

Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240200030903

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TEST REPORT

Application No.: KSCR2402000309AT
FCC ID: XMR202401AF68E
Applicant: Quectel Wireless Solutions Co., Ltd.
Address of Applicant: Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer: Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer: Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Equipment Under Test (EUT):
EUT Name: Wi-Fi & Bluetooth Module
Model No.: AF68E
Trade Mark: Quectel
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2024-02-29
Date of Test: 2024-04-26 to 2024-05-06
Date of Issue: 2024-05-07

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

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Revision Record			
Version	Description	Date	Remark
00	Original	2024-05-07	/

Authorized for issue by:			
Tested By		Maker Qi	
		Maker_Qi/Project Engineer	
Approved By		Terry Hou	
		Terry Hou /Reviewer	



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2 Test Summary

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

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

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3.3-4.8V,Typ: 3.85V
Operation Frequency:	802.11b/g/n(HT20)/ax(HEW20): 2412MHz to 2462MHz;802.11n(HT40)/ax(HEW40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK), 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK), 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024-QAM)
Number of Channels:	802.11b/g/n(HT20)/ax(HEW20):11;802.11n(HT40)/ax(HEW40):7
Channel Spacing:	5MHz
Antenna Type:	External antenna
Antenna Gain:	ANT5 (WIFI0): 3.1dBi (Provided by the manufacturer) ANT6 (WIFI1):3dBi (Provided by the manufacturer) Directional gain: 3.05dBi (The transmitted signal is uncorrelated)

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
AC Adapter	/	/	/
Notebook	LENOVO	K27	EB24537645

4.3 Power level setting using in test:

Channel	802.11b		802.11g		802.11n(HT20)		802.11ax(HEW20)	
	Ant 1	Ant 2	Ant 2	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
1	16.5	16.5	16	16	15.5	15.5	14	14
6	18.5	18.5	18	18	17.5	17.5	17.5	17.5
11	16.5	16.5	14.5	14.5	13	13	12	12
Channel	802.11n(HT20)		802.11ax(HEW20)					
	Ant 2	Ant 2	Ant 1	Ant 2				
3	12.5	12.5	12.5	12.5				
6	17	17	17	17				
9	12	12	12.5	12.5				

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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4.5 Test Location

Lab A:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

Lab B:

Conducted Emissions at AC Power Line (150kHz-30MHz); Radiated Emissions; Radiated Emissions which fall in the restricted bands test at:

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.

No.2, Tongsheng Road, Wuzhong District, Suzhou, Jiangsu, China

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

4.6 Test Facility

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

Lab A:

• A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

Lab B:

• A2LA (Certificate No. 6336.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 6336.01.

• Innovation, Science and Economic Development Canada

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• FCC –Designation Number: CN1312

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Lab A:

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
RF Conducted Test						
1	Spectrum Analyzer	Keysight	N9020A	KUS1911E004-2	08/24/2023	08/23/2024
2	Spectrum Analyzer	Keysight	N9020A	KUS2001M001-2	08/24/2023	08/23/2024
3	Spectrum Analyzer	Keysight	N9030B	KSEM021-1	01/15/2024	01/14/2025
4	Signal Generator	R&S	SMBV100B	KSEM032	03/19/2024	03/18/2025
5	Signal Generator	R&S	SMW200A	KSEM020-1	08/24/2023	08/23/2024
6	Signal Generator	Agilent	N5182A	KUS2001M001-1	08/24/2023	08/23/2024
7	Radio Communication Test Station	Anritsu	MT8000A	KSEM001-1	08/24/2023	08/23/2024
8	Radio Communication Analyzer	Anritsu	MT8821C	KSEM002-1	03/19/2024	03/18/2025
9	Universal Radio Communication Tester	R&S	CMW500	KUS1911E004-1	08/24/2023	08/23/2024
10	Switcher	TST	FY562	KUS2001M001-4	01/15/2024	01/14/2025
11	AC Power Source	EXTECH	6605	KS301178	N.C.R	N.C.R
12	DC Power Supply	Aglient	E3632A	KS301180	N.C.R	N.C.R
13	Conducted Test Cable	Thermax	RF01-RF04	CZ301111-CZ301120	01/15/2024	01/14/2025
14	Temp. / Humidity Chamber	TERCHY	MHK-120AK	KS301190	08/24/2023	08/23/2024
15	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-5	03/19/2024	03/18/2025
16	Software	BST	TST-PASS	/	NCR	NCR
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	08/24/2023	08/23/2024
2	Universal Radio Communication Tester	R&S	CMW500	KSEM009-1	03/19/2024	03/18/2025
3	Signal Generator	Agilent	E8257C	KS301066	08/24/2023	08/23/2024
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	03/18/2023	03/17/2025
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2023	06/28/2025
6	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E006	03/19/2024	03/18/2025
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	KS301079	08/24/2023	08/23/2024
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	KS301186	04/07/2023	04/06/2025
9	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	01/07/2024	01/06/2026
10	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/15/2024	01/14/2025
11	Amplifier(18~40GHz)	PANSHAN TECHNOLOGY	LNA180400G40	KSEM038	08/24/2023	08/23/2024
12	RE Test Cable	REBES MICROWAVE	/	CZ301097	08/24/2023	08/23/2024
13	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	03/19/2024	03/18/2025
14	Software	Faratronic	EZ EMC-v 3A1	/	NCR	NCR
15	Software	ESE	E3_V 6.111221a	/	NCR	NCR



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Lab B:

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals						
1	Shielding Room	Brilliant-emc	N/A	SUWI-04-03-01	5/8/2021	5/7/2024
2	Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2/1/2024	1/31/2025
3	Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2/8/2024	2/7/2025
4	Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2/4/2024	2/3/2025
5	Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2/4/2024	2/3/2025
6	Measurement Software	Tonscend	JS32-CE	SUWI-02-09-05	NCR	NCR
RF Radiated Test						
1	Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-02	11/25/2021	11/24/2024
2	Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-13	2/8/2024	2/7/2025
3	Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	5/11/2023	5/10/2024
4	Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	11/21/2023	11/20/2024
5	Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2/1/2024	1/31/2025
6	Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	VULB 9168	SUWI-01-11-04	11/25/2023	11/24/2024
7	Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	11/25/2023	11/24/2024
8	Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9170	SUWI-01-11-03	5/12/2023	5/11/2024
9	Active Loop Antenna	SCHWRZBECK MESS- ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	5/13/2023	5/12/2024
10	Amplifier	Tonscend	TAP9K3G32	SUWI-01-14-06	11/21/2023	11/20/2024
11	Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	11/21/2023	11/20/2024
12	Amplifier	Tonscend	TAP30M7G30	SUWI-01-14-05	11/21/2023	11/20/2024
13	Measurement Software	Tonscend	JS32-RE	SUWI-02-09-04	NCR	NCR
14	Measurement Software	Tonscend	JS32-RSE	SUWI-02-09-06	NCR	NCR

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

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

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The ANT5 (WIFI0) and ANT6 (WIFI1) is External antenna, and all no consideration of replacement. The best case gain of the ANT5 (WIFI0) is 3.1dBi. and ANT6 (WIFI1) is 3dBi.

Antenna location: Refer to internal photo.



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Directional Gain Calculations for MIMO:

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

Basic methodology with NANT transmit antennas, each with the same directional gain GANT dBi, being driven by NANT transmitter outputs of equal power. Directional gain is to be computed as follows:

- If any transmit signals are correlated with each other,
Directional gain = $GANT + 10 \log(NANT)$ dBi
- If all transmit signals are completely uncorrelated with each other,
Directional gain = GANT

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi

- If transmit signals are correlated, then
Directional gain = $10 \log[(10G1 / 20 + 10G2 / 20 + \dots + 10GN / 20)^2 / NANT]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]
- If all transmit signals are completely uncorrelated, then
Directional gain = $10 \log[(10G1 / 10 + 10G2 / 10 + \dots + 10GN / 10) / NANT]$ dBi

Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain.

All antennas have the same gain:

Operation Frequency	ANT5(WIFI0) (dBi)	ANT6(WIFI1) (dBi)	Directional gain For Power(dBi)	Directional gain For PSD(dBi)
2400 MHz to 2483.5 MHz	3.1	3	3.05	3.05

2400 MHz to 2483.5 MHz:

Power Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) =0

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) =0

7 Radio Spectrum Matter Test Results

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

Test Requirement 47 CFR Part 15, Subpart C 15.207

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

Measurement Distance: 3m

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz		

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C

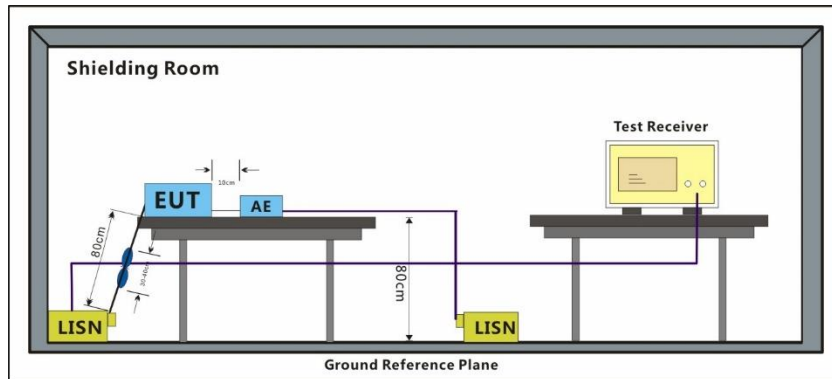
Humidity: 46 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

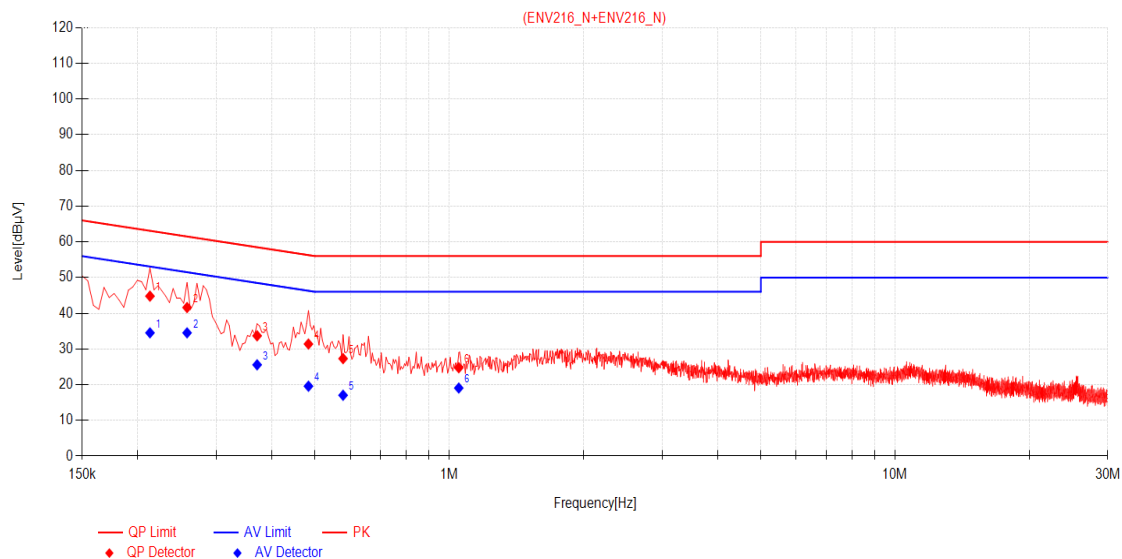
7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

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

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



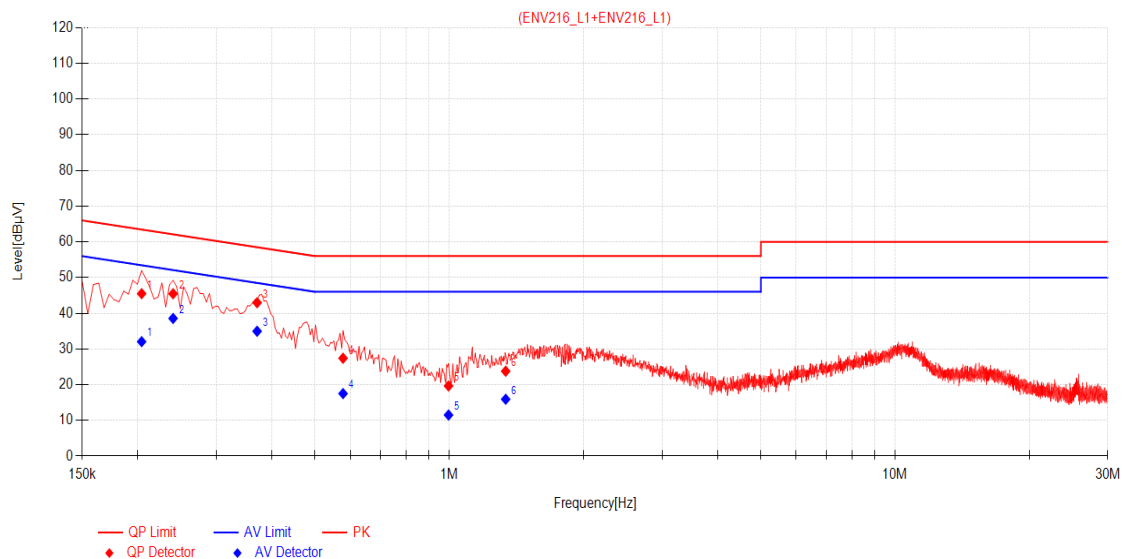
Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBuV]	QP Value [dBuV]	QP Limit [dBuV]	QP Margin [dB]	AV Reading [dBuV]	AV Value [dBuV]	AV Limit [dBuV]	AV Margin [dB]	Verdict
1	0.2130	11.80	32.99	44.79	63.09	18.30	22.71	34.51	53.09	18.58	PASS
2	0.2580	11.67	29.94	41.61	61.50	19.89	22.84	34.51	51.50	16.99	PASS
3	0.3705	11.54	22.14	33.68	58.49	24.81	14.02	25.56	48.49	22.93	PASS
4	0.4830	11.51	19.87	31.38	56.29	24.91	8.06	19.57	46.29	26.72	PASS
5	0.5775	11.48	15.82	27.30	56.00	28.70	5.56	17.04	46.00	28.96	PASS
6	1.0500	11.49	13.26	24.75	56.00	31.25	7.58	19.07	46.00	26.93	PASS

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Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.2040	11.89	33.60	45.49	63.45	17.96	20.16	32.05	53.45	21.40	PASS
2	0.2400	11.80	33.67	45.47	62.10	16.63	26.75	38.55	52.10	13.55	PASS
3	0.3705	11.62	31.34	42.96	58.49	15.53	23.34	34.96	48.49	13.53	PASS
4	0.5775	11.57	15.84	27.41	56.00	28.59	5.94	17.51	46.00	28.49	PASS
5	0.9960	11.53	8.11	19.64	56.00	36.36	-0.03	11.50	46.00	34.50	PASS
6	1.3380	11.56	12.22	23.78	56.00	32.22	4.37	15.93	46.00	30.07	PASS

7.2 Conducted Peak Output Power

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

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

Limit:

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

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

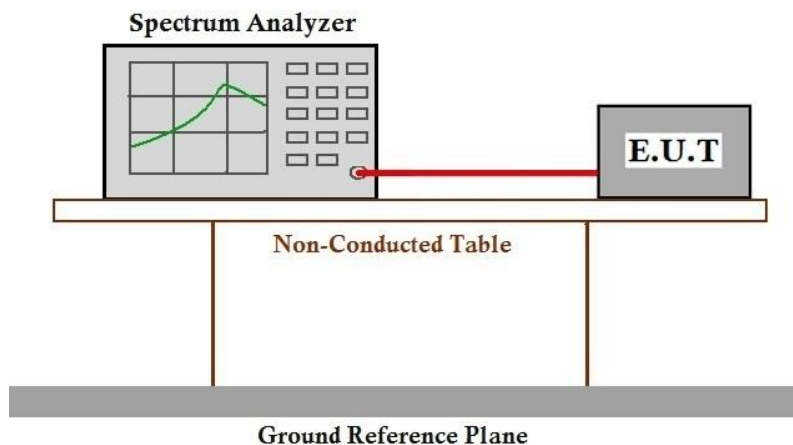
Humidity: 48 % RH

Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.2.3 Test Setup Diagram





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7.2.4 Measurement Procedure and Data

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

Please Refer to Appendix for Details

7.3 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit:

≥500 kHz

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

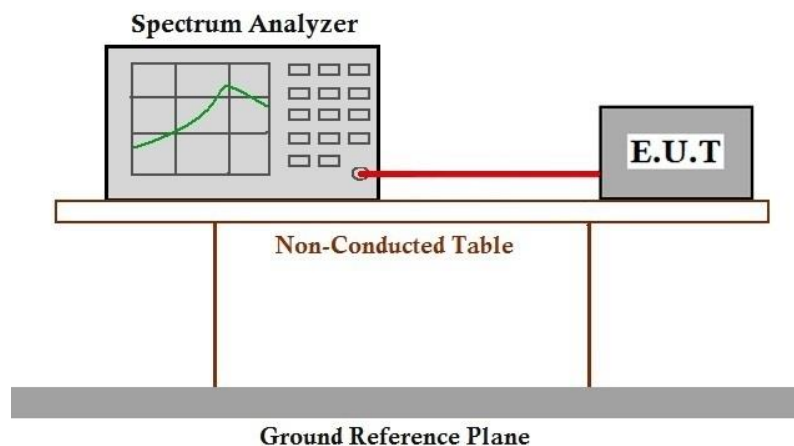
Humidity: 48 % RH

Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.4 Power Spectrum Density

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

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

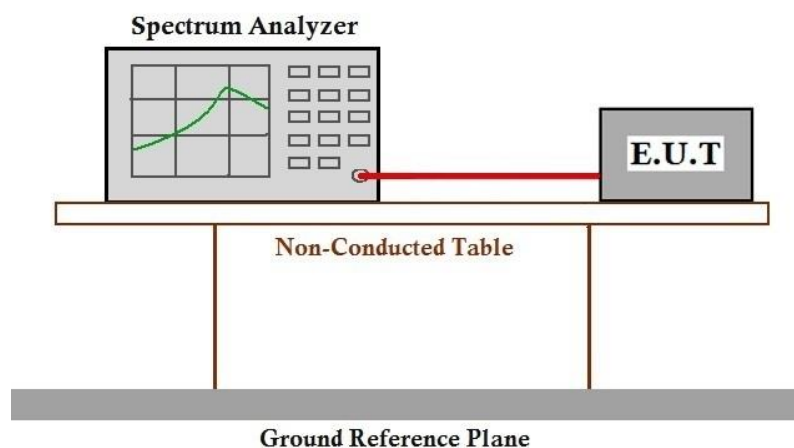
Humidity: 48 % RH

Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.5 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
 Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

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

7.5.1 E.U.T. Operation

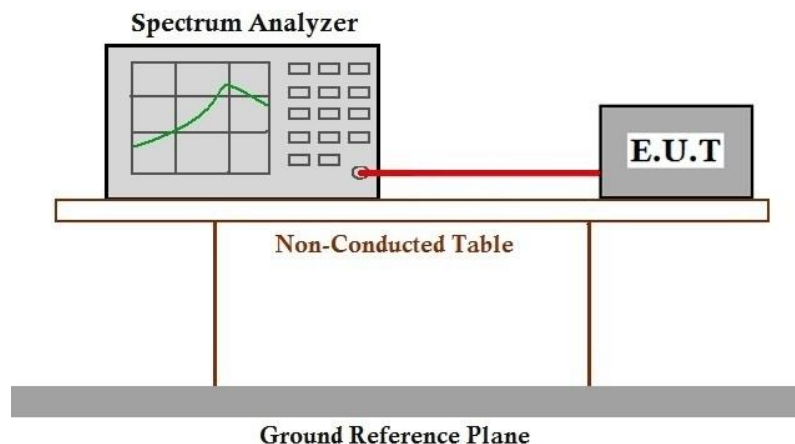
Operating Environment:

Temperature: 22 °C Humidity: 48 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.5.3 Test Setup Diagram





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7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.6 Conducted Spurious Emissions

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

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

Limit:

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

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

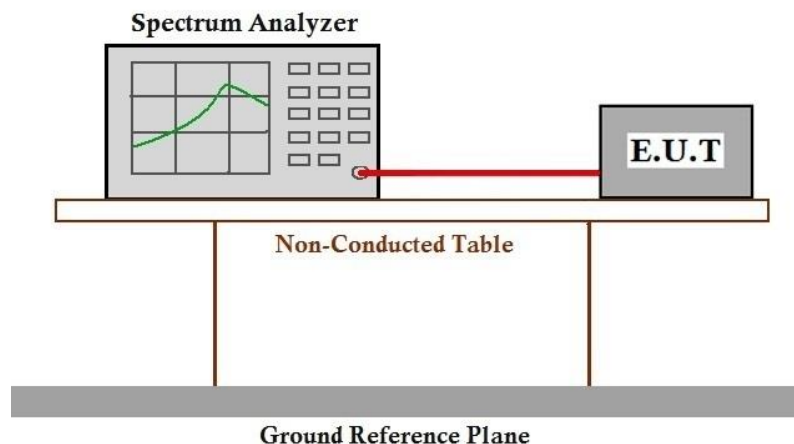
Humidity: 48 % RH

Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.6.3 Test Setup Diagram





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7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details

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7.7 Radiated Emissions which fall in the restricted bands

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

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

Measurement Distance: 3m

Limit:

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

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

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 20.5 °C

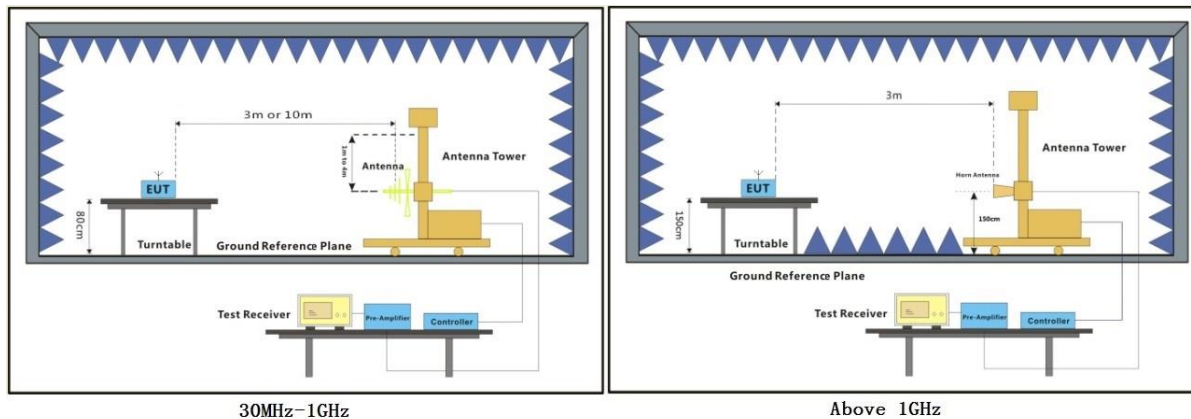
Humidity: 51.3 % RH

Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

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

Remark 1: $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

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

Remark 3: This test item was investigated while operating in SISO and MIMO mode, however, it was determined that SISO antenna 1 operation for b/g modulation and MiMO antenna operation for n/ax modulation produced the worst emissions. So the emissions produced from other operation are not recorded in report.

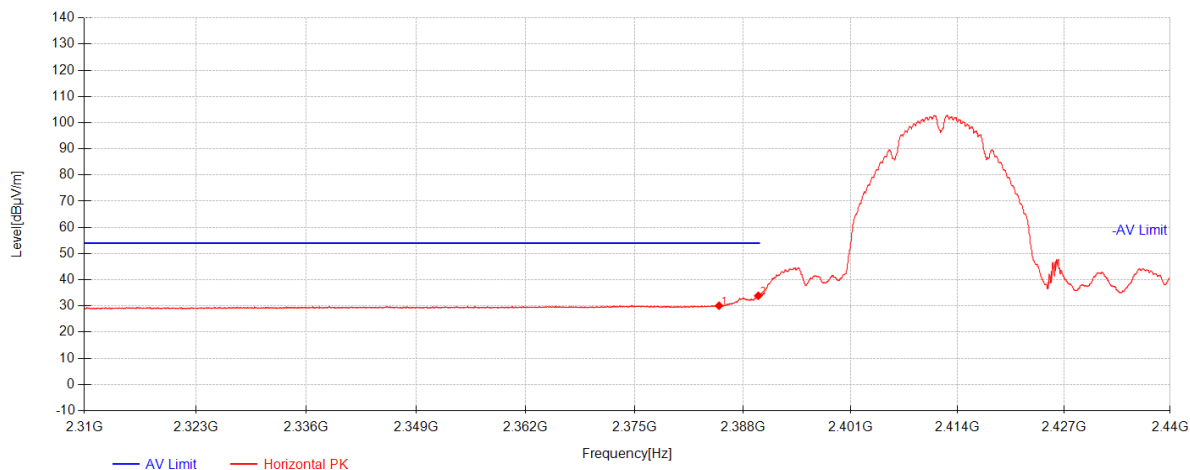
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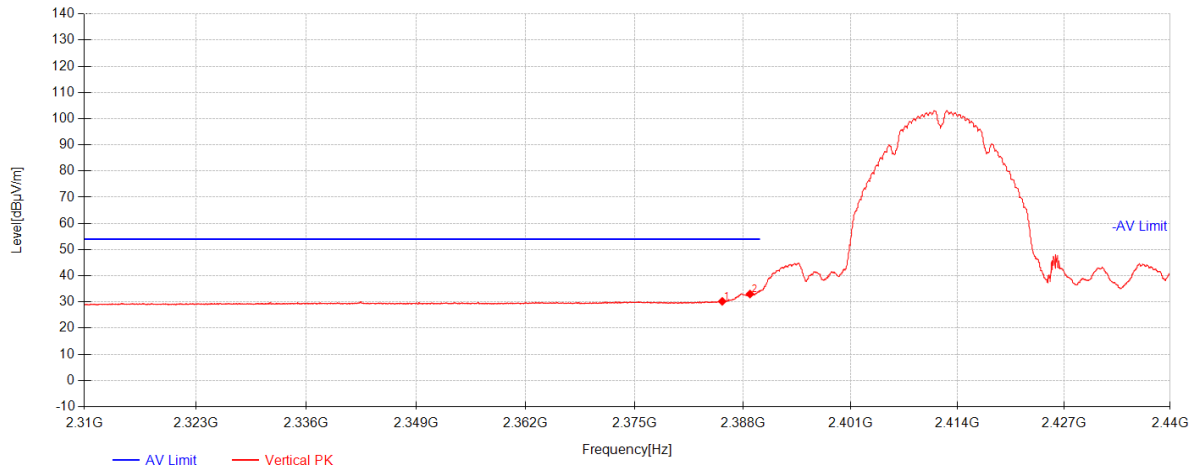
802.11b Channel 01



Data List

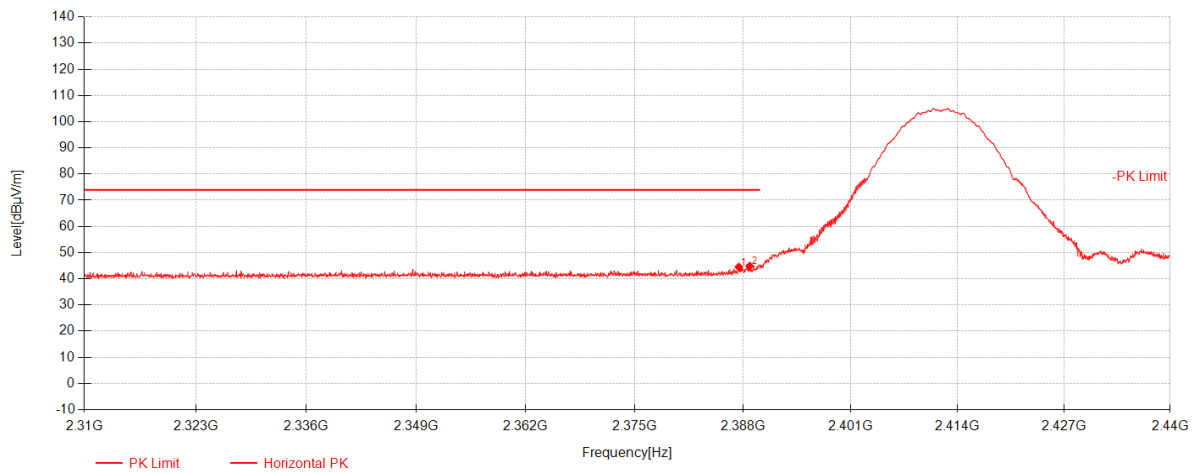
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2385.14	26.67	26.98	-23.57	30.08	54.00	23.92	Horizontal
2	2389.8633	30.45	26.99	-23.57	33.87	54.00	20.13	Horizontal

802.11b Channel 01



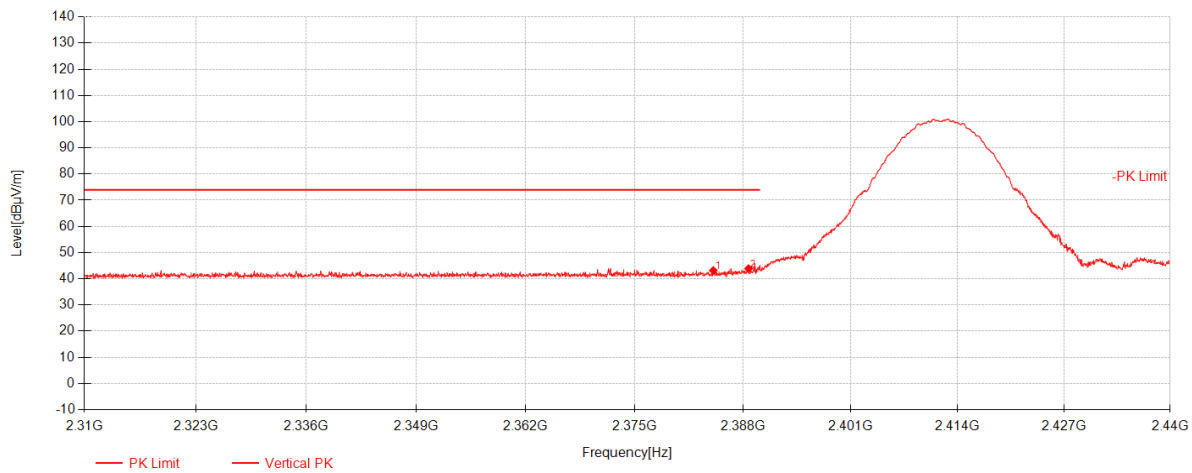
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2385.53	26.82	26.98	-23.57	30.23	54.00	23.77	Vertical
2	2388.8667	29.61	26.99	-23.57	33.03	54.00	20.97	Vertical

802.11b Channel 01



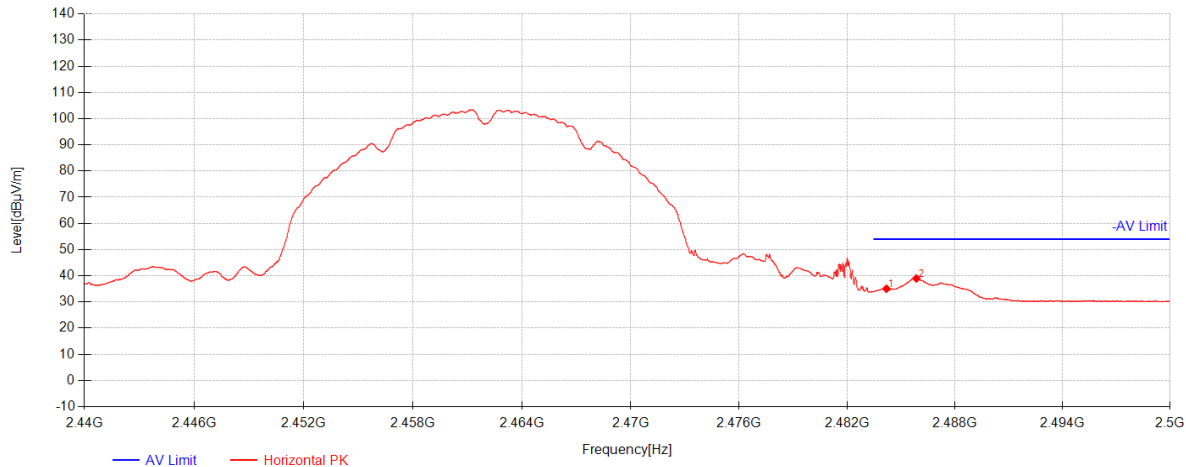
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2387.5233	41.10	26.99	-23.57	44.51	74.00	29.49	Horizontal
2	2388.8233	41.46	26.99	-23.57	44.88	74.00	29.12	Horizontal

802.11b Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2384.4467	39.77	26.98	-23.57	43.17	74.00	30.83	Vertical
2	2388.6933	40.47	26.99	-23.57	43.89	74.00	30.11	Vertical

802.11b Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.19	31.34	27.26	-23.54	35.05	54.00	18.95	Horizontal
2	2485.855	35.25	27.26	-23.54	38.97	54.00	15.03	Horizontal

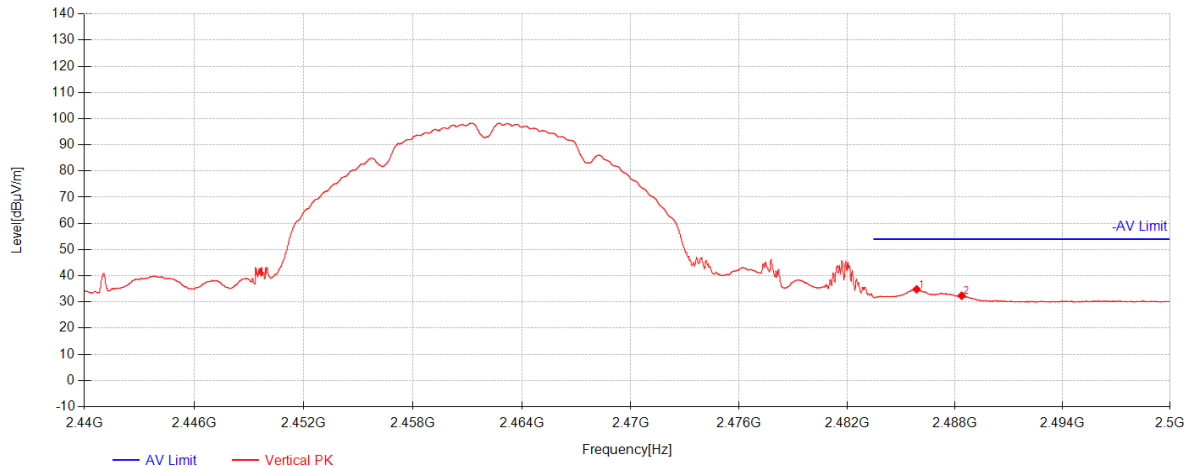
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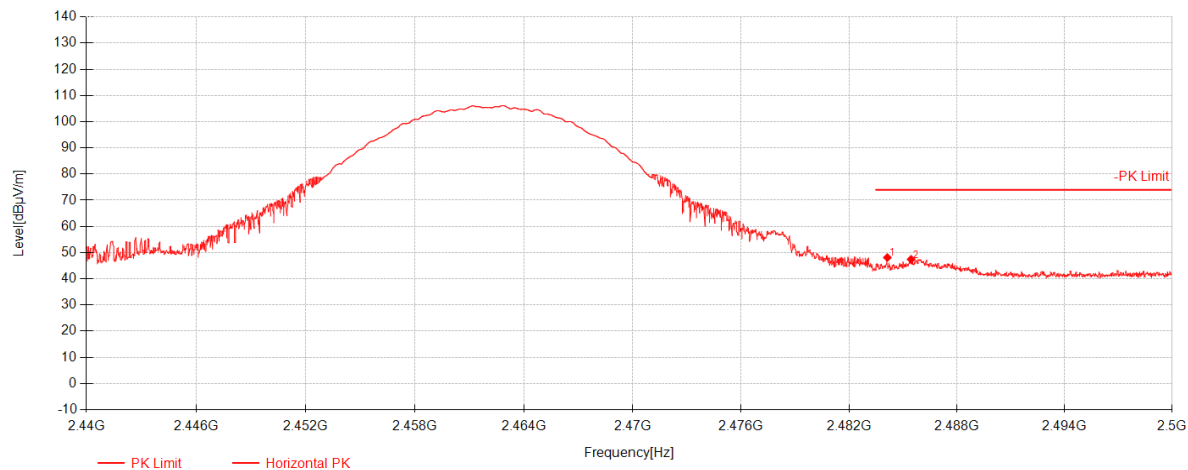
802.11b Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2485.87	31.11	27.26	-23.54	34.83	54.00	19.17	Vertical
2	2488.375	28.66	27.27	-23.54	32.38	54.00	21.62	Vertical

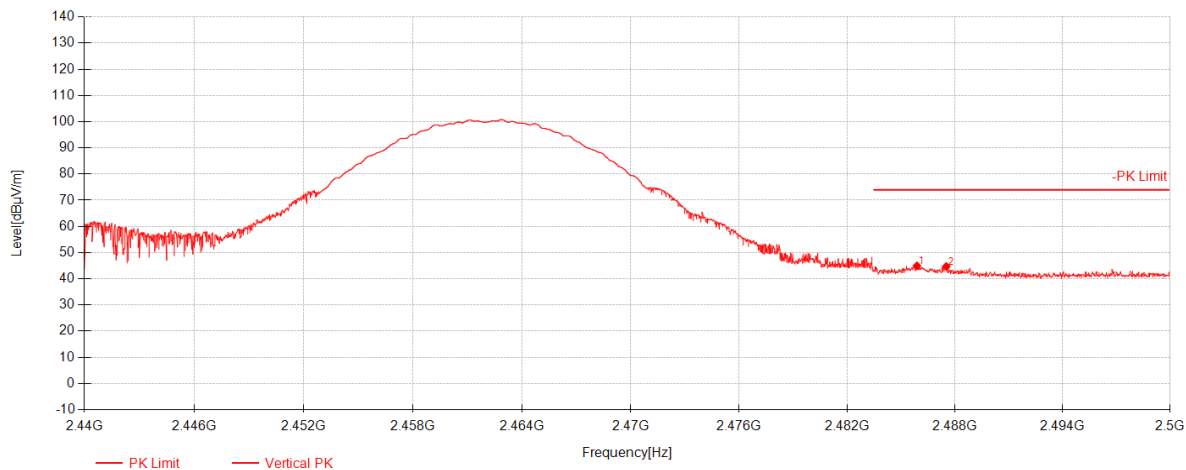
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802.11b Channel 11



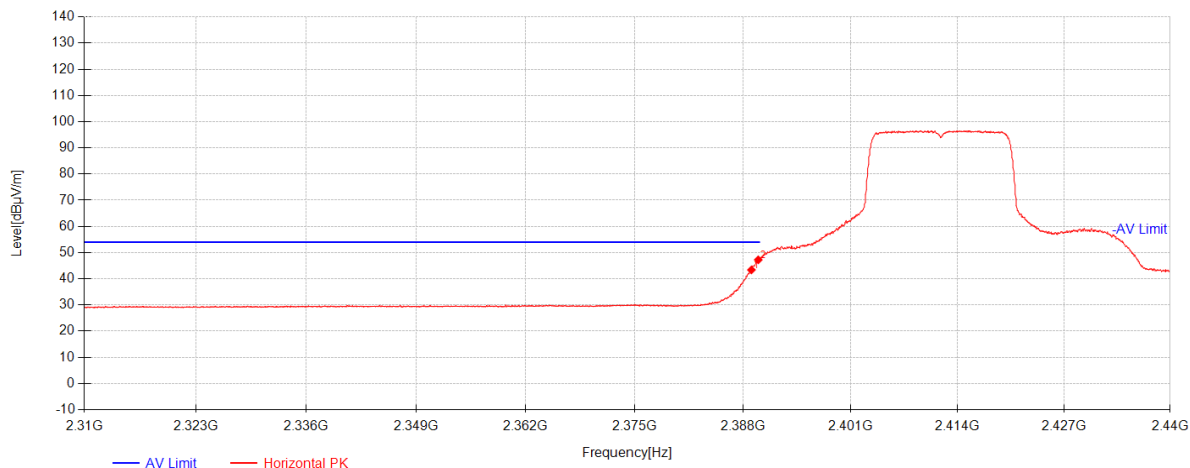
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.13	44.39	27.26	-23.54	48.10	74.00	25.90	Horizontal
2	2485.45	43.72	27.26	-23.54	47.43	74.00	26.57	Horizontal

802.11b Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2485.885	41.23	27.26	-23.54	44.95	74.00	29.05	Vertical
2	2487.52	41.02	27.27	-23.54	44.74	74.00	29.26	Vertical

802.11g Channel 01



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.04	39.97	26.99	-23.57	43.39	54.00	10.61	Horizontal
2	2389.8633	43.82	26.99	-23.57	47.24	54.00	6.76	Horizontal

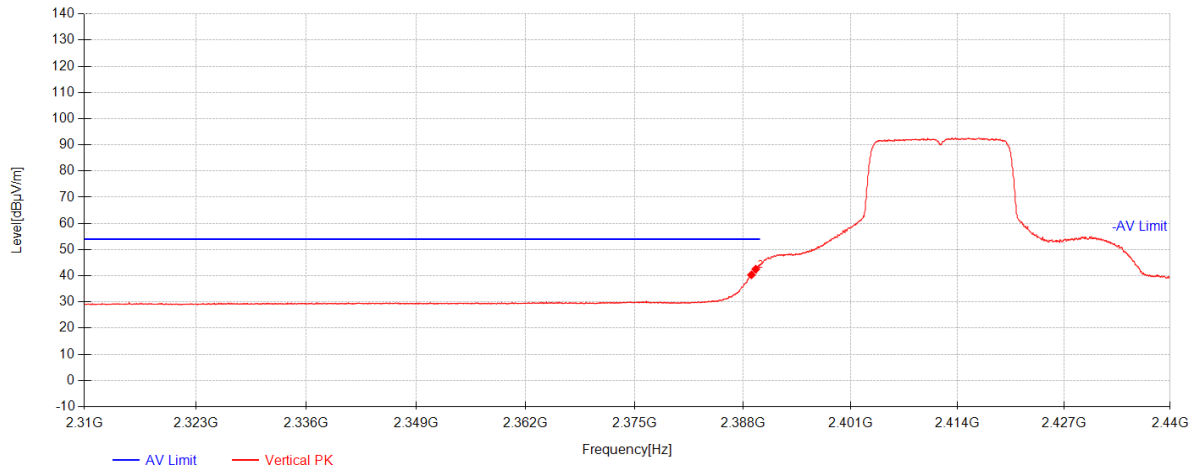
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802.11g Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.04	36.93	26.99	-23.57	40.35	54.00	13.65	Vertical
2	2389.56	39.10	26.99	-23.57	42.52	54.00	11.48	Vertical

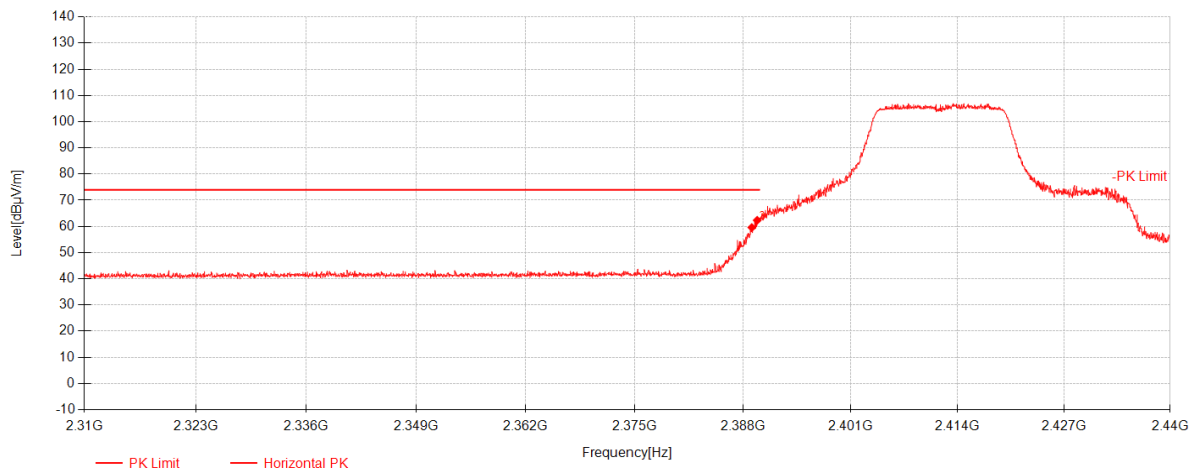
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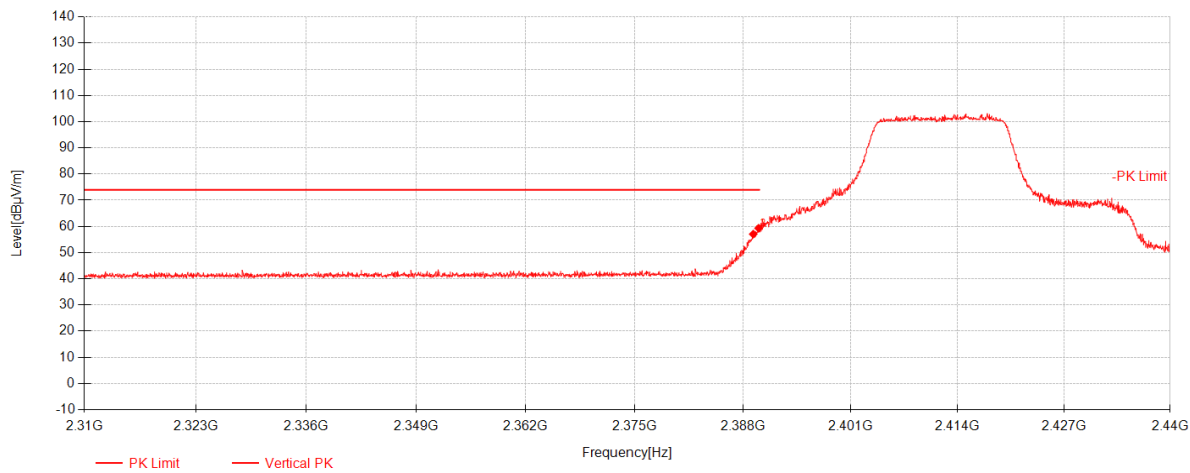
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802.11g Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.0833	56.18	26.99	-23.57	59.60	74.00	14.40	Horizontal
2	2389.7333	58.93	26.99	-23.57	62.35	74.00	11.65	Horizontal

802.11g Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.2567	53.65	26.99	-23.57	57.07	74.00	16.93	Vertical
2	2389.9067	55.89	26.99	-23.57	59.31	74.00	14.69	Vertical

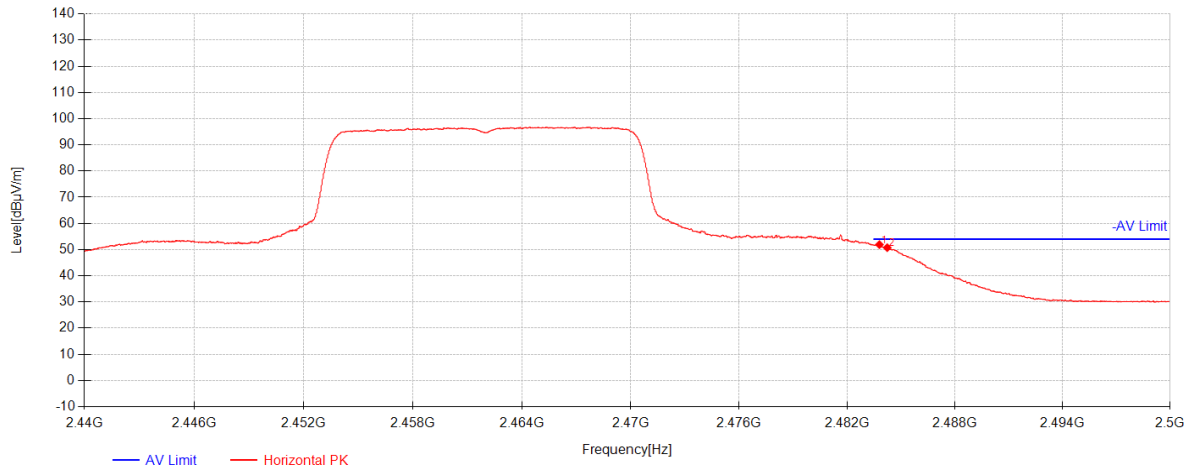
Compliance Certification Services (Kunshan) Inc.

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Report No.: KSCR240200030903

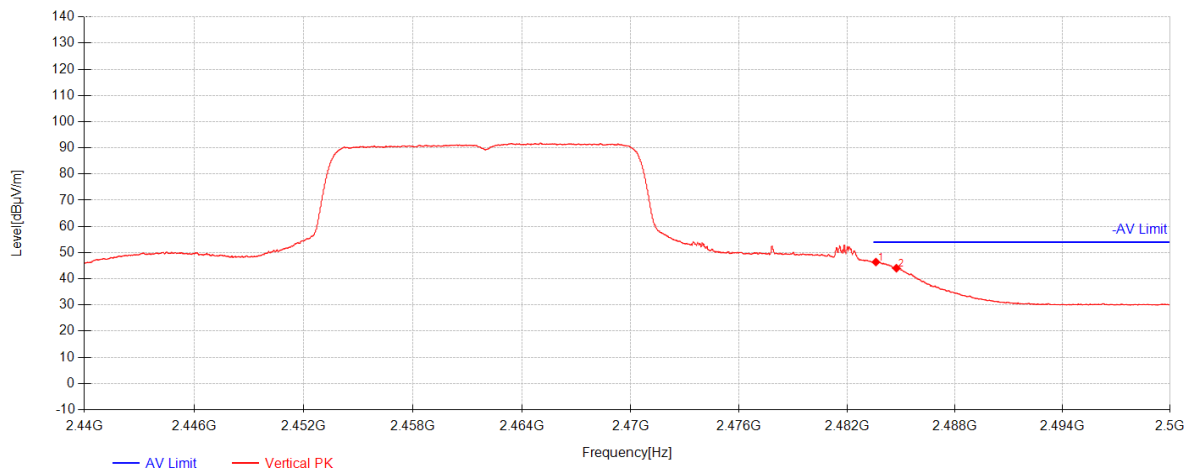
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802.11g Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.8	48.19	27.25	-23.54	51.90	54.00	2.10	Horizontal
2	2484.235	47.03	27.26	-23.54	50.74	54.00	3.26	Horizontal

802.11g Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.605	42.68	27.25	-23.54	46.39	54.00	7.61	Vertical
2	2484.745	40.33	27.26	-23.54	44.04	54.00	9.96	Vertical

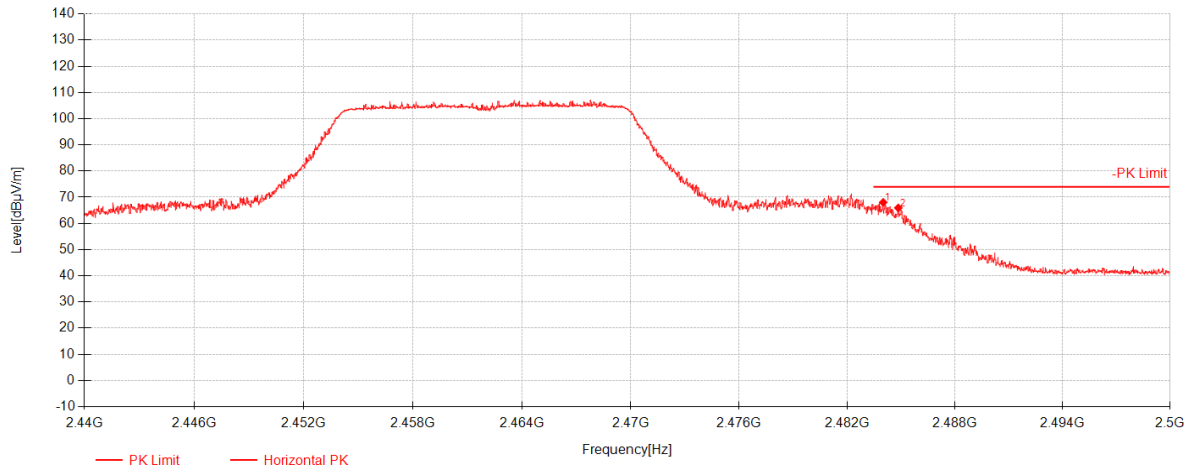
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.01	64.32	27.26	-23.54	68.03	74.00	5.97	Horizontal
2	2484.85	62.23	27.26	-23.54	65.94	74.00	8.06	Horizontal

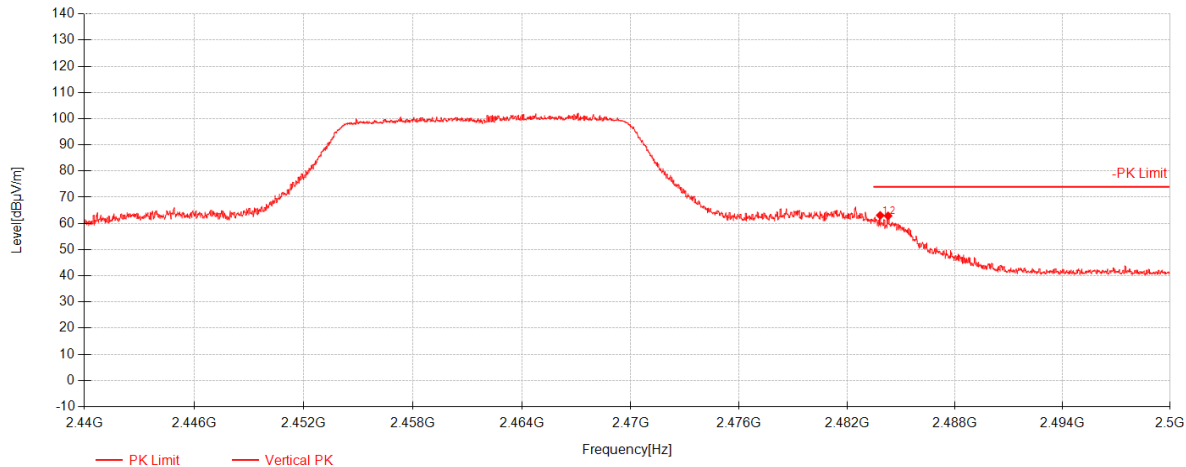
Compliance Certification Services (Kunshan) Inc.

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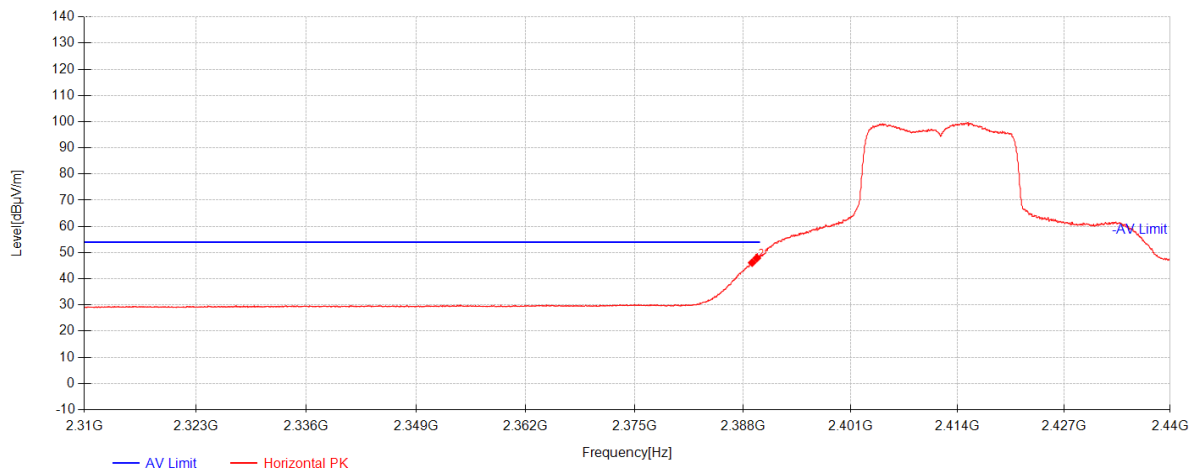
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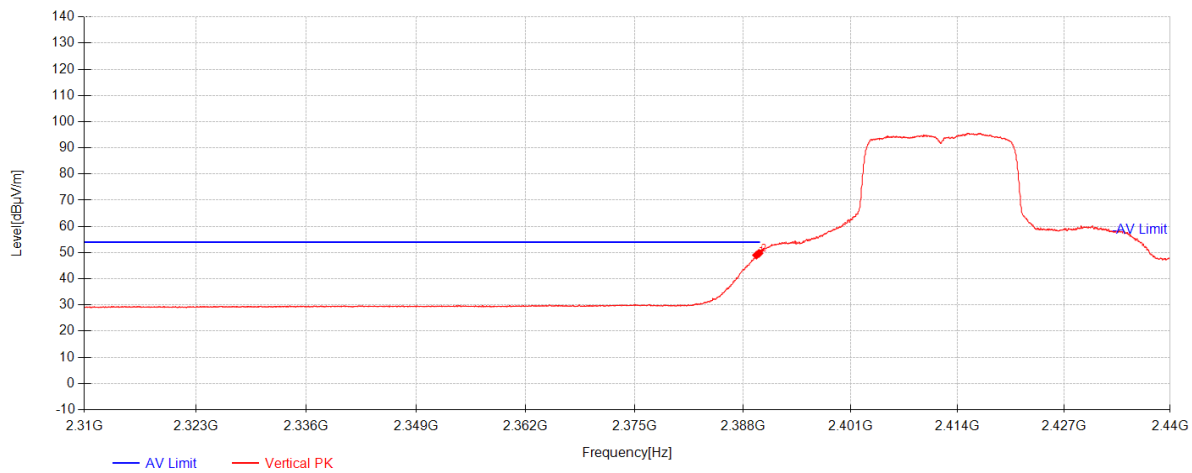
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.845	59.37	27.25	-23.54	63.08	74.00	10.92	Vertical
2	2484.28	59.18	27.26	-23.54	62.89	74.00	11.11	Vertical

802.11n20 Channel 01



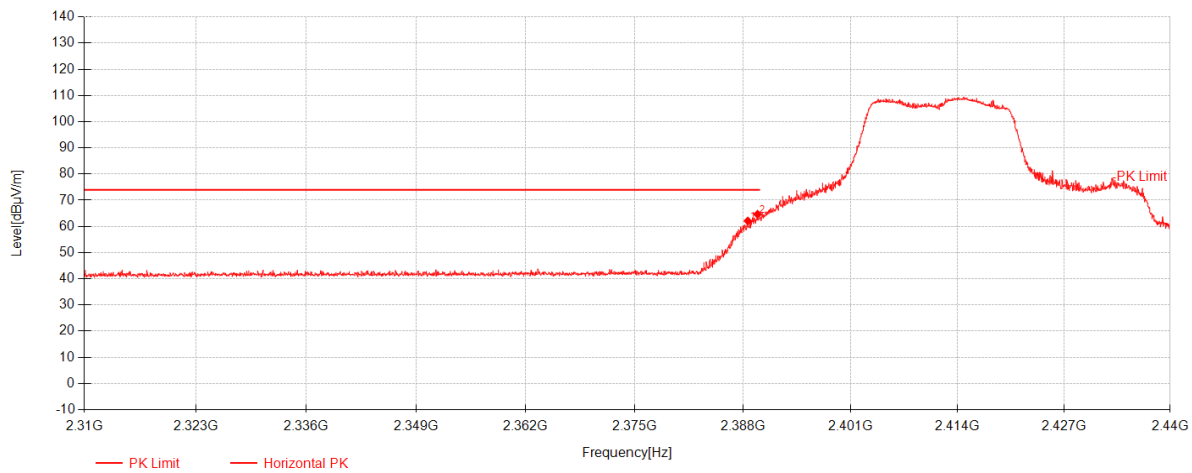
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1	2389.1267	42.74	26.99	-23.57	46.16	54.00	7.84	Horizontal
2	2389.69	44.49	26.99	-23.57	47.91	54.00	6.09	Horizontal

802.11n20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.6467	45.61	26.99	-23.57	49.03	54.00	4.97	Vertical
2	2389.95	46.30	26.99	-23.57	49.72	54.00	4.28	Vertical

802.11n20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2388.6067	58.68	26.99	-23.57	62.10	74.00	11.90	Horizontal
2	2389.7767	61.24	26.99	-23.57	64.66	74.00	9.34	Horizontal



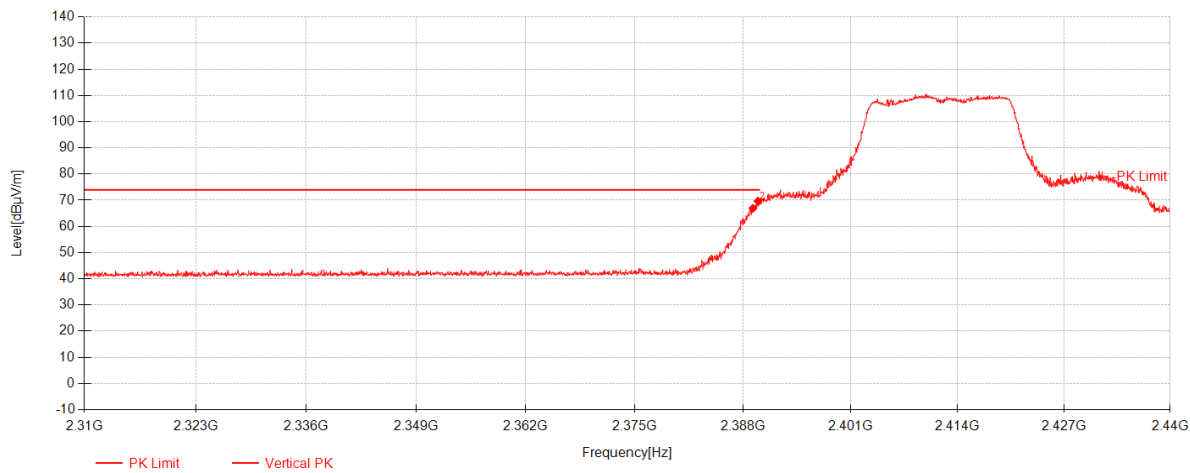
Compliance Certification Services (Kunshan) Inc.

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802.11n20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.2133	63.52	26.99	-23.57	66.94	74.00	7.06	Vertical
2	2389.82	66.27	26.99	-23.57	69.69	74.00	4.31	Vertical

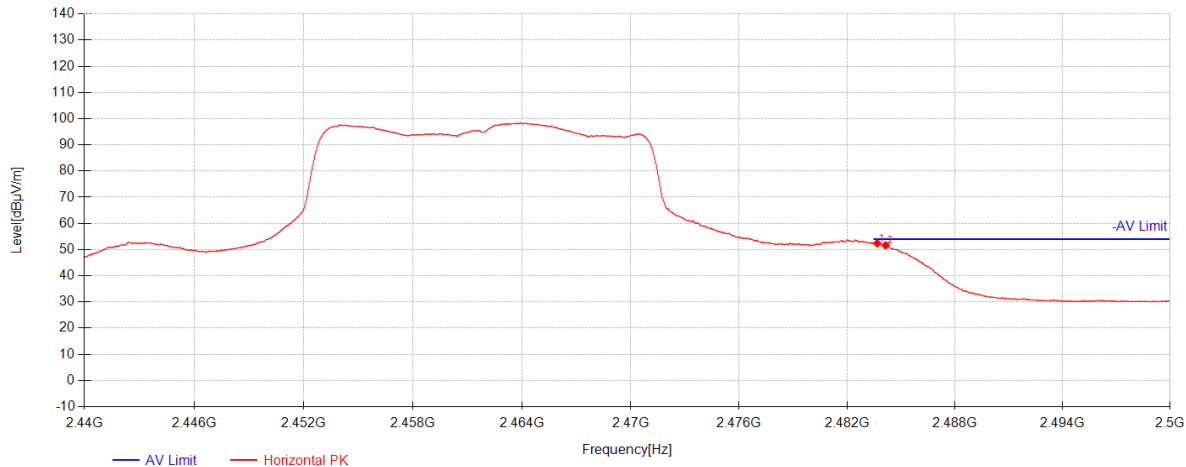
Compliance Certification Services (Kunshan) Inc.

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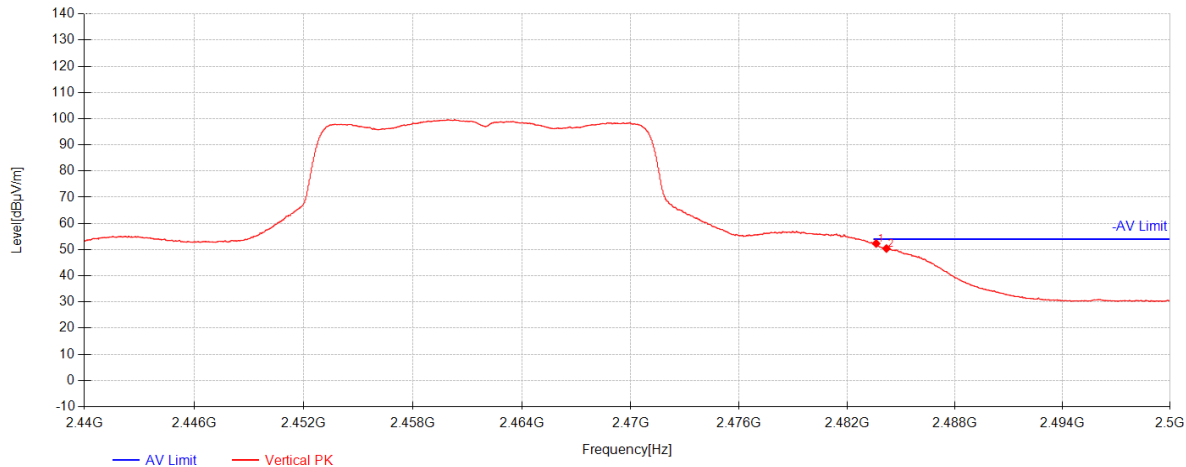
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802.11n20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.68	48.69	27.25	-23.54	52.40	54.00	1.60	Horizontal
2	2484.145	47.90	27.26	-23.54	51.61	54.00	2.39	Horizontal

802.11n20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.62	48.61	27.25	-23.54	52.32	54.00	1.68	Vertical
2	2484.19	46.70	27.26	-23.54	50.41	54.00	3.59	Vertical

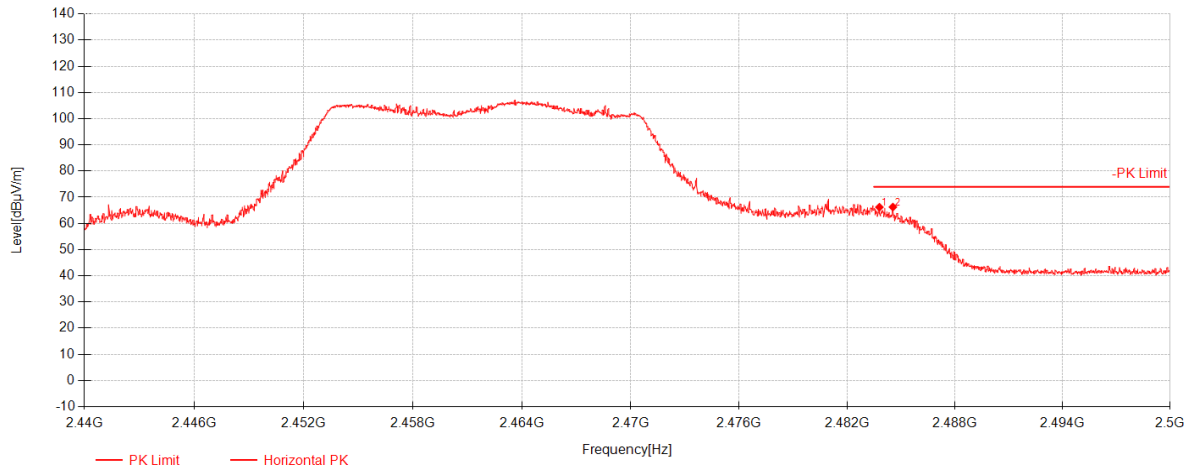
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802.11n20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.8	62.48	27.25	-23.54	66.19	74.00	7.81	Horizontal
2	2484.55	62.55	27.26	-23.54	66.26	74.00	7.74	Horizontal

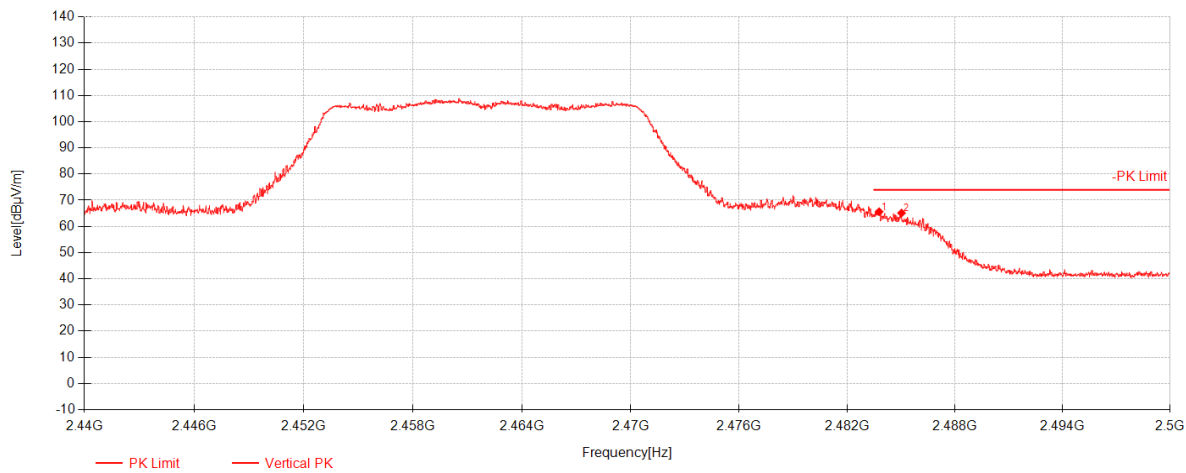
Compliance Certification Services (Kunshan) Inc.

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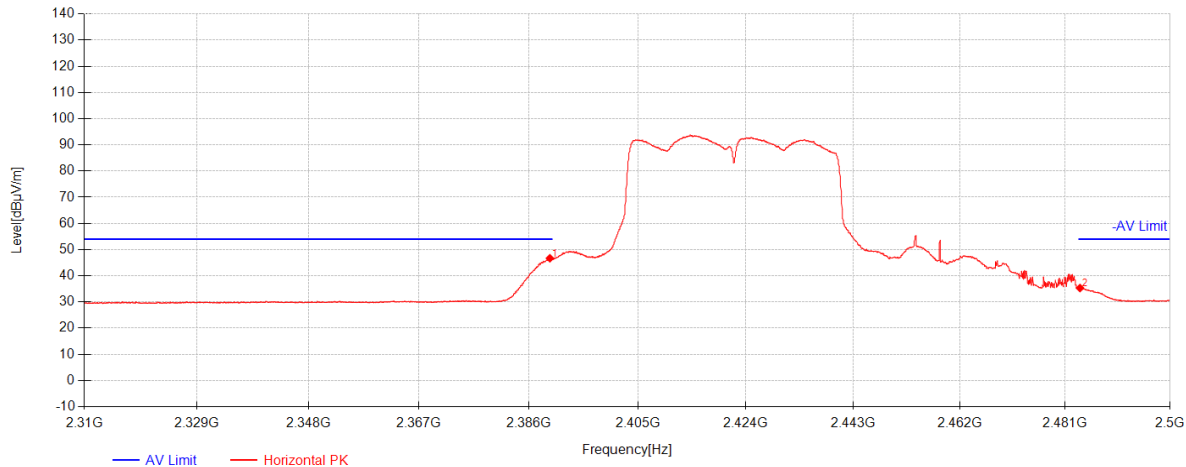
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802.11n20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.785	61.90	27.25	-23.54	65.61	74.00	8.39	Vertical
2	2485.03	61.41	27.26	-23.54	65.12	74.00	8.88	Vertical

802.11n40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.6467	43.28	26.99	-23.57	46.70	54.00	7.30	Horizontal
2	2483.68	31.61	27.25	-23.54	35.32	54.00	18.68	Horizontal

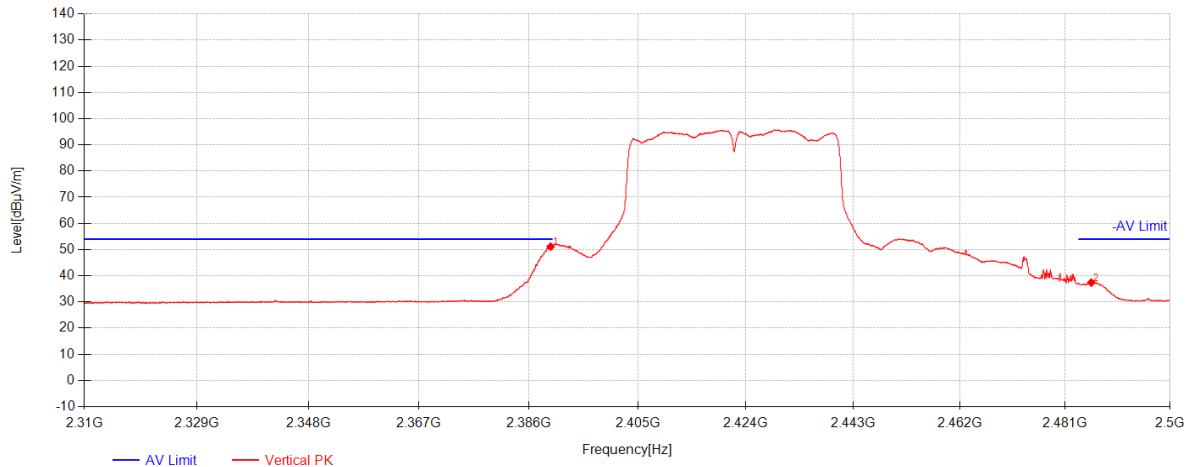
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802.11n40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.7767	47.71	26.99	-23.57	51.13	54.00	2.87	Vertical
2	2485.72	33.69	27.26	-23.54	37.41	54.00	16.59	Vertical

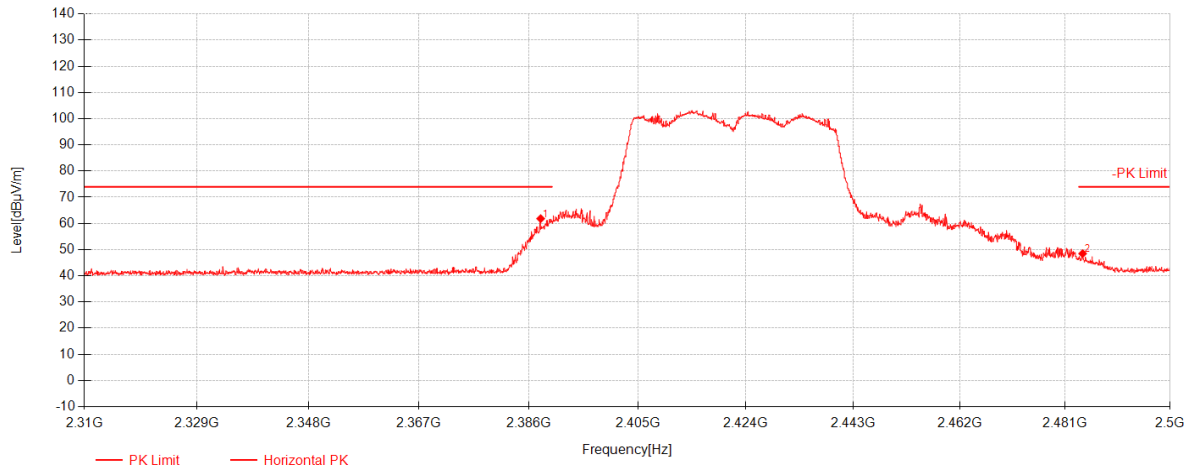
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802.11n40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2388.0433	58.40	26.99	-23.57	61.82	74.00	12.18	Horizontal
2	2484.16	44.76	27.26	-23.54	48.47	74.00	25.53	Horizontal

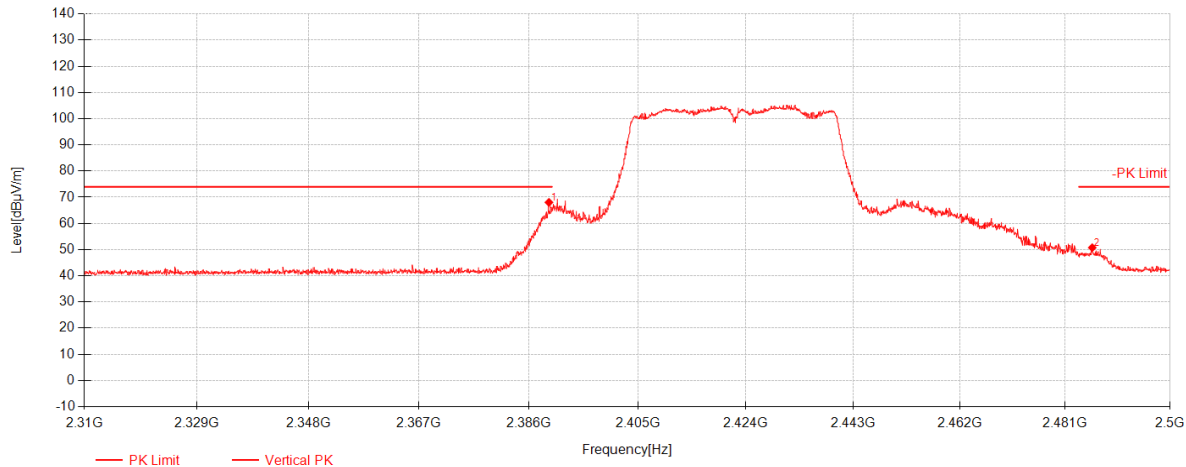
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802.11n40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.4733	64.62	26.99	-23.57	68.04	74.00	5.96	Vertical
2	2485.9	47.03	27.26	-23.54	50.75	74.00	23.25	Vertical

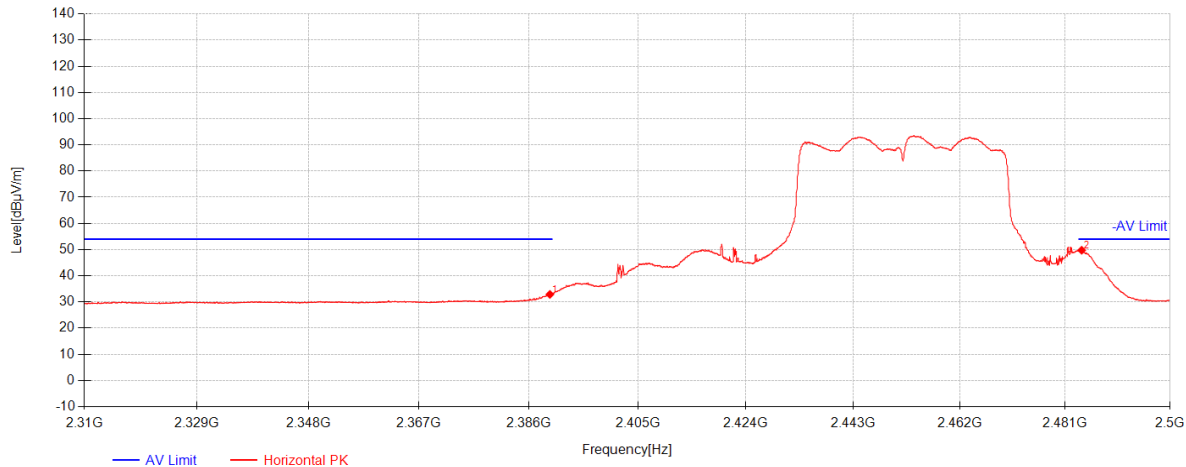
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802.11n40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.6467	29.47	26.99	-23.57	32.89	54.00	21.11	Horizontal
2	2483.98	46.06	27.26	-23.54	49.77	54.00	4.23	Horizontal

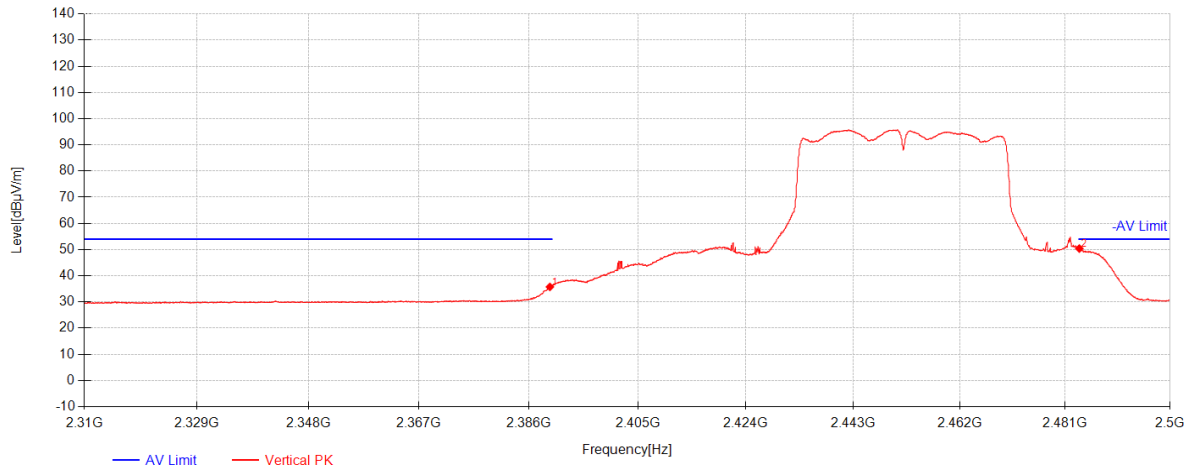
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.6467	32.33	26.99	-23.57	35.75	54.00	18.25	Vertical
2	2483.56	46.69	27.25	-23.54	50.40	54.00	3.60	Vertical

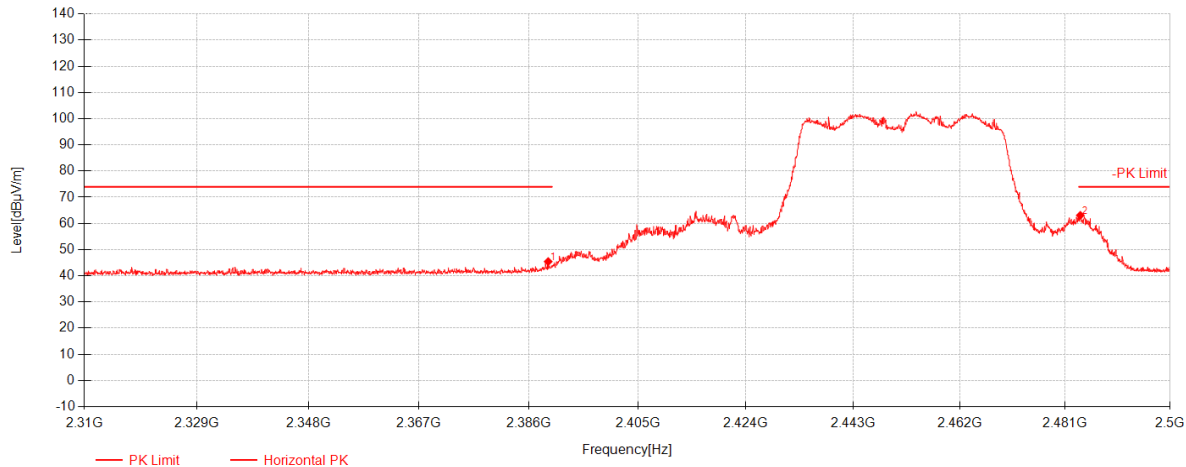
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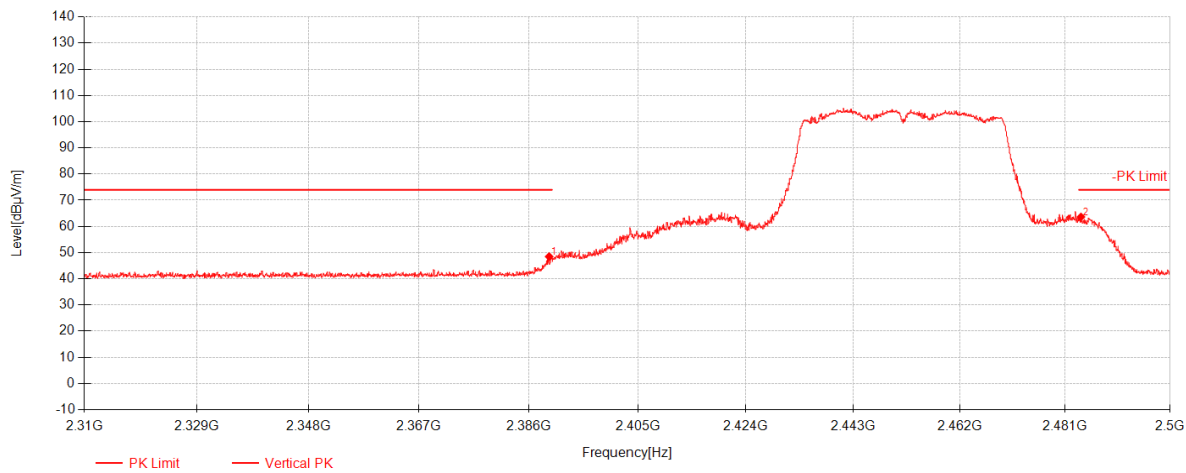
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802.11n40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.3433	42.01	26.99	-23.57	45.43	74.00	28.57	Horizontal
2	2483.74	59.39	27.25	-23.54	63.10	74.00	10.90	Horizontal

802.11n40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.5167	45.06	26.99	-23.57	48.48	74.00	25.52	Vertical
2	2483.86	59.93	27.25	-23.54	63.64	74.00	10.36	Vertical

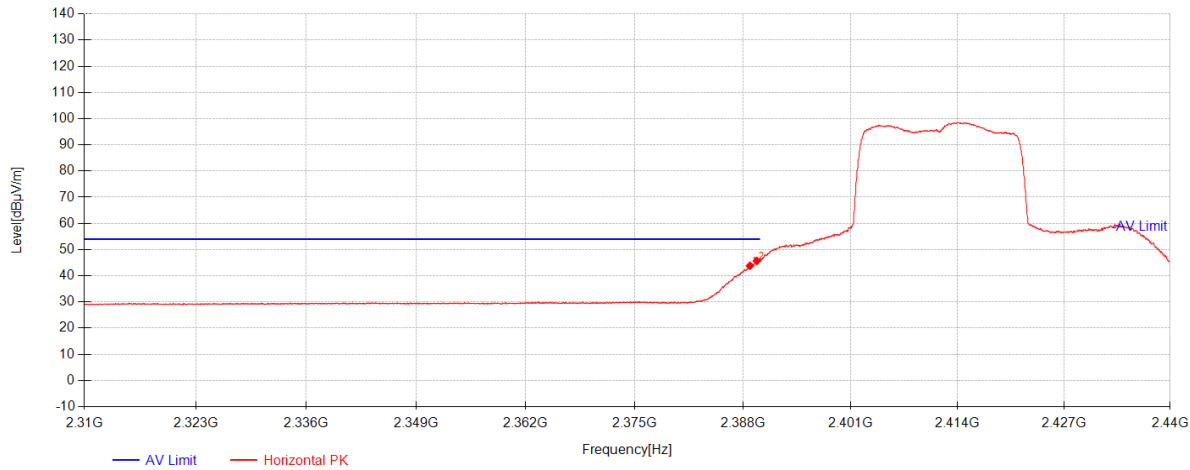
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802.11ax20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2388.8667	40.39	26.99	-23.57	43.81	54.00	10.19	Horizontal
2	2389.69	42.25	26.99	-23.57	45.67	54.00	8.33	Horizontal

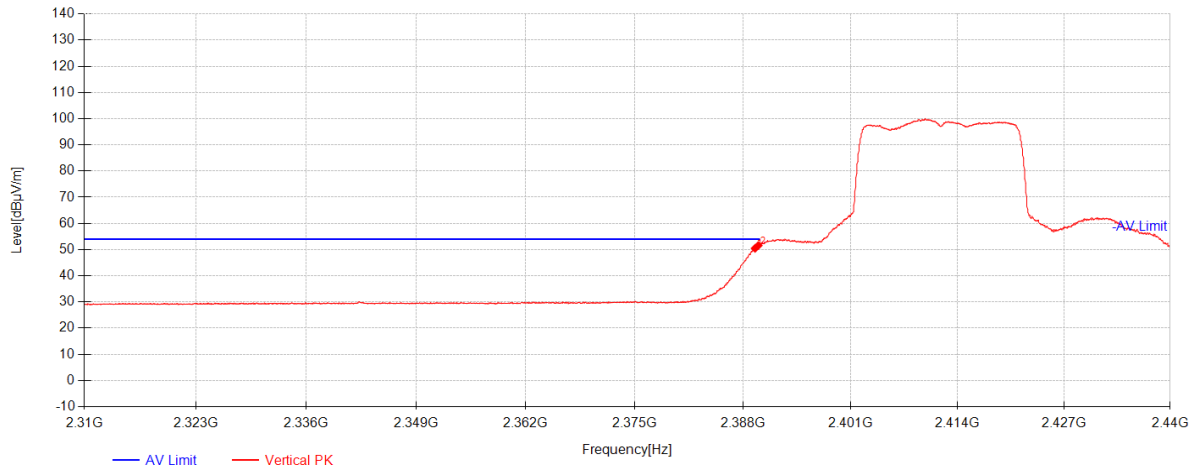
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802.11ax20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.4733	47.06	26.99	-23.57	50.48	54.00	3.52	Vertical
2	2389.8633	48.14	26.99	-23.57	51.56	54.00	2.44	Vertical

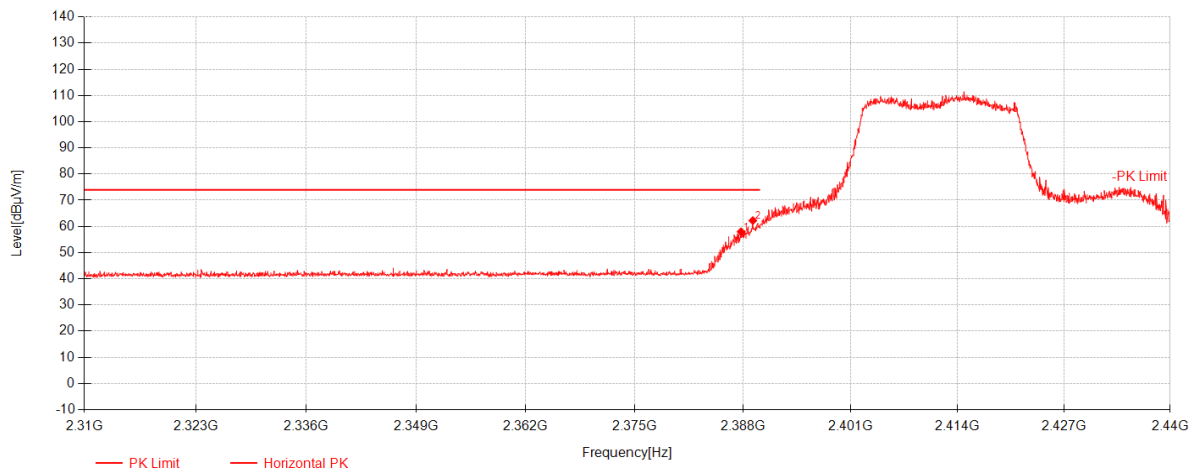
Compliance Certification Services (Kunshan) Inc.

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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2387.7833	54.54	26.99	-23.57	57.95	74.00	16.05	Horizontal
2	2389.2133	58.81	26.99	-23.57	62.23	74.00	11.77	Horizontal



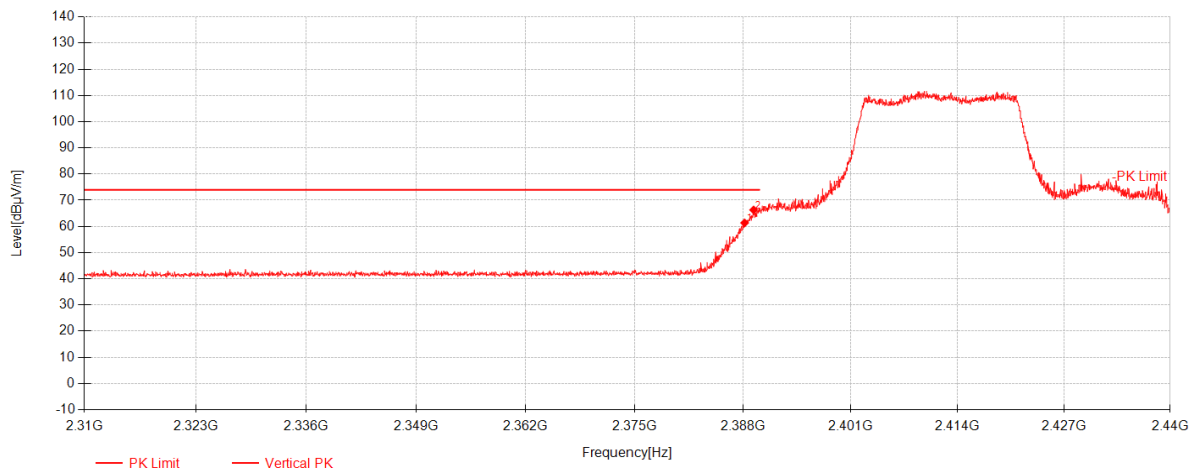
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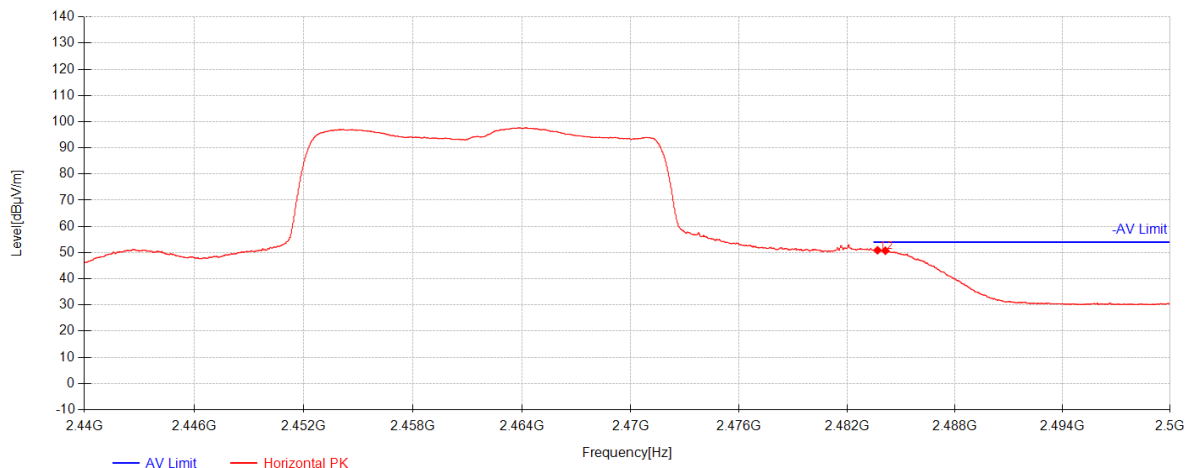
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2388.2167	57.93	26.99	-23.57	61.35	74.00	12.65	Vertical
2	2389.3	62.89	26.99	-23.57	66.31	74.00	7.69	Vertical

802.11ax20 Channel 11



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.695	47.19	27.25	-23.54	50.90	54.00	3.10	Horizontal
2	2484.13	47.00	27.26	-23.54	50.71	54.00	3.29	Horizontal

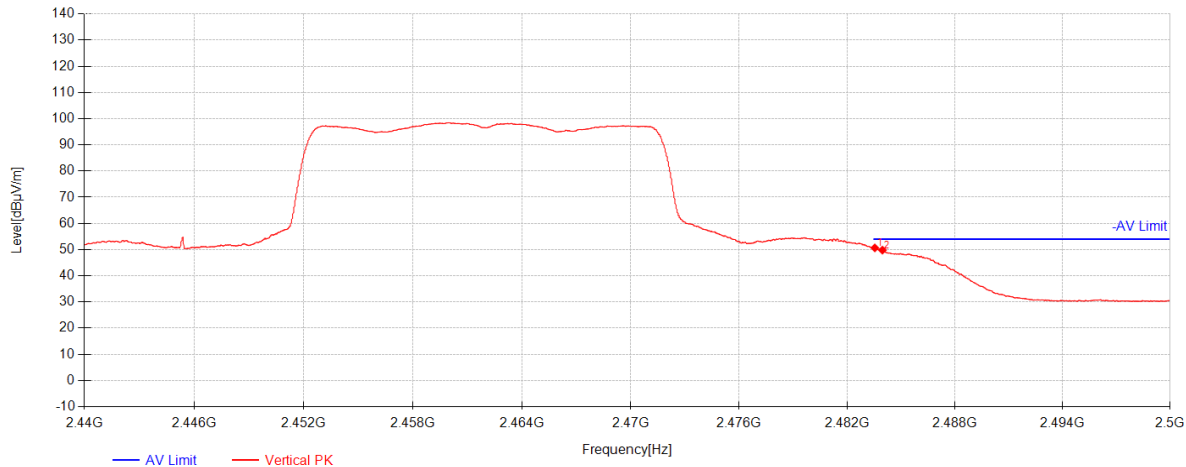
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.545	46.94	27.25	-23.54	50.65	54.00	3.35	Vertical
2	2483.965	46.09	27.26	-23.54	49.80	54.00	4.20	Vertical

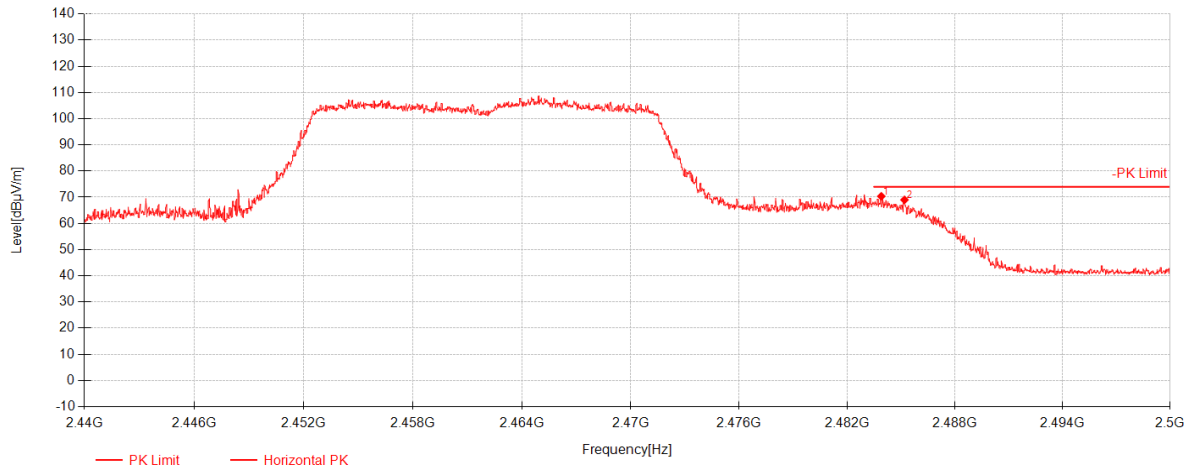
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.905	66.66	27.25	-23.54	70.37	74.00	3.63	Horizontal
2	2485.195	65.30	27.26	-23.54	69.01	74.00	4.99	Horizontal

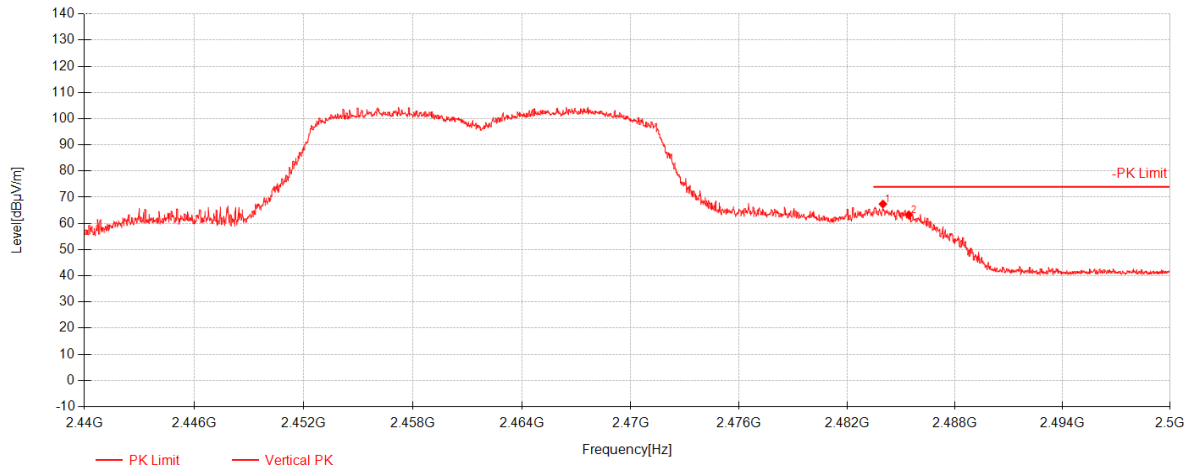
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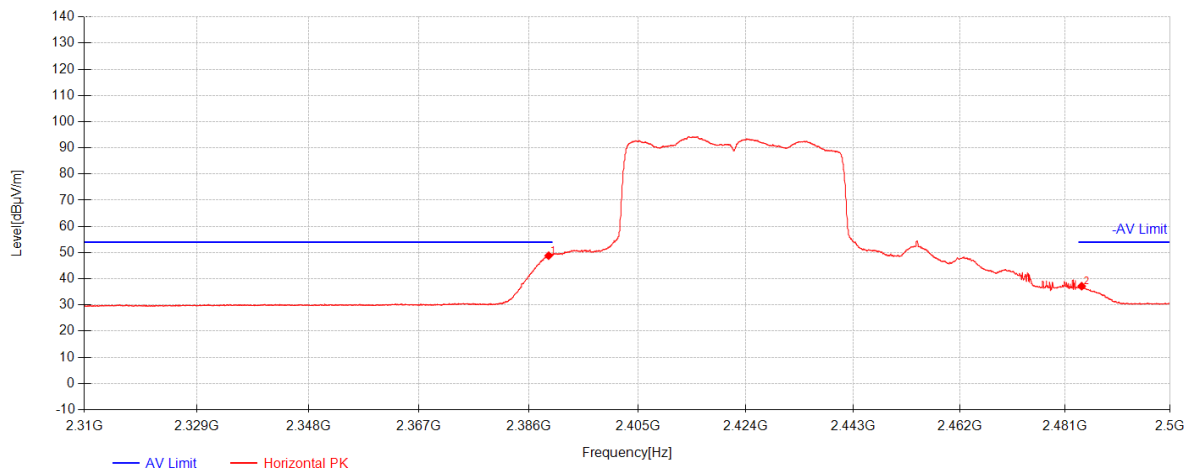
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.995	63.70	27.26	-23.54	67.41	74.00	6.59	Vertical
2	2485.435	59.61	27.26	-23.54	63.32	74.00	10.68	Vertical

802.11ax40 Channel 03



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.43	45.41	26.99	-23.57	48.83	54.00	5.17	Horizontal
2	2483.98	33.47	27.26	-23.54	37.18	54.00	16.82	Horizontal

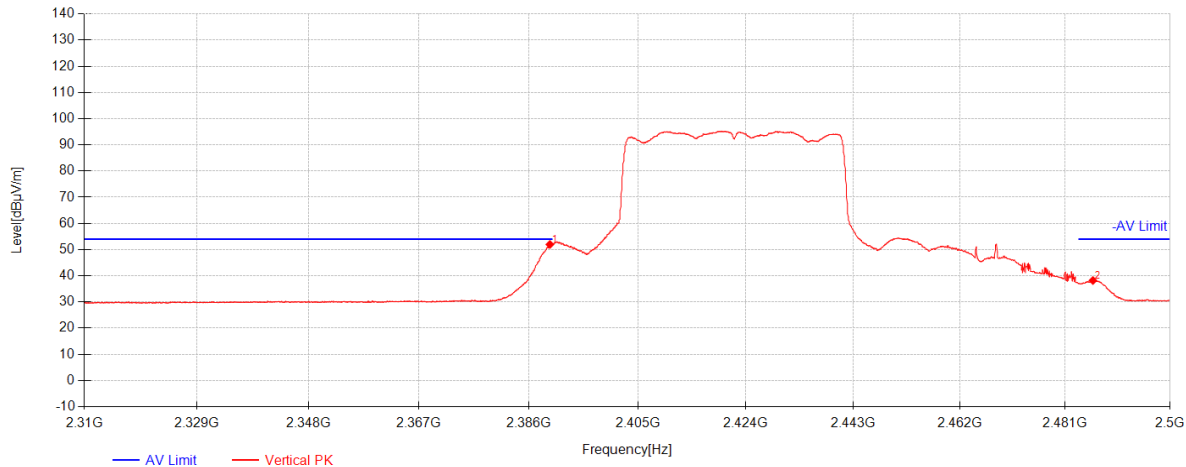
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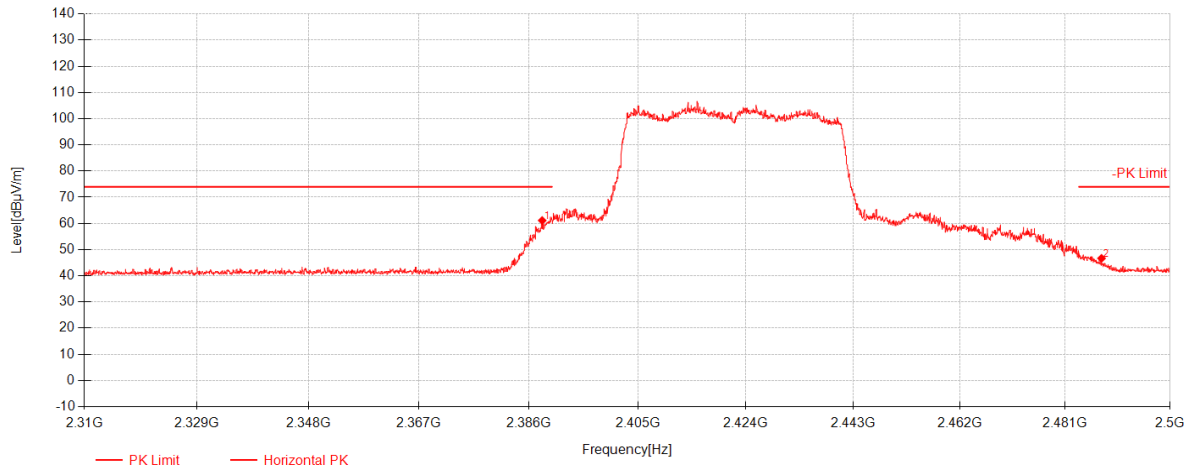
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.6467	48.55	26.99	-23.57	51.97	54.00	2.03	Vertical
2	2486.02	34.47	27.26	-23.54	38.19	54.00	15.81	Vertical

802.11ax40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2388.3033	57.70	26.99	-23.57	61.12	74.00	12.88	Horizontal
2	2487.58	42.95	27.27	-23.54	46.67	74.00	27.33	Horizontal

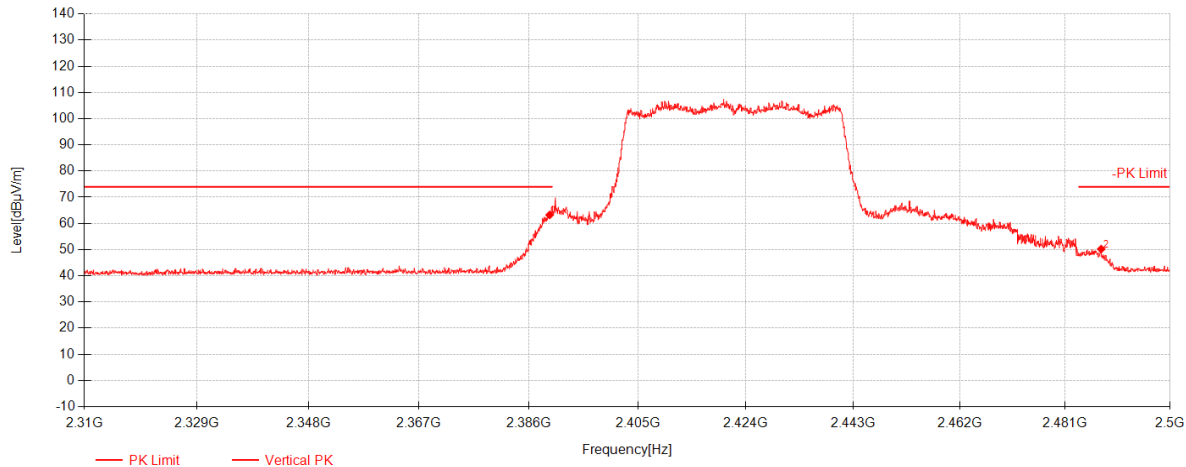
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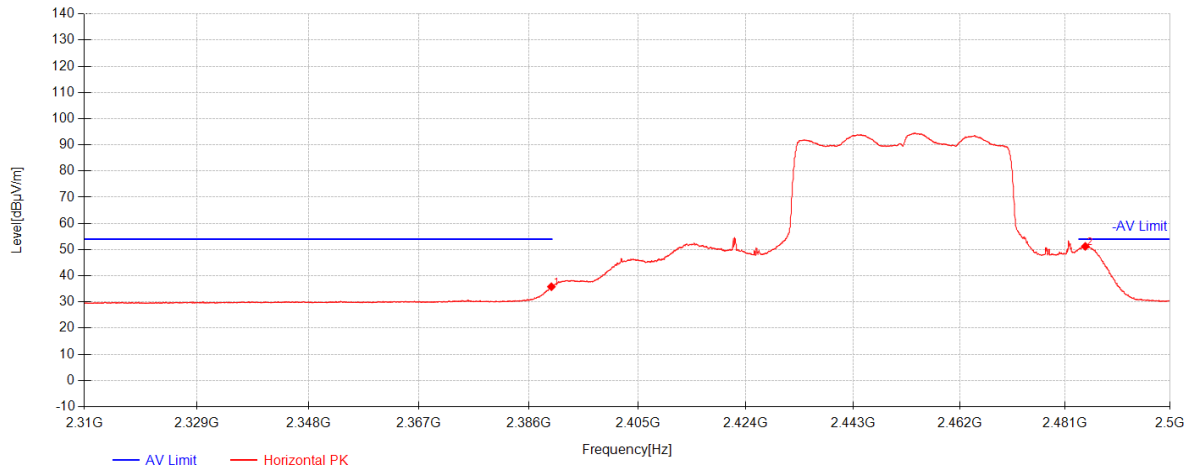
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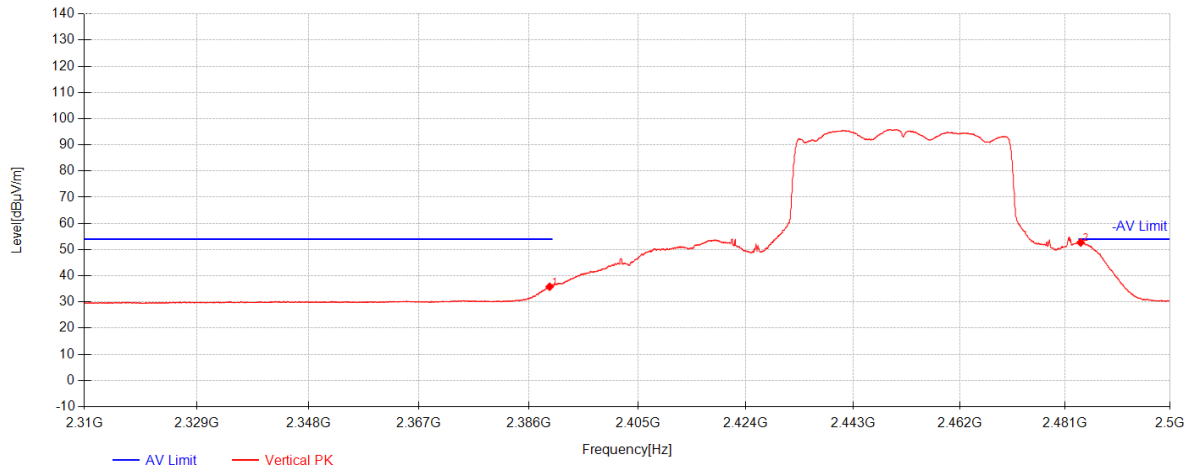
Data List								
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1	2389.6033	59.82	26.99	-23.57	63.24	74.00	10.76	Vertical
2	2487.52	46.49	27.27	-23.54	50.21	74.00	23.79	Vertical

802.11ax40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.9067	32.40	26.99	-23.57	35.82	54.00	18.18	Horizontal
2	2484.64	47.52	27.26	-23.54	51.23	54.00	2.77	Horizontal

802.11ax40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.6033	32.40	26.99	-23.57	35.82	54.00	18.18	Vertical
2	2483.8	49.00	27.25	-23.54	52.71	54.00	1.29	Vertical

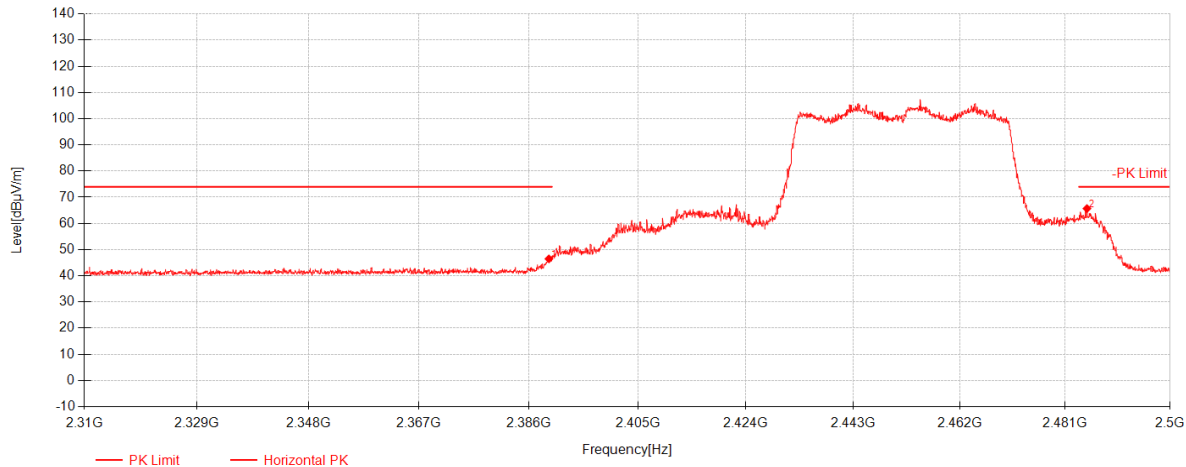
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2389.4733	43.04	26.99	-23.57	46.46	74.00	27.54	Horizontal
2	2484.94	61.96	27.26	-23.54	65.67	74.00	8.33	Horizontal

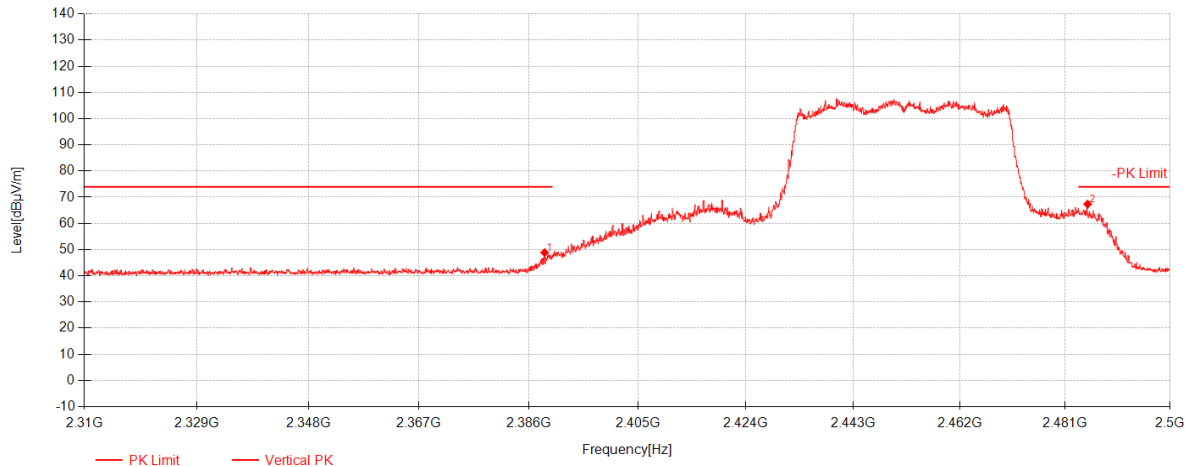
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802.11ax40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2388.7367	45.44	26.99	-23.57	48.86	74.00	25.14	Vertical
2	2485.06	63.66	27.26	-23.54	67.37	74.00	6.63	Vertical

7.8 Radiated Spurious Emissions Below 1GHz

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

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

Measurement Distance: 3m

Limit:

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

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 20.5 °C

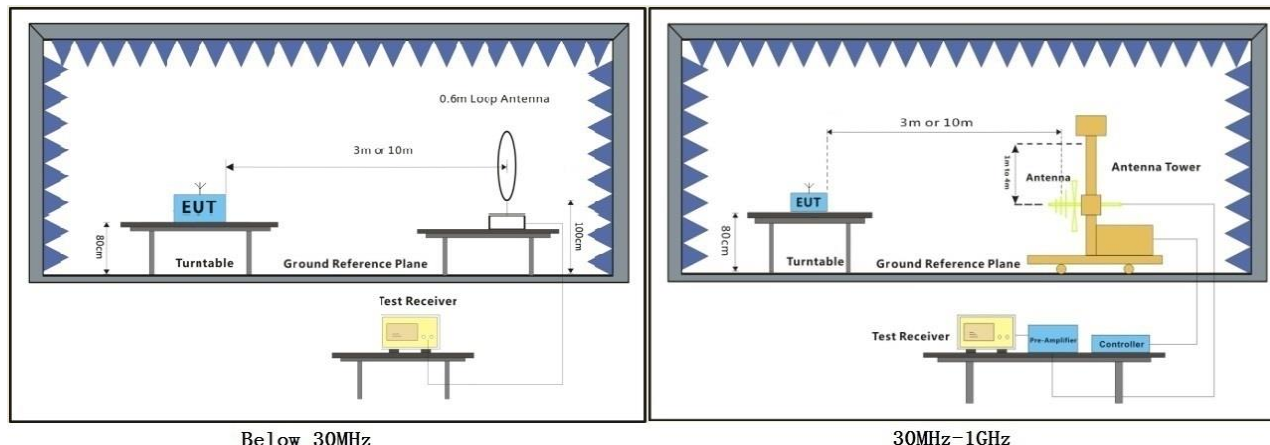
Humidity: 51.3 % RH

Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HEW20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HEW40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.8.3 Test Setup Diagram



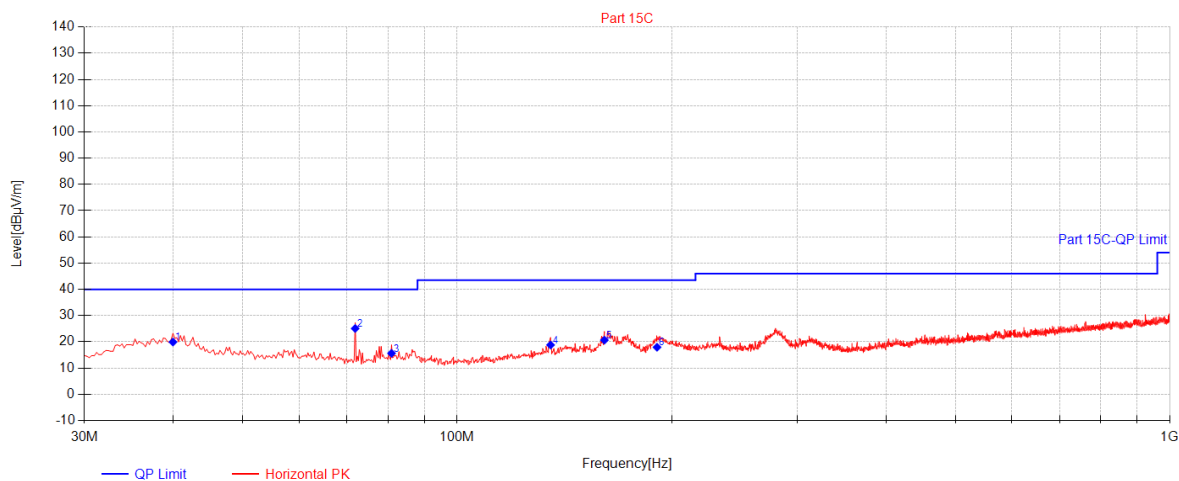
7.8.4 Measurement Procedure and Data

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

Remark:

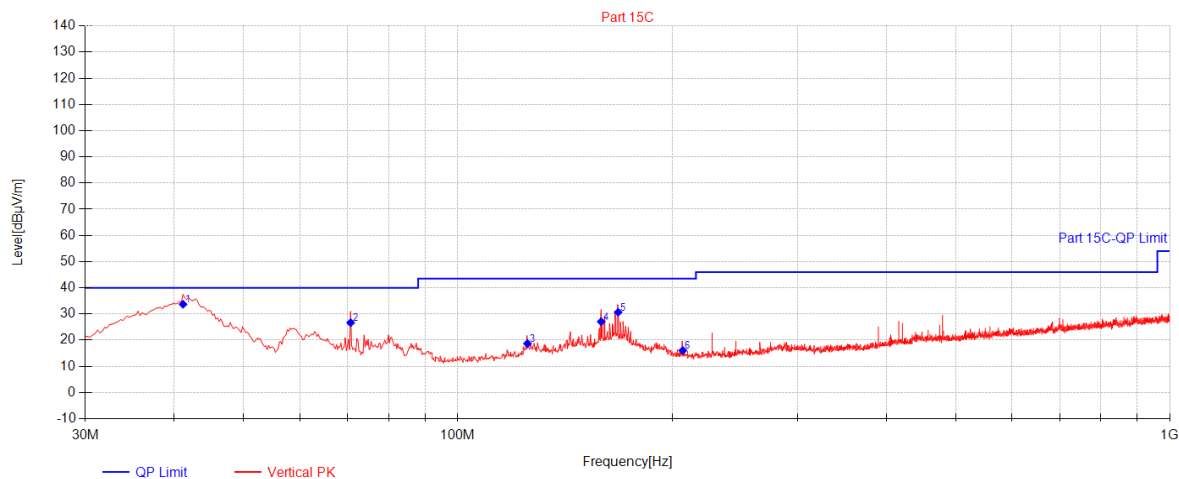
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. This test item was investigated while operating in SISO and MIMO mode, however, it was determined that SISO antenna 1 operation for b/g modulation and MiMO antenna operation for n/ax modulation produced the worst emissions. So the emissions produced from other operation are not recorded in report.

11AX40 Channel 09 WORSE



Final Data List								
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	AF [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity
1	39.9425	42.13	-36.27	14.06	19.92	40.00	20.08	Horizontal
2	71.9525	50.89	-36.35	10.52	25.07	40.00	14.93	Horizontal
3	80.925	42.01	-35.70	9.30	15.61	40.00	24.39	Horizontal
4	135.245	41.22	-35.59	13.17	18.79	43.50	24.71	Horizontal
5	160.95	41.78	-35.30	14.17	20.64	43.50	22.86	Horizontal
6	190.7775	41.23	-35.40	12.10	17.93	43.50	25.57	Horizontal

11AX40 Channel 09 WORSE



Final Data List								
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	AF [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity
1	41.155	55.99	-36.25	13.97	33.71	40.00	6.29	Vertical
2	70.74	52.41	-36.45	10.71	26.66	40.00	13.34	Vertical
3	125.3025	42.03	-35.88	12.53	18.68	43.50	24.82	Vertical
4	159.01	48.26	-35.31	14.11	27.06	43.50	16.44	Vertical
5	167.9825	51.47	-35.18	14.36	30.65	43.50	12.85	Vertical
6	207.025	41.00	-35.05	10.13	16.08	43.50	27.42	Vertical

7.9 Radiated Spurious Emissions Above 1GHz

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

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

Measurement Distance: 3m

Limit:

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

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 20.5 °C

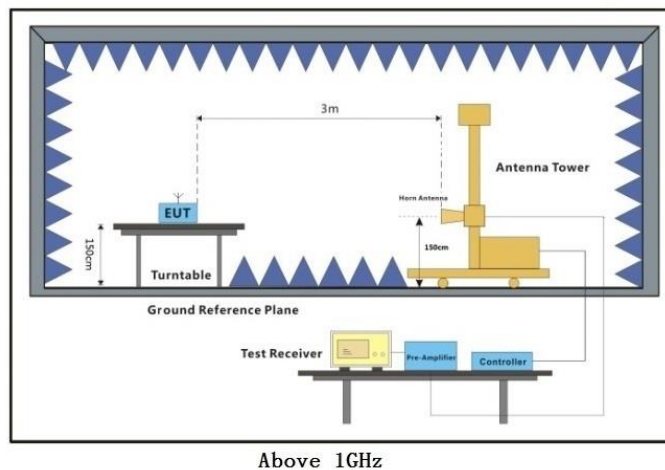
Humidity: 51.3 % RH

Atmospheric Pressure: 1010 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)/ax(HE20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40)/ax(HE40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

7.9.3 Test Setup Diagram



7.9.4 Measurement Procedure and Data

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

Remark:

1. $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamplifier Factor}$
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
4. This test item was investigated while operating in SISO and MIMO mode, however, it was determined that SISO antenna 1 operation for b/g modulation and MiMO antenna operation for n modulation produced the worst emissions. So the emissions produced from other operation are not recorded in report.

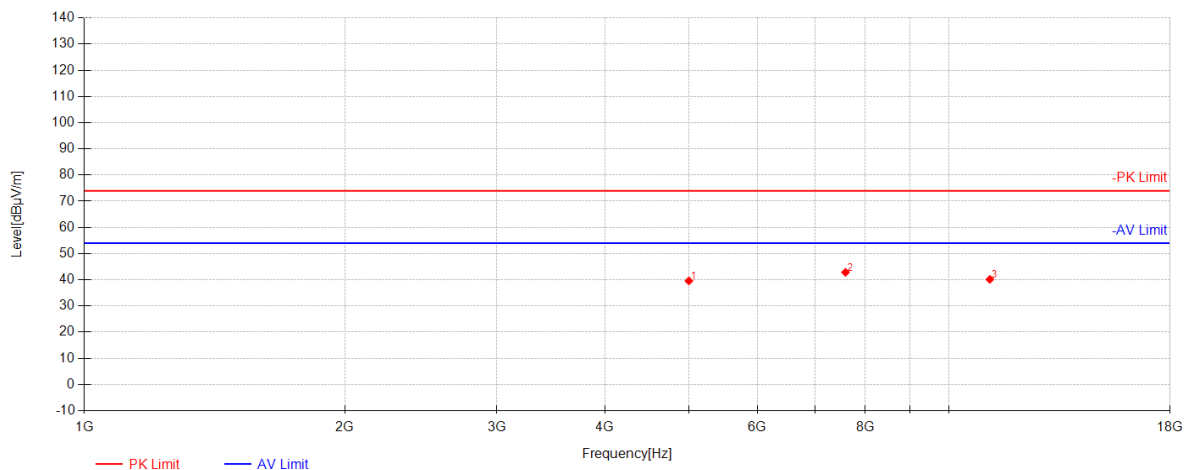
Compliance Certification Services (Kunshan) Inc.

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802.11b Channel 01



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000.5	53.82	31.40	-45.64	39.58	74.00	34.42	Horizontal
2	7588	49.18	36.64	-42.96	42.86	74.00	31.14	Horizontal
3	11144.5	39.15	38.71	-37.71	40.15	74.00	33.85	Horizontal

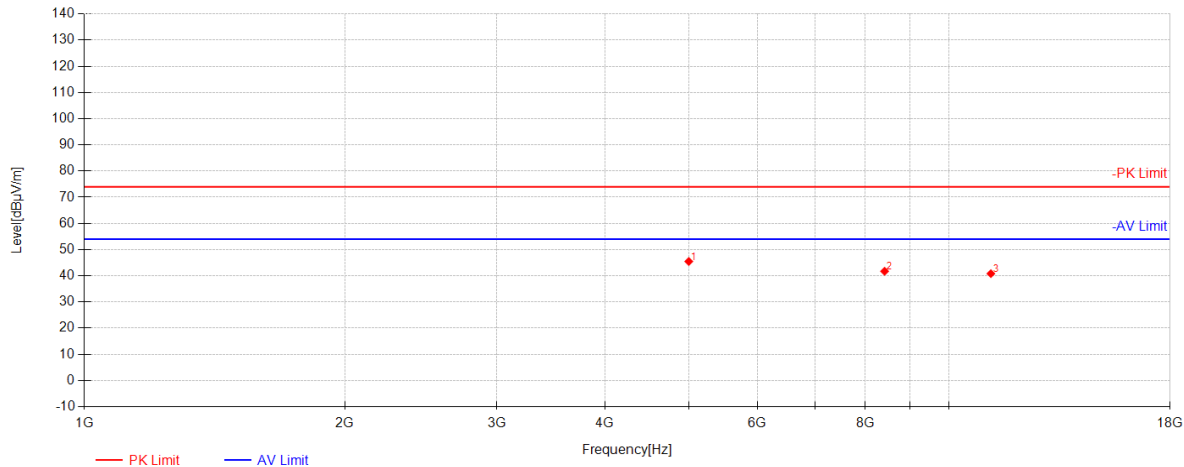
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802.11b Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	59.71	31.40	-45.64	45.47	74.00	28.53	Vertical
2	8420.5	46.62	36.59	-41.48	41.72	74.00	32.28	Vertical
3	11174.5	39.64	38.72	-37.54	40.82	74.00	33.18	Vertical

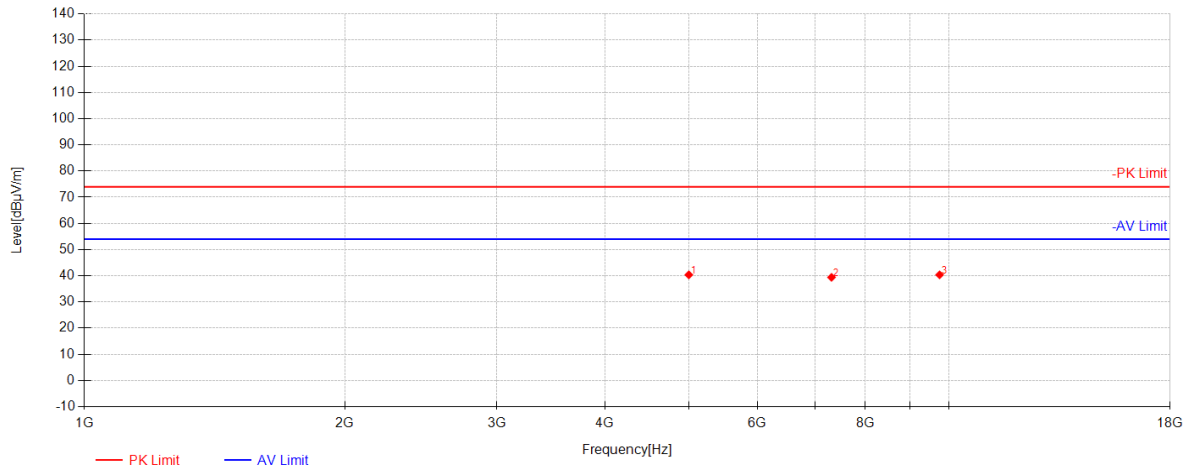
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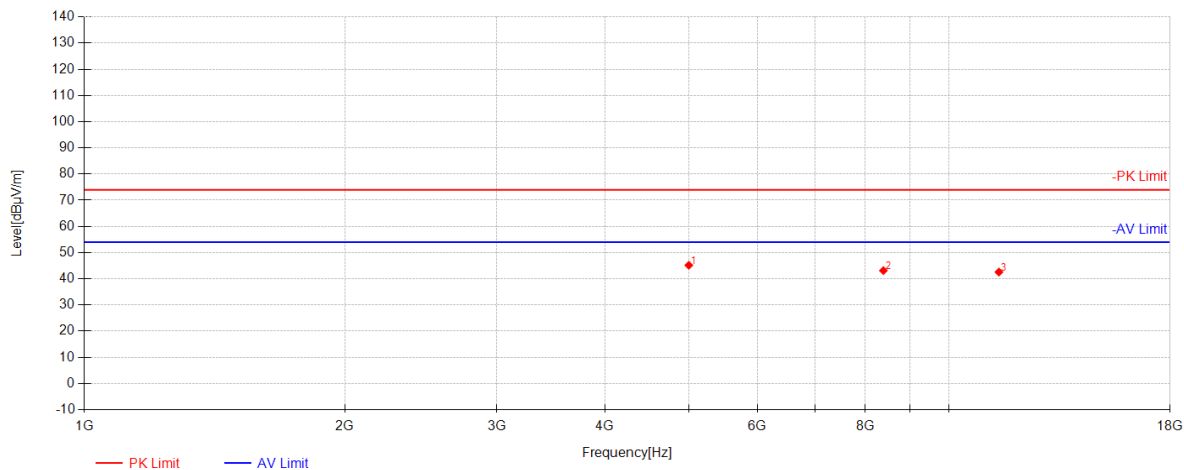
802.11b Channel 06



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	54.60	31.40	-45.64	40.36	74.00	33.64	Horizontal
2	7311.0000	47.05	36.07	-43.71	39.41	74.00	34.59	Horizontal
3	9748.0000	42.09	37.72	-39.46	40.35	74.00	33.65	Horizontal

802.11b Channel 06



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	59.41	31.40	-45.64	45.17	74.00	28.83	Vertical
2	8393.5	48.01	36.60	-41.49	43.13	74.00	30.87	Vertical
3	11416.5	41.19	38.74	-37.36	42.57	74.00	31.43	Vertical

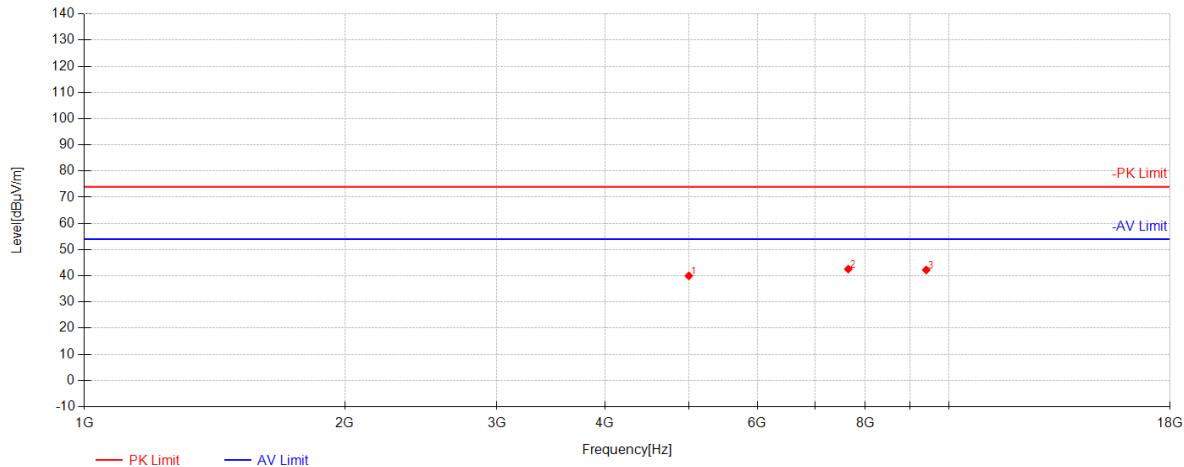
Compliance Certification Services (Kunshan) Inc.

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802.11b Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	54.21	31.40	-45.64	39.97	74.00	34.03	Horizontal
2	7645	48.91	36.66	-43.02	42.55	74.00	31.45	Horizontal
3	9407.5	45.01	37.07	-39.86	42.22	74.00	31.78	Horizontal

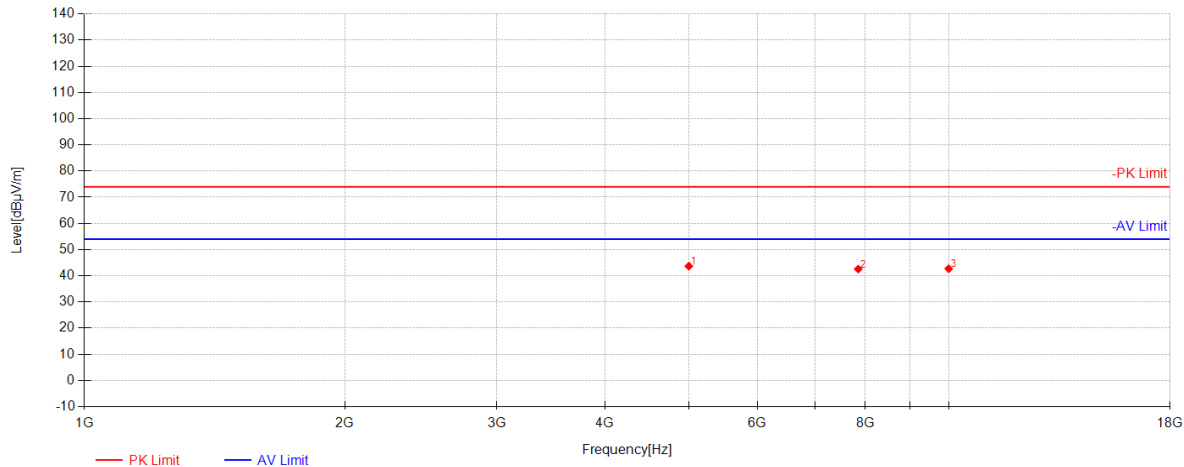
Compliance Certification Services (Kunshan) Inc.

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802.11b Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	57.92	31.40	-45.64	43.68	74.00	30.32	Vertical
2	7849	48.37	36.74	-42.56	42.55	74.00	31.45	Vertical
3	9986.5	43.77	38.17	-39.25	42.69	74.00	31.31	Vertical

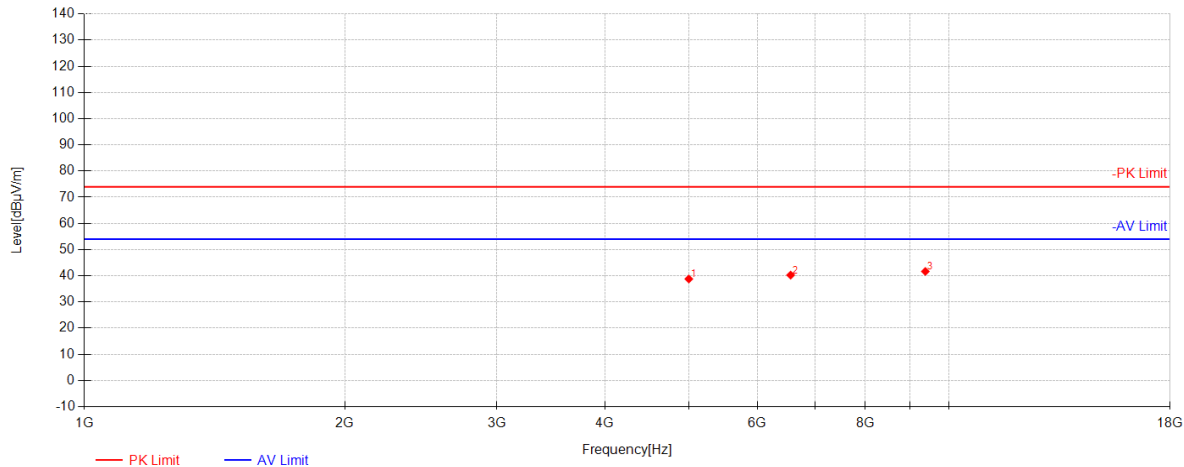
Compliance Certification Services (Kunshan) Inc.

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802.11g Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.02	31.40	-45.64	38.78	74.00	35.22	Horizontal
2	6556.5	50.32	34.40	-44.46	40.26	74.00	33.74	Horizontal
3	9385.5	44.52	37.03	-39.89	41.67	74.00	32.33	Horizontal

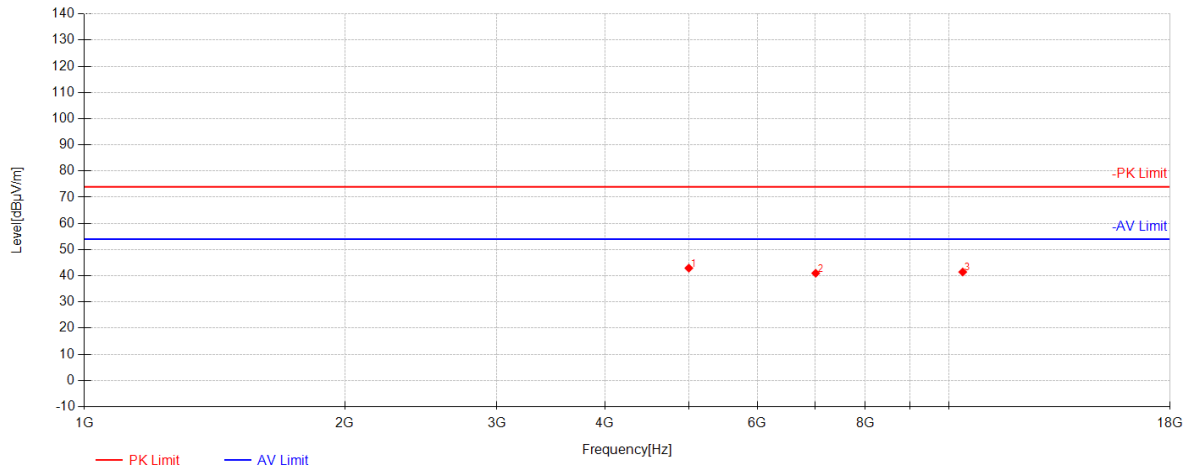
Compliance Certification Services (Kunshan) Inc.

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802.11g Channel 01



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	57.16	31.40	-45.64	42.92	74.00	31.08	Vertical
2	7009	49.35	35.23	-43.61	40.97	74.00	33.03	Vertical
3	10366.5	42.09	38.38	-39.04	41.44	74.00	32.56	Vertical

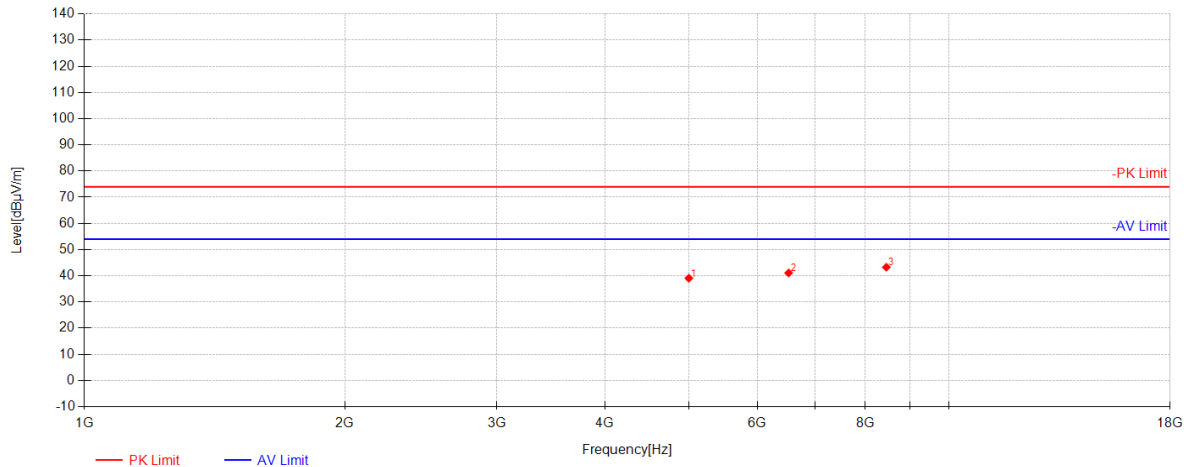
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802.11g Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.32	31.40	-45.64	39.08	74.00	34.92	Horizontal
2	6522	51.30	34.34	-44.55	41.09	74.00	32.91	Horizontal
3	8459	48.26	36.57	-41.55	43.28	74.00	30.72	Horizontal

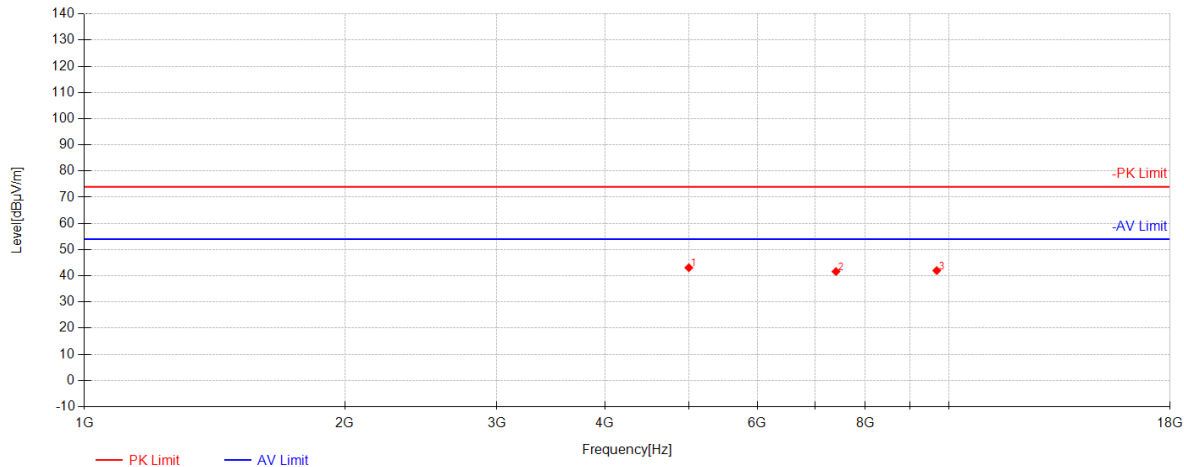
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802.11g Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	57.32	31.40	-45.64	43.08	74.00	30.92	Vertical
2	7398	48.72	36.31	-43.42	41.62	74.00	32.38	Vertical
3	9674.5	43.90	37.58	-39.50	41.98	74.00	32.02	Vertical

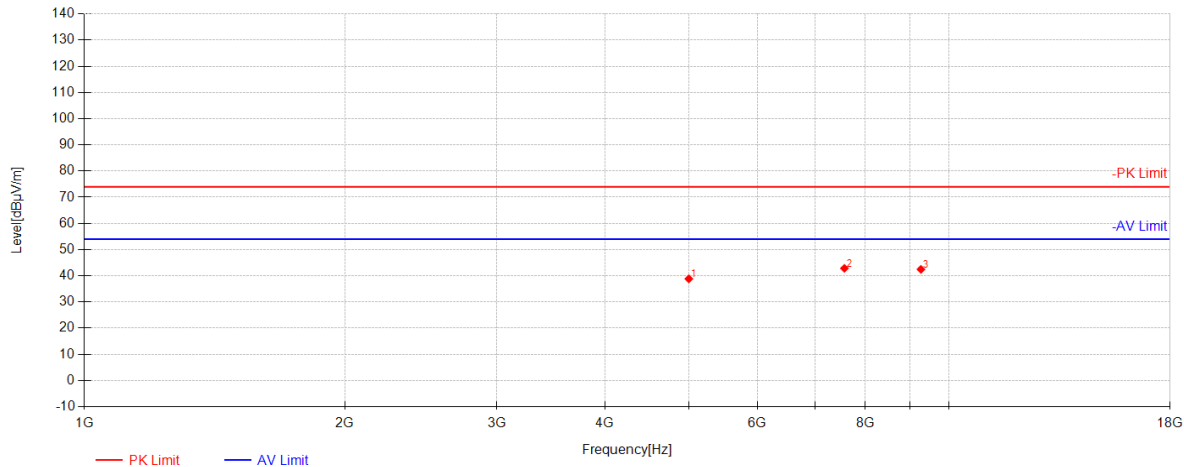
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802.11g Channel 11



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.08	31.40	-45.64	38.84	74.00	35.16	Horizontal
2	7566	49.22	36.63	-43.00	42.85	74.00	31.15	Horizontal
3	9275.5	45.86	36.82	-40.23	42.46	74.00	31.54	Horizontal

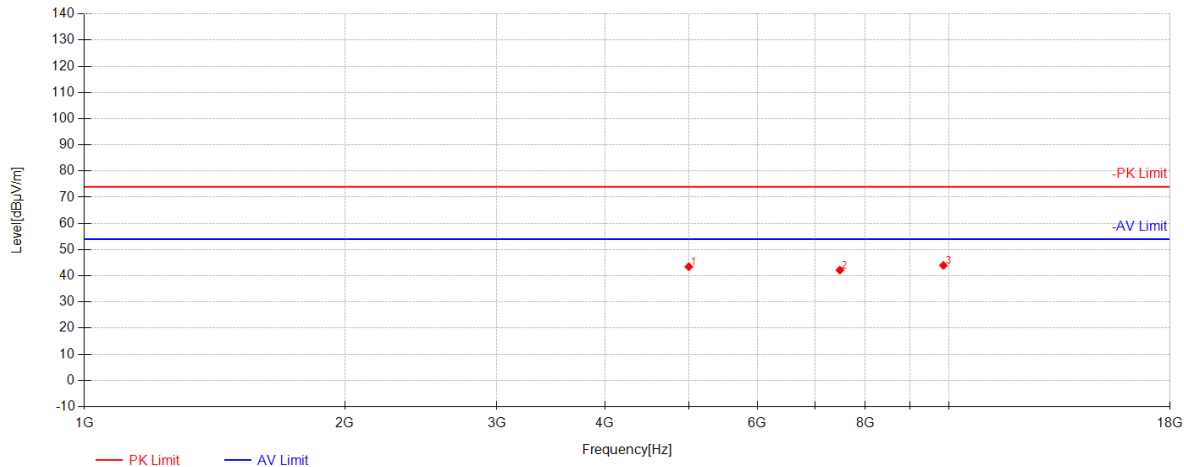
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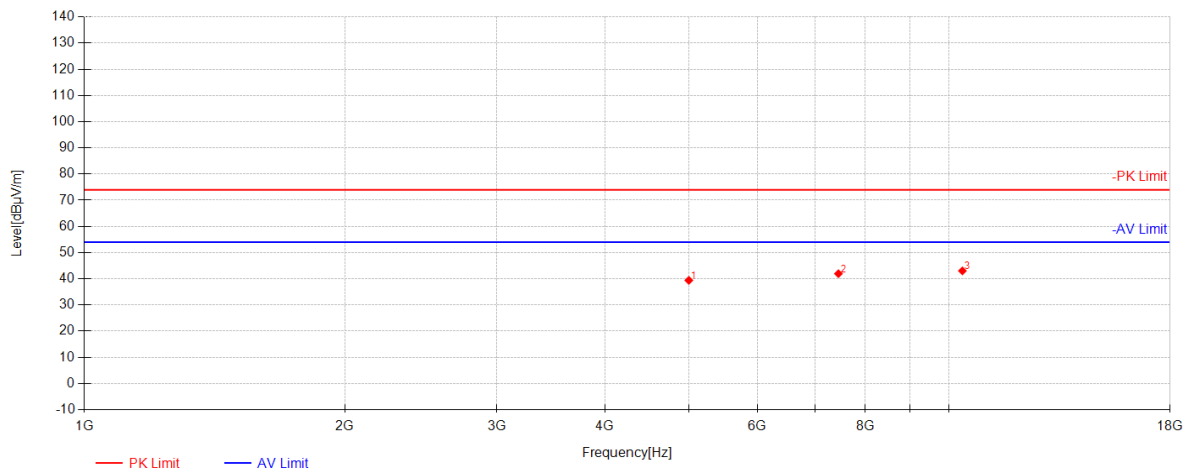
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Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	57.68	31.40	-45.64	43.44	74.00	30.56	Vertical
2	7475	48.82	36.53	-43.21	42.14	74.00	31.86	Vertical
3	9848	45.46	37.91	-39.41	43.96	74.00	30.04	Vertical

802.11n20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.63	31.40	-45.64	39.39	74.00	34.61	Horizontal
2	7446.5	48.77	36.45	-43.28	41.94	74.00	32.06	Horizontal
3	10358.5	43.68	38.38	-39.04	43.02	74.00	30.98	Horizontal

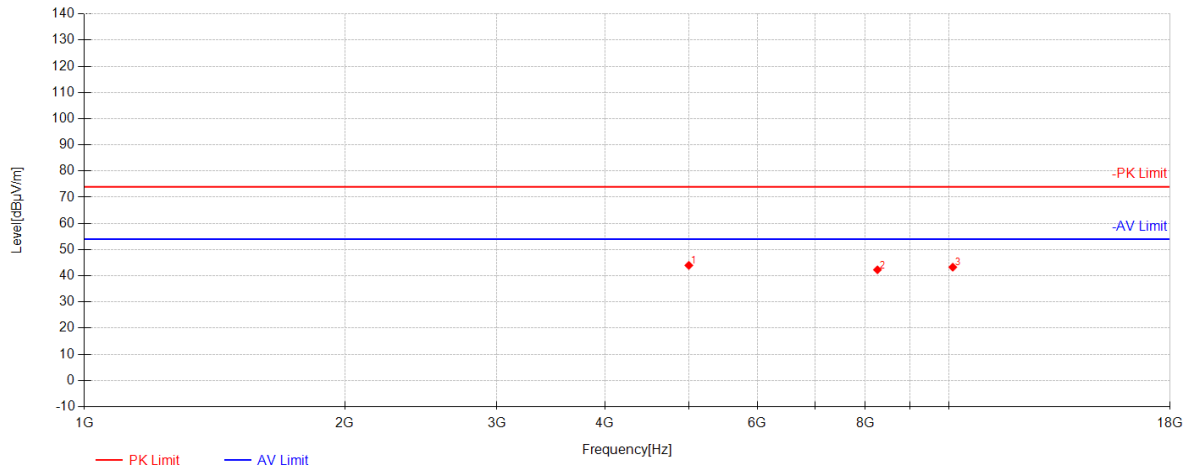
Compliance Certification Services (Kunshan) Inc.

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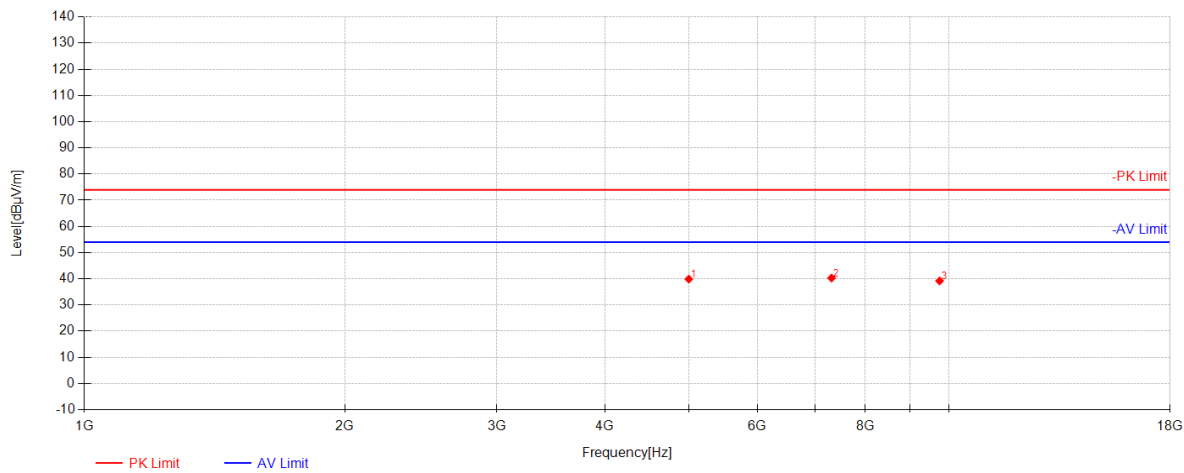
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802.11n20 Channel 01



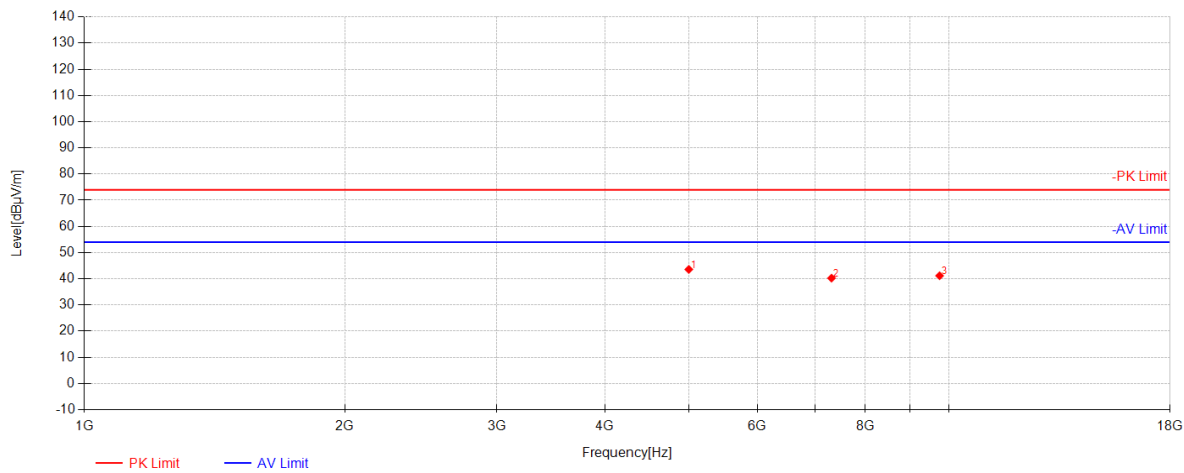
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.21	31.40	-45.64	43.97	74.00	30.03	Vertical
2	8261.5	47.74	36.67	-42.13	42.28	74.00	31.72	Vertical
3	10096.5	44.16	38.25	-39.12	43.28	74.00	30.72	Vertical

802.11n20 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	54.12	31.40	-45.64	39.88	74.00	34.12	Horizontal
2	7311.0000	47.91	36.07	-43.71	40.27	74.00	33.73	Horizontal
3	9748.0000	40.91	37.72	-39.46	39.17	74.00	34.83	Horizontal

802.11n20 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	57.82	31.40	-45.64	43.58	74.00	30.42	Vertical
2	7311.0000	47.89	36.07	-43.71	40.25	74.00	33.75	Vertical
3	9748.0000	42.90	37.72	-39.46	41.16	74.00	32.84	Vertical

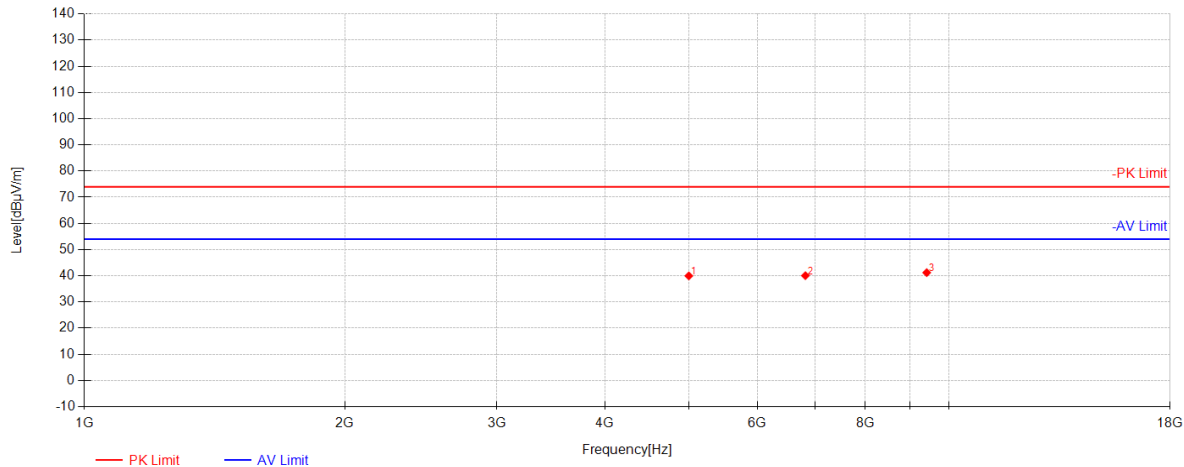
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802.11n20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	54.19	31.40	-45.64	39.95	74.00	34.05	Horizontal
2	6819.5	49.33	34.88	-44.16	40.05	74.00	33.95	Horizontal
3	9419	44.01	37.10	-39.91	41.20	74.00	32.80	Horizontal

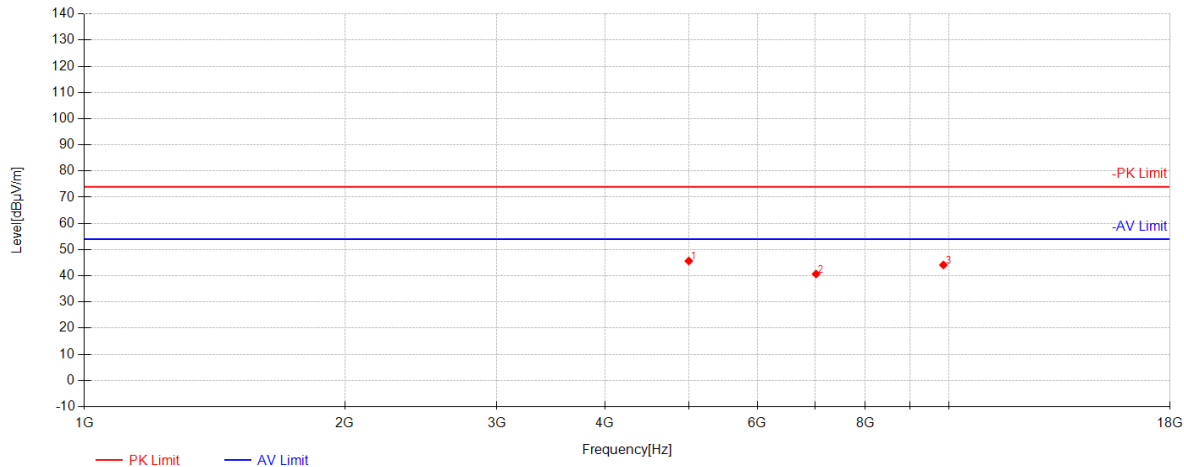
Compliance Certification Services (Kunshan) Inc.

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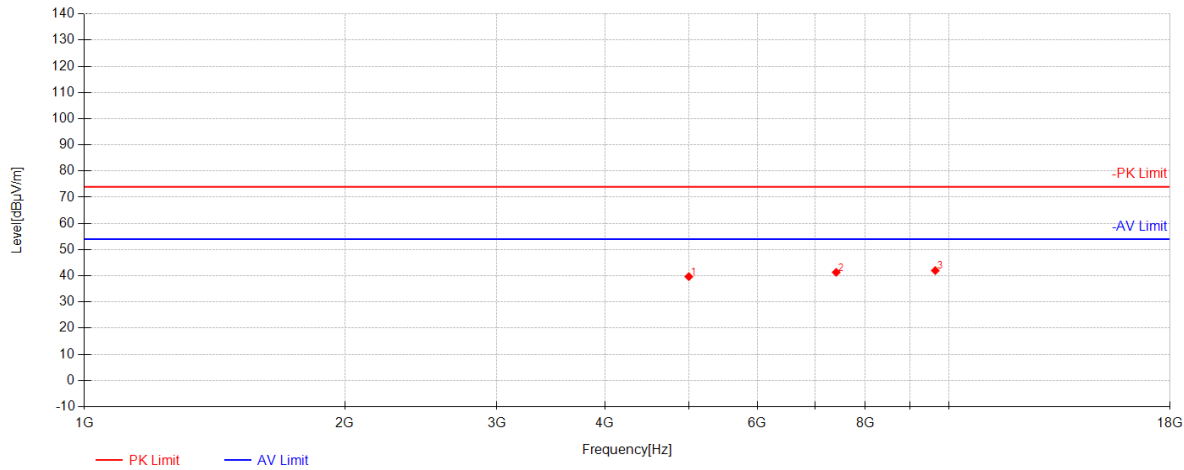
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802.11n20 Channel 11



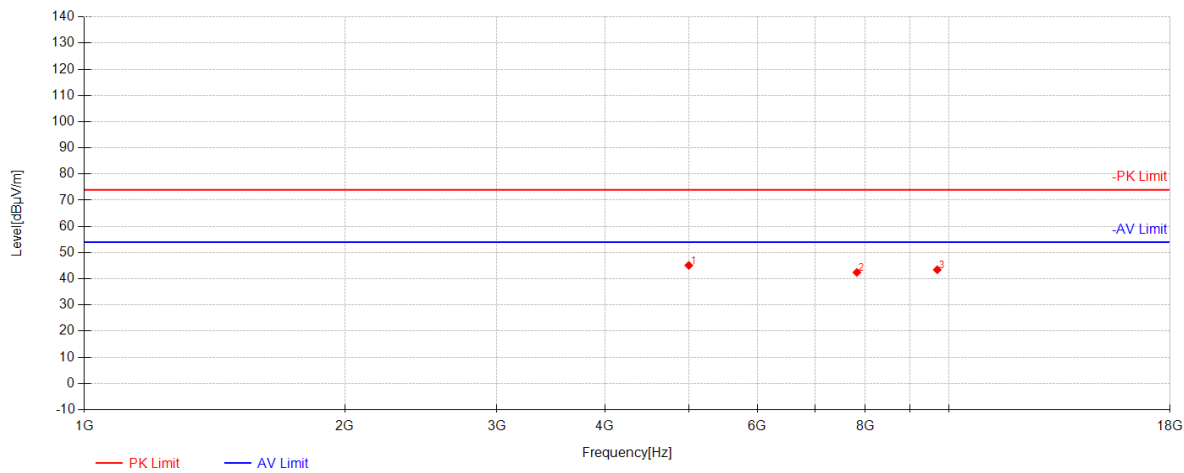
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	59.88	31.40	-45.64	45.64	74.00	28.36	Vertical
2	7016	49.08	35.24	-43.66	40.67	74.00	33.33	Vertical
3	9848	45.63	37.91	-39.41	44.13	74.00	29.87	Vertical

802.11n40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.92	31.40	-45.64	39.68	74.00	34.32	Horizontal
2	7402.5	48.40	36.33	-43.40	41.32	74.00	32.68	Horizontal
3	9636.5	44.08	37.51	-39.59	42.00	74.00	32.00	Horizontal

802.11n40 Channel 03



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	59.36	31.40	-45.64	45.12	74.00	28.88	Vertical
2	7821.5	48.13	36.73	-42.42	42.44	74.00	31.56	Vertical
3	9688	45.31	37.61	-39.47	43.45	74.00	30.55	Vertical

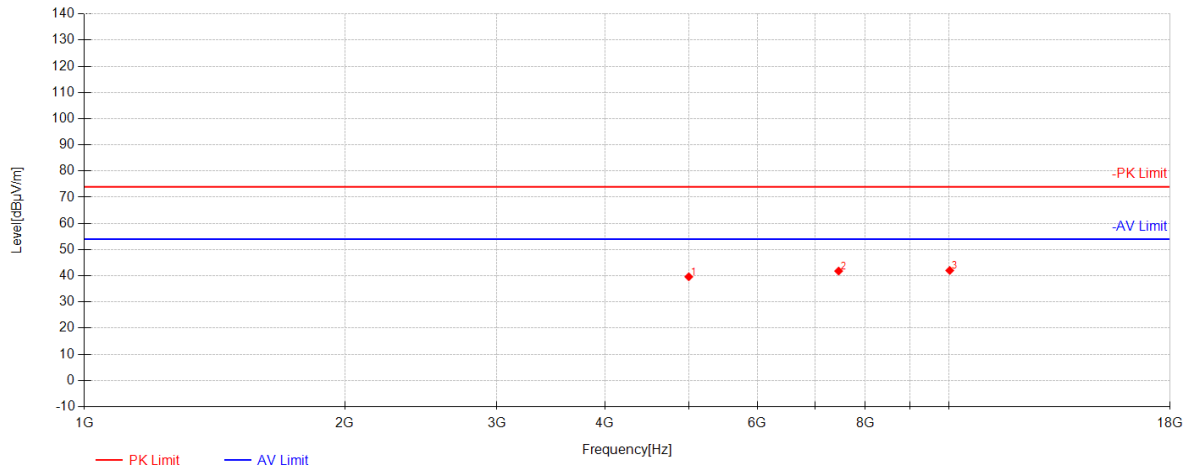
Compliance Certification Services (Kunshan) Inc.

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802.11n40 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.86	31.40	-45.64	39.62	74.00	34.38	Horizontal
2	7451	48.62	36.46	-43.27	41.81	74.00	32.19	Horizontal
3	10015.5	43.03	38.21	-39.22	42.02	74.00	31.98	Horizontal

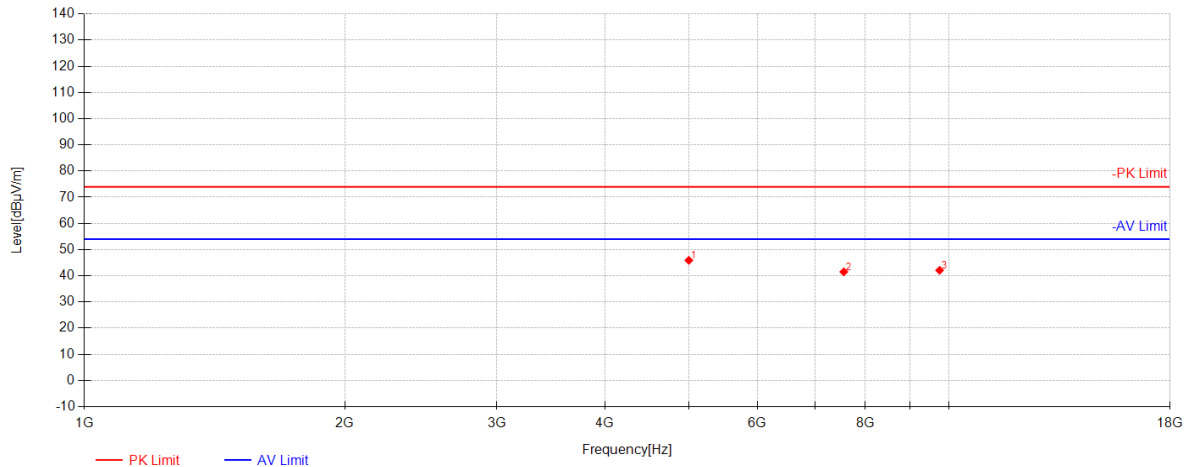
Compliance Certification Services (Kunshan) Inc.

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802.11n40 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	60.14	31.40	-45.64	45.90	74.00	28.10	Vertical
2	7553.5	47.91	36.62	-43.03	41.50	74.00	32.50	Vertical
3	9748	43.82	37.72	-39.46	42.08	74.00	31.92	Vertical

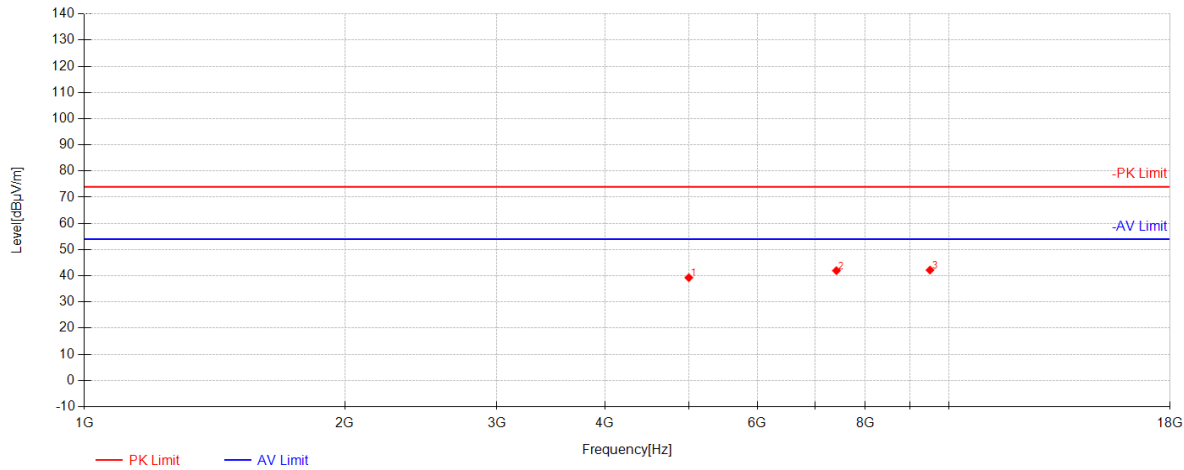
Compliance Certification Services (Kunshan) Inc.

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802.11n40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.52	31.40	-45.64	39.28	74.00	34.72	Horizontal
2	7406.5	49.00	36.34	-43.39	41.95	74.00	32.05	Horizontal
3	9502	45.14	37.25	-40.22	42.17	74.00	31.83	Horizontal

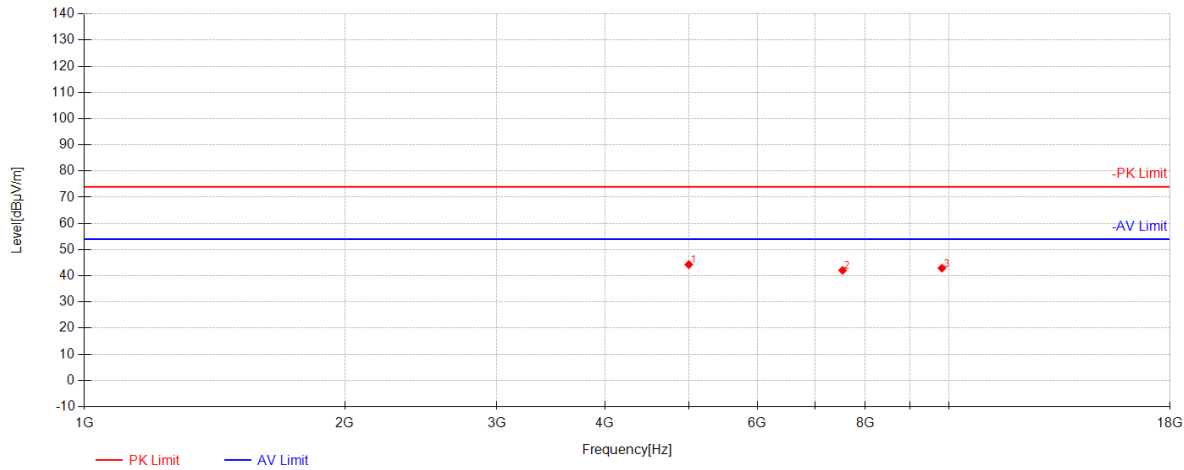
Compliance Certification Services (Kunshan) Inc.

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802.11n40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.51	31.40	-45.64	44.27	74.00	29.73	Vertical
2	7529	48.53	36.61	-43.08	42.06	74.00	31.94	Vertical
3	9808	44.55	37.84	-39.47	42.92	74.00	31.08	Vertical

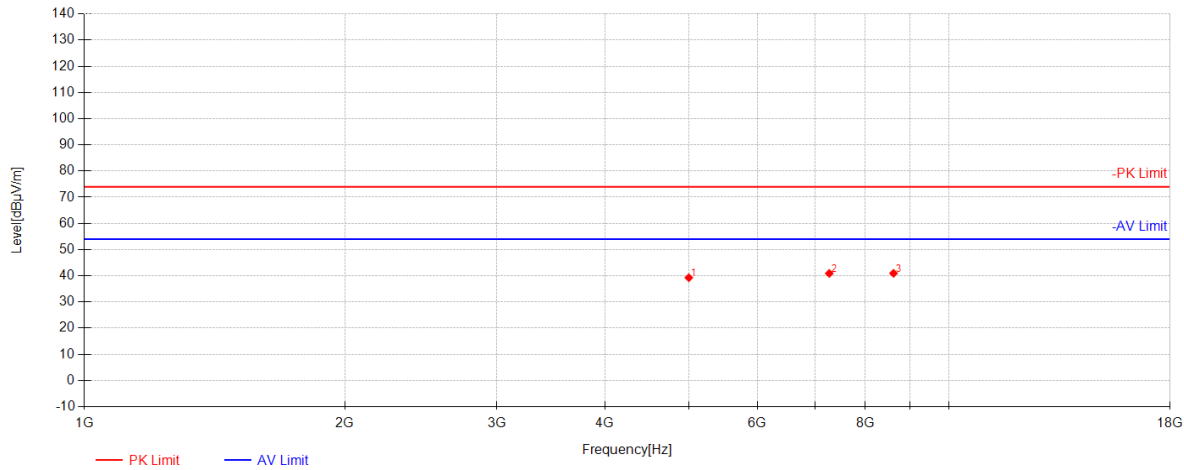
Compliance Certification Services (Kunshan) Inc.

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802.11ax20 Channel 01



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.50	31.40	-45.64	39.26	74.00	34.74	Horizontal
2	7267.5	48.59	35.95	-43.64	40.90	74.00	33.10	Horizontal
3	8623	45.87	36.49	-41.41	40.95	74.00	33.05	Horizontal

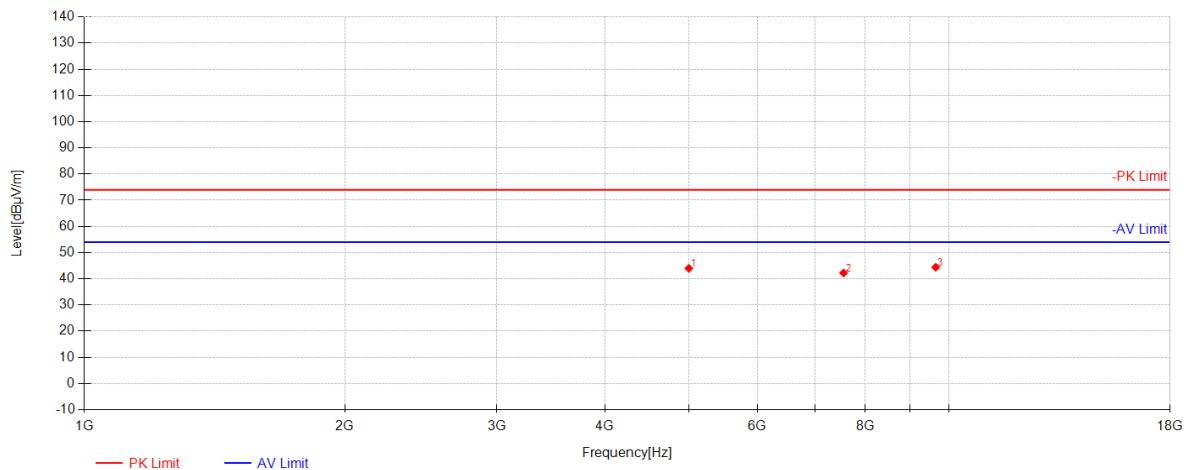
Compliance Certification Services (Kunshan) Inc.

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802.11ax20 Channel 01



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.20	31.40	-45.64	43.96	74.00	30.04	Vertical
2	7548.5	48.64	36.62	-43.04	42.22	74.00	31.78	Vertical
3	9648	46.42	37.53	-39.56	44.39	74.00	29.61	Vertical

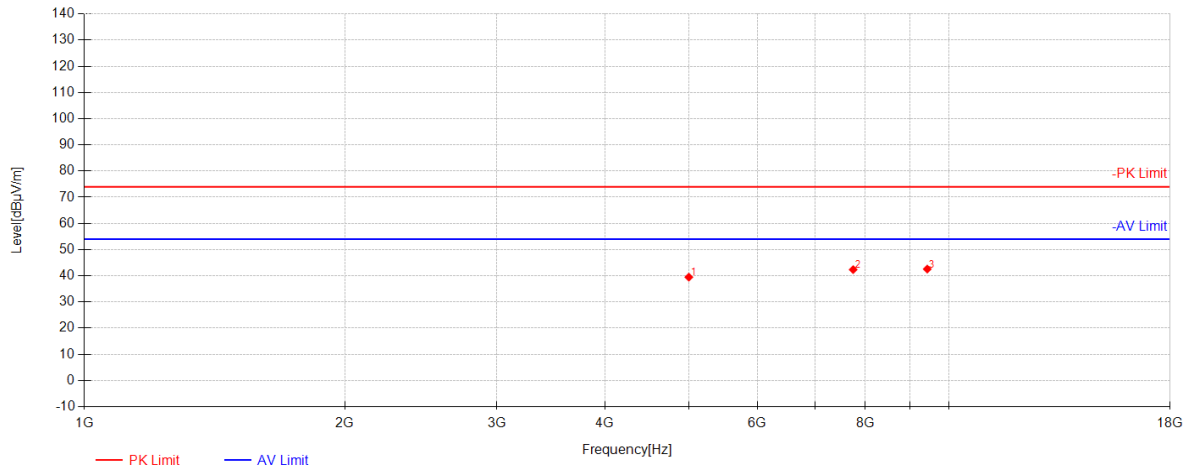
Compliance Certification Services (Kunshan) Inc.

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802.11ax20 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.72	31.40	-45.64	39.48	74.00	34.52	Horizontal
2	7745	48.42	36.70	-42.76	42.36	74.00	31.64	Horizontal
3	9433.5	45.40	37.12	-39.96	42.56	74.00	31.44	Horizontal

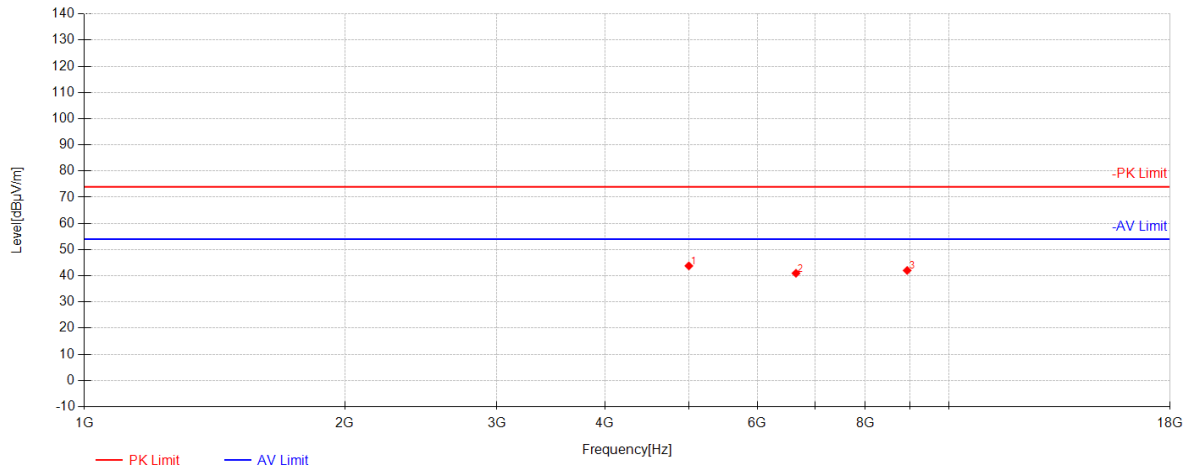
Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240200030903

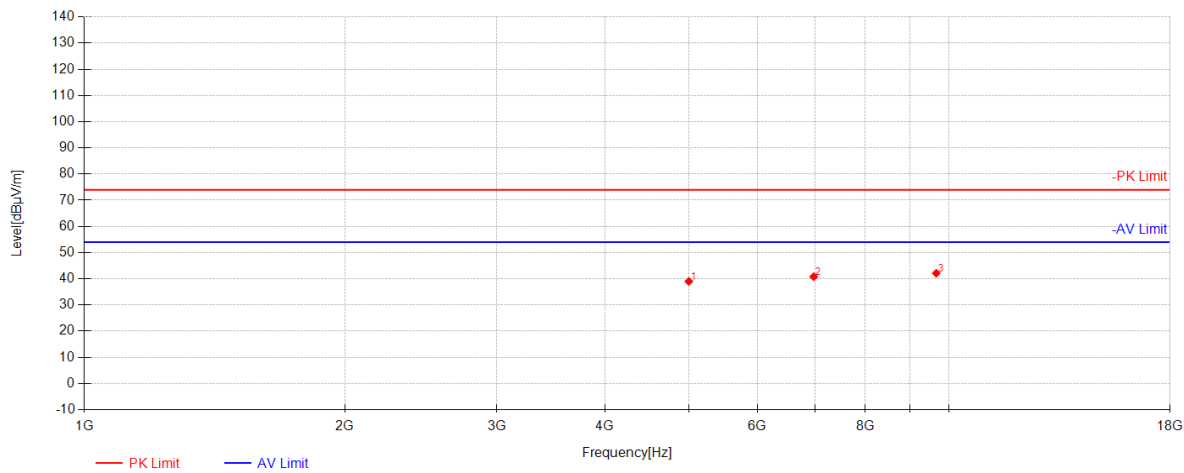
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802.11ax20 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000.5	58.01	31.40	-45.64	43.77	74.00	30.23	Vertical
2	6650.5	50.48	34.57	-44.08	40.97	74.00	33.03	Vertical
3	8942	46.84	36.33	-41.14	42.03	74.00	31.97	Vertical

802.11ax20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.24	31.40	-45.64	39.00	74.00	35.00	Horizontal
2	6972	49.37	35.15	-43.70	40.82	74.00	33.18	Horizontal
3	9662.5	44.09	37.56	-39.53	42.12	74.00	31.88	Horizontal

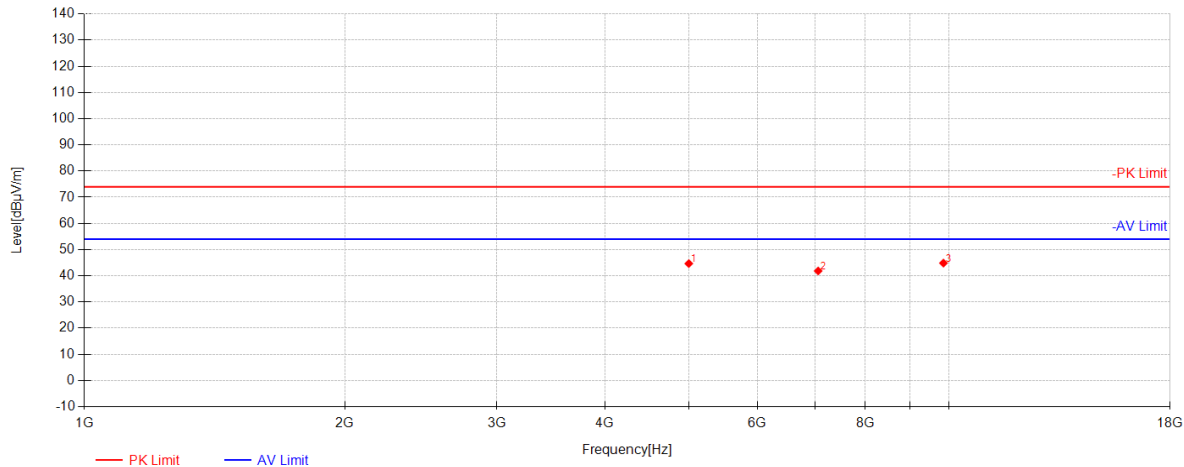
Compliance Certification Services (Kunshan) Inc.

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802.11ax20 Channel 11



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.90	31.40	-45.64	44.66	74.00	29.34	Vertical
2	7055.5	50.41	35.36	-43.92	41.85	74.00	32.15	Vertical
3	9848	46.35	37.91	-39.41	44.85	74.00	29.15	Vertical

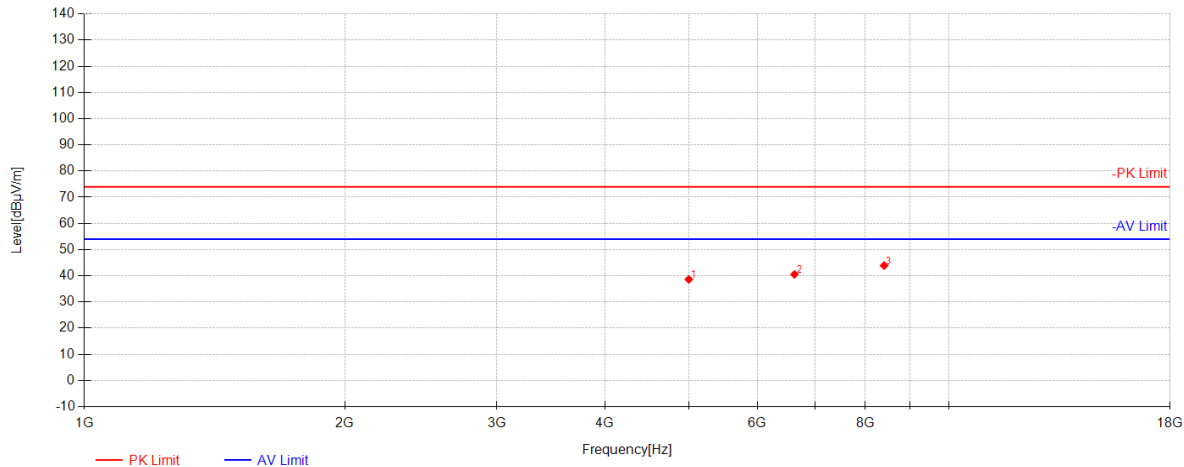
Compliance Certification Services (Kunshan) Inc.

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802.11ax40 Channel 03



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	52.86	31.40	-45.64	38.62	74.00	35.38	Horizontal
2	6623.5	50.22	34.52	-44.22	40.52	74.00	33.48	Horizontal
3	8408.5	48.76	36.60	-41.46	43.89	74.00	30.11	Horizontal

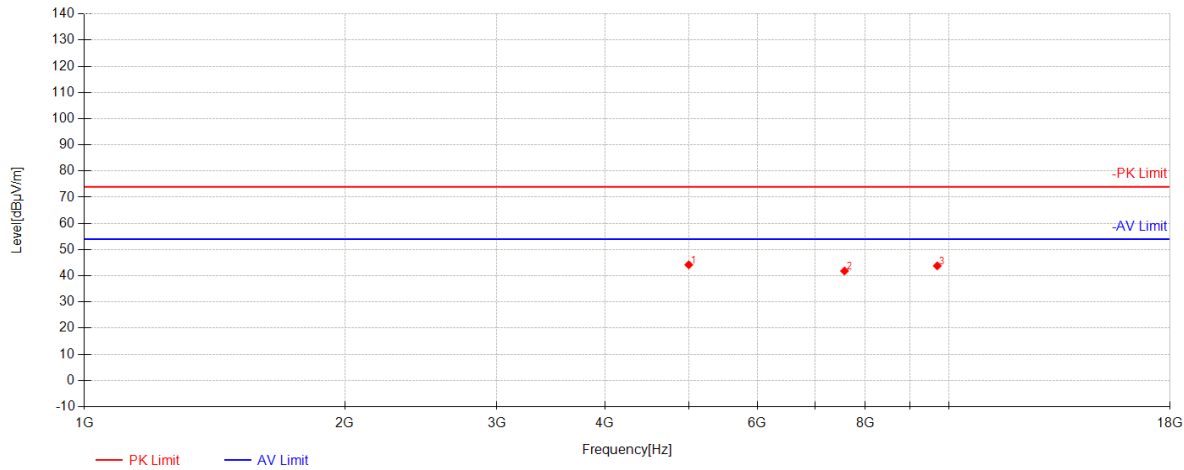
Compliance Certification Services (Kunshan) Inc.

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802.11ax40 Channel 03



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.43	31.40	-45.64	44.19	74.00	29.81	Vertical
2	7568.5	48.20	36.63	-43.00	41.83	74.00	32.17	Vertical
3	9687.5	45.64	37.61	-39.47	43.78	74.00	30.22	Vertical

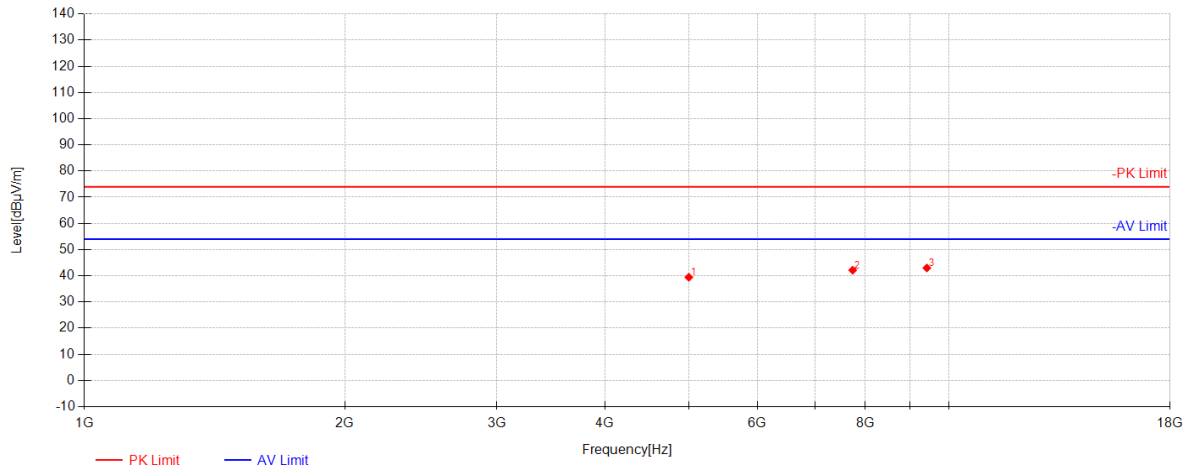
Compliance Certification Services (Kunshan) Inc.

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802.11ax40 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	53.68	31.40	-45.64	39.44	74.00	34.56	Horizontal
2	7734	48.28	36.69	-42.84	42.13	74.00	31.87	Horizontal
3	9423	45.79	37.10	-39.92	42.97	74.00	31.03	Horizontal

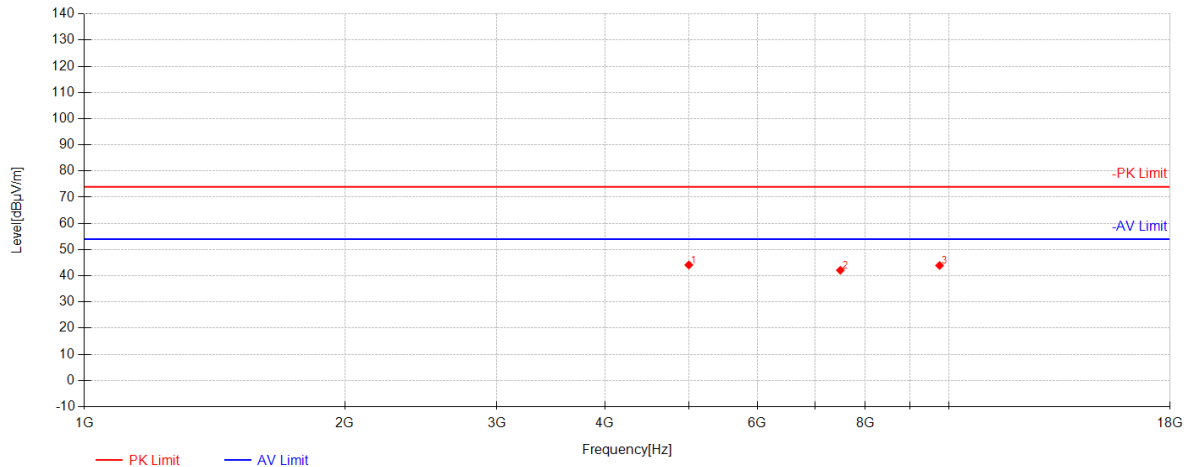
Compliance Certification Services (Kunshan) Inc.

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802.11ax40 Channel 06



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.37	31.40	-45.64	44.13	74.00	29.87	Vertical
2	7484.5	48.73	36.56	-43.18	42.10	74.00	31.90	Vertical
3	9748	45.66	37.72	-39.46	43.92	74.00	30.08	Vertical

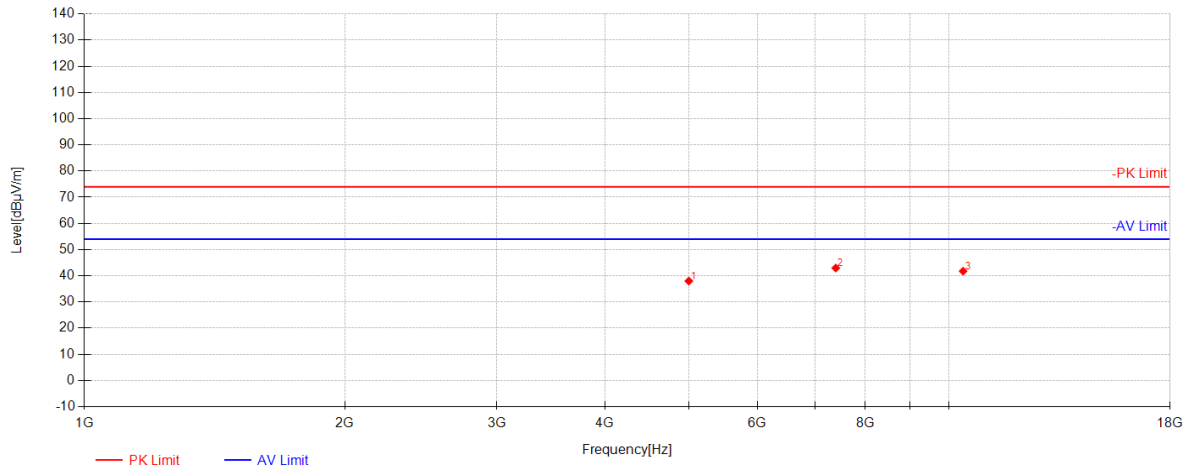
Compliance Certification Services (Kunshan) Inc.

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802.11ax40 Channel 09



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	52.24	31.40	-45.64	38.00	74.00	36.00	Horizontal
2	7393.5	50.08	36.30	-43.43	42.95	74.00	31.05	Horizontal
3	10377.5	42.40	38.39	-39.03	41.76	74.00	32.24	Horizontal

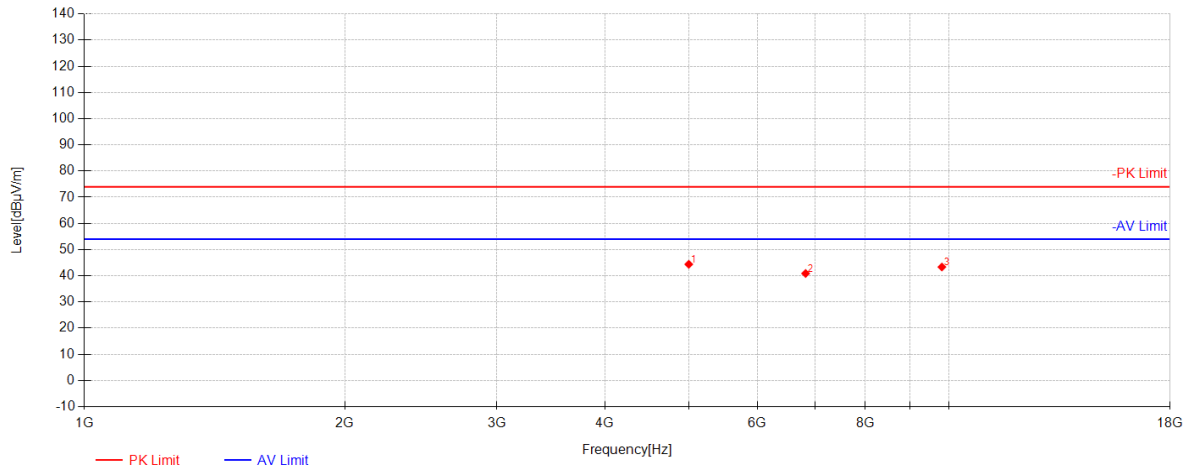
Compliance Certification Services (Kunshan) Inc.

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802.11ax40 Channel 09



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5000	58.63	31.40	-45.64	44.39	74.00	29.61	Vertical
2	6823	50.15	34.88	-44.15	40.88	74.00	33.12	Vertical
3	9808	44.99	37.84	-39.47	43.36	74.00	30.64	Vertical



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2402000309AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2402000309AT

10 Appendix

1. Duty Cycle

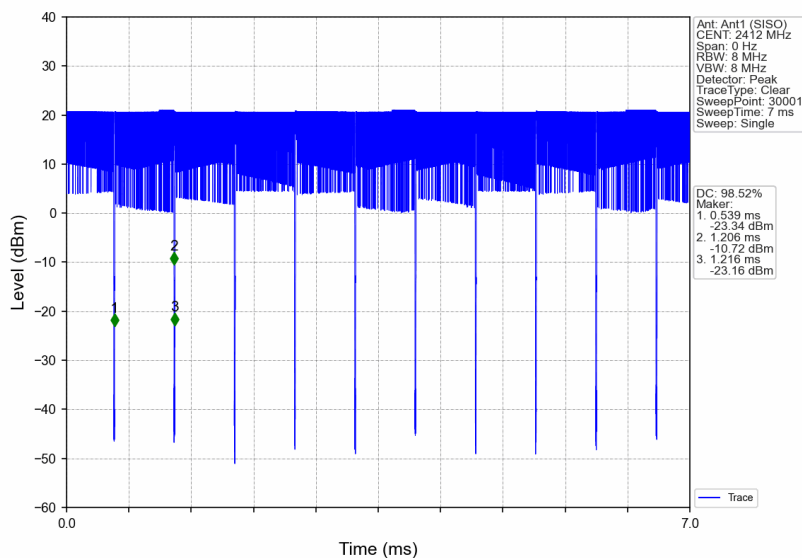
1.1 Ant1

1.1.1 Test Result

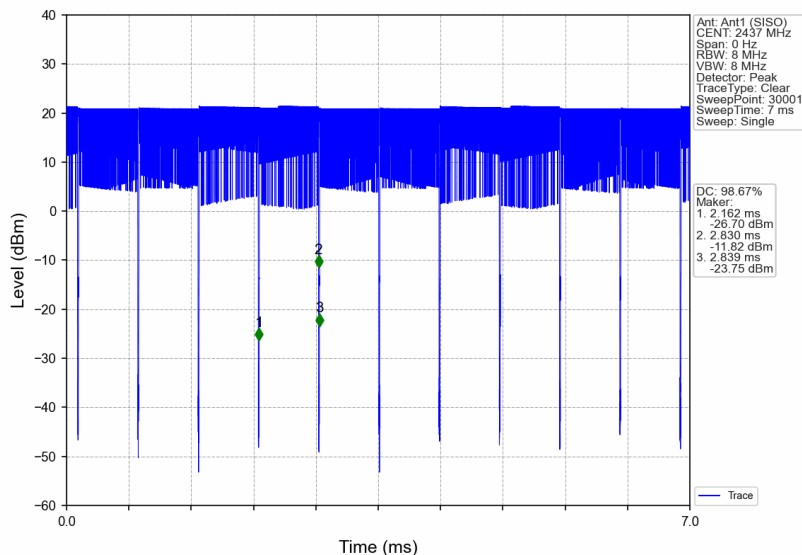
Ant1									
Mode	TX Type	Frequency (MHz)	RU	RU Pos	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
802.11b	SISO	2412	/	/	0.667	0.677	98.52	0.06	0.03
		2437	/	/	0.668	0.677	98.67	0.06	0.03
		2462	/	/	0.667	0.676	98.67	0.06	0.03
802.11g	SISO	2412	/	/	2.096	2.112	99.24	0.03	0.03
		2437	/	/	2.097	2.112	99.29	0.03	0.03
		2462	/	/	2.097	2.112	99.29	0.03	0.03
802.11n (HT20)	MIMO	2412	/	/	5.396	5.412	99.70	0.01	0.04
		2437	/	/	5.396	5.412	99.70	0.01	0.04
		2462	/	/	5.396	5.412	99.70	0.01	0.04
802.11n (HT40)	MIMO	2422	/	/	5.195	5.210	99.71	0.01	0.00
		2437	/	/	5.195	5.210	99.71	0.01	0.00
		2452	/	/	5.195	5.210	99.71	0.01	0.04
802.11ax (HEW20)	MIMO	2412	RU242	Left	5.417	5.432	99.72	0.01	0.00
		2437	RU242	Left	5.418	5.432	99.74	0.01	0.00
		2462	RU242	Left	5.418	5.434	99.71	0.01	0.04
802.11ax (HEW40)	MIMO	2422	RU484	Left	4.104	4.118	99.66	0.01	0.00
		2437	RU484	Left	4.103	4.118	99.64	0.02	0.00
		2452	RU484	Left	4.104	4.120	99.61	0.02	0.04

1.1.2 Test Graph

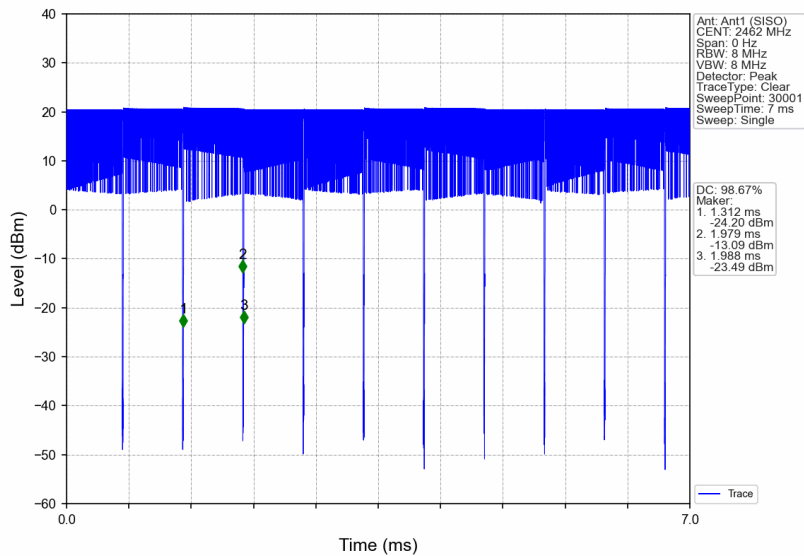
802.11b_LCH_2412MHz_Ant1 (SISO)_NTNV



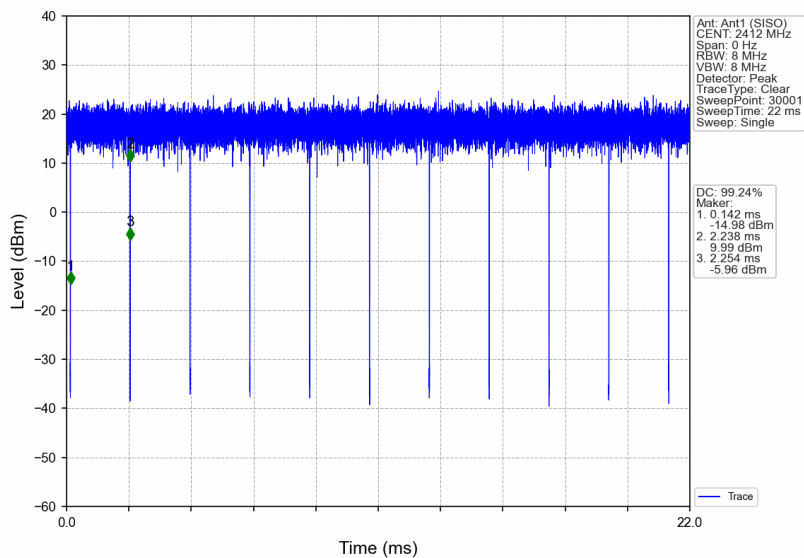
802.11b_MCH_2437MHz_Ant1 (SISO)_NTNV



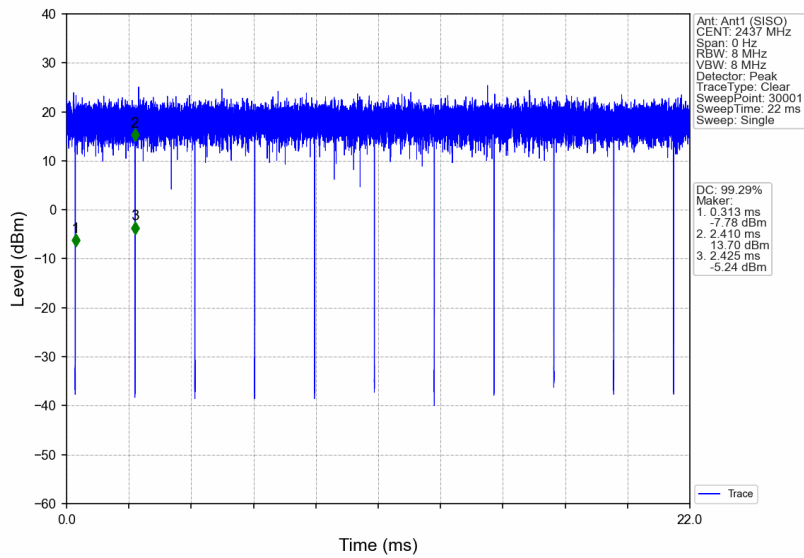
802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV



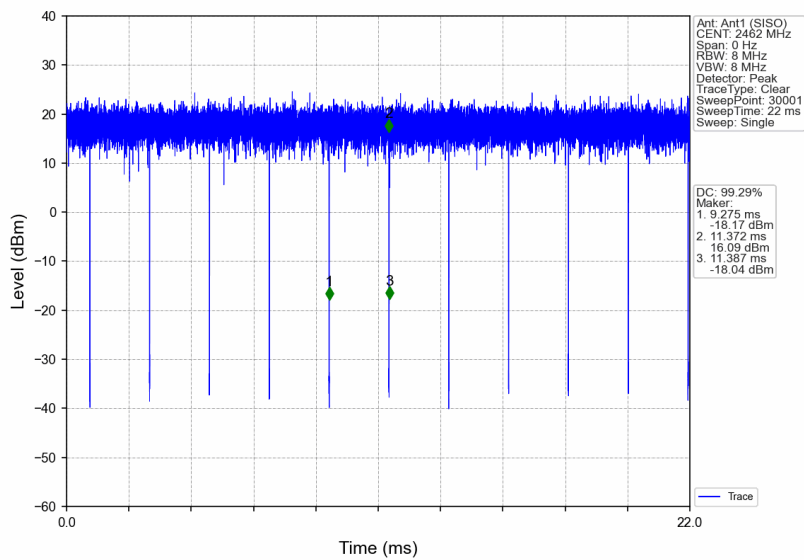
802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV



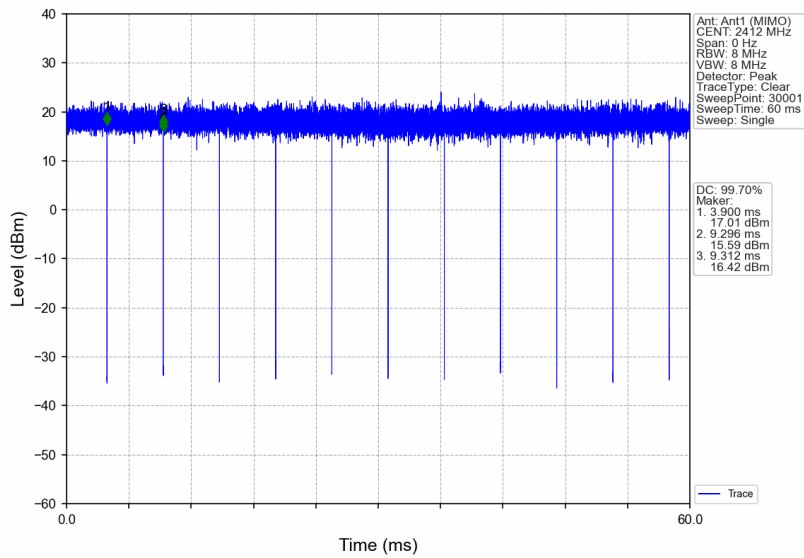
802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV



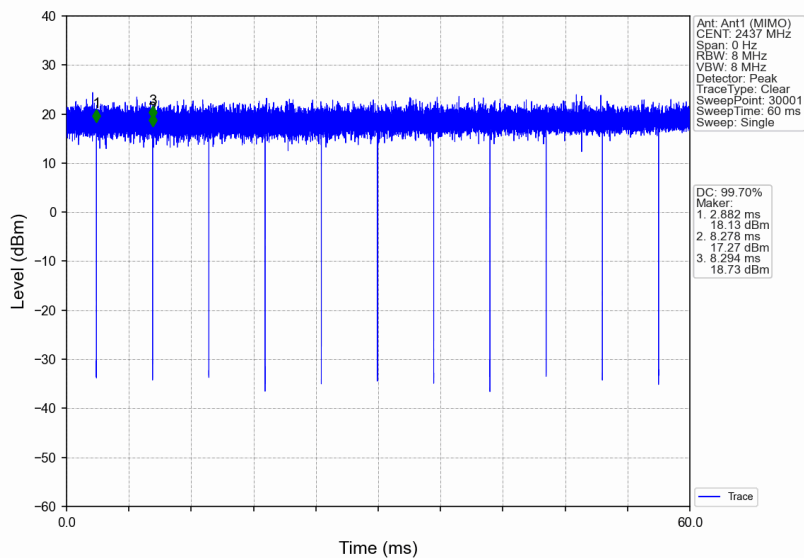
802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV



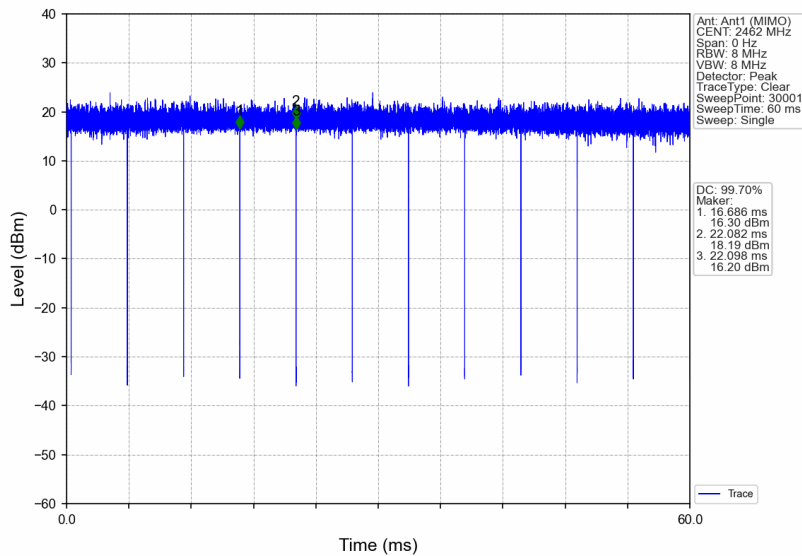
802.11n(HT20)_LCH_2412MHz_Ant1 (MIMO)_NTNV



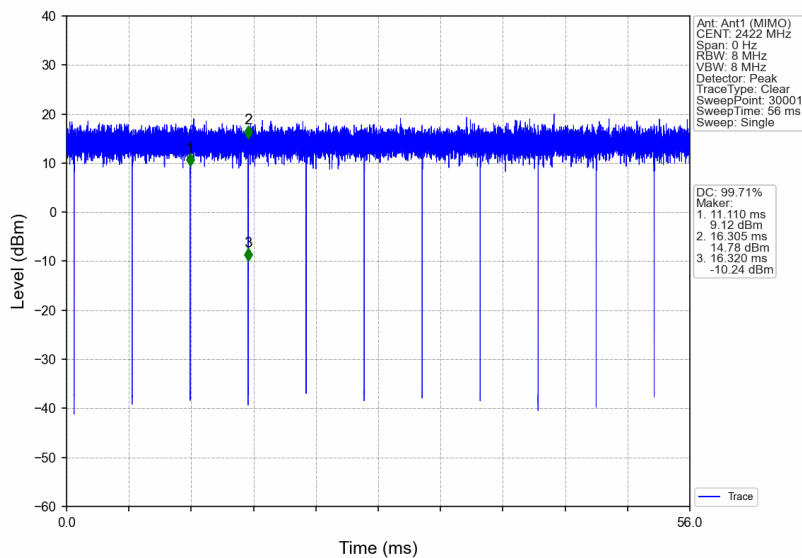
802.11n(HT20)_MCH_2437MHz_Ant1 (MIMO)_NTNV



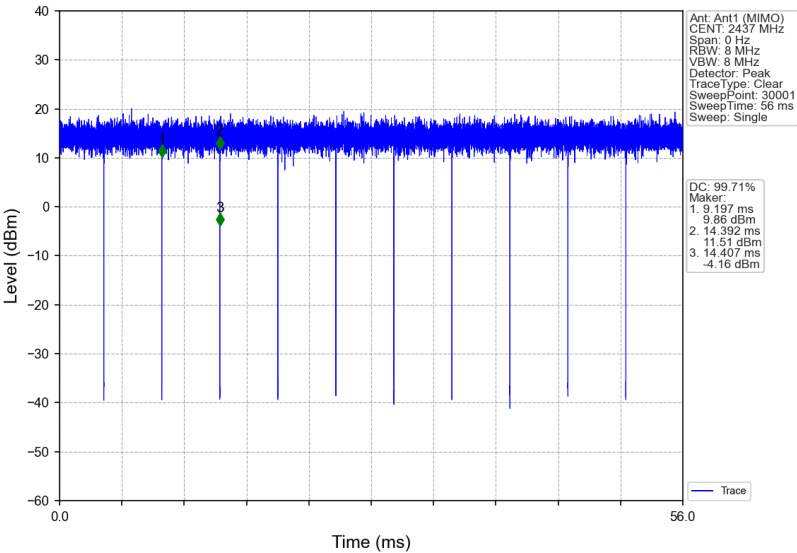
802.11n(HT20)_HCH_2462MHz_Ant1 (MIMO)_NTNV



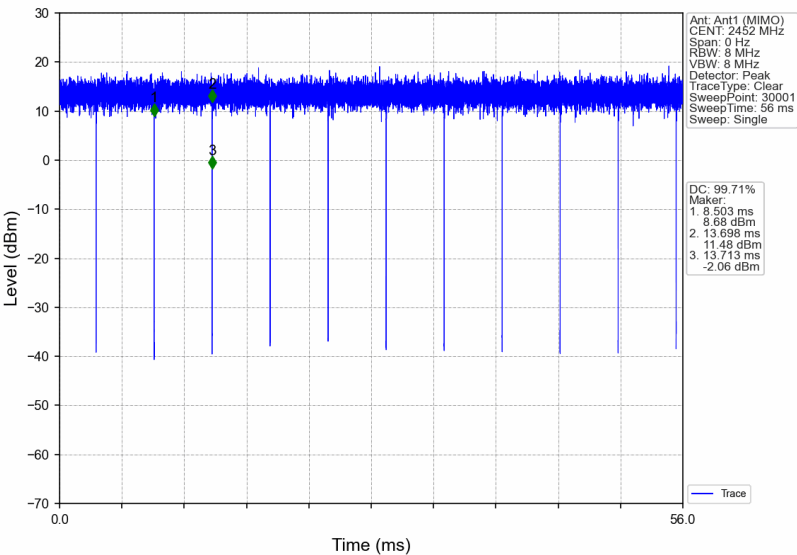
802.11n(HT40)_LCH_2422MHz_Ant1 (MIMO)_NTNV



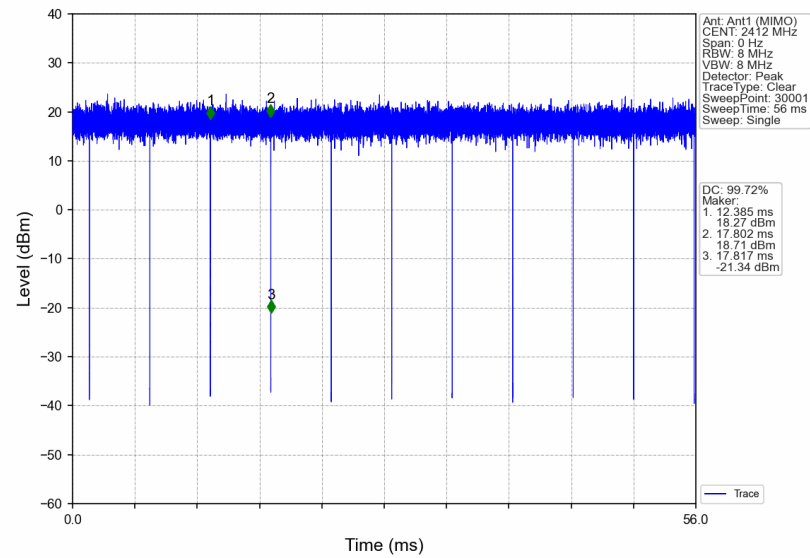
802.11n(HT40)_MCH_2437MHz_Ant1 (MIMO)_NTNV



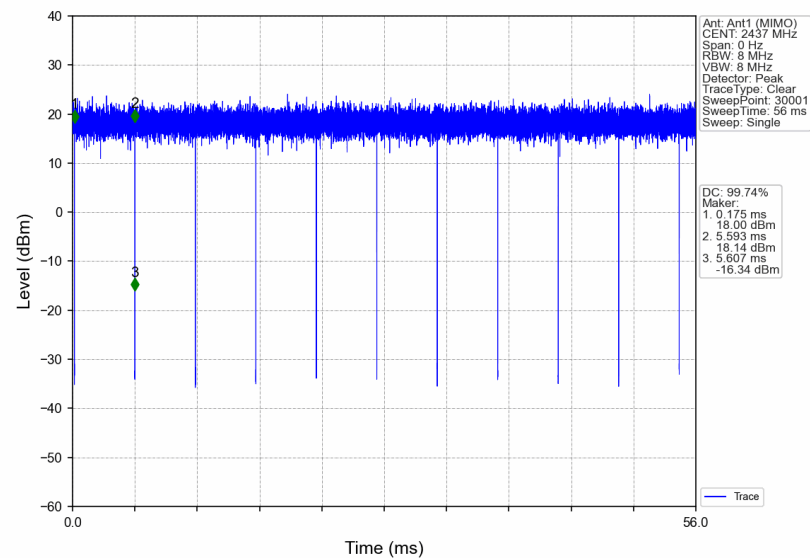
802.11n(HT40)_HCH_2452MHz_Ant1 (MIMO)_NTNV



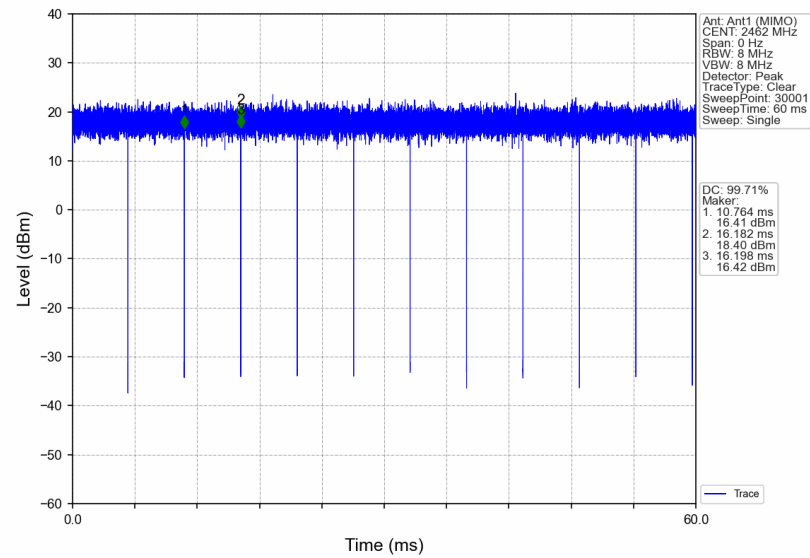
802.11ax(HEW20)_LCH_2412MHz_RU242_Left_Ant1 (MIMO)_NTNV



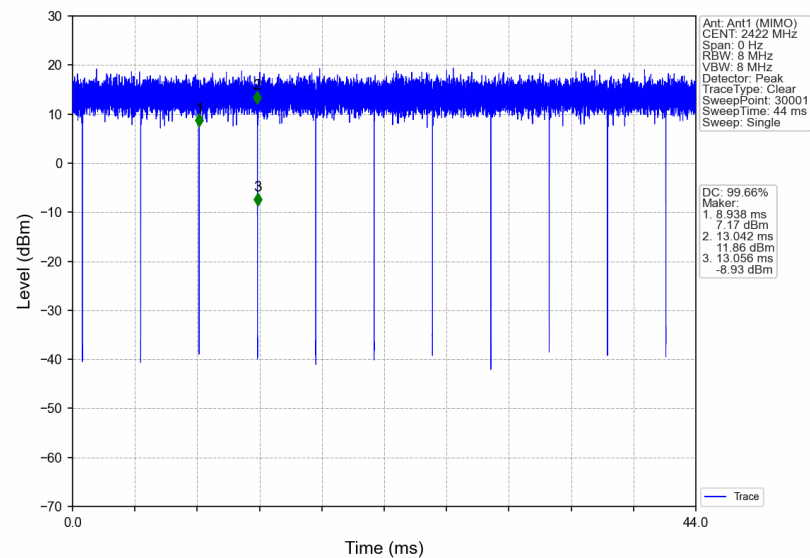
802.11ax(HEW20)_MCH_2437MHz_RU242_Left_Ant1 (MIMO)_NTNV



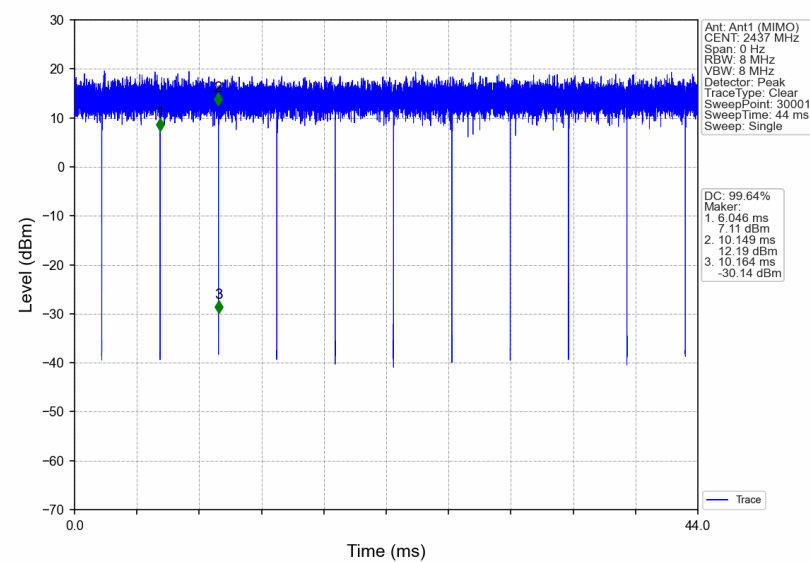
802.11ax(HEW20)_HCH_2462MHz_RU242_Left_Ant1 (MIMO)_NTNV



802.11ax(HEW40)_LCH_2422MHz_RU484_Left_Ant1 (MIMO)_NTNV



802.11ax(HEW40)_MCH_2437MHz_RU484_Left_Ant1 (MIMO)_NTNV



802.11ax(HEW40)_HCH_2452MHz_RU484_Left_Ant1 (MIMO)_NTNV

