

TEST REPORT

Application No.:	GZCR2209001271AT
Applicant:	Guangzhou Robustel Co., Ltd.
Address of Applicant:	501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, China
Manufacturer:	Guangzhou Robustel Co., Ltd.
Address of Manufacturer:	501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, China
Factory:	Guangzhou Robustel Co., Ltd.
Address of Factory:	501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, China
Equipment Under Test (EUT):	
EUT Name:	Industrial Cellular Gateway
Model No.:	R2010-B-4L-A27NA, R2010-A-4L-A27NA, R2010-A-4L-A03AU
♣	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Trade Mark:	
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2022-09-29
Date of Test:	2022-10-26 to 2022-11-08
Date of Issue:	2023-03-06
Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards specified above.



Ricky Liu
Manager



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SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

EMC-TRF-01 Rev 1.1

Report No.: GZCR220900127102

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Revision Record			
Version	Report No.	Date	Remark
01	GZCR220900127102	2023-03-06	Original

Authorized for issue by			
		Curry Wu/Project Engineer	
		Vico Cui/Reviewer	

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.2	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

◆ Declaration of EUT Family Grouping:

Model No.: R2010-B-4L-A27NA, R2010-A-4L-A27NA, R2010-A-4L-A03AU

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference as below:

Model No.:	Difference on:
R2010-A-4L-A27NA, R2010-B-4L-A27NA	Remove the POE function for model R2010-A-4L-A27NA
R2010-A-4L-A03AU, R2010-B-4L-A27NA	Remove the POE function and change the WWAN module for model R2010-A-4L-A03AU

Therefore, only one model R2010-B-4L-A27NA was tested in this report.

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 12V 1.5A supply by adaptor or DC 48-57V supply by POE port adaptor information
model:	GQ24-120150-AX
input:	AC100-240V 50/60Hz 1A MAX
output:	DC12V 1.5A 18W
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz; 802.11n(HT40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK); 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20): 11; 802.11n(HT40): 7
Channel Spacing:	5MHz
Antenna Type:	RP-SMA Connector with dedicated antenna
Antenna Number:	2
Antenna Gain:	ANT1: 5 dBi; ANT2: 5 dBi
Remark:	The switching adaptor is an optional part of EUT, all test in this report is performed with this adaptor. Two antennas can simultaneous transmission
Communication part:	Module ID XMR202008EC25AFXD for R2010-B-4L-A27NA, R2010-A-4L-A27NA Module ID XMR201805EC25AU for R2010-A-4L-A03AU

4.2 Description of Support Units

Description	Manufacturer	Model No.	SN/Certificate NO
POE adaptor	Ubiquiti.Inc	GP-H480-065G	N/A

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4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±2.76dB
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 3%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Emissions which fall in the restricted bands	±5.00dB (30MHz-1GHz; 3m); ±4.38dB (30MHz-1GHz; 10m); ± 5.12dB (1GHz-6GHz); ±5.38dB (6GHz-18GHz); ±5.61dB(18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±5.00dB (3m); ±4.38dB (10m)
Radiated Spurious Emissions Above 1GHz	±5.12dB (1GHz-6GHz); ±5.38dB (6GHz-18GHz); ±5.61dB(18GHz-40GHz)

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

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4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Coaxial Cable	HangTianXing	2m	EMC0107	2022-08-24	2023-08-23
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2022-10-16	2025-10-15
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2022-09-09	2023-09-08
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2022-05-20	2023-05-19
Test Software E3r	Audix	Ver.6.11812	GZE100-77	N/A	N/A

Conducted Peak Output Power					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2022-08-24	2023-08-23
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Minimum 6dB Bandwidth					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2022-08-24	2023-08-23
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Power Spectrum Density					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2022-08-24	2023-08-23
Test Software	TST	V2.0	GZE100-78	N/A	N/A



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Conducted Band Edges Measurement

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2022-08-24	2023-08-23
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Conducted Spurious Emissions

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2022-08-24	2023-08-23
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Radiated Emissions which fall in the restricted bands

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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Radiated Spurious Emissions Below 1GHz

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2022-06-21	2023-06-20
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2022-05-20	2023-05-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18

Radiated Spurious Emissions Above 1GHz

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable (Above 1GHz)	Scoflex	KMKG-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

General used equipment

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2022-06-24	2023-06-23

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

Both of two antenna are dedicated and no consideration of replacement. The best case gain of this two antenna is 5 dBi. The directional gain is 8.01dBi.

Antenna location: Refer to internal photo.

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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 26.4 °C Humidity: 55.6 % RH Atmospheric Pressure: 1015 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode power by AC/DC adaptor_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.
Pre-scan	02	TX mode power by POE adaptor_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates.

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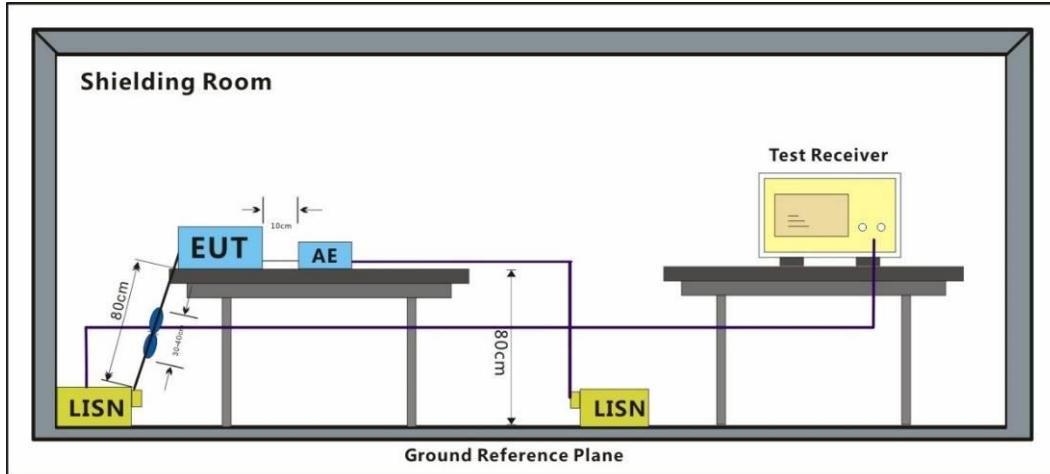
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7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 μ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

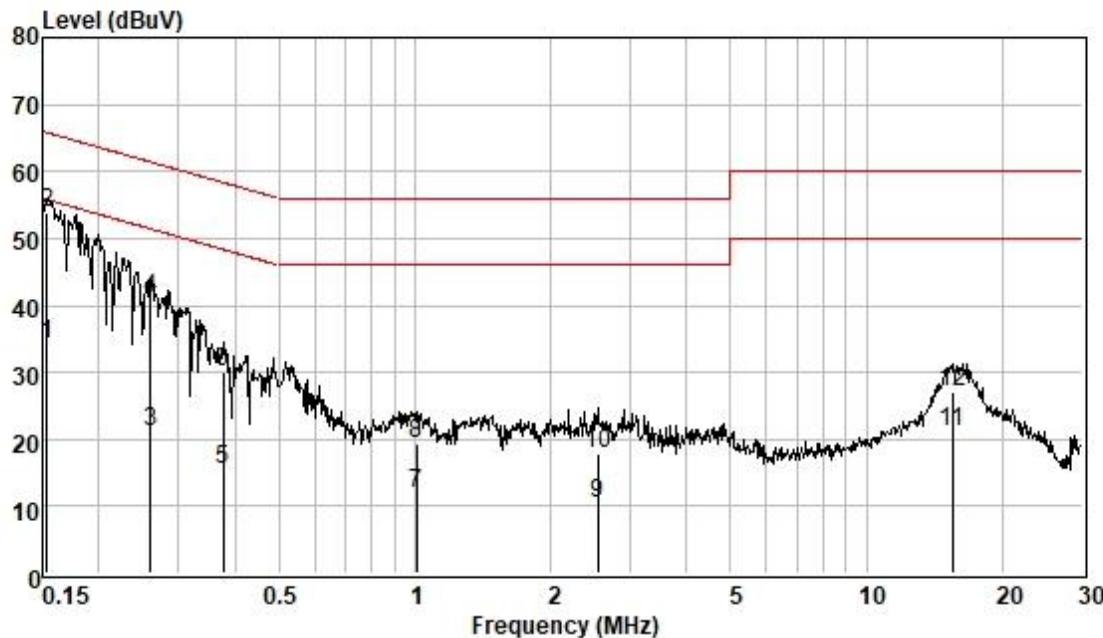
Remark: Level=Read Level+ Cable Loss+ LISN Factor

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Test Mode: 00; Line: Live line



Pol :LINE

Mode :

Model :

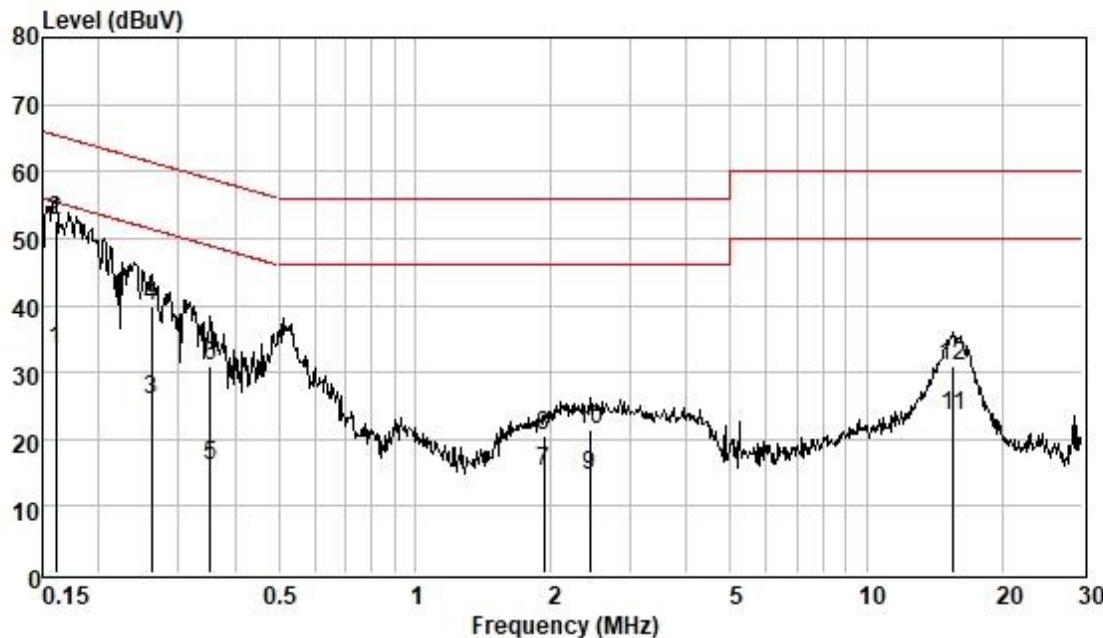
	Frequenc	Read Level	Cable Loss	LISN Factor	Measured Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.153	24.63	0.06	9.61	34.30	55.82	-21.52	Average
2	0.153	44.08	0.06	9.61	53.75	65.82	-12.07	QP
3	0.260	11.46	0.06	9.61	21.13	51.42	-30.29	Average
4	0.260	31.43	0.06	9.61	41.10	61.42	-20.32	QP
5	0.377	5.77	0.06	9.59	15.42	48.34	-32.92	Average
6	0.377	20.50	0.06	9.59	30.15	58.34	-28.19	QP
7	1.010	2.10	0.07	9.59	11.76	46.00	-34.24	Average
8	1.010	9.59	0.07	9.59	19.25	56.00	-36.75	QP
9	2.540	0.73	0.13	9.62	10.48	46.00	-35.52	Average
10	2.540	8.15	0.13	9.62	17.90	56.00	-38.10	QP
11	15.470	11.14	0.30	9.70	21.14	50.00	-28.86	Average
12	15.470	17.15	0.30	9.70	27.15	60.00	-32.85	QP

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Test Mode: 00; Line: Neutral Line



Pol : NEUTRAL

Mode :

Model :

	Frequenc	Read	Cable	LISN	Measured	Limit	Over	Remark
	MHz	Level	Loss	Factor	Level	Line	Limit	dB
		dBuV	dB	dB	dBuV	dBuV		
1	0.161	23.59	0.06	9.61	33.26	55.43	-22.17	Average
2	0.161	42.92	0.06	9.61	52.59	65.43	-12.84	QP
3	0.262	16.14	0.06	9.60	25.80	51.38	-25.58	Average
4	0.262	30.07	0.06	9.60	39.73	61.38	-21.65	QP
5	0.352	6.29	0.06	9.62	15.97	48.91	-32.94	Average
6	0.352	21.14	0.06	9.62	30.82	58.91	-28.09	QP
7	1.928	5.33	0.11	9.61	15.05	46.00	-30.95	Average
8	1.928	10.91	0.11	9.61	20.63	56.00	-35.37	QP
9	2.435	4.85	0.13	9.61	14.59	46.00	-31.41	Average
10	2.435	11.66	0.13	9.61	21.40	56.00	-34.60	QP
11	15.552	13.49	0.30	9.80	23.59	50.00	-26.41	Average
12	15.552	20.75	0.30	9.80	30.85	60.00	-29.15	QP

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7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.2

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 26.3 °C Humidity: 66.7 % RH Atmospheric Pressure: 1014 mbar

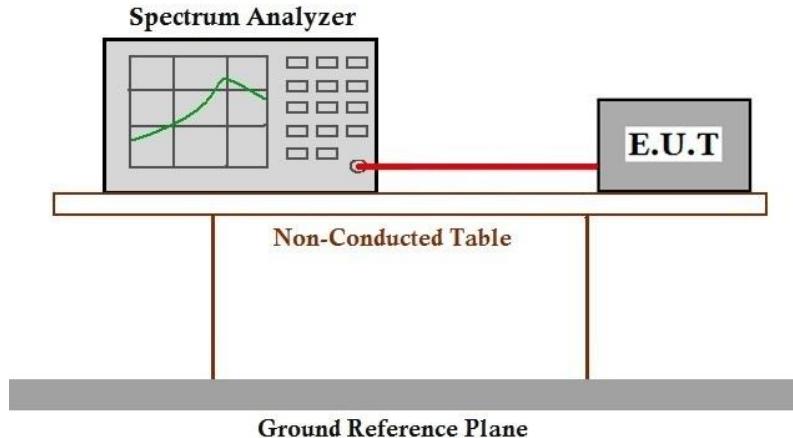
7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

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7.2.3 Test Setup Diagram**7.2.4 Measurement Procedure and Data**

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details

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7.3 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)
Test Method: ANSI C63.10 (2013) Section 11.8.1
Limit: ≥ 500 kHz

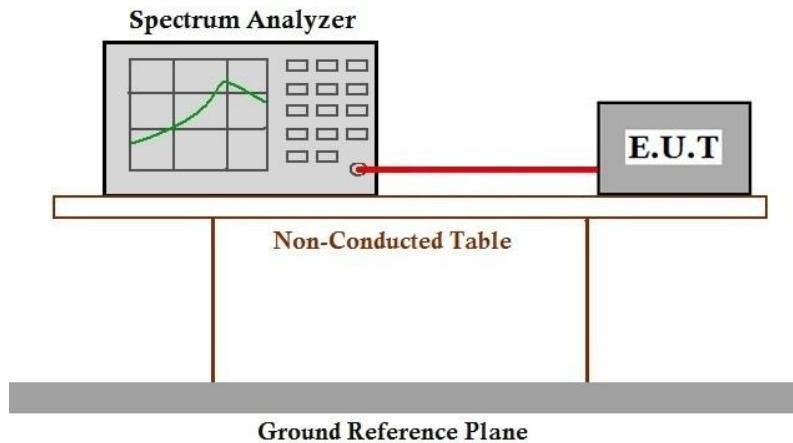
7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 26.3 °C Humidity: 66.7 % RH Atmospheric Pressure: 1014 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.4 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)
Test Method: ANSI C63.10 (2013) Section 11.10.2
Limit: $\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission

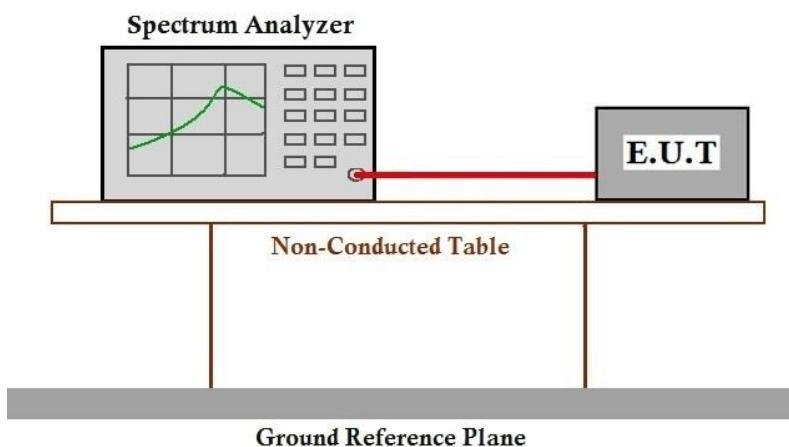
7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 26.3 °C Humidity: 66.7 % RH Atmospheric Pressure: 1014 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

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7.5 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 26.3 °C Humidity: 66.7 % RH Atmospheric Pressure: 1014 mbar

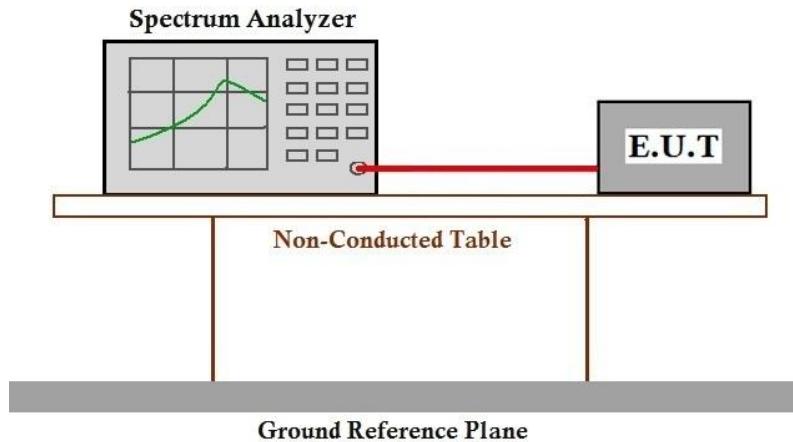
7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

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7.5.3 Test Setup Diagram**7.5.4 Measurement Procedure and Data**

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7.6 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 26.3 °C Humidity: 66.7 % RH Atmospheric Pressure: 1014 mbar

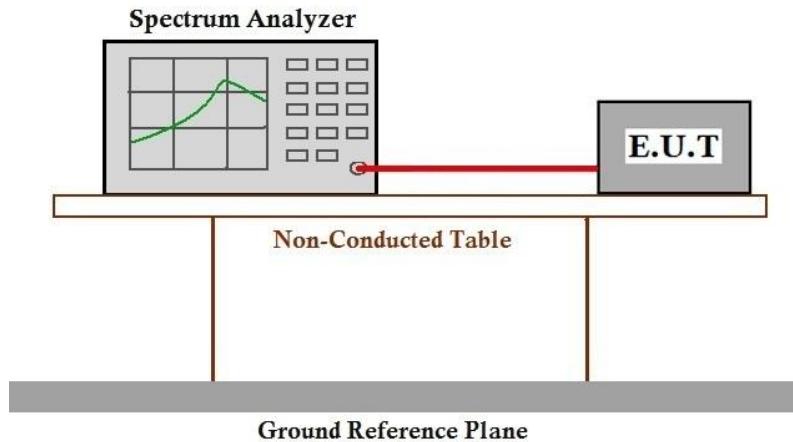
7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

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7.6.3 Test Setup Diagram**7.6.4 Measurement Procedure and Data**

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7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Test Distance: 3 m

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C Humidity: 48.6 % RH Atmospheric Pressure: 1015 mbar

7.7.2 Test Mode Description

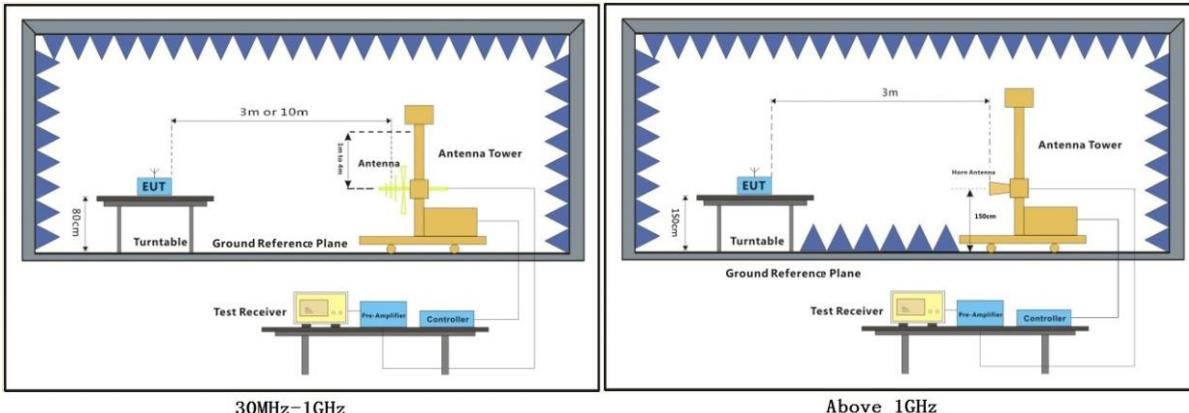
Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

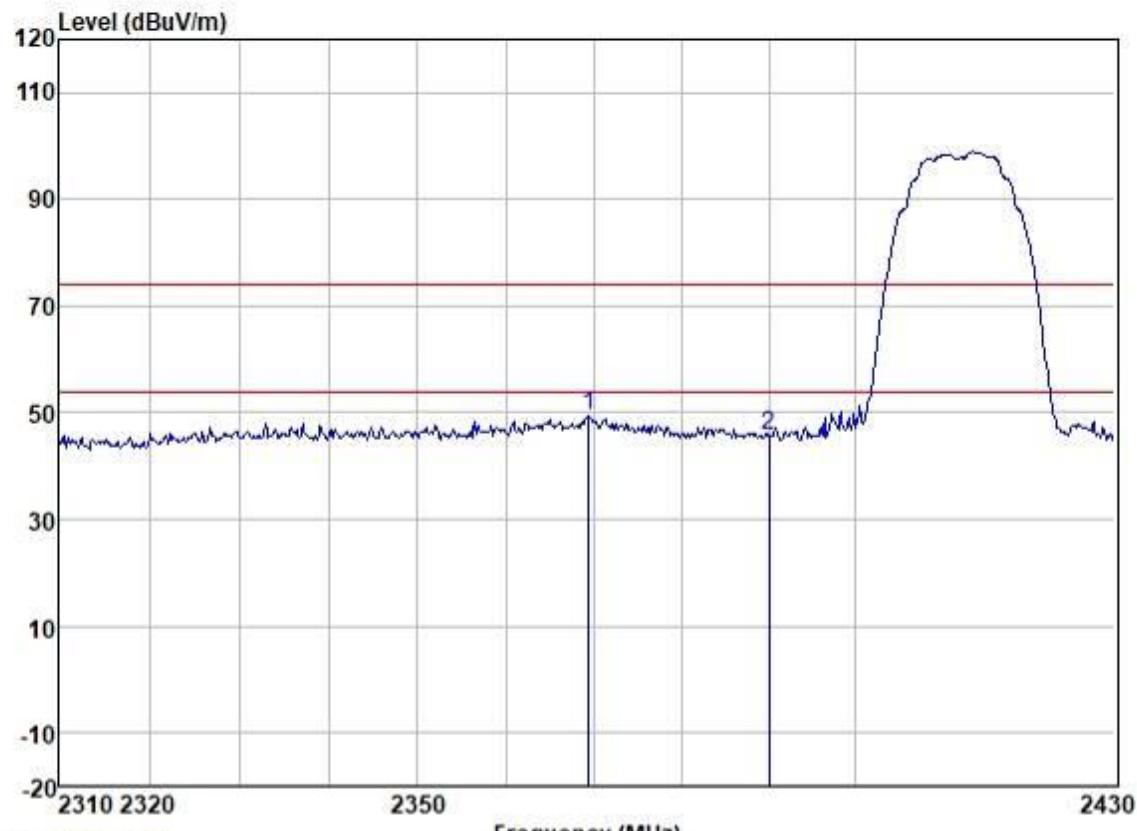
Remark3:For WLAN radiated test, according to the conducted power and verify test the SISO & MIMO mode, the worst-case is SISO mode for 802.11b/g, MIMO mode for 802.11n, therefore, all final test are performed in SISO & MIMO mode and reported.

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Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



Race: (Discrete)

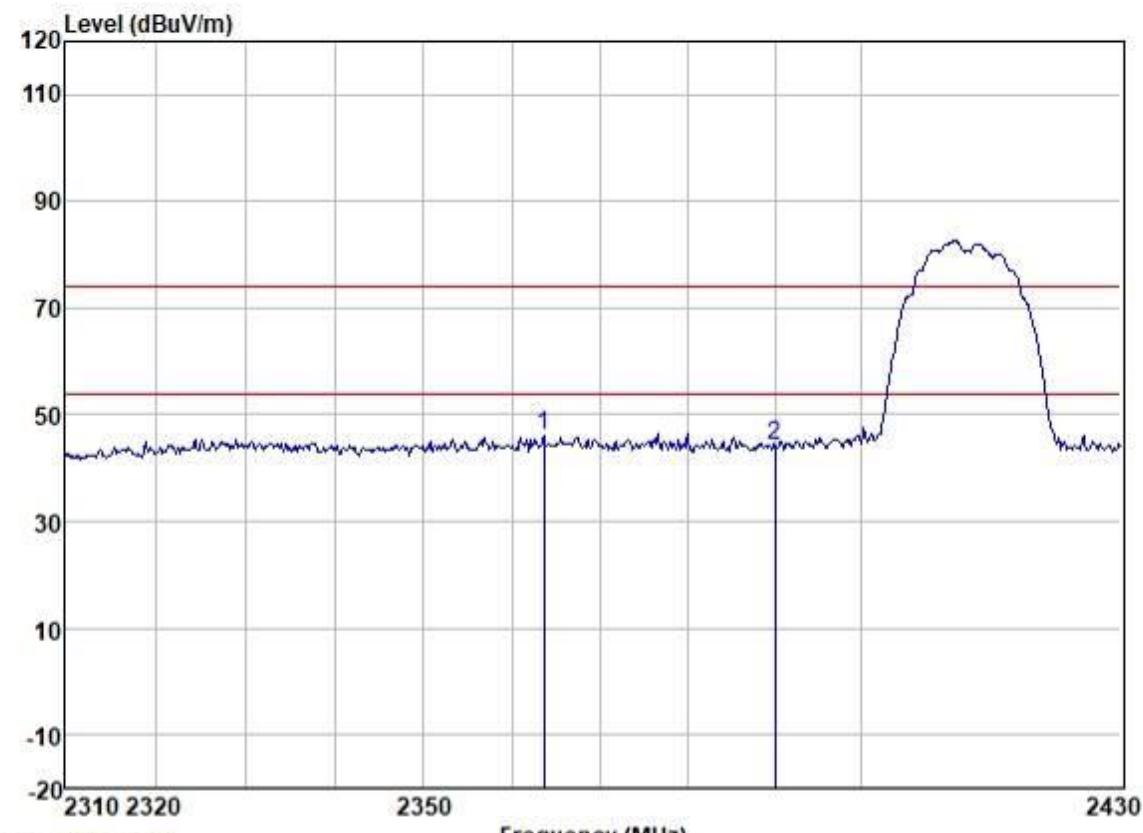
Freq	ReadAntenna	Cable	Preamp	Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 2369.360	54.51	27.64	4.39	37.13	49.41	74.00	-24.59 VERTICAL Peak
2 2390.000	50.97	27.68	4.22	37.13	45.74	74.00	-28.26 VERTICAL Peak

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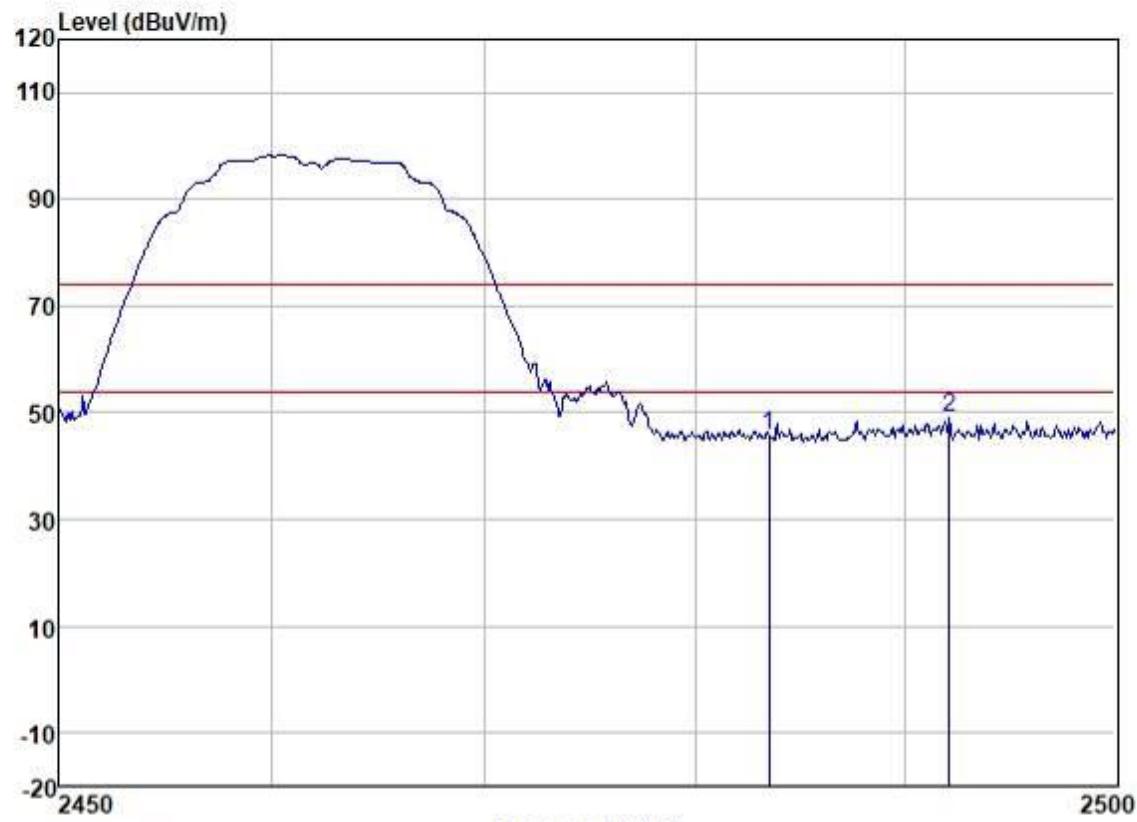
Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



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Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:High



race: (Discrete)

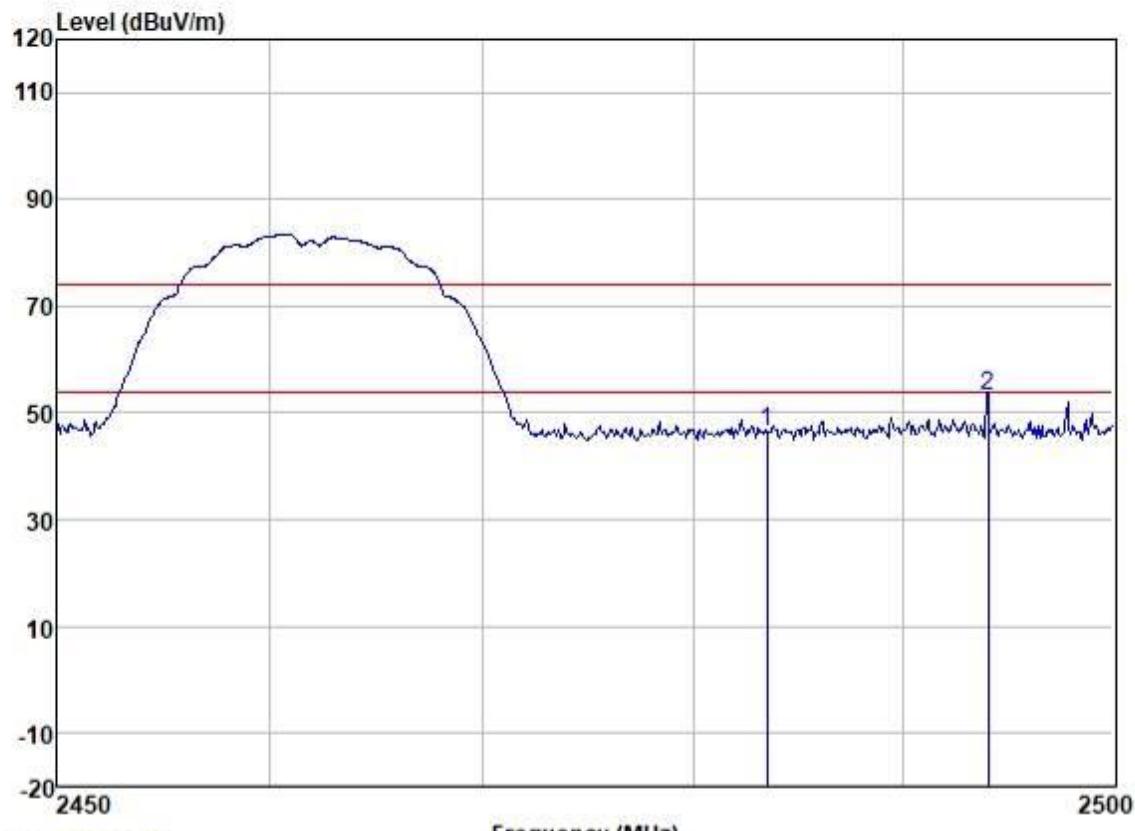
Freq	ReadAntenna	Cable		Preamp	Limit	Over	Over	Over	Remark
	Level	Factor	Loss	Factor					
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB	
1 2483.500	51.54	27.85	3.42	37.11	45.70	74.00	-28.30	VERTICAL	Peak
2 2492.083	54.89	27.86	3.33	37.10	48.98	74.00	-25.02	VERTICAL	Peak

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Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High



Race: (Discrete)

Freq	ReadAntenna		Cable		Preamp	Limit	Over	Pol/Phase	Remark
	MHz	Level	Factor	Loss		Level	Line	Limit	
1	2483.500	52.39	27.85	3.42	37.11	46.55	74.00	-27.45	HORIZONTAL Peak
2	2494.047	59.00	27.86	3.33	37.10	53.09	74.00	-20.91	HORIZONTAL Peak

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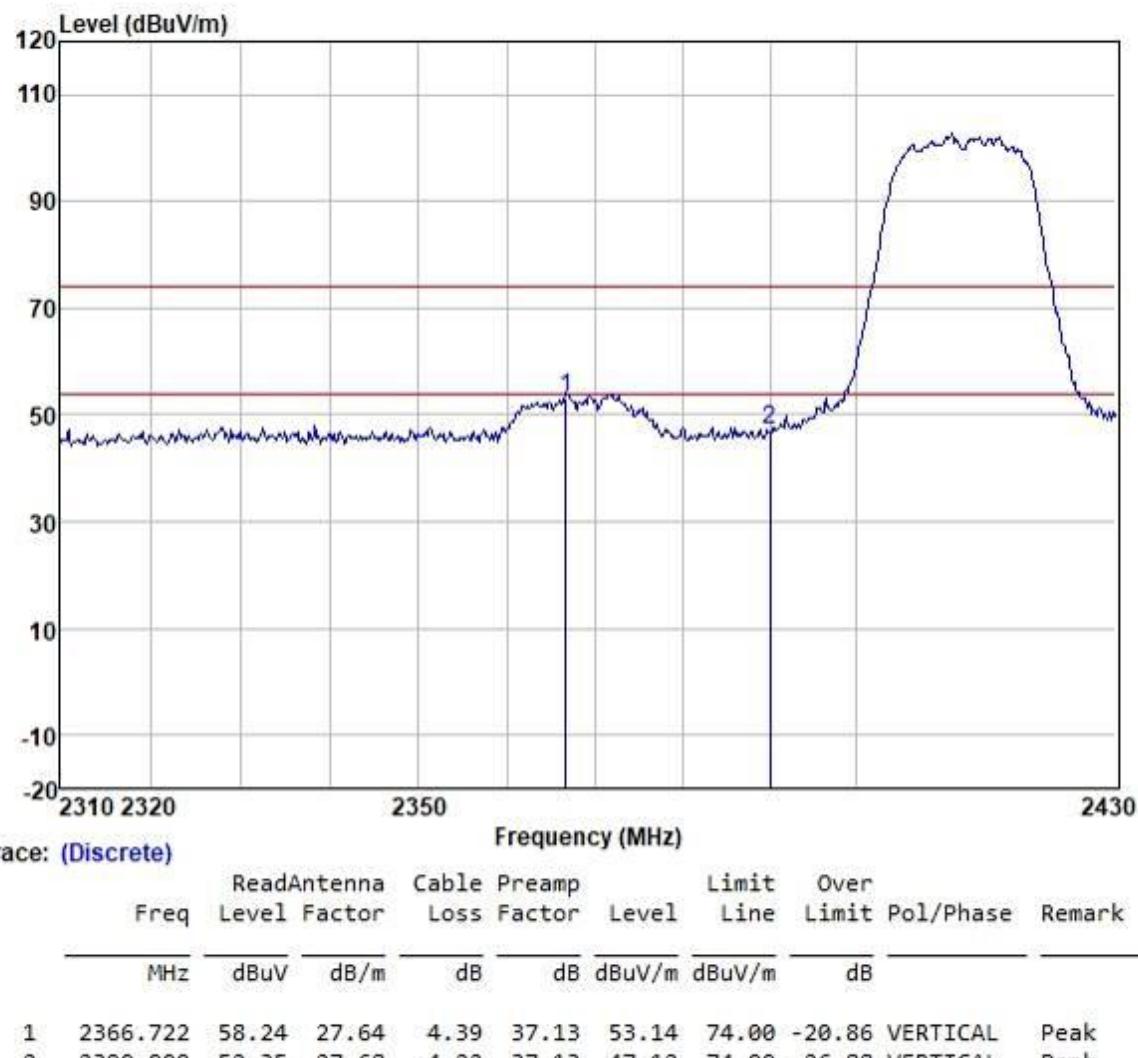
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Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:Low



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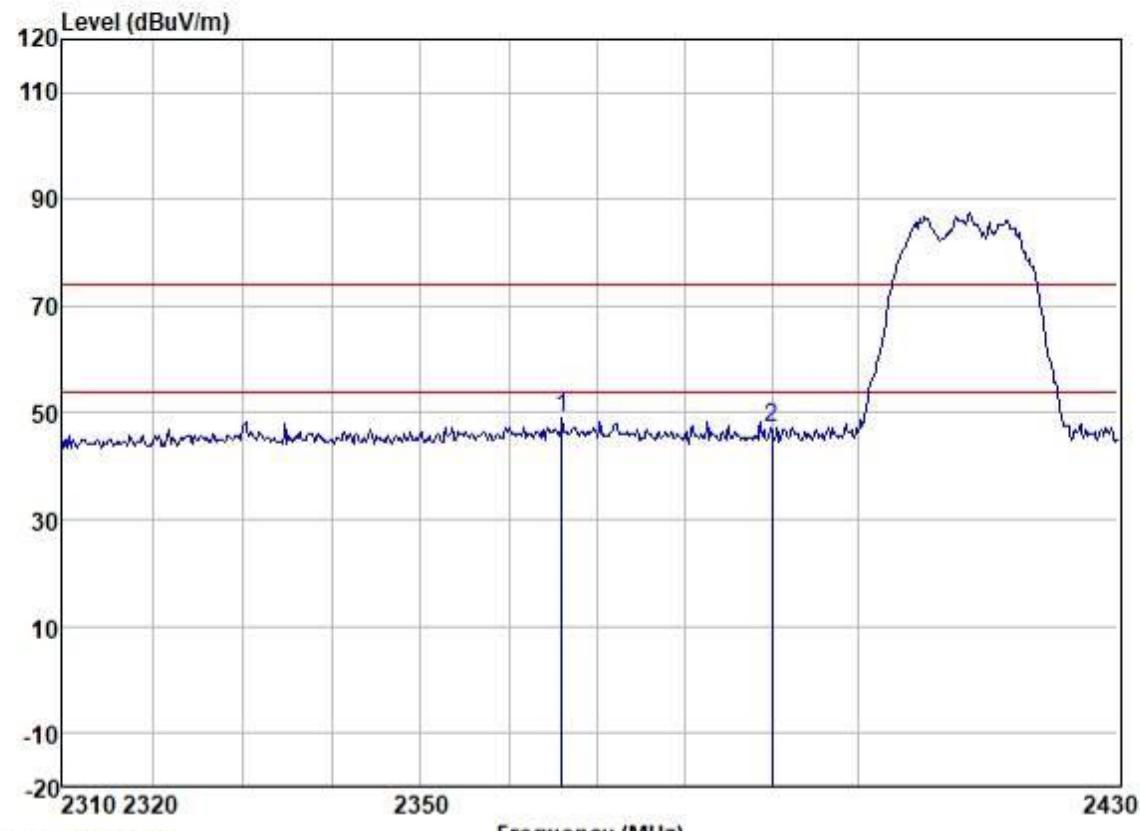
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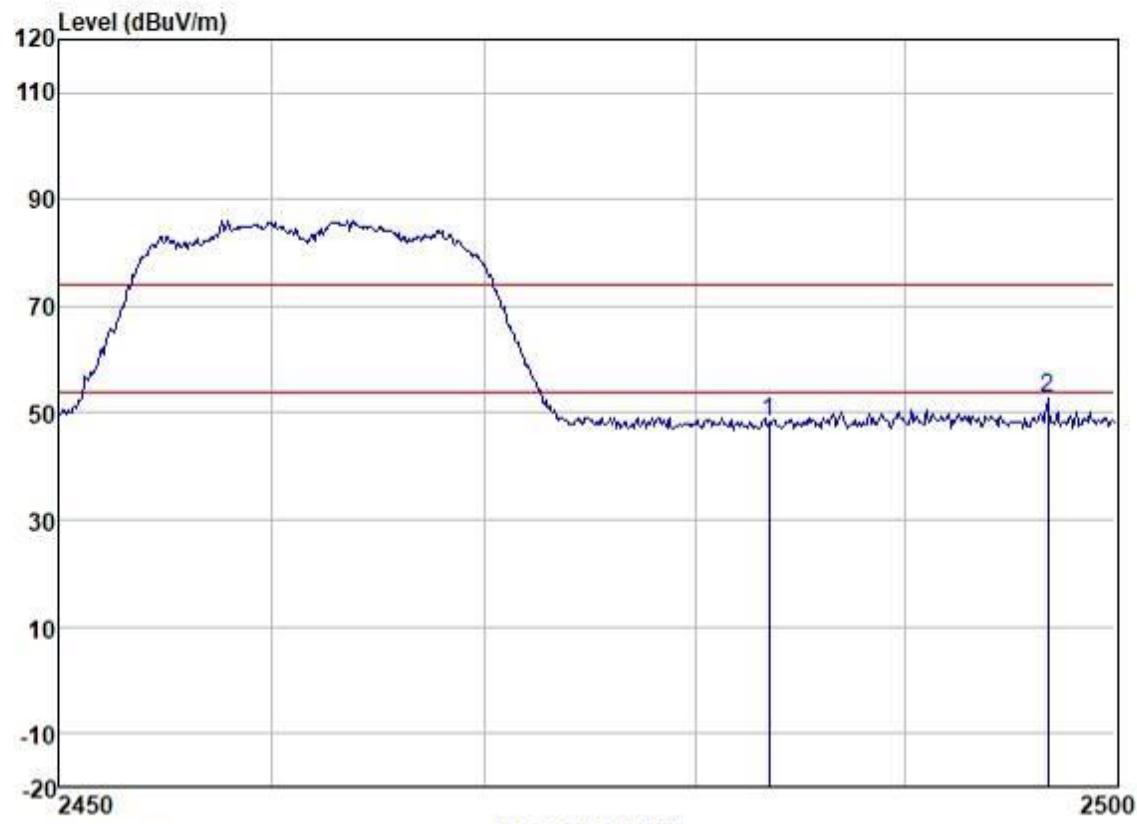
Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:Low



Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	Level Factor	Cable Loss Factor					
1	2366.003	54.17	27.64	4.39	37.13	49.07	74.00	-24.93	HORIZONTAL Peak
2	2390.000	52.44	27.68	4.22	37.13	47.21	74.00	-26.79	HORIZONTAL Peak



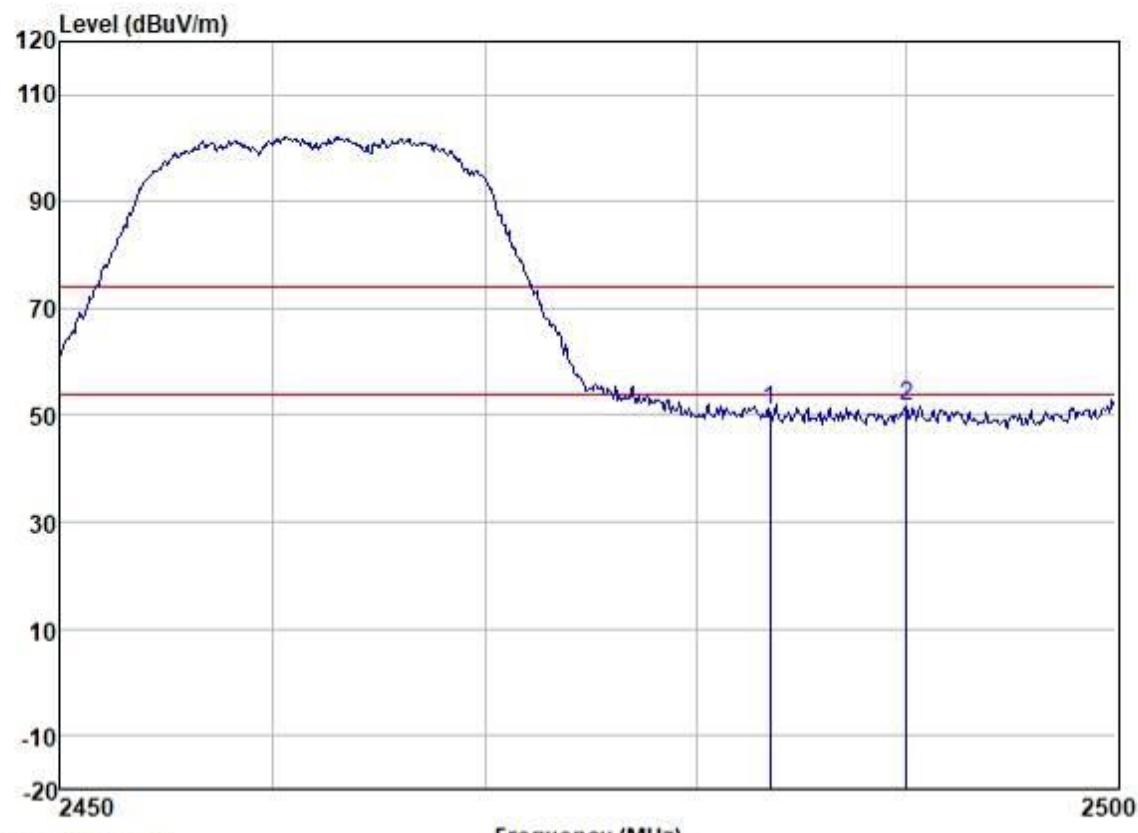
Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:High



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Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:High



Race: (Discrete)

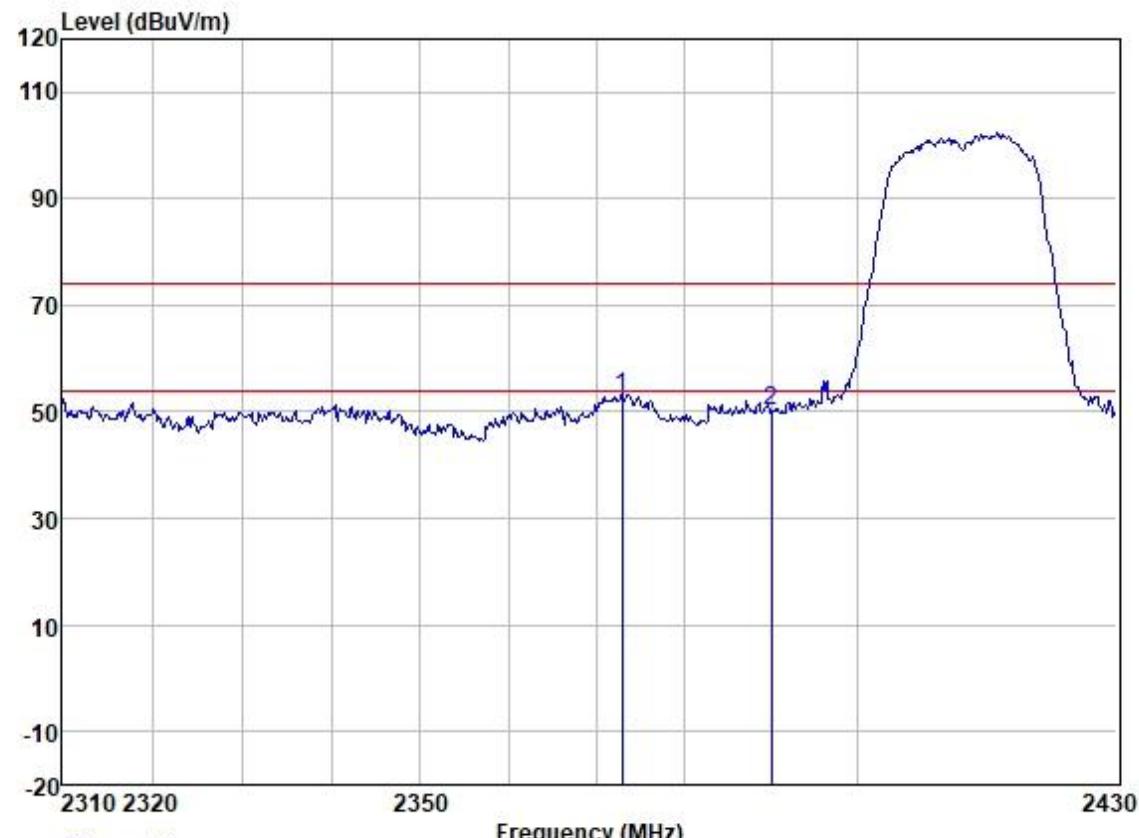
Race	Freq	ReadAntenna		Cable		Preamp	Limit	Over	Pol/Phase	Remark
		Level	Factor	Loss	Factor					
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.500	56.86	27.85	3.42	37.11	51.02	74.00	-22.98	HORIZONTAL	Peak
2	2489.969	57.73	27.86	3.33	37.11	51.81	74.00	-22.19	HORIZONTAL	Peak



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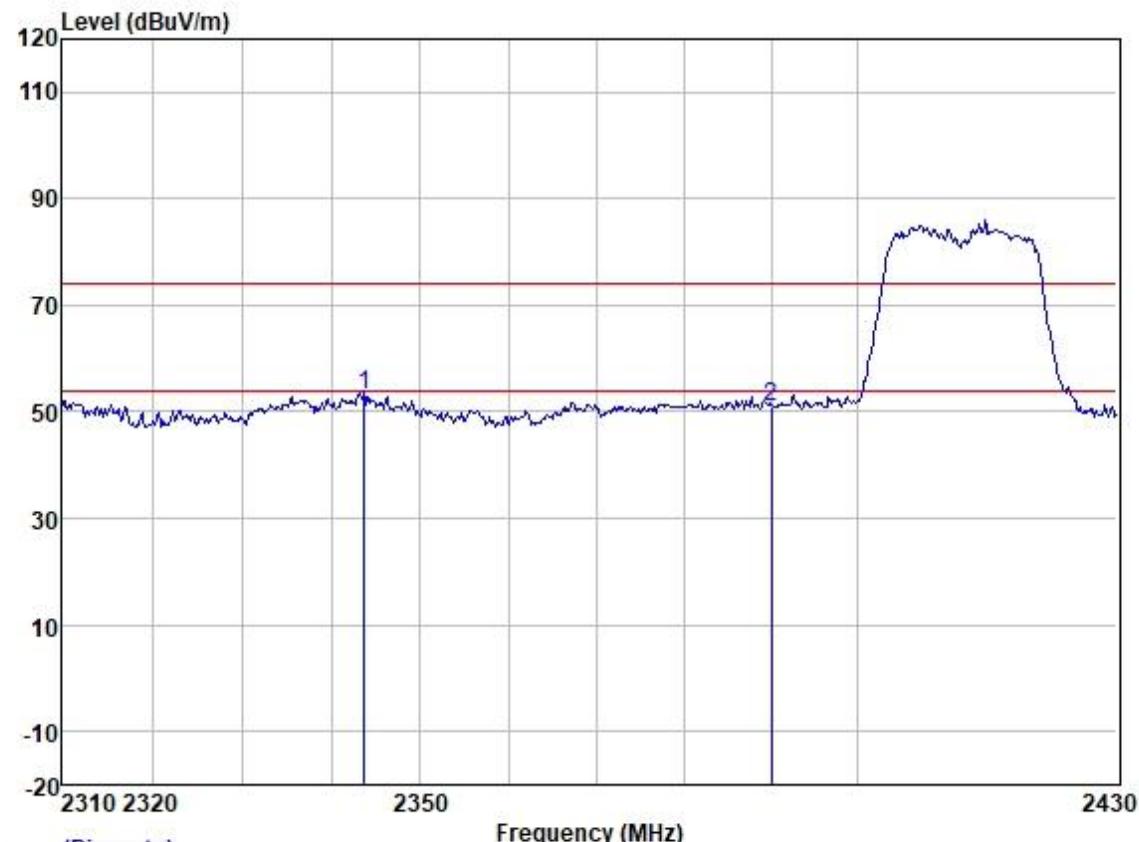
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



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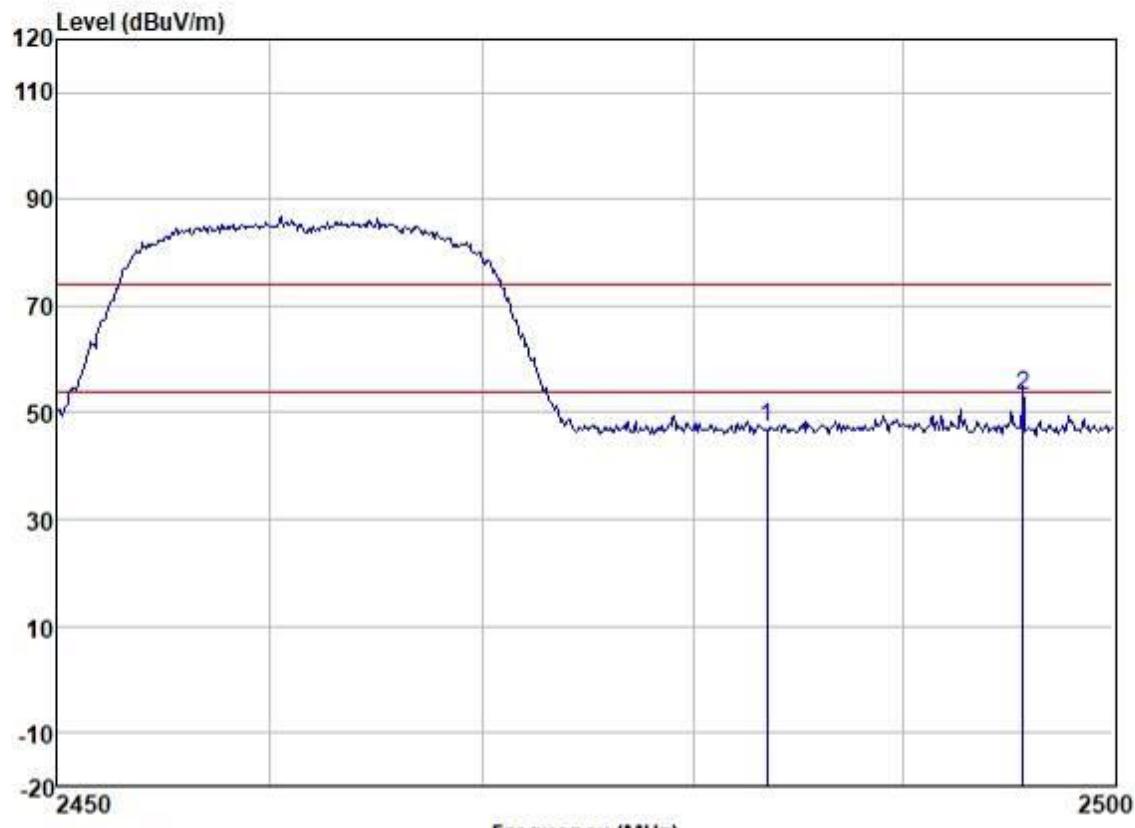
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



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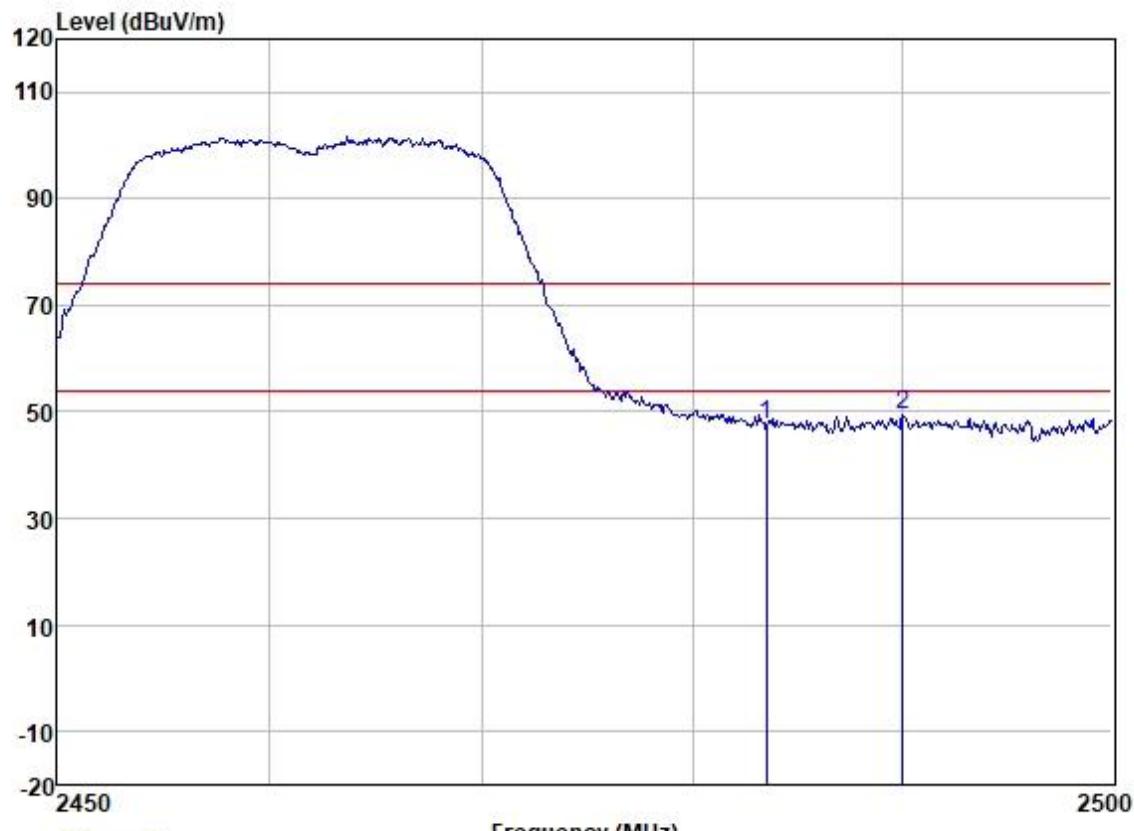
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



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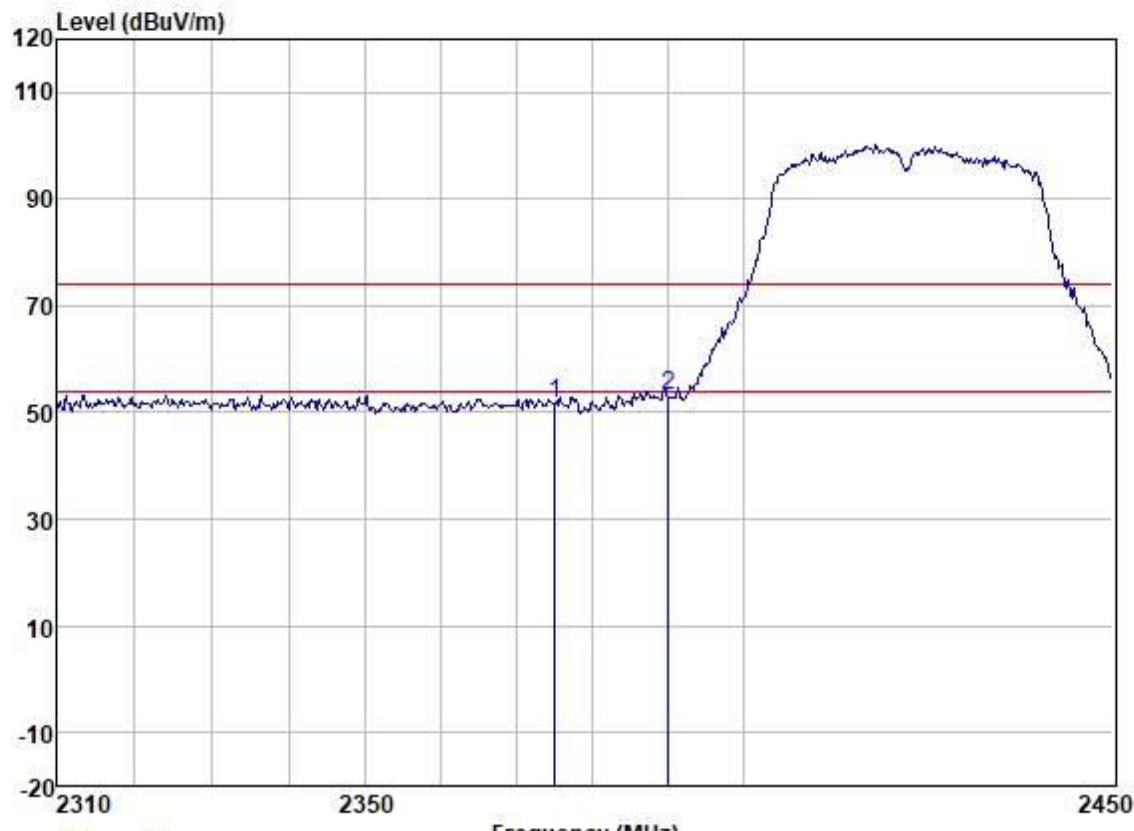
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



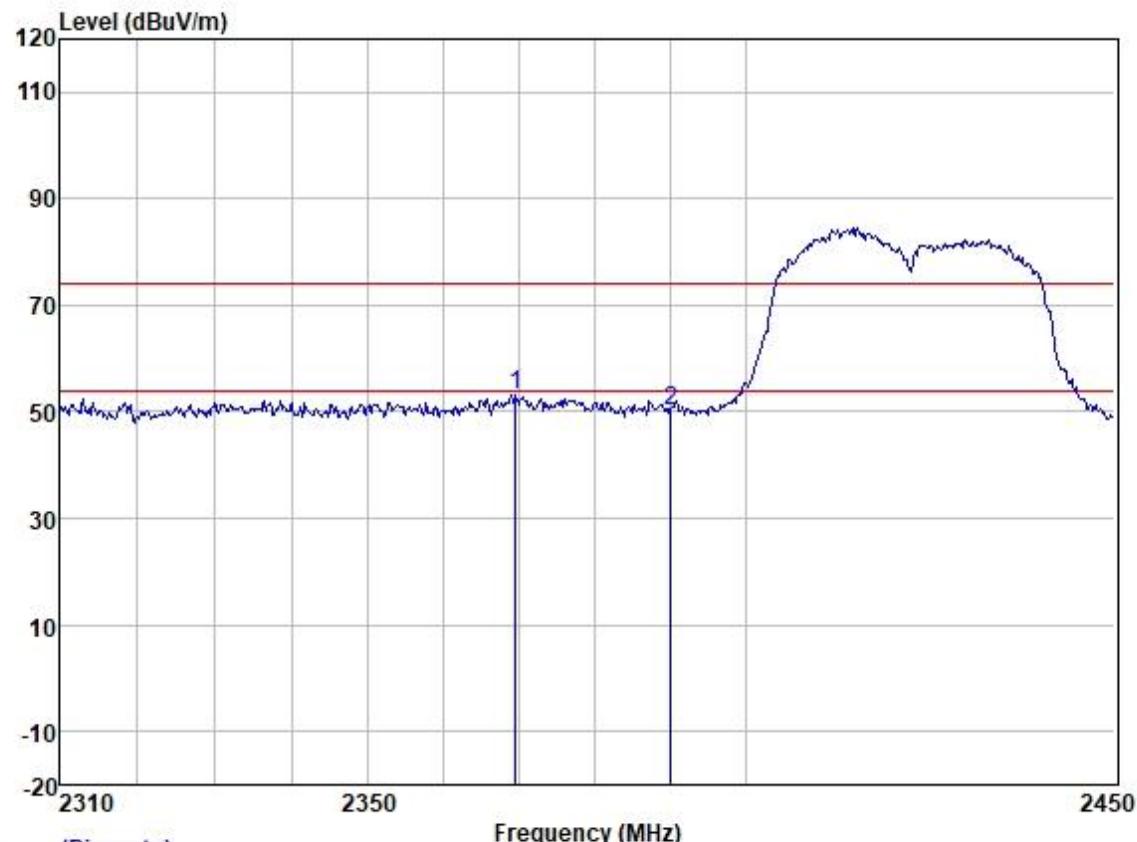
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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:40MHz; Channel:Low



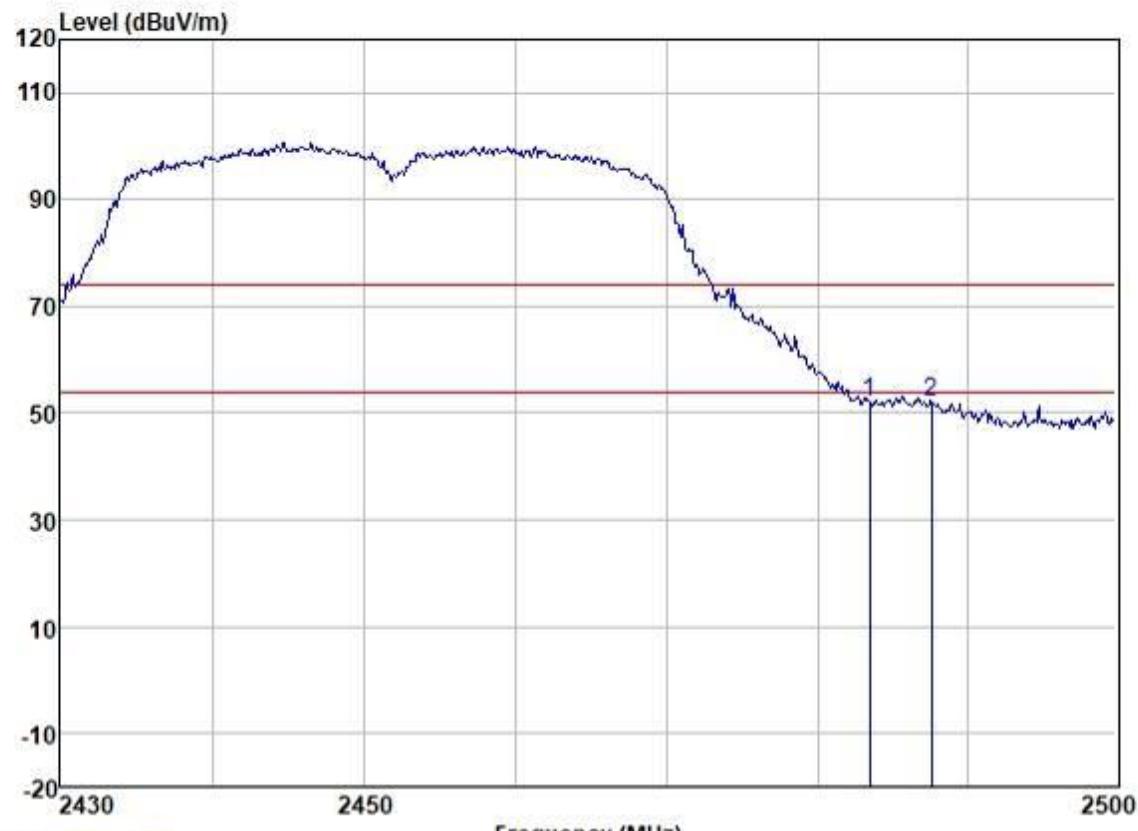
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:40MHz; Channel:Low



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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:40MHz; Channel:High



Race: (Discrete)

Race	Freq	ReadAntenna		Cable		Preamp	Limit	Over	Over	Pol/Phase	Remark
		Level	Factor	Loss	Factor						
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1	2483.500	57.77	27.85	3.42	37.11	51.93	74.00	-22.07	VERTICAL	Peak	
2	2487.606	57.74	27.85	3.42	37.11	51.90	74.00	-22.10	VERTICAL	Peak	

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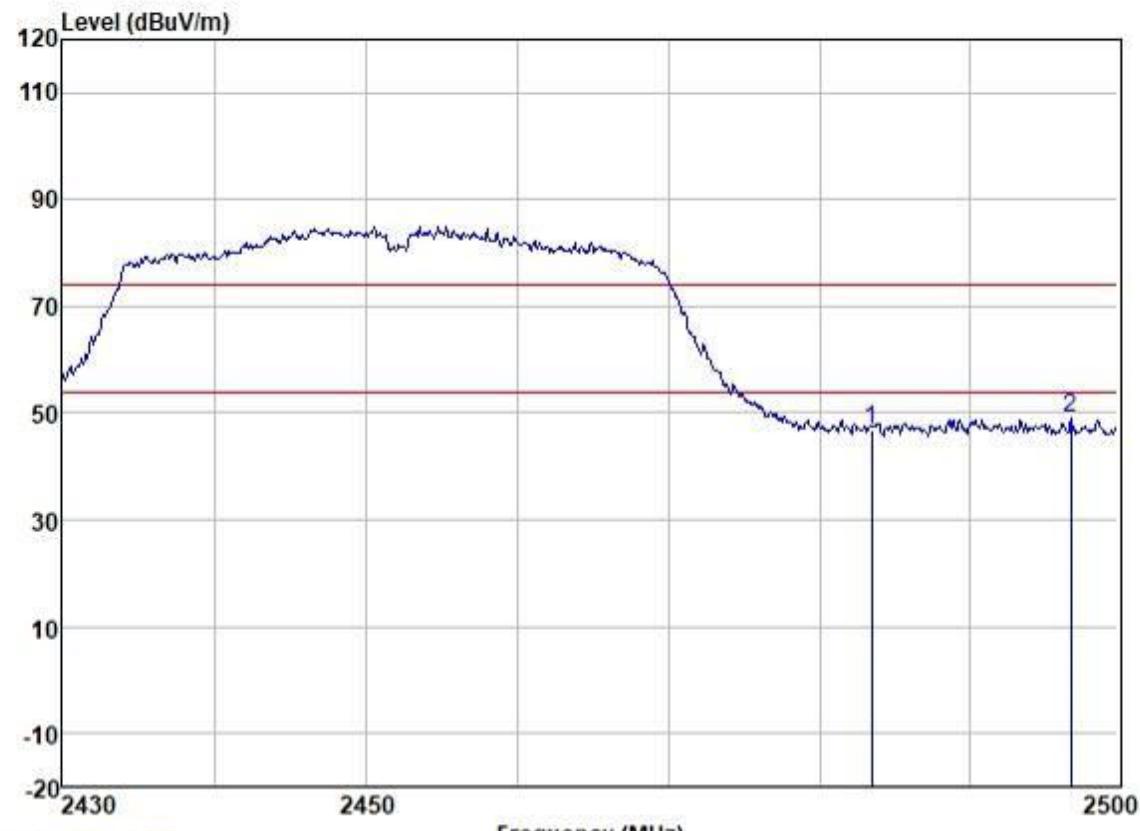
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:40MHz; Channel:High



7.8 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Limit:

Test Distance: 3 m

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C Humidity: 58.7 % RH Atmospheric Pressure: 1015 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



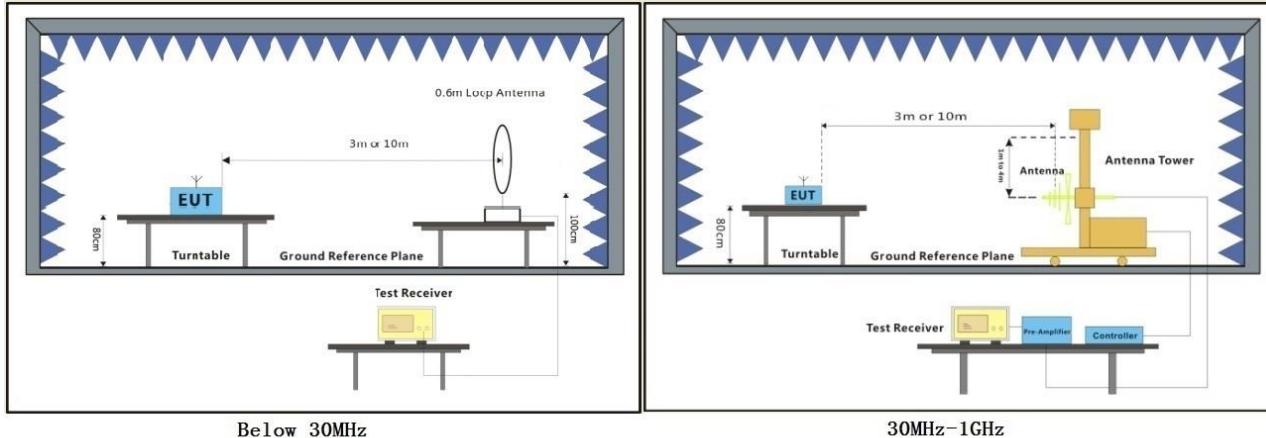
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7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

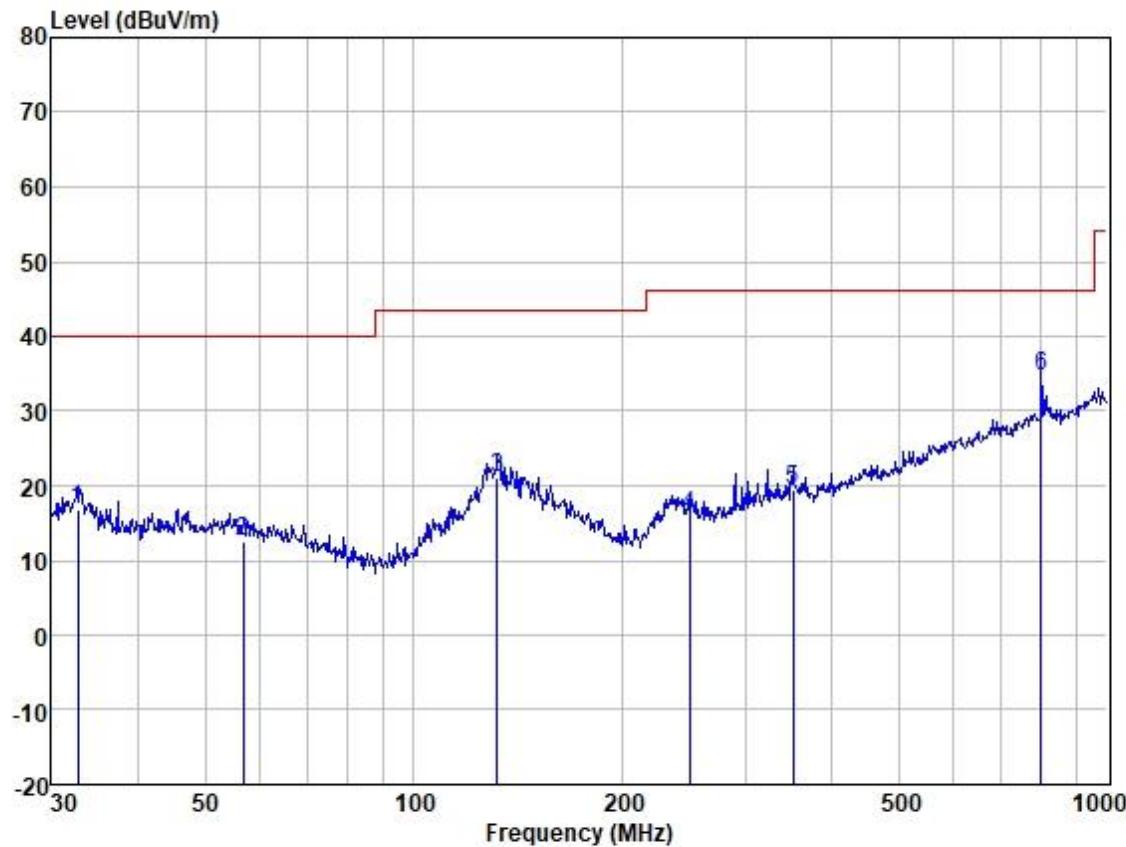
- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



Test Mode: 00; Polarity: Horizontal



Site : SGS
Job :
Model :
Power :
Test Mode :

Freq	Read	Antena	Cable	Preamp	Measured	Limit	Over	Pol/	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit	Phase	
1	32.749	30.59	12.85	1.04	27.64	16.84	40.00	-23.16	HORIZONTAL QP
2	56.792	25.22	13.64	1.20	27.60	12.46	40.00	-27.54	HORIZONTAL QP
3	131.758	34.22	12.31	1.96	27.52	20.97	43.50	-22.53	HORIZONTAL QP
4	249.425	28.41	11.77	2.93	27.24	15.87	46.00	-30.13	HORIZONTAL QP
5	351.708	28.97	14.44	3.62	27.69	19.34	46.00	-26.66	HORIZONTAL QP
6	801.786	34.44	22.88	6.04	28.59	34.77	46.00	-11.23	HORIZONTAL QP

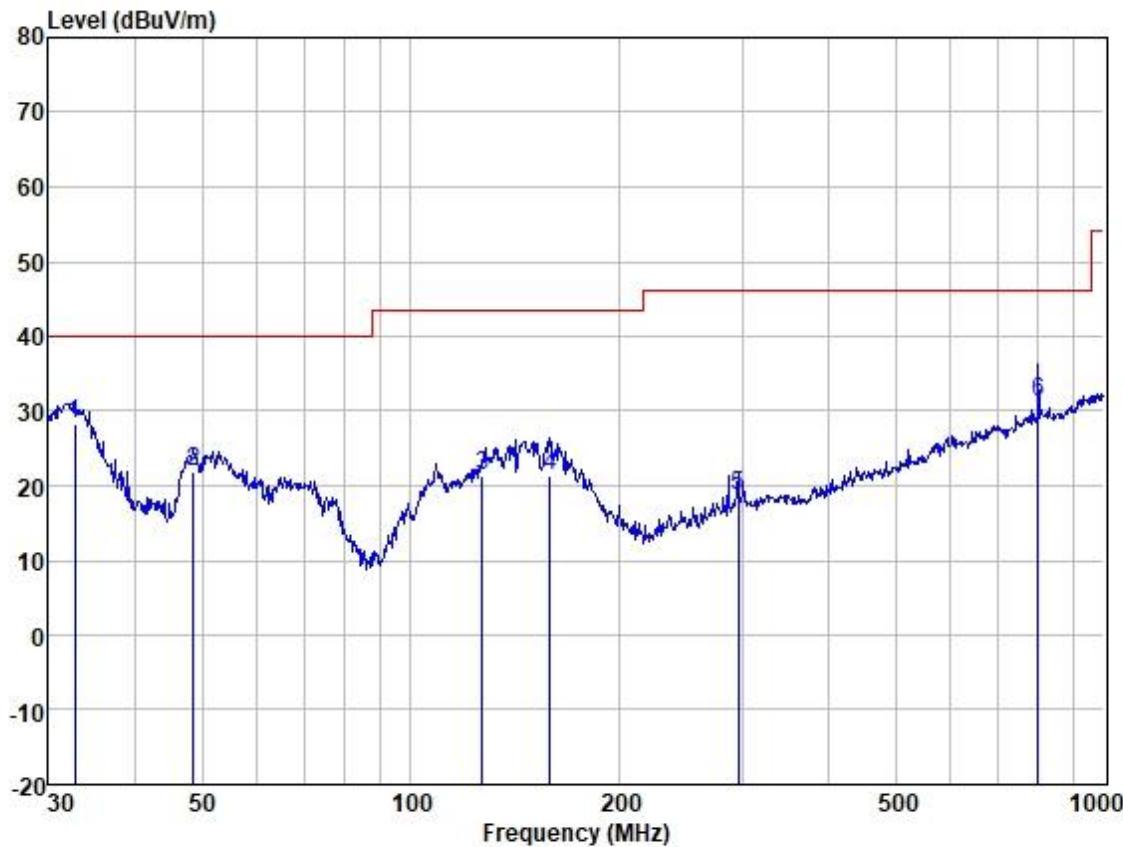
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Test Mode: 00; Polarity: Vertical



Site : SGS
Job :
Model :
Power :
Test Mode :

Freq	Read	Antena	Cable	Preamp	Measured	Limit	Over	Pol/	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit	Phase	
1 32.749	42.02	12.85	1.04	27.64	28.27	40.00	-11.73	VERTICAL	QP
2 48.502	34.47	13.97	1.13	27.60	21.97	40.00	-18.03	VERTICAL	QP
3 126.772	34.94	11.91	1.90	27.54	21.21	43.50	-22.29	VERTICAL	QP
4 158.668	32.74	13.67	2.32	27.36	21.37	43.50	-22.13	VERTICAL	QP
5 296.184	29.24	13.32	3.21	27.20	18.57	46.00	-27.43	VERTICAL	QP
6 801.786	30.88	22.88	6.04	28.59	31.21	46.00	-14.79	VERTICAL	QP

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7.9 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

7.9.1 E.U.T. Operation

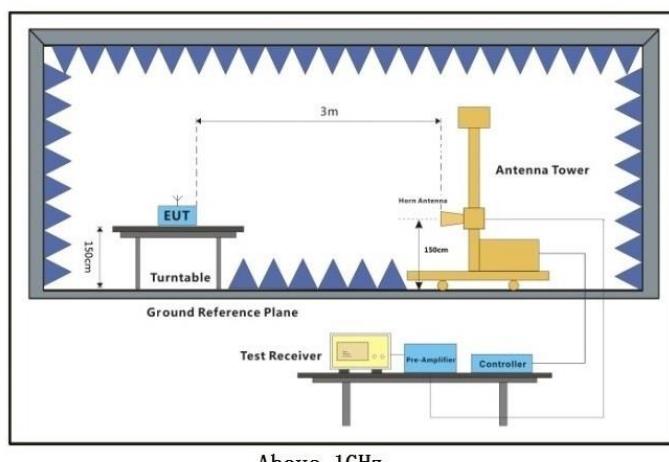
Operating Environment:

Temperature: 23.3 °C Humidity: 48.6 % RH Atmospheric Pressure: 1015 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.9.3 Test Setup Diagram



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7.9.4 Measurement Procedure and Data

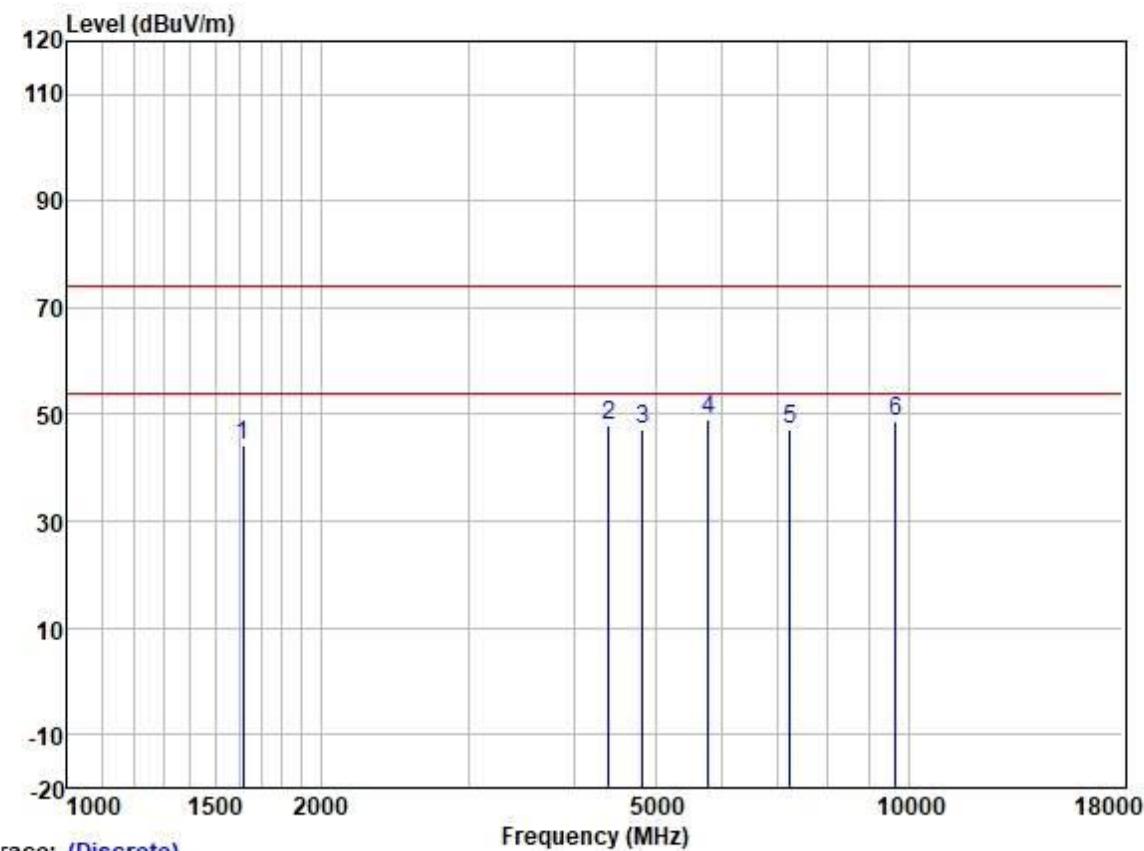
- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 4: For WLAN radiated test, according to the conducted power and verify test the SISO & MIMO mode, the worst-case is SISO mode for 802.11b/g, MIMO mode for 802.11n, therefore, all final test are performed in SISO & MIMO mode and reported.



Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



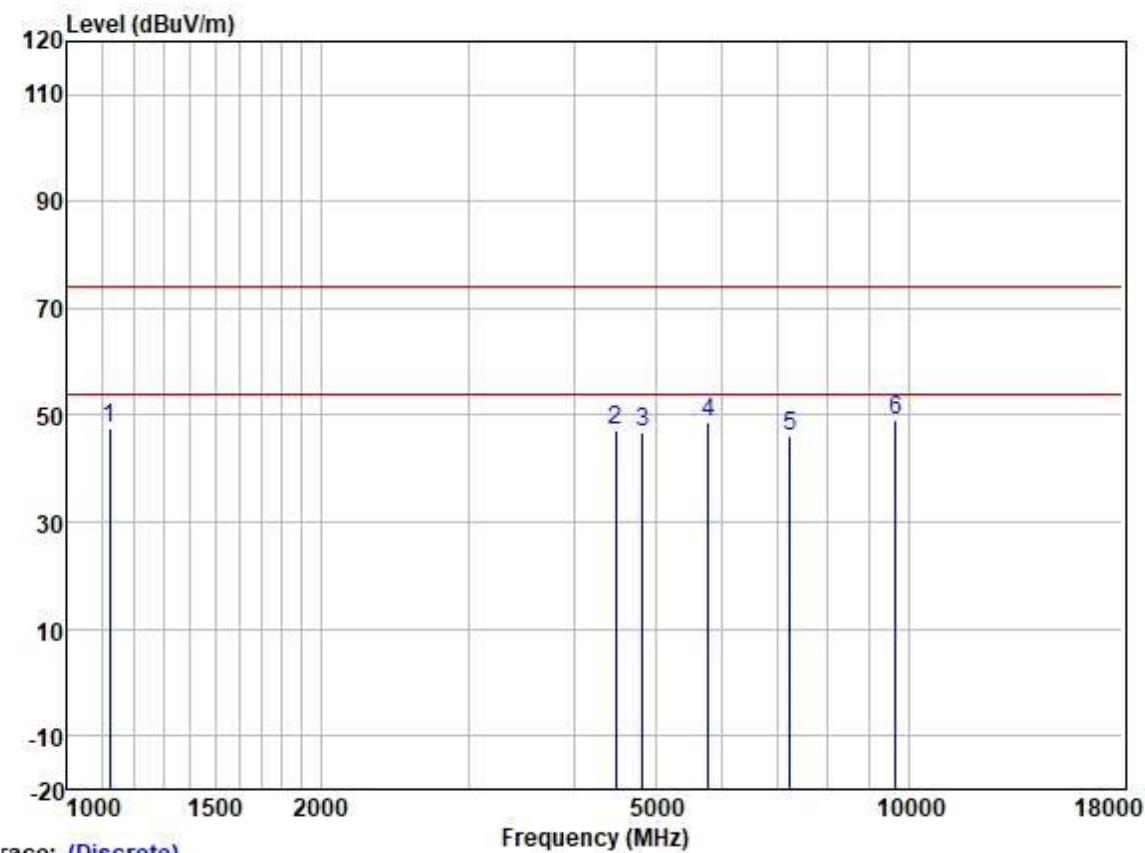
Race: (Discrete)	ReadAntenna						Cable	Preamp	Limit	Over	Pol/Phase	Remark
	Freq	Level	Antenna	Cable	Preamp	Level						
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB				
1	1615.754	53.69	24.74	3.04	37.37	44.10	74.00	-29.90	VERTICAL	peak		
2	4405.090	45.41	33.74	5.37	36.61	47.91	74.00	-26.09	VERTICAL	peak		
3	4824.000	44.11	34.16	5.46	36.63	47.10	74.00	-26.90	VERTICAL	peak		
4	5780.300	47.44	32.66	5.68	36.69	49.09	74.00	-24.91	VERTICAL	peak		
5	7236.000	41.67	35.78	6.35	36.77	47.03	74.00	-26.97	VERTICAL	peak		
6	9648.000	39.16	38.70	7.89	37.16	48.59	74.00	-25.41	VERTICAL	peak		

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Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



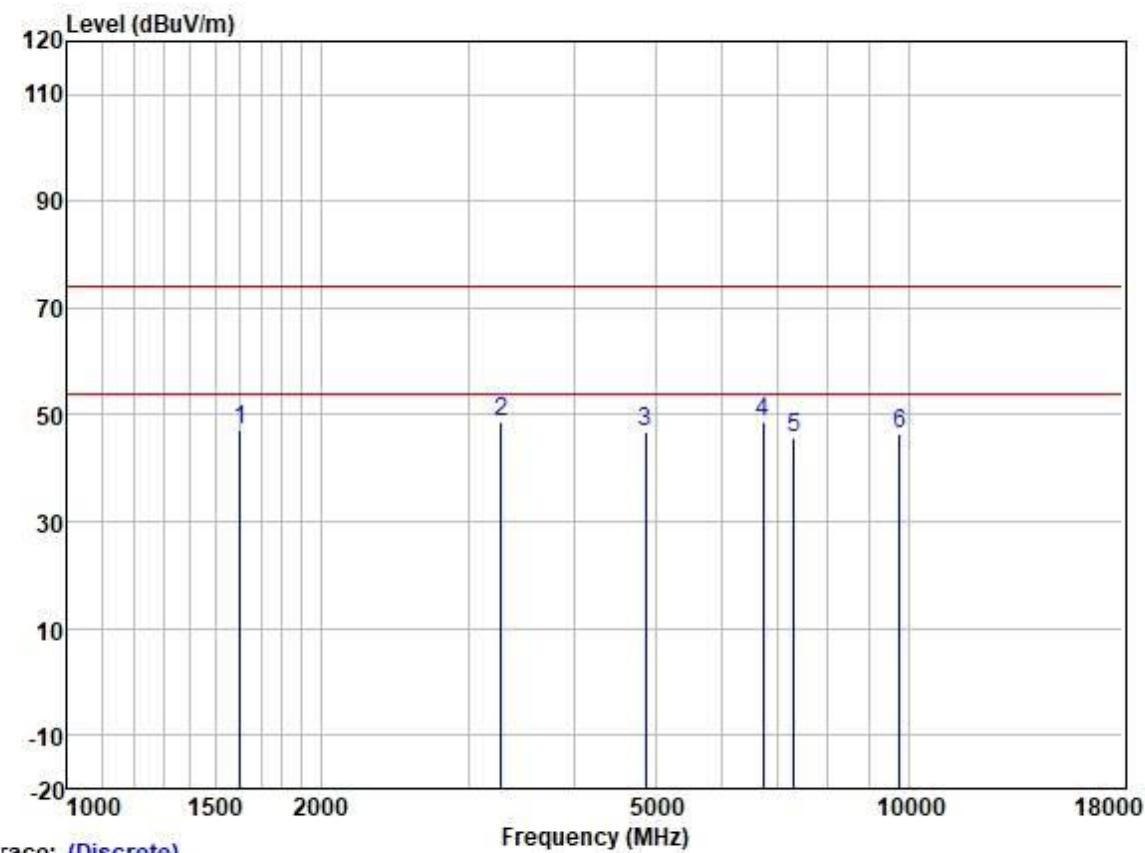
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level				
1	1122.563	59.80	22.75	2.52	37.66	47.41	74.00	-26.59	HORIZONTAL	peak
2	4482.150	44.45	34.12	5.34	36.62	47.29	74.00	-26.71	HORIZONTAL	peak
3	4824.000	43.71	34.16	5.46	36.63	46.70	74.00	-27.30	HORIZONTAL	peak
4	5780.300	47.22	32.66	5.68	36.69	48.87	74.00	-25.13	HORIZONTAL	peak
5	7236.000	40.75	35.78	6.35	36.77	46.11	74.00	-27.89	HORIZONTAL	peak
6	9648.000	39.81	38.70	7.89	37.16	49.24	74.00	-24.76	HORIZONTAL	peak

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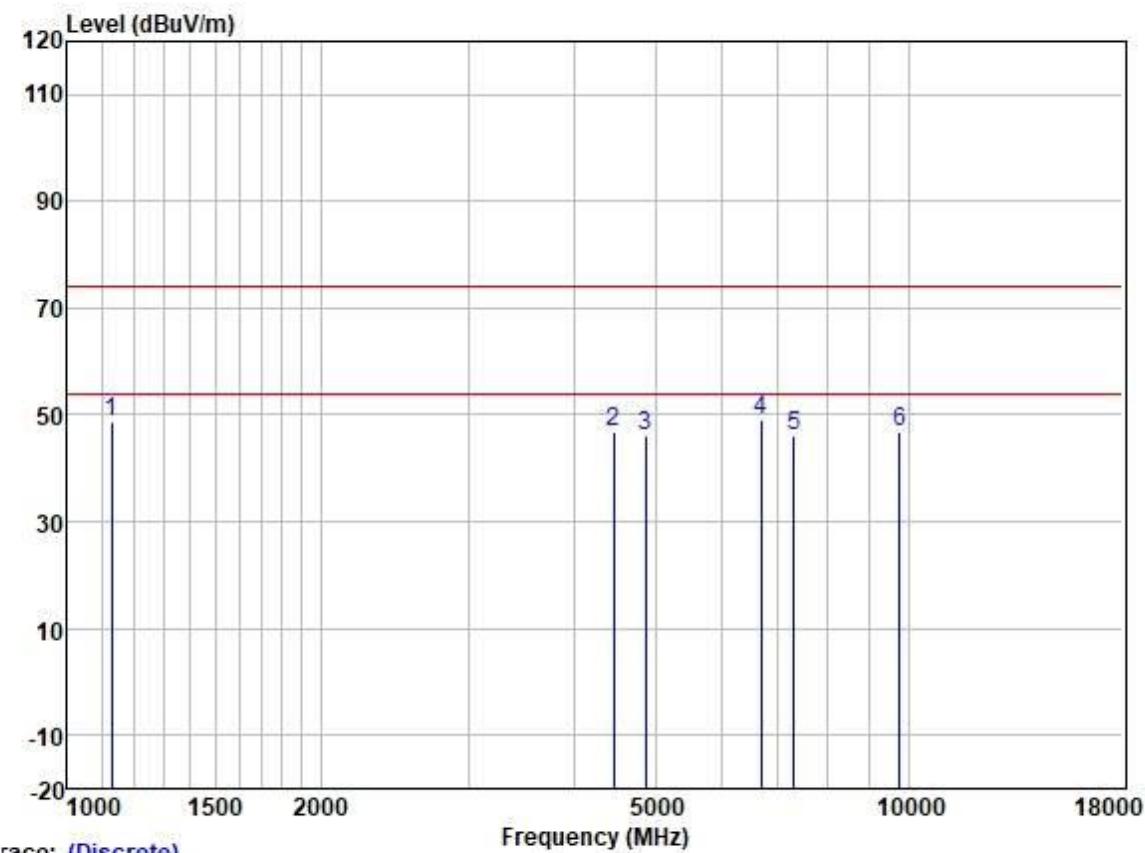
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Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:middle



Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:middle



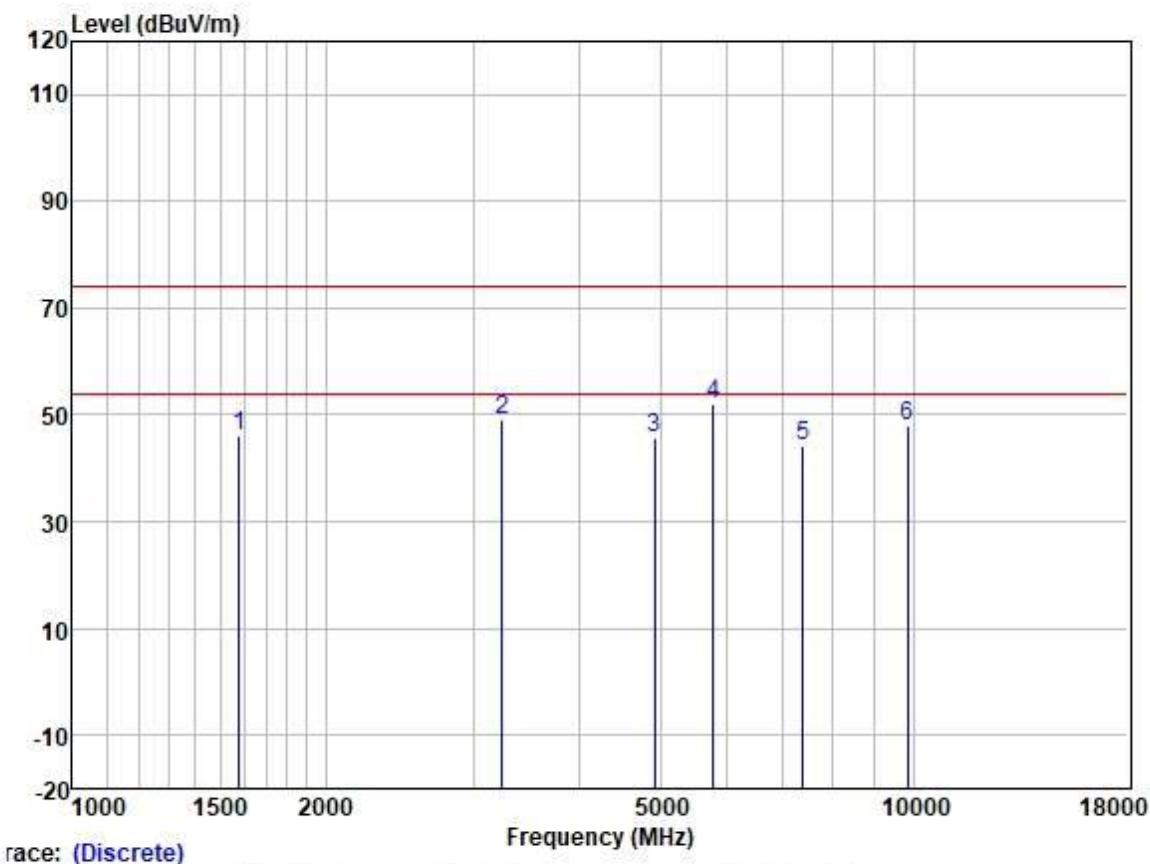
Freq	ReadAntenna		Cable		Preamp		Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss	Factor	Level	dBuV/m	dBuV/m	dB		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1129.072	60.93	22.78	2.53	37.66	48.58	74.00	-25.42	HORIZONTAL	peak	
2 4456.315	44.17	34.00	5.35	36.61	46.91	74.00	-27.09	HORIZONTAL	peak	
3 4874.000	43.06	34.15	5.49	36.64	46.06	74.00	-27.94	HORIZONTAL	peak	
4 6679.040	45.18	34.28	6.27	36.72	49.01	74.00	-24.99	HORIZONTAL	peak	
5 7311.000	40.67	36.00	6.32	36.77	46.22	74.00	-27.78	HORIZONTAL	peak	
6 9748.000	37.58	38.81	7.43	37.17	46.65	74.00	-27.35	HORIZONTAL	peak	

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Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:High



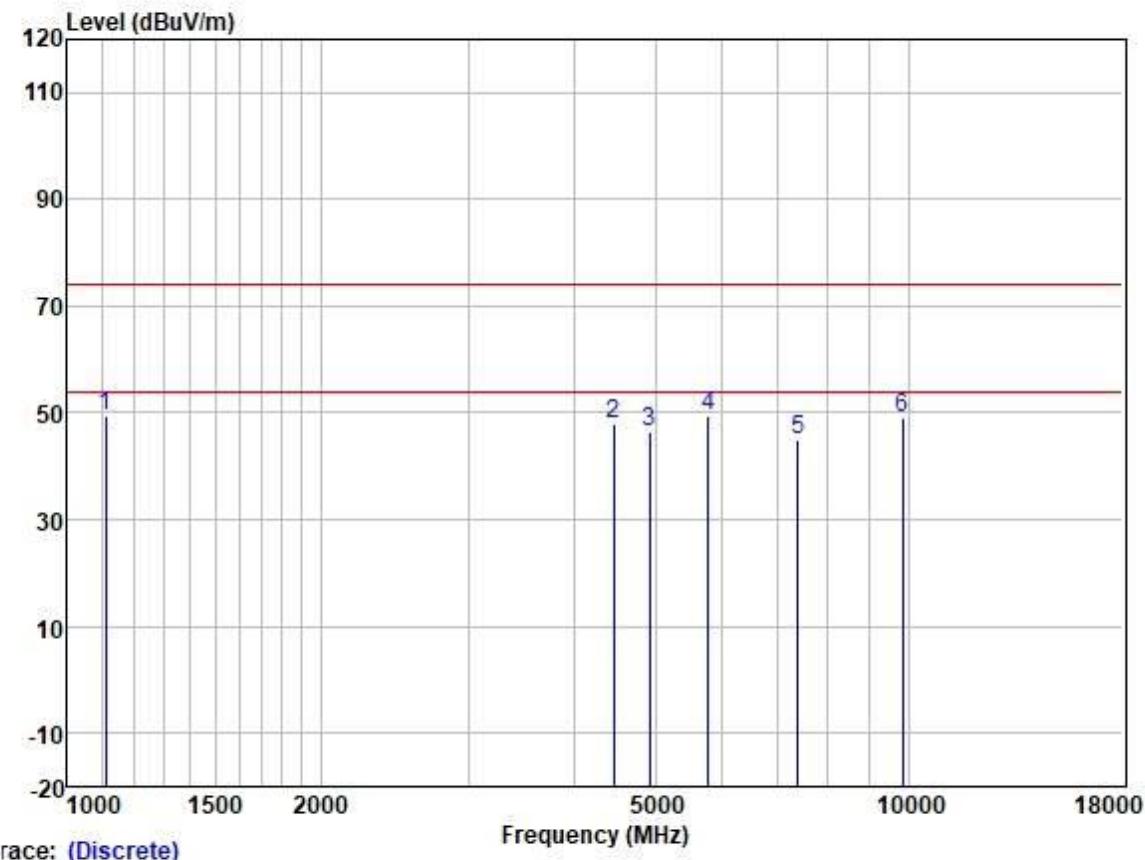
Freq	ReadAntenna	Cable	Preamp	Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 1578.822	55.74	24.62	2.99	37.39	45.96	74.00	-28.04 VERTICAL peak
2 3242.619	52.52	28.87	4.32	36.77	48.94	74.00	-25.06 VERTICAL peak
3 4924.000	42.68	34.15	5.51	36.64	45.70	74.00	-28.30 VERTICAL peak
4 5780.300	50.32	32.66	5.68	36.69	51.97	74.00	-22.03 VERTICAL peak
5 7386.000	38.48	36.23	6.30	36.78	44.23	74.00	-29.77 VERTICAL peak
6 9848.000	39.21	38.88	7.06	37.18	47.97	74.00	-26.03 VERTICAL peak

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Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High



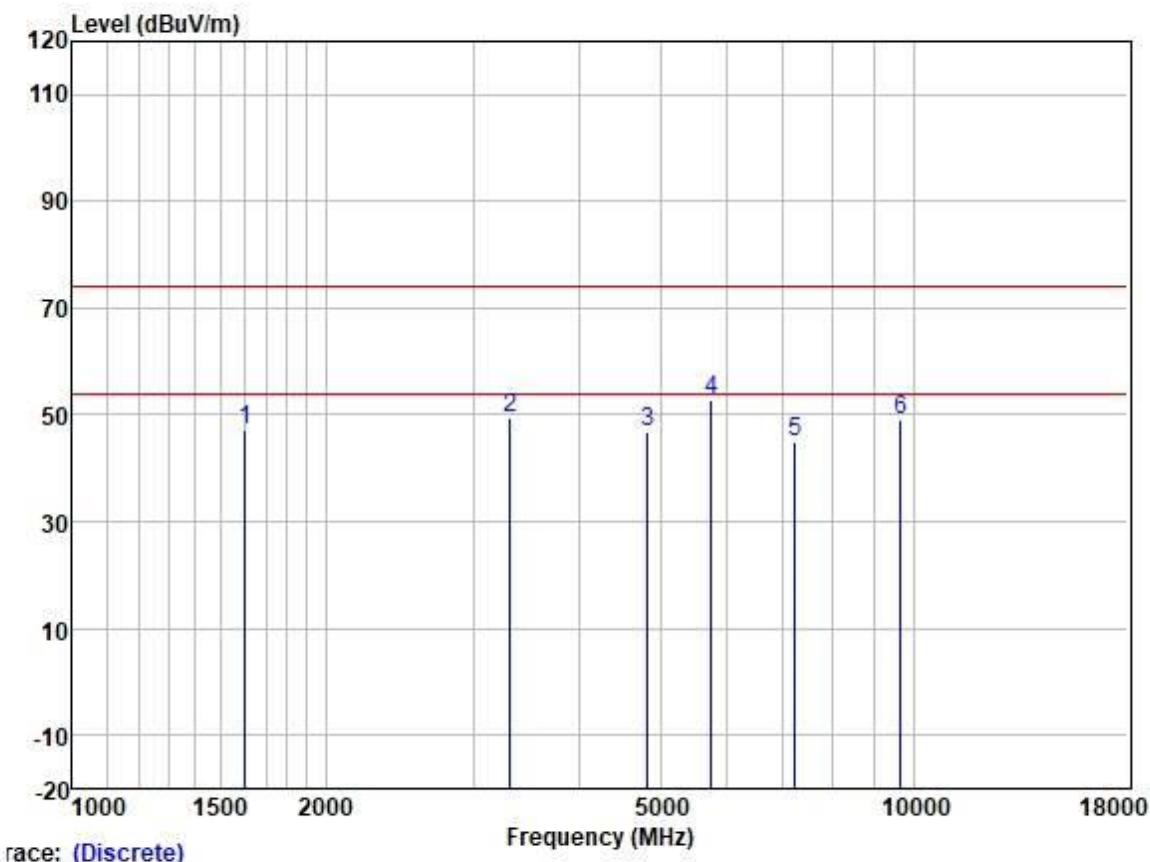
Freq	ReadAntenna		Cable		Preamp		Limit	Over	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level				
	dBuV	dB/m		dB	dBuV/m	dBuV/m		dB		
1	1109.660	61.90	22.71	2.51	37.67	49.45	74.00	-24.55	HORIZONTAL	peak
2	4456.315	45.17	34.00	5.35	36.61	47.91	74.00	-26.09	HORIZONTAL	peak
3	4924.000	43.52	34.15	5.51	36.64	46.54	74.00	-27.46	HORIZONTAL	peak
4	5780.300	47.61	32.66	5.68	36.69	49.26	74.00	-24.74	HORIZONTAL	peak
5	7386.000	39.03	36.23	6.30	36.78	44.78	74.00	-29.22	HORIZONTAL	peak
6	9848.000	40.42	38.88	7.06	37.18	49.18	74.00	-24.82	HORIZONTAL	peak

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Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:Low



Race: (Discrete)

Freq	ReadAntenna Level	Cable Loss	Preamp Factor	Limit		Over Line Limit	Over Pol/Phase	Remark
				dB	dBuV/m			
MHz	dBuV	dB/m						
1 1606.441	56.67	24.71	3.02	37.37	47.03	74.00	-26.97	VERTICAL peak
2 3318.471	53.09	28.94	4.26	36.74	49.55	74.00	-24.45	VERTICAL peak
3 4824.000	43.88	34.16	5.46	36.63	46.87	74.00	-27.13	VERTICAL peak
4 5746.982	50.98	32.65	5.70	36.69	52.64	74.00	-21.36	VERTICAL peak
5 7236.000	39.75	35.78	6.35	36.77	45.11	74.00	-28.89	VERTICAL peak
6 9648.000	39.74	38.70	7.89	37.16	49.17	74.00	-24.83	VERTICAL peak

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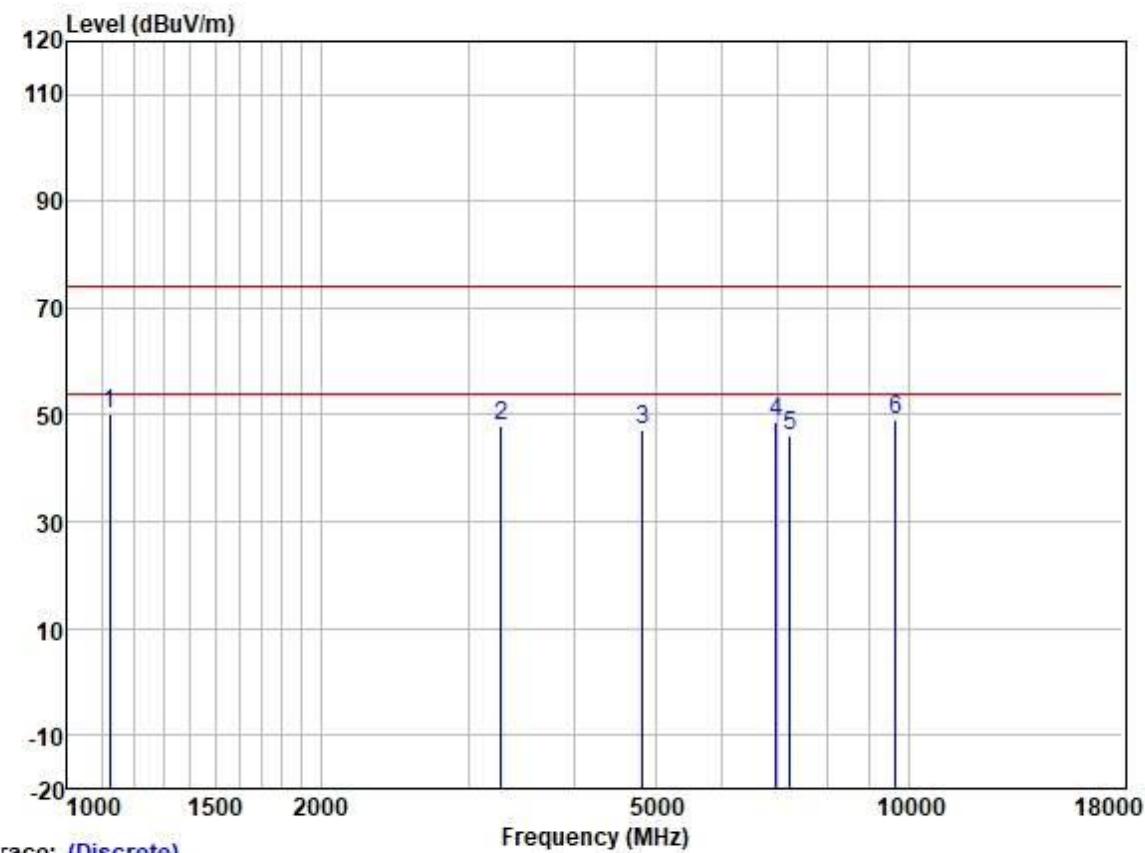
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:Low



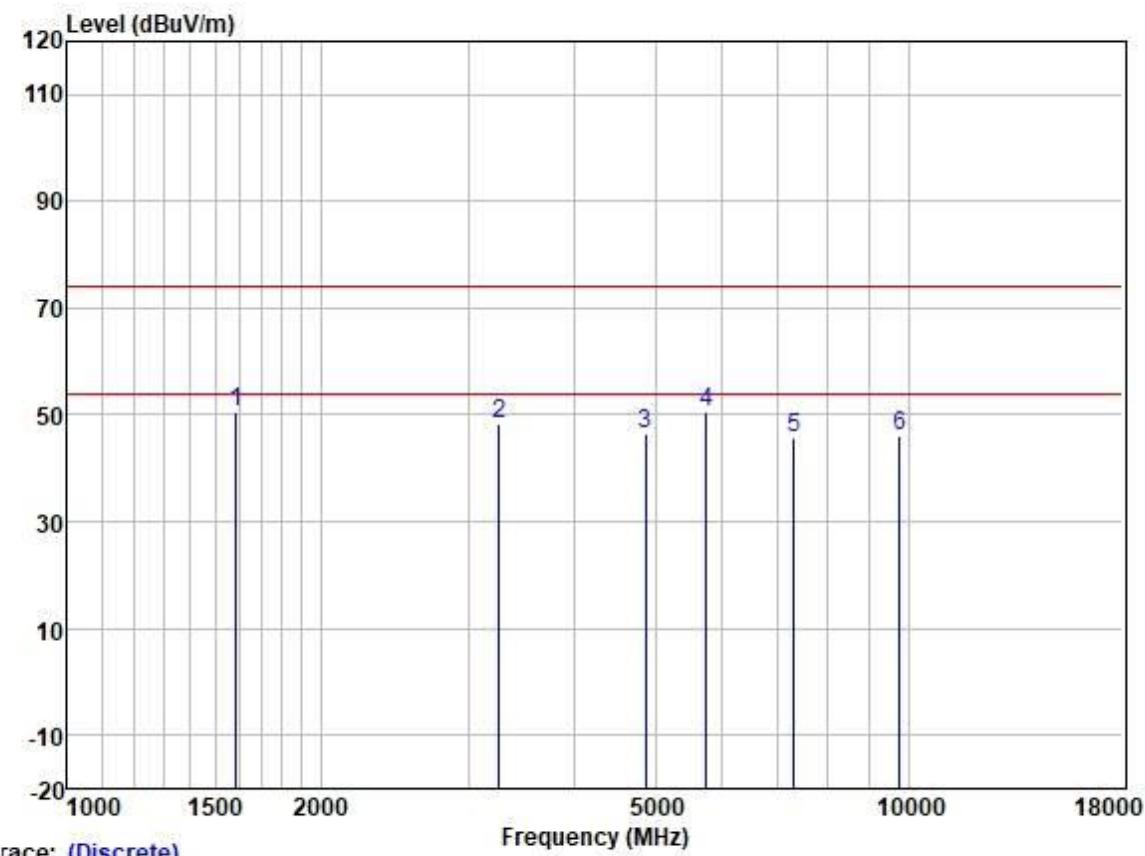
Freq	Read	Antenna	Cable	Preamp	Limit	Over	Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss	Factor						
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1122.563	62.62	22.75	2.52	37.66	50.23	74.00	-23.77	HORIZONTAL	peak
2	3280.326	51.42	28.91	4.29	36.76	47.86	74.00	-26.14	HORIZONTAL	peak
3	4824.000	44.22	34.16	5.46	36.63	47.21	74.00	-26.79	HORIZONTAL	peak
4	6954.852	43.90	35.04	6.40	36.74	48.60	74.00	-25.40	HORIZONTAL	peak
5	7236.000	40.81	35.78	6.35	36.77	46.17	74.00	-27.83	HORIZONTAL	peak
6	9648.000	39.64	38.70	7.89	37.16	49.07	74.00	-24.93	HORIZONTAL	peak

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Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:middle



Freq	ReadAntenna	Cable	Preamp	Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 1587.975	60.45	24.65	3.00	37.39	50.71	74.00	-23.29 VERTICAL peak
2 3261.418	52.00	28.89	4.31	36.76	48.44	74.00	-25.56 VERTICAL peak
3 4874.000	43.39	34.15	5.49	36.64	46.39	74.00	-27.61 VERTICAL peak
4 5746.982	48.96	32.65	5.70	36.69	50.62	74.00	-23.38 VERTICAL peak
5 7311.000	40.32	36.00	6.32	36.77	45.87	74.00	-28.13 VERTICAL peak
6 9748.000	37.19	38.81	7.43	37.17	46.26	74.00	-27.74 VERTICAL peak

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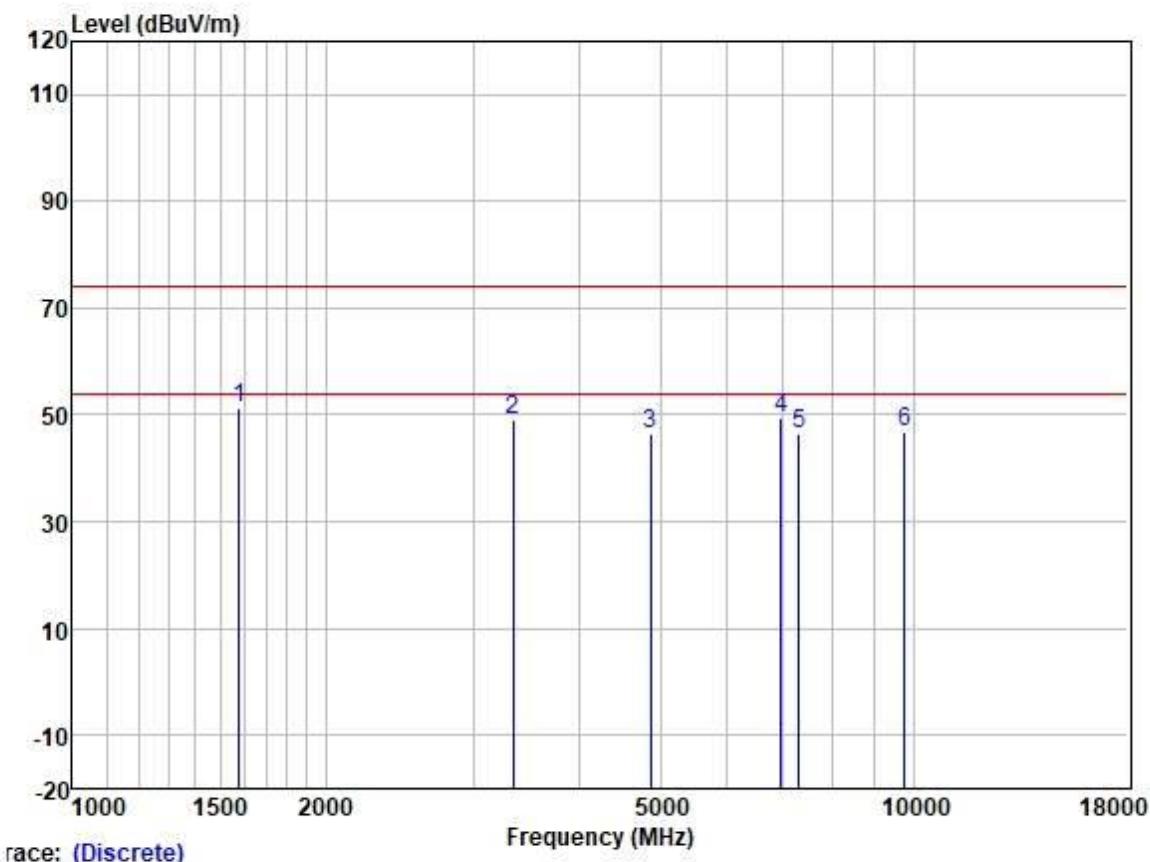


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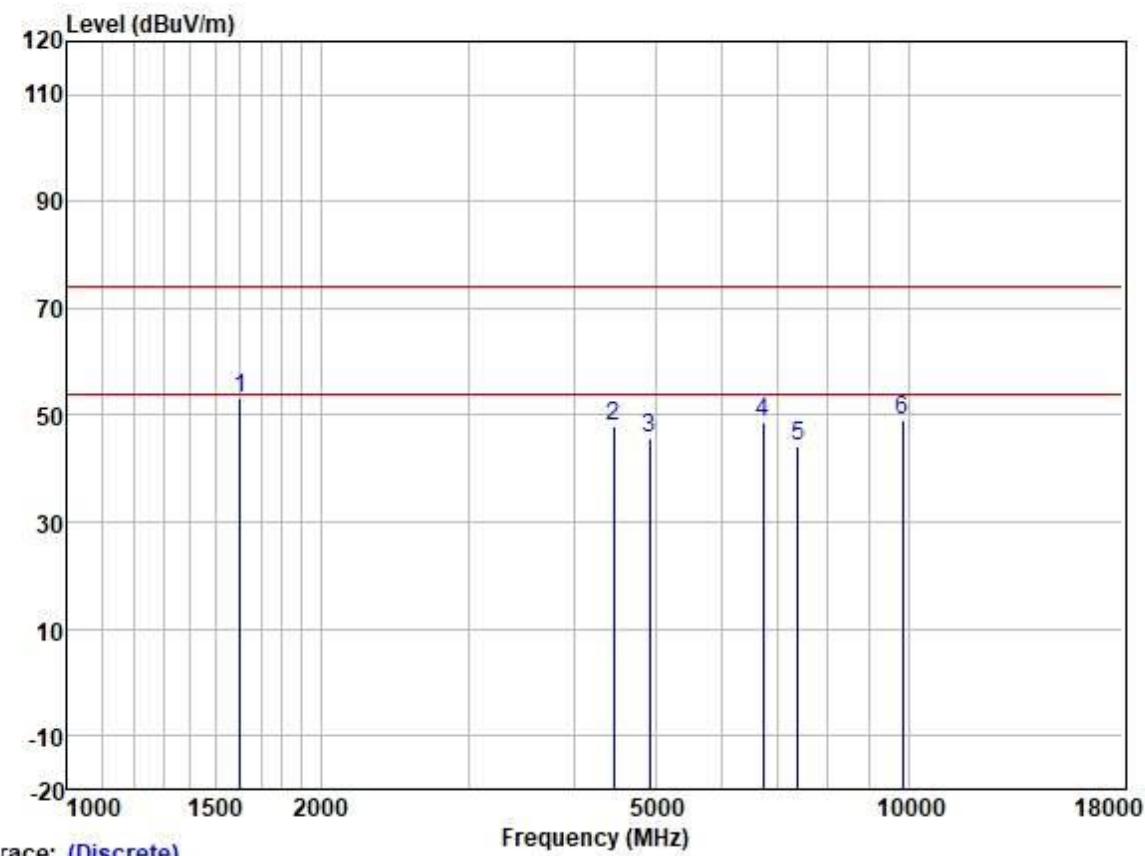
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:middle



Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:High



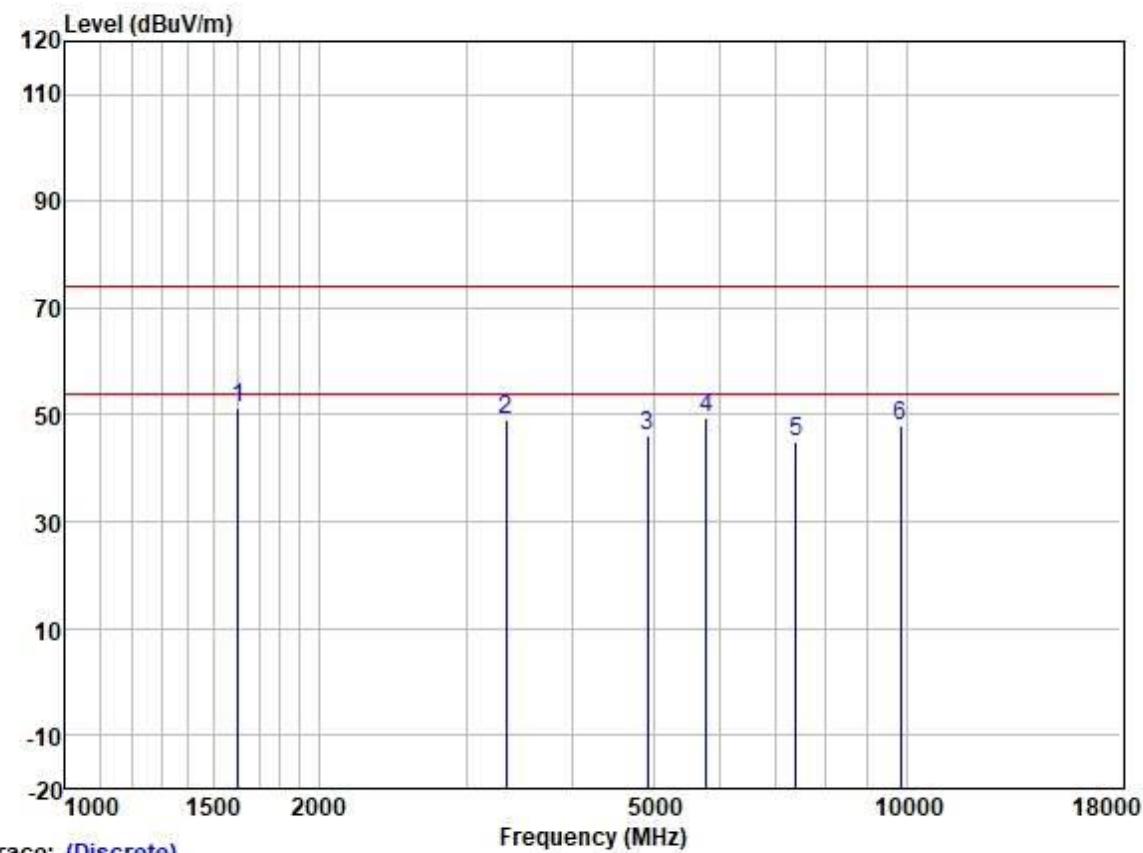
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level				
	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m				
1 1606.441	62.72	24.71	3.02	37.37	53.08	74.00	-20.92	VERTICAL	peak	
2 4456.315	45.18	34.00	5.35	36.61	47.92	74.00	-26.08	VERTICAL	peak	
3 4924.000	42.64	34.15	5.51	36.64	45.66	74.00	-28.34	VERTICAL	peak	
4 6717.762	44.72	34.42	6.29	36.73	48.70	74.00	-25.30	VERTICAL	peak	
5 7386.000	38.49	36.23	6.30	36.78	44.24	74.00	-29.76	VERTICAL	peak	
6 9848.000	40.12	38.88	7.06	37.18	48.88	74.00	-25.12	VERTICAL	peak	

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Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:High



Freq	ReadAntenna		Cable		Preamp		Limit	Over	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level				
1	1606.441	60.81	24.71	3.02	37.37	51.17	74.00	-22.83	HORIZONTAL	peak
2	3337.710	52.62	28.95	4.25	36.74	49.08	74.00	-24.92	HORIZONTAL	peak
3	4924.000	42.89	34.15	5.51	36.64	45.91	74.00	-28.09	HORIZONTAL	peak
4	5780.300	47.78	32.66	5.68	36.69	49.43	74.00	-24.57	HORIZONTAL	peak
5	7386.000	39.11	36.23	6.30	36.78	44.86	74.00	-29.14	HORIZONTAL	peak
6	9848.000	39.37	38.88	7.06	37.18	48.13	74.00	-25.87	HORIZONTAL	peak

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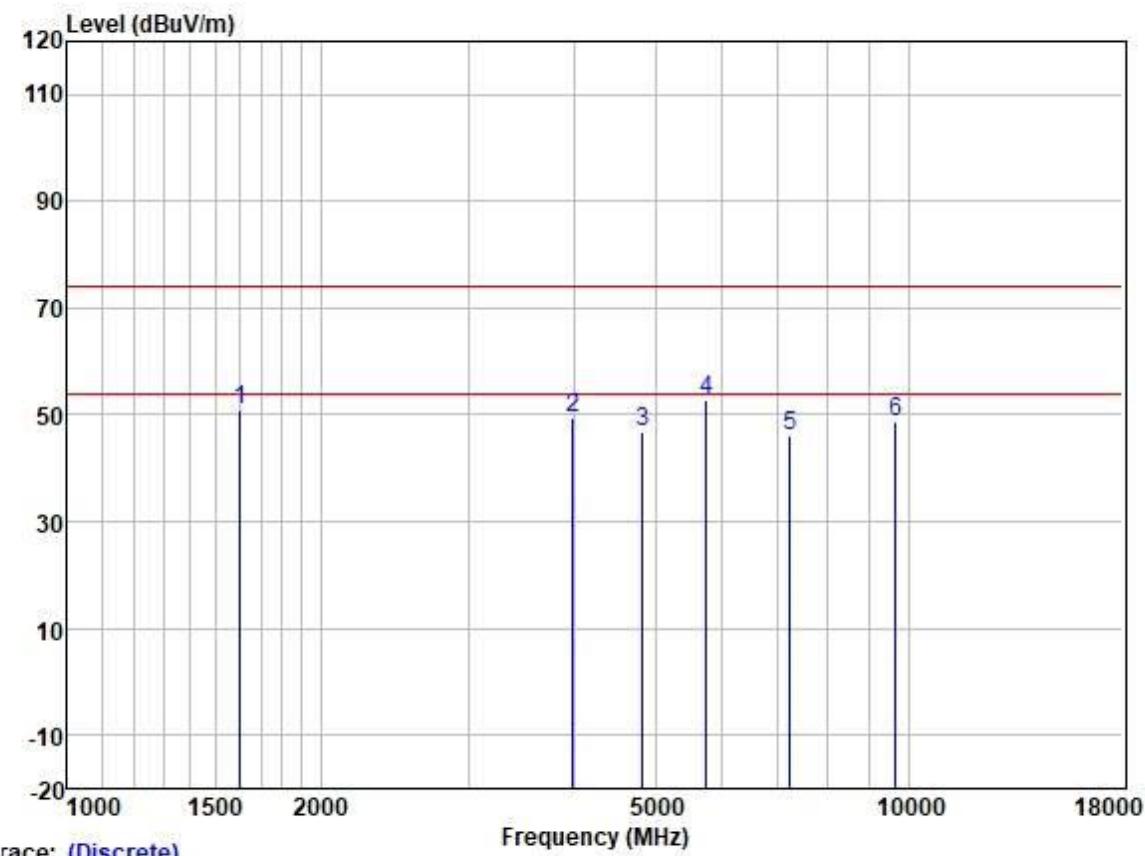
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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Index	Frequency (MHz)	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Pol/Phase	Remark
		Freq	Level	Antenna Factor	Loss	Preamp Factor	Level				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m				
1	1606.441	60.64	24.71	3.02	37.37	51.00	74.00	-23.00	VERTICAL	peak	
2	3992.781	50.17	30.59	5.25	36.60	49.41	74.00	-24.59	VERTICAL	peak	
3	4824.000	43.69	34.16	5.46	36.63	46.68	74.00	-27.32	VERTICAL	peak	
4	5746.982	51.01	32.65	5.70	36.69	52.67	74.00	-21.33	VERTICAL	peak	
5	7236.000	40.60	35.78	6.35	36.77	45.96	74.00	-28.04	VERTICAL	peak	
6	9648.000	39.16	38.70	7.89	37.16	48.59	74.00	-25.41	VERTICAL	peak	

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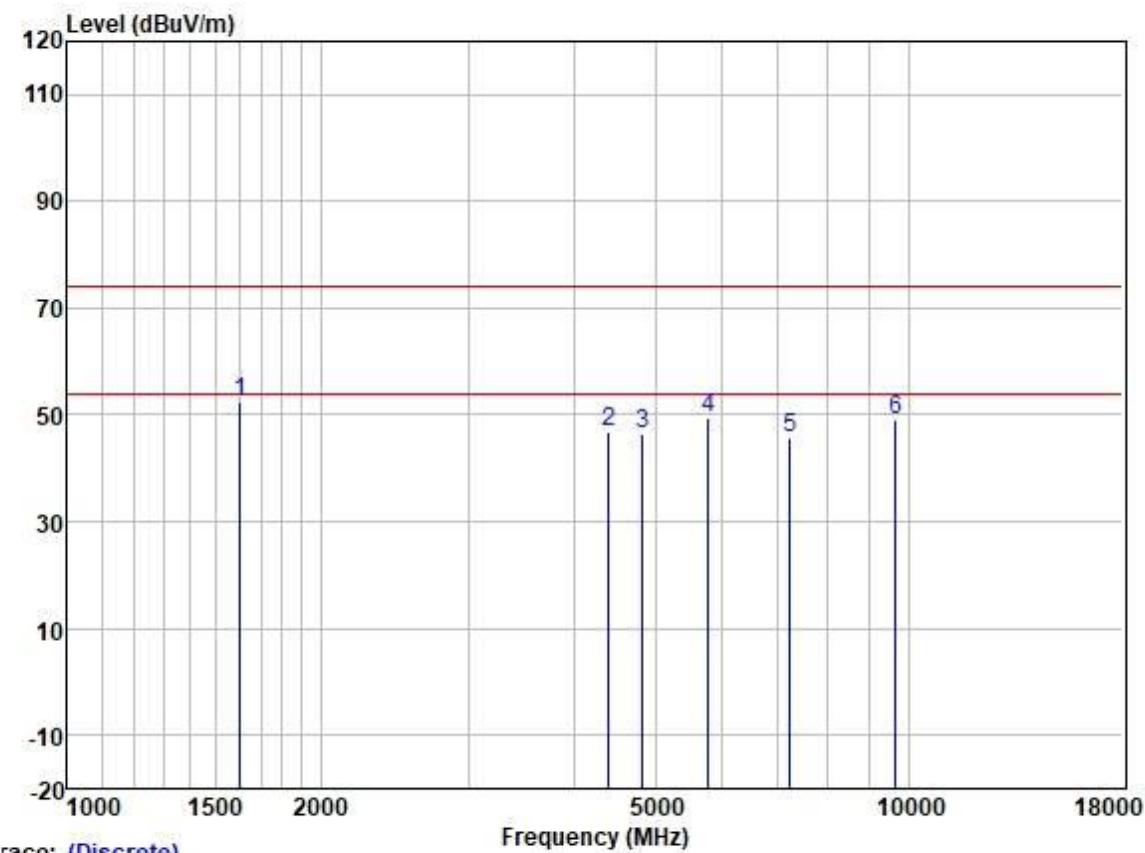
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
1	1606.441	61.91	24.71	3.02	37.37	52.27	74.00	-21.73	HORIZONTAL	peak
2	4405.090	44.50	33.74	5.37	36.61	47.00	74.00	-27.00	HORIZONTAL	peak
3	4824.000	43.30	34.16	5.46	36.63	46.29	74.00	-27.71	HORIZONTAL	peak
4	5780.300	47.98	32.66	5.68	36.69	49.63	74.00	-24.37	HORIZONTAL	peak
5	7236.000	40.24	35.78	6.35	36.77	45.60	74.00	-28.40	HORIZONTAL	peak
6	9648.000	39.78	38.70	7.89	37.16	49.21	74.00	-24.79	HORIZONTAL	peak

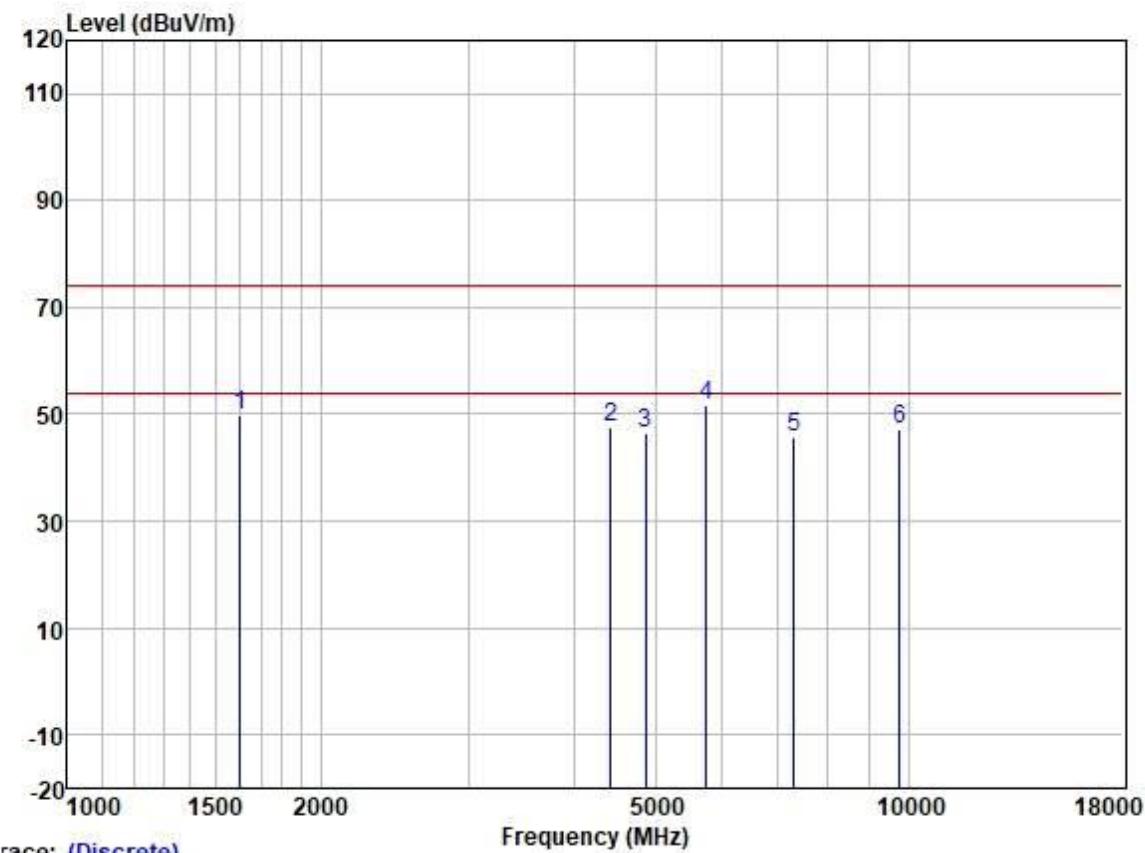
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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level				
	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m				
1	1606.441	59.58	24.71	3.02	37.37	49.94	74.00	-24.06	VERTICAL	peak
2	4430.628	45.07	33.87	5.36	36.61	47.69	74.00	-26.31	VERTICAL	peak
3	4874.000	43.44	34.15	5.49	36.64	46.44	74.00	-27.56	VERTICAL	peak
4	5746.982	49.87	32.65	5.70	36.69	51.53	74.00	-22.47	VERTICAL	peak
5	7311.000	40.31	36.00	6.32	36.77	45.86	74.00	-28.14	VERTICAL	peak
6	9748.000	38.06	38.81	7.43	37.17	47.13	74.00	-26.87	VERTICAL	peak

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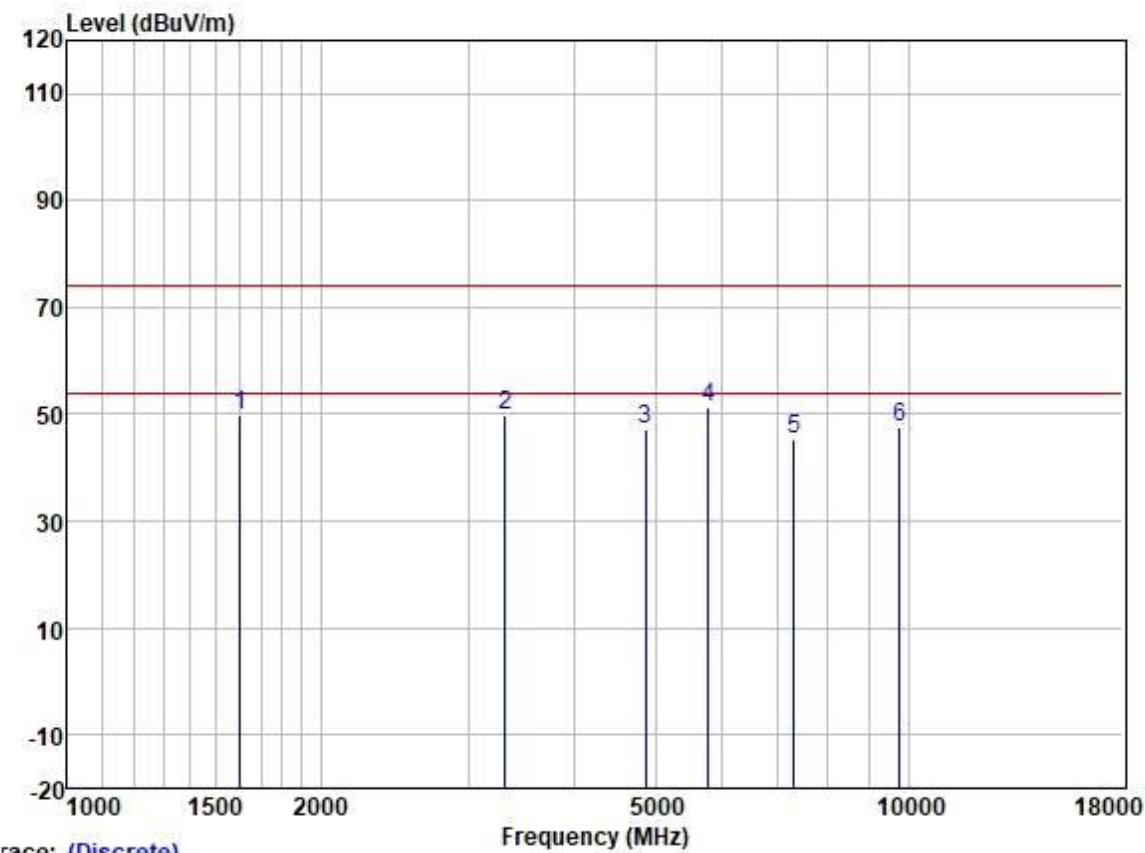
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level	Line	Line	dB		
1	1606.441	59.42	24.71	3.02	37.37	49.78	74.00	-24.22	HORIZONTAL	peak	
2	3318.471	53.19	28.94	4.26	36.74	49.65	74.00	-24.35	HORIZONTAL	peak	
3	4874.000	44.02	34.15	5.49	36.64	47.02	74.00	-26.98	HORIZONTAL	peak	
4	5780.300	49.63	32.66	5.68	36.69	51.28	74.00	-22.72	HORIZONTAL	peak	
5	7311.000	39.74	36.00	6.32	36.77	45.29	74.00	-28.71	HORIZONTAL	peak	
6	9748.000	38.64	38.81	7.43	37.17	47.71	74.00	-26.29	HORIZONTAL	peak	

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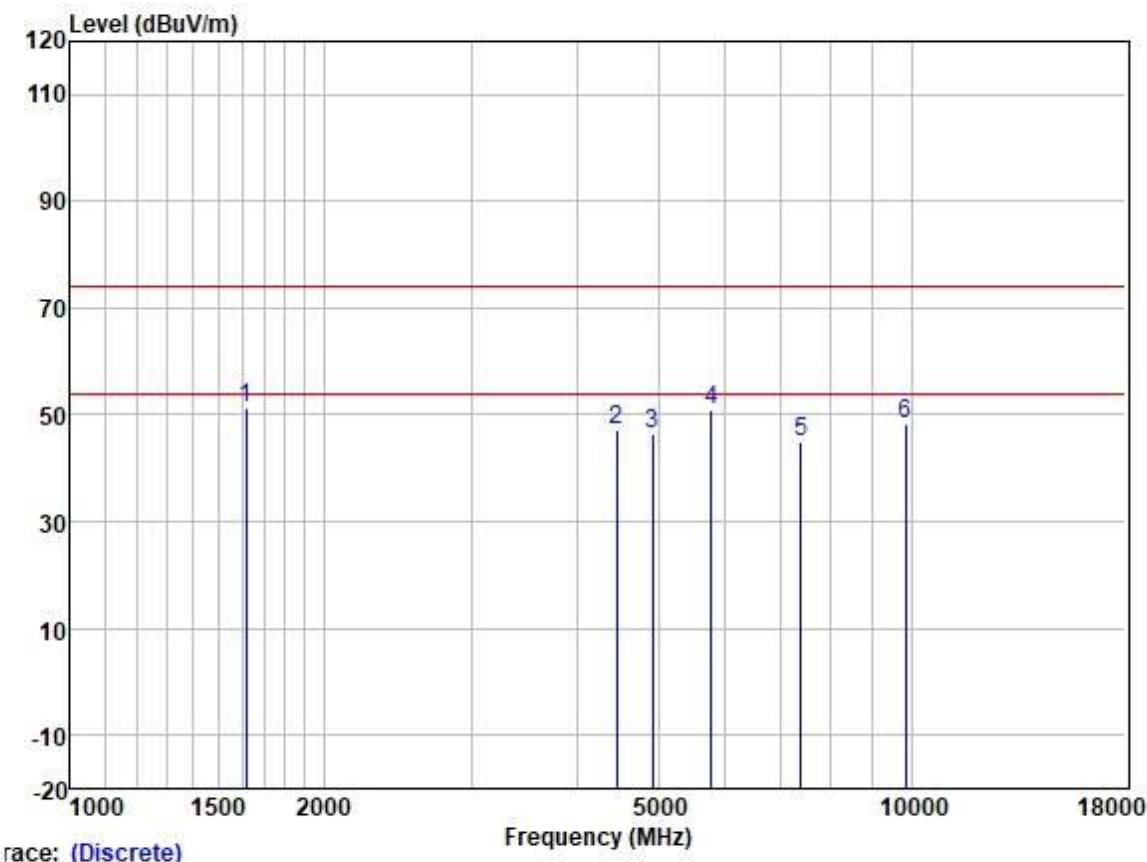
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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Race: (Discrete)

Freq	ReadAntenna		Cable		Preamp		Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss	Factor	Level	Line				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1615.754	60.73	24.74	3.04	37.37	51.14	74.00	-22.86	VERTICAL	peak	
2 4456.315	44.36	34.00	5.35	36.61	47.10	74.00	-26.90	VERTICAL	peak	
3 4924.000	43.48	34.15	5.51	36.64	46.50	74.00	-27.50	VERTICAL	peak	
4 5780.300	49.41	32.66	5.68	36.69	51.06	74.00	-22.94	VERTICAL	peak	
5 7386.000	39.05	36.23	6.30	36.78	44.80	74.00	-29.20	VERTICAL	peak	
6 9848.000	39.51	38.88	7.06	37.18	48.27	74.00	-25.73	VERTICAL	peak	

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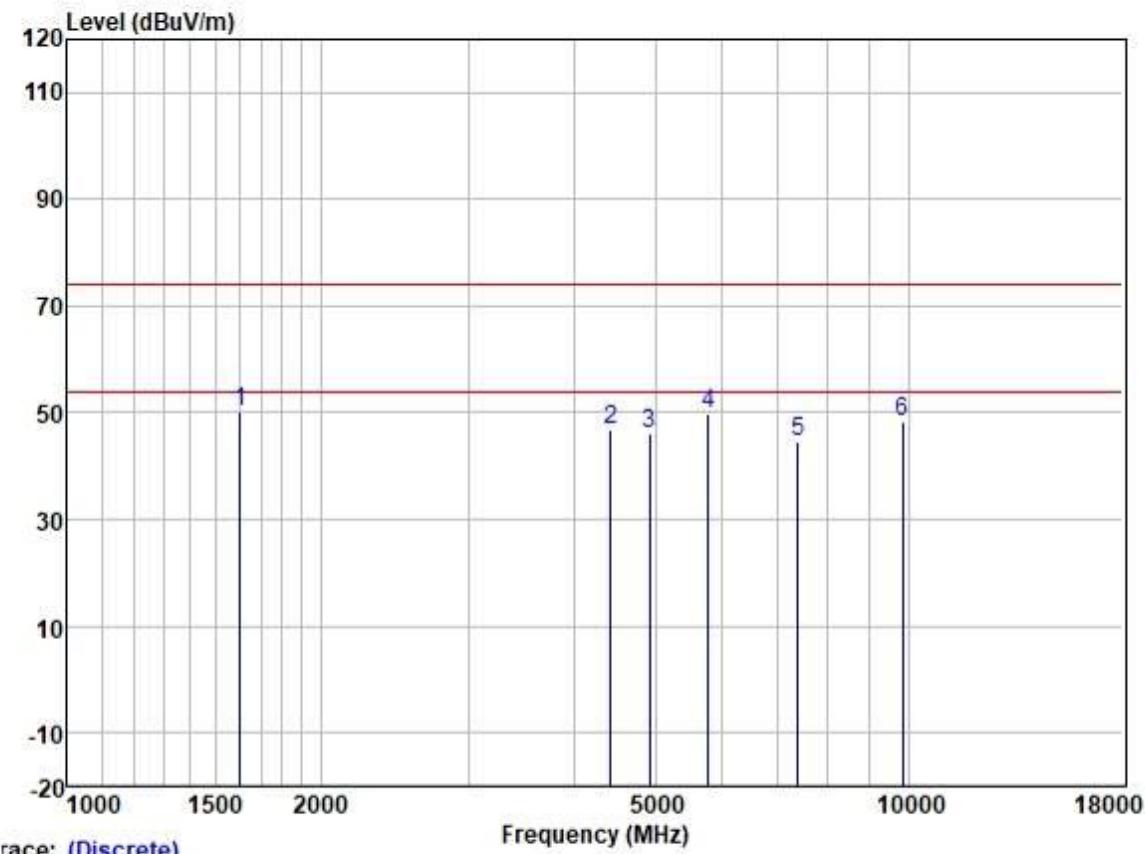


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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Race: (Discrete)

Freq	ReadAntenna Level	Antenna Factor	Cable Loss		Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
			MHz	dBuV	dB/m	dB	dBuV/m			
1 1606.441	59.81	24.71	3.02	37.37	50.17	74.00	-23.83	HORIZONTAL	peak	
2 4430.628	44.23	33.87	5.36	36.61	46.85	74.00	-27.15	HORIZONTAL	peak	
3 4924.000	42.94	34.15	5.51	36.64	45.96	74.00	-28.04	HORIZONTAL	peak	
4 5780.300	48.04	32.66	5.68	36.69	49.69	74.00	-24.31	HORIZONTAL	peak	
5 7386.000	38.72	36.23	6.30	36.78	44.47	74.00	-29.53	HORIZONTAL	peak	
6 9848.000	39.41	38.88	7.06	37.18	48.17	74.00	-25.83	HORIZONTAL	peak	

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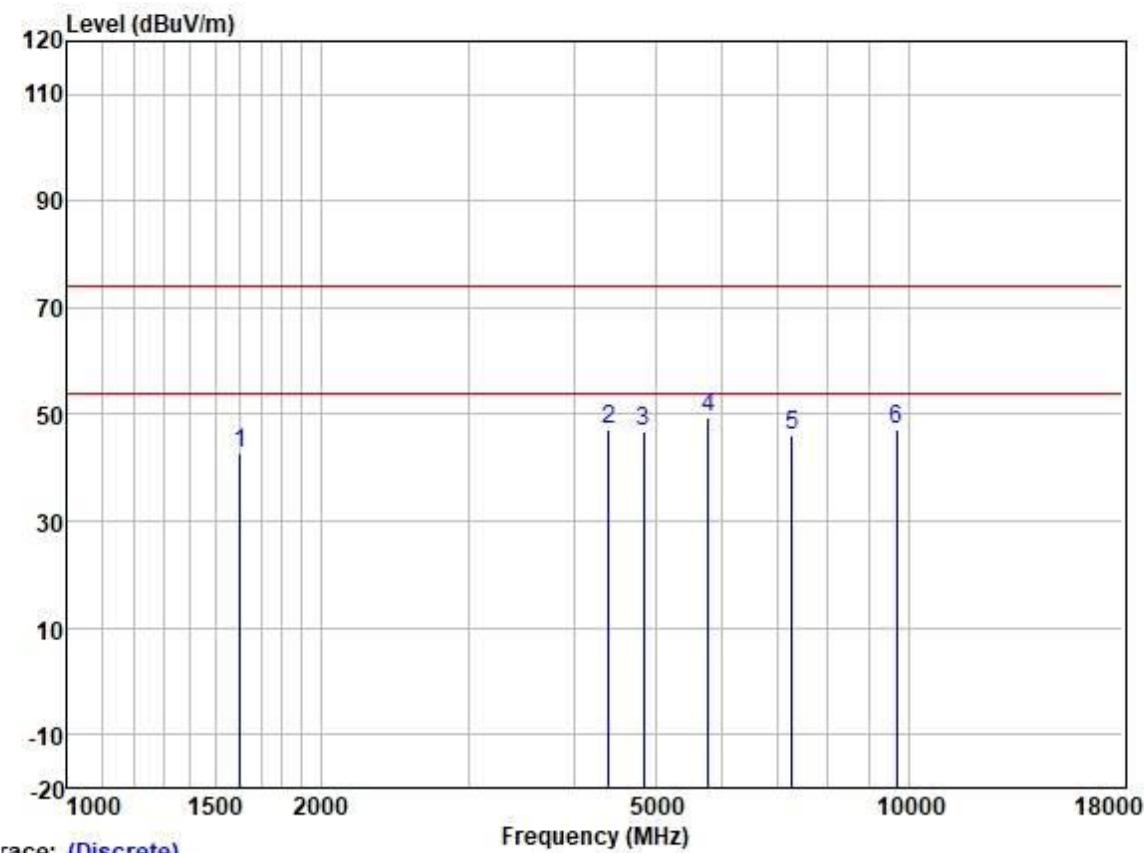
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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:40MHz; Channel:Low



Race: (Discrete)

Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level					
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1	1606.441	52.45	24.71	3.02	37.37	42.81	74.00	-31.19	VERTICAL	peak	
2	4405.090	44.66	33.74	5.37	36.61	47.16	74.00	-26.84	VERTICAL	peak	
3	4844.000	44.00	34.15	5.47	36.64	46.98	74.00	-27.02	VERTICAL	peak	
4	5780.300	47.68	32.66	5.68	36.69	49.33	74.00	-24.67	VERTICAL	peak	
5	7266.000	40.61	35.86	6.34	36.77	46.04	74.00	-27.96	VERTICAL	peak	
6	9688.000	37.95	38.75	7.68	37.16	47.22	74.00	-26.78	VERTICAL	peak	

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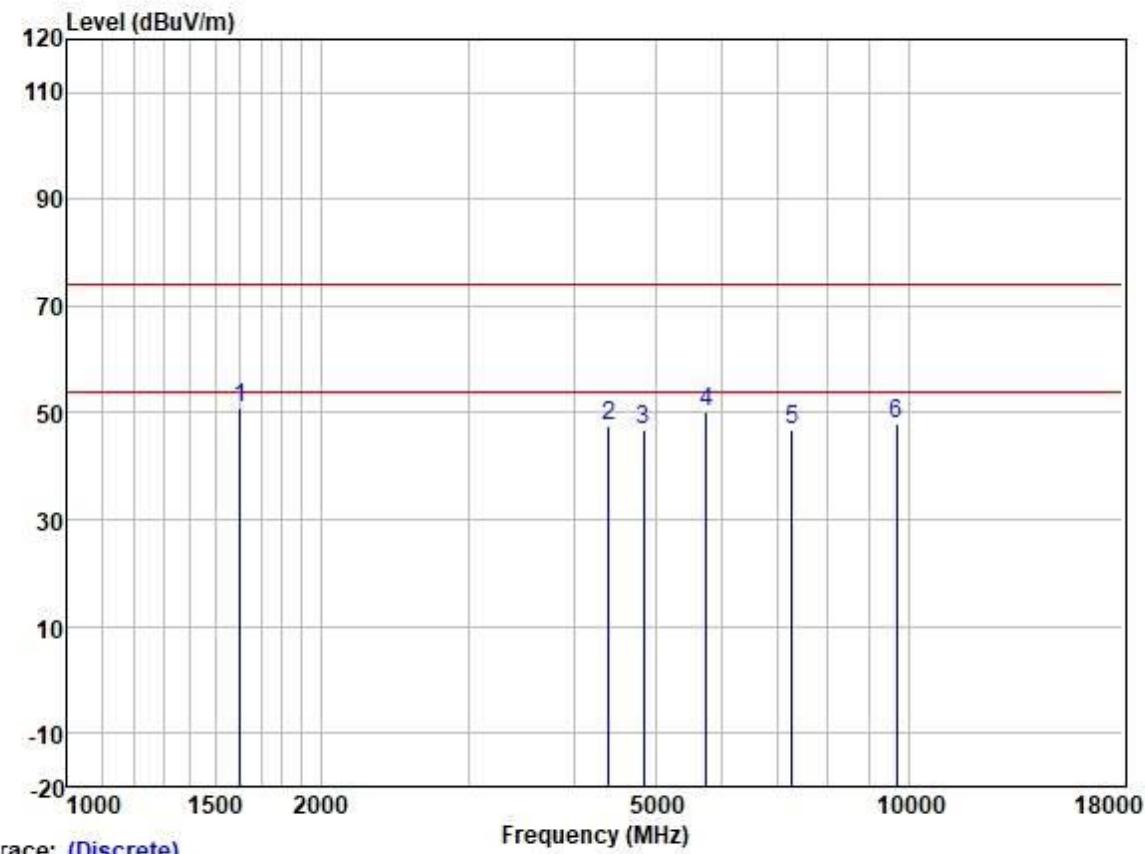
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:40MHz; Channel:Low



Race: (Discrete)

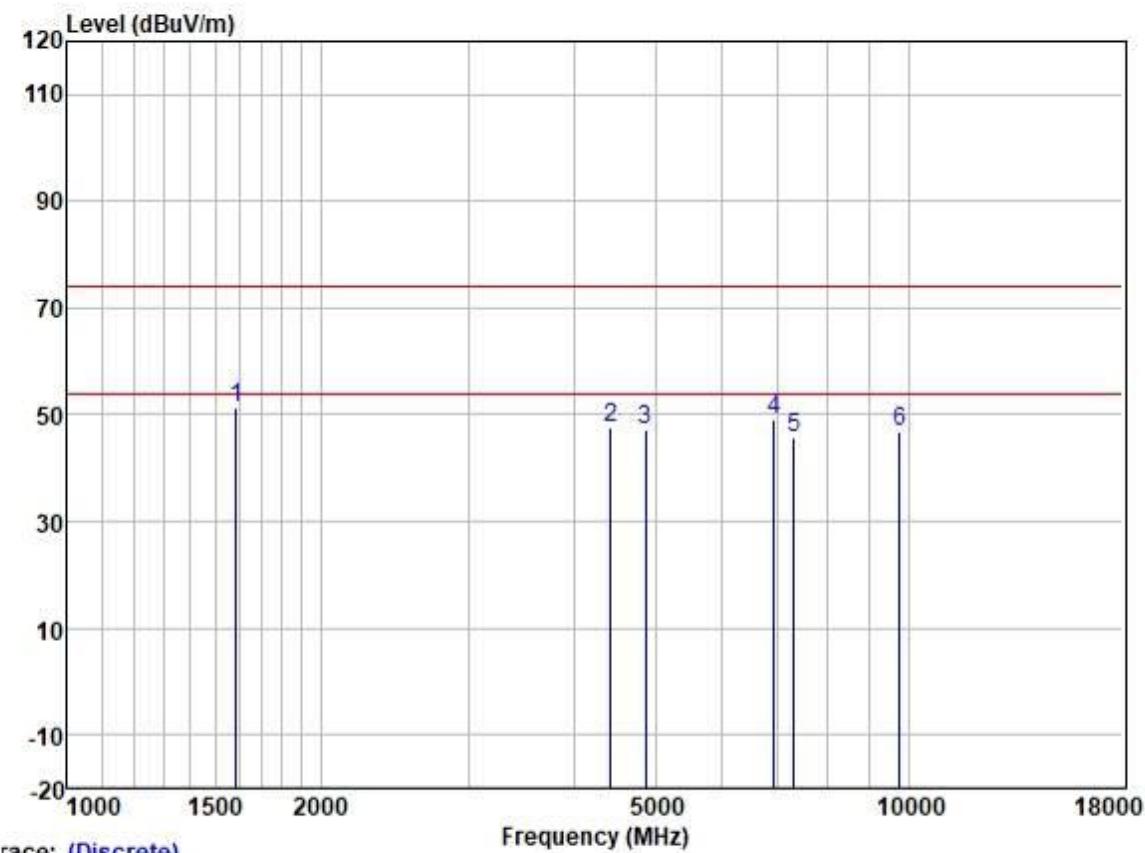
Freq	ReadAntenna Level	Cable Loss	Preamp Factor	Limit		Over Line Limit	Over Pol/Phase	Remark
				dB	dBuV/m			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1606.441	60.53	24.71	3.02	37.37	50.89	74.00	-23.11	HORIZONTAL peak
2 4405.090	44.91	33.74	5.37	36.61	47.41	74.00	-26.59	HORIZONTAL peak
3 4844.000	43.75	34.15	5.47	36.64	46.73	74.00	-27.27	HORIZONTAL peak
4 5746.982	48.64	32.65	5.70	36.69	50.30	74.00	-23.70	HORIZONTAL peak
5 7266.000	41.50	35.86	6.34	36.77	46.93	74.00	-27.07	HORIZONTAL peak
6 9688.000	38.66	38.75	7.68	37.16	47.93	74.00	-26.07	HORIZONTAL peak

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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:40MHz; Channel:middle



Race: (Discrete)

Freq	ReadAntenna		Cable		Preamp	Limit	Over	Limit	Over	Pol/Phase	Remark
	MHz	Level	Antenna	Loss							
1	1587.975	60.87	24.65	3.00	37.39	51.13	74.00	-22.87	VERTICAL	peak	
2	4430.628	45.09	33.87	5.36	36.61	47.71	74.00	-26.29	VERTICAL	peak	
3	4874.000	44.11	34.15	5.49	36.64	47.11	74.00	-26.89	VERTICAL	peak	
4	6914.763	44.31	34.97	6.39	36.74	48.93	74.00	-25.07	VERTICAL	peak	
5	7311.000	40.21	36.00	6.32	36.77	45.76	74.00	-28.24	VERTICAL	peak	
6	9748.000	37.66	38.81	7.43	37.17	46.73	74.00	-27.27	VERTICAL	peak	

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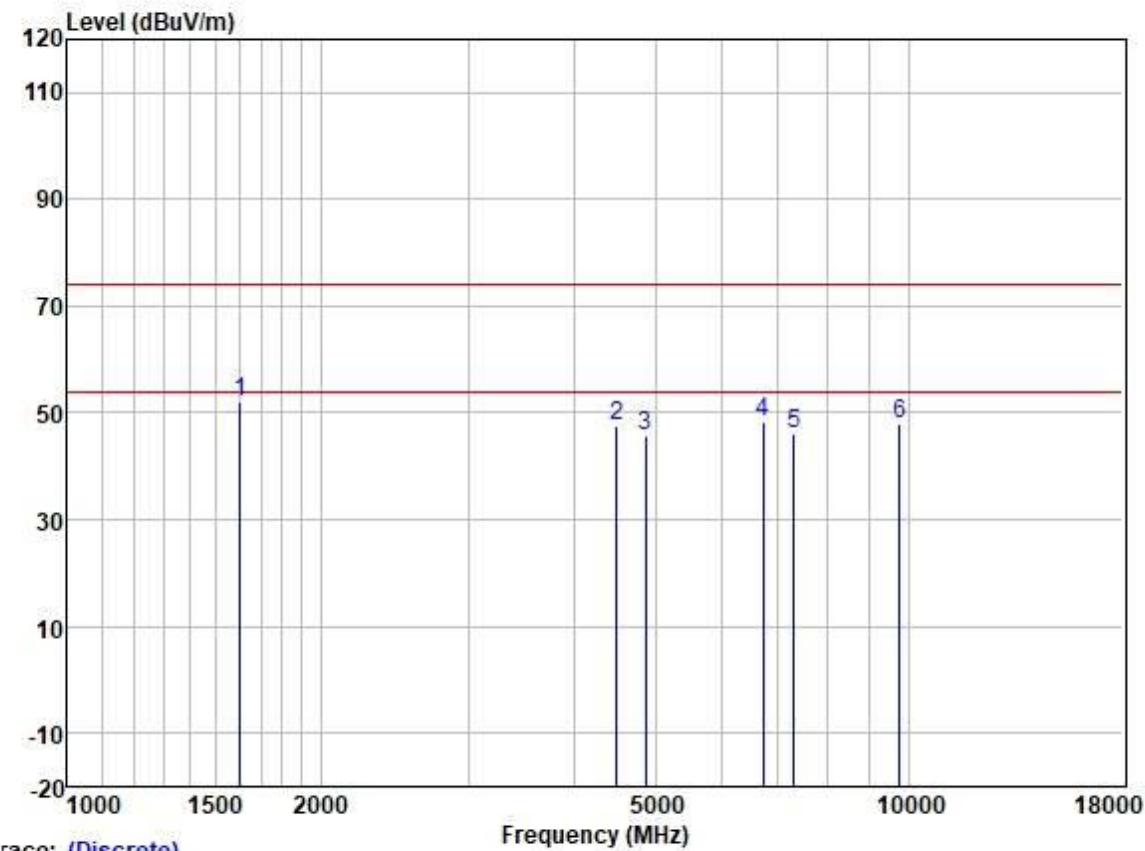
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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:40MHz; Channel:middle



Race: (Discrete)	Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Pol/Phase	Remark
		Level	Factor	Loss	Factor	Level	dBuV/m				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m				
1	1606.441	61.65	24.71	3.02	37.37	52.01	74.00	-21.99	HORIZONTAL	peak	
2	4495.125	44.75	34.17	5.33	36.62	47.63	74.00	-26.37	HORIZONTAL	peak	
3	4874.000	42.88	34.15	5.49	36.64	45.88	74.00	-28.12	HORIZONTAL	peak	
4	6717.762	44.45	34.42	6.29	36.73	48.43	74.00	-25.57	HORIZONTAL	peak	
5	7311.000	40.56	36.00	6.32	36.77	46.11	74.00	-27.89	HORIZONTAL	peak	
6	9748.000	38.70	38.81	7.43	37.17	47.77	74.00	-26.23	HORIZONTAL	peak	

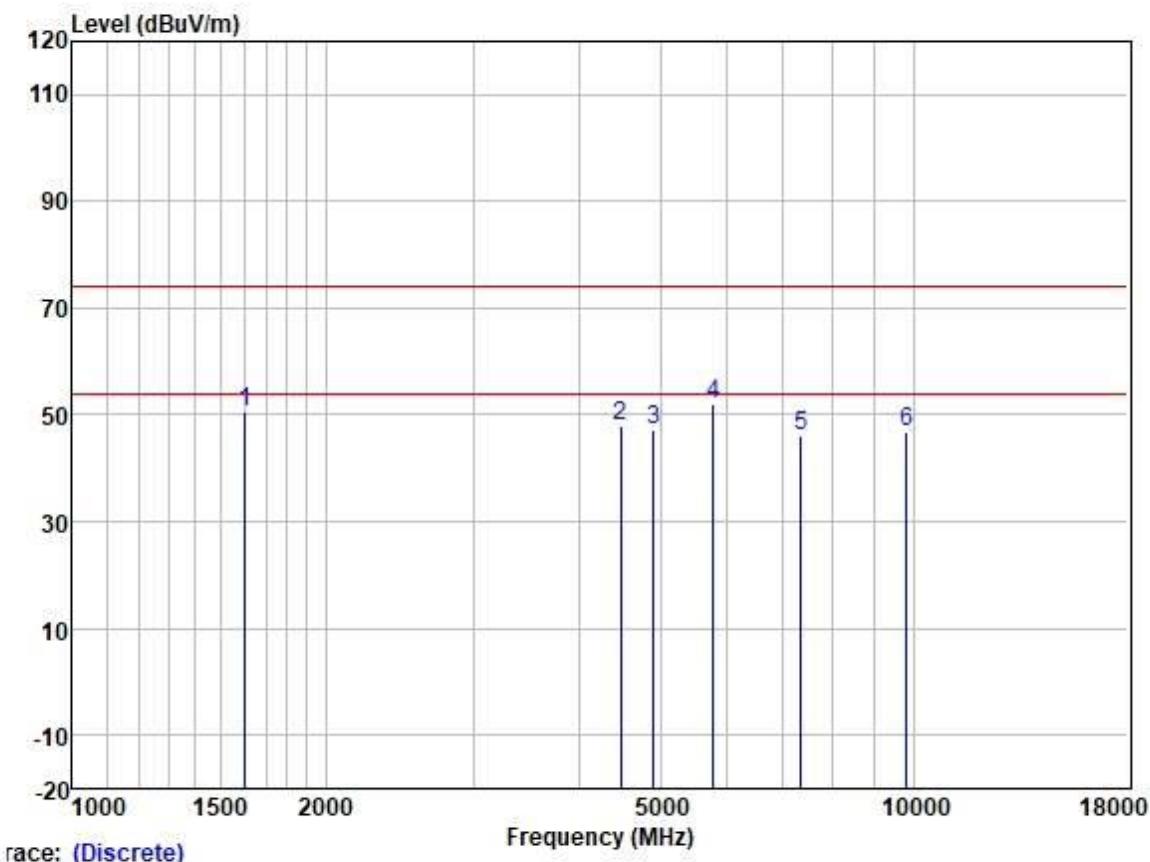
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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:40MHz; Channel:High



Freq	Read	Antenna	Cable	Preamp	Limit	Over	Limit	Over	Pol/Phase	Remark
	Level	Factor	Loss	Factor						
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB		
1 1606.441	60.18	24.71	3.02	37.37	50.54	74.00	-23.46	VERTICAL	peak	
2 4482.150	45.22	34.12	5.34	36.62	48.06	74.00	-25.94	VERTICAL	peak	
3 4904.000	44.15	34.15	5.50	36.64	47.16	74.00	-26.84	VERTICAL	peak	
4 5780.300	50.49	32.66	5.68	36.69	52.14	74.00	-21.86	VERTICAL	peak	
5 7356.000	40.54	36.12	6.31	36.78	46.19	74.00	-27.81	VERTICAL	peak	
6 9808.000	37.86	38.86	7.17	37.18	46.71	74.00	-27.29	VERTICAL	peak	

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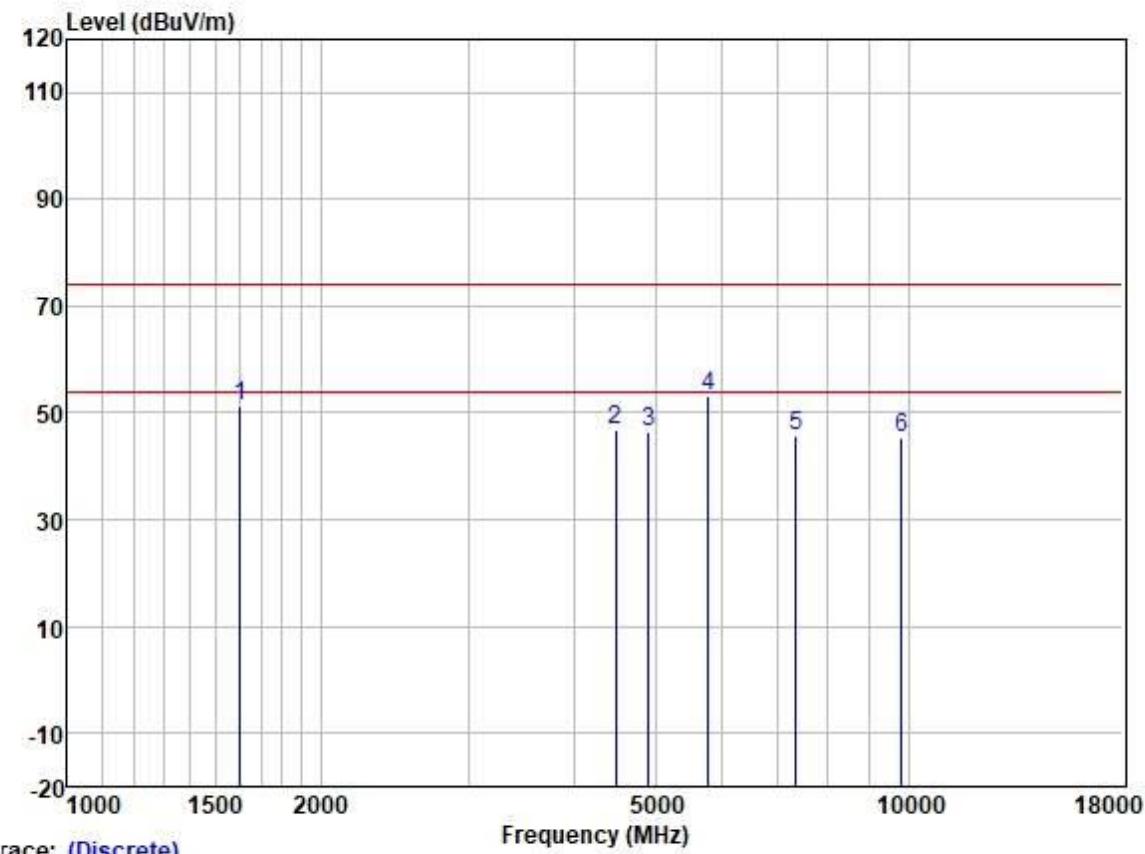


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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:40MHz; Channel:High



Freq	ReadAntenna Level	Cable Loss	Preamp Factor	Limit		Over Line Limit	Over Pol/Phase	Remark
				dB	dBuV/m			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1606.441	60.81	24.71	3.02	37.37	51.17	74.00	-22.83	HORIZONTAL peak
2 4482.150	44.00	34.12	5.34	36.62	46.84	74.00	-27.16	HORIZONTAL peak
3 4904.000	43.62	34.15	5.50	36.64	46.63	74.00	-27.37	HORIZONTAL peak
4 5780.300	51.58	32.66	5.68	36.69	53.23	74.00	-20.77	HORIZONTAL peak
5 7356.000	39.94	36.12	6.31	36.78	45.59	74.00	-28.41	HORIZONTAL peak
6 9808.000	36.65	38.86	7.17	37.18	45.50	74.00	-28.50	HORIZONTAL peak

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8 Test Setup Photo

Refer to Setup Photos for GZCR220900127102



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9 EUT Constructional Details (EUT Photos)

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10 Appendix

Pre-test the duty cycle and bandwidth test in Ant1 and Ant2, find the worst case is ant1 and only record the worst case.

1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
802.11b	SISO	2412	12.190	12.233	99.65	0.02	0.00
		2437	12.190	12.233	99.65	0.02	0.00
		2462	12.190	12.237	99.62	0.02	0.03
802.11g	SISO	2412	2.024	2.074	97.59	0.11	0.04
		2437	2.025	2.075	97.59	0.11	0.04
		2462	2.024	2.074	97.59	0.11	0.04
802.11n (HT20)	MIMO	2412	2.025	2.075	97.59	0.11	0.04
		2437	2.025	2.075	97.59	0.11	0.04
		2462	2.025	2.075	97.59	0.11	0.04
802.11n (HT40)	MIMO	2422	0.928	0.966	96.07	0.17	0.00
		2437	0.929	0.966	96.17	0.17	0.03
		2452	0.928	0.966	96.07	0.17	0.03

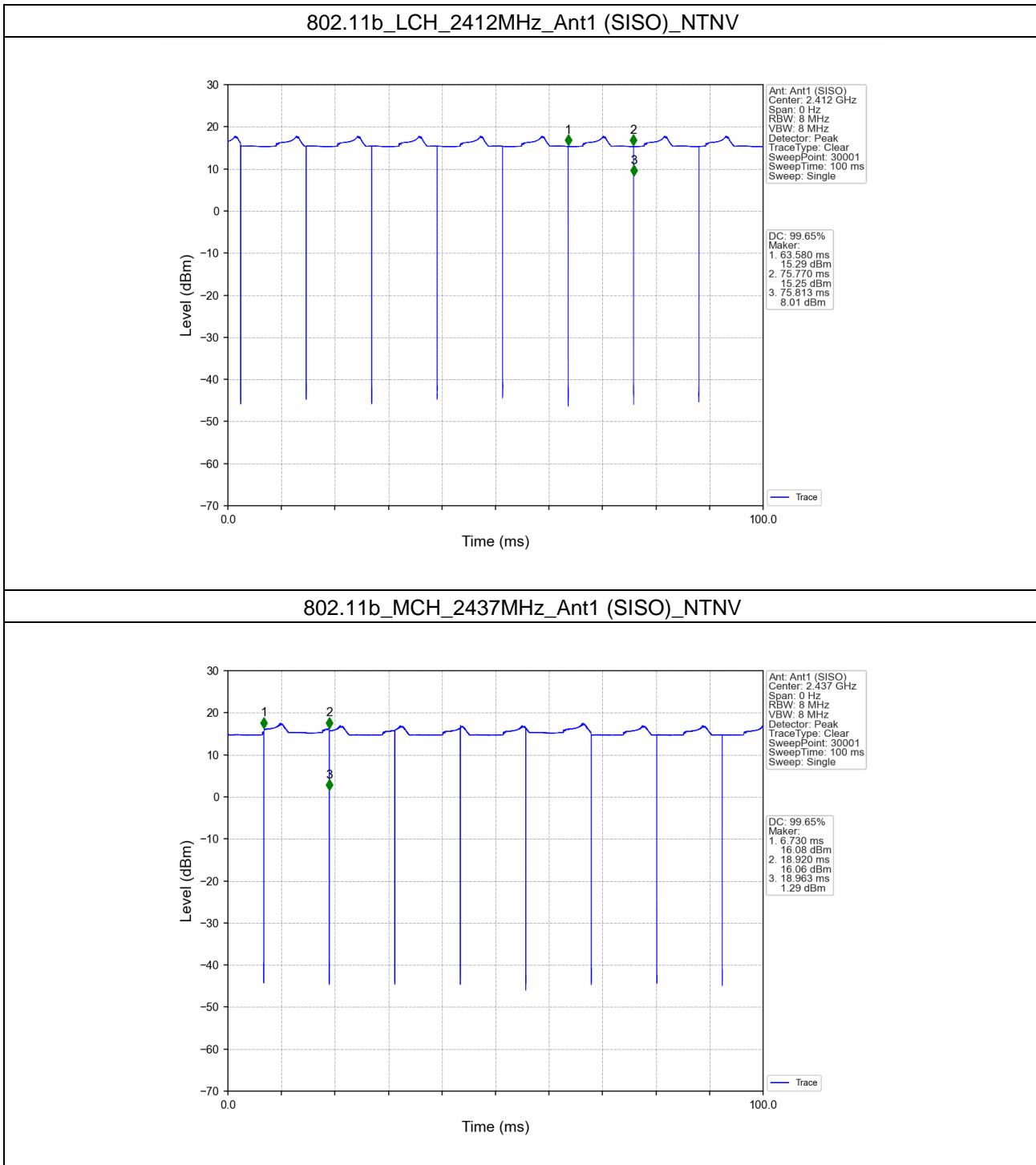
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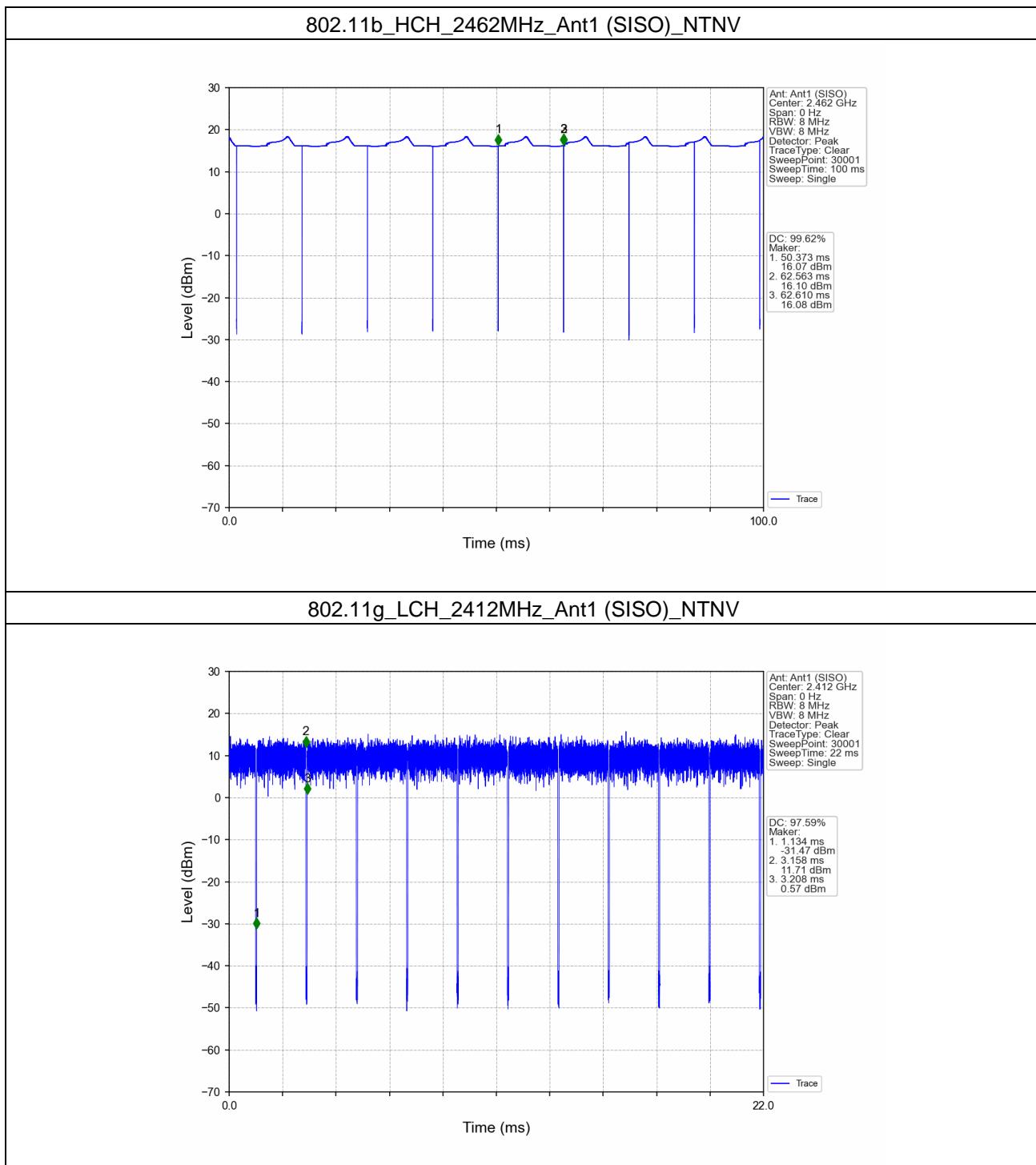
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1.1.2 Test Graph

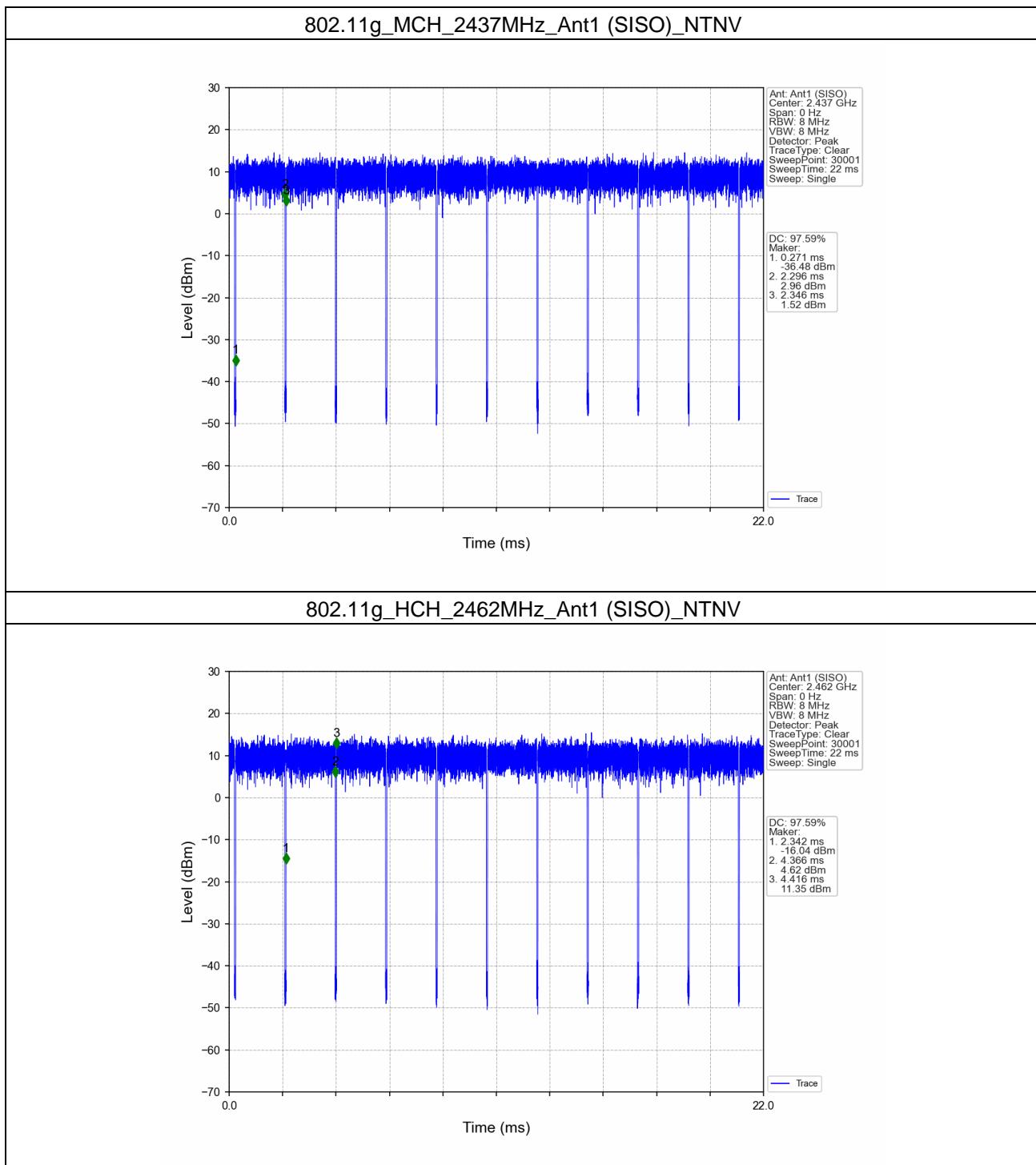


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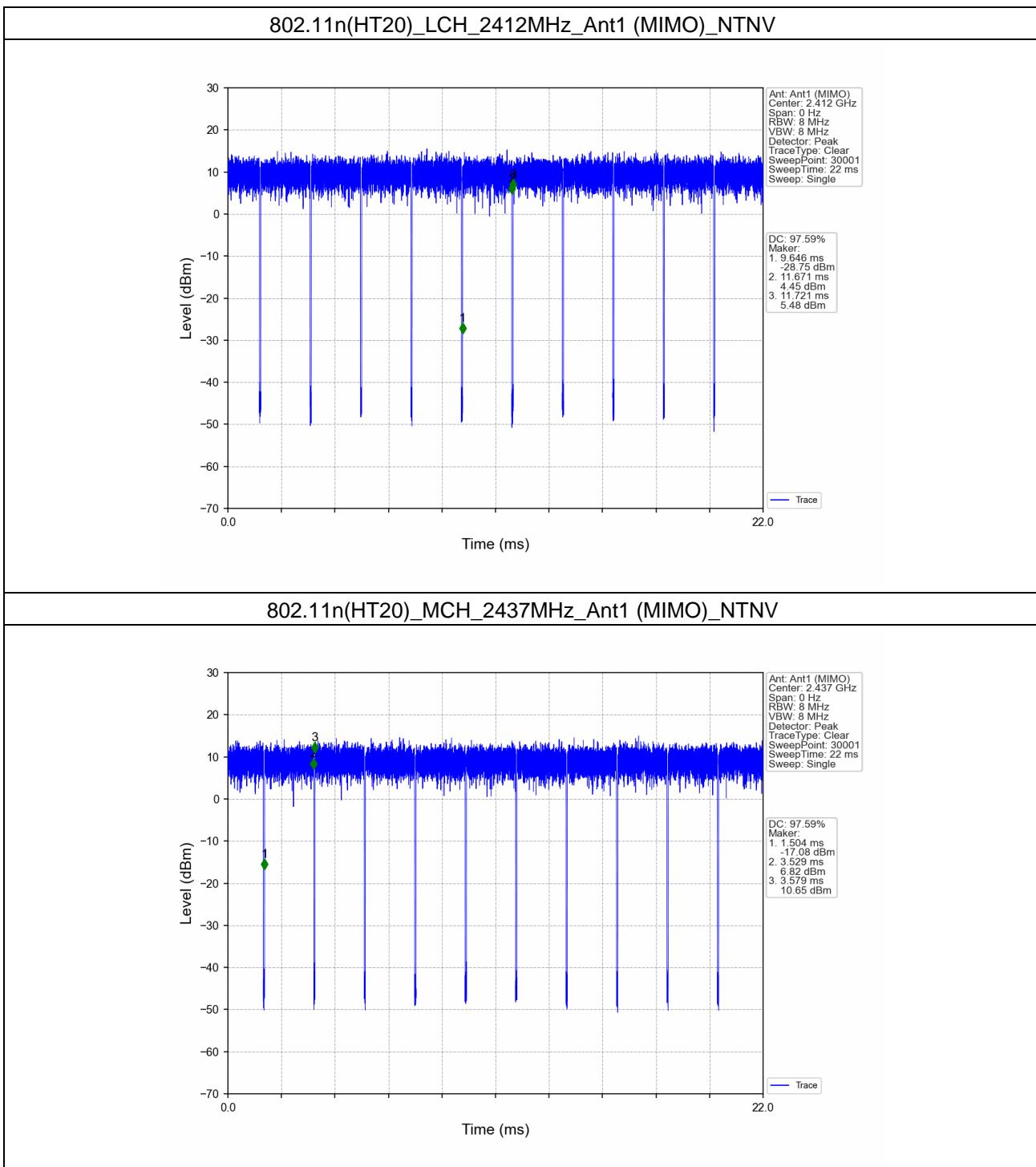
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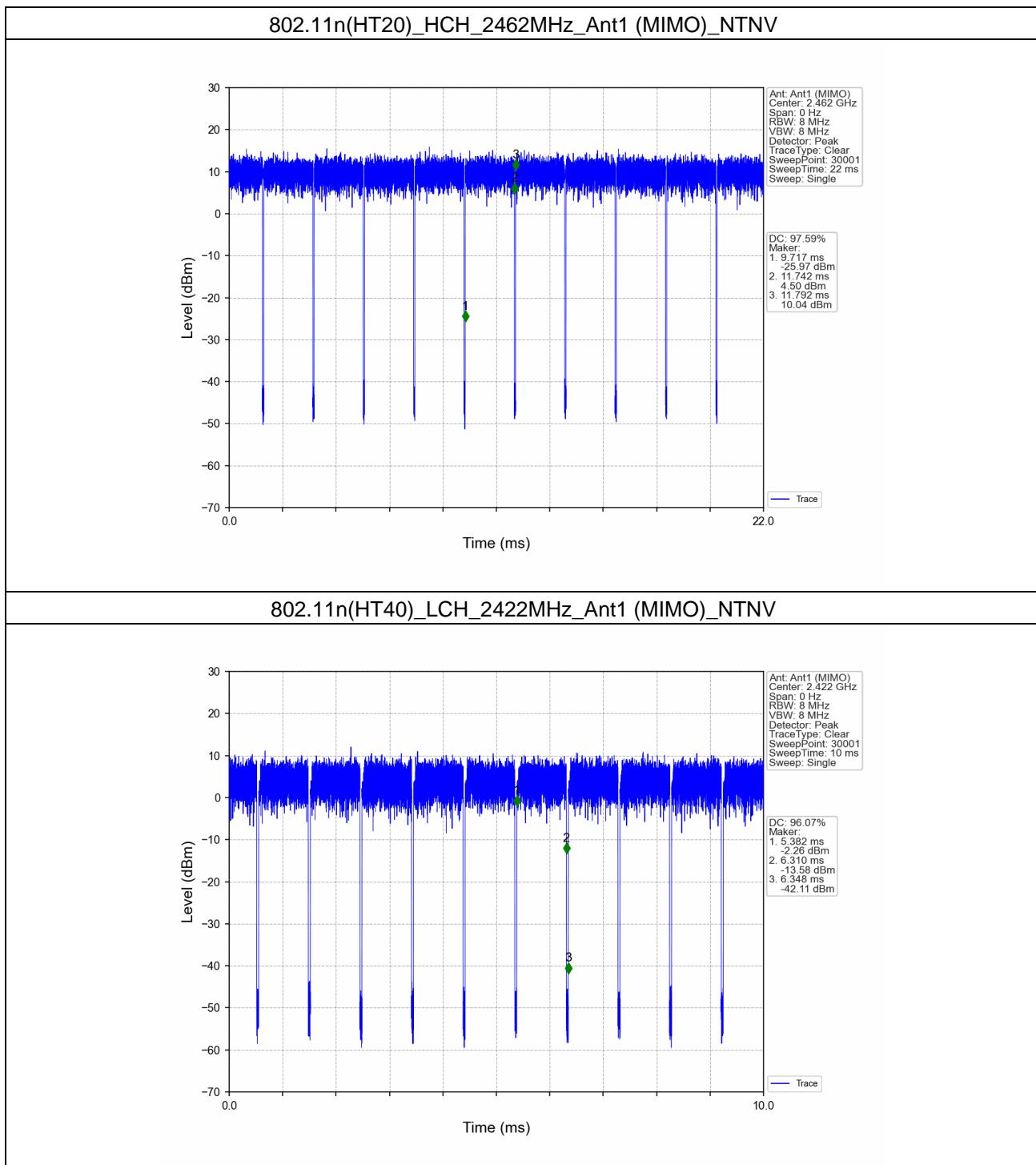




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