



FCC TEST REPORT

FCC ID: 2AVBO-HTA9

Product	:	Thermal imaging camera
Model Name	:	HT-A9
Serial model	:	HT-A8,HT-H8
Brand	:	HTI
Report No.	:	PTC19111304001E -FC01
Prepared for		
Dongguan Xintai Instrument Co.,Ltd		
Building F, NO. 13-16, Hongye Industrial Zone, Tangxia Community, Tangxia Town, Dongguan City,Guangdong Province,China		
Prepared by		
Dongguan Precise Testing & Certification Corp., Ltd.		
Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China		



1 TEST RESULT CERTIFICATION

Applicant's name : Dongguan Xintai Instrument Co.,Ltd

Address : Building F, NO. 13-16, Hongye Industrial Zone, Tangxia Community,
Tangxia Town, Dongguan City,Guangdong Province,China

Manufacture's name : Dongguan Xintai Instrument Co.,Ltd

Address : Building F, NO. 13-16, Hongye Industrial Zone, Tangxia Community,
Tangxia Town, Dongguan City,Guangdong Province,China

Product name : Thermal imaging camera

Model name : HT-A9

Serial model : HT-A8,HT-H8

Standards : FCC CFR47 Part 15 Section 15.247

Test procedure : ANSI C63.10:2013

Test Date : December 01, 2019 to December 08, 2019

Date of Issue : December 12, 2019

Test Result : Pass

This device described above has been tested by PTC, 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 Engineer:

Technical Manager:



Leo Yang

Leo Yang / Engineer

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2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS

Remark:

1. The EUT is powered by full-charged battery during the test.



3 General Information

3.1 General Description of E.U.T.

Product Name	:	Thermal imaging camera
Model Name	:	HT-A9
Serial model	:	HT-A8,HT-H8
Equipment Type	:	DTS
Specification	:	802.11b/g/n (HT20)/n (HT40)
Operation Frequency	:	2.4G Wi-Fi: 2412-2462MHz for 802.11b/g/n (HT20) 2422-2452MHz for 802.11n (HT40)
Number of Channel	:	802.11b/g/n(HT20): 11 Channels 802.11n(HT40): 7 Channels
Type of Modulation	:	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Antenna installation	:	Integral Antenna
Antenna Gain	:	3 dBi
Power supply	:	Battery 4.2V 5000mA USB 5V 1A
Hardware Version	:	HT-A8-MB-V1.3
Software Version	:	V2.1.1



3.2 Channel List

The system was configured for testing in testing mode, which was provided by manufacturer.

Wi-Fi, Frequency and Channel list :

802.11b/g/n(HT20)		802.11n(HT40)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	1	--
2	2417	2	--
3	2422	3	2422
4	2427	4	2427
5	2432	5	2432
6	2437	6	2437
7	2442	7	2442
8	2447	8	2447
9	2452	9	2452
10	2457	10	--
11	2462	11	--

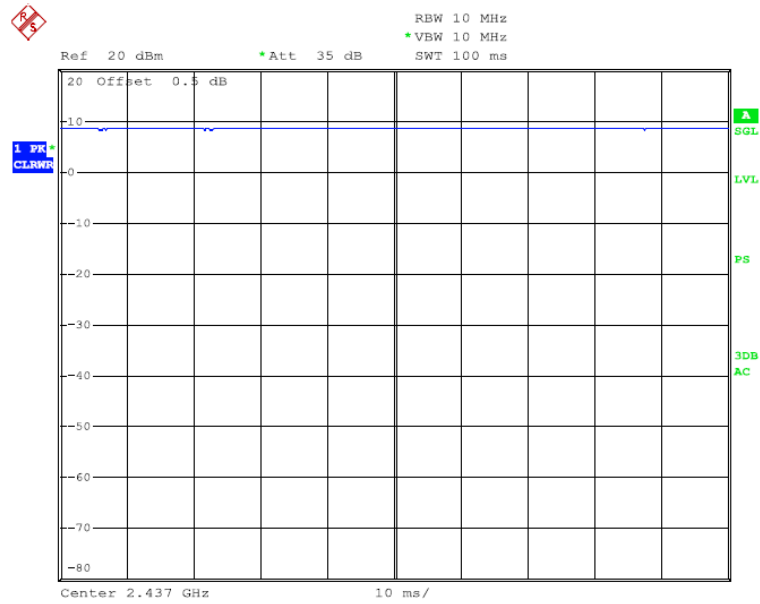
The maximum duty cycle as following table:

Test Mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle(%)
802.11b	100	100	100%
802.11g	100	100	100%
802.11n(HT20)	100	100	100%

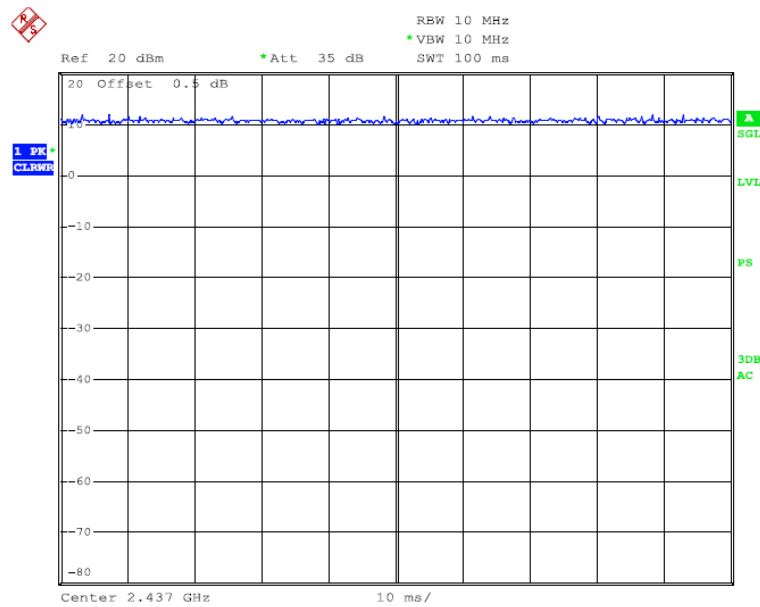


Test Plots:

802.11b

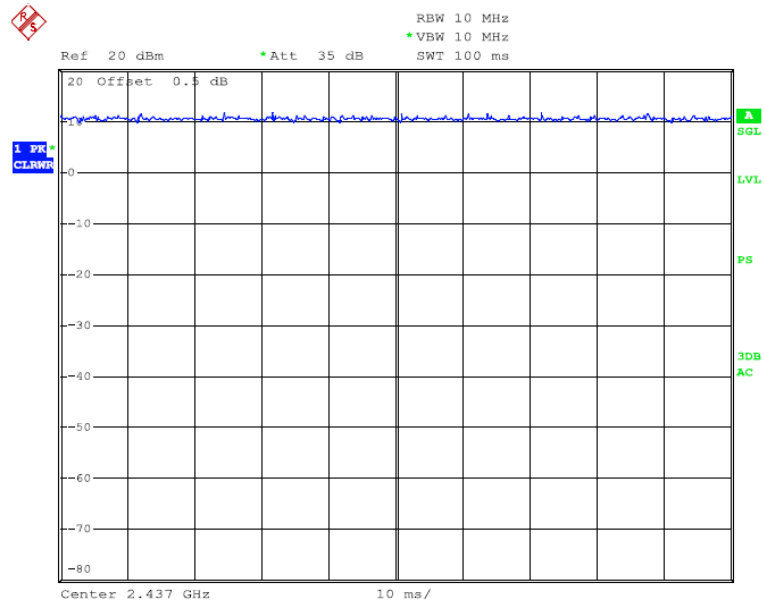


802.11g

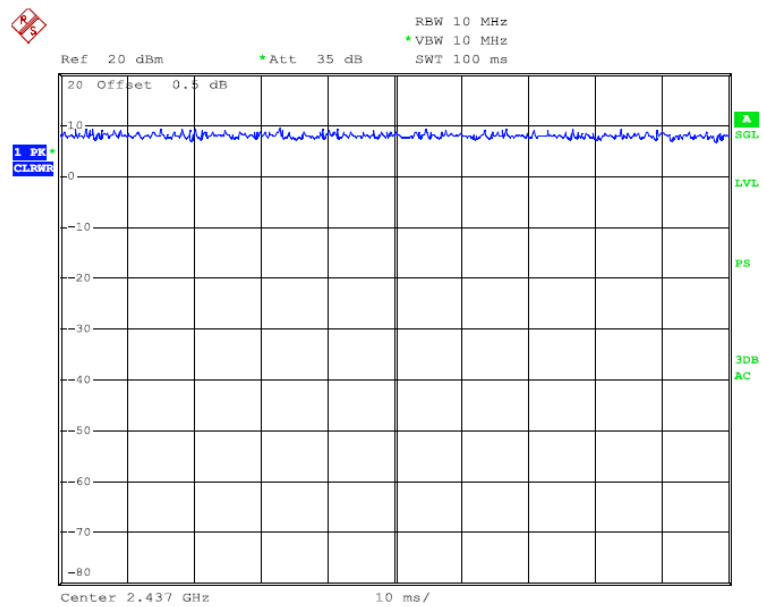




802.11n(HT20)



802.11n(HT40)





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3.3 Test Site

Precise Testing & Certification Co., Ltd.

Building1, No.6 Tongxin Road, Dongcheng Street, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1



4 Equipment During Test

4.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	Sep. 19, 2020
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Sep. 19, 2020
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Sep. 19, 2020
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Sep. 19, 2020

Remark: 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.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 19, 2020
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Sep. 19, 2020
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-572	25MHz-2GHz	Sep. 19, 2020
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep. 19, 2020
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep. 19, 2020
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Sep. 19, 2020
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Sep. 19, 2020
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Sep. 19, 2020
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep. 19, 2020



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Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 19, 2020
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep. 19, 2020
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep. 19, 2020



4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	$\pm 1.0\text{dB}$
Power Spectral Density, conducted	$\pm 2.2\text{dB}$
Radio Frequency	$\pm 1 \times 10^{-6}$
Bandwidth	$\pm 1.5 \times 10^{-6}$
Time	$\pm 2\%$
Duty Cycle	$\pm 2\%$
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 3\%$
Conducted Emissions (150kHz~30MHz)	$\pm 3.64\text{dB}$
Radiated Emission(30MHz~1GHz)	$\pm 5.03\text{dB}$
Radiated Emission(1GHz~25GHz)	$\pm 4.74\text{dB}$

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



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4.3 Description of Support Units

Equipment	Model No.	Series No.
N/A	N/A	N/A

5 Conducted Emission

Test Requirement:	: FCC CFR 47 Part 15 Section 15.207
Test Method	: ANSI C63.10: 2013
Test Result	: PASS
Frequency Range	: 150kHz to 30MHz
Class/Severity	: Class B

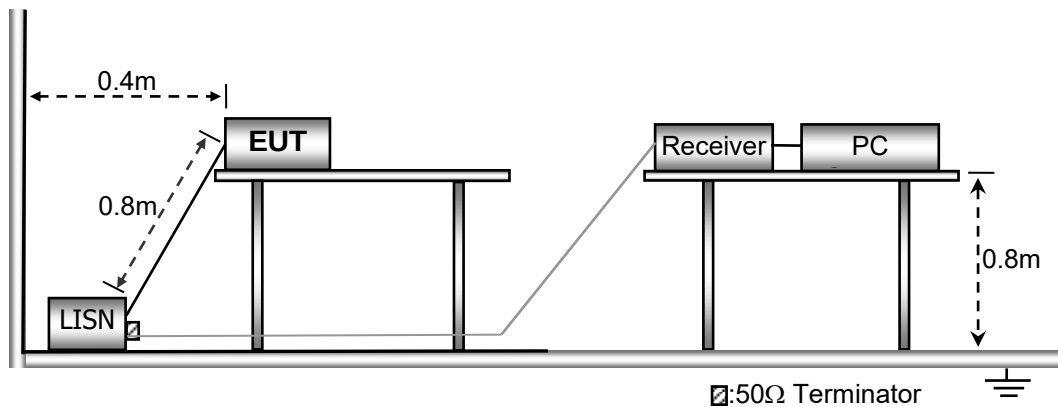
5.1 E.U.T. Operation

Operating Environment :

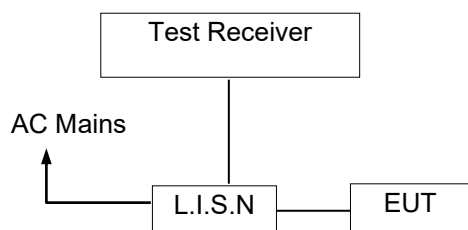
Temperature	: 24.6 °C
Humidity	: 50 % RH
Atmospheric Pressure	: 101.12kPa

5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



5.3 Test SET-UP (Block Diagram of Configuration)



5.4 Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

5.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.7 Conducted Emission Test Result

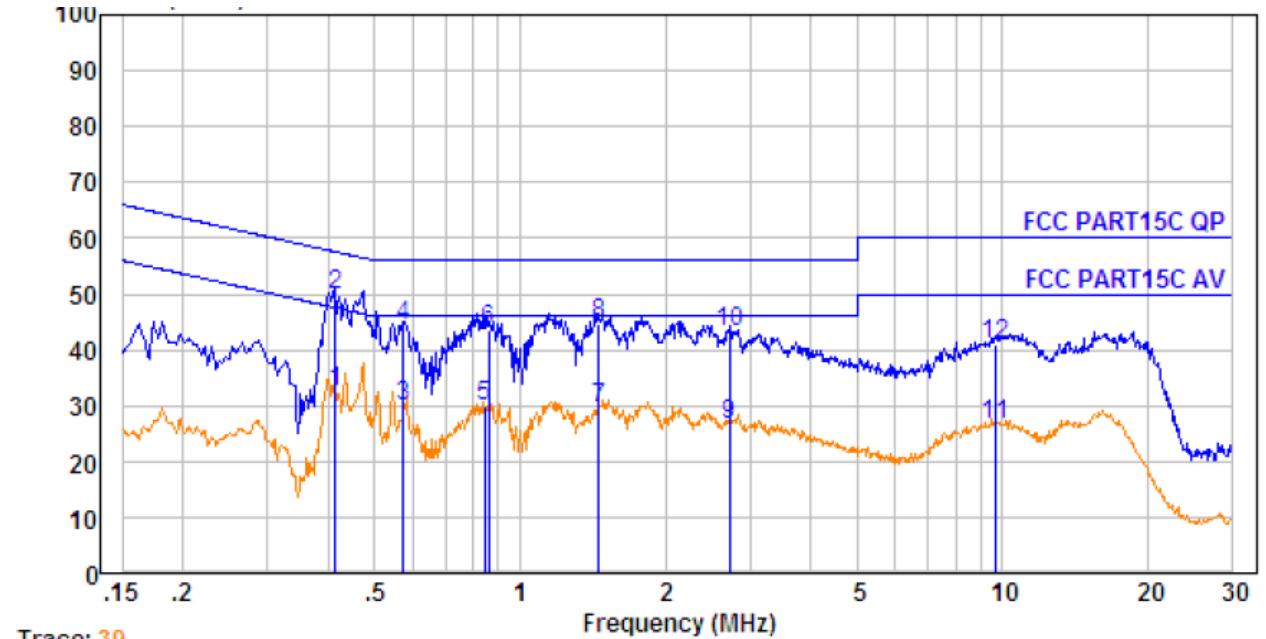
Pass.

Please refer to the following pages.



Test Mode: Keep TX Transmitting

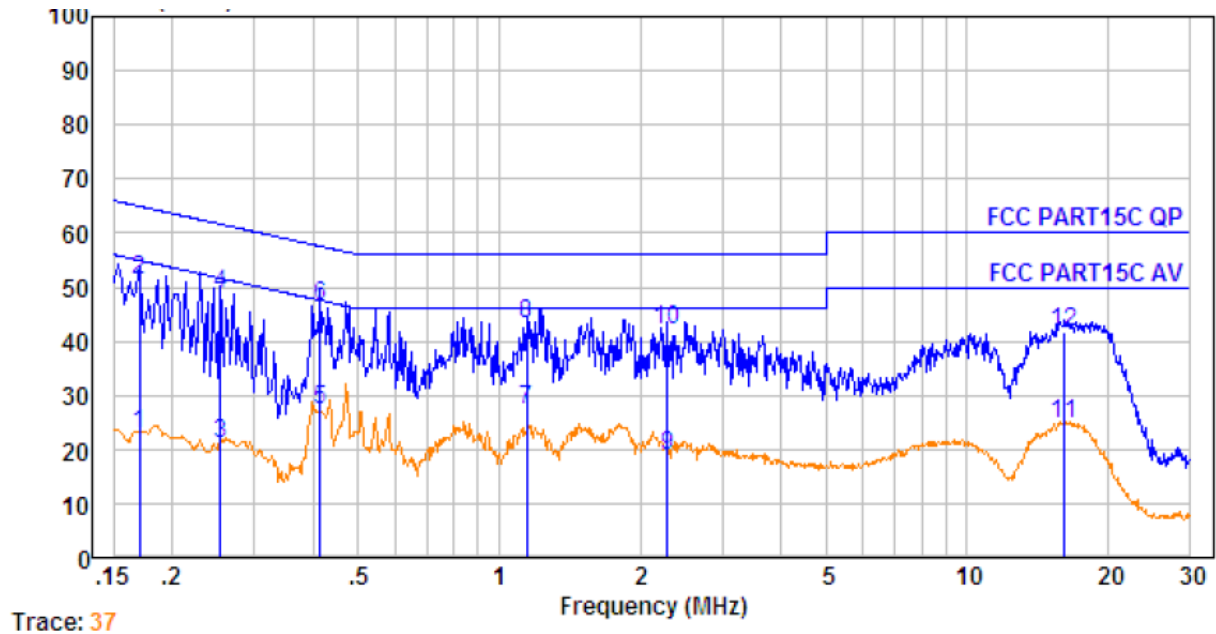
Line-AC 120V/60Hz



Trace: 39

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dB μ V	Emission Level dB μ V	Limit dB μ V	Over Limit dB	Remark
1.	0.415	0.41	9.74	22.23	32.38	47.55	-15.17	Average
2.	0.415	0.41	9.74	39.64	49.79	57.55	-7.76	QP
3.	0.573	0.43	9.79	19.67	29.89	46.00	-16.11	Average
4.	0.573	0.43	9.79	34.18	44.40	56.00	-11.60	QP
5.	0.844	0.45	9.81	19.75	30.01	46.00	-15.99	Average
6.	0.862	0.45	9.81	33.17	43.43	56.00	-12.57	QP
7.	1.456	0.47	9.84	19.11	29.42	46.00	-16.58	Average
8.	1.456	0.47	9.84	34.26	44.57	56.00	-11.43	QP
9.	2.721	0.47	9.87	16.08	26.42	46.00	-19.58	Average
10.	2.721	0.47	9.87	32.67	43.01	56.00	-12.99	QP
11.	9.705	0.56	9.96	16.00	26.52	50.00	-23.48	Average
12.	9.705	0.56	9.96	30.62	41.14	60.00	-18.86	QP

Neutral-AC 120V/60Hz



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBμV	Emission Level dBμV	Limit dBμV	Over Limit dB	Remark
1.	0.170	0.24	9.57	12.91	22.72	54.94	-32.22	Average
2.	0.170	0.24	9.57	41.34	51.15	64.94	-13.79	QP
3.	0.253	0.33	9.67	11.20	21.20	51.64	-30.44	Average
4.	0.253	0.33	9.67	38.67	48.67	61.64	-12.97	QP
5.	0.415	0.41	9.77	17.17	27.35	47.55	-20.20	Average
6.	0.415	0.41	9.77	36.27	46.45	57.55	-11.10	QP
7.	1.147	0.46	9.86	17.05	27.37	46.00	-18.63	Average
8.	1.147	0.46	9.86	32.97	43.29	56.00	-12.71	QP
9.	2.285	0.47	9.89	8.33	18.69	46.00	-27.31	Average
10.	2.285	0.47	9.89	31.64	42.00	56.00	-14.00	QP
11.	16.140	0.52	10.05	14.21	24.78	50.00	-25.22	Average
12.	16.140	0.52	10.05	31.28	41.85	60.00	-18.15	QP



6 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247
 Test Method : ANSI C63.10:2013
 Test Result : PASS
 Measurement Distance : 3m
 Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

6.1 EUT Operation

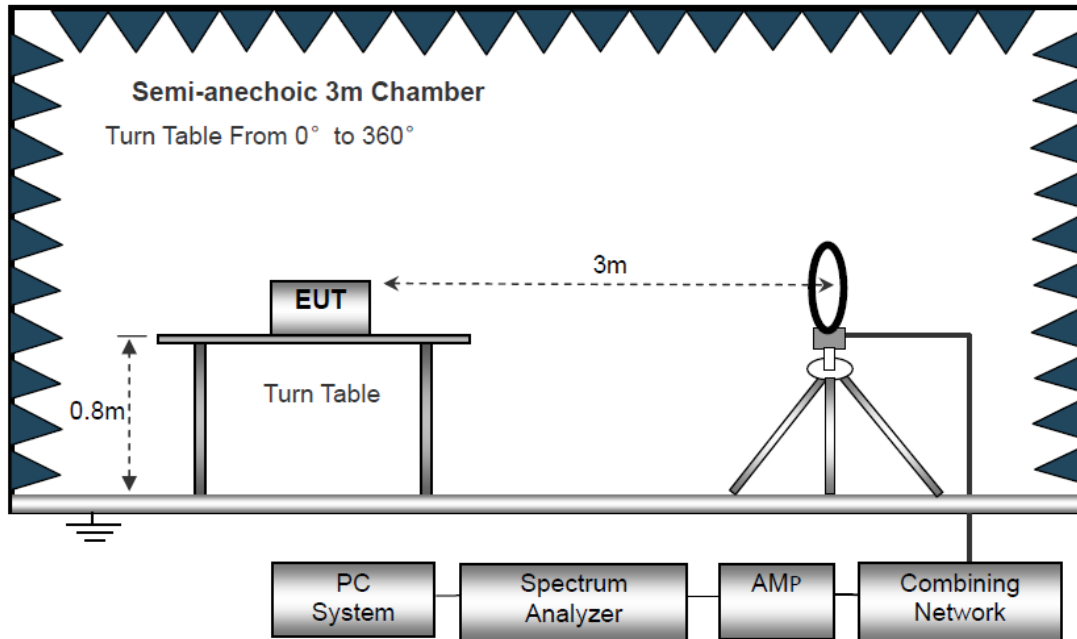
Operating Environment :

Temperature: : 24.6 °C
 Humidity: : 49 % RH
 Atmospheric Pressure: : 101.12kPa
 Test Voltage : AC 120V/60Hz

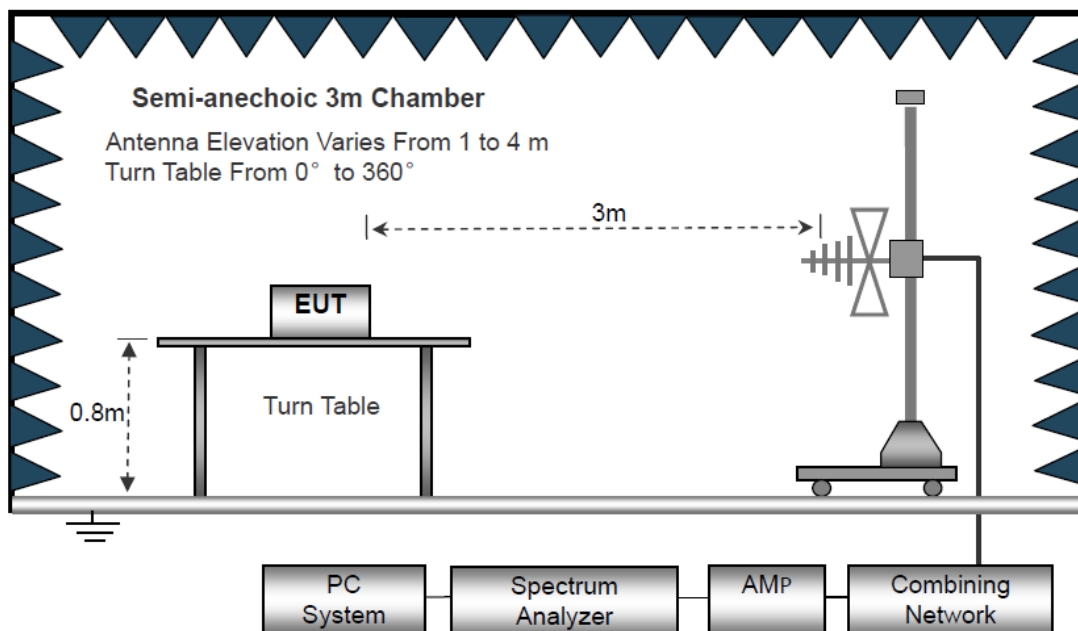
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

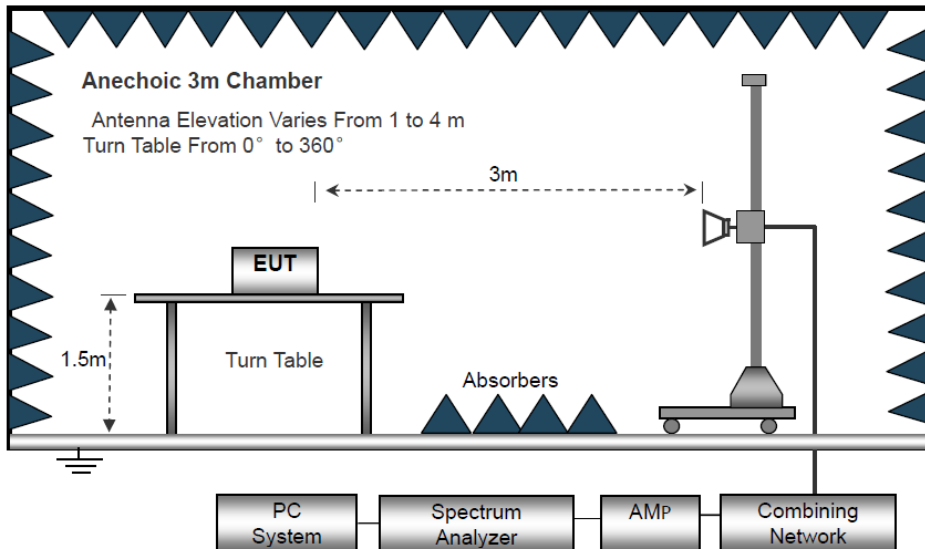
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



6.3 Spectrum Analyzer Setup

Below 30MHz			
IF Bandwidth	:	10kHz	
Resolution Bandwidth	:	10kHz	
Video Bandwidth	:	10kHz	
30MHz ~ 1GHz			
Detector	:	PK	QP
Resolution Bandwidth	:	100kHz	120kHz
Video Bandwidth	:	300kHz	300kHz
Above 1GHz			
Detector	:	PK	AV
Resolution Bandwidth	:	1MHz	1MHz
Video Bandwidth	:	3MHz	10Hz



6.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.
2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
7. Test Procedure of measurement (For Above 1GHz):
 - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
 - 2) Change the antenna polarization and repeat 1) with vertical polarization.
 - 3) Make a hardcopy of the spectrum.
 - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
 - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
 - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
 - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
 - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.



6.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

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

Limit line = Specific limits (dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

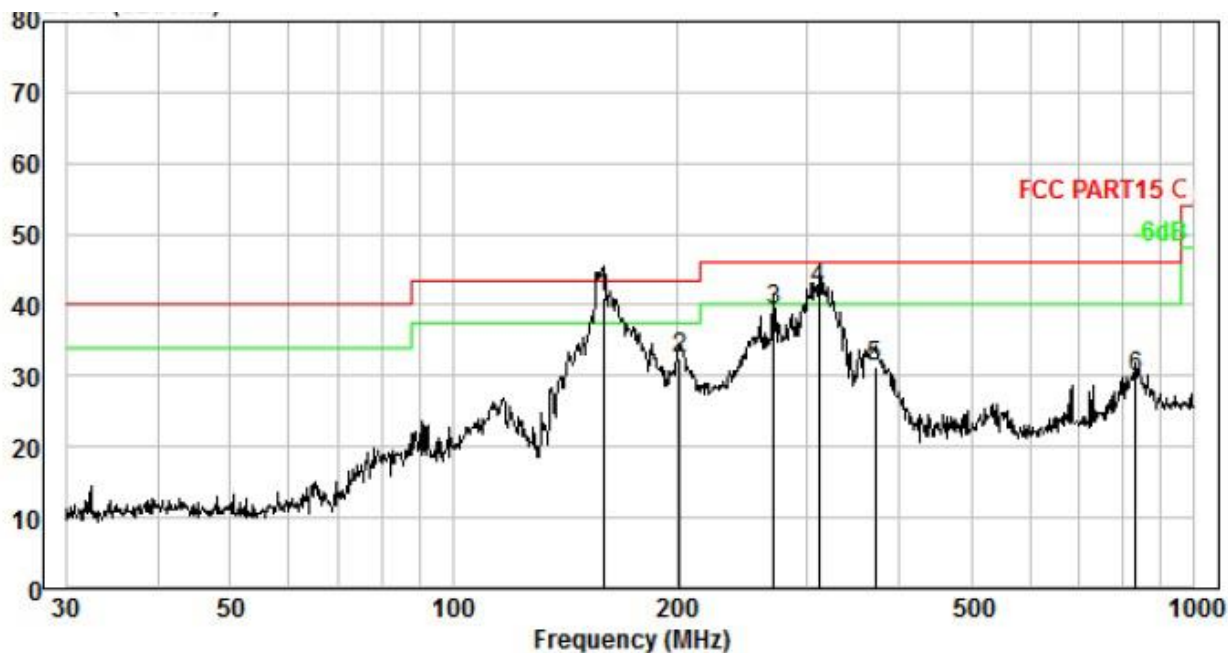
All the modulation modes were tested the data of the worst mode (802.11b Low Channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following test plots:



Test Mode: 802.11b (2412MHz)

Antenna Polarization: Horizontal

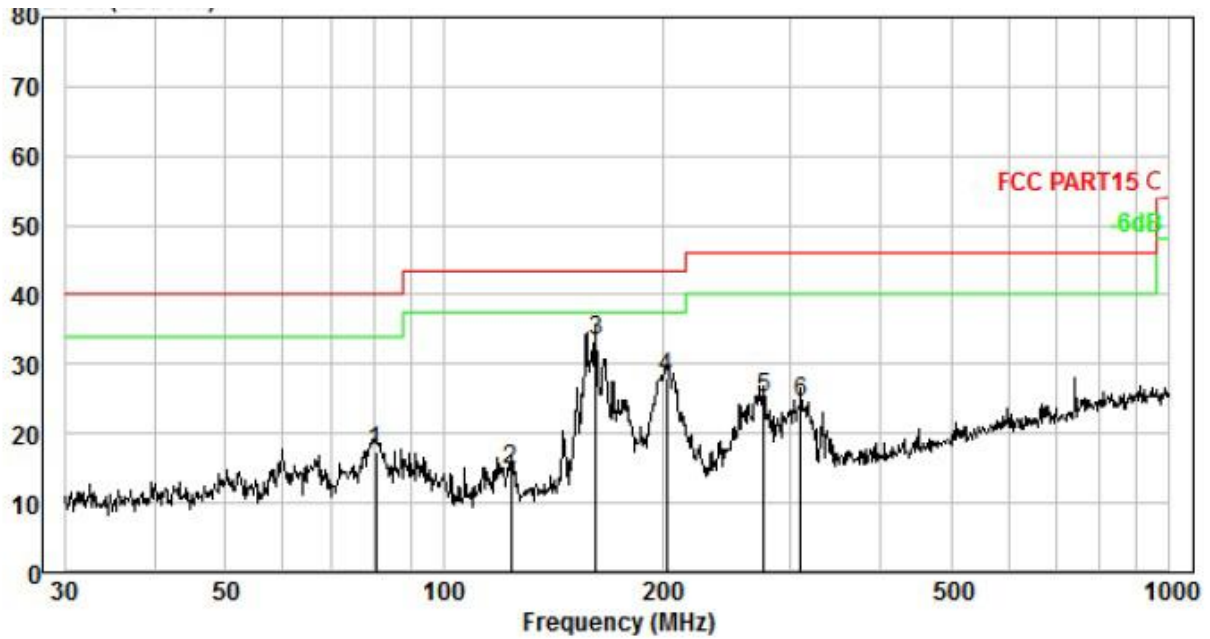


No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	159.225	4.07	13.88	53.70	30.55	41.10	43.50	-2.40	QP
2.	202.100	4.48	10.42	48.20	30.63	32.47	43.50	-11.03	QP
3.	270.375	4.98	12.49	52.58	30.73	39.32	46.00	-6.68	QP
4.	311.087	5.22	13.45	54.30	30.78	42.19	46.00	-3.81	QP
5.	370.702	5.53	14.66	42.02	30.84	31.37	46.00	-14.63	QP
6.	833.317	6.92	21.97	32.08	31.13	29.84	46.00	-16.16	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor



Antenna Polarization: Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamplifier Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	80.644	2.90	8.76	36.21	30.31	17.56	40.00	-22.44	QP
2.	123.699	3.64	12.26	29.34	30.46	14.78	43.50	-28.72	QP
3.	162.041	4.10	13.76	46.10	30.56	33.40	43.50	-10.10	QP
4.	202.810	4.48	10.44	43.65	30.63	27.94	43.50	-15.56	QP
5.	276.124	5.02	12.68	38.00	30.74	24.96	46.00	-21.04	QP
6.	309.998	5.22	13.42	36.71	30.78	24.57	46.00	-21.43	QP

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor



Test Frequency: From 1GHz to 18GHz

Low Channel (2412MHz) Worst case 802.11g

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824	38.47	AV	V	33.06	3.94	35.04	40.43	54	-13.57
4824	42.21	AV	H	33.06	3.94	35.04	44.17	54	-9.83
4824	50.11	PK	V	33.06	3.94	35.04	52.07	74	-21.93
4824	51.26	PK	H	33.06	3.94	35.04	53.22	74	-20.78
7236	39.24	AV	V	34.11	3.96	35.12	42.19	54	-11.81
7236	40.15	AV	H	34.11	3.96	35.12	43.1	54	-10.9
7236	52.49	PK	V	34.11	3.96	35.12	55.44	74	-18.56
7236	53.66	PK	H	34.11	3.96	35.12	56.61	74	-17.39

Middle Channel (2437MHz) Worst case 802.11n (HT20)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874	38.12	AV	V	33.16	3.96	35.15	40.09	54	-13.91
4874	39.06	AV	H	33.16	3.96	35.15	41.03	54	-12.97
4874	48.29	PK	V	33.16	3.96	35.15	50.26	74	-23.74
4874	50.17	PK	H	33.16	3.96	35.15	52.14	74	-21.86
7311	40.12	AV	V	34.02	3.41	35.26	42.29	54	-11.71
7311	41.62	AV	H	34.02	3.41	35.26	43.79	54	-10.21
7311	53.29	PK	V	34.02	3.41	35.26	55.46	74	-18.54
7311	52.84	PK	H	34.02	3.41	35.26	55.01	74	-18.99

High Channel (2462MHz) Worst case 802.11b

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924	39.22	AV	V	33.19	3.42	35.28	40.55	54	-13.45
4924	39.15	AV	H	33.19	3.42	35.28	40.48	54	-13.52
4924	49.26	PK	V	33.19	3.42	35.28	50.59	74	-23.41
4924	51.42	PK	H	33.19	3.42	35.28	52.75	74	-21.25
7386	40.28	AV	V	33.53	3.49	35.62	41.68	54	-12.32
7386	39.58	AV	H	33.53	3.49	35.62	40.98	54	-13.02
7386	52.11	PK	V	33.53	3.49	35.62	53.51	74	-20.49
7386	53.06	PK	H	33.53	3.49	35.62	54.46	74	-19.54

Note:

1. The testing has been conformed to $10 \times 2462\text{MHz} = 24620\text{MHz}$.
2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Emission Level = Reading + Factor
Margin=Emission Level-Limit
4. X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

2.4G WiFi (802.11b/g/n)mode have been tested, and the worst result(802.11b) was report as below

Test Mode: 802.11b Low Channel 2412MHz									Test Value
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	
2310.00	13.85	28.05	6.62	0.00	48.52	74.00	-25.48	V	Peak
2390.00	13.86	27.65	6.75	0.00	48.26	74.00	-25.74	V	
2310.00	13.41	28.05	6.62	0.00	48.08	74.00	-25.92	H	
2390.00	12.72	27.65	6.75	0.00	47.12	74.00	-26.88	H	
2310.00	11.12	28.05	6.62	0.00	45.79	54.00	-8.21	V	Average
2390.00	10.73	27.65	6.75	0.00	45.13	54.00	-8.87	V	
2310.00	11.15	28.05	6.62	0.00	45.82	54.00	-8.18	H	
2390.00	10.63	27.65	6.75	0.00	45.03	54.00	-8.97	H	

Test Mode: 802.11b High Channel 2462MHz									Test Value
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	
2483.50	12.90	27.26	6.83	0.00	46.99	74.00	-27.01	V	Peak
2500.00	13.93	27.20	6.84	0.00	47.97	74.00	-26.03	V	
2483.50	13.40	27.26	6.83	0.00	47.49	74.00	-26.51	H	
2500.00	12.08	27.20	6.84	0.00	46.12	74.00	-27.88	H	
2483.50	10.77	27.26	6.83	0.00	44.88	54.00	-9.12	V	Average
2500.00	10.67	27.20	6.84	0.00	44.71	54.00	-9.29	V	
2483.50	10.72	27.26	6.83	0.00	44.81	54.00	-9.19	H	
2500.00	10.66	27.20	6.84	0.00	44.70	54.00	-9.30	H	

Test Frequency: From 18GHz to 25GHz

The measurements were more than 20dB below the limit and not reported.



7 Band Edge Measurement & Unwanted Emissions into Restricted Frequency Bands

Test Requirement	: Section 15.247(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	: ANSI C63.10:2013
Test Limit	: Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

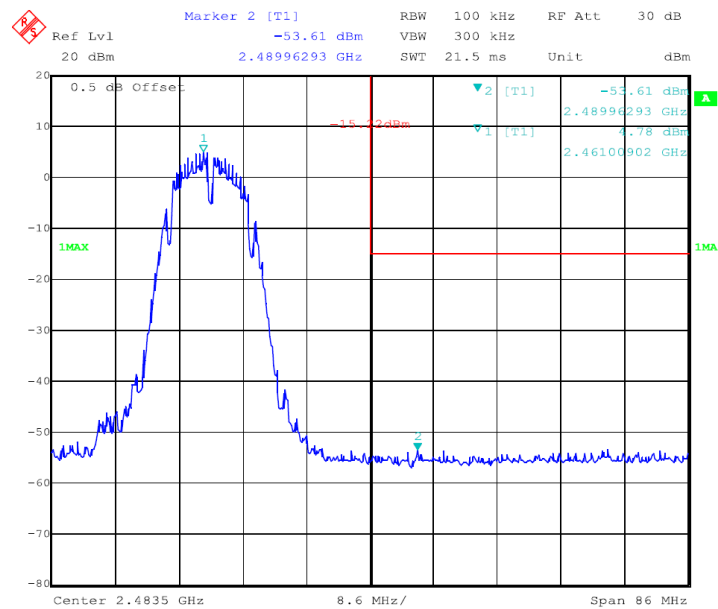
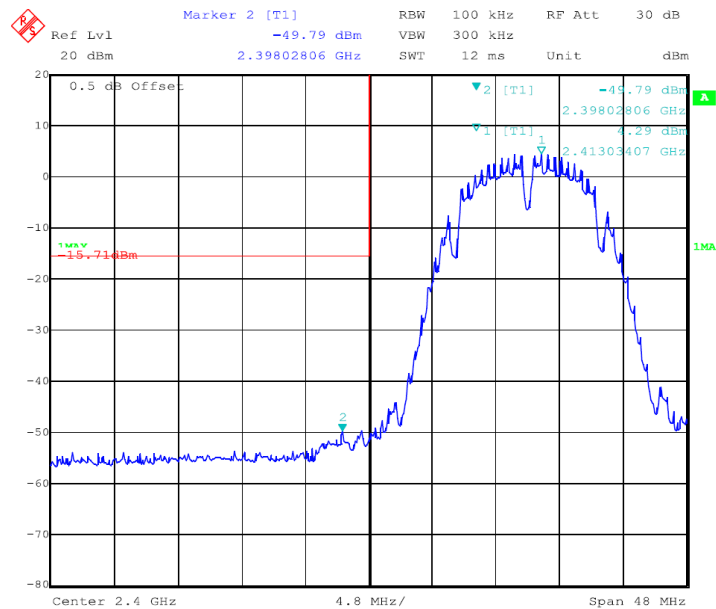
7.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 1MHz, VBW = 3MHz, Sweep = auto
Detector function = peak, Trace = max hold



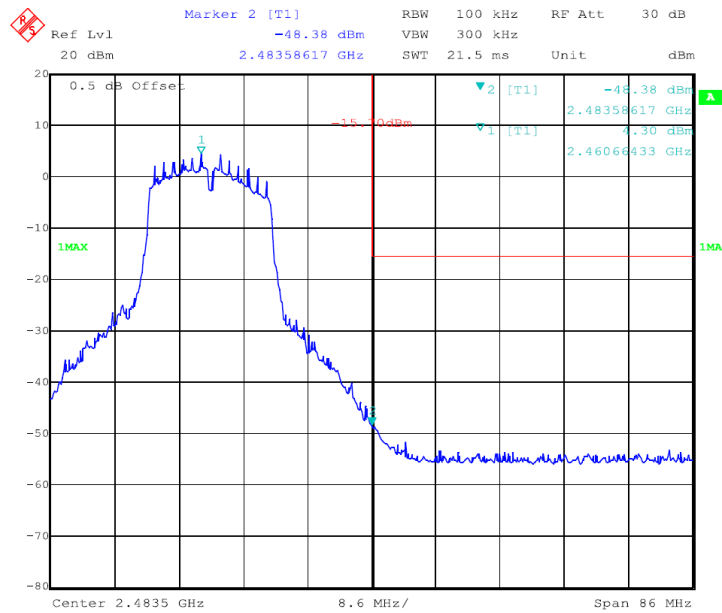
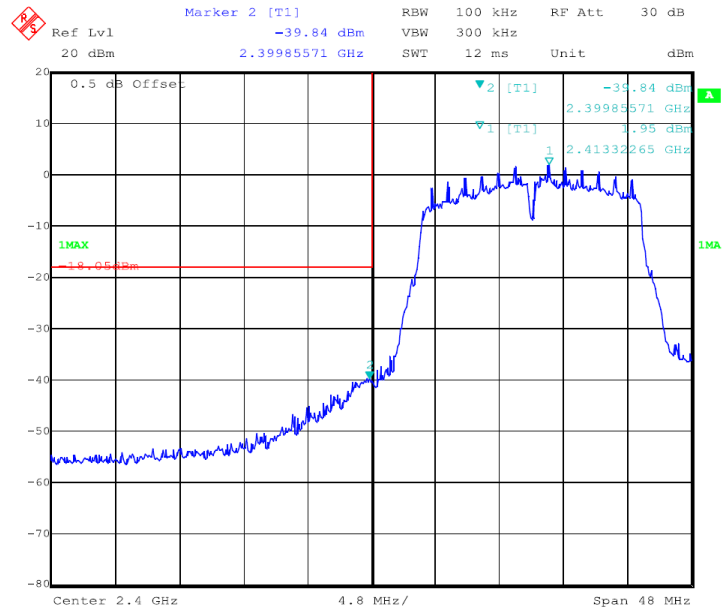
7.2 Test Result

802.11b



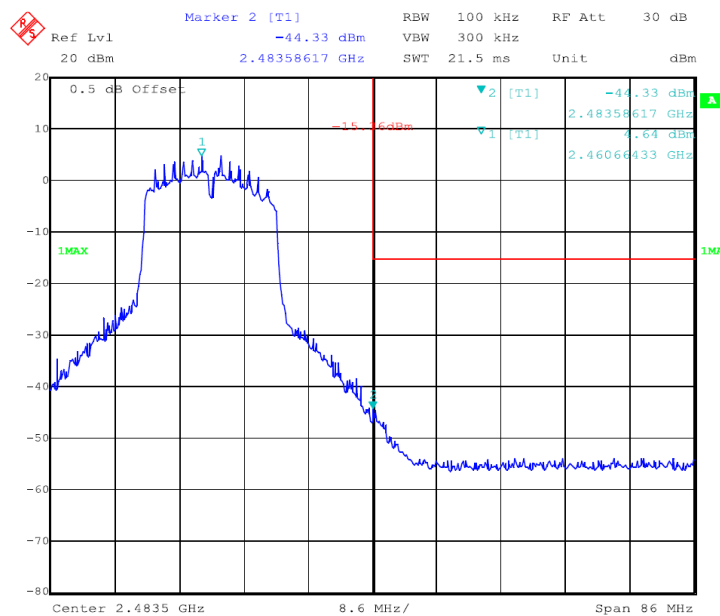
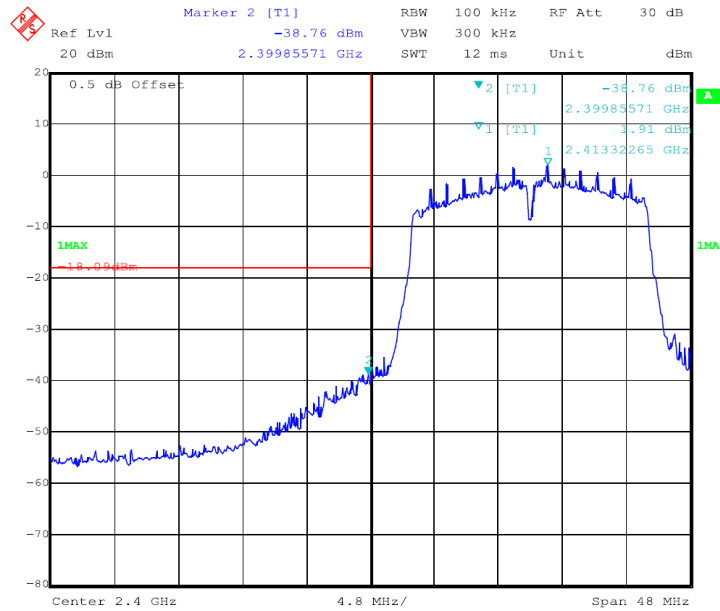


802.11g



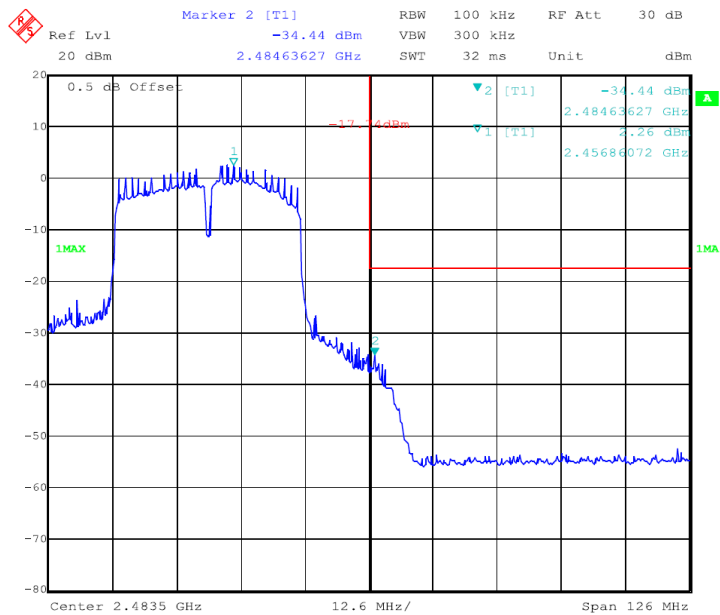
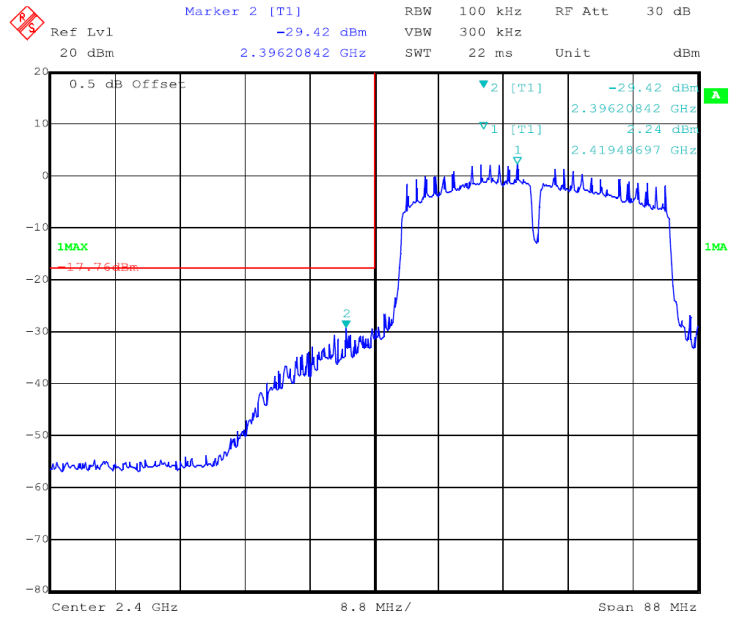


802.11n-HT20





802.11n-HT40

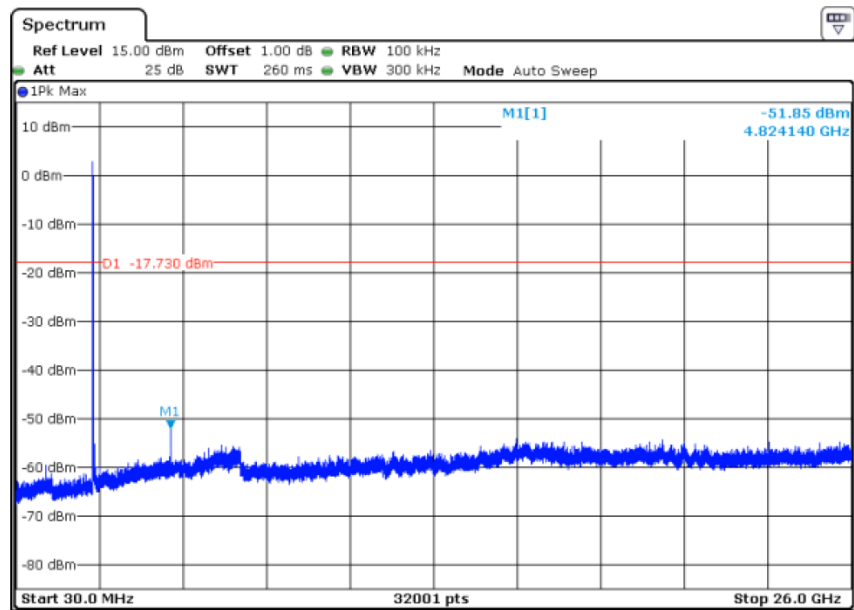




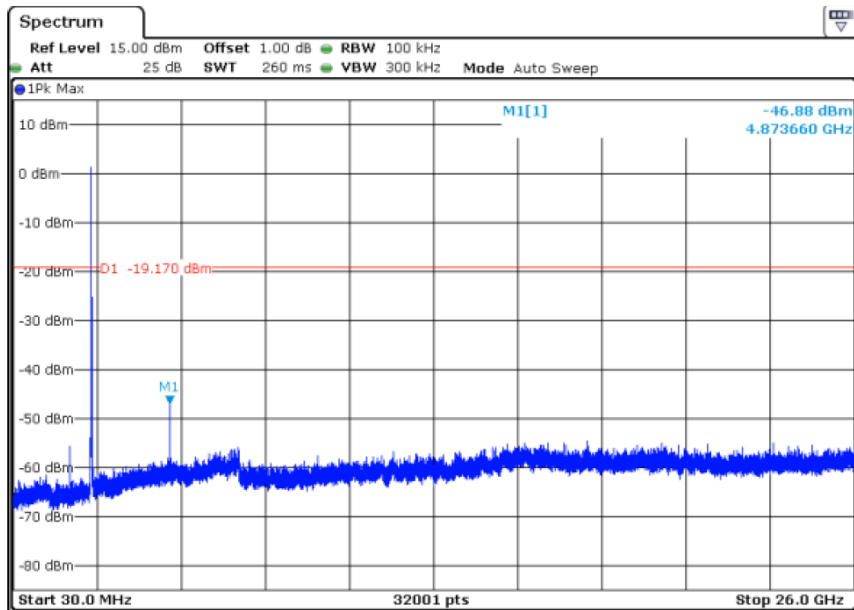
For conducted spurious emission

802.11b

Low Channel

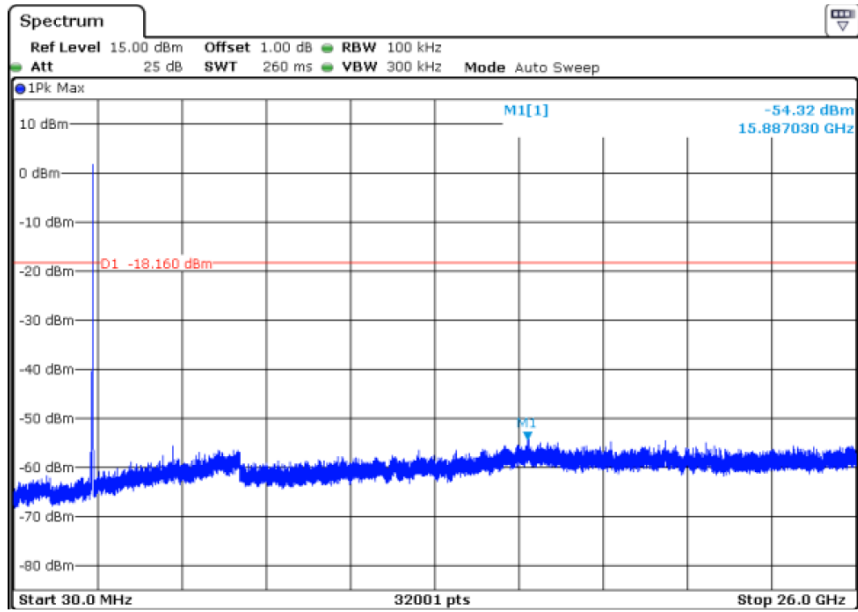


Middle Channel



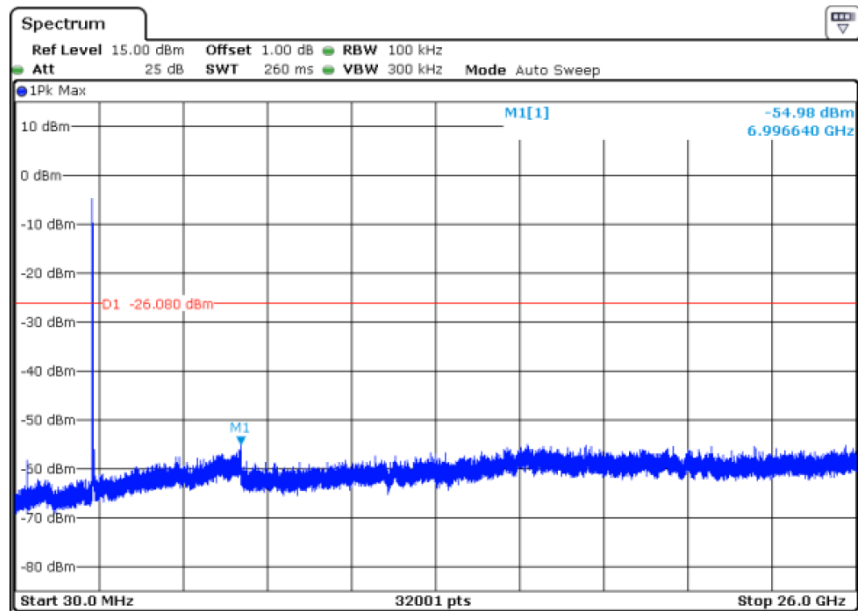


High Channel



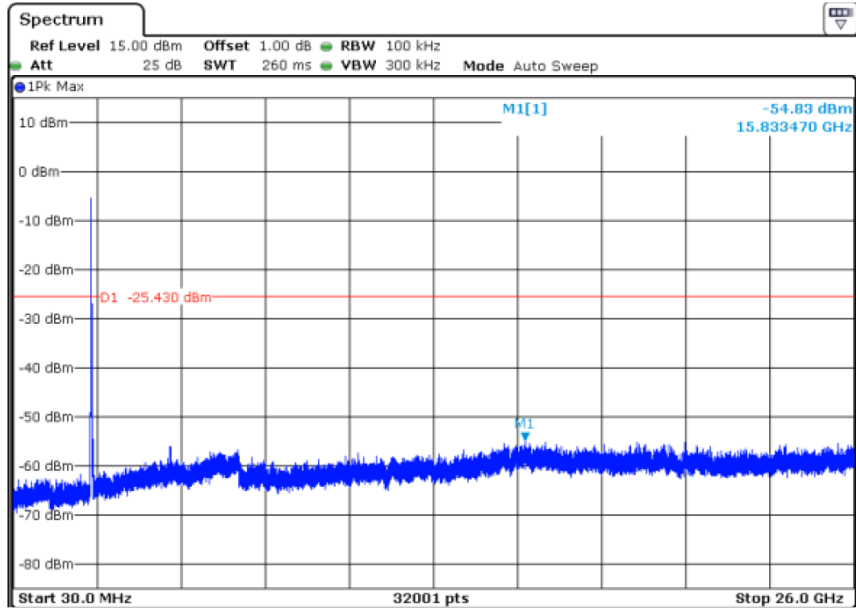
802.11g

Low Channel

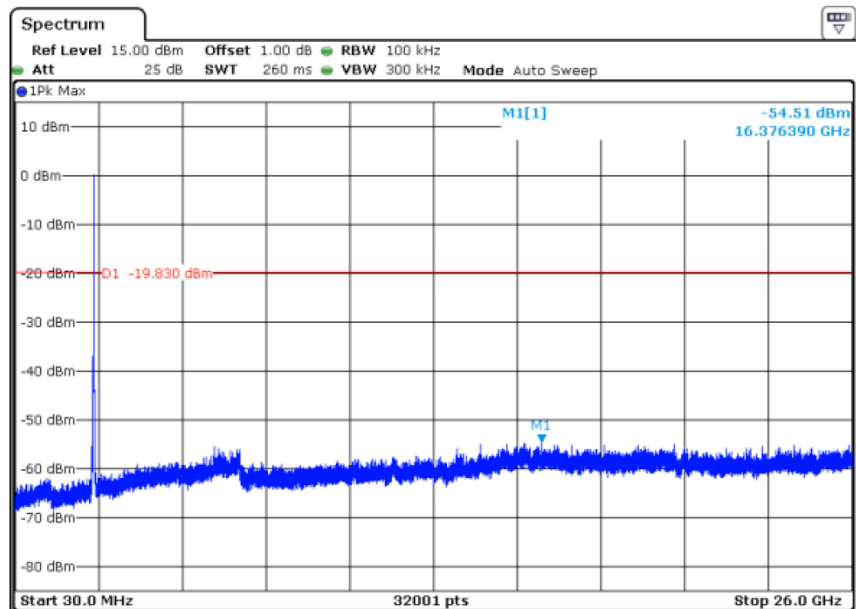




Middle Channel



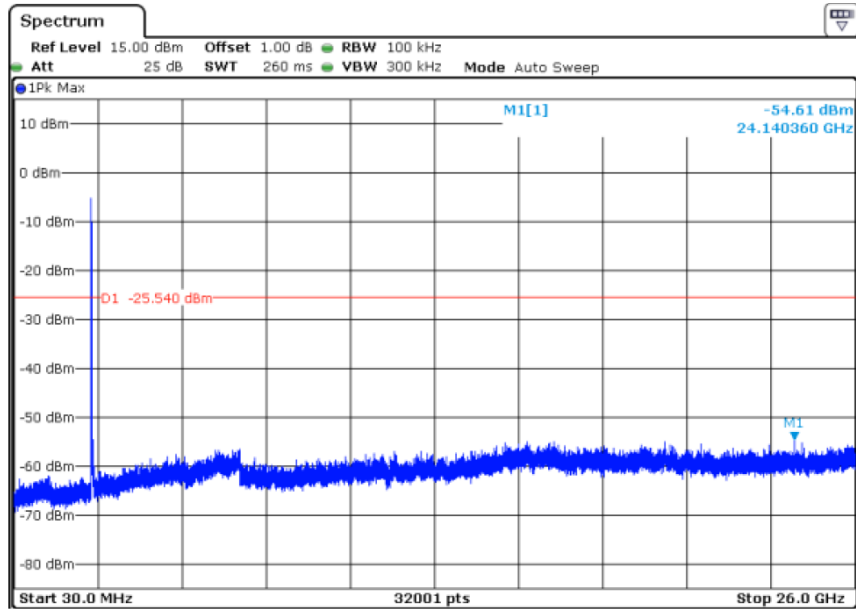
High Channel



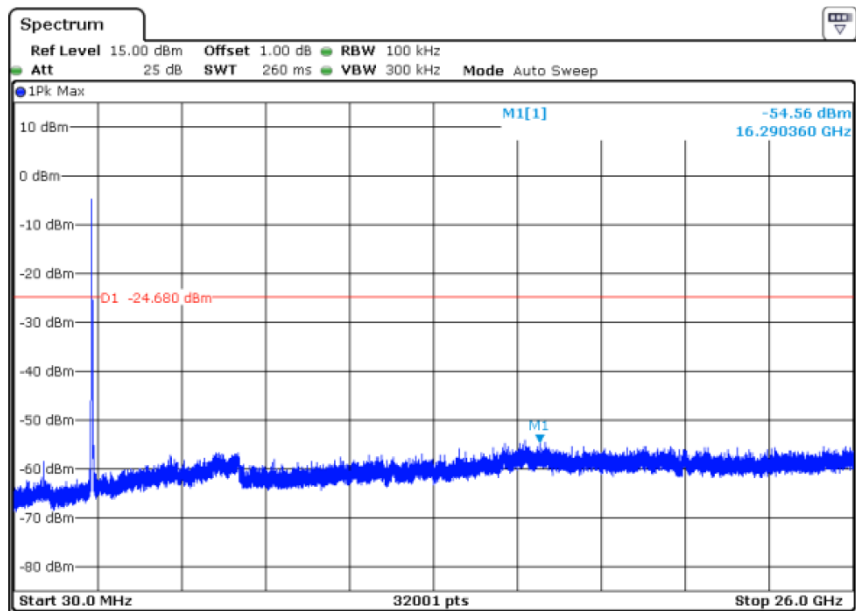


802.11n(HT20)

Low Channel

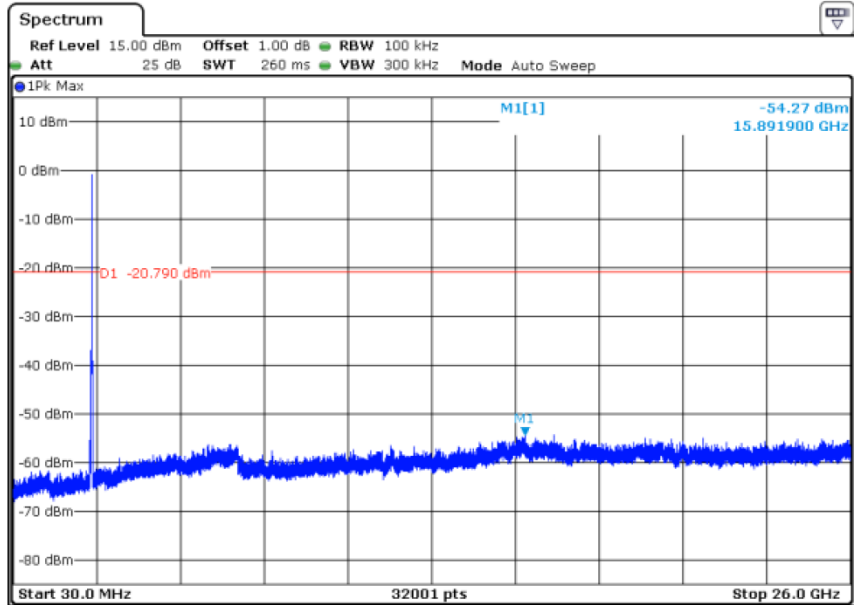


Middle Channel



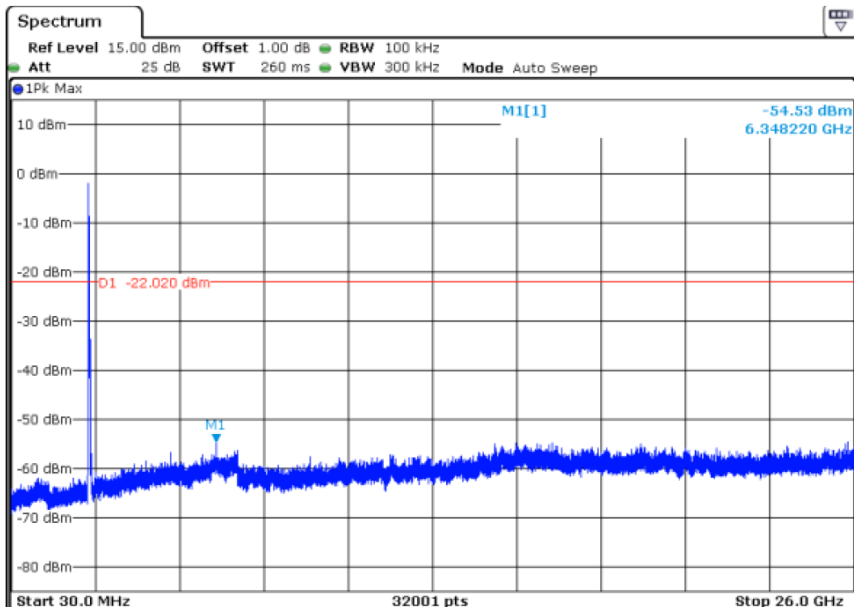


High Channel



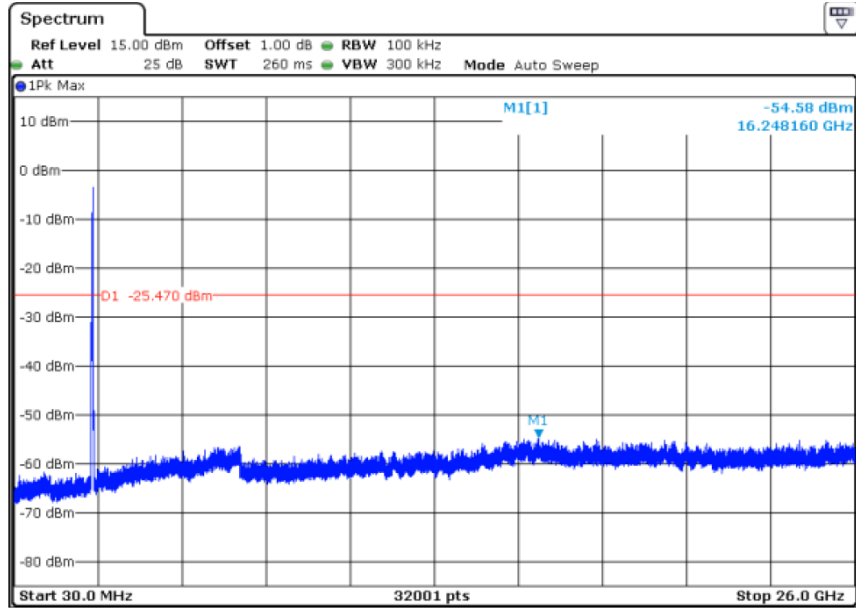
802.11n(HT40)

Low Channel

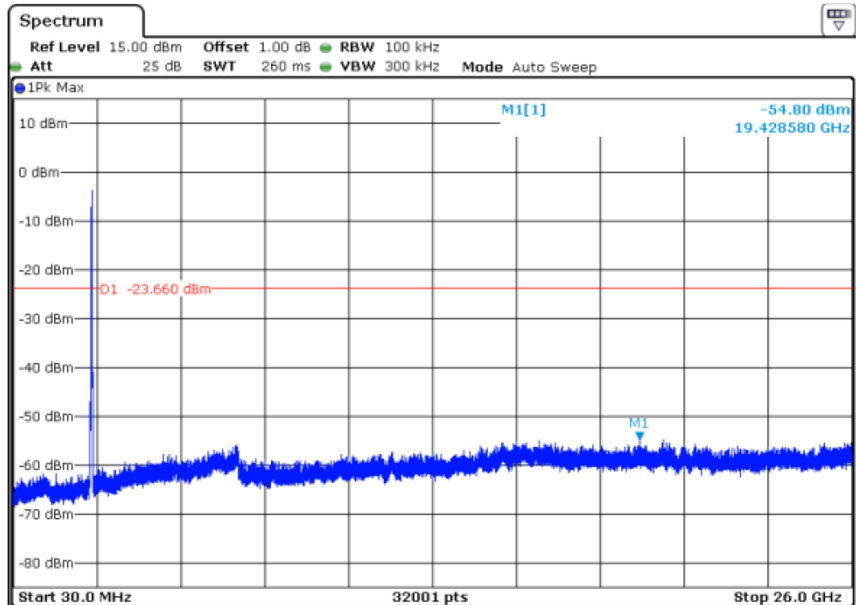




Middle Channel



High Channel





8 6dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

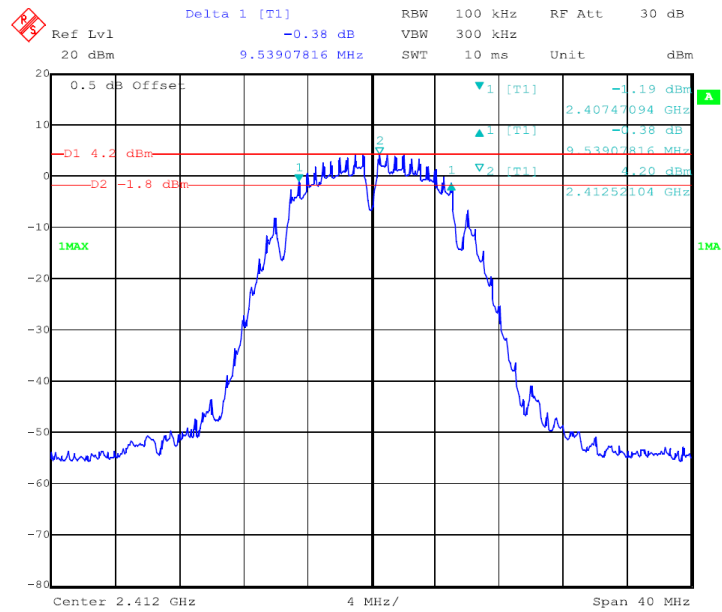
8.2 Test Result

Modulation	Bandwidth(MHz)			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	9.54	10.02	9.54	≥500kHz
802.11g	15.31	15.47	15.31	≥500kHz
802.11n-HT20	16.03	16.91	16.11	≥500kHz
802.11n-HT40	35.11	35.75	35.27	≥500kHz

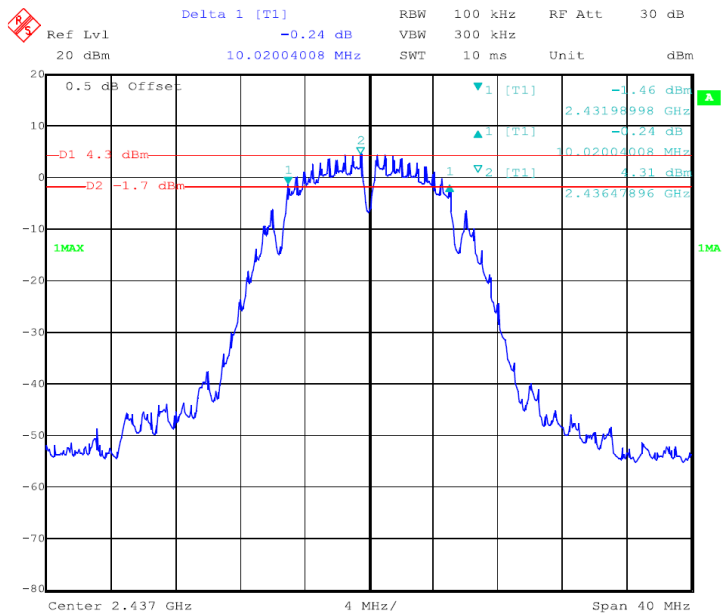
802.11b Low Channel



Report No.: PTC19111304001E -FC01



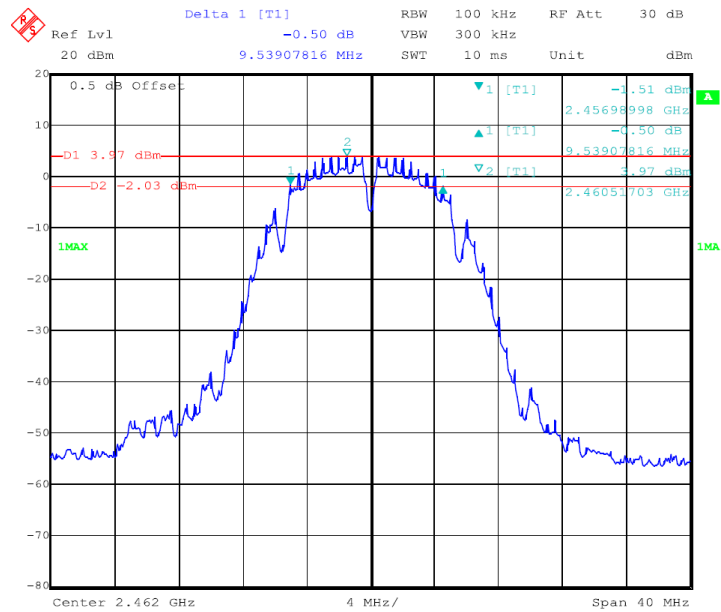
802.11b Middle Channel



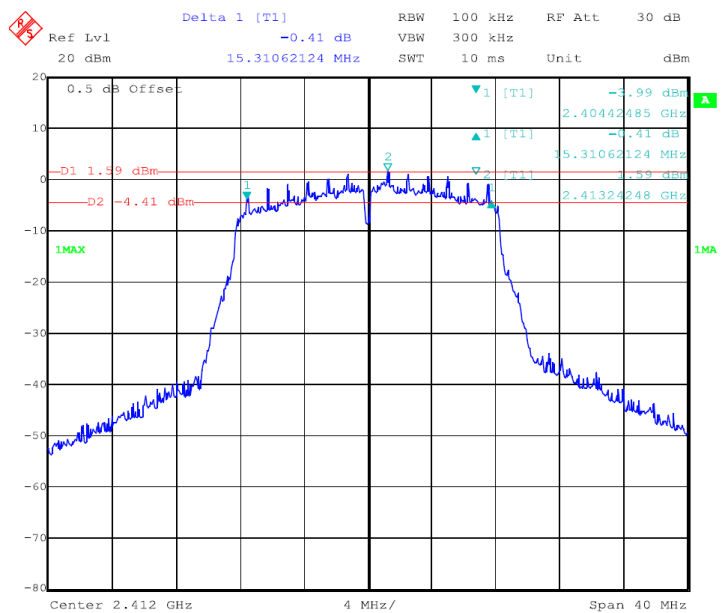
802.11b High Channel



Report No.: PTC19111304001E -FC01

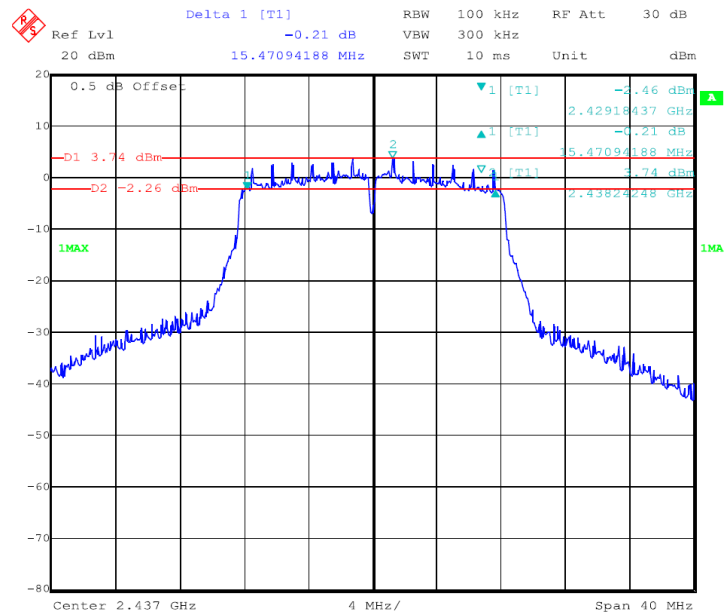


802.11g Low Channel

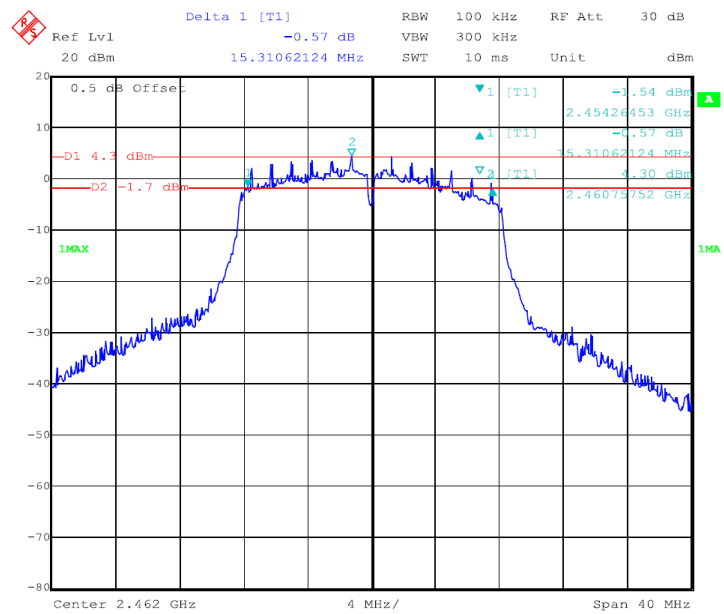




802.11g Middle Channel

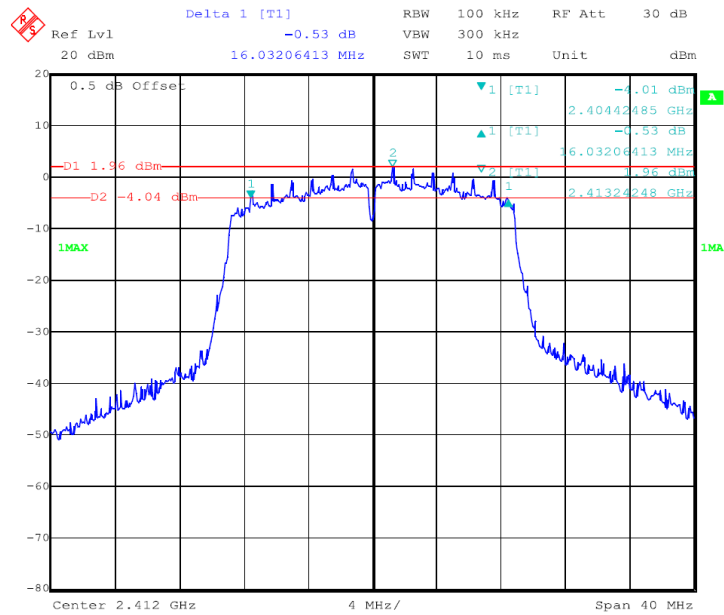


802.11g High Channel

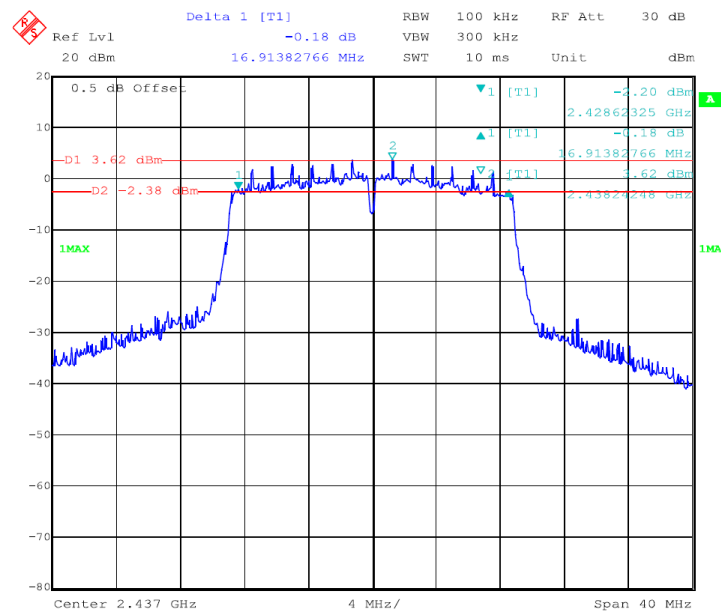




802.11n-HT20 Low Channel

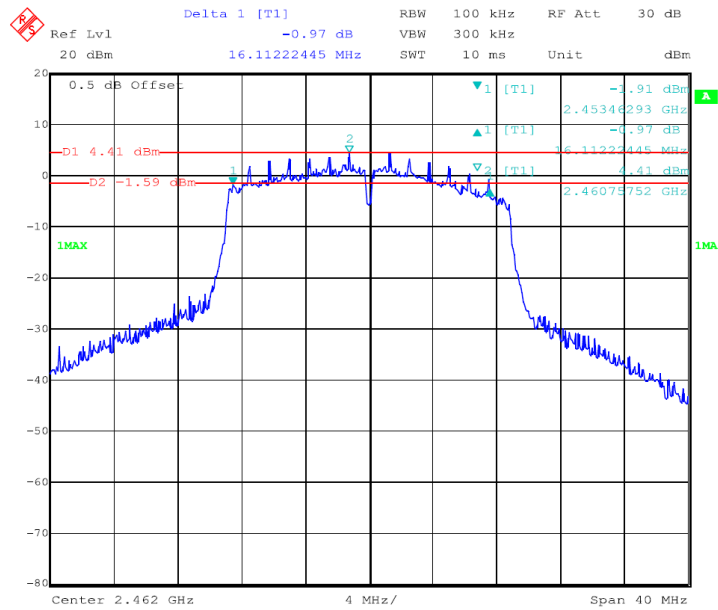


802.11n-HT20 Middle Channel

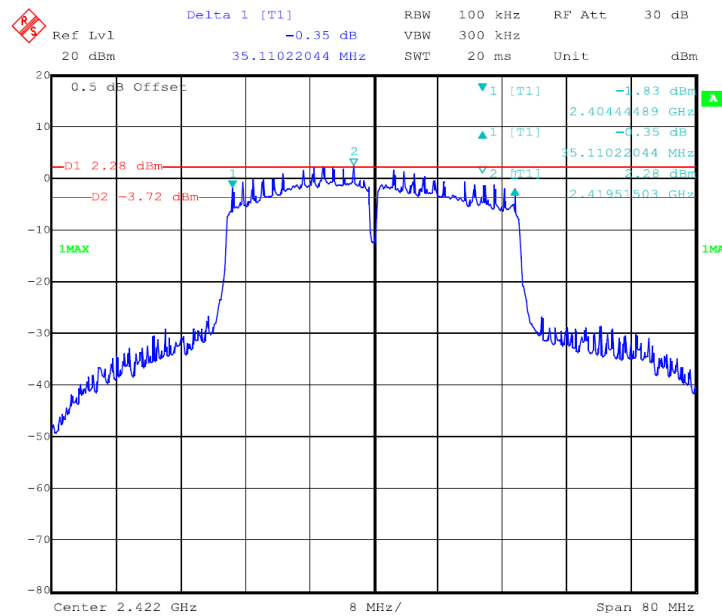




802.11n-HT20 High Channel

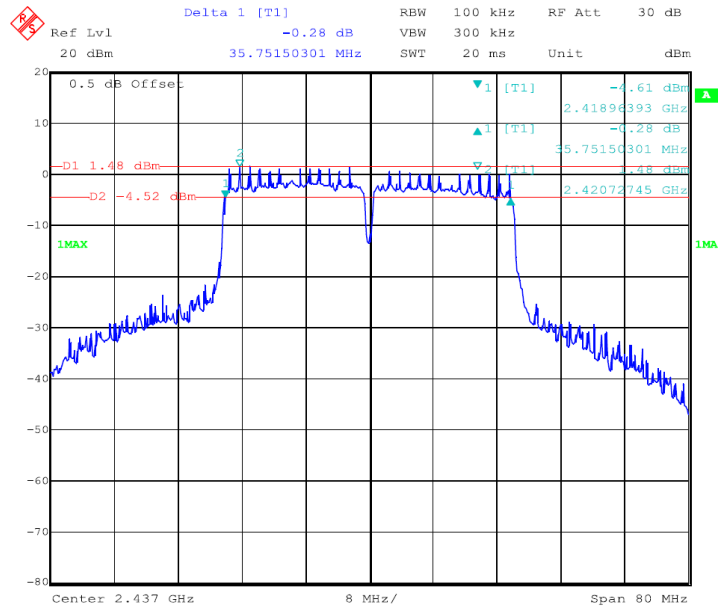


802.11n-HT40 Low Channel

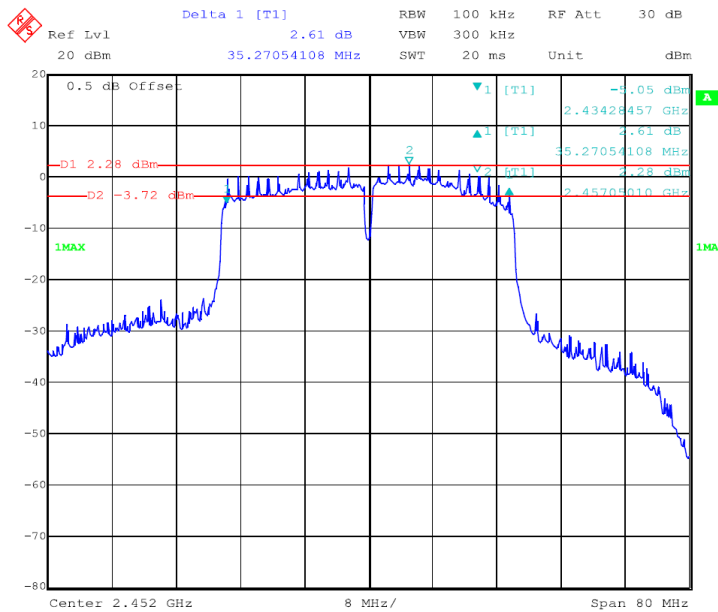




802.11n-HT40 Middle Channel



802.11n-HT40 High Channel





9 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

9.1 Test Procedure

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v05 section 9.1.2 PKPM1 Peak Power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

9.2 Test Result

Modulation	Maximum Peak Output Power (dBm)			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	12.49	12.18	12.51	1W(30dBm)
802.11g	10.99	10.86	10.84	1W(30dBm)
802.11n-HT20	9.81	9.76	9.78	1W(30dBm)
802.11n-HT40	8.36	8.54	8.35	1W(30dBm)



10 Power Spectral density

Test Requirement	: FCC CFR47 Part 15 Section 15.247
Test Method	: ANSI C63.10:2013
Test Limit	: Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

10.1 Test Procedure

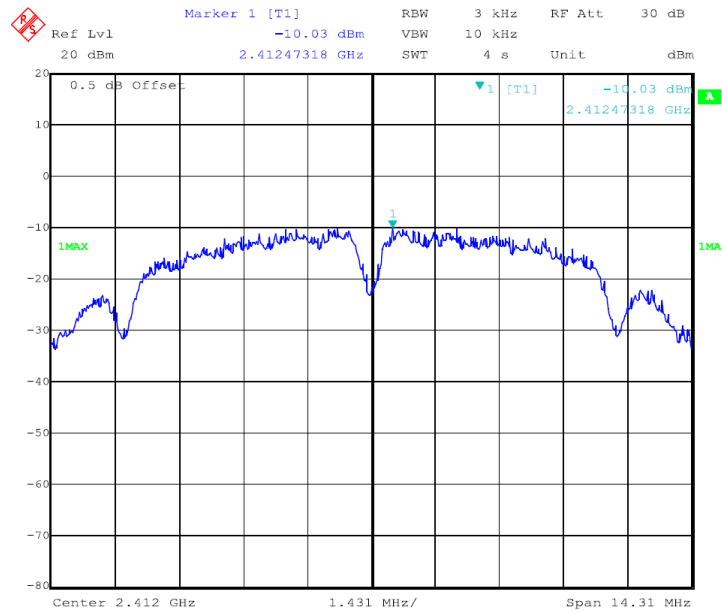
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz, Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

10.2 Test Result

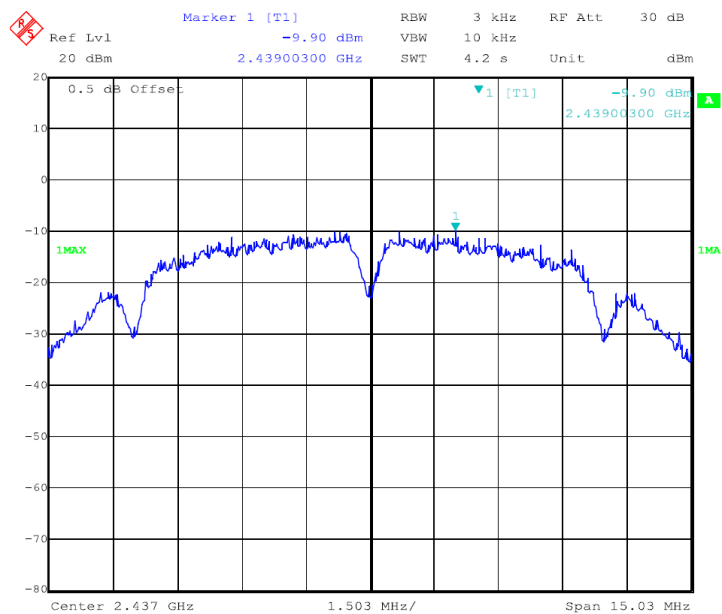
Modulation	Power Spectral density (dBm/3kHz)			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	-10.03	-9.90	-9.90	8dBm/3kHz
802.11g	-12.66	-10.53	-10.20	8dBm/3kHz
802.11n-HT20	-12.87	-10.97	-10.62	8dBm/3kHz
802.11n-HT40	-12.69	-12.84	-12.25	8dBm/3kHz



802.11b Low Channel

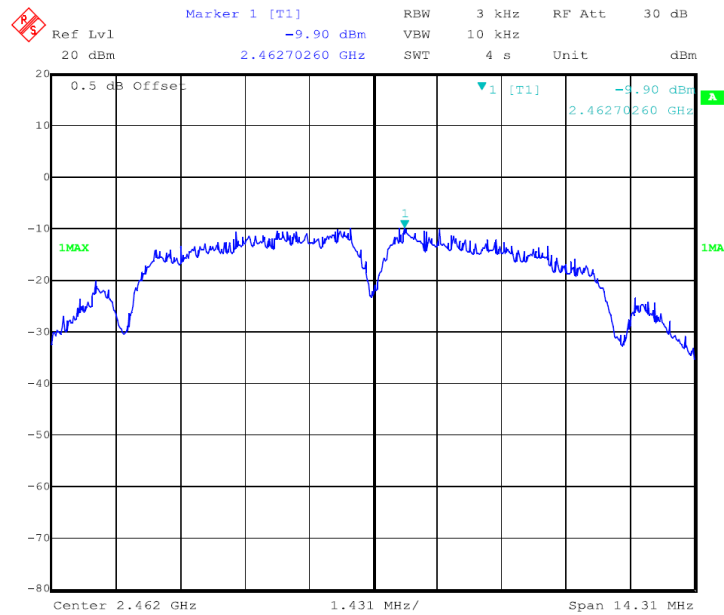


802.11b Middle Channel

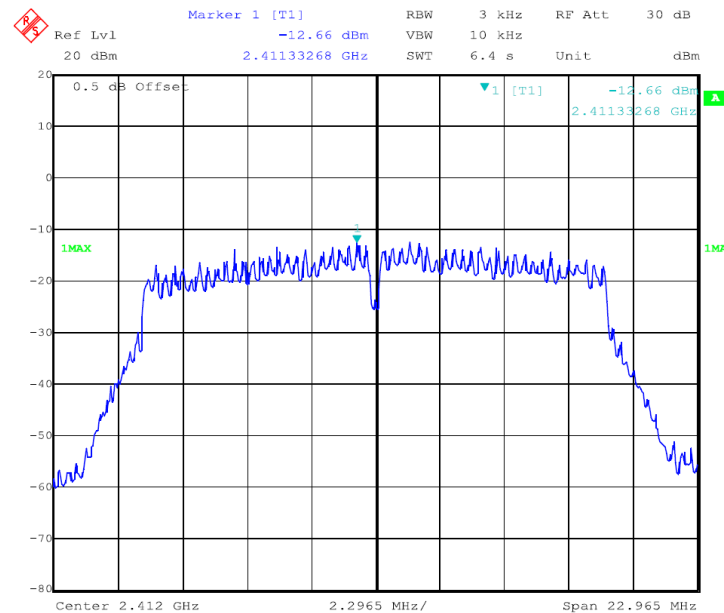




802.11b High Channel

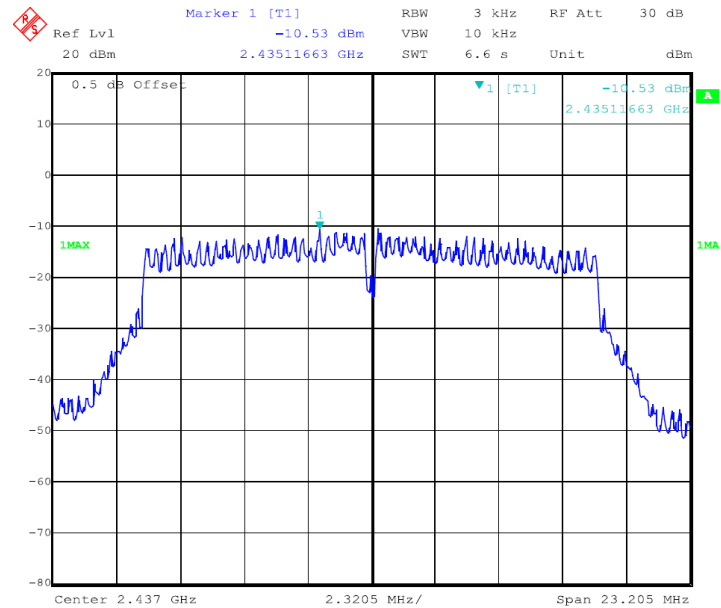


802.11g Low Channel

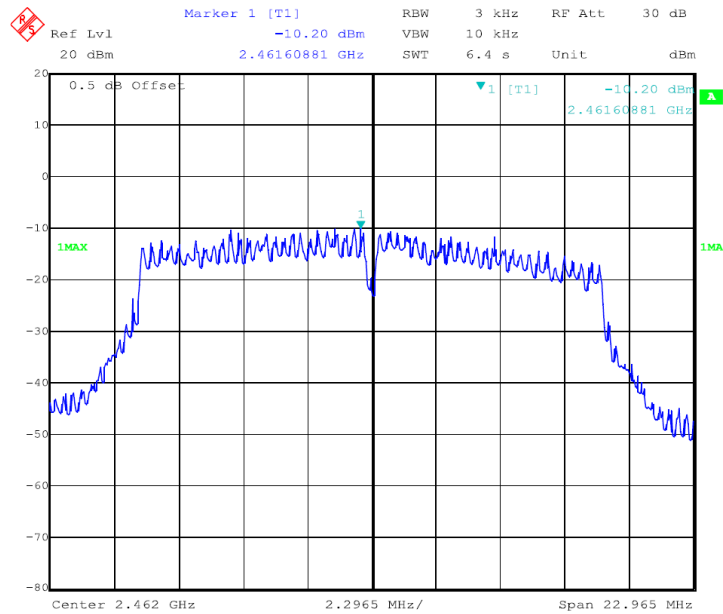




802.11g Middle Channel

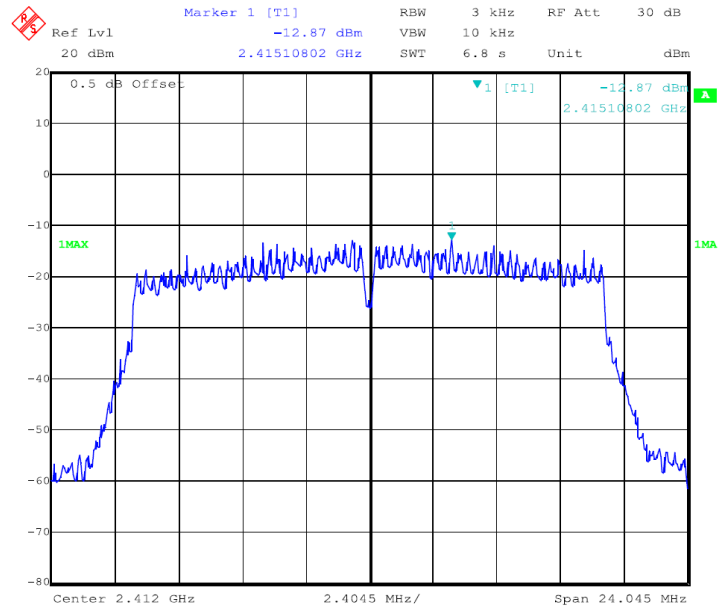


802.11g High Channel

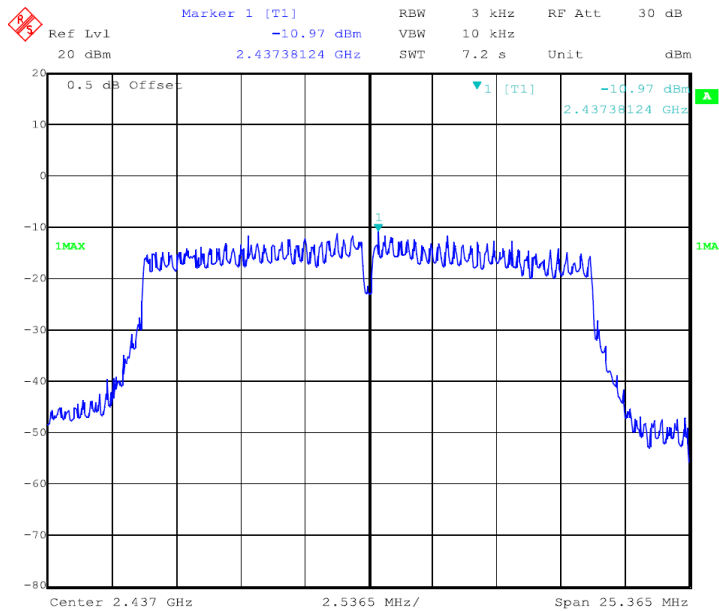




802.11n-HT20 Low Channel

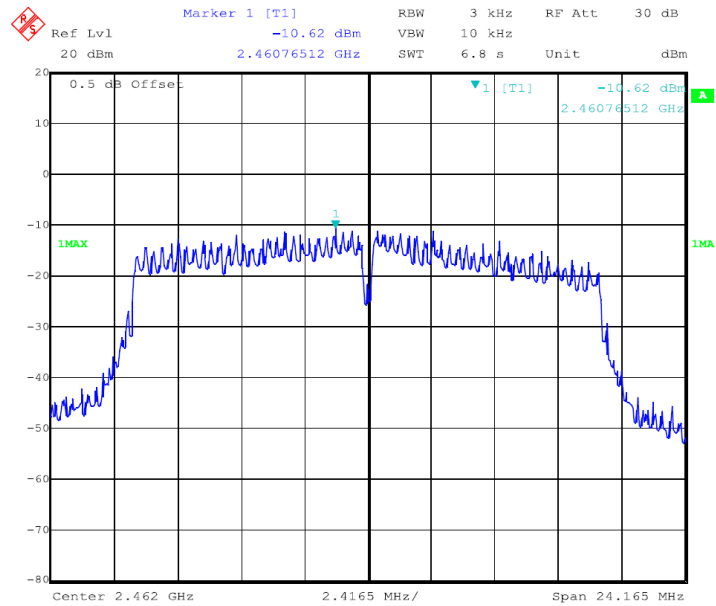


802.11n-HT20 Middle Channel

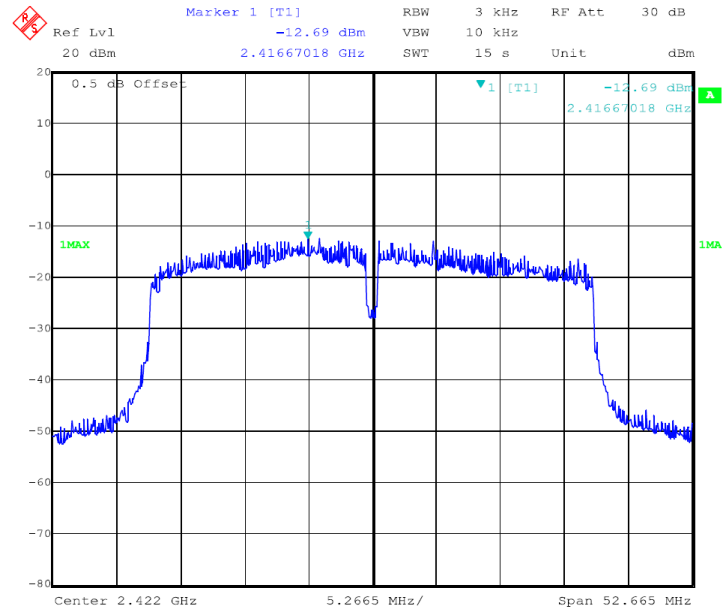




802.11n-HT20 High Channel

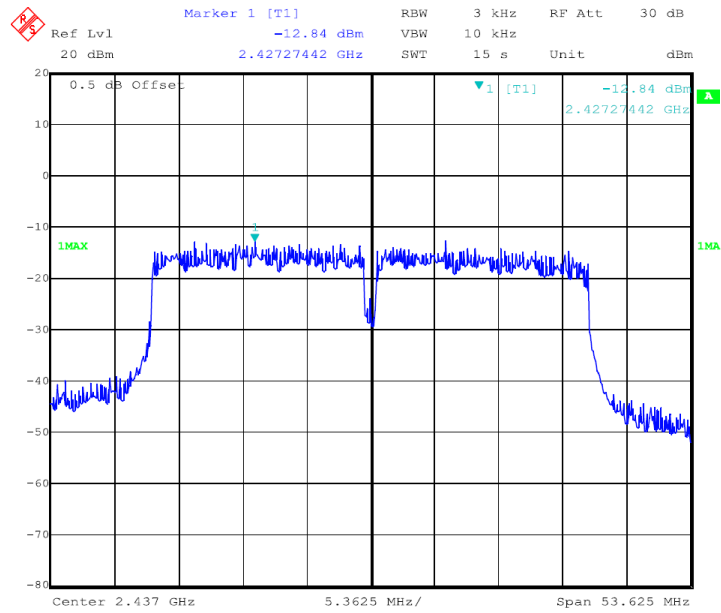


802.11n-HT40 Low Channel

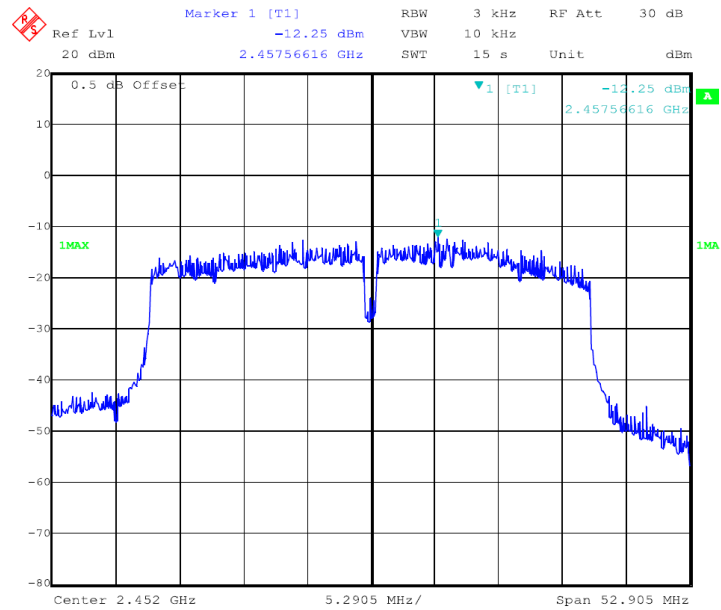




802.11n-HT40 Middle Channel



802.11n-HT40 High Channel





11 Antenna Application

11.1 Antenna Requirement

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2 Result

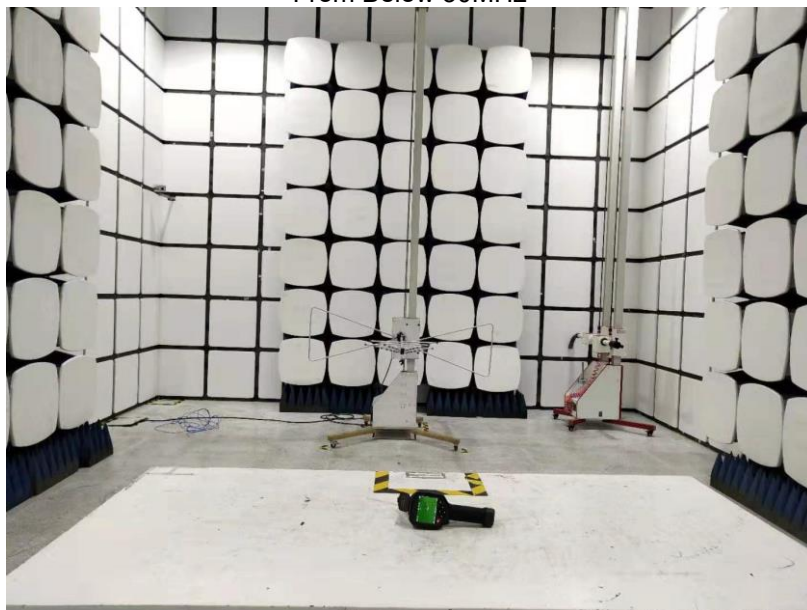
The EUT'S antenna, permanent attached antenna, is internal antenna. The antenna's gain is 3dBi and meets the requirement.

12 Test Setup

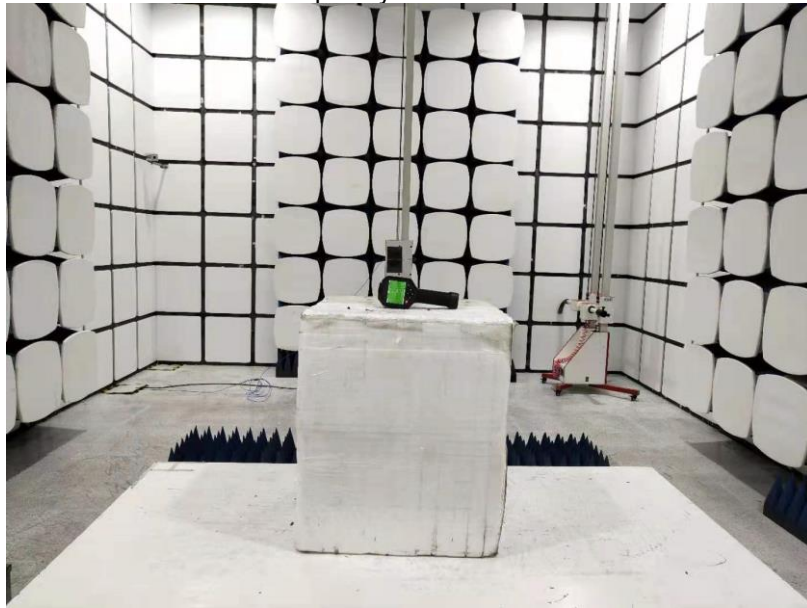
Conducted Emissions



Radiated Spurious Emissions
From Below 30MHz

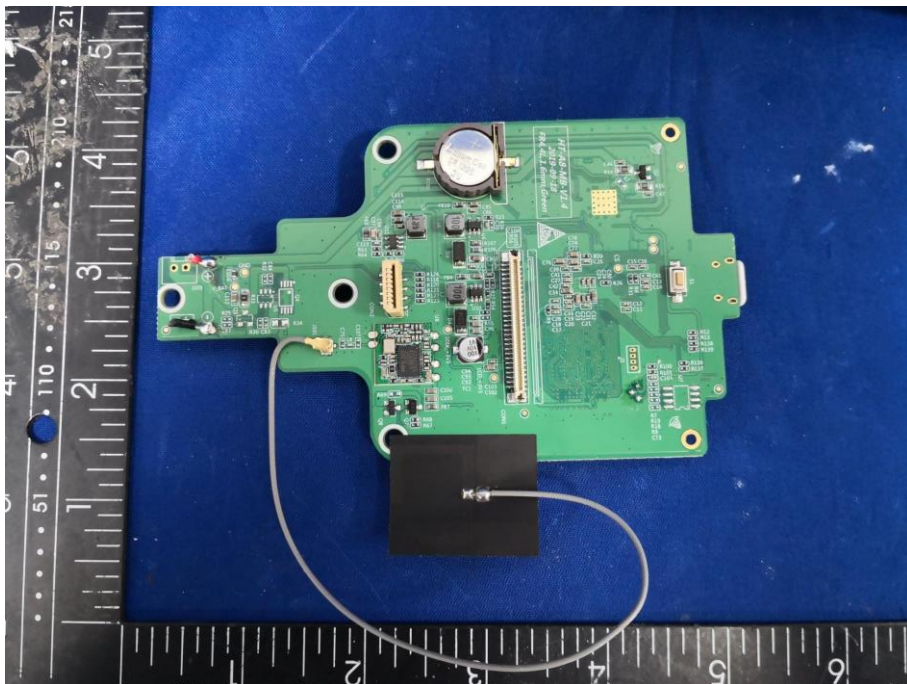


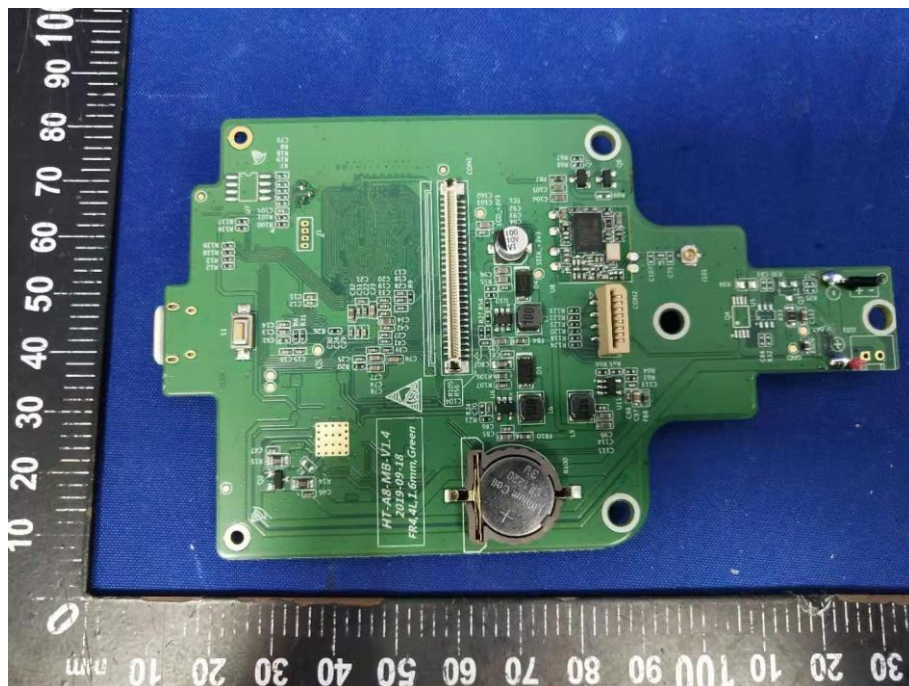
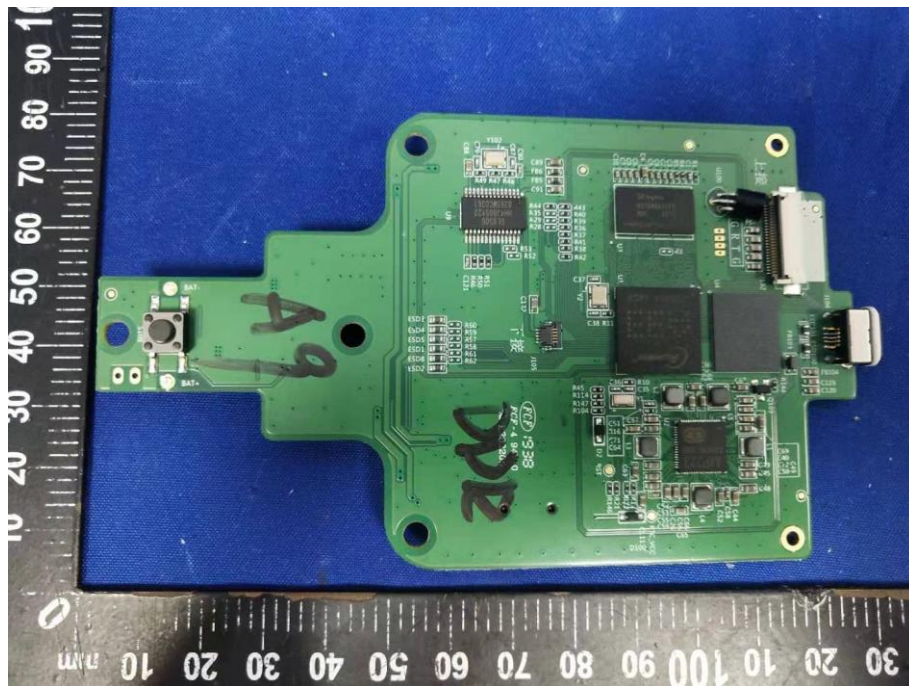
Test frequency from Above 1GHz

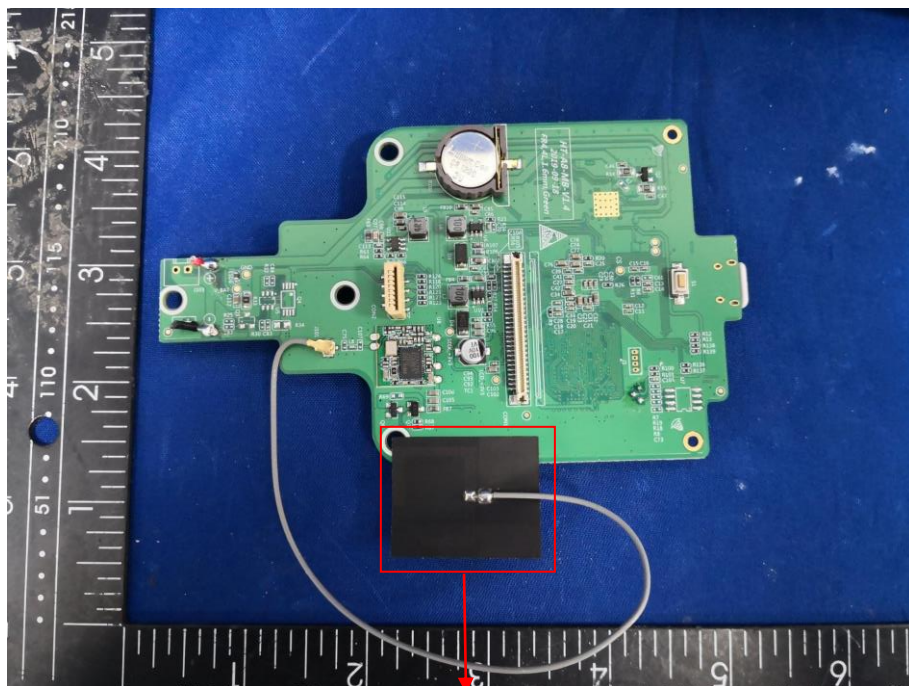
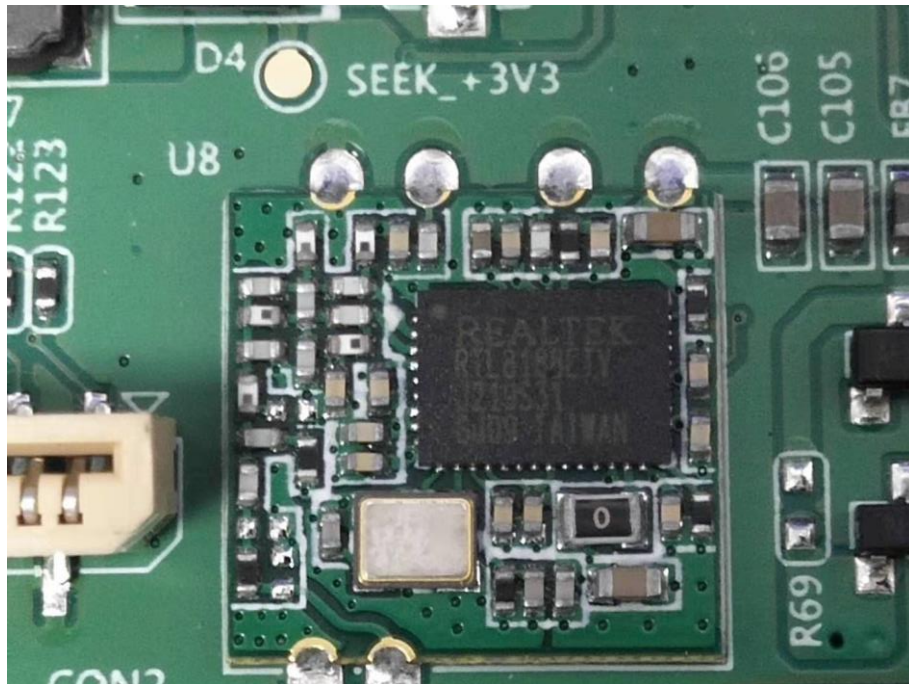


13 EUT Photos

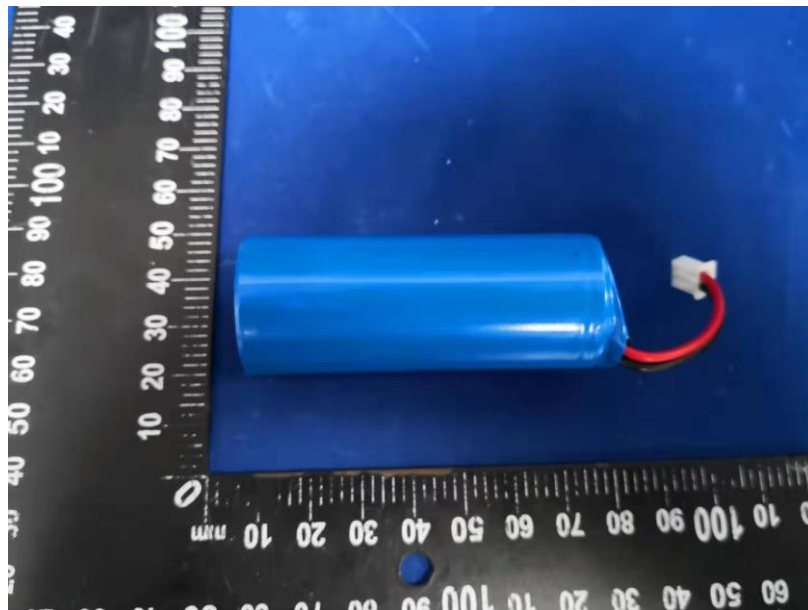
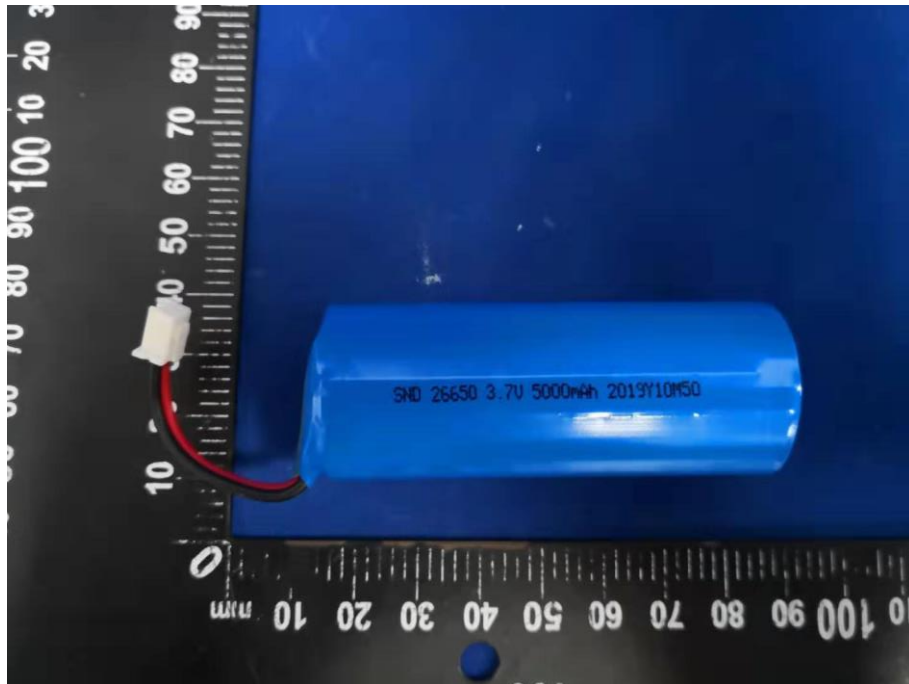








RF Antenna



*****THE END REPORT*****