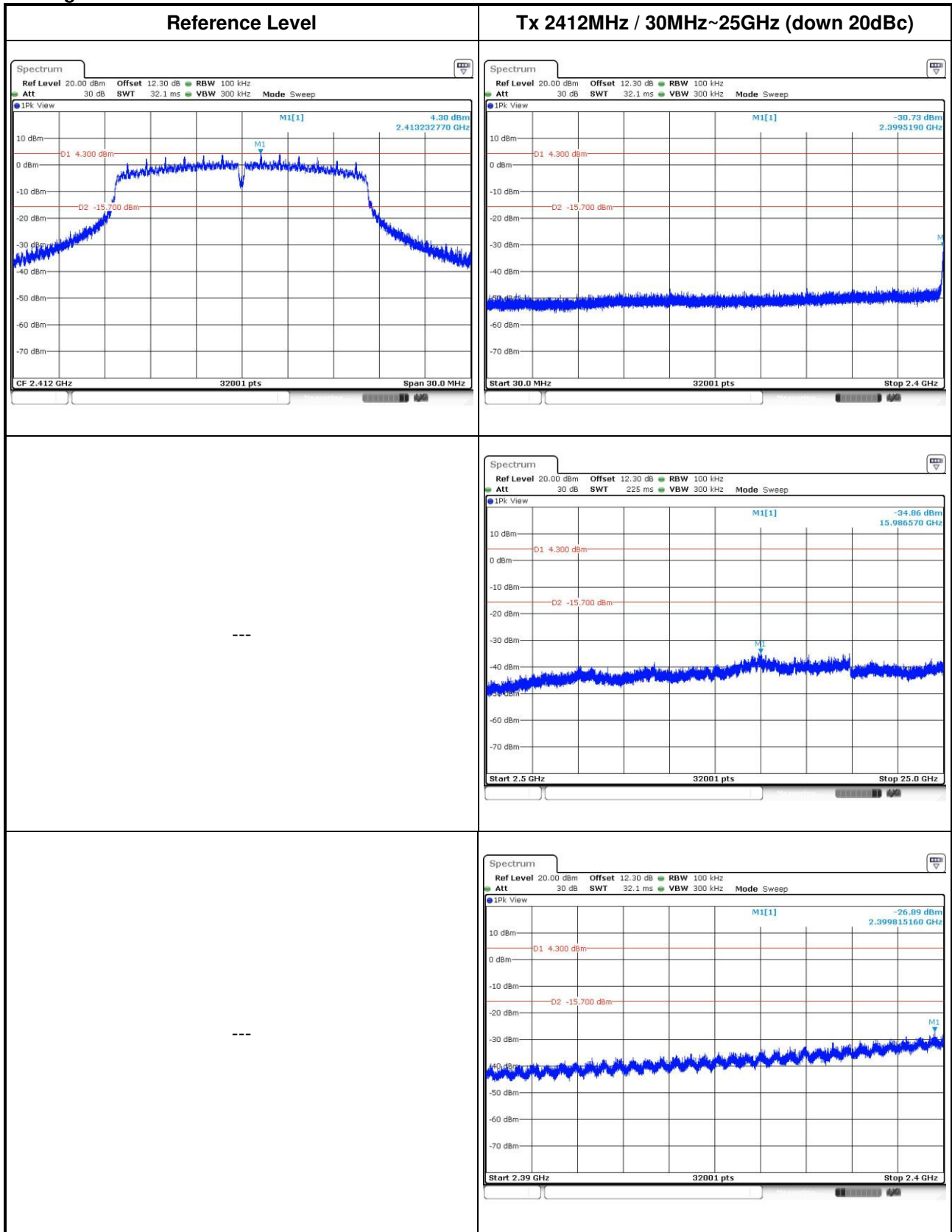
802.11b

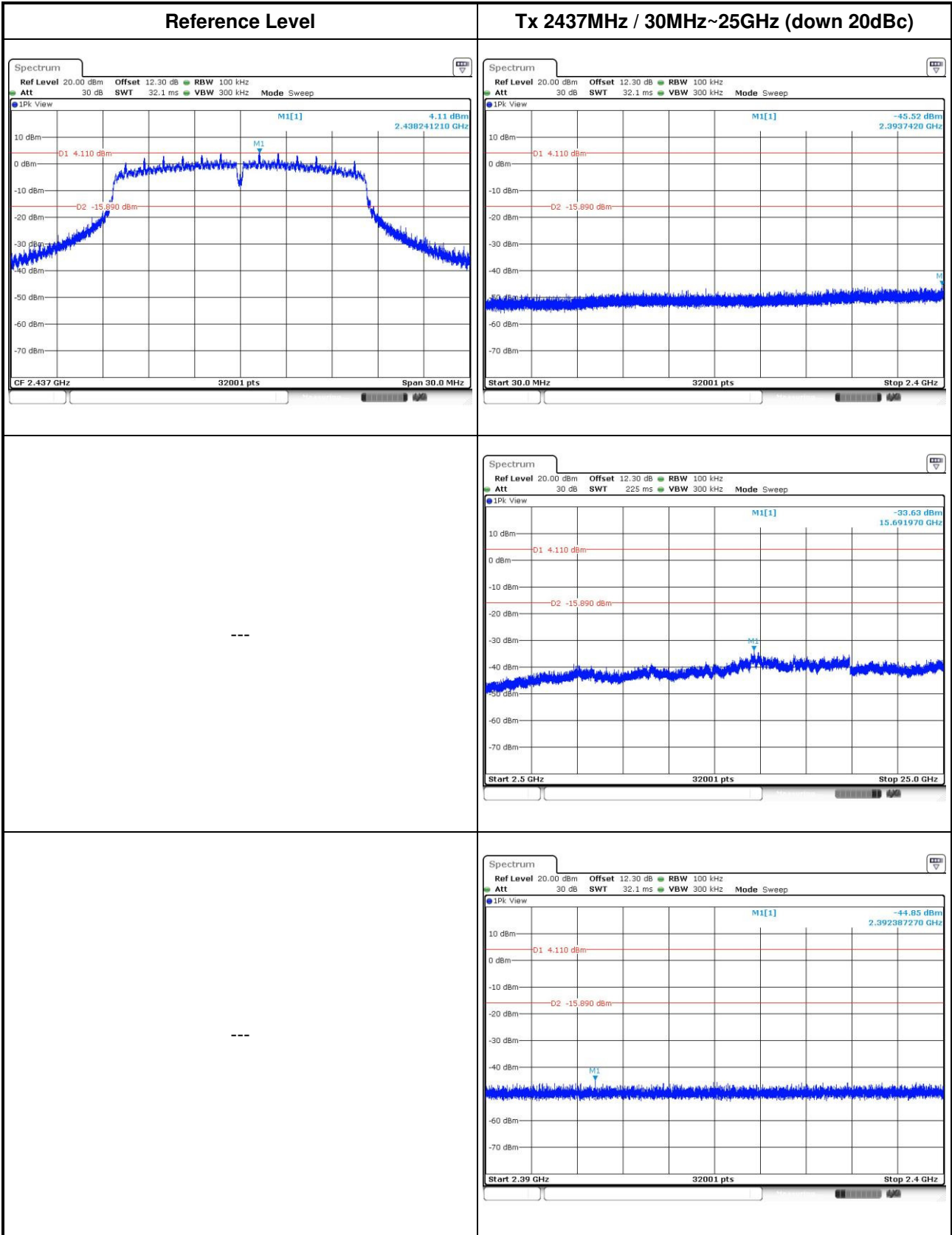


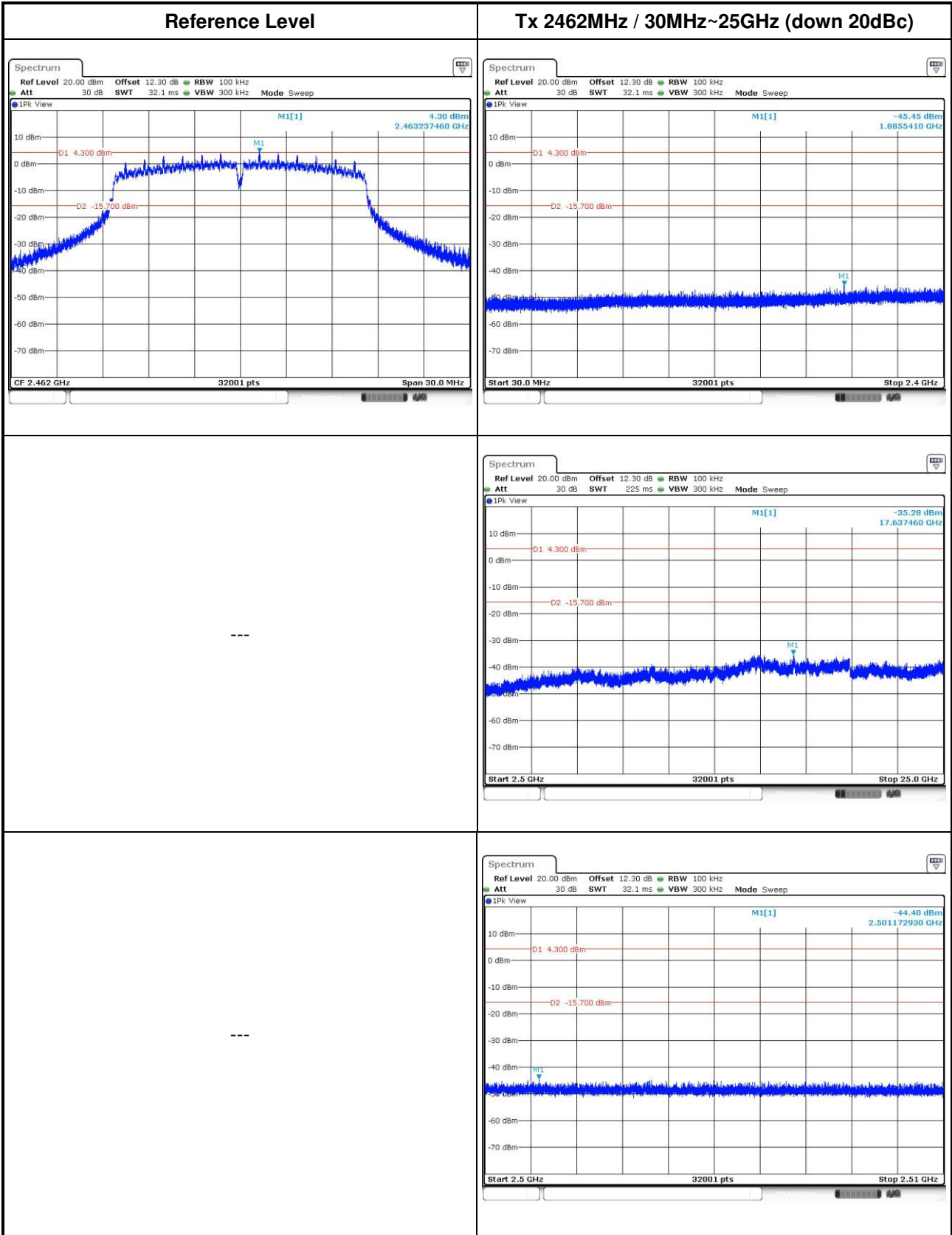




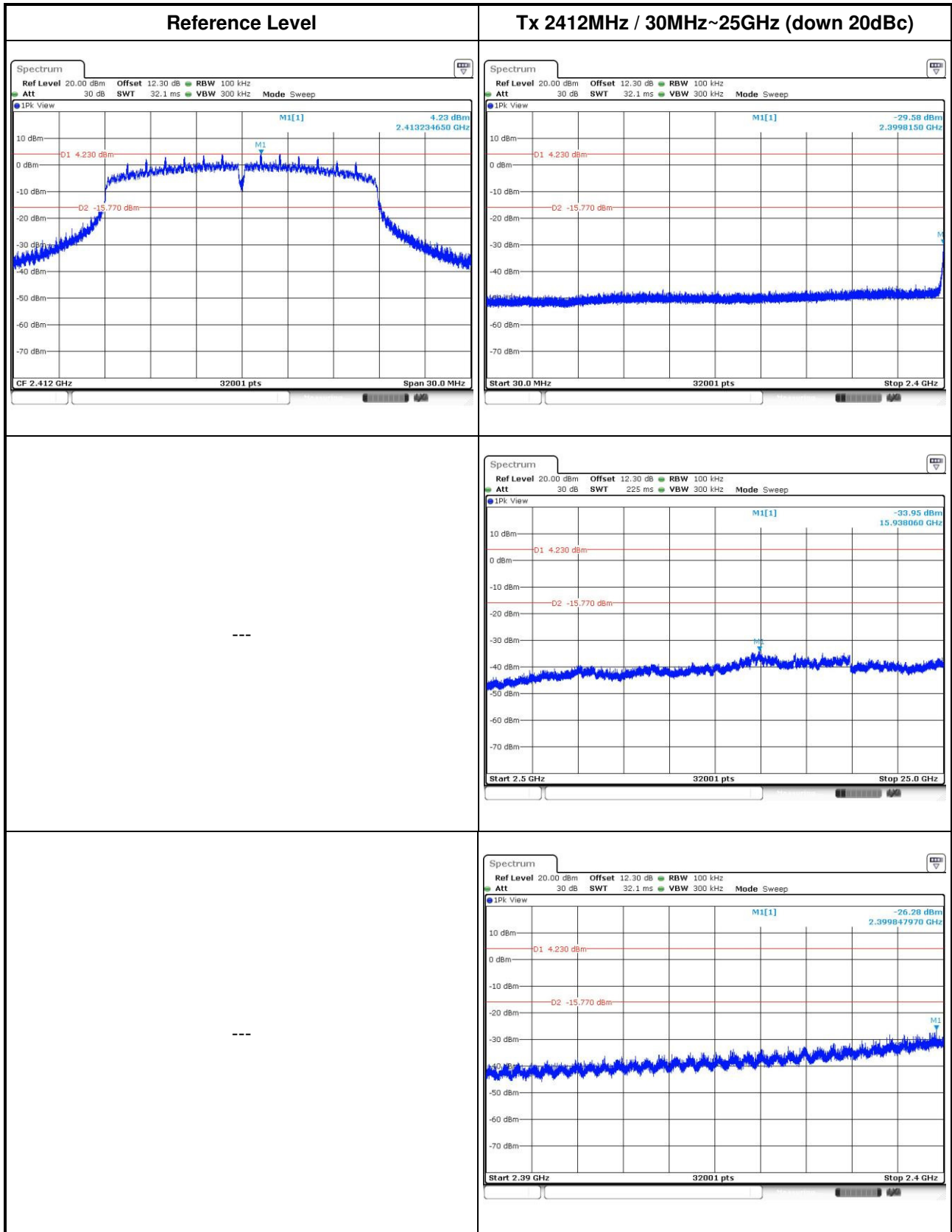
802.11g

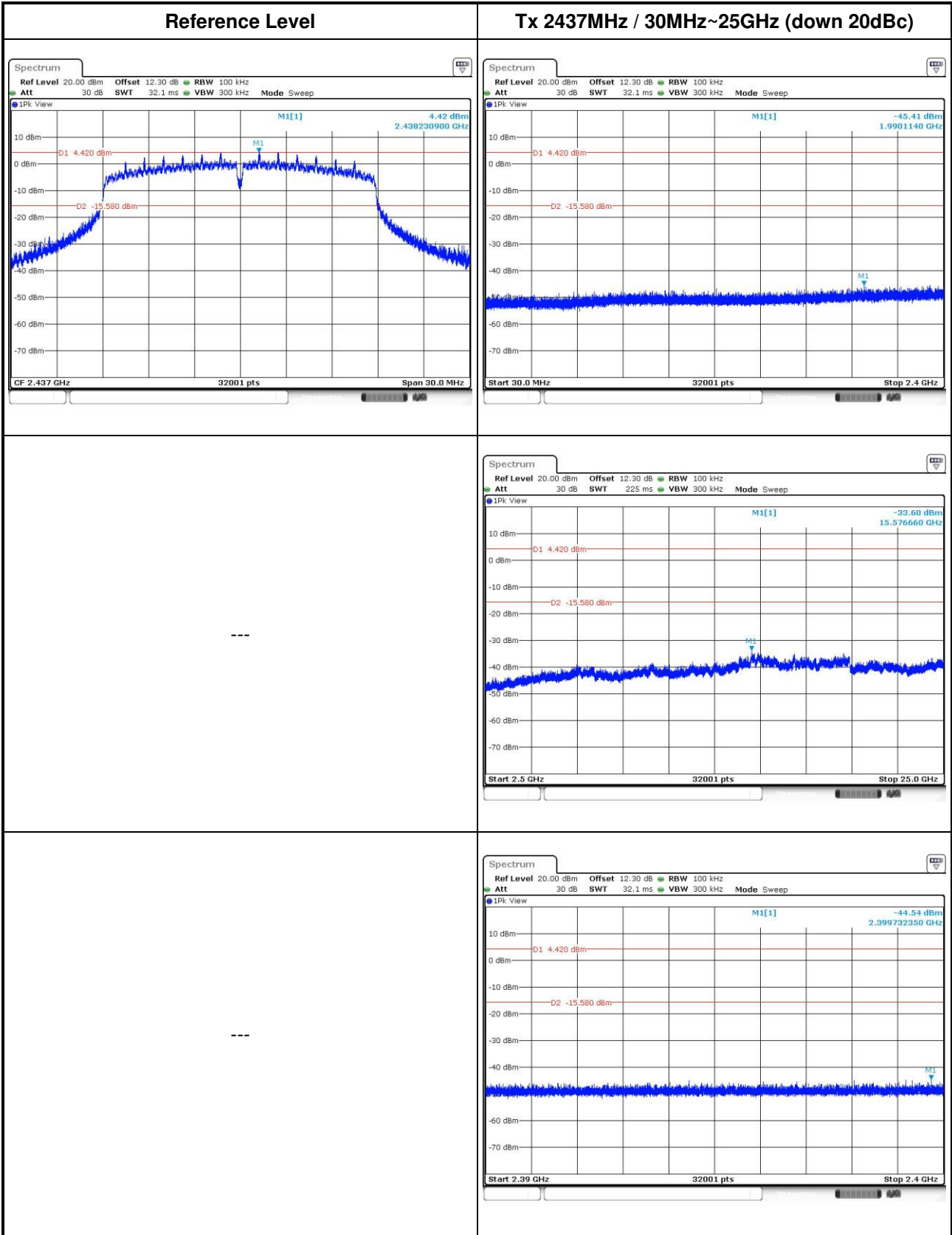


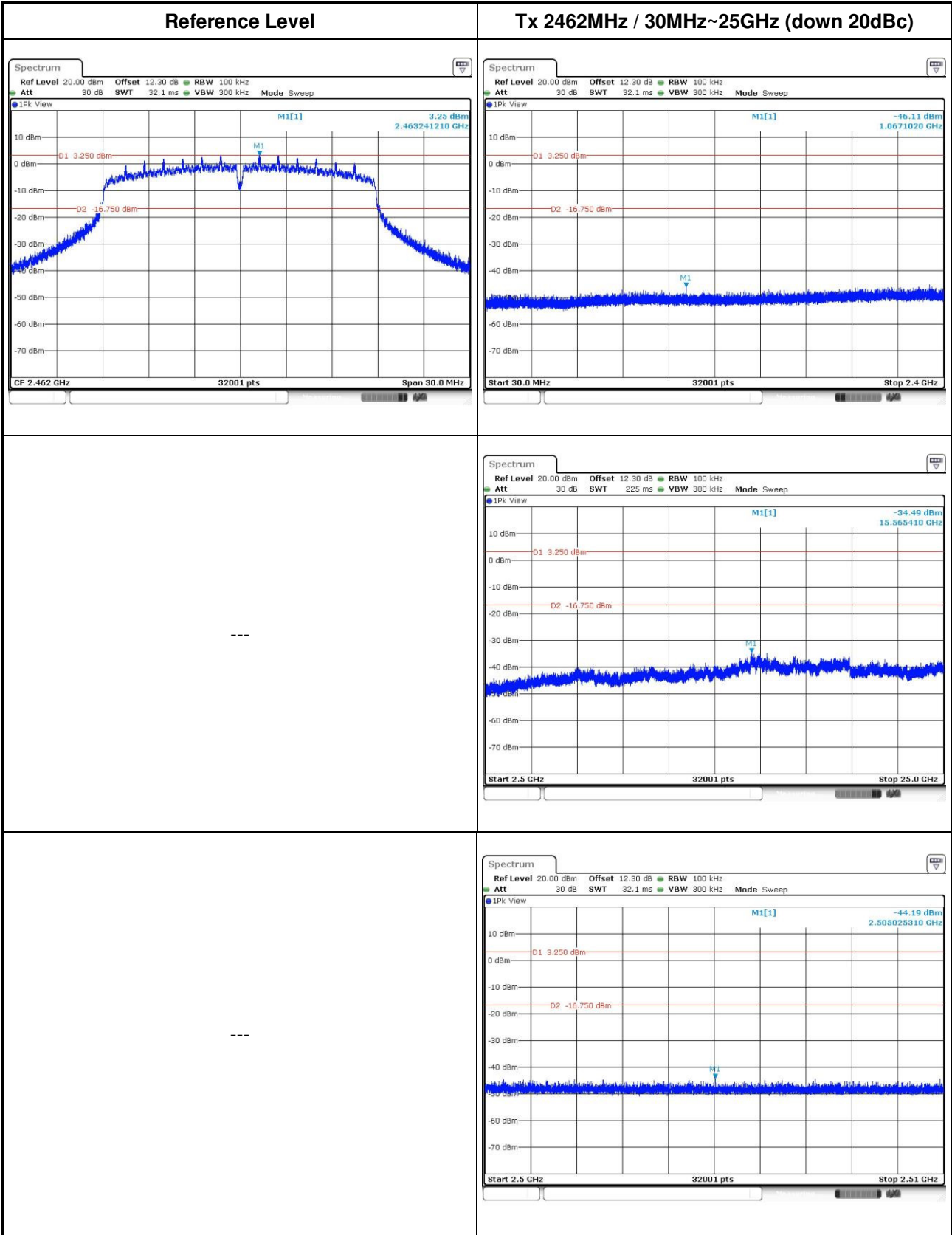




802.11n HT20







4 Test laboratory information

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

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

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

Linkou

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No. 30-2, Ding Fwu Tsuen, Lin
Kou District, New Taipei City,
Taiwan, R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd St.,
Kwei Shan District, Tao Yuan City
333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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.

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Email: ICC_Service@icertifi.com.tw

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