



FCC 47 CFR PART 15 SUBPART C 15.247

TEST REPORT

FOR

UA504 WiFi Module

Model : UA504

Trade Name : Uascent

Issued to

ShenZhen Gather Genius Technology Limited
4F, Building A, Tongfang Information Harbor, No.11, Langshan Road,
Nanshan District, Shenzhen, China

Issued by

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APPENDIX 1 PHOTOS OF TEST CONFIGURATION

APPENDIX 2 PHOTOS OF EUT



1. General Information

Applicant : ShenZhen Gather Genius Technology Limited

Address : 4F, Building A, Tongfang Information Harbor, No.11, Langshan Road,
Nanshan District, Shenzhen, China

Manufacturer : ShenZhen Gather Genius Technology Limited

Address : 4F, Building A, Tongfang Information Harbor, No.11, Langshan Road,
Nanshan District, Shenzhen, China

EUT : UA504 WiFi Module

Model Name : UA504

Model Differences :

Is here with confirmed to comply with the requirements set out in the FCC Rules and Regulations Part 15 Subpart C and the measurement procedures were according to ANSI C63.10-2013. The said equipment in the configuration described in this report shows the maximum emission levels emanating

FCC part 15 subpart C

Receipt Date : 10/12/2017

Final Test Date : 12/04/2017

Tested By:

Reviewed by:

Dec. 04, 2017

Date

Bell Wei/ Engineer

Dec 04, 2017

Date

Mike Lee / Manager
Designation Number: TW1083



2. Report of Measurements and Examinations

2.1 List of Measurements and Examinations

Test Specification clause	Test case	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	☒ Lowest ☒ Middle ☒ Highest	802.11b	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	☒ Lowest ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	☒ Lowest ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	☒ Lowest ☒ Middle ☒ Highest	802.11b 802.11g 802.11n HT20	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	☐	☐	☒	☐	complies



§15.209(a)	TX spurious Emissions radiated < 30 MHz	-/-	802.11b	-/-	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	-/-	802.11b	-/-	☒	☐	☐	☐	complies

Remark:

1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

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	11b/DSSS	1 Mbps	1/6/11
Power Spectral Density	11g/OFDM	6 Mbps	1/6/11
6dB Bandwidth	11n(20MHz)/OFDM	6.5Mbps	1/6/11
Spurious RF conducted emission			
Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10 th Harmonic			
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11



3. Test Configuration of Equipment under Test

3.1 Description of the tested samples

EUT Name : UA504 WiFi Module

Model Number : UA504

FCCID : 2ALLFUA504

Receipt Date : 10/12/2017

Input Voltage : DC 5V From PC

Power From : ☐ Inside ☒ Outside
☐ Adaptor ☐ Battery ☐ AC Power Source ☐ DC Power Source
☒ Support Unit PC

Operate Frequency : Refer to the channel list as described below (2.412 ~2.462 GHz)

Modulation Technique : 802.11b : 1 Mbps
802.11g : 6 Mbps
802.11n HT20 : 6.5 Mbps

Number of Channels : 802.11b, 802.11g, 802.11n, HT20 : 13

Channel spacing : ☐ N/A ☒ 5 MHz

Operating Mode : ☐ Simplex ☒ Half Duplex

Antenna Type : Dipole Antenna

Channel bandwidth : 5 MHz

Antenna gain : 3.00 dBi



3.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT 20 (2412MHz~2462MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---



3.3 Test Mode and Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- b. The complete test system included Notebook and EUT for RF test.
- c. An executive "QATEST" under XP was executed to keep transmitting and receiving data via Wireless.
- d. The following test modes were performed for test:
 - 802.11b/g/n HT20: CH01: 2412MHz, CH06: 2437MHz, CH11: 2462MHz
 - 802.11n HT40: CH03: 2422MHz, CH06: 2437MHz, CH09: 2452MHz



3.4 TEST Methodology & General Test Procedures

[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

[KDB 558074 D01 DTS Meas Guidance v04](#): GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247

3.5 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated emission	$\pm 4.11\text{dB}$
Peak Output Power(conducted)	$\pm 1.38\text{dB}$
Peak Output Power(Radiated)	$\pm 1.70\text{dB}$
Power Spectral Density	$\pm 1.39\text{dB}$
Radiated emission(3m)	$\pm 4.11\text{dB}$
Radiated emission(10m)	$\pm 3.89\text{dB}$

3.6 Description of the Support Equipments

Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.

Support Equipment

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
1.	PC	EliteBook 828 G4	NA	NA	HP	NA	NA
2.	NA	NA	NA	NA	NA	NA	N/A
INSIDE SUPPORT EQUIPMENT							



No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test

Grounding: Grounding was in accordance with the manufacturer's requirement and conditions for the intended use.

4. Test and measurement equipment

4.1 calibration

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2 equipment

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

**TABLELIST OF TEST AND MEASUREMENT EQUIPMENT**

Test Site	Instrument	Manufacturer	Model No.	S/N	Next Cal. Date
Conduction	Spectrum (9K--3GHz)	R&S	FSP3	833387/010	2018/09/20
	EMI Receiver	R&S	ESHS10	830223/008	2018/06/06
	LISN	Rolf Heine Hochfrequenztechnik	NNB-2/16z	98062	2018/06/11
	ISN	Schwarzbeck	8-Wire ISN CAT5	CAT5-8158-0094	2018/09/21
	RF Cable	N/A	N/A	EMI-3	2018/10/18
Radiation	Bilog antenna(30M-1G)	ETC	MCTD2786B	BLB16M04004/JB-5-004	2018/05/18
	Double Ridged Guide Horn antenna(1G-18G)	ETC	MCTD 1209	DRH15N02009	2018/11/01
	Horn antenna (18G-26G)	com-power	AH-826	81000	2018/08/16
	LOOP Antenna (Below 30M)	com-power	AL-130	17117	2018/10/04
	Pre amplifier (30M-1G)	EMC INSTRUMENT	EMC9135	980334	2018/05/03
	Microwave Preamplifier (1G-18G)	EMC INSTRUMENT	EMC051845	980108&A T -18001	2018/10/22
	Pre amplifier (18G~26G)	MITEQ	JS4-18002600-30-5A	808329	2018/08/09
	EMI Test	R&S	ESVS30	826006/002	2018/11/27



	Receiver		(20M-1000MHz)		
	RF Cable (open site)	EMCI	N male on end of both sides (EMI4)	30m	2018/10/18
	RF CABLE (1~26G)	HARBOUR INDUSTRIES	LL142MI(4M+4M)	NA	2018/04/17
	RF CABLE (1~26G)	HARBOUR INDUSTRIES	LL142MI(7M)	NA	2018/08/09
	Spectrum (9K--7GHz)	R&S	FSP7	830180/006	2018/04/14
	Spectrum (9K--40GHz)	AGILENT	8564EC	4046A0032	2018/03/01
Software	e3	AUDIX	N/A	N/A	N/A
SG	SINGAL GENERATOR (100k-1GHz)	HP	8648A	3619U0042 6	N/A

***CALIBRATION INTERVAL OF INSTRUMENTS LISTED ABOVE IS ONE YEAR**



5. Antenna Requirements

5.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.2 Antenna Construction and Directional Gain

802.11b/g/n:

Antenna Type: Dipole Antenna

Antenna Gain: 3.0 dBi



6. Test of Conducted Emission

6.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2014 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

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

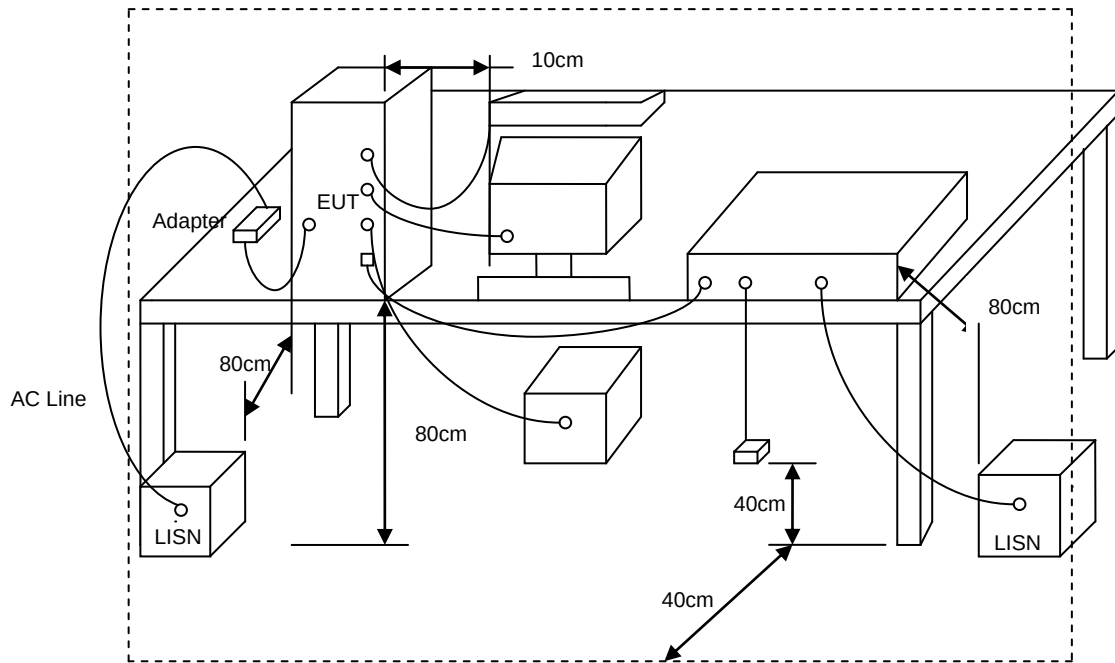
*Decreases with the logarithm of the frequency.

6.2 Test Procedures

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



6.3 Typical Test Setup

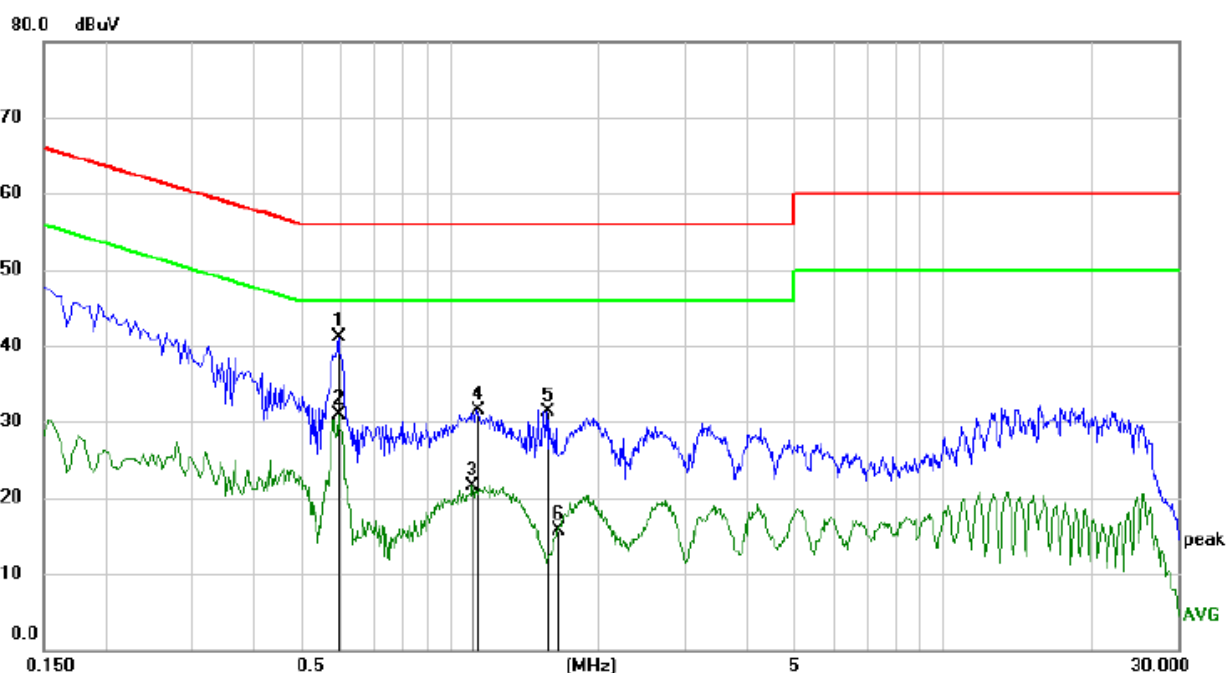




6.4 Test Result and Data

Remark: We measured Conducted Emission at 802.11b/802.11g/802.11n HT20 mode in AC 120V/60Hz the worst case was recorded .

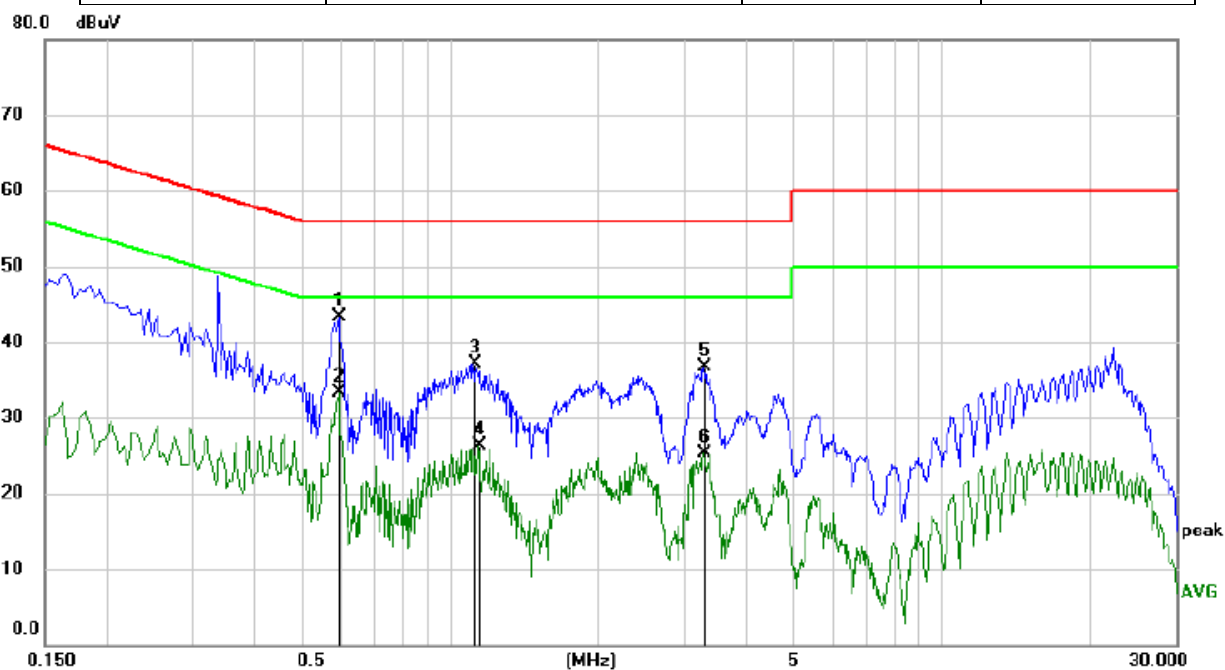
Power	: AC 120V	Pol/Phase	: LINE
Test Mode 1	: TX b CH11 2462MHz	Temperature	: 26 °C
Memo	:	Humidity	: 40 %



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.5955	41.18	-0.03	41.15	56.00	-14.85	peak
2		0.5955	30.86	-0.03	30.83	46.00	-15.17	AVG
3		1.1085	21.64	-0.04	21.60	46.00	-24.40	AVG
4		1.1355	31.52	-0.04	31.48	56.00	-24.52	peak
5		1.5765	31.35	-0.04	31.31	56.00	-24.69	peak
6		1.6620	15.83	-0.04	15.79	46.00	-30.21	AVG



Power	: AC 110V	Pol/Phase	: NEUTRAL
Test Mode 1	: TX b CH11 2462MHz	Temperature	: 26 °C
Memo	:	Humidity	: 40 %



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV	dBuV	dB	
1	*	0.5955	43.40	-0.03	43.37	56.00	-12.63	peak
2		0.5955	33.28	-0.03	33.25	46.00	-12.75	AVG
3		1.1220	37.18	-0.04	37.14	56.00	-18.86	peak
4		1.1445	26.40	-0.04	26.36	46.00	-19.64	AVG
5		3.2865	36.65	-0.04	36.61	56.00	-19.39	peak
6		3.2865	25.40	-0.04	25.36	46.00	-20.64	AVG



7. Test of Radiated Emission

7.1 Test Limit

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/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

7.2 Test Procedures

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

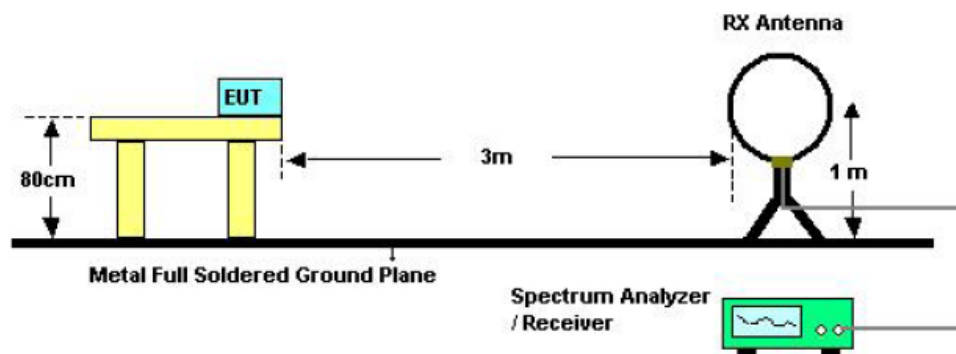


average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

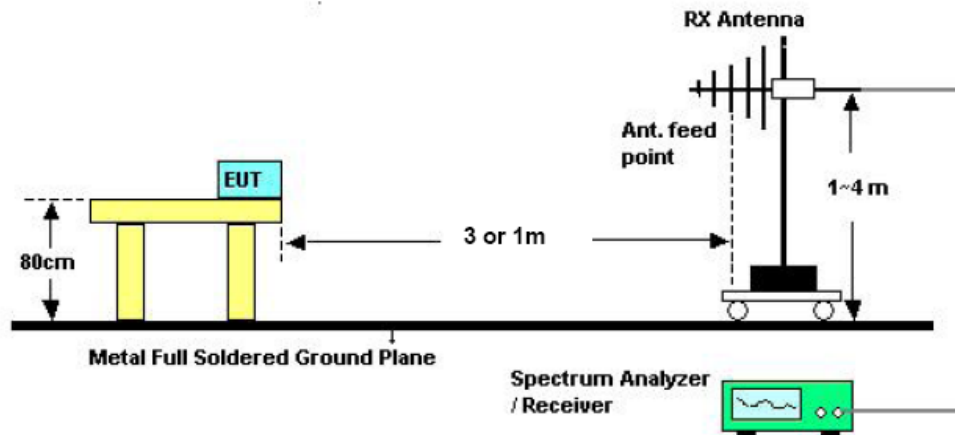
- i. "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.

7.3 Typical Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].



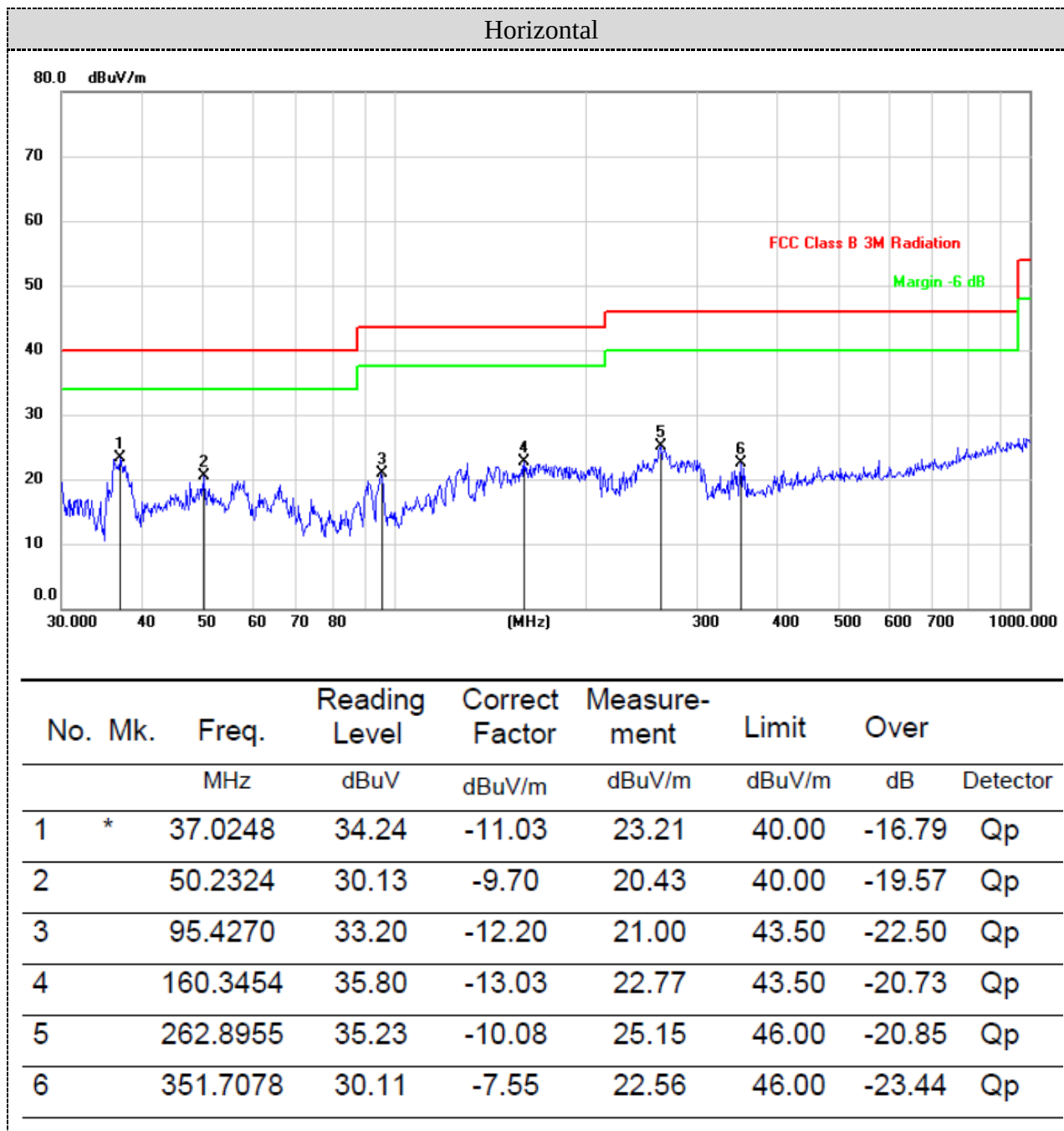
7.4 Test Result and Data (9kHz ~ 30MHz)

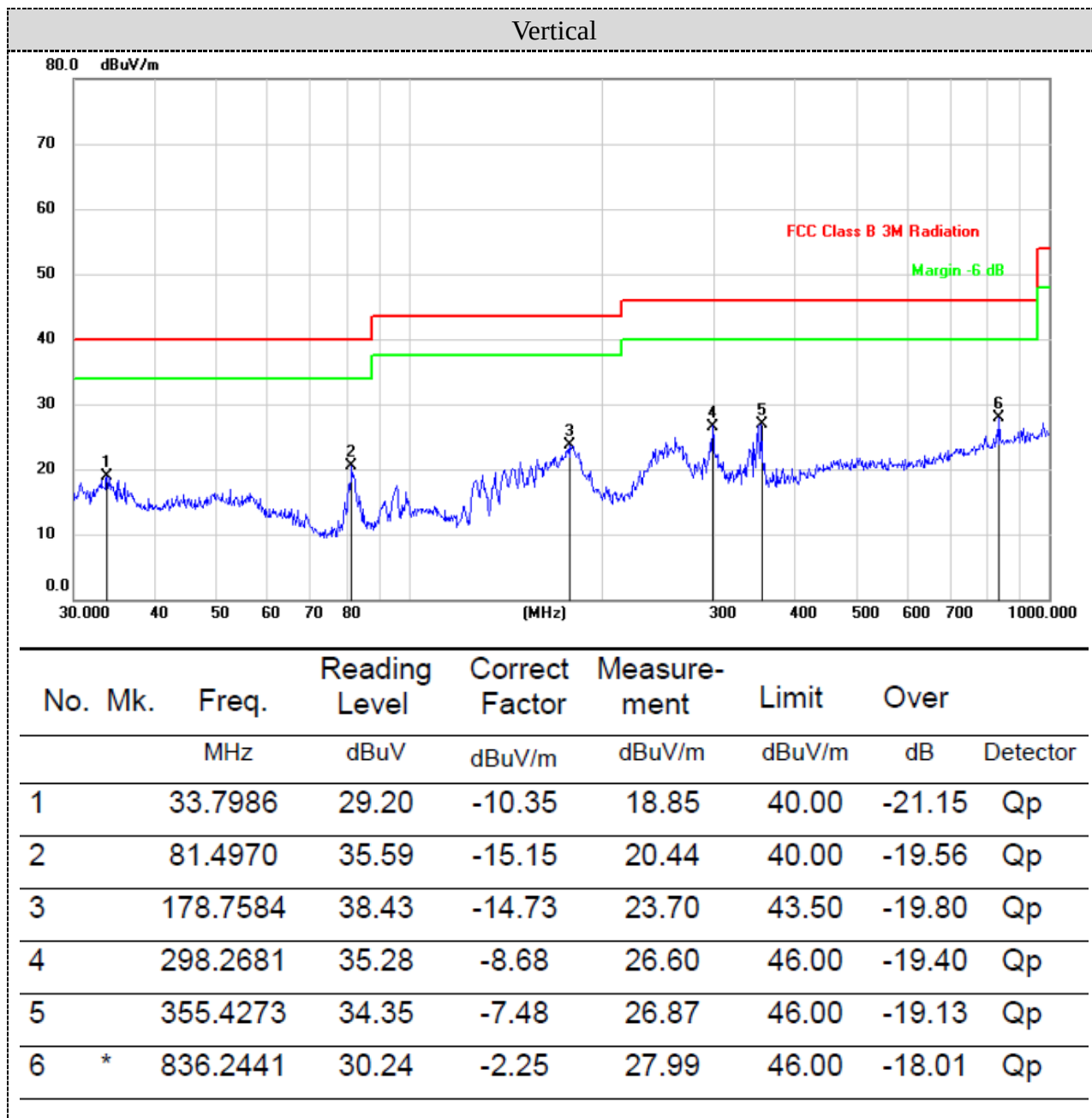
Remark: We measured Radiated Emission at 802.11b/802.11g/802.11n HT20 mode from 9 KHz to 25GHz in AC 120V/60Hz and recorded worst case at 802.11b mode.

Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.36	49.79	96.48	46.69	QP	PASS
1.65	43.12	63.25	20.13	QP	PASS
20.51	44.35	69.54	25.19	QP	PASS
25.77	43.67	69.54	25.87	QP	PASS

7.5 Test Result and Data (30MHz ~ 1GHz, worst emissions found)

Remark: We measured Radiated Emission at 802.11b/802.11g/802.11n HT20 mode from 9 KHz to 25GHz in AC 120V/60Hz and recorded worst case at 802.11b mode





**7.6 Test Result and Data (Above 1GHz)****802.11b Mode (above 1GHz)**

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	53.40	PK	74	20.60	1.00	115	51.30	31.6	7.00	36.5	2.10
1	4824	39.57	AV	54	14.43	1.00	115	37.47	31.6	7.00	36.5	2.10
2	7236	51.36	PK	74	22.64	1.00	209	40.43	37.33	8.90	35.3	10.93
2	7236	39.35	AV	54	14.65	1.00	209	28.42	37.33	8.90	35.3	10.93

Frequency(MHz):				2412			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	55.39	PK	74	18.61	1.00	112	53.29	31.60	7.00	36.50	2.10
1	4824	41.62	AV	54	12.38	1.00	112	39.52	31.60	7.00	36.50	2.10
2	7236	50.89	PK	74	23.11	1.00	219	39.96	37.33	8.90	35.30	10.93
2	7236	41.75	AV	54	12.25	1.00	219	30.82	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	57.17	PK	74.00	16.83	1.00	229	55.05	31.02	7.60	36.5	2.12
1	4874.00	38.93	AV	54.00	15.07	1.00	229	36.81	31.02	7.60	36.5	2.12
2	7311.00	54.21	PK	74.00	19.79	1.00	142	43.13	37.28	8.60	34.8	11.08
2	7311.00	39.49	AV	54.00	14.51	1.00	142	28.41	37.28	8.60	34.8	11.08



Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-a mplifier (dB)	Correction Factor (dB/m)
1	4874.00	57.49	PK	74.00	16.51	1.00	129	55.37	31.02	7.60	36.5	2.12
1	4874.00	40.60	AV	54.00	13.40	1.00	129	38.48	31.02	7.60	36.5	2.12
2	7311.00	52.63	PK	74.00	21.37	1.00	269	41.55	37.28	8.60	34.8	11.08
2	7311.00	40.54	AV	54.00	13.46	1.00	269	29.46	37.28	8.60	34.8	11.08

Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-a mplifier (dB)	Correction Factor (dB/m)
1	4924.00	59.31	PK	74.00	14.69	1.00	137	56.11	31.58	7.82	36.2	3.20
1	4924.00	40.64	AV	54.00	13.36	1.00	137	37.44	31.58	7.82	36.2	3.20
2	7386.00	55.09	PK	74.00	18.91	1.00	285	43.15	38.51	8.73	35.3	11.94
2	7386.00	39.42	AV	54.00	14.58	1.00	285	27.48	38.51	8.73	35.3	11.94

Frequency(MHz):				2462			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-a mplifier (dB)	Correction Factor (dB/m)
1	4924.00	57.32	PK	74.00	16.68	1.00	138	54.12	31.58	7.82	36.2	3.20
1	4924.00	40.45	AV	54.00	13.55	1.00	138	37.25	31.58	7.82	36.2	3.20
2	7386.00	53.06	PK	74.00	20.94	1.00	257	41.12	38.51	8.73	35.3	11.94
2	7386.00	41.35	AV	54.00	12.65	1.00	257	29.41	38.51	8.73	35.3	11.94



802.11g Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	59.51	PK	74	14.49	1.00	96	57.41	31.6	7.00	36.5	2.10
1	4824	42.77	AV	54	11.23	1.00	93	40.67	31.6	7.00	36.5	2.10
2	7236	52.30	PK	74	21.70	1.00	132	41.37	37.33	8.90	35.3	10.93
2	7236	39.11	AV	54	14.89	1.00	132	28.18	37.33	8.90	35.3	10.93

Frequency(MHz):				2412			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	59.57	PK	74	14.43	1.00	108	57.47	31.60	7.00	36.50	2.10
1	4824	40.72	AV	54	13.28	1.00	108	38.62	31.60	7.00	36.50	2.10
2	7236	53.58	PK	74	20.42	1.00	187	42.65	37.33	8.90	35.30	10.93
2	7236	40.39	AV	54	13.61	1.00	187	29.46	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	58.43	PK	74.00	15.57	1.00	109	56.33	31.02	7.60	36.5	2.12
1	4874.00	41.22	AV	54.00	12.78	1.00	109	39.10	31.02	7.60	36.5	2.12
2	7311.00	53.43	PK	74.00	20.57	1.00	213	42.35	37.28	8.60	34.8	11.08
2	7311.00	41.29	AV	54.00	12.71	1.00	213	30.21	37.28	8.60	34.8	11.08



Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-a mplifier(dB)	Correction Factor (dB/m)
1	4874.00	58.65	PK	74.00	15.35	1.00	59	56.53	31.02	7.60	36.5	2.12
1	4874.00	41.59	AV	54.00	12.41	1.00	59	39.47	31.02	7.60	36.5	2.12
2	7311.00	55.80	PK	74.00	18.20	1.00	238	44.72	37.28	8.60	34.8	11.08
2	7311.00	39.88	AV	54.00	14.12	1.00	238	28.80	37.28	8.60	34.8	11.08

Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-a mplifier(dB)	Correction Factor (dB/m)
1	4924.00	59.30	PK	74.00	14.70	1.00	107	56.10	31.58	7.82	36.2	3.20
1	4924.00	41.50	AV	54.00	12.50	1.00	107	38.30	31.58	7.82	36.2	3.20
2	7386.00	53.65	PK	74.00	20.35	1.00	191	41.71	38.51	8.73	35.3	11.94
2	7386.00	39.68	AV	54.00	14.32	1.00	191	27.74	38.51	8.73	35.3	11.94

Frequency(MHz):				2462			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-a mplifier(dB)	Correction Factor (dB/m)
1	4924.00	59.84	PK	74.00	14.16	1.00	107	56.64	31.58	7.82	36.2	3.20
1	4924.00	41.26	AV	54.00	12.74	1.00	107	38.06	31.58	7.82	36.2	3.20
2	7386.00	54.87	PK	74.00	19.13	1.00	201	42.93	38.51	8.73	35.3	11.94
2	7386.00	40.83	AV	54.00	13.17	1.00	201	28.89	38.51	8.73	35.3	11.94



802.11n HT20 Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	57.75	PK	74	16.25	1.00	115	55.65	31.6	7.00	36.5	2.10
1	4824	40.56	AV	54	13.44	1.00	115	38.46	31.6	7.00	36.5	2.10
2	7236	55.40	PK	74	18.60	1.00	132	44.47	37.33	8.90	35.3	10.93
2	7236	40.76	AV	54	13.24	1.00	132	29.83	37.33	8.90	35.3	10.93

Frequency(MHz):				2412			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	59.11	PK	74	14.89	1.00	123	57.01	31.60	7.00	36.50	2.10
1	4824	41.46	AV	54	12.54	1.00	123	39.36	31.60	7.00	36.50	2.10
2	7236	53.62	PK	74	20.38	1.00	259	42.69	37.33	8.90	35.30	10.93
2	7236	40.46	AV	54	13.54	1.00	259	29.53	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	56.36	PK	74.00	17.64	1.00	119	54.24	31.02	7.60	36.5	2.12
1	4874.00	39.99	AV	54.00	14.01	1.00	119	37.87	31.02	7.60	36.5	2.12
2	7311.00	53.40	PK	74.00	20.60	1.00	261	42.32	37.28	8.60	34.8	11.08
2	7311.00	41.41	AV	54.00	12.59	1.00	261	30.33	37.28	8.60	34.8	11.08



Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	59.54	PK	74.00	14.46	1.00	79	57.42	31.02	7.60	36.5	2.12
1	4874.00	42.49	AV	54.00	11.51	1.00	79	40.37	31.02	7.60	36.5	2.12
2	7311.00	53.73	PK	74.00	20.27	1.00	132	42.65	37.28	8.60	34.8	11.08
2	7311.00	39.81	AV	54.00	14.19	1.00	132	28.73	37.28	8.60	34.8	11.08

Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	57.61	PK	74.00	16.39	1.00	142	54.41	31.58	7.82	36.2	3.20
1	4924.00	40.88	AV	54.00	13.12	1.00	142	37.68	31.58	7.82	36.2	3.20
2	7386.00	54.72	PK	74.00	19.28	1.00	227	42.78	38.51	8.73	35.3	11.94
2	7386.00	41.36	AV	54.00	12.64	1.00	227	29.42	38.51	8.73	35.3	11.94

Frequency(MHz):				2462			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	58.05	PK	74.00	15.95	1.00	171	54.85	31.58	7.82	36.2	3.20
1	4924.00	40.68	AV	54.00	13.32	1.00	171	37.48	31.58	7.82	36.2	3.20
2	7386.00	54.73	PK	74.00	19.27	1.00	235	42.79	38.51	8.73	35.3	11.94
2	7386.00	41.76	AV	54.00	12.24	1.00	235	29.82	38.51	8.73	35.3	11.94

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.



8. 6dB Bandwidth Measurement Data

8.1 Test Limit

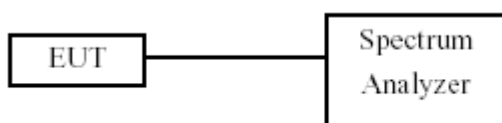
The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

8.2 Test Procedures

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. According to KDB558074 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

- a. Set RBW = 100 kHz.
- b. Set the video bandwidth (VBW) ≥ 3 RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Sweep = auto couple.
- f. Allow the trace to stabilize.
- g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.3 Test Setup Layout





8.4 Test Result and Data

Test Date: Oct. 15, 2017

Temperature: 26°C

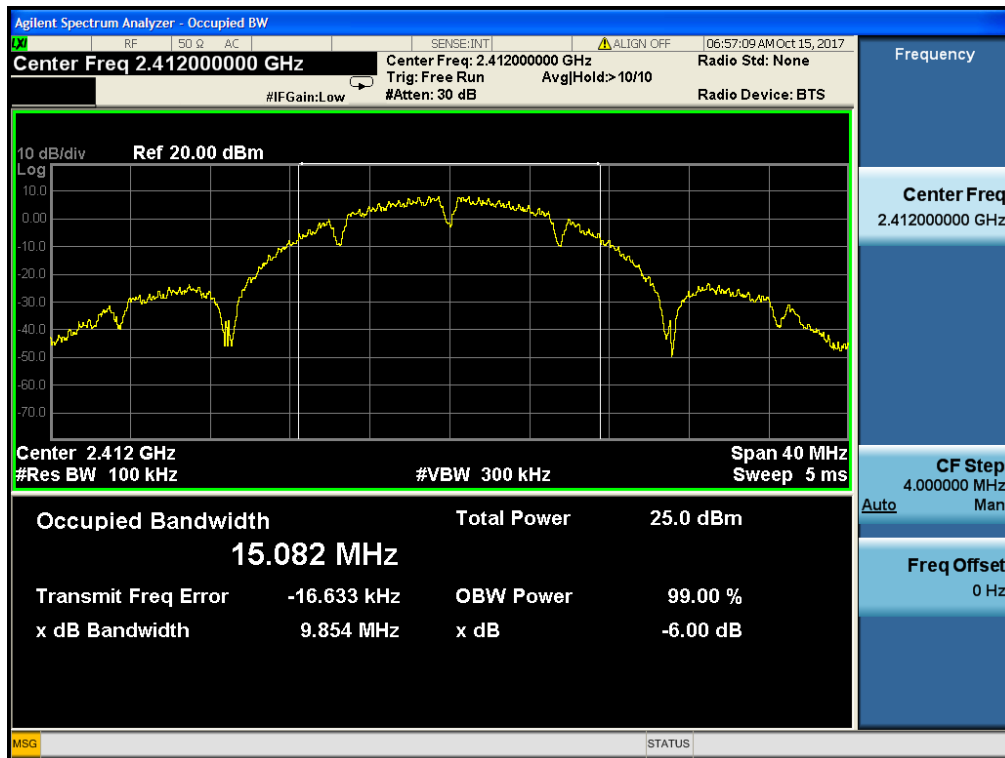
Atmospheric pressure: 996 pha

Humidity: 58%

Modulation Standard	Channel	Frequency (MHz)	6dB Bandwidth (MHz)
802.11b (11Mbps)	01	2412	9.854
	06	2437	10.05
	11	2462	10.05
802.11g (6Mbps)	01	2412	16.40
	06	2437	16.37
	11	2462	16.38
802.11n HT20 (6.5Mbps)	01	2412	17.66
	06	2437	17.67
	11	2462	17.66



Modulation Standard: 802.11b (1Mbps)
Channel: 01



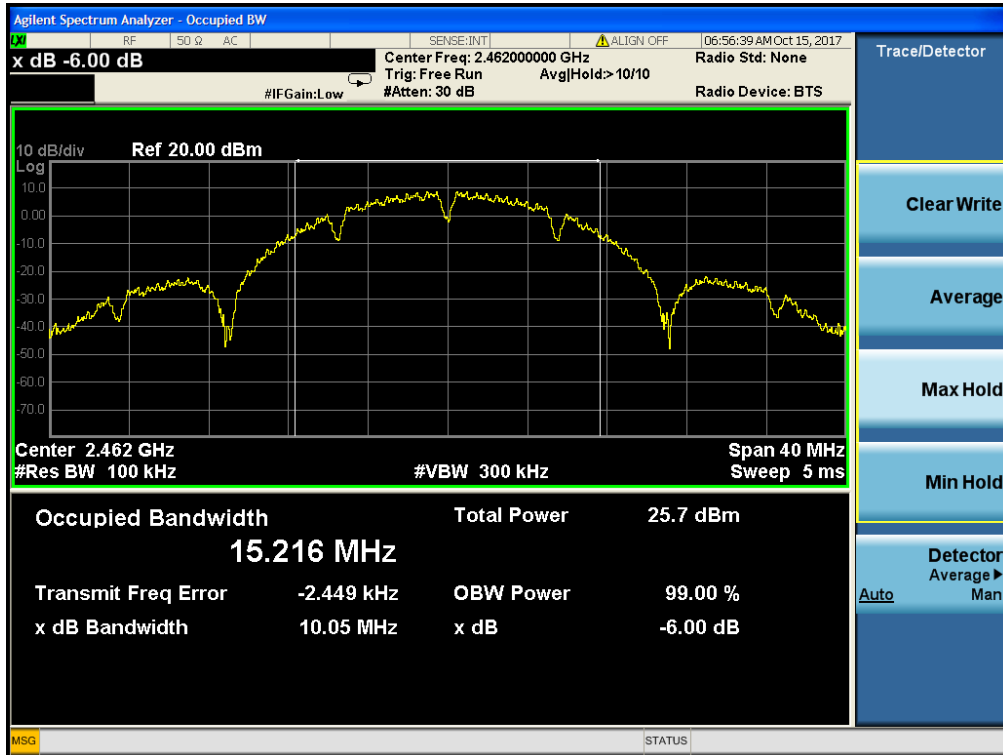
Modulation Standard: 802.11b (1Mbps)
Channel: 06



Modulation Standard: 802.11b (1Mbps)

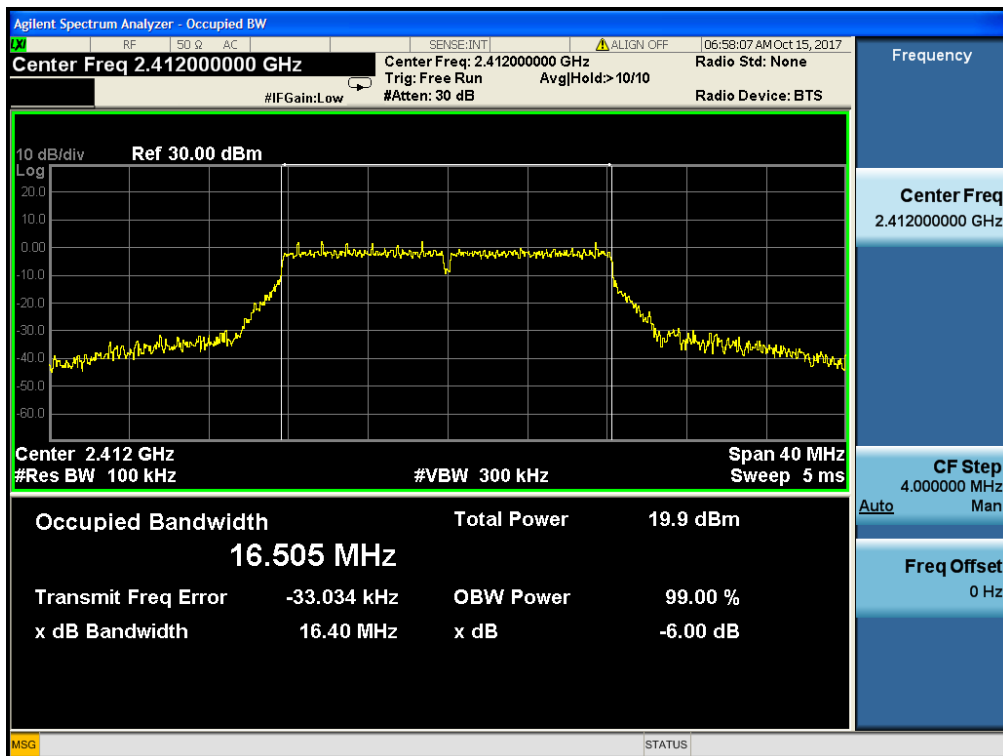


Channel: 11



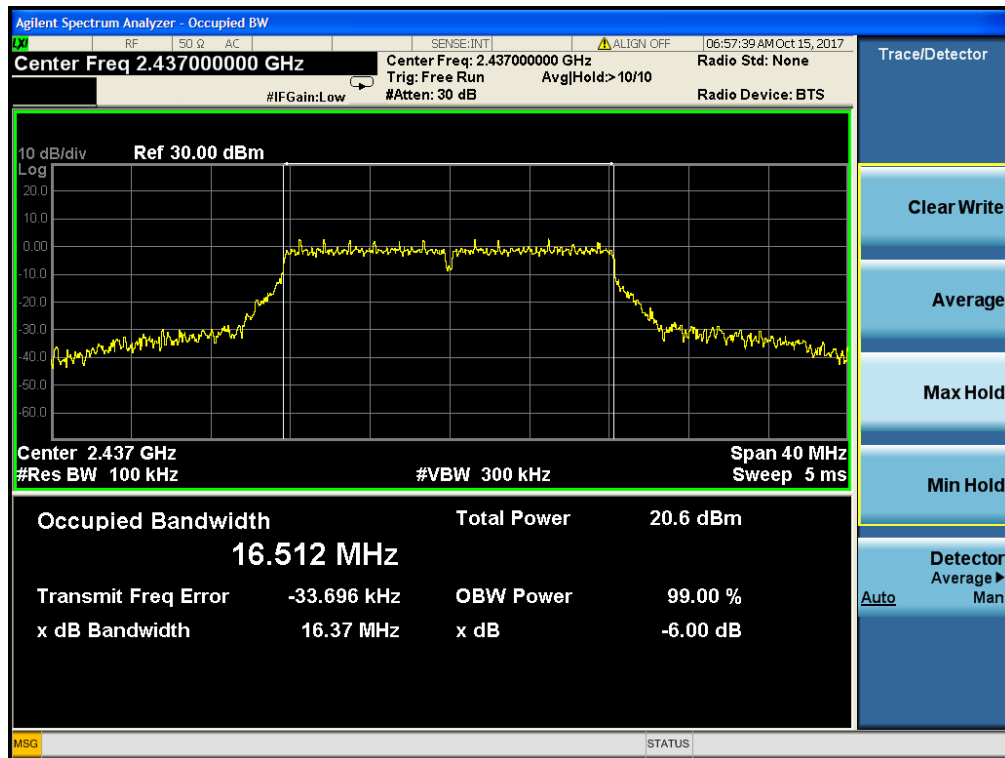
Modulation Standard: 802.11g (6Mbps)

Channel: 01

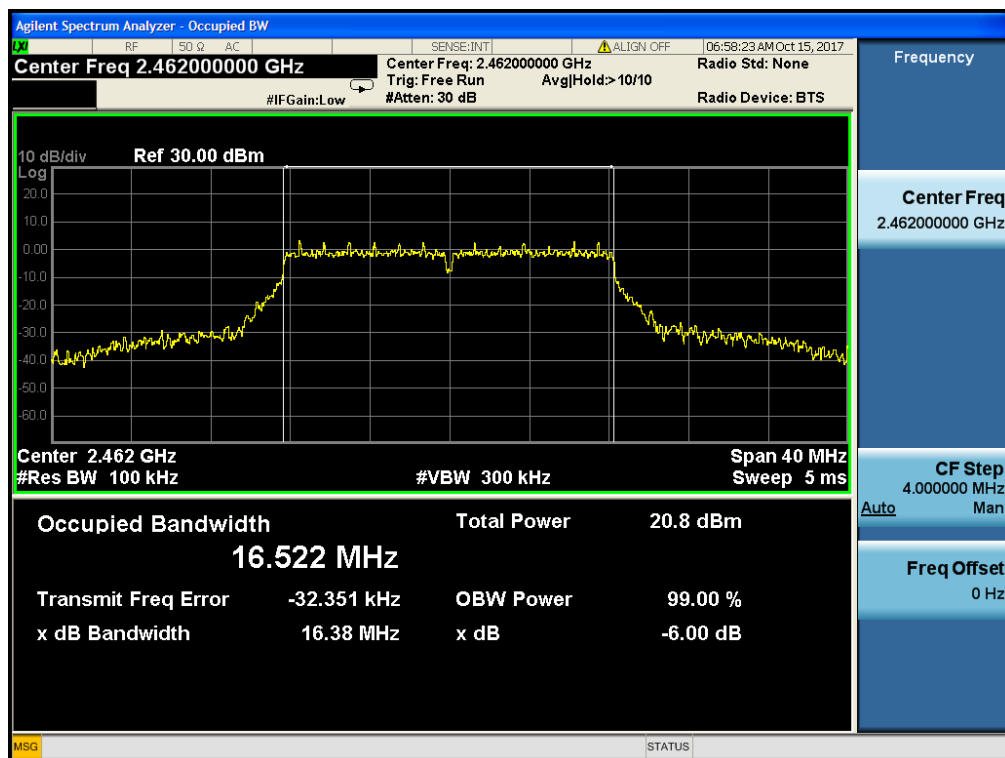


Modulation Standard: 802.11g (6Mbps)

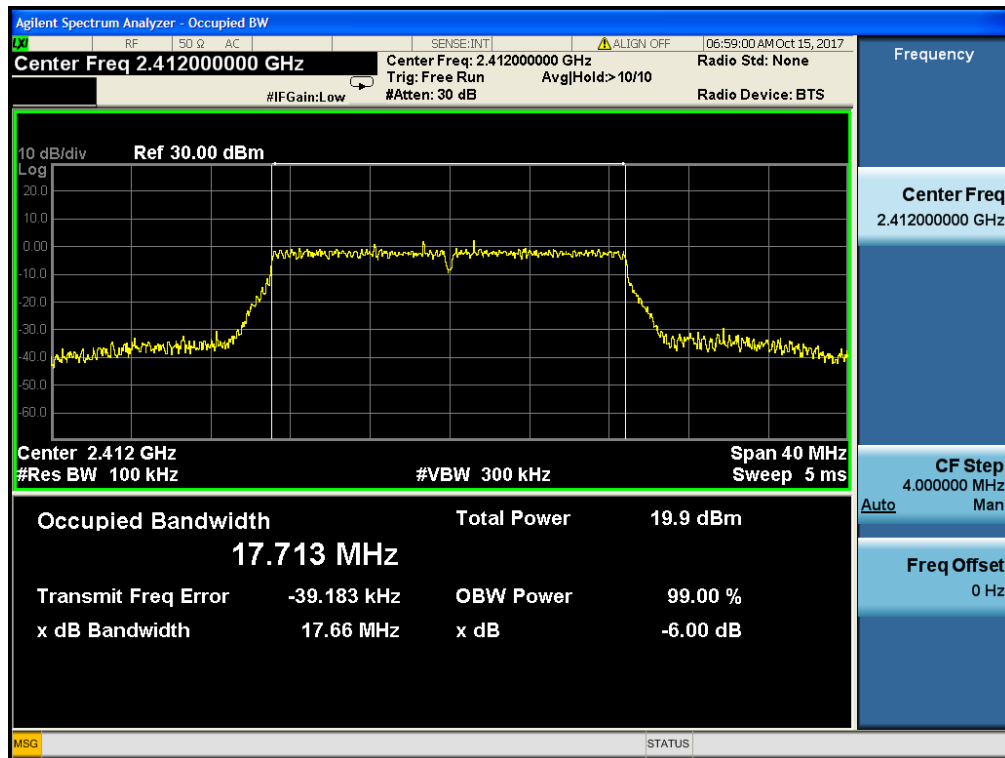
Channel: 06



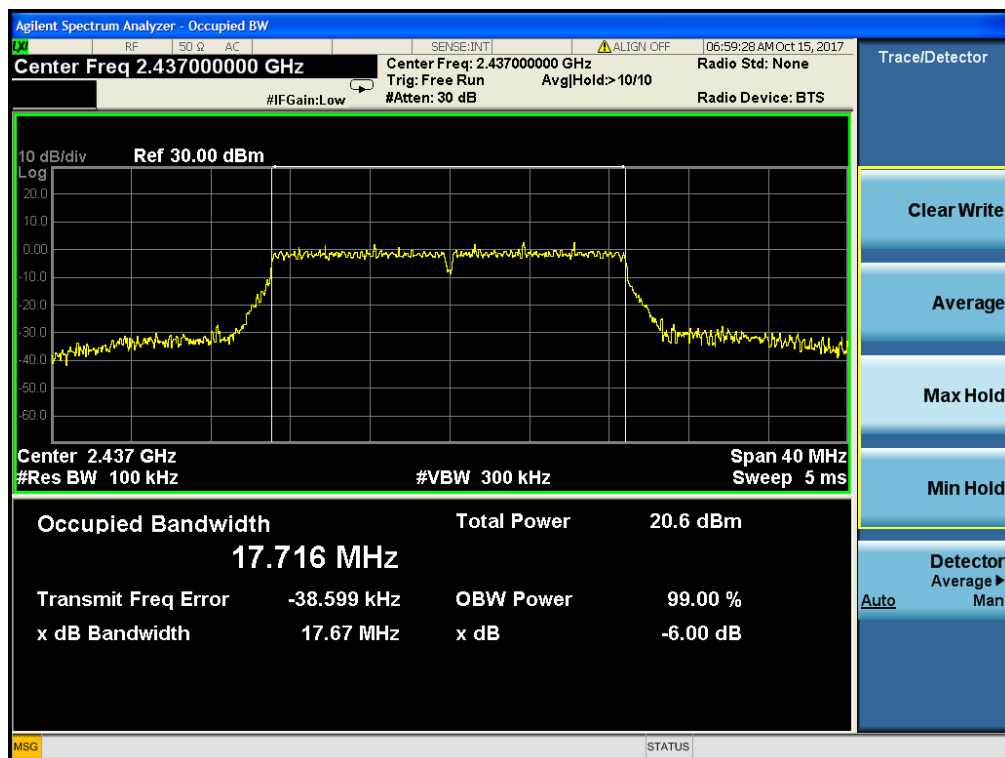
Modulation Standard: 802.11g (6Mbps)
Channel: 11



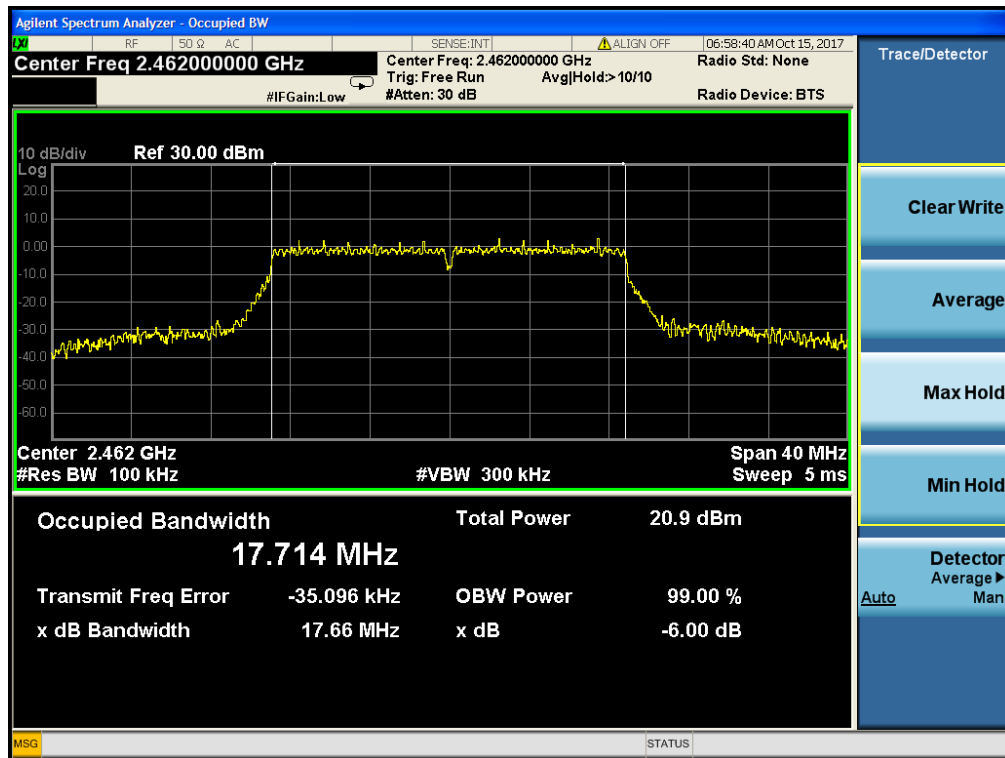
Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 01



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 06



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 11





9. Maximum Peak and Average Output Power

9.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

9.2 Test Procedures

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power, 9.1.2. and Average conducted output power, 9.2.3.1.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple detector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

9.3 Test Setup Layout





9.4 Test Result and Data

Test Date: Oct. 15, 2017

Temperature: 26°C

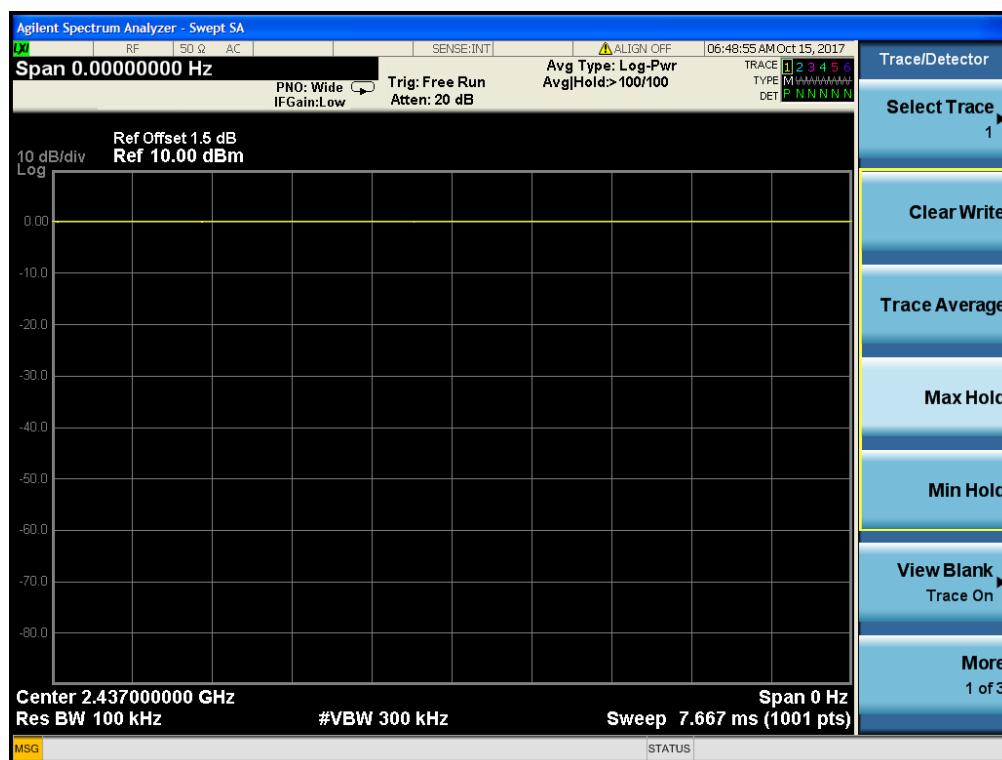
Atmospheric pressure: 996 pha

Humidity: 58%

Modulation Standard	Channel	Frequency (MHz)	Peak Power Output (dBm)	Output power AV (dBm)
802.11b (1Mbps)	01	2412	16.57	14.31
	06	2437	16.65	14.43
	11	2462	16.89	14.72
802.11g (6Mbps)	01	2412	14.55	11.77
	06	2437	14.89	11.96
	11	2462	15.01	12.05
802.11n HT20 (6.5Mbps)	01	2412	14.69	11.62
	06	2437	14.98	11.87
	11	2462	15.23	12.06

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

Duty cycle used in all test items: 100%





10. Power Spectral Density

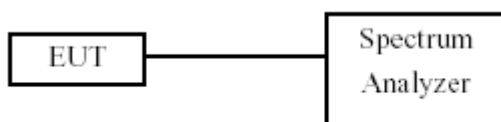
10.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm

10.2 Test Procedures

- The transmitter output was connected to spectrum analyzer.
- The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
- The power spectral density was measured and recorded.

10.3 Test Setup Layout





10.4 Test Result and Data

Test Date: Oct. 15, 2017

Temperature: 26°C

Atmospheric pressure: 996 pha

Humidity: 58%

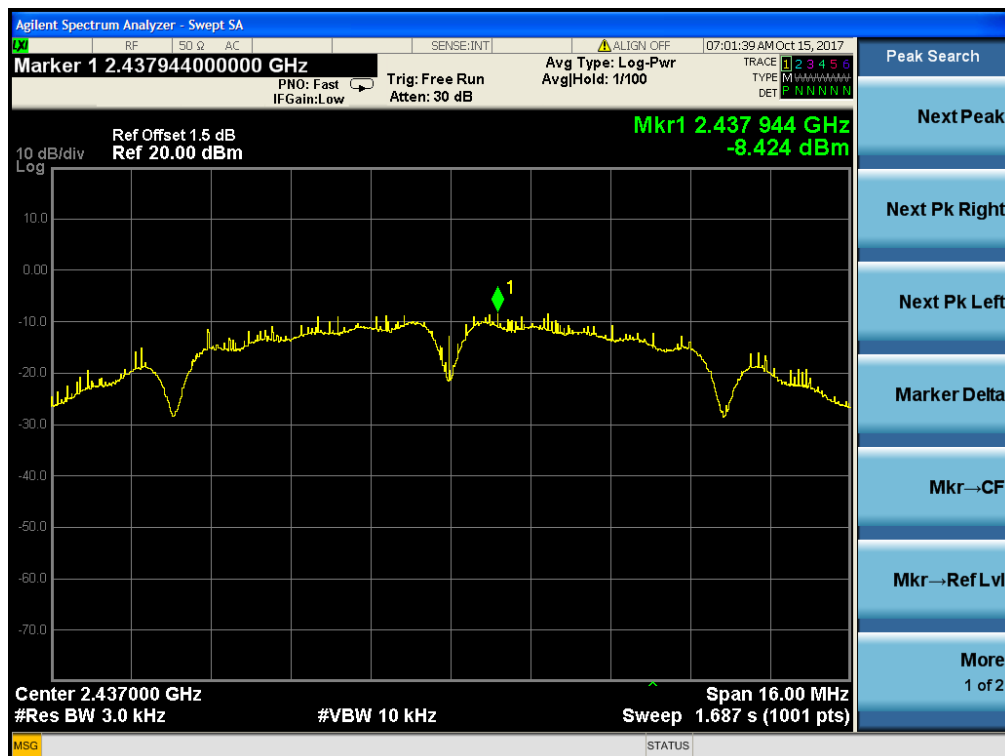
Modulation Standard	Channel	Frequency (MHz)	Measured Power Density (dBm)
802.11b (11Mbps)	01	2412	-8.035
	06	2437	-8.424
	11	2462	-8.958
802.11g (6Mbps)	01	2412	-13.065
	06	2437	-12.315
	11	2462	-11.793
802.11n HT20 (6.5Mbps)	01	2412	-13.452
	06	2437	-11.840
	11	2462	-12.446



Modulation Standard: 802.11b (1Mbps)
Channel: 01



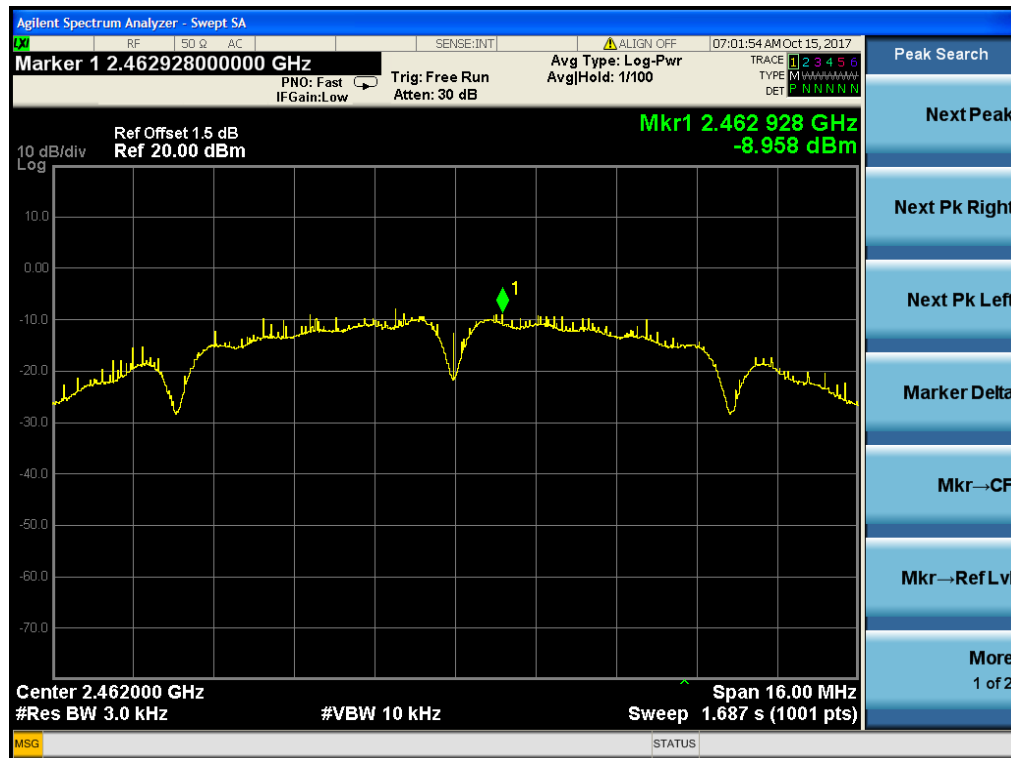
Modulation Standard: 802.11b (1Mbps)
Channel: 06



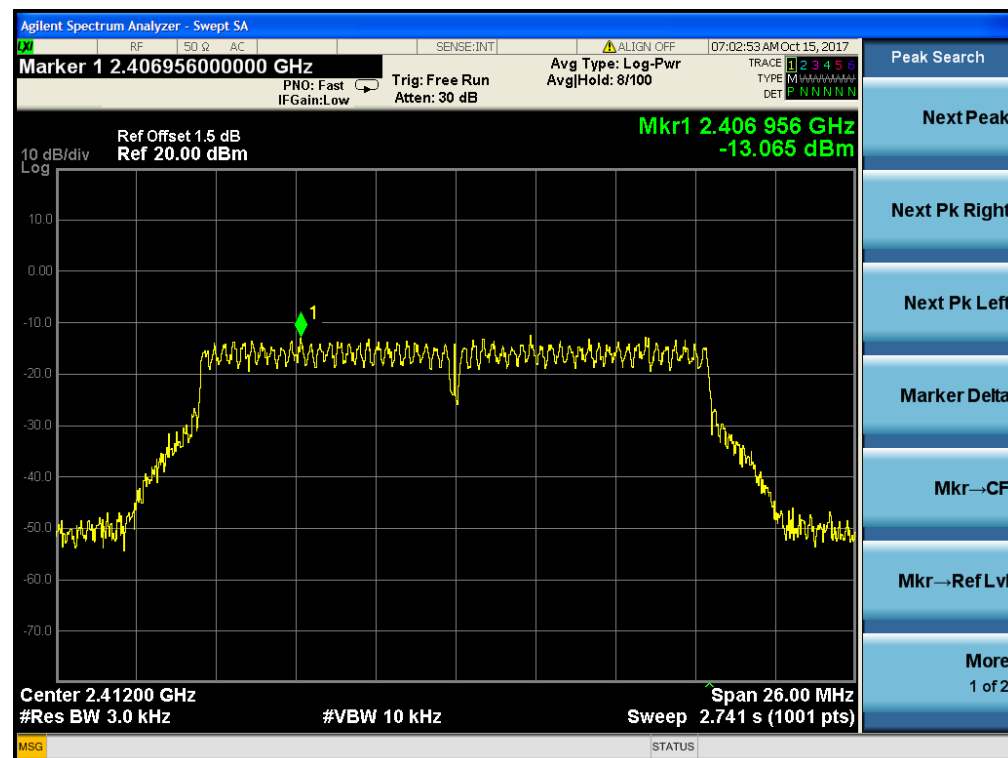
Modulation Standard: 802.11b (1Mbps)



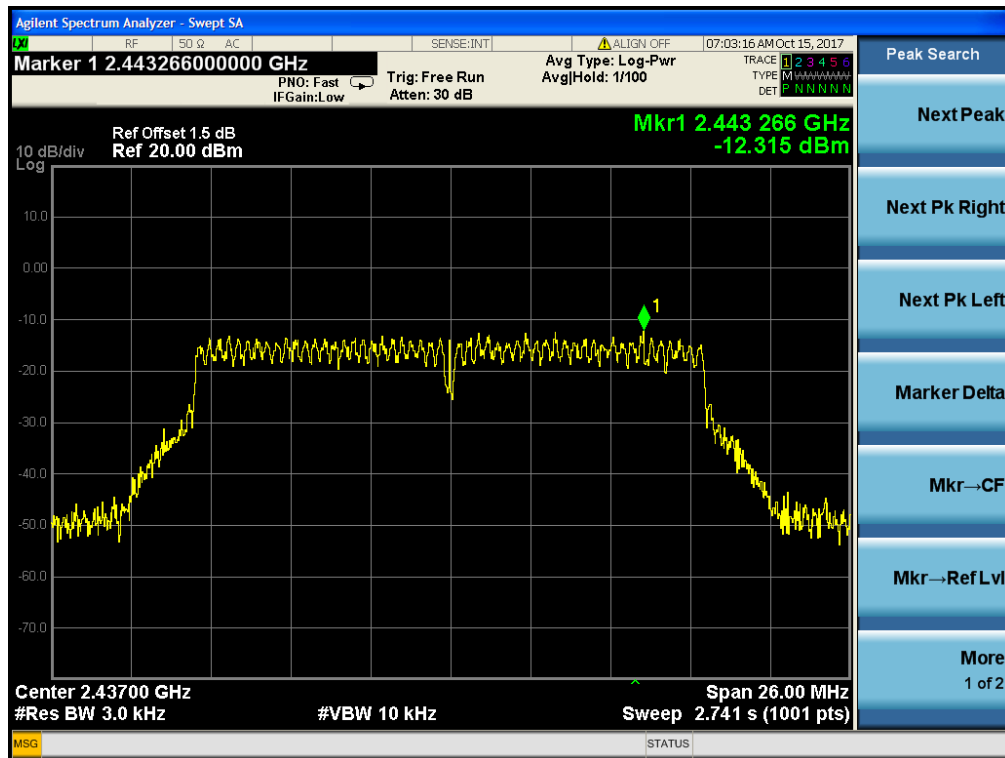
Channel: 11



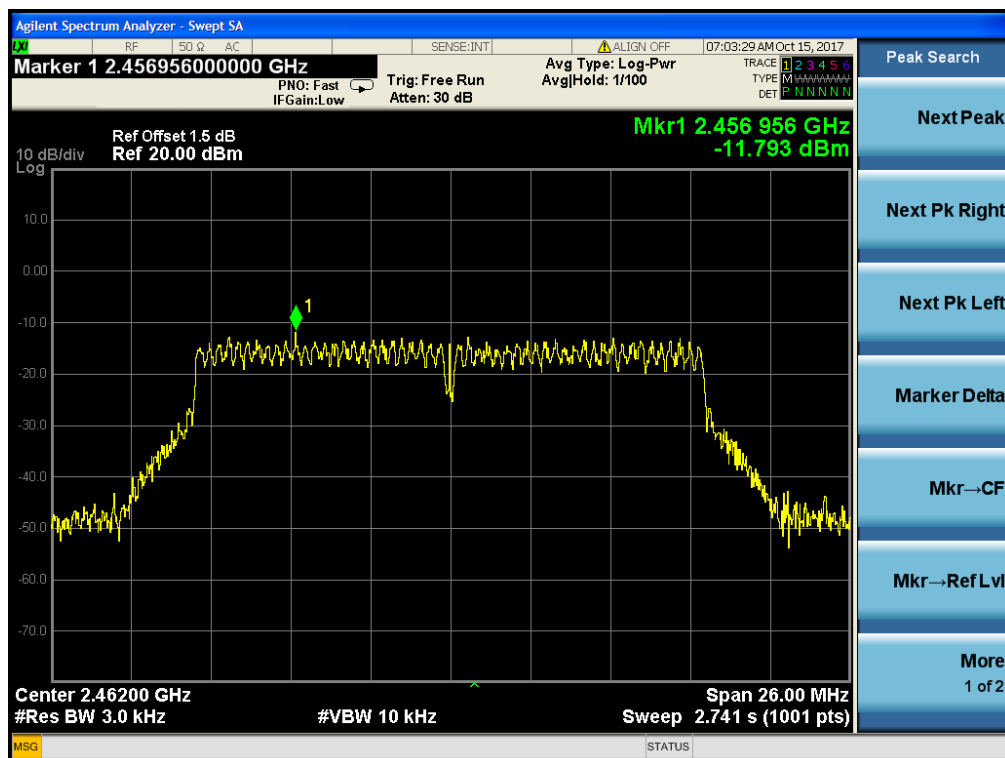
Modulation Standard: 802.11g (6Mbps)
Channel: 01



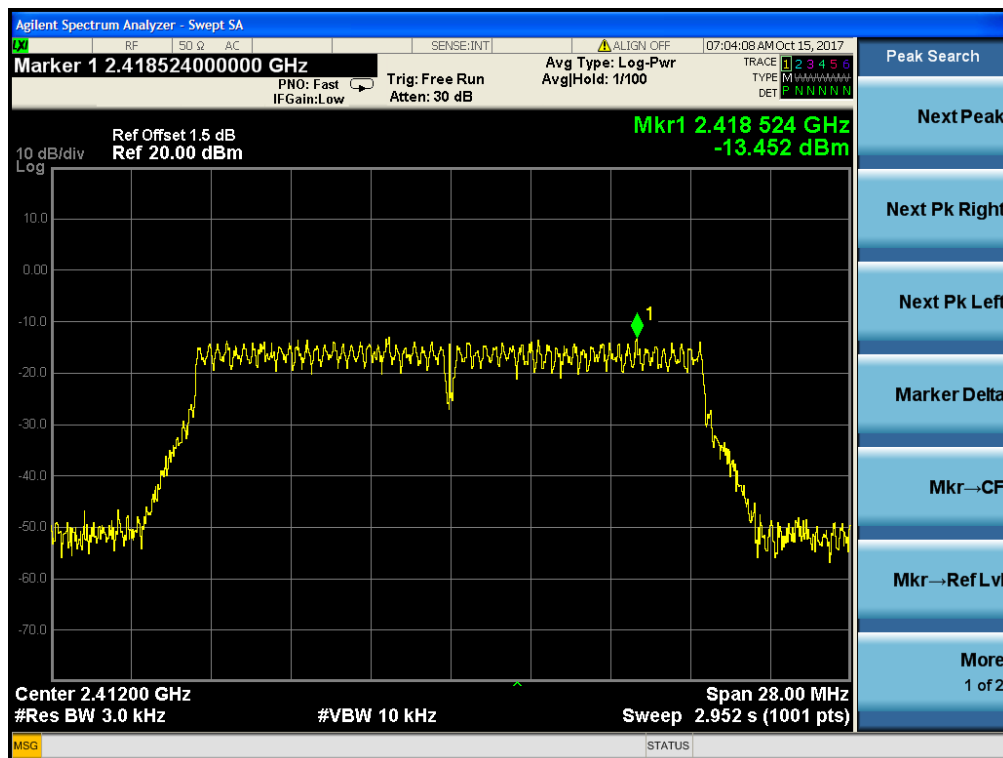
Modulation Standard: 802.11g (6Mbps)
Channel: 06



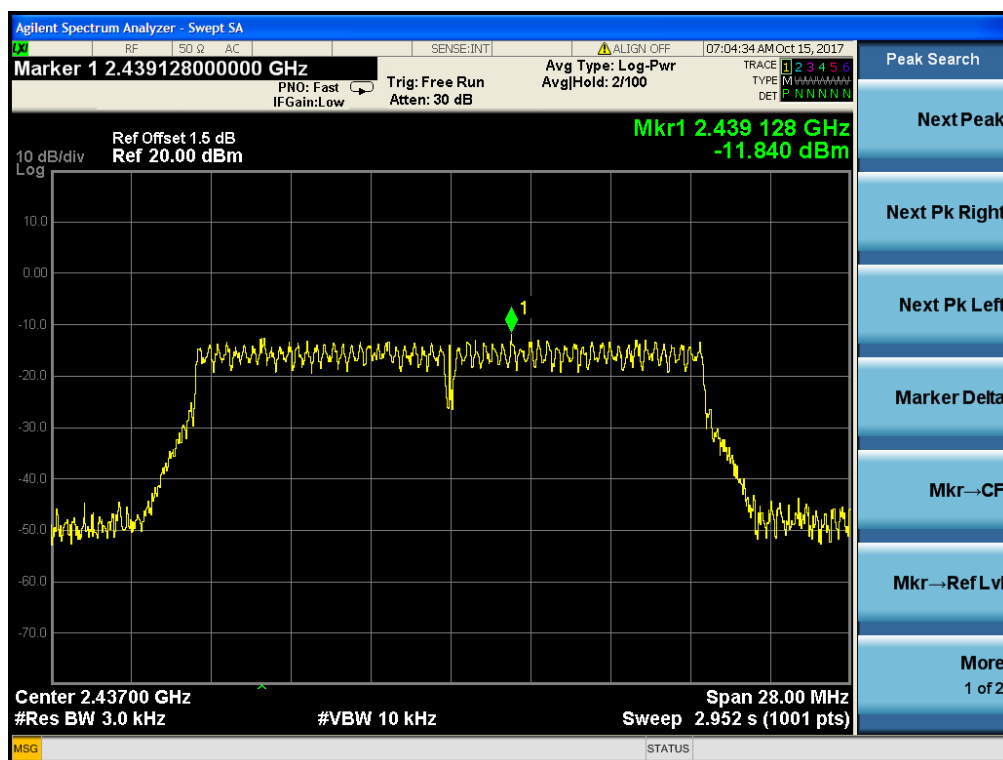
Modulation Standard: 802.11g (6Mbps)
Channel: 11



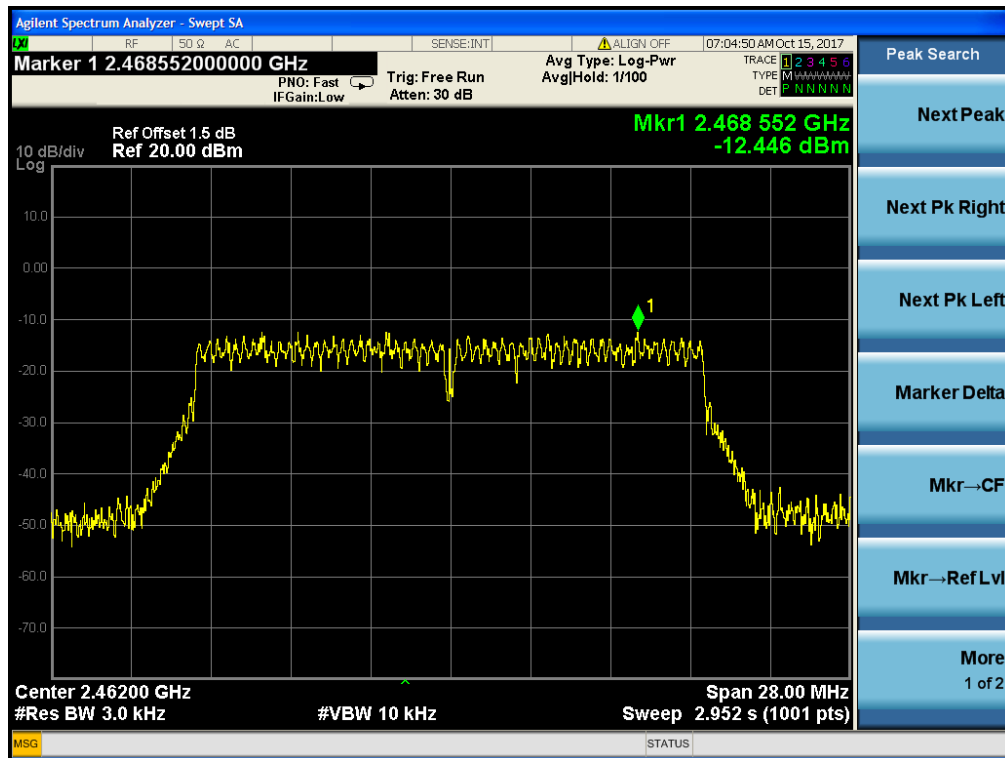
Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 01



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 06



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 11





11. Band Edges Measurement

11.1 Test Limit

Below -20dB of the highest emission level in operating band.

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).

11.2 Test Procedure

According to KDB 558074 D01 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies $\leq$ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies $>$ 1000 MHz).