



Test Report

FCC ID:SENISC3S

Product Name:	iCamera KEEP Pro
Trademark:	N/A
Model Name :	iSC3s
Prepared For :	iSmart Alarm, Inc.
Address :	1290 Kifer Road, Suite 306 Sunnyvale, CA 94086
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
Address :	No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	Nov. 18 - Nov 28, 2016
Date of Report :	Nov 28, 2016
Report No.:	BCTC-FY161004657-1E



VERIFICATION OF COMPLIANCE

Applicant's name iSmart Alarm, Inc.

Address..... 1290 Kifer Road, Suite 306 Sunnyvale, CA 94086

Manufacture's Name iSmart Alarm, Inc.

Address..... 1290 Kifer Road, Suite 306 Sunnyvale, CA 94086

Product description

Product name iCamera KEEP Pro

Model Name: iSC3s

FCC Part15.407

Standards

ANSI C63.10-2013

KDB789033 D02 General U-NII Test Procedures New Rules
v01r03

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Result

Pass

Testing Engineer :

Eric Yang

Eric Yang

**Reviewer
(Supervisor)** :

Jade Yang

Jade Yang

**Approved &
Authorized
Signer(Manager)** :



Carson Zhang

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1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	RSS-GEN 15.207	PASS
Radiated Emissions	RSS-GEN 15.407(b), 15.209	PASS
26dB bandwidth and 99%dB Bandwidth	RSS-247 15.403(i) 15.407(e)	PASS
Minimum 6 dB bandwidth	15.407(e)	PASS
Power density	RSS-247 15.407 (a)	PASS
Maximum Peak Output Power	RSS-247 15.407 (a)	PASS
Emissions from out of band	RSS-247 15.407 (b)	PASS
Transmission in case of Absence of Information	RSS-247 15.407(c)	PASS
Frequency Stability	RSS-247 15.407(g)	PASS
Antenna Requirement	15.203	PASS

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) For all test, the setup authorization of the prototype testing software comes from the customer. (including output power and other parameters)



2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	iCamera KEEP Pro
Model No.:	iSC3s
Trade Name:	N/A
Operation Frequency:	5180-5240 5745-5825MHz(5G 802.11a/n(HT20)) 5190-5230, 5755-5795 MHz(802.11n(HT40))
Channel numbers:	See channel list
Modulation technology:	64QAM, 16QAM, QPSK, BPSK for OFDM
Data speed (IEEE 802.11a):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	FPCB antenna
Antenna gain:	2.0dBi
Power supply:	DC 5V from adapter
Adapter	Model: KA1517-050200USU I/P:AC 100-240V 50/60Hz 0.35A Max O/P:DC 5V/2000mA

Channel List for 802.11a/n(20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240



Channel List for 802.11a/n(20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

Channel List for 802.11n(40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

Channel List for 802.11n(40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5755	161	5795



2.3. Independent Operation Modes

The basic operation modes are:

These is Digital Transmission system (DTS) and have modulation OFDM, DSSS, DBPSK, DQPSK, CCK, 16QAM, 64QAM. According exploratory test, EUT will have maximum output power in those data rate (802.11a/n: MCS0), so those data rate were used for all test. The equipment enables high-speed access without wires to network assets. This adapter uses the IEEE 802.11 protocol to enable wireless communications between the host and Wireless router.

802.11a/n(20)

Frequency	Band 1	Band 4
Low	5180MHz	5745MHz
Middle	5200MHz	5785MHz
High	5240MHz	5825MHz

802.11n(40)

Frequency	Band 1	Band 4
Low	5190MHz	5755MHz
Middle	-	-
High	5230MHz	5795MHz

Note: for conducted emission test, we pretest all mode,the worst mode was 802.11a channel 36.

for radiated emissions test, we pretest all mode,the worst mode was 802.11a/n20

The worst mode's data was recording and show in the test report.

2.4. Test Sites

2.4.1. Test Facilities

Lab Qualifications : FCC Registration No.:187086
IC Registered No.:12655A



2.5. List of Test and Measurement Instruments

Conduction test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	1166.5950K03-101165-ha	2016.07.06	2017.07.05	1 year
2	LISN	R&S	NSLK8126	8126466	2016.08.24	2017.08.23	1 year
3	LISN	R&S	NSLK8126	8126487	2016.08.24	2017.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.07.06	2017.07.05	1 year
5	RF cables	R&S	R204	R20X	2016.07.06	2017.07.05	1 year

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Kind of equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.07.06	2017.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2016.07.06	2017.07.05	1 year
3	Bilog Antenna	R&S	VULB9168	VULB9168-438	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.07.06	2017.07.05	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.07.06	2017.07.05	1 year
6	Horn Antenna	R&S	HF906	10027	2016.07.06	2017.07.05	1 year
7	Horn Antenna	R&S	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
8	Amplifier	R&S	BBV9743	9743-019	2016.12.22	2017.12.21	1 year
9	Loop Antenna	ARA	PLGWF-4B0630/B	1029	2016.07.06	2017.07.05	1 year
10	RF cables	R&S	R203	R20X	2016.07.06	2017.07.05	1 year
11	Antenna connector	Florida RFLabs	Lab-Fle	RF 01#	2016.07.06	2017.07.05	1 year
12	Power Metter	ANRITSU	ML2487A	6K00001568	2016.07.06	2017.07.05	1 year
13	Power Sensor (AV)	ANRITSU	ML2491A	030989	2016.07.06	2017.07.05	1 year
14	Signal Analyzer	Agilent	N9010A	MY48030494	2016.07.06	2017.07.05	1 year
15	Test Receiver	R&S	ESU 40	100376	2016.07.06	2017.07.05	1 year

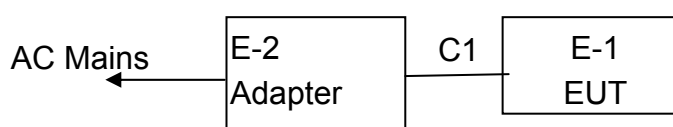
3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: iCamera KEEP Pro)

3.3. Auxiliary Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	iCamera KEEP Pro	N/A	iSC3s	N/A	EUT
E-2	Adapter	N/A	KA1517-050200USU	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	1.8m	USB cable unshielded

3.4. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted Emission Measurement

POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class B (dBuV)		Standard
	Quasi -peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

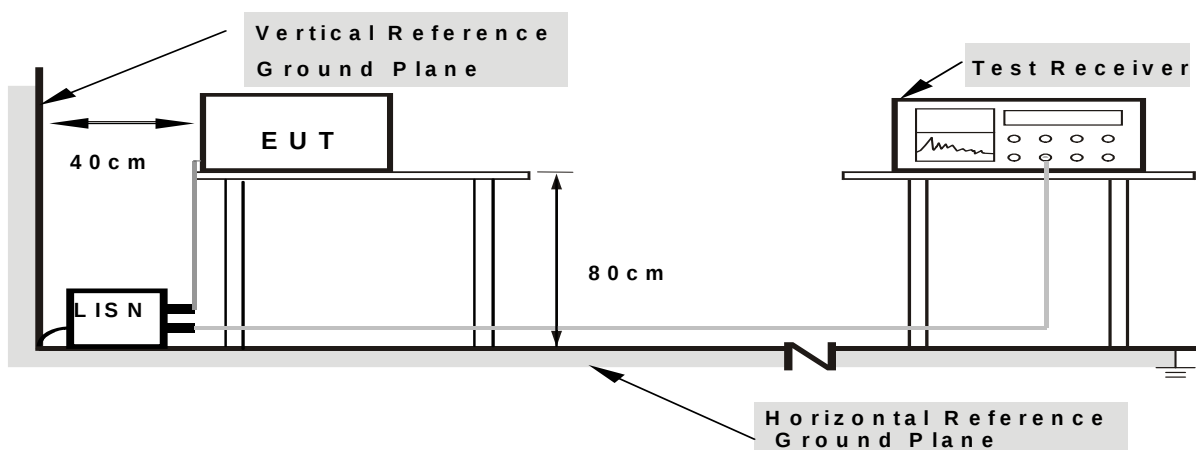
4.1.1. TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.2. DEVIATION FROM TEST STANDARD

No deviation

4.1.3. TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

4.1.4. EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest all adapter's emission, only the adapter 1's data was worst and the data was recording in the report.

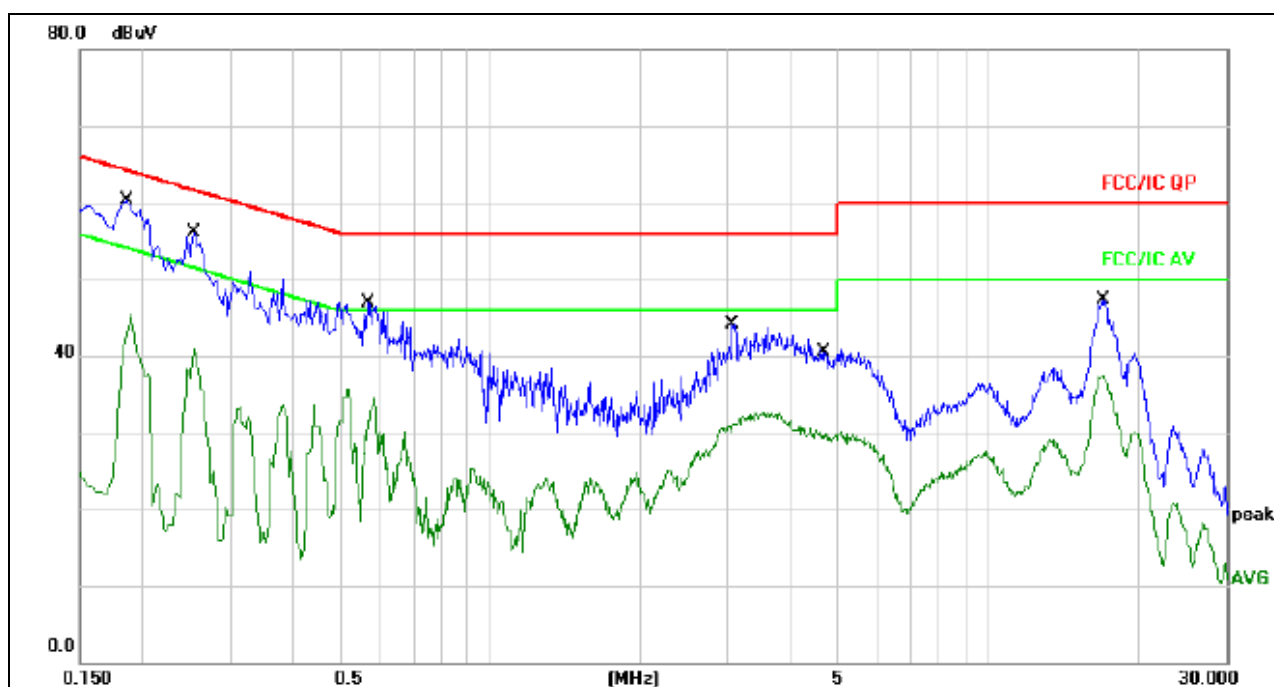
The data only show the worst mode.

If peak level comply with Quasi-Peak limit, then the Quasi-Peak level is deemed to comply with Quasi-Peak limit.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

4.1.5. TEST RESULTS

EUT:	iCamera KEEP Pro	Model Name :	iSC3s
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	DC 5V from adapter	Test Mode:	Link Mode

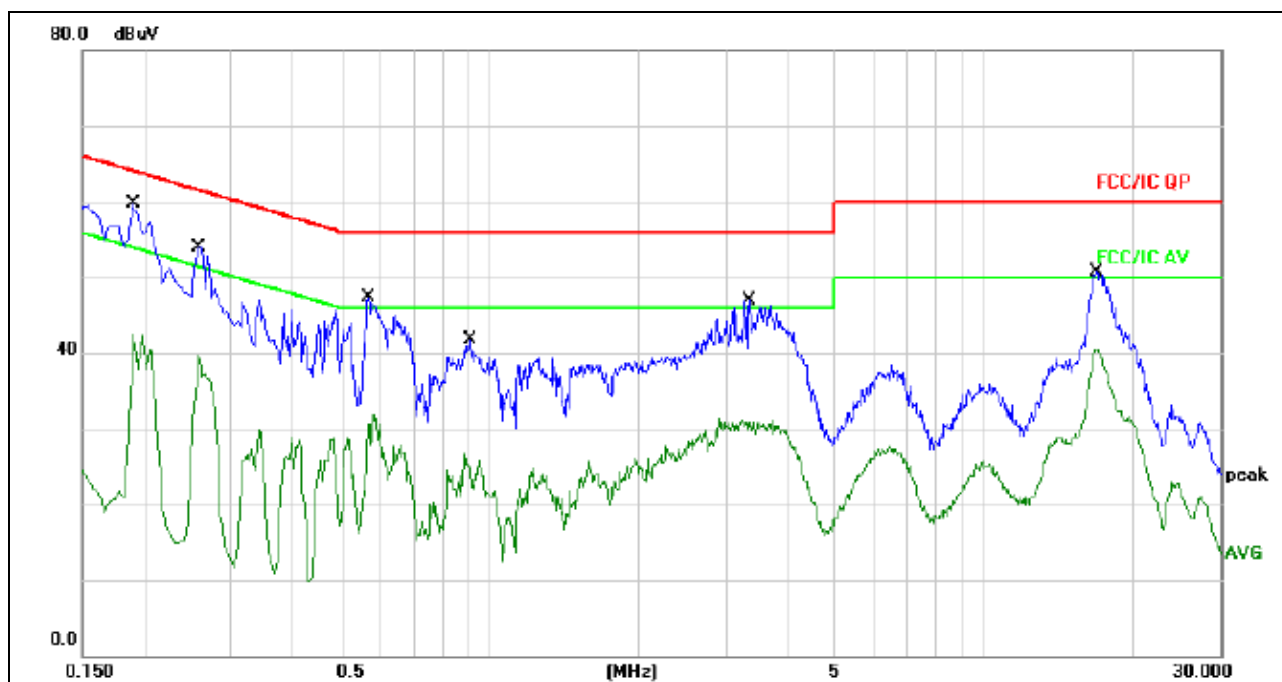


Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1860	50.72	9.66	60.38	64.21	-3.83	QP	
2		0.1860	35.81	9.66	45.47	54.21	-8.74	AVG	
3		0.2540	46.53	9.66	56.19	61.62	-5.43	QP	
4		0.2540	31.18	9.66	40.84	51.62	-10.78	AVG	
5		0.5700	37.21	9.68	46.89	56.00	-9.11	QP	
6		0.5700	24.82	9.68	34.50	46.00	-11.50	AVG	
7		3.0700	34.31	9.72	44.03	56.00	-11.97	QP	
8		3.0700	22.26	9.72	31.98	46.00	-14.02	AVG	
9		4.6660	30.82	9.73	40.55	56.00	-15.45	QP	
10		4.6660	20.39	9.73	30.12	46.00	-15.88	AVG	
11		16.9380	37.35	9.89	47.24	60.00	-12.76	QP	
12		16.9380	27.63	9.89	37.52	50.00	-12.48	AVG	

EUT:	iCamera KEEP Pro	Model Name :	iSC3s
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	DC 5V from adapter	Test Mode:	Link Mode



Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1900	50.02	9.65	59.67	64.03	-4.36	QP	
2		0.1900	32.80	9.65	42.45	54.03	-11.58	AVG	
3		0.2580	44.30	9.66	53.96	61.49	-7.53	QP	
4		0.2580	30.04	9.66	39.70	51.49	-11.79	AVG	
5		0.5700	37.72	9.68	47.40	56.00	-8.60	QP	
6		0.5700	22.20	9.68	31.88	46.00	-14.12	AVG	
7		0.9100	32.08	9.69	41.77	56.00	-14.23	QP	
8		0.9100	17.05	9.69	26.74	46.00	-19.26	AVG	
9		3.3460	37.20	9.72	46.92	56.00	-9.08	QP	
10		3.3460	21.21	9.72	30.93	46.00	-15.07	AVG	
11		16.8940	40.75	9.89	50.64	60.00	-9.36	QP	
12		16.8940	30.65	9.89	40.54	50.00	-9.46	AVG	

4.2. Radiated Emission Measurement

4.2.1. Radiated Emission Limits (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average



Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.2. TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 1.5 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- 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.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

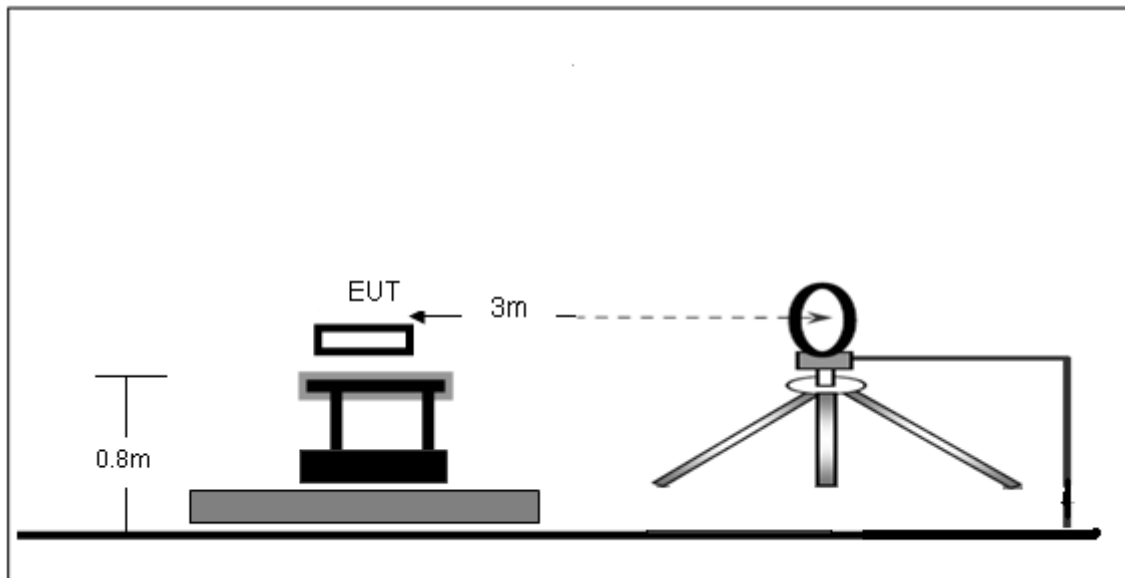
We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

4.2.3. DEVIATION FROM TEST STANDARD

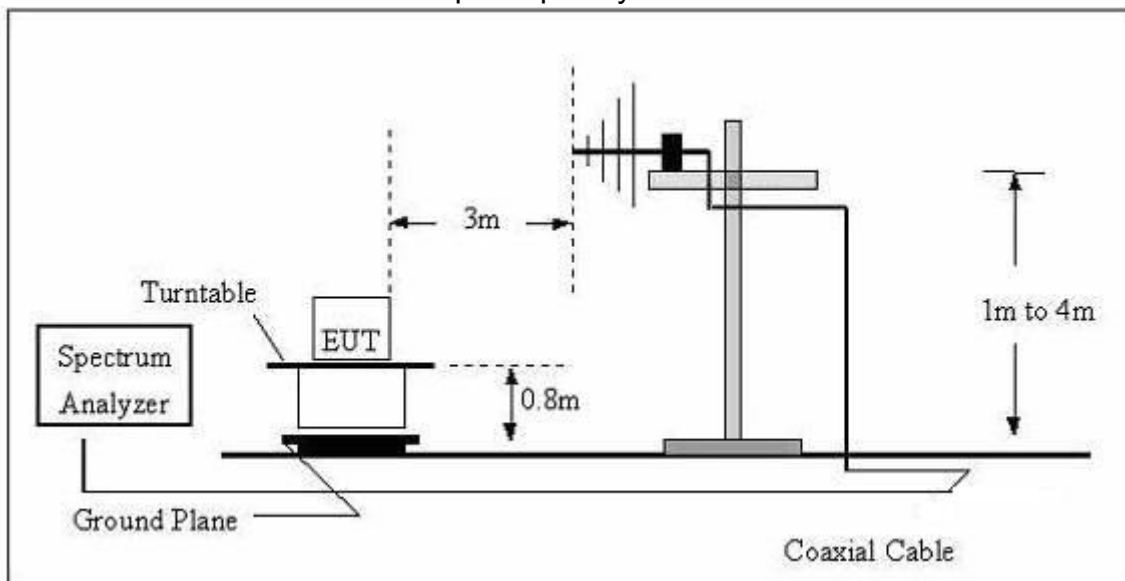
No deviation

4.2.4. TEST SETUP

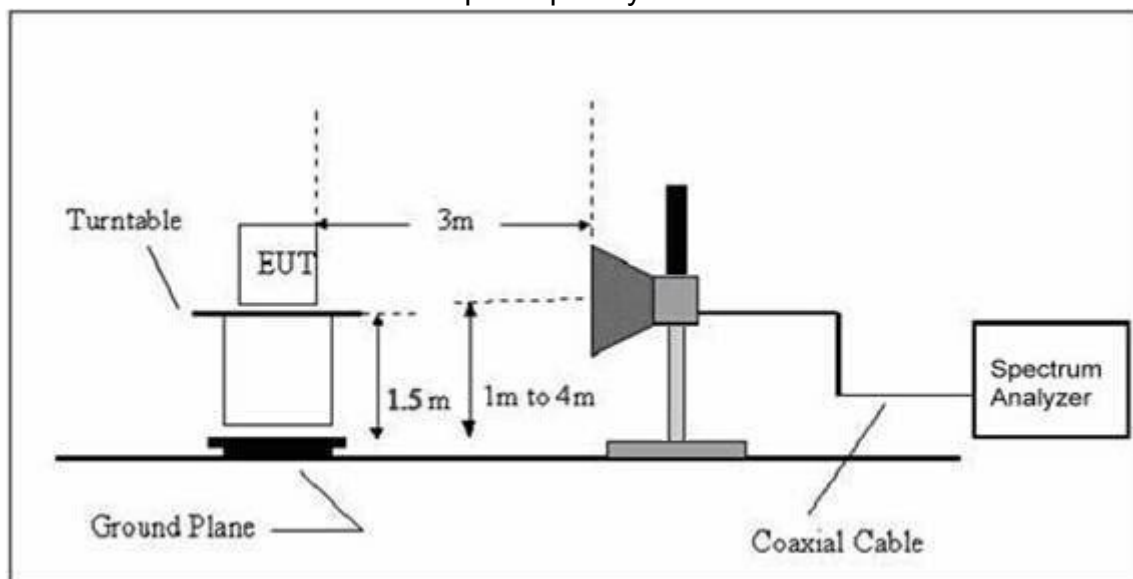
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



4.2.5. EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

We pretest all adapter's emission, only the adapter 1's data was worst and the data was recording in the report.

The data only show the worst mode.



Radiated Spurious Emission (Below 30MHz)

EUT :	iCamera KEEP Pro	Model Name :	iSC3s
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	DC 5V from adapter		
Test Mode :	TX		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

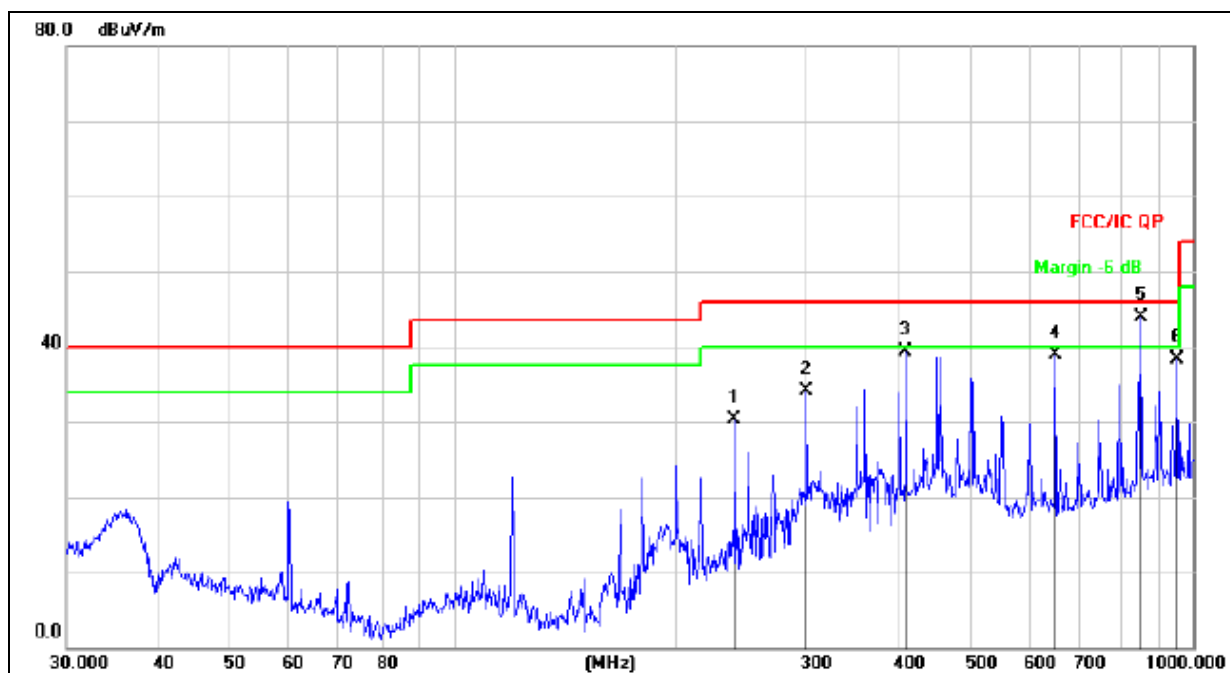
Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



Radiated Spurious Emission (Between 30MHz – 1GHz)

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 5V from adapter		
Test Mode : (Worst)	Link Mode		



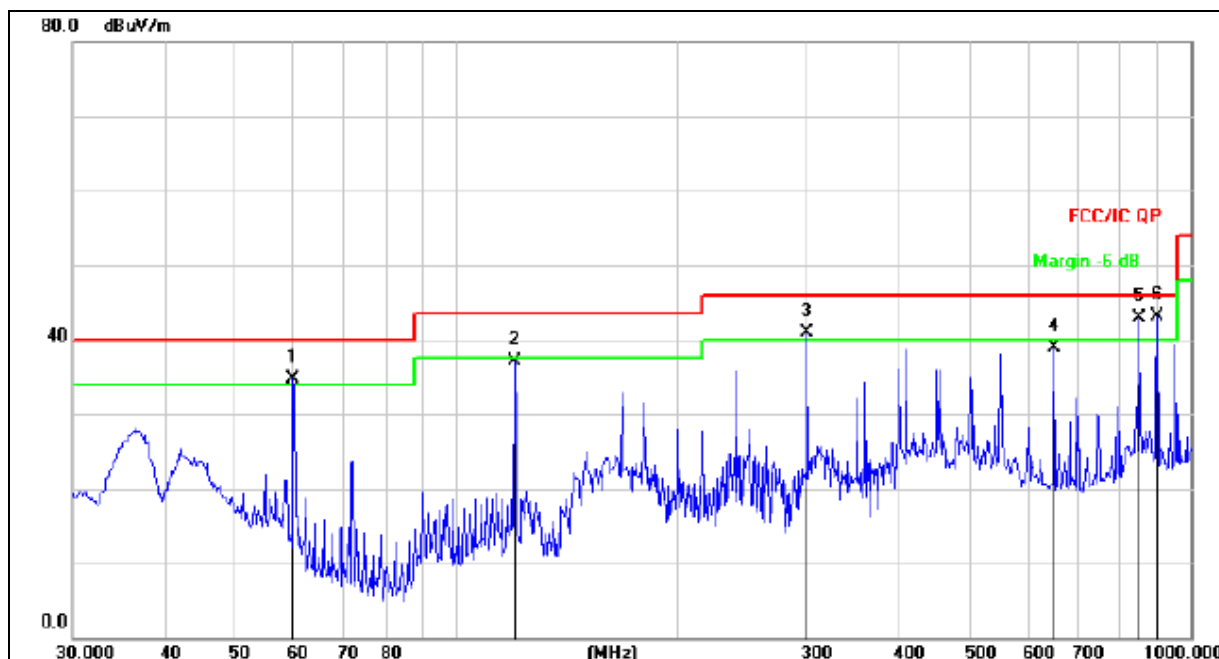
Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		239.9874	44.44	-14.12	30.32	46.00	-15.68	QP
2		300.3673	46.28	-12.09	34.19	46.00	-11.81	QP
3		408.9460	48.49	-9.13	39.36	46.00	-6.64	QP
4		651.9417	42.63	-3.78	38.85	46.00	-7.15	QP
5	*	851.0353	44.22	-0.27	43.95	46.00	-2.05	QP
6		952.0937	36.91	1.30	38.21	46.00	-7.79	QP



Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 5V from adapter		
Test Mode : (Worst)	Link Mode		



Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1	!	59.8588	50.91	-16.25	34.66	40.00	-5.34	QP
2		119.8556	55.09	-18.07	37.02	43.50	-6.48	QP
3	!	300.3673	52.93	-12.09	40.84	46.00	-5.16	QP
4		651.9417	42.78	-3.78	39.00	46.00	-7.00	QP
5	!	851.0353	43.19	-0.27	42.92	46.00	-3.08	QP
6	*	900.1474	42.34	0.70	43.04	46.00	-2.96	QP



Radiated Spurious Emission (Above 1GHz)
802.11a band 1

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5180MHz	10360.00	58.75	PK	H	36.36	10.20	27.10	59.69	74.00	Pass
	10360.00	48.45	Ave	H	36.36	10.20	27.10	49.39	54.00	Pass
	15540.00	59.26	PK	H	36.40	10.55	27.50	60.91	74.00	Pass
	15540.00	48.47	Ave	H	36.40	10.55	27.50	50.12	54.00	Pass
	10360.00	57.58	PK	V	36.63	10.20	27.10	58.25	74.00	Pass
	10360.00	48.85	Ave	V	36.63	10.20	27.10	49.52	54.00	Pass
	15540.00	58.45	PK	V	36.40	10.55	27.50	60.10	74.00	Pass
	15540.00	47.24	Ave	V	36.40	10.55	27.50	48.89	54.00	Pass
Middle Channel 5200MHz	10400.00	56.87	PK	H	36.38	10.20	27.10	57.79	74.00	Pass
	10400.00	45.63	Ave	H	36.38	10.20	27.10	46.55	54.00	Pass
	15600.00	58.22	PK	H	36.45	10.55	27.50	59.82	74.00	Pass
	15600.00	45.95	Ave	H	36.45	10.55	27.50	47.55	54.00	Pass
	10400.00	57.46	PK	V	36.68	10.20	27.10	58.08	74.00	Pass
	10400.00	47.75	Ave	V	36.68	10.20	27.10	48.37	54.00	Pass
	15600.00	58.69	PK	V	36.50	10.55	27.50	60.24	74.00	Pass
	15600.00	47.48	Ave	V	36.50	10.55	27.50	49.03	54.00	Pass
Upper Channel 5240MHz	10480.00	56.44	PK	H	36.65	10.35	27.34	57.48	74.00	Pass
	10480.00	46.25	Ave	H	36.65	10.35	27.34	47.29	54.00	Pass
	15720.00	58.36	PK	H	36.74	10.78	27.95	60.35	74.00	Pass
	15720.00	47.74	Ave	H	36.74	10.78	27.95	49.73	54.00	Pass
	10480.00	57.25	PK	V	36.65	10.35	27.34	58.29	74.00	Pass
	10480.00	45.48	Ave	V	36.65	10.35	27.34	46.52	54.00	Pass
	15720.00	59.56	PK	V	36.74	10.78	27.95	61.55	74.00	Pass
	15720.00	47.78	Ave	V	36.74	10.78	27.95	49.77	54.00	Pass

Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



802.11a band 4

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5745MHz	11490.00	56.35	PK	H	37.15	10.55	28.12	57.87	74.00	Pass
	11490.00	47.74	Ave	H	37.15	10.55	28.12	49.26	54.00	Pass
	17235.00	57.65	PK	H	37.44	10.84	28.43	59.48	74.00	Pass
	17235.00	46.75	Ave	H	37.44	10.84	28.43	48.58	54.00	Pass
	11490.00	56.47	PK	V	37.15	10.55	28.12	57.99	74.00	Pass
	11490.00	46.35	Ave	V	37.15	10.55	28.12	47.87	54.00	Pass
	17235.00	56.48	PK	V	37.44	10.84	28.43	58.31	74.00	Pass
	17235.00	46.52	Ave	V	37.44	10.84	28.43	48.35	54.00	Pass
Middle Channel 5785MHz	11570.00	57.51	PK	H	33.95	6.89	29.36	59.81	74.00	Pass
	11570.00	48.05	Ave	H	33.95	6.89	29.36	50.35	54.00	Pass
	17355.00	58.12	PK	H	35.25	7.10	27.22	57.19	74.00	Pass
	17355.00	48.52	Ave	H	35.25	7.10	27.22	47.59	54.00	Pass
	11570.00	57.44	PK	V	33.95	6.89	29.36	59.74	74.00	Pass
	11570.00	47.83	Ave	V	33.95	6.89	29.36	50.13	54.00	Pass
	17355.00	59.01	PK	V	35.25	7.10	27.22	58.08	74.00	Pass
	17355.00	47.57	Ave	V	35.25	7.10	27.22	46.64	54.00	Pass
Upper Channel 5825MHz	11650.00	57.65	PK	H	37.29	10.96	28.56	59.88	57.12	Pass
	11650.00	46.32	Ave	H	37.29	10.96	28.56	48.55	46.04	Pass
	17475.00	59.46	PK	H	37.65	11.15	28.75	61.71	59.77	Pass
	17475.00	47.28	Ave	H	37.65	11.15	28.75	49.53	48.12	Pass
	11650.00	58.71	PK	V	37.29	10.96	28.56	60.94	58.43	Pass
	11650.00	47.33	Ave	V	37.29	10.96	28.56	49.56	46.91	Pass
	17475.00	59.29	PK	V	37.65	11.15	28.75	61.54	59.21	Pass
	17475.00	46.89	Ave	V	37.65	11.15	28.75	49.14	48.24	Pass

Remark:

Emission Level = Receiver Reading + Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



802.11n20 band 1

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5180MHz	10360.00	57.81	PK	H	33.36	6.20	29.10	59.75	74.00	Pass
	10360.00	47.78	Ave	H	33.36	6.20	29.10	49.72	54.00	Pass
	15540.00	59.46	PK	H	34.40	6.55	26.50	58.11	74.00	Pass
	15540.00	48.75	Ave	H	34.40	6.55	26.50	47.40	54.00	Pass
	10360.00	57.65	PK	V	33.36	6.20	29.10	59.59	74.00	Pass
	10360.00	48.05	Ave	V	33.45	6.20	29.10	49.90	54.00	Pass
	15540.00	58.87	PK	V	34.40	6.55	26.50	57.52	74.00	Pass
	15540.00	48.96	Ave	V	34.40	6.55	26.50	47.61	54.00	Pass
Middle Channel 5200MHz	10400.00	56.50	PK	H	33.65	6.45	29.36	58.66	74.00	Pass
	10400.00	47.52	Ave	H	33.65	6.45	29.36	49.68	54.00	Pass
	15600.00	59.01	PK	H	34.72	6.84	26.68	57.81	74.00	Pass
	15600.00	47.53	Ave	H	34.72	6.84	26.68	46.33	54.00	Pass
	10400.00	57.31	PK	V	33.65	6.45	29.36	59.47	74.00	Pass
	10400.00	47.76	Ave	V	33.65	6.45	29.36	49.92	54.00	Pass
	15600.00	58.77	PK	V	34.72	6.84	26.68	57.57	74.00	Pass
	15600.00	47.82	Ave	V	34.72	6.84	26.38	46.32	54.00	Pass
Upper Channel 5240MHz	10480.00	56.69	PK	H	33.89	6.82	30.55	60.17	74.00	Pass
	10480.00	46.94	Ave	H	33.89	6.82	30.55	50.42	54.00	Pass
	15720.00	59.00	PK	H	35.12	6.95	27.85	58.68	74.00	Pass
	15720.00	47.83	Ave	H	35.12	6.95	27.85	47.51	54.00	Pass
	10480.00	57.69	PK	V	33.89	6.82	30.55	61.17	74.00	Pass
	10480.00	45.85	Ave	V	33.89	6.82	30.55	49.33	54.00	Pass
	15720.00	59.05	PK	V	35.12	6.95	27.85	58.73	74.00	Pass
	15720.00	47.98	Ave	V	35.12	6.95	27.85	47.66	54.00	Pass

Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



802.11n20 band 4

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5745MHz	11490.00	56.97	PK	H	34.26	6.45	29.23	58.39	74.00	Pass
	11490.00	47.47	Ave	H	33.26	6.45	29.23	49.89	54.00	Pass
	17235.00	58.68	PK	H	34.83	6.96	26.88	57.69	74.00	Pass
	17235.00	47.88	Ave	H	34.83	6.96	26.88	46.89	54.00	Pass
	11490.00	56.65	PK	V	34.25	6.48	29.46	58.34	74.00	Pass
	11490.00	46.35	Ave	V	33.25	6.48	29.46	49.04	54.00	Pass
	17235.00	58.92	PK	V	34.83	6.96	26.88	57.93	74.00	Pass
	17235.00	48.07	Ave	V	34.83	6.96	26.88	47.08	54.00	Pass
Middle Channel 5785MHz	11570.00	57.67	PK	H	33.95	6.89	29.36	59.97	74.00	Pass
	11570.00	46.91	Ave	H	33.95	6.89	29.36	49.21	54.00	Pass
	17355.00	58.28	PK	H	35.25	7.10	27.22	57.35	74.00	Pass
	17355.00	48.65	Ave	H	35.25	7.10	27.22	47.72	54.00	Pass
	11570.00	57.6	PK	V	33.95	6.89	29.36	59.9	74.00	Pass
	11570.00	47.46	Ave	V	33.95	6.89	29.36	49.76	54.00	Pass
	17355.00	59.17	PK	V	35.25	7.10	27.22	58.24	74.00	Pass
	17355.00	47.7	Ave	V	35.25	7.10	27.22	46.77	54.00	Pass
Upper Channel 5825MHz	11650.00	58.26	PK	H	34.35	7.15	30.15	61.21	74.00	Pass
	11650.00	46.84	Ave	H	34.35	7.15	30.15	49.79	54.00	Pass
	17475.00	59.93	PK	H	35.75	7.45	28.54	60.17	74.00	Pass
	17475.00	48.12	Ave	H	35.75	7.45	28.54	48.36	54.00	Pass
	11650.00	58.56	PK	V	34.35	7.15	30.15	61.51	74.00	Pass
	11650.00	47.02	Ave	V	34.35	7.15	30.15	49.97	54.00	Pass
	17475.00	59.37	PK	V	35.75	7.45	28.54	59.61	74.00	Pass
	17475.00	48.37	Ave	V	35.75	7.45	28.54	48.61	54.00	Pass

Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



18G~40GHz

802.11a band 1

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5180MHz	20590.00	58.81	PK	H	36.36	10.20	27.10	59.75	74.00	Pass
	20590.00	48.78	Ave	H	36.36	10.20	27.10	49.72	54.00	Pass
	25580.00	59.46	PK	H	36.40	10.55	27.50	61.11	74.00	Pass
	25590.00	48.56	Ave	H	36.40	10.55	27.50	50.21	54.00	Pass
	20590.00	57.45	PK	V	36.63	10.20	27.10	58.12	74.00	Pass
	20590.00	48.35	Ave	V	36.63	10.20	27.10	49.02	54.00	Pass
	25580.00	58.43	PK	V	36.40	10.55	27.50	60.08	74.00	Pass
	25580.00	47.96	Ave	V	36.40	10.55	27.50	49.61	54.00	Pass
Middle Channel 5200MHz	20450.00	55.50	PK	H	36.38	10.20	27.10	56.42	74.00	Pass
	20450.00	46.52	Ave	H	36.38	10.20	27.10	47.44	54.00	Pass
	25670.00	58.01	PK	H	36.45	10.55	27.50	59.61	74.00	Pass
	25670.00	46.53	Ave	H	36.45	10.55	27.50	48.13	54.00	Pass
	20450.00	57.31	PK	V	36.68	10.20	27.10	57.93	74.00	Pass
	20450.00	47.35	Ave	V	36.68	10.20	27.10	47.97	54.00	Pass
	25670.00	58.12	PK	V	36.50	10.55	27.50	59.67	74.00	Pass
	25670.00	47.76	Ave	V	36.50	10.55	27.50	49.31	54.00	Pass
Upper Channel 5240MHz	20480.00	56.64	PK	H	36.65	10.35	27.34	57.68	74.00	Pass
	20480.00	46.54	Ave	H	36.65	10.35	27.34	47.58	54.00	Pass
	25720.00	58.56	PK	H	36.74	10.78	27.95	60.55	74.00	Pass
	25720.00	47.75	Ave	H	36.74	10.78	27.95	49.74	54.00	Pass
	20480.00	57.25	PK	V	36.65	10.35	27.34	58.29	74.00	Pass
	20480.00	45.75	Ave	V	36.65	10.35	27.34	46.79	54.00	Pass
	25785.00	59.21	PK	V	36.74	10.78	27.95	61.2	74.00	Pass
	25785.00	47.68	Ave	V	36.74	10.78	27.95	49.67	54.00	Pass

Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



802.11a band 4

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5745MHz	214560.00	56.85	PK	H	37.15	10.55	28.12	58.37	74.00	Pass
	21456.00	47.56	Ave	H	37.15	10.55	28.12	49.08	54.00	Pass
	27235.00	58.62	PK	H	37.44	10.84	28.43	60.45	74.00	Pass
	27235.00	47.48	Ave	H	37.44	10.84	28.43	49.31	54.00	Pass
	214560.00	56.45	PK	V	37.15	10.55	28.12	57.97	74.00	Pass
	21456.00	46.25	Ave	V	37.15	10.55	28.12	47.77	54.00	Pass
	27235.00	57.92	PK	V	37.44	10.84	28.43	59.75	74.00	Pass
	27235.00	47.62	Ave	V	37.44	10.84	28.43	49.45	54.00	Pass
Middle Channel 5785MHz	21548.00	57.27	PK	H	37.15	10.89	28.35	59.36	74.00	Pass
	21548.00	46.84	Ave	H	37.15	10.89	28.35	48.93	54.00	Pass
	27395.00	58.19	PK	H	37.44	10.95	28.54	60.24	74.00	Pass
	27395.00	48.52	Ave	H	37.44	10.95	28.54	50.57	54.00	Pass
	21548.00	57.53	PK	V	37.15	10.89	28.35	59.62	74.00	Pass
	21548.00	47.37	Ave	V	37.15	10.89	28.35	49.46	54.00	Pass
	27395.00	59.21	PK	V	37.44	10.95	28.54	61.26	74.00	Pass
	27395.00	47.18	Ave	V	37.44	10.95	28.54	49.23	54.00	Pass
Upper Channel 5825MHz	21750.00	57.86	PK	H	37.29	10.96	28.56	60.09	74.00	Pass
	21750.00	46.65	Ave	H	37.29	10.96	28.56	48.88	54.00	Pass
	27494.00	59.44	PK	H	37.65	11.15	28.75	61.69	74.00	Pass
	27494.00	47.55	Ave	H	37.65	11.15	28.75	49.8	54.00	Pass
	21750.00	58.39	PK	V	37.29	10.96	28.56	60.62	74.00	Pass
	21750.00	47.11	Ave	V	37.29	10.96	28.56	49.34	54.00	Pass
	27494.00	59.74	PK	V	37.65	11.15	28.75	61.99	74.00	Pass
	27494.00	47.56	Ave	V	37.65	11.15	28.75	49.81	54.00	Pass

Remark:

Emission Level = Receiver Reading + Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



802.11n20 band 1

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5180MHz	20590.00	58.67	PK	H	36.36	10.20	27.10	59.61	74.00	Pass
	20590.00	48.45	Ave	H	36.36	10.20	27.10	49.39	54.00	Pass
	25580.00	59.61	PK	H	36.40	10.55	27.50	61.26	74.00	Pass
	25590.00	48.49	Ave	H	36.40	10.55	27.50	50.14	54.00	Pass
	20590.00	57.57	PK	V	36.63	10.20	27.10	58.24	74.00	Pass
	20590.00	48.85	Ave	V	36.63	10.20	27.10	49.52	54.00	Pass
	25580.00	58.45	PK	V	36.40	10.55	27.50	60.10	74.00	Pass
	25580.00	47.23	Ave	V	36.40	10.55	27.50	48.88	54.00	Pass
Middle Channel 5200MHz	20450.00	56.87	PK	H	36.38	10.20	27.10	57.79	74.00	Pass
	20450.00	45.63	Ave	H	36.38	10.20	27.10	46.55	54.00	Pass
	25670.00	58.22	PK	H	36.45	10.55	27.50	59.82	74.00	Pass
	25670.00	45.95	Ave	H	36.45	10.55	27.50	47.55	54.00	Pass
	20450.00	57.46	PK	V	36.68	10.20	27.10	58.08	74.00	Pass
	20450.00	47.75	Ave	V	36.68	10.20	27.10	48.37	54.00	Pass
	25670.00	58.69	PK	V	36.50	10.55	27.50	60.24	74.00	Pass
	25670.00	47.48	Ave	V	36.50	10.55	27.50	49.03	54.00	Pass
Upper Channel 5240MHz	20480.00	56.25	PK	H	36.65	10.35	27.34	57.29	74.00	Pass
	20480.00	46.37	Ave	H	36.65	10.35	27.34	47.41	54.00	Pass
	25720.00	58.71	PK	H	36.74	10.78	27.95	60.7	74.00	Pass
	25720.00	47.48	Ave	H	36.74	10.78	27.95	49.47	54.00	Pass
	20480.00	57.19	PK	V	36.65	10.35	27.34	58.23	74.00	Pass
	20480.00	45.47	Ave	V	36.65	10.35	27.34	46.51	54.00	Pass
	25785.00	59.38	PK	V	36.74	10.78	27.95	61.37	74.00	Pass
	25785.00	47.44	Ave	V	36.74	10.78	27.95	49.43	54.00	Pass

Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.



802.11n20 band 4

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5745MHz	214560.00	56.37	PK	H	37.15	10.55	28.12	57.89	74.00	Pass
	21456.00	47.78	Ave	H	37.15	10.55	28.12	49.3	54.00	Pass
	27235.00	57.62	PK	H	37.44	10.84	28.43	59.45	74.00	Pass
	27235.00	46.48	Ave	H	37.44	10.84	28.43	48.31	54.00	Pass
	214560.00	56.22	PK	V	37.15	10.55	28.12	57.74	74.00	Pass
	21456.00	46.47	Ave	V	37.15	10.55	28.12	47.99	54.00	Pass
	27235.00	57.78	PK	V	37.44	10.84	28.43	59.61	74.00	Pass
	27235.00	47.12	Ave	V	37.44	10.84	28.43	48.95	54.00	Pass
Middle Channel 5785MHz	21548.00	57.45	PK	H	37.15	10.89	28.35	59.54	74.00	Pass
	21548.00	46.39	Ave	H	37.15	10.89	28.35	48.48	54.00	Pass
	27395.00	58.48	PK	H	37.44	10.95	28.54	60.53	74.00	Pass
	27395.00	48.29	Ave	H	37.44	10.95	28.54	50.34	54.00	Pass
	21548.00	57.35	PK	V	37.15	10.89	28.35	59.44	74.00	Pass
	21548.00	47.46	Ave	V	37.15	10.89	28.35	49.55	54.00	Pass
	27395.00	59.57	PK	V	37.44	10.95	28.54	61.62	74.00	Pass
	27395.00	47.33	Ave	V	37.44	10.95	28.54	49.38	54.00	Pass
Upper Channel 5825MHz	21750.00	57.78	PK	H	37.29	10.96	28.56	60.01	74.00	Pass
	21750.00	46.21	Ave	H	37.29	10.96	28.56	48.44	54.00	Pass
	27494.00	59.44	PK	H	37.65	11.15	28.75	61.69	74.00	Pass
	27494.00	47.51	Ave	H	37.65	11.15	28.75	49.76	54.00	Pass
	21750.00	58.35	PK	V	37.29	10.96	28.56	60.58	74.00	Pass
	21750.00	47.22	Ave	V	37.29	10.96	28.56	49.45	54.00	Pass
	27494.00	59.38	PK	V	37.65	11.15	28.75	61.63	74.00	Pass
	27494.00	47.14	Ave	V	37.65	11.15	28.75	49.39	54.00	Pass

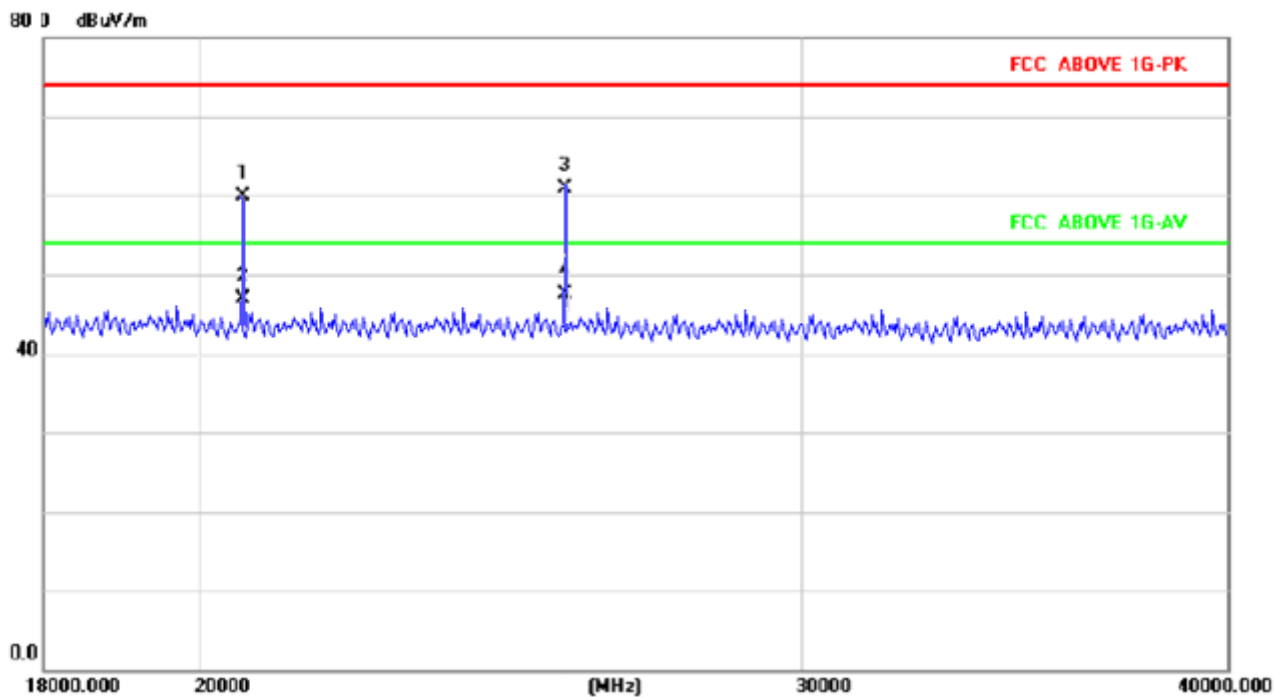
Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

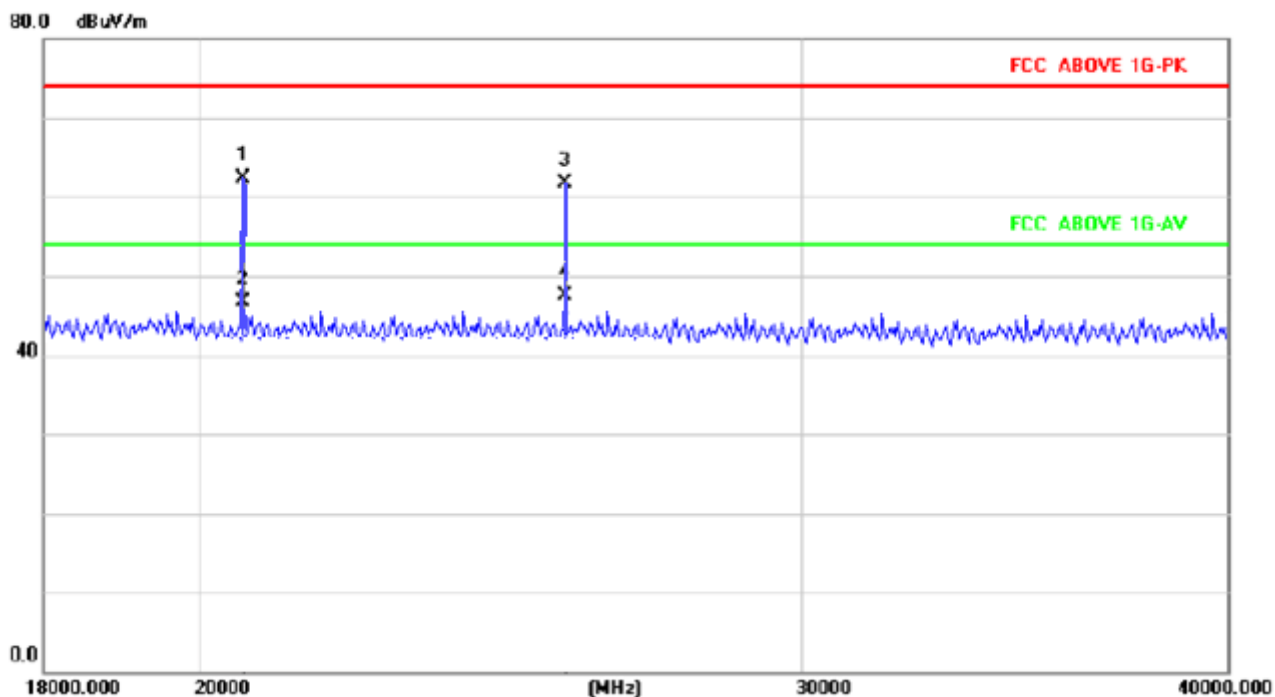
Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.

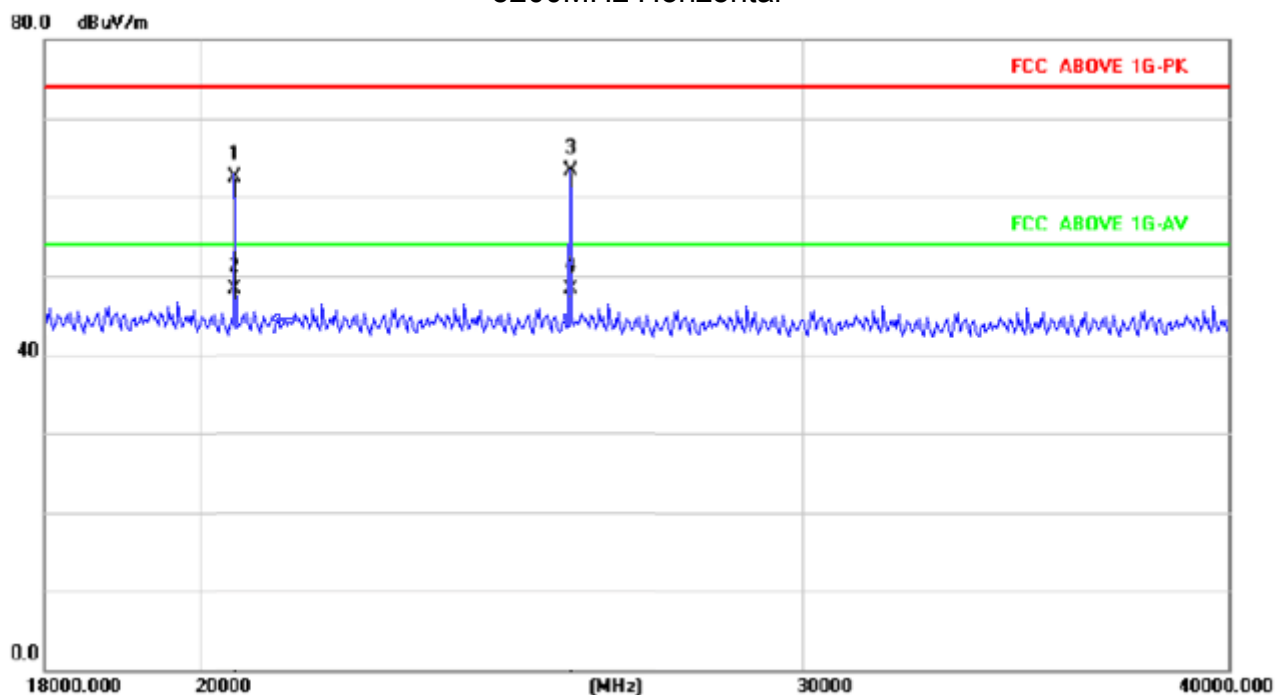
802.11a band 1 5180MHz Horizontal



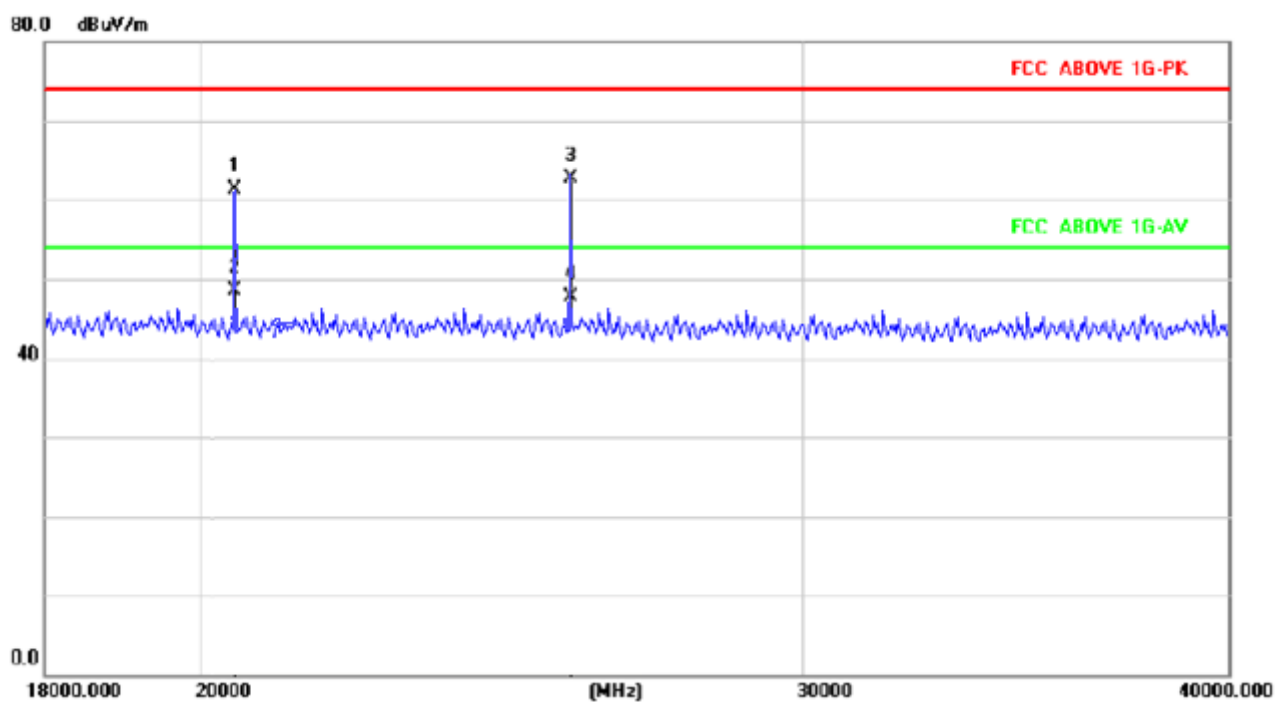
5180MHz Vertical



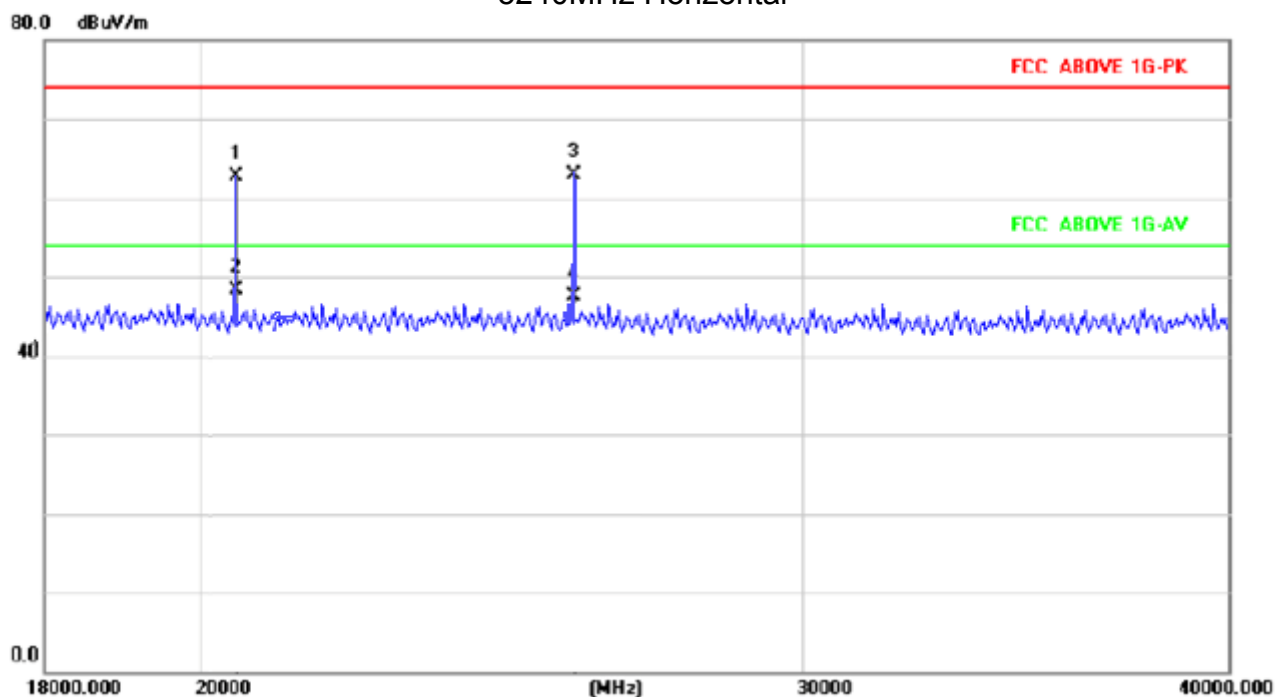
5200MHz Horizontal



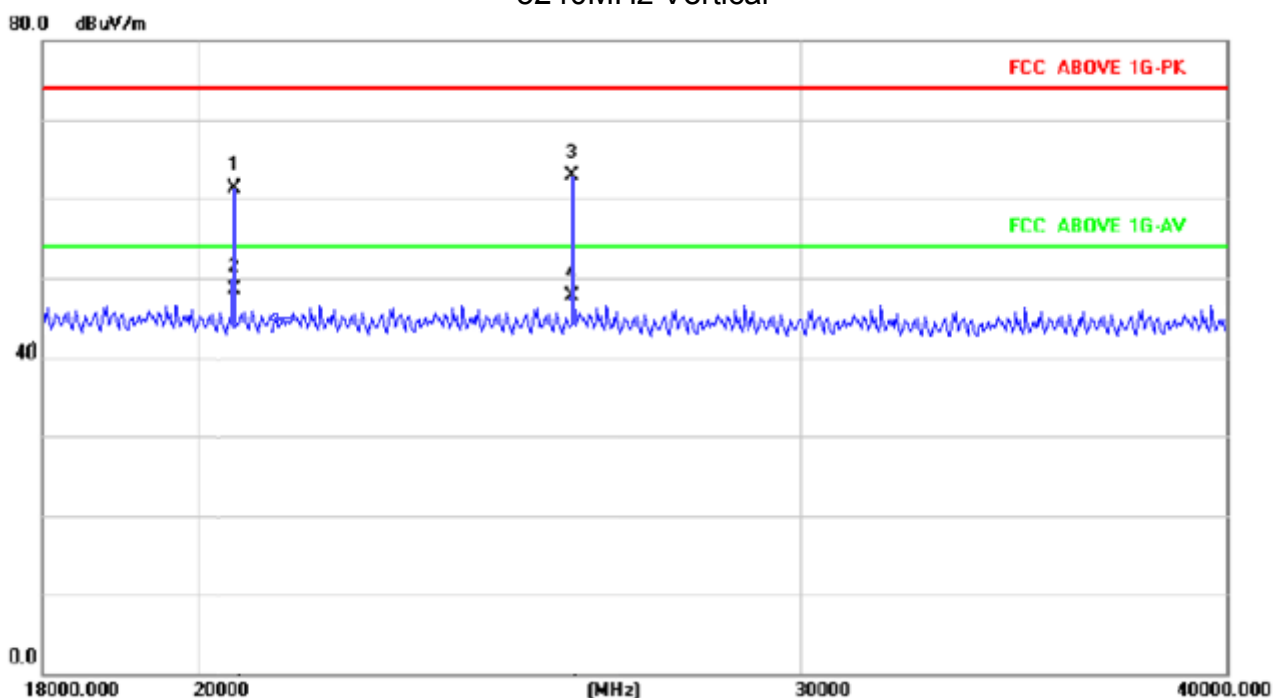
5200MHz Vertical



5240MHz Horizontal



5240MHz Vertical



Note: "802.11a band 1" mode is the worst mode and the data recording in the report.

5. BAND EDGE COMPLIANCE TEST

5.1. Limits

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

5.2. TEST PROCEDURE

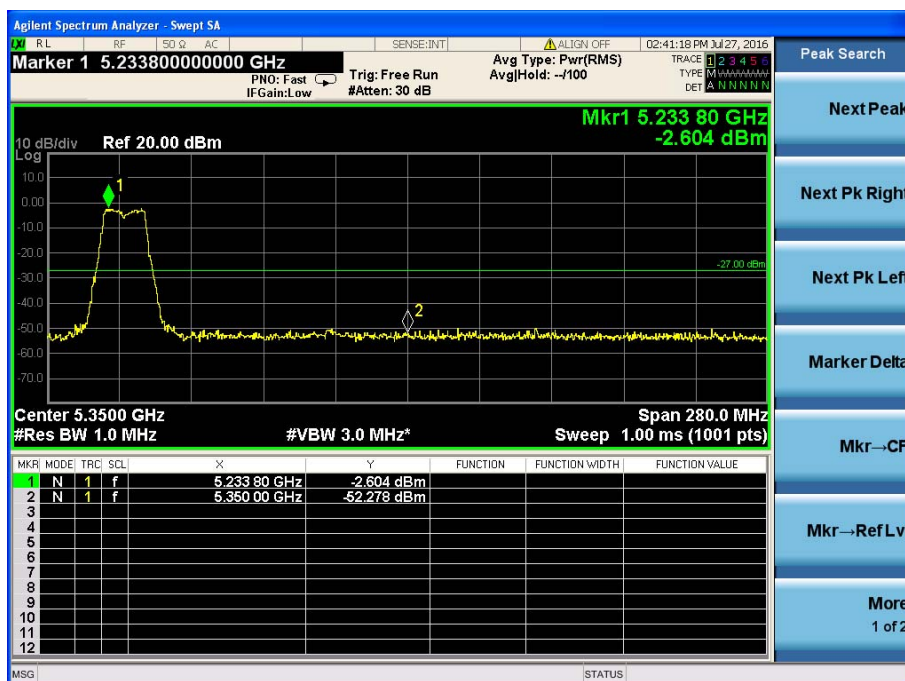
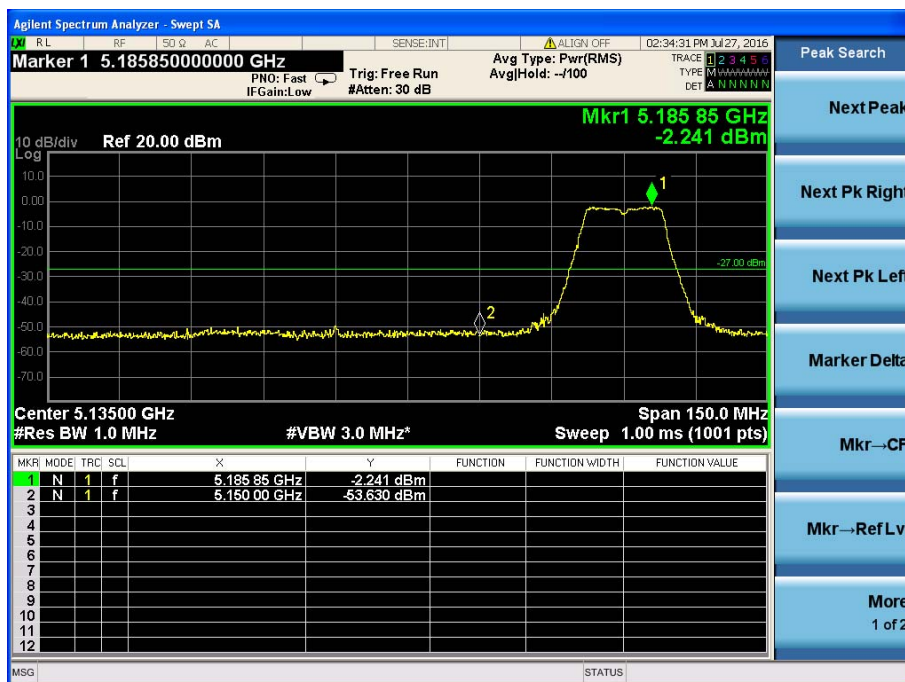
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
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.

5.3. Test Data

Please see data as below:

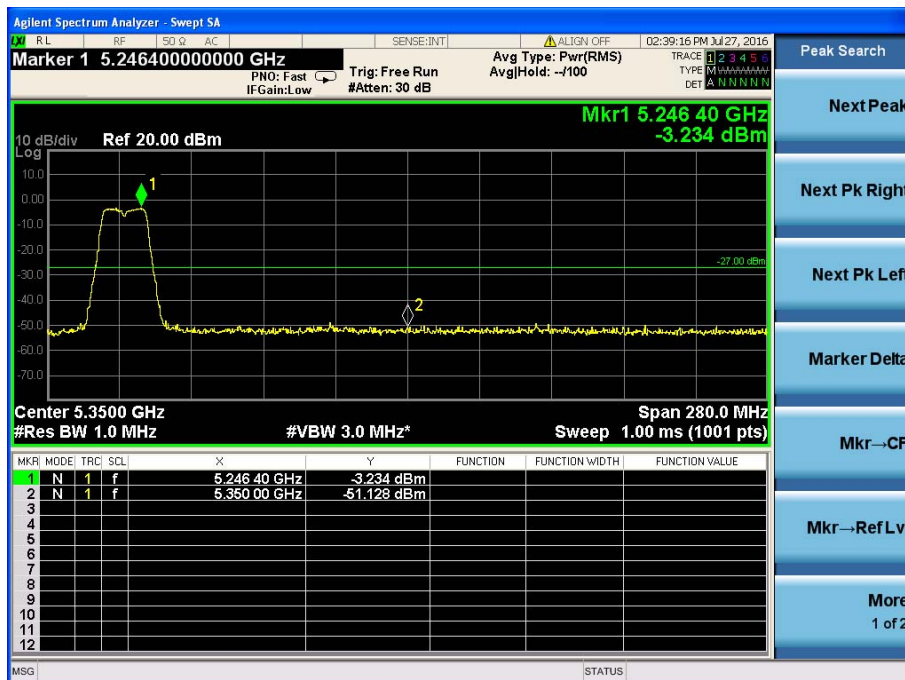
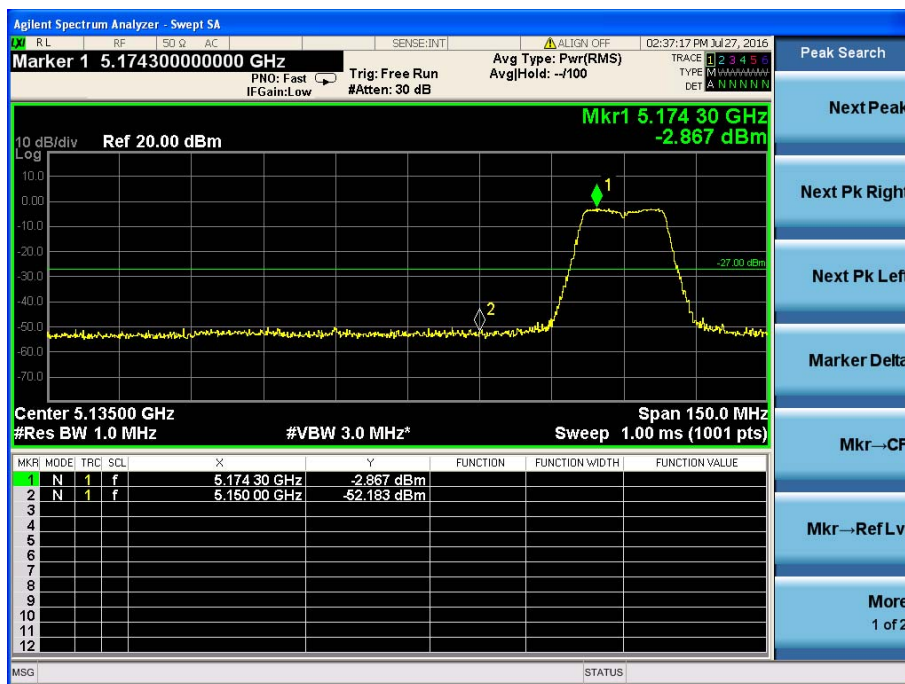


Band 1
802.11a



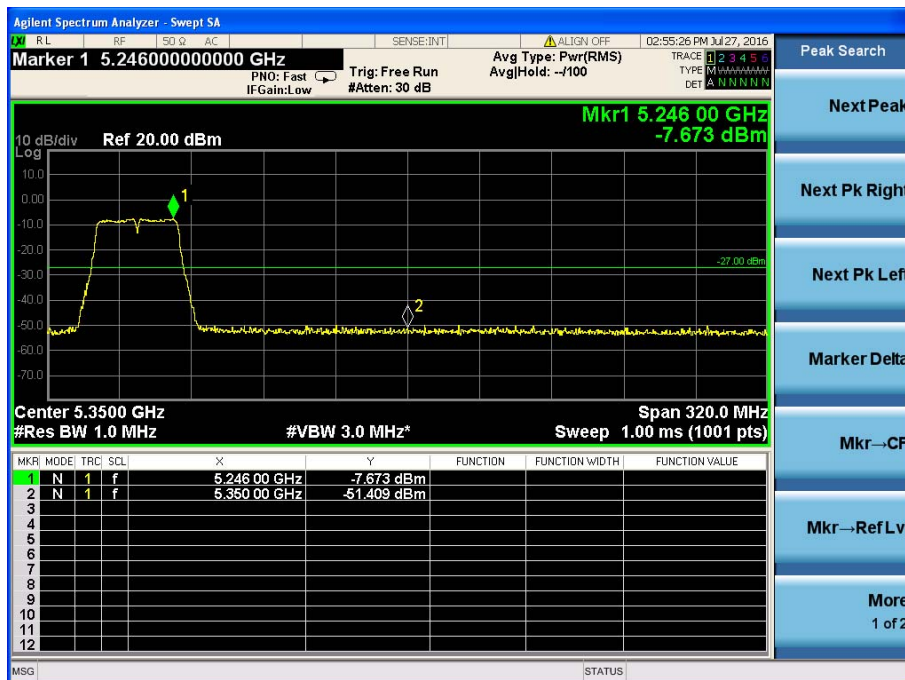
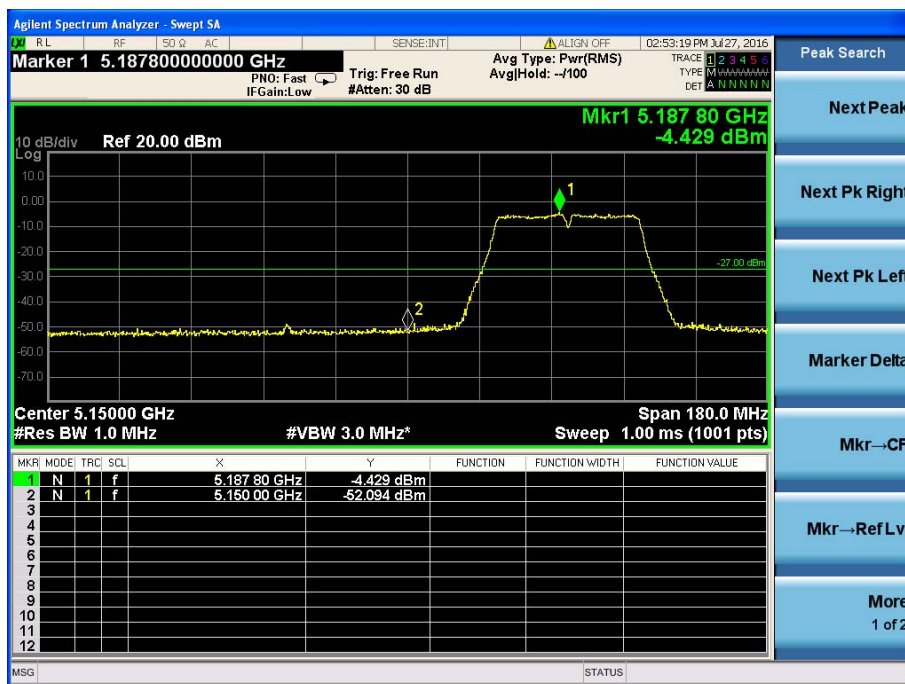


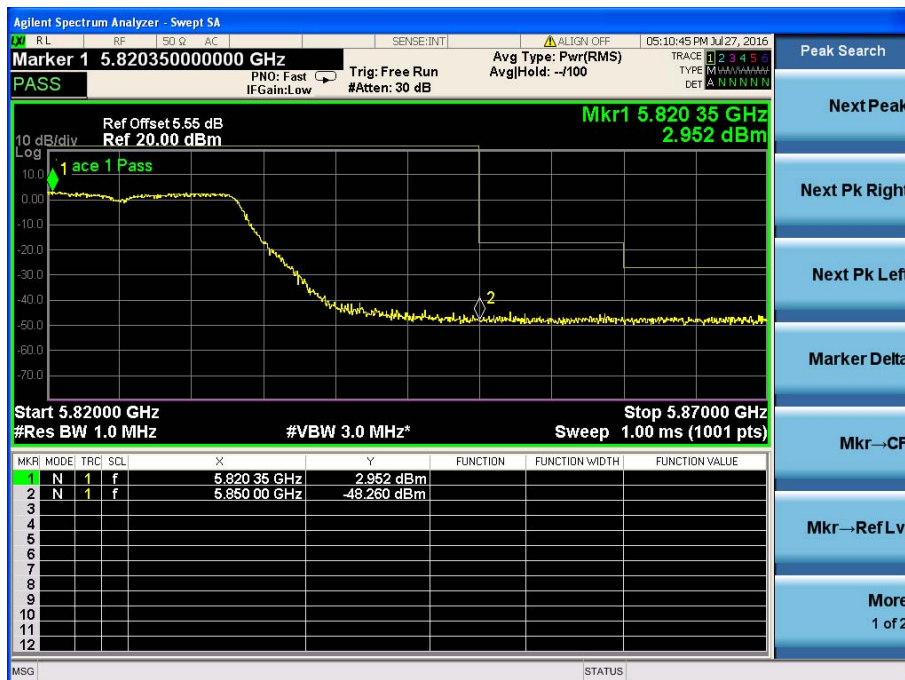
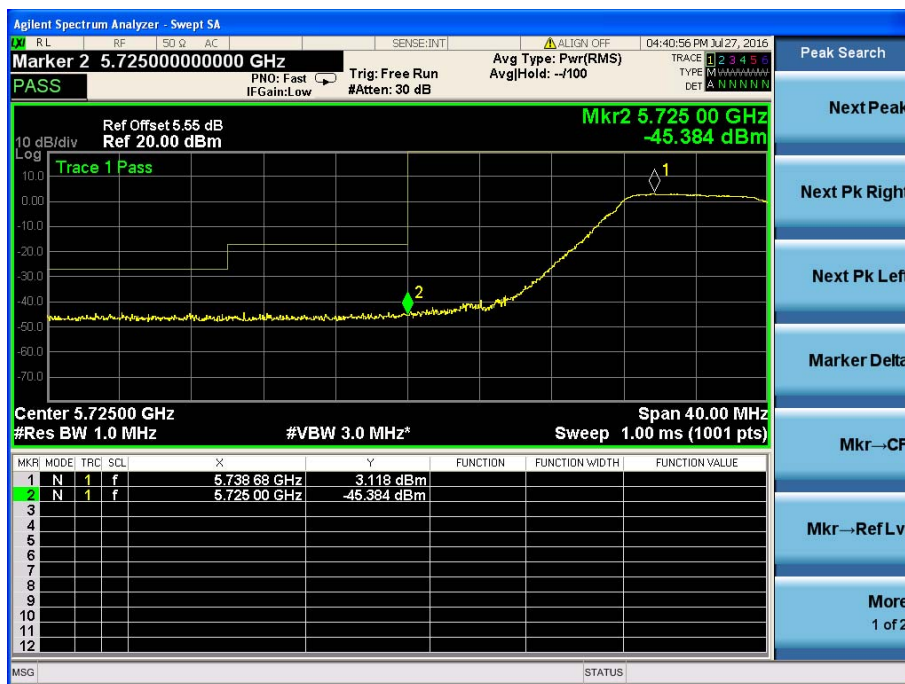
802.11n20





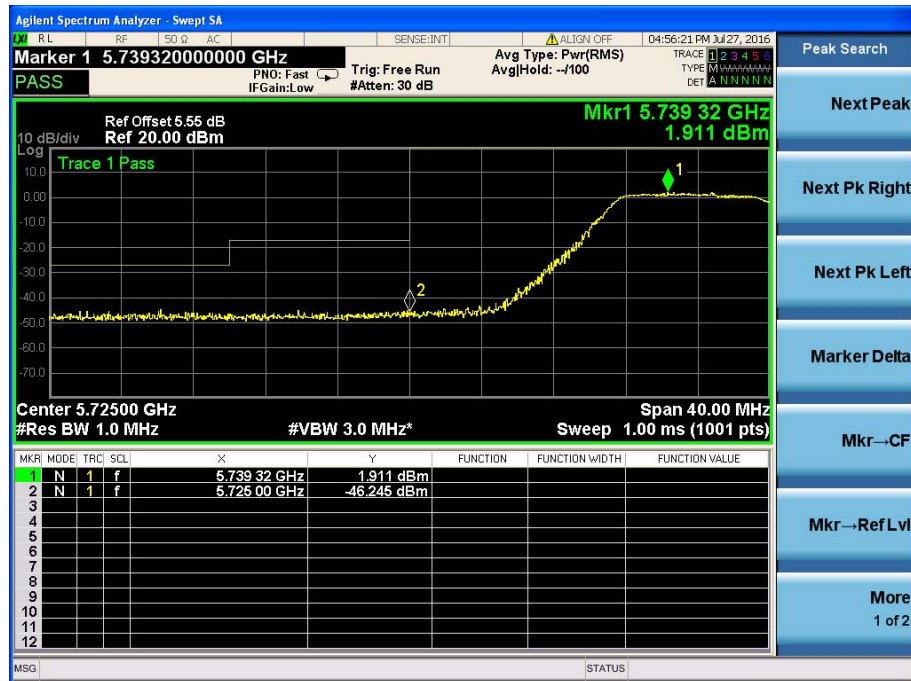
802.11n40



Band 4
802.11a

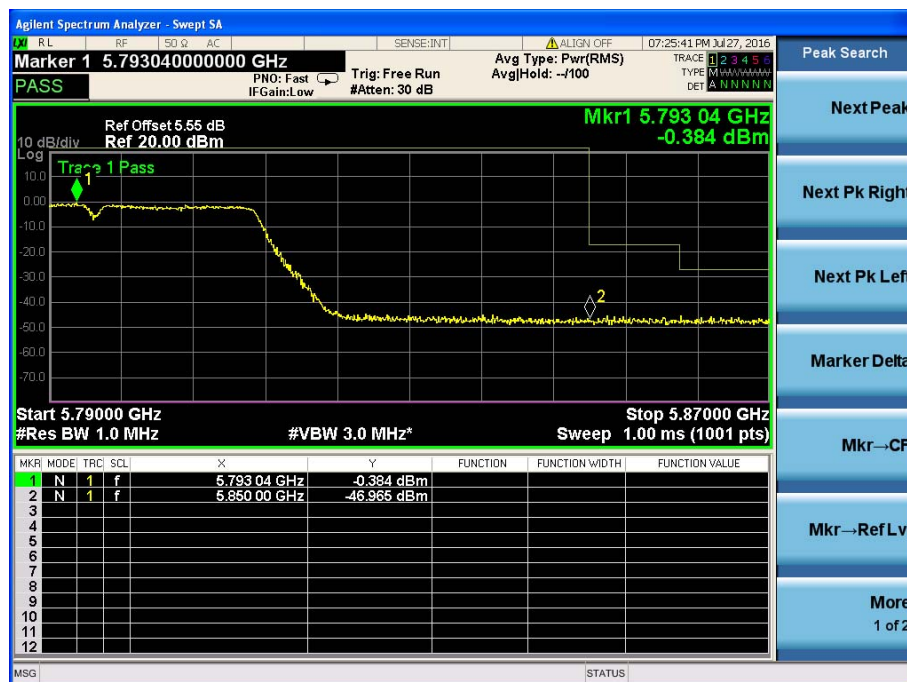


802.11n20





802.11n40



6. 26DB AND 99% BANDWIDTH TEST

6.1. Applied procedures / limit

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

6.2. TEST PROCEDURE

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The following procedure shall be used for measuring (99 %) power bandwidth:

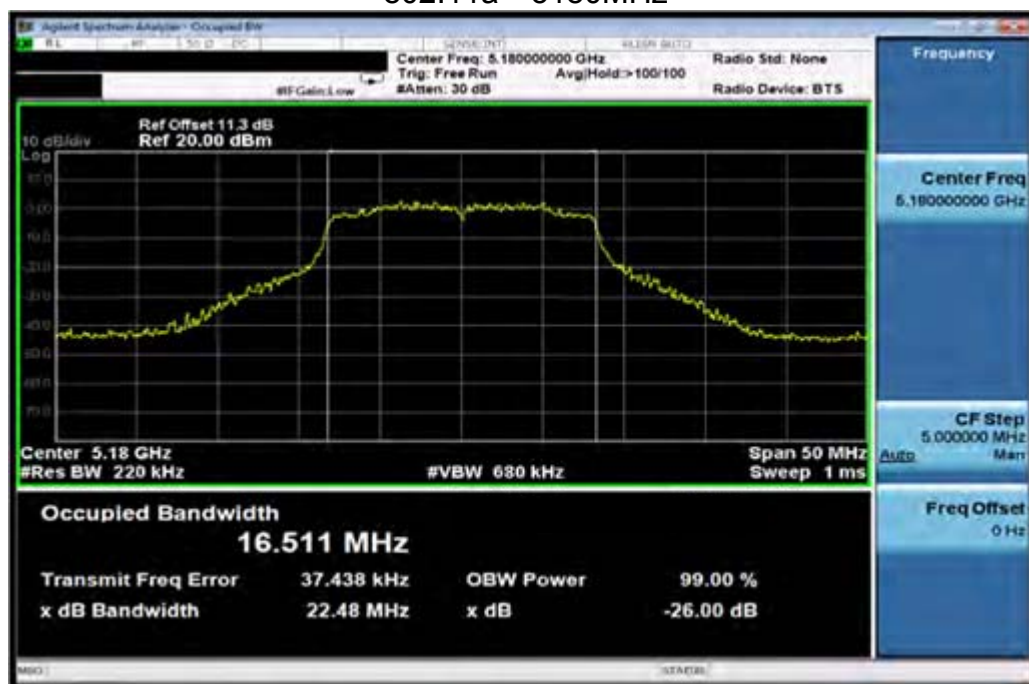
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 \cdot$ RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

6.3. Test result

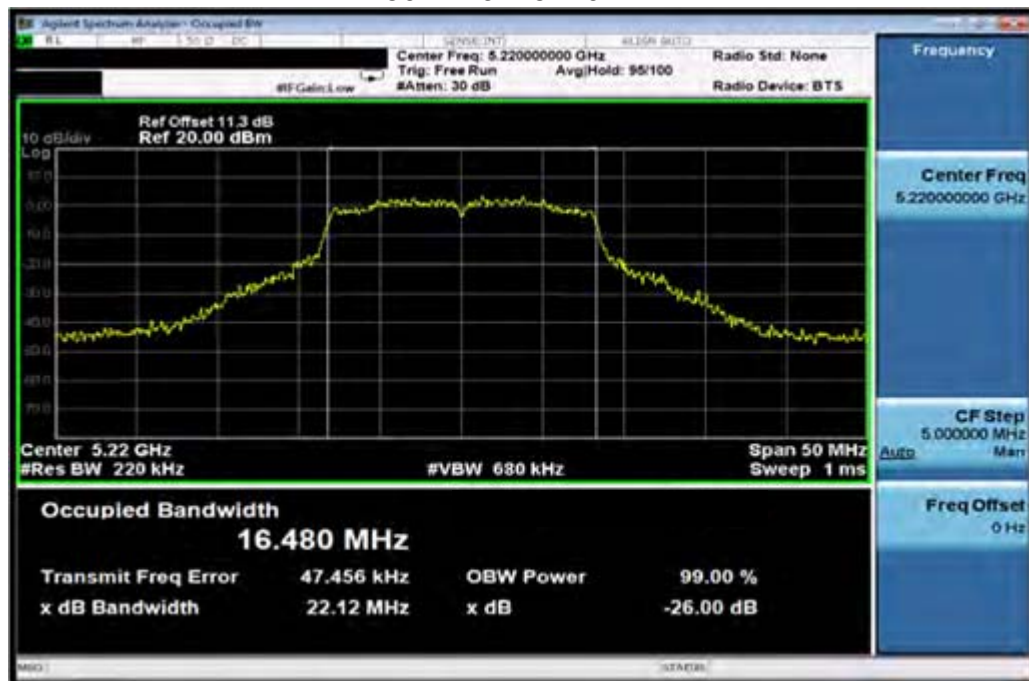
26dB bandwidth

	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	22.48	16.51
	5200	22.12	16.48
	5240	22.49	16.49
802.11n (HT20)	5180	23.00	17.65
	5200	23.78	17.70
	5240	23.07	17.69
802.11n (HT40)	5190	43.22	36.17
	5230	42.81	36.14

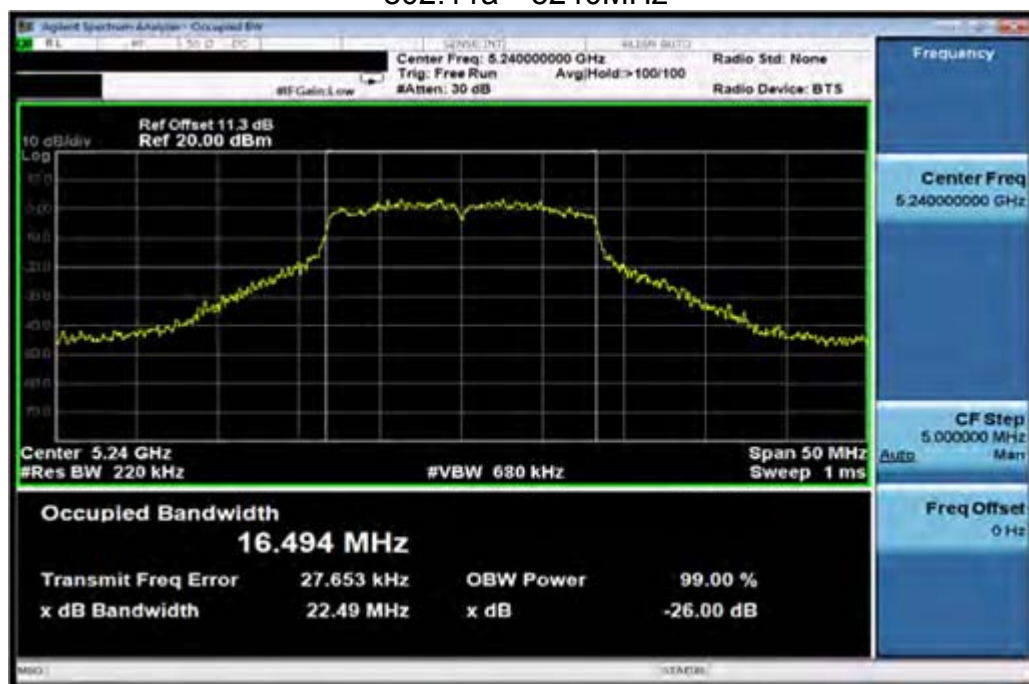
802.11a 5180MHz



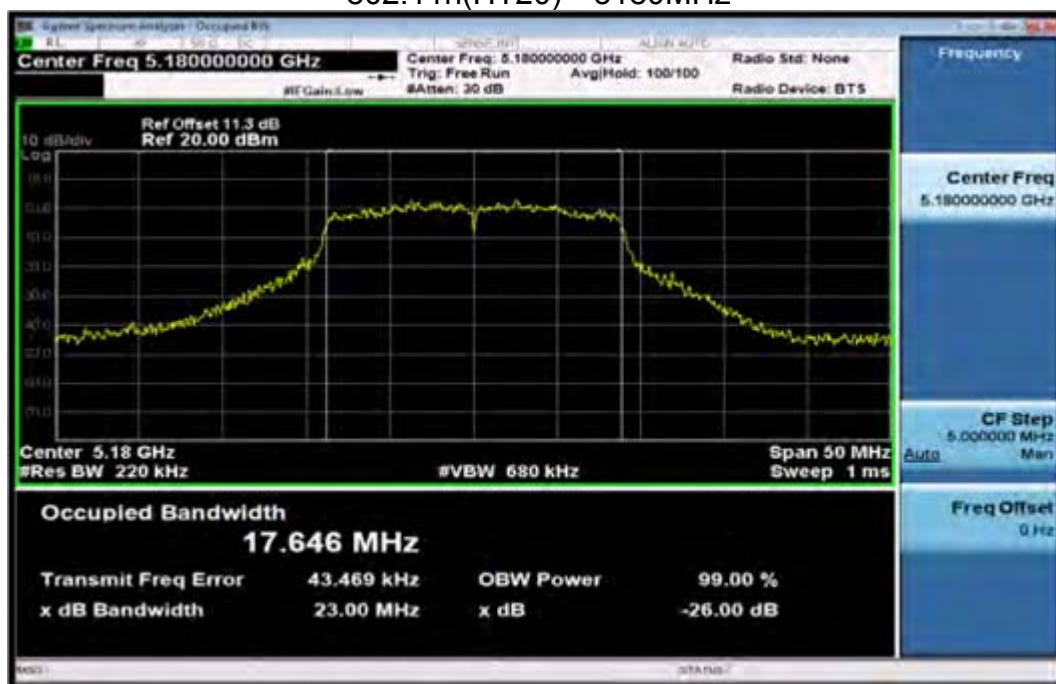
802.11a 5220MHz



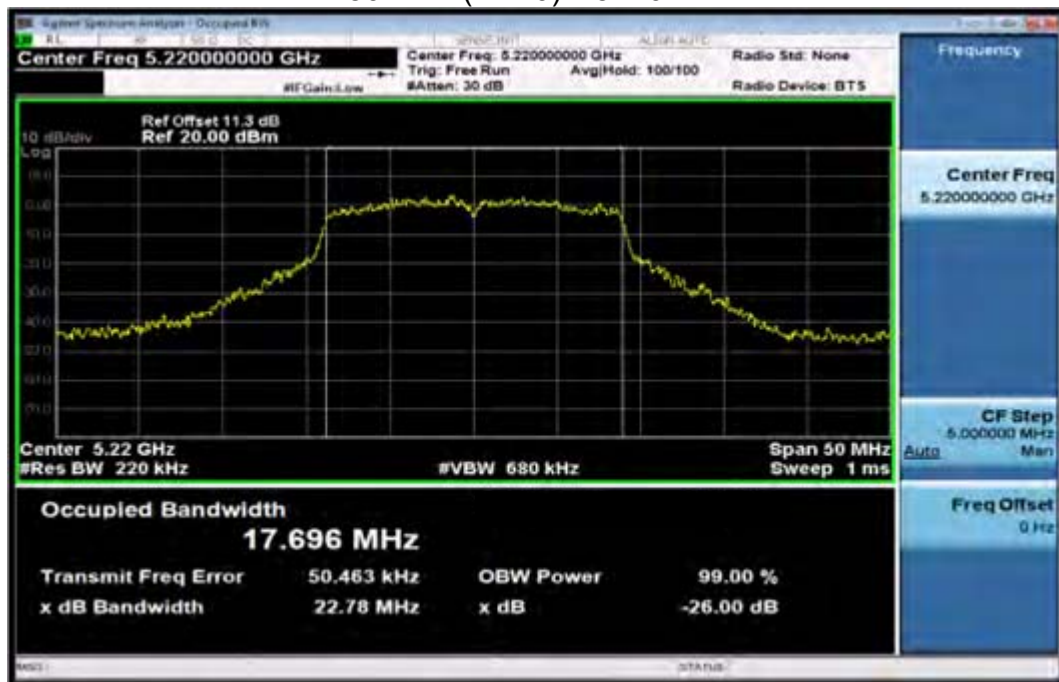
802.11a 5240MHz



802.11n(HT20) 5180MHz



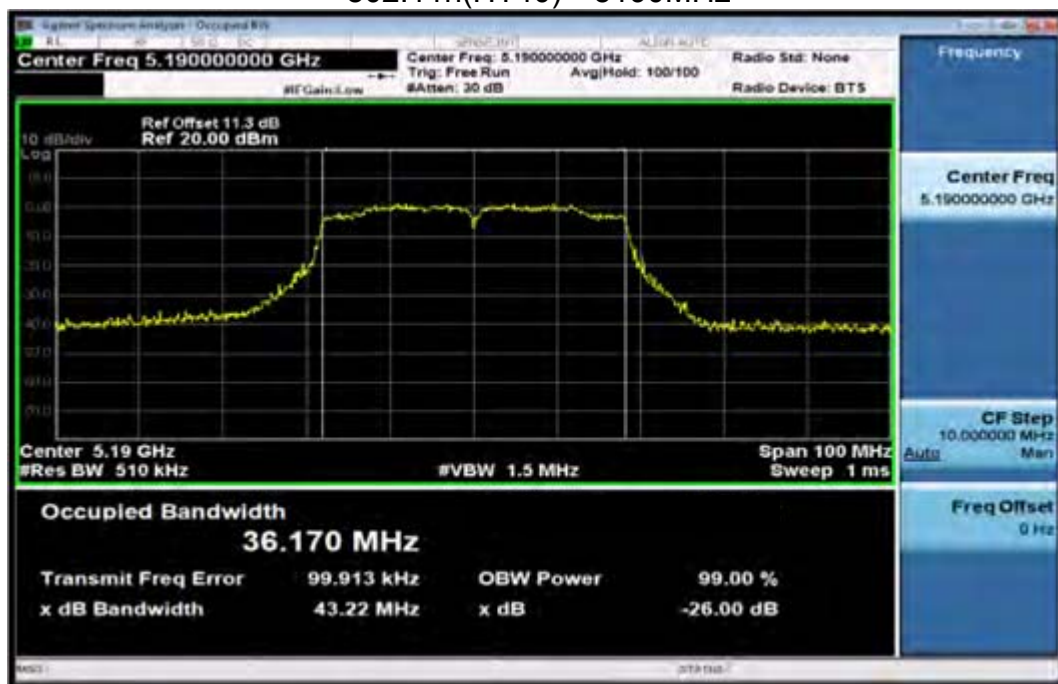
802.11n(HT20) 5220MHz



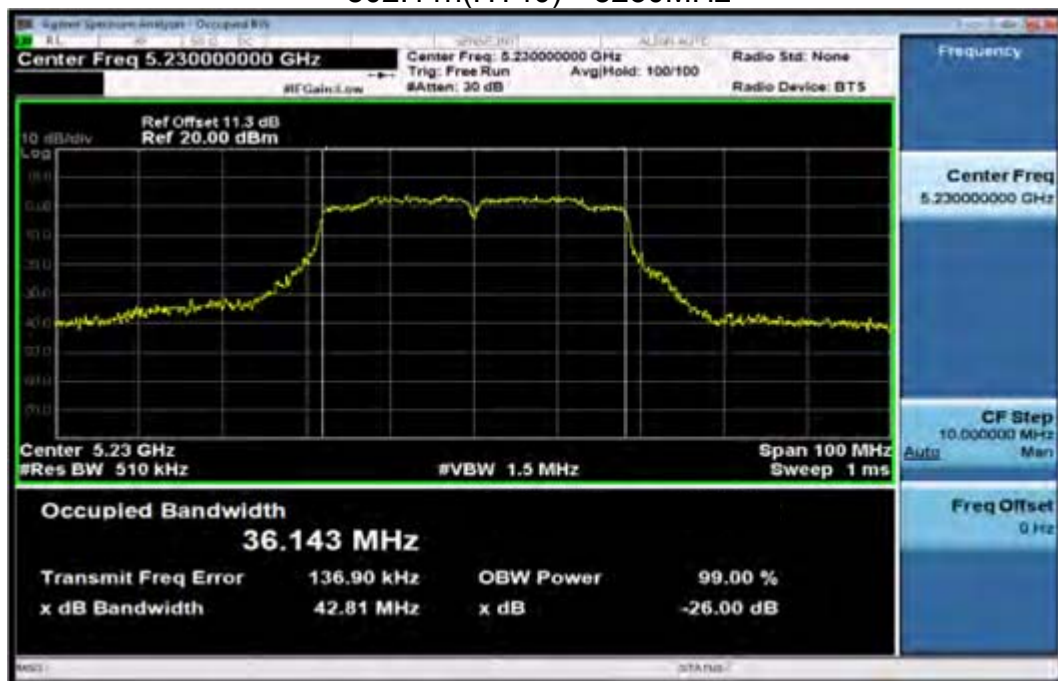
802.11n(HT20) 5240MHz



802.11n(HT40) 5190MHz



802.11n(HT40) 5230MHz



7. MINIMUM 6 DB BANDWIDTH

7.1. Applied procedures / limit

According to FCC §15.407(e)

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

7.2. TEST PROCEDURE

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

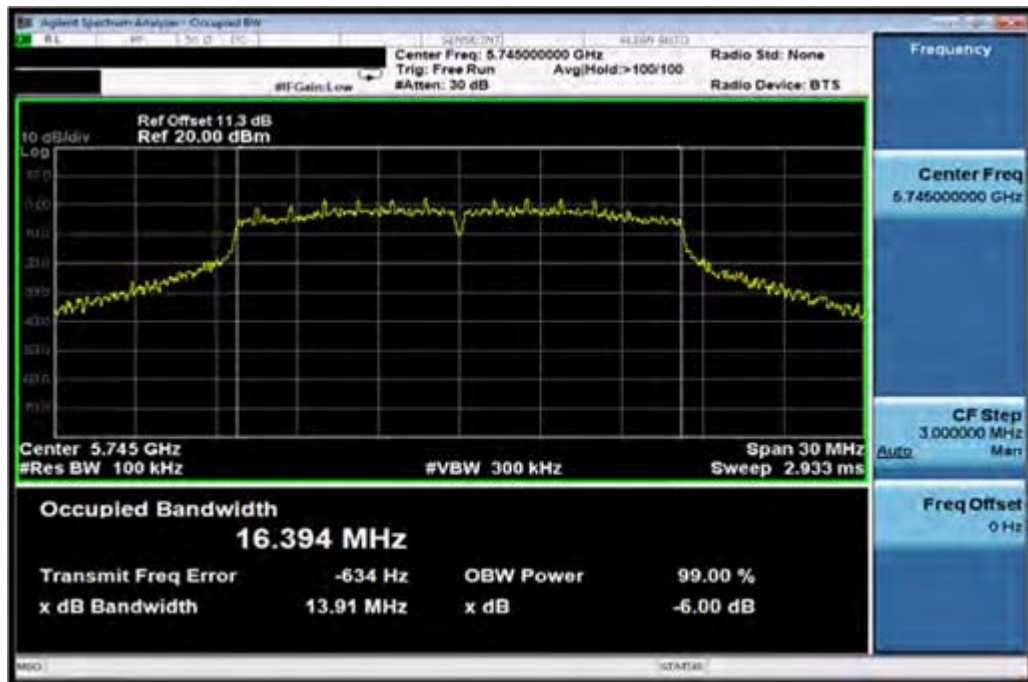
- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points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

7.3. Test result

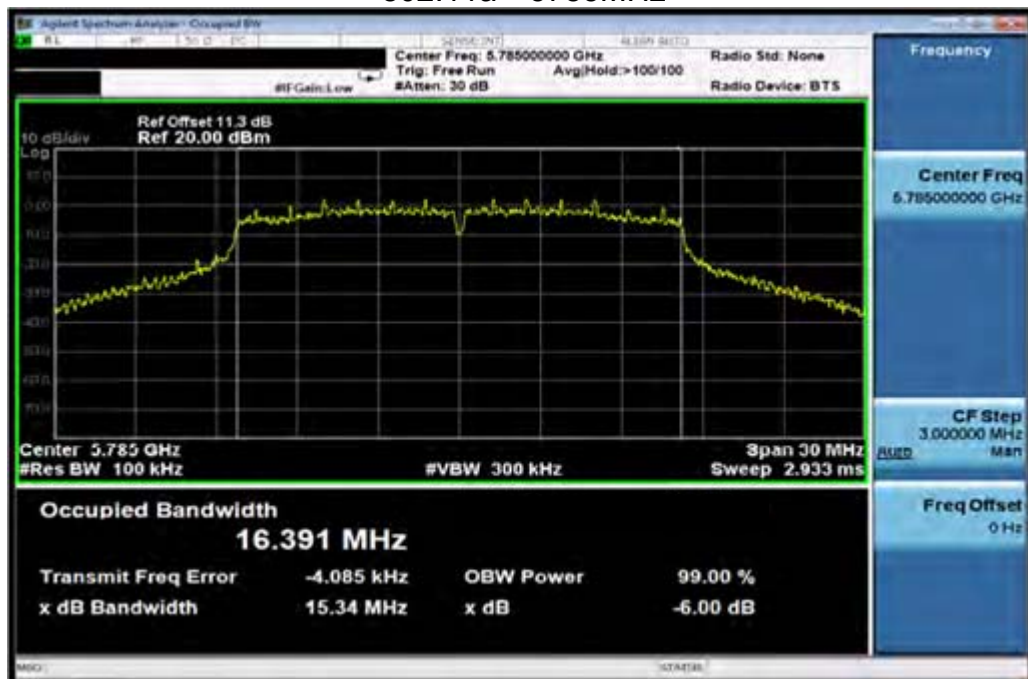
6dB bandwidth

	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
802.11a	5745	13.91	16.39	>0.5
	5785	15.34	16.39	>0.5
	5825	12.35	16.40	>0.5
802.11n (HT20)	5745	13.90	17.58	>0.5
	5785	15.05	17.58	>0.5
	5825	13.82	17.59	>0.5
802.11n (HT40)	5755	35.14	35.92	>0.5
	5795	33.89	35.95	>0.5

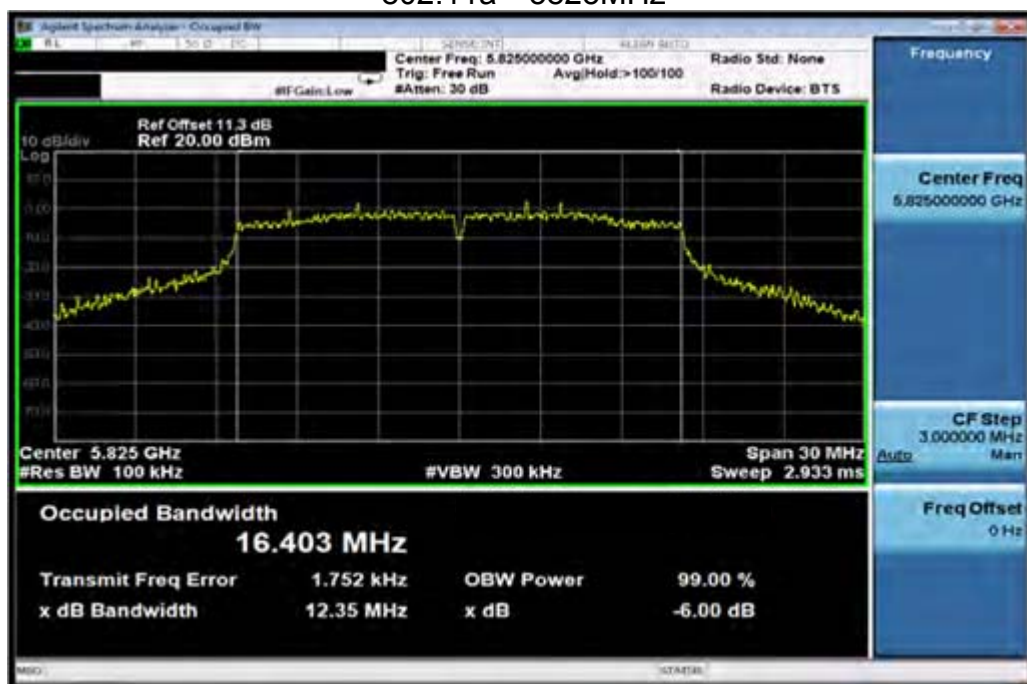
802.11a 5745MHz



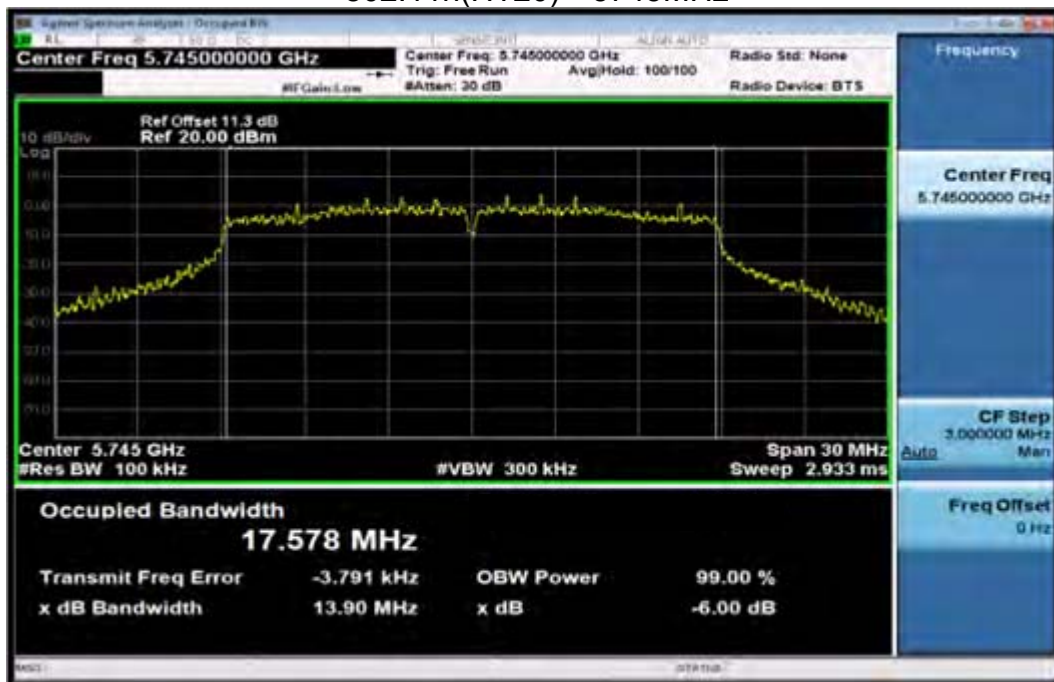
802.11a 5785MHz



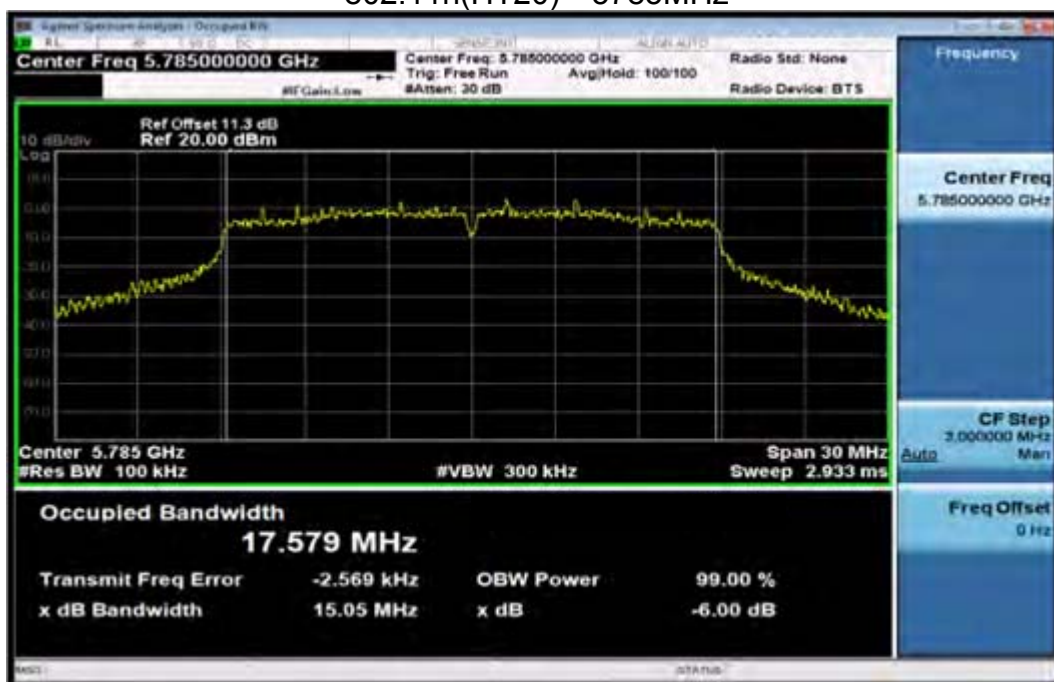
802.11a 5825MHz



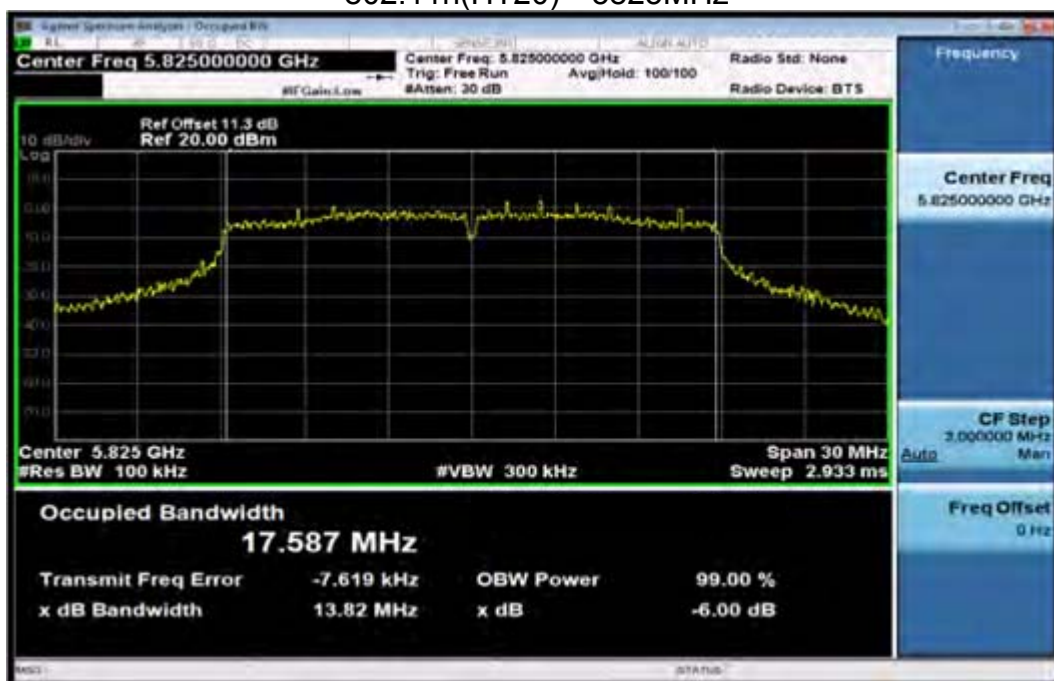
802.11n(HT20) 5745MHz



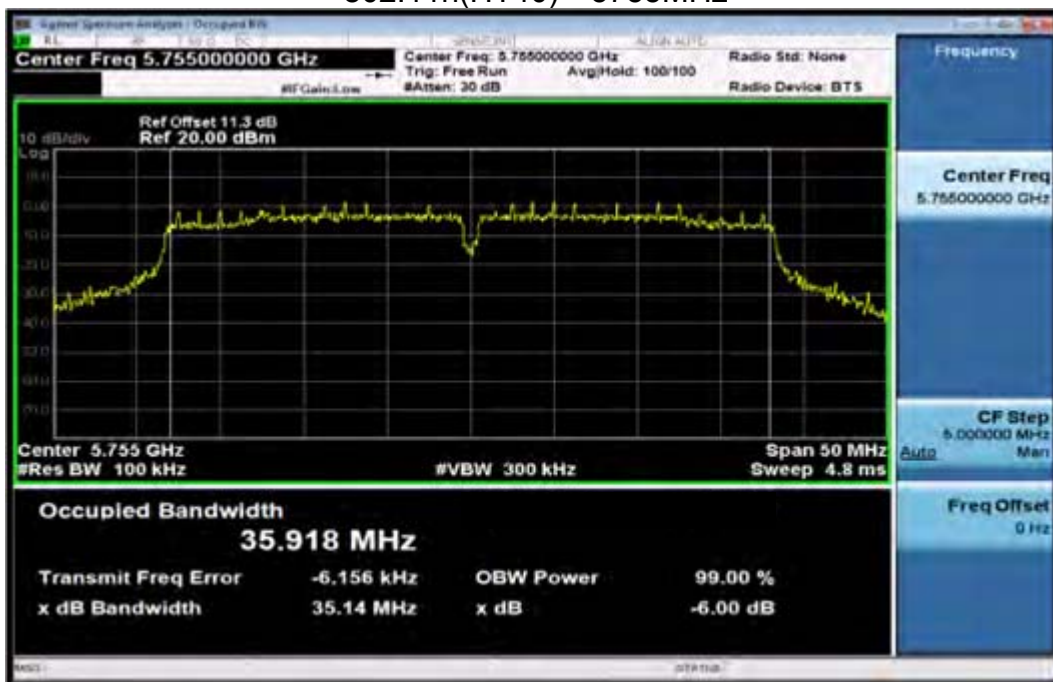
802.11n(HT20) 5785MHz



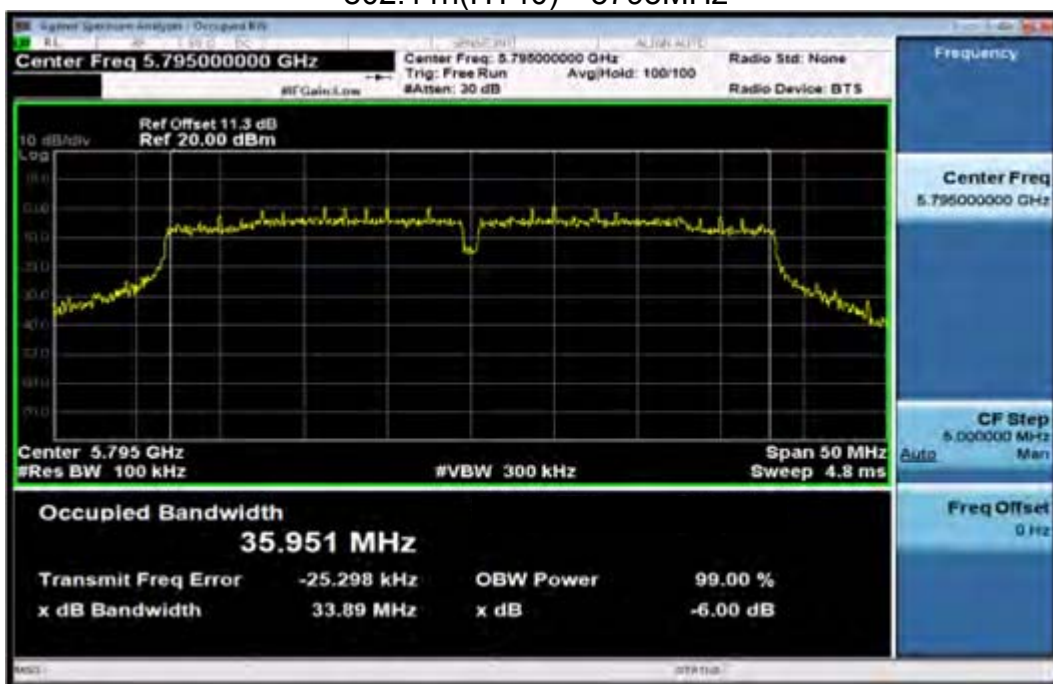
802.11n(HT20) 5825MHz



802.11n(HT40) 5755MHz



802.11n(HT40) 5795MHz



8. OUTPUT POWER TEST

8.1. Limits

For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

8.2. Test setup

1. The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):
2. Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
 - a. The Transmitter output (antenna port) was connected to the power meter.
 - b. Turn on the EUT and power meter and then record the power value.
 - c. Repeat above procedures on all channels needed to be tested.



8.3. Test result

	Frequency (MHz)	Average Output Power(d Bm)	Duty Cycle Factor	Total Output Power(dBm)	Average Output Power(mW)	FCC Limit (dBm)	Result
802.11a	5180	6.41	0.21	6.62	4.59	23.98	Pass
	5220	6.42	0.21	6.63	4.60	23.98	Pass
	5240	6.43	0.21	6.64	4.61	23.98	Pass
	5745	6.53	0.21	6.74	4.72	30.00	Pass
	5785	6.54	0.21	6.75	4.73	30.00	Pass
	5825	6.52	0.21	6.73	4.71	30.00	Pass
802.11n (HT20)	5180	5.86	0.42	6.28	4.25	23.98	Pass
	5220	5.79	0.42	6.21	4.18	23.98	Pass
	5240	5.67	0.42	6.09	4.06	23.98	Pass
	5745	5.87	0.42	6.29	4.26	30.00	Pass
	5785	5.55	0.42	5.97	3.95	30.00	Pass
	5825	5.82	0.42	6.24	4.21	30.00	Pass
802.11n (HT40)	5190	4.87	0.77	5.64	3.66	23.98	Pass
	5230	4.79	0.77	5.56	3.60	23.98	Pass
	5755	4.83	0.77	5.60	3.63	30.00	Pass
	5795	4.75	0.77	5.52	3.56	30.00	Pass



9. PEAK POWER SPECTRAL DENSITY TEST

9.1. Limits

In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

9.2. Test setup

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. For U-NII1, U-NII-2A, U-NII-2C Band:
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=510 kHz, VBW=3*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.

9.3. Test data

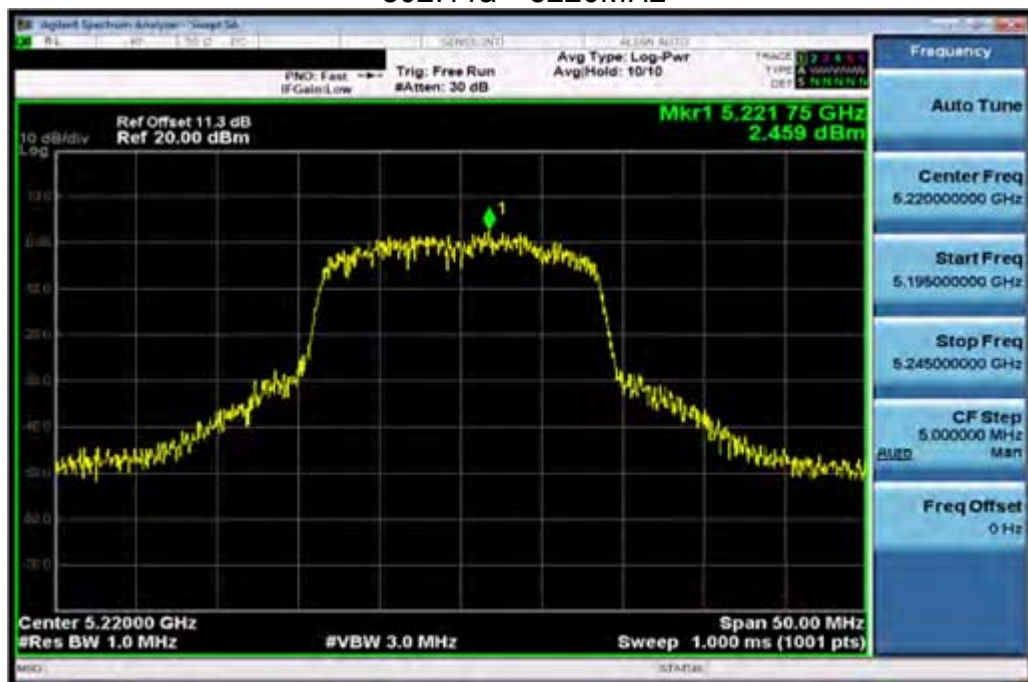
Test data as below

	Frequency (MHz)	Reading Level (dBm)	Duty Cycle Factor (dB)	Duty factor 10 log (1MHz/RBW)	PPSD (dBm)	FCC Limit (dBm)	Result
802.11a	5180	1.93	0.21	0.0	2.14	11.00	Pass
	5220	2.46	0.21	0.0	2.67	11.00	Pass
	5240	1.33	0.21	0.0	1.54	11.00	Pass
	5745	1.66	0.21	0.0	1.87	30.00	Pass
	5785	2.17	0.21	0.0	2.38	30.00	Pass
	5825	1.85	0.21	0.0	2.06	30.00	Pass
802.11n (HT20)	5180	1.18	0.44	0.0	1.62	11.00	Pass
	5220	2.39	0.44	0.0	2.83	11.00	Pass
	5240	2.09	0.44	0.0	2.53	11.00	Pass
	5745	3.04	0.44	0.0	3.48	30.00	Pass
	5785	2.63	0.44	0.0	3.07	30.00	Pass
	5825	1.73	0.44	0.0	2.17	30.00	Pass
802.11n (HT40)	5190	-3.92	0.77	0.0	-3.15	11.00	Pass
	5230	-0.35	0.77	0.0	0.42	11.00	Pass
	5755	0.38	0.77	0.0	1.15	30.00	Pass
	5795	-0.59	0.77	0.0	0.18	30.00	Pass

802.11a 5180MHz



802.11a 5220MHz



802.11a 5240MHz



802.11a 5745MHz



802.11a 5785MHz



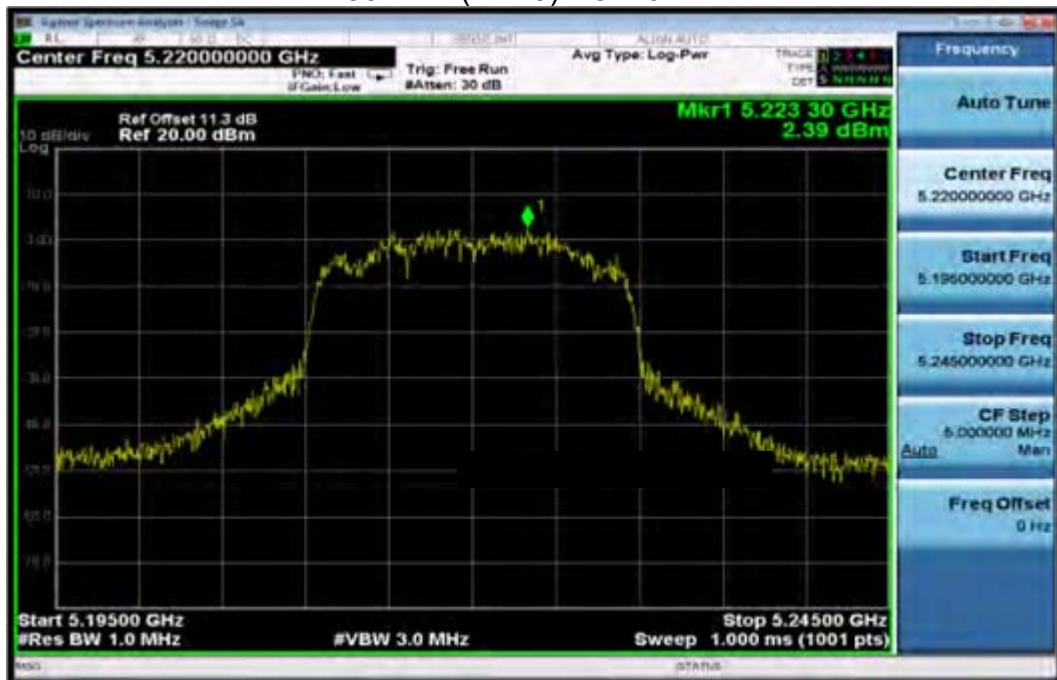
802.11a 5825MHz



802.11n(HT20) 5180MHz



802.11n(HT20) 5220MHz



802.11n(HT20) 5240MHz



802.11n(HT20) 5745MHz



802.11n(HT20) 5785MHz



802.11n(HT20) 5825MHz



802.11n(HT40) 5190MHz



802.11n(HT40) 5230MHz



802.11n(HT40) 5755MHz



802.11n(HT40) 5795MHz





10. DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = T_{\text{on}} / (T_{\text{on}} + T_{\text{off}})$$

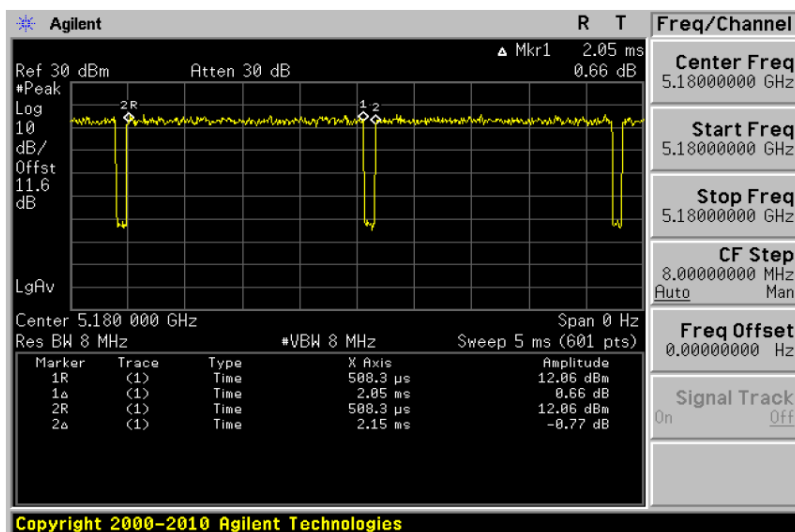
Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

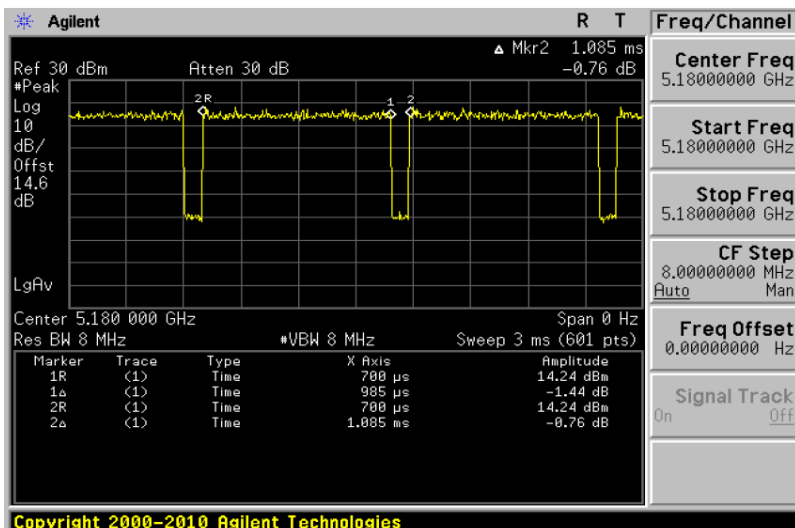
Duty Cycle:

Operation Mode	Duty Cycle	Duty Fator (dB) $10 * \log (1/ \text{Duty cycle})$
802.11a	95.35%	0.21
802.11n(HT20)	90.78%	0.42
802.11n(HT40)	83.76%	0.77

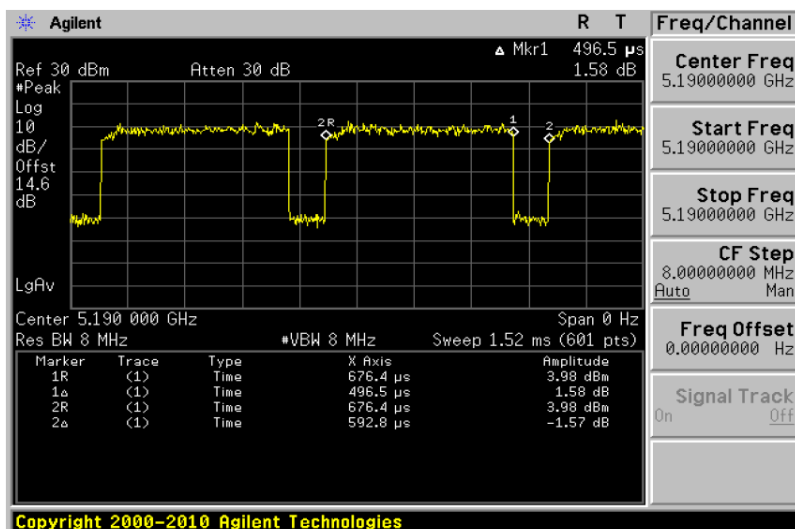
802.11a



802.11n(HT20)



802.11n(HT40)





11. FREQUENCY STABILITY

11.1. Limits

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

11.2. Test setup

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.



11.3. Test data

Test data as below

	Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
802.11a	4.255V	-20℃	5180.000	5180.0428	-0.0428
			5220.000	5220.0347	-0.0347
			5240.000	5240.0248	-0.0248
			5745.000	5745.0342	-0.0342
			5785.000	5785.0362	-0.0362
			5825.000	5825.0342	-0.0342
	3.145V	-20℃	5180.000	5180.0248	-0.0248
			5220.000	5220.0318	-0.0318
			5240.000	5240.0276	-0.0276
			5745.000	5745.0294	-0.0294
			5785.000	5785.0347	-0.0347
			5825.000	5825.0418	-0.0418
	3.70V	25℃	5180.000	5180.0517	-0.0517
			5220.000	5220.0249	-0.0249
			5240.000	5240.0361	-0.0361
			5745.000	5745.0347	-0.0347
			5785.000	5785.0428	-0.0428
			5825.000	5825.0294	-0.0294
	4.255V	50℃	5180.000	5180.0347	-0.0347
			5220.000	5220.0264	-0.0264
			5240.000	5240.0318	-0.0318
			5745.000	5745.0614	-0.0614
			5785.000	5785.0418	-0.0418
			5825.000	5825.0611	-0.0611
	3.145V	50℃	5180.000	5180.0336	-0.0336
			5220.000	5220.0275	-0.0275
			5240.000	5240.0361	-0.0361
			5745.000	5745.0484	-0.0484
			5785.000	5785.0294	-0.0294
			5825.000	5825.0741	-0.0741



	Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
802.11n20	4.255V	-20℃	5180.000	5180.0418	-0.0418
			5220.000	5220.0364	-0.0364
			5240.000	5240.0269	-0.0269
			5745.000	5745.0674	-0.0674
			5785.000	5785.0249	-0.0249
			5825.000	5825.0337	-0.0337
	3.145V		5180.000	5180.0289	-0.0289
			5220.000	5220.0519	-0.0519
			5240.000	5240.0347	-0.0347
			5745.000	5745.0427	-0.0427
			5785.000	5785.0428	-0.0428
			5825.000	5825.0218	-0.0218
	3.70V	25℃	5180.000	5180.0247	-0.0247
			5220.000	5220.0351	-0.0351
			5240.000	5240.0428	-0.0428
			5745.000	5745.0617	-0.0617
			5785.000	5785.0347	-0.0347
			5825.000	5825.0519	-0.0519
	4.255V	50℃	5180.000	5180.0267	-0.0267
			5220.000	5220.0314	-0.0314
			5240.000	5240.0516	-0.0516
			5745.000	5745.0324	-0.0324
			5785.000	5785.0614	-0.0614
			5825.000	5825.0287	-0.0287
	3.145V	50℃	5180.000	5180.0327	-0.0327
			5220.000	5220.0287	-0.0287
			5240.000	5240.0611	-0.0611
			5745.000	5745.0387	-0.0387
			5785.000	5785.0269	-0.0269
			5825.000	5825.0334	-0.0334



	Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
802.11n40	4.255V	-20℃	5190.000	5190.0268	-0.0268
			5230.000	5230.0364	-0.0364
			5755.000	5755.0517	-0.0517
			5795.000	5795.0641	-0.0641
	3.145V		5190.000	5190.0297	-0.0297
			5230.000	5230.0384	-0.0384
			5755.000	5755.0275	-0.0275
			5795.000	5795.0466	-0.0466
	3.70V	25℃	5190.000	5190.0258	-0.0258
			5230.000	5230.0618	-0.0618
			5755.000	5755.0268	-0.0268
			5795.000	5795.0517	-0.0517
	4.255V	50℃	5190.000	5190.0617	-0.0617
			5230.000	5230.0547	-0.0547
			5755.000	5755.0417	-0.0417
			5795.000	5795.0349	-0.0349
	3.145V	50℃	5190.000	5190.0521	-0.0521
			5230.000	5230.0329	-0.0329
			5755.000	5755.0337	-0.0337
			5795.000	5795.0419	-0.0419



12. TRANSMISSION IN THE ABSENCE OF DATA

12.1. Limits

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

12.2. Test result

No non-compliance noted:

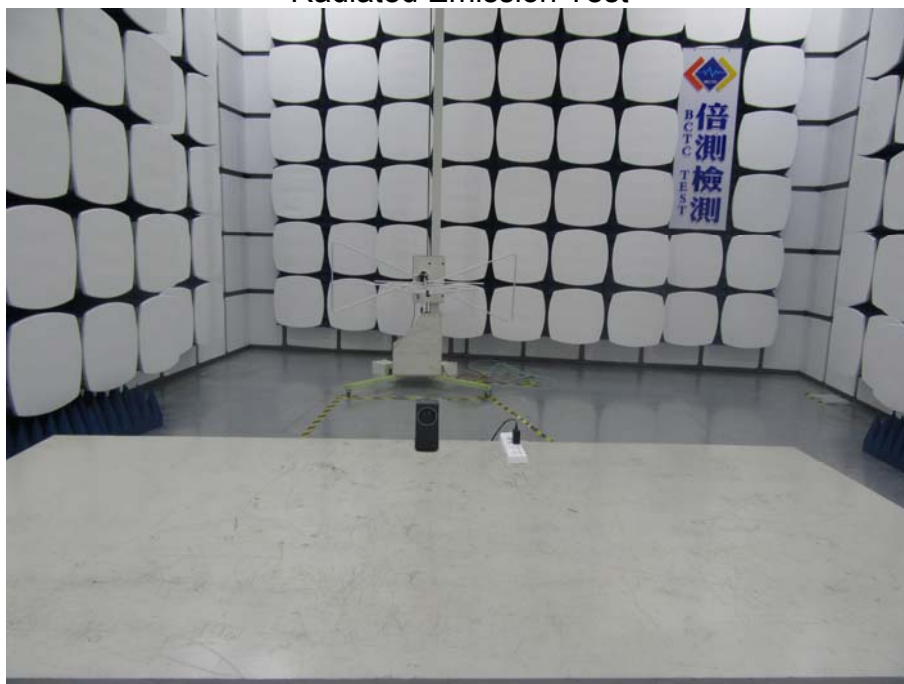
Refer to the theory of operation.

13. PHOTOGRAPHS OF TEST SET-UP

Conducted Emission



Radiated Emission Test



14. EUT PHOTO



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