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Report Template Version: V03

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Test Report

Report No. : CQASZ20190800043EX-01

Applicant: Amovision Technology Co., Ltd

Address of Applicant: 2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China

Manufacturer: Amovision Technology Co., Ltd

Address of Manufacturer: 2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China

Equipment Under Test (EUT):

Product: Network Camera

All Model No.: A3, A1, A1 1080P, A1K, A1S, A1P, A2, A3, A3S, A3K, A3 1080P, A3M, A3P, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B13, B14, B15, B16, B17, B18, B19, B20, C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C10-TZ, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, HMD2, HMD4, HMB1, ZM-A3, ZM-WFA3, ZM-WFA3K, ZM-WFA3S, CT-AYBWC, EC730, EC750

Test Model No.: A3

Brand Name: N/A

FCC ID: 2AUAU-AX

Standards: 47 CFR FCC Part 15 Subpart C 15.247

Date of Test: Aug. 12, 2019 to Sep. 02, 2019

Date of Issue: Sep. 02, 2019

Test Result : PASS

Tested By:

Tom Chen

(Tom Chen)

Reviewed By:

Aaron Ma

(Aaron Ma)

Approved By:

Jack Ai

(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190800043EX-01	Rev.01	Initial report	Sep. 02, 2019

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak & Average Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS

3 Contents

	Page
1 VERSION.....	2
2 TEST SUMMARY.....	3
3 CONTENTS.....	4
4 GENERAL INFORMATION.....	5
4.1 CLIENT INFORMATION.....	5
4.2 GENERAL DESCRIPTION OF EUT.....	5
4.3 TEST ENVIRONMENT.....	6
4.4 DESCRIPTION OF SUPPORT UNITS.....	7
4.5 TEST LOCATION.....	7
4.6 . TEST FACILITY.....	7
4.7 STATEMENT OF THE MEASUREMENT UNCERTAINTY.....	7
4.8 DEVIATION FROM STANDARDS.....	8
4.9 ABNORMALITIES FROM STANDARD CONDITIONS.....	8
4.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	8
4.11 EQUIPMENT LIST.....	9
5 TEST RESULTS AND MEASUREMENT DATA.....	10
5.1 ANTENNA REQUIREMENT.....	10
5.2 CONDUCTED EMISSIONS.....	11
5.3 CONDUCTED PEAK & AVERAGE OUTPUT POWER.....	14
5.4 6dB OCCUPY BANDWIDTH.....	15
5.5 POWER SPECTRAL DENSITY.....	19
5.6 BAND-EDGE FOR RF CONDUCTED EMISSIONS.....	23
5.7 RF CONDUCTED SPURIOUS EMISSIONS.....	26
5.8 RADIATED SPURIOUS EMISSIONS.....	37
5.8.1 Radiated emission below 1GHz.....	40
5.8.2 Transmitter emission above 1GHz.....	42
5.9 RESTRICTED BANDS AROUND FUNDAMENTAL FREQUENCY.....	46
6 PHOTOGRAPHS - EUT TEST SETUP.....	51
6.1 RADIATED EMISSION.....	51
6.2 CONDUCTED EMISSION.....	53
7 PHOTOGRAPHS - EUT CONSTRUCTIONAL DETAILS.....	54

4 General Information

4.1 Client Information

Applicant:	Amovision Technology Co., Ltd
Address of Applicant:	2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China
Manufacturer:	Amovision Technology Co., Ltd
Address of Manufacturer:	2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China

4.2 General Description of EUT

Product Name:	Network Camera
Test model No.:	A3
Trade Mark:	N/A
Hardware version:	V1.0
Software version:	V3.2
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM IEEE for 802.11n(HT20): OFDM
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type	IPEX Antenna
Antenna Gain	1.5dBi
Power Supply:	AC120V 60Hz(DC 3.7V from battery)

1. All model: A3, A1, A1 1080P, A1K, A1S, A1P, A2, A3, A3S, A3K, A3 1080P, A3M, A3P, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B13, B14, B15, B16, B17, B18, B19, B20, C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C10-TZ, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, HMD2, HMD4, HMB1, ZM-A3, ZM-WFA3, ZM-WFA3K, ZM-WFA3S, CT-AYBWC, EC730, EC750

2. Only the model A3 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

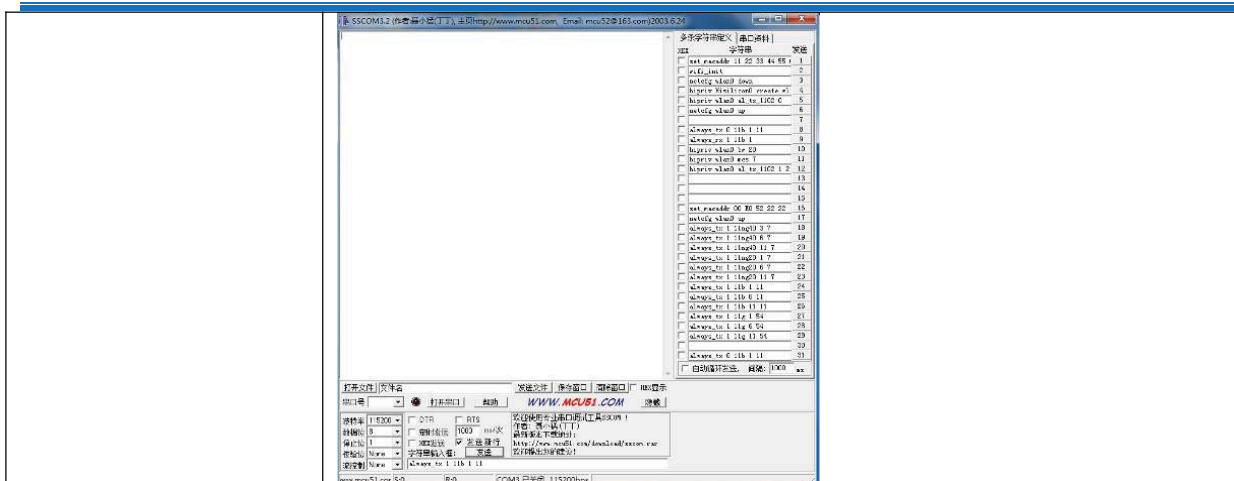
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11b/g/n (HT20):

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

4.3 Test Environment

Operating Environment:	
Radiated Emission	
Temperature:	25.4 °C
Humidity:	52 % RH
Atmospheric Pressure:	992mbar
RF item test (RF test room)	
Temperature:	26.0 °C
Humidity:	58 % RH
Atmospheric Pressure:	992mbar
Conduction emission	
Temperature:	24.0 C
Humidity:	51 % RH
Atmospheric Pressure:	992mbar
Transmitting mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT. Note: In the process of transmitting of EUT, the duty cycle >98%.



4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450C	Provide by lab	FCC ID
AC/DC Adapter	Lenovo	ADLX65NLC3A	Provide by lab	CC SDOC

4.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

4.6 . Test Facility

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

• **ISED Registration No.: 22984-1**

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen 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. Registration No.:522263

4.7 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 Huaxia Testing Technology 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 CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

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

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Equipment List


Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Spectrum analyzer	keysight	N9020A	CQA-105	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/10/28	2020/10/27
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2018/9/26	2019/9/25
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable	CQA	N/A	CQA-C009	2018/9/26	2019/9/25

Note:

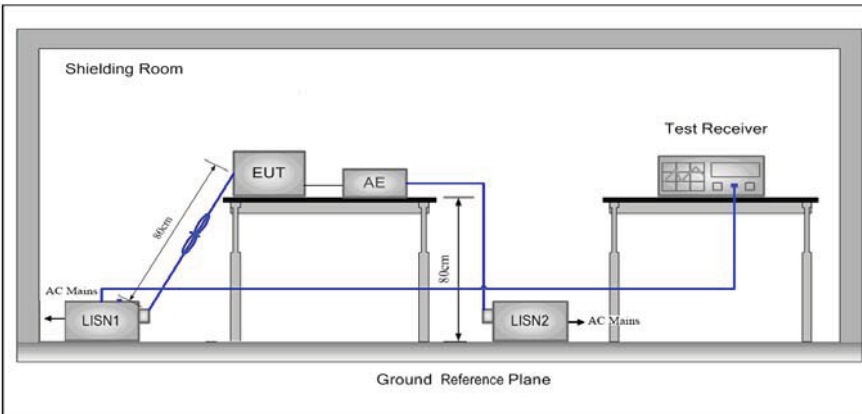
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 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.</p> <p>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.</p>	
EUT Antenna:	<p>Antenna</p> 
The antenna is internal antenna. The best case gain of the antenna is 1.5dBi.	

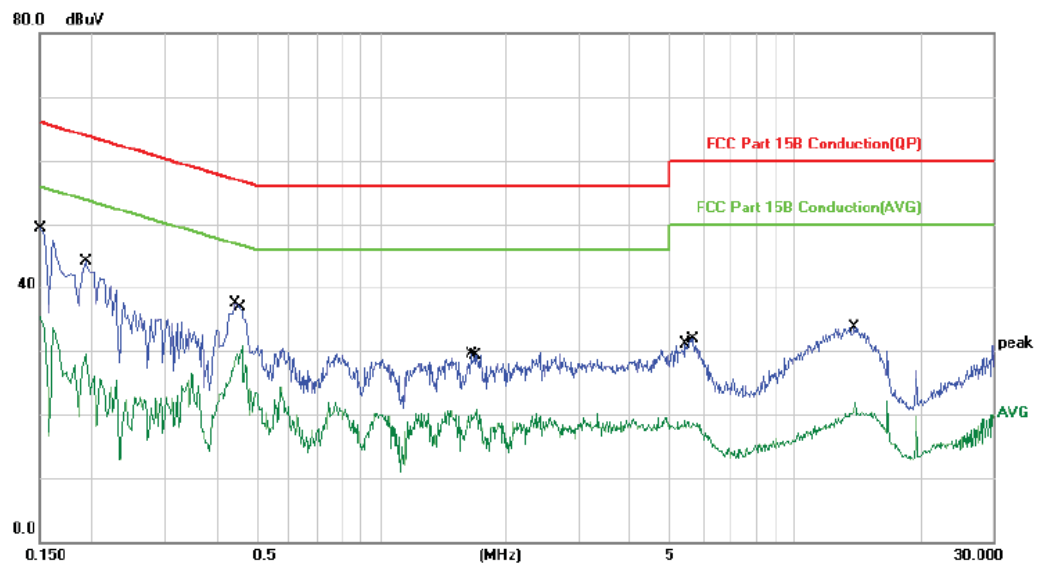
5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207			
Test Method:	ANSI C63.10: 2013			
Test Frequency Range:	150kHz to 30MHz			
Limit:	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 Procedure:	<div>1) The mains terminal disturbance voltage test was conducted in a shielded room.</div> <div>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω 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.</div> <div>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,</div> <div>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.</div> <div>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: 2013 on conducted measurement.</div>			
Test Setup:	<div></div>			
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.			
Final Test Mode:	All modes of 802.11b/g/n were tested at Low, Middle, and High channel; only			

	the worst result of 802.11b CH1 was reported as below
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

Live Line:

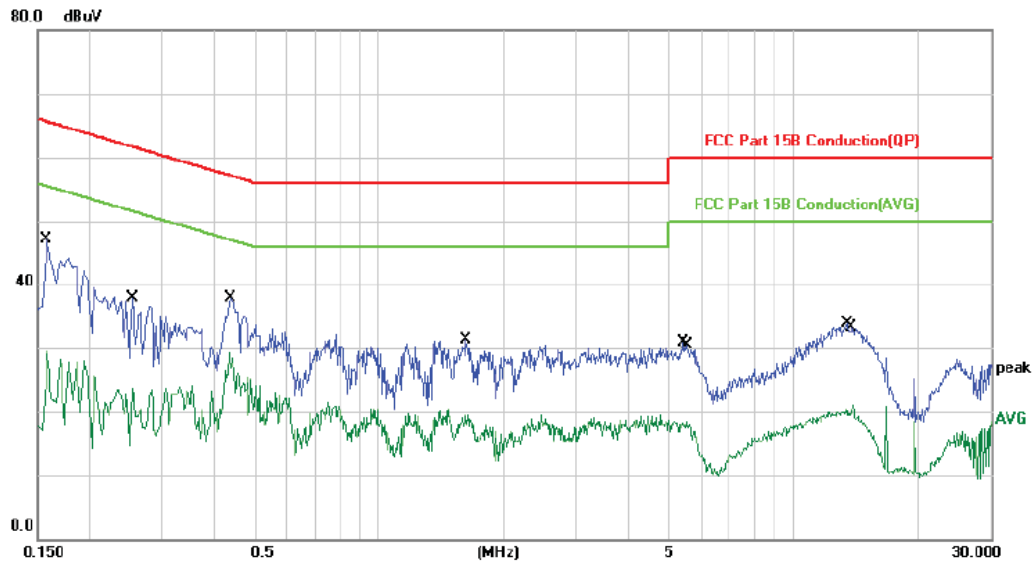


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1500	49.43	-0.13	49.30	65.99	-16.69	QP	
2	0.1500	35.71	-0.13	35.58	55.99	-20.41	AVG	
3	0.1940	44.30	-0.13	44.17	63.86	-19.69	QP	
4	0.4460	37.46	-0.02	37.44	56.95	-19.51	QP	
5 *	0.4620	30.91	-0.02	30.89	46.66	-15.77	AVG	
6	1.6460	29.66	-0.20	29.46	56.00	-26.54	QP	
7	1.7060	21.03	-0.21	20.82	46.00	-25.18	AVG	
8	5.4340	19.33	-0.23	19.10	50.00	-30.90	AVG	
9	5.6700	32.13	-0.24	31.89	60.00	-28.11	QP	
10	13.8740	33.86	-0.18	33.68	60.00	-26.32	QP	
11	13.9580	21.99	-0.19	21.80	50.00	-28.20	AVG	

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:

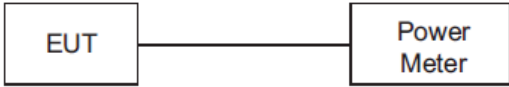


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1580	47.25	-0.13	47.12	65.56	-18.44	QP	
2		0.1580	29.57	-0.13	29.44	55.56	-26.12	AVG	
3		0.2540	37.96	-0.11	37.85	61.62	-23.77	QP	
4		0.2540	23.81	-0.11	23.70	51.62	-27.92	AVG	
5	*	0.4340	29.23	-0.02	29.21	47.18	-17.97	AVG	
6		0.4380	37.84	-0.02	37.82	57.10	-19.28	QP	
7		1.6180	19.71	-0.20	19.51	46.00	-26.49	AVG	
8		1.6220	31.44	-0.20	31.24	56.00	-24.76	QP	
9		5.4300	31.19	-0.23	30.96	60.00	-29.04	QP	
10		5.5140	18.65	-0.24	18.41	50.00	-31.59	AVG	
11		13.4660	34.06	-0.16	33.90	60.00	-26.10	QP	
12		13.9700	21.26	-0.19	21.07	50.00	-28.93	AVG	

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

5.3 Conducted Peak & Average Output Power

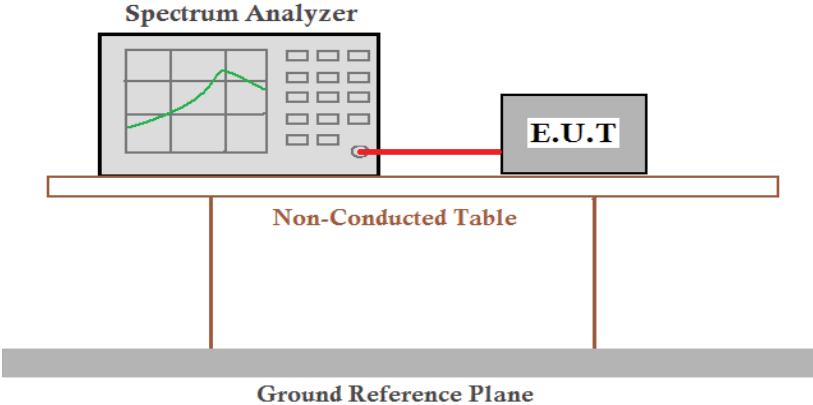
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g; 65Mbps of rate is the worst case of 802.11n(HT20); Only the worst case is recorded in the report.
Limit:	30dBm
Test Results:	Pass

WIFI

Type	Test channel	Peak Output Power (dBm)	Average Output Power dBm)	Limit (dBm)	Result
802.11b	Lowest	17.147	11.390	30.00	Pass
	Middle	17.289	11.505		
	Highest	16.472	10.641		
802.11g	Lowest	15.041	7.378	30.00	Pass
	Middle	17.070	9.327		
	Highest	16.312	8.594		
802.11n(HT20)	Lowest	13.776	6.388	30.00	Pass
	Middle	15.468	8.172		
	Highest	15.569	8.239		

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

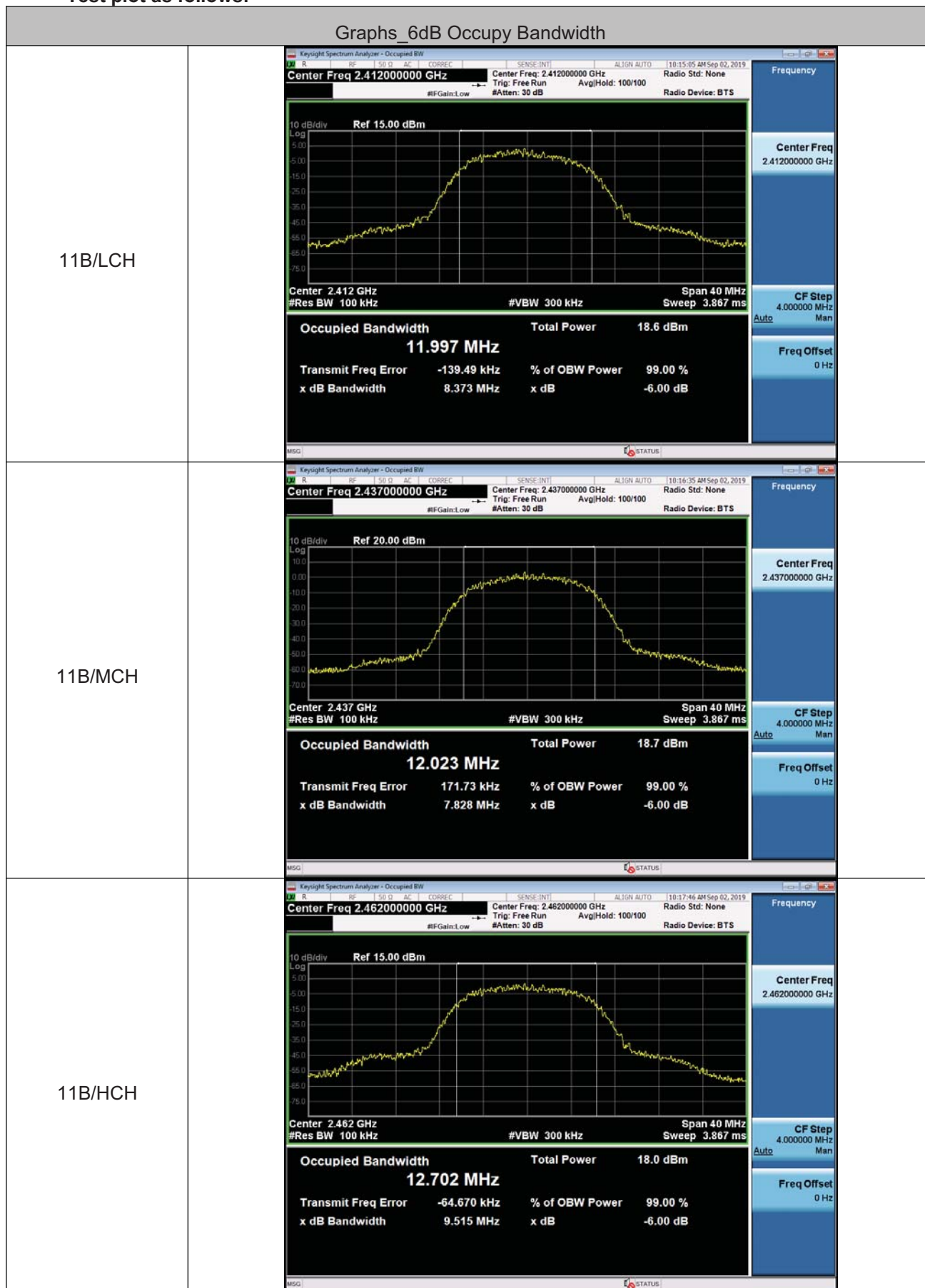
5.4 6dB Occupy Bandwidth

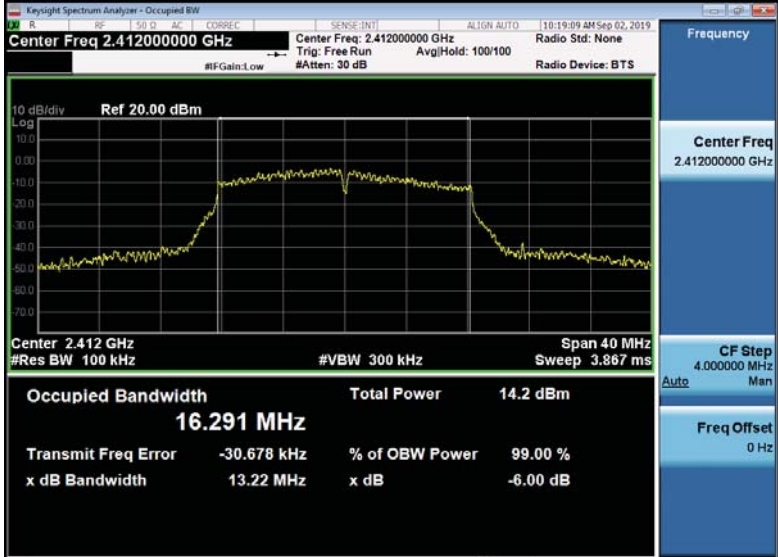
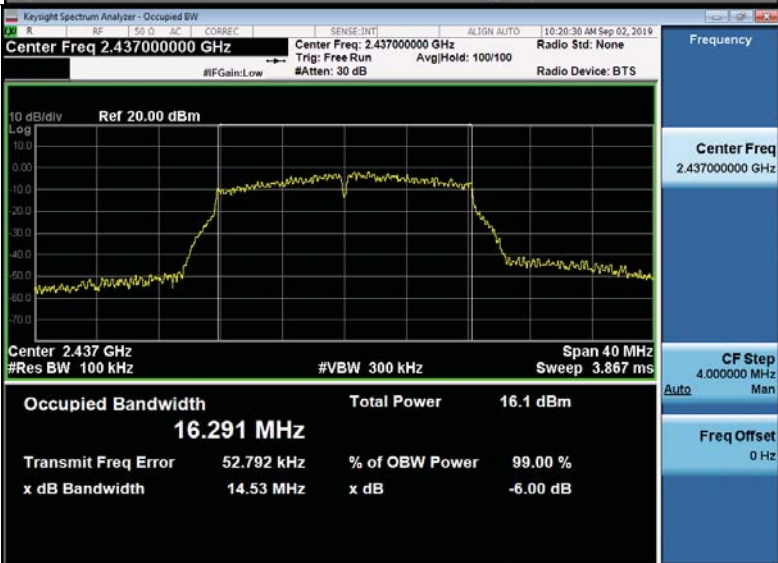
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g; 65Mbps of rate is the worst case of 802.11n(HT20); Only the worst case is recorded in the report.
Limit:	≥ 500 kHz
Test Results:	Pass

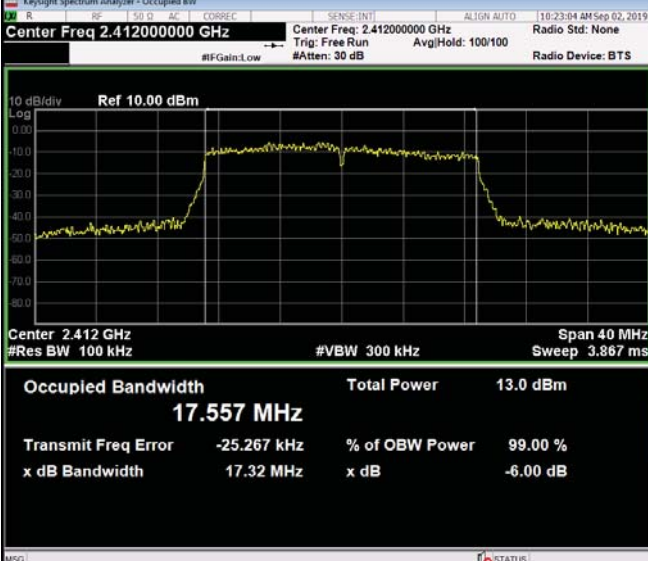
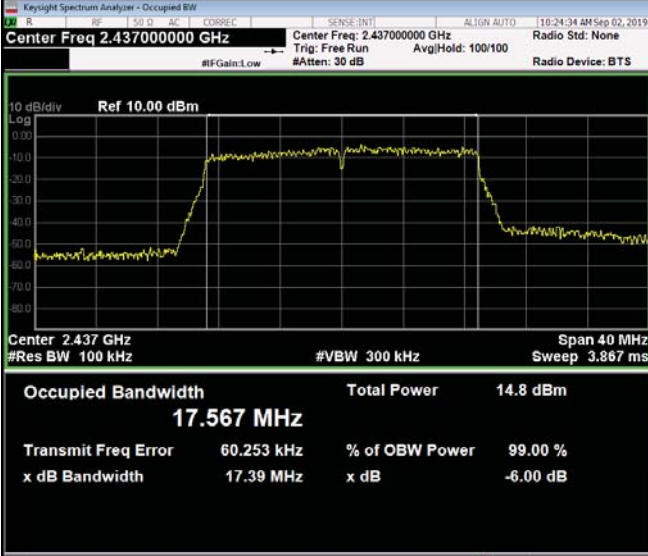
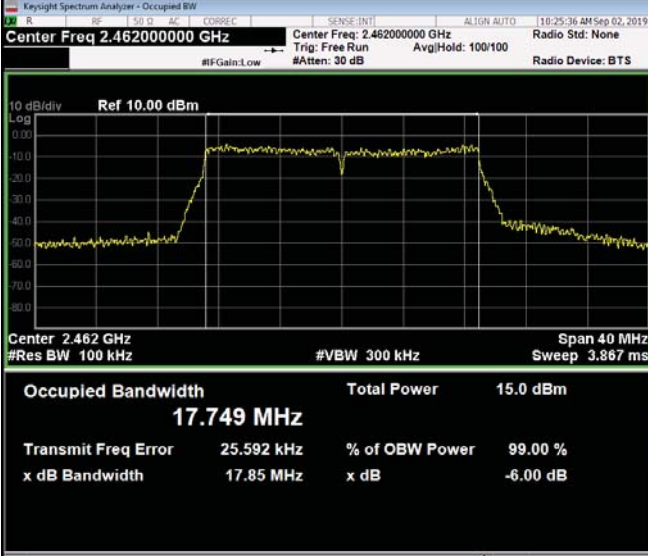
Measurement Data

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	Lowest	8.37	≥500	Pass
	Middle	7.83		
	Highest	9.52		
802.11g	Lowest	13.22	≥500	Pass
	Middle	14.53		
	Highest	16.49		
802.11n(HT20)	Lowest	17.32	≥500	Pass
	Middle	17.39		
	Highest	17.85		

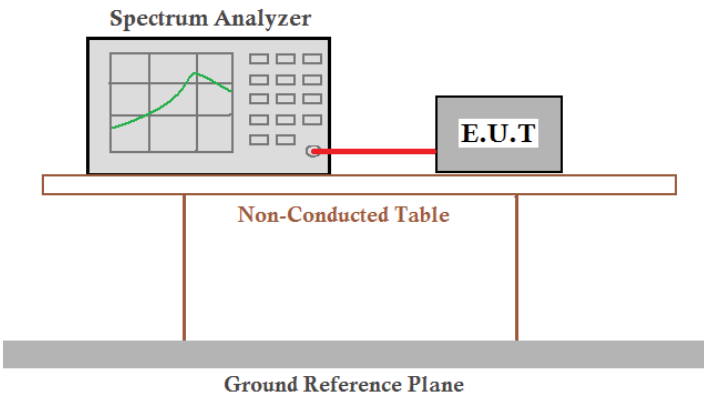
Test plot as follows:



11G/LCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.41200000 GHz</p> <p>Center Freq: 2.41200000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div Ref 20.00 dBm</p> <p>Center 2.412 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 40 MHz</p> <p>Sweep 3.867 ms</p> <p>Occupied Bandwidth 16.291 MHz</p> <p>Total Power 14.2 dBm</p> <p>Transmit Freq Error -30.678 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 13.22 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.41200000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0 Hz</p>
11G/MCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.43700000 GHz</p> <p>Center Freq: 2.43700000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div Ref 20.00 dBm</p> <p>Center 2.437 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 40 MHz</p> <p>Sweep 3.867 ms</p> <p>Occupied Bandwidth 16.291 MHz</p> <p>Total Power 16.1 dBm</p> <p>Transmit Freq Error 52.792 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 14.53 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.43700000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0 Hz</p>
11G/HCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.46200000 GHz</p> <p>Center Freq: 2.46200000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div Ref 10.00 dBm</p> <p>Center 2.462 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 40 MHz</p> <p>Sweep 3.867 ms</p> <p>Occupied Bandwidth 16.446 MHz</p> <p>Total Power 15.2 dBm</p> <p>Transmit Freq Error -2.902 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 16.49 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.46200000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0 Hz</p>

11N20/LCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.41200000 GHz</p> <p>Center Freq: 2.412000000 GHz</p> <p>Trig: Free Run</p> <p>#Gain: Low</p> <p>#Atten: 30 dB</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div</p> <p>Ref 10.00 dBm</p> <p>Center 2.412 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 40 MHz</p> <p>Sweep 3.867 ms</p> <p>Occupied Bandwidth 17.557 MHz</p> <p>Total Power 13.0 dBm</p> <p>Transmit Freq Error -25.267 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 17.32 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.41200000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0 Hz</p> <p>MSG</p> <p>STATUS</p>
11N20/MCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.43700000 GHz</p> <p>Center Freq: 2.437000000 GHz</p> <p>Trig: Free Run</p> <p>#Gain: Low</p> <p>#Atten: 30 dB</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div</p> <p>Ref 10.00 dBm</p> <p>Center 2.437 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 40 MHz</p> <p>Sweep 3.867 ms</p> <p>Occupied Bandwidth 17.567 MHz</p> <p>Total Power 14.8 dBm</p> <p>Transmit Freq Error 60.253 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 17.39 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.43700000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0 Hz</p> <p>MSG</p> <p>STATUS</p>
11N20/HCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.46200000 GHz</p> <p>Center Freq: 2.462000000 GHz</p> <p>Trig: Free Run</p> <p>#Gain: Low</p> <p>#Atten: 30 dB</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div</p> <p>Ref 10.00 dBm</p> <p>Center 2.462 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 40 MHz</p> <p>Sweep 3.867 ms</p> <p>Occupied Bandwidth 17.749 MHz</p> <p>Total Power 15.0 dBm</p> <p>Transmit Freq Error 25.592 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 17.85 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.46200000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0 Hz</p> <p>MSG</p> <p>STATUS</p>

5.5 Power Spectral Density




Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g; 65Mbps of rate is the worst case of 802.11n(HT20); Only the worst case is recorded in the report.
Limit:	≤8.00dBm/3kHz
Test Results:	Pass


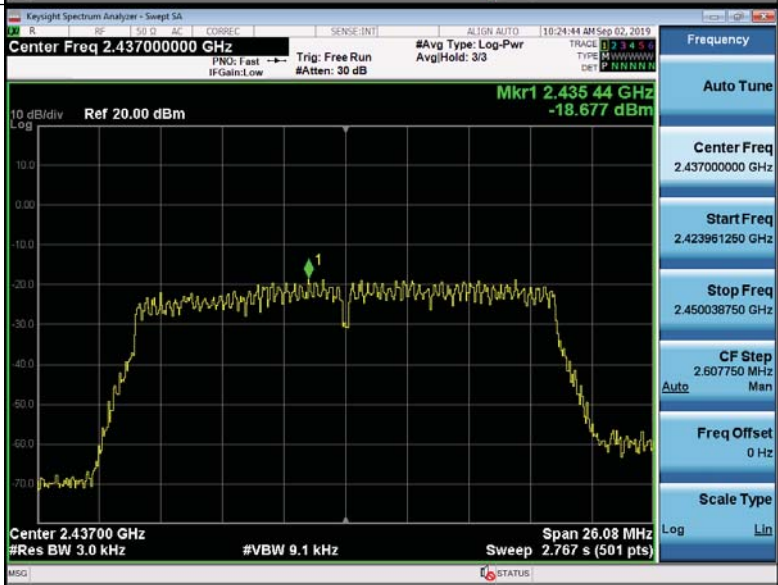
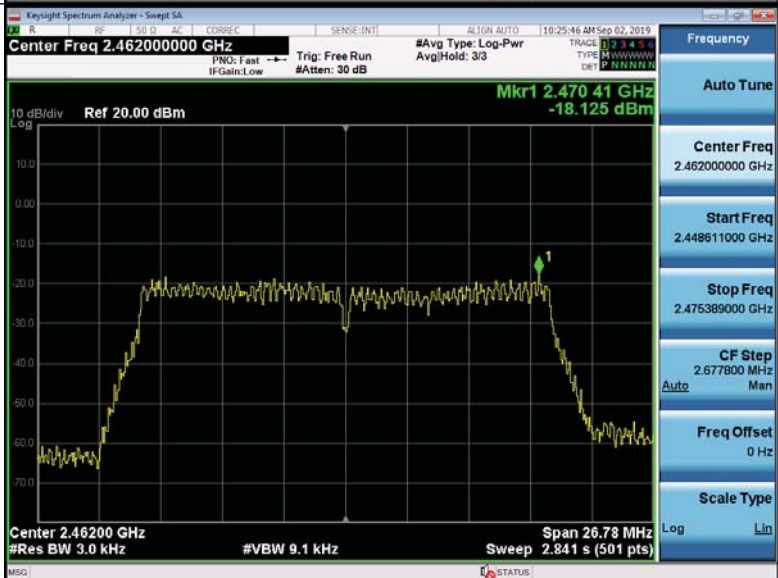
Measurement Data

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	Lowest	-11.121	≤8	Pass
	Middle	-11.402		
	Highest	-12.571		
802.11g	Lowest	-16.891	≤8	Pass
	Middle	-15.394		
	Highest	-17.900		
802.11n(HT20)	Lowest	-19.650	≤8	Pass
	Middle	-18.677		
	Highest	-18.125		

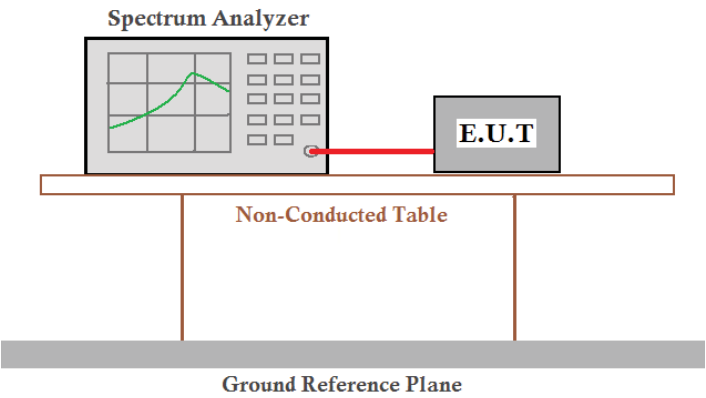
Test plot as follows:

Graphs	
11B/LCH	<p>Key parameters for 11B/LCH:</p> <ul style="list-style-type: none"> Center Freq: 2.412000000 GHz Start Freq: 2.408720250 GHz Stop Freq: 2.418279750 GHz CF Step: 1.256950 MHz Freq Offset: 0 Hz Scale Type: Log Span: 12.56 MHz Res BW: 3.0 kHz VBW: 9.1 kHz Sweep: 1.333 s (501 pts) Marker: Mkr1 2.410744 GHz, -11.121 dBm
11B/MCH	<p>Key parameters for 11B/MCH:</p> <ul style="list-style-type: none"> Center Freq: 2.437000000 GHz Start Freq: 2.431129000 GHz Stop Freq: 2.442871000 GHz CF Step: 1.174200 MHz Freq Offset: 0 Hz Scale Type: Log Span: 11.74 MHz Res BW: 3.0 kHz VBW: 9.1 kHz Sweep: 1.246 s (501 pts) Marker: Mkr1 2.436342 GHz, -11.402 dBm
11B/HCH	<p>Key parameters for 11B/HCH:</p> <ul style="list-style-type: none"> Center Freq: 2.462000000 GHz Start Freq: 2.454863750 GHz Stop Freq: 2.469136250 GHz CF Step: 1.427250 MHz Freq Offset: 0 Hz Scale Type: Log Span: 14.27 MHz Res BW: 3.0 kHz VBW: 9.1 kHz Sweep: 1.514 s (501 pts) Marker: Mkr1 2.461343 GHz, -12.571 dBm

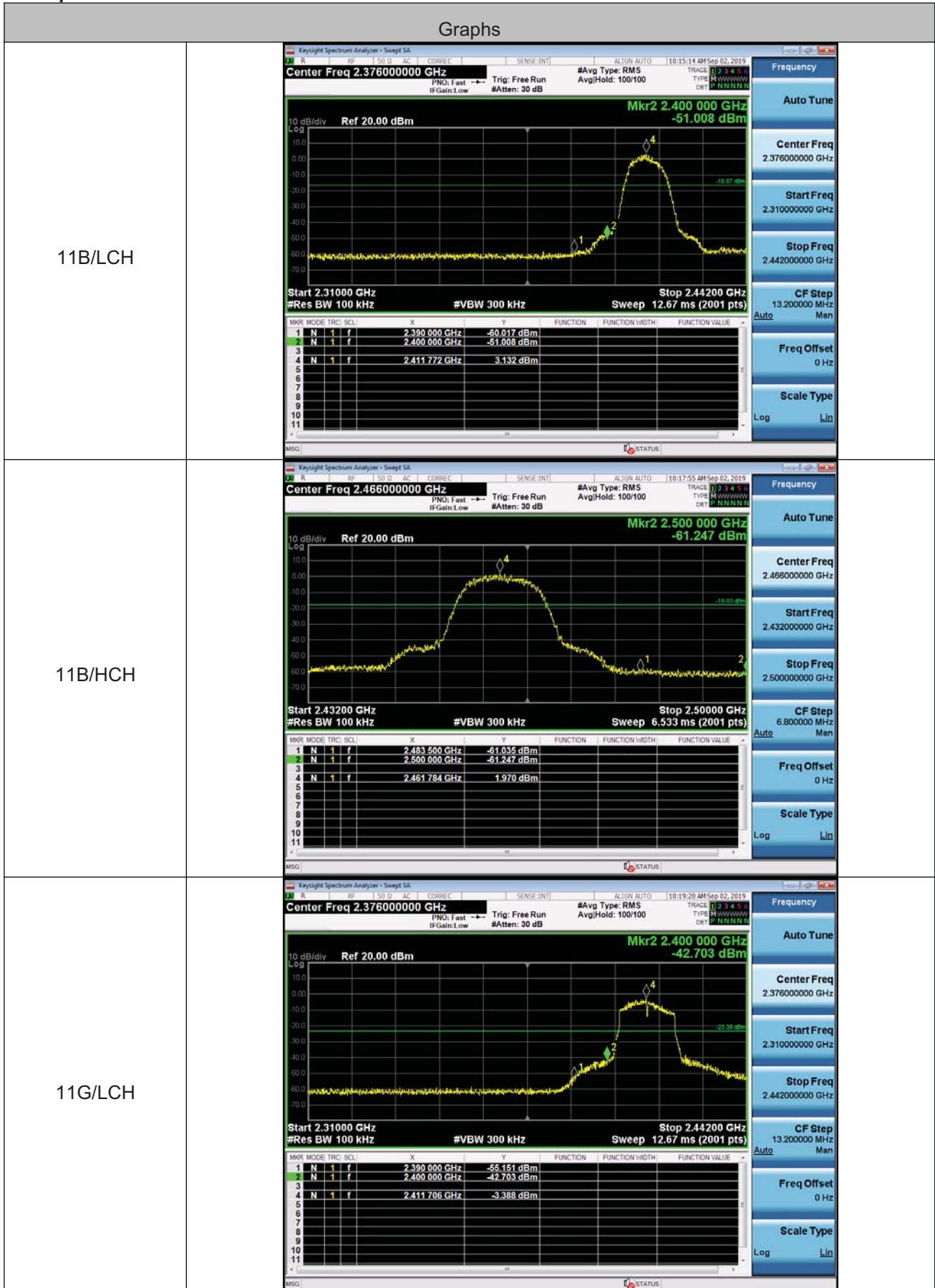
11G/LCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.41200000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.41018 GHz -16.891 dBm</p> <p>Center 2.412000 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 19.83 MHz</p> <p>Sweep 2.105 s (501 pts)</p>
11G/MCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.43700000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.43669 GHz -15.394 dBm</p> <p>Center 2.43700 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 21.80 MHz</p> <p>Sweep 2.313 s (501 pts)</p>
11G/HCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.46200000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.46042 GHz -17.900 dBm</p> <p>Center 2.46200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 24.73 MHz</p> <p>Sweep 2.624 s (501 pts)</p>

11N20/LCH	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.41200000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.41106 GHz -19.650 dBm</p> <p>Center 2.41200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 25.98 MHz</p> <p>Sweep 2.756 s (501 pts)</p>
11N20/MCH	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.43700000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.43544 GHz -18.677 dBm</p> <p>Center 2.43700 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 26.08 MHz</p> <p>Sweep 2.767 s (501 pts)</p>
11N20/HCH	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.46200000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.47041 GHz -18.125 dBm</p> <p>Center 2.46200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 26.78 MHz</p> <p>Sweep 2.841 s (501 pts)</p>

5.6 Band-edge for RF Conducted Emissions

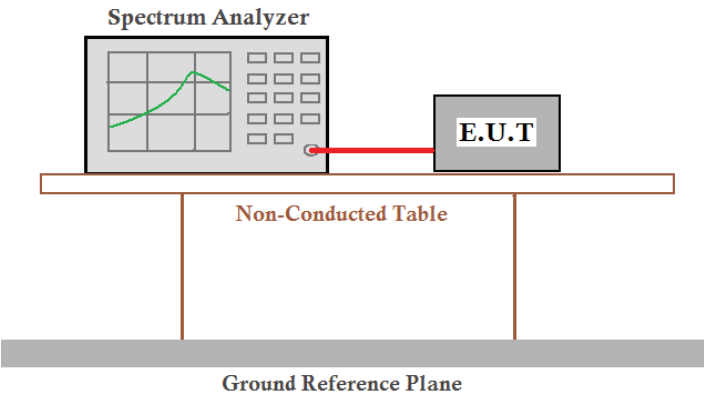
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g; 65Mbps of rate is the worst case of 802.11n(HT20); Only the worst case is recorded in the report.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass

Test plot as follows:

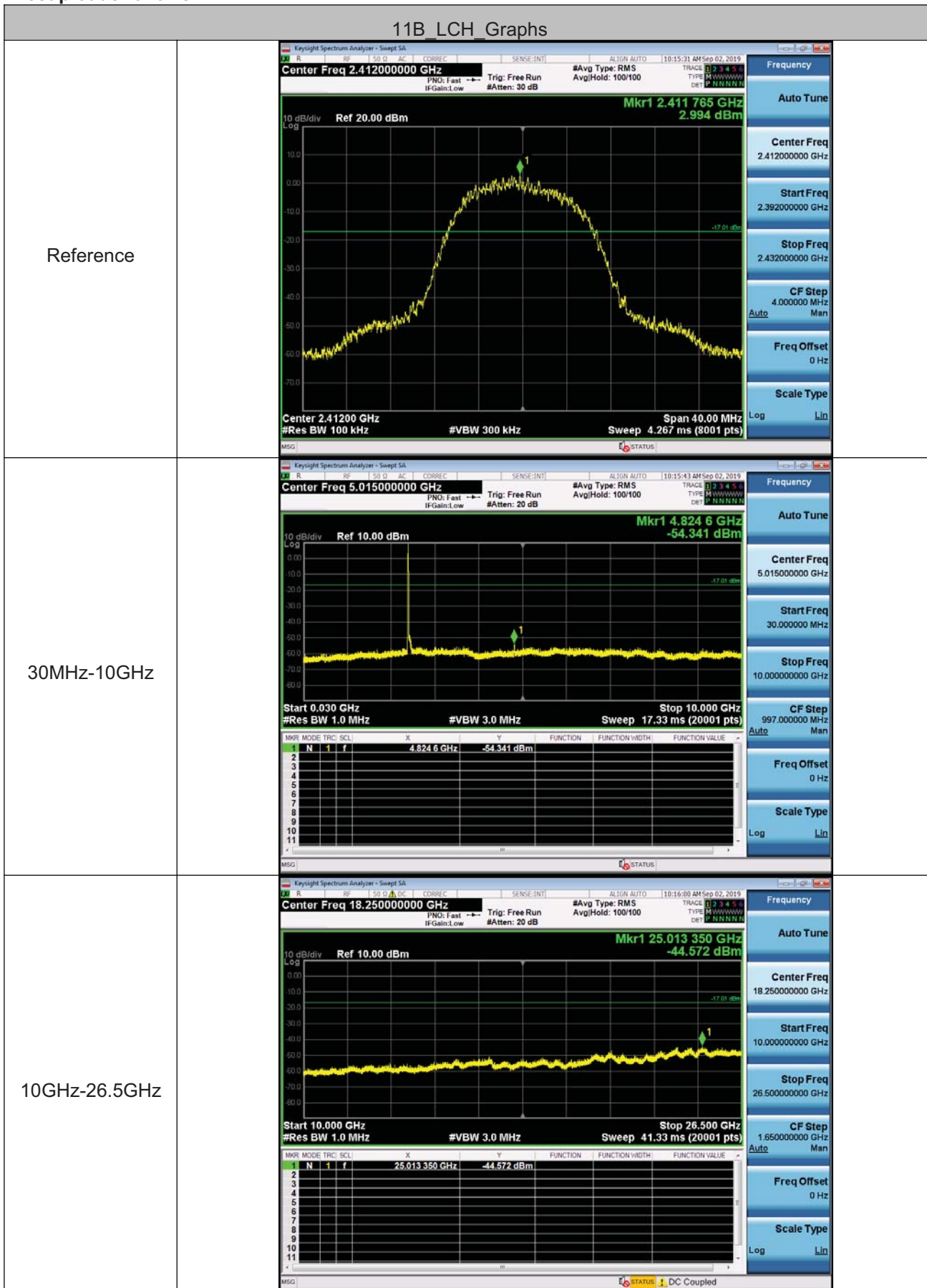


11G/HCH	<div><div><div><div>KeySight Spectrum Analyzer - Swept SA</div><div><div>Center Freq 2.46600000 GHz</div><div><div>IF No: Fast</div><div>IF Gain: Low</div></div><div><div>Trig: Free Run</div><div>#Atten: 30 dB</div></div></div><div><div>#Avg Type: RMS</div><div>Avg/Hold: 100/100</div></div><div><div>10:21:43 AM Sep 02, 2019</div><div>TRACE 1 2 3 4 5</div><div>TYPE M W W W W W W W</div><div>DET P N N N N N</div></div></div><div><div>10 dB/div</div><div>Ref 20.00 dBm</div><div><div>10.0</div><div>0.00</div><div>-10.0</div><div>-20.0</div><div>-30.0</div><div>-40.0</div><div>-50.0</div><div>-60.0</div><div>-70.0</div></div><div><div>2.43200 GHz</div><div>Start</div><div>2.50000 GHz</div><div>Stop</div></div><div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 6.533 ms (2001 pts)</div></div><div><div>MNR MODE TRC SCL</div><div>X</div><div>Y</div><div>FUNCTION</div><div>FUNCTION WIDTH</div><div>FUNCTION VALUE</div></div><div><div>1 N 1 f</div><div>2.483 500 GHz</div><div>-53.797 dBm</div><div></div><div></div><div></div></div><div><div>2 N 1 f</div><div>2.500 000 GHz</div><div>-62.200 dBm</div><div></div><div></div><div></div></div><div><div>3</div><div></div><div></div><div></div><div></div><div></div></div><div><div>4 N 1 f</div><div>2.458 554 GHz</div><div>-3.831 dBm</div><div></div><div></div><div></div></div><div><div>5</div><div></div><div></div><div></div><div></div><div></div></div><div><div>6</div><div></div><div></div><div></div><div></div><div></div></div><div><div>7</div><div></div><div></div><div></div><div></div><div></div></div><div><div>8</div><div></div><div></div><div></div><div></div><div></div></div><div><div>9</div><div></div><div></div><div></div><div></div><div></div></div><div><div>10</div><div></div><div></div><div></div><div></div><div></div></div><div><div>11</div><div></div><div></div><div></div><div></div><div></div></div></div><div><div>MSG</div><div>STATUS</div></div><div><div>Frequency</div><div>Auto Tune</div><div>Center Freq 2.46600000 GHz</div><div>Start Freq 2.432000000 GHz</div><div>Stop Freq 2.500000000 GHz</div><div>CF Step 6.8000000 MHz</div><div>Auto Man</div><div>Freq Offset 0 Hz</div><div>Scale Type</div><div>Log Lin</div></div></div></div>
11N20/LCH	<div><div><div><div>KeySight Spectrum Analyzer - Swept SA</div><div><div>Center Freq 2.376000000 GHz</div><div><div>IF No: Fast</div><div>IF Gain: Low</div></div><div><div>Trig: Free Run</div><div>#Atten: 30 dB</div></div></div><div><div>#Avg Type: RMS</div><div>Avg/Hold: 100/100</div></div><div><div>10:23:17 AM Sep 02, 2019</div><div>TRACE 1 2 3 4 5</div><div>TYPE M W W W W W W W</div><div>DET P N N N N N</div></div></div><div><div>10 dB/div</div><div>Ref 20.00 dBm</div><div><div>10.0</div><div>0.00</div><div>-10.0</div><div>-20.0</div><div>-30.0</div><div>-40.0</div><div>-50.0</div><div>-60.0</div><div>-70.0</div></div><div><div>2.31000 GHz</div><div>Start</div><div>2.44200 GHz</div><div>Stop</div></div><div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 12.67 ms (2001 pts)</div></div><div><div>MNR MODE TRC SCL</div><div>X</div><div>Y</div><div>FUNCTION</div><div>FUNCTION WIDTH</div><div>FUNCTION VALUE</div></div><div><div>1 N 1 f</div><div>2.390 000 GHz</div><div>-54.464 dBm</div><div></div><div></div><div></div></div><div><div>2 N 1 f</div><div>2.400 000 GHz</div><div>-44.025 dBm</div><div></div><div></div><div></div></div><div><div>3</div><div></div><div></div><div></div><div></div><div></div></div><div><div>4 N 1 f</div><div>2.407 284 GHz</div><div>-5.267 dBm</div><div></div><div></div><div></div></div><div><div>5</div><div></div><div></div><div></div><div></div><div></div></div><div><div>6</div><div></div><div></div><div></div><div></div><div></div></div><div><div>7</div><div></div><div></div><div></div><div></div><div></div></div><div><div>8</div><div></div><div></div><div></div><div></div><div></div></div><div><div>9</div><div></div><div></div><div></div><div></div><div></div></div><div><div>10</div><div></div><div></div><div></div><div></div><div></div></div><div><div>11</div><div></div><div></div><div></div><div></div><div></div></div></div><div><div>MSG</div><div>STATUS</div></div><div><div>Frequency</div><div>Auto Tune</div><div>Center Freq 2.376000000 GHz</div><div>Start Freq 2.310000000 GHz</div><div>Stop Freq 2.442000000 GHz</div><div>CF Step 13.2000000 MHz</div><div>Auto Man</div><div>Freq Offset 0 Hz</div><div>Scale Type</div><div>Log Lin</div></div></div></div>
11N20/HCH	<div><div><div><div>KeySight Spectrum Analyzer - Swept SA</div><div><div>Center Freq 2.466000000 GHz</div><div><div>IF No: Fast</div><div>IF Gain: Low</div></div><div><div>Trig: Free Run</div><div>#Atten: 30 dB</div></div></div><div><div>#Avg Type: RMS</div><div>Avg/Hold: 100/100</div></div><div><div>10:25:49 AM Sep 02, 2019</div><div>TRACE 1 2 3 4 5</div><div>TYPE M W W W W W W W</div><div>DET P N N N N N</div></div></div><div><div>10 dB/div</div><div>Ref 20.00 dBm</div><div><div>10.0</div><div>0.00</div><div>-10.0</div><div>-20.0</div><div>-30.0</div><div>-40.0</div><div>-50.0</div><div>-60.0</div><div>-70.0</div></div><div><div>2.43200 GHz</div><div>Start</div><div>2.50000 GHz</div><div>Stop</div></div><div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 6.533 ms (2001 pts)</div></div><div><div>MNR MODE TRC SCL</div><div>X</div><div>Y</div><div>FUNCTION</div><div>FUNCTION WIDTH</div><div>FUNCTION VALUE</div></div><div><div>1 N 1 f</div><div>2.483 500 GHz</div><div>-50.870 dBm</div><div></div><div></div><div></div></div><div><div>2 N 1 f</div><div>2.500 000 GHz</div><div>-61.614 dBm</div><div></div><div></div><div></div></div><div><div>3</div><div></div><div></div><div></div><div></div><div></div></div><div><div>4 N 1 f</div><div>2.453 624 GHz</div><div>-4.228 dBm</div><div></div><div></div><div></div></div><div><div>5</div><div></div><div></div><div></div><div></div><div></div></div><div><div>6</div><div></div><div></div><div></div><div></div><div></div></div><div><div>7</div><div></div><div></div><div></div><div></div><div></div></div><div><div>8</div><div></div><div></div><div></div><div></div><div></div></div><div><div>9</div><div></div><div></div><div></div><div></div><div></div></div><div><div>10</div><div></div><div></div><div></div><div></div><div></div></div><div><div>11</div><div></div><div></div><div></div><div></div><div></div></div></div><div><div>MSG</div><div>STATUS</div></div><div><div>Frequency</div><div>Auto Tune</div><div>Center Freq 2.466000000 GHz</div><div>Start Freq 2.432000000 GHz</div><div>Stop Freq 2.500000000 GHz</div><div>CF Step 6.8000000 MHz</div><div>Auto Man</div><div>Freq Offset 0 Hz</div><div>Scale Type</div><div>Log Lin</div></div></div></div>

5.7 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>The diagram illustrates the test setup for RF conducted spurious emissions. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane, represented by a thick grey bar.</p> <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	<p>Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g; 65Mbps of rate is the worst case of 802.11n(HT20);</p> <p>Only the worst case is recorded in the report.</p>
Limit:	<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.</p>
Test Results:	Pass

Test plot as follows:

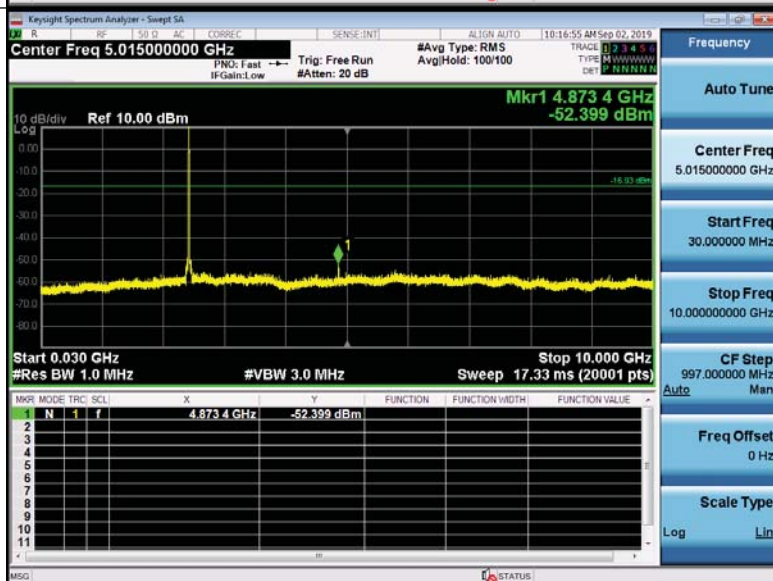


11B_MCH_Graphs

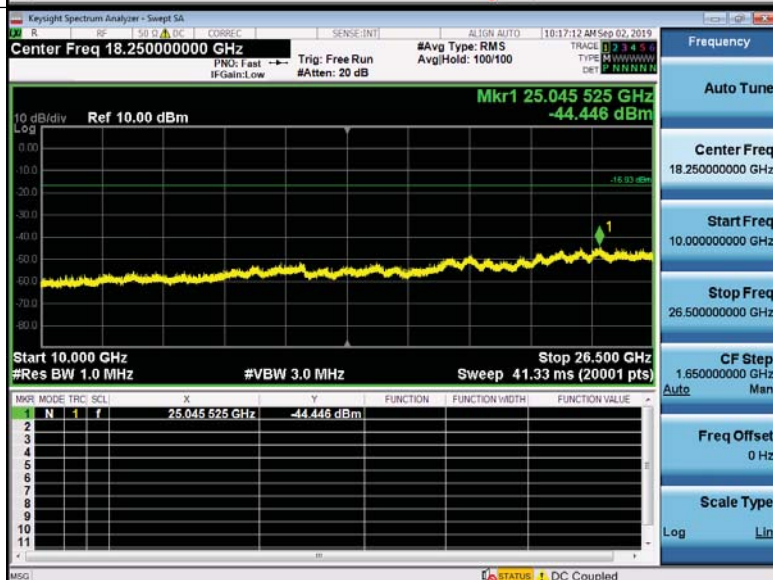
Reference



30MHz-10GHz



10GHz-26.5GHz

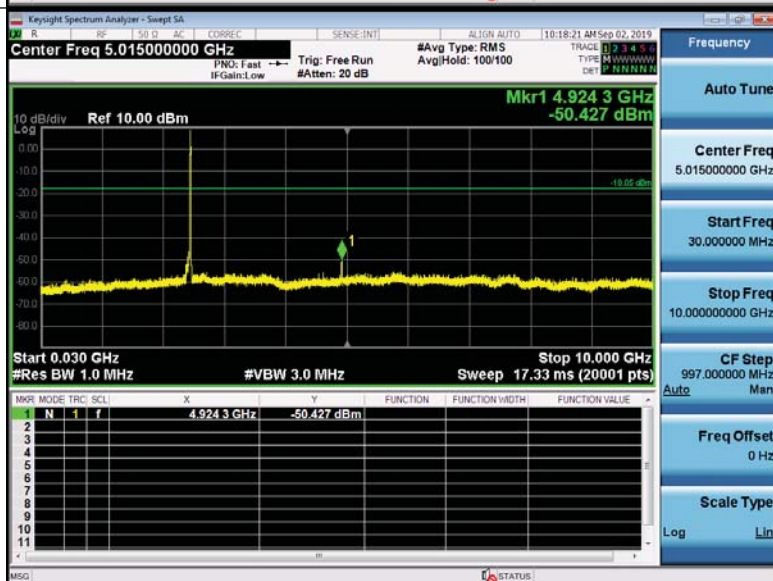


11B_HCH_Graphs

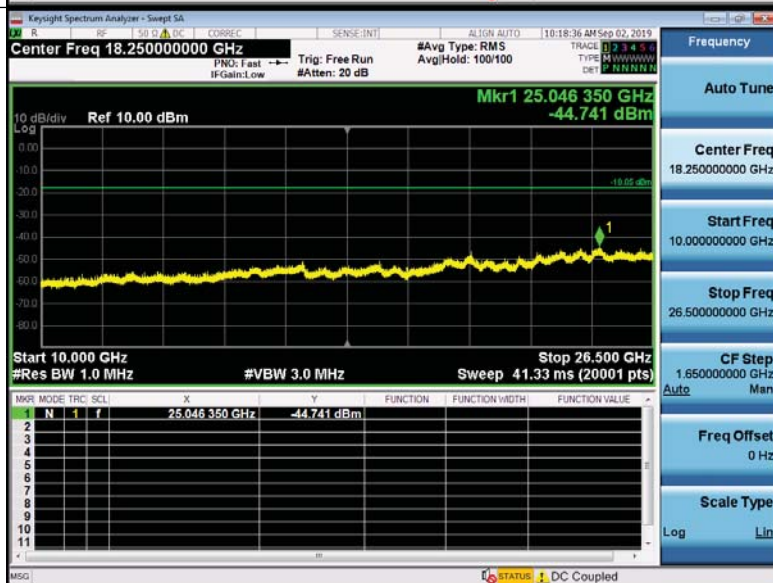
Reference



30MHz-10GHz

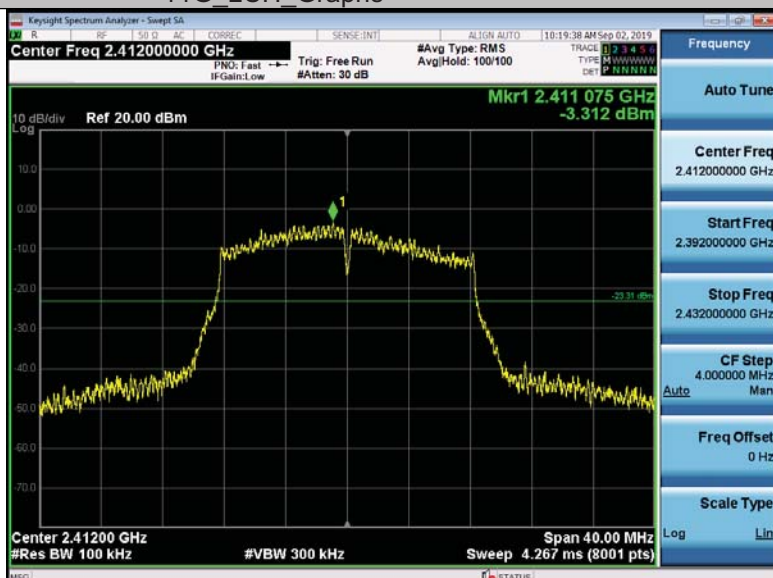


10GHz-26.5GHz

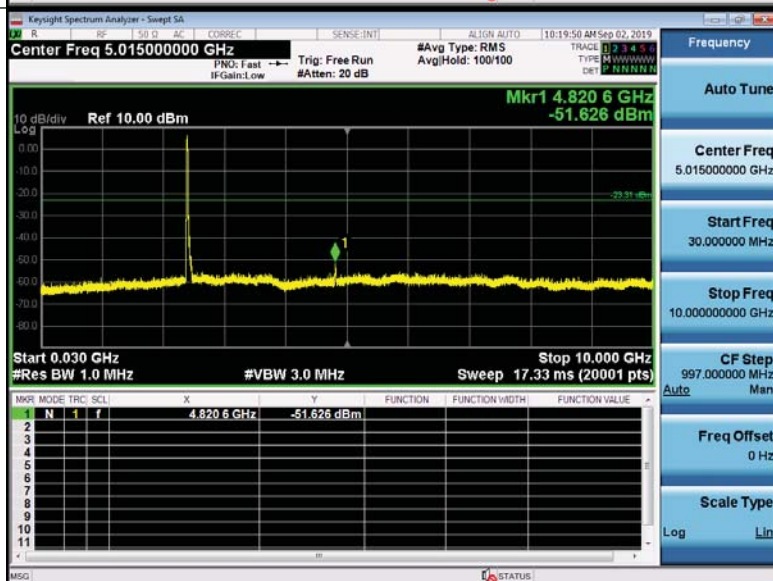


11G LCH Graphs

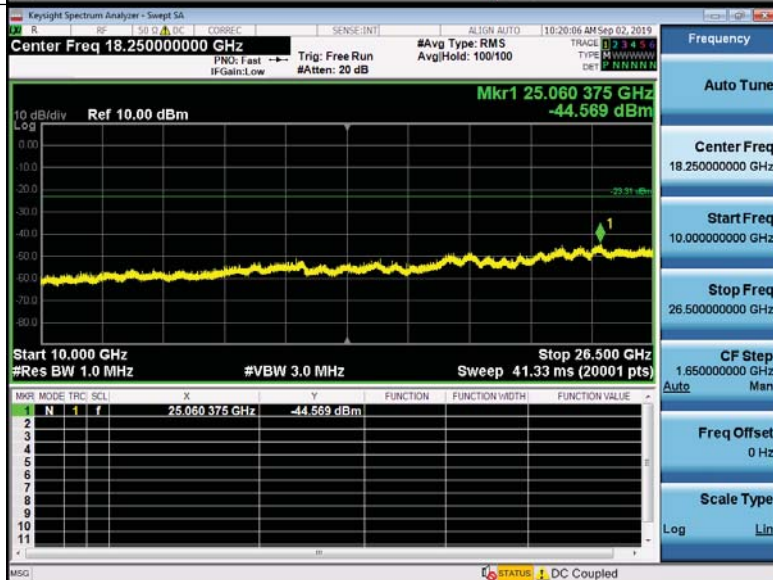
Reference

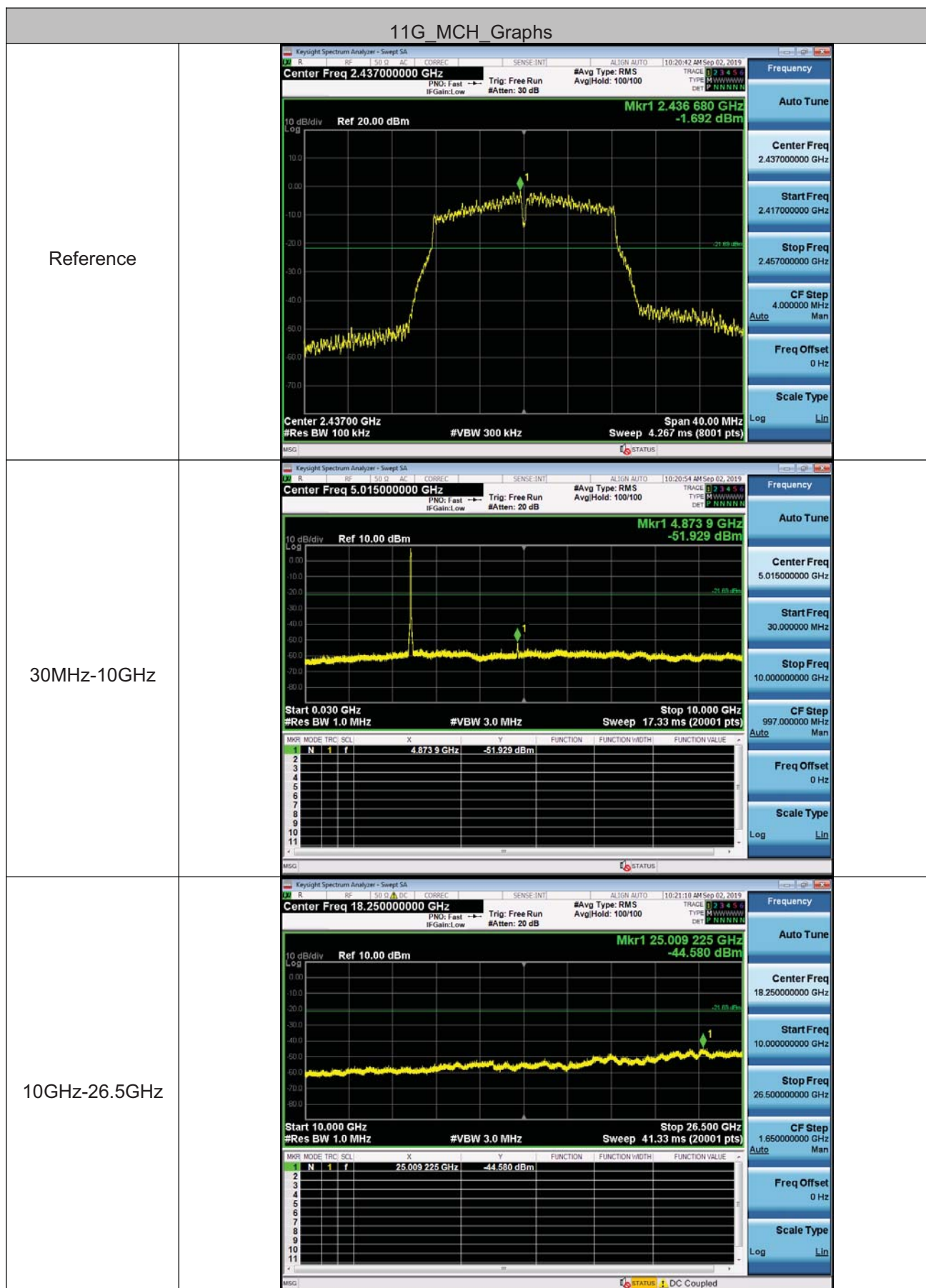


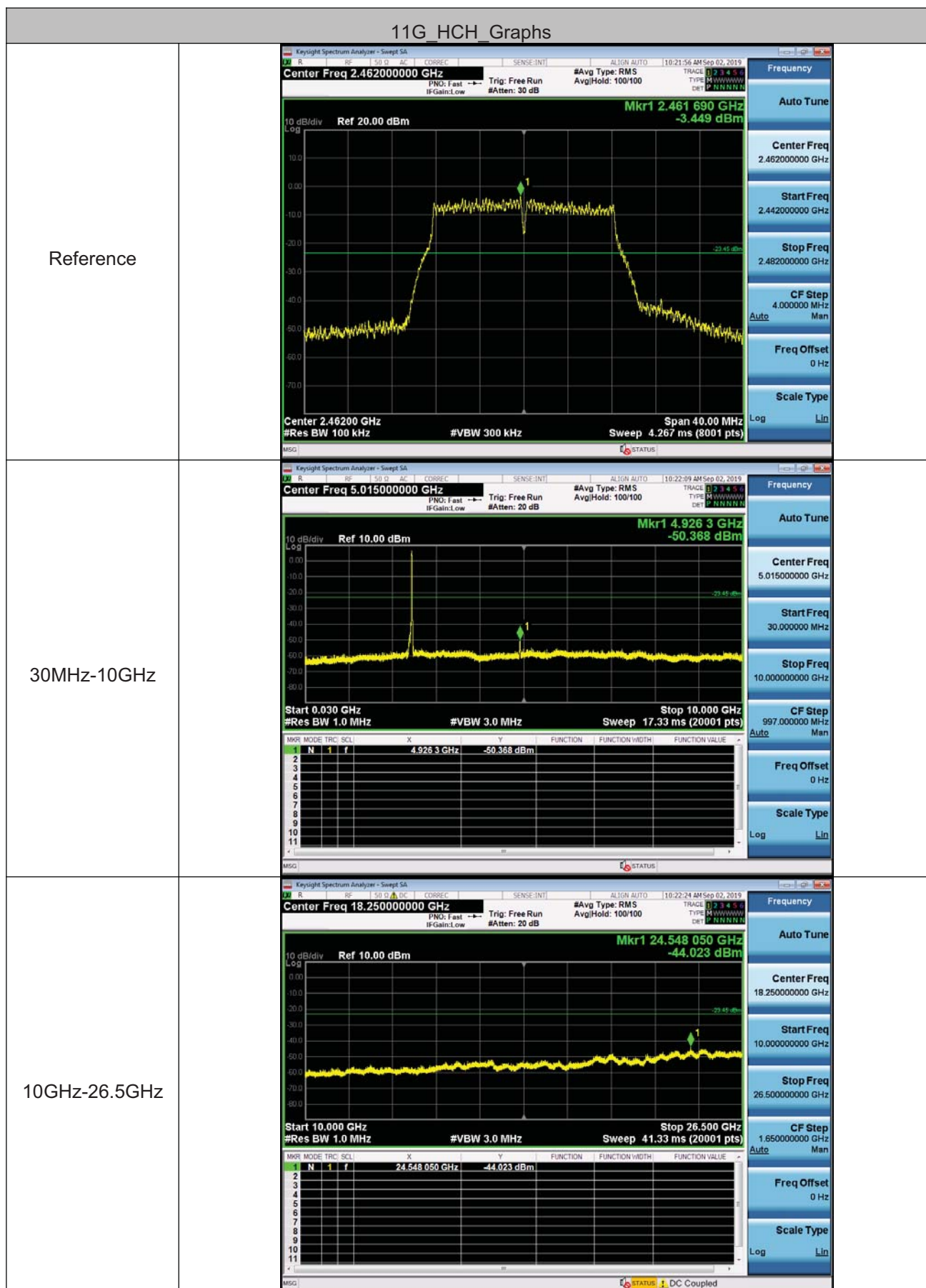
30MHz-10GHz



10GHz-26.5GHz





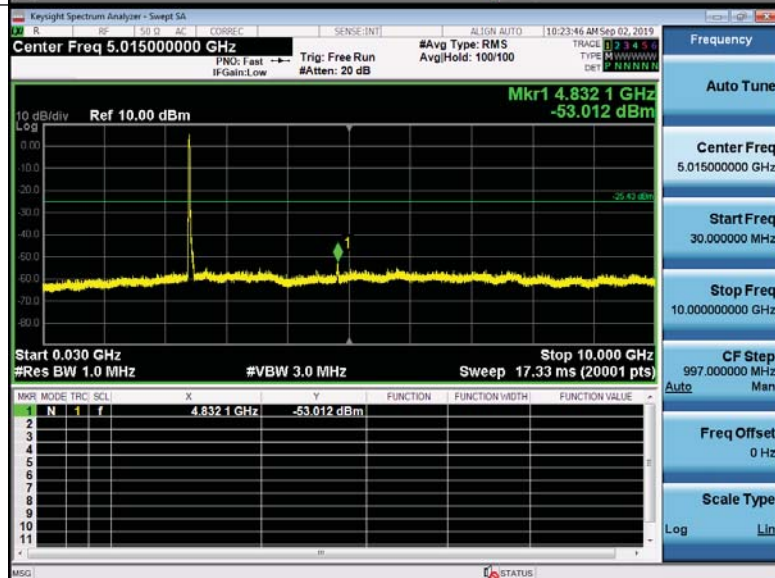


11N20_LCH_Graphs

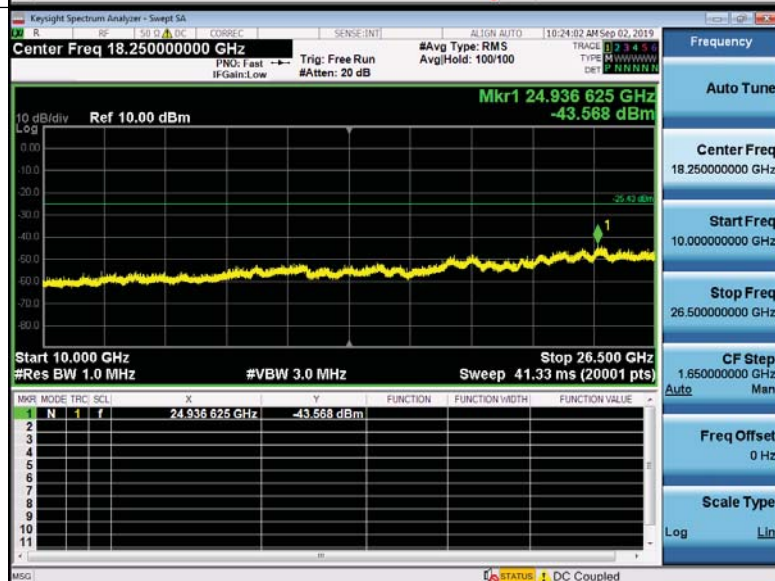
Reference



30MHz-10GHz

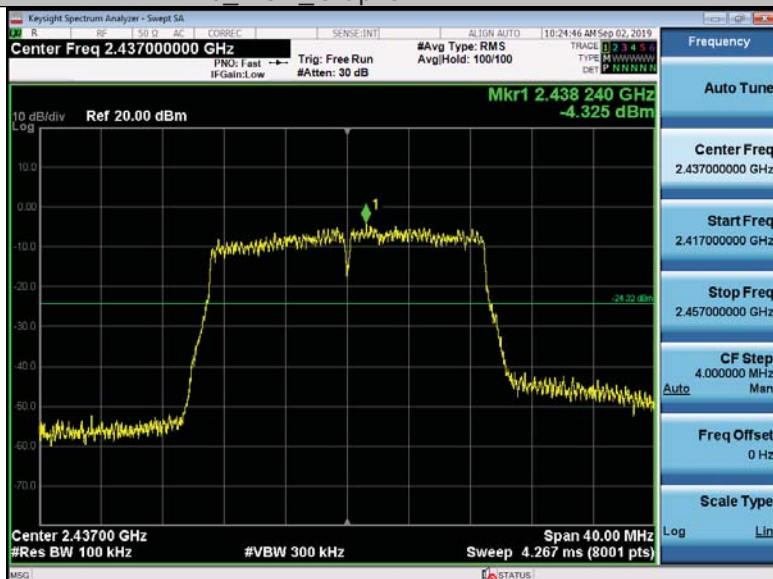


10GHz-26.5GHz

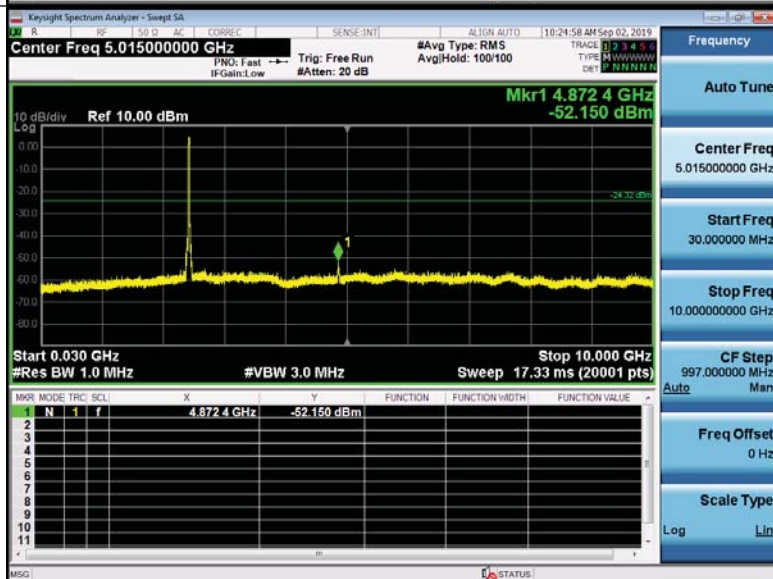


11N20_MCH_Graphs

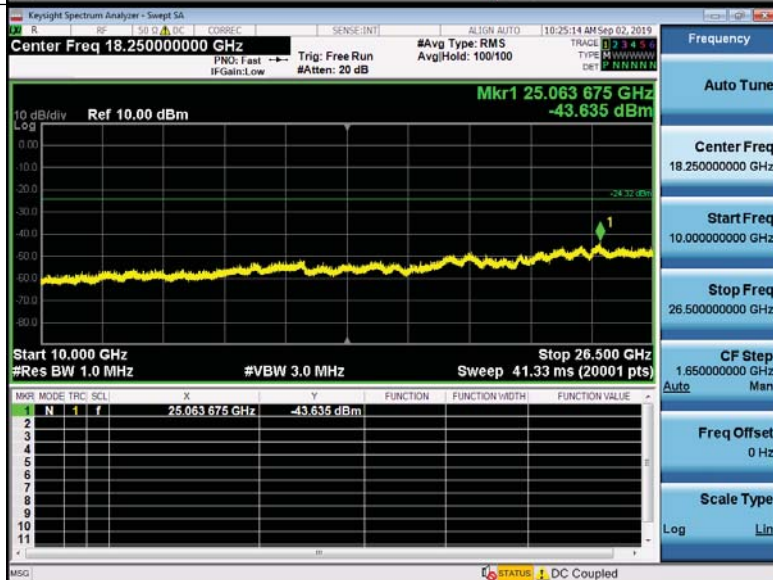
Reference



30MHz-10GHz



10GHz-26.5GHz

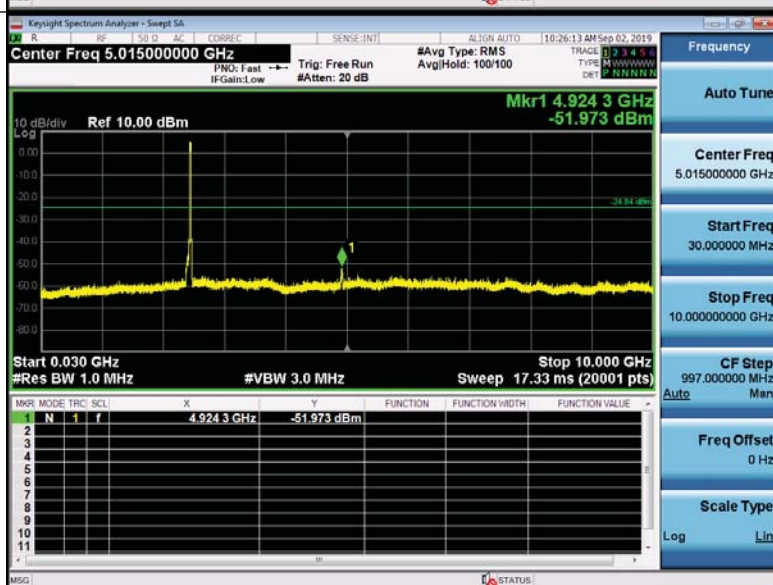


11N20_HCH_Graphs

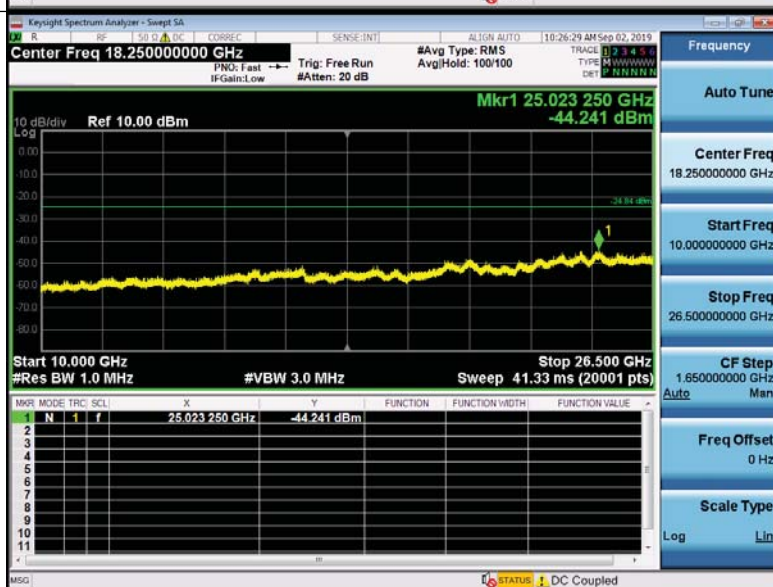
Reference



30MHz-10GHz



10GHz-26.5GHz



Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

5.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 2013				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

Test Setup:

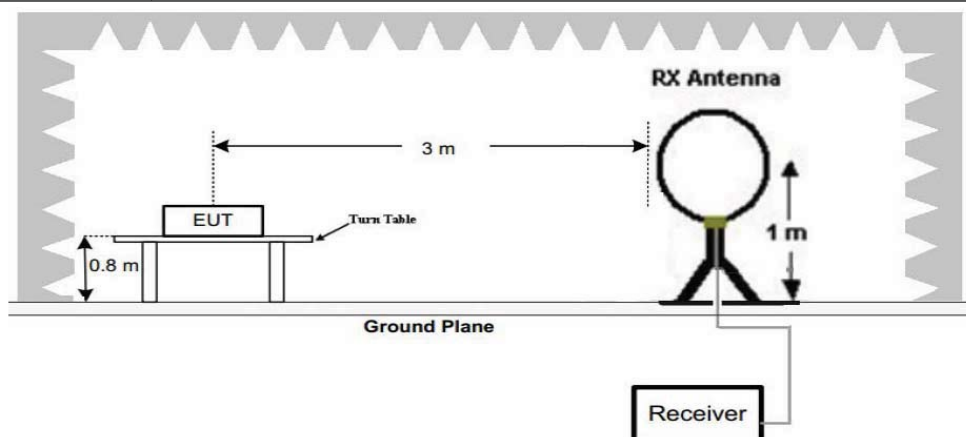


Figure 1. Below 30MHz

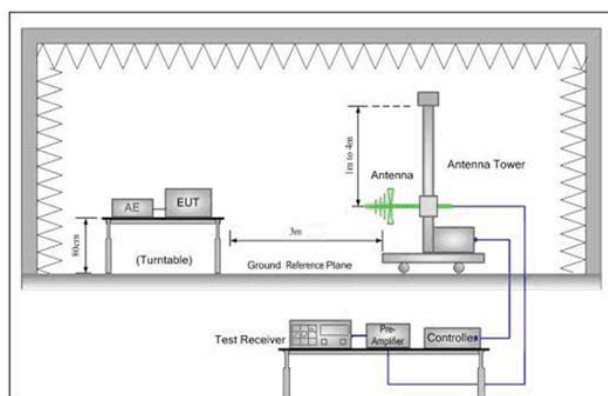


Figure 2. 30MHz to 1GHz

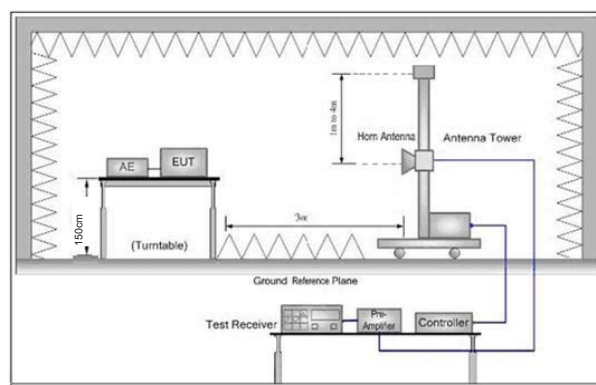


Figure 3. Above 1 GHz

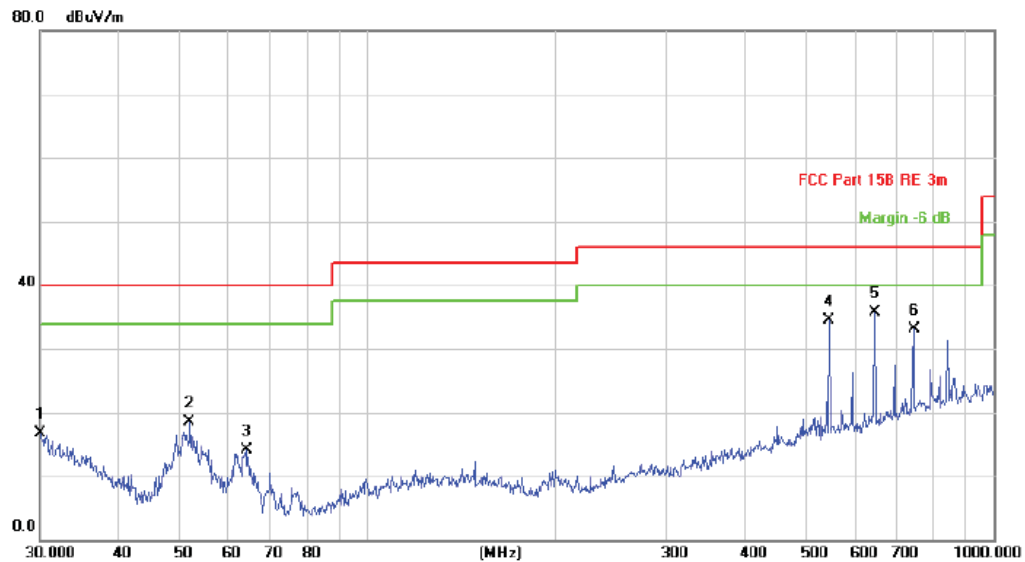
Test Procedure:

- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
Note: For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 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.

	<p>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.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>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, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel</p> <p>h. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates.</p> <p>Transmitting mode,</p>
Final Test Mode:	<p>Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g; 65Mbps of rate is the worst case of 802.11n(HT20);</p> <p>For below 1GHz, through Pre-scan, find the 11Mbps of rate of 802.11b at lowest channel is the worst case.</p> <p>Only the worst case is recorded in the report.</p>
Test Results:	Pass

5.8.1 Radiated emission below 1GHz

30MHz~1GHz		
Test mode:	Transmitting	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		30.0000	21.61	-4.90	16.71	40.00	-23.29	QP		
2		52.0251	37.25	-18.78	18.47	40.00	-21.53	QP		
3		63.9828	32.91	-18.83	14.08	40.00	-25.92	QP		
4		545.1826	40.58	-6.03	34.55	46.00	-11.45	QP		
5	*	645.1195	39.90	-4.10	35.80	46.00	-10.20	QP		
6		744.8661	35.56	-2.48	33.08	46.00	-12.92	QP		

Remark:

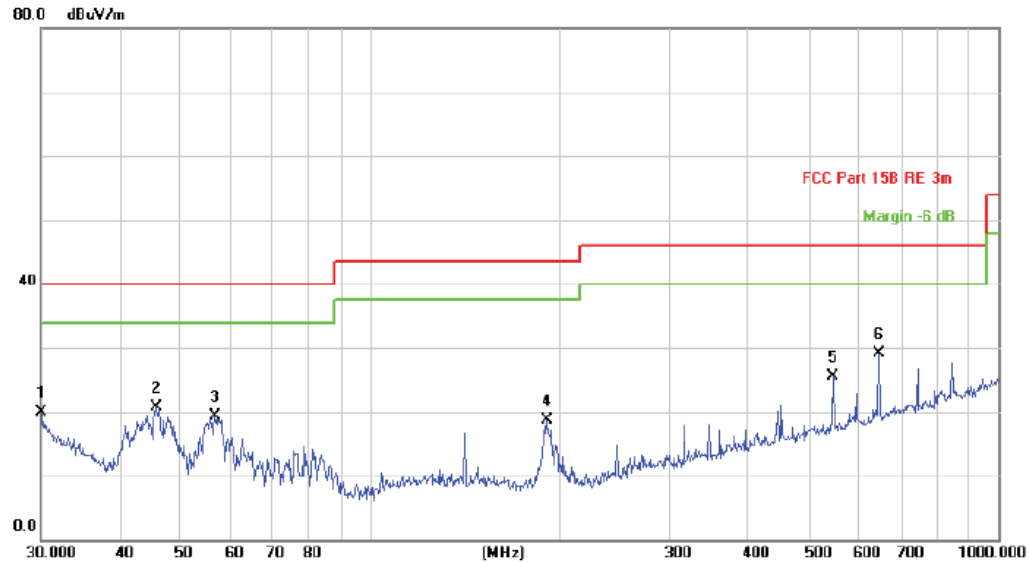
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

Test mode:	Transmitting	Horizontal
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		30.1054	23.48	-3.59	19.89	40.00	-20.11	QP		
2		45.8553	36.52	-15.76	20.76	40.00	-19.24	QP		
3		56.7917	38.19	-18.88	19.31	40.00	-20.69	QP		
4		191.0738	32.89	-14.10	18.79	43.50	-24.71	QP		
5		545.1826	30.98	-5.53	25.45	46.00	-20.55	QP		
6	*	645.1195	32.68	-3.50	29.18	46.00	-16.82	QP		

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

5.8.2 Transmitter emission above 1GHz

Test mode:		802.11b(11Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4824.000	54.64	-4.26	50.38	74	-23.62	PK	H
4824.000	51.61	-4.26	47.35	74	-26.65	AV	H
7236.000	52.16	1.18	53.34	74	-20.66	PK	H
7236.000	48.16	1.18	49.34	74	-24.66	AV	H
4824.000	55.00	-4.26	50.74	74	-23.26	PK	V
4824.000	51.18	-4.26	46.92	74	-27.08	AV	V
7236.000	51.59	1.18	52.77	74	-21.23	PK	V
7236.000	49.50	1.18	50.68	74	-23.32	AV	V

Test mode:		802.11b(11Mbps)		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4874.000	53.56	-4.12	49.44	74	-24.56	PK	H
4874.000	51.86	-4.12	47.74	74	-26.26	AV	H
7311.000	51.90	1.46	53.36	74	-20.64	PK	H
7311.000	48.19	1.46	49.65	74	-24.35	AV	H
4874.000	53.14	-4.12	49.02	74	-24.98	PK	V
4874.000	52.23	-4.12	48.11	74	-25.89	AV	V
7311.000	51.77	1.46	53.23	74	-20.77	PK	V
7311.000	49.80	1.46	51.26	74	-22.74	AV	V

Test mode:		802.11b(11Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4924.000	54.36	-4.03	50.33	74	-23.67	PK	H
4924.000	52.69	-4.03	48.66	74	-25.34	AV	H
7386.000	51.56	1.66	53.22	74	-20.78	PK	H
7386.000	49.08	1.66	50.74	74	-23.26	AV	H

4924.000	54.27	-4.03	50.24	74	-23.76	PK	V
4924.000	52.73	-4.03	48.70	74	-25.30	AV	V
7386.000	51.83	1.66	53.49	74	-20.51	PK	V
7386.000	50.00	1.66	51.66	74	-22.34	AV	V

Test mode:		802.11g(54Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4824.000	53.80	-4.26	49.54	74	-24.46	PK	H
4824.000	52.65	-4.26	48.39	74	-25.61	AV	H
7236.000	51.08	1.18	52.26	74	-21.74	PK	H
7236.000	49.25	1.18	50.43	74	-23.57	AV	H
4824.000	54.18	-4.26	49.92	74	-24.08	PK	V
4824.000	52.45	-4.26	48.19	74	-25.81	AV	V
7236.000	51.86	1.18	53.04	74	-20.96	PK	V
7236.000	49.69	1.18	50.87	74	-23.13	AV	V

Test mode:		802.11g(54Mbps)		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4874.000	53.28	-4.12	49.16	74	-24.84	PK	H
4874.000	52.18	-4.12	48.06	74	-25.94	AV	H
7311.000	51.95	1.46	53.41	74	-20.59	PK	H
7311.000	49.52	1.46	50.98	74	-23.02	AV	H
4874.000	54.36	-4.12	50.24	74	-23.76	PK	V
4874.000	51.33	-4.12	47.21	74	-26.79	AV	V
7311.000	50.85	1.46	52.31	74	-21.69	PK	V
7311.000	49.14	1.46	50.60	74	-23.40	AV	V

Test mode:		802.11g(54Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4924.000	53.20	-4.03	49.17	74	-24.83	PK	H

4924.000	52.12	-4.03	48.09	74	-25.91	AV	H
7386.000	51.80	1.66	53.46	74	-20.54	PK	H
7386.000	49.94	1.66	51.60	74	-22.40	AV	H
4924.000	53.50	-4.03	49.47	74	-24.53	PK	V
4924.000	51.06	-4.03	47.03	74	-26.97	AV	V
7386.000	52.61	1.66	54.27	74	-19.73	PK	V
7386.000	49.00	1.66	50.66	74	-23.34	AV	V

Test mode:		802.11n(HT20) (65Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4824.000	54.42	-4.26	50.16	74	-23.84	PK	H
4824.000	52.79	-4.26	48.53	74	-25.47	AV	H
7236.000	50.93	1.18	52.11	74	-21.89	PK	H
7236.000	49.34	1.18	50.52	74	-23.48	AV	H
4824.000	54.37	-4.26	50.11	74	-23.89	PK	V
4824.000	52.96	-4.26	48.70	74	-25.30	AV	V
7236.000	51.52	1.18	52.70	74	-21.30	PK	V
7236.000	48.70	1.18	49.88	74	-24.12	AV	V

Test mode:		802.11n(HT20) (65Mbps)		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4874.000	53.90	-4.12	49.78	74	-24.22	PK	H
4874.000	52.98	-4.12	48.86	74	-25.14	AV	H
7311.000	51.62	1.46	53.08	74	-20.92	PK	H
7311.000	49.92	1.46	51.38	74	-22.62	AV	H
4874.000	54.72	-4.12	50.60	74	-23.40	PK	V
4874.000	52.28	-4.12	48.16	74	-25.84	AV	V
7311.000	52.02	1.46	53.48	74	-20.52	PK	V
7311.000	48.31	1.46	49.77	74	-24.23	AV	V

Test mode:		802.11b(65Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4924.000	53.06	-4.12	48.94	74	-25.06	PK	H
4924.000	52.75	-4.12	48.63	74	-25.37	AV	H
7386.000	51.85	1.46	53.31	74	-20.69	PK	H
7386.000	49.75	1.46	51.21	74	-22.79	AV	H
4924.000	54.92	-4.12	50.80	74	-23.20	PK	V
4924.000	51.94	-4.12	47.82	74	-26.18	AV	V
7386.000	51.46	1.46	52.92	74	-21.08	PK	V
7386.000	49.75	1.46	51.21	74	-22.79	AV	V

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

5.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10 2013		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			

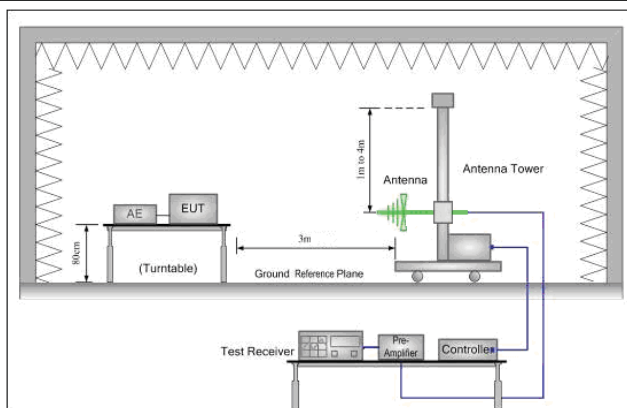


Figure 1. 30MHz to 1GHz

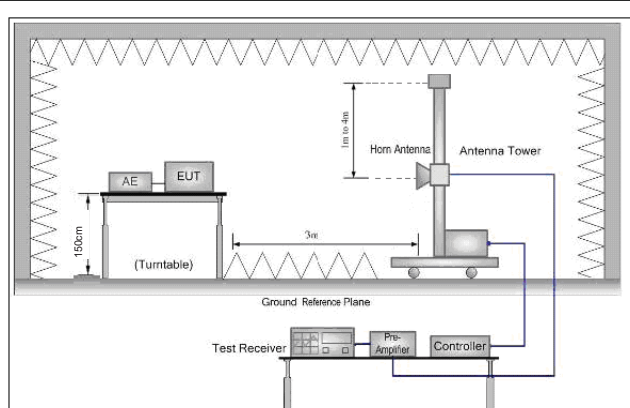


Figure 2. Above 1 GHz

Test Procedure:

- 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- Note: For the radiated emission test above 1GHz:
- Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - 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.

	<p>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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</p> <p>g. Test the EUT in the lowest channel , the Highest channel</p> <p>h. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates.</p> <p>Transmitting mode.</p>
Final Test Mode:	<p>Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case</p> <p>Through Pre-scan, find the 11Mbps of rate is the worst case of 802.11b; 54Mbps of rate is the worst case of 802.11g ; 65Mbps of rate is the worst case of 802.11n(HT20) ;</p> <p>Only the worst case is recorded in the report.</p>
Test Results:	Pass

Test data:

Worse case mode:		802.11b(11Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2390.000	62.85	-9.2	53.65	74	-20.35	PK	H
2390.000	46.20	-9.2	37.00	54	-17.00	AV	H
2400.000	59.70	-9.39	50.31	74	-23.69	PK	H
2400.000	42.54	-9.39	33.15	54	-20.85	AV	H
2390.000	62.99	-9.2	53.79	74	-20.21	PK	V
2390.000	46.85	-9.2	37.65	54	-16.35	AV	V
2400.000	59.80	-9.39	50.41	74	-23.59	PK	V
2400.000	42.27	-9.39	32.88	54	-21.12	AV	V

Worse case mode:		802.11b(11Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2483.500	60.02	-9.29	50.73	74	-23.27	PK	H
2483.500	46.42	-9.29	37.13	54	-16.87	AV	H
2483.500	59.21	-9.29	49.92	74	-24.08	PK	V
2483.500	42.74	-9.29	33.45	54	-20.55	AV	V

Worse case mode:		802.11g(54Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2390.000	61.72	-9.2	52.52	74	-21.48	PK	H
2390.000	47.13	-9.2	37.93	54	-16.07	AV	H
2400.000	59.76	-9.39	50.37	74	-23.63	PK	H
2400.000	41.83	-9.39	32.44	54	-21.56	AV	H
2390.000	63.08	-9.2	53.88	74	-20.12	PK	V
2390.000	46.48	-9.2	37.28	54	-16.72	AV	V
2400.000	60.26	-9.39	50.87	74	-23.13	PK	V
2400.000	41.82	-9.39	32.43	54	-21.57	AV	V

Worse case mode:		802.11g(54Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2483.500	61.44	-9.29	52.15	74	-21.85	PK	H
2483.500	47.81	-9.29	38.52	54	-15.48	AV	H
2483.500	60.78	-9.29	51.49	74	-22.51	PK	V
2483.500	41.67	-9.29	32.38	54	-21.62	AV	V

Worse case mode:		802.11n(HT20) (65Mbps)		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2390.000	59.38	-9.2	50.18	74	-23.82	PK	H
2390.000	46.23	-9.2	37.03	54	-16.97	AV	H
2400.000	60.71	-9.39	51.32	74	-22.68	PK	H
2400.000	42.59	-9.39	33.20	54	-20.80	AV	H
2390.000	59.20	-9.2	50.00	74	-24.00	PK	V
2390.000	46.37	-9.2	37.17	54	-16.83	AV	V
2400.000	59.12	-9.39	49.73	74	-24.27	PK	V
2400.000	42.16	-9.39	32.77	54	-21.23	AV	V

Worse case mode:		802.11n(HT20) (65Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2483.500	62.68	-9.29	53.39	74	-20.61	PK	H
2483.500	47.01	-9.29	37.72	54	-16.28	AV	H
2483.500	60.05	-9.29	50.76	74	-23.24	PK	V
2483.500	41.98	-9.29	32.69	54	-21.31	AV	V

Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

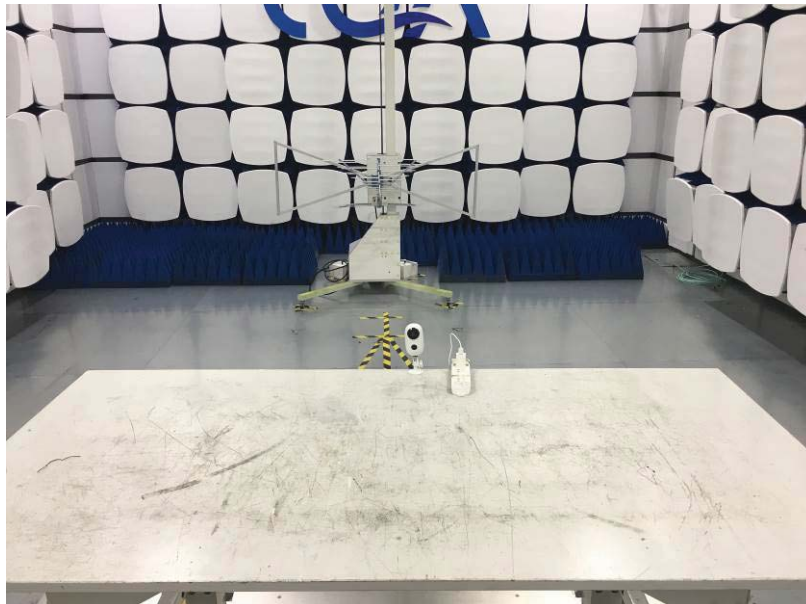
6 Photographs - EUT Test Setup

6.1 Radiated Emission

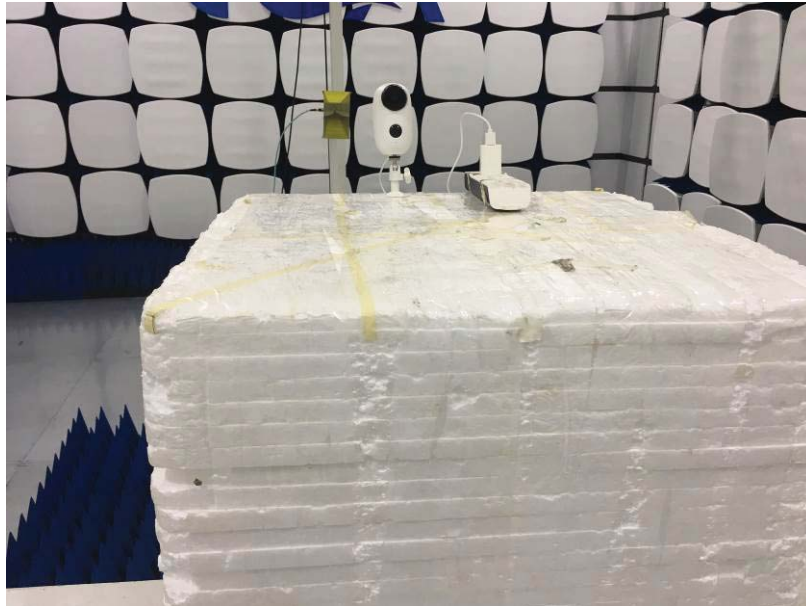
Below 30MHz



30MHz~1GHz



Above 1GHz



6.2 Conducted Emission



7 Photographs - EUT Constructional Details

External photos



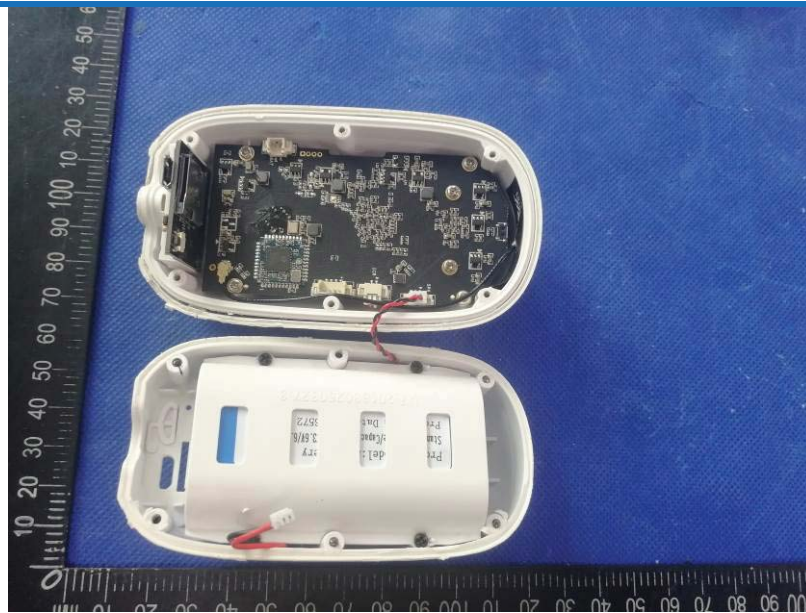


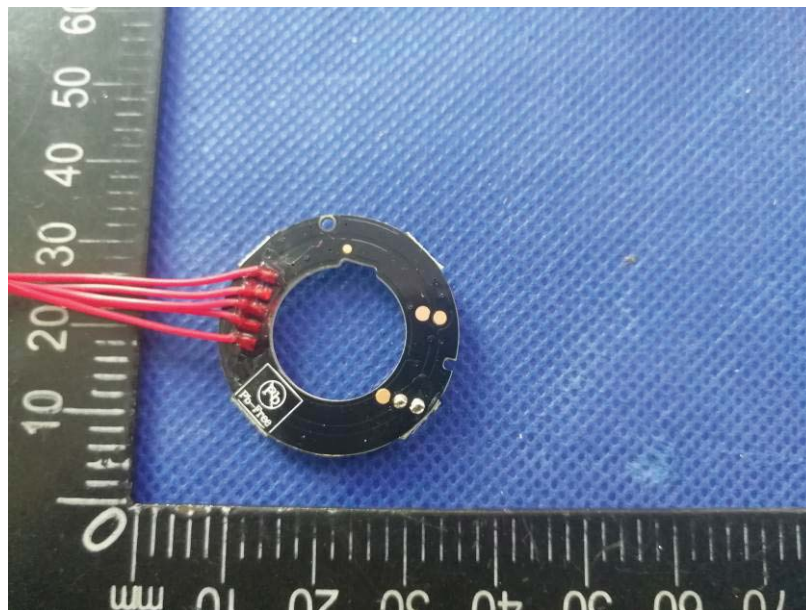
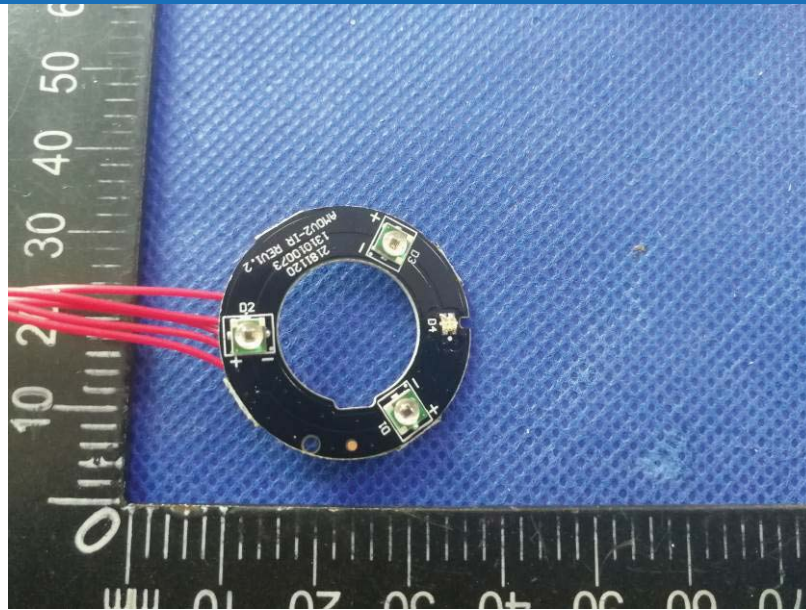


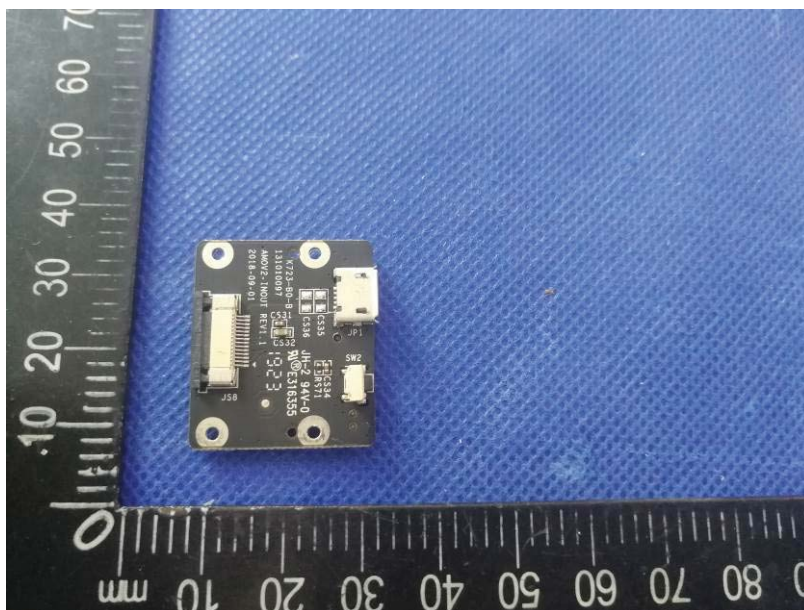
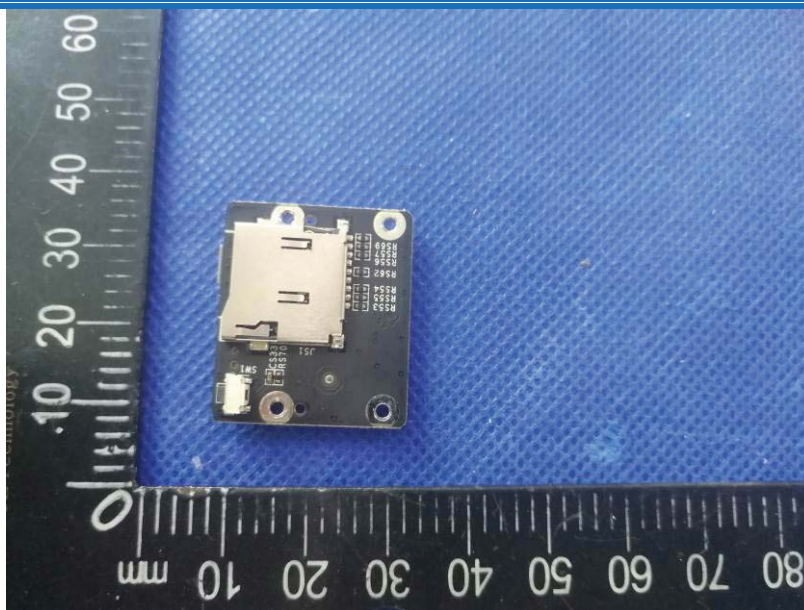


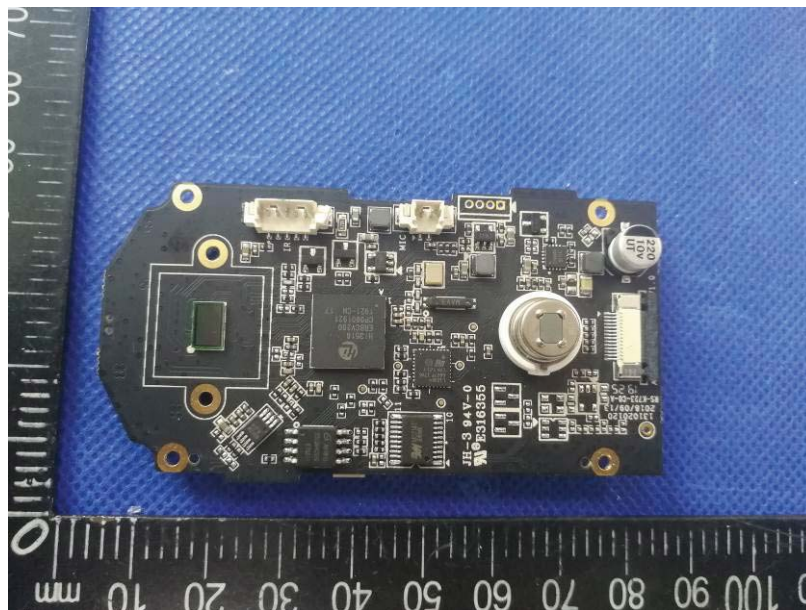
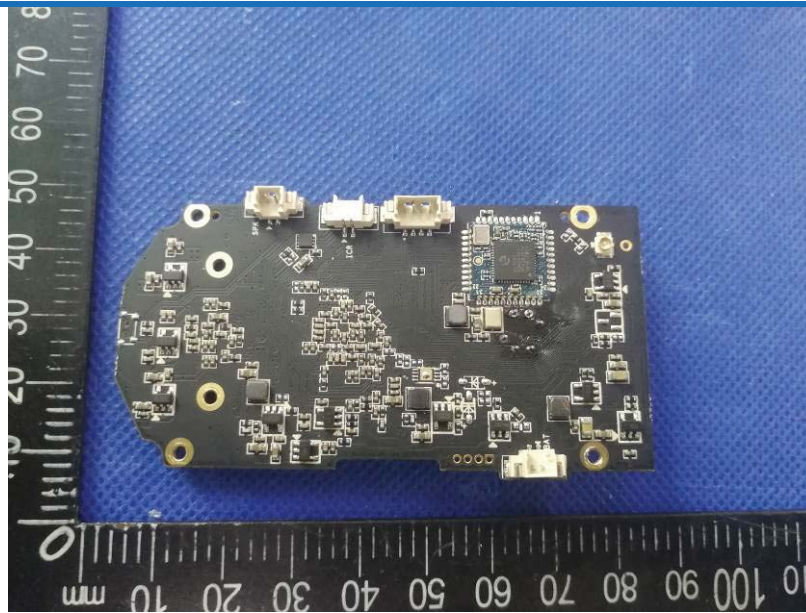
Internal photos



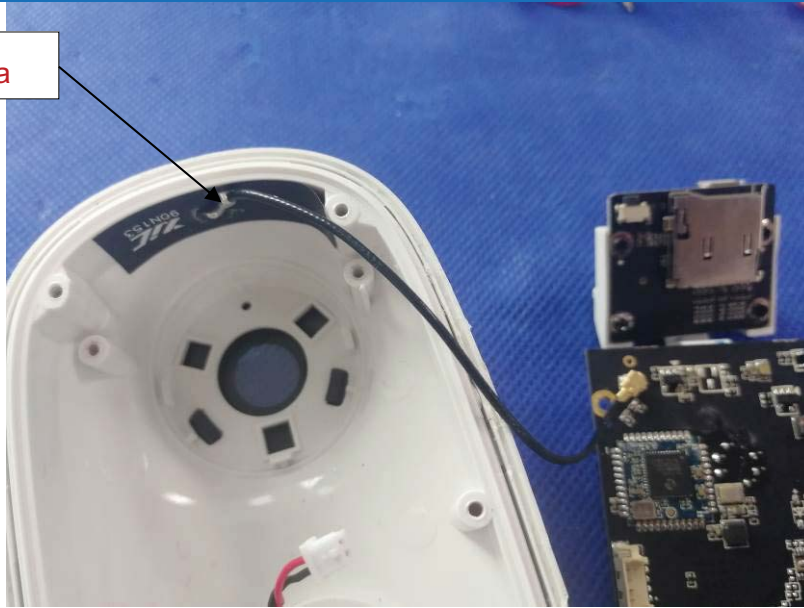








WIFI Antenna



THE END