



PRECISE TESTING

FCC TEST REPORT

FCC ID: 2ARJNMAD3D

Product	:	Madshot 3D camera
Model Name	:	Madshot, Madshot Pro, Madshot SE
Brand	:	Madshot
Report No.	:	PTC18091803203E-FC02
Prepared for		
Huizhou Uni Dragonts Technology Co., Ltd.		
No. 205-2, 206-1, Building B, No. 16, Huifeng East Second Road, Zhongkai High-Tech Zone, Huizhou, Guangdong, China (Mainland)		
Prepared by		
Dongguan Precise Testing & Certification Corp., Ltd.		
Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China		



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Report No.: PTC18091803203E-FC02

1 TEST RESULT CERTIFICATION

Applicant's name : Huizhou Uni Dragonts Technology Co., Ltd.
Address : No. 205-2, 206-1, Building B, No. 16, Huifeng East Second Road, Zhongkai High-Tech Zone, Huizhou, Guangdong, China (Mainland)
Manufacture's name : Huizhou Uni Dragonts Technology Co., Ltd.
Address : No. 205-2, 206-1, Building B, No. 16, Huifeng East Second Road, Zhongkai High-Tech Zone, Huizhou, Guangdong, China (Mainland)
Product name : Madshot 3D camera
Model name : Madshot, Madshot Pro, Madshot SE
Standards : FCC CFR47 Part 15 Section 15.247
Test procedure : ANSI C63.10:2013
Test Date : Oct18, 2018 to Oct 24, 2018
Date of Issue : Oct 25, 2018
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:

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager

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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
Conducted Spurious Emission	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: N/A: Not Applicable		



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3 General Information

3.1 General Description of E.U.T.

Product Name	:	Madshot 3D camera
Model Name	:	Madshot, Madshot Pro, Madshot SE
Specification	:	802.11b/g/n(HT20/HT40)
Operation Frequency	:	2412-2462MHz
Number of Channel	:	11 CH/7CH
Type of Modulation	:	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Antenna installation	:	Internal PCB Antenna
Antenna Gain	:	0 dBi
Power supply	:	DC 5V from Adapter input AC 120V/60Hz
Supplied Voltage	:	DC 2*3.7V lithium Battery
Hardware Version	:	Madshot V1.1
Software Version	:	FWHS602M180930



3.2 Channel List

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20): MCS0; 802.11n (HT40): MCS0) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462

Test Frequency and Channel for 802.11 b/g/n (HT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	6	2437	9	2452



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3.3 Test Site

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1

Test Lab: Shenzhen BCTC Testing Co., Ltd.

Address: BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Registered No.: 712850

Test items: Radiated Spurious Emission(18GHz to 25GHz)



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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-26.5GHz	Apr 07, 2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Oct 09, 2019
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Oct 09, 2019
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Oct 09, 2019

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.03, 2019
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Aug.31, 2019
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Aug.31, 2019
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep.03, 2019
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep.03, 2019
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Oct.13, 2019
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Aug.31, 2019
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Aug.31, 2019
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep.03, 2019

Radiated Emission (Test Frequency from 18GHz-25GHz in Shenzhen BCTC Testing Co., Ltd.)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-26.5GHz	Aug.26, 2019
Test Receiver	R&S	ESPI	101396	9KHz-7GHz	Aug.26, 2019
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	Sep.02, 2019
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Aug.26, 2019
RF Cable	R&S	R204	R21X	1GHz-40GHz	Aug.26, 2019
Antenna Connector	Florida RF Labs	N/A	RF01#	N/A	Aug.26, 2019

Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 03, 2019
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep. 03, 2019
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep. 03, 2019



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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)	$\pm 4.74\text{dB}$



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4.3 Description of Support Units

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



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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

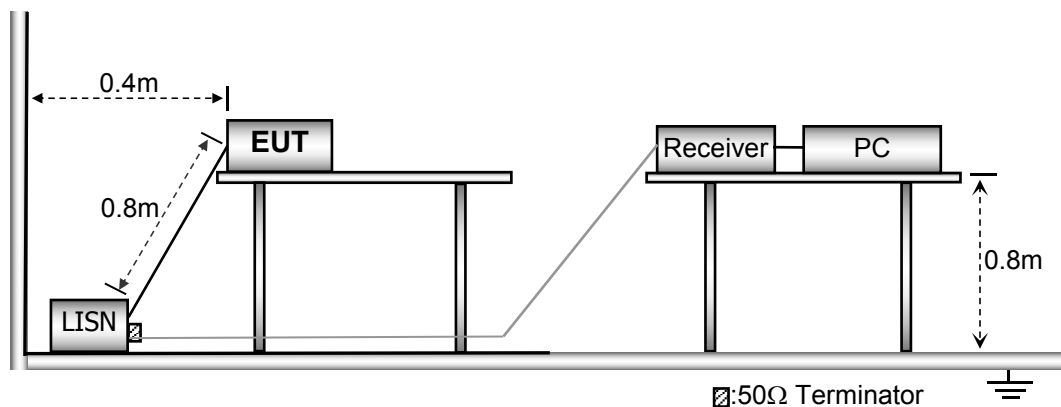
5.1 E.U.T. Operation

Operating Environment :

Temperature : 25.5 °C
Humidity : 51 % RH
Atmospheric Pressure : 101.2kPa

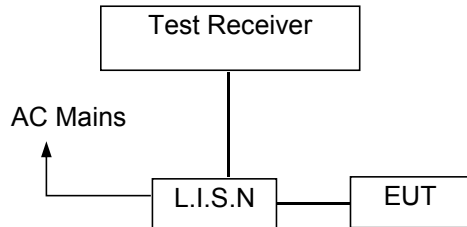
5.2 EUT Setup

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.

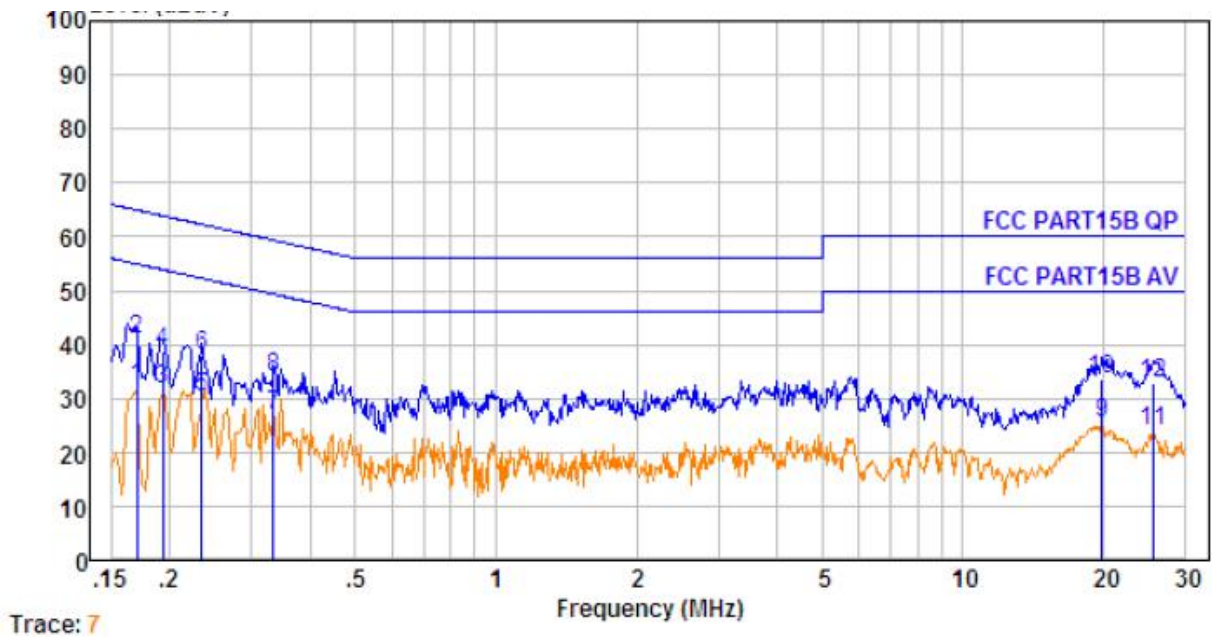
Please refer to the following pages.



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Line-AC 120V/60Hz



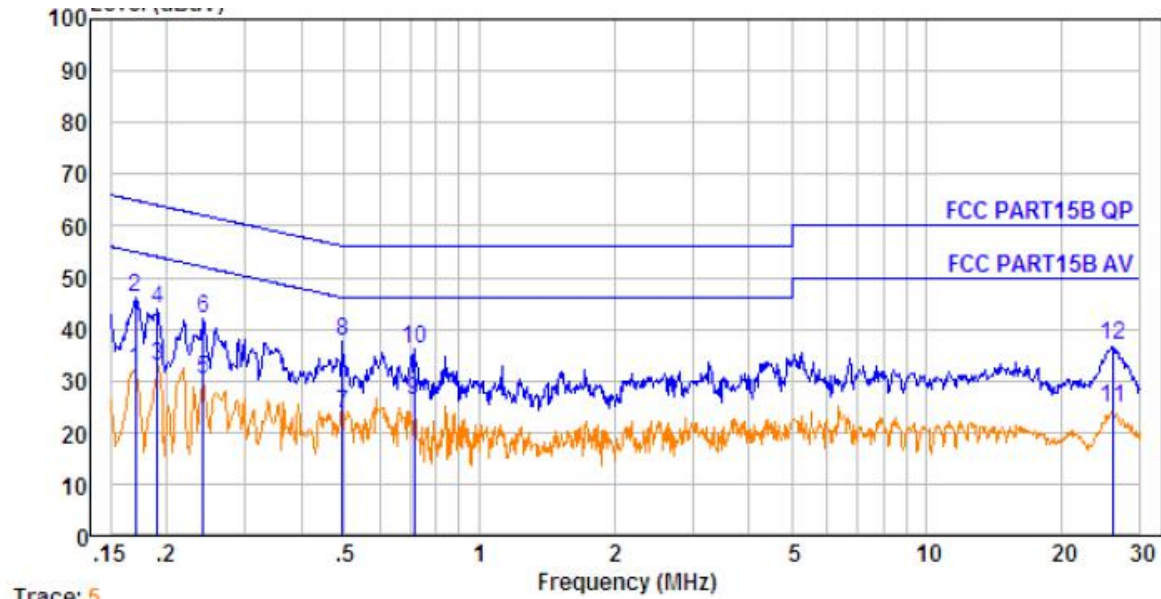
No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.170	0.24	9.54	22.32	32.10	54.94	-22.84	Average
2.	0.170	0.24	9.54	31.36	41.14	64.94	-23.80	QP
3.	0.193	0.27	9.58	21.93	31.78	53.89	-22.11	Average
4.	0.193	0.27	9.58	28.95	38.80	63.89	-25.09	QP
5.	0.234	0.31	9.62	20.26	30.19	52.30	-22.11	Average
6.	0.234	0.31	9.62	28.22	38.15	62.30	-24.15	QP
7.	0.334	0.38	9.70	16.91	26.99	49.35	-22.36	Average
8.	0.334	0.38	9.70	23.97	34.05	59.35	-25.30	QP
9.	19.845	0.39	9.84	15.34	25.57	50.00	-24.43	Average
10.	19.845	0.39	9.84	23.39	33.62	60.00	-26.38	QP
11.	25.591	0.53	9.90	13.40	23.83	50.00	-26.17	Average
12.	25.591	0.53	9.90	22.33	32.76	60.00	-27.24	QP



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Neutral-AC 120V/60Hz



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.170	0.24	9.57	22.28	32.09	54.94	-22.85	Average
2.	0.170	0.24	9.57	36.24	46.05	64.94	-18.89	QP
3.	0.190	0.27	9.60	23.00	32.87	54.02	-21.15	Average
4.	0.190	0.27	9.60	34.12	43.99	64.02	-20.03	QP
5.	0.242	0.32	9.66	20.14	30.12	52.04	-21.92	Average
6.	0.242	0.32	9.66	32.18	42.16	62.04	-19.88	QP
7.	0.494	0.43	9.81	13.51	23.75	46.10	-22.35	Average
8.	0.494	0.43	9.81	27.56	37.80	56.10	-18.30	QP
9.	0.716	0.44	9.83	15.95	26.22	46.00	-19.78	Average
10.	0.716	0.44	9.83	25.90	36.17	56.00	-19.83	QP
11.	26.139	0.52	10.08	14.02	24.62	50.00	-25.38	Average
12.	26.139	0.52	10.08	26.13	36.73	60.00	-23.27	QP



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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

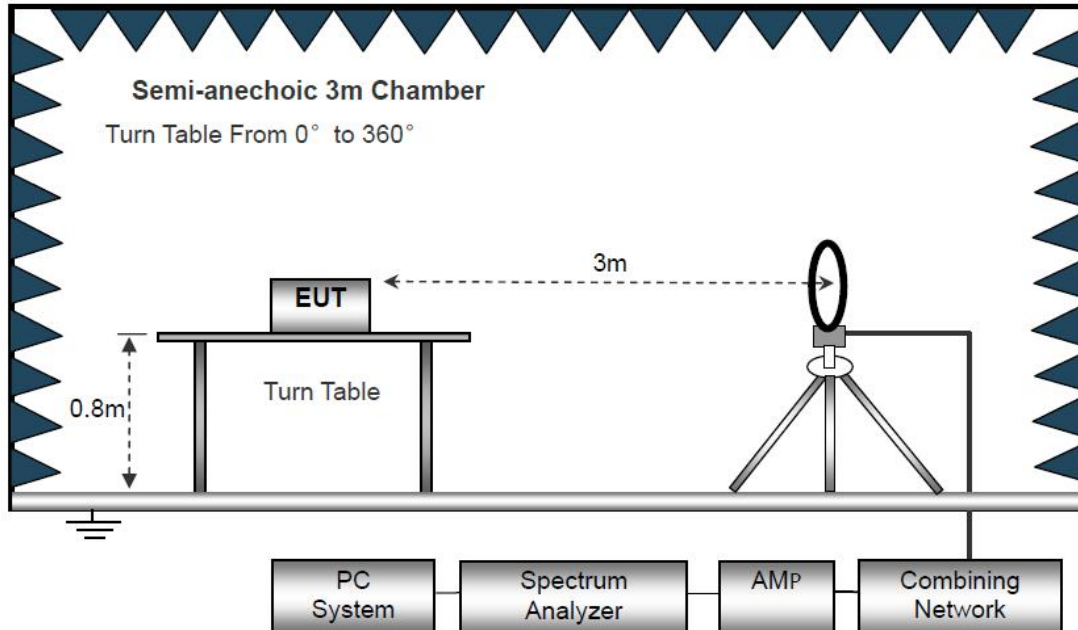
Operating Environment :

Temperature: : 23.5 °C
 Humidity: : 51.1 % RH
 Atmospheric Pressure: : 101.2kPa
 Test Voltage : DC 3.8V Battery

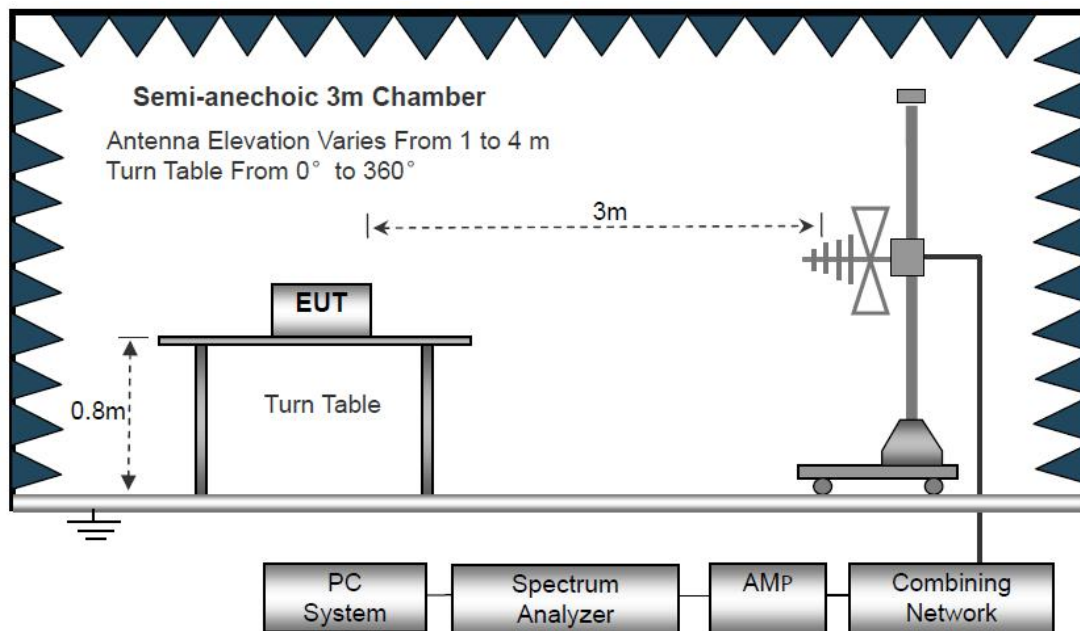
6.2 Test Setup

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

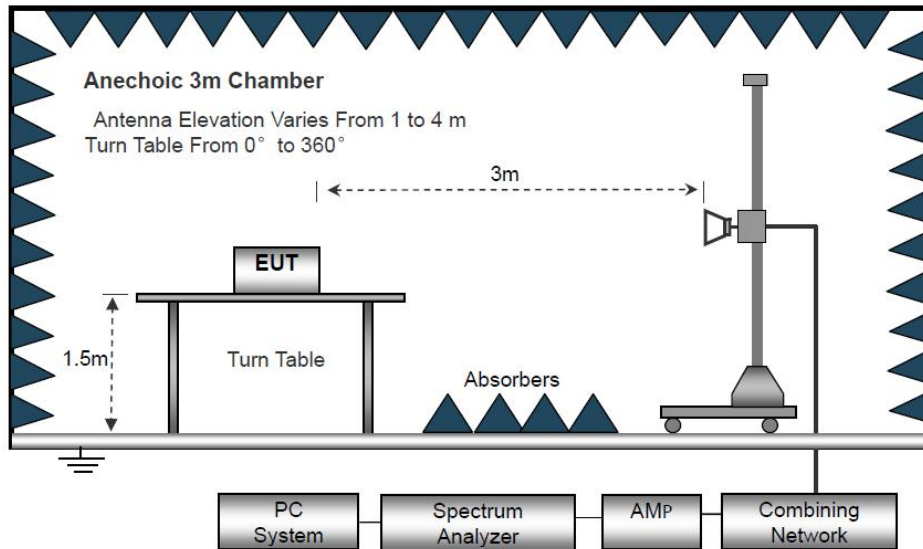
The test setup for emission measurement below 30MHz



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

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value



6.4 Test Procedure

1. 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.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room



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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 (TX 802.11b Low Channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

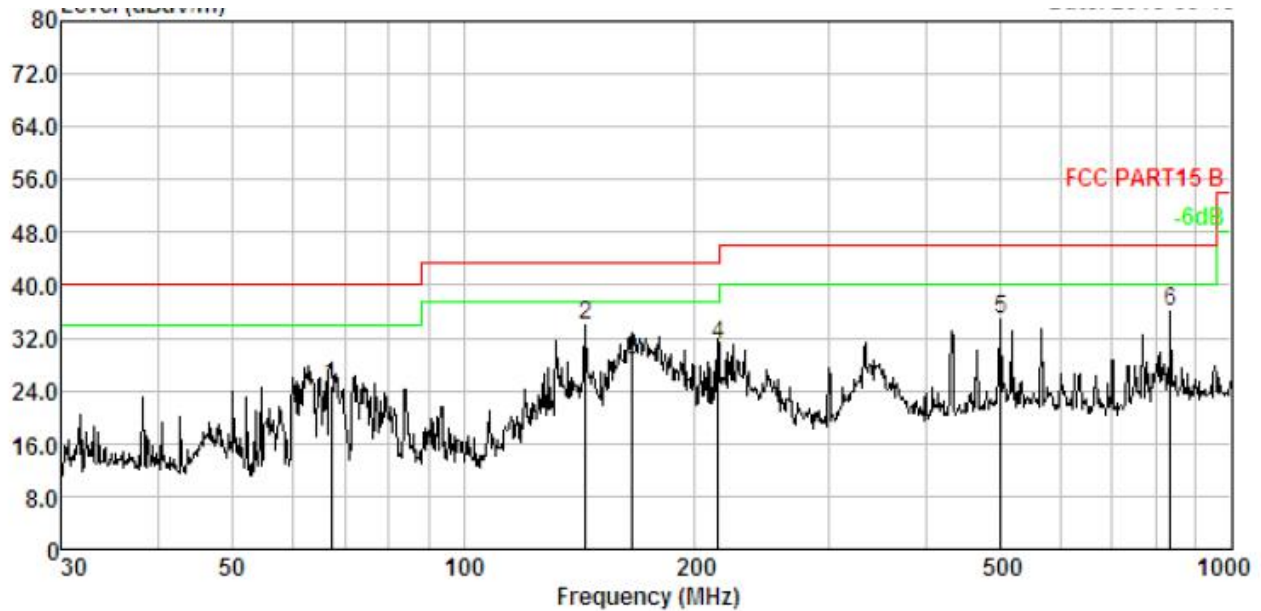
Please refer to the following test plots:



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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.	67.202	1.79	11.01	42.25	30.25	24.80	40.00	-15.20	QP
2.	144.335	2.48	13.60	48.46	30.52	34.02	43.50	-9.48	QP
3.	166.068	2.60	13.54	43.11	30.57	28.68	43.50	-14.82	QP
4.	214.514	2.84	10.66	48.06	30.65	30.91	43.50	-12.59	QP
5.	501.179	3.60	17.08	45.12	30.95	34.85	46.00	-11.15	QP
6.	833.317	4.06	21.97	41.16	31.13	36.06	46.00	-9.94	QP

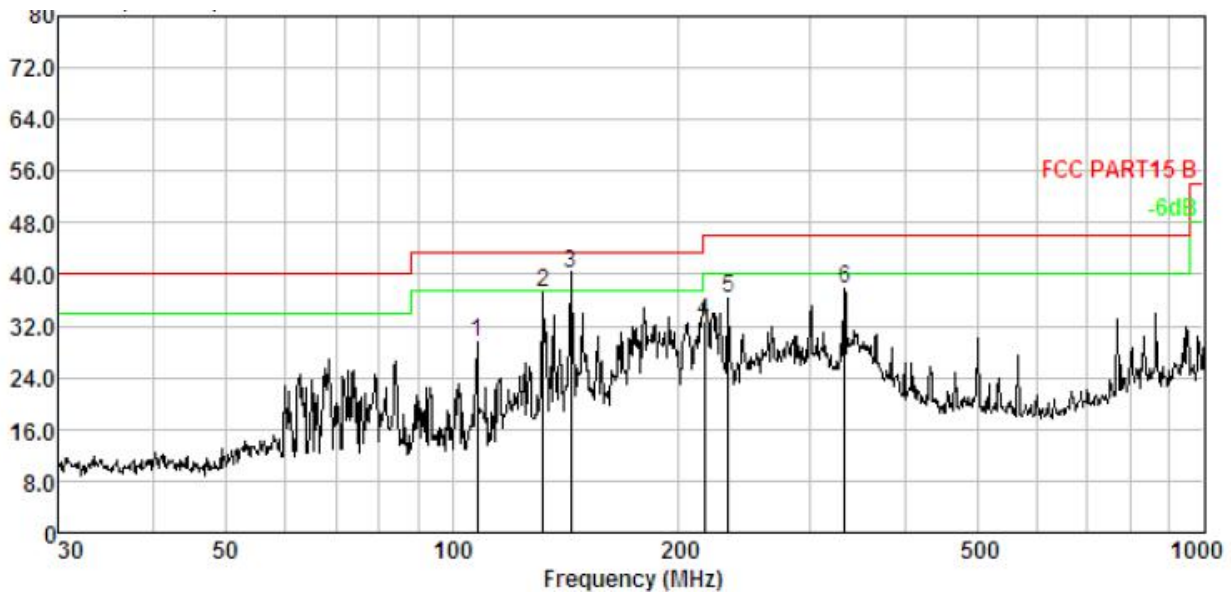
Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor



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Antenna Polarization: Vertical



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.	107.888	2.21	10.90	46.96	30.42	29.65	43.50	-13.85	QP
2.	132.221	2.40	12.80	52.52	30.49	37.23	43.50	-6.27	QP
3.	143.830	2.47	13.57	54.71	30.52	40.23	43.50	-3.27	QP
4.	216.783	2.85	10.70	49.85	30.66	32.74	46.00	-13.26	QP
5.	233.349	2.91	11.40	52.80	30.68	36.43	46.00	-9.57	QP
6.	332.519	3.23	13.93	51.36	30.81	37.71	46.00	-8.29	QP

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

Test Frequency: From 1GHz to 18GHz

802.11b Low Channel

Meter		Antenna		Orrected	Emission					
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
Low Channel (2412 MHz)										
4824.51	59.13	44.20	9.04	31.60	-3.56	55.57	74.00	-18.43	PK	Vertical
4824.51	38.57	44.20	9.04	31.60	-3.56	35.01	54.00	-18.99	AV	Vertical
4824.55	58.47	44.20	9.04	31.60	-3.56	54.91	74.00	-19.09	PK	Horizontal
4824.55	38.92	44.20	9.04	31.60	-3.56	35.36	54.00	-18.64	AV	Horizontal
7235.81	51.19	43.50	11.40	35.50	3.40	54.59	74.00	-19.41	PK	Vertical
7235.81	33.85	43.50	11.40	35.50	3.40	37.25	54.00	-16.75	AV	Vertical
7235.80	51.21	43.50	11.40	35.50	3.40	54.61	74.00	-19.39	PK	Horizontal
7235.80	33.66	43.50	11.40	35.50	3.40	37.06	54.00	-16.94	AV	Horizontal

802.11b Mid Channel

Meter		Antenna		Orrected	Emission					
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
Low Channel (2437 MHz)										
4874.31	58.93	44.20	9.04	31.60	-3.56	55.37	74.00	-18.63	PK	Vertical
4874.31	38.93	44.20	9.04	31.60	-3.56	35.37	54.00	-18.63	AV	Vertical
4874.41	59.11	44.20	9.04	31.60	-3.56	55.55	74.00	-18.45	PK	Horizontal
4874.41	39.27	44.20	9.04	31.60	-3.56	35.71	54.00	-18.29	AV	Horizontal
7310.88	51.61	43.50	11.40	35.50	3.40	55.01	74.00	-18.99	PK	Vertical
7310.88	32.73	43.50	11.40	35.50	3.40	36.13	54.00	-17.87	AV	Vertical
7310.89	50.92	43.50	11.40	35.50	3.40	54.32	74.00	-19.68	PK	Horizontal
7310.89	32.64	43.50	11.40	35.50	3.40	36.04	54.00	-17.96	AV	Horizontal



PRECISE TESTING

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802.11b High Channel

Meter		Antenna		Orrected	Emission					
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
Low Channel (2462 MHz)										
4924.37	58.68	44.20	9.04	31.60	-3.56	55.12	74.00	-18.88	PK	Vertical
4924.37	49.23	44.20	9.04	31.60	-3.56	45.67	54.00	-8.33	AV	Vertical
4924.37	58.85	44.20	9.04	31.60	-3.56	55.29	74.00	-18.71	PK	Horizontal
4924.37	50.47	44.20	9.04	31.60	-3.56	46.91	54.00	-7.09	AV	Horizontal
7385.93	54.98	43.50	11.40	35.50	3.40	58.38	74.00	-15.62	PK	Vertical
7385.93	43.63	43.50	11.40	35.50	3.40	47.03	54.00	-6.97	AV	Vertical
7385.93	54.67	43.50	11.40	35.50	3.40	58.07	74.00	-15.93	PK	Horizontal
7385.93	43.97	43.50	11.40	35.50	3.40	47.37	54.00	-6.63	AV	Horizontal

Remark:

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

2. Scan with 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40) the worst case is 802.11b.

Emission Level = Meter Reading + Factor

Margin = Limit - Emission Level

3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

Test Frequency: From 18GHz to 25GHz

802.11b Low Channel

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
18998.14	31.90	23.10	55.00	74.00	-19.00	PK	Vertical
18998.14	21.90	23.10	45.00	54.00	-9.00	AV	Vertical
18998.14	31.92	23.10	55.02	74.00	-18.98	PK	Horizontal
18998.14	21.96	23.10	45.06	54.00	-8.94	AV	Horizontal

802.11b Middle Channel

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
18998.13	31.80	23.10	54.90	74.00	-19.10	PK	Vertical
18998.13	21.85	23.10	44.95	54.00	-9.05	AV	Vertical
18998.13	31.85	23.10	54.95	74.00	-19.05	PK	Horizontal
18998.13	21.85	23.10	44.95	54.00	-9.05	AV	Horizontal



PRECISE TESTING

Report No.: PTC18091803203E-FC02

802.11b High Channel

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
18898.22	31.73	23.10	54.83	74.00	-19.17	PK	Vertical
18898.22	21.77	23.10	44.87	54.00	-9.13	AV	Vertical
18898.22	31.77	23.10	54.87	74.00	-19.13	PK	Horizontal
18898.22	21.78	23.10	44.88	54.00	-9.12	AV	Horizontal

Band edge Requirements)

Meter		Antenna		Orrected	Emission					
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
802.11b										
2400.00	68.38	43.80	4.91	25.90	-12.99	55.39	74	-18.61	PK	Vertical
2400.00	53.48	43.80	4.91	25.90	-12.99	40.49	54	-13.51	AV	Vertical
2400.00	68.81	43.80	4.91	25.90	-12.99	55.82	74	-18.18	PK	Horizontal
2400.00	52.19	43.80	4.91	25.90	-12.99	39.20	54	-14.80	AV	Horizontal
2483.50	69.18	43.80	5.12	25.90	-12.78	56.40	74	-17.60	PK	Vertical
2483.50	52.43	43.80	5.12	25.90	-12.78	39.65	54	-14.35	AV	Vertical
2483.50	69.49	43.80	5.12	25.90	-12.78	56.71	74	-17.29	PK	Horizontal
2483.50	52.74	43.80	5.12	25.90	-12.78	39.96	54	-14.04	AV	Horizontal
802.11g										
2400.00	67.13	43.80	4.91	25.90	-12.99	54.14	74	-19.86	PK	Vertical
2400.00	52.83	43.80	4.91	25.90	-12.99	39.84	54	-14.16	AV	Vertical
2400.00	65.20	43.80	4.91	25.90	-12.99	52.21	74	-21.79	PK	Horizontal
2400.00	53.95	43.80	4.91	25.90	-12.99	40.96	54	-13.04	AV	Horizontal
2483.50	66.44	43.80	5.12	25.90	-12.78	53.66	74	-20.34	PK	Vertical
2483.50	52.49	43.80	5.12	25.90	-12.78	39.71	54	-14.29	AV	Vertical
2483.50	65.32	43.80	5.12	25.90	-12.78	52.54	74	-21.46	PK	Horizontal
2483.50	53.09	43.80	5.12	25.90	-12.78	40.31	54	-13.69	AV	Horizontal
802.11n20										
2400.00	66.26	43.80	4.91	25.90	-12.99	53.27	74	-20.73	PK	Vertical
2400.00	52.69	43.80	4.91	25.90	-12.99	39.70	54	-14.30	AV	Vertical
2400.00	65.84	43.80	4.91	25.90	-12.99	52.85	74	-21.15	PK	Horizontal
2400.00	54.30	43.80	4.91	25.90	-12.99	41.31	54	-12.69	AV	Horizontal
2483.50	65.53	43.80	5.12	25.90	-12.78	52.75	74	-21.25	PK	Vertical
2483.50	53.24	43.80	5.12	25.90	-12.78	40.46	54	-13.54	AV	Vertical
2483.50	65.44	43.80	5.12	25.90	-12.78	52.66	74	-21.34	PK	Horizontal
2483.50	53.13	43.80	5.12	25.90	-12.78	40.35	54	-13.65	AV	Horizontal



PRECISE TESTING

Report No.: PTC18091803203E-FC02

Meter		Antenna		Orrected	Emission		Margin	Detector	Type	Comment
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level				
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
802.11n40										
2400.00	67.26	43.80	4.91	25.90	-12.99	54.27	74	-19.73	PK	Vertical
2400.00	53.42	43.80	4.91	25.90	-12.99	40.43	54	-13.57	AV	Vertical
2400.00	66.11	43.80	4.91	25.90	-12.99	53.12	74	-20.88	PK	Horizontal
2400.00	54.27	43.80	4.91	25.90	-12.99	41.28	54	-12.72	AV	Horizontal
2483.50	65.09	43.80	5.12	25.90	-12.78	52.31	74	-21.69	PK	Vertical
2483.50	52.28	43.80	5.12	25.90	-12.78	39.50	54	-14.50	AV	Vertical
2483.50	65.34	43.80	5.12	25.90	-12.78	52.56	74	-21.44	PK	Horizontal
2483.50	53.52	43.80	5.12	25.90	-12.78	40.74	54	-13.26	AV	Horizontal
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Low measurement frequencies is range from 2310 to 2400 MHz, high measurement frequencies is range from 2483.5 to 2500 MHz. Only show the worst point data of the emissions in the frequency 2310-2400 MHz and 2483.5-2500 MHz.										



7 Conducted Spurious Emission

Test Requirement : FCC CFR47 Part 15 Section 15.247
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

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

7.2 Test Result

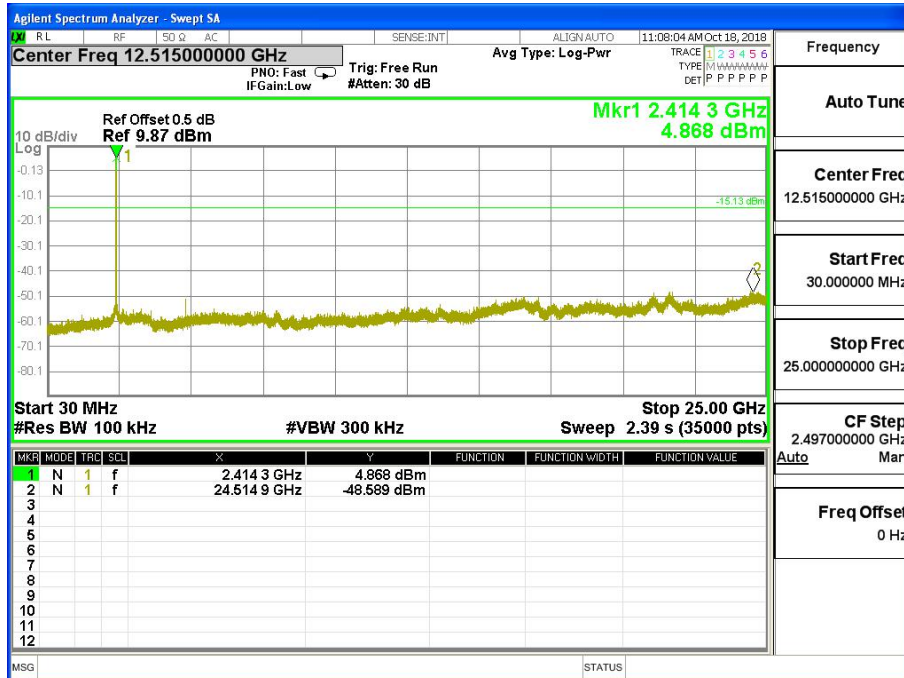


PRECISE TESTING

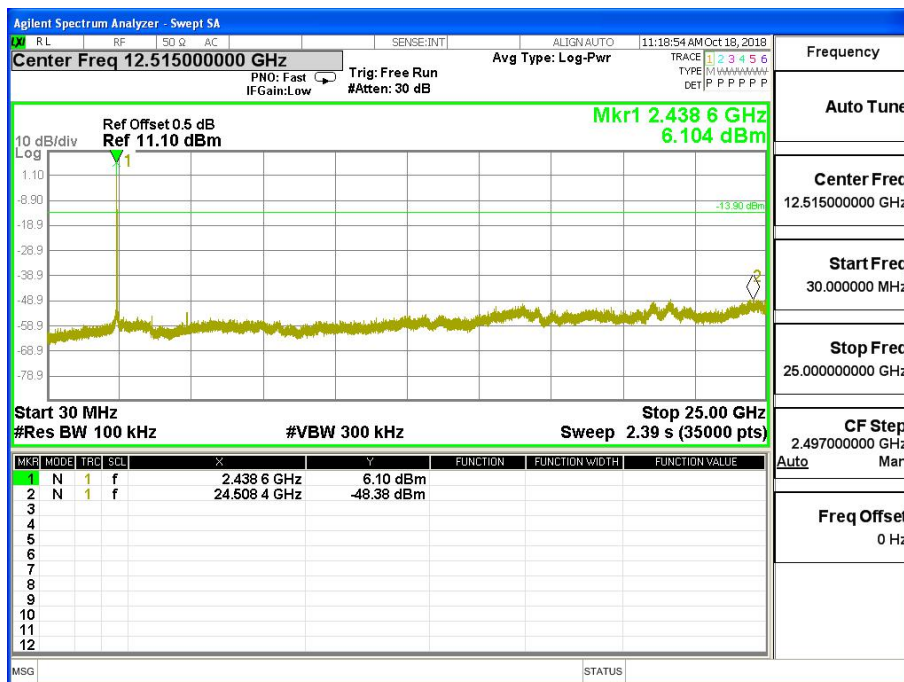
Report No.: PTC18091803203E-FC02

802.11 b

Low Channel



Middle Channel

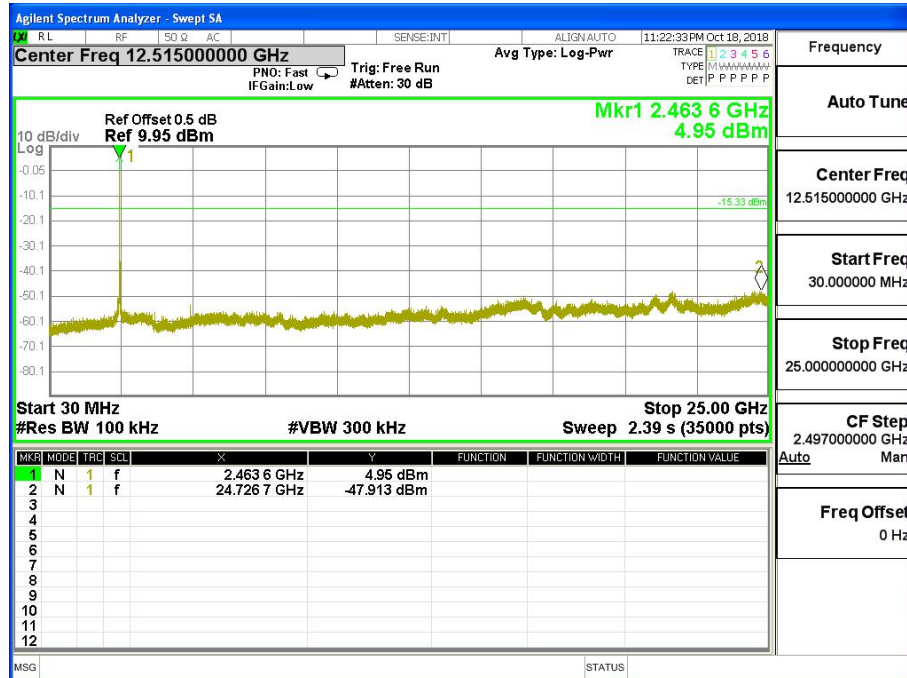




PRECISE TESTING

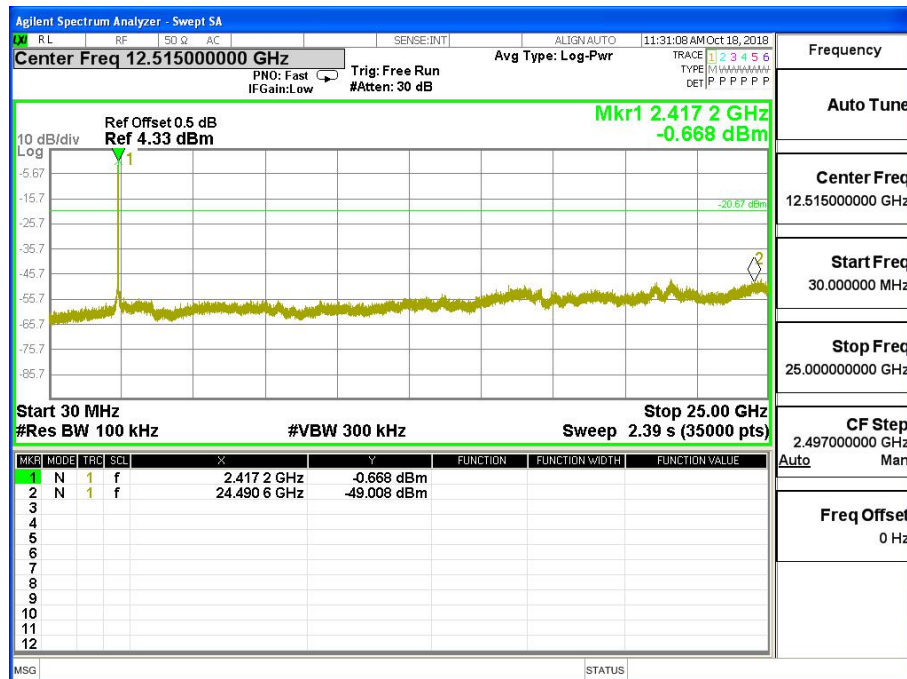
Report No.: PTC18091803203E-FC02

High Channel



802.11g

Low Channel

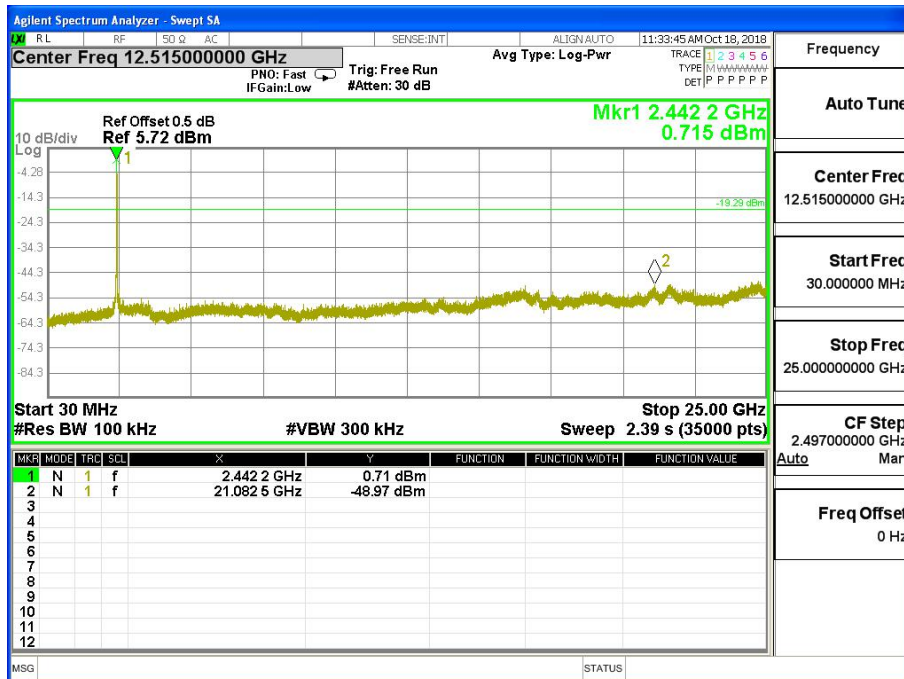




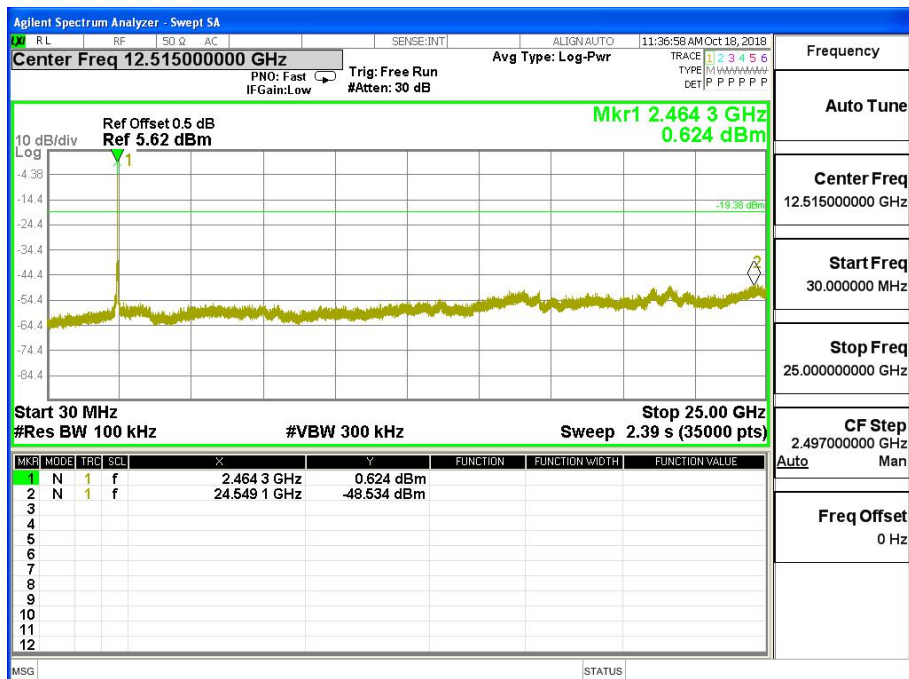
PRECISE TESTING

Report No.: PTC18091803203E-FC02

Middle Channel



High Channel



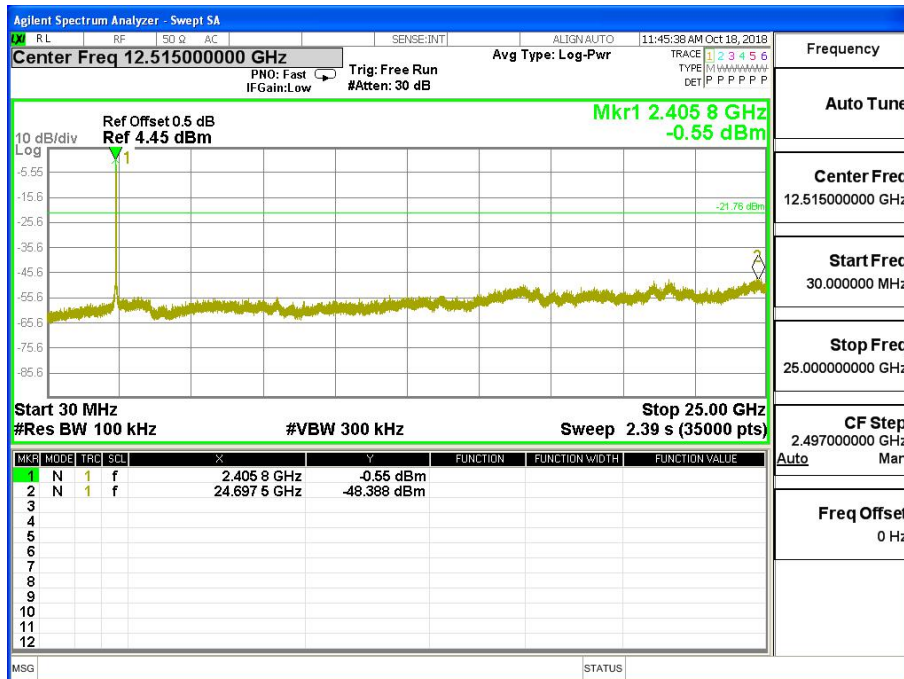
802.11n-HT20



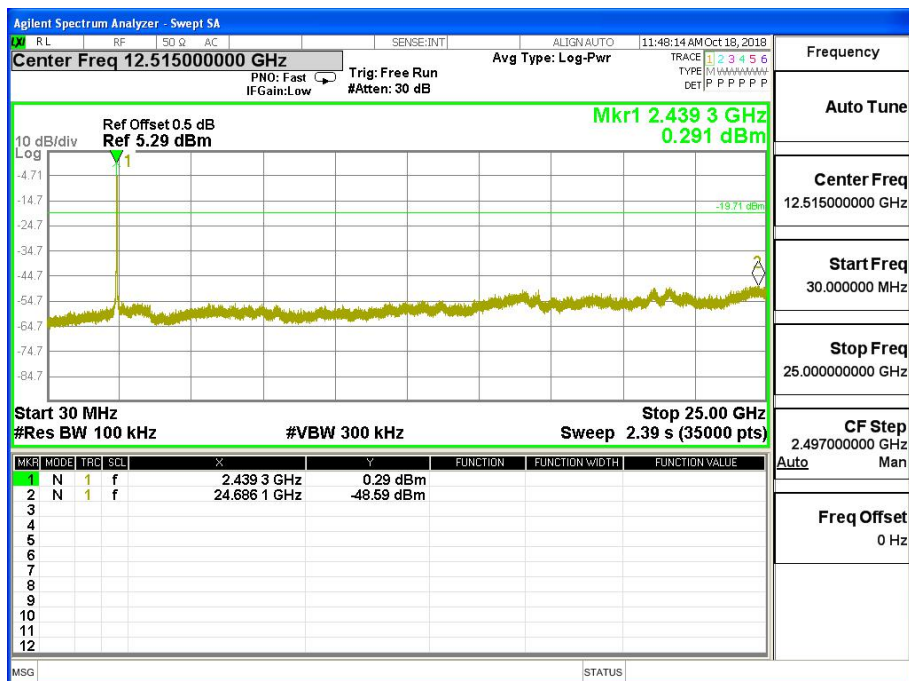
PRECISE TESTING

Report No.: PTC18091803203E-FC02

Low Channel



Middle Channel

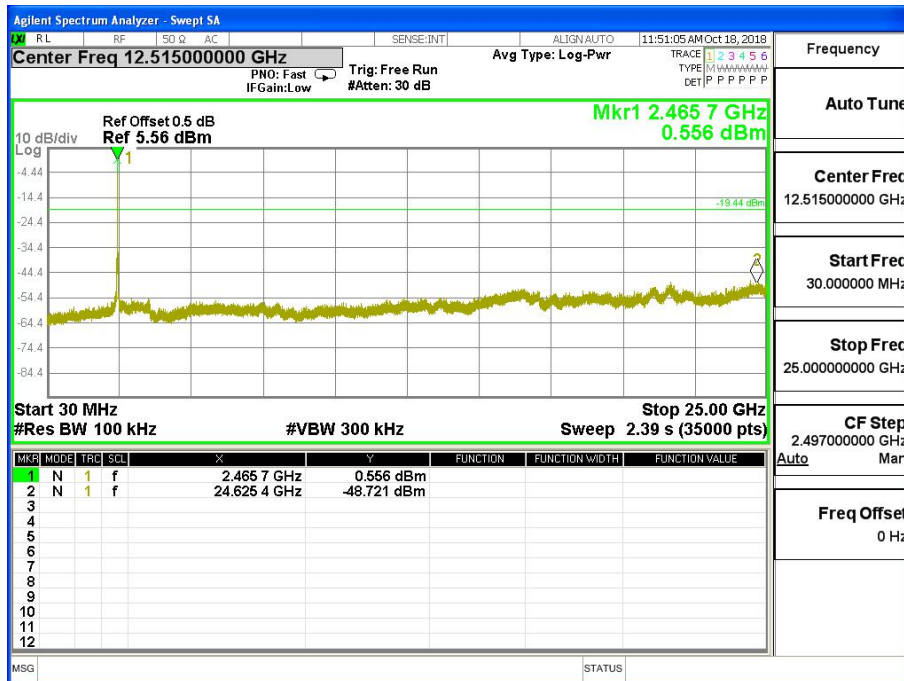




PRECISE TESTING

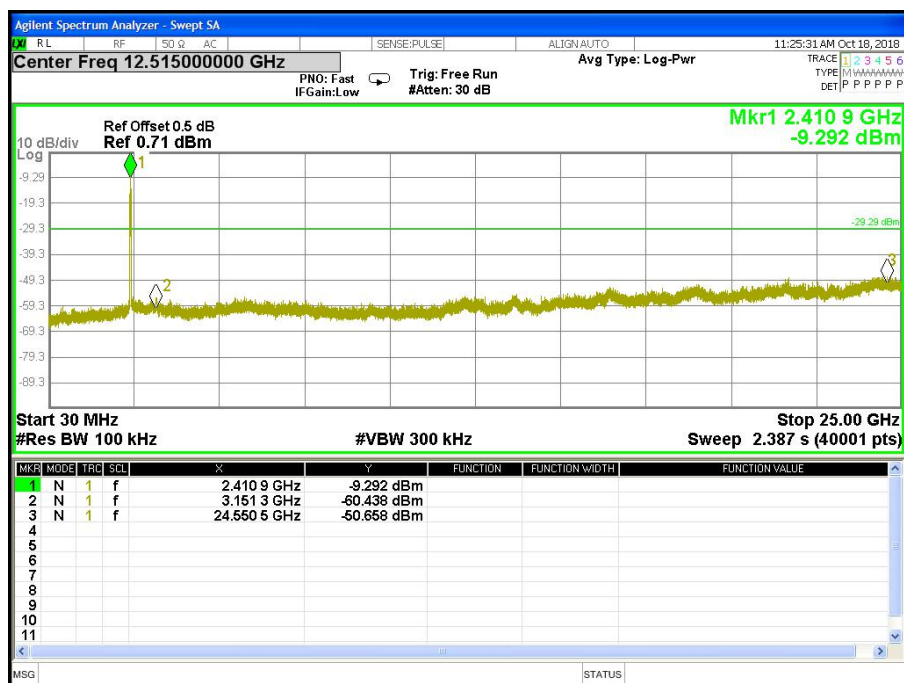
Report No.: PTC18091803203E-FC02

High Channel



802.11n-HT40

Low Channel

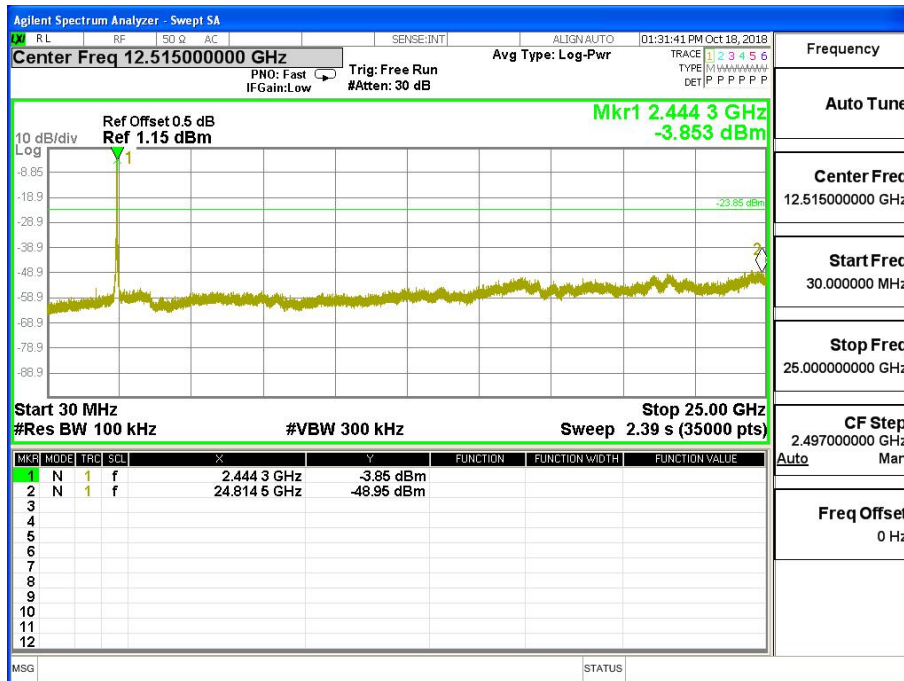




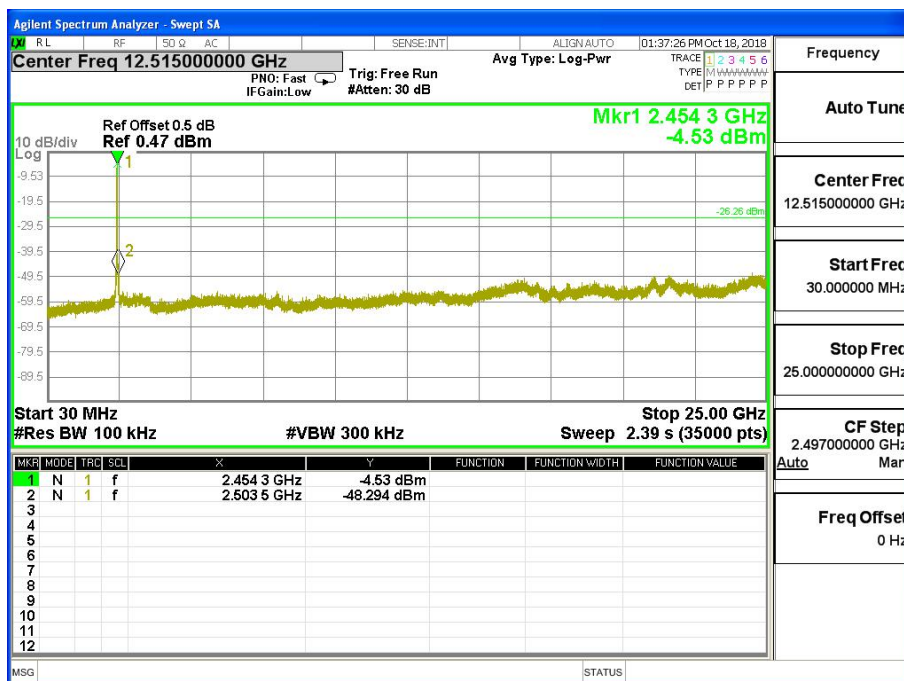
PRECISE TESTING

Report No.: PTC18091803203E-FC02

Middle Channel



High Channel





8 Band Edge Measurement

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)).

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, Sweep = auto
Detector function = peak, Trace = max hold

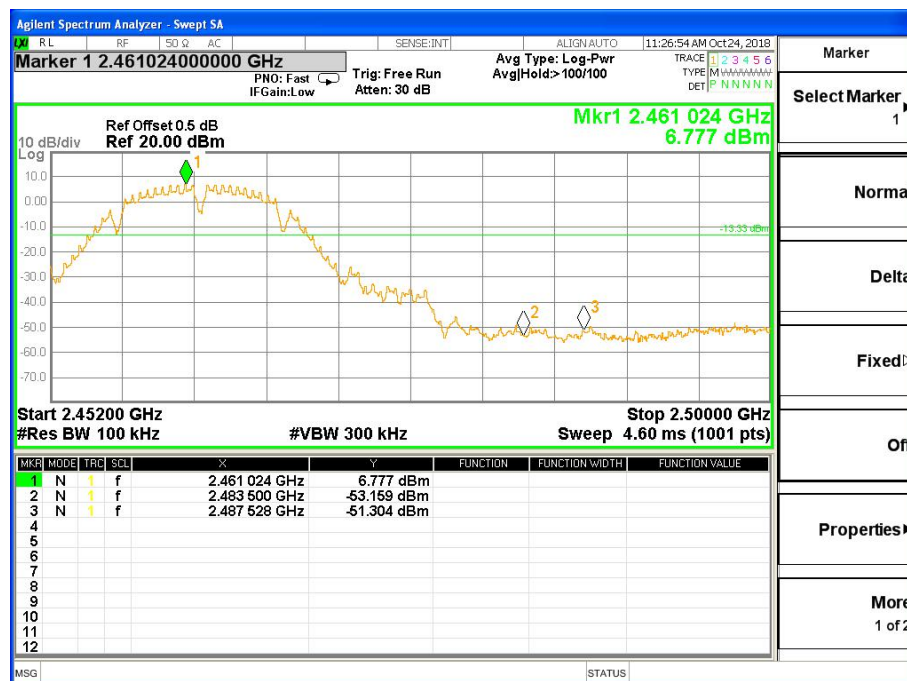
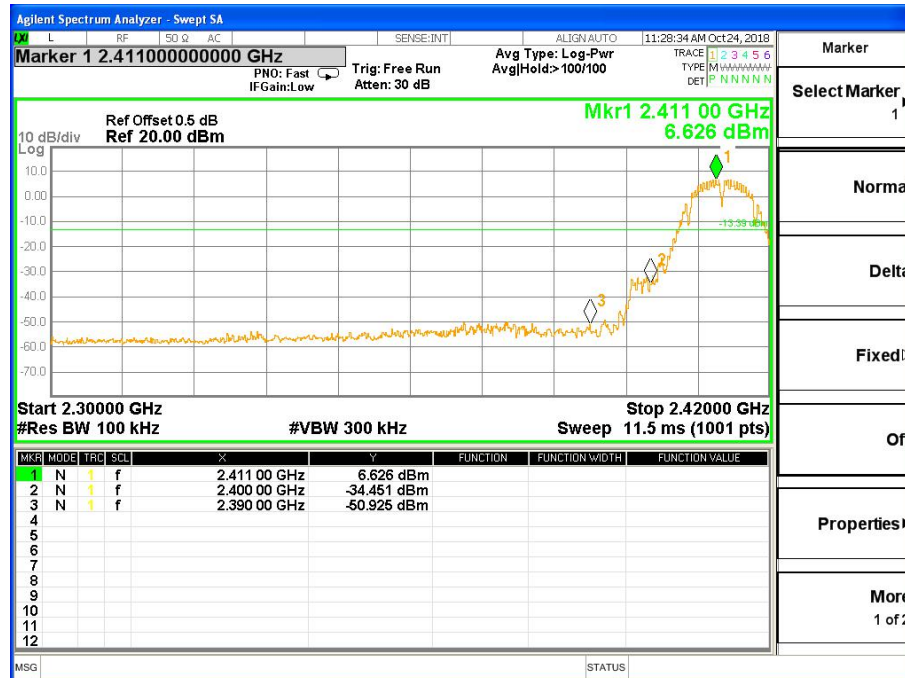


PRECISE TESTING

Report No.: PTC18091803203E-FC02

8.2 Test Result

802.11b

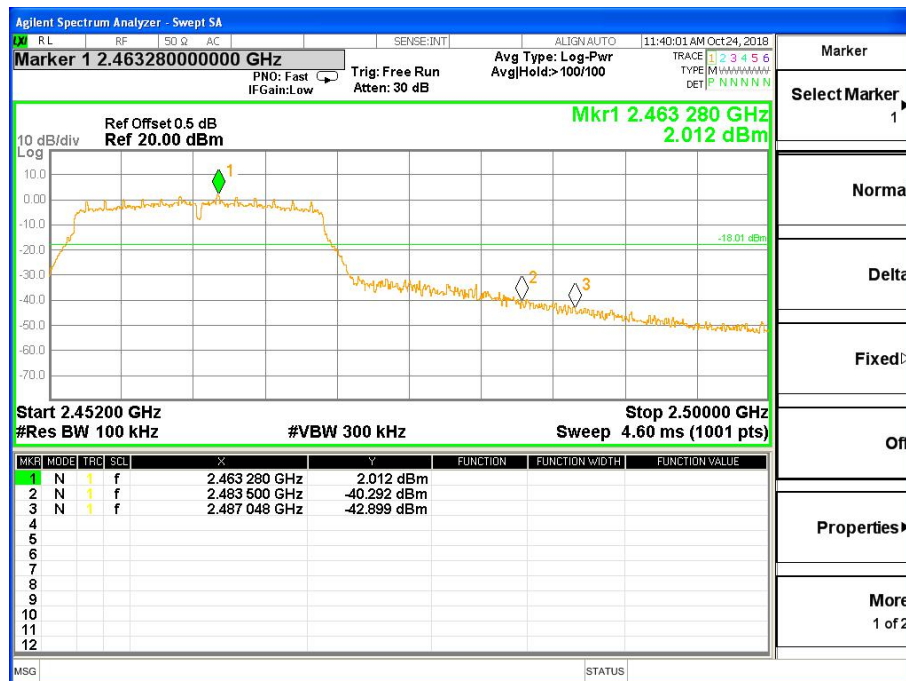
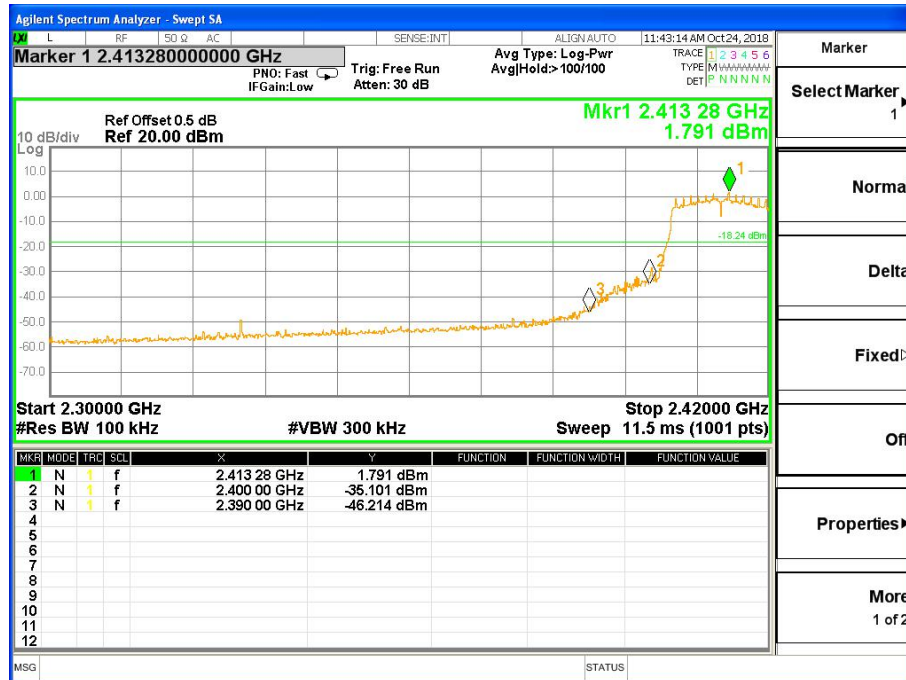




PRECISE TESTING

Report No.: PTC18091803203E-FC02

802.11g

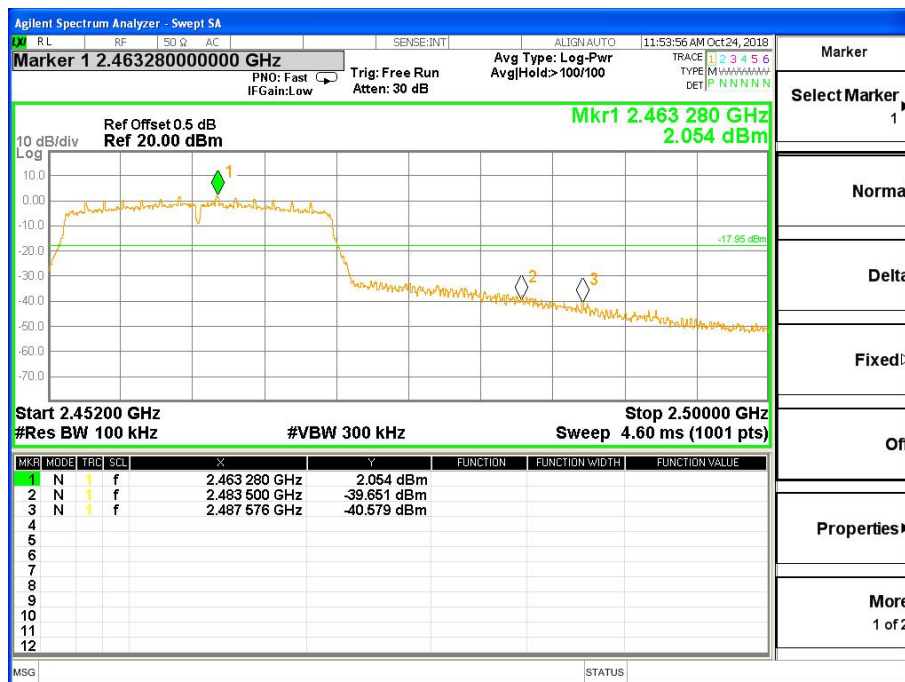
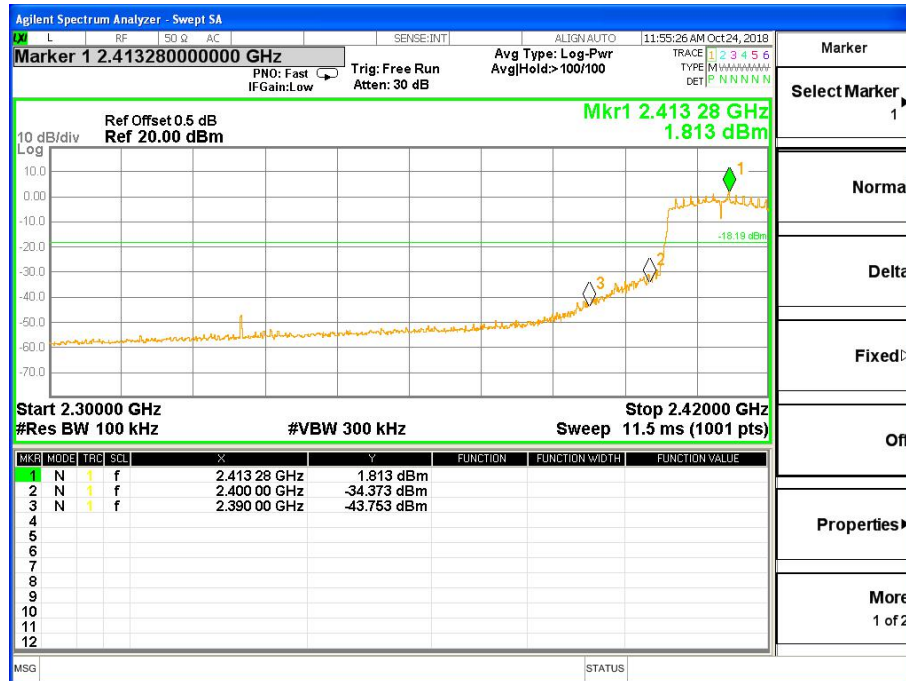




PRECISE TESTING

Report No.: PTC18091803203E-FC02

802.11n-HT20

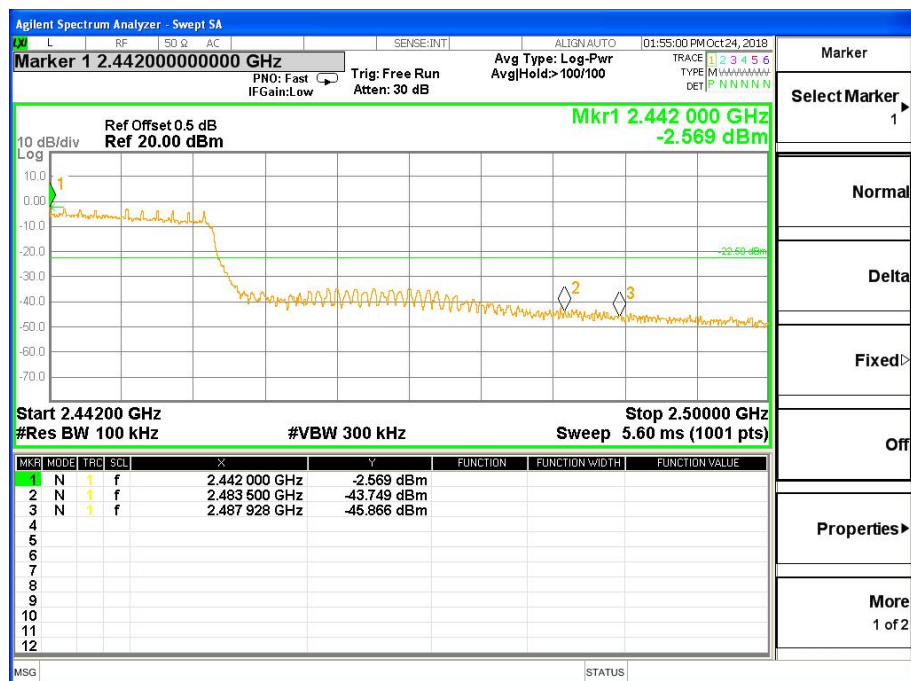
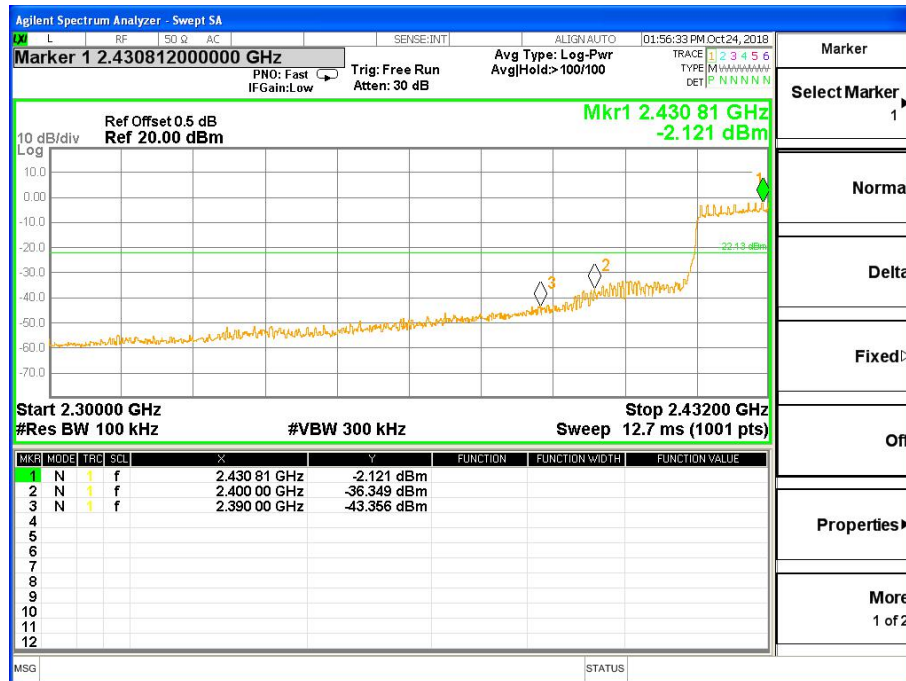




PRECISE TESTING

Report No.: PTC18091803203E-FC02

802.11n-HT40





PRECISE TESTING

Report No.: PTC18091803203E-FC02

9 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.

9.1 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

9.2 Test Result

Modulation	Bandwidth(MHz)			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	10.04	10.04	10.03	≥500kHz
802.11g	15.44	15.45	15.44	≥500kHz
802.11n-HT20	15.68	15.94	16.15	≥500kHz
802.11n-HT40	35.18	35.48	35.19	≥500kHz