

**Shenzhen Global Test Service Co.,Ltd.**

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT**FCC PART 15.247****Report Reference No.**.....: **GTS20191119010-1-4-1****FCC ID**.....: **2ASRT-PPX620**

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Date of issue.....: Dec. 13, 2019

Representative Laboratory Name .: **Shenzhen Global Test Service Co.,Ltd.**

Address: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, China

Applicant's name.....: **Screeneo Innovation SA**

Address: Route de Lully 5c, 1131 Tolochenaz, Switzerland

Test specificationStandard: **FCC Part 15.247**

TRF Originator.....: Shenzhen Global Test Service Co.,Ltd.

Master TRF.....: Dated 2014-12

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Test item description: Pico Projector

Trade Mark: PHILIPS

Manufacturer: Shenzhen Suichen Technology Co., Ltd.

Model/Type reference.....: PPX620

Listed Models: N/A

Modulation Type: CCK/DSSS, OFDM

Operation Frequency.....: From 2412 - 2462MHz

Hardware Version: N/A

Software Version: N/A

Rating: DC13.05V from battery charged by AC/DC adapter

Result.....: **PASS**

TEST REPORT

Test Report No. : GTS20191119010-1-4-1	Dec. 13, 2019 Date of issue
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Equipment under Test : Pico Projector

Model /Type : PPX620

Listed Models : N/A

Applicant : **Screeneo Innovation SA**

Address : Route de Lully 5c, 1131 Tolochenaz, Switzerland

Manufacturer : **Shenzhen Suichen Technology Co., Ltd.**

Address : 12A01, Yunsong building, No.33, Tairan 8, Tian'an
community, Shatou street, Futian District, Shenzhen,
China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 V05r02](#): Guidance for Compliance Measurements on Digital Transmission Systems (DTS) ,Frequency Hopping Spread Spectrum System(HFSS), and Hybrid System Devices Operating Under §15.247 of The FCC rules.

[KDB662911 D01 v02r01](#):Emissions Testing of Transmitters with Multiple Outputs in the Same Band.

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Nov. 15, 2019
Testing commenced on	:	Nov. 17, 2019
Testing concluded on	:	Dec. 12, 2019

2.2 Product Description

Product Name:	Pico Projector
Model/Type reference:	PPX620
Power supply:	DC13.05V from battery charged by AC/DC adapter
Adapter information:	Model: S-TR-149D Input: AC100-240V, 50/60Hz, 1.5A(Max) PD Output: 5V---3A, 9V---3A, 12V---3A, 15V---4A, 20V---3.25A Power Output:65W
WIFI	
Supported type:	802.11b/802.11g/802.11n(H20)/802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20)/802.11n(H40): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40): 7
Channel separation:	5MHz
Antenna type:	FPC antenna 2*2
Antenna gain:	2.0dBi

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	☐ 230V / 50 Hz	☐ 120V / 60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

DC13.05V from battery

2.4 Short description of the Equipment under Test (EUT)

This is a Pico Projector.

For more details, refer to the user's manual of the EUT.

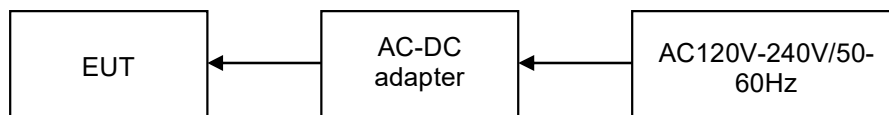
2.5 EUT operation mode

The application provider specific test commands to control sample in continuous TX and RX (Duty Cycle >98%) for testing meet KDB558074 test requirement.

IEEE 802.11b/g/n: Thirteen channels are provided to the EUT.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

2.6 Block Diagram of Test Setup



2.7 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the EUT filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.9 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

3.2 Test Facility

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

FCC-Registration No.: 165725

Shenzhen Global Test Service Co.,Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

A2LA-Lab Cert. No.: 4758.01

Shenzhen Global Test Service Co.,Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

CNAS-Lab Code: L8169

Shenzhen Global Test Service Co.,Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2024.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4 Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9KHz~1GHz& Radiated Emission 1GHz~10 th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz) SISO/OFDM	6.5Mbps	1/6/11
	11n(40MHz)/OFDM	13.5Mbps	3/6/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11
	11n(40MHz)/OFDM	13.5Mbps	3/9

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6 Equipments Used during the Test

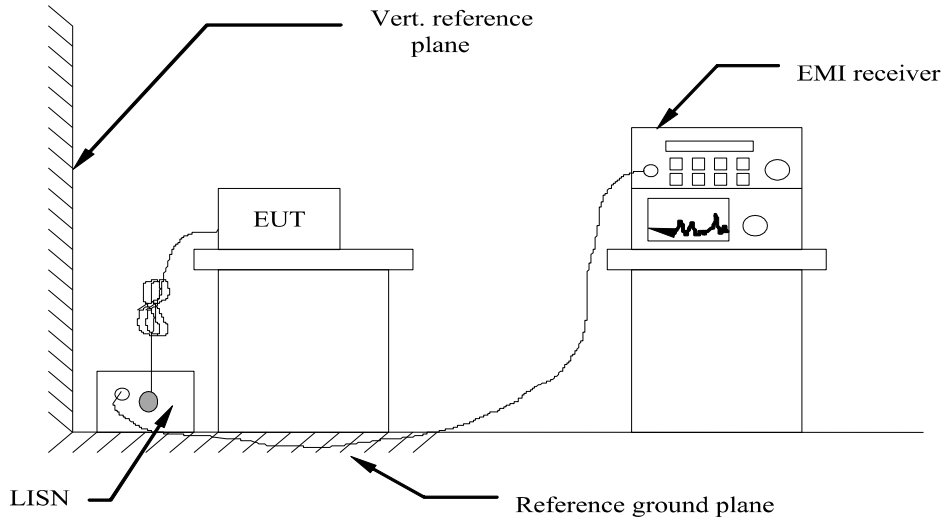
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2019/09/20	2020/09/19
LISN	R&S	ESH2-Z5	893606/008	2019/09/20	2020/09/19
EMI Test Receiver	R&S	ESPI3	101841-cd	2019/09/20	2020/09/19
EMI Test Receiver	R&S	ESCI7	101102	2019/09/20	2020/09/19
Spectrum Analyzer	Agilent	N9020A	MY48010425	2019/09/20	2020/09/19
Spectrum Analyzer	R&S	FSV40	100019	2019/09/20	2020/09/19
Vector Signal generator	Agilent	N5181A	MY49060502	2019/09/20	2020/09/19
Signal generator	Agilent	E4421B	3610AO1069	2019/09/20	2020/09/19
Climate Chamber	ESPEC	EL-10KA	A20120523	2019/09/20	2020/09/19
Controller	EM Electronics	Controller EM 1000	N/A	N/A	N/A
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2019/09/23	2020/09/22
Active Loop Antenna	Beijing Da Ze Technology Co.,Ltd.	ZN30900C	15006	2019/10/12	2020/10/11
Bilog Antenna	Schwarzbeck	VULB9163	000976	2019/05/26	2020/05/25
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2019/09/20	2020/09/19
Amplifier	Schwarzbeck	BBV 9743	#202	2019/09/20	2020/09/19
Amplifier	Schwarzbeck	BBV9179	9719-025	2019/09/20	2020/09/19
Amplifier	EMCI	EMC051845B	980355	2019/09/20	2020/09/19
Temperature/Humidity Meter	Gangxing	CTH-608	02	2019/09/20	2020/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	KL142031	2019/09/20	2020/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	KL142032	2019/09/20	2020/09/19
RF Cable(below 1GHz)	HUBER+SUHNER	RG214	RE01	2019/09/20	2020/09/19
RF Cable(above 1GHz)	HUBER+SUHNER	RG214	RE02	2019/09/20	2020/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2019/09/20	2020/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2019/09/20	2020/09/19
Test Control Unit	Tonscend	JS0806-1	178060067	2019/06/20	2020/06/19
Automated filter bank	Tonscend	JS0806-F	19F8060177	2019/06/20	2020/06/19
EMI Test Software	Tonscend	JS1120-1	Ver 2.6.8.0518	/	/
EMI Test Software	Tonscend	JS1120-3	Ver 2.5.77.0418	/	/
EMI Test Software	Tonscend	JS32-CE	Ver 2.5	/	/
EMI Test Software	Tonscend	JS32-RE	Ver 2.5.1.8	/	/

Note: The Cal.Interval was one year.

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

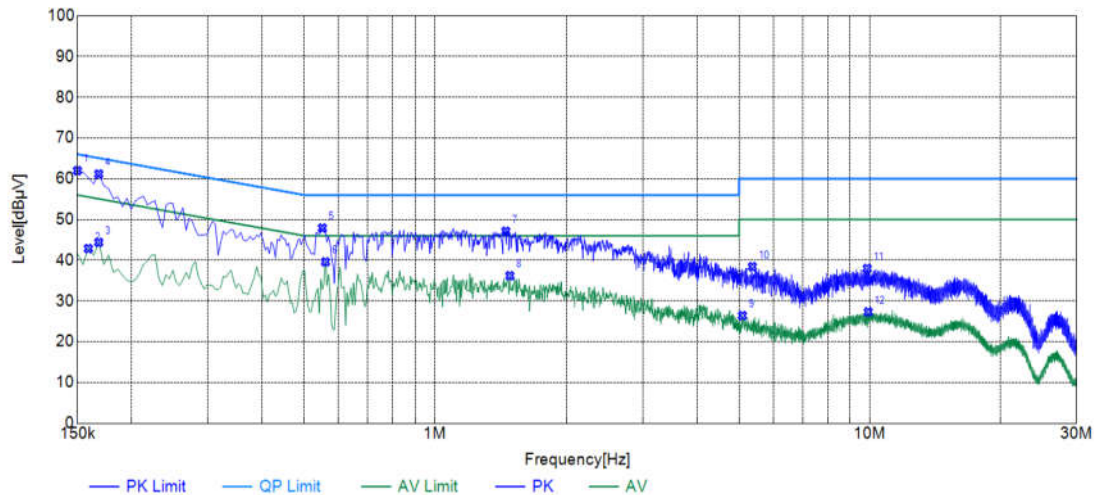
* Decreases with the logarithm of the frequency.

TEST RESULTS

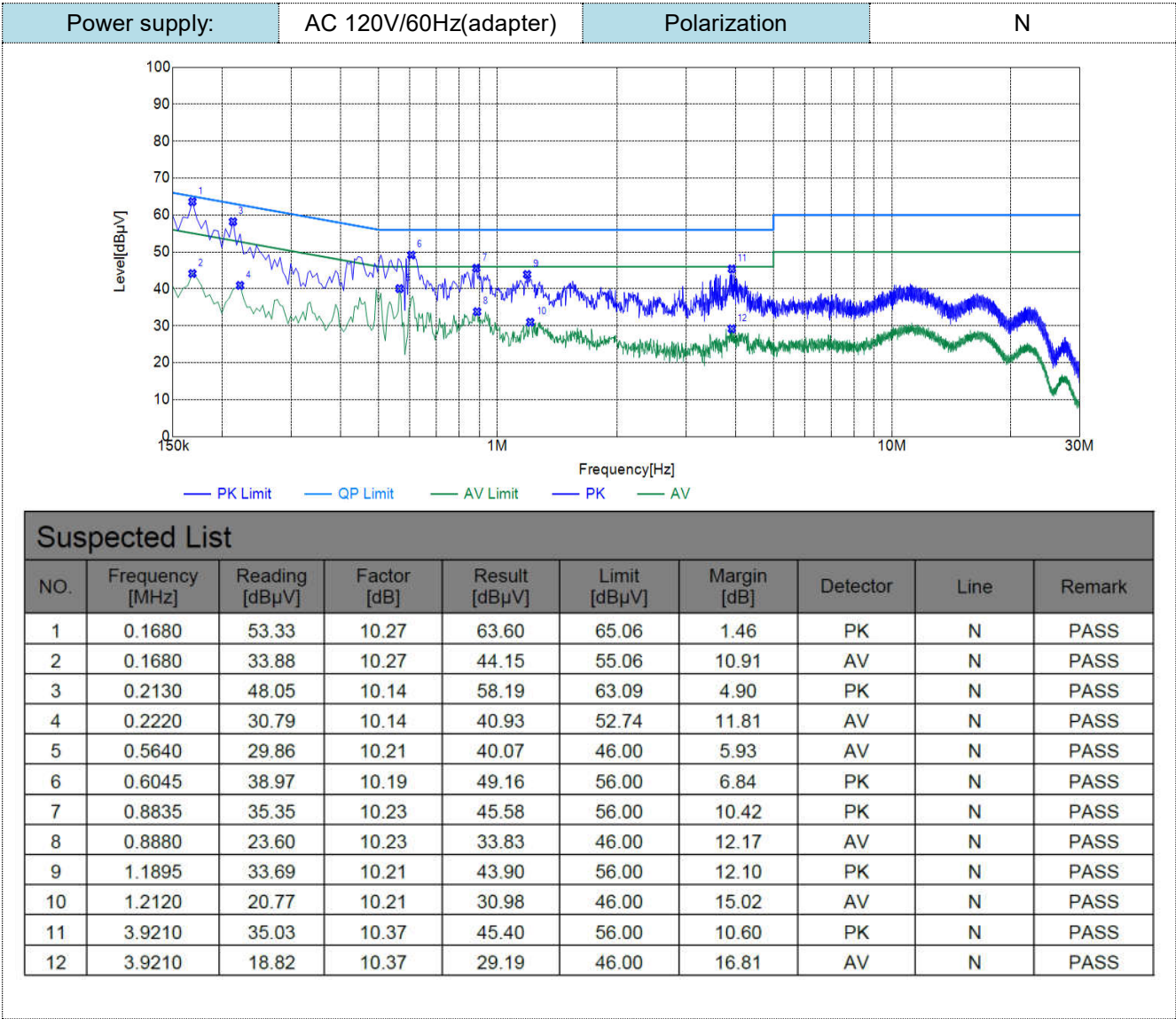
Remark:

1. All modes of 802.11b/g/n were tested at Low, Middle, and High channel; only the worst result of 802.11b CH11 was reported as below:
2. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:.

Power supply:	AC 120V/60Hz(adapter)	Polarization	L
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**Suspected List**

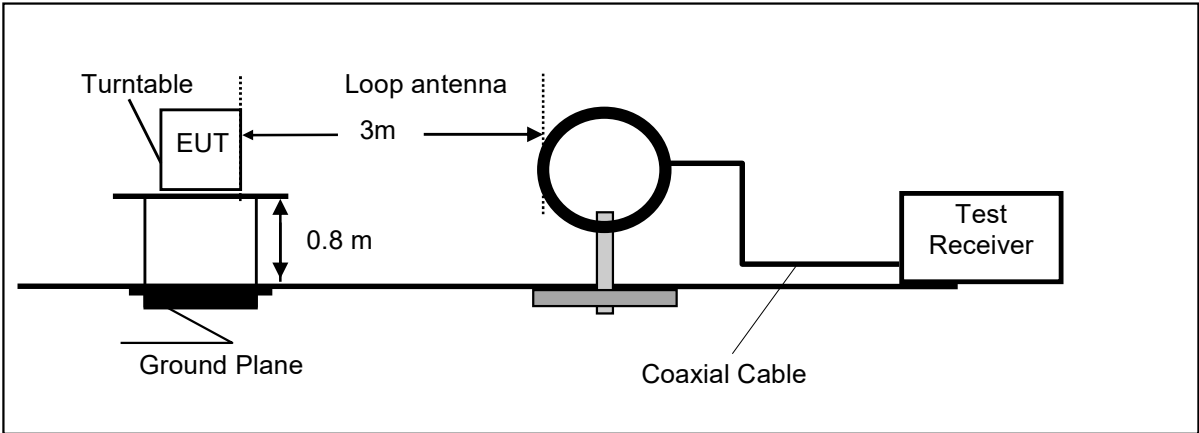
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	Result [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Line	Remark
1	0.1500	51.62	10.35	61.97	66.00	4.03	PK	L1	PASS
2	0.1590	32.55	10.31	42.86	55.52	12.66	AV	L1	PASS
3	0.1680	34.10	10.27	44.37	55.06	10.69	AV	L1	PASS
4	0.1680	50.88	10.27	61.15	65.06	3.91	PK	L1	PASS
5	0.5505	37.67	10.22	47.89	56.00	8.11	PK	L1	PASS
6	0.5595	29.37	10.21	39.58	46.00	6.42	AV	L1	PASS
7	1.4505	36.87	10.23	47.10	56.00	8.90	PK	L1	PASS
8	1.4820	25.95	10.23	36.18	46.00	9.82	AV	L1	PASS
9	5.0910	16.05	10.36	26.41	50.00	23.59	AV	L1	PASS
10	5.3655	28.02	10.40	38.42	60.00	21.58	PK	L1	PASS
11	9.8700	27.41	10.58	37.99	60.00	22.01	PK	L1	PASS
12	9.9240	16.73	10.58	27.31	50.00	22.69	AV	L1	PASS



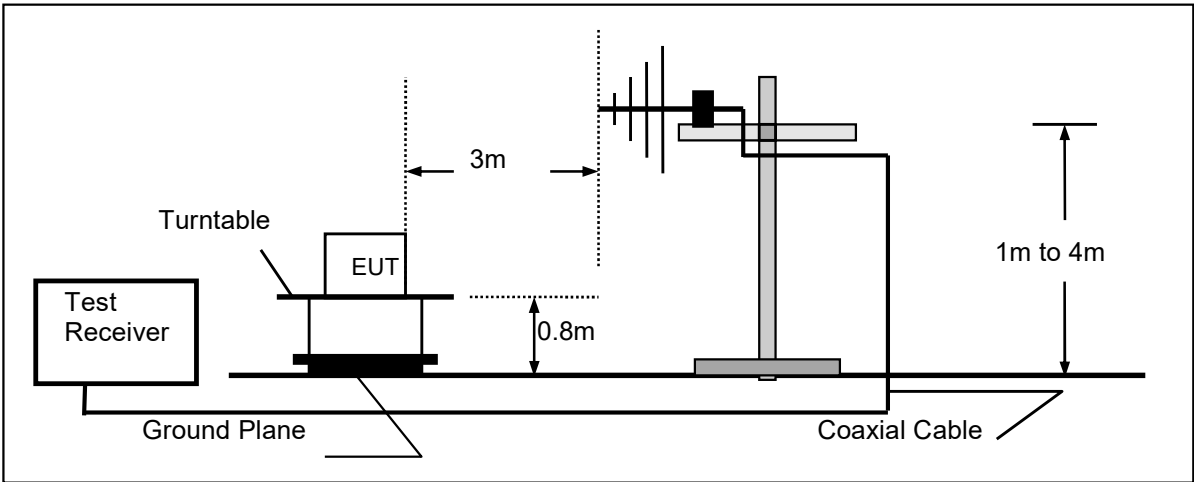
4.2 Radiated Emission

TEST CONFIGURATION

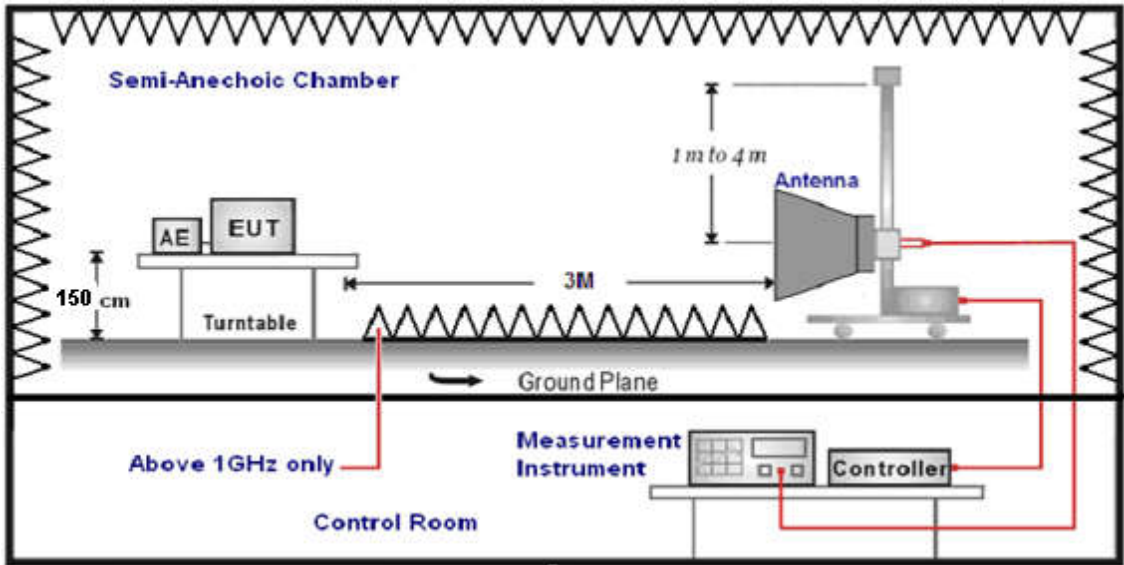
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

$$\text{Transd}=AF +CL-AG$$

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

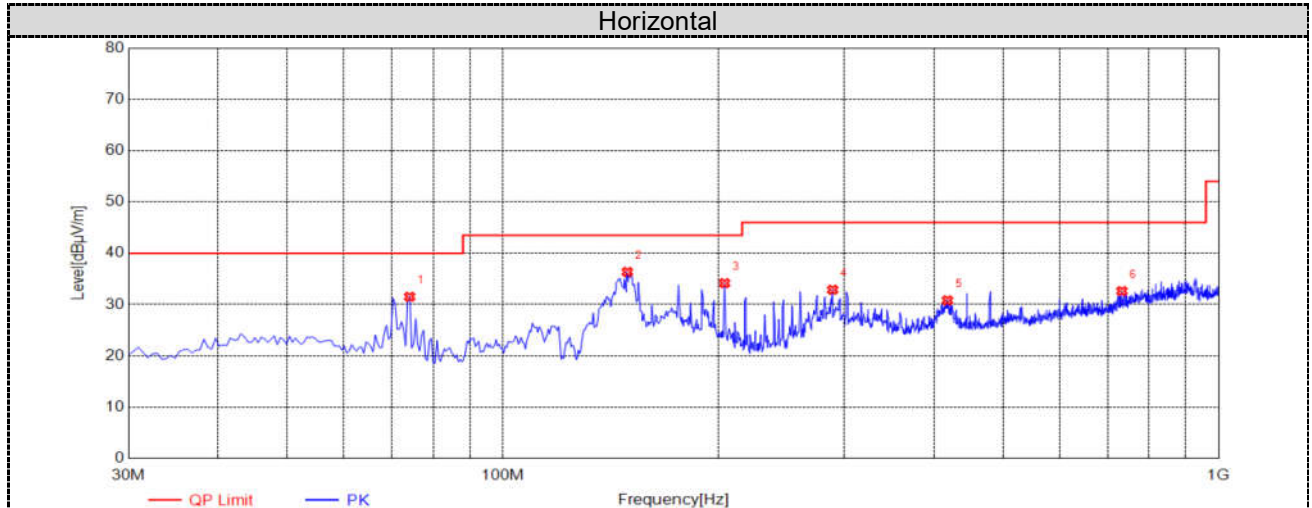
The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

Remark:

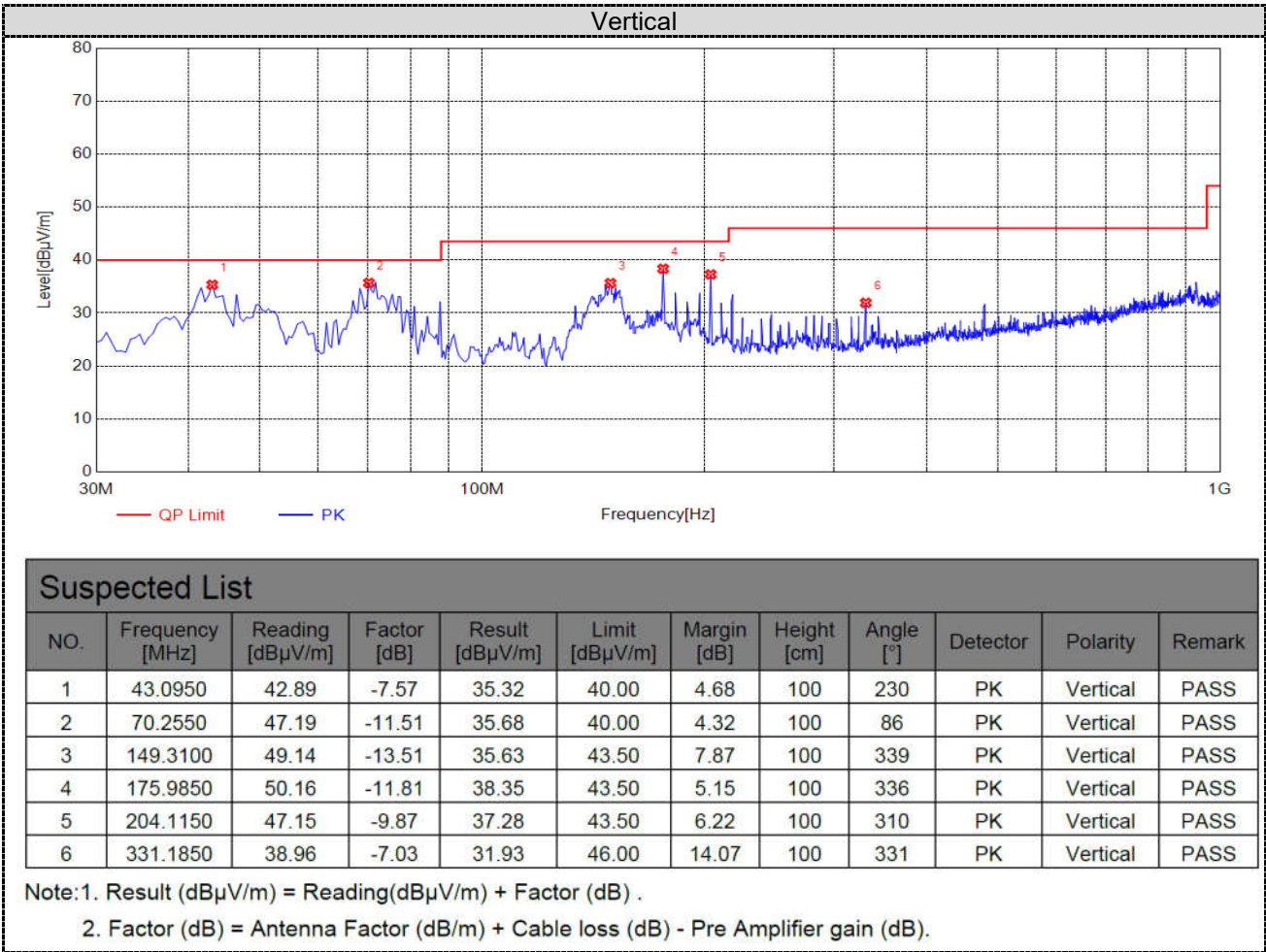
1. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
2. All three channels (lowest/middle/highest) of each mode were measured above 1GHz and recorded worst case at 802.11b mode.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz**Suspected List**

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	74.1350	44.96	-13.44	31.52	40.00	8.48	100	356	PK	Horizontal	PASS
2	149.3100	49.86	-13.51	36.35	43.50	7.15	100	354	PK	Horizontal	PASS
3	204.1150	44.03	-9.87	34.16	43.50	9.34	100	340	PK	Horizontal	PASS
4	288.9900	41.08	-8.20	32.88	46.00	13.12	100	31	PK	Horizontal	PASS
5	418.0000	36.46	-5.66	30.80	46.00	15.20	100	252	PK	Horizontal	PASS
6	732.7650	33.14	-0.52	32.62	46.00	13.38	100	0	PK	Horizontal	PASS

Note: 1. Result (dBμV/m) = Reading(dBμV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).



Suspected List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	43.0950	42.89	-7.57	35.32	40.00	4.68	100	230	PK	Vertical	PASS
2	70.2550	47.19	-11.51	35.68	40.00	4.32	100	86	PK	Vertical	PASS
3	149.3100	49.14	-13.51	35.63	43.50	7.87	100	339	PK	Vertical	PASS
4	175.9850	50.16	-11.81	38.35	43.50	5.15	100	336	PK	Vertical	PASS
5	204.1150	47.15	-9.87	37.28	43.50	6.22	100	310	PK	Vertical	PASS
6	331.1850	38.96	-7.03	31.93	46.00	14.07	100	331	PK	Vertical	PASS

Note:1. Result (dBμV/m) = Reading(dBμV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

For 1GHz to 25GHz

Note: 802.11b/802.11g/802.11n (H20)/802.11n (H40) all have been tested, only worse case 802.11b mode 1Mbps is reported

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	55.26	PK	74	18.74	54.47	30.28	7.01	36.50	0.79
4824.00	46.98	AV	54	7.02	46.19	30.28	7.01	36.50	0.79
7236.00	48.56	PK	74	25.44	38.36	36.59	8.91	35.30	10.20
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	55.86	PK	74	18.14	55.07	30.28	7.01	36.50	0.79
4824.00	48.08	AV	54	5.92	47.29	30.28	7.01	36.50	0.79
7236.00	49.06	PK	74	24.94	38.86	36.59	8.91	35.30	10.20
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	55.52	PK	74	18.48	54.04	30.36	7.62	36.50	1.48
4874.00	46.68	AV	54	7.32	45.20	30.36	7.62	36.50	1.48
7311.00	49.12	PK	74	24.88	38.97	36.61	8.84	35.30	10.15
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	56.12	PK	74	17.88	54.64	30.36	7.62	36.50	1.48
4874.00	47.58	AV	54	6.42	46.10	30.36	7.62	36.50	1.48
7311.00	50.42	PK	74	23.58	40.27	36.61	8.84	35.30	10.15
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	55.57	PK	74	18.43	53.40	30.43	7.94	36.20	2.17
4924.00	47.37	AV	54	6.63	45.20	30.43	7.94	36.20	2.17
7386.00	48.81	PK	74	25.19	38.88	36.78	8.45	35.30	9.93
7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	56.87	PK	74	17.13	54.70	30.43	7.94	36.20	2.17
4924.00	47.87	AV	54	6.13	45.70	30.43	7.94	36.20	2.17
7386.00	50.31	PK	74	23.69	40.38	36.78	8.45	35.30	9.93
7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Results of Band Edges Test (Radiated)

Note: 802.11b/802.11g/802.11n (H20) /802.11n (H40) all have been tested, only worse case 802.11b is reported.

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	50.12	PK	74	23.88	55.53	27.49	3.32	36.22	-5.41
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	57.63	PK	74	16.37	62.89	27.55	3.41	36.22	-5.26
2400.00	46.98	AV	54	7.02	52.24	27.55	3.41	36.22	-5.26

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	51.22	PK	74	22.78	56.63	27.49	3.32	36.22	-5.41
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	58.83	PK	74	15.17	64.09	27.55	3.41	36.22	-5.26
2400.00	49.08	AV	54	4.92	54.34	27.55	3.41	36.22	-5.26

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	50.36	PK	74	23.64	55.87	27.45	3.38	36.34	-5.51
2483.50	--	AV	54	--	--	--	--	--	--
2500.00	47.23	PK	74	26.77	52.70	27.41	3.47	36.35	-5.47
2500.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	51.66	PK	74	22.34	57.17	27.45	3.38	36.34	-5.51
2483.50	--	AV	54	--	--	--	--	--	--
2500.00	48.33	PK	74	25.67	53.80	27.41	3.47	36.35	-5.47
2500.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.

4.3 Maximum Conducted Output Power

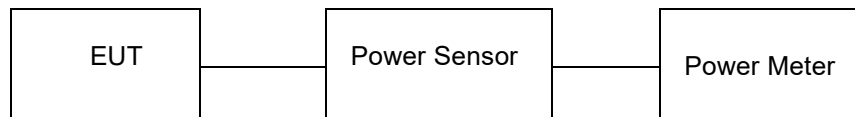
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

WIFI						
Type	Channel	Output power Ant1 (dBm)	Output power Ant2 (dBm)	Output power Total (dBm)	Limit (dBm)	Result
802.11b	01	15.47	15.33	N/A	30.00	Pass
	06	15.55	15.45	N/A		
	11	15.36	15.29	N/A		
802.11g	01	13.22	13.18	N/A	30.00	Pass
	06	13.30	13.25	N/A		
	11	13.19	13.08	N/A		
802.11n(HT20) MIMO	01	13.27	13.15	16.22	30.00	Pass
	06	13.36	13.30	16.34		
	11	13.25	13.17	16.22		
802.11n(HT40) MIMO	03	11.30	11.17	14.25	30.00	Pass
	06	11.37	11.21	14.30		
	09	11.21	11.15	14.19		

Note: 1.The test results including the cable lose.

4.4 Power Spectral Density

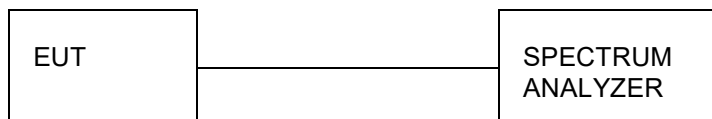
Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration

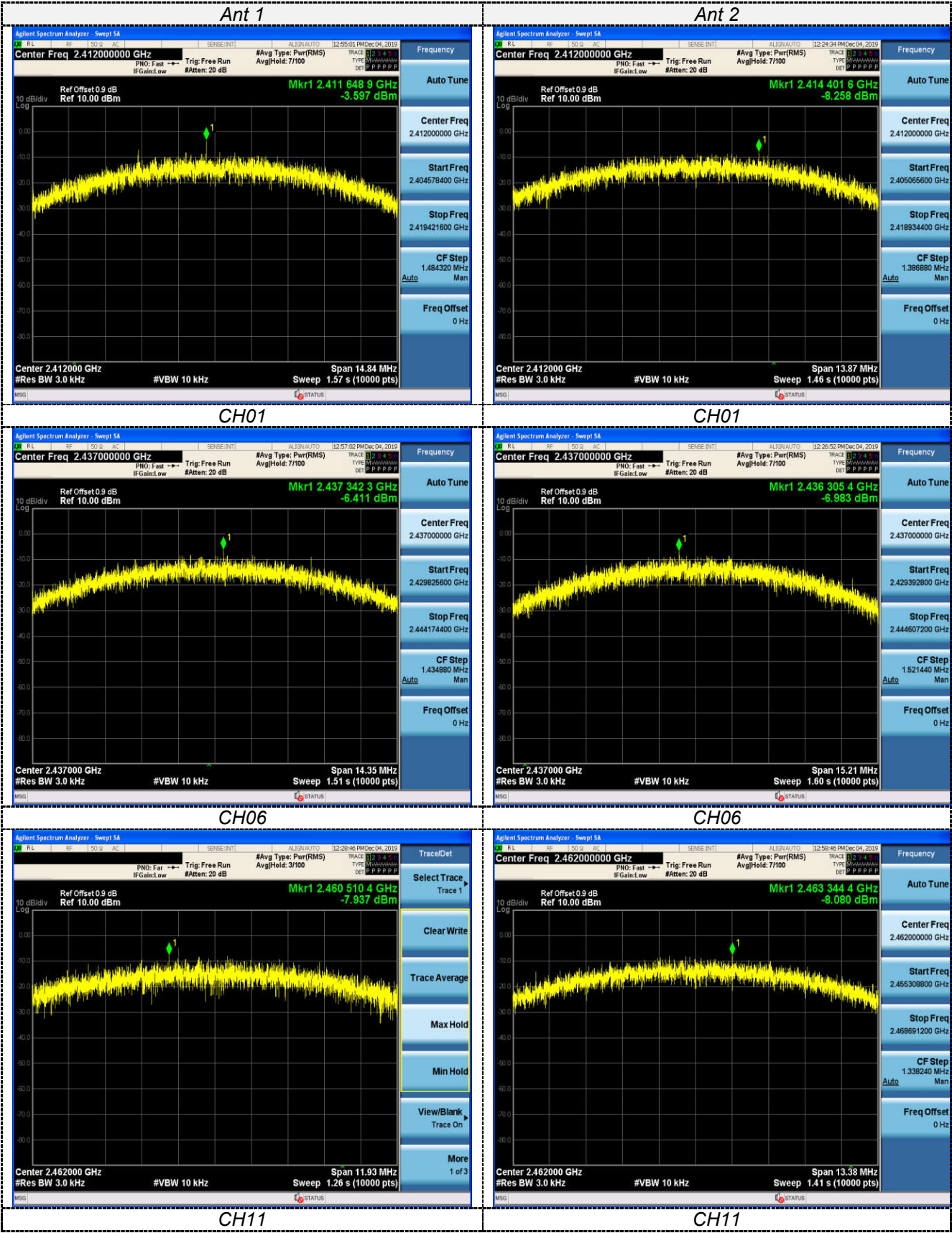


Test Results

WIFI						
Type	Channel	Power Spectral Density Ant1 (dBm/3KHz)	Power Spectral Density Ant2 (dBm/3KHz)	Power Spectral Density Total (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-3.597	-8.258	N/A	8.00	Pass
	06	-6.411	-6.983	N/A		
	11	-7.937	-8.080	N/A		
802.11g	01	-13.004	-11.798	N/A	8.00	Pass
	06	-12.455	-12.068	N/A		
	11	-11.913	-12.990	N/A		
802.11n(HT20) MIMO	01	-13.209	-11.513	-9.268	8.00	Pass
	06	-13.605	-11.833	-9.619		
	11	-12.087	-13.323	-9.651		
802.11n(HT40) MIMO	03	-17.353	-17.370	-14.351	8.00	Pass
	06	-16.952	-17.932	-14.404		
	09	-17.535	-18.114	-14.805		

Test plot as follows:

802.11b



Ant 2

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 2.412000000 GHz

Ref Offset 0.9 dB
Ref 10.00 dBm

Mkr1 2.414 401 6 GHz
-8.258 dBm

10 dB/div
Log

Center Freq 2.41200000 GHz

Start Freq 2.405065600 GHz

Stop Freq 2.418934400 GHz

CF Step 1.386880 MHz

Freq Offset 0 Hz

Center 2.412000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.46 s (10000 pts)

Frequency

Auto Tune

Center Freq 2.41200000 GHz

Start Freq 2.405065600 GHz

Stop Freq 2.418934400 GHz

CF Step 1.386880 MHz

Freq Offset 0 Hz

Center 2.412000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.46 s (10000 pts)

CH01

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 2.437000000 GHz

Ref Offset 0.9 dB
Ref 10.00 dBm

Mkr1 2.437 342 3 GHz
-6.411 dBm

10 dB/div
Log

Center Freq 2.437000000 GHz

Start Freq 2.429825600 GHz

Stop Freq 2.444174400 GHz

CF Step 1.434880 MHz

Freq Offset 0 Hz

Center 2.437000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.51 s (10000 pts)

Frequency

Auto Tune

Center Freq 2.437000000 GHz

Start Freq 2.429825600 GHz

Stop Freq 2.444174400 GHz

CF Step 1.434880 MHz

Freq Offset 0 Hz

Center 2.437000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.51 s (10000 pts)

CH01

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 2.437000000 GHz

Ref Offset 0.9 dB
Ref 10.00 dBm

Mkr1 2.436 305 4 GHz
-6.983 dBm

10 dB/div
Log

Center Freq 2.437000000 GHz

Start Freq 2.429392800 GHz

Stop Freq 2.444807200 GHz

CF Step 1.521440 MHz

Freq Offset 0 Hz

Center 2.437000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.60 s (10000 pts)

Frequency

Auto Tune

Center Freq 2.437000000 GHz

Start Freq 2.429392800 GHz

Stop Freq 2.444807200 GHz

CF Step 1.521440 MHz

Freq Offset 0 Hz

Center 2.437000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.60 s (10000 pts)

CH06

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 2.460000000 GHz

Ref Offset 0.9 dB
Ref 10.00 dBm

Mkr1 2.460 510 4 GHz
-7.937 dBm

10 dB/div
Log

Center Freq 2.460000000 GHz

Start Freq 2.453088000 GHz

Stop Freq 2.466891200 GHz

CF Step 1.338240 MHz

Freq Offset 0 Hz

Center 2.460000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.26 s (10000 pts)

Trace/Det

Select Trace

Trace 1

Clear Write

Trace Average

Max Hold

Min Hold

View/Blank

Trace On

More

1 of 3

CH06

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 2.462000000 GHz

Ref Offset 0.9 dB
Ref 10.00 dBm

Mkr1 2.463 344 4 GHz
-8.080 dBm

10 dB/div
Log

Center Freq 2.462000000 GHz

Start Freq 2.455308800 GHz

Stop Freq 2.468691200 GHz

CF Step 1.338240 MHz

Freq Offset 0 Hz

Center 2.462000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.41 s (10000 pts)

Frequency

Auto Tune

Center Freq 2.462000000 GHz

Start Freq 2.455308800 GHz

Stop Freq 2.468691200 GHz

CF Step 1.338240 MHz

Freq Offset 0 Hz

Center 2.462000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.41 s (10000 pts)

CH11

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 2.462000000 GHz

Ref Offset 0.9 dB
Ref 10.00 dBm

Mkr1 2.463 344 4 GHz
-8.080 dBm

10 dB/div
Log

Center Freq 2.462000000 GHz

Start Freq 2.455308800 GHz

Stop Freq 2.468691200 GHz

CF Step 1.338240 MHz

Freq Offset 0 Hz

Center 2.462000 GHz

#Res BW 3.0 kHz

#VBW 10 kHz

Sweep 1.41 s (10000 pts)

Frequency

Auto Tune

Center Freq 2.462000000 GHz

Start Freq 2.455308800 GHz

Stop Freq 2.468691200 GHz

CF Step 1.338240 MHz

Freq Offset 0 Hz

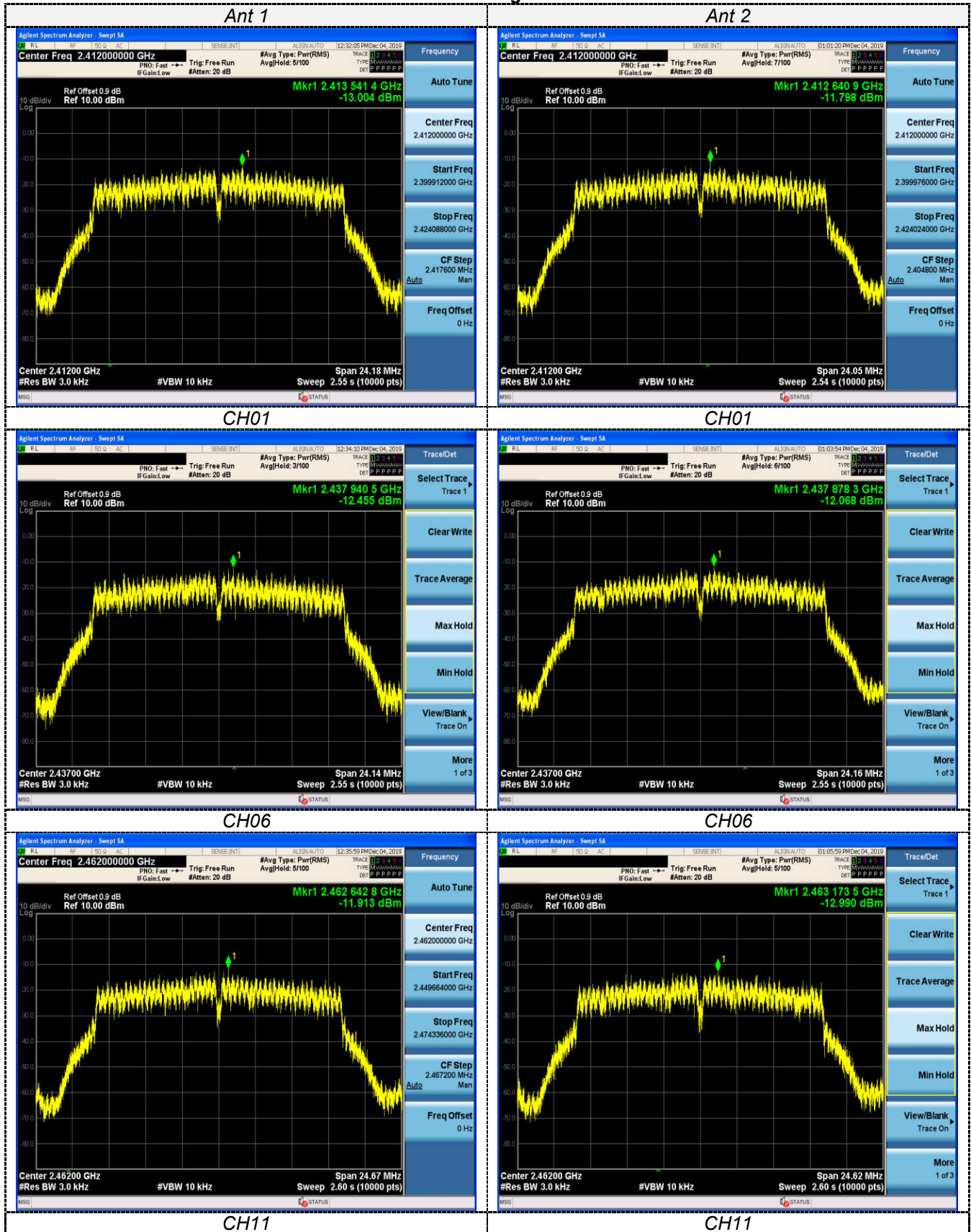
Center 2.462000 GHz

#Res BW 3.0 kHz

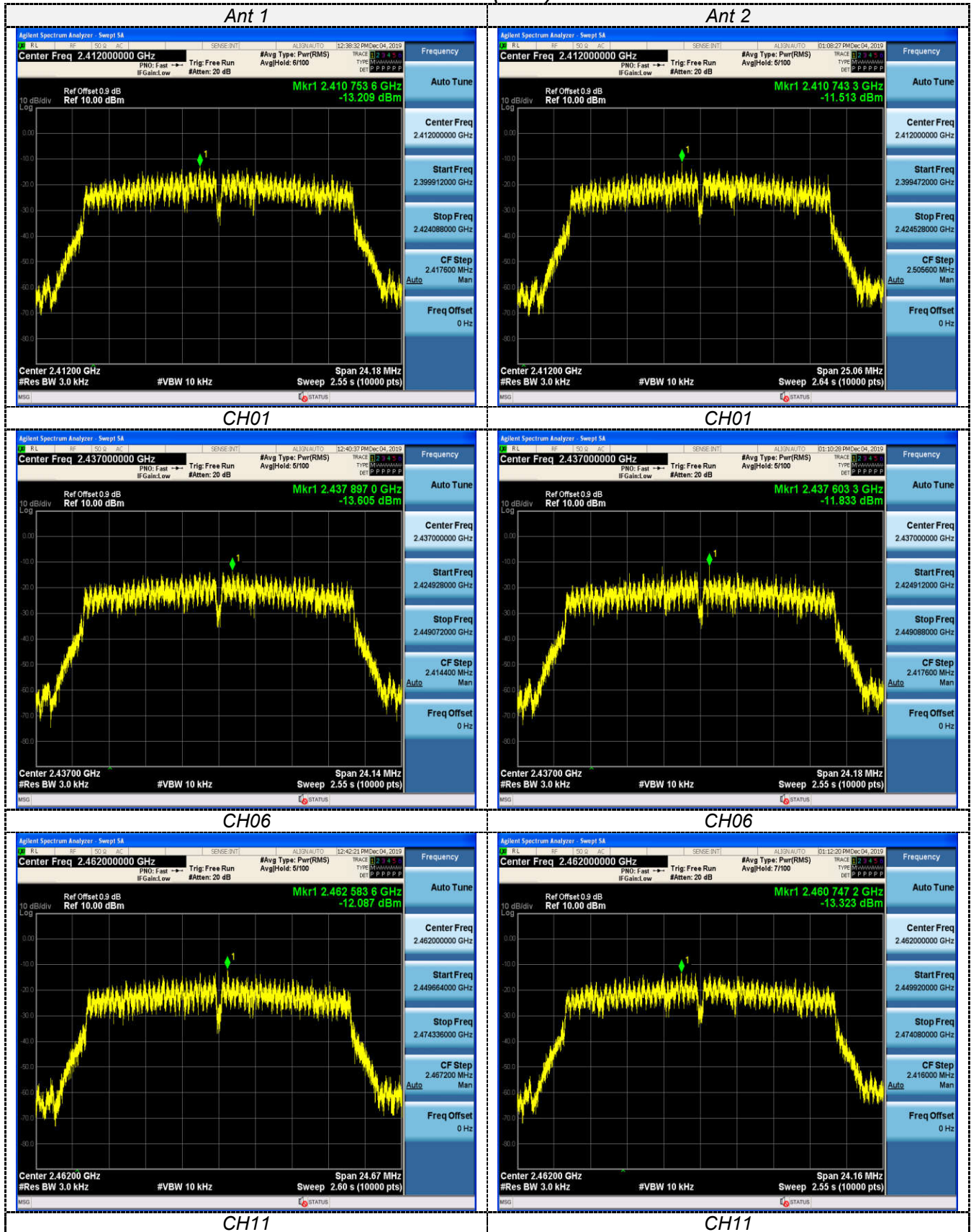
#VBW 10 kHz

Sweep 1.41 s (10000 pts)

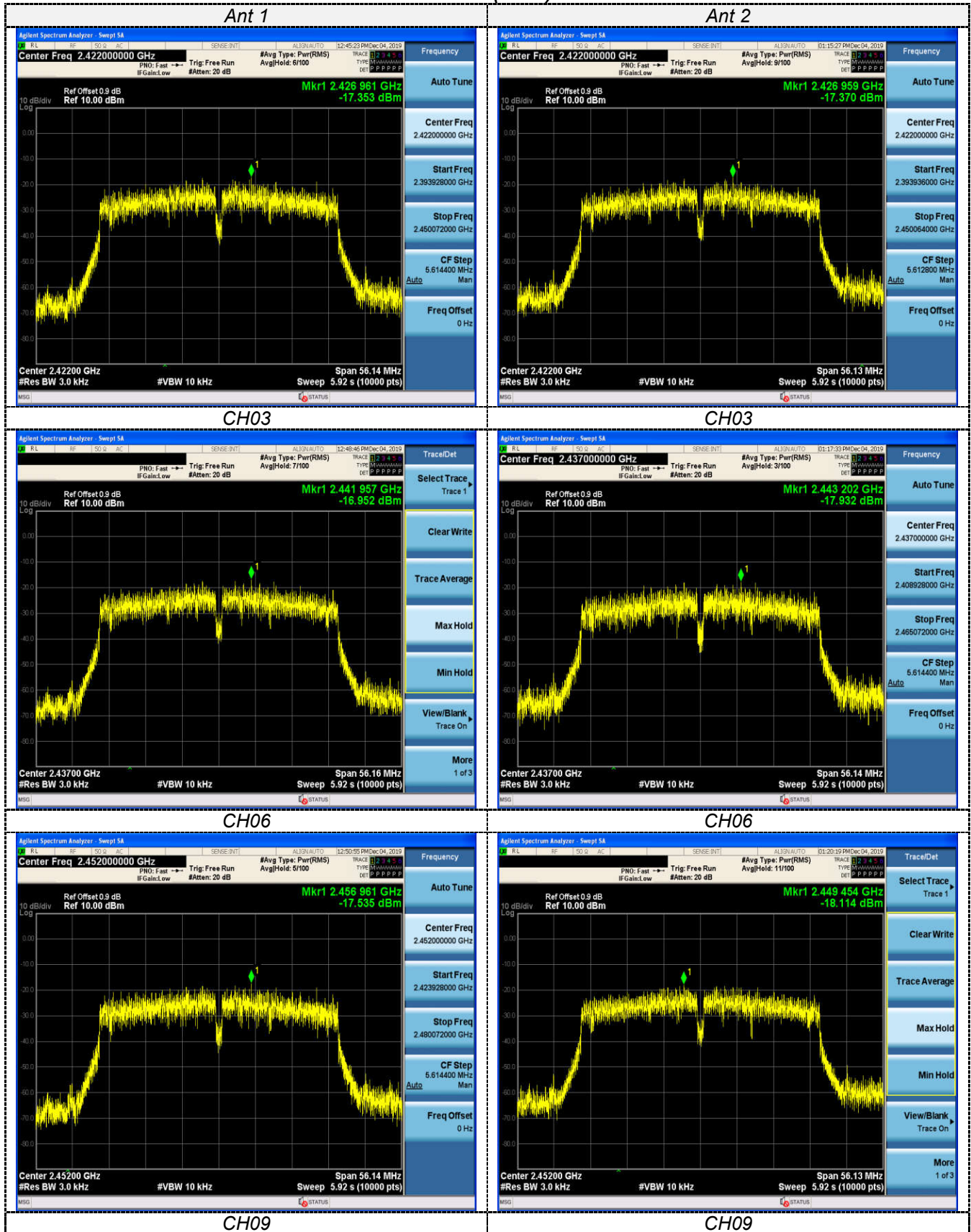
802.11g



802.11n(HT20)



802.11n(HT40)



4.5 6dB Bandwidth

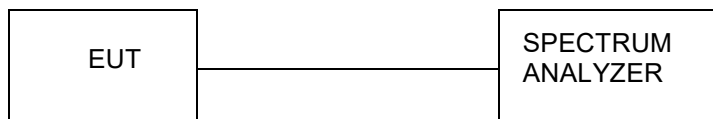
Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration



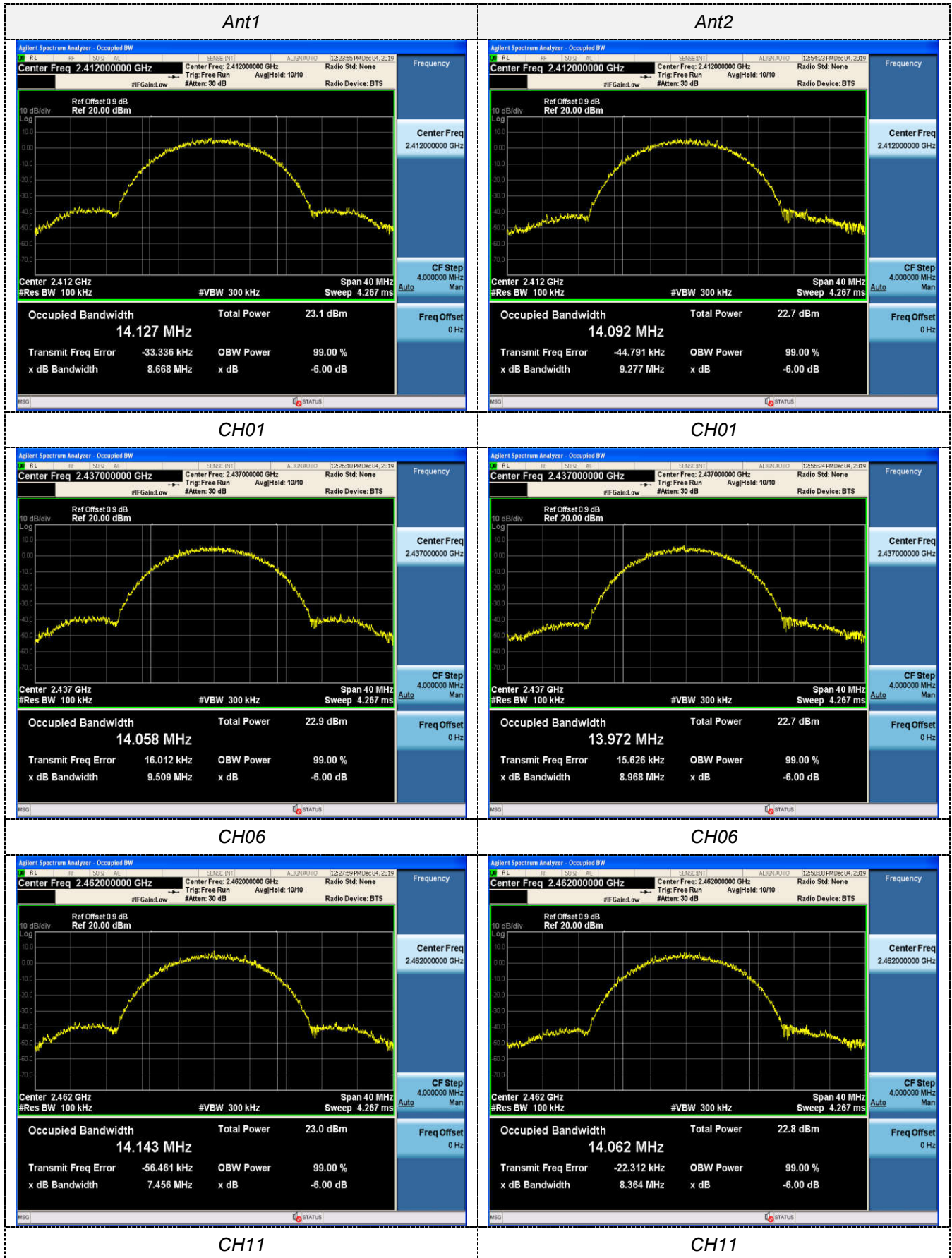
Test Results

WIFI

Type	Channel	6dB Bandwidth Ant1 (MHz)	6dB Bandwidth Ant2 (MHz)	Limit (KHz)	Result
802.11b	01	8.668	9.277	≥500	Pass
	06	9.509	8.968		
	11	7.456	8.364		
802.11g	01	15.11	15.03	≥500	Pass
	06	15.09	15.10		
	11	15.42	15.39		
802.11n(HT20)	01	15.11	15.66	≥500	Pass
	06	15.09	15.11		
	11	15.42	15.10		
802.11n(HT40)	03	35.09	35.08	≥500	Pass
	06	35.10	35.09		
	09	35.09	35.08		

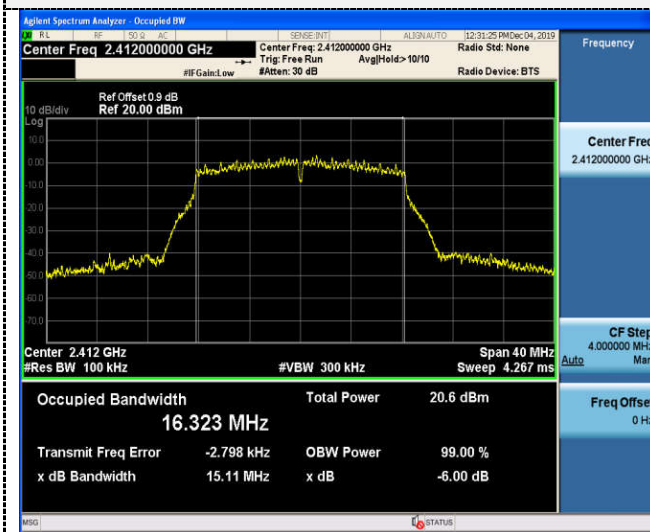
Test plot as follows:

802.11b

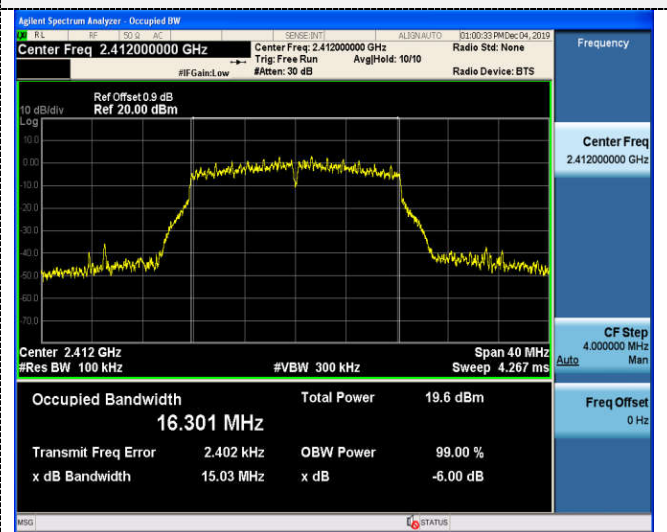


802.11g

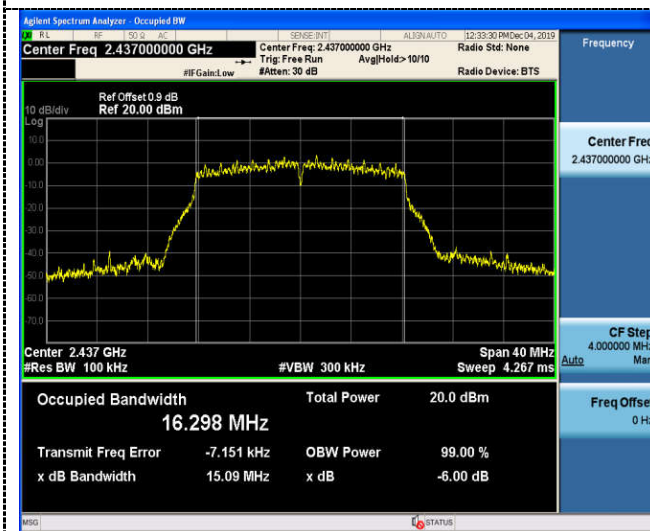
Ant1



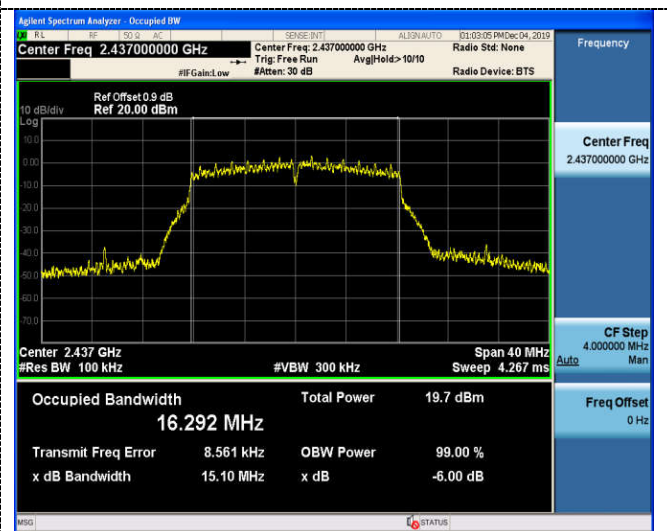
Ant2



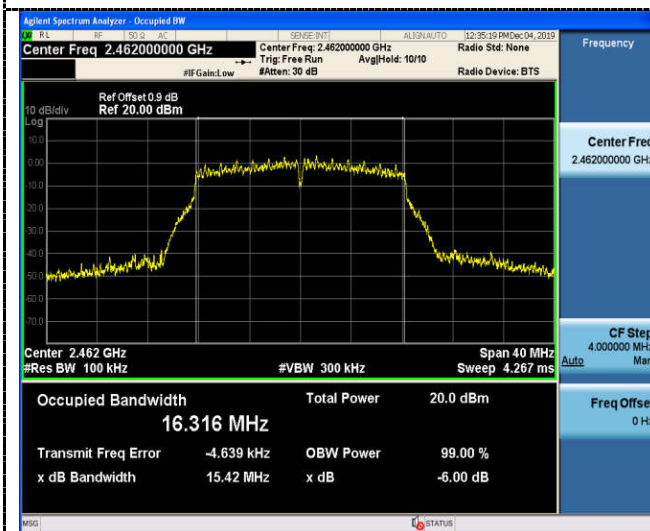
CH01



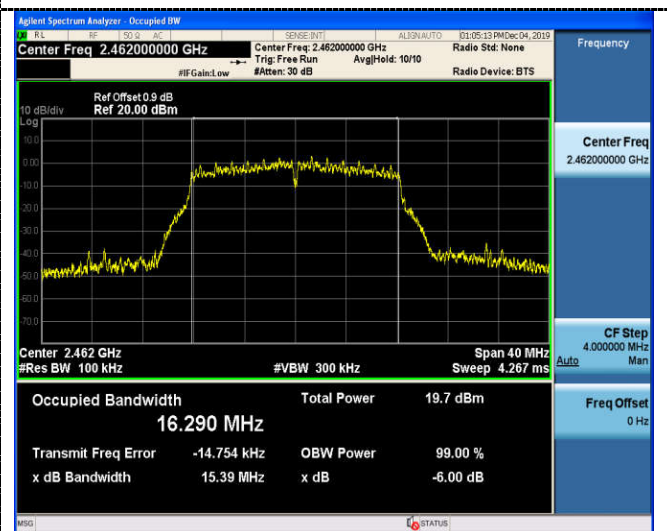
CH01



CH06



CH06



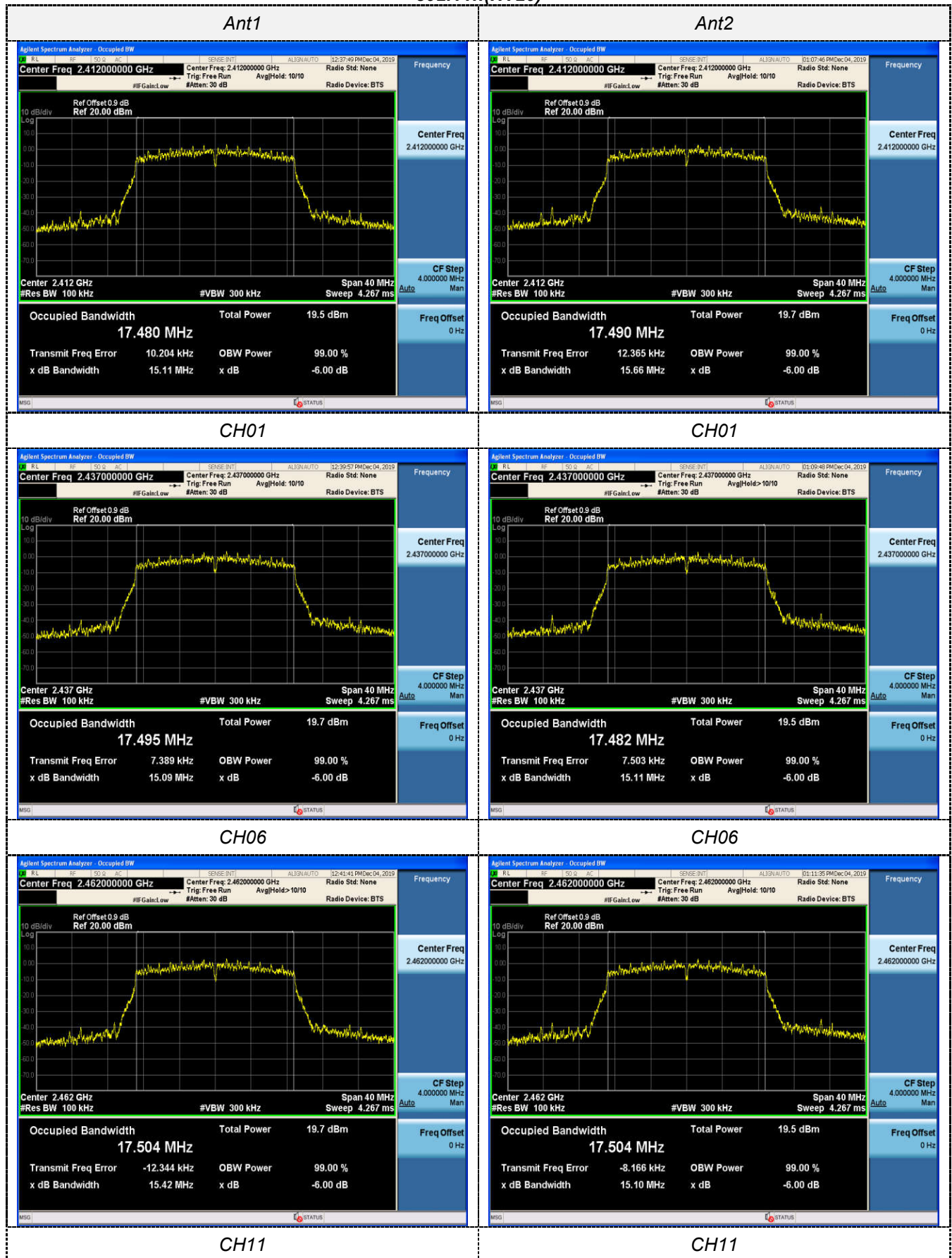
CH11



CH11



802.11n(HT20)



802.11n(HT40)

