



FCC RADIO TEST REPORT

Applicant : Benq Corporation

Address : 16 Jihu Road, Neihu, Taipei 114, Taiwan

Equipment : BenQ Wireless Dongle

Model No. : WDR02U

Trade Name : BenQ

FCC ID : JVPWDR02U

I HEREBY CERTIFY THAT :

The sample was received on Jul. 25, 2018 and the testing was carried out on Nov. 01, 2018 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Tested by:

Mark Liao / Assistant Manager

Amos Zhang/ Engineer

Laboratory Accreditation:



Cerpass Technology Corporation Test Laboratory

TAF LAB Code:

1439

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History of this test report

Report No.	Issue Date	Description
TEDL1806202	Nov. 03, 2018	Original



1. Summary of Test Procedure and Test Results

1.1. Applicable Standards

ANSI C63.4:2014

ANSI C63.10:2013&RSS-247

FCC Rules and Regulations Part 15 Subpart E §15.407

First R&O 14-30

KDB662911

KDB789033

KDB644545

FCC Rule	Description of Test	Result
15.203	Antenna Requirement	Pass
15.207(a)	AC Power Line Conducted Emission	Pass
15.407(b) 15.209	Radiated Spurious Emission	Pass
15.407(a)	26 dB Occupied Bandwidth	Pass
15.407	6 dB Bandwidth	Pass
15.407 (a) & (a)(3)	Average Power	Pass
15.407(a)	Output and PPSD	Pass
15.407(g)	Frequency Stability	Pass
15.407(c)	Automatically Discontinue Transmission	Pass
2.1091	Radio Frequency Exposure	Pass



2. Test Configuration of Equipment under Test

2.1. Feature of Equipment under Test

Equipment	BenQ Wireless Dongle
Model No.	WDR02U
Frequency Range	802.11a/n/ac: 5150MHz-5250MHz, 5725MHz -5850MHz
Modulation Type	DSSS: DBPSK, DQPSK, CCK OFDM: 256QAM, 64QAM, 16QAM, QPSK, BPSK
Data Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 400.0Mbps 802.11ac : up to 867Mbps
Antenna Type	PCB Antenna

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2. Carrier Frequency of Channels

Band 1: 5150MHz-5250MHz

802.11a, 802.11n HT20, 802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*36	5180	*44	5220
40	5200	*48	5240

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*38	5190	*46	5230

802.11ac VHT80

Channel	Frequency(MHz)
*42	5210

Band 4: 5725MHz -5850MHz

802.11a, 802.11n HT20, 802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*149	5745	161	5805
153	5765	*165	5825
*157	5785		

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*151	5755	*159	5795

802.11ac VHT80

Channel	Frequency(MHz)
*155	5775

Note: Channels remarked * are selected to perform test.



2.3. Test Mode and Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- b. The complete test system included remote workstation and EUT for RF test. The remote workstation included Notebook.

An executive program, "MT7662UQA.exe" under WIN 7 was executed to transmit and receive data via WLAN.

- c. The following test modes were performed for the test:

Conducted Emissions from the AC mains power ports	
Test Mode	Operating Description
1	802.11a (6Mbps)
2	802.11ac VHT20 (6.5Mbps)
3	802.11ac VHT40 (13.5Mbps)
4	802.11ac VHT80 (29.3Mbps)
caused "Test Mode 1" generated the worst case, it was reported as the final data.	
Radiation Emissions (30MHz ~ 1GHz)	
Test Mode	Operating Description
1	802.11a (6Mbps)
2	802.11ac VHT20 (6.5Mbps)
3	802.11ac VHT40 (13.5Mbps)
4	802.11ac VHT80 (29.3Mbps)
caused "Test Mode 1" generated the worst case, they were reported as the final data.	
Radiation Emissions (1GHz ~ 40GHz)	
Test Mode	Operating Description
1	802.11a (6Mbps)
2	802.11ac VHT20 (6.5Mbps)
3	802.11ac VHT40 (13.5Mbps)
4	802.11ac VHT80 (29.3Mbps)
caused "Test Mode 1~4" generated the worst case, they were reported as the final data.	

2.4. Description of Test System

Device	Manufacturer	Model No.	Description
Notebook	SONY	PCG-71811P	Power Cable, Unshielding, 1.8m



2.5. General Information of Test

Test Site	Cerpass Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582	
	FCC	TW1079, TW1061, TW1439
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 40,000MHz	
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.	

2.6. Measurement Uncertainty

Measurement Item	Uncertainty
Radiated Spurious Emission(9KHz~30MHz)	±5.007dB
Radiated Spurious Emission(30MHz~1GHz)	±5.157dB
Radiated Spurious Emission(1GHz~18GHz)	±6.383dB
Radiated Spurious Emission(18GHz~40GHz)	±6.648dB
Conducted Spurious Emission	±1.253dB
6dB Bandwidth	±6.89%
Power Spectral Density	±0.630dB
26 dB Occupied Bandwidth	±6.10%
Frequency Stability	±375KHz
Channel Frequencies Separation	±6.10%
20dB Bandwidth	±6.12%
Dwell Time	±1.34%
Peak Output Power(Conducted Power Meter)	±0.86dB
Temperature	±1.2oC
Humidity	±2.7%
Channel Move Time	±4.53%
Channel Closing Transmission Time	±6.61%
Threshold	±0.631dB
Non occupancy period	±1.17%



3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI3	100821	2017/09/08	2018/09/07
LISN	Schwarzbeck	NSLK 8127	8127-568	2018/02/26	2019/02/25
Pulse Limiter	R&S	ESH3-Z2	101934	2018/02/22	2019/02/21
Bilog Antenna	Schwarzbeck	VULB9168	275	2017/08/31	2018/08/30
Active Loop Antenna	EMCO	6507	40855	2018/05/22	2019/05/21
Horn Antenna	EMCO	3115	31601	2017/09/11	2018/09/10
Horn Antenna	EMCO	3116	31970	2018/03/23	2019/03/22
Preamplifier	EM	EM330	60658	2017/09/08	2018/09/07
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2017/09/20	2018/09/19
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2017/11/10	2018/11/09
MXG MW Analog Signal Generator	KEYSIGHT	N5183A	MY50142931	2018/03/23	2019/03/22
Spectrum Analyzer	R&S	FSP40	100219	2018/07/03	2019/07/02
BLUETOOTH TESTER	R&S	CBT	101133	2018/04/02	2019/04/01
Attenuator	KEYSIGHT	8491B	MY39250705	2017/09/04	2018/09/03
Rotary Attenuator	Agilent	8495B	MY42146680	2018/03/29	2019/03/28
Temp & Humi chamber	T-MACHINE	TMJ-9712	T-12-040111	2017/09/04	2018/09/03
Series Power Meter	Anritsu	ML2495A	1224005	2018/03/23	2019/03/22
Power Sensor	Anritsu	MA2411B	1207295	2018/03/23	2019/03/22
Software	Farad	Ez-EMC	ver.ct3a1	N/A	N/A
Software	AUDIX	E3	V8.2014-8-6	N/A	N/A
Software	Keysight	N7607B Signal Studio	V3.0.0.0	N/A	N/A
Software	Keysight	Inservice MonitorUtility	N/A	N/A	N/A



4. Antenna Requirements

4.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2. Antenna Construction and Directional Gain

Antenna Type	PCB Antenna
Antenna Gain	Bluetooth: 2.0 dBi 2.4GHz: ANT A: 2.0 dBi ; ANT B: 2.0 dBi 5150MHz-5250MHz: ANT A: 2.0 dBi ; ANT B: 2.0 dBi 5725MHz-5850MHz: ANT A: 2.0 dBi ; ANT B: 2.0 dBi

2412-2462MHz
For Power directional gain= $G_{ant} = 2.0 \text{ dBi}$ For PSD directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$ = 5.01 (dBi)
5150MHz -5250MHz
For Power directional gain= $G_{ant} = 2.0 \text{ dBi}$ For PSD directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$ = 5.01 (dBi)
5725MHz -5850MHz
For Power directional gain= $G_{ant} = 2.0 \text{ dBi}$ For PSD directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$ = 5.01 (dBi)



5. Test of AC Power Line Conducted Emission

5.1. Test Limit

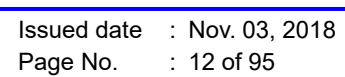
Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

5.2. Test Procedures

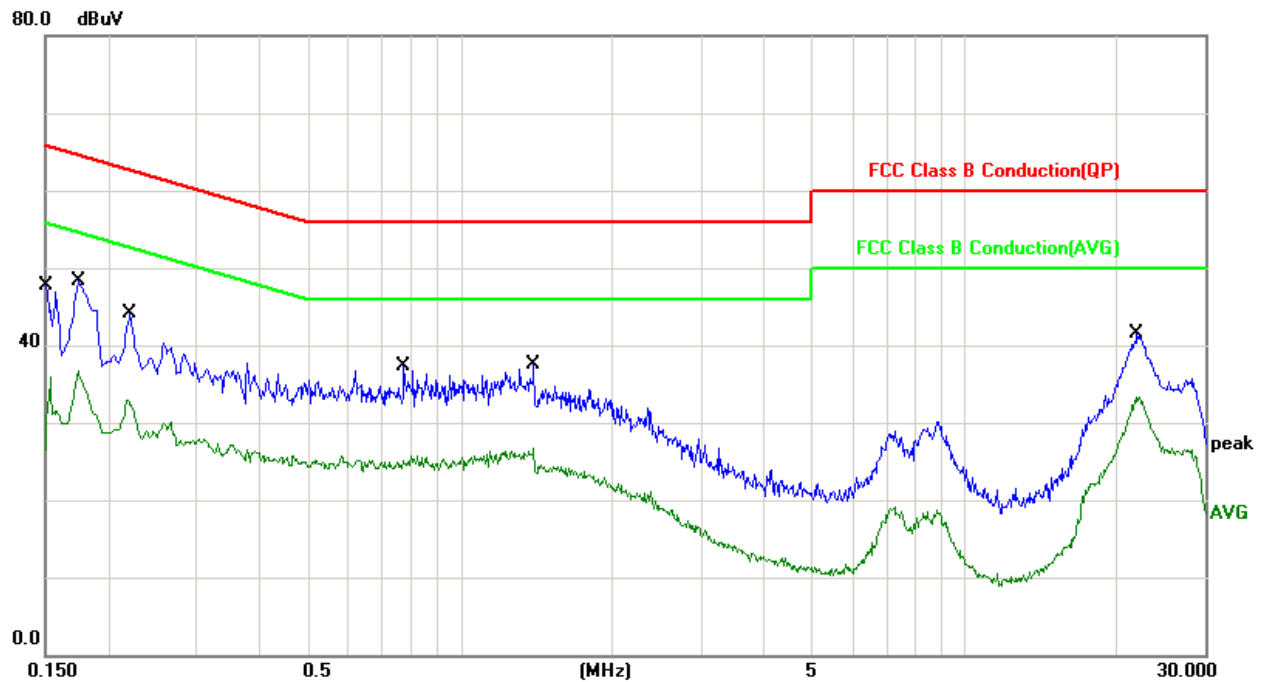
- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.





5.4. Test Result and Data

Power	: AC 120V	Pol/Phase	: LINE
Test Mode	: Mode 1, Band 1	Temperature	: 26 °C
Test date	: Aug. 12, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1508	10.06	34.64	44.70	65.95	-21.25	QP
2	0.1508	10.06	21.18	31.24	55.95	-24.71	AVG
3	0.1740	10.06	34.29	44.35	64.76	-20.41	QP
4	0.1740	10.06	23.89	33.95	54.76	-20.81	AVG
5	0.2220	10.05	28.51	38.56	62.74	-24.18	QP
6	0.2220	10.05	21.82	31.87	52.74	-20.87	AVG
7	0.7740	10.08	19.72	29.80	56.00	-26.20	QP
8	0.7740	10.08	14.48	24.56	46.00	-21.44	AVG
9	1.3980	10.50	19.24	29.74	56.00	-26.26	QP
10	1.3980	10.50	14.26	24.76	46.00	-21.24	AVG
11	22.0020	10.58	26.35	36.93	60.00	-23.07	QP
12	22.0020	10.58	21.40	31.98	50.00	-18.02	AVG

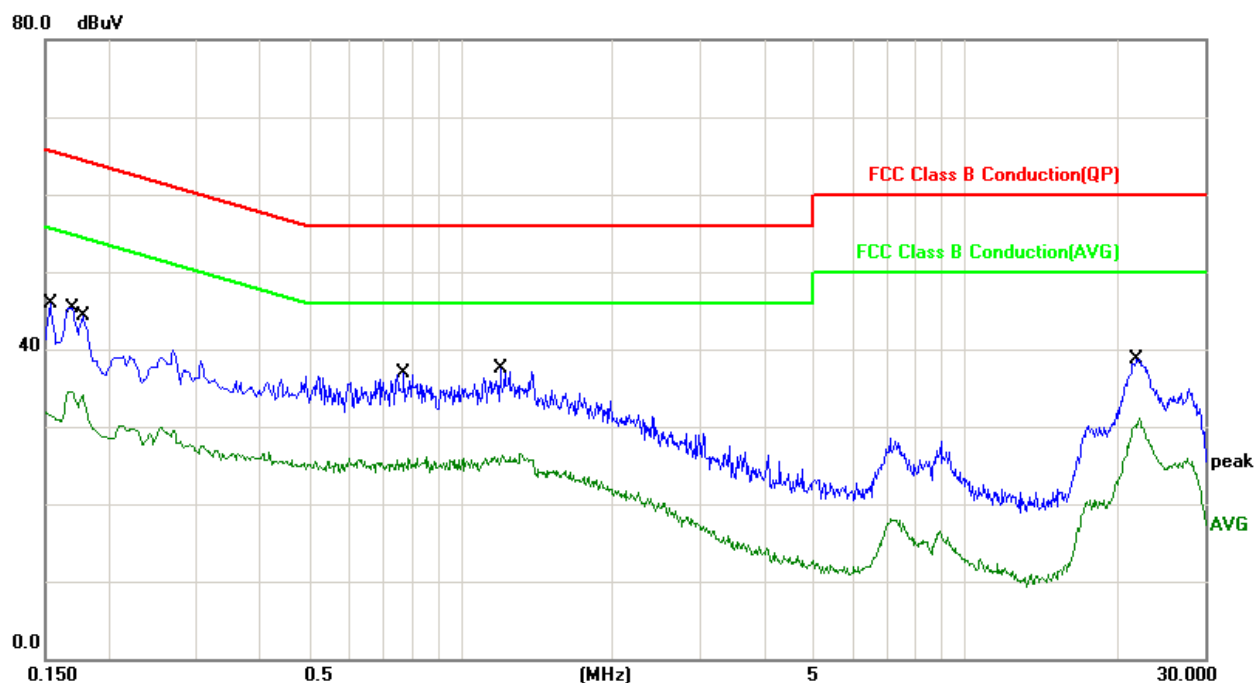
Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC, or Current Probe) Factor + Cable Loss + Attenuator



Power	: AC 120V	Pol/Phase	: NEUTRAL
Test Mode	: Mode 1, Band 1	Temperature	: 26 °C
Test date	: Aug. 12, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1539	10.06	26.45	36.51	65.78	-29.27	QP
2	0.1539	10.06	20.19	30.25	55.78	-25.53	AVG
3	0.1700	10.06	32.32	42.38	64.96	-22.58	QP
4	0.1700	10.06	25.21	35.27	54.96	-19.69	AVG
5	0.1780	10.06	28.98	39.04	64.57	-25.53	QP
6	0.1780	10.06	21.86	31.92	54.57	-22.65	AVG
7	0.7740	10.08	19.99	30.07	56.00	-25.93	QP
8	0.7740	10.08	14.81	24.89	46.00	-21.11	AVG
9	1.2020	10.14	20.50	30.64	56.00	-25.36	QP
10	1.2020	10.14	15.35	25.49	46.00	-20.51	AVG
11	21.9540	10.58	23.92	34.50	60.00	-25.50	QP
12	21.9540	10.58	19.04	29.62	50.00	-20.38	AVG

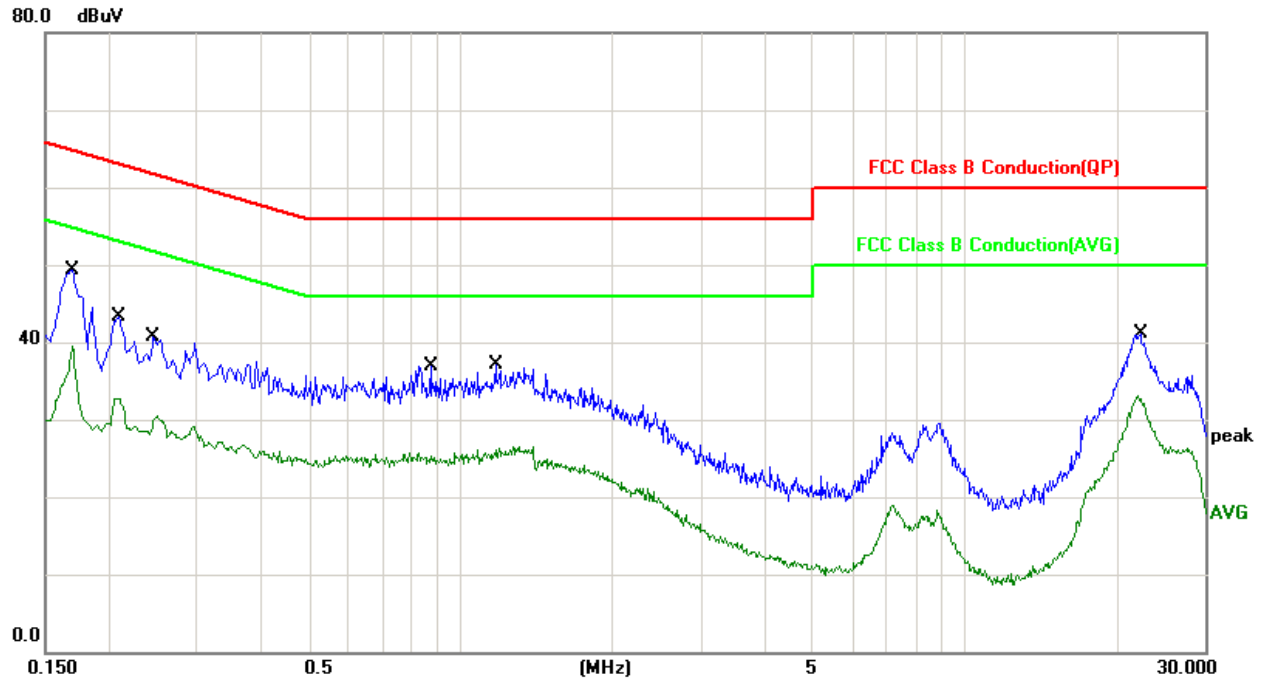
Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC, or Current Probe) Factor + Cable Loss + Attenuator



Power	: AC 120V	Pol/Phase	: LINE
Test Mode	: Mode 1, Band 4	Temperature	: 26 °C
Test date	: Aug. 12, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	10.06	36.51	46.57	64.96	-18.39	QP
2	0.1700	10.06	25.88	35.94	54.96	-19.02	AVG
3	0.2100	10.05	28.35	38.40	63.20	-24.80	QP
4	0.2100	10.05	21.44	31.49	53.20	-21.71	AVG
5	0.2460	10.03	24.39	34.42	61.89	-27.47	QP
6	0.2460	10.03	18.68	28.71	51.89	-23.18	AVG
7	0.8740	10.10	19.55	29.65	56.00	-26.35	QP
8	0.8740	10.10	14.50	24.60	46.00	-21.40	AVG
9	1.1740	10.30	20.16	30.46	56.00	-25.54	QP
10	1.1740	10.30	15.00	25.30	46.00	-20.70	AVG
11	22.3900	10.58	25.82	36.40	60.00	-23.60	QP
12	22.3900	10.58	20.93	31.51	50.00	-18.49	AVG

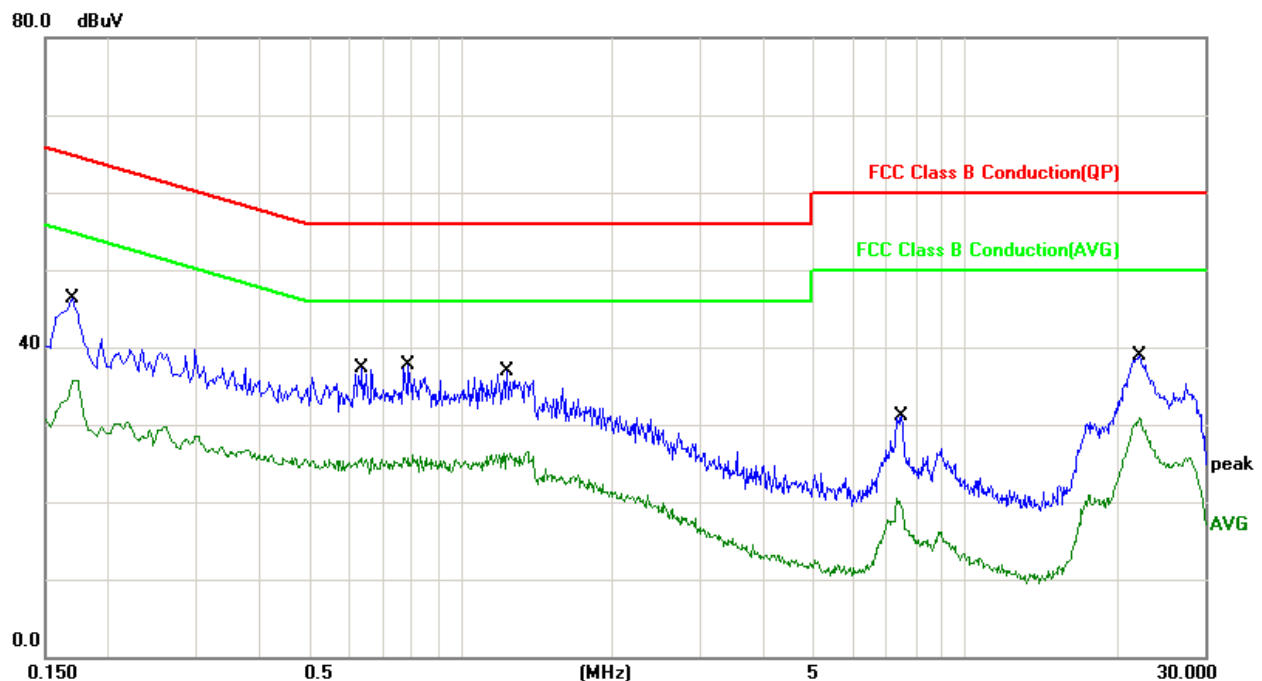
Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC, or Current Probe) Factor + Cable Loss + Attenuator



Power	: AC 120V	Pol/Phase	: NEUTRAL
Test Mode	: Mode 1, Band 4	Temperature	: 26 °C
Test date	: Aug. 12, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	10.06	32.41	42.47	64.96	-22.49	QP
2	0.1700	10.06	25.32	35.38	54.96	-19.58	AVG
3	0.6380	10.01	20.63	30.64	56.00	-25.36	QP
4	0.6380	10.01	14.92	24.93	46.00	-21.07	AVG
5	0.7900	10.09	20.39	30.48	56.00	-25.52	QP
6	0.7900	10.09	14.79	24.88	46.00	-21.12	AVG
7	1.2380	10.14	20.55	30.69	56.00	-25.31	QP
8	1.2380	10.14	15.29	25.43	46.00	-20.57	AVG
9	7.5060	10.24	11.26	21.50	60.00	-38.50	QP
10	7.5060	10.24	5.33	15.57	50.00	-34.43	AVG
11	22.2340	10.58	24.03	34.61	60.00	-25.39	QP
12	22.2340	10.58	19.28	29.86	50.00	-20.14	AVG

Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC, or Current Probe) Factor + Cable Loss + Attenuator



5.5. Test Photographs

Front View



Rear View





6. Test of Spurious Emission (Radiated)

6.1. Test Limit

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

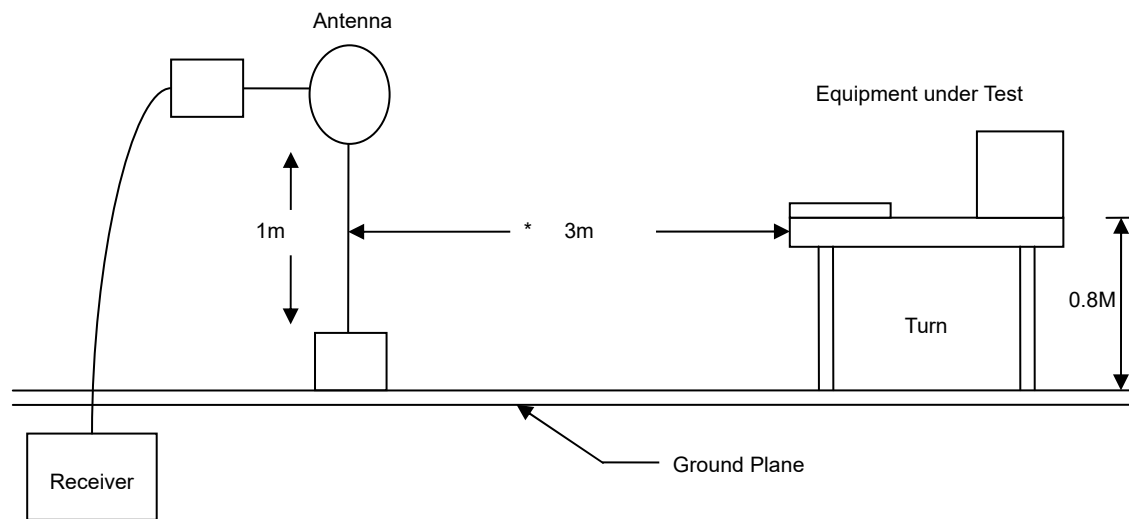
6.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- i. "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.

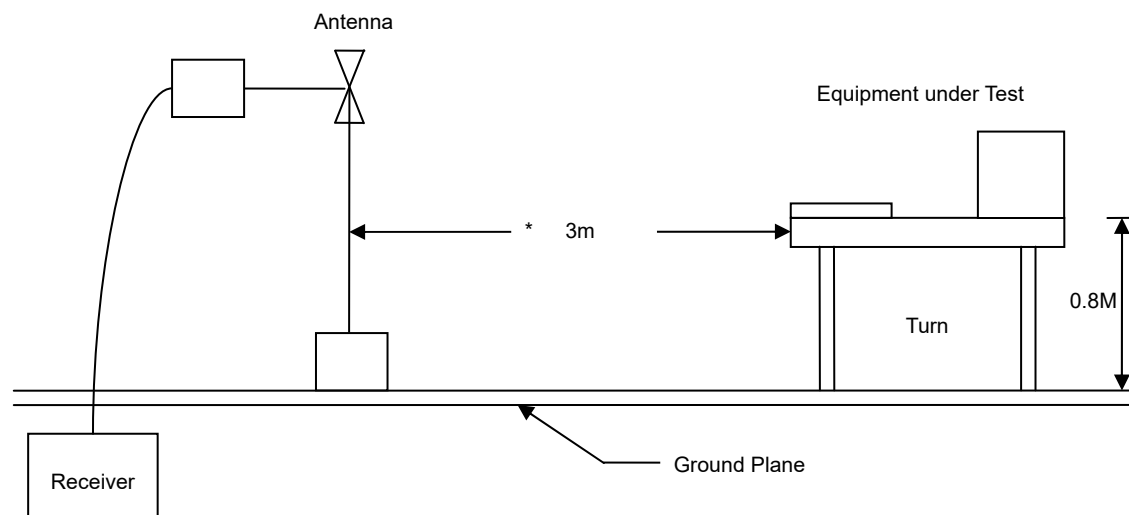


6.3. Typical Test Setup

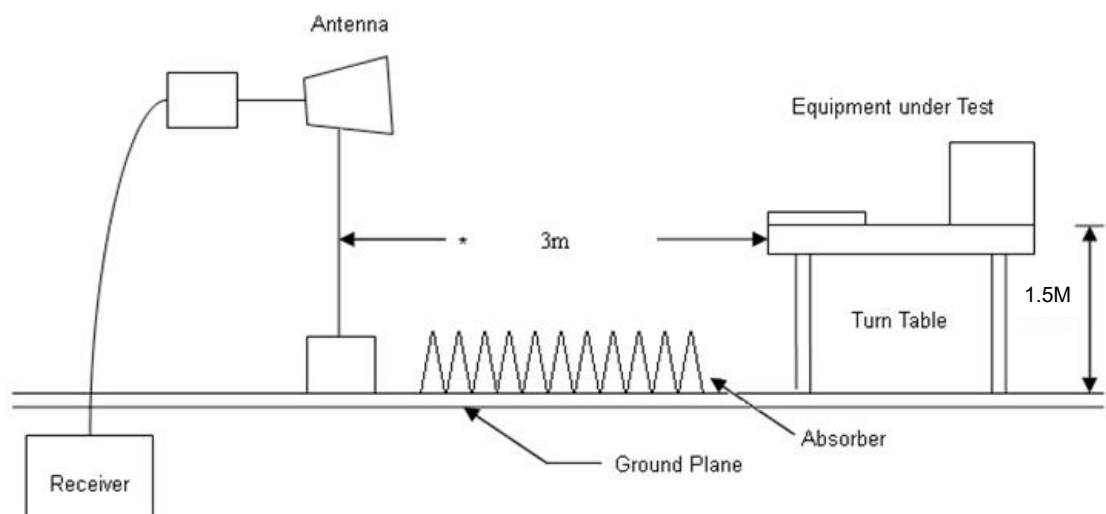
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



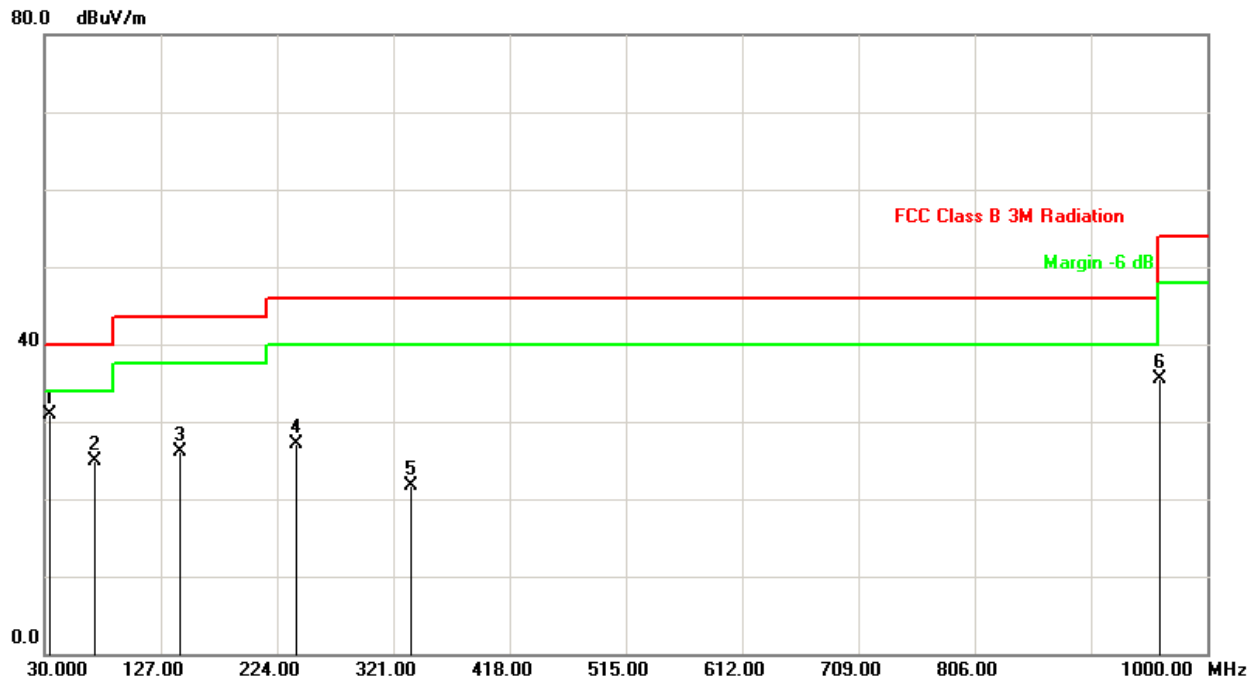


6.4. Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

6.5. Test Result and Data (30MHz ~ 1GHz)

Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	33.8800	-5.41	36.26	30.85	40.00	-9.15	peak	100	74
2	71.7099	-14.83	39.72	24.89	40.00	-15.11	peak	100	314
3	143.4900	-10.80	36.95	26.15	43.50	-17.35	peak	100	225
4	239.5200	-9.06	36.17	27.11	46.00	-18.89	peak	100	69
5	335.5500	-4.22	26.02	21.80	46.00	-24.20	peak	100	102
6	960.2300	3.17	32.33	35.50	54.00	-18.50	peak	100	78

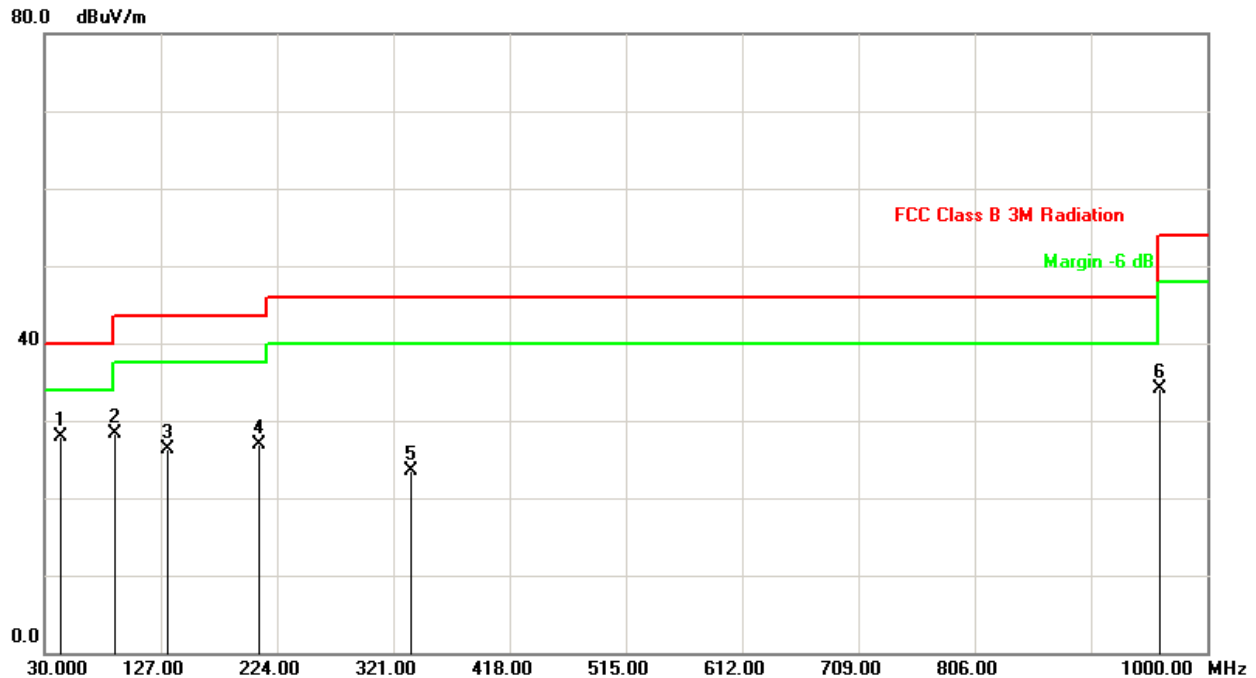
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	43.5799	-11.77	39.75	27.98	40.00	-12.02	peak	200	31
2	89.1700	-11.48	39.84	28.36	43.50	-15.14	peak	100	225
3	132.8199	-9.28	35.49	26.21	43.50	-17.29	peak	100	76
4	209.4499	-9.50	36.35	26.85	43.50	-16.65	peak	200	119
5	335.5500	-4.22	27.65	23.43	46.00	-22.57	peak	200	208
6	960.2300	3.17	30.84	34.01	54.00	-19.99	peak	100	37

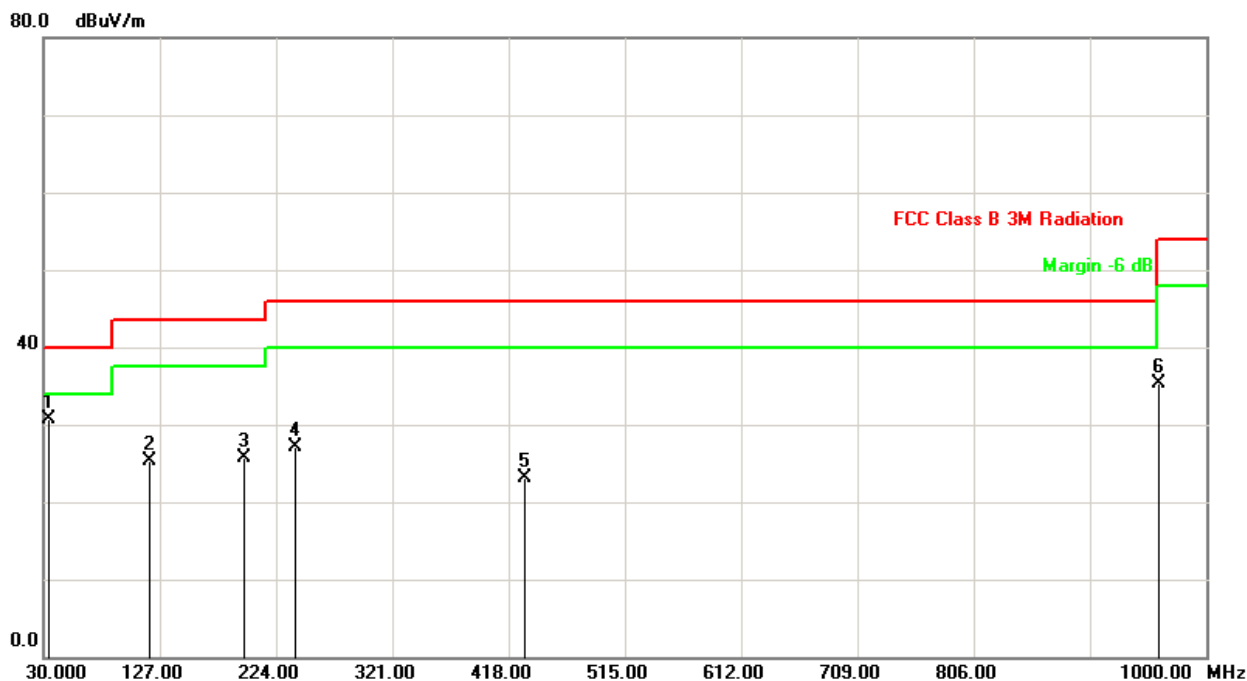
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	33.8800	-5.41	36.06	30.65	40.00	-9.35	peak	100	214
2	119.2399	-8.17	33.48	25.31	43.50	-18.19	peak	100	53
3	197.8100	-9.77	35.52	25.75	43.50	-17.75	peak	100	116
4	239.5200	-9.06	36.18	27.12	46.00	-18.88	peak	100	78
5	431.5799	-4.60	27.80	23.20	46.00	-22.80	peak	100	128
6	960.2300	3.17	32.08	35.25	54.00	-18.75	peak	100	56

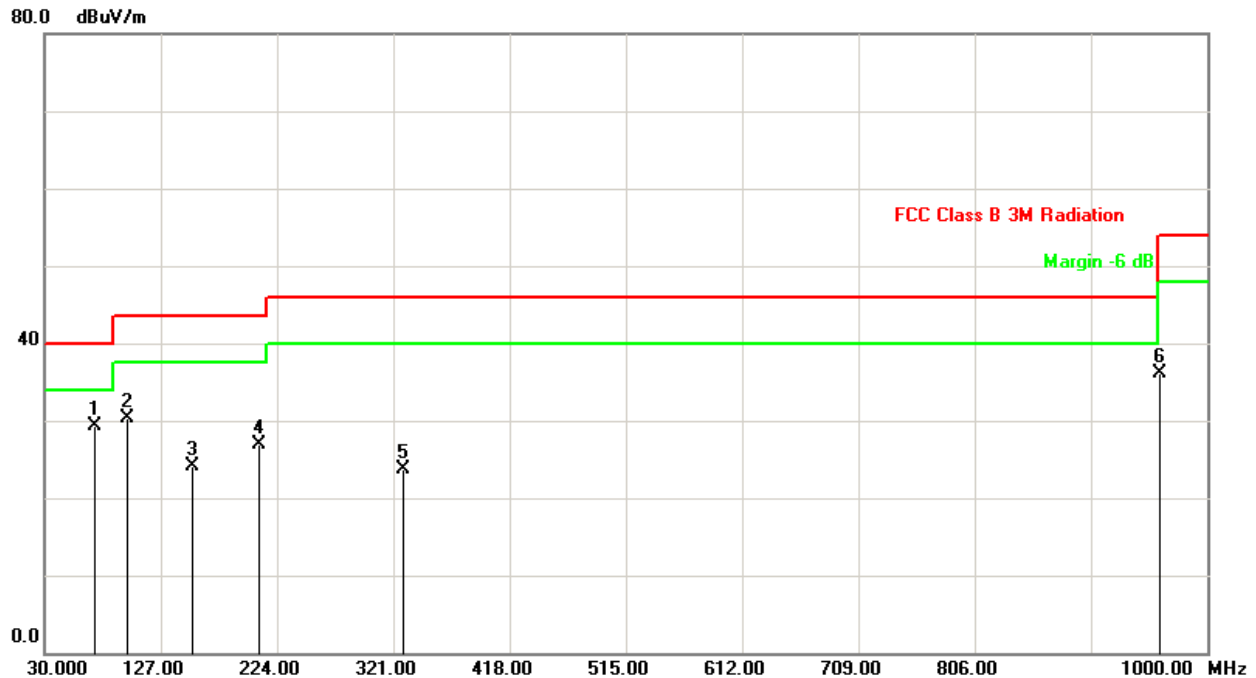
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	71.7099	-14.83	44.10	29.27	40.00	-10.73	peak	100	23
2	99.8399	-9.63	39.87	30.24	43.50	-13.26	peak	200	114
3	154.1598	-11.53	35.61	24.08	43.50	-19.42	peak	100	79
4	209.4499	-9.50	36.40	26.90	43.50	-16.60	peak	100	116
5	329.7300	-4.13	27.93	23.80	46.00	-22.20	peak	200	237
6	960.2300	3.17	32.92	36.09	54.00	-17.91	peak	200	24

Note: Level = Reading + Factor

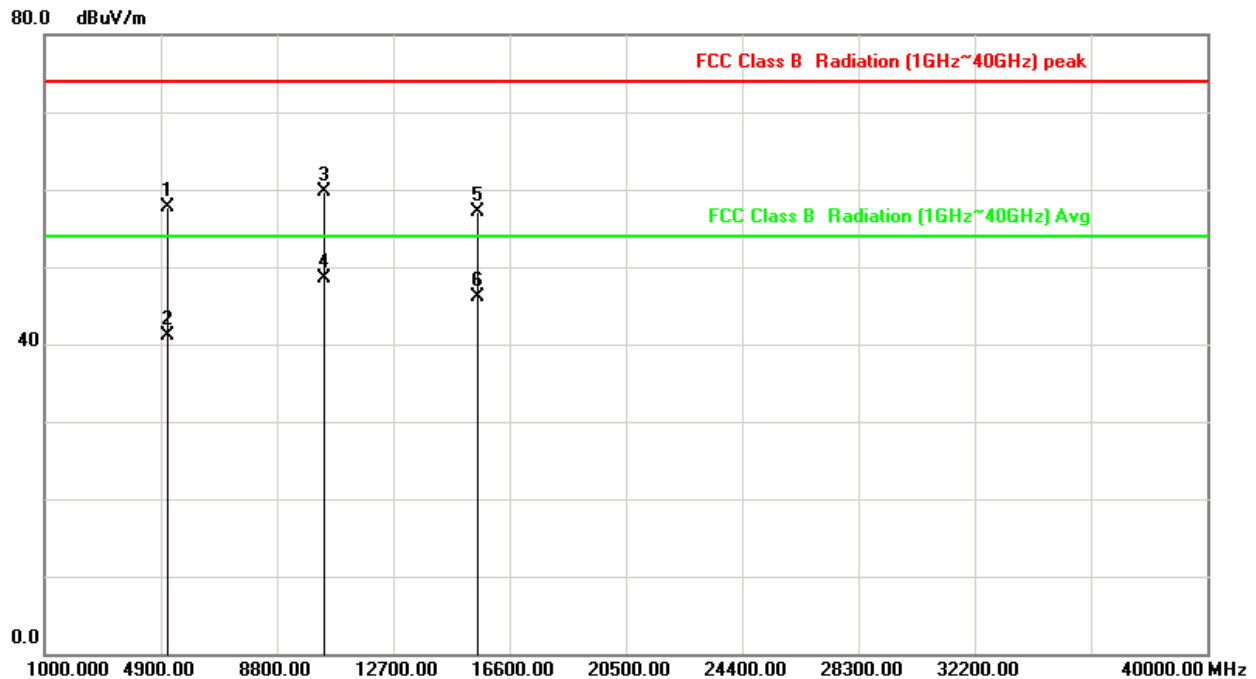
Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



6.6. Test Result and Data (1GHz ~ 40GHz)

Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH36, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	42.96	57.69	74.00	-16.31	peak
2	5150.000	14.73	26.39	41.12	54.00	-12.88	AVG
3	10360.000	25.85	33.81	59.66	74.00	-14.34	peak
4	10360.000	25.85	22.69	48.54	54.00	-5.46	AVG
5	15540.000	38.25	18.93	57.18	74.00	-16.82	peak
6	15540.000	38.25	7.88	46.13	54.00	-7.87	AVG

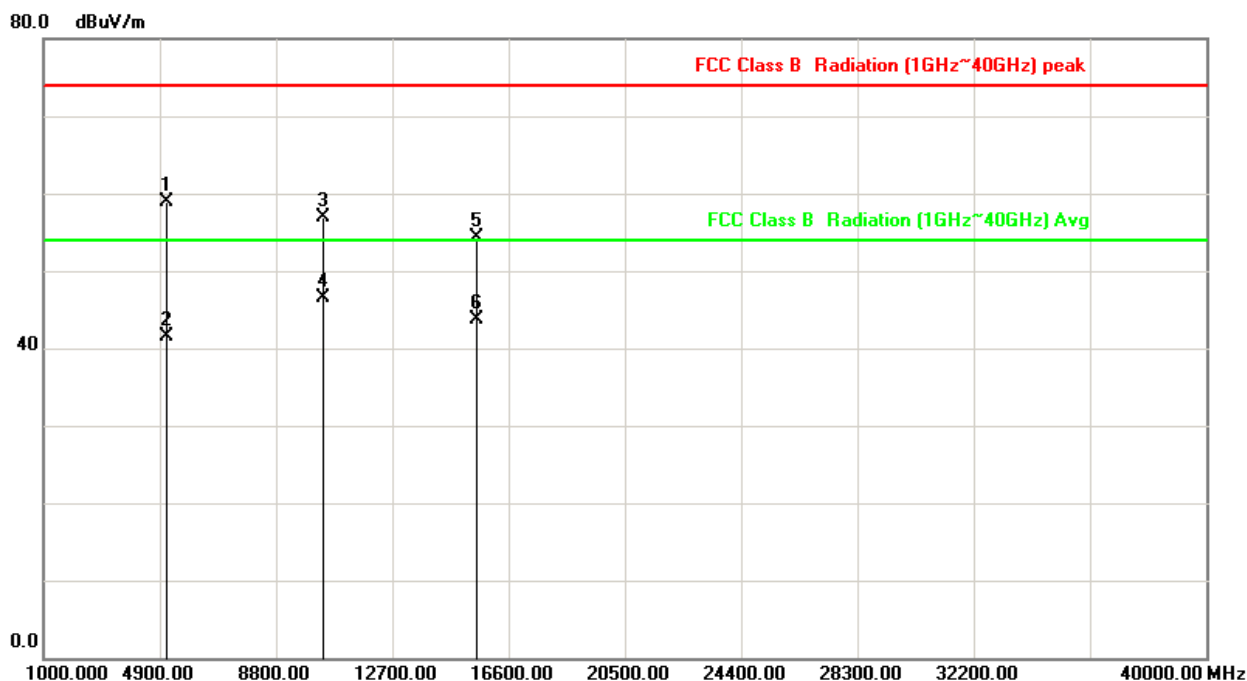
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH36, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	44.10	58.83	74.00	-15.17	peak
2	5150.000	14.73	26.78	41.51	54.00	-12.49	AVG
3	10360.000	25.85	31.12	56.97	74.00	-17.03	peak
4	10360.000	25.85	20.59	46.44	54.00	-7.56	AVG
5	15540.000	38.25	16.14	54.39	74.00	-19.61	peak
6	15540.000	38.25	5.49	43.74	54.00	-10.26	AVG

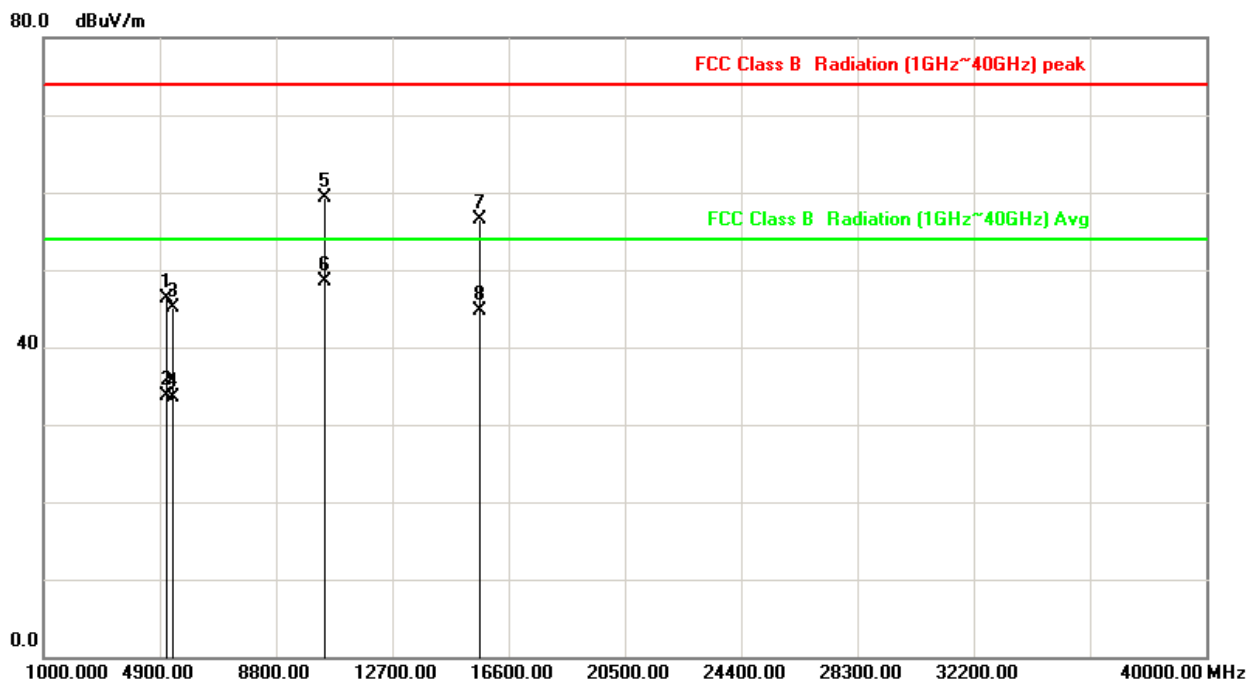
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH44, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	31.54	46.27	74.00	-27.73	peak
2	5150.000	14.73	18.95	33.68	54.00	-20.32	AVG
3	5350.000	14.89	30.26	45.15	74.00	-28.85	peak
4	5350.000	14.89	18.56	33.45	54.00	-20.55	AVG
5	10440.000	26.03	33.24	59.27	74.00	-14.73	peak
6	10440.000	26.03	22.41	48.44	54.00	-5.56	AVG
7	15660.000	38.30	18.12	56.42	74.00	-17.58	peak
8	15660.000	38.30	6.38	44.68	54.00	-9.32	AVG

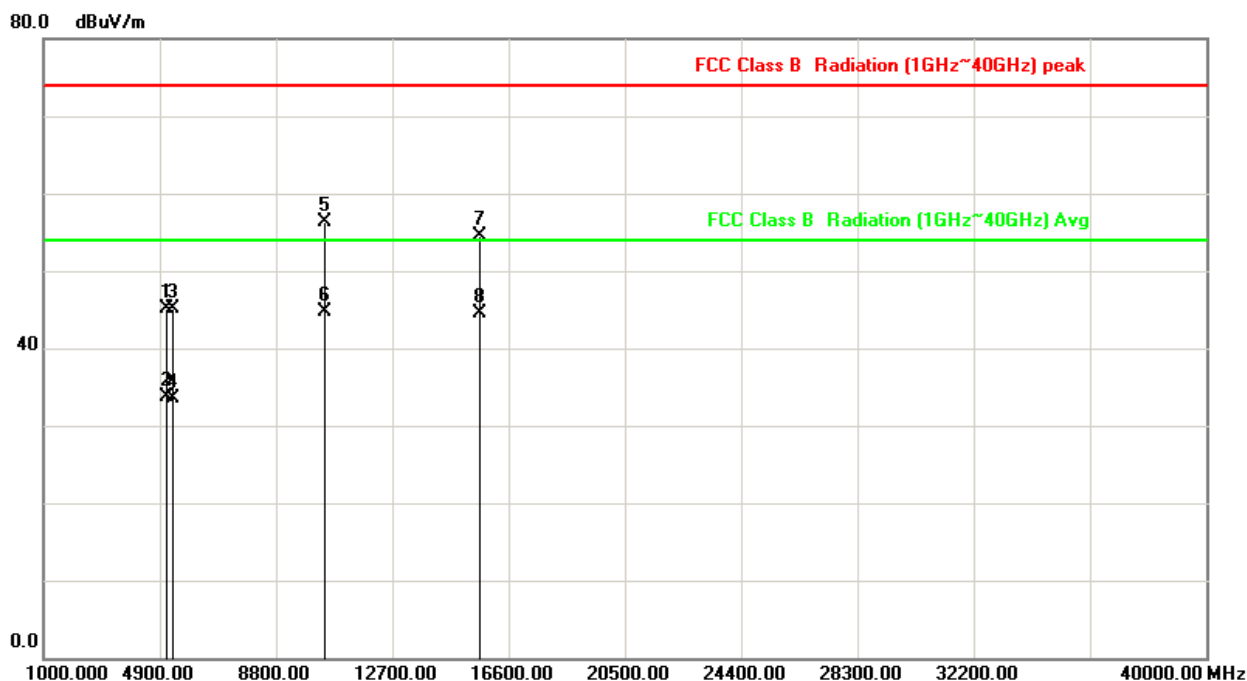
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH44, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	30.28	45.01	74.00	-28.99	peak
2	5150.000	14.73	18.95	33.68	54.00	-20.32	AVG
3	5350.000	14.89	30.13	45.02	74.00	-28.98	peak
4	5350.000	14.89	18.66	33.55	54.00	-20.45	AVG
5	10440.000	26.03	30.29	56.32	74.00	-17.68	peak
6	10440.000	26.03	18.72	44.75	54.00	-9.25	AVG
7	15660.000	38.30	16.23	54.53	74.00	-19.47	peak
8	15660.000	38.30	6.27	44.57	54.00	-9.43	AVG

Note: Level = Reading + Factor

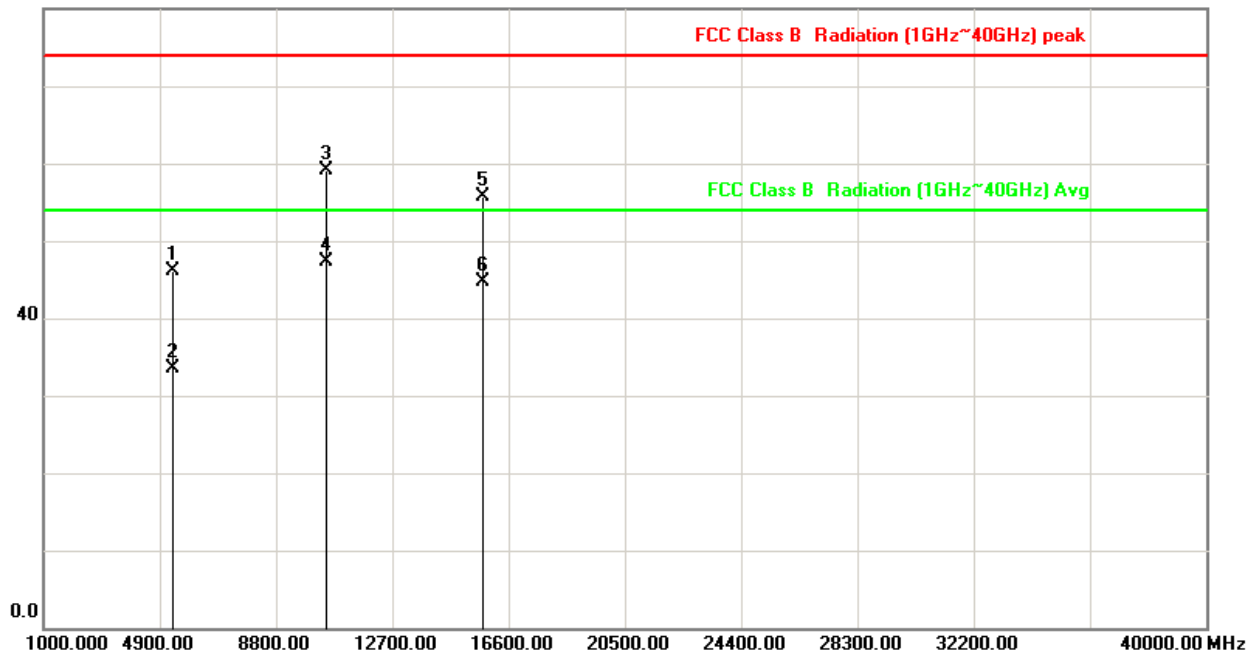
Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH48, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5350.000	14.89	31.30	46.19	74.00	-27.81	peak
2	5350.000	14.89	18.67	33.56	54.00	-20.44	AVG
3	10480.000	26.12	32.89	59.01	74.00	-14.99	peak
4	10480.000	26.12	21.16	47.28	54.00	-6.72	AVG
5	15720.000	38.33	17.31	55.64	74.00	-18.36	peak
6	15720.000	38.33	6.45	44.78	54.00	-9.22	AVG

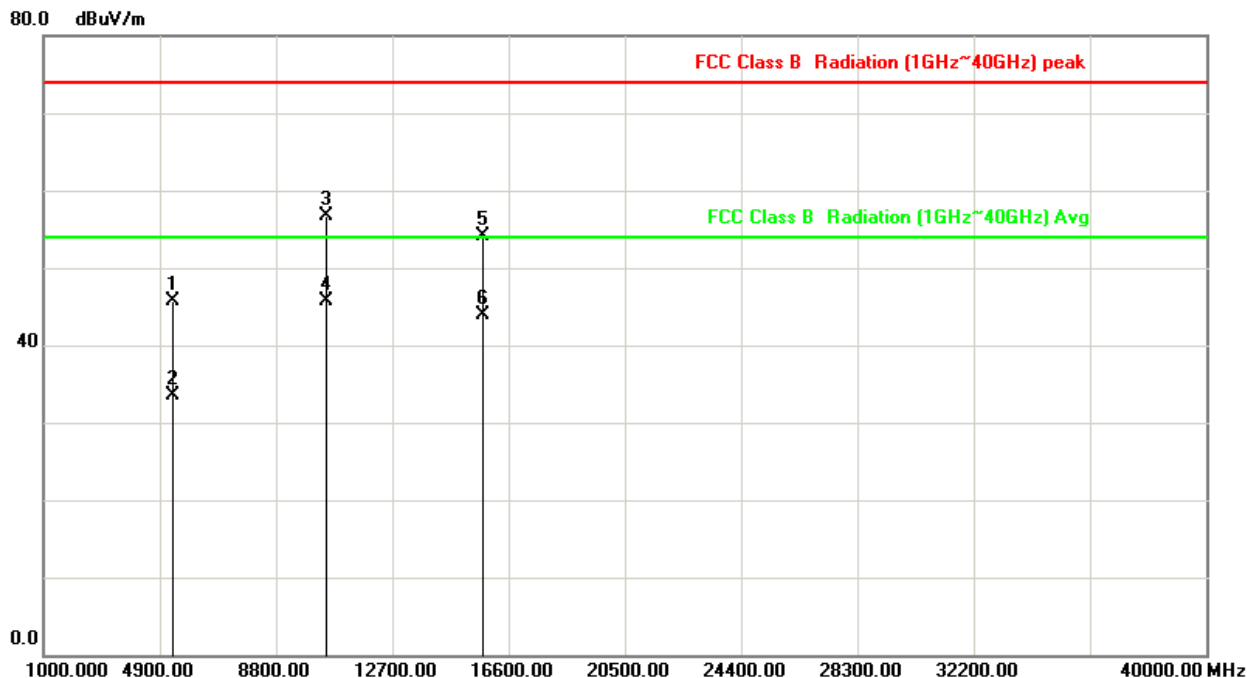
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH48, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5350.000	14.89	30.81	45.70	74.00	-28.30	peak
2	5350.000	14.89	18.68	33.57	54.00	-20.43	AVG
3	10480.000	26.12	30.65	56.77	74.00	-17.23	peak
4	10480.000	26.12	19.67	45.79	54.00	-8.21	AVG
5	15720.000	38.33	15.74	54.07	74.00	-19.93	peak
6	15720.000	38.33	5.64	43.97	54.00	-10.03	AVG

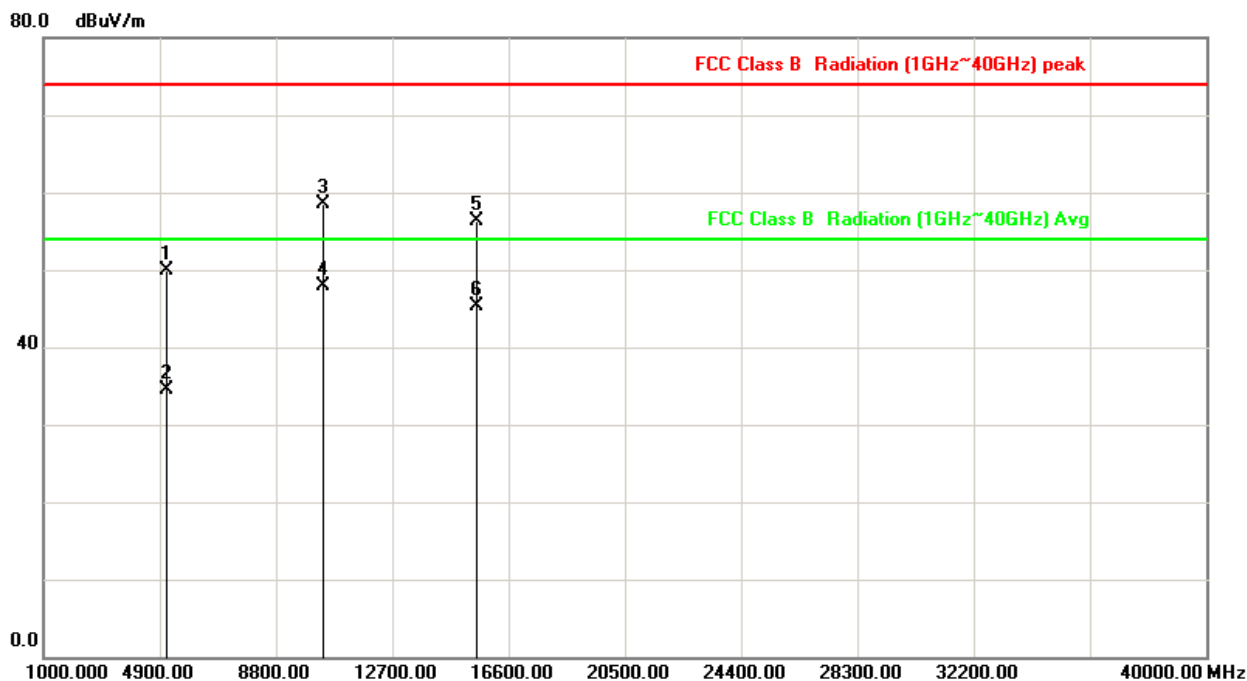
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH36, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	35.24	49.97	74.00	-24.03	peak
2	5150.000	14.73	19.68	34.41	54.00	-19.59	AVG
3	10360.000	25.85	32.57	58.42	74.00	-15.58	peak
4	10360.000	25.85	21.96	47.81	54.00	-6.19	AVG
5	15540.000	38.25	18.10	56.35	74.00	-17.65	peak
6	15540.000	38.25	7.13	45.38	54.00	-8.62	AVG

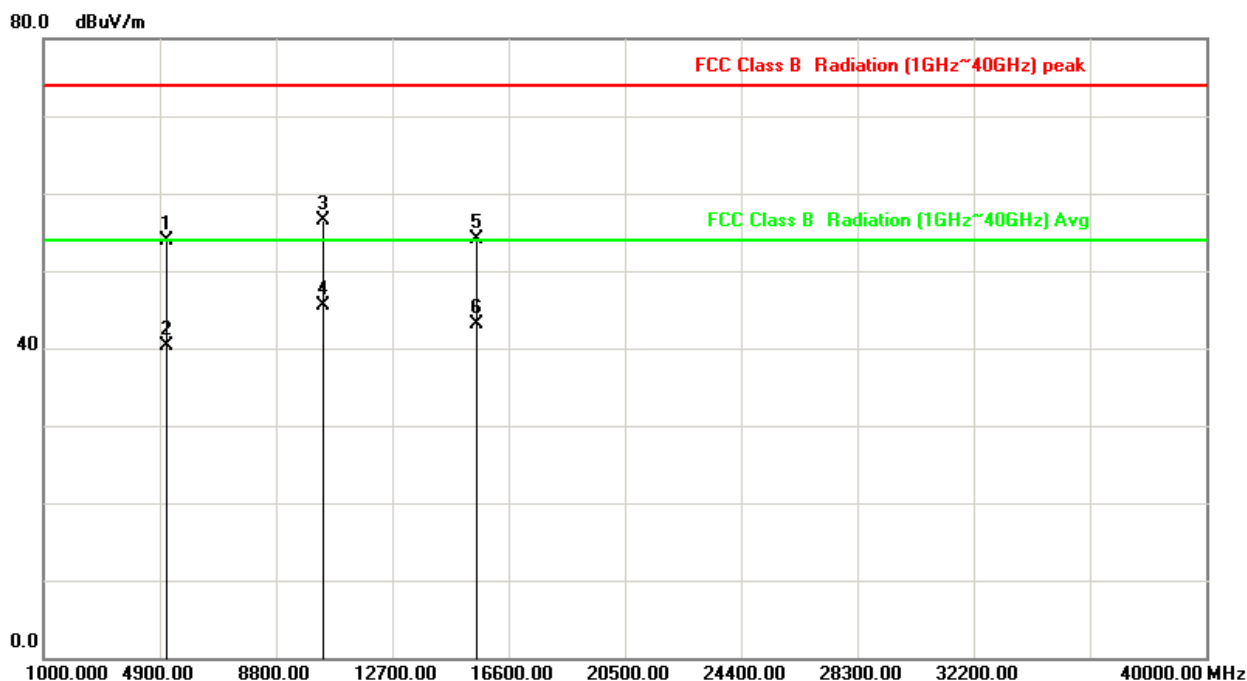
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH36, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	39.21	53.94	74.00	-20.06	peak
2	5150.000	14.73	25.67	40.40	54.00	-13.60	AVG
3	10360.000	25.85	30.58	56.43	74.00	-17.57	peak
4	10360.000	25.85	19.66	45.51	54.00	-8.49	AVG
5	15540.000	38.25	15.92	54.17	74.00	-19.83	peak
6	15540.000	38.25	4.87	43.12	54.00	-10.88	AVG

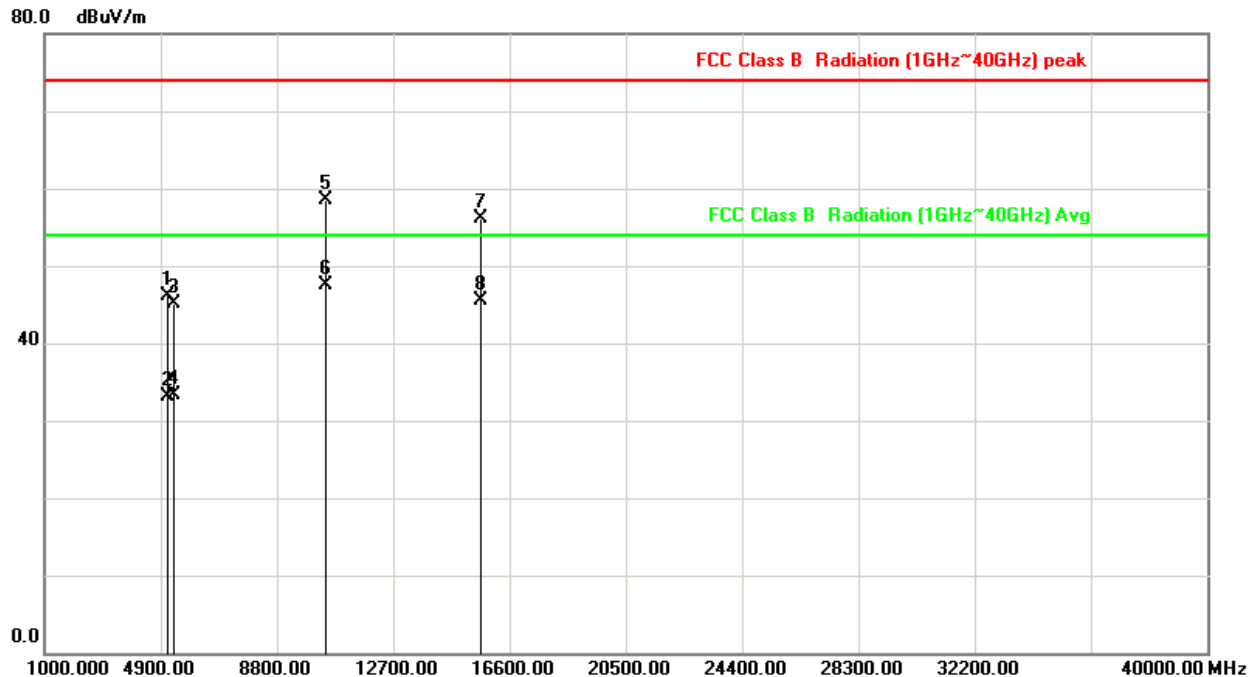
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH44, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	31.33	46.06	74.00	-27.94	peak
2	5150.000	14.73	18.42	33.15	54.00	-20.85	AVG
3	5350.000	14.89	30.15	45.04	74.00	-28.96	peak
4	5350.000	14.89	18.37	33.26	54.00	-20.74	AVG
5	10440.000	26.03	32.52	58.55	74.00	-15.45	peak
6	10440.000	26.03	21.44	47.47	54.00	-6.53	AVG
7	15660.000	38.30	17.73	56.03	74.00	-17.97	peak
8	15660.000	38.30	7.16	45.46	54.00	-8.54	AVG

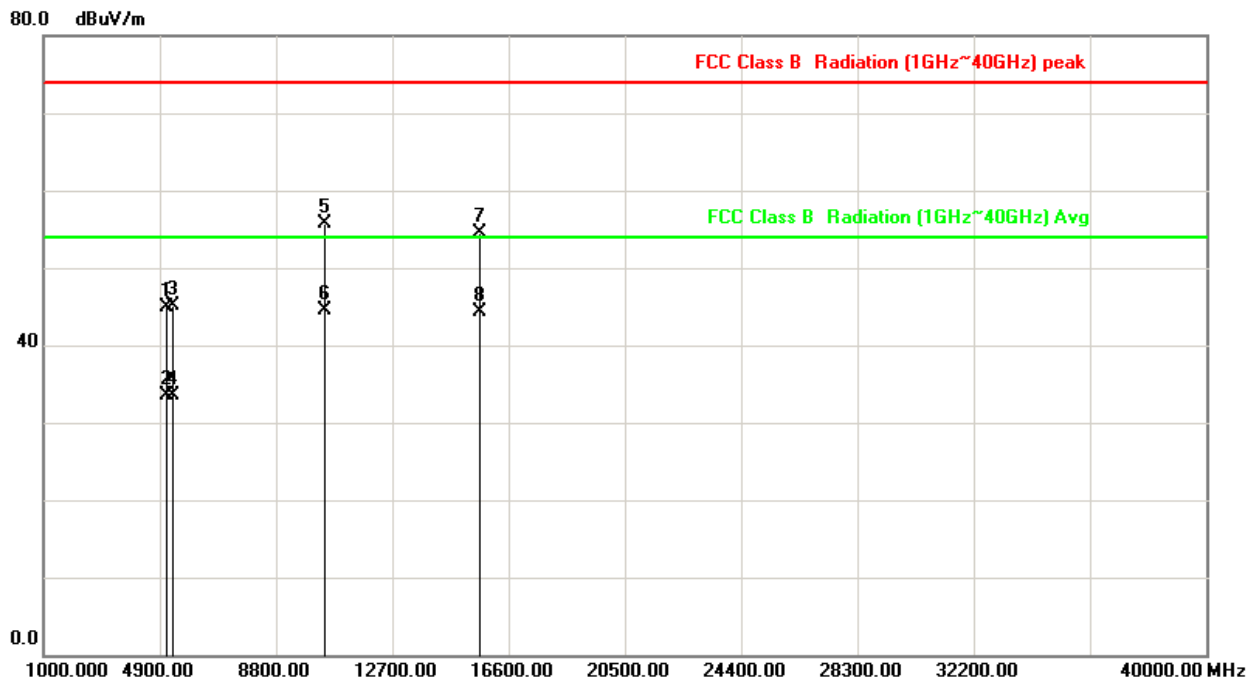
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH44, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	30.25	44.98	74.00	-29.02	peak
2	5150.000	14.73	18.79	33.52	54.00	-20.48	AVG
3	5350.000	14.89	30.24	45.13	74.00	-28.87	peak
4	5350.000	14.89	18.59	33.48	54.00	-20.52	AVG
5	10440.000	26.03	29.66	55.69	74.00	-18.31	peak
6	10440.000	26.03	18.53	44.56	54.00	-9.44	AVG
7	15660.000	38.30	16.22	54.52	74.00	-19.48	peak
8	15660.000	38.30	5.91	44.21	54.00	-9.79	AVG

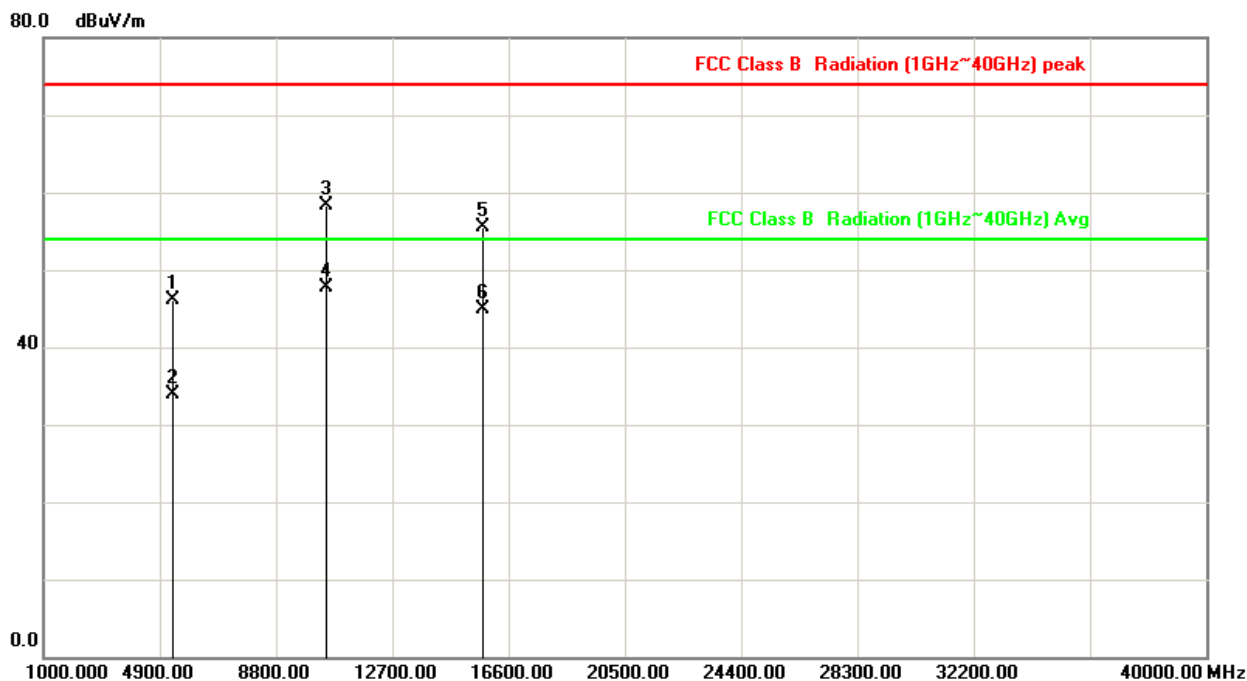
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH48, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5350.000	14.89	31.30	46.19	74.00	-27.81	peak
2	5350.000	14.89	18.97	33.86	54.00	-20.14	AVG
3	10480.000	26.12	32.21	58.33	74.00	-15.67	peak
4	10480.000	26.12	21.58	47.70	54.00	-6.30	AVG
5	15720.000	38.33	17.10	55.43	74.00	-18.57	peak
6	15720.000	38.33	6.59	44.92	54.00	-9.08	AVG

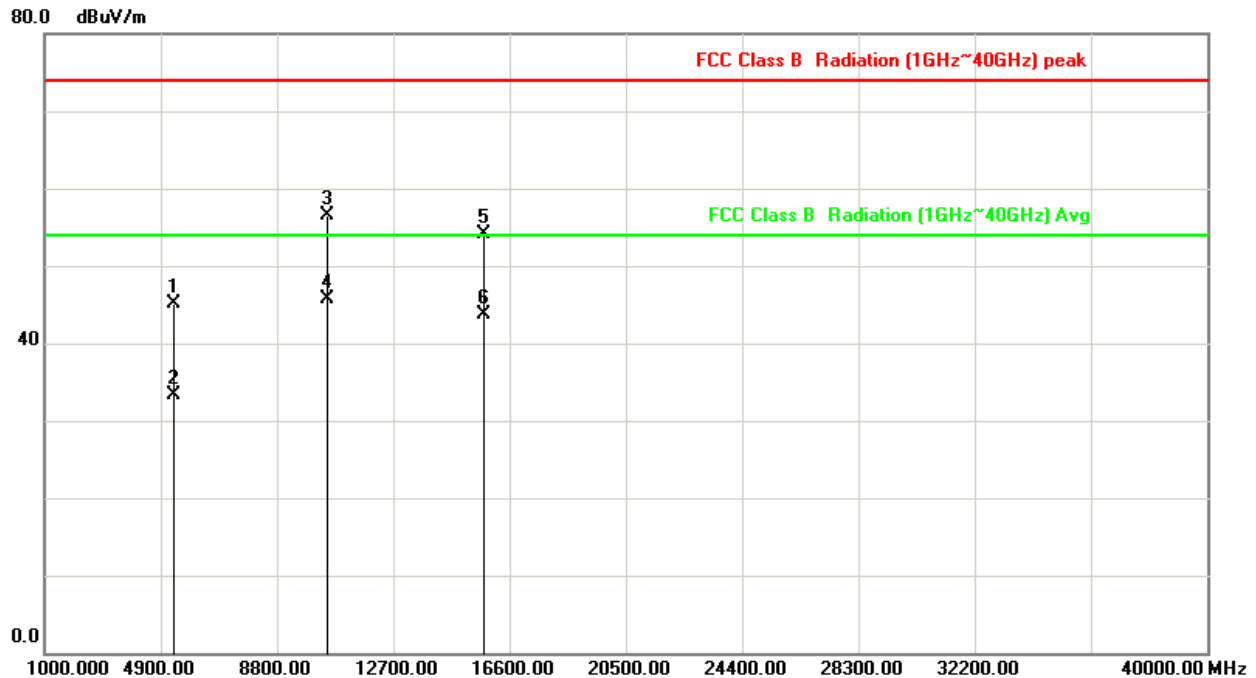
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH48, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5350.000	14.89	30.21	45.10	74.00	-28.90	peak
2	5350.000	14.89	18.44	33.33	54.00	-20.67	AVG
3	10480.000	26.12	30.45	56.57	74.00	-17.43	peak
4	10480.000	26.12	19.51	45.63	54.00	-8.37	AVG
5	15720.000	38.33	15.77	54.10	74.00	-19.90	peak
6	15720.000	38.33	5.31	43.64	54.00	-10.36	AVG

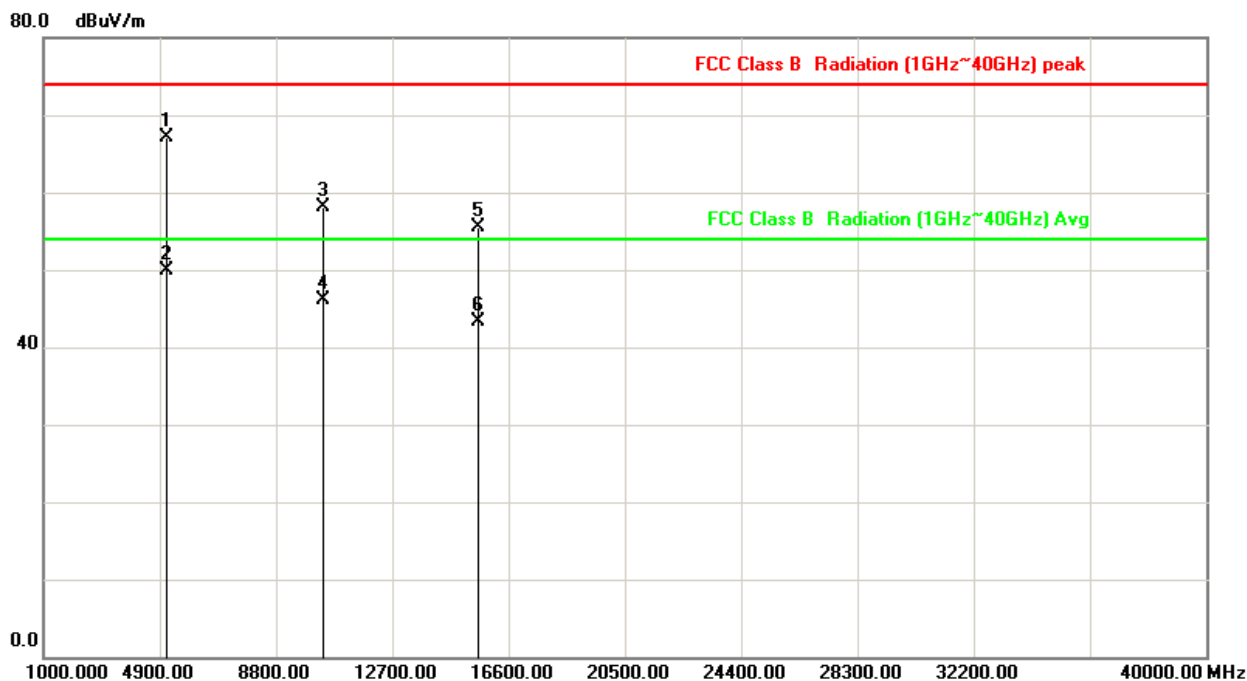
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH38, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	52.34	67.07	74.00	-6.93	peak
2	5150.000	14.73	35.15	49.88	54.00	-4.12	AVG
3	10380.000	25.89	32.25	58.14	74.00	-15.86	peak
4	10380.000	25.89	20.21	46.10	54.00	-7.90	AVG
5	15570.000	38.26	17.19	55.45	74.00	-18.55	peak
6	15570.000	38.26	5.03	43.29	54.00	-10.71	AVG

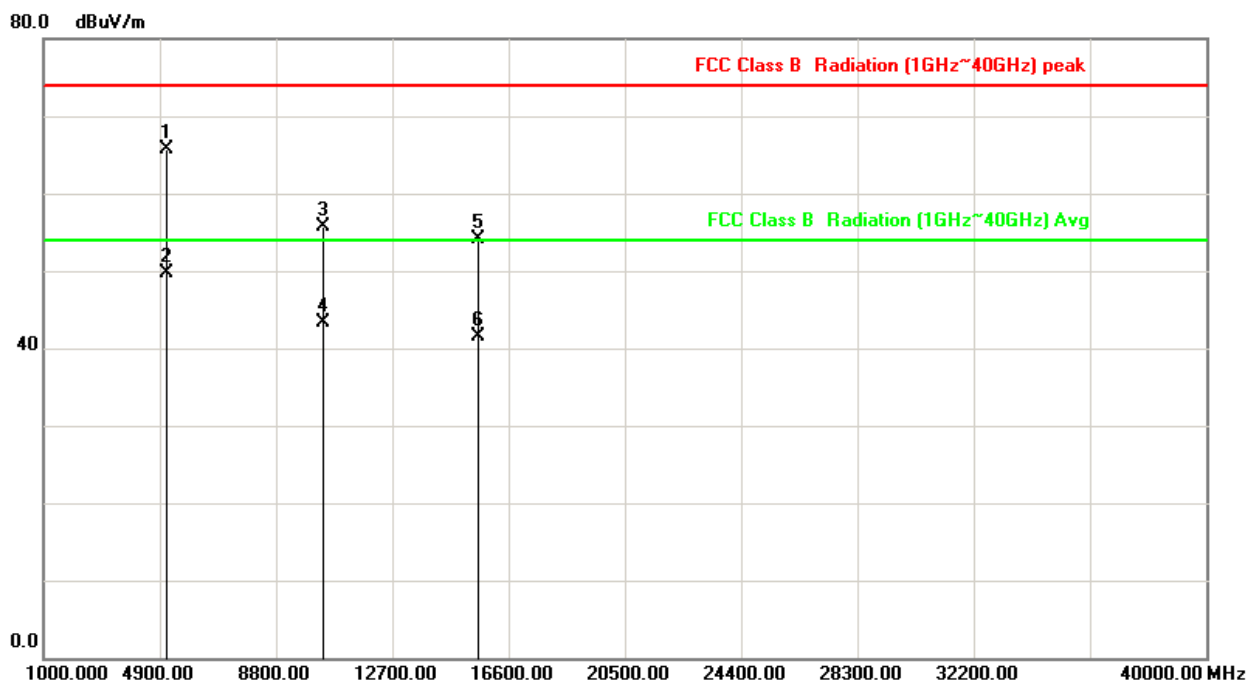
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH38, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	51.02	65.75	74.00	-8.25	peak
2	5150.000	14.73	34.98	49.71	54.00	-4.29	AVG
3	10380.000	25.89	29.81	55.70	74.00	-18.30	peak
4	10380.000	25.89	17.42	43.31	54.00	-10.69	AVG
5	15570.000	38.26	15.83	54.09	74.00	-19.91	peak
6	15570.000	38.26	3.29	41.55	54.00	-12.45	AVG

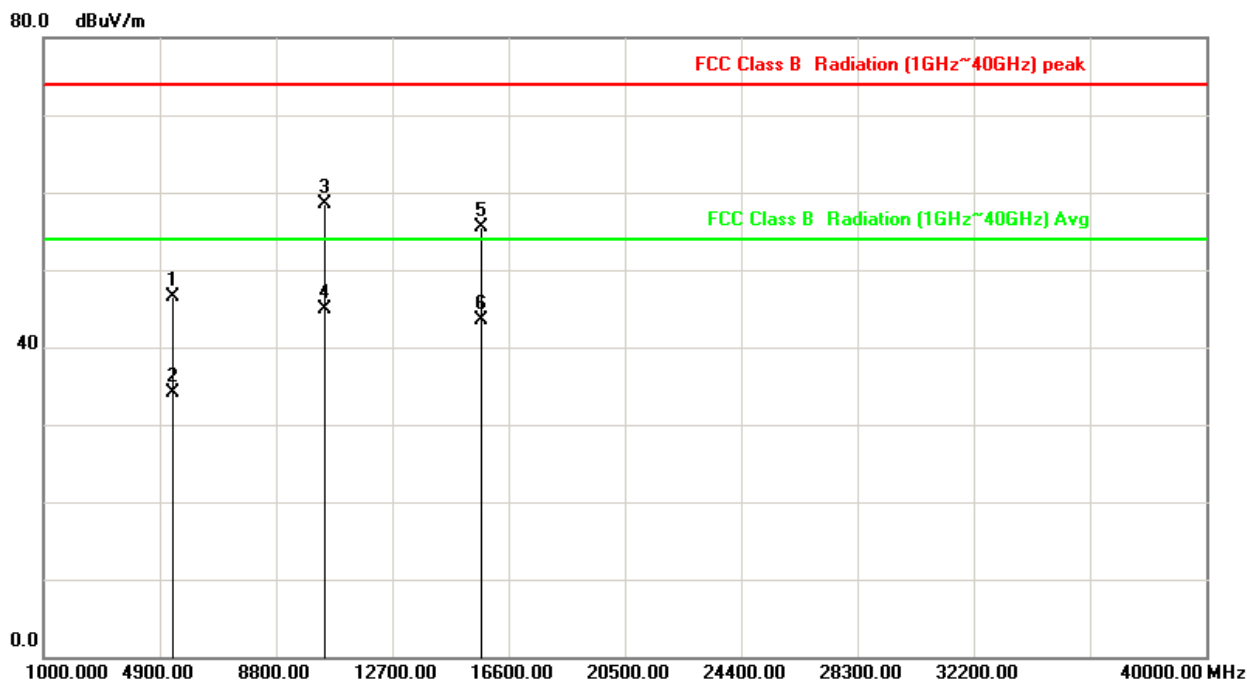
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH46, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5350.000	14.89	31.66	46.55	74.00	-27.45	peak
2	5350.000	14.89	19.15	34.04	54.00	-19.96	AVG
3	10460.000	26.07	32.45	58.52	74.00	-15.48	peak
4	10460.000	26.07	18.89	44.96	54.00	-9.04	AVG
5	15690.000	38.32	17.26	55.58	74.00	-18.42	peak
6	15690.000	38.32	5.10	43.42	54.00	-10.58	AVG

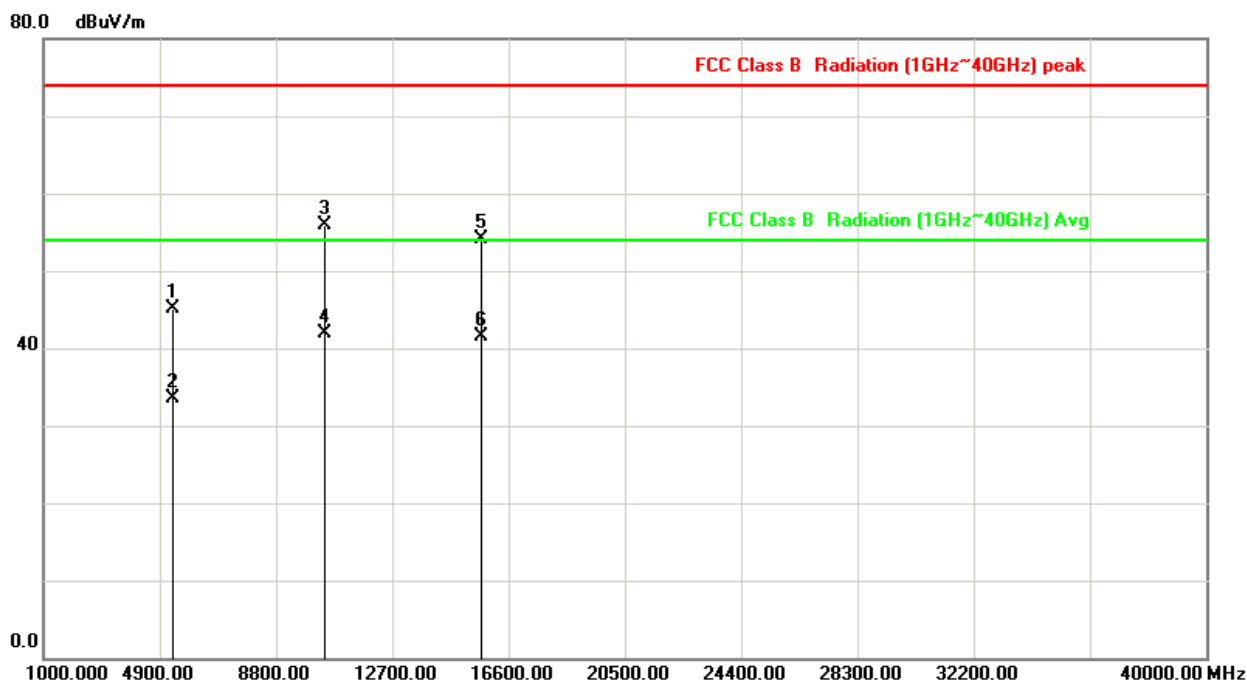
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH46, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5350.000	14.89	30.21	45.10	74.00	-28.90	peak
2	5350.000	14.89	18.66	33.55	54.00	-20.45	AVG
3	10460.000	26.07	29.91	55.98	74.00	-18.02	peak
4	10460.000	26.07	15.81	41.88	54.00	-12.12	AVG
5	15690.000	38.32	15.77	54.09	74.00	-19.91	peak
6	15690.000	38.32	3.24	41.56	54.00	-12.44	AVG

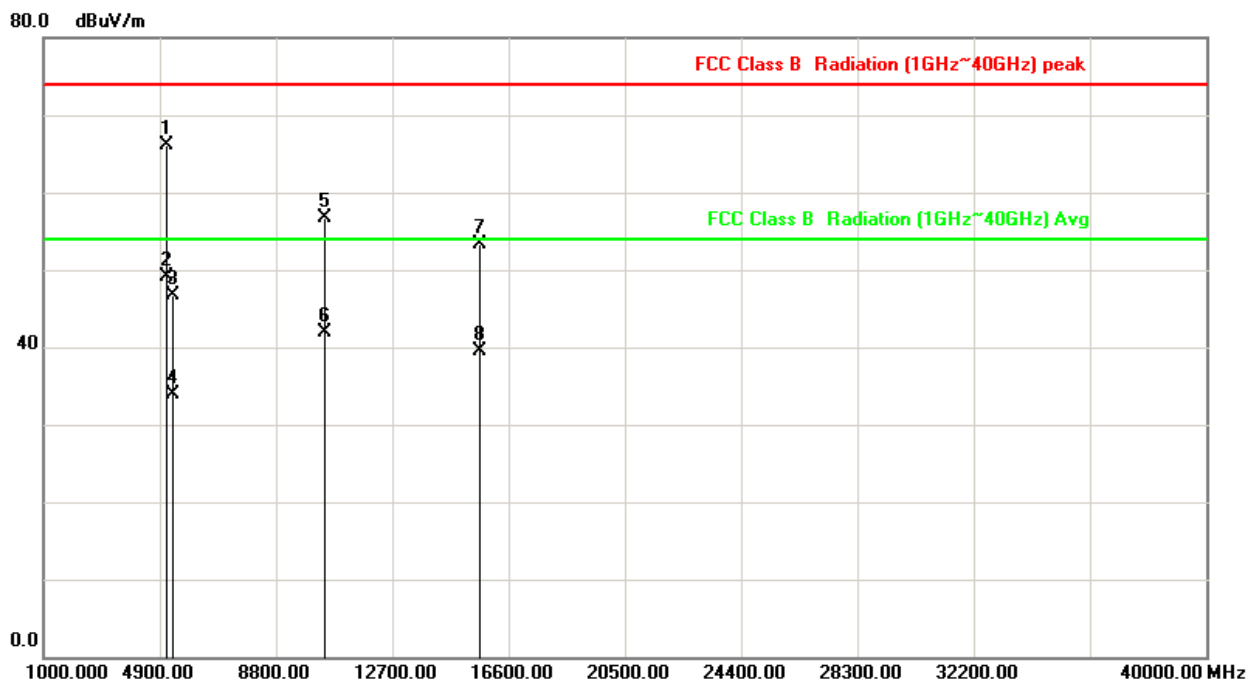
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 4, CH42, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	51.45	66.18	74.00	-7.82	peak
2	5150.000	14.73	34.29	49.02	54.00	-4.98	AVG
3	5350.000	14.89	31.84	46.73	74.00	-27.27	peak
4	5350.000	14.89	18.95	33.84	54.00	-20.16	AVG
5	10420.000	25.98	30.68	56.66	74.00	-17.34	peak
6	10420.000	25.98	15.88	41.86	54.00	-12.14	AVG
7	15630.000	38.29	15.11	53.40	74.00	-20.60	peak
8	15630.000	38.29	1.25	39.54	54.00	-14.46	AVG

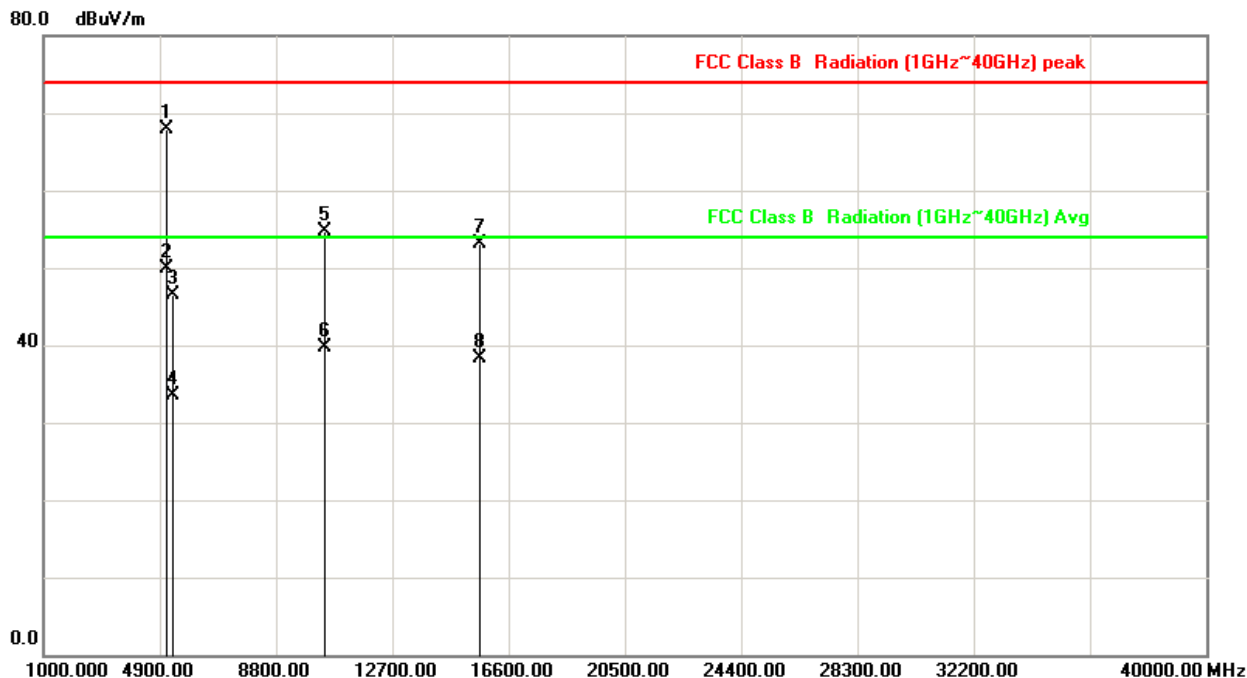
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 4, CH42, Band 1	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5150.000	14.73	53.20	67.93	74.00	-6.07	peak
2	5150.000	14.73	35.12	49.85	54.00	-4.15	AVG
3	5350.000	14.89	31.62	46.51	74.00	-27.49	peak
4	5350.000	14.89	18.65	33.54	54.00	-20.46	AVG
5	10420.000	25.98	28.67	54.65	74.00	-19.35	peak
6	10420.000	25.98	13.66	39.64	54.00	-14.36	AVG
7	15630.000	38.29	14.91	53.20	74.00	-20.80	peak
8	15630.000	38.29	0.11	38.40	54.00	-15.60	AVG

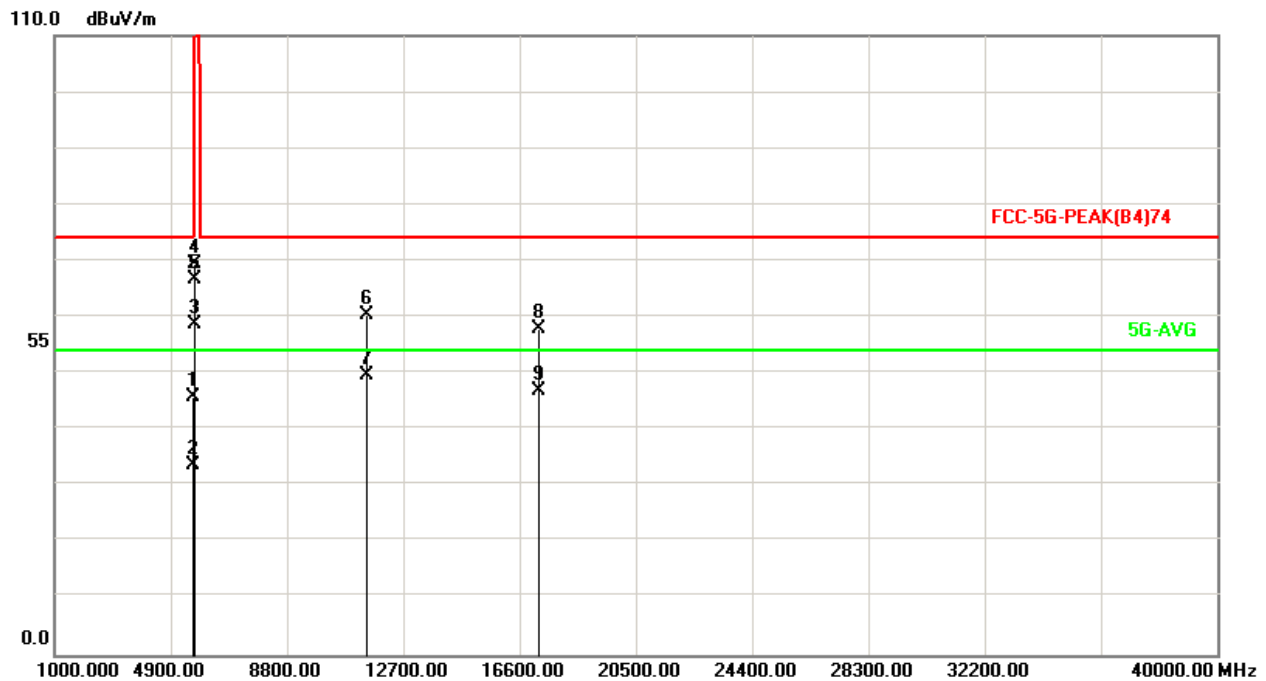
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH149, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	30.52	45.91	74.00	-28.09	peak
2	5650.000	15.39	18.22	33.61	54.00	-20.39	AVG
3	5700.000	15.52	43.25	58.77	105.20	-46.43	peak
4	5720.000	15.57	53.74	69.31	110.80	-41.49	peak
5	5725.000	15.58	51.23	66.81	122.20	-55.39	peak
6	11490.000	28.84	31.62	60.46	74.00	-13.54	peak
7	11490.000	28.84	20.89	49.73	54.00	-4.27	AVG
8	17235.000	43.26	14.56	57.82	74.00	-16.18	peak
9	17235.000	43.26	3.71	46.97	54.00	-7.03	AVG

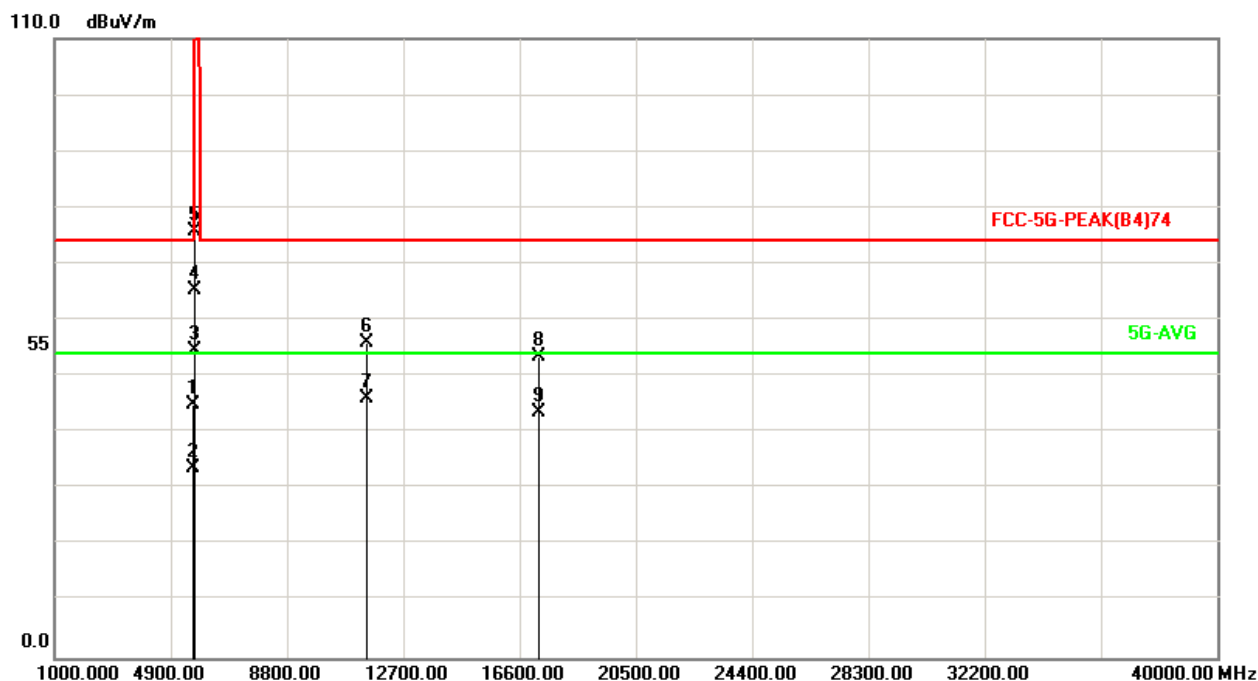
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH149, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	29.54	44.93	74.00	-29.07	peak
2	5650.000	15.39	18.23	33.62	54.00	-20.38	AVG
3	5700.000	15.52	39.13	54.65	105.20	-50.55	peak
4	5720.000	15.57	49.76	65.33	110.80	-45.47	peak
5	5725.000	15.58	60.07	75.65	122.20	-46.55	peak
6	11490.000	28.84	27.21	56.05	74.00	-17.95	peak
7	11490.000	28.84	17.34	46.18	54.00	-7.82	AVG
8	17235.000	43.26	10.36	53.62	74.00	-20.38	peak
9	17235.000	43.26	0.24	43.50	54.00	-10.50	AVG

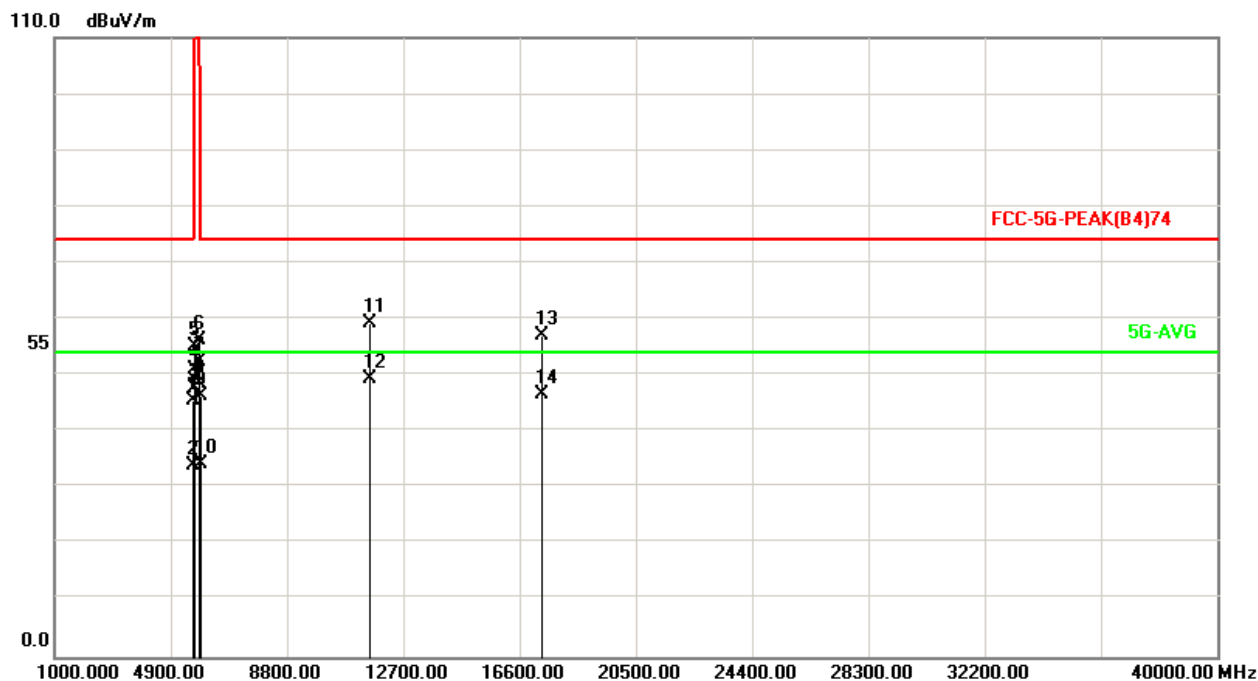
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH157, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	30.26	45.65	74.00	-28.35	peak
2	5650.000	15.39	18.66	34.05	54.00	-19.95	AVG
3	5700.000	15.52	32.19	47.71	105.20	-57.49	peak
4	5720.000	15.57	35.45	51.02	110.80	-59.78	peak
5	5725.000	15.58	39.69	55.27	122.20	-66.93	peak
6	5850.000	15.89	40.31	56.20	122.20	-66.00	peak
7	5855.000	15.90	36.49	52.39	110.80	-58.41	peak
8	5875.000	15.95	32.57	48.52	105.20	-56.68	peak
9	5925.000	16.07	30.21	46.28	74.00	-27.72	peak
10	5925.000	16.07	18.25	34.32	54.00	-19.68	AVG
11	11570.000	29.00	30.26	59.26	74.00	-14.74	peak
12	11570.000	29.00	20.42	49.42	54.00	-4.58	AVG
13	17355.000	43.74	13.26	57.00	74.00	-17.00	peak
14	17355.000	43.74	2.86	46.60	54.00	-7.40	AVG

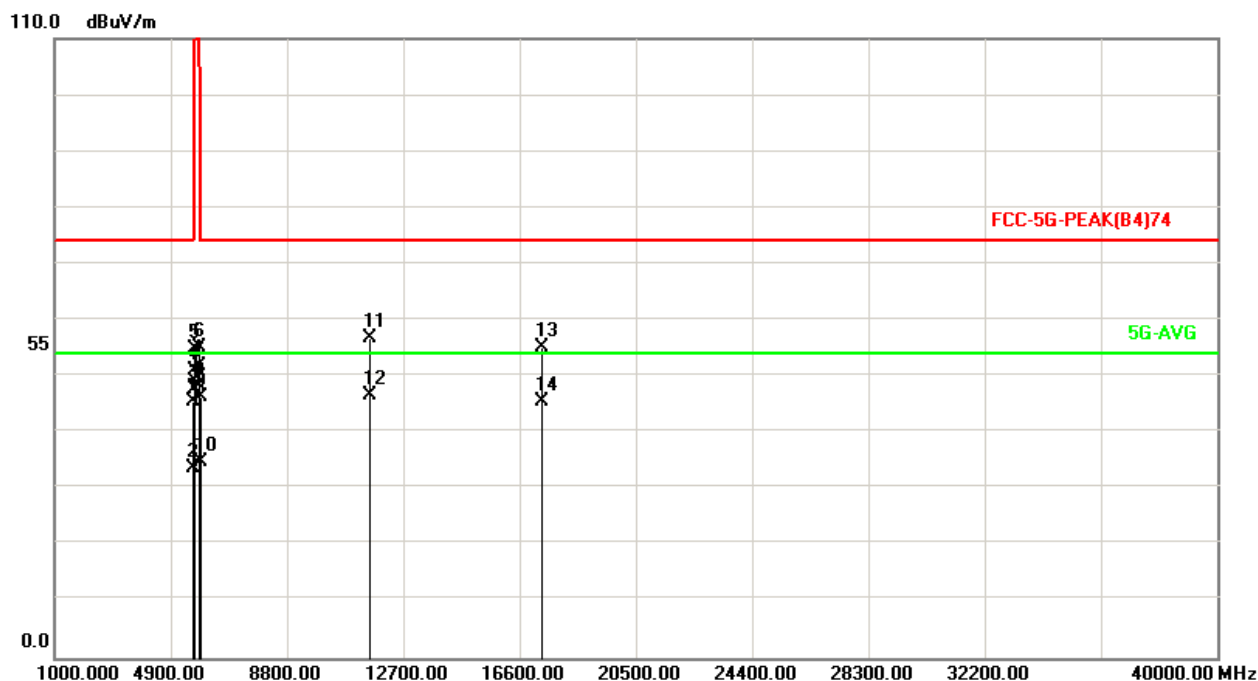
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH157, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	30.15	45.54	74.00	-28.46	peak
2	5650.000	15.39	18.25	33.64	54.00	-20.36	AVG
3	5700.000	15.52	32.10	47.62	105.20	-57.58	peak
4	5720.000	15.57	35.38	50.95	110.80	-59.85	peak
5	5725.000	15.58	39.27	54.85	122.20	-67.35	peak
6	5850.000	15.89	39.18	55.07	122.20	-67.13	peak
7	5855.000	15.90	35.91	51.81	110.80	-58.99	peak
8	5875.000	15.95	32.22	48.17	105.20	-57.03	peak
9	5925.000	16.07	30.14	46.21	74.00	-27.79	peak
10	5925.000	16.07	18.79	34.86	54.00	-19.14	AVG
11	11570.000	29.00	27.71	56.71	74.00	-17.29	peak
12	11570.000	29.00	17.67	46.67	54.00	-7.33	AVG
13	17355.000	43.74	11.43	55.17	74.00	-18.83	peak
14	17355.000	43.74	1.74	45.48	54.00	-8.52	AVG

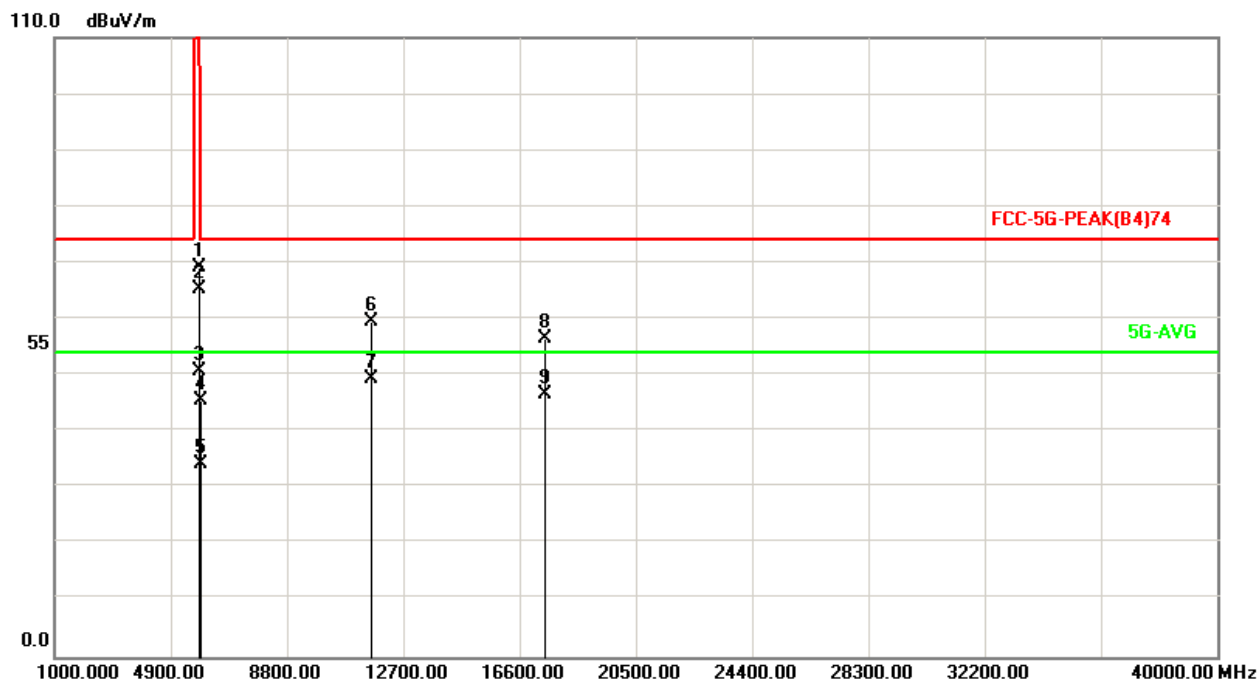
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH165, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5850.000	15.89	53.26	69.15	122.20	-53.05	peak
2	5855.000	15.90	49.29	65.19	110.80	-45.61	peak
3	5875.000	15.95	34.81	50.76	105.20	-54.44	peak
4	5925.000	16.07	29.32	45.39	74.00	-28.61	peak
5	5925.000	16.07	18.15	34.22	54.00	-19.78	AVG
6	11650.000	29.16	30.42	59.58	74.00	-14.42	peak
7	11650.000	29.16	20.16	49.32	54.00	-4.68	AVG
8	17475.000	44.21	12.41	56.62	74.00	-17.38	peak
9	17475.000	44.21	2.33	46.54	54.00	-7.46	AVG

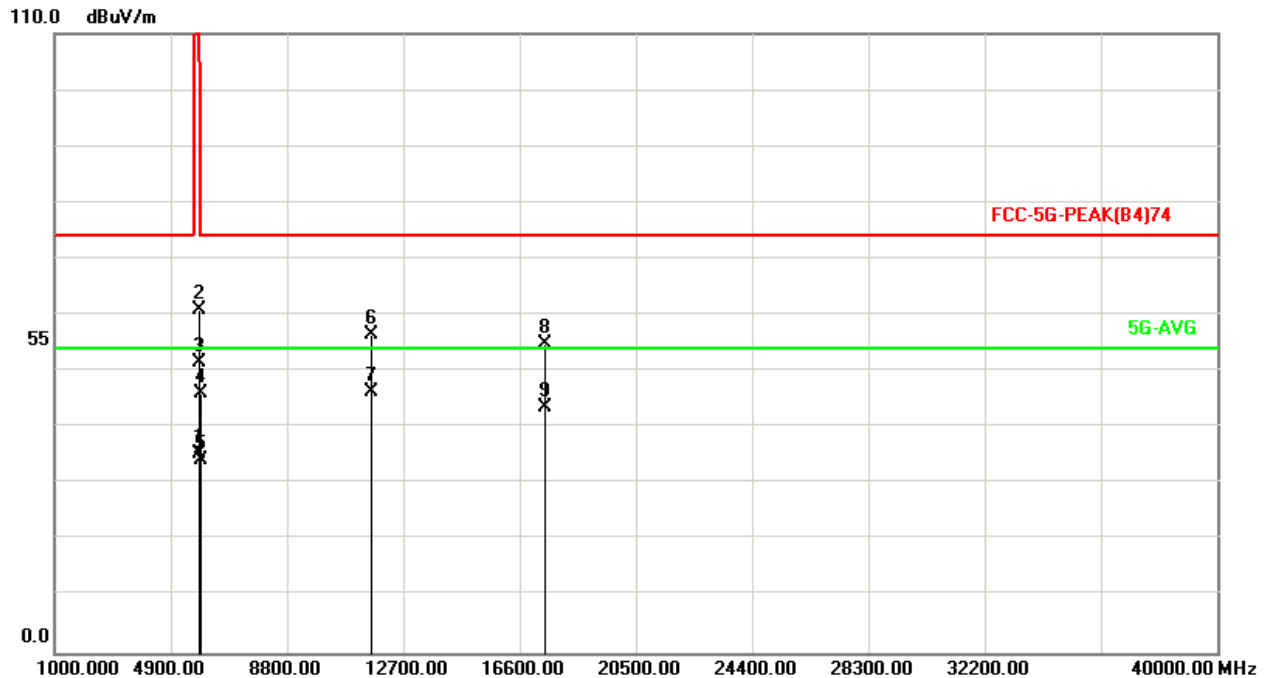
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH165, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5850.000	15.89	19.45	35.34	122.20	-86.86	peak
2	5855.000	15.90	45.14	61.04	110.80	-49.76	peak
3	5875.000	15.95	35.49	51.44	105.20	-53.76	peak
4	5925.000	16.07	30.03	46.10	74.00	-27.90	peak
5	5925.000	16.07	18.16	34.23	54.00	-19.77	AVG
6	11650.000	29.16	27.39	56.55	74.00	-17.45	peak
7	11650.000	29.16	17.31	46.47	54.00	-7.53	AVG
8	17475.000	44.21	10.71	54.92	74.00	-19.08	peak
9	17475.000	44.21	-0.57	43.64	54.00	-10.36	AVG

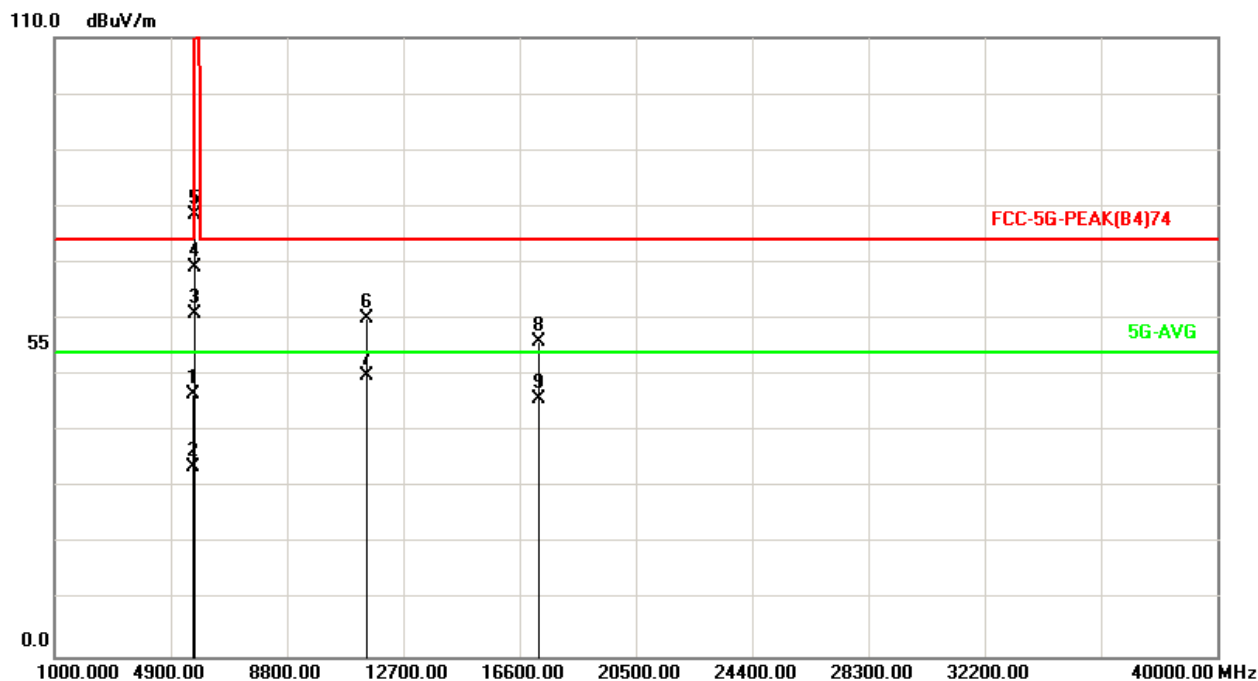
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH149, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	31.10	46.49	74.00	-27.51	peak
2	5650.000	15.39	18.33	33.72	54.00	-20.28	AVG
3	5700.000	15.52	45.47	60.99	105.20	-44.21	peak
4	5720.000	15.57	53.66	69.23	110.80	-41.57	peak
5	5725.000	15.58	62.94	78.52	122.20	-43.68	peak
6	11490.000	28.84	31.20	60.04	74.00	-13.96	peak
7	11490.000	28.84	21.03	49.87	54.00	-4.13	AVG
8	17235.000	43.26	12.81	56.07	74.00	-17.93	peak
9	17235.000	43.26	2.52	45.78	54.00	-8.22	AVG

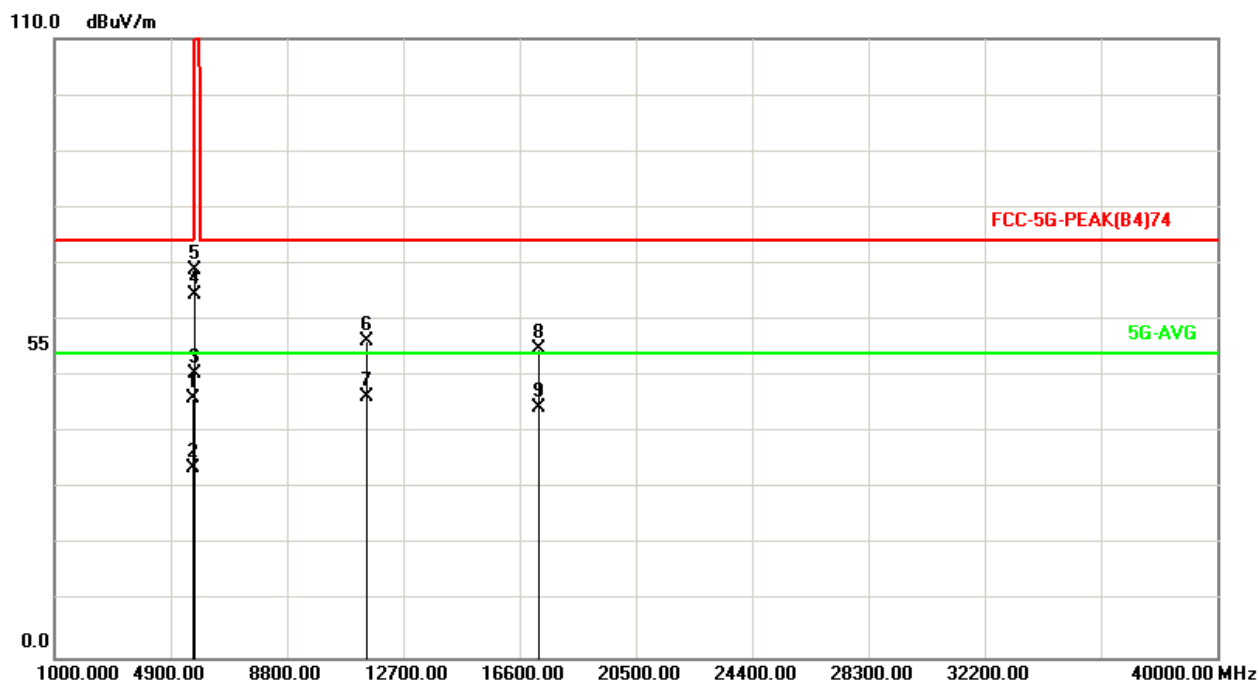
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH149, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	30.57	45.96	74.00	-28.04	peak
2	5650.000	15.39	18.35	33.74	54.00	-20.26	AVG
3	5700.000	15.52	34.83	50.35	105.20	-54.85	peak
4	5720.000	15.57	49.05	64.62	110.80	-46.18	peak
5	5725.000	15.58	53.31	68.89	122.20	-53.31	peak
6	11490.000	28.84	27.33	56.17	74.00	-17.83	peak
7	11490.000	28.84	17.46	46.30	54.00	-7.70	AVG
8	17235.000	43.26	11.56	54.82	74.00	-19.18	peak
9	17235.000	43.26	1.05	44.31	54.00	-9.69	AVG

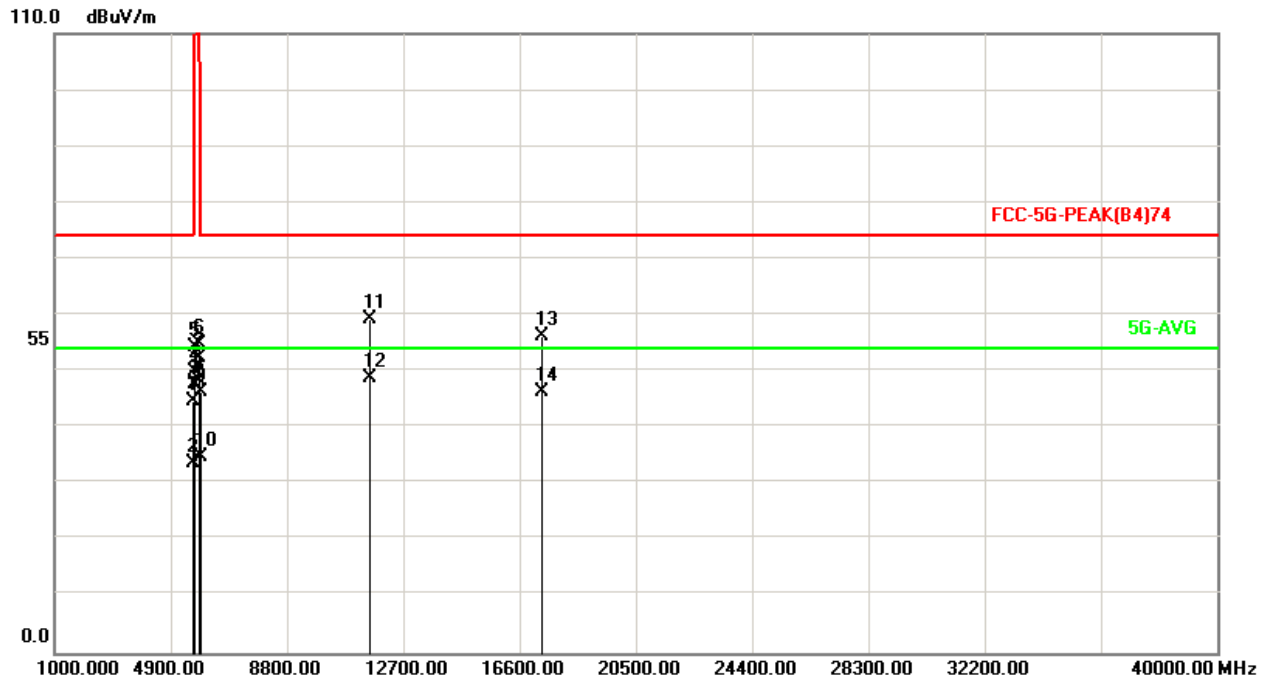
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH157, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	29.19	44.58	74.00	-29.42	peak
2	5650.000	15.39	18.23	33.62	54.00	-20.38	AVG
3	5700.000	15.52	32.14	47.66	105.20	-57.54	peak
4	5720.000	15.57	34.26	49.83	110.80	-60.97	peak
5	5725.000	15.58	38.81	54.39	122.20	-67.81	peak
6	5850.000	15.89	39.10	54.99	122.20	-67.21	peak
7	5855.000	15.90	36.47	52.37	110.80	-58.43	peak
8	5875.000	15.95	32.42	48.37	105.20	-56.83	peak
9	5925.000	16.07	30.20	46.27	74.00	-27.73	peak
10	5925.000	16.07	18.79	34.86	54.00	-19.14	AVG
11	11570.000	29.00	30.16	59.16	74.00	-14.84	peak
12	11570.000	29.00	19.72	48.72	54.00	-5.28	AVG
13	17355.000	43.74	12.54	56.28	74.00	-17.72	peak
14	17355.000	43.74	2.61	46.35	54.00	-7.65	AVG

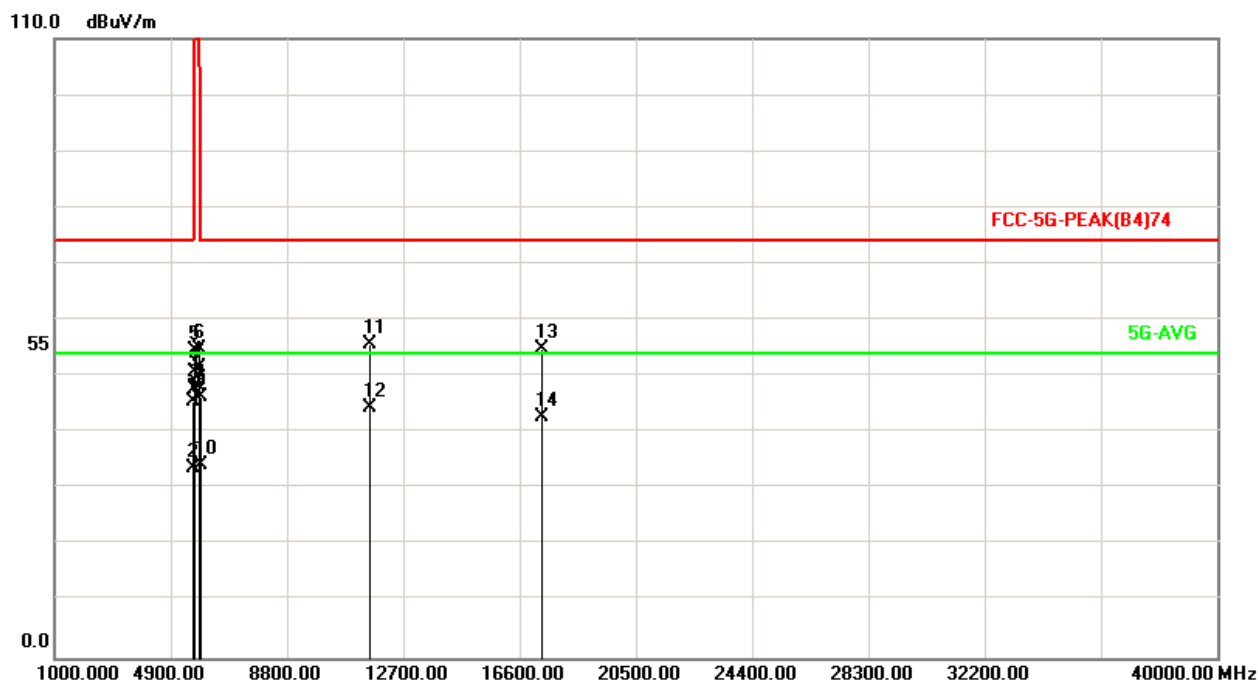
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH157, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	30.23	45.62	74.00	-28.38	peak
2	5650.000	15.39	18.21	33.60	54.00	-20.40	AVG
3	5700.000	15.52	32.16	47.68	105.20	-57.52	peak
4	5720.000	15.57	35.27	50.84	110.80	-59.96	peak
5	5725.000	15.58	39.02	54.60	122.20	-67.60	peak
6	5850.000	15.89	39.11	55.00	122.20	-67.20	peak
7	5855.000	15.90	35.64	51.54	110.80	-59.26	peak
8	5875.000	15.95	32.16	48.11	105.20	-57.09	peak
9	5925.000	16.07	30.32	46.39	74.00	-27.61	peak
10	5925.000	16.07	18.20	34.27	54.00	-19.73	AVG
11	11570.000	29.00	26.79	55.79	74.00	-18.21	peak
12	11570.000	29.00	15.45	44.45	54.00	-9.55	AVG
13	17355.000	43.74	11.01	54.75	74.00	-19.25	peak
14	17355.000	43.74	-1.03	42.71	54.00	-11.29	AVG

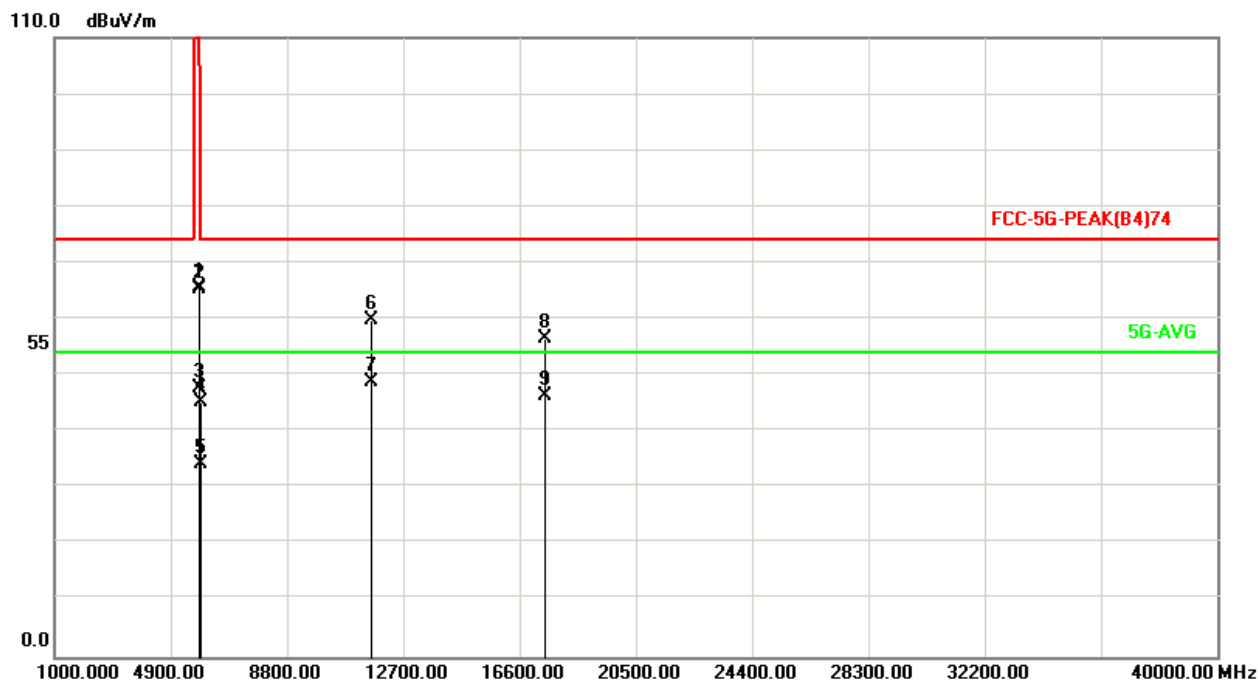
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH165, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5850.000	15.89	49.61	65.50	122.20	-56.70	peak
2	5855.000	15.90	49.32	65.22	110.80	-45.58	peak
3	5875.000	15.95	31.74	47.69	105.20	-57.51	peak
4	5925.000	16.07	29.13	45.20	74.00	-28.80	peak
5	5925.000	16.07	18.15	34.22	54.00	-19.78	AVG
6	11650.000	29.16	30.59	59.75	74.00	-14.25	peak
7	11650.000	29.16	19.66	48.82	54.00	-5.18	AVG
8	17475.000	44.21	12.26	56.47	74.00	-17.53	peak
9	17475.000	44.21	2.14	46.35	54.00	-7.65	AVG

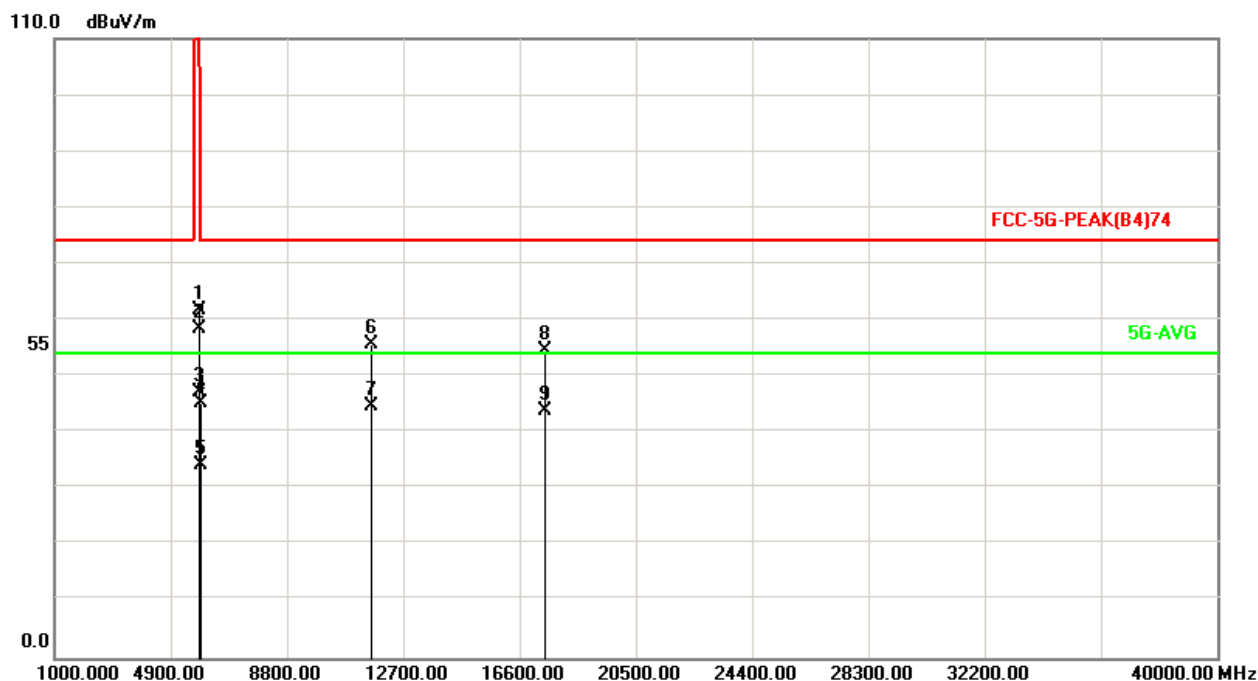
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH165, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5850.000	15.89	45.96	61.85	122.20	-60.35	peak
2	5855.000	15.90	42.60	58.50	110.80	-52.30	peak
3	5875.000	15.95	31.23	47.18	105.20	-58.02	peak
4	5925.000	16.07	29.12	45.19	74.00	-28.81	peak
5	5925.000	16.07	18.17	34.24	54.00	-19.76	AVG
6	11650.000	29.16	26.45	55.61	74.00	-18.39	peak
7	11650.000	29.16	15.41	44.57	54.00	-9.43	AVG
8	17475.000	44.21	10.25	54.46	74.00	-19.54	peak
9	17475.000	44.21	-0.37	43.84	54.00	-10.16	AVG

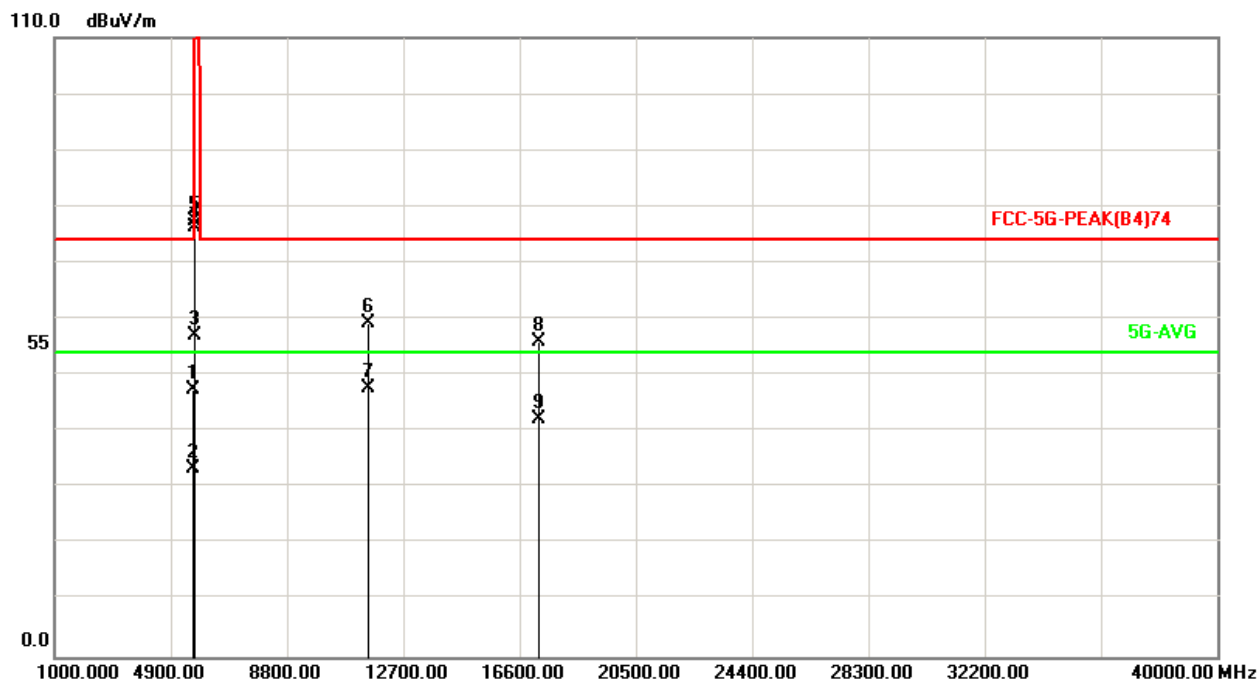
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH151, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	32.15	47.54	74.00	-26.46	peak
2	5650.000	15.39	18.16	33.55	54.00	-20.45	AVG
3	5700.000	15.52	41.53	57.05	105.20	-48.15	peak
4	5720.000	15.57	60.65	76.22	110.80	-34.58	peak
5	5725.000	15.58	61.74	77.32	122.20	-44.88	peak
6	11510.000	28.88	30.46	59.34	74.00	-14.66	peak
7	11510.000	28.88	18.89	47.77	54.00	-6.23	AVG
8	17265.000	43.38	12.47	55.85	74.00	-18.15	peak
9	17265.000	43.38	-1.15	42.23	54.00	-11.77	AVG

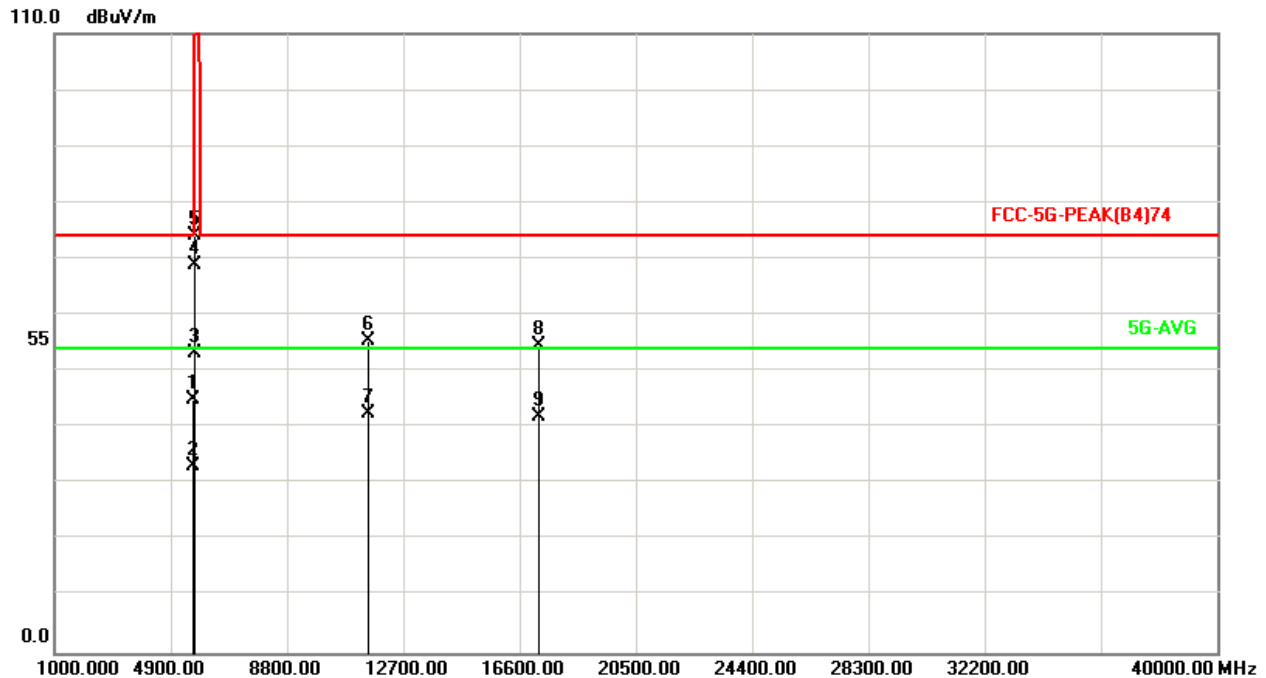
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH151, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	29.71	45.10	74.00	-28.90	peak
2	5650.000	15.39	17.88	33.27	54.00	-20.73	AVG
3	5700.000	15.52	37.69	53.21	105.20	-51.99	peak
4	5720.000	15.57	53.41	68.98	110.80	-41.82	peak
5	5725.000	15.58	58.60	74.18	122.20	-48.02	peak
6	11510.000	28.88	26.45	55.33	74.00	-18.67	peak
7	11510.000	28.88	13.58	42.46	54.00	-11.54	AVG
8	17265.000	43.38	11.29	54.67	74.00	-19.33	peak
9	17265.000	43.38	-1.37	42.01	54.00	-11.99	AVG

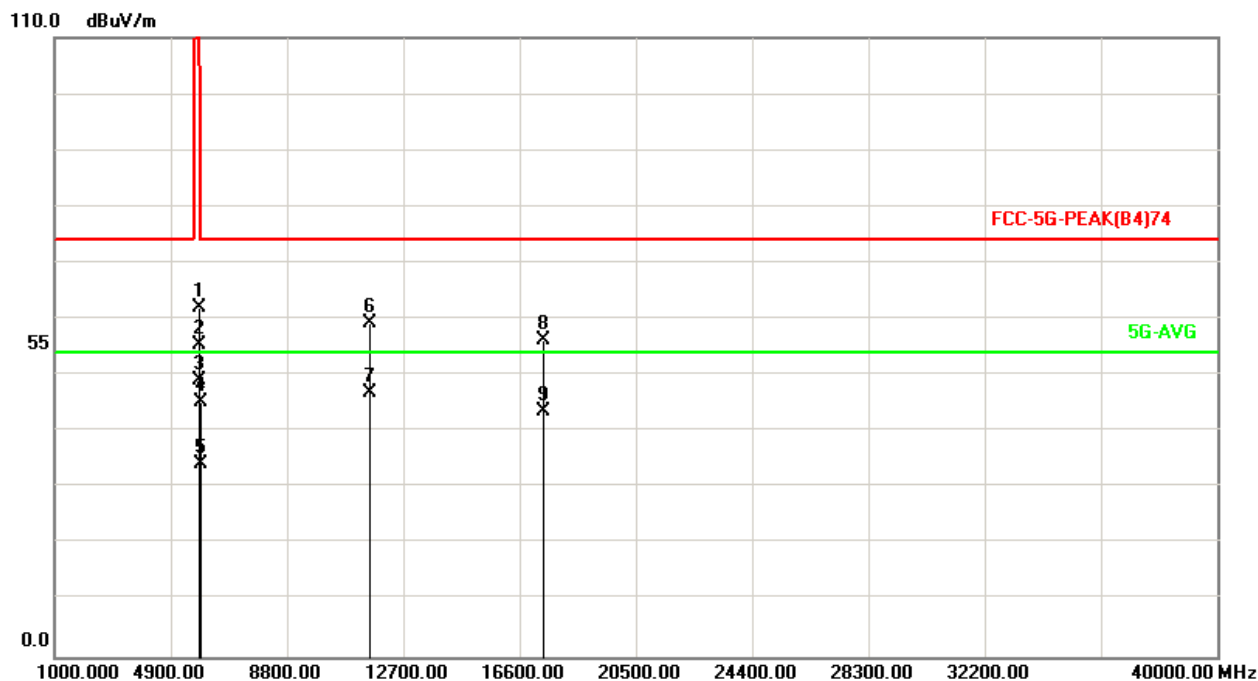
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH159, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5850.000	15.89	46.11	62.00	122.20	-60.20	peak
2	5855.000	15.90	39.59	55.49	110.80	-55.31	peak
3	5875.000	15.95	33.01	48.96	105.20	-56.24	peak
4	5925.000	16.07	29.15	45.22	74.00	-28.78	peak
5	5925.000	16.07	18.12	34.19	54.00	-19.81	AVG
6	11590.000	29.04	30.23	59.27	74.00	-14.73	peak
7	11590.000	29.04	17.98	47.02	54.00	-6.98	AVG
8	17385.000	43.85	12.48	56.33	74.00	-17.67	peak
9	17385.000	43.85	-0.30	43.55	54.00	-10.45	AVG

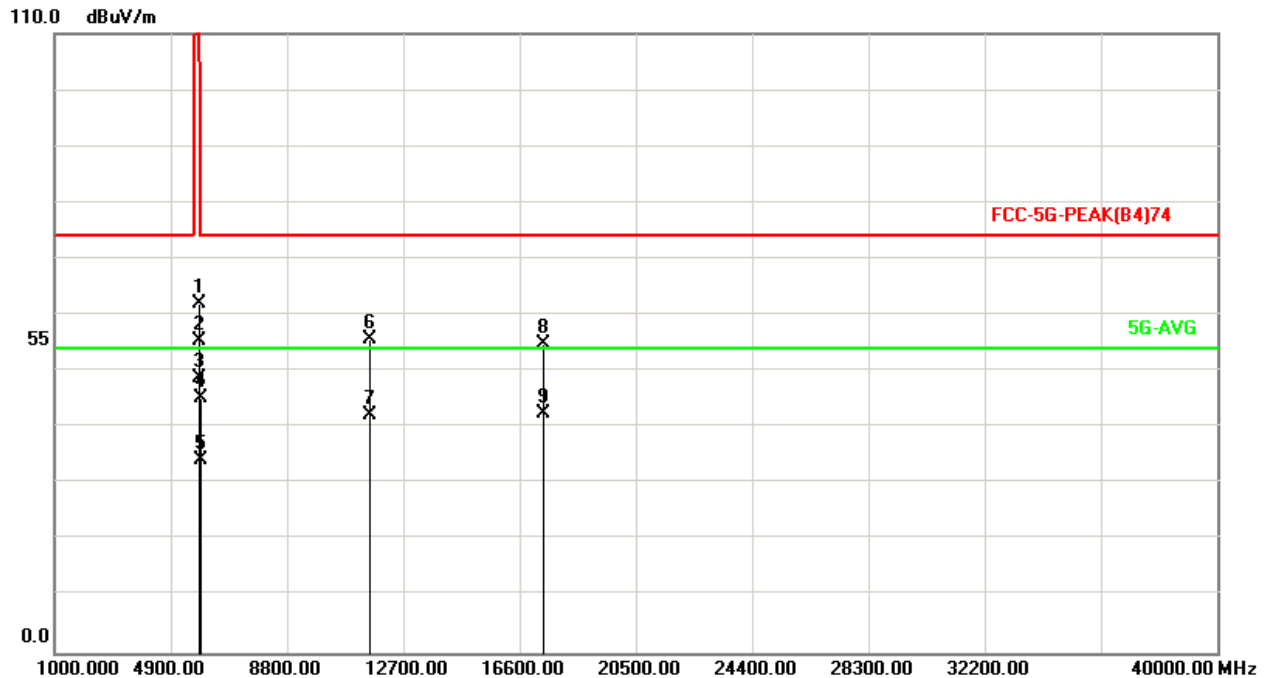
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH159, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5850.000	15.89	46.08	61.97	122.20	-60.23	peak
2	5855.000	15.90	39.58	55.48	110.80	-55.32	peak
3	5875.000	15.95	32.96	48.91	105.20	-56.29	peak
4	5925.000	16.07	29.17	45.24	74.00	-28.76	peak
5	5925.000	16.07	18.10	34.17	54.00	-19.83	AVG
6	11590.000	29.04	26.59	55.63	74.00	-18.37	peak
7	11590.000	29.04	13.15	42.19	54.00	-11.81	AVG
8	17385.000	43.85	10.95	54.80	74.00	-19.20	peak
9	17385.000	43.85	-1.39	42.46	54.00	-11.54	AVG

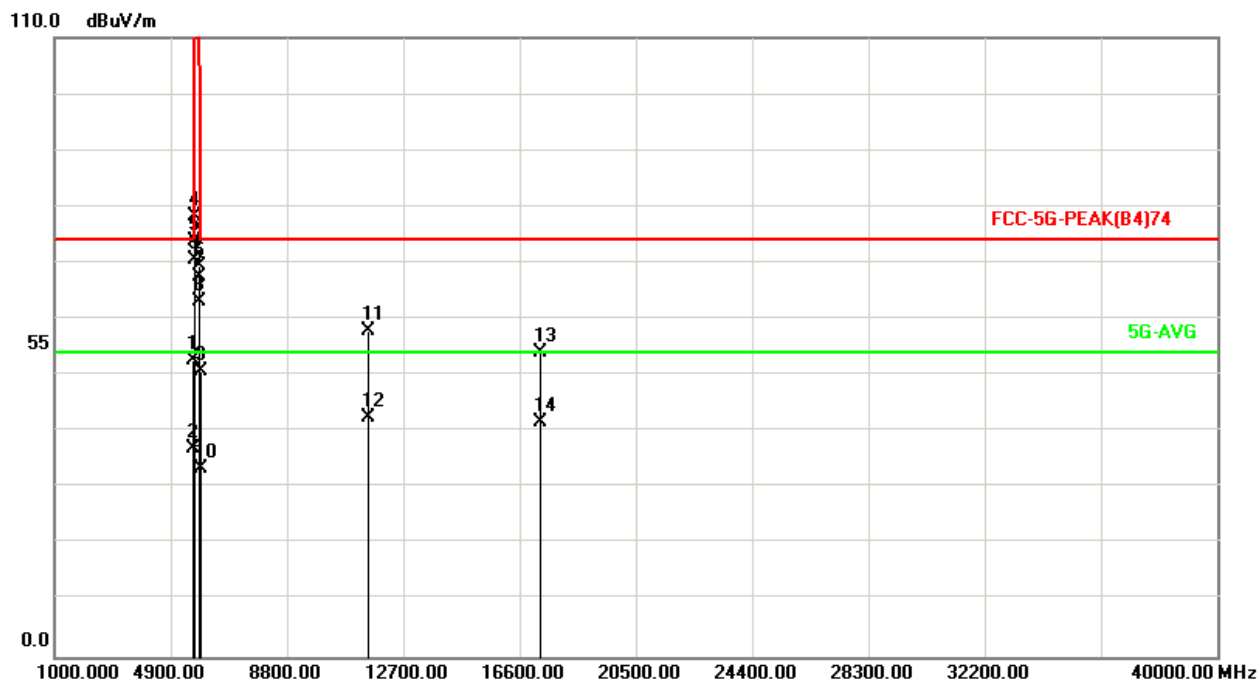
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: VERTICAL
Test Mode	: Mode 4, CH155, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	37.24	52.63	74.00	-21.37	peak
2	5650.000	15.39	21.56	36.95	54.00	-17.05	AVG
3	5700.000	15.52	55.04	70.56	105.20	-34.64	peak
4	5720.000	15.57	62.76	78.33	110.80	-32.47	peak
5	5725.000	15.58	58.27	73.85	122.20	-48.35	peak
6	5850.000	15.89	53.61	69.50	122.20	-52.70	peak
7	5855.000	15.90	51.65	67.55	110.80	-43.25	peak
8	5875.000	15.95	47.07	63.02	105.20	-42.18	peak
9	5925.000	16.07	34.68	50.75	74.00	-23.25	peak
10	5925.000	16.07	17.45	33.52	54.00	-20.48	AVG
11	11550.000	28.96	28.93	57.89	74.00	-16.11	peak
12	11550.000	28.96	13.55	42.51	54.00	-11.49	AVG
13	17325.000	43.62	10.36	53.98	74.00	-20.02	peak
14	17325.000	43.62	-1.85	41.77	54.00	-12.23	AVG

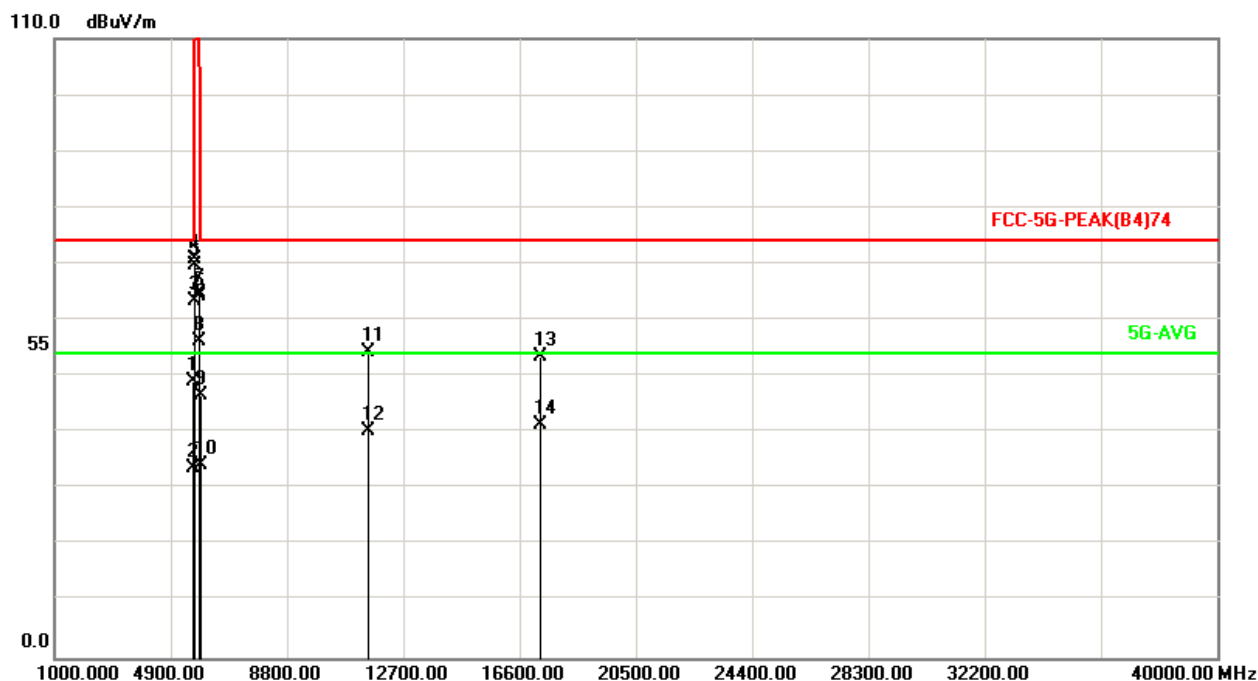
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC 5V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 4, CH155, Band 4	Temperature	: 26 °C
Test date	: Nov. 01, 2018	Humidity	: 48 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	5650.000	15.39	33.78	49.17	74.00	-24.83	peak
2	5650.000	15.39	18.36	33.75	54.00	-20.25	AVG
3	5700.000	15.52	47.85	63.37	105.20	-41.83	peak
4	5720.000	15.57	55.19	70.76	110.80	-40.04	peak
5	5725.000	15.58	54.25	69.83	122.20	-52.37	peak
6	5850.000	15.89	48.32	64.21	122.20	-57.99	peak
7	5855.000	15.90	48.84	64.74	110.80	-46.06	peak
8	5875.000	15.95	40.29	56.24	105.20	-48.96	peak
9	5925.000	16.07	30.48	46.55	74.00	-27.45	peak
10	5925.000	16.07	18.16	34.23	54.00	-19.77	AVG
11	11550.000	28.96	25.40	54.36	74.00	-19.64	peak
12	11550.000	28.96	11.39	40.35	54.00	-13.65	AVG
13	17325.000	43.62	9.77	53.39	74.00	-20.61	peak
14	17325.000	43.62	-2.11	41.51	54.00	-12.49	AVG

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor

**6.7. Restricted Bands of Operation**

Only spurious emissions are permitted in any of the frequency bands listed below:

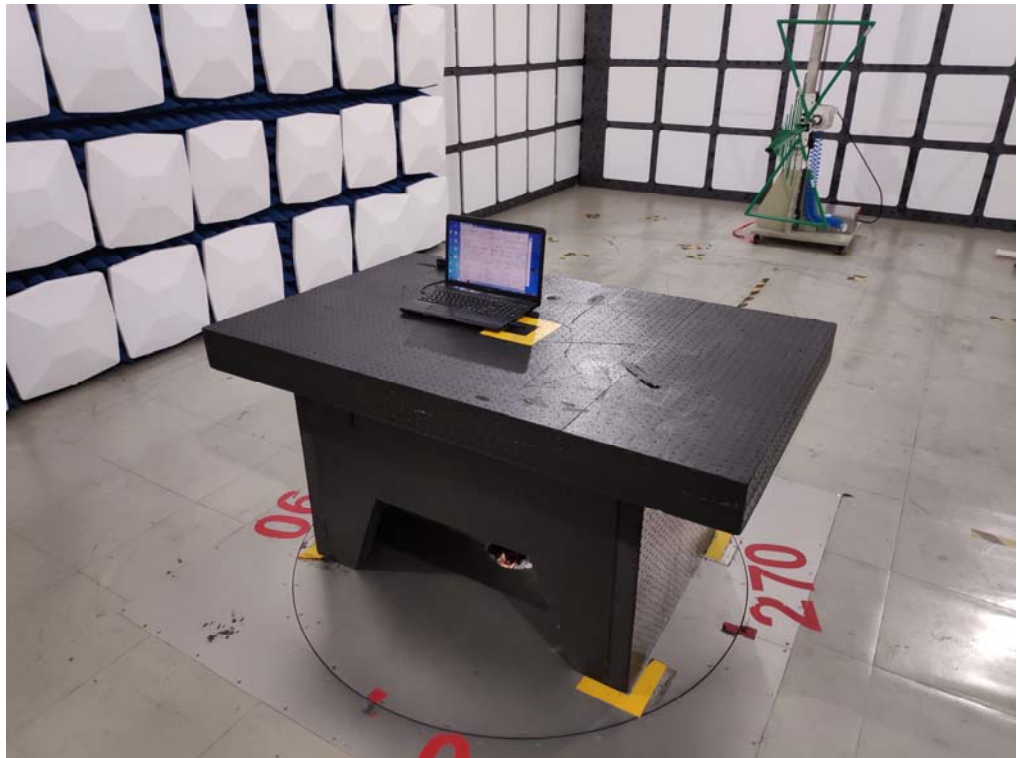
MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.150
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz



6.8. Test Photographs (30MHz ~ 1GHz)

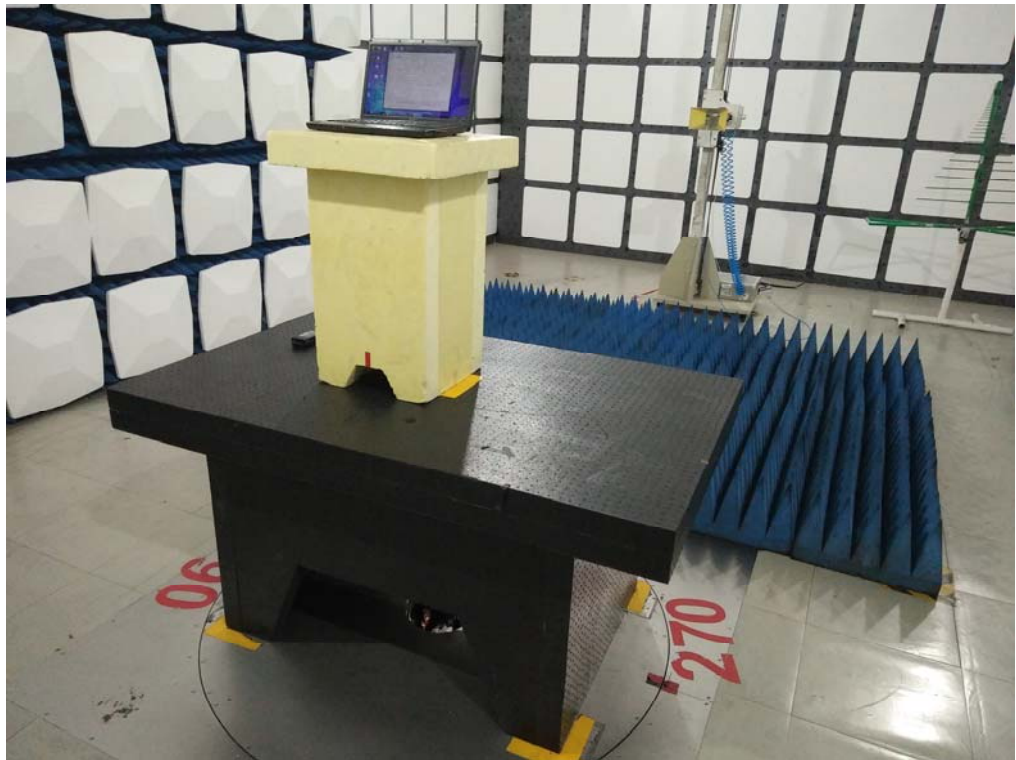
Front View





6.9. Test Photographs (1GHz ~ 40GHz)

Front View





7. On Time, Duty Cycle and Measurement methods

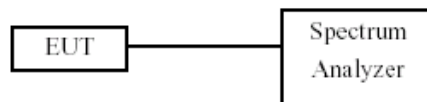
7.1. Test Limit

None; for reporting purposes only.

7.2. Test Procedure

KDB 789033 Zero-Span Spectrum Analyzer Method.

7.3. Test Setup Layout



7.4. Test Result and Data

Temperature: 21°C

Humidity: 56%

Test Date: Aug. 11, 2018

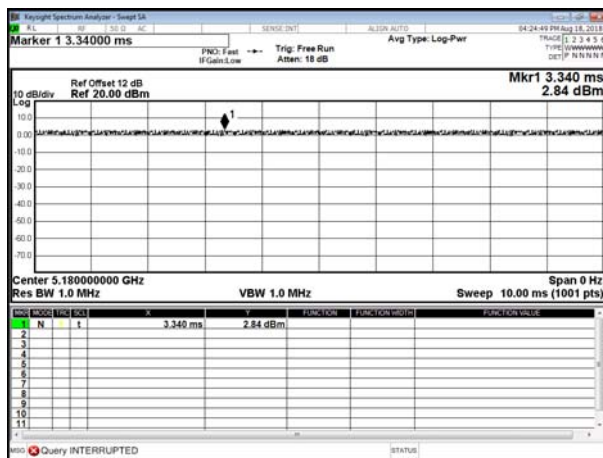
Modulation Type	On Time (msec)	Period Time (msec)	Duty Cycle (%)	1/T Minimum VBW(Hz)	Duty Cycle correction Factor (dB)
802.11a	100.00	100.00	100.00%	10.00	0.00
802.11n HT20	100.00	100.00	100.00%	10.00	0.00
802.11n HT40	100.00	100.00	100.00%	10.00	0.00
802.11ac VHT20	100.00	100.00	100.00%	10.00	0.00
802.11ac VHT40	100.00	100.00	100.00%	10.00	0.00
802.11ac VHT80	100.00	100.00	100.00%	10.00	0.00

7.5. Measurement Methods

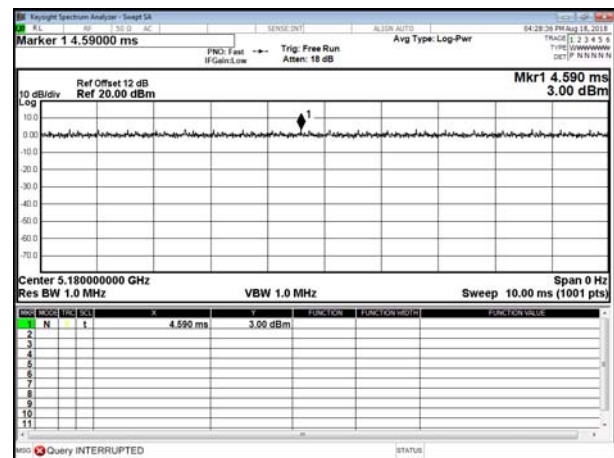
26 dB and 6dB Emission BW	KDB 789033 D02 v02r01, Section C
99% Occupied BW	KDB 789033 D02 v02r01, Section D
Conducted Output Power	KDB 789033 D02 v02r01, Section E.2.d and E.3.b (Method PM-G)
Power Spectral Density	KDB 789033 D02 v02r01, Section F
Unwanted emissions in restricted bands	KDB 789033 D02 v02r01, Sections G and H
Unwanted emissions in non-restricted bands	KDB 789033 D02 v02r01, Sections G and H



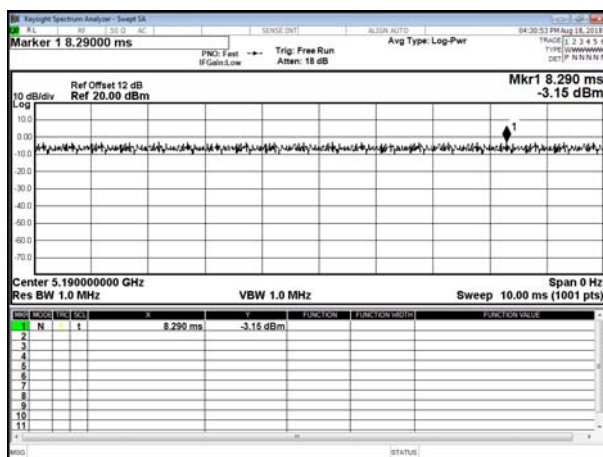
Modulation Standard: 802.11a (6Mbps)



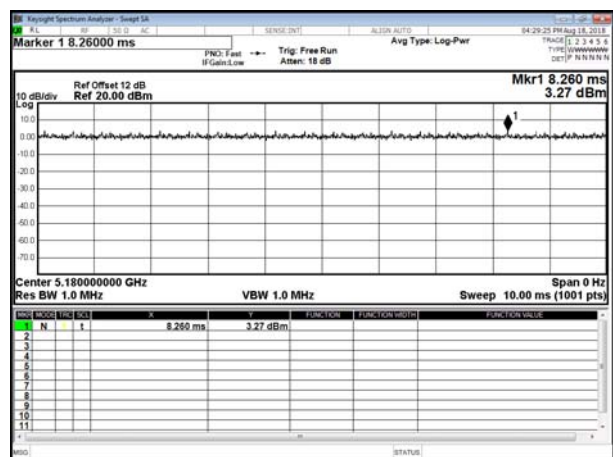
Modulation Standard: 802.11n HT20 (6.5Mbps)



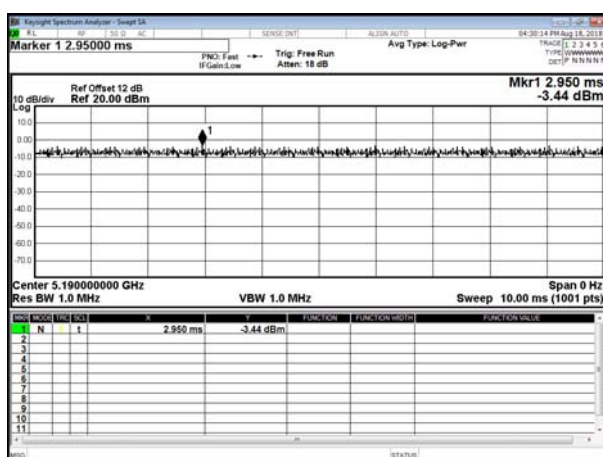
Modulation Standard: 802.11n HT40 (13.5Mbps)



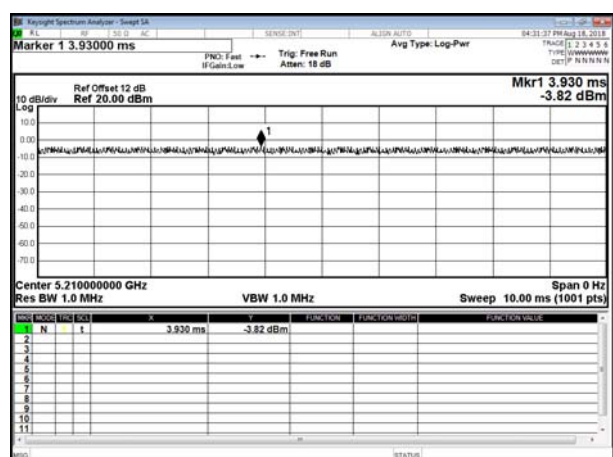
Modulation Standard: 802.11ac VHT20 (29.3Mbps)



Modulation Standard: 802.11ac VHT40 (13.5Mbps)



Modulation Standard: 802.11ac VHT80 (29.3Mbps)





8. 6dB Bandwidth & 99% Bandwidth

8.1. Test Limit

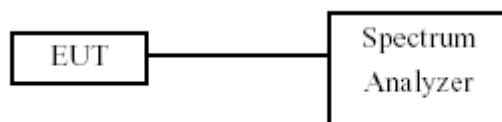
FCC §15.407

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

8.2. Test Procedure

Reference to 789033 D02 General UNII Test Procedures New Rules v01: The transmitter output is connected to a spectrum analyzer with the RBW set to 100KHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

8.3. Test Setup Layout



8.4. Test Result and Data (6dB Bandwidth)

Temperature: 21°C

Humidity: 56%

Test Date: Aug. 11, 2018

In the 5.8G Band

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)
			ANT A	ANT B	
802.11a	149	5745	16.53	16.59	0.50
	157	5785	16.53	16.54	0.50
	165	5825	16.51	16.56	0.50
802.11ac VHT20	149	5745	17.67	17.70	0.50
	157	5785	17.68	17.69	0.50
	165	5825	17.65	17.68	0.50
802.11ac VHT40	155	5755	36.38	36.40	0.50
	159	5795	36.39	36.40	0.50
802.11ac VHT80	155	5775	74.89	75.91	0.50

**8.5. Test Result and Data (99% Bandwidth)**

Temperature: 21°C

Humidity: 56%

Test Date: Aug. 11, 2018

In the 5.8G Band

Modulation Type	Channel	Frequency (MHz)	99% Bandwidth (MHz)	
			ANT A	ANT B
802.11a	149	5745	16.925	16.753
	157	5785	16.689	16.832
	165	5825	16.874	16.852
802.11ac VHT20	149	5745	17.655	17.663
	157	5785	17.778	17.731
	165	5825	17.727	17.673
802.11ac VHT40	155	5755	36.056	36.011
	159	5795	36.110	36.078
802.11ac VHT80	155	5775	74.780	74.923

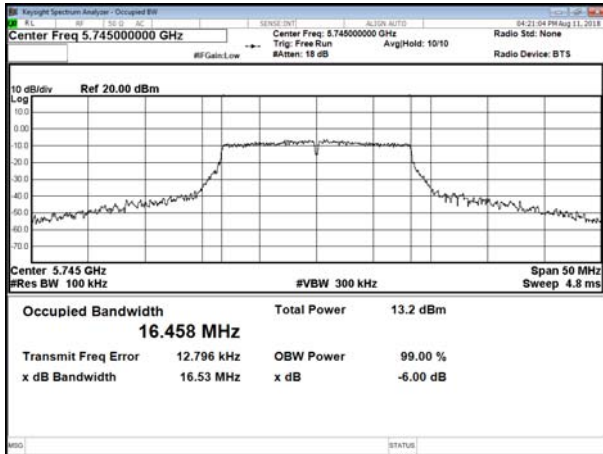


6dB Bandwidth

ANT A

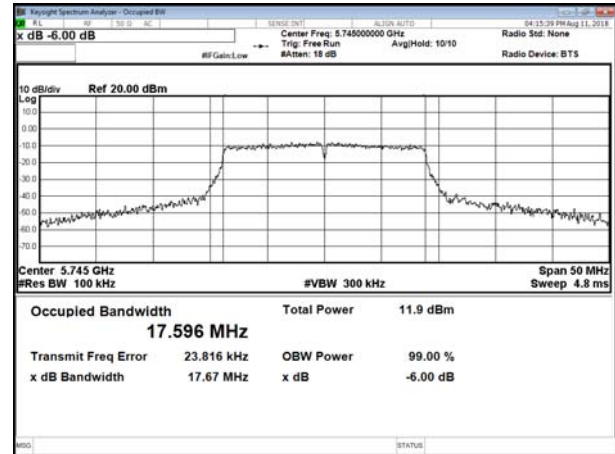
Modulation Standard: 802.11a (6Mbps)

CH149

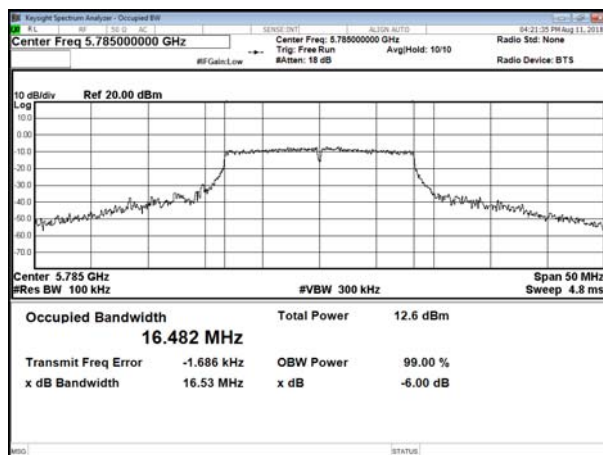


Modulation Standard: 802.11ac, VHT20 (6.5Mbps)

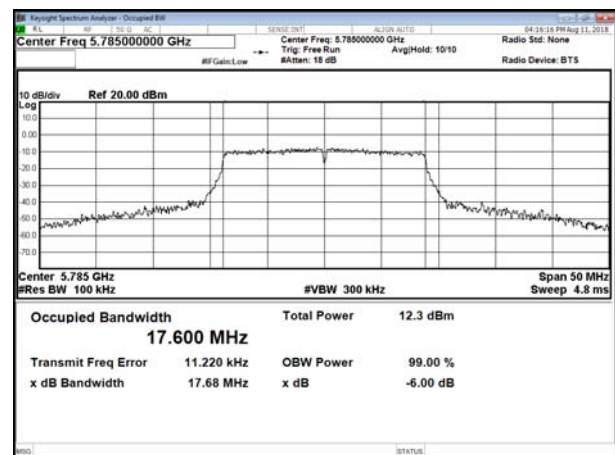
CH149



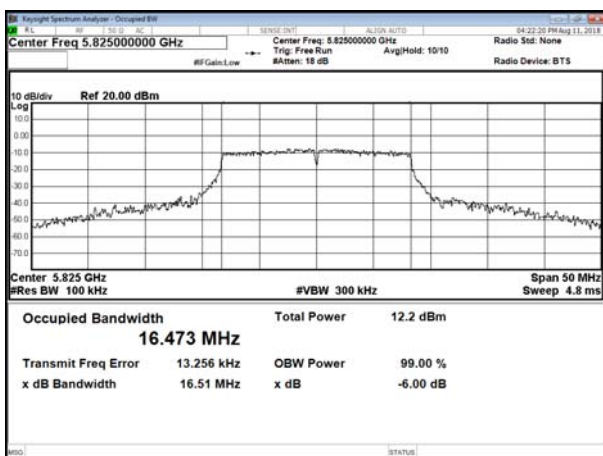
CH157



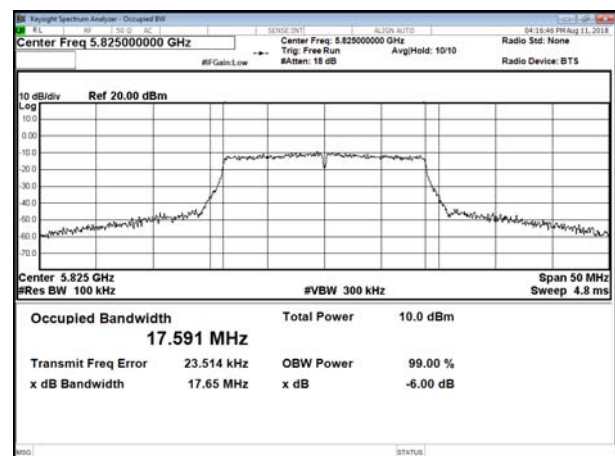
CH157



CH165

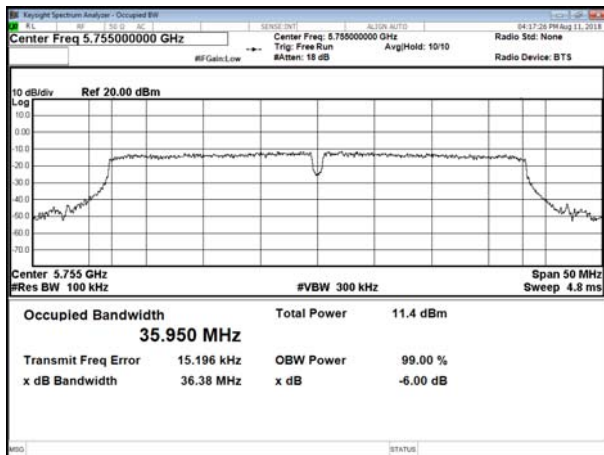


CH165

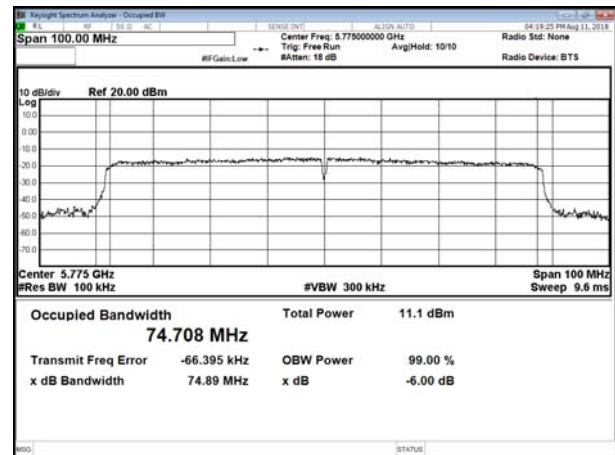




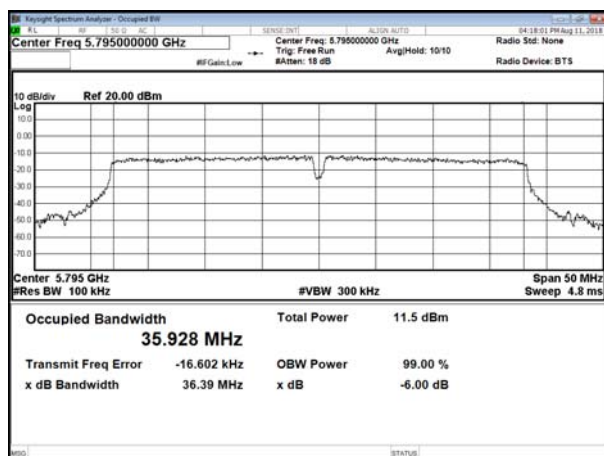
Modulation Standard: 802.11ac, VHT40 (13.5Mbps)
CH151



Modulation Standard: 802.11ac, VHT80 (29.3Mbps)
CH155

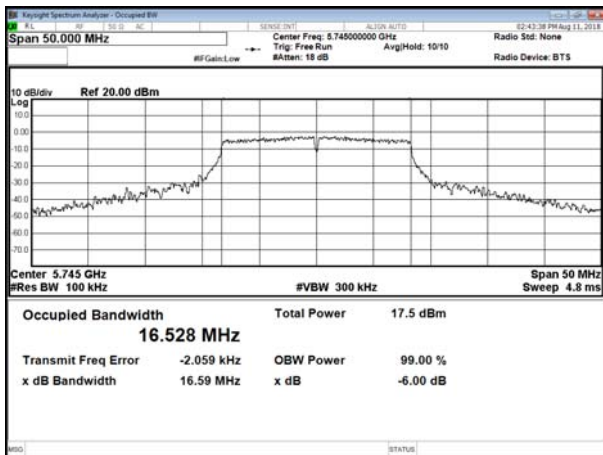
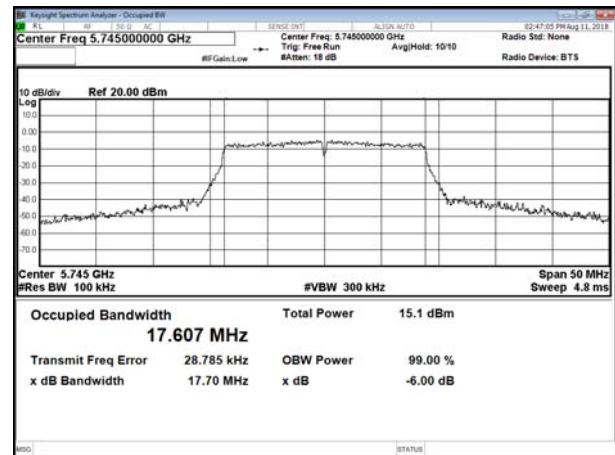


CH159

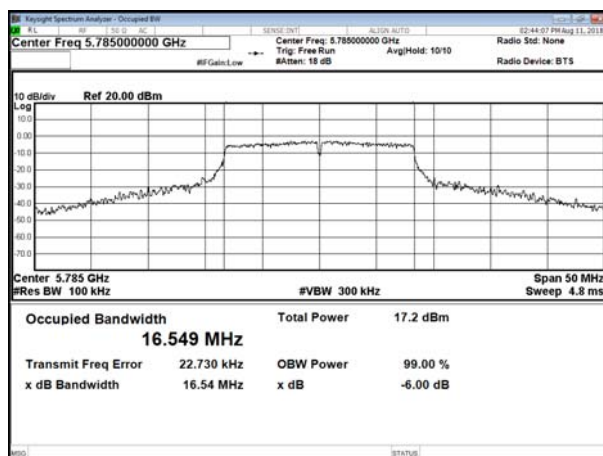




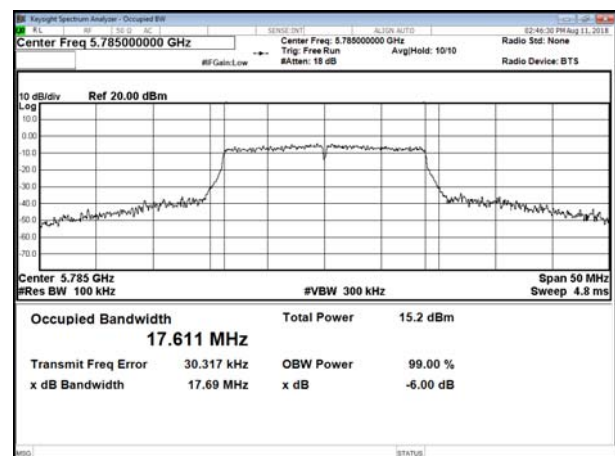
ANT B

Modulation Standard: 802.11a (6Mbps)
CH149Modulation Standard: 802.11ac, VHT20 (6.5Mbps)
CH149

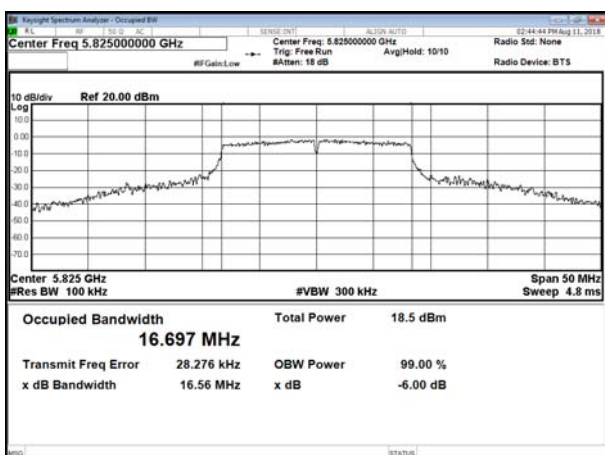
CH157



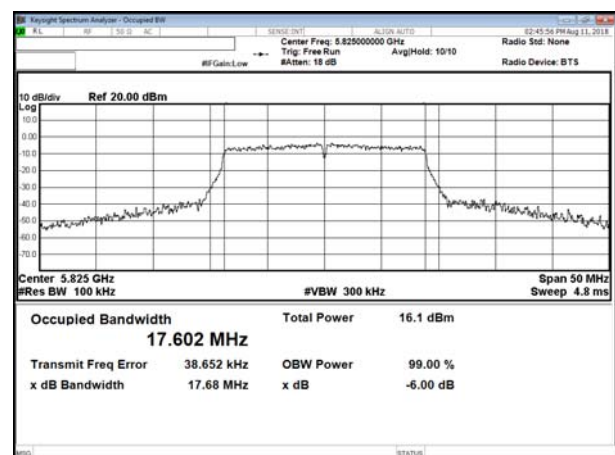
CH157



CH165

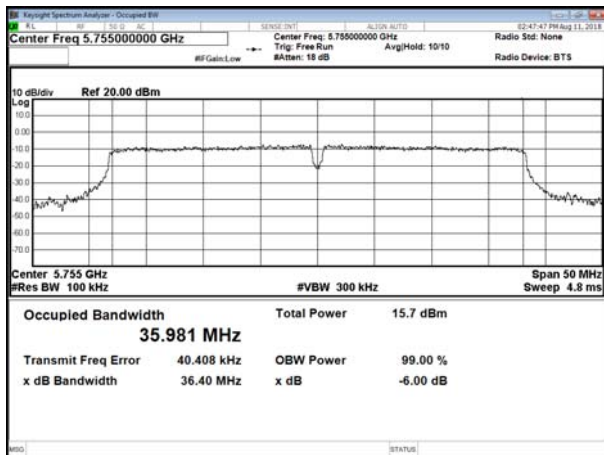


CH165

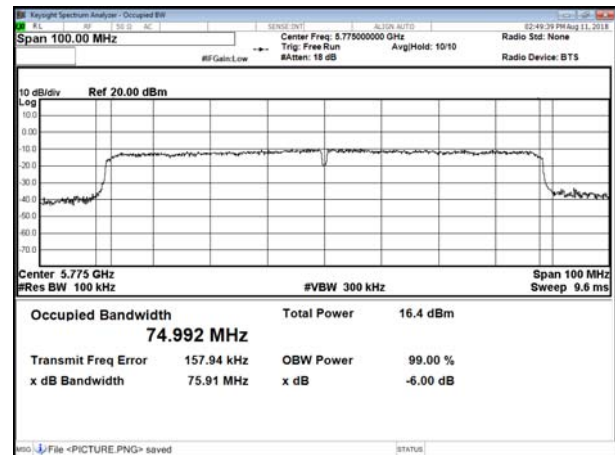




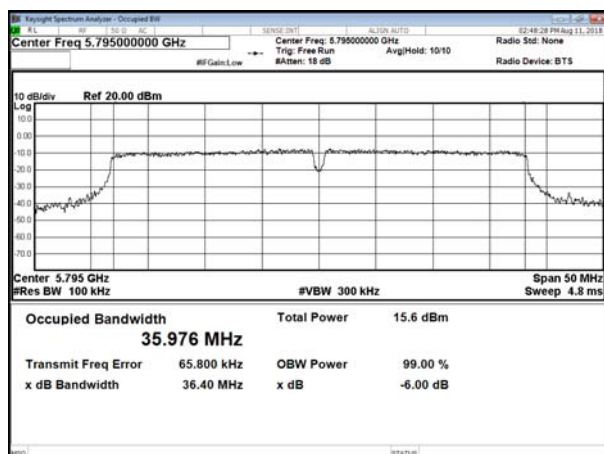
Modulation Standard: 802.11ac, VHT40 (13.5Mbps)
CH151



Modulation Standard: 802.11ac, VHT80 (29.3Mbps)
CH155



CH159





99% Bandwidth

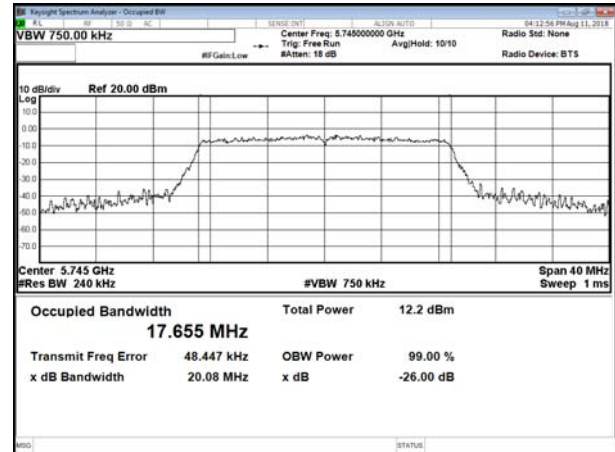
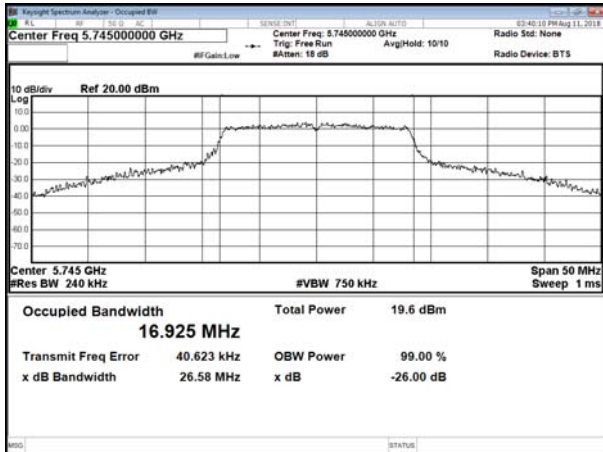
ANT A

Modulation Standard: 802.11a (6Mbps)

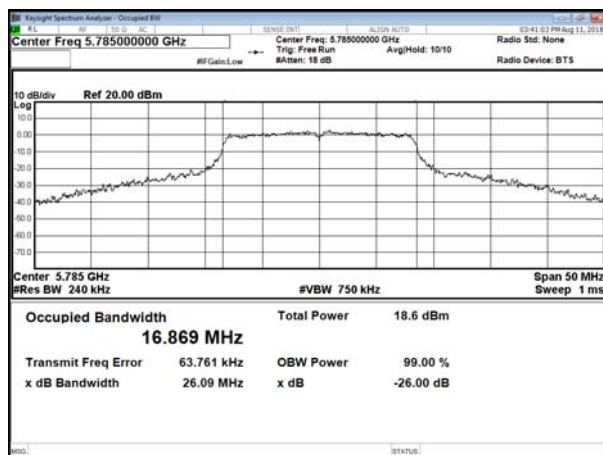
CH149

Modulation Standard: 802.11ac, VHT20 (6.5Mbps)

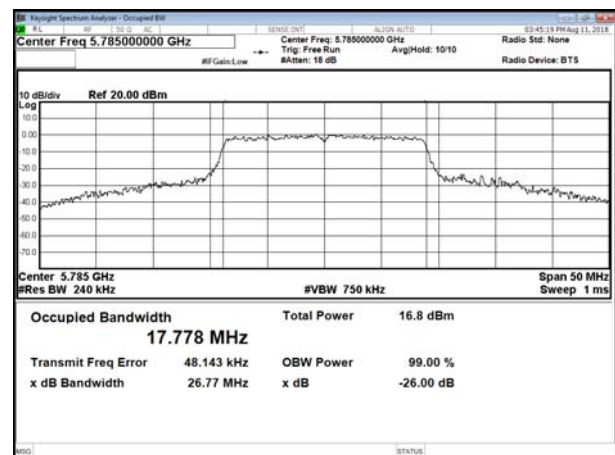
CH149



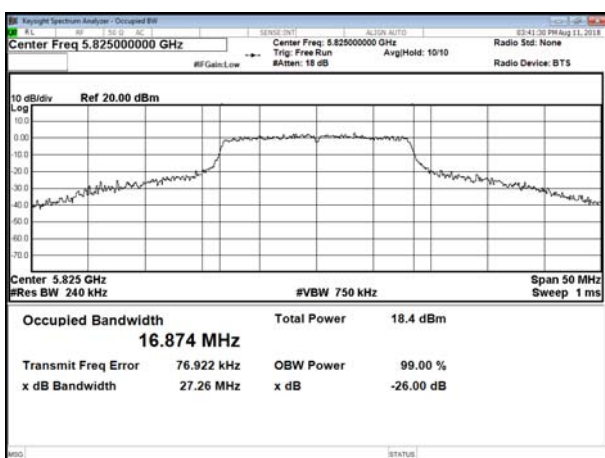
CH157



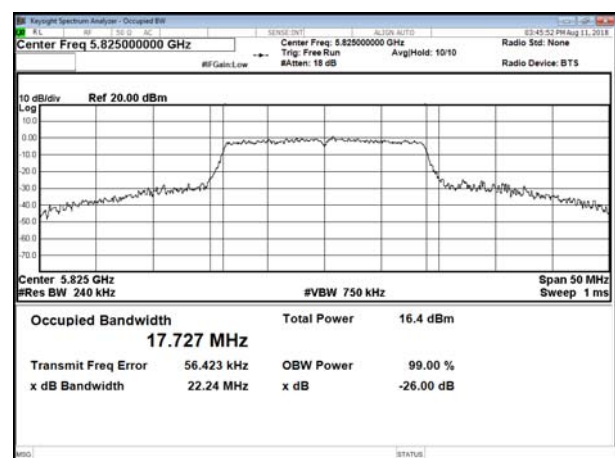
CH157



CH165

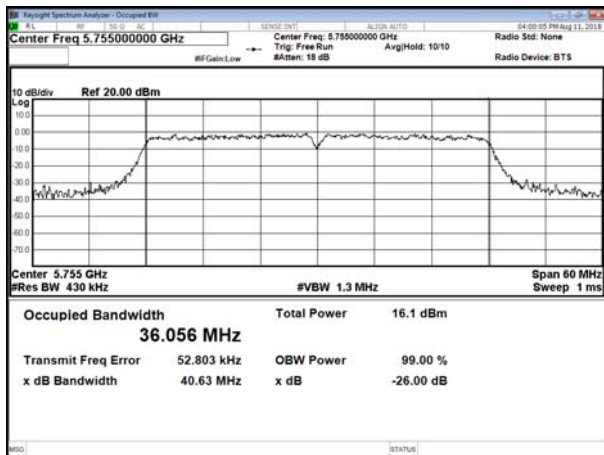


CH165

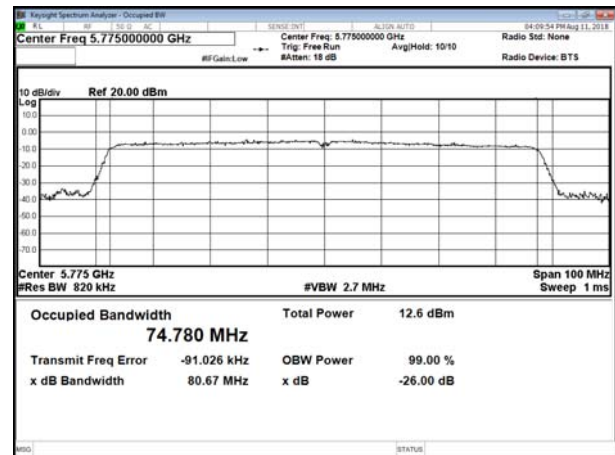




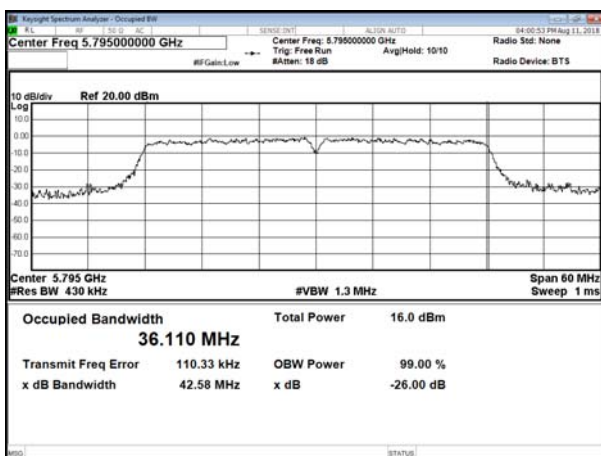
Modulation Standard: 802.11ac, VHT40 (13.5Mbps)
CH151



Modulation Standard: 802.11ac, VHT80 (29.3Mbps)
CH155

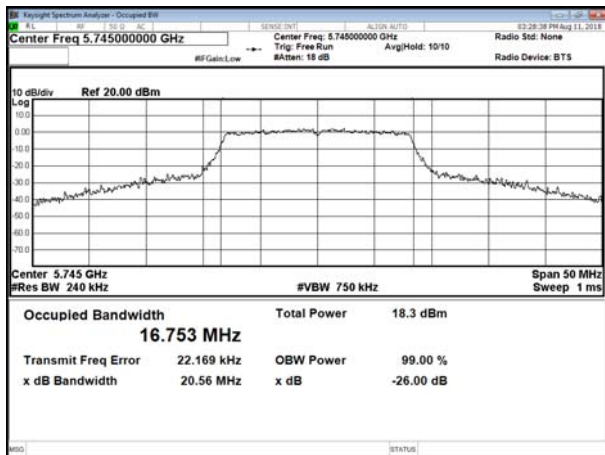


CH159

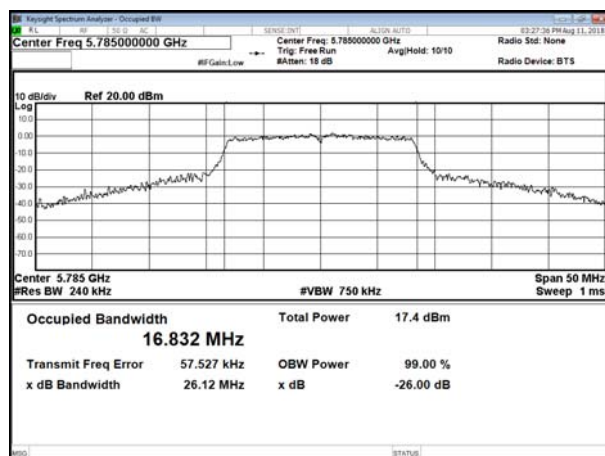




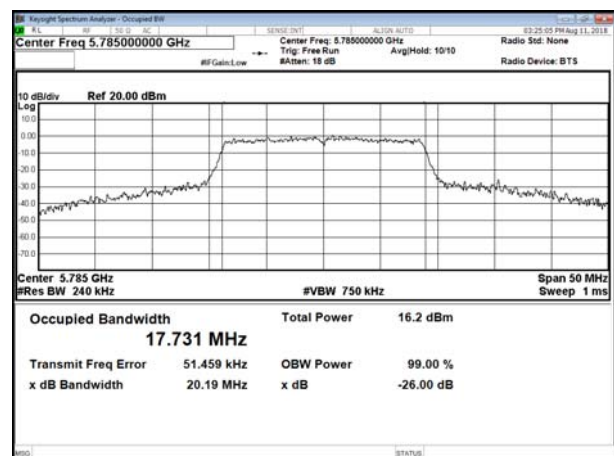
ANT B

Modulation Standard: 802.11a (6Mbps)
CH149Modulation Standard: 802.11ac, VHT20 (6.5Mbps)
CH149

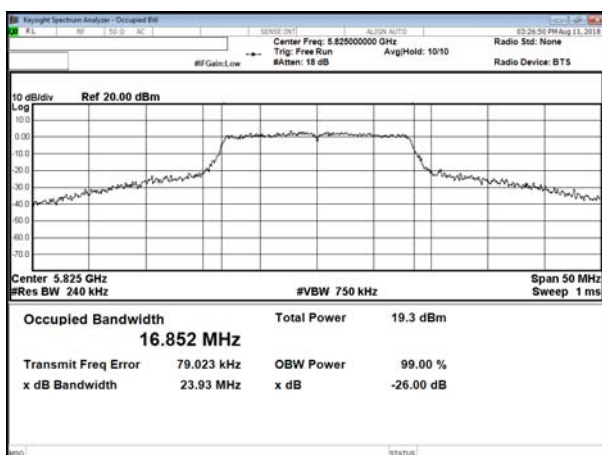
CH157



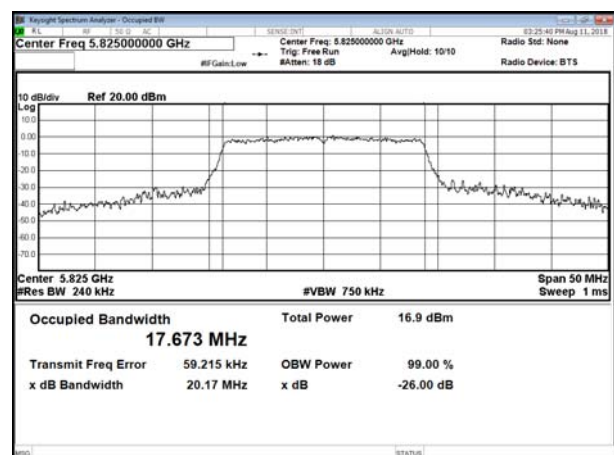
CH157



CH165

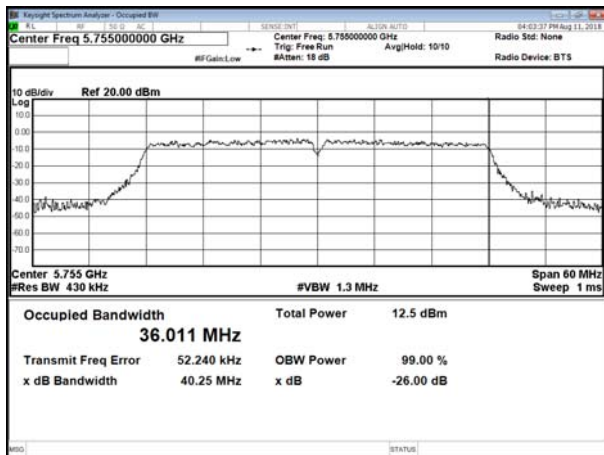


CH165

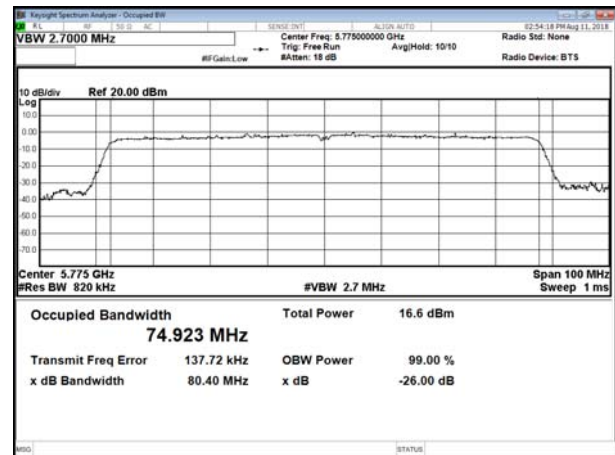




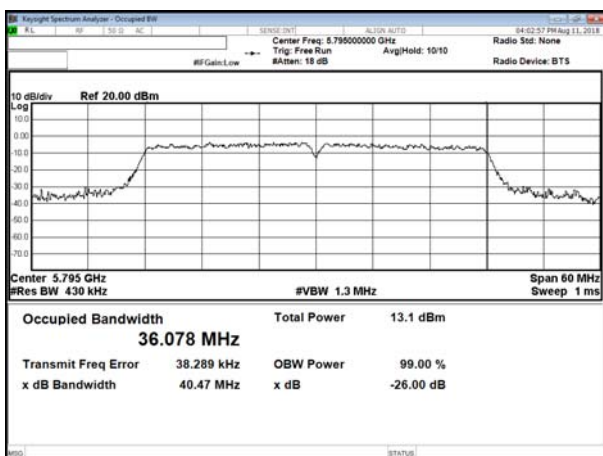
Modulation Standard: 802.11ac, VHT40 (13.5Mbps)
CH151



Modulation Standard: 802.11ac, VHT80 (29.3Mbps)
CH155



CH159





9. 26dB Bandwidth & 99% Bandwidth

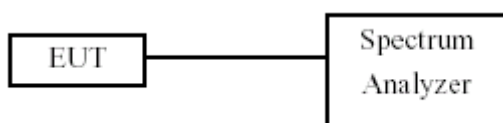
9.1. Test Limit

None; for reporting purposes only.

9.2. Test Procedure

Reference to 789033 D02 General UNII Test Procedures New Rules v01: The transmitter output is connected to a spectrum analyzer with the RBW = approximately 1% of the emission bandwidth, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

9.3. Test Setup Layout



9.4. Test Result and Data

Temperature: 21°C

Humidity: 56%

Test Date: Aug. 11, 2018

In the 5.2G Band

Modulation Type	Channel	Frequency (MHz)	26dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
			ANT A	ANT B	ANT A	ANT B
802.11a	36	5180	20.68	20.80	16.761	16.737
	44	5220	21.91	20.82	16.759	16.789
	48	5240	20.49	21.06	16.625	16.762
802.11ac VHT20	36	5180	20.12	20.12	17.676	17.660
	44	5220	20.09	20.04	17.658	17.648
	48	5240	20.12	20.10	17.642	17.652
802.11ac VHT40	38	5190	40.60	41.02	36.019	36.055
	46	5230	40.69	40.70	36.042	36.042
802.11ac VHT80	42	5210	81.36	80.70	75.070	75.011



26dB Bandwidth & 99% Bandwidth

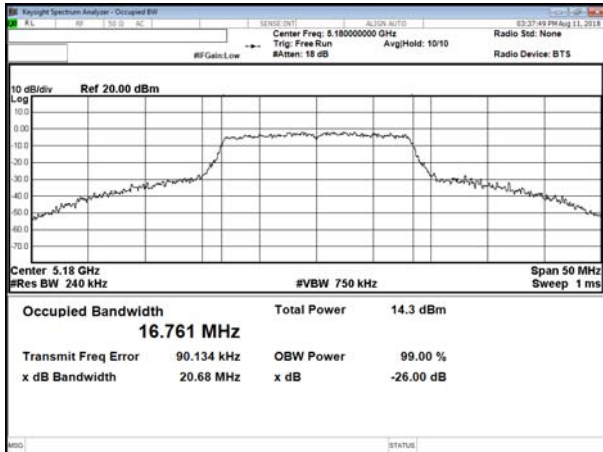
ANT A

Modulation Standard: 802.11a (6Mbps)

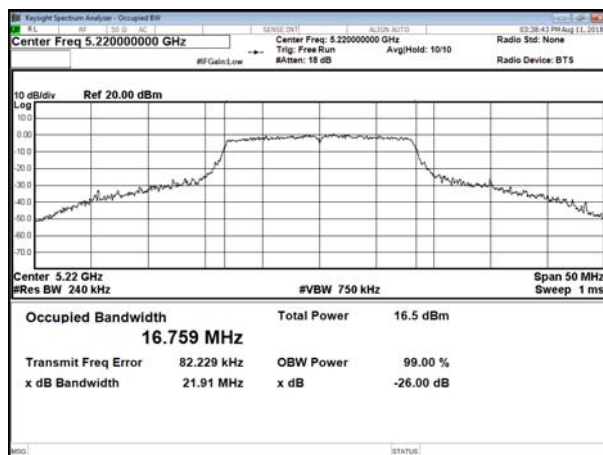
CH36

802.11ac VHT20 (6.5Mbps)

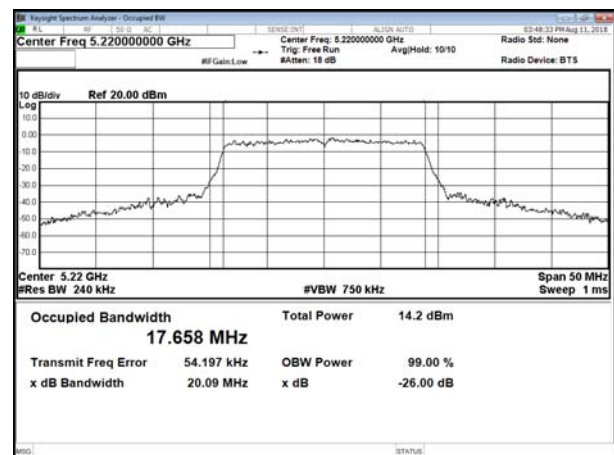
CH36



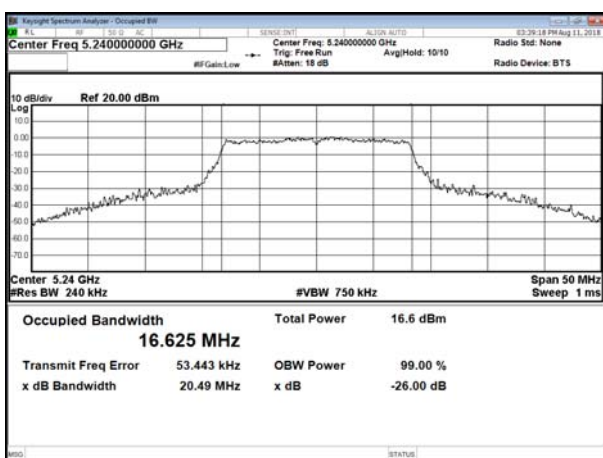
CH44



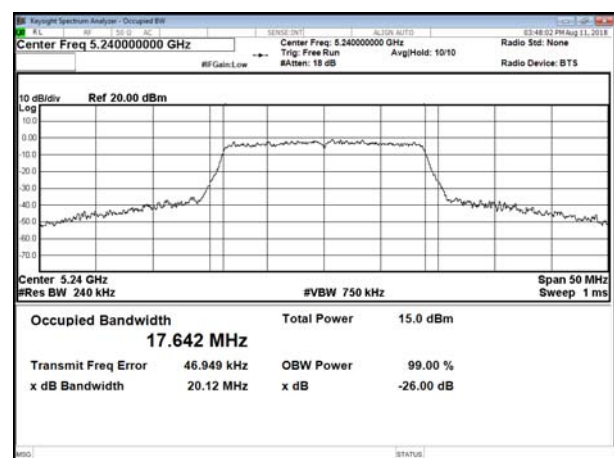
CH44



CH48

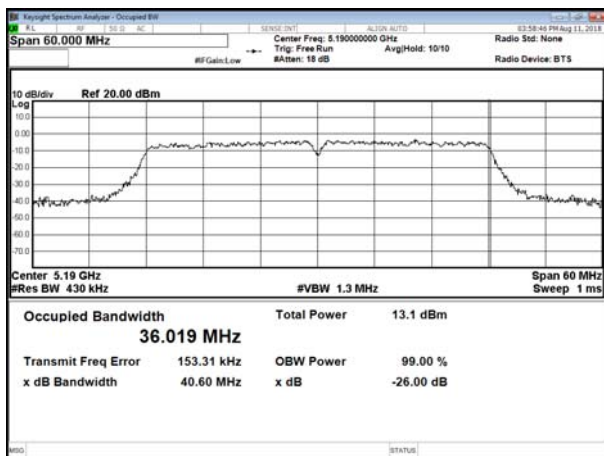


CH48

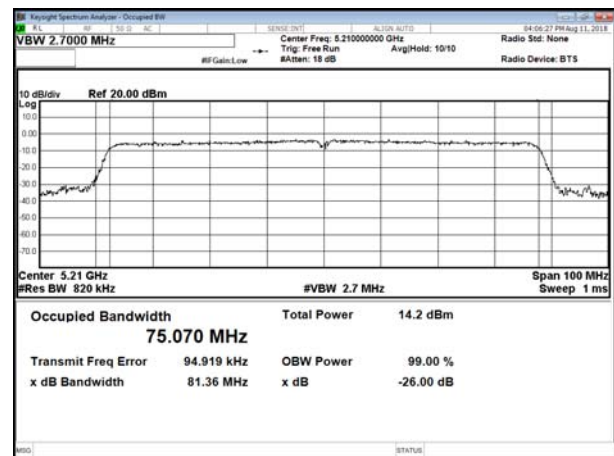




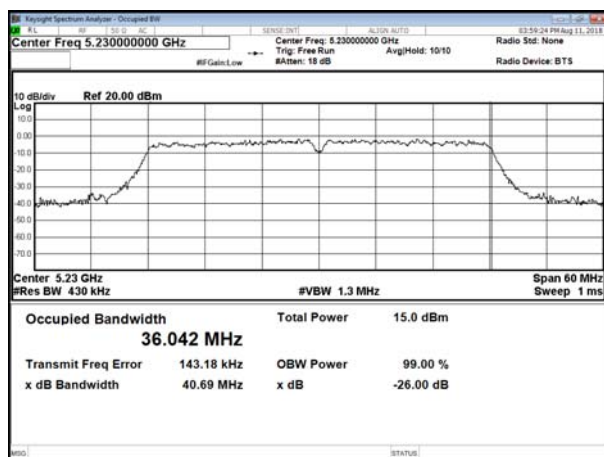
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42



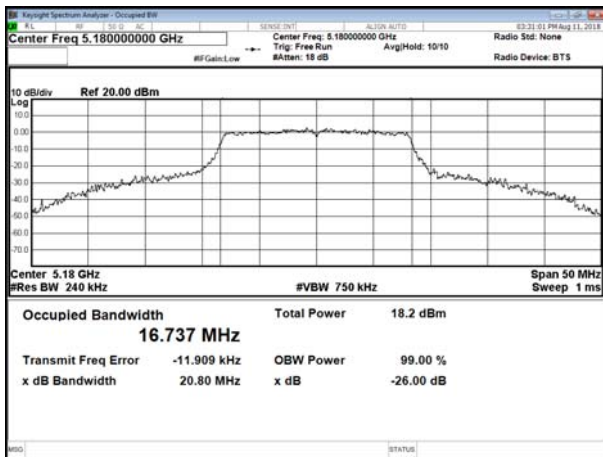
CH46



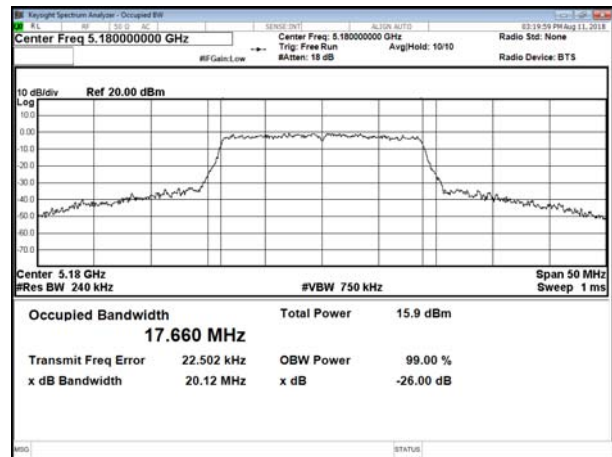


ANT B

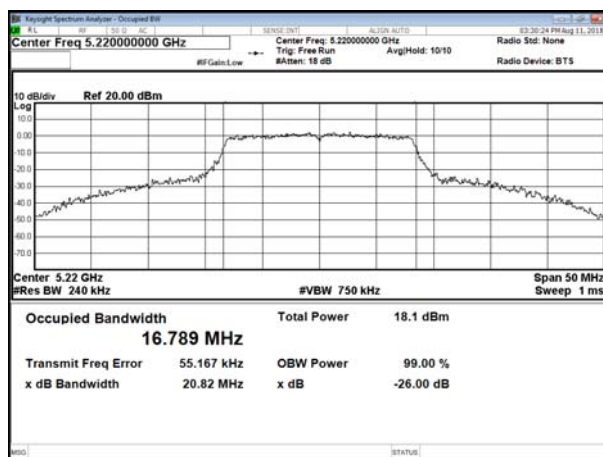
Modulation Standard: 802.11a (6Mbps)
CH36



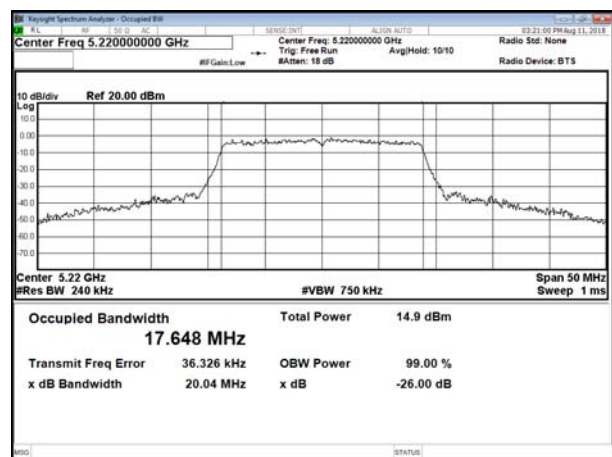
802.11ac VHT20 (6.5Mbps)
CH36



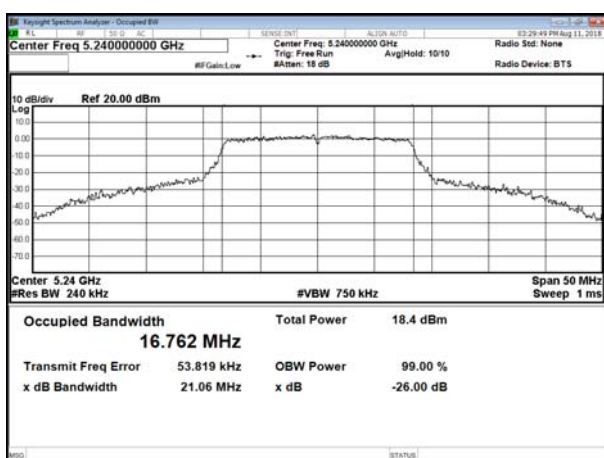
CH44



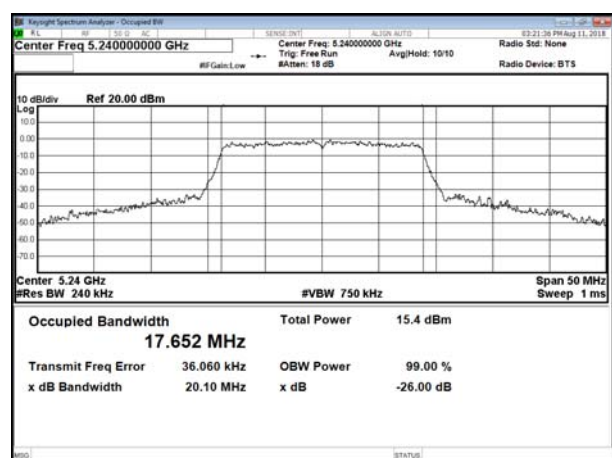
CH44



CH48



CH48

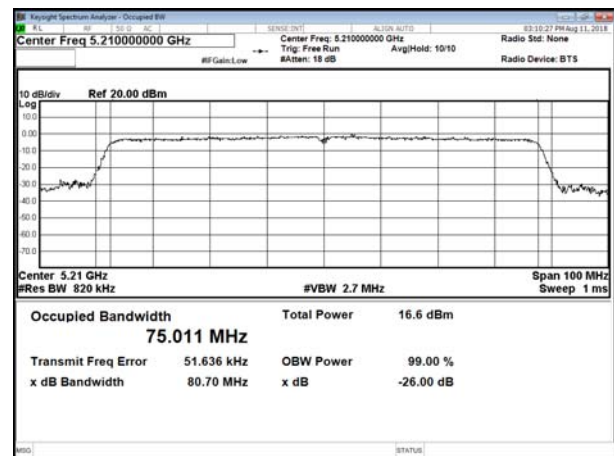




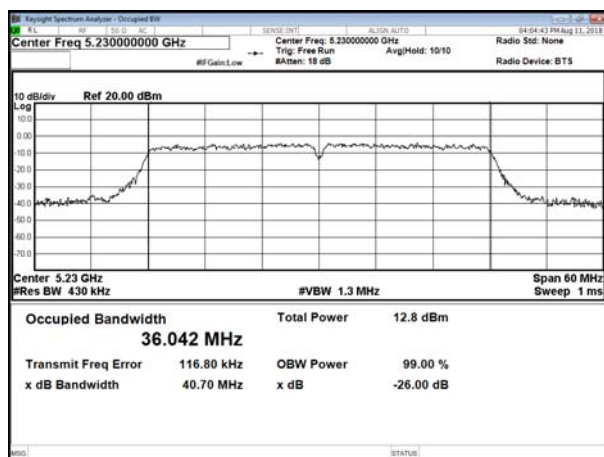
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42



CH46





10. Average Power

10.1. Test Limit

Output Power:

Frequency Band		Limit
☒	5.15~5.25GHz	
	Operating Mode	
☐	Outdoor access point	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30degrees as measured from the horizon must not exceed 125 mW (21 dBm).
☐	Indoor access point	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
☐	Fixed point-to-point access points	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.
☒	client devices	The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



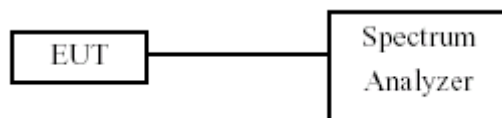
Frequency Band		Limit
☐	5.25-5.35 GHz	The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm $10 \log B$, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
☐	5.470-5.725 GHz	
☒	5.725~5.85 GHz	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

10.2. Test Procedure

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

10.3. Test Setup Layout





10.4. Test Result and Data

Temperature: 21°C

Humidity: 56%

Test Date: Aug. 11, 2018

In the 5.2G Band

Modulation Type	Channel	Frequency (MHz)	Avg Power Output (dBm)		Total Power (dBm)	Total Power (mW)	Power Limit (dBm)
			ANT A	ANT B			
802.11a	36	5180	13.75	14.25	17.02	50.35	24.00
	44	5220	12.42	13.55	16.03	40.09	24.00
	48	5240	12.45	14.01	16.31	42.76	24.00
802.11an HT20	36	5180	10.24	11.56	13.96	24.89	24.00
	44	5220	10.67	11.58	14.16	26.06	24.00
	48	5240	11.21	11.31	14.27	26.73	24.00
802.11an HT40	38	5190	11.38	12.61	15.05	31.99	24.00
	46	5230	10.89	11.47	14.20	26.30	24.00
802.11ac VHT20	36	5180	10.36	11.71	14.10	25.70	24.00
	44	5220	10.72	11.71	14.25	26.61	24.00
	48	5240	11.22	11.35	14.30	26.92	24.00
802.11ac VHT40	38	5190	11.41	12.66	15.09	32.28	24.00
	46	5230	10.89	11.47	14.20	26.30	24.00
802.11ac VHT80	42	5210	10.75	11.78	14.31	26.98	24.00

In the 5.8G Band

Modulation Type	Channel	Frequency (MHz)	Avg Power Output (dBm)		Total Power (dBm)	Total Power (mW)	Power Limit (dBm)
			ANT A	ANT B			
802.11a	149	5745	11.39	13.02	15.29	33.81	30.00
	157	5785	10.94	12.01	14.52	28.31	30.00
	165	5825	11.21	12.50	14.91	30.97	30.00
802.11an HT20	149	5745	10.30	10.98	13.66	23.23	30.00
	157	5785	10.44	11.85	14.21	26.36	30.00
	165	5825	11.37	13.10	15.33	34.12	30.00
802.11an HT40	151	5755	10.92	11.23	14.09	25.64	30.00
	159	5795	10.41	11.52	14.01	25.18	30.00
802.11ac VHT20	149	5745	10.31	11.01	13.68	23.33	30.00
	157	5785	10.47	11.88	14.24	26.55	30.00
	165	5825	11.41	13.11	15.35	34.28	30.00
802.11ac VHT40	151	5755	10.94	11.27	14.12	25.82	30.00
	159	5795	10.46	11.59	14.07	25.53	30.00
802.11ac VHT80	155	5775	11.43	12.01	14.74	29.79	30.00



11. PPSD

11.1. Test Limit

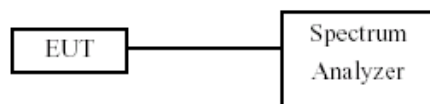
PSD:

Frequency Band		Limit
☒	5.15~5.25GHz	
	Operating Mode	
☐	Outdoor access point	17 dBm/MHz
☐	Indoor access point	17 dBm/MHz
☐	Fixed point-to-point access points	17 dBm/MHz
☒	Mobile and portable client devices	11 dBm/MHz
☐	5.725~5.85 GHz	11 dBm/MHz
☐	5.470-5.725 GHz	11 dBm/MHz
☒	5.725~5.85 GHz	30 dBm/500kHz

11.2. Test Procedure

Reference to KDB789033 D02 General UNII Test Procedures New Rules v02r01

11.3. Test Setup Layout



**11.4. Test Result and Data**

Temperature: 21°C

Humidity: 56%

Test Date: Aug. 11, 2018

In the 5.2G Band

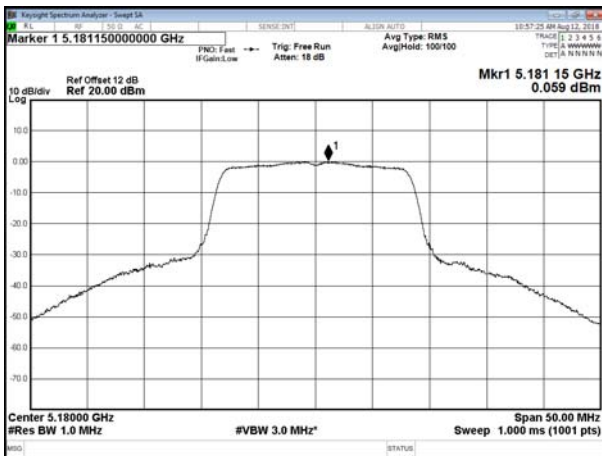
Modulation Type	CH	Freq. (MHz)	Meas PPSD (dBm/MHz)		Sum chain (dBm)	Duty Cycle CF(dB)	Total Corr'd PPSD (dBm/MHz)	PPSD Limit (dBm/MHz)
			ANT A	ANT B				
802.11a	36	5180	0.059	0.875	3.50	0.00	3.50	11.00
	44	5220	0.616	0.449	3.54	0.00	3.54	11.00
	48	5240	0.100	1.149	3.67	0.00	3.67	11.00
802.11ac VHT20	36	5180	-1.182	-0.259	2.31	0.00	2.31	11.00
	44	5220	-1.285	-1.085	1.83	0.00	1.83	11.00
	48	5240	-1.023	-0.308	2.36	0.00	2.36	11.00
802.11ac VHT40	38	5190	-4.271	-4.885	-1.56	0.00	-1.56	11.00
	46	5230	-4.524	-4.685	-1.59	0.00	-1.59	11.00
802.11ac VHT80	42	5210	-7.078	-7.004	-4.03	0.00	-4.03	11.00

In the 5.8G Band

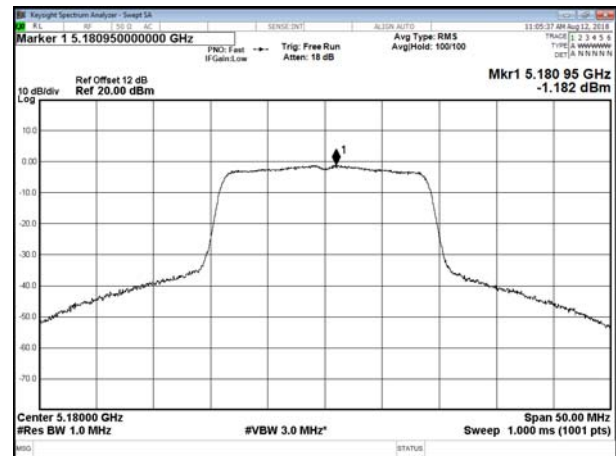
Modulation Type	CH	Freq. (MHz)	Meas PPSD (dBm/MHz)		Sum chain (dBm)	Duty Cycle CF(dB)	10log(500K Hz/RBW) CF (dB)	Total Corr'd PPSD (dBm/500kHz)	PPSD Limit (dBm/500kHz)
			ANT A	ANT B					
802.11a	149	5745	0.290	1.250	3.81	0.00	-3.01	0.80	30.00
	157	5785	0.219	1.346	3.83	0.00	-3.01	0.82	30.00
	165	5825	0.471	1.463	4.01	0.00	-3.01	1.00	30.00
802.11ac VHT20	149	5745	-1.169	-0.473	2.20	0.00	-3.01	-0.81	30.00
	157	5785	-0.836	-1.250	1.97	0.00	-3.01	-1.04	30.00
	165	5825	-0.471	-1.034	2.27	0.00	-3.01	-0.74	30.00
802.11ac VHT40	155	5755	-4.402	-4.314	-1.35	0.00	-3.01	-4.36	30.00
	159	5795	-4.905	-4.064	-1.45	0.00	-3.01	-4.46	30.00
802.11ac VHT80	155	5775	-7.776	-7.491	-4.62	0.00	-3.01	-7.63	30.00



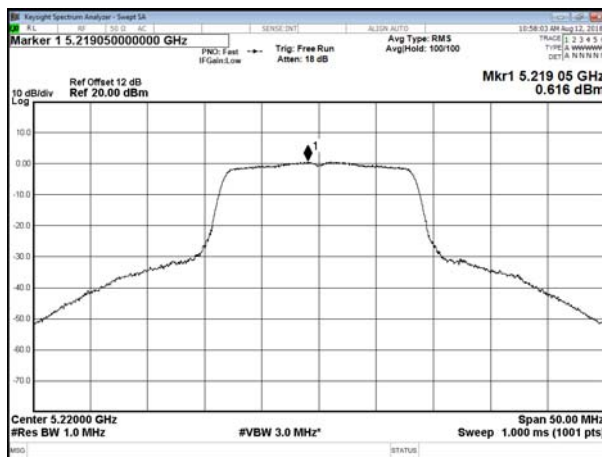
5.2G Band 1, ANT A
Modulation Standard: 802.11a (6Mbps)
CH36



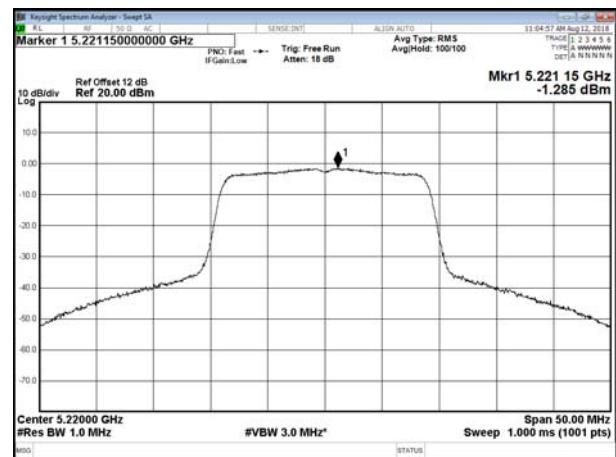
Modulation Standard: 802.11ac VHT20 (6.5Mbps)
CH36



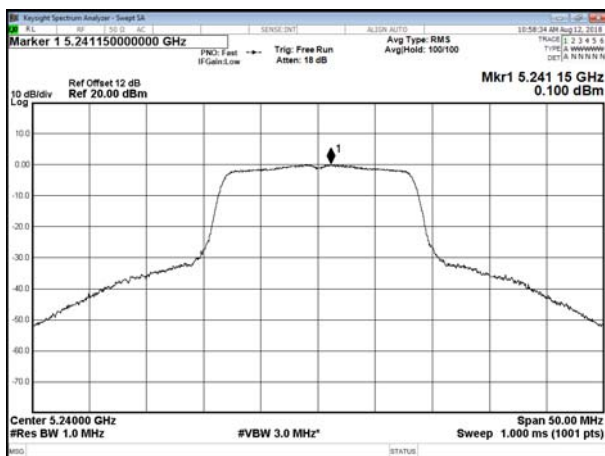
CH44



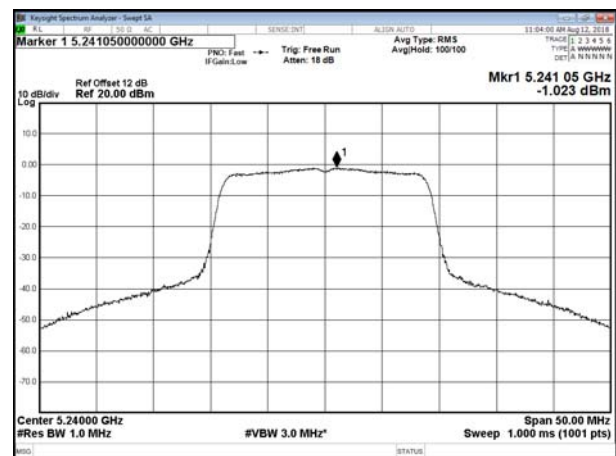
CH44



CH48

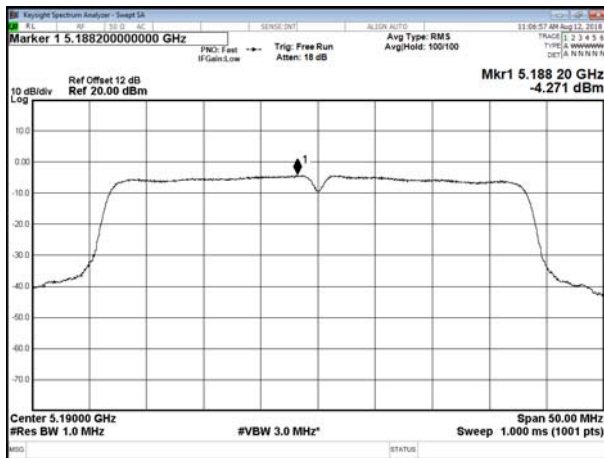


CH48

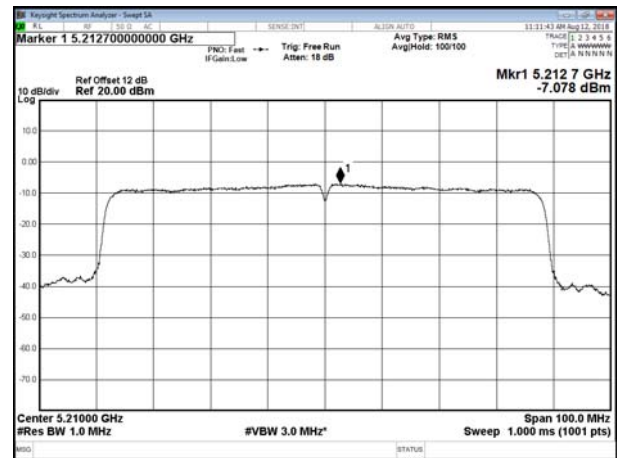




Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42

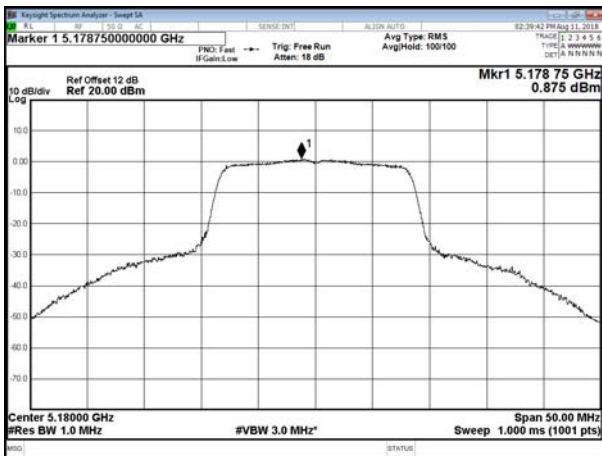


CH46

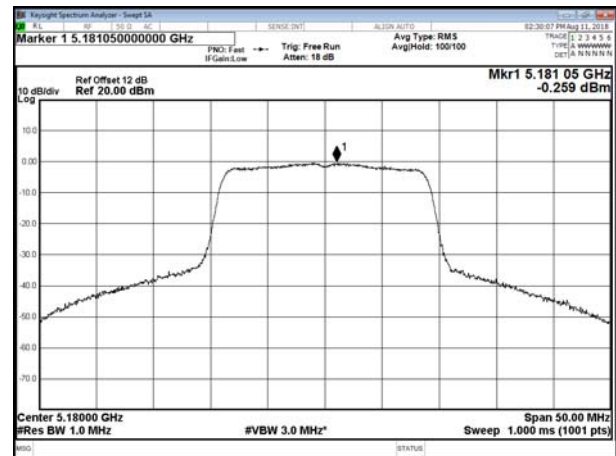




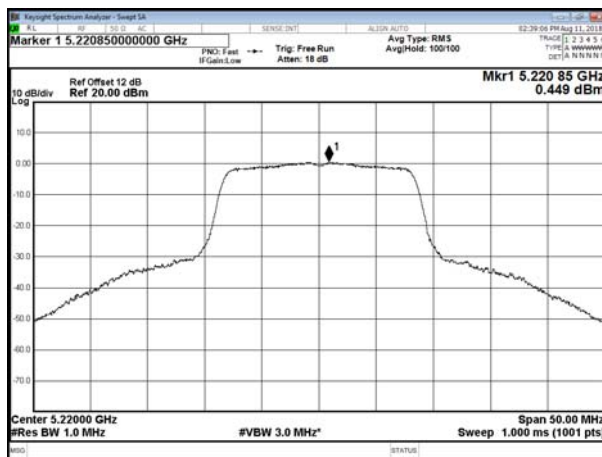
5.2G Band 1, ANT B
Modulation Standard: 802.11a (6Mbps)
CH36



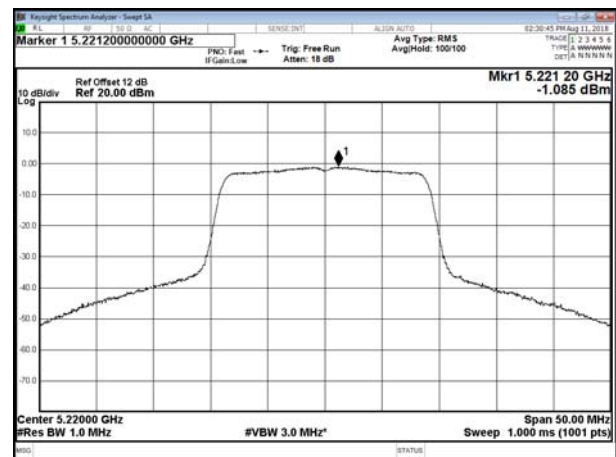
Modulation Standard: 802.11ac VHT20 (6.5Mbps)
CH36



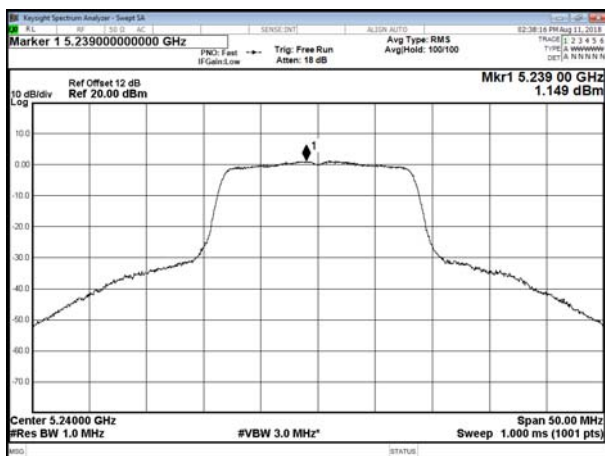
CH44



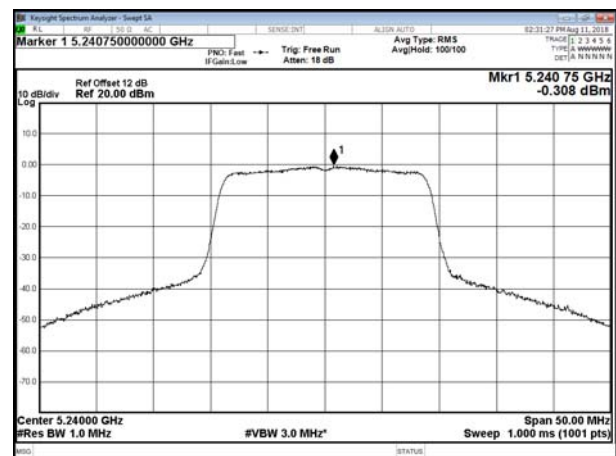
CH44



CH48

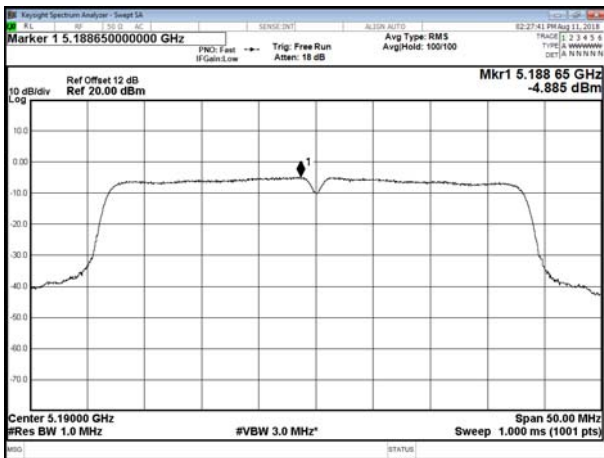


CH48

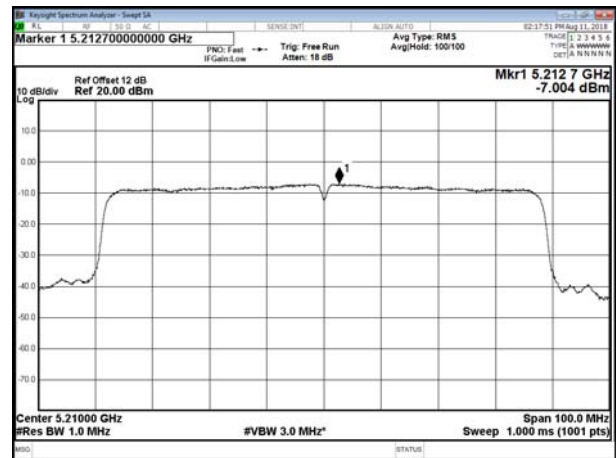




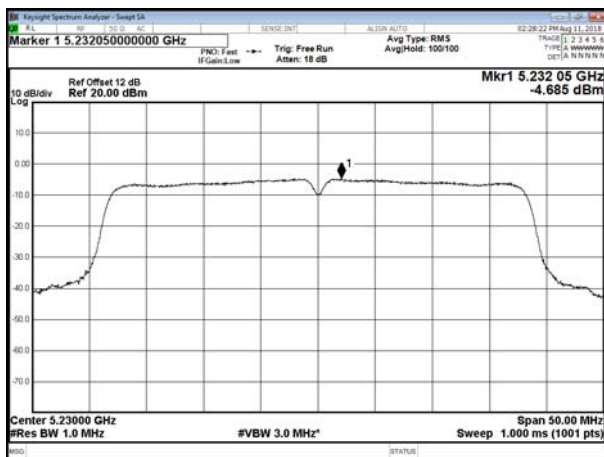
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42

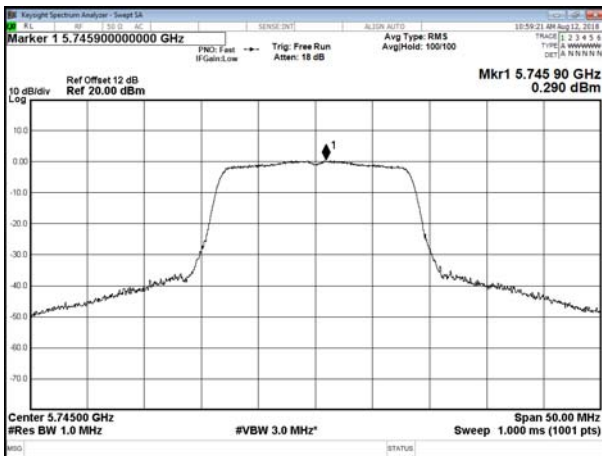


CH46

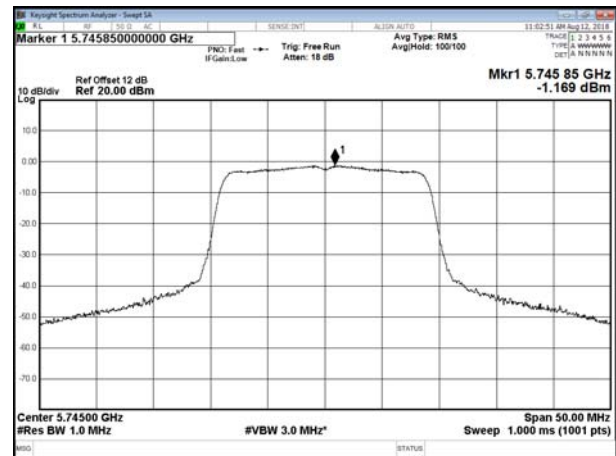




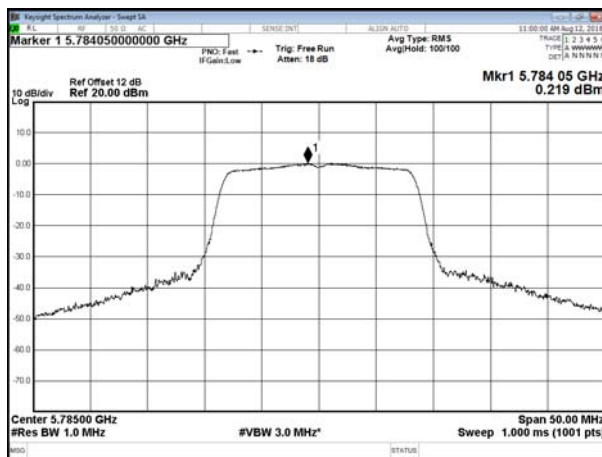
5.8G Band 4, ANT A
Modulation Standard: 802.11a (6Mbps)
CH149



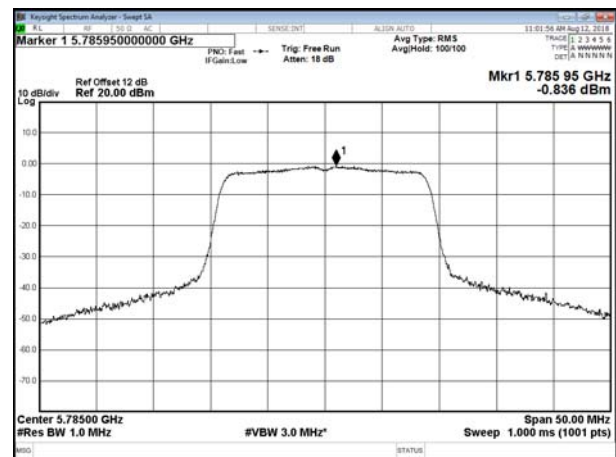
Modulation Standard: 802.11ac VHT20 (6.5Mbps)
CH149



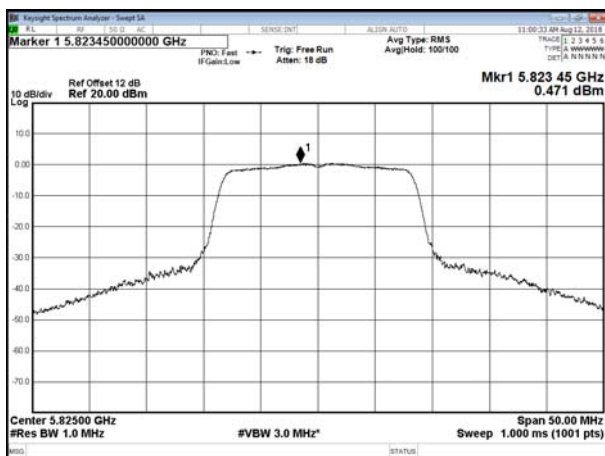
CH157



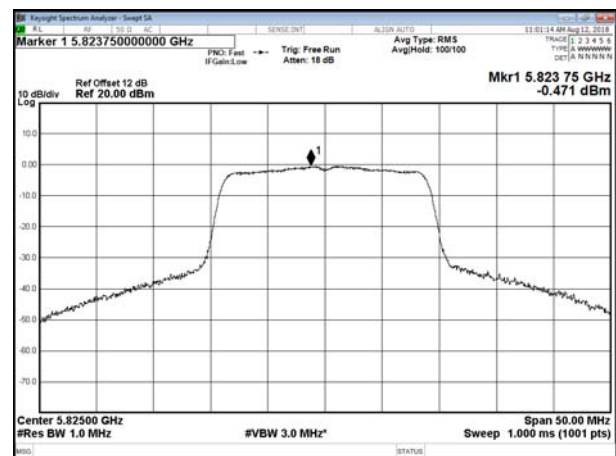
CH157



CH165

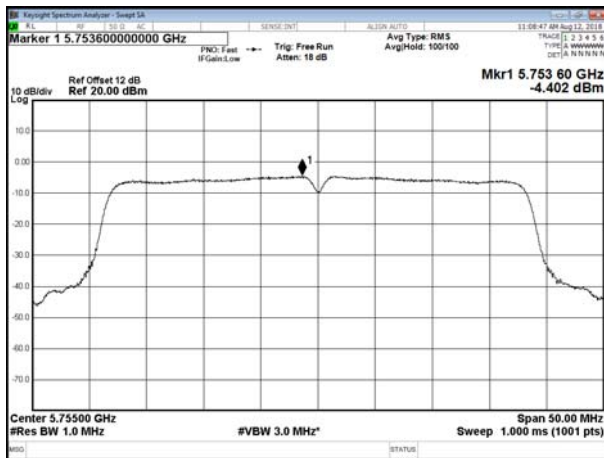


CH165

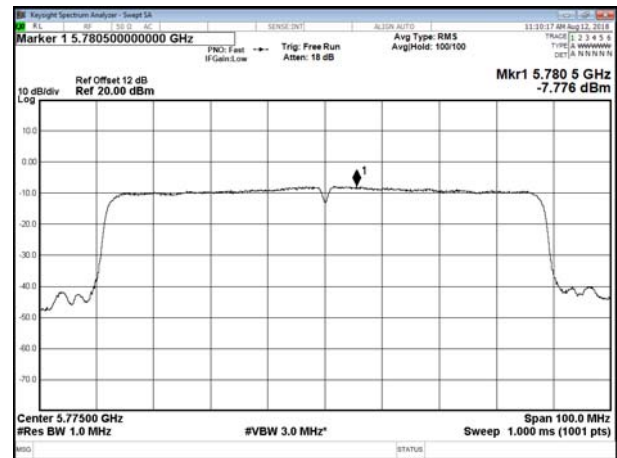




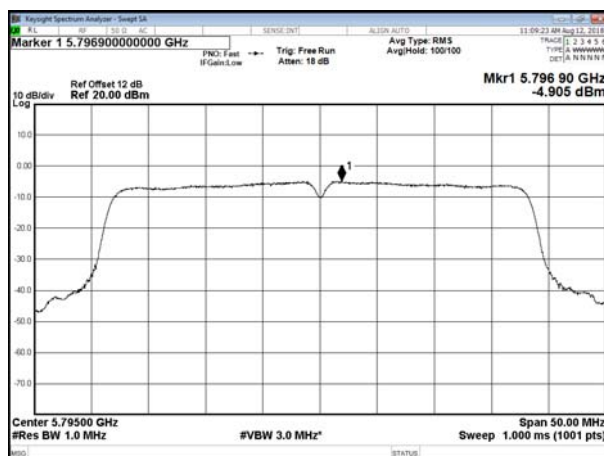
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH151



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH155

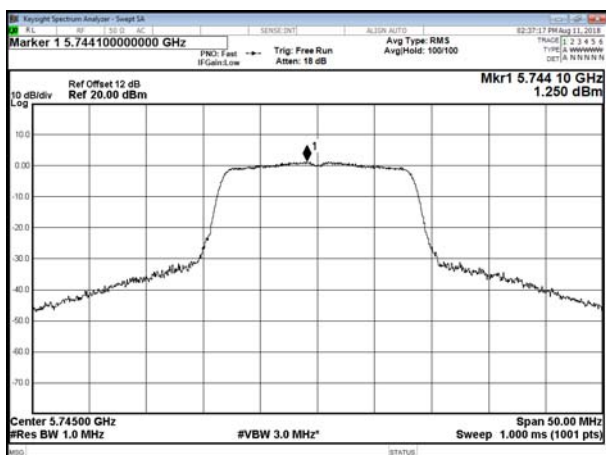


CH159

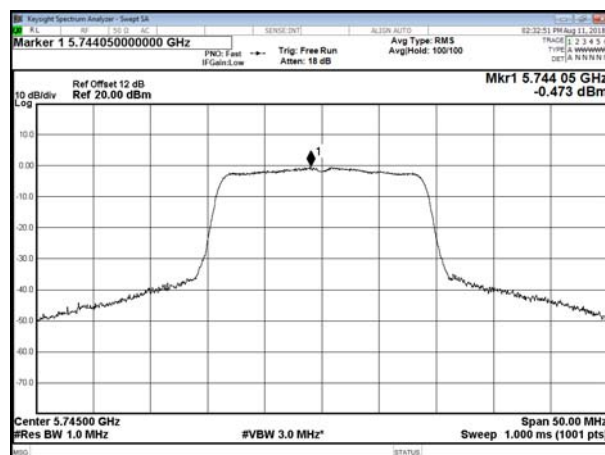




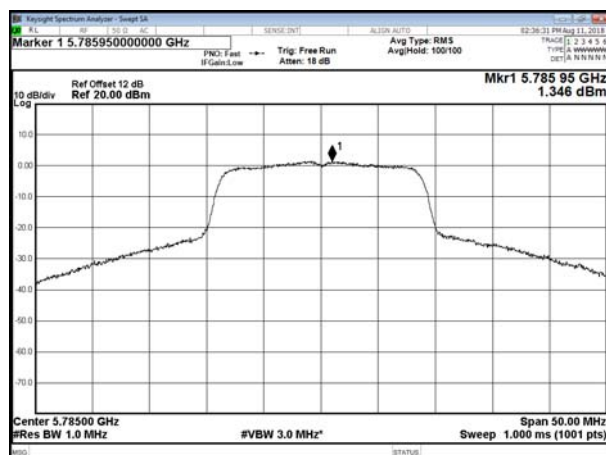
5.8G Band 4, ANT B
Modulation Standard: 802.11a (6Mbps)
CH149



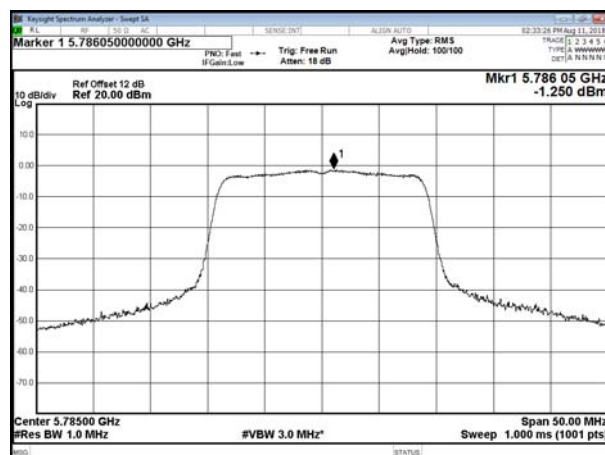
Modulation Standard: 802.11ac VHT20 (6.5Mbps)
CH149



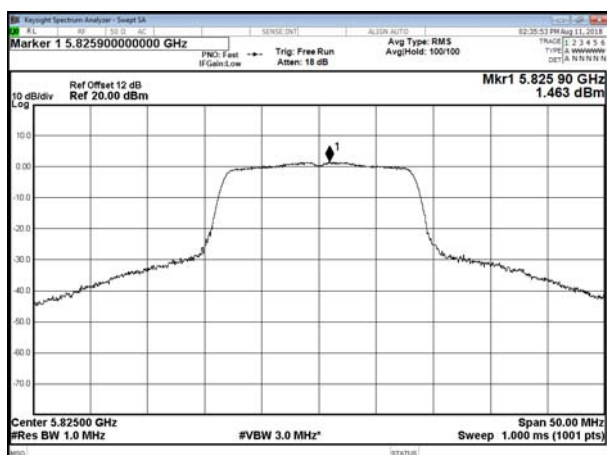
CH157



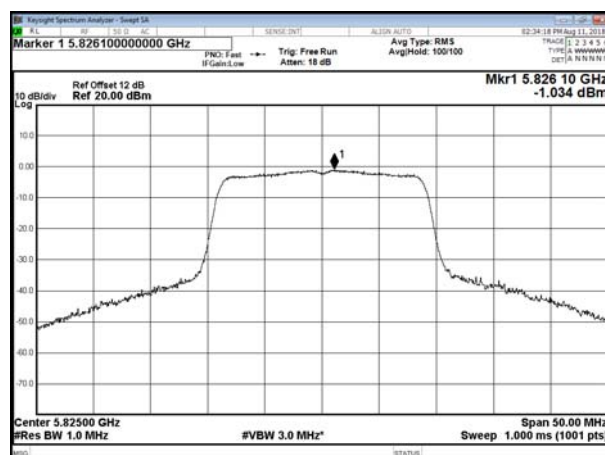
CH157



CH165

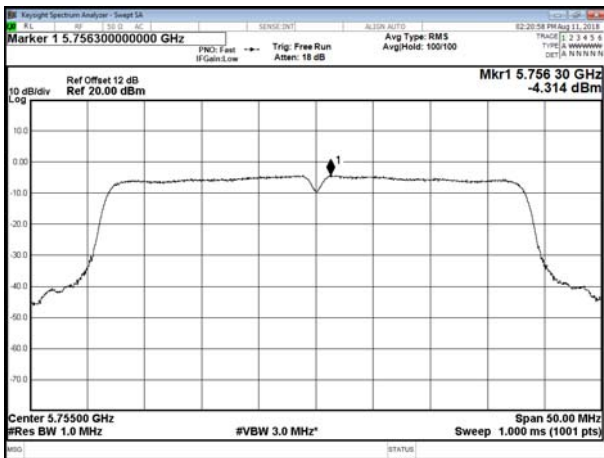


CH165

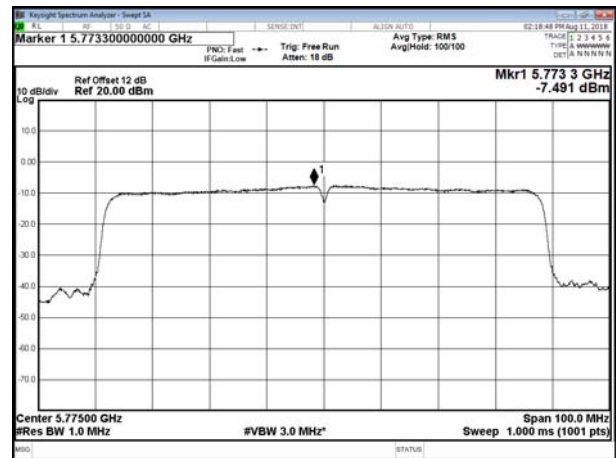




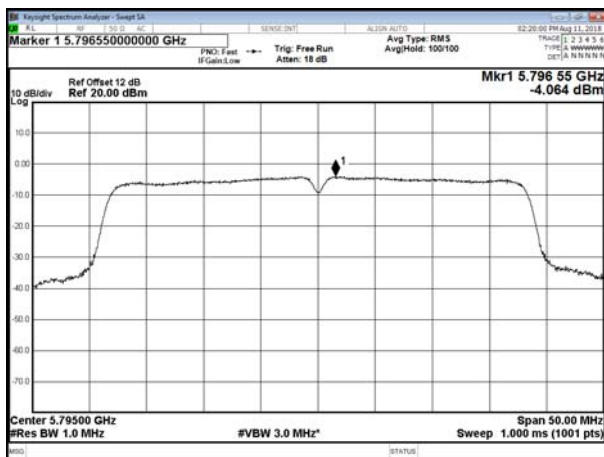
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH151



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH155



CH159



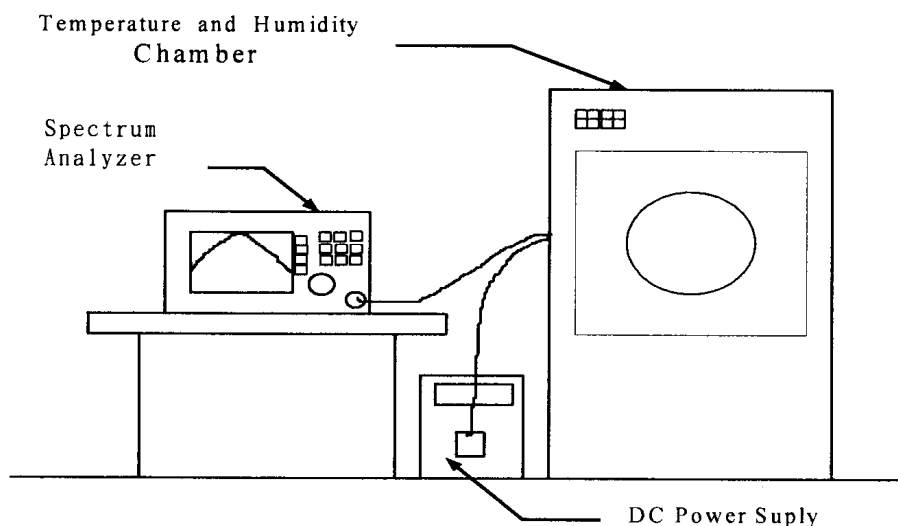


12. Frequency Stability

12.1. Test Procedure

1. The EUT was placed inside the Temperature and Humidity chamber.
2. The transmitter output was connected to spectrum analyzer.
3. Turn the EUT on and couple its output to a spectrum analyzer.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
6. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
7. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

12.2. Test Setup Layout





12.3. Test Result and Data

Temperature: 21°C

Humidity: 58%

Test Date: Nov. 01, 2018

Operating frequency: 5220 MHz							
Temp	Power supply	2 minute		5 minute		10 minute	
(°C)	(V)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
55	4.25	5220.2385	0.004569	5220.2354	0.004510	5220.2347	0.044923
	5.00	5220.2391	0.004580	5220.2351	0.004504	5220.2345	0.045134
	5.75	5220.2352	0.004506	5220.2344	0.004490	5220.2356	0.044176
40	4.25	5220.2321	0.004446	5220.2257	0.004324	5220.2306	0.044674
	5.00	5220.2324	0.004452	5220.2324	0.004452	5220.2332	0.045057
	5.75	5220.2316	0.004437	5220.2332	0.004467	5220.2352	0.042414
30	4.25	5220.2269	0.004347	5220.2202	0.004218	5220.2214	0.042874
	5.00	5220.2266	0.004341	5220.2214	0.004241	5220.2238	0.043180
	5.75	5220.2281	0.004370	5220.2234	0.004280	5220.2254	0.038966
20	4.25	5220.2243	0.004297	5220.2124	0.004069	5220.2034	0.038333
	5.00	5220.2252	0.004314	5220.2151	0.004121	5220.2001	0.037471
	5.75	5220.2241	0.004293	5220.2089	0.004002	5220.1956	0.032682
10	4.25	5220.1663	0.003186	5220.1455	0.002787	5220.1706	0.030900
	5.00	5220.1664	0.003188	5220.1374	0.002632	5220.1613	0.030402
	5.75	5220.1695	0.003247	5220.1365	0.002615	5220.1587	0.012625
0	4.25	5220.0769	0.001473	5220.0653	0.001251	5220.0659	0.012529
	5.00	5220.0778	0.001490	5220.0666	0.001276	5220.0654	0.012433
	5.75	5220.0724	0.001387	5220.0658	0.001261	5220.0649	0.003621
-10	4.25	5220.0203	0.000389	5220.0201	0.000385	5220.0189	0.003678
	5.00	5220.0214	0.000410	5220.0196	0.000375	5220.0192	0.003506
	5.75	5220.0206	0.000395	5220.0184	0.000352	5220.0183	0.002375
-20	4.25	5220.0153	0.000293	5220.0136	0.000261	5220.0124	0.002395
	5.00	5220.0154	0.000295	5220.0142	0.000272	5220.0125	0.002510
	5.75	5220.0156	0.000299	5220.0150	0.000287	5220.0131	0.044923

Limit:

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.



13. Automatically Discontinue Transmission

13.1.Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

13.2.Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.