



FCC RADIO TEST REPORT

Applicant : Datto, Inc.

Address : 101 Merritt 7, Norwalk, CT 06851 USA

Equipment : WiFi Access Point

Model No. : A42, AP42

Trade Name :  , 

FCC ID. : WT8OMA42

I HEREBY CERTIFY THAT :

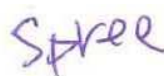
The sample was received on Jun. 19, 2017 and the testing was carried out on Jul. 26, 2017 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:



Mark Liao / Assistant Manager

Tested by:



Spree Yei / Engineer

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory





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History of this test report

Report No.	Issue Date	Description
TEFE1702072	Jun. 29, 2017	Original
TEFE1706331	Jul. 31, 2017	This test report was to request a Class II Change, as follow: 1. additional outdoor use



1. Summary of Test Procedure and Test Results

1.1. Applicable Standards

ANSI C63.4:2014

ANSI C63.10:2013

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 (a) & (a)(3)	Average Power	Pass
15.407(a)	PPSD	Pass



2. Test Configuration of Equipment under Test

2.1. Feature of Equipment

Modulation Type	DSSS, OFDM
Frequency Range	802.11b/g/n/ac: 2412-2462MHz 802.11a/an/ac: 5150-5250MHz, 5725-5850MHz
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS15, HT20/40 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11ac: MCS0 – MCS9, VHT 20/40/80
Antenna Type	PIFA Antenna
Antenna Gain	802.11b/g/n/ac: Antenna A: 4.4 dBi Antenna B: 3.9 dBi 802.11a/an/ac: Antenna A: 4.7 dBi Antenna B: 4.7 dBi

2.2. The difference of Model No.

Model No.	Trade Name	Difference
A42		Marketing differentiation
AP42		

2.3. Carrier Frequency of Channels

Band 1: 5150MHz-5250MHz

802.11a, 802.11an HT 20, 802.11ac VHT20

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

802.11an HT 40, 802.11ac VHT40

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

802.11ac VHT80

Channel	Frequency(MHz)
*42	5210

Note: Channels remarked * are selected to perform test.



2.4. Test Mode and Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- The complete test system included remote workstation and EUT for RF test. The remote workstation included Notebook.
- An executive program, "QRCT:V3.0.197.0" under WIN 7 was executed to transmit and receive data via WLAN.
- The following test modes were performed for the test:

Test Mode	Operating Description
1	802.11a (6Mbps), PoE 24V
2	802.11an HT20 (6.5Mbps), PoE 24V
3	802.11an HT40 (13.5Mbps), PoE 24V
4	802.11ac VHT20 (6.5Mbps), PoE 24V
5	802.11ac VHT40 (13.5Mbps), PoE 24V
6	802.11ac VHT80 (29.3Mbps), PoE 24V
7	802.11a (6Mbps), PoE 54V
8	802.11an HT20 (6.5Mbps), PoE 54V
9	802.11an HT40 (13.5Mbps), PoE 54V
10	802.11ac VHT20 (6.5Mbps), PoE 54V
11	802.11ac VHT40 (13.5Mbps), PoE 54V
12	802.11ac VHT80 (29.3Mbps), PoE 54V
For conduction test, caused "Test Mode 1,7" generated the worst case, they were reported as the final data. For radiation test (below 1GHz), caused "Test Mode 1,7" generated the worst case, they were reported as the final data. For radiation test (above 1GHz), caused "Test Mode 7,10,11,12" generated the worst case, they were reported as the final data. Note: Non-Beamforming was the worst case, so we use this mode for the test result.	

2.5. Description of Test System

Device	Manufacturer	Model No.	Description
Remote workstation			
Notebook	DELL	LatitudeE5450/5450	Power Cable, Unshielding, 1.8m

Use Cable:

Cable	Quantity	Description
Notebook	1	Unshielding, 1.2m
Notebook	1	Unshielding, 15.0m



2.6. 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, 390316, 228391, 641184
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-4218, R-4399 for Radiated emission test G-812, G-813 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.	

2.7. Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Conducted Emission	9 kHz ~ 30 MHz	Line / Neutral	±2.9076 dB
Radiated Emission	9 kHz ~ 25,000 MHz	Vertical / Horizontal	±0.948 dB
Spurious Emission (Conducted)	-	-	±4.011 dB
Maximum Peak and Average Output Power	-	-	±0.322 dB
Power Spectral Density	-	-	±0.322 dB
Bandwidth	-	-	74.224Hz



3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI3	100443	2017/03/07	2018/03/06
LISN	Schwarzbeck	NSLK 8127	8127-740	2016/08/30	2017/08/29
LISN	Schwarzbeck	NSLK 8127	8127-516	2016/09/06	2017/09/05
Pulse Limiter	R&S	ESH3-Z2	101934	2017/02/14	2018/02/13
Bilog Antenna	Schwarzbeck	VULB9168	369	2017/03/15	2018/03/14
Active Loop Antenna	EMCO	6507	40855	2017/05/15	2018/05/14
Horn Antenna	EMCO	3115	31601	2016/09/05	2017/09/04
Horn Antenna	EMCO	3116	31970	2017/03/29	2018/03/28
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200207	2017/03/17	2018/03/16
Preamplifier	EM	EM330	60660	2017/02/25	2018/02/24
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2016/09/13	2017/09/12
Preamplifier	Agilent	8449B	3008A01954	2017/02/09	2018/02/08
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2016/11/04	2017/11/03
MXG MW Analog Signal Generator	KEYSIGHT	N5183A	MY50142931	2017/03/17	2018/03/16
Spectrum Analyzer	R&S	FSP40	100219	2016/09/01	2017/08/31
BLUETOOTH TESTER	R&S	CBT	101133	2017/03/10	2018/03/09
Attenuator	KEYSIGHT	8491B	MY39250703	2017/03/07	2018/03/06
Rotary Attenuator	Agilent	8495B	MY42146680	2017/03/13	2018/03/12
Temp & Humi chamber	T-MACHINE	TMJ-9712	T-12-040111	2016/09/05	2017/09/04
Series Power Meter	Anritsu	ML2495A	1224005	2017/03/01	2018/02/28
Power Sensor	Anritsu	MA2411B	1207295	2017/03/01	2018/02/28
Cable	HUBER SUHNER	SUCOFLEX 102	28422/2	2017/02/25	2018/02/24
Cable	HUBER SUHNER	SUCOFLEX 102	28418/2	2017/02/25	2018/02/24
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	v2.0.0.1	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	Antenna Gain
PIFA Antenna	Antenna 1: 4.7 dBi
	Antenna 2: 4.7 dBi

For Power directional gain= $G_{ant} = 4.71$ dBi

For PSD directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / NANT]$
= 7.71 (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

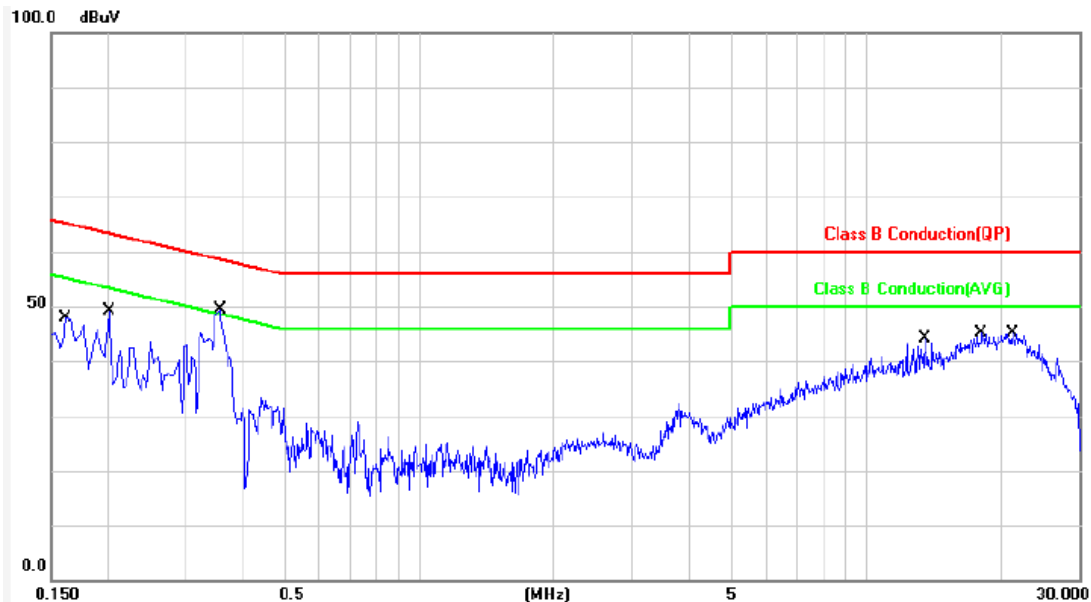
- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- 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	: PoE 24V	Pol/Phase	: LINE
Test Mode	: Mode 1	Temperature	: 20 °C
Test date	: Jun. 20, 2017	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1620	9.91	35.48	45.39	65.36	-19.97	QP	P
2	0.1620	9.91	25.71	35.62	55.36	-19.74	AVG	P
3	0.2020	9.91	35.15	45.06	63.52	-18.46	QP	P
4	0.2020	9.91	25.37	35.28	53.52	-18.24	AVG	P
5	0.3580	9.93	36.45	46.38	58.77	-12.39	QP	P
6	0.3580	9.93	29.62	39.55	48.77	-9.22	AVG	P
7	13.5780	10.44	30.06	40.50	60.00	-19.50	QP	P
8	13.5780	10.44	26.34	36.78	50.00	-13.22	AVG	P
9	18.1420	10.56	28.96	39.52	60.00	-20.48	QP	P
10	18.1420	10.56	23.58	34.14	50.00	-15.86	AVG	P
11	21.3020	10.65	28.90	39.55	60.00	-20.45	QP	P
12	21.3020	10.65	23.50	34.15	50.00	-15.85	AVG	P

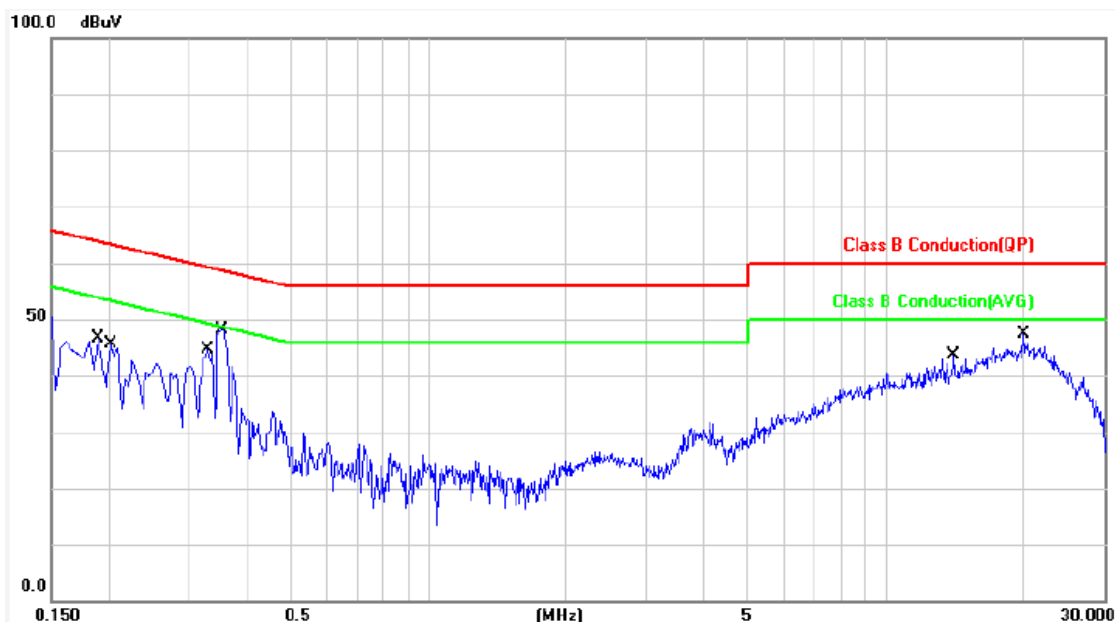
Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss+ Attenuator



Power	: PoE 24V	Pol/Phase	: NEUTRAL
Test Mode	: Mode 1	Temperature	: 20 °C
Test date	: Jun. 20, 2017	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1900	9.88	34.48	44.36	64.03	-19.67	QP	P
2	0.1900	9.88	24.43	34.31	54.03	-19.72	AVG	P
3	0.2020	9.88	34.84	44.72	63.52	-18.80	QP	P
4	0.2020	9.88	25.34	35.22	53.52	-18.30	AVG	P
5	0.3300	9.88	34.45	44.33	59.45	-15.12	QP	P
6	0.3300	9.88	30.00	39.88	49.45	-9.57	AVG	P
7	0.3540	9.89	37.85	47.74	58.87	-11.13	QP	P
8	0.3540	9.89	34.84	44.73	48.87	-4.14	AVG	P
9	14.0700	10.45	28.82	39.27	60.00	-20.73	QP	P
10	14.0700	10.45	24.49	34.94	50.00	-15.06	AVG	P
11	19.9660	10.64	29.06	39.70	60.00	-20.30	QP	P
12	19.9660	10.64	23.78	34.42	50.00	-15.58	AVG	P

Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss+ Attenuator



Power	: PoE 54V	Pol/Phase	: LINE
Test Mode	: Mode 7	Temperature	: 20 °C
Test date	: Jun. 20, 2017	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1660	9.91	39.17	49.08	65.15	-16.07	QP	P
2	0.1660	9.91	20.81	30.72	55.15	-24.43	AVG	P
3	0.1860	9.91	35.81	45.72	64.21	-18.49	QP	P
4	0.1860	9.91	18.80	28.71	54.21	-25.50	AVG	P
5	0.2100	9.91	32.23	42.14	63.20	-21.06	QP	P
6	0.2100	9.91	18.17	28.08	53.20	-25.12	AVG	P
7	0.5340	9.93	35.96	45.89	56.00	-10.11	QP	P
8	0.5340	9.93	30.67	40.60	46.00	-5.40	AVG	P
9	11.7380	10.38	33.69	44.07	60.00	-15.93	QP	P
10	11.7380	10.38	28.90	39.28	50.00	-10.72	AVG	P
11	18.3300	10.56	31.44	42.00	60.00	-18.00	QP	P
12	18.3300	10.56	26.04	36.60	50.00	-13.40	AVG	P

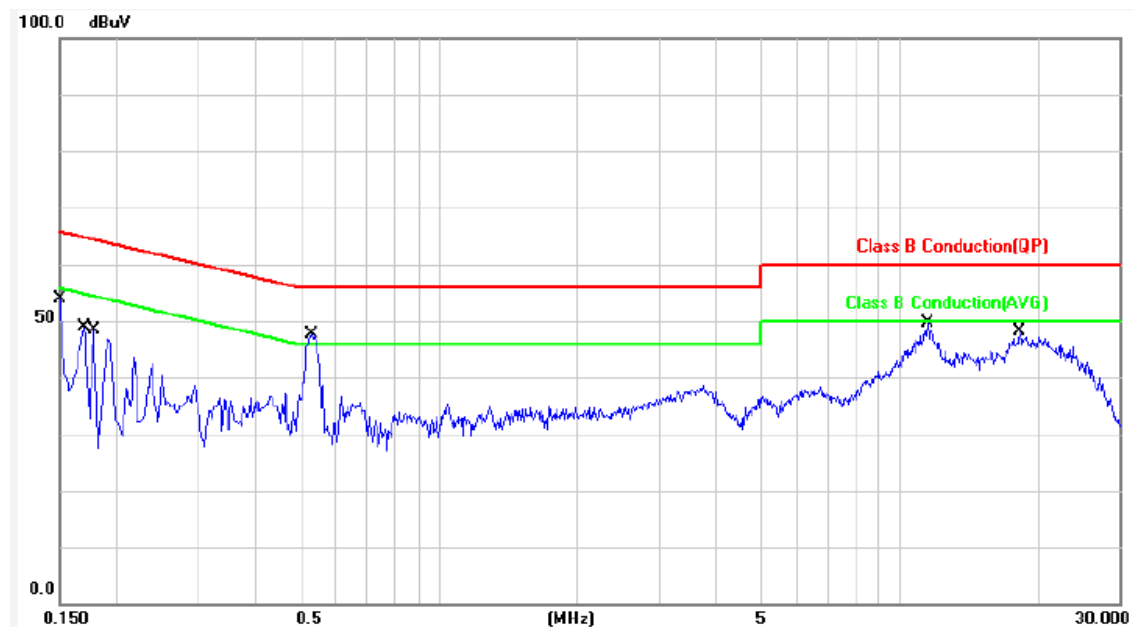
Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss+ Attenuator



Power	: PoE 54V	Pol/Phase	: NEUTRAL
Test Mode	: Mode 7	Temperature	: 20 °C
Test date	: Jun. 20, 2017	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1500	9.88	42.33	52.21	65.99	-13.78	QP	P
2	0.1500	9.88	24.04	33.92	55.99	-22.07	AVG	P
3	0.1700	9.88	38.12	48.00	64.96	-16.96	QP	P
4	0.1700	9.88	19.97	29.85	54.96	-25.11	AVG	P
5	0.1780	9.88	36.32	46.20	64.57	-18.37	QP	P
6	0.1780	9.88	19.43	29.31	54.57	-25.26	AVG	P
7	0.5299	9.89	36.10	45.99	56.00	-10.01	QP	P
8	0.5299	9.89	31.11	41.00	46.00	-5.00	AVG	P
9	11.5260	10.36	33.79	44.15	60.00	-15.85	QP	P
10	11.5260	10.36	28.97	39.33	50.00	-10.67	AVG	P
11	18.2500	10.58	31.55	42.13	60.00	-17.87	QP	P
12	18.2500	10.58	26.14	36.72	50.00	-13.28	AVG	P

Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss+ Attenuator



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.

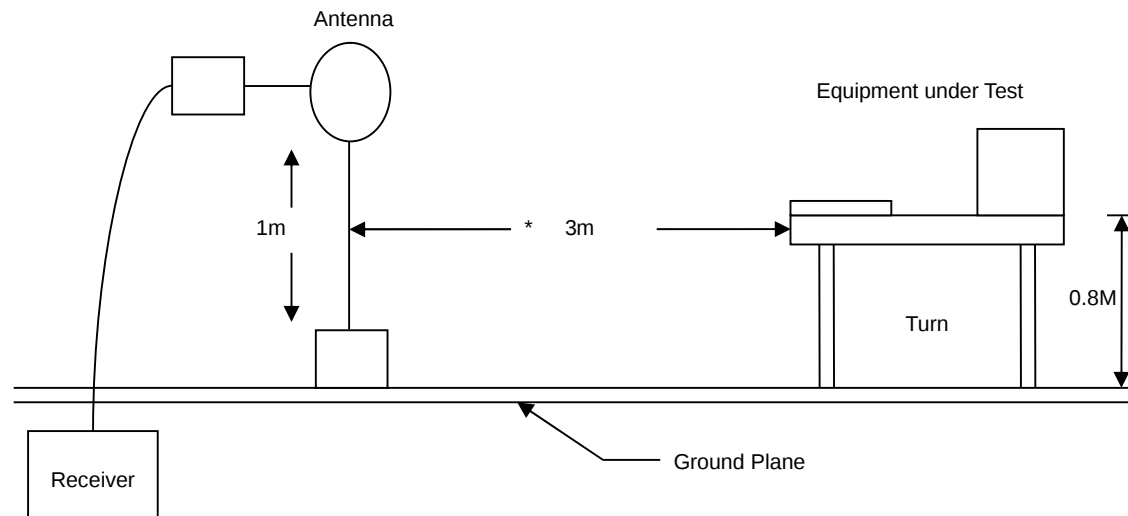
6.2. Test Procedures

- 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.

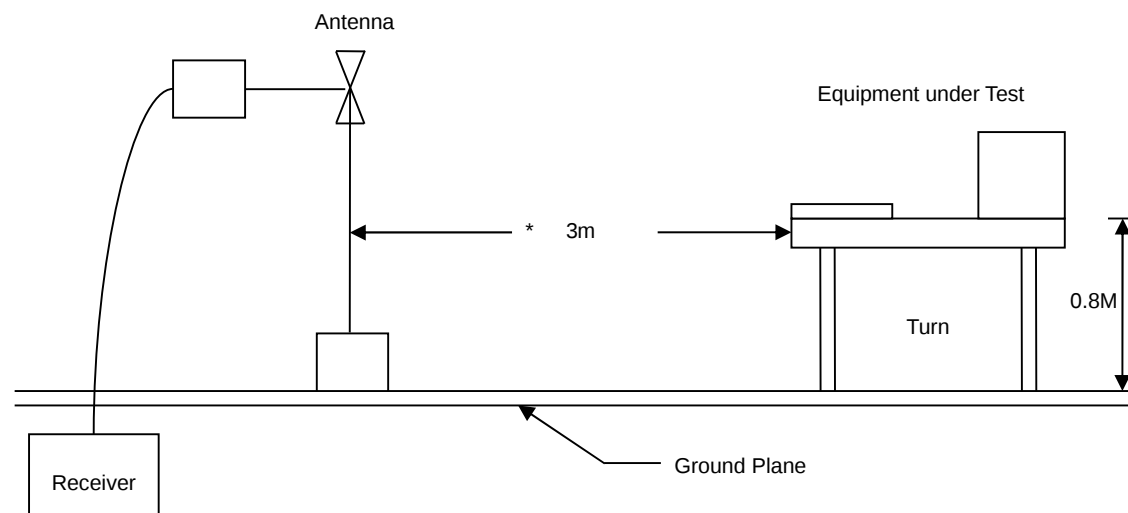


6.3. Typical Test Setup

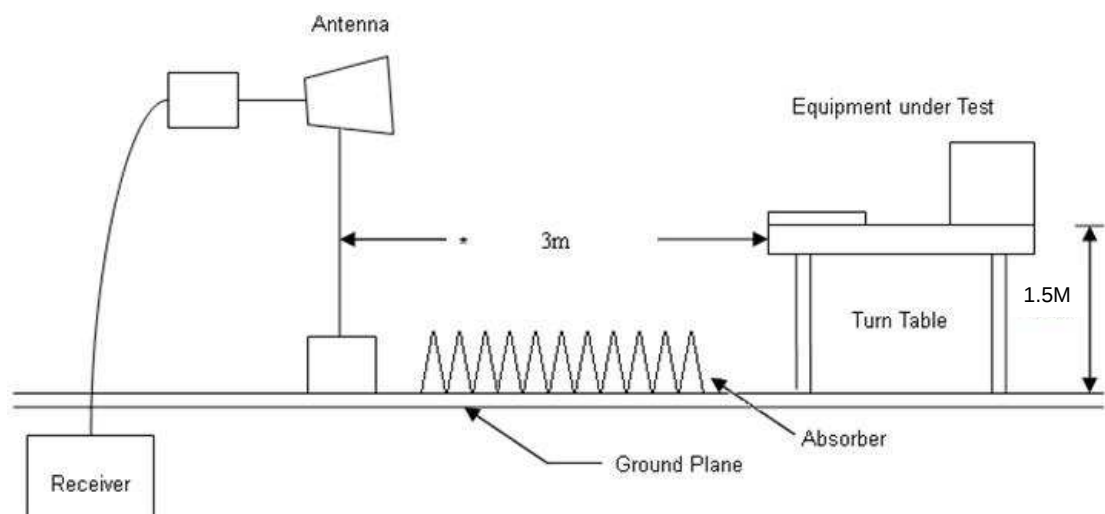
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



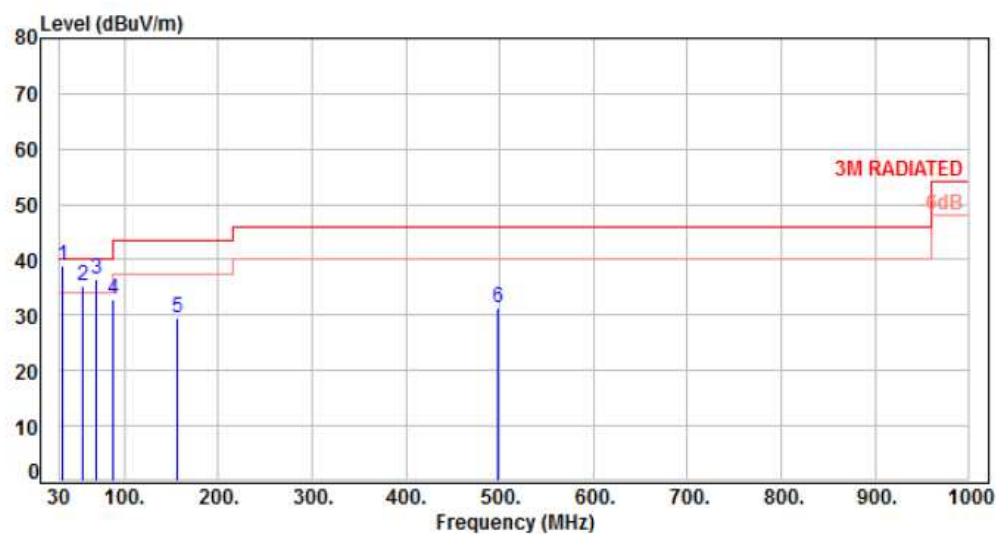


6.4. Test Result and Data (9kHz ~ 30MHz)

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

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

Power	: PoE 24V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1	Temperature	: 22 °C
Test Date	: Jun. 19, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	33.88	-10.80	49.73	38.93	40.00	-1.07	QP	100	161	P
2	55.22	-10.02	45.46	35.44	40.00	-4.56	Peak	100	0	P
3	70.74	-12.16	48.58	36.42	40.00	-3.58	QP	100	173	P
4	88.20	-15.75	48.69	32.94	43.50	-10.56	Peak	100	0	P
5	156.10	-9.84	39.24	29.40	43.50	-14.10	Peak	100	0	P
6	497.54	-4.00	35.40	31.40	46.00	-14.60	Peak	100	0	P

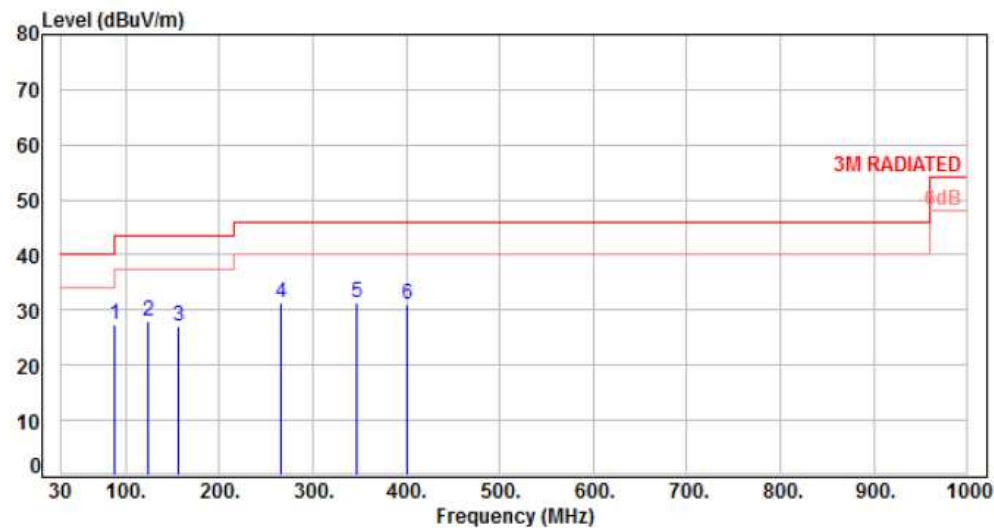
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	PoE 24V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1	Temperature	:	22 °C
Test Date	:	Jun. 19, 2017	Humidity	:	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	88.20	-15.75	43.15	27.40	43.50	-16.10	Peak	100	0	P
2	123.12	-11.65	39.52	27.87	43.50	-15.63	Peak	100	0	P
3	156.10	-9.84	36.91	27.07	43.50	-16.43	Peak	100	0	P
4	266.68	-9.88	41.14	31.26	46.00	-14.74	Peak	100	0	P
5	346.22	-7.72	39.05	31.33	46.00	-14.67	Peak	100	0	P
6	400.54	-6.23	37.28	31.05	46.00	-14.95	Peak	100	0	P

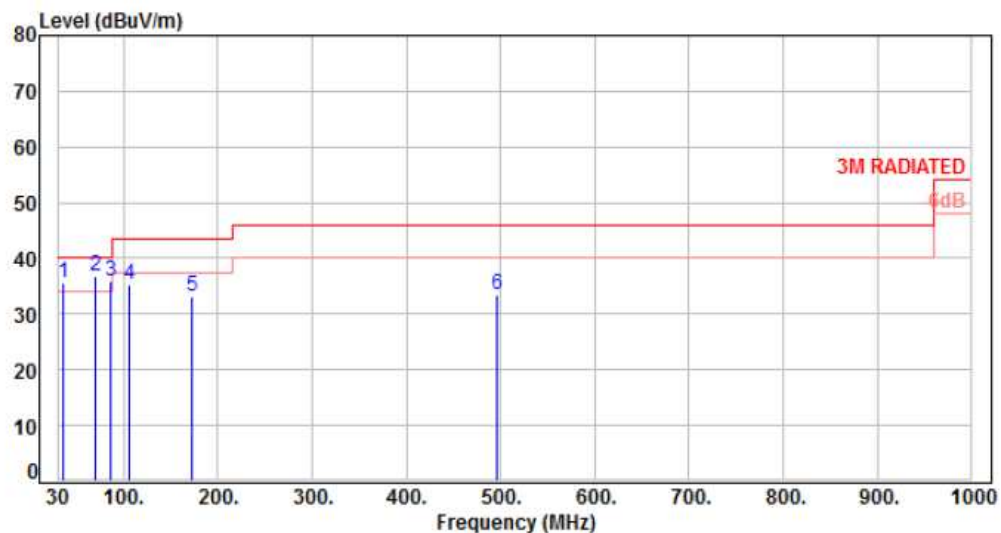
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 7	Temperature	: 22 °C
Test Date	: Jun. 19, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	35.82	-10.67	46.11	35.44	40.00	-4.56	QP	100	159	P
2	70.74	-12.16	49.03	36.87	40.00	-3.13	QP	100	161	P
3	86.26	-15.34	51.20	35.86	40.00	-4.14	Peak	100	0	P
4	105.66	-13.70	49.01	35.31	43.50	-8.19	Peak	100	0	P
5	171.62	-10.27	43.53	33.26	43.50	-10.24	Peak	100	0	P
6	495.60	-4.04	37.41	33.37	46.00	-12.63	Peak	100	0	P

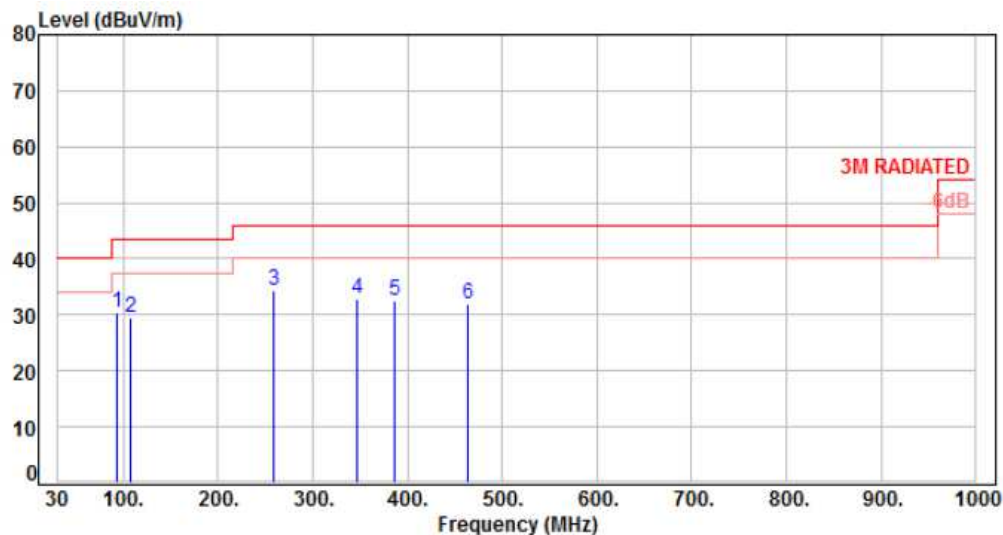
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	PoE 54V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 7	Temperature	:	22 °C
Test Date	:	Jun. 19, 2017	Humidity	:	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	94.02	-15.59	46.14	30.55	43.50	-12.95	Peak	100	0	P
2	107.60	-13.34	42.87	29.53	43.50	-13.97	Peak	100	0	P
3	258.92	-10.25	44.48	34.23	46.00	-11.77	Peak	100	0	P
4	346.22	-7.72	40.70	32.98	46.00	-13.02	Peak	100	0	P
5	386.96	-6.60	39.16	32.56	46.00	-13.44	Peak	100	0	P
6	464.56	-4.62	36.56	31.94	46.00	-14.06	Peak	100	0	P

Note: Level=Reading+Factor

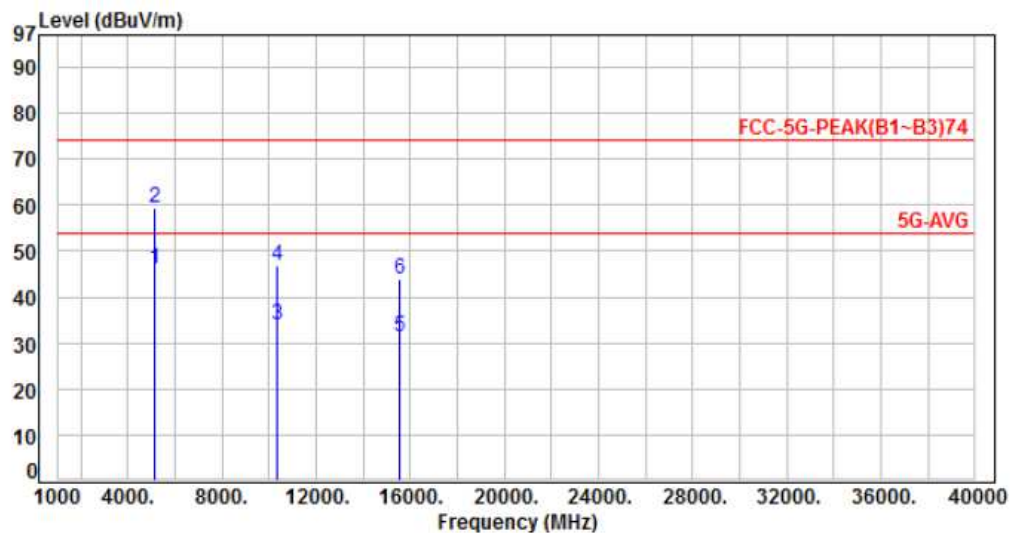
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



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

Power	:	PoE 54V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 7, CH36	Temperature	:	22 °C
Test Date	:	Jul. 26, 2017	Humidity	:	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.87	46.16	54.00	-7.84	Average	159	293	P
2	5150.00	-12.71	71.97	59.26	74.00	-14.74	Peak	159	293	P
3	10360.00	-7.44	41.34	33.90	54.00	-20.10	Average	154	314	P
4	10360.00	-7.44	54.25	46.81	74.00	-27.19	Peak	154	314	P
5	15540.00	-3.78	35.28	31.50	54.00	-22.50	Average	254	183	P
6	15540.00	-3.78	47.62	43.84	74.00	-30.16	Peak	254	183	P

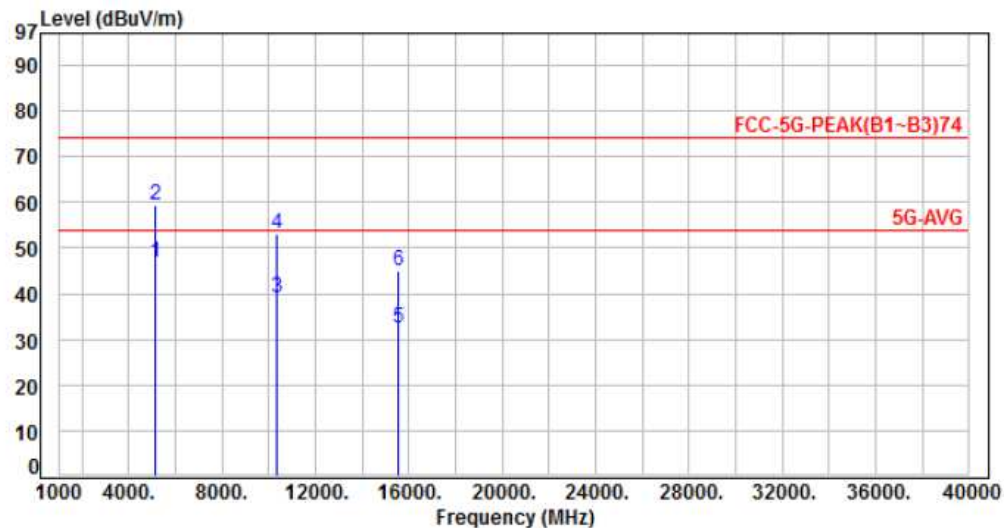
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 7, CH36	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	59.43	46.72	54.00	-7.28	Average	320	333	P
2	5150.00	-12.71	72.10	59.39	74.00	-14.61	Peak	320	333	P
3	10360.00	-7.44	46.71	39.27	54.00	-14.73	Average	193	276	P
4	10360.00	-7.44	60.44	53.00	74.00	-21.00	Peak	193	276	P
5	15540.00	-3.78	36.22	32.44	54.00	-21.56	Average	103	291	P
6	15540.00	-3.78	48.62	44.84	74.00	-29.16	Peak	103	291	P

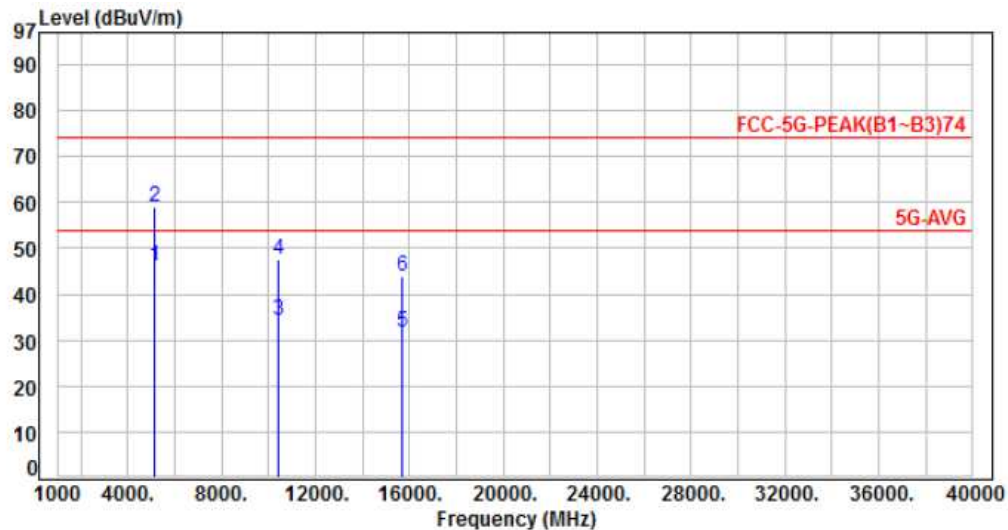
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 7, CH44	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.73	46.02	54.00	-7.98	Average	122	252	P
2	5150.00	-12.71	71.86	59.15	74.00	-14.85	Peak	122	252	P
3	10440.00	-7.43	41.78	34.35	54.00	-19.65	Average	117	310	P
4	10440.00	-7.43	54.83	47.40	74.00	-26.60	Peak	117	310	P
5	15660.00	-3.80	35.49	31.69	54.00	-22.31	Average	109	221	P
6	15660.00	-3.80	47.69	43.89	74.00	-30.11	Peak	109	221	P

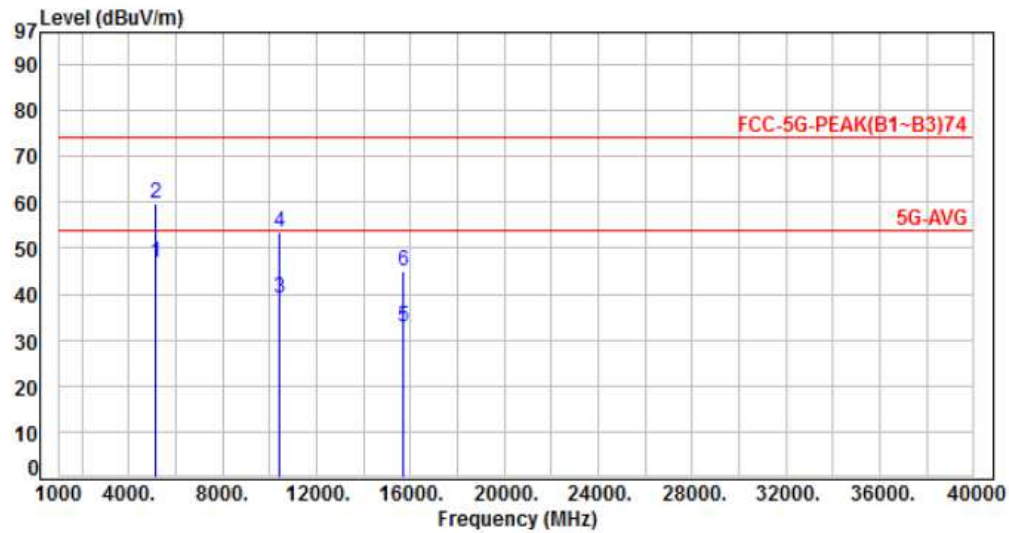
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 7, CH44	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	59.45	46.74	54.00	-7.26	Average	138	329	P
2	5150.00	-12.71	72.32	59.61	74.00	-14.39	Peak	138	329	P
3	10440.00	-7.43	46.58	39.15	54.00	-14.85	Average	165	287	P
4	10440.00	-7.43	60.76	53.33	74.00	-20.67	Peak	165	287	P
5	15660.00	-3.80	36.62	32.82	54.00	-21.18	Average	100	292	P
6	15660.00	-3.80	48.98	45.18	74.00	-28.82	Peak	100	292	P

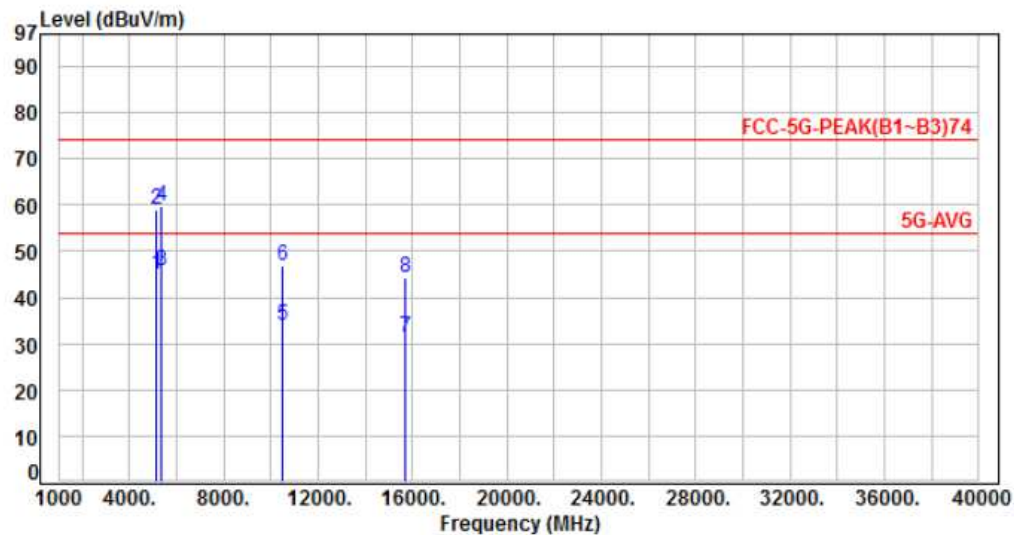
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 7, CH48	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	57.84	45.13	54.00	-8.87	Average	129	258	P
2	5150.00	-12.71	71.78	59.07	74.00	-14.93	Peak	129	258	P
3	5350.00	-12.32	58.21	45.89	54.00	-8.11	Average	129	258	P
4	5350.00	-12.32	71.89	59.57	74.00	-14.43	Peak	129	258	P
5	10480.00	-7.42	41.39	33.97	54.00	-20.03	Average	141	133	P
6	10480.00	-7.42	54.32	46.90	74.00	-27.10	Peak	141	133	P
7	15720.00	-3.81	35.11	31.30	54.00	-22.70	Average	143	281	P
8	15720.00	-3.81	47.92	44.11	74.00	-29.89	Peak	143	281	P

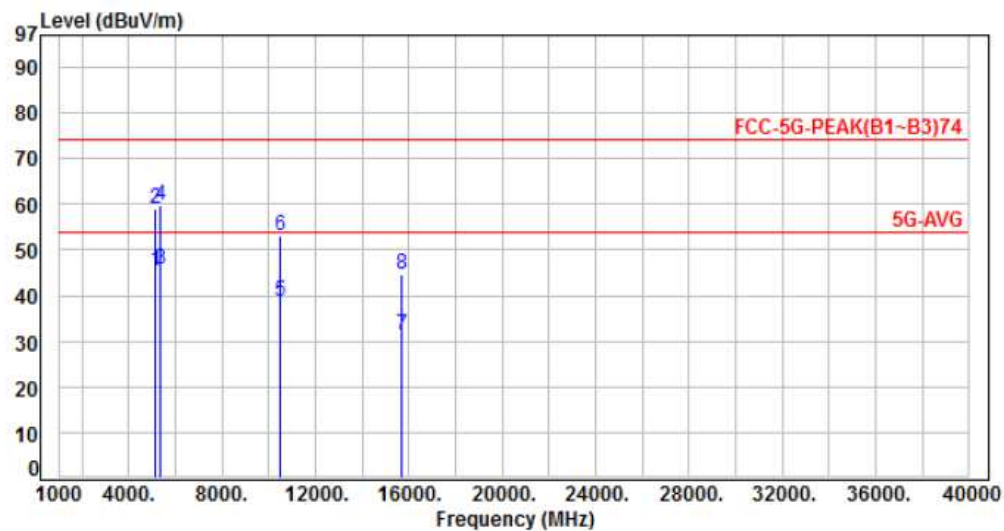
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 7, CH48	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.15	45.44	54.00	-8.56	Average	136	331	P
2	5150.00	-12.71	71.82	59.11	74.00	-14.89	Peak	136	331	P
3	5350.00	-12.32	58.24	45.92	54.00	-8.08	Average	136	331	P
4	5350.00	-12.32	71.91	59.59	74.00	-14.41	Peak	136	331	P
5	10480.00	-7.42	46.24	38.82	54.00	-15.18	Average	158	285	P
6	10480.00	-7.42	60.61	53.19	74.00	-20.81	Peak	158	285	P
7	15720.00	-3.81	35.28	31.47	54.00	-22.53	Average	122	308	P
8	15720.00	-3.81	48.39	44.58	74.00	-29.42	Peak	122	308	P

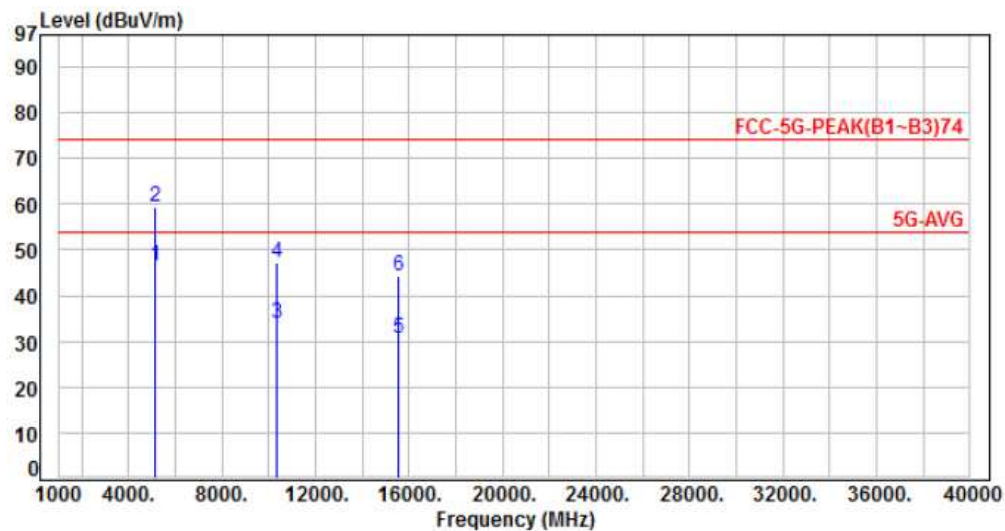
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 10, CH36	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV)	Limit (dBUV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	59.03	46.32	54.00	-7.68	Average	161	296	P
2	5150.00	-12.71	72.13	59.42	74.00	-14.58	Peak	161	296	P
3	10360.00	-7.44	41.33	33.89	54.00	-20.11	Average	148	300	P
4	10360.00	-7.44	54.72	47.28	74.00	-26.72	Peak	148	300	P
5	15540.00	-3.78	34.57	30.79	54.00	-23.21	Average	255	181	P
6	15540.00	-3.78	47.86	44.08	74.00	-29.92	Peak	255	181	P

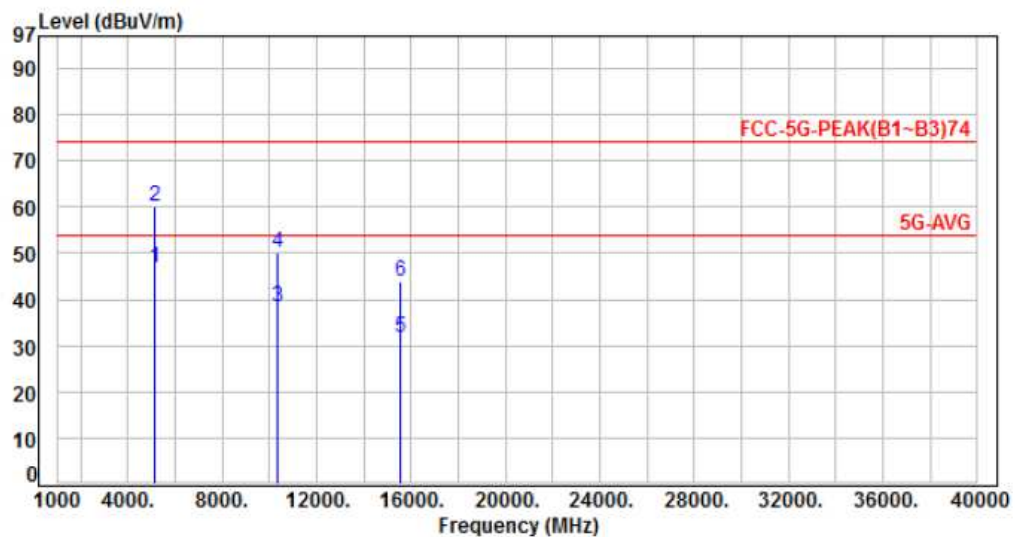
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 10, CH36	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	59.37	46.66	54.00	-7.34	Average	227	4	P
2	5150.00	-12.71	72.65	59.94	74.00	-14.06	Peak	227	4	P
3	10360.00	-7.44	45.83	38.39	54.00	-15.61	Average	182	277	P
4	10360.00	-7.44	57.48	50.04	74.00	-23.96	Peak	182	277	P
5	15540.00	-3.78	35.55	31.77	54.00	-22.23	Average	105	286	P
6	15540.00	-3.78	47.62	43.84	74.00	-30.16	Peak	105	286	P

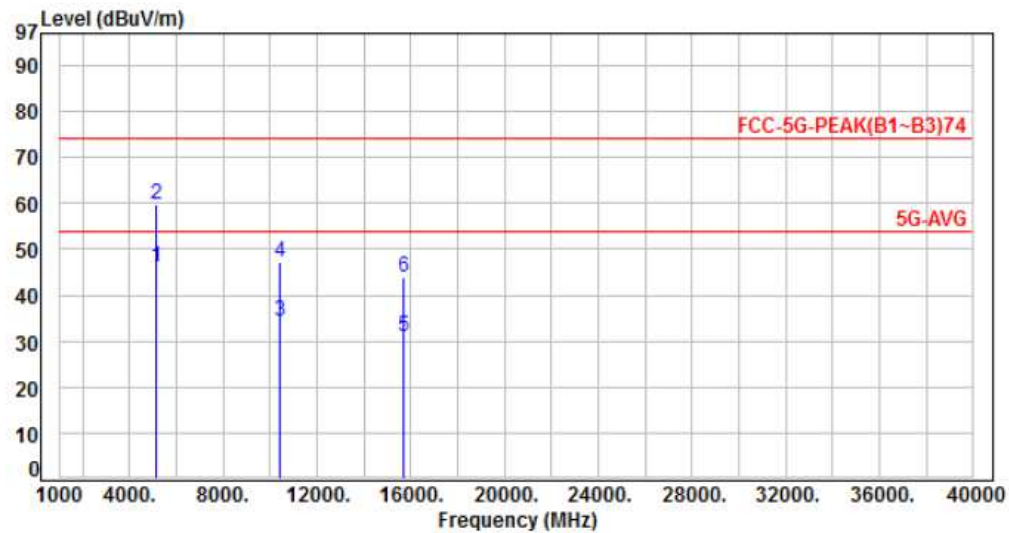
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 10, CH44	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.83	46.12	54.00	-7.88	Average	115	95	P
2	5150.00	-12.71	72.28	59.57	74.00	-14.43	Peak	115	95	P
3	10440.00	-7.43	41.58	34.15	54.00	-19.85	Average	144	301	P
4	10440.00	-7.43	54.77	47.34	74.00	-26.66	Peak	144	301	P
5	15660.00	-3.80	34.69	30.89	54.00	-23.11	Average	188	212	P
6	15660.00	-3.80	47.71	43.91	74.00	-30.09	Peak	188	212	P

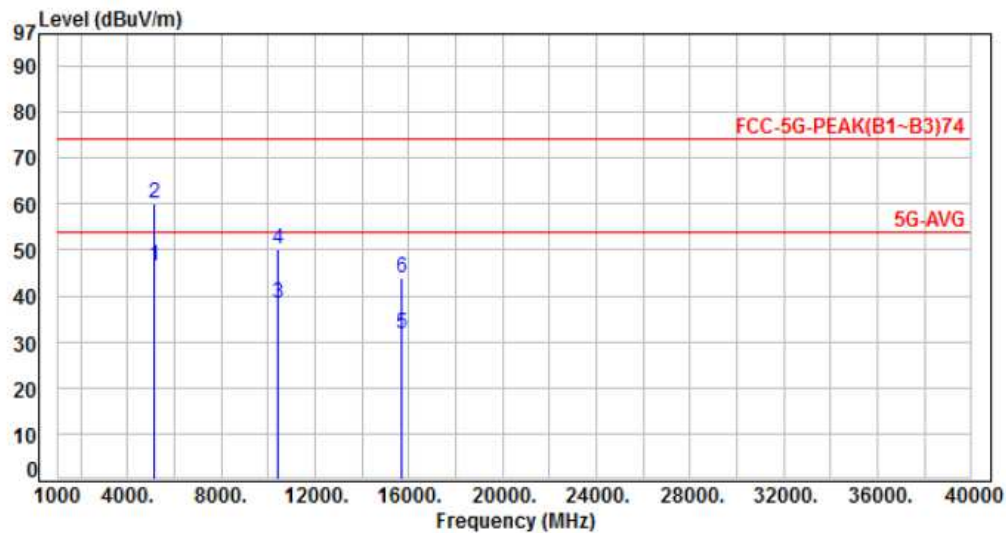
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 10, CH44	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV)	Limit (dBUV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	59.12	46.41	54.00	-7.59	Average	135	331	P
2	5150.00	-12.71	72.78	60.07	74.00	-13.93	Peak	135	331	P
3	10440.00	-7.43	45.86	38.43	54.00	-15.57	Average	100	289	P
4	10440.00	-7.43	57.64	50.21	74.00	-23.79	Peak	100	289	P
5	15660.00	-3.80	35.61	31.81	54.00	-22.19	Average	204	293	P
6	15660.00	-3.80	47.82	44.02	74.00	-29.98	Peak	204	293	P

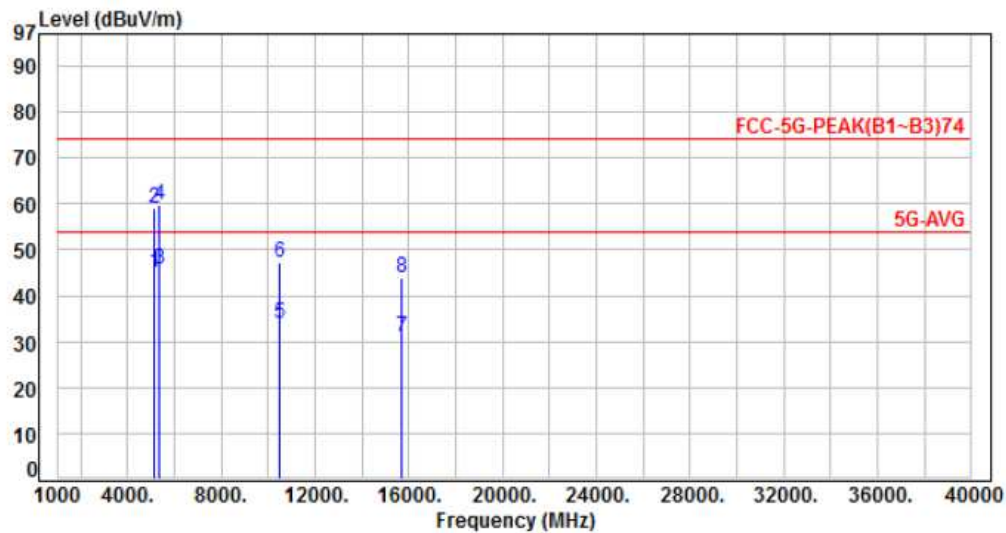
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 10, CH48	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	57.79	45.08	54.00	-8.92	Average	120	65	P
2	5150.00	-12.71	71.56	58.85	74.00	-15.15	Peak	120	65	P
3	5350.00	-12.32	58.12	45.80	54.00	-8.20	Average	120	65	P
4	5350.00	-12.32	72.02	59.70	74.00	-14.30	Peak	120	65	P
5	10480.00	-7.42	41.42	34.00	54.00	-20.00	Average	122	331	P
6	10480.00	-7.42	54.60	47.18	74.00	-26.82	Peak	122	331	P
7	15720.00	-3.81	34.73	30.92	54.00	-23.08	Average	188	143	P
8	15720.00	-3.81	47.57	43.76	74.00	-30.24	Peak	188	143	P

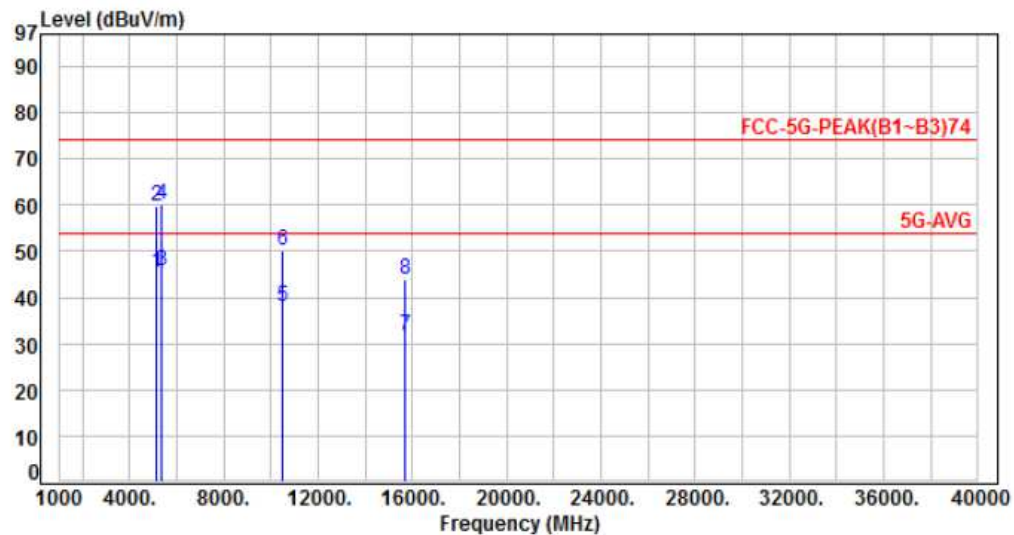
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 10, CH48	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.13	45.42	54.00	-8.58	Average	128	325	P
2	5150.00	-12.71	72.28	59.57	74.00	-14.43	Peak	128	325	P
3	5350.00	-12.32	58.04	45.72	54.00	-8.28	Average	128	325	P
4	5350.00	-12.32	72.33	60.01	74.00	-13.99	Peak	128	325	P
5	10480.00	-7.42	45.46	38.04	54.00	-15.96	Average	282	286	P
6	10480.00	-7.42	57.42	50.00	74.00	-24.00	Peak	282	286	P
7	15720.00	-3.81	35.35	31.54	54.00	-22.46	Average	247	280	P
8	15720.00	-3.81	47.77	43.96	74.00	-30.04	Peak	247	280	P

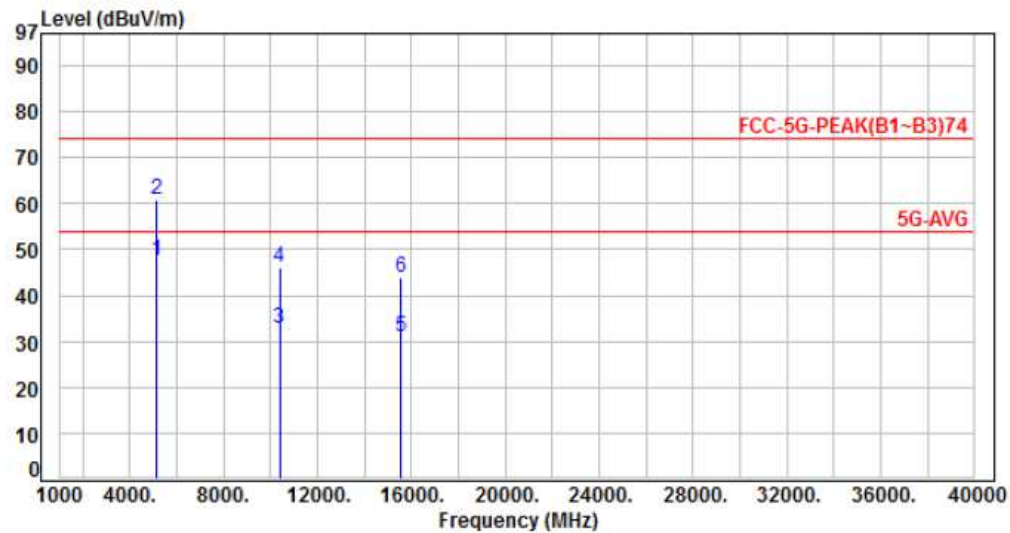
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 11, CH38	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	60.26	47.55	54.00	-6.45	Average	173	286	P
2	5150.00	-12.71	73.40	60.69	74.00	-13.31	Peak	173	286	P
3	10380.00	-7.43	40.43	33.00	54.00	-21.00	Average	152	261	P
4	10380.00	-7.43	53.61	46.18	74.00	-27.82	Peak	152	261	P
5	15570.00	-3.78	34.68	30.90	54.00	-23.10	Average	188	293	P
6	15570.00	-3.78	47.82	44.04	74.00	-29.96	Peak	188	293	P

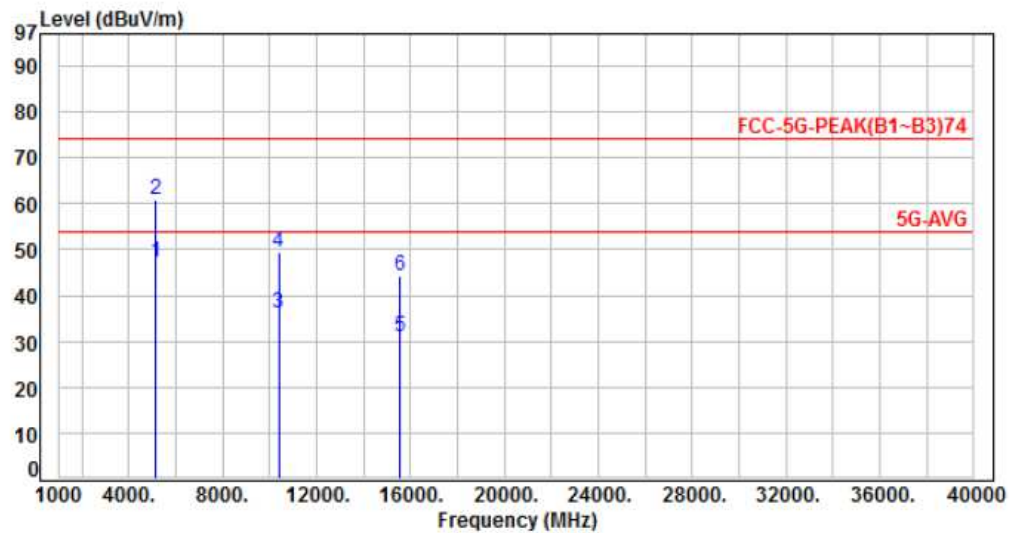
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 11, CH38	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	60.07	47.36	54.00	-6.64	Average	226	335	P
2	5150.00	-12.71	73.53	60.82	74.00	-13.18	Peak	226	335	P
3	10380.00	-7.43	43.66	36.23	54.00	-17.77	Average	183	309	P
4	10380.00	-7.43	56.91	49.48	74.00	-24.52	Peak	183	309	P
5	15570.00	-3.78	34.78	31.00	54.00	-23.00	Average	162	289	P
6	15570.00	-3.78	47.87	44.09	74.00	-29.91	Peak	162	289	P

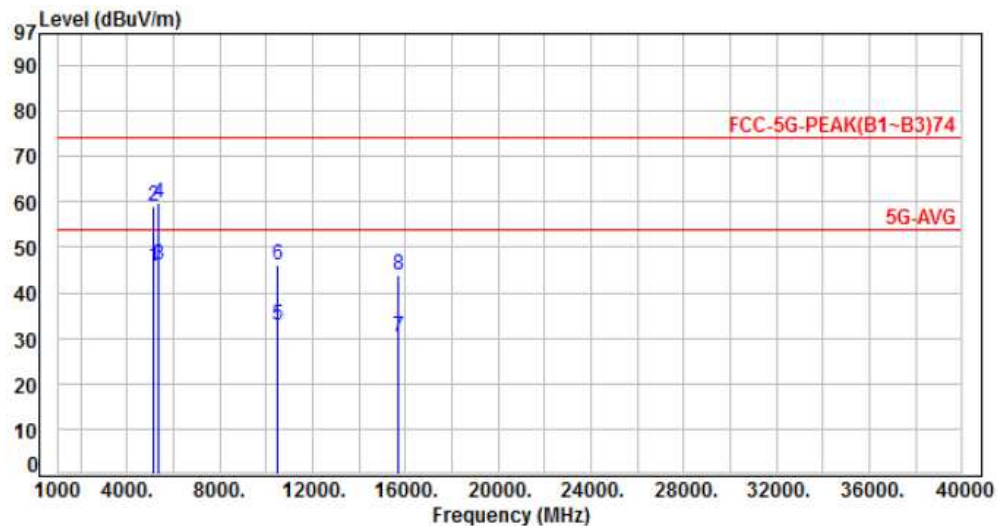
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 11, CH46	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.42	45.71	54.00	-8.29	Average	165	257	P
2	5150.00	-12.71	71.63	58.92	74.00	-15.08	Peak	165	257	P
3	5350.00	-12.32	58.32	46.00	54.00	-8.00	Average	165	257	P
4	5350.00	-12.32	72.11	59.79	74.00	-14.21	Peak	165	257	P
5	10460.00	-7.42	40.13	32.71	54.00	-21.29	Average	153	99	P
6	10460.00	-7.42	53.60	46.18	74.00	-27.82	Peak	153	99	P
7	15690.00	-3.81	34.12	30.31	54.00	-23.69	Average	173	231	P
8	15690.00	-3.81	47.80	43.99	74.00	-30.01	Peak	173	231	P

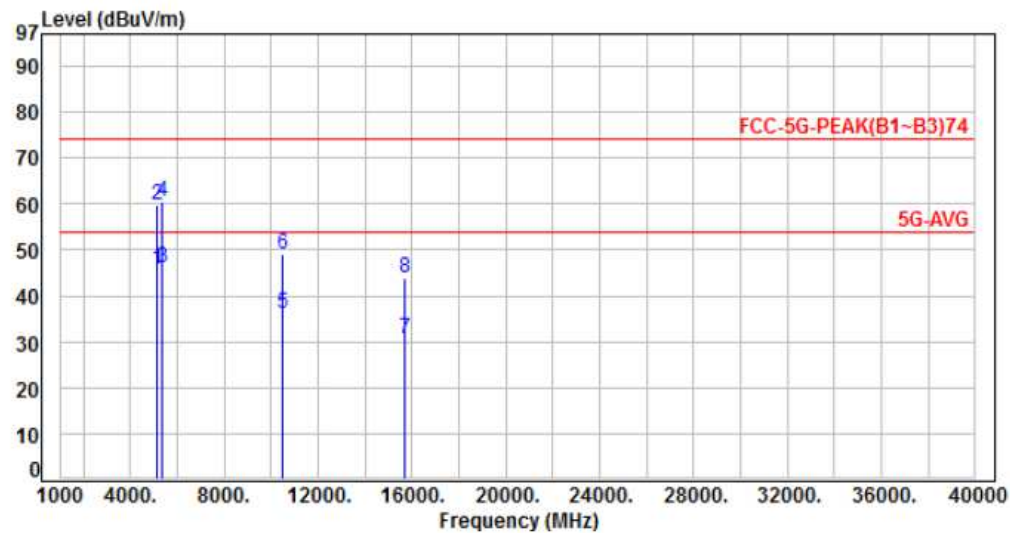
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 11, CH46	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	58.51	45.80	54.00	-8.20	Average	221	334	P
2	5150.00	-12.71	72.35	59.64	74.00	-14.36	Peak	221	334	P
3	5350.00	-12.32	58.53	46.21	54.00	-7.79	Average	221	334	P
4	5350.00	-12.32	72.66	60.34	74.00	-13.66	Peak	221	334	P
5	10460.00	-7.42	43.42	36.00	54.00	-18.00	Average	128	320	P
6	10460.00	-7.42	56.56	49.14	74.00	-24.86	Peak	128	320	P
7	15690.00	-3.81	34.39	30.58	54.00	-23.42	Average	240	279	P
8	15690.00	-3.81	47.75	43.94	74.00	-30.06	Peak	240	279	P

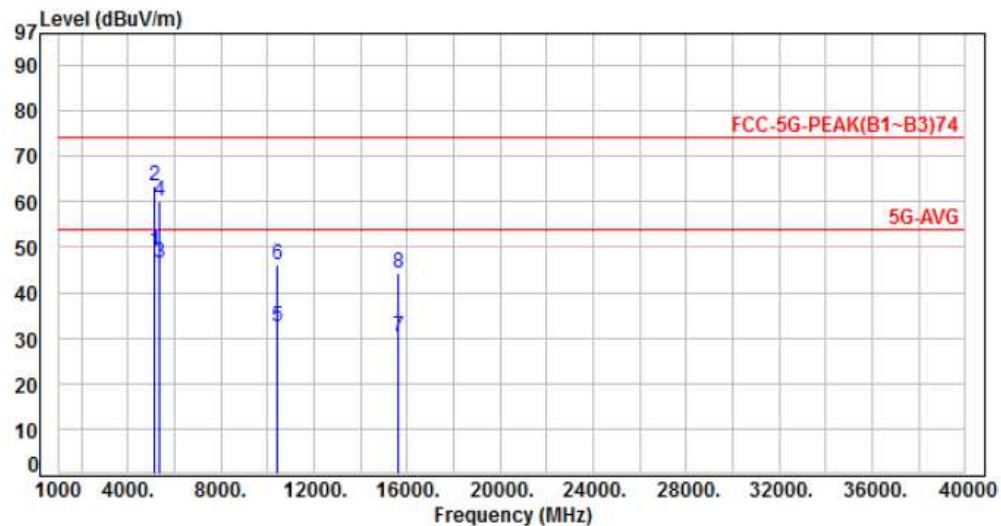
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: VERTICAL
Test Mode	: Mode 12, CH42	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	61.92	49.21	54.00	-4.79	Average	156	288	P
2	5150.00	-12.71	76.14	63.43	74.00	-10.57	Peak	156	288	P
3	5350.00	-12.32	58.67	46.35	54.00	-7.65	Average	156	288	P
4	5350.00	-12.32	72.49	60.17	74.00	-13.83	Peak	156	288	P
5	10420.00	-7.44	39.90	32.46	54.00	-21.54	Average	261	302	P
6	10420.00	-7.44	53.52	46.08	74.00	-27.92	Peak	261	302	P
7	15630.00	-3.80	34.02	30.22	54.00	-23.78	Average	167	198	P
8	15630.00	-3.80	47.93	44.13	74.00	-29.87	Peak	167	198	P

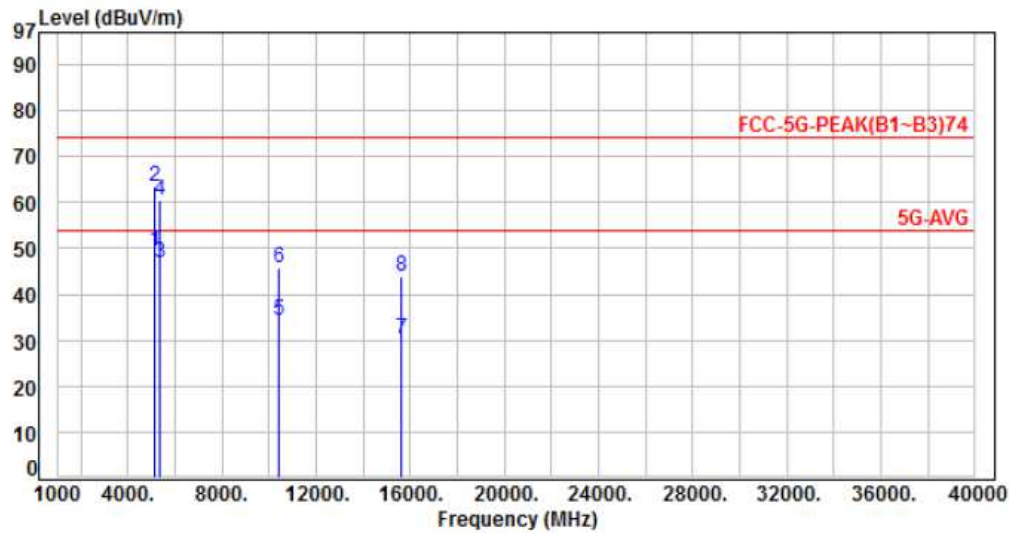
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: PoE 54V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 12, CH42	Temperature	: 22 °C
Test Date	: Jul. 26, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	-12.71	62.30	49.59	54.00	-4.41	Average	213	356	P
2	5150.00	-12.71	76.10	63.39	74.00	-10.61	Peak	213	356	P
3	5350.00	-12.32	59.21	46.89	54.00	-7.11	Average	213	356	P
4	5350.00	-12.32	72.90	60.58	74.00	-13.42	Peak	213	356	P
5	10420.00	-7.44	41.82	34.38	54.00	-19.62	Average	251	30	P
6	10420.00	-7.44	53.22	45.78	74.00	-28.22	Peak	251	30	P
7	15630.00	-3.80	34.11	30.31	54.00	-23.69	Average	271	298	P
8	15630.00	-3.80	47.86	44.06	74.00	-29.94	Peak	271	298	P

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



7. On Time, Duty Cycle and Measurement methods

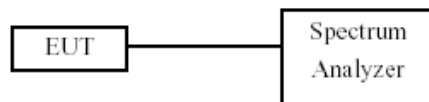
7.1. Test Limit

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: 22°C

Humidity: 65%

Test Date: Jul. 26, 2017

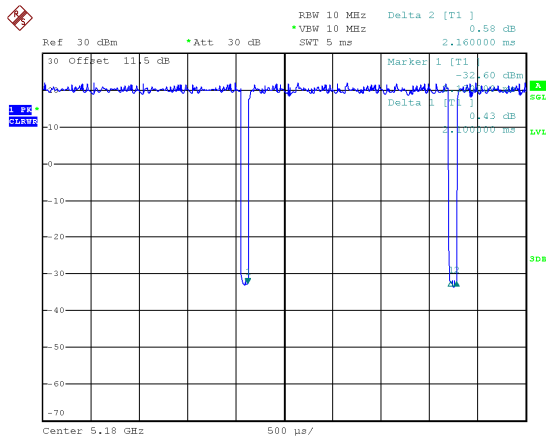
Modulation Type	On Time (msec)	Period Time (msec)	Duty Cycle (%)	1/T Minimum VBW(Hz)	Duty Cycle correction Factor (dB)
802.11a	2.10	2.16	97.22%	476.19	0.12
802.11ac VHT20	5.08	5.12	99.22%	196.85	0.03
802.11ac VHT40	2.46	2.53	97.23%	406.50	0.12
802.11ac VHT80	1.16	1.24	94.17%	859.11	0.26

7.5. Measurement Methods

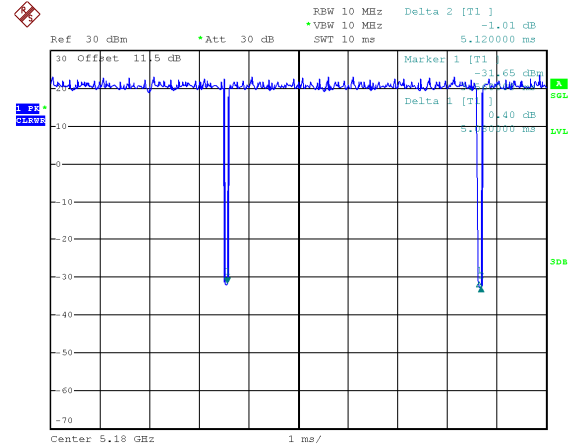
26 dB and 6dB Emission BW	KDB 789033 D02 v01, Section C
99% Occupied BW	KDB 789033 D02 v01, Section D
Conducted Output Power	KDB 789033 D02 v01, Section E.2.d and E.3.b (Method PM-G)
Power Spectral Density	KDB 789033 D02 v01, Section F
Unwanted emissions in restricted bands	KDB 789033 D02 v01, Sections G and H
Unwanted emissions in non-restricted bands	KDB 789033 D02 v01, Sections G and H



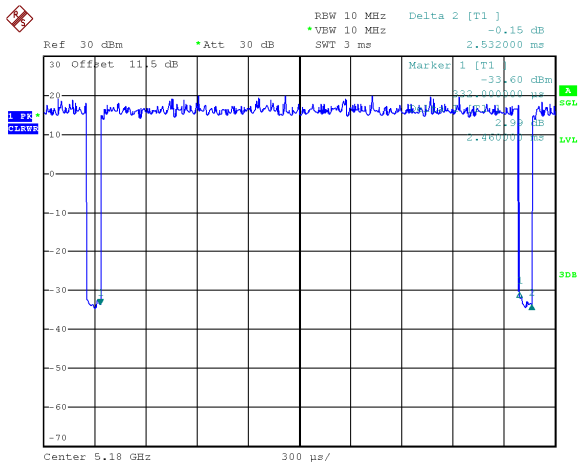
Modulation Standard: 802.11a (6Mbps)



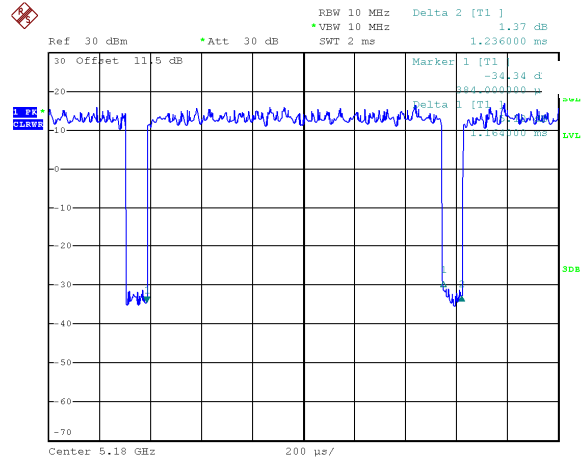
Modulation Standard: 802.11ac, VHT20 (6.5Mbps)



Modulation Standard: 802.11ac, VHT40 (13.5Mbps)



Modulation Standard: 802.11ac, VHT80 (29.3Mbps)





8. 26dB Bandwidth

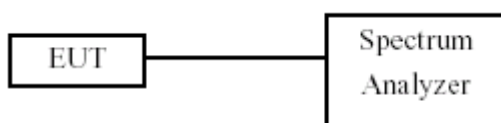
8.1. Test Limit

None; for reporting purposes only.

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 = approximately 1% of the emission bandwidth, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

8.3. Test Setup Layout



8.4. Test Result and Data

Temperature: 22°C

Humidity: 65%

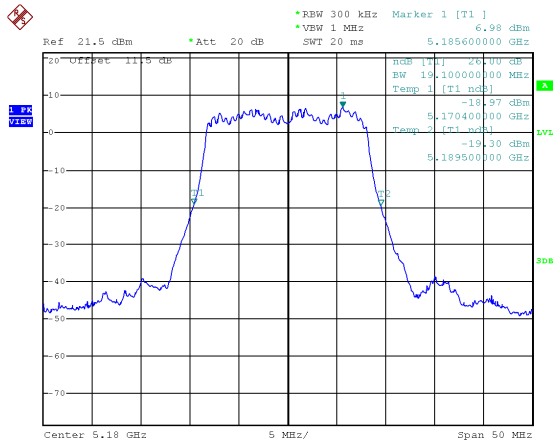
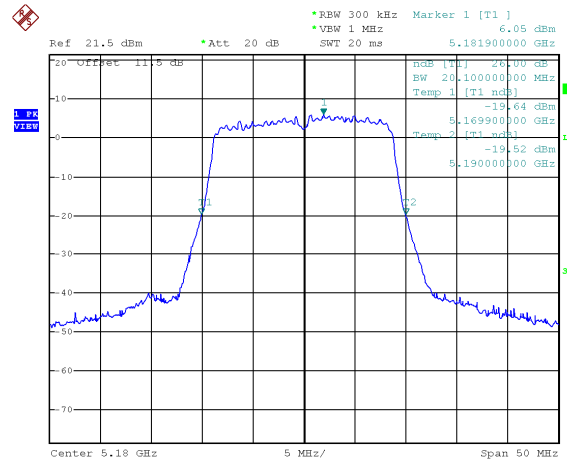
Test Date: Jul. 26, 2017

In the 5.2G Band

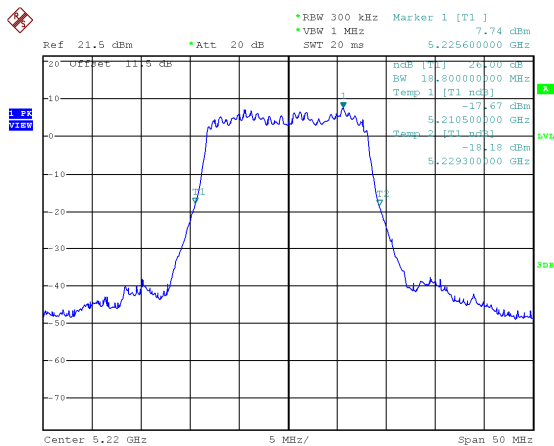
Modulation Type	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
			ANT A	ANT B
802.11a	36	5180	19.10	19.40
	44	5220	18.80	19.50
	48	5240	18.90	19.50
802.11ac VHT20	36	5180	20.10	20.40
	44	5220	20.00	20.40
	48	5240	20.00	20.40
802.11ac VHT40	38	5190	40.80	40.80
	46	5230	40.80	40.80
802.11ac VHT80	42	5210	83.84	84.16



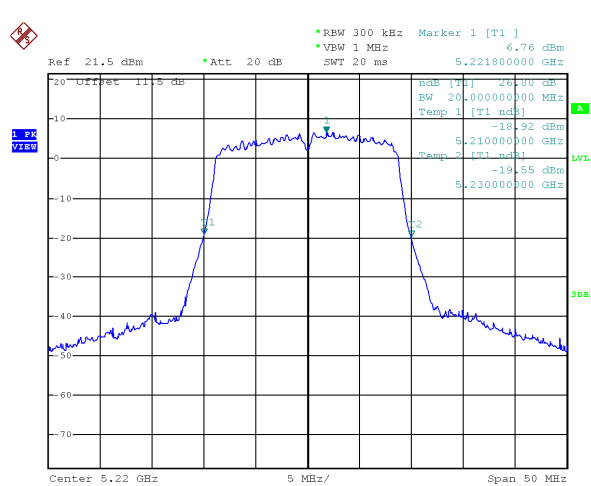
ANT A

Modulation Standard: 802.11a (6Mbps)
CH36802.11ac VHT20 (6.5Mbps)
CH36

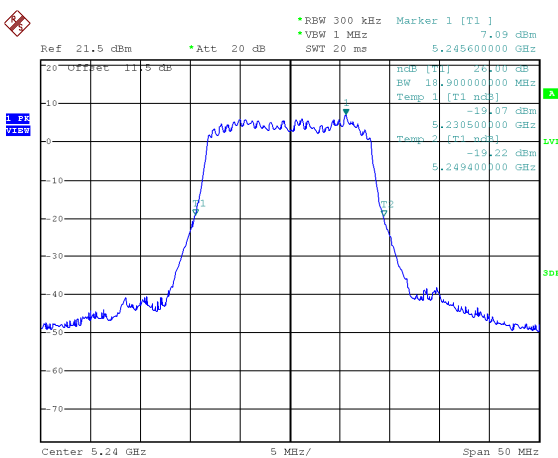
CH44



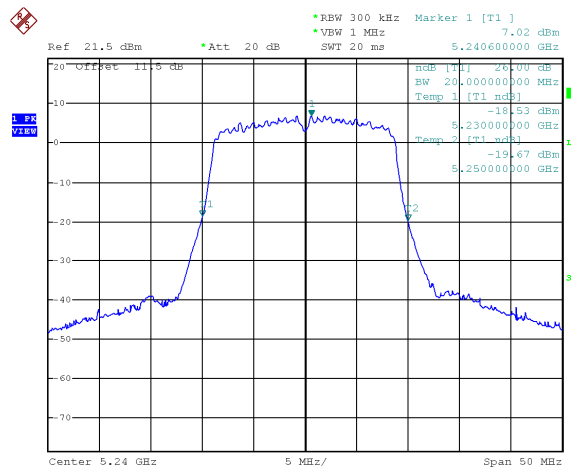
CH44



CH48



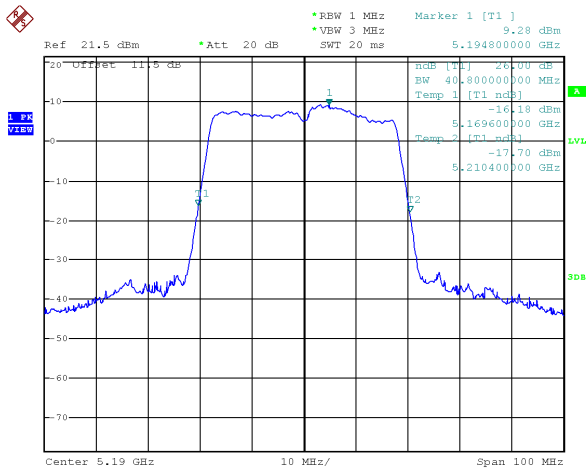
CH48



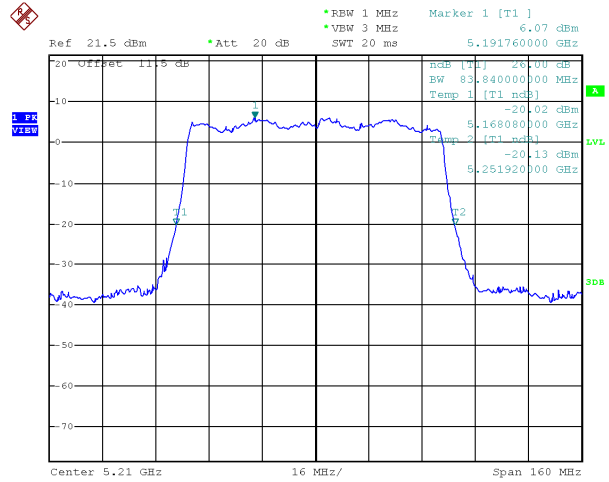


ANT A

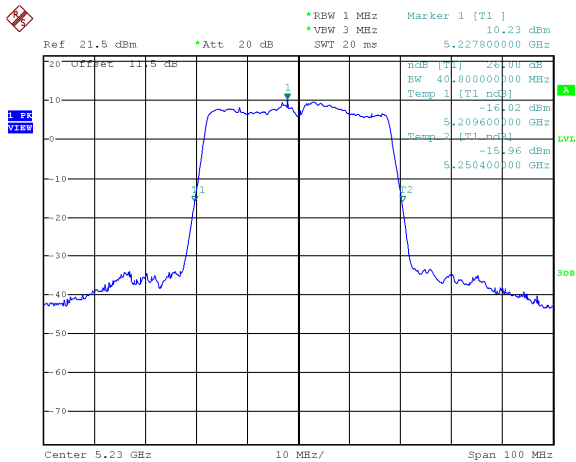
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42

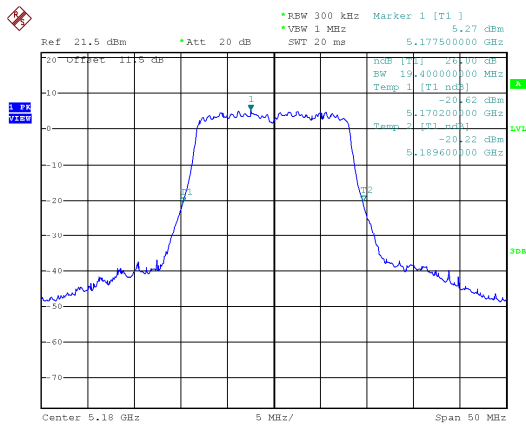
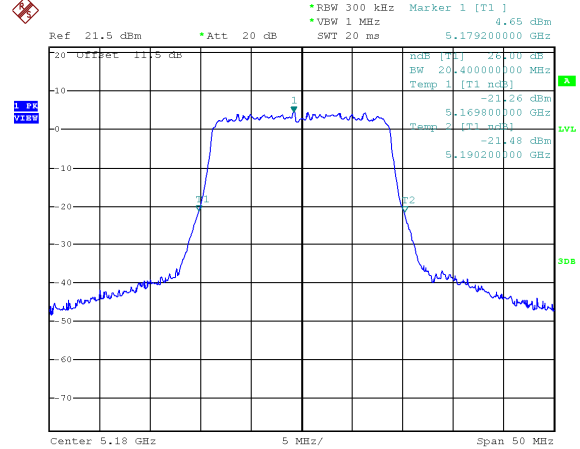


CH46

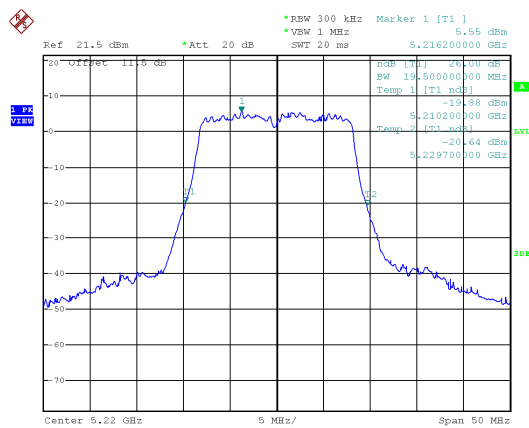




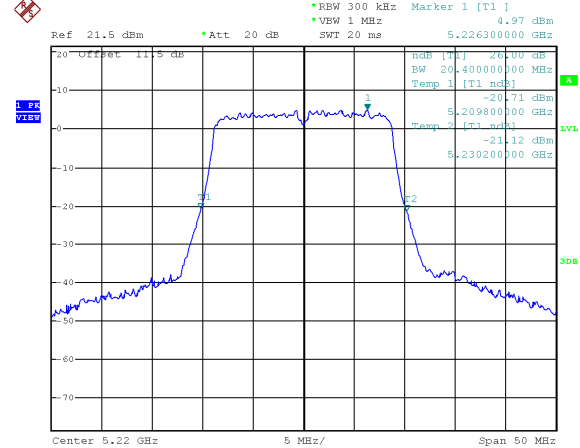
ANT B

Modulation Standard: 802.11a (6Mbps)
CH36802.11ac VHT20 (6.5Mbps)
CH36

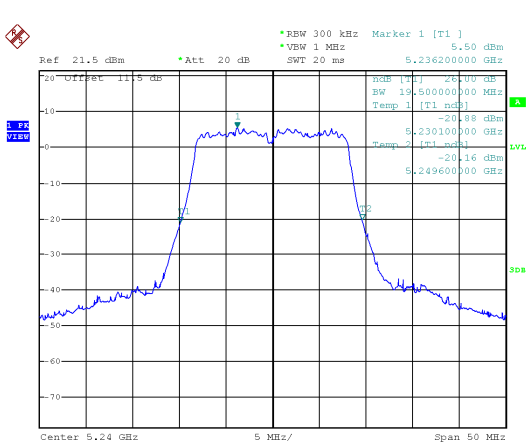
CH44



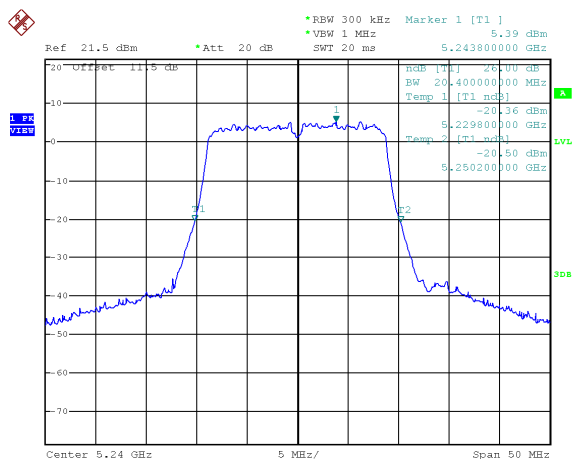
CH44



CH48

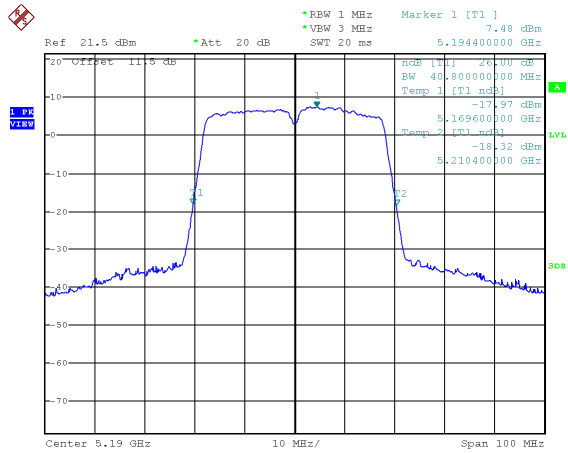
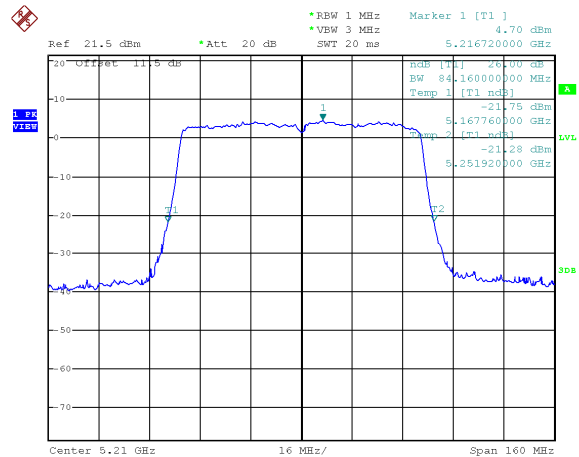


CH48

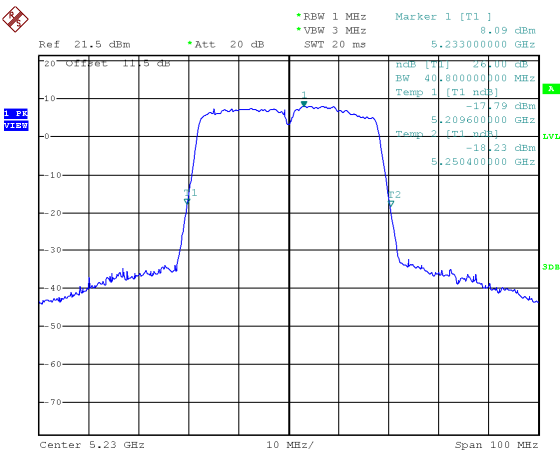




ANT B

Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42

CH46





9. Average Power

9.1. Test Limit

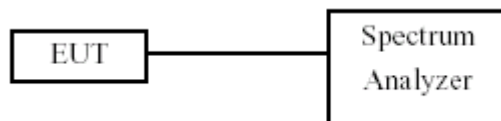
For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum 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 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

9.2. 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.

9.3. Test Setup Layout





9.4. Test Result and Data

Temperature: 22°C

Humidity: 65%

Test Date: Jul. 26, 2017

Non-Beamforming

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	13.09	13.24	16.18	41.46	30.00
	44	5220	13.21	13.29	16.26	42.27	30.00
	48	5240	12.96	12.79	15.89	38.78	30.00
802.11an HT20	36	5180	13.01	13.36	16.20	41.68	30.00
	44	5220	13.11	13.31	16.22	41.89	30.00
	48	5240	13.22	13.24	16.24	42.08	30.00
802.11an HT40	38	5190	13.08	13.29	16.20	41.65	30.00
	46	5230	13.15	13.29	16.23	41.98	30.00
802.11ac VHT20	36	5180	13.02	13.38	16.21	41.82	30.00
	44	5220	13.22	13.25	16.25	42.12	30.00
	48	5240	13.19	13.31	16.26	42.27	30.00
802.11ac VHT40	38	5190	13.14	13.35	16.26	42.23	30.00
	46	5230	13.32	13.21	16.28	42.42	30.00
802.11ac VHT80	42	5210	13.18	13.2	16.20	41.69	30.00

**Non-Beamforming****In the 5.2G Band**

Modulation Type	Channel	Freq. (MHz)	N _{SS}	N _{TX}	Measured value of each antenna port (dBm)		Gain above 30° (dB)	E.I.R.P Power above 30° (dBm)	Total E.I.R.P above 30° (dBm)	E.I.R.P Limit (dBm)
802.11a	36	5180	1	2	ANT 1	13.09	4.7	17.79	20.88	21
					ANT 2	13.24	4.7	17.94		
802.11a	44	5220	1	2	ANT 1	13.21	4.7	17.91	20.96	21
					ANT 2	13.29	4.7	17.99		
802.11a	48	5240	1	2	ANT 1	12.96	4.7	17.66	20.59	21
					ANT 2	12.79	4.7	17.49		
802.11n HT20	36	5180	1	2	ANT 1	13.01	4.7	17.71	20.90	21
					ANT 2	13.36	4.7	18.06		
802.11n HT20	44	5220	1	2	ANT 1	13.11	4.7	17.81	20.92	21
					ANT 2	13.31	4.7	18.01		
802.11n HT20	48	5240	1	2	ANT 1	13.22	4.7	17.92	20.94	21
					ANT 2	13.24	4.7	17.94		
802.11n HT40	38	5190	1	2	ANT 1	13.08	4.7	17.78	20.90	21
					ANT 2	13.29	4.7	17.99		
802.11n HT40	46	5230	1	2	ANT 1	13.15	4.7	17.85	20.93	21
					ANT 2	13.29	4.7	17.99		
802.11ac VHT20	36	5180	1	2	ANT 1	13.02	4.7	17.72	20.91	21
					ANT 2	13.38	4.7	18.08		
802.11ac VHT20	44	5220	1	2	ANT 1	13.22	4.7	17.92	20.95	21
					ANT 2	13.25	4.7	17.95		
802.11ac VHT20	48	5240	1	2	ANT 1	13.19	4.7	17.89	20.96	21
					ANT 2	13.31	4.7	18.01		
802.11ac VHT40	38	5190	1	2	ANT 1	13.14	4.7	17.84	20.96	21
					ANT 2	13.35	4.7	18.05		
802.11ac VHT40	46	5230	1	2	ANT 1	13.32	4.7	18.02	20.98	21
					ANT 2	13.21	4.7	17.91		
802.11ac VHT80	42	5210	1	2	ANT 1	13.18	4.7	17.88	20.90	21
					ANT 2	13.2	4.7	17.9		

**Beamforming****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	10.08	10.23	13.17	20.73	28.84
	44	5220	10.2	10.28	13.25	21.14	28.84
	48	5240	9.95	9.78	12.88	19.39	28.84
802.11an HT20	36	5180	10	10.35	13.19	20.84	28.84
	44	5220	10.1	10.3	13.21	20.95	28.84
	48	5240	10.21	10.23	13.23	21.04	28.84
802.11an HT40	38	5190	10.07	10.28	13.19	20.83	28.84
	46	5230	10.14	10.28	13.22	20.99	28.84
802.11ac VHT20	36	5180	10.01	10.37	13.20	20.91	28.84
	44	5220	10.21	10.24	13.24	21.06	28.84
	48	5240	10.18	10.3	13.25	21.14	28.84
802.11ac VHT40	38	5190	10.13	10.34	13.25	21.12	28.84
	46	5230	10.31	10.2	13.27	21.21	28.84
802.11ac VHT80	42	5210	10.17	10.19	13.19	20.85	28.84

**Beamforming****In the 5.2G Band**

Modulation Type	Channel	Freq. (MHz)	N _{SS}	N _{TX}	Measured value of each antenna port (dBm)		Gain above 30° (dB)	E.I.R.P Power above 30° (dBm)	Total E.I.R.P above 30° (dBm)	E.I.R.P Limit (dBm)
802.11a	36	5180	1	2	ANT 1	10.08	7.71	17.79	20.88	21
					ANT 2	10.23	7.71	17.94		
802.11a	44	5220	1	2	ANT 1	10.2	7.71	17.91	20.96	21
					ANT 2	10.28	7.71	17.99		
802.11a	48	5240	1	2	ANT 1	9.95	7.71	17.66	20.59	21
					ANT 2	9.78	7.71	17.49		
802.11n HT20	36	5180	1	2	ANT 1	10	7.71	17.71	20.90	21
					ANT 2	10.35	7.71	18.06		
802.11n HT20	44	5220	1	2	ANT 1	10.1	7.71	17.81	20.92	21
					ANT 2	10.3	7.71	18.01		
802.11n HT20	48	5240	1	2	ANT 1	10.21	7.71	17.92	20.94	21
					ANT 2	10.23	7.71	17.94		
802.11n HT40	38	5190	1	2	ANT 1	10.07	7.71	17.78	20.90	21
					ANT 2	10.28	7.71	17.99		
802.11n HT40	46	5230	1	2	ANT 1	10.14	7.71	17.85	20.93	21
					ANT 2	10.28	7.71	17.99		
802.11ac VHT20	36	5180	1	2	ANT 1	10.01	7.71	17.72	20.91	21
					ANT 2	10.37	7.71	18.08		
802.11ac VHT20	44	5220	1	2	ANT 1	10.21	7.71	17.92	20.95	21
					ANT 2	10.24	7.71	17.95		
802.11ac VHT20	48	5240	1	2	ANT 1	10.18	7.71	17.89	20.96	21
					ANT 2	10.3	7.71	18.01		
802.11ac VHT40	38	5190	1	2	ANT 1	10.13	7.71	17.84	20.96	21
					ANT 2	10.34	7.71	18.05		
802.11ac VHT40	46	5230	1	2	ANT 1	10.31	7.71	18.02	20.98	21
					ANT 2	10.2	7.71	17.91		
802.11ac VHT80	42	5210	1	2	ANT 1	10.17	7.71	17.88	20.90	21
					ANT 2	10.19	7.71	17.9		



10. PPSS

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.
☐	Mobile and portable 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.

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



10.2. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was Measured with an average power meter employing a video bandwidth greater than 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

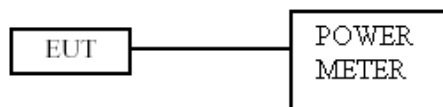
802.11an (BW $\leq$ 40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)

Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D01 section F) procedure is used for measurements.

10.3. Test Setup Layout



10.4. Test Result and Data

Temperature: 22°C

Humidity: 65%

Test Date: Jul. 26, 2017

In the 5.2G Band

Modulation Type	CH	Freq. (MHz)	Meas PPSSD (dBm/MHz)		Sum chain (dBm)	Duty Cycle CF(dB)	Total Corr'd PPSSD (dBm/MHz)	PPSSD Limit (dBm/MHz)
			ANT A	ANT B				
802.11a	36	5180	1.89	1.62	4.77	0.12	4.89	15.29
	44	5220	2.33	2.12	5.24	0.12	5.36	15.29
	48	5240	2.66	1.79	5.26	0.12	5.38	15.29
802.11ac VHT20	36	5180	1.54	1.50	4.53	0.00	4.53	15.29
	44	5220	2.01	1.99	5.01	0.00	5.01	15.29
	48	5240	2.11	2.16	5.15	0.00	5.15	15.29
802.11ac VHT40	38	5190	-1.17	-1.20	1.83	0.12	1.95	15.29
	46	5230	-0.52	-0.58	2.46	0.12	2.58	15.29
802.11ac VHT80	42	5210	-4.39	-4.45	-1.41	0.26	-1.15	15.29

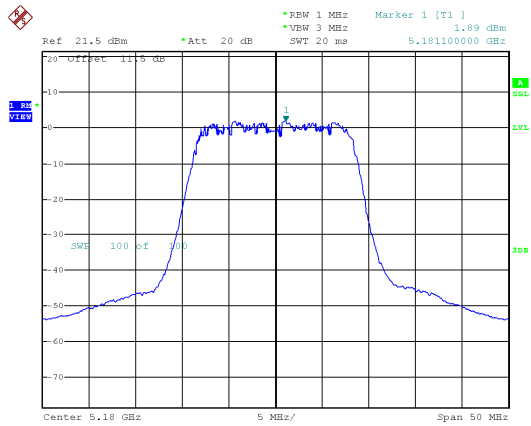


5.2G Band

ANT A

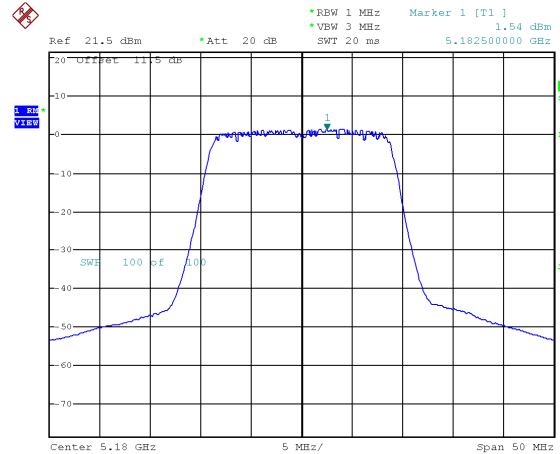
Modulation Standard: 802.11a (6Mbps)

CH36

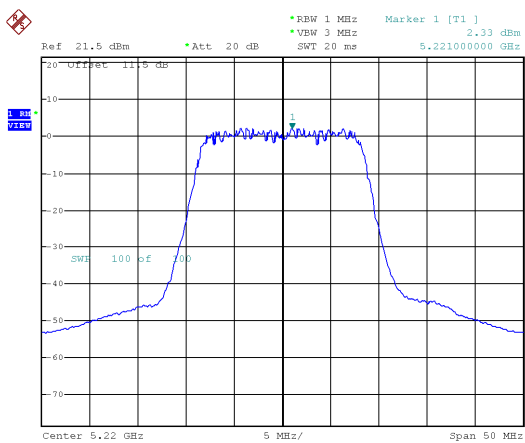


Modulation Standard: 802.11ac VHT20 (6.5Mbps)

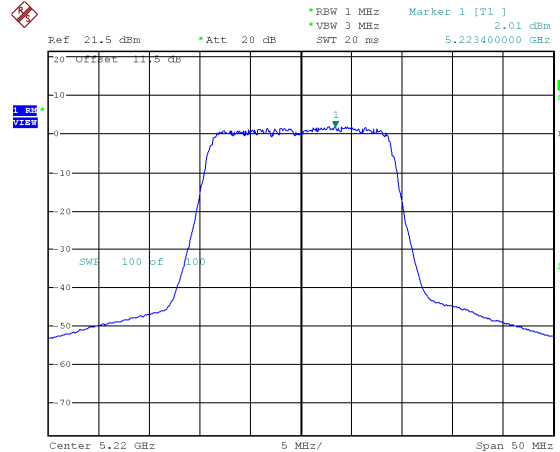
CH36



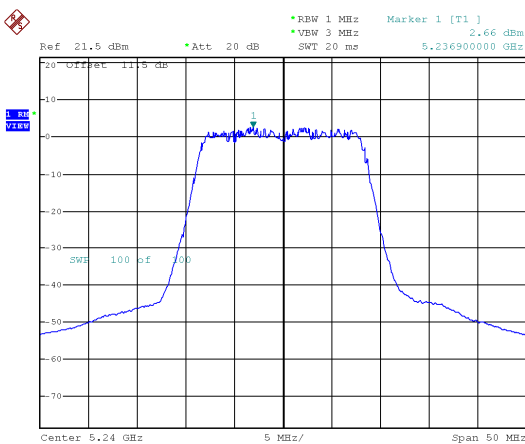
CH44



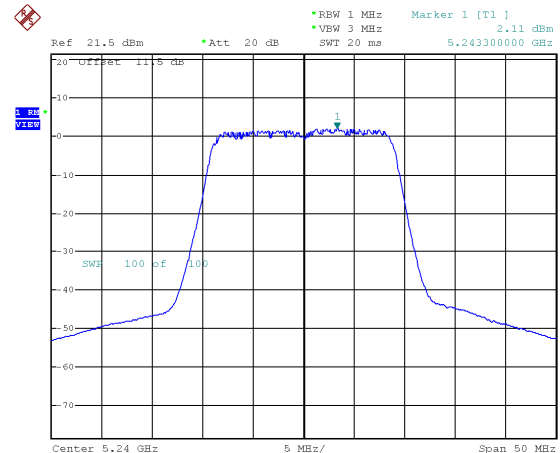
CH44



CH48



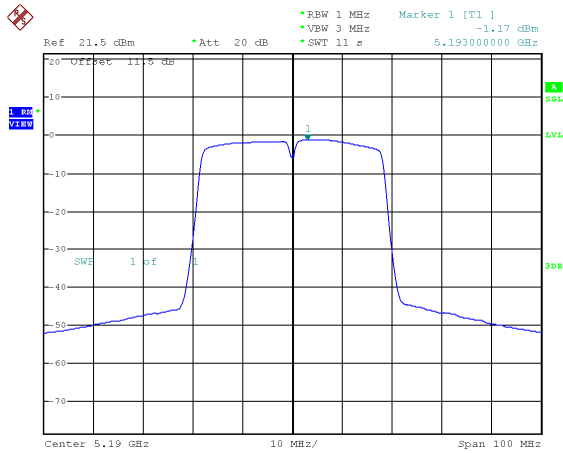
CH48



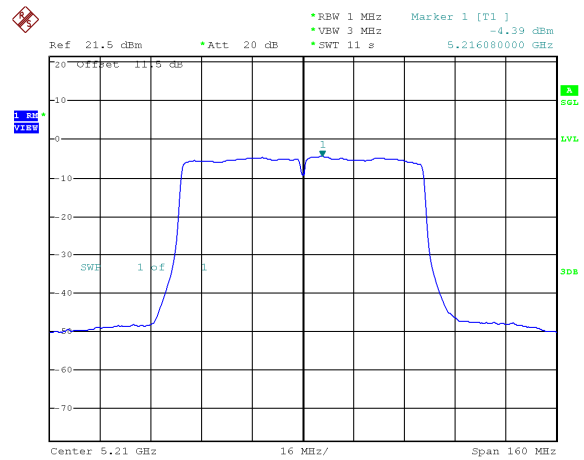


ANT A

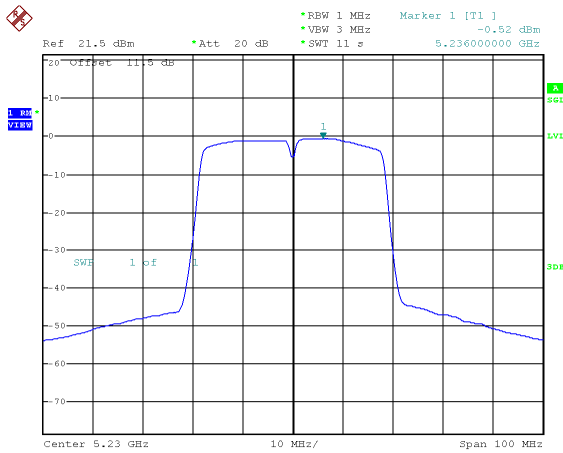
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42

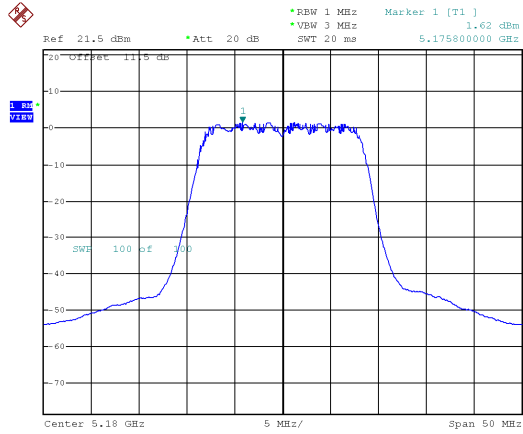
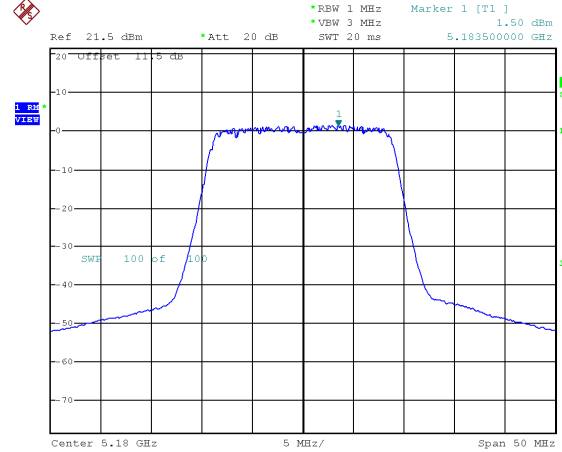


CH46

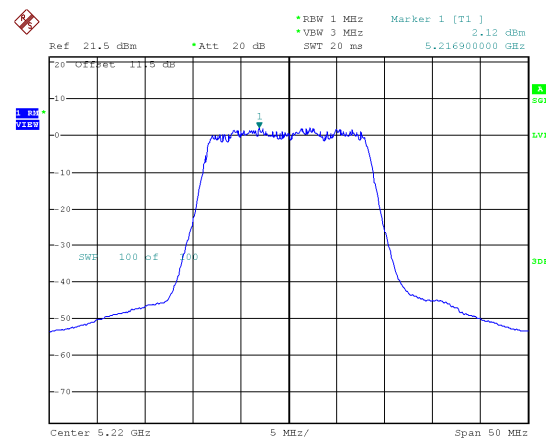




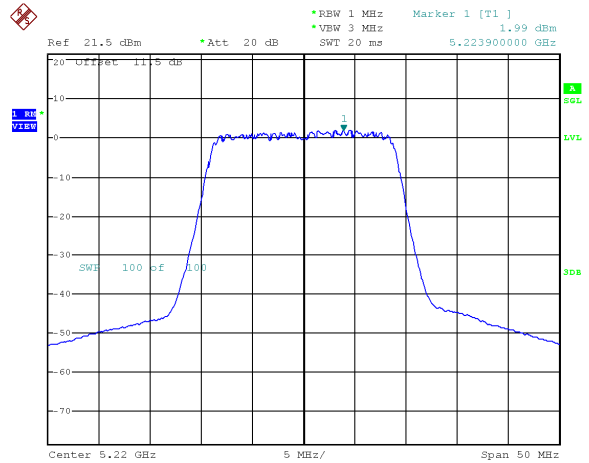
ANT B

Modulation Standard: 802.11a (6Mbps)
CH36Modulation Standard: 802.11ac VHT20 (6.5Mbps)
CH36

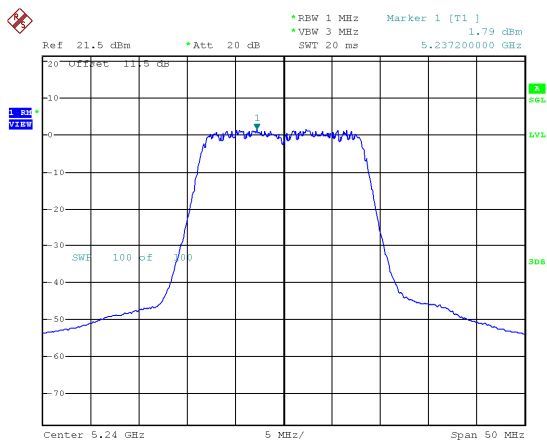
CH44



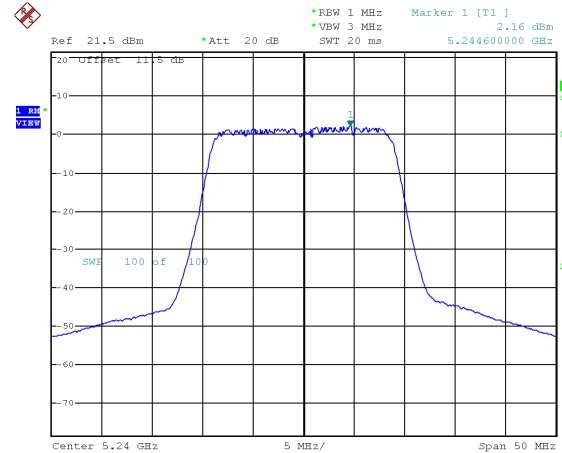
CH44



CH48



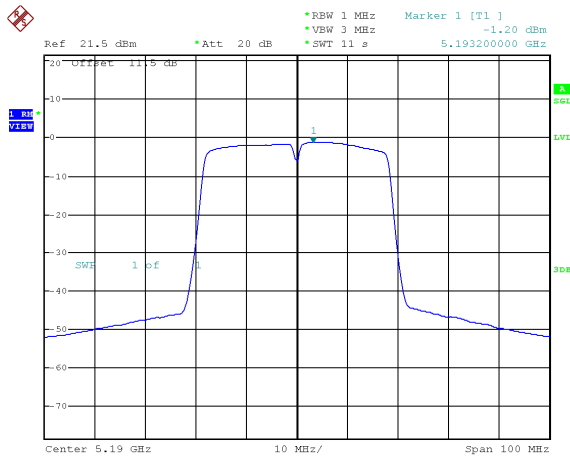
CH48



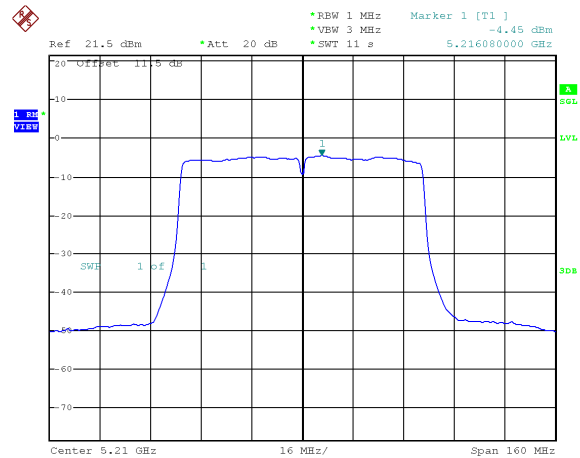


ANT B

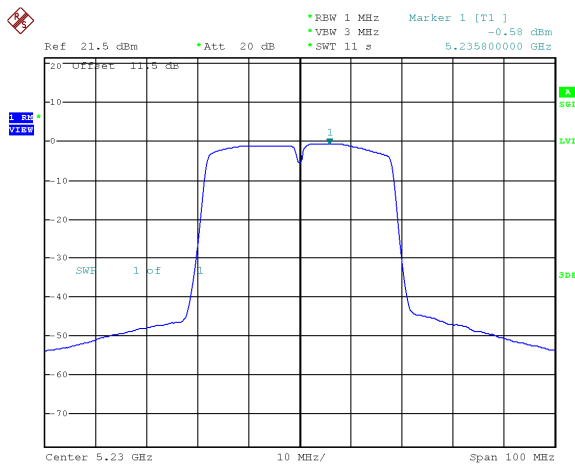
Modulation Standard: 802.11ac VHT40 (13.5Mbps)
CH38



Modulation Standard: 802.11ac VHT80 (29.3Mbps)
CH42



CH46



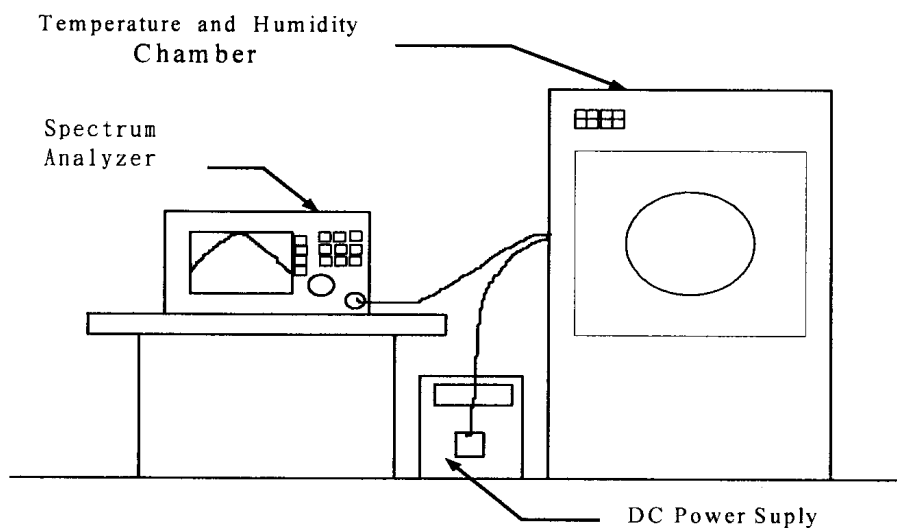


11. Frequency Stability

11.1. 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.

11.2. Test Setup Layout



**11.3. Test Result and Data**

Temperature: 22°C

Humidity: 65%

Test Date: Jul. 26, 2017

Operating frequency: 5180 MHz							
Temp	Power supply	2 minute		5 minute		10 minute	
(°C)	(V)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	102	5179.4974	-0.000035	5179.1516	0.000749	5179.0056	0.000234
	120	5179.6334	0.000066	5179.9756	0.001301	5179.9184	-0.000182
	138	5179.7943	0.000723	5179.2237	-0.001694	5179.2622	0.000291
40	102	5179.0252	-0.000087	5179.3335	0.001183	5179.7701	0.000889
	120	5179.6280	-0.000595	5179.4832	0.000750	5179.8492	-0.001283
	138	5179.9795	0.001844	5179.7174	-0.001823	5179.9561	-0.000804
30	102	5179.1445	0.001776	5179.1618	0.000864	5179.1087	-0.000221
	120	5179.4715	-0.000289	5179.5733	-0.000899	5179.8871	0.000158
	138	5179.7975	-0.001096	5179.1600	-0.001527	5179.1165	-0.001613
20	102	5179.2881	0.000340	5179.8894	0.001754	5179.0658	-0.001236
	120	5179.5670	-0.000505	5179.4950	0.001246	5179.6920	-0.000724
	138	5179.1532	-0.001367	5179.1754	0.000047	5179.5782	-0.001043
10	102	5179.2971	-0.001401	5179.9213	0.000707	5179.3499	0.000522
	120	5179.9943	-0.001771	5179.6311	0.000934	5179.9723	-0.001719
	138	5179.4614	0.000360	5179.4954	0.000550	5179.6987	-0.000046
0	102	5179.7866	-0.001537	5179.2902	-0.000248	5179.6272	-0.000599
	120	5179.9886	-0.001776	5179.1993	-0.000590	5179.4216	-0.001717
	138	5179.9003	0.000596	5179.2295	-0.001158	5179.2762	0.001427
-10	102	5179.8533	-0.001740	5179.8228	-0.001451	5179.2671	-0.000179
	120	5179.0803	-0.000068	5179.7678	-0.001639	5179.1653	-0.000534
	138	5179.0898	0.000861	5179.6837	-0.001446	5179.0078	-0.000335
-20	102	5179.4519	-0.001734	5179.8279	0.000959	5179.6316	0.001825
	120	5179.3149	0.001171	5179.2675	0.001659	5179.1651	0.000509
	138	5179.2359	-0.001608	5179.0361	0.000555	5179.3266	0.000341
-30	102	5179.3564	0.001330	5179.9514	-0.000388	5179.5166	0.000890
	120	5179.4934	0.001713	5179.7267	0.001778	5179.6412	-0.001050
	138	5179.7799	-0.001098	5179.1932	0.000875	5179.8709	-0.001133

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.



12. Automatically Discontinue Transmission

12.1.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.

12.2.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.