FCC C2PC Test Report

FCC ID	:	**RYK-WPEQ257ACN**
Equipment	:	**802.11ac/b/g/n Mini PCIe Module**
Model No.	:	**WPEQ-257ACN**
Brand Name	:	**SparkLAN**
Applicant	:	**SparkLAN Communications, Inc.**
Address	:	**8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan.**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Oct. 16, 2019**
Tested Date	:	**Oct. 19 ~ Nov. 01, 2019**

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

Reviewed by: **Approved by:**

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

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR660602AC	Rev. 01	Initial issue	Nov. 27, 2019

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.502MHz 39.13 (Margin -16.87dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2390.00MHz 53.71 (Margin -0.29dB) - AV	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

This report is issued as a Class II Permissive Change. The difference is adding antennas.
Therefore, conducted emissions & radiated emission is performed for this C2PC.

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11**	**Ch. Freq. (MHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**Data Rate / MCS**
2400-2483.5	b	2412-2462	1-11 [11]	2	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	2	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	MCS 0-15
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	MCS 0-15
Note 1: RF output power specifies that Maximum Peak Conducted Output Power. Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation. Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.					

1.1.2 Antenna Details (Adding antenna were marked in boldface)

Ant. No.	**Brand**	**Model**	**Type**	**Connector**	**Operating Frequencies(GHz) / Antenna Gain (dBi)**		
					2.4~2.4835	**5.15~5.25**	**5.725~5.85**
1	Wanshih Electronic Co., Ltd.	WSS038	Dipole	RP-SMA	4.6	5	5
2	Long Cheng Tech. Int'l Co., Ltd.	DB B-SMA THIN PADDLE Ant. GEC6200	Dipole	RP-SMA	3	5	5
3	**SparkLAN Communications, Inc.**	**AD-103AG**	**Dipole**	**RP-SMA**	**2.02**	**1.93**	**2.03**
4	**SparkLAN Communications, Inc.**	**AD-302N**	**Dipole**	**RP-SMA**	**3.14**	**2.74**	**2.35**
5	**SparkLAN Communications, Inc.**	**AD-303N**	**Dipole**	**RP-SMA**	**3.14**	**2.82**	**2.97**
6	**TAOGLAS**	**FXP522.A.07.A.001**	**Monopole**	**IPEX**	**Port 1: 3.78 Port 2: 3.15**	**Port 1: 4.63 Port 2: 4.61**	**Port 1: 4.63 Port 2: 4.61**

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host

1.1.4 Accessories

N/A

1.1.5 Channel List

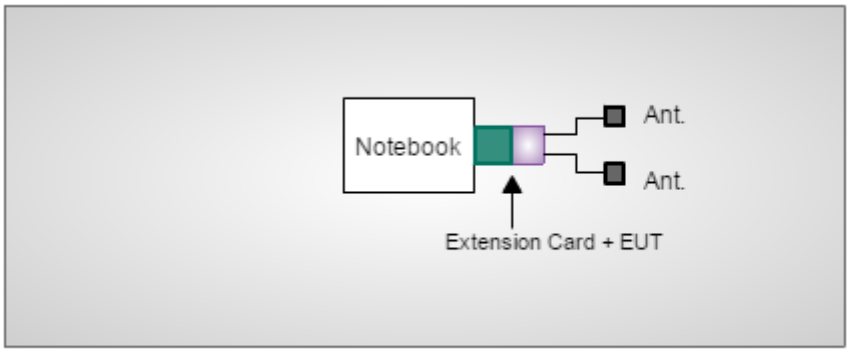
Frequency band (MHz)		2400~2483.5	
802.11 b / g / n HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	3	2422
2	2417	4	2427
3	2422	5	2432
4	2427	6	2437
5	2432	7	2442
6	2437	8	2447
7	2442	9	2452
8	2447	---	---
9	2452	---	---
10	2457	---	---
11	2462	---	---

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6430	DoC	---
2.	Extension Card	---	---	---	---

1.3 Test Setup Chart

Test Setup Diagram



**Antenna distance 5cm

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Oct. 31, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Jan. 08, 2019	Jan. 07, 2020
LISN	R&S	ENV216	101579	Mar. 08, 2019	Mar. 07, 2020
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 22, 2019	Oct. 21, 2020
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Oct. 19 ~ Nov. 01, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Dec. 27, 2018	Dec. 26, 2019
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 12, 2019	Jul. 11, 2020
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 18, 2018	Dec. 17, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 07, 2019	Oct. 06, 2020
Preamplifier	EMC	EMC02325	980225	Jul. 09, 2019	Jul. 08, 2020
Preamplifier	Agilent	83017A	MY39501308	Oct. 08, 2019	Oct. 07, 2020
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020
RF Cable	EMC	EMC104-SM-SM-8000	181106	Oct. 07, 2019	Oct. 06, 2020
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 07, 2019	Oct. 06, 2020
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 07, 2019	Oct. 06, 2020
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 07, 2019	Oct. 06, 2020
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 07, 2019	Oct. 06, 2020
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 07, 2019	Oct. 06, 2020
Measurement Software	AUDIX	e3	6.120210g	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 15.247 Meas Guidance v05r02
FCC KDB 662911 D01 Multiple Transmitter Output v02r01

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 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**
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.41 dB
Radiated emission > 1GHz	±4.59 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 58%	Akun Chung
Radiated Emissions	03CH01-WS	24-25°C / 61-65%	Roger Lu

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	11g	2437	6 Mbps	---
Radiated Emissions ≤1GHz	11g	2437	6 Mbps	---
Radiated Emissions >1GHz	11b 11g HT20 HT40	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **X-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 Conducted Emissions

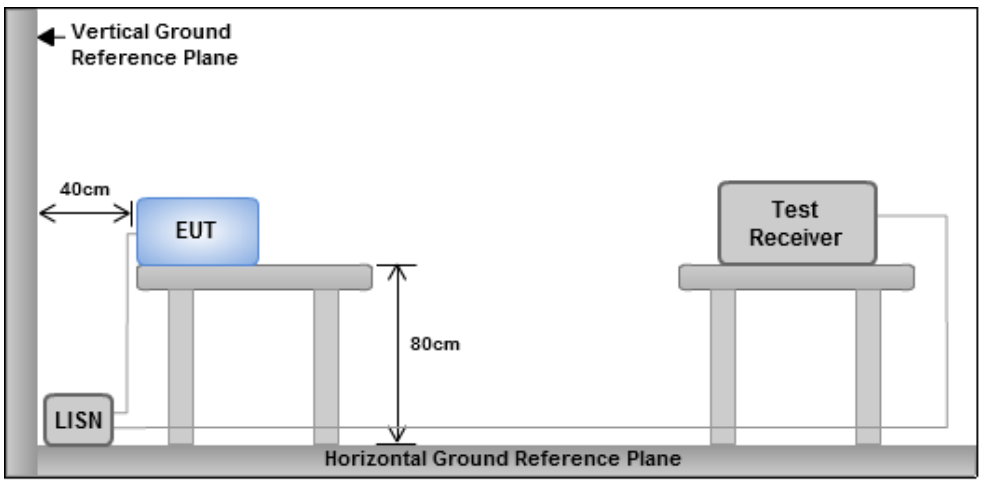
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

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

3.1.3 Test Setup

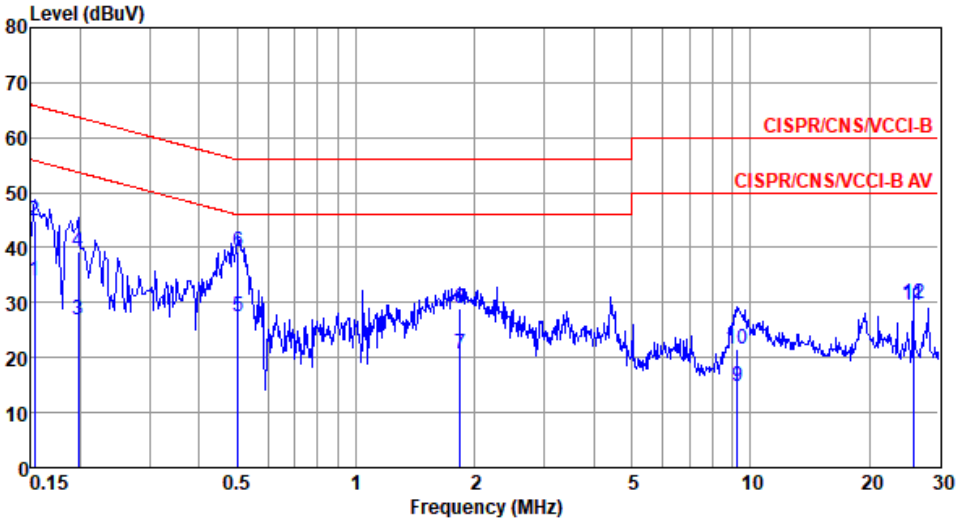


Note: 1. Support units were connected to second LISN.

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

3.1.4 Test Result of Conducted Emissions

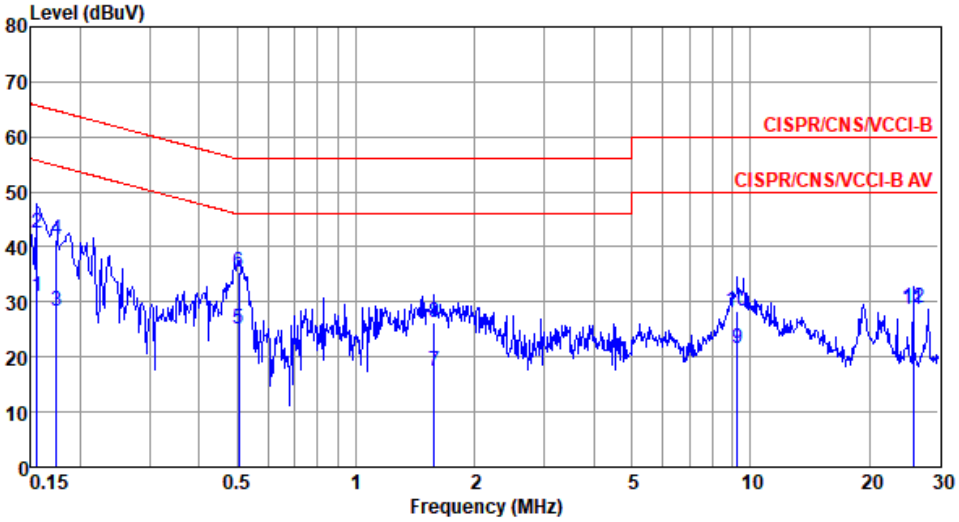
Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.153	33.90	55.82	-21.92	24.32	9.53	0.05	Average
2	0.153	44.80	65.82	-21.02	35.22	9.53	0.05	QP
3	0.198	26.97	53.71	-26.74	17.37	9.54	0.06	Average
4	0.198	39.34	63.71	-24.37	29.74	9.54	0.06	QP
5	0.502	27.57	46.00	-18.43	17.90	9.58	0.09	Average
6*	0.502	39.13	56.00	-16.87	29.46	9.58	0.09	QP
7	1.839	20.60	46.00	-25.40	10.83	9.60	0.17	Average
8	1.839	28.81	56.00	-27.19	19.04	9.60	0.17	QP
9	9.253	14.79	50.00	-35.21	4.76	9.65	0.38	Average
10	9.253	21.69	60.00	-38.31	11.66	9.65	0.38	QP
11	25.870	29.38	50.00	-20.62	19.03	9.63	0.72	Average
12	25.870	29.95	60.00	-30.05	19.60	9.63	0.72	QP

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

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



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.156	31.04	55.69	-24.65	21.42	9.57	0.05	Average
2	0.156	42.62	65.69	-23.07	33.00	9.57	0.05	QP
3	0.174	28.31	54.77	-26.46	18.67	9.58	0.06	Average
4	0.174	41.39	64.77	-23.38	31.75	9.58	0.06	QP
5	0.505	25.09	46.00	-20.91	15.38	9.62	0.09	Average
6*	0.505	35.48	56.00	-20.52	25.77	9.62	0.09	QP
7	1.577	17.54	46.00	-28.46	7.73	9.65	0.16	Average
8	1.577	26.25	56.00	-29.75	16.44	9.65	0.16	QP
9	9.253	21.50	50.00	-28.50	11.41	9.71	0.38	Average
10	9.253	28.26	60.00	-31.74	18.17	9.71	0.38	QP
11	25.869	28.53	50.00	-21.47	17.99	9.82	0.72	Average
12	25.869	28.94	60.00	-31.06	18.40	9.82	0.72	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 Unwanted Emissions into Restricted Frequency Bands

3.2.1 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.

3.2.2 Test Procedures

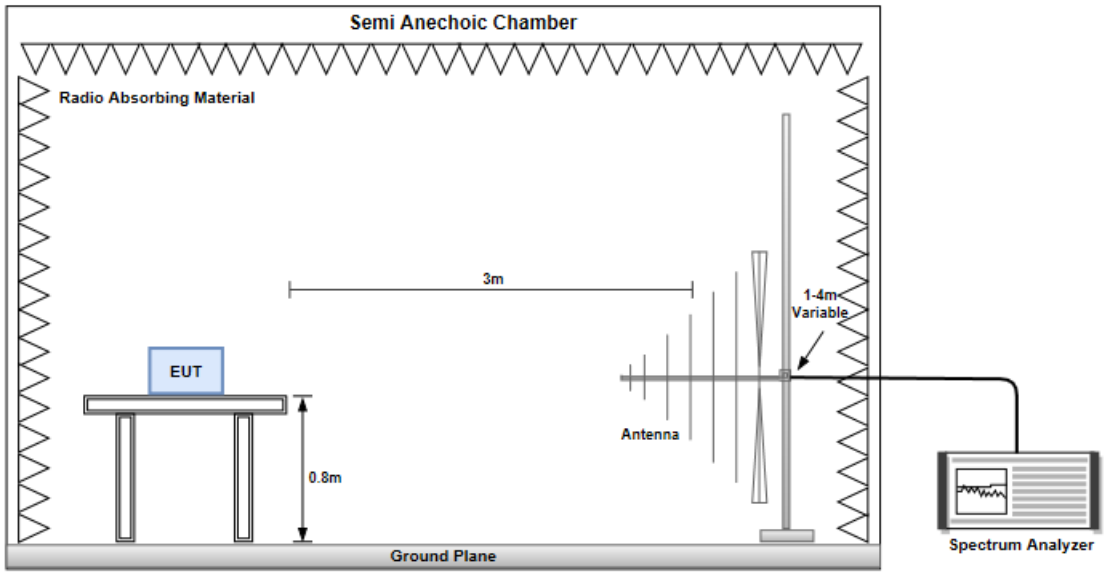
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

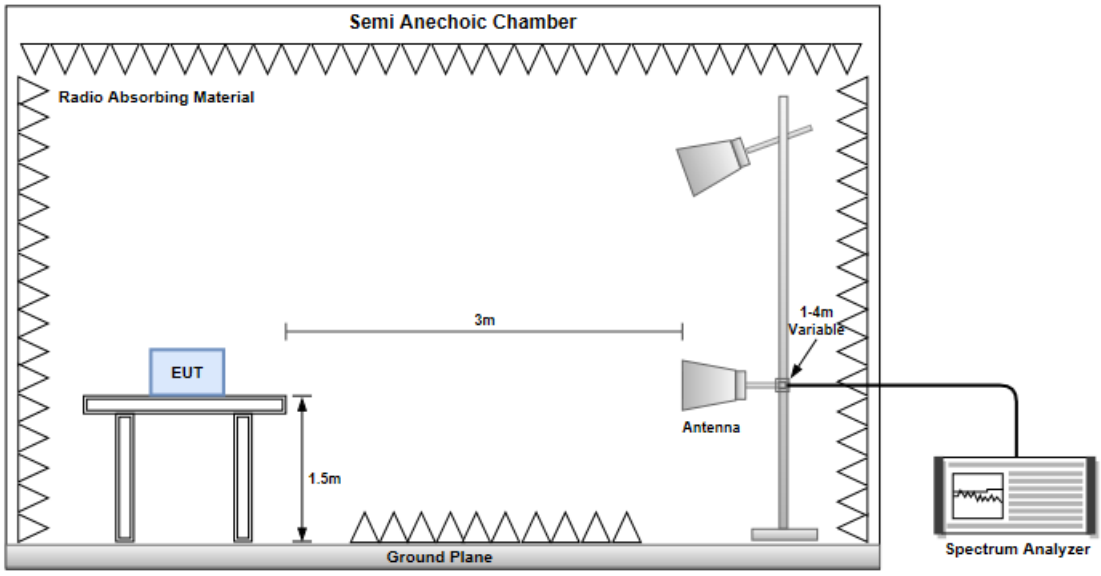
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.2.3 Test Setup

Radiated Emissions below 1 GHz

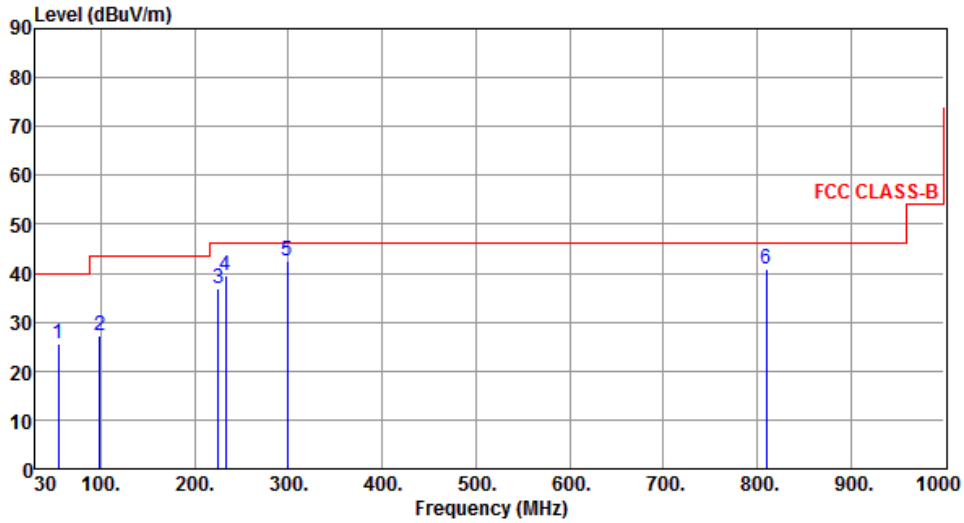


Radiated Emissions above 1 GHz



3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

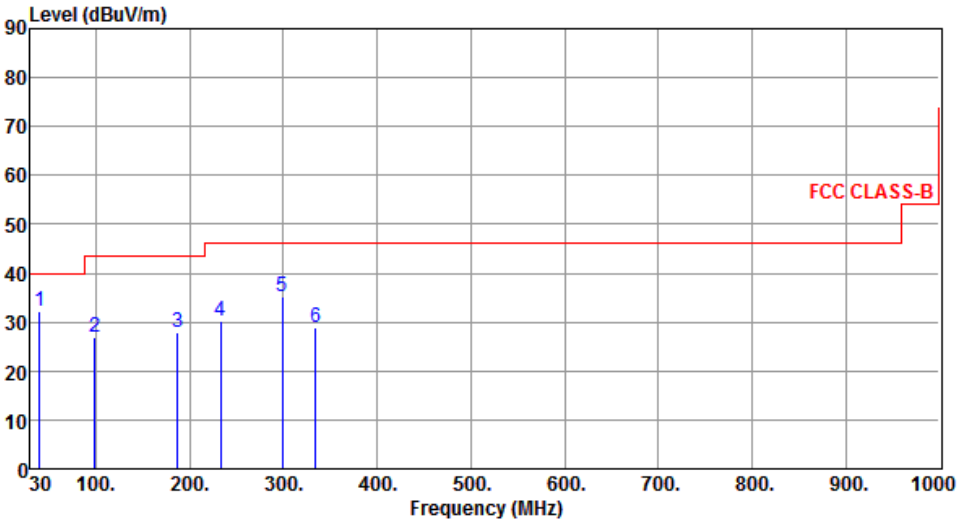
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	54.25	25.47	40.00	-14.53	34.01	-8.54	Peak	---	---
2	98.87	27.10	43.50	-16.40	40.32	-13.22	Peak	---	---
3	224.97	36.71	46.00	-9.29	48.73	-12.02	Peak	---	---
4	232.73	39.38	46.00	-6.62	50.54	-11.16	Peak	---	---
5	298.69	42.41	46.00	-3.59	50.53	-8.12	Peak	---	---
6	809.88	41.00	46.00	-5.00	38.39	2.61	Peak	---	---

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

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

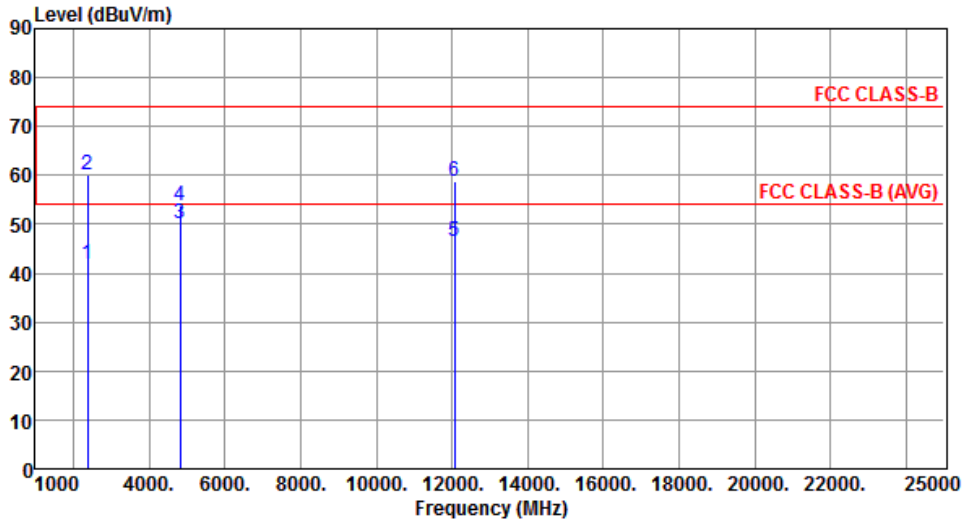


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	39.70	32.20	40.00	-7.80	40.92	-8.72	Peak	---	---
2	98.87	26.92	43.50	-16.58	40.14	-13.22	Peak	---	---
3	187.14	27.80	43.50	-15.70	38.69	-10.89	Peak	---	---
4	232.73	30.37	46.00	-15.63	41.53	-11.16	Peak	---	---
5	298.69	35.20	46.00	-10.80	43.32	-8.12	Peak	---	---
6	334.58	28.99	46.00	-17.01	36.12	-7.13	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.

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

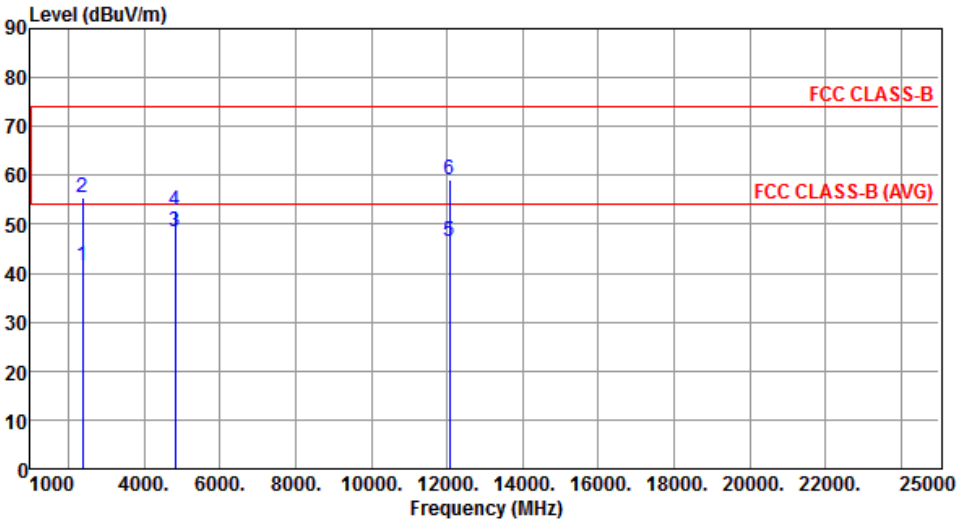
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	42.00	54.00	-12.00	44.82	-2.82	Average	100	84
2	2390.00	60.01	74.00	-13.99	62.83	-2.82	Peak	100	84
3	4824.00	50.01	54.00	-3.99	46.46	3.55	Average	105	117
4	4824.00	53.87	74.00	-20.13	50.32	3.55	Peak	105	117
5	12060.00	46.49	54.00	-7.51	32.66	13.83	Average	100	40
6	12060.00	58.94	74.00	-15.06	45.11	13.83	Peak	100	40

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

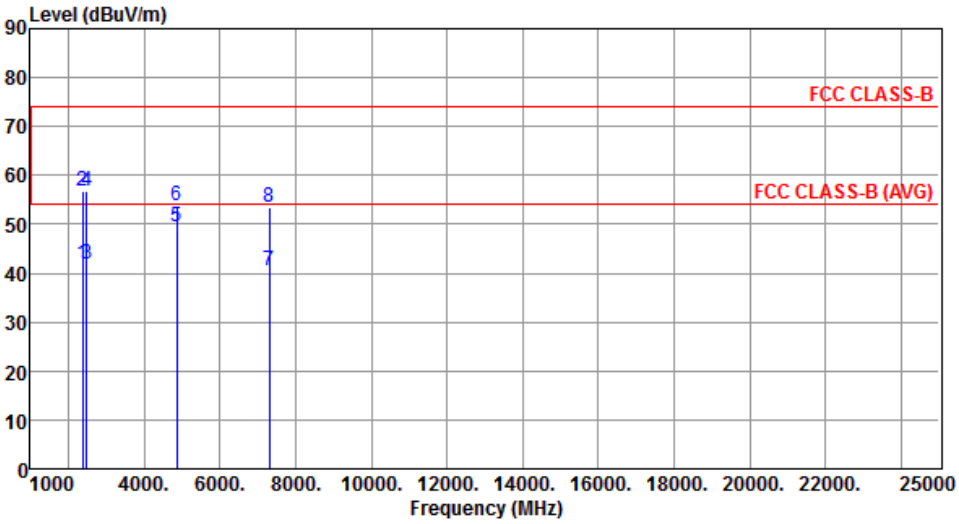
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	41.65	54.00	-12.35	44.47	-2.82	Average	274	269
2	2390.00	55.56	74.00	-18.44	58.38	-2.82	Peak	274	269
3	4824.00	48.63	54.00	-5.37	45.08	3.55	Average	101	264
4	4824.00	52.97	74.00	-21.03	49.42	3.55	Peak	101	264
5	12060.00	46.40	54.00	-7.60	32.57	13.83	Average	100	50
6	12060.00	59.02	74.00	-14.98	45.19	13.83	Peak	100	50

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).

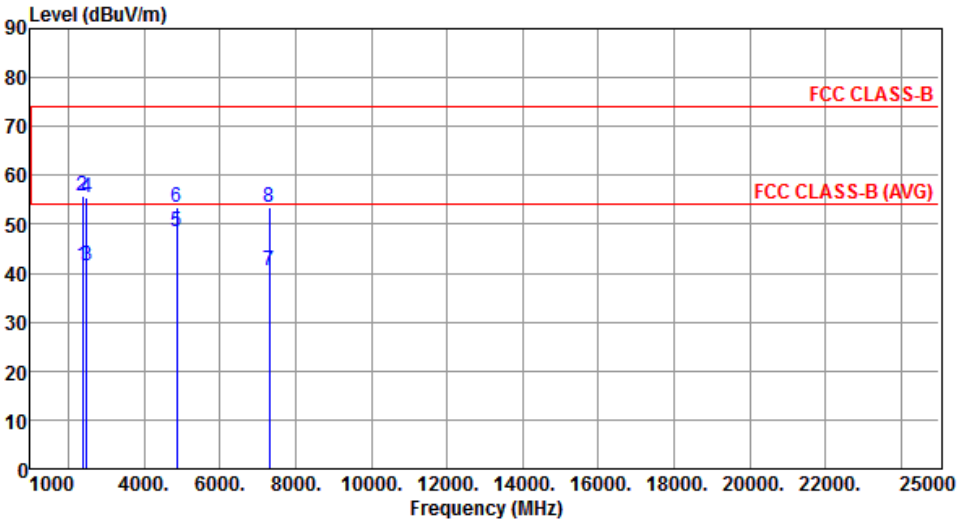
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	42.00	54.00	-12.00	44.82	-2.82	Average	100	97
2	2390.00	56.89	74.00	-17.11	59.71	-2.82	Peak	100	97
3	2483.50	41.71	54.00	-12.29	44.67	-2.96	Average	100	97
4	2483.50	56.67	74.00	-17.33	59.63	-2.96	Peak	100	97
5	4874.00	49.52	54.00	-4.48	45.93	3.59	Average	115	107
6	4874.00	53.85	74.00	-20.15	50.26	3.59	Peak	115	107
7	7311.00	40.37	54.00	-13.63	31.18	9.19	Average	100	50
8	7311.00	53.49	74.00	-20.51	44.30	9.19	Peak	100	50

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).

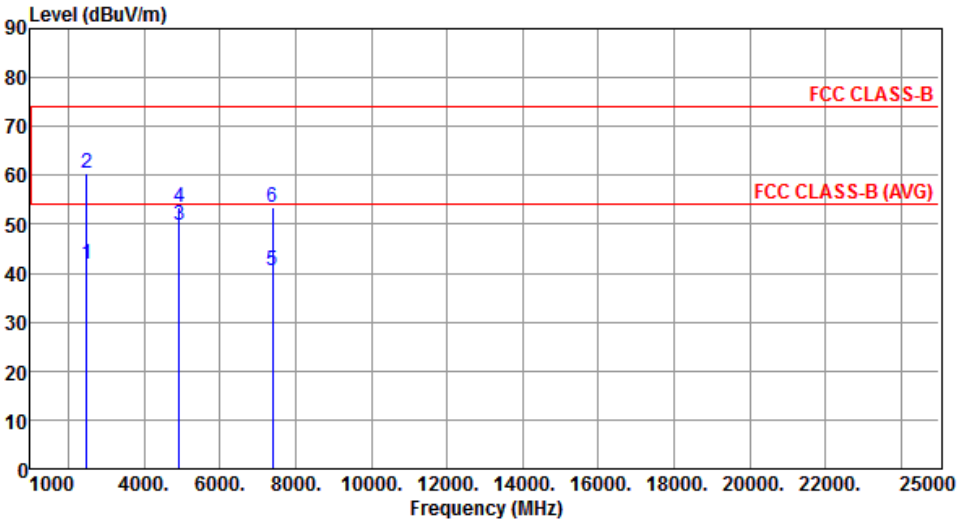
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	41.67	54.00	-12.33	44.49	-2.82	Average	275	266
2	2390.00	55.73	74.00	-18.27	58.55	-2.82	Peak	275	266
3	2483.50	41.66	54.00	-12.34	44.62	-2.96	Average	275	266
4	2483.50	55.60	74.00	-18.40	58.56	-2.96	Peak	275	266
5	4874.00	48.48	54.00	-5.52	44.89	3.59	Average	101	266
6	4874.00	53.43	74.00	-20.57	49.84	3.59	Peak	101	266
7	7311.00	40.47	54.00	-13.53	31.28	9.19	Average	100	30
8	7311.00	53.47	74.00	-20.53	44.28	9.19	Peak	100	30

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).

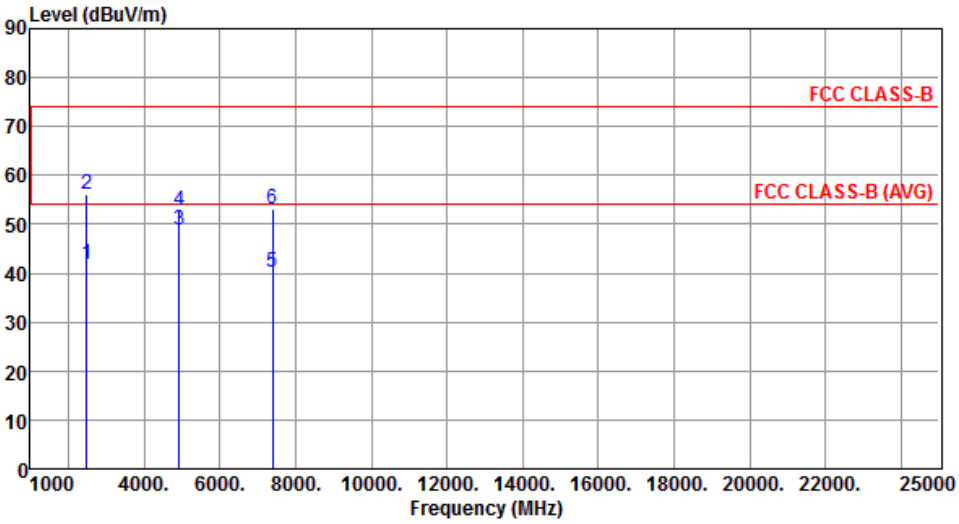
Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	41.98	54.00	-12.02	44.94	-2.96	Average	100	86
2	2483.50	60.56	74.00	-13.44	63.52	-2.96	Peak	100	86
3	4924.00	49.88	54.00	-4.12	46.19	3.69	Average	105	100
4	4924.00	53.55	74.00	-20.45	49.86	3.69	Peak	105	100
5	7386.00	40.39	54.00	-13.61	31.46	8.93	Average	100	60
6	7386.00	53.36	74.00	-20.64	44.43	8.93	Peak	100	60

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		

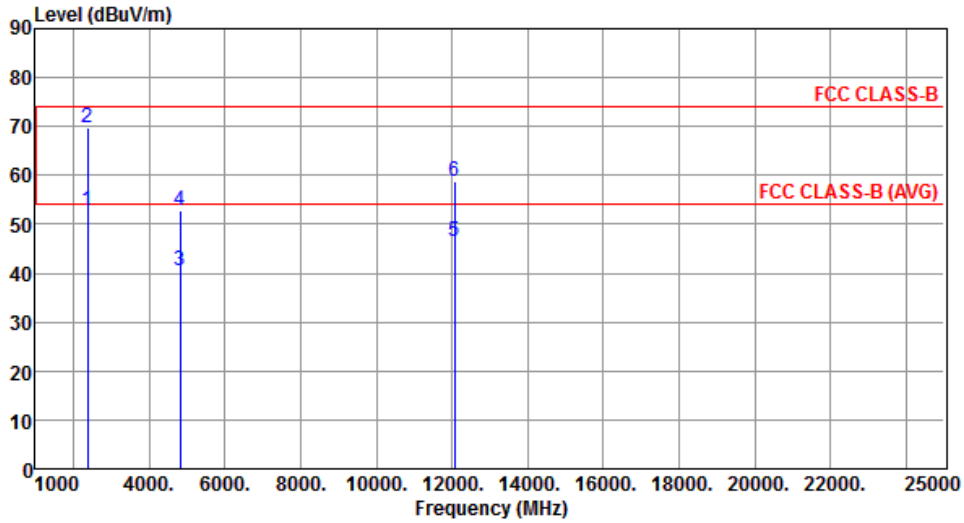


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	41.74	54.00	-12.26	44.70	-2.96	Average	277	261
2	2483.50	55.98	74.00	-18.02	58.94	-2.96	Peak	277	261
3	4924.00	48.75	54.00	-5.25	45.06	3.69	Average	101	263
4	4924.00	52.66	74.00	-21.34	48.97	3.69	Peak	101	263
5	7386.00	40.20	54.00	-13.80	31.27	8.93	Average	100	50
6	7386.00	53.25	74.00	-20.75	44.32	8.93	Peak	100	50

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).

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

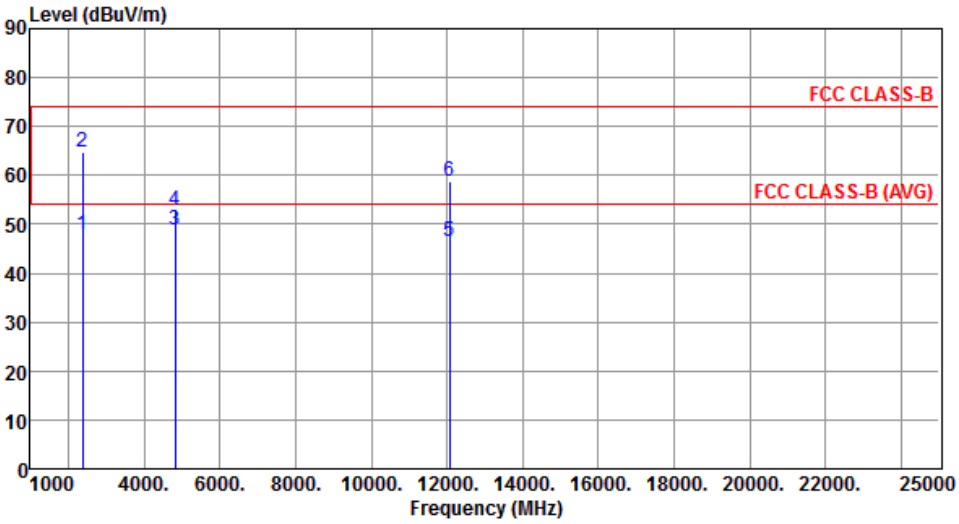
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	52.87	54.00	-1.13	55.69	-2.82	Average	100	85
2	2390.00	69.76	74.00	-4.24	72.58	-2.82	Peak	100	85
3	4824.00	40.60	54.00	-13.40	37.05	3.55	Average	115	106
4	4824.00	52.97	74.00	-21.03	49.42	3.55	Peak	115	106
5	12060.00	46.53	54.00	-7.47	32.70	13.83	Average	100	20
6	12060.00	58.89	74.00	-15.11	45.06	13.83	Peak	100	20

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

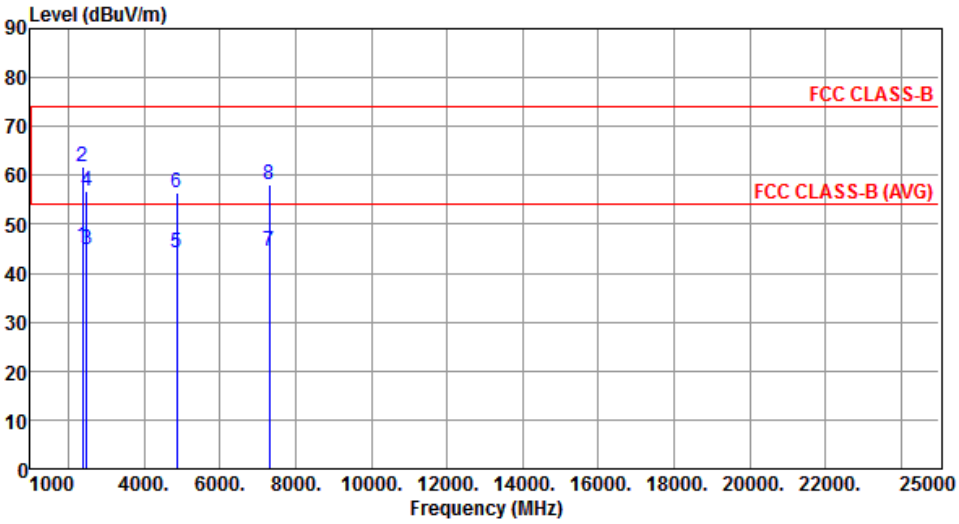
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	47.95	54.00	-6.05	50.77	-2.82	Average	246	267
2	2390.00	64.73	74.00	-9.27	67.55	-2.82	Peak	246	267
3	4824.00	48.90	54.00	-5.10	45.35	3.55	Average	100	265
4	4824.00	52.71	74.00	-21.29	49.16	3.55	Peak	100	265
5	12060.00	46.53	54.00	-7.47	32.70	13.83	Average	100	50
6	12060.00	58.86	74.00	-15.14	45.03	13.83	Peak	100	50

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).

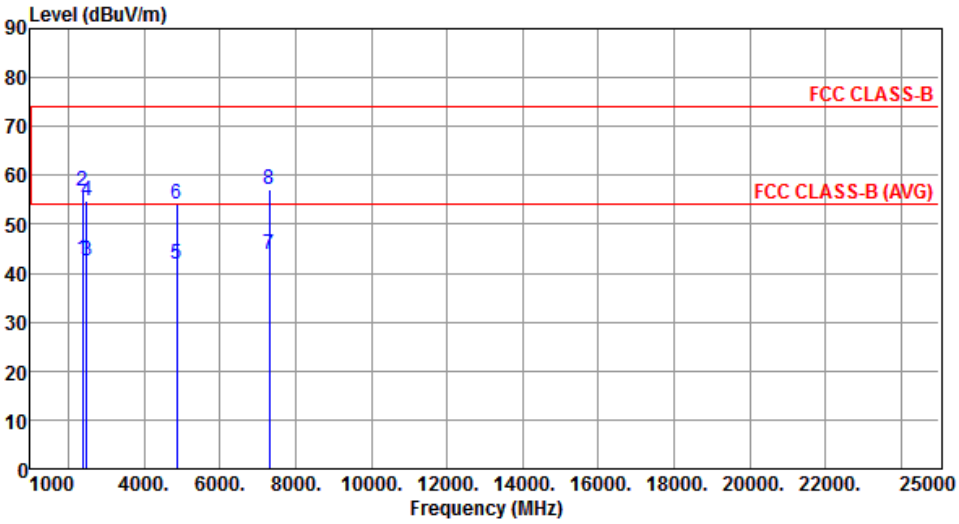
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	45.56	54.00	-8.44	48.38	-2.82	Average	100	91
2	2390.00	61.65	74.00	-12.35	64.47	-2.82	Peak	100	91
3	2483.50	44.90	54.00	-9.10	47.86	-2.96	Average	100	91
4	2483.50	56.64	74.00	-17.36	59.60	-2.96	Peak	100	91
5	4874.00	44.24	54.00	-9.76	40.65	3.59	Average	114	105
6	4874.00	56.38	74.00	-17.62	52.79	3.59	Peak	114	105
7	7311.00	44.47	54.00	-9.53	35.28	9.19	Average	100	131
8	7311.00	57.99	74.00	-16.01	48.80	9.19	Peak	100	131

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).

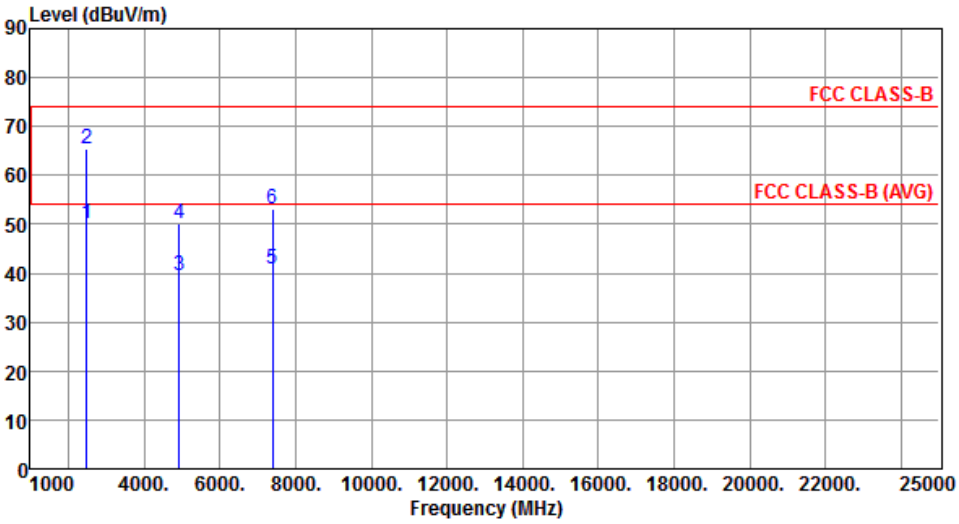
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	42.80	54.00	-11.20	45.62	-2.82	Average	251	263
2	2390.00	56.83	74.00	-17.17	59.65	-2.82	Peak	251	263
3	2483.50	42.44	54.00	-11.56	45.40	-2.96	Average	251	263
4	2483.50	54.65	74.00	-19.35	57.61	-2.96	Peak	251	263
5	4874.00	41.77	54.00	-12.23	38.18	3.59	Average	100	266
6	4874.00	54.08	74.00	-19.92	50.49	3.59	Peak	100	266
7	7311.00	43.71	54.00	-10.29	34.52	9.19	Average	100	282
8	7311.00	57.12	74.00	-16.88	47.93	9.19	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).

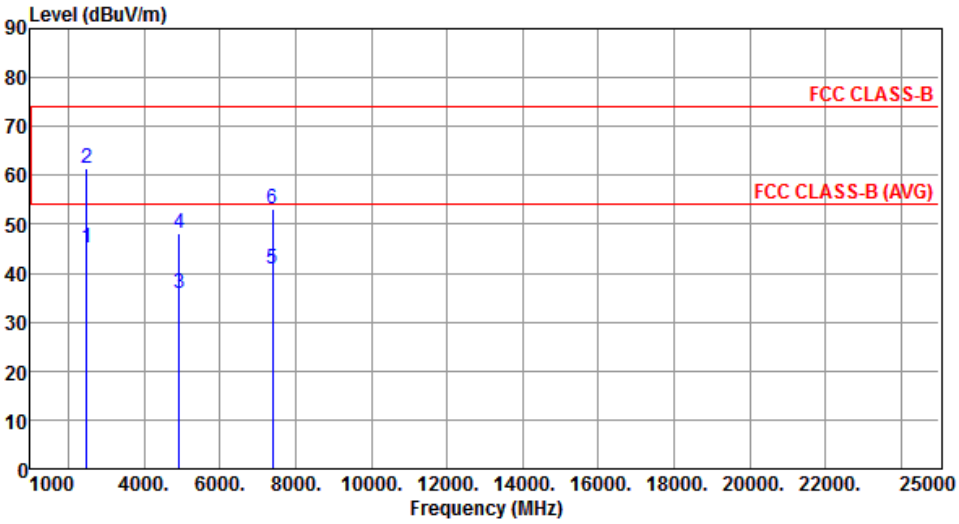
Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	50.14	54.00	-3.86	53.10	-2.96	Average	100	98
2	2483.50	65.50	74.00	-8.50	68.46	-2.96	Peak	100	98
3	4924.00	39.43	54.00	-14.57	35.74	3.69	Average	115	106
4	4924.00	50.09	74.00	-23.91	46.40	3.69	Peak	115	106
5	7386.00	40.89	54.00	-13.11	31.96	8.93	Average	100	20
6	7386.00	53.27	74.00	-20.73	44.34	8.93	Peak	100	20

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		

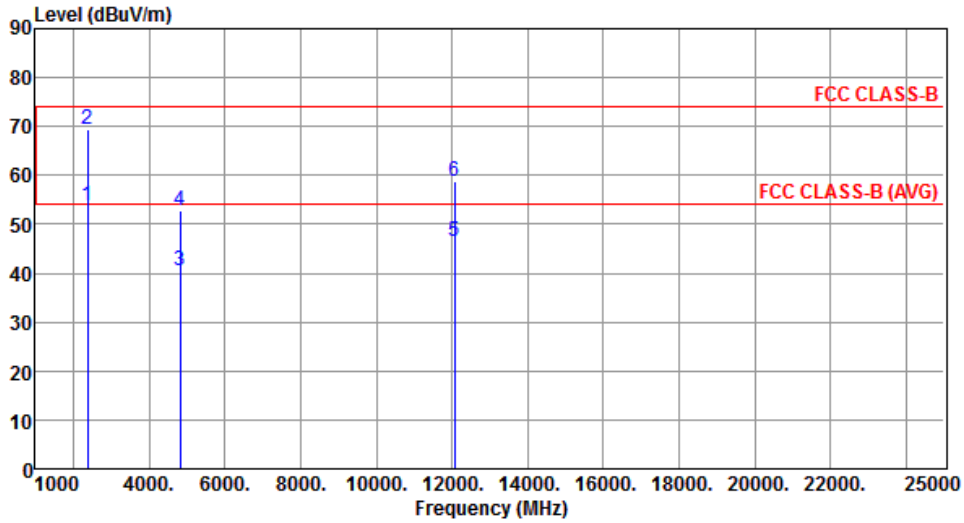


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	45.20	54.00	-8.80	48.16	-2.96	Average	249	265
2	2483.50	61.44	74.00	-12.56	64.40	-2.96	Peak	249	265
3	4924.00	35.76	54.00	-18.24	32.07	3.69	Average	100	105
4	4924.00	48.07	74.00	-25.93	44.38	3.69	Peak	100	105
5	7386.00	40.86	54.00	-13.14	31.93	8.93	Average	100	30
6	7386.00	53.20	74.00	-20.80	44.27	8.93	Peak	100	30

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).

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

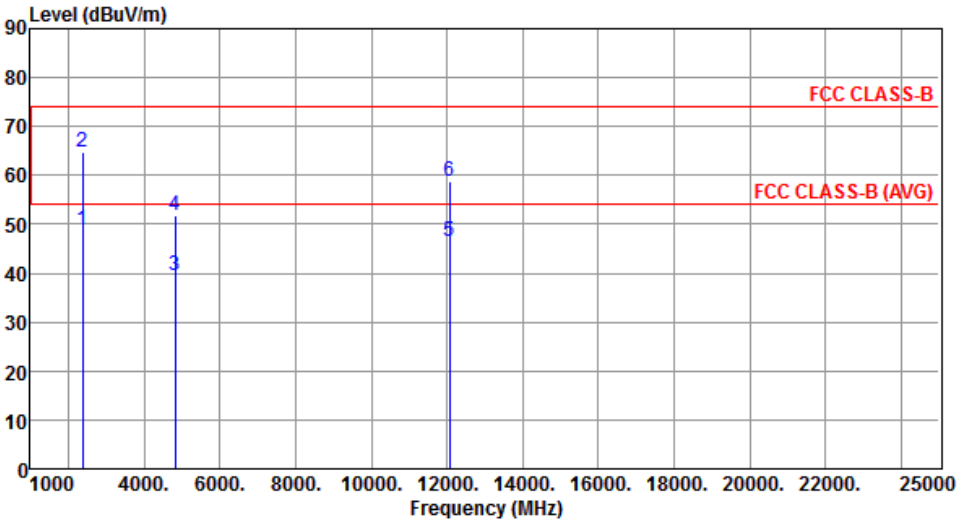
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	53.71	54.00	-0.29	56.53	-2.82	Average	100	100
2	2390.00	69.57	74.00	-4.43	72.39	-2.82	Peak	100	100
3	4824.00	40.54	54.00	-13.46	36.99	3.55	Average	116	105
4	4824.00	52.71	74.00	-21.29	49.16	3.55	Peak	116	105
5	12060.00	46.40	54.00	-7.60	32.57	13.83	Average	100	30
6	12060.00	58.89	74.00	-15.11	45.06	13.83	Peak	100	30

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

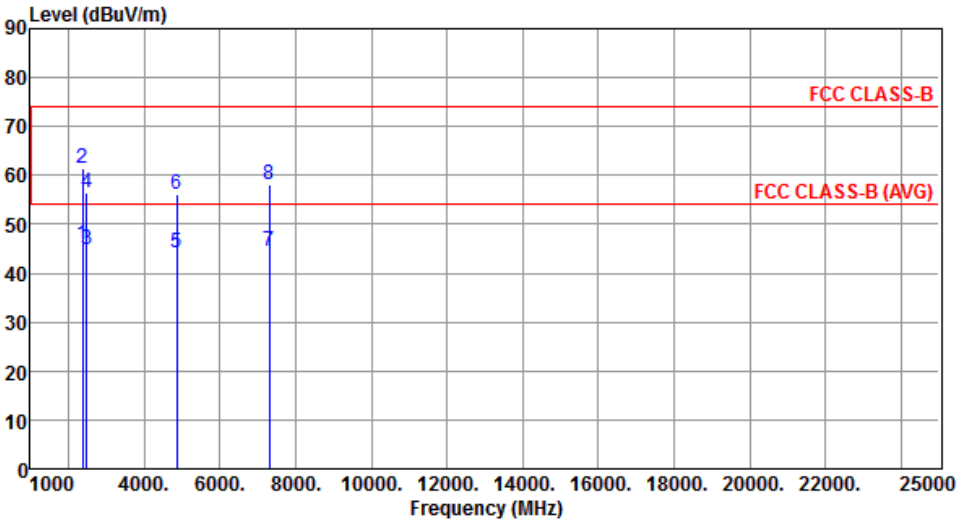
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	48.75	54.00	-5.25	51.57	-2.82	Average	251	262
2	2390.00	64.73	74.00	-9.27	67.55	-2.82	Peak	251	262
3	4824.00	39.51	54.00	-14.49	35.96	3.55	Average	100	265
4	4824.00	51.67	74.00	-22.33	48.12	3.55	Peak	100	265
5	12060.00	46.53	54.00	-7.47	32.70	13.83	Average	100	40
6	12060.00	58.78	74.00	-15.22	44.95	13.83	Peak	100	40

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).

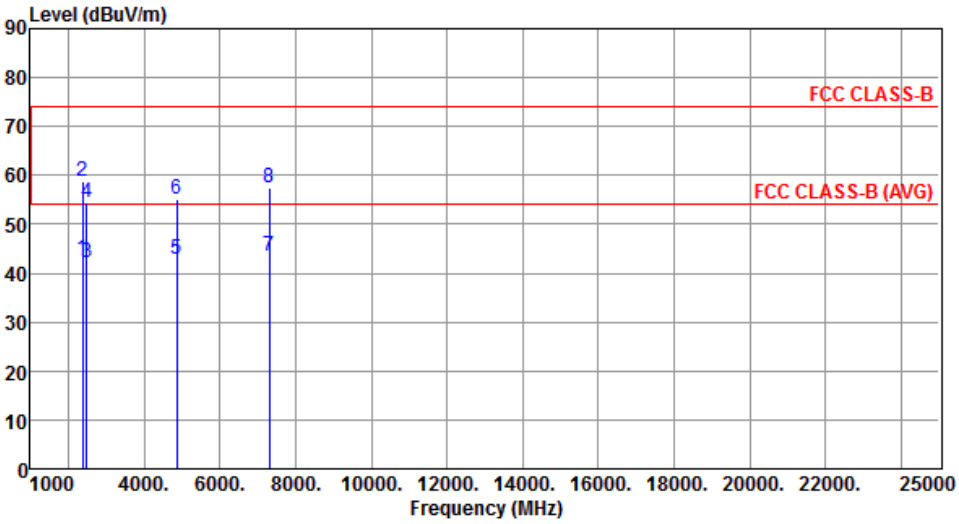
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	45.70	54.00	-8.30	48.52	-2.82	Average	100	88
2	2390.00	61.49	74.00	-12.51	64.31	-2.82	Peak	100	88
3	2483.50	44.71	54.00	-9.29	47.67	-2.96	Average	100	88
4	2483.50	56.41	74.00	-17.59	59.37	-2.96	Peak	100	88
5	4874.00	44.05	54.00	-9.95	40.46	3.59	Average	115	106
6	4874.00	56.24	74.00	-17.76	52.65	3.59	Peak	115	106
7	7311.00	44.52	54.00	-9.48	35.33	9.19	Average	100	129
8	7311.00	58.12	74.00	-15.88	48.93	9.19	Peak	100	129

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).

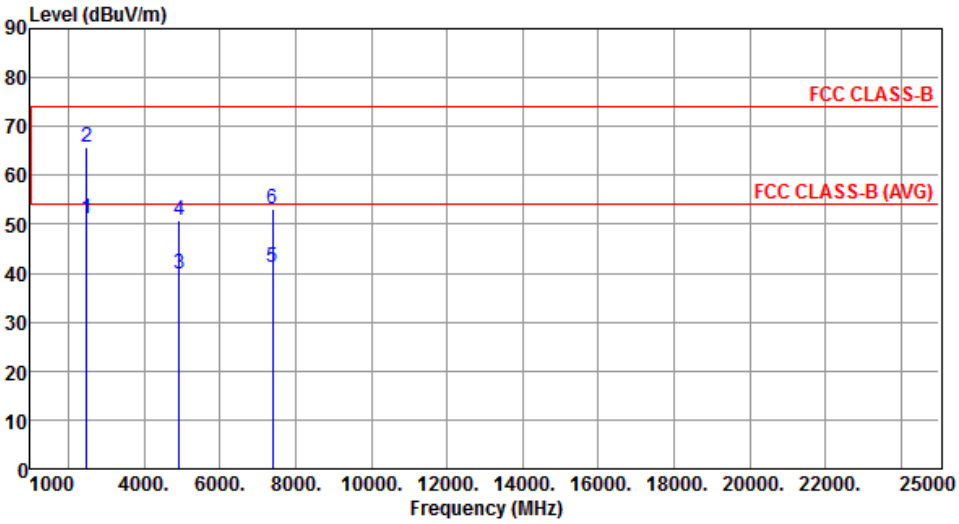
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	42.75	54.00	-11.25	45.57	-2.82	Average	251	263
2	2390.00	58.65	74.00	-15.35	61.47	-2.82	Peak	251	263
3	2483.50	42.30	54.00	-11.70	45.26	-2.96	Average	251	263
4	2483.50	54.58	74.00	-19.42	57.54	-2.96	Peak	251	263
5	4874.00	42.98	54.00	-11.02	39.39	3.59	Average	114	107
6	4874.00	54.98	74.00	-19.02	51.39	3.59	Peak	114	107
7	7311.00	43.47	54.00	-10.53	34.28	9.19	Average	100	285
8	7311.00	57.30	74.00	-16.70	48.11	9.19	Peak	100	285

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).

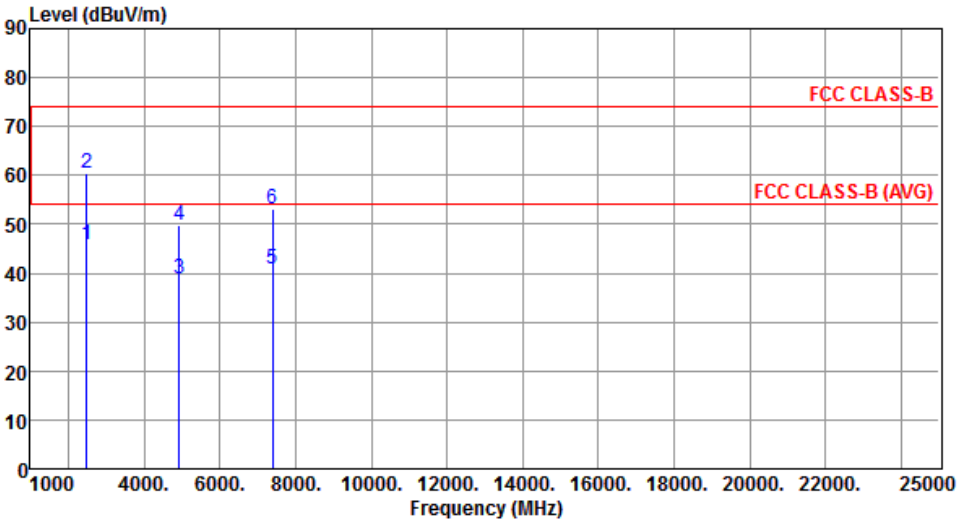
Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	51.00	54.00	-3.00	53.96	-2.96	Average	100	98
2	2483.50	65.84	74.00	-8.16	68.80	-2.96	Peak	100	98
3	4924.00	39.96	54.00	-14.04	36.27	3.69	Average	114	107
4	4924.00	50.67	74.00	-23.33	46.98	3.69	Peak	114	107
5	7386.00	41.19	54.00	-12.81	32.26	8.93	Average	100	20
6	7386.00	53.27	74.00	-20.73	44.34	8.93	Peak	100	20

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		

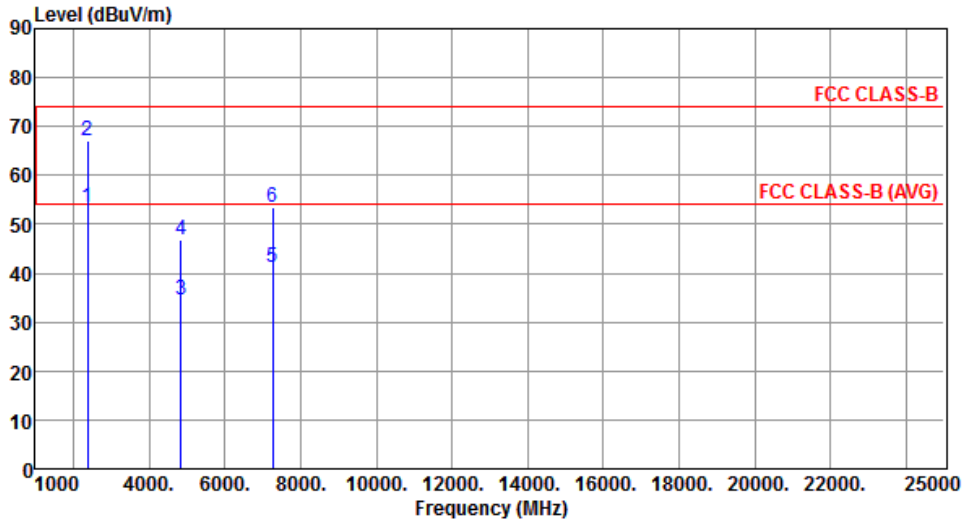


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	45.94	54.00	-8.06	48.90	-2.96	Average	255	264
2	2483.50	60.41	74.00	-13.59	63.37	-2.96	Peak	255	264
3	4924.00	38.87	54.00	-15.13	35.18	3.69	Average	100	263
4	4924.00	49.79	74.00	-24.21	46.10	3.69	Peak	100	263
5	7386.00	40.95	54.00	-13.05	32.02	8.93	Average	100	40
6	7386.00	53.09	74.00	-20.91	44.16	8.93	Peak	100	40

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).

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

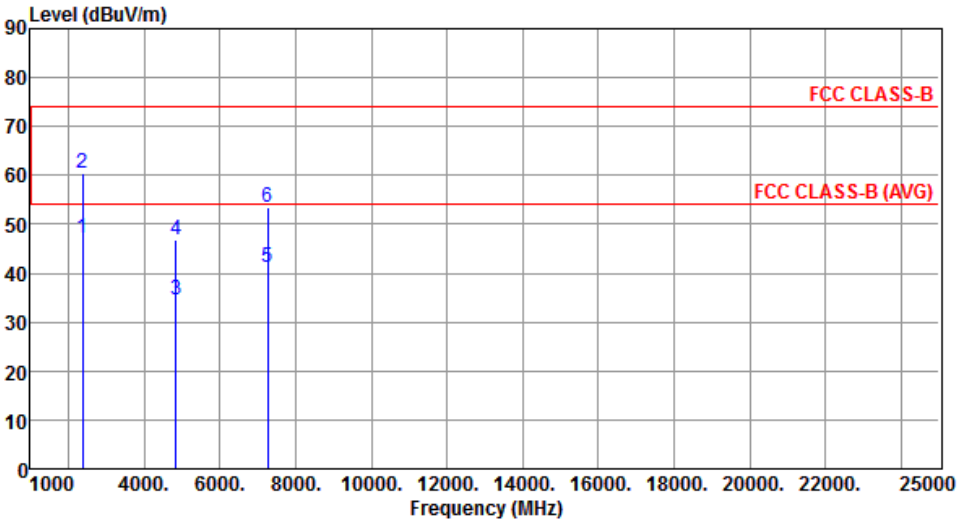
Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Horizontal		



	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	53.55	54.00	-0.45	56.37	-2.82	Average	100	96
2	2390.00	67.19	74.00	-6.81	70.01	-2.82	Peak	100	96
3	4844.00	34.65	54.00	-19.35	31.09	3.56	Average	100	20
4	4844.00	46.97	74.00	-27.03	43.41	3.56	Peak	100	20
5	7266.00	41.07	54.00	-12.93	31.84	9.23	Average	100	50
6	7266.00	53.34	74.00	-20.66	44.11	9.23	Peak	100	50

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

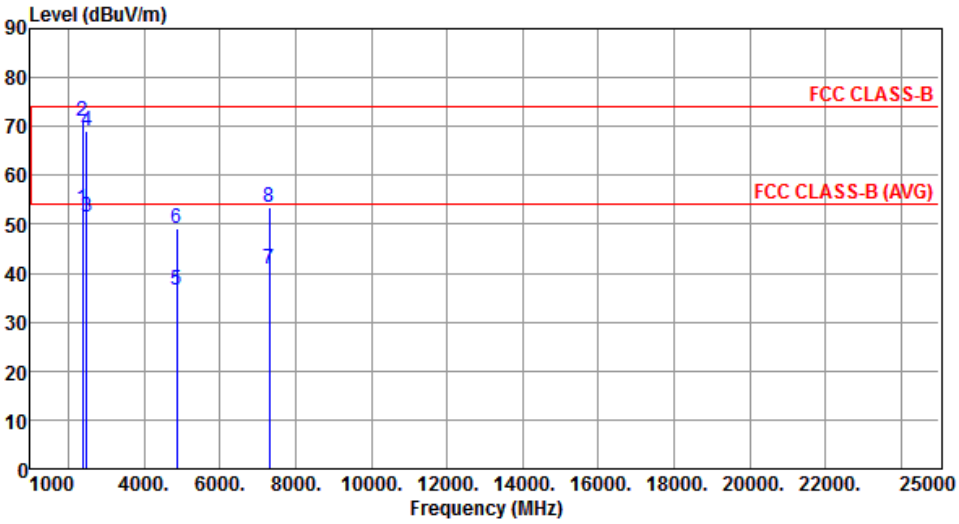
Modulation	HT40	**Test Freq. (MHz)**	2422
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	47.05	54.00	-6.95	49.87	-2.82	Average	255	247
2	2390.00	60.47	74.00	-13.53	63.29	-2.82	Peak	255	247
3	4844.00	34.70	54.00	-19.30	31.14	3.56	Average	100	90
4	4844.00	46.98	74.00	-27.02	43.42	3.56	Peak	100	90
5	7266.00	41.11	54.00	-12.89	31.88	9.23	Average	100	50
6	7266.00	53.32	74.00	-20.68	44.09	9.23	Peak	100	50

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

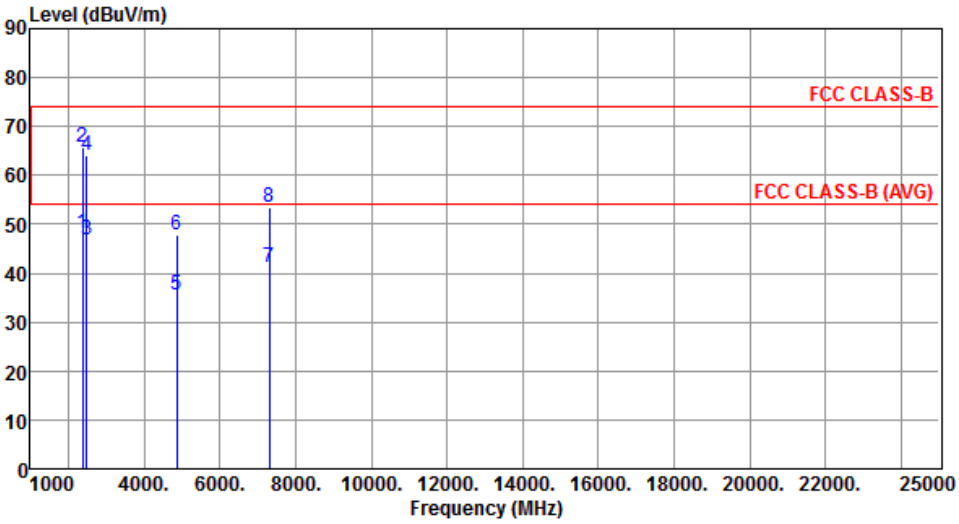
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	53.24	54.00	-0.76	56.06	-2.82	Average	100	93
2	2390.00	71.20	74.00	-2.80	74.02	-2.82	Peak	100	93
3	2483.50	51.62	54.00	-2.38	54.58	-2.96	Average	100	93
4	2483.50	69.02	74.00	-4.98	71.98	-2.96	Peak	100	93
5	4874.00	36.58	54.00	-17.42	32.99	3.59	Average	116	100
6	4874.00	49.02	74.00	-24.98	45.43	3.59	Peak	116	100
7	7311.00	40.96	54.00	-13.04	31.77	9.19	Average	100	40
8	7311.00	53.48	74.00	-20.52	44.29	9.19	Peak	100	40

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

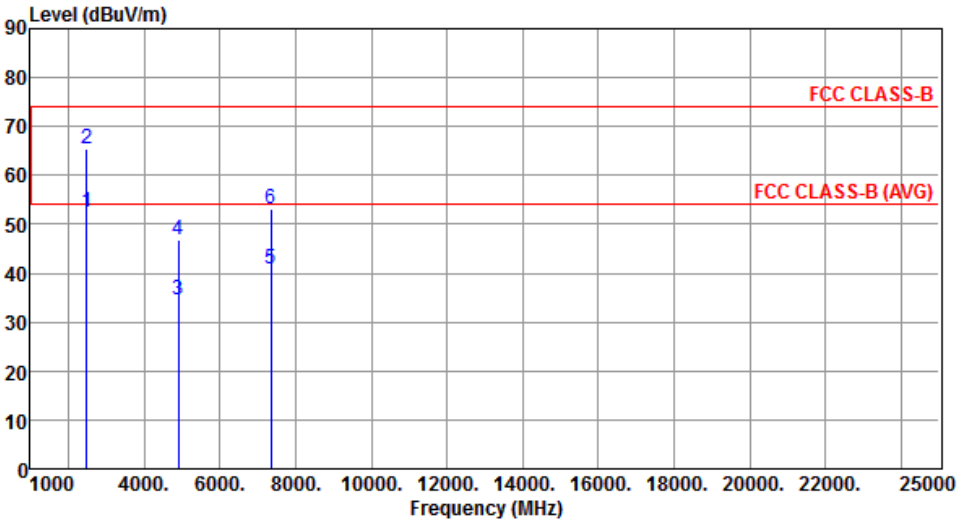
Modulation	HT40	**Test Freq. (MHz)**	2437
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	48.09	54.00	-5.91	50.91	-2.82	Average	254	267
2	2390.00	65.65	74.00	-8.35	68.47	-2.82	Peak	254	267
3	2483.50	46.74	54.00	-7.26	49.70	-2.96	Average	254	267
4	2483.50	63.95	74.00	-10.05	66.91	-2.96	Peak	254	267
5	4874.00	35.64	54.00	-18.36	32.05	3.59	Average	100	263
6	4874.00	47.75	74.00	-26.25	44.16	3.59	Peak	100	263
7	7311.00	41.09	54.00	-12.91	31.90	9.19	Average	100	30
8	7311.00	53.38	74.00	-20.62	44.19	9.19	Peak	100	30

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

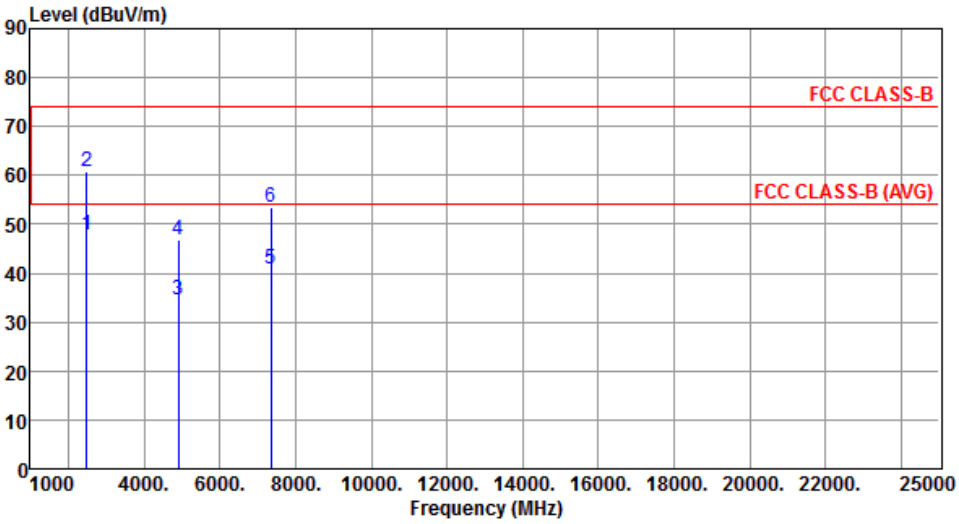
Modulation	HT40	**Test Freq. (MHz)**	2452
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.63	54.00	-1.37	55.59	-2.96	Average	100	92
2	2483.50	65.58	74.00	-8.42	68.54	-2.96	Peak	100	92
3	4904.00	34.67	54.00	-19.33	31.04	3.63	Average	100	30
4	4904.00	46.95	74.00	-27.05	43.32	3.63	Peak	100	30
5	7356.00	40.95	54.00	-13.05	31.89	9.06	Average	100	50
6	7356.00	53.18	74.00	-20.82	44.12	9.06	Peak	100	50

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

Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	47.90	54.00	-6.10	50.86	-2.96	Average	256	269
2	2483.50	60.68	74.00	-13.32	63.64	-2.96	Peak	256	269
3	4904.00	34.63	54.00	-19.37	31.00	3.63	Average	100	20
4	4904.00	46.96	74.00	-27.04	43.33	3.63	Peak	100	20
5	7356.00	40.92	54.00	-13.08	31.86	9.06	Average	100	50
6	7356.00	53.36	74.00	-20.64	44.30	9.06	Peak	100	50

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).

4 Test laboratory information

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

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

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

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

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

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

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