

CIG SHANGHAI CO., LTD.

Application
For
Certification

FCC ID: SFK-OAPDBNA**WiFi Access Point****Model: WF-3220-Z1**

Report No.: 130422002SZN -002

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-12]

Prepared and Checked by:

Approved by:

Sign on file

Billy Li
Supervisor

Leung Wai Leung, Tommy
Deputy General Manager
Date: April 22, 2013

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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11.5 Test Result: Pass70

2 GENERAL INFORMATION

2.1 Product Description for Equipment Under Test (EUT)

The CIG SHANGHAI CO.,LTD's product, model number: WF-3220-Z1 (FCC ID:SFK-OAPDBNA)(the "EUT") in this report is a Wireless Access Point, which was measured approximately: 300mm * 226mm * 144.5mm

Adapter information:

Model: DBcom-PSE01A-G

Input: AC100-240V, 50/60Hz,

Output: DC48V, 500mA/25W

Appearance of EUT:



2.2 Objective

This Type approval report is prepared on behalf of CIG SHANGHAI CO.,LTD in accordance with Part 2、 Part 15 of the Federal Communication Commissions rules.

2.3 Related Submittal(s)/Grant(s)

No related submittal(s).

2.4 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2. as well as the following parts:

Part 15 Wireless Communication Services

Applicable Standards: ANSI C63.4-2009, KDB 558074, KDB 662911.

All radiated and conducted measurement was performed at ZTE Corporation Reliability Testing Center. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.



2.5 Test Facility

The Test site used by ZTE Corporation to collect test data is located in the 1/F,B2 Wing, ZTE Plaza, Keji Road South, Shenzhen, Guangdong, 518057, P.R.China, Tel: +86-755-26771609,Fax: +86-755-26770347. Test site at ZTE Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC). ZTE Corporation EMC Lab was certificated by CNAS and the registration number was L0611. The FCC registration number of ZTE corporation EMC lab is 373926. The IC registration number of ZTE corporation EMC lab is 5200A. The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No. of CIG SHANGHAI CO.,LTD: 0022496871.

2.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiated emissions measurement at the EMC lab. is 3.8dB,and conducted emission is 2.1dB



3 SYSTEM TEST CONFIGURATION

3.1 Identification of EUT

Category: IEEE 802.11a/g /n Wireless Access Point

Model Name: WF-3220-Z1

Alternate model: N/A

Brand name: N/A

Adapter:

Product: Switching Power Supply

Model: DBcom-PSE01A-G

Input: 100-240Vac 50/60Hz

Output: DC48V, 500mA/25W

3.2 Detail Specification

Operation Frequency: 5745 MHz -5825MHz

Type of Spectrum: OFDM

Category: 802.11a; 802.11n (HT20)

Operation Frequency: 5755 MHz -5795MHz

Type of Spectrum: OFDM

Category: 802.11n (HT40)

Antenna Type: External Antenna

Antenna Number: 1

MIMO Antenna gain: 17dBi

Data rate: 6, 6.5, 9,12,13,19.5, 24, 26,27,36,48,54, and maximum of 135Mbps

3.3 Information Related to Testing

Test mode

TM1: 120VAC 60Hz TX MODE continuous transmitting with maximum power control level.

For 802.11 a, n (HT20)

TRF no.: FCC 15C_Tx_c

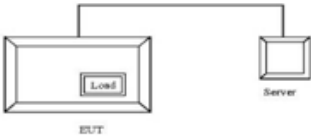


CH LOW: 5745MHz
CH MID: 5785MHz
CH HIGH: 5825MHz

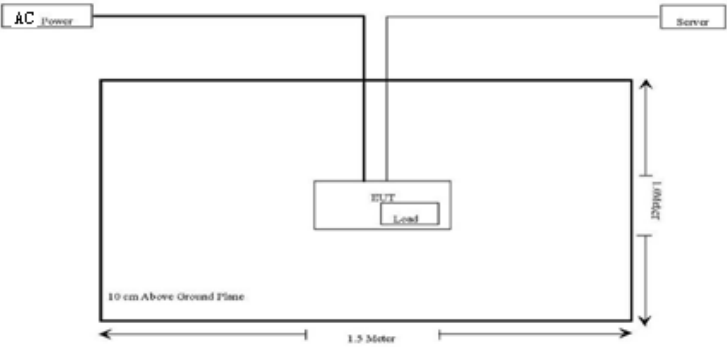
For 802.11n (HT40)
CH LOW: 5755MHz
CH HIGH: 5795MHz
IEEE 802.11a: 6Mbps data rate
IEEE 802.11n HT20: MSC10
IEEE 802.11n HT40: MSC10
Remark: Only the worse case found by prescan is listed.
Support Equipment:

Description	Manufacturer	Model No.
RJ 45 Cable connected between POE adapter and EUT	N/A	unshielded 1.5m
RJ 45 Cable connected between POE adapter and PC	N/A	Unshielded 10m
PC	DELL	Pro80Jn
2 x Antenna Interconnecting Cable	CIG SHANGHAI	2.0m
2 x terminal	N/A	50 ohm
POE adapter	CIG SHANGHAI	Model: DBcom-PSE01A-G

Configuration of Test Setup



Block Diagram of Test Setup



4 SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna requirement	Not Applicable
§15.207(a)	AC line conducted emissions	Compliant
§15.209 §15.247(d)	Radiated Emissions	Compliant
§15.247(a)	6dB Emission Bandwidth	Compliant
§15.247(b)	Maximum Peak Output Power	Compliant
§ 15.247(d)	100kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(a)	Power Spectral Density	Compliant

5 ANTENNA REQUIREMENT

5.1 Applicable standard: FCC §15.203

5.2 Limit

According to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with the section §15.203 of the rules, §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Further, this requirement does not apply to intentional radiators that must be professionally installed.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

5.3 Test Data

According to the user manual, the device cannot be sold retail, to the general public or by mail order. It must be sold to dealers. It is installed by licensed professionals with special training.

The EUT used one fixed antenna, the maximum gain is 15dBi. And according to FCC47CFR section 15.247(b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB than the directional gain of the antenna exceeds 6dBi. Please refer to MAXIMUM PEAK OUTPUT POWER.

5.4 Test Result: Not applicable

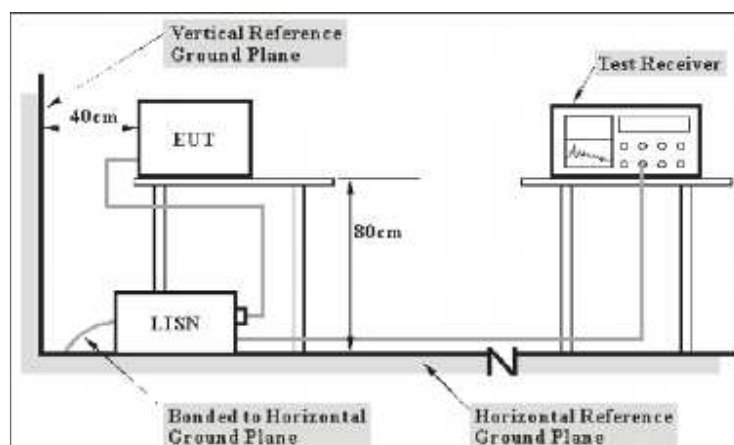
6 AC LINE CONDUCTED EMISSIONS

6.1 Applicable Standard: FCC §15.207

6.2 Test Equipment List and Details

Manufacturer	Equipment	Model	Last Cal.	Cal. Interval
R&S	EMI Test receiver	ESCI 3	2012-7-25	1 year
TESE Q	ISN	ISN T800	2012-5-24	1
Schwarzbeck	LISN	NSLK8128	2012-10-24	1
FCC	Current Probe	F-35	N/A	1

EUT Setup



The setup of EUT is according with per ANSI C63.4-2009 measurement procedure, The specification used was the FCC Part 15.207 limits.

6.3 Test Procedure

During the conducted emission test, the adapter was connected to the LISN. Maximizing procedure was performed on the six highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

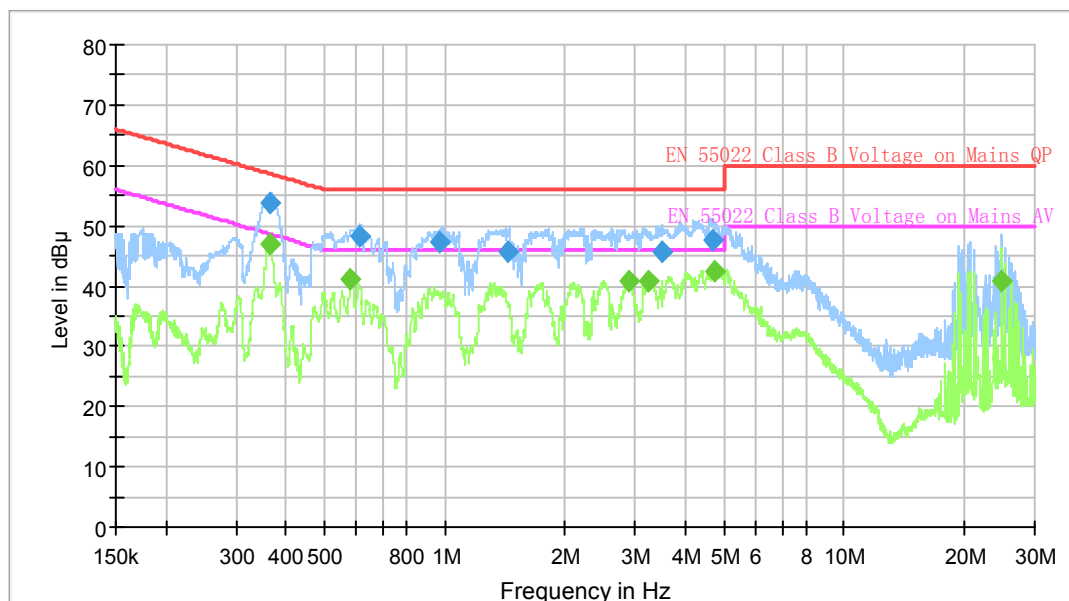
6.4 Environmental Conditions

Temperature:	20°C
Relative Humidity:	60 %
ATM Pressure:	1009 mbar

6.5 Test Result: Pass

120Vac/60Hz,Line

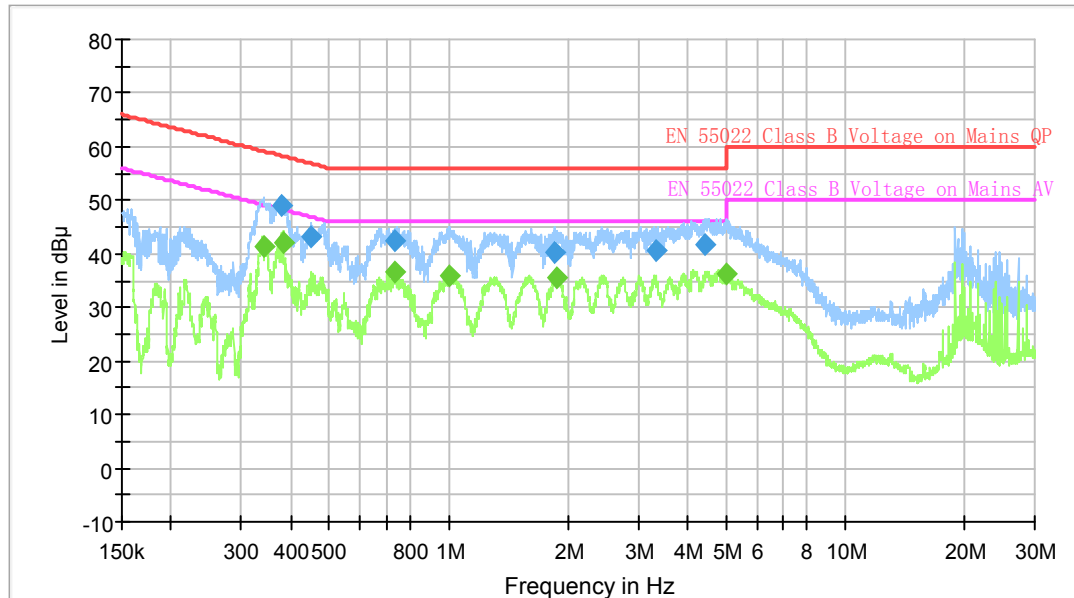
CLASSB CISPR22 Voltage 150k to 30MHz



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Corrected Result(dBuV)	Correction Factor(dB)	Limit(dBuV)	Margin(dB)	Detector (QP/AV.)
0.366332	53.7	10.0	58.6	4.8	QP
0.610562	48.1	10.0	56.0	7.9	QP
0.975700	47.3	10.0	56.0	8.7	QP
1.445332	45.8	10.0	56.0	10.2	QP
3.484468	45.8	10.0	56.0	10.2	QP
4.666529	47.7	10.0	56.0	8.3	QP
0.363282	47.1	10.0	48.7	1.5	AV
0.581379	41.1	10.0	46.0	4.9	AV
2.891288	40.9	10.0	46.0	5.1	AV
3.242962	40.9	10.0	46.0	5.1	AV
4.728111	42.5	10.0	46.0	3.5	AV
24.916125	40.8	10.0	50.0	9.2	AV

120Vac/60Hz,Neutral

CISPR22 Voltage 150k to 30MHz_N



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Corrected Result(dBuV)	Correction Factor(dB)	Limit(dBuV)	Margin(dB)	Detector (QP/AV.)
0.379202	48.9	10.0	58.3	9.4	QP
0.449329	43.3	10.0	56.9	13.6	QP
0.733498	42.4	10.0	56.0	13.6	QP
1.855207	40.2	10.0	56.0	15.8	QP
3.346486	40.7	10.0	56.0	15.3	QP
4.441760	41.8	10.0	56.0	14.2	QP
0.341145	41.4	10.0	49.2	7.8	AV
0.382654	42.1	10.0	48.2	6.2	AV
0.728099	36.5	10.0	46.0	9.5	AV
1.001237	36.0	10.0	46.0	10.0	AV
1.879470	35.5	10.0	46.0	10.5	AV
5.043447	36.1	10.0	50.0	13.9	AV

7 RADIATED EMISSIONS

7.1 Applicable Standard: FCC §15.247(d), 15.209 , 15.205

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a)

According to FCC Part 15.209 and relevant rules:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency MHz	Distance m	Field strength		Distance m	Field strength dBμV/m(QP)
		μV/m	dBμV/m(QP)		
30-88	3	100	40.0	10	30.0
88-216	3	150	43.5	10	33.5
216-960	3	200	46.0	10	36.0
960-1000	3	500	54.0	10	44.0
Above 1000	3	74.0 dBμV/m (PK) 54.0 dBμV/m (AV)		/	/

15.205 Restricted bands:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

7.2 Test Equipment List and Details

Manufacturer	Equipment	Model	Last Cal.	Cal. Interval
R&S	EMI Test receiver	ESU26	2012-11-3	1 year
R&S	Log periodic Antenna	SWB-VULB 9163	2012-7-25	1 year
R&S	Horn Antenna	HF907	2012-7-25	1 year
ETS-LINDGREN	Active loop Antenna	6502	2012-7-16	1 year

7.3 Test Procedure

During the radiated emission test, the MIMO and continuously Tx mode was used. The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

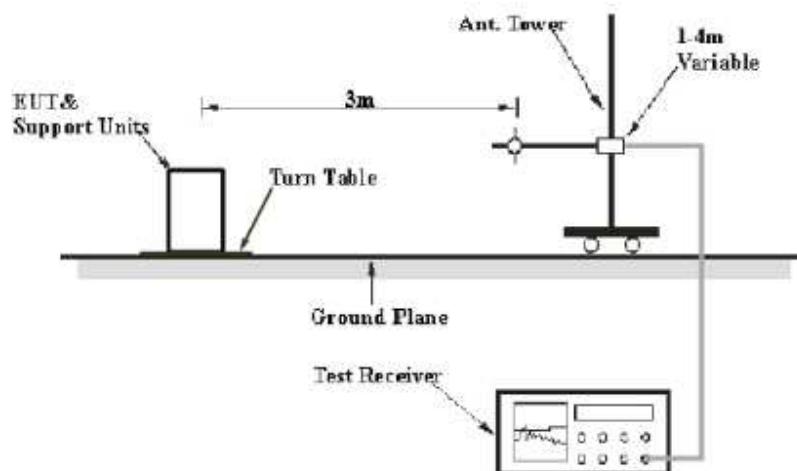
The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. Detector function for radiated emissions above 1GHz is in peak mode and Quasi-Peak mode is used below 1GHz. The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Above 1000 MHz, a resolution bandwidth of 1 MHz as below is used.

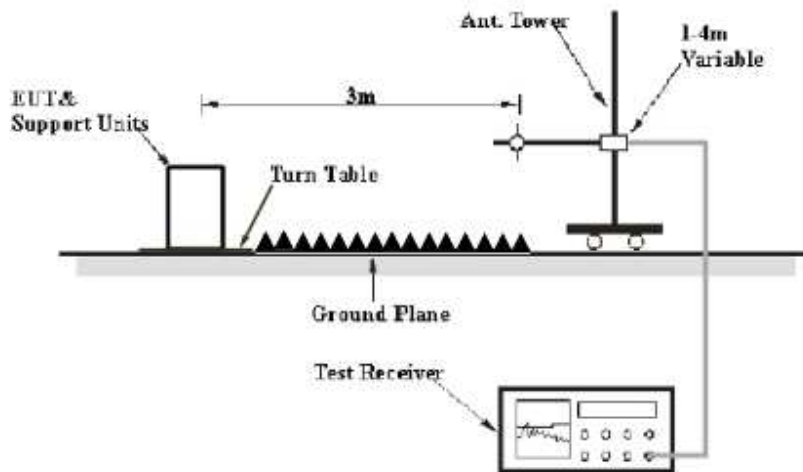
RBW=1MHz; VBW=1MHz, PK detector for peak emissions measurement above 1GHz

RBW=1MHz; VBW=10Hz, PK detector for average emissions measure above 1GHz

EUT Setup:

Below 1 GHz





The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the FCC part 2.1053. The specification used was the FCC 15.209 and FCC 15.247 limits.

7.4 Environmental Conditions

Temperature:	26°C
Relative Humidity:	60 %
ATM Pressure:	1009 mbar

7.5 Test Result: Pass

Remark: If PK value is lower than AV limit, only show PK diagram as below, the spurious emissions more than 20 dB below the permissible value are not reported.

From 9 KHz to 30MHz and 18GHz to 40GHz, the spurious emissions more than 20 dB below the limit.

For some 7G to 18G, Spurious Emission meet the limits of the field strength that not be measured.

“*” donates fundamental frequency.

For restriction band test: Only list the restriction band test which there found emission.

For other restriction band: no emission found.

For Radiated emission test: The EUT have been tested at X, Y, Z axial direction. Only list the worse mode.

Frequency (MHz)	Reading (dBμV/m)	Polarization	Margin (dB)	Limit (dBμV/m)	Comment
30.226333	28.8	H	11.2	40.0	Diagram 7- 1
31.519667	27.0	H	13.0	40.0	
32.651333	35.5	H	4.5	40.0	
359.994000	41.7	H	4.3	46.0	
374.996667	33.7	H	12.3	46.0	
840.014667	39.6	H	6.4	46.0	
32.748333	34.3	V	5.7	40.0	Diagram 7-2
36.725333	32.4	V	7.6	40.0	
56.707333	34.0	V	6.0	40.0	
87.844333	31.8	V	8.2	40.0	
359.961667	33.7	V	12.3	46.0	
839.982333	40.1	V	5.9	46.0	

Diagram 7- 1

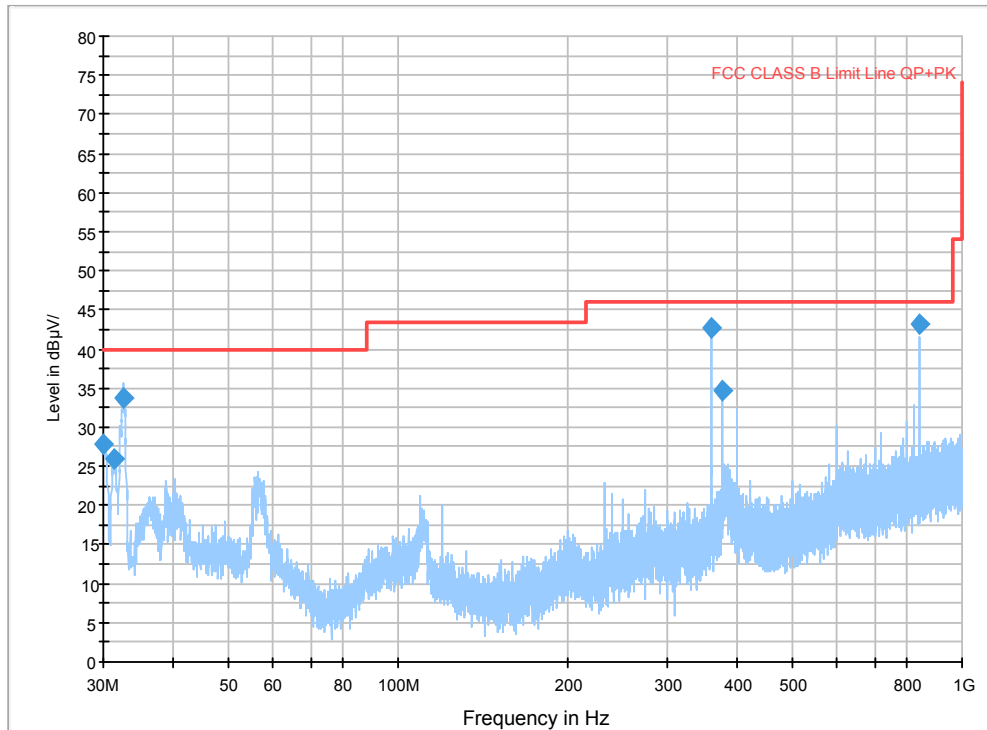
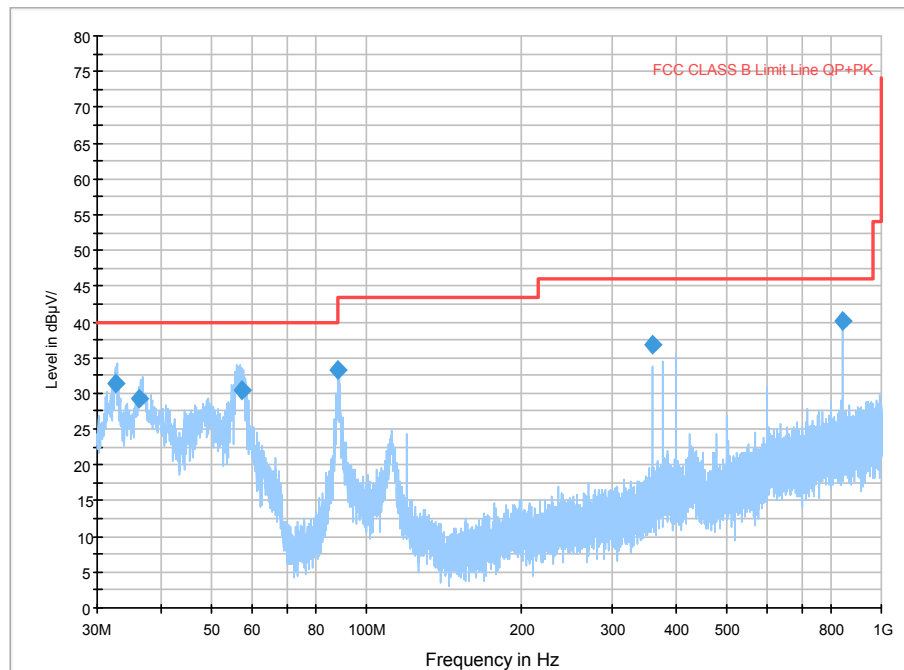


Diagram 7- 2



Test Mode	802.11.a-5745MHz					
Frequency (MHz)	Reading (dBμV/m)	Polarization	Margin (dB)	Limit (dBμV/m)	Detector (PK/AV)	Comment
1319.790667	45.6	H	28.4	74.0	PK	Diagram 7- 3
1319.997333	42.4	H	11.6	54.0	AV	
1319.955667	51.9	V	22.1	74.0	PK	Diagram 7-4
1319.870333	48.4	V	5.6	54.0	AV	
5701.044500	54.0	H	20	74.0	PK	Diagram 7-5
5719.835500	52.6	H	21.4	74.0	PK	
5725.000000	50.8	H	23.2	74.0	PK	
5742.582500	94.5	H	--	--	PK*	
5720.060000	52.2	V	21.8	74.0	PK	Diagram 7-6
5725.000000	48.0	V	26	74.0	PK	
5740.460000	94.8	V	--	--	PK*	
5700.890000	53.0	V	21	74.0	PK	
5720.158500	46.9	H	7.1	54.0	AV	Diagram 7-7
5725.000000	43.7	H	10.3	54.0	AV	
5738.341500	91.8	H	--	--	AV*	
5704.150500	47.9	H	6.1	54.0	AV	
5719.873833	49.6	V	4.4	54.0	AV	Diagram 7-8
5725.000000	43.1	V	10.9	54.0	AV	
5740.255667	91.3	V	--	--	AV*	
--	--	H	--	74.0	PK	Diagram 7-9
--	--	H	--	54.0	AV	
--	--	V	--	74.0	PK	Diagram 7-10
--	--	V	--	54.0	AV	

Diagram 7- 3

FCC CLASS B HF3.0_1G-7G_HOR

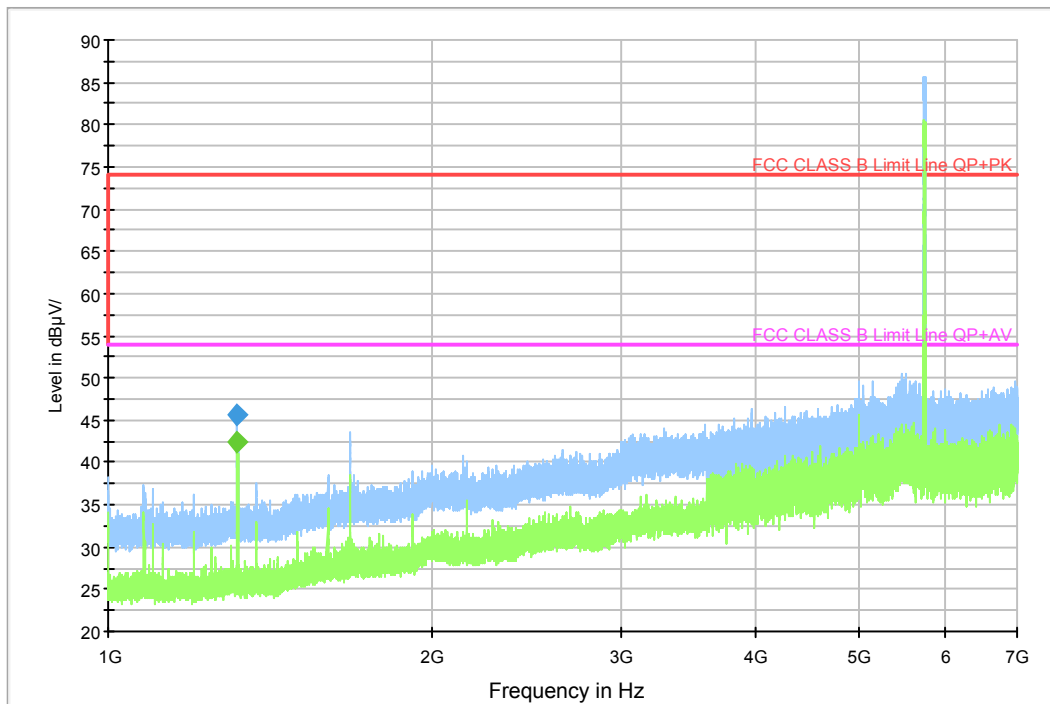


Diagram 7- 4

FCC CLASS B HF3.0_1G-7G_VER

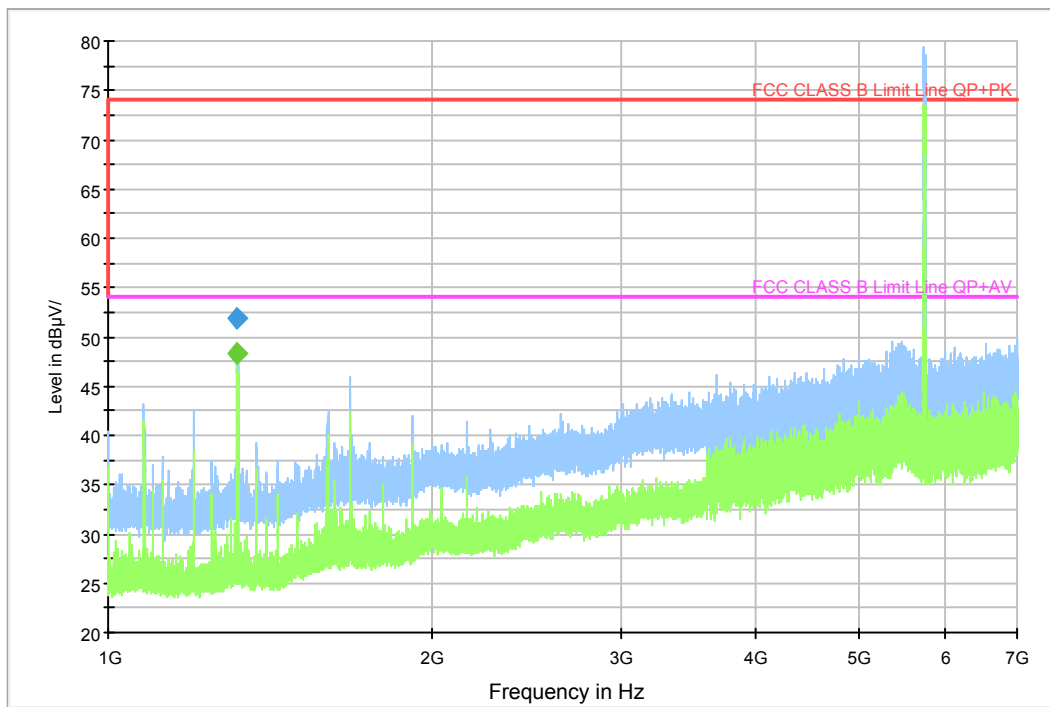


Diagram 7- 5

FCC BAND EDGE 5.8G LOW HF1.0 PK HOR

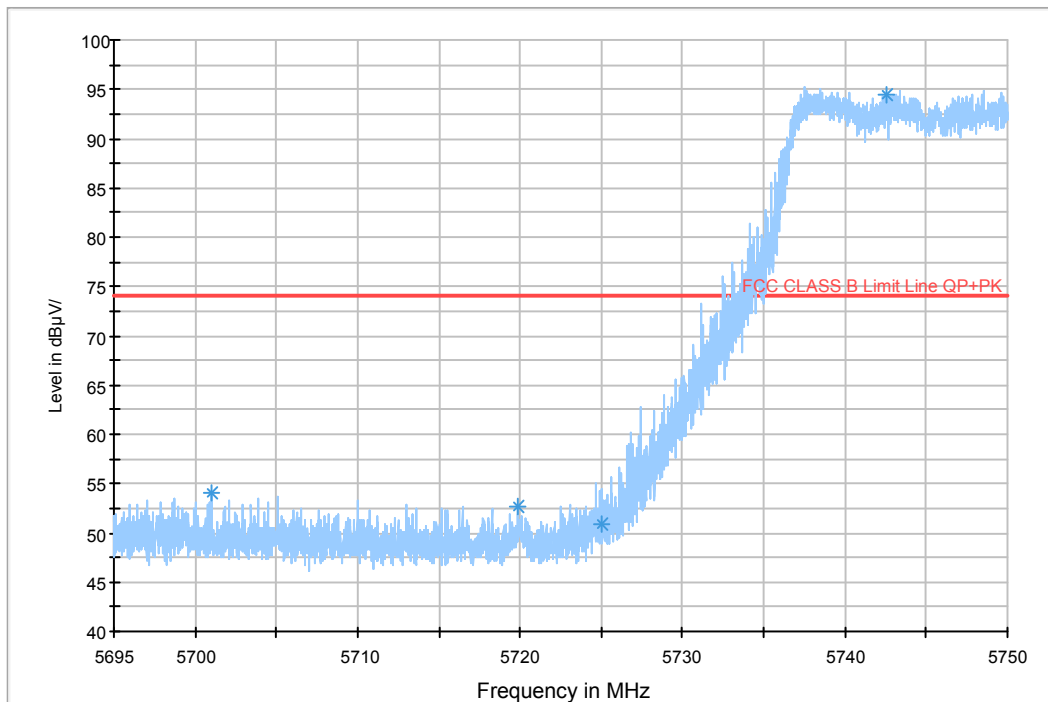


Diagram 7- 6

FCC BAND EDGE 5.8G LOW HF1.0 PK VER

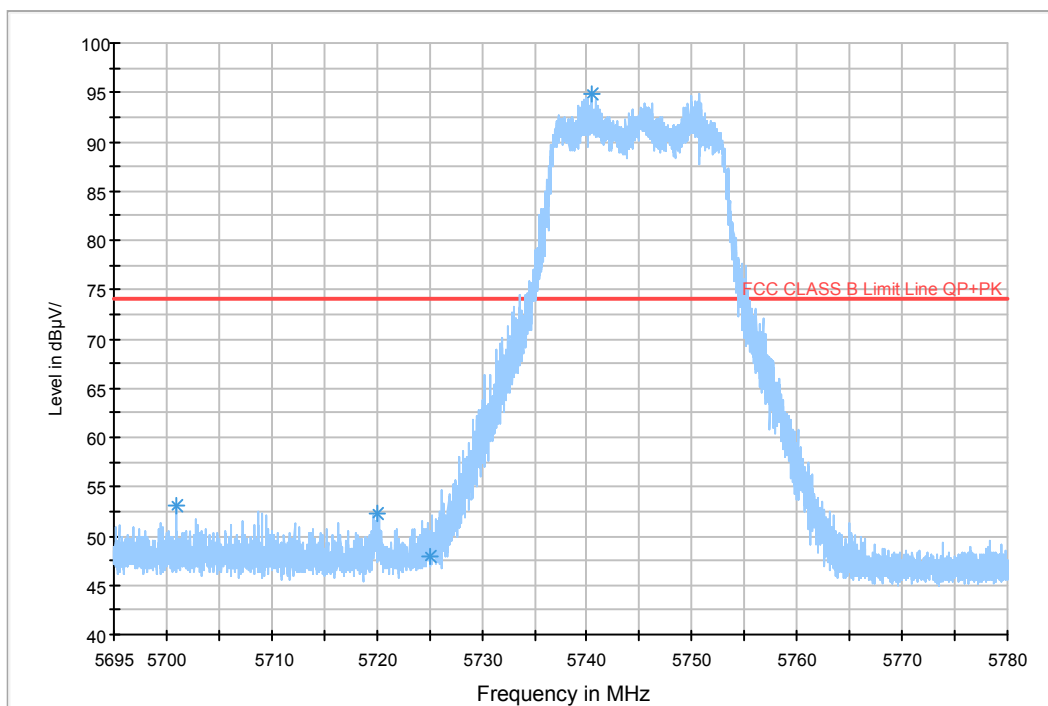


Diagram 7- 7

FCC BAND EDGE 5.8G LOW HF1.0 AV HOR

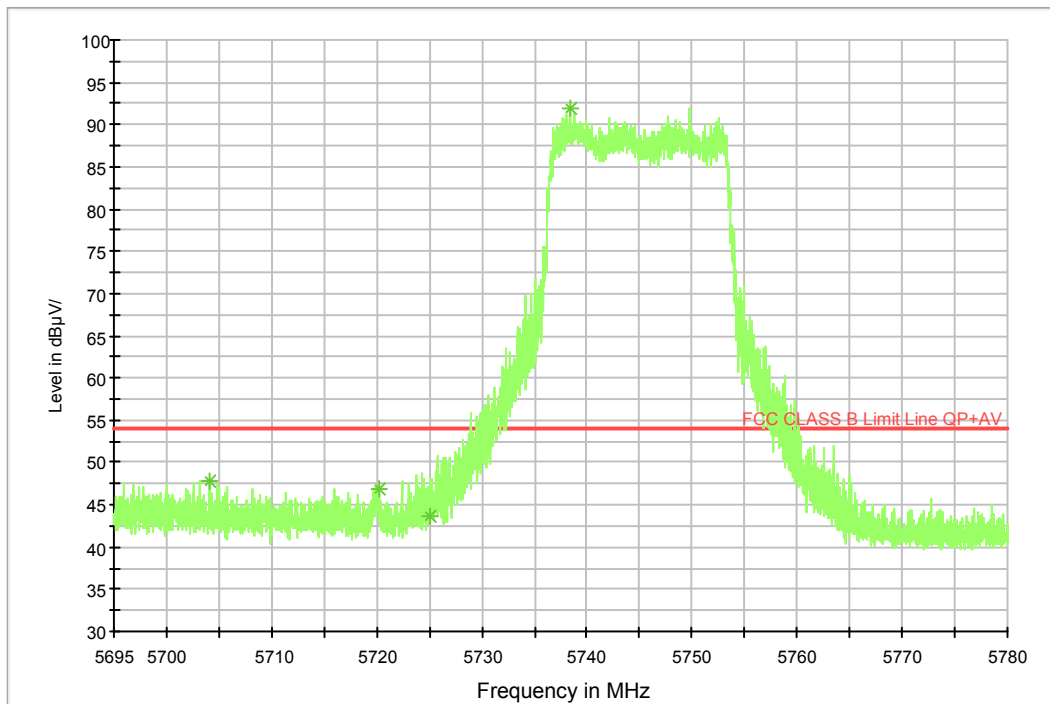


Diagram 7- 8

FCC BAND EDGE 5.8G LOW HF1.0 AV VER

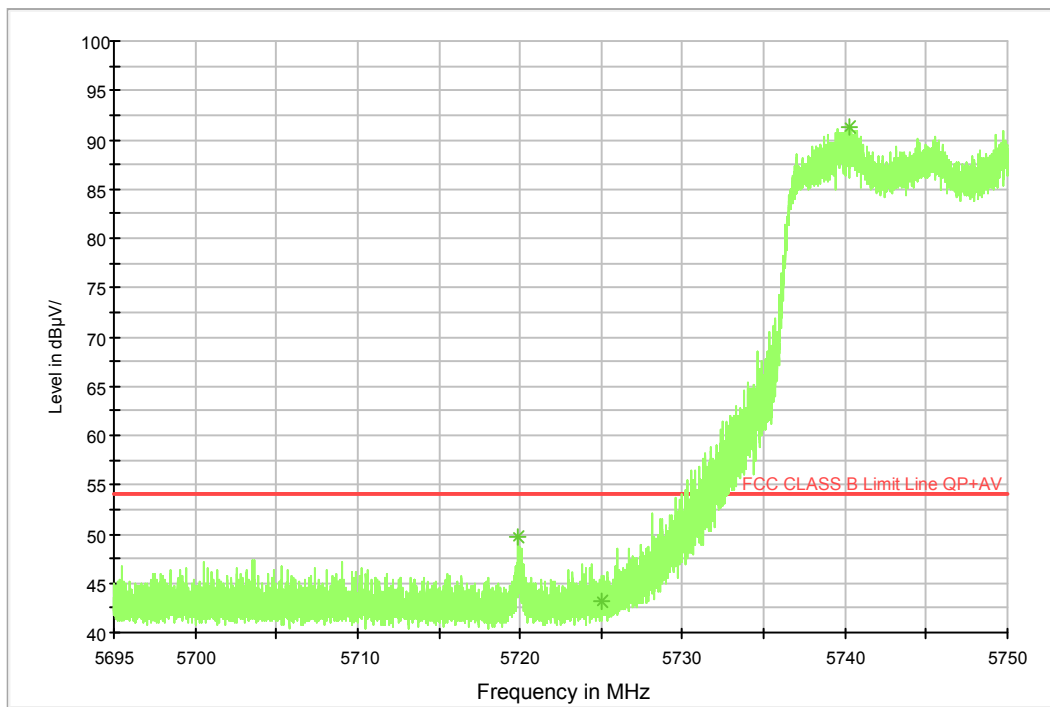


Diagram 7- 9

FCC CLASS B HF7.0_7G-18G_HOR

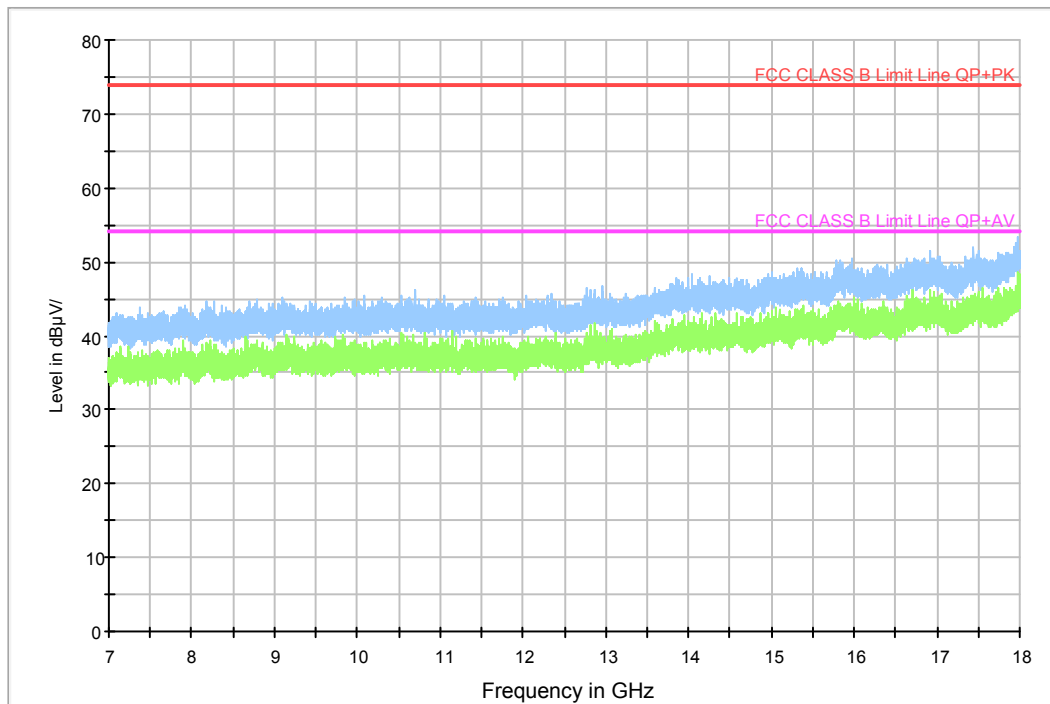
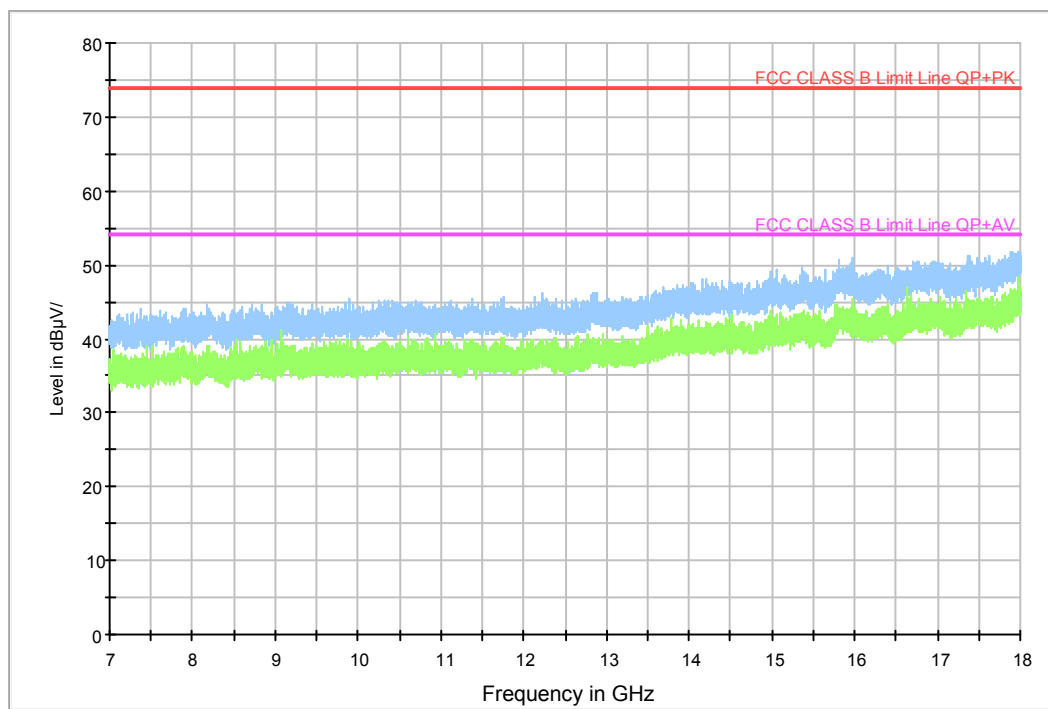


Diagram 7- 10

FCC CLASS B HF7.0_7G-18G_VER



Test Mode 802.11.a-5785MHz

Frequency (MHz)	Reading (dBμV/m)	Polarization	Margin (dB)	Limit (dBμV/m)	Detector (PK/AV)	Comment
1318.672800	48.7	H	25.3	74.0	PK	Diagram 7- 11
1320.997333	43.4	H	10.6	54.0	AV	
1320.357892	50.7	V	23.3	74.0	PK	Diagram 7-12
1320.621897	49.4	V	4.6	54.0	AV	
--	--	H	--	74.0	PK	Diagram 7-13
--	--	H	--	54.0	AV	
--	--	V	--	74.0	PK	Diagram 7-14
--	--	V	--	54.0	AV	

Diagram 7- 11

FCC CLASS B HF3.0_1G-7G_HOR

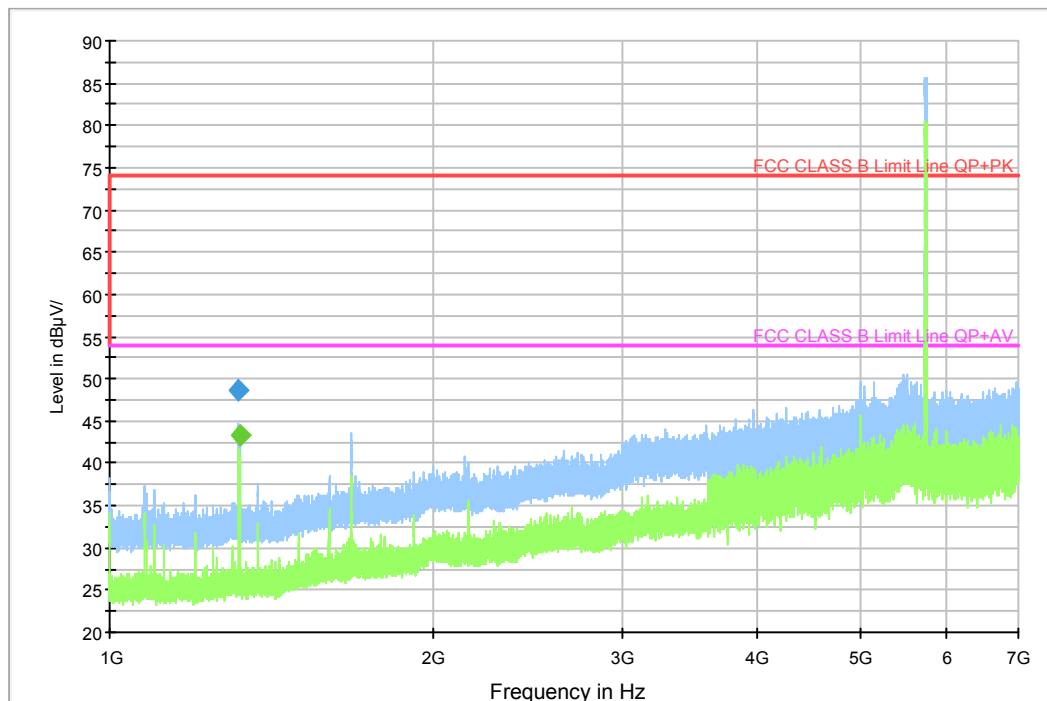


Diagram 7- 12

FCC CLASS B HF3.0_1G-7G_VER

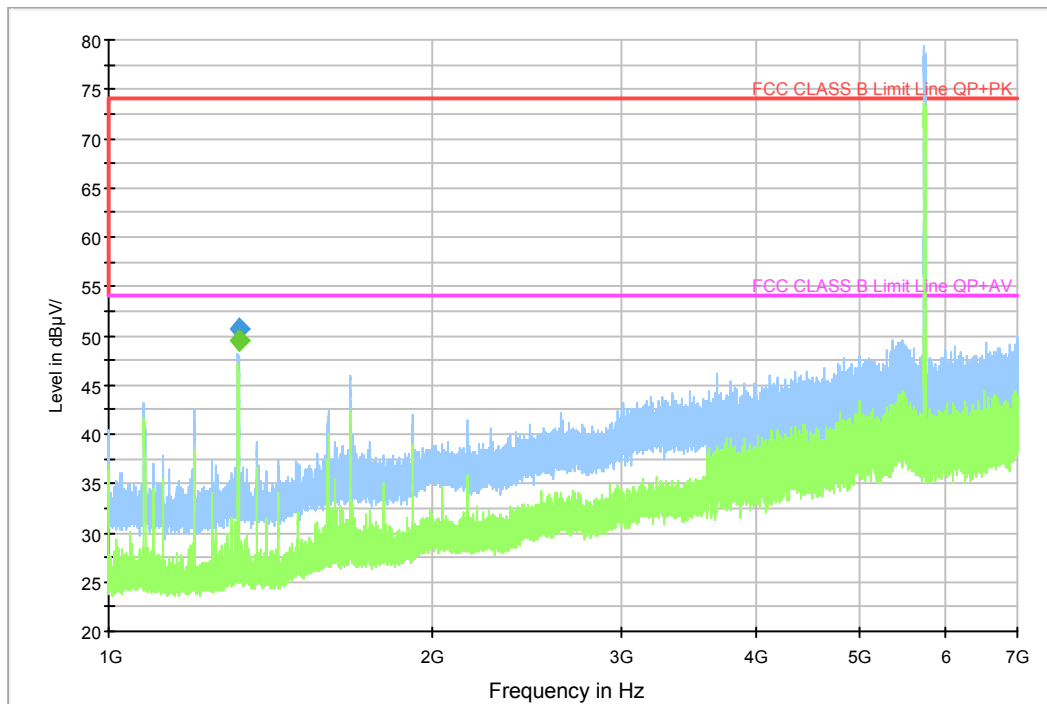


Diagram 7- 13

FCC CLASS B HF7.0_7G-18G_HOR

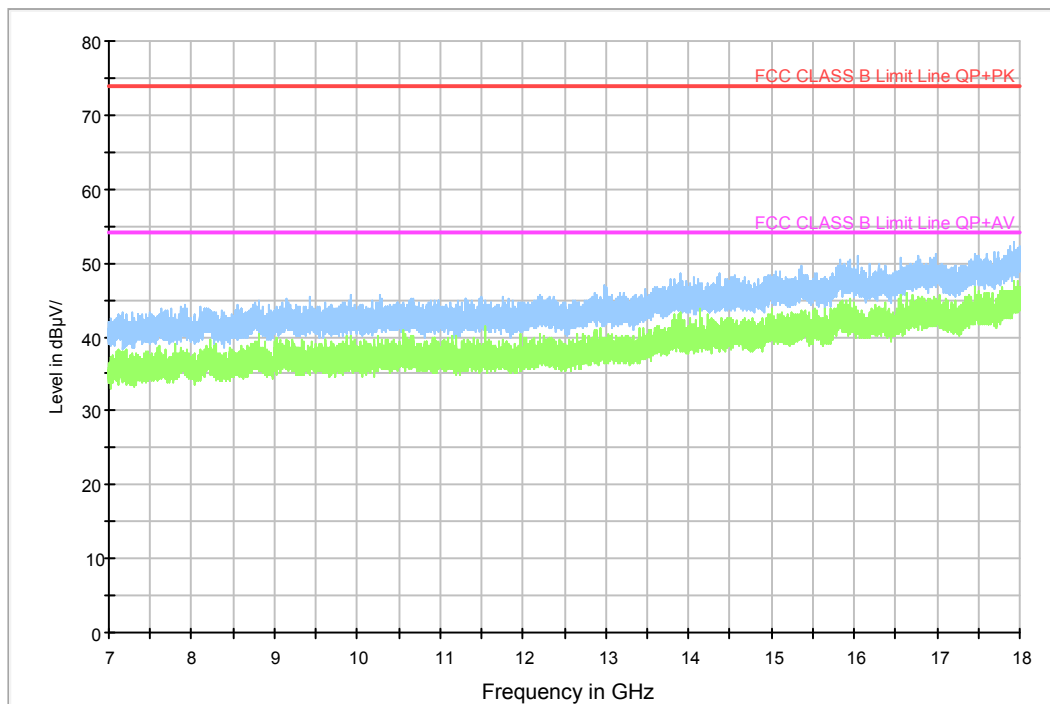
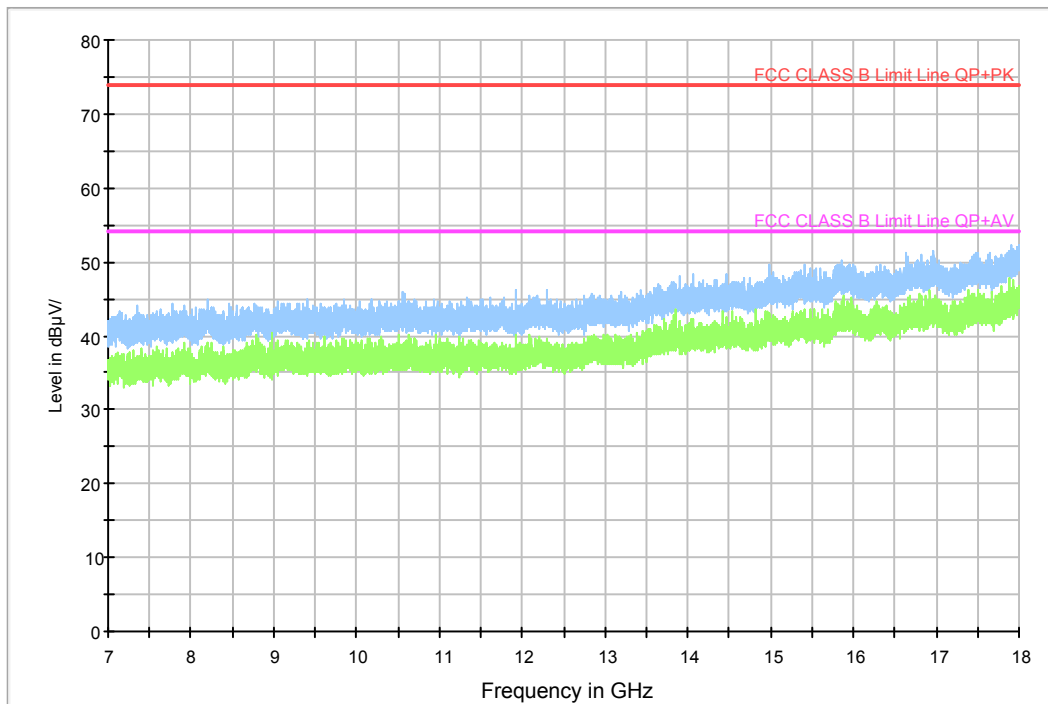


Diagram 7- 14

FCC CLASS B HF7.0_7G-18G_HOR



Test Mode	802.11.a-5825MHz					
Frequency (MHz)	Reading (dBµV/m)	Polarization	Margin (dB)	Limit (dBµV/m)	Detector (PK/AV)	Comment
1319.687325	45.7	H	28.3	74.0	PK	Diagram 7- 15
1319.328746	42.6	H	11.4	54.0	AV	
1320.634898	48.6	V	25.4	74.0	PK	Diagram 7-16
1321.327620	47.4	V	6.6	54.0	AV	
5827.424000	95.6	H	--	74.0	PK*	Diagram 7-17
5850.000000	47.2	H	26.8	74.0	PK	
5858.424000	51.0	H	23	74.0	PK	
5827.384000	95.6	V	--	74.0	PK*	Diagram 7-18
5850.000000	45.8	V	28.2	74.0	PK	
5873.648000	49.8	V	24.2	74.0	PK	
5826.064000	86.7	H	--	54.0	AV*	Diagram 7-19
5850.000000	41.1	H	12.9	54.0	AV	
5854.928000	44.5	H	9.5	54.0	AV	
5828.712000	89.7	V	--	54.0	AV*	Diagram 7-20
5850.000000	41.0	V	13	54.0	AV	
5867.144000	44.4	V	9.6	54.0	AV	
--	--	H	--	74.0	PK	Diagram 7-21
--	--	H	--	54.0	AV	Diagram 7-22
--	--	V	--	74.0	PK	
--	--	V	--	54.0	AV	

Diagram 7- 15

FCC CLASS B HF3.0_1G-7G_VER

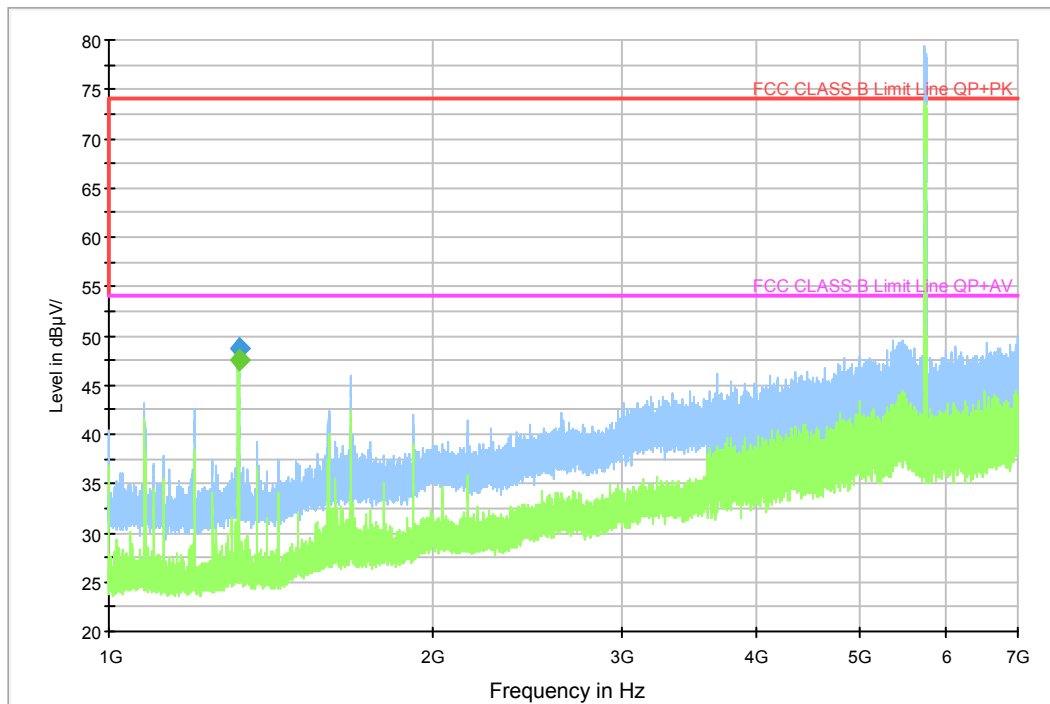


Diagram 7- 16

FCC CLASS B HF3.0_1G-7G_HOR

