FCC Certification Test Report

SHENZHEN ZERO ZERO INFINITY TECHNOLOGY CO., LTD.

HOVER CAMERA

MODEL: HC-6428

FCC ID: 2AIDWHC-6428

REPORT# **16WS0525027F-02 Rev 0**
May 18, 2016

Prepared for:

Shenzhen Zero Zero Infinity Technology Co., Ltd.
1607 Innovation Park, High-Tech Park of Nanshan dist. Shenzhen

Prepared By:

Washington International Technology Limited

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For the

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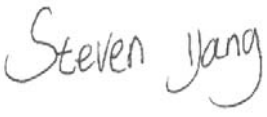
Henry guo

Reviewed by:



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Steven yang

Abstract

This report has been prepared on behalf of Shenzhen Zero Zero Infinity Technology Co., Ltd. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Spread Spectrum Transceiver under Part 15.247 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for a Shenzhen Zero Zero Infinity Technology Co., Ltd. Hover Camera.

And Testing was performed by Compliance Certification Services (Shenzhen) Inc. has been accepted by the FCC, the FCC Registration Number is 441872.

The Hover Camera is an IEEE 802.11a/802.11b/802.11g/802.11n compliant device and complies with the limits for a Direct Sequence Spread Spectrum Transmitter device under Part 15.247 of the FCC Rules and Regulations.

Revision History	Reason	Date
Rev 0	Initial Release	**May.18, 2016**

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1 Introduction

1.1 Compliance Statement

After the modifications listed in Section 2.7 were installed:

The Shenzhen Zero Zero Infinity Technology Co., Ltd. Hover Camera complies with the limits for a Spread Spectrum Transceiver device under Part 15.247 of the FCC Rules and Regulations.

1.2 Test Scope Summary

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 2013 version of ANSI C63.10

Test Specification	Specific Description	Result	Modifications (Y/N)	Test Location
CFR47 Part 15.207	Conducted Emissions – AC Power Ports	N/A	Not Applicable	N/A
CFR47 Part 15.209	Radiated Emissions	Complied	No	Compliance Certification Services (Shenzhen) Inc.
CFR47 Part 15.247	RF Power Output	Complied	No	Compliance Certification Services (Shenzhen) Inc.
CFR47 Part 15.247(d)	Conducted Out of Band Emission	Complied	No	Compliance Certification Services (Shenzhen) Inc.
CFR47 Part 15.247(d)	Radiated spurious emissions	Complied	No	Compliance Certification Services (Shenzhen) Inc.
CFR47 Part 15.247	Occupied Bandwidth	Complied	No	Compliance Certification Services (Shenzhen) Inc.
CFR47 Part 15.247	Band Edge Measurements (Radiated)	Complied	No	Compliance Certification Services (Shenzhen) Inc.
NOTE: The EUT is also considered as a kind of other class B digital device it has been verified to comply with the requirements of FCC Part 15B Class B(Certification) the test report has been issued by WashingtonTechnology International Limited				

1.3 Contract Information

Customer: Shenzhen Zero Zero Infinity Technology Co., Ltd.

1607 Innovation Park, High-Tech Park of Nanshan dist. Shenzhen

1.4 Test and Support Personnel

Paul Pan

Compliance Certification Services (Shenzhen) Inc.

No.10-1 Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town, Baoan Distr, Shenzhen, Guangdong, China.

Project Leader

1.5 Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	**Amp**ere**s**
b/s	**b**its per **s**econd
BW	**B**and**W**idth
CE	**C**onducted **E**mission
cm	Centi**m**eter
CW	**C**ontinuous **W**ave
dB	**decibel**
dc	**d**irect **c**urrent
EMI	**E**lectro**m**agnetic **I**nterference
EUT	**E**quipment **U**nder **T**est
FM	**F**requency **M**odulation
G	**g**iga - prefix for 10^9 multiplier
Hz	**H**ertz
IF	**I**ntermediate **F**requency
k	**k**ilo - prefix for 10^3 multiplier
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
M	**M**ega - prefix for 10^6 multiplier
m	**M**eter
µ	**m**icro - prefix for 10^{-6} multiplier
NB	**N**arrow**b**and
QP	**Q**uasi-**P**eak
RE	**R**adiated **E**missions
RF	**R**adio **F**requency
rms	**r**oot-**m**ean-**s**quare
SN	**S**erial **N**umber
S/A	**S**pectrum **A**nalyzer
V	**V**olt

2 Equipment Under Test

2.1 EUT Identification

The results obtained relate only to the item(s) tested.

Table 1: Overview of Hover Camera, Equipment Under Test

ITEM	DESCRIPTION
Manufacturer:	Shenzhen Zero Zero Infinity Technology Co., Ltd.
FCC ID Number	2AIDWHC-6428
Trade Mark:	Hover Camera
EUT Name:	Hover Camera
Test Model:	HC-6428
FCC Rule Parts:	§15.247
Frequency Range:	IEEE 802.11b/g/n(HT20) : 2412 – 2462MHz IEEE 802.11n(HT40): 2422 – 2452 MHz
Maximum Output Power:	SISO Mode: 20.64 dBm
	MIMO Mode: 23.43 dBm
Modulation:	Direct Sequence Spread Spectrum(DSSS)
Necessary Bandwidth:	N/A
Keying:	Automatic
Type of Information:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Number of Channels:	IEEE 802.11b/g/n(HT20) : 11 IEEE 802.11n(HT40): 7
Antenna Type	Chain 0: PIFA antenna Chain 1: PCB antenna
Antenna Gain	Chain 0: -1.72 dBi gain (2400 ~ 2500 MHz) Chain 1: -1.66 dBi gain (2400 ~ 2500 MHz)
Frequency Tolerance:	N/A
Emission Type(s):	N/A
Interface Cables:	None
Sample Received Date:	Apr. 29, 2016

Sample tested Date:	**May 06, 2016~ May 18, 2016**
Power Source & Voltage:	**7.4Vdc (Rechargeable LIPO Battery)** **Battery capacity: 1100mA**
Software Version:	**V3**
Hardware Version:	**V0.2**

2.2 EUT Description

The Hover Camera is a small amateur unmanned aerial vehicle. Mobile phone and pad or other equipment by connecting it to Wi-Fi, it can photograph or 4k video recording. The Wi-Fi support IEEE 802.11 a /b/g/n protocol.

Product Name: Hover Camera

Model No. : HC-6428

Tested Model No.: HC-6428

EUT Rated Voltage: 7.4Vdc (Rechargeable LIPO Battery)

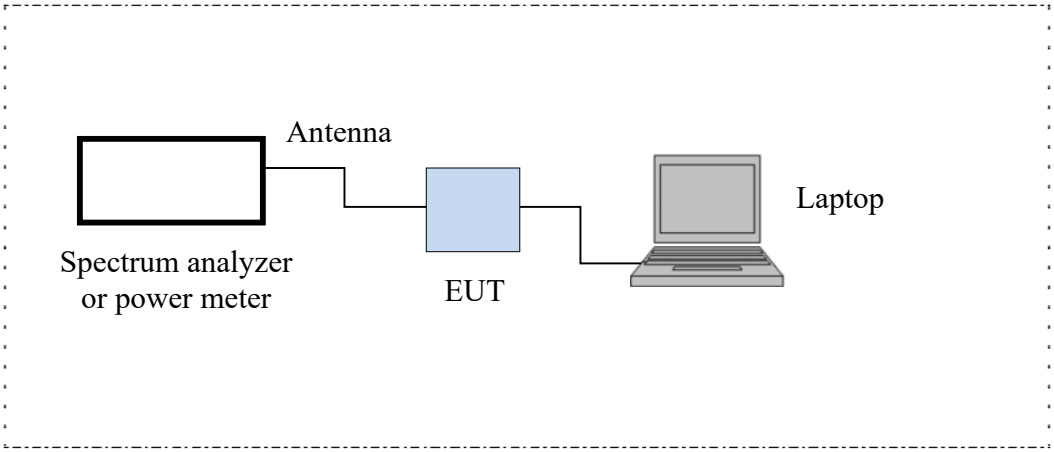
I/O Ports: USB*1;

2.3 Test Configuration

The Shenzhen Zero Zero Infinity Technology Co., Ltd. Hover Camera, Equipment Under Test (EUT), was operated form 7.4Vdc rechargeable LIPO battery Powered.

The EUT was tested connected to a host Laptop via USB cable and to spectrum analyzer or power meter via antenna port. The EUT firmware/software was set up to control power, bit rate, and channel selection.

RF test setup



Conducted test setup:

Not Applicable

Radiated test setup:

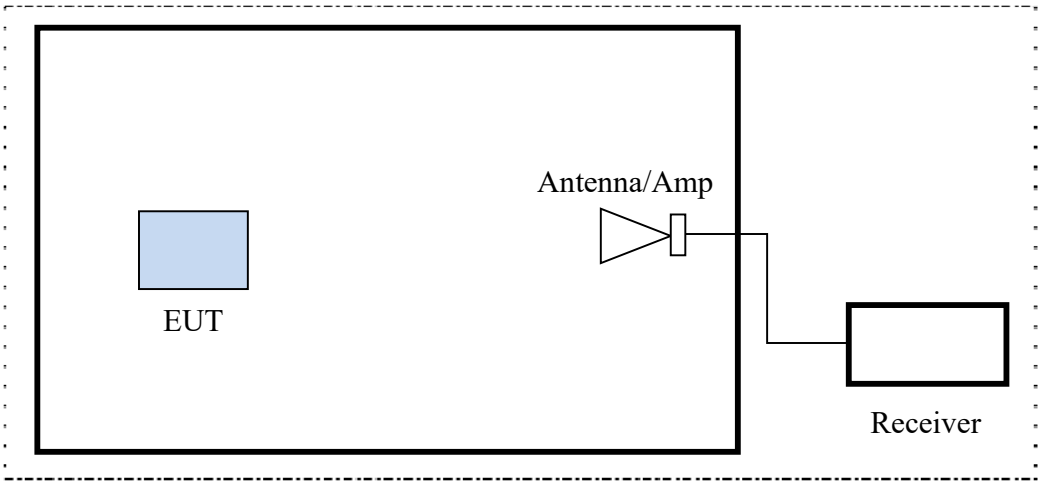


Figure 1: Test Configuration

2.4 Equipment Configuration

The EUT was set up as outlined in Radiated Emission Test Configuration photo. The EUT was comprised of the following equipment. (All Modules, PCBs, etc. listed were considered as part of the EUT, as tested.)

Table 2: Equipment Configuration

Name / Description	Model Number	Part Number	Serial Number	Revision
Hover Camera	HC-6428	/	FFB2USM380064	/
Hover Camera	HC-6428	/	FFB2USM380072	/

2.5 Interface Cables

Table 3: Interface Cables

Port Identification	Connector Type	Cable Length	Shielded (Y/N)	Termination Point
Antenna cable	SMA	0.2m	N	N/A
Antenna cable	SMA	0.2m	N	N/A
USB Cable	USB	1.0	Y	N/A

2.6 Support Equipment

The following support equipment was used during testing:

No.	Support Equipment	Model/Part Number	Serial Number
1	Laptop	Inspiron 15 5000 series	B3MY362

2.7 EUT Modifications

No modifications were performed in order to meet the test requirements:

2.8 Testing Algorithm

The Hover Camera was operated using and drivers.

2.9 Test Location

All measurements herein were performed at And Testing was performed by Compliance Certification Services (Shenzhen) Inc. has been accepted by the FCC, the FCC Registration Number is 441872.

2.10 Measurements

2.10.1 Measurement Method

All measurements were performed according to the 2013 version of ANSI C63.10 for testing compliance of a wide variety of unlicensed wireless devices

2.11 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{div_a{}^2} + \frac{b^2}{div_b{}^2} + \frac{c^2}{div_c{}^2} + ...}$$

where u_c = standard uncertainty

a, b, c,.. = individual uncertainty elements

$div_{a, b, c}$ = the individual uncertainty element divisor based on the probability distribution

divisor = 1.732 for rectangular distribution

divisor = 2 for normal distribution

divisor = 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = ku_c$$

where U = expanded uncertainty

k = coverage factor

k ≤ 2 for 95% coverage (ANSI/NCSL Z540-2 Annex G)

u_c = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 4 below.

Table 4: Expanded Uncertainty List

Scope	Expanded Uncertainty
Uncertainty for Radiation Emission test in 3m chamber	2.6dB(30~200MHz, Polarize: H)
	2.6dB(30~200MHz, Polarize: V)
	3.0dB(200M~1GHz, Polarize: H)
	2.8dB(200M~1GHz, Polarize: V)
Uncertainty for Radiation Emission test in 3m chamber (1GHz-18GHz)	6.3dB (1~6GHz, Distance: 3m)
	5.7dB (6~18GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.6dB
Uncertainty for Conduction Spurious emission test	2.0dB
Uncertainty for Output power test	0.8dB
Uncertainty for Power density test	2.0dB
Uncertainty for Frequency range test	$7x10^{-8}$
Uncertainty for Bandwidth test	83 kHz
Uncertainty for DC power test	0.1%
Uncertainty for test site temperature and humidity	0.6℃
	3%

3 Test Equipment

Table 5 shows a list of the test equipment used for measurements along with the calibration information.

Table 5: Test Equipment List

Radiation Emission Test

Item	Instrument	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	Feb.21,16	1 Year
2	Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
3	Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
4	Controller	CT	N/A	N/A	N.C.R	N.C.R
5	Bilog Antenna	SCHAFFNER	CBL6143	5063	Feb.22,16	1 Year
6	Horn Antenna	SCHWARZBECK	BBHA9120	D286	Feb.21,16	1 Year
7	Loop Antenna	COM-POWER	AL-130	121044	Feb.21,16	1 Year
8	High Noise Amplifier	Agilent	8449B	3008A01838	Feb.22,16	1 Year
9	Horn Antenna	Schwarzbeck	BBHA9120	D286	Feb.22,16	1 Year
10	Temp. / Humidity Meter	Anymetre	JR913	N/A	Feb.22,16	1 Year
11	Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
12	Test S/W	FARAO	LZ-RF / CCS-SZ-3A2			

RF Test

Item	Instrument	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	N9010A	MY52221469	Feb.22,16	1 Year
2	Power Meter	Agilent	ML2495A	1204003	Feb.22,16	1 Year

4 System Test Configuration

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, Radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 7.4Vdc rechargeable LIPO battery. Only the worst case data were recorded in this test report.

For SISO modes, there are two transmission antennas. The antenna used in any given time can be either Chain 0 or Chain 1. Both antenna ports have different output powers. Therefore, output power and PSD measurement for SISO modes on both antenna ports are reported. For MIMO modes, both Chain 0 and Chain 1 used at the same time.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency Band(GHz)	Mode	Antenna Port	Worst-case Orientation
2.4	1TX SISO	Chain 0	X-Portrait
		Chain 1	X-Portrait
	2TX MIMO	Chain 0 + Chain 1	X-Portrait

Worst-case data rates see table below:

Mode	Worst-case data rates		
	SISO Mode		MIMO Mode:
	Chain 0	Chain 1	Chain 0+1
802.11b	1 Mbps	1 Mbps	N/A
802.11g	24 Mbps	24 Mbps	N/A
802.11n HT20	MCS 4	MCS 6	MCS 6
802.11n HT40	MCS 5	MCS 0	MCS 6

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

5 Duty Cycle of Test Signal and Measurement Methods

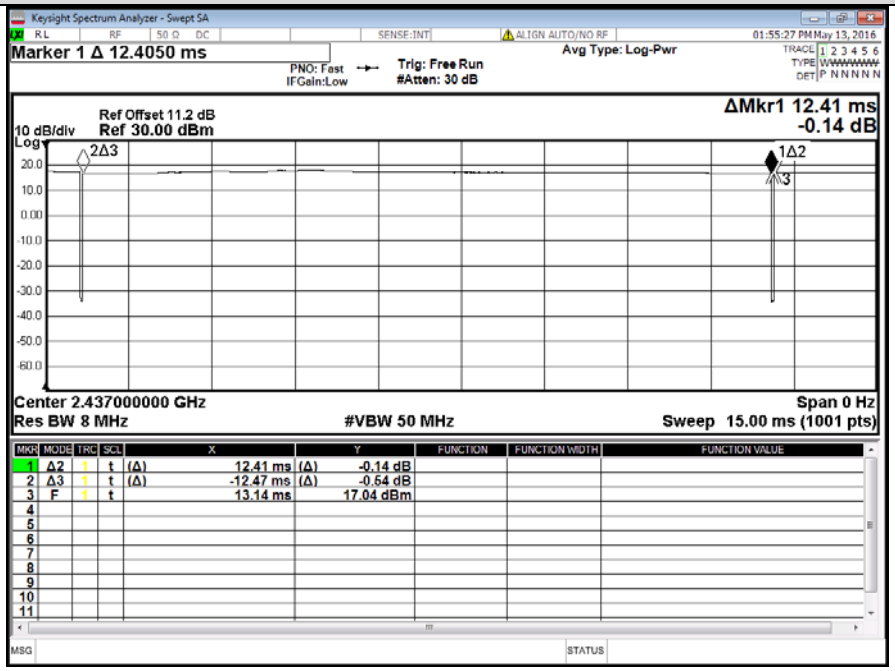
5.1 Duty Cycle:

Mode	Data rates (Mbps)	Transmission Duration T (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)
802.11b	1Mbps	12.4100	12.4700	1.00	99.52	0.02	0.01
802.11g	24Mbps	0.5395	0.5910	0.91	91.29	0.40	1.85
802.11n(HT20)	MCS4	0.3555	0.4090	0.87	86.92	0.61	2.81
802.11n(HT20)	MCS6	0.2507	0.3043	0.82	82.39	0.84	3.99
802.11n(HT40)	MCS0	0.9480	0.9982	0.95	94.97	0.22	1.05
802.11n(HT40)	MCS5	0.1570	0.2100	0.75	74.76	1.26	6.37
802.11n(HT40)	MCS6	0.1440	0.1970	0.73	73.10	1.36	6.94

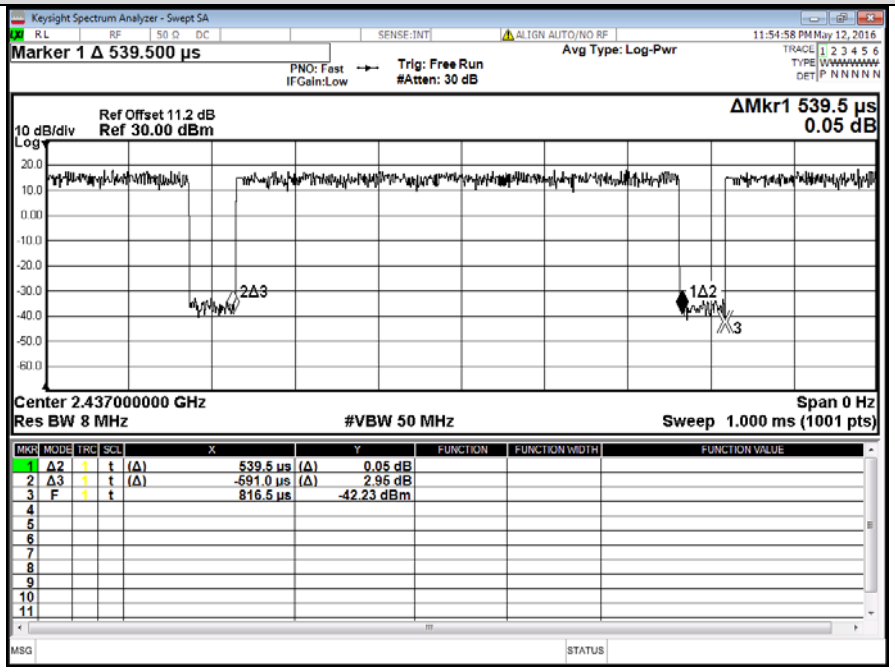
Remark:

1. Duty cycle= On Time/ Period;
2. Duty Cycle factor = 10 * log(1/ Duty cycle)

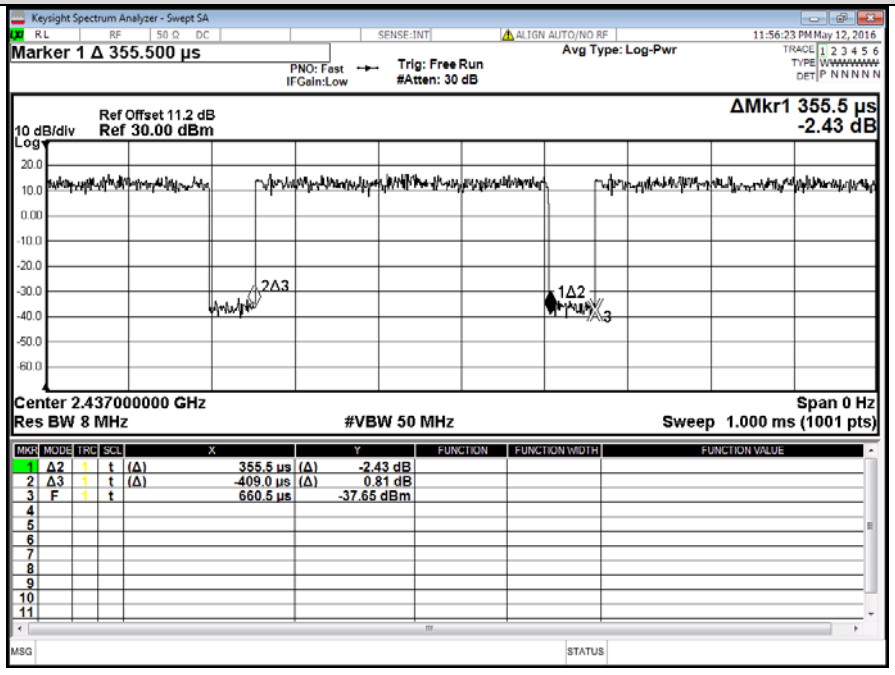
Test Mode: 802.11b_ 1Mbps

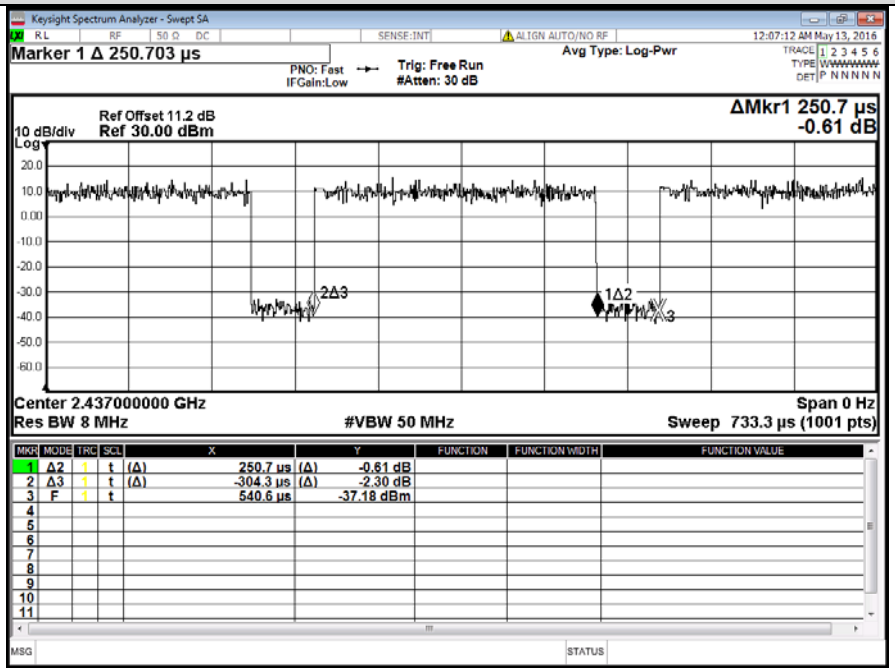


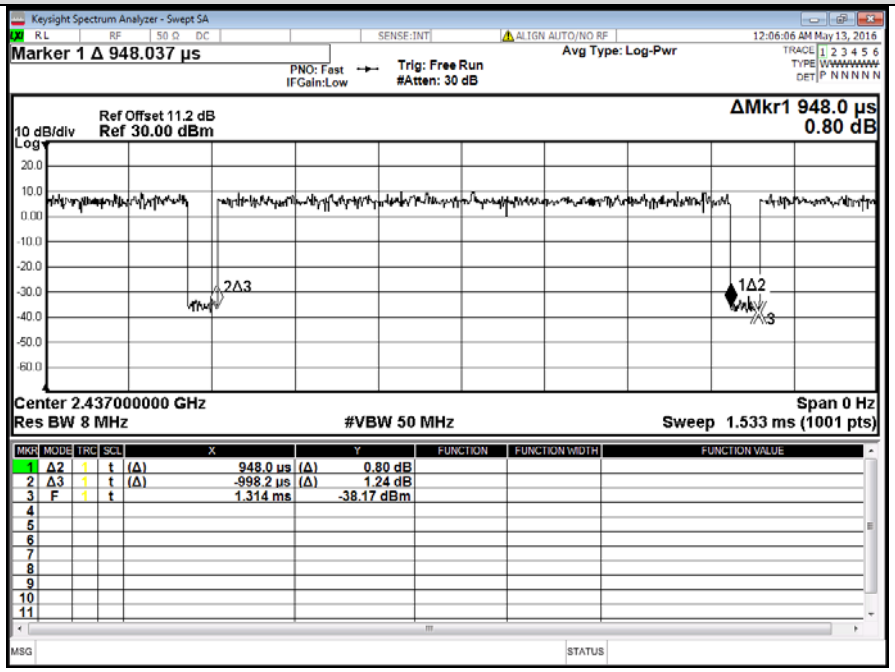
Test Mode: 802.11g_24Mbps



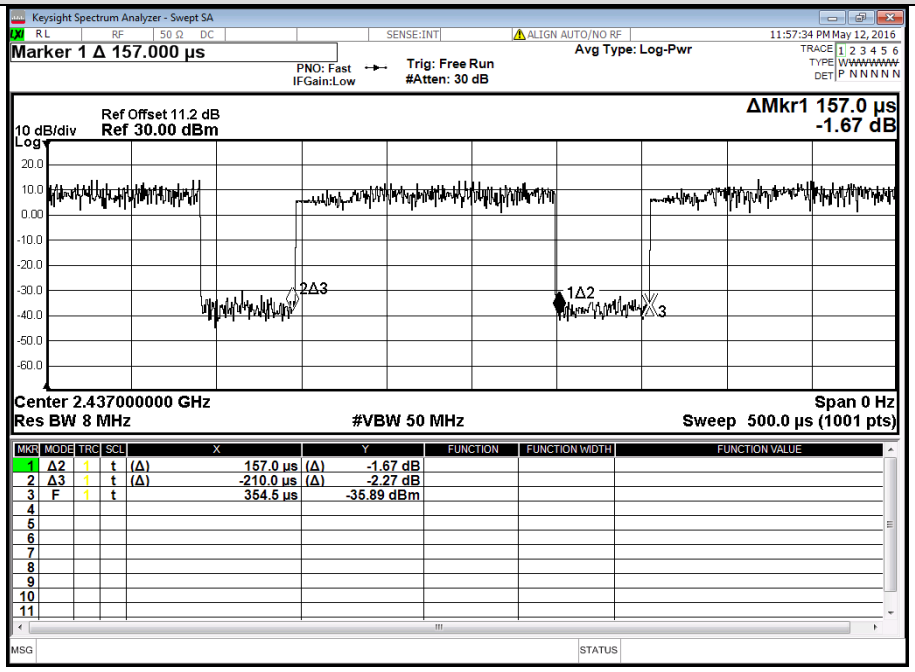
Test Mode: 802.11n(HT20)_MCS 4



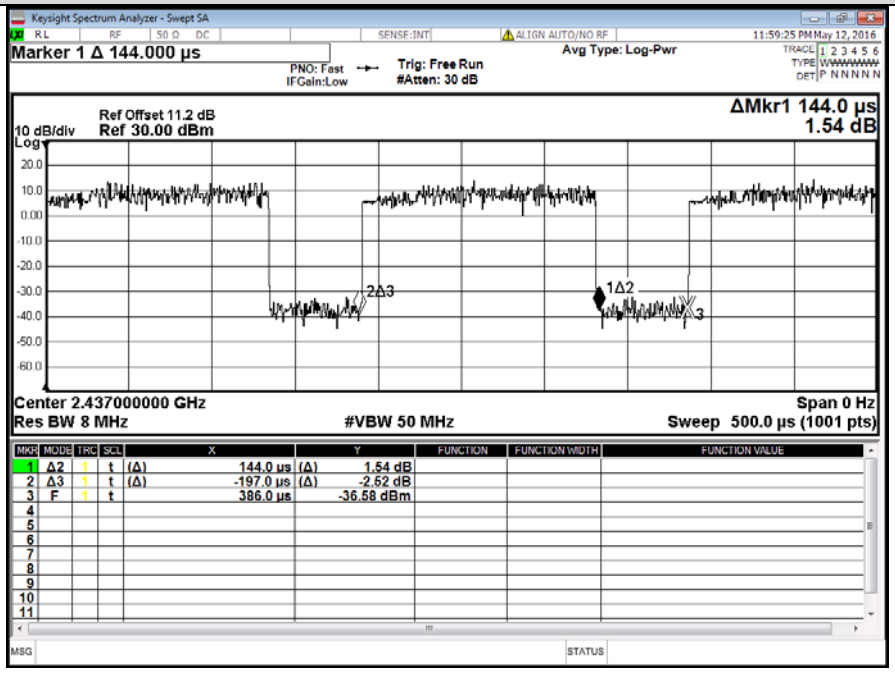
Test Mode: 802.11n(HT20)_MCS 6


Test Mode: 802.11n(HT40) _MCS 0


Test Mode: 802.11n(HT40) _MCS 5



Test Mode: 802.11n(HT40) _MCS 6



5.2 Measurement Methods:

KDB 558074 D01 DTS Meas Guidance v03r05

KDB 662911 D01 Multiple Transmitter Output v02r01

6 Test Results

6.1 RF Power Output

To measure the output power the unit was set to transmit on a low, high and middle channel. The output from the transmitter was connected to an attenuator and then to the input of a detector diode. The output of the detector diode was displayed on an oscilloscope. The trace deflection was recorded and the transmitter was replaced with a signal generator at the same frequency. The output of the signal generator was increased until the trace deflection was the same as it was with the transmitter. The signal from the generator was then connected to a power meter and the level was taken.

6.1.1 Limit

For systems using digital modulation in the 2400—2483.5MHz, The Peak output Power shall not exceed 1W(30dBm)

6.1.2 Test Procedure (KDB 558074 D01 v03r05, Section 9.1.2)

1, Connected the EUT's antenna port to measure device by 20dB attenuator.

2, For IEEE 802.11b/g and IEEE802.11n HT20 and HT40 mode, use a PK power meter which's bandwidth is 20MHz up to 40MHz and above 6dB bandwidth of signal to measure out each test modes' PK output power.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

6.1.3 Test Data

The EUT complied with the FCC Part 15.247 RF Power Output requirements.

Table 6 provides the test results for RF Power Output. (all the data attached was use the worst case data rate data)

6.1.4 Areas of Concern

None.

Table 6: RF Power Output

Maximum Conducted Peak Power:

SISO Mode-Test Data

802.11b:

Channel/ Frequency (MHz)	Antenna	Maximum Conducted Peak Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5Mbps	11 Mbps
1(2412)	Chain 0	**17.04**	16.95	16.94	17.02
	Chain 1	**16.74**	16.69	16.69	16.67
6(2437)	Chain 0	**15.66**	15.57	15.54	15.58
	Chain 1	**17.88**	17.82	17.84	17.85
11(2462)	Chain 0	**16.46**	16.38	16.40	16.33
	Chain 1	**17.88**	17.82	17.84	17.85

802.11g:

Channel/ Frequency (MHz)	Antenna	Maximum Conducted Peak Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
1(2412)	Chain 0	17.88	18.10	17.87	17.99	**20.25**	19.83	19.63	19.72
	Chain 1	17.84	18.10	17.85	17.60	**20.64**	20.35	20.11	20.25
6(2437)	Chain 0	16.73	17.02	16.76	16.83	**18.92**	18.77	18.84	18.85
	Chain 1	17.16	17.36	17.19	17.11	**19.67**	19.46	19.38	19.42
11(2462)	Chain 0	17.35	17.54	17.43	17.47	**19.64**	19.29	19.30	19.41
	Chain 1	17.53	17.68	17.84	17.59	**20.53**	20.33	20.42	20.36

802.11n20:

Channel/ Frequency (MHz)	Antenna	Maximum Conducted Peak Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
1(2412)	Chain 0	17.35	17.54	17.43	17.47	**19.64**	19.29	19.30	19.41
	Chain 1	17.18	16.09	16.03	18.82	18.87	18.64	**19.78**	18.84
6(2437)	Chain 0	14.37	14.24	14.15	16.32	**16.43**	16.07	16.14	16.09
	Chain 1	16.18	15.82	15.87	18.18	18.09	18.14	**18.97**	18.02
11(2462)	Chain 0	16.26	16.17	16.13	18.01	**18.09**	17.36	17.37	17.51
	Chain 1	16.54	16.15	16.11	18.69	18.73	18.62	**19.52**	18.57

802.11n40:

Channel/ Frequency (MHz)	Antenna	Maximum Conducted Peak Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
3(2422)	Chain 0	15.47	15.04	15.18	19.29	19.07	**19.35**	19.34	19.06
	Chain 1	**18.96**	14.41	14.35	18.31	17.97	18.33	18.49	17.56
6(2437)	Chain 0	14.82	14.74	14.71	17.54	17.32	**17.60**	17.43	17.28
	Chain 1	**19.26**	16.21	16.32	18.95	18.69	18.75	18.87	18.65
9(2452)	Chain 0	15.61	15.45	15.32	18.01	17.89	**18.07**	17.26	17.54
	Chain 1	**19.52**	16.67	16.53	19.18	19.08	19.16	19.00	19.27

MIMO Mode-Test Data

802.11n20:

Channel/ Frequency (MHz)	Antenna	Maximum Conducted Peak Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
1(2412)	Chain 0	17.27	17.02	17.03	19.35	18.94	19.36	**20.17**	19.03
	Chain 1	15.86	16.05	15.77	18.75	18.56	18.97	**20.66**	20.04
6(2437)	Chain 0	14.65	14.35	14.37	16.03	15.65	15.47	**16.18**	15.35
	Chain 1	15.33	15.34	15.38	18.23	18.06	18.19	**18.89**	18.46
11(2462)	Chain 0	16.48	16.29	16.33	18.02	17.73	17.86	**18.16**	17.77
	Chain 1	15.87	15.76	15.82	18.72	18.66	18.75	**19.61**	19.24

802.11n40:

Channel/ Frequency (MHz)	Antenna	Maximum Conducted Peak Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
3(2422)	Chain 0	16.57	15.04	15.12	17.60	17.74	17.67	**17.89**	17.37
	Chain 1	13.79	13.89	14.02	17.79	17.60	18.08	**18.24**	17.55
6(2437)	Chain 0	16.38	15.87	15.44	17.37	17.48	17.34	**17.60**	17.28
	Chain 1	14.67	14.54	14.53	18.44	18.28	18.65	**18.87**	18.56
9(2452)	Chain 0	16.26	15.62	15.41	17.28	17.39	17.32	**17.58**	17.32
	Chain 1	15.06	14.95	15.04	19.24	19.19	19.54	**19.75**	19.65

Mode	Channel Frequency (MHz)	Maximum Conducted Peak Power (dBm)			Power Limit (dBm)	Result (Pass / Fail)
		Chain 0	Chain 1	Total		
802.11n (HT20)	1 (2412)	20.17	20.66	**23.43**	30	Pass
	6 (2437)	16.18	18.89	20.75	30	Pass
	11 (2462)	18.16	19.61	21.96	30	Pass
802.11n (HT40)	3 (2422)	17.89	18.24	21.08	30	Pass
	6 (2437)	17.60	18.87	21.29	30	Pass
	9 (2452)	17.58	19.75	21.81	30	Pass

Note1: According exploratory test, EUT will have maximum output power as above bolded data rate, so those data rate were used for all test.

Note2. The TX chains are correlated and the antenna gain is unequal among the chains.
The directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / NANT]$ dBi
$= 10 \log[(10^{-1.72/20} + 10^{-1.66/20})^2 / 2]$
$= 1.32$dBi,
So the Power limit is 30dBm (1000mW);

Maximum Conducted Average Power:

SISO Mode-Test Data

Mode	Channel Frequency (MHz)	Maximum Conducted Average Power (dBm)			
		Chain 0 Measured Power	Power with Duty Factor	Chain 1 Measured Power	Power with Duty Factor
802.11b	1 (2412)	14.56	**14.56**	14.19	14.19
	6 (2437)	13.52	13.52	15.32	**15.32**
	11 (2462)	13.84	13.84	14.05	14.05
802.11g	1 (2412)	12.27	12.67	12.23	12.63
	6 (2437)	13.69	14.09	11.78	12.18
	11 (2462)	11.99	12.39	12.04	12.44
802.11n (HT20)	1 (2412)	11.22	11.83	10.53	11.37
	6 (2437)	9.84	10.45	10.29	11.13
	11 (2462)	9.71	10.32	10.44	11.28
802.11n (HT40)	3 (2422)	11.32	12.58	10.43	10.65
	6 (2437)	10.75	12.01	10.79	11.01
	9 (2452)	10.27	11.53	10.81	11.03

MIMO Mode-Test Data

Mode	Channel Frequency (MHz)	Maximum Conducted Average Power (dBm)				
		Chain 0		Chain 1		Total[1]
		Measured Power	Power with Duty Factor	Measured Power	Power with Duty Factor	
802.11n (HT20)	1 (2412)	11.37	12.21	11.57	12.41	**15.32**
	6 (2437)	9.80	10.64	10.34	11.18	13.93
	11 (2462)	9.89	10.73	10.25	11.09	13.92
802.11n (HT40)	3 (2422)	9.62	10.98	9.47	10.83	13.92
	6 (2437)	10.96	12.32	10.58	11.94	15.14
	9 (2452)	10.56	11.92	10.94	12.30	15.12

Remark: Total=$10*\log_{10}(10^{\text{Chain0 Measured Power}/10}+10^{\text{Chain1 Measured Power}/10})$

6.2 RF Power Spectral Density

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system.

6.2.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.2.2 Test Procedure (KDB 558074 D01 v03r05, Section 10.2)

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.2.3 Test Data

The EUT complied with the FCC Part 15.247 RF Power Spectral Density requirements.

Table 7 provides the test results for RF Power Spectral Density. (all the data attached was use the worst case data rate data)

6.2.4 Areas of Concern

None.

Table 7: RF Power Spectral Density

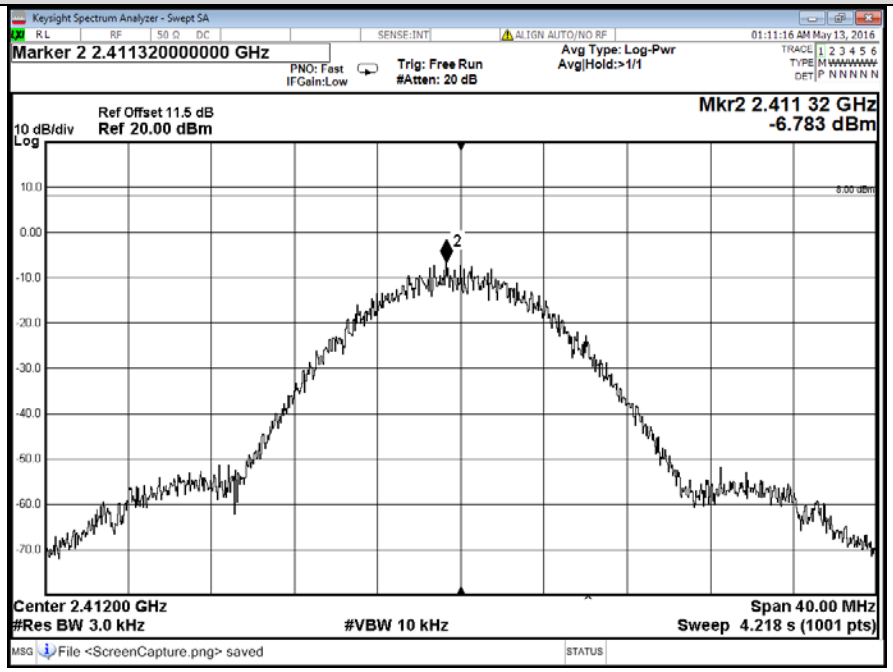
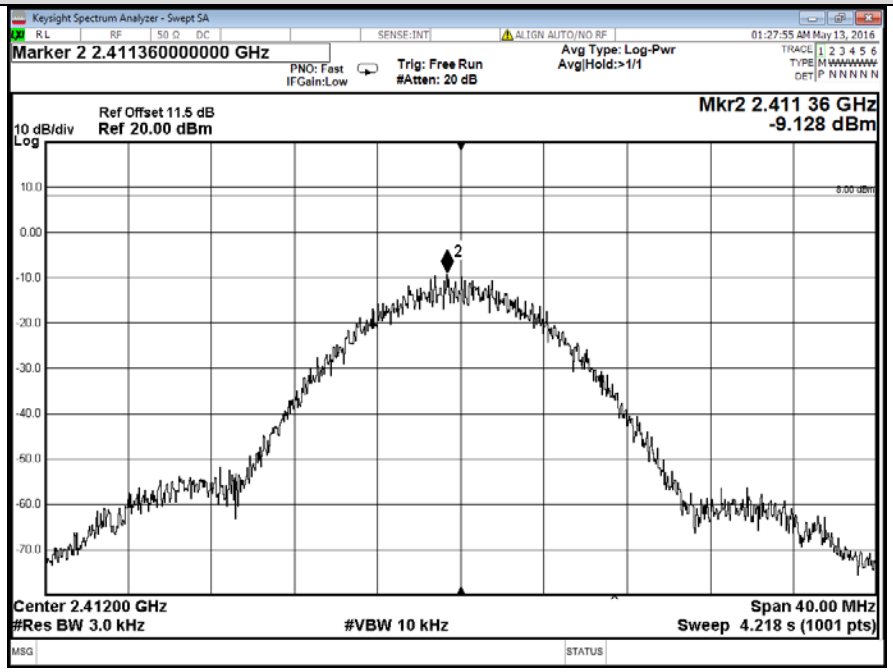
SISO Mode-Test Data

Mode	Channel Frequency (MHz)	PSD(dBm)		PSD Limit (dBm)	Result (Pass / Fail)
		Chain 0	Chain 1		
802.11b	1 (2412)	-6.78	-9.13	8	Pass
	6 (2437)	**-6.45**	-8.79	8	Pass
	11 (2462)	-7.29	**-7.11**	8	Pass
802.11g	1 (2412)	-12.41	-14.23	8	Pass
	6 (2437)	-11.98	-14.74	8	Pass
	11 (2462)	-12.48	-14.52	8	Pass
802.11n(HT20)	1 (2412)	-15.13	-16.92	8	Pass
	6 (2437)	-14.81	-16.05	8	Pass
	11 (2462)	-15.96	-17.21	8	Pass
802.11n(HT40)	3 (2422)	-18.311	-21.533	8	Pass
	6 (2437)	-16.686	-18.338	8	Pass
	9 (2452)	-17.100	-18.040	8	Pass

MIMO Mode-Test Data

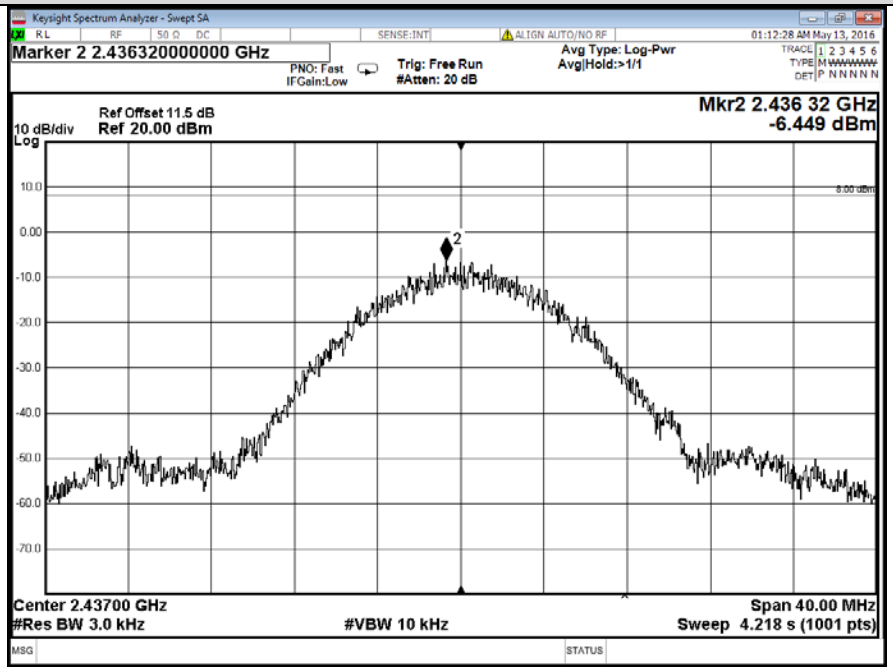
Mode	Channel Frequency (MHz)	PSD(dBm)			PSD Limit (dBm)	Result (Pass / Fail)
		Chain 0	Chain 1	Total		
802.11n(HT20)	1 (2412)	-15.44	-17.28	-13.25	8	Pass
	6 (2437)	-13.12	-16.70	**-11.54**	8	Pass
	11 (2462)	-16.26	-17.73	-13.92	8	Pass
802.11n(HT40)	3 (2422)	-16.93	-19.12	-14.88	8	Pass
	6 (2437)	-16.43	-17.87	-14.08	8	Pass
	9 (2452)	-18.13	-18.25	-15.18	8	Pass

SISO Mode-Test Data

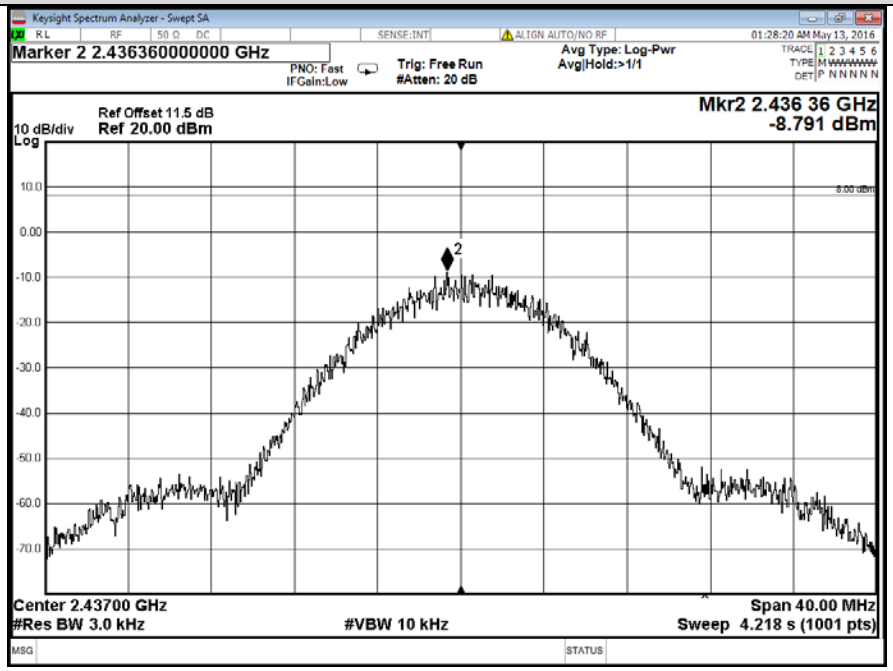
Test Mode: 802.11b_2412MHz
Chain 0

Chain 1


Test Mode: 802.11b_2437MHz

Chain 0

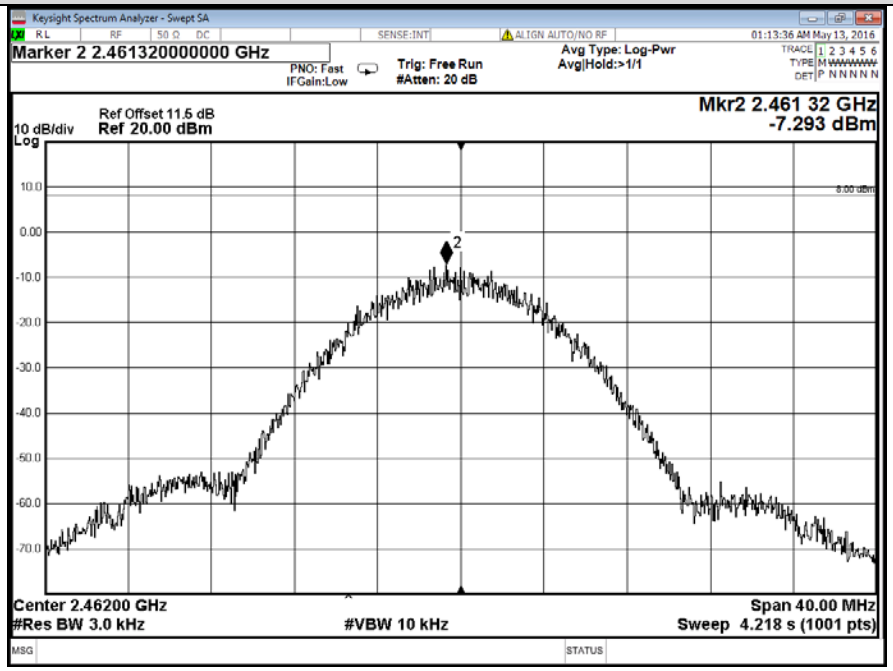


Chain 1

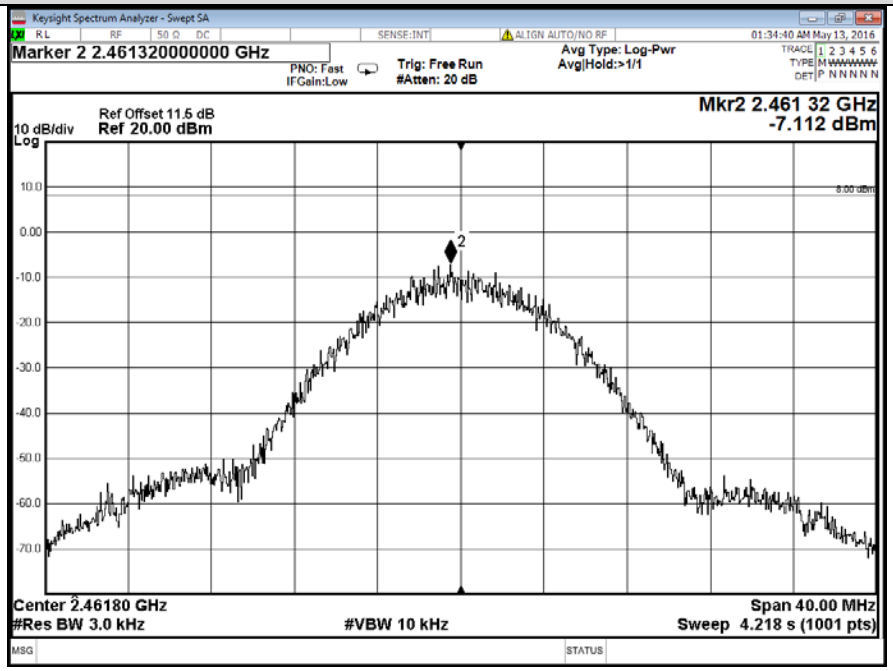


Test Mode: 802.11b_2462MHz

Chain 0

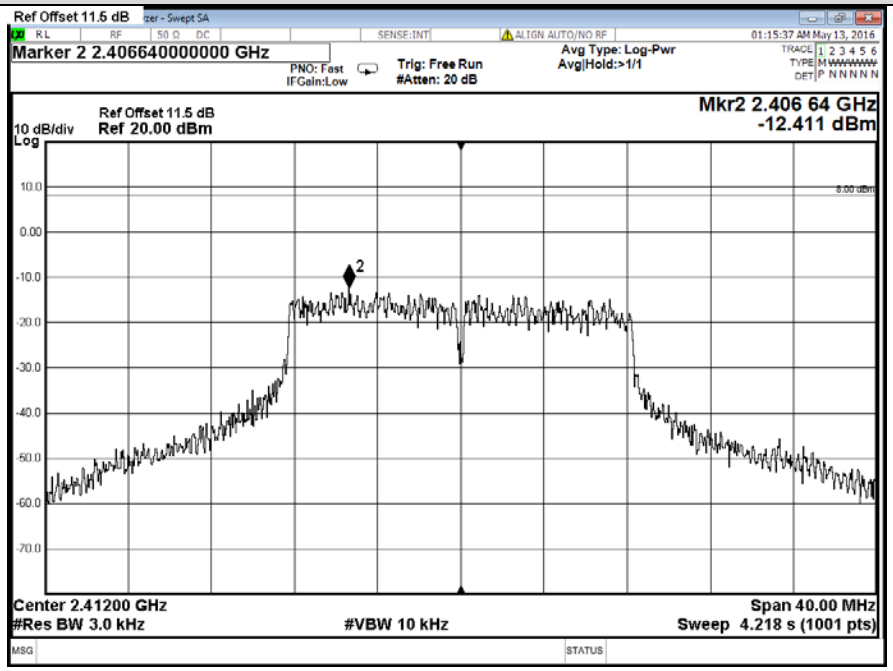


Chain 1

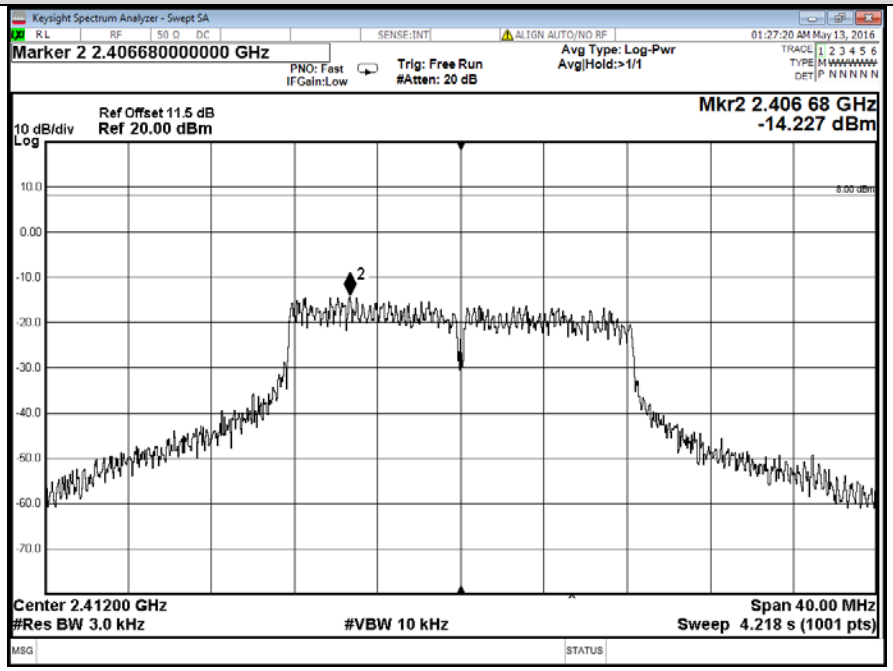


Test Mode: 802.11g_2412MHz

Chain 0

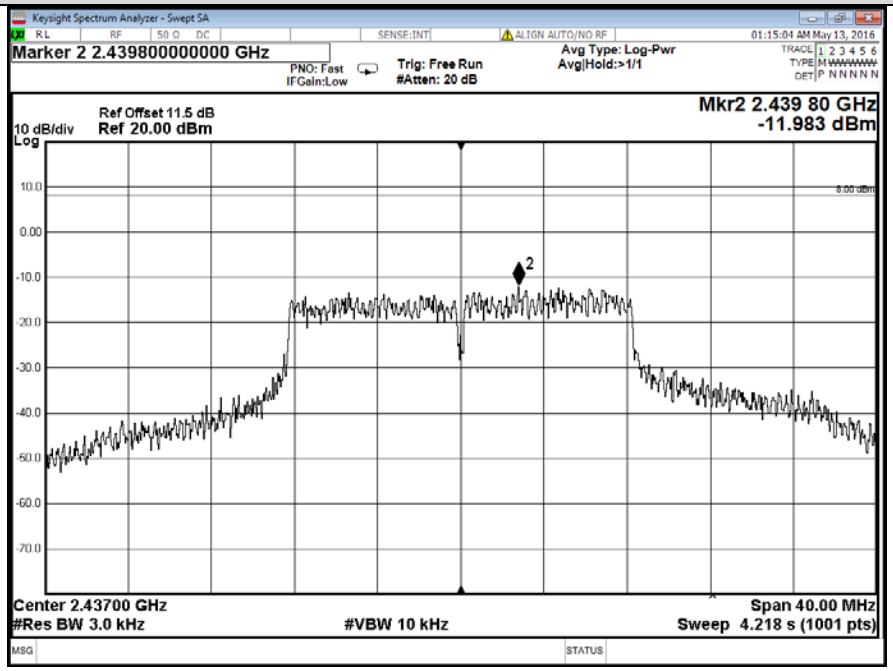


Chain 1

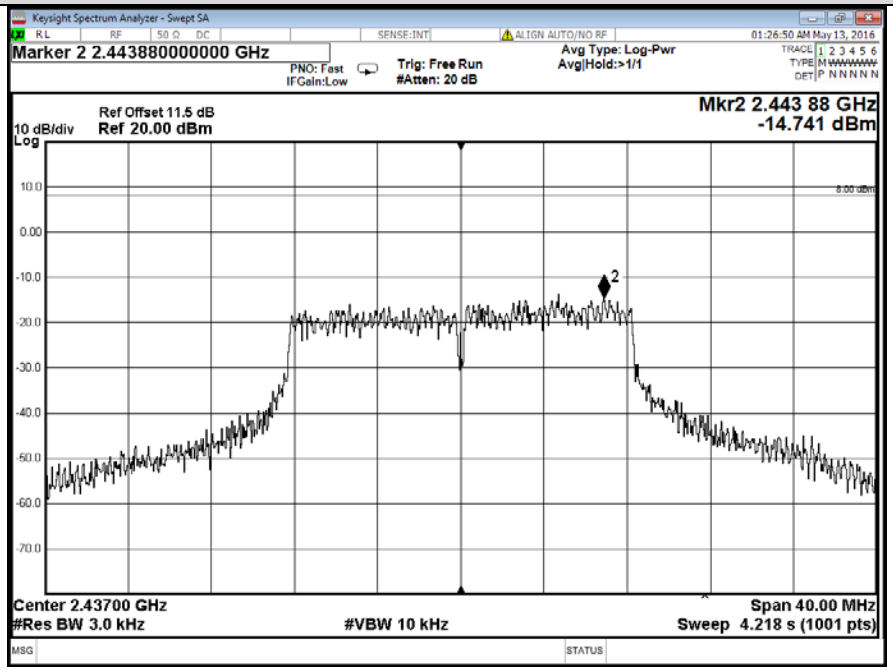


Test Mode: 802.11g_2437MHz

Chain 0

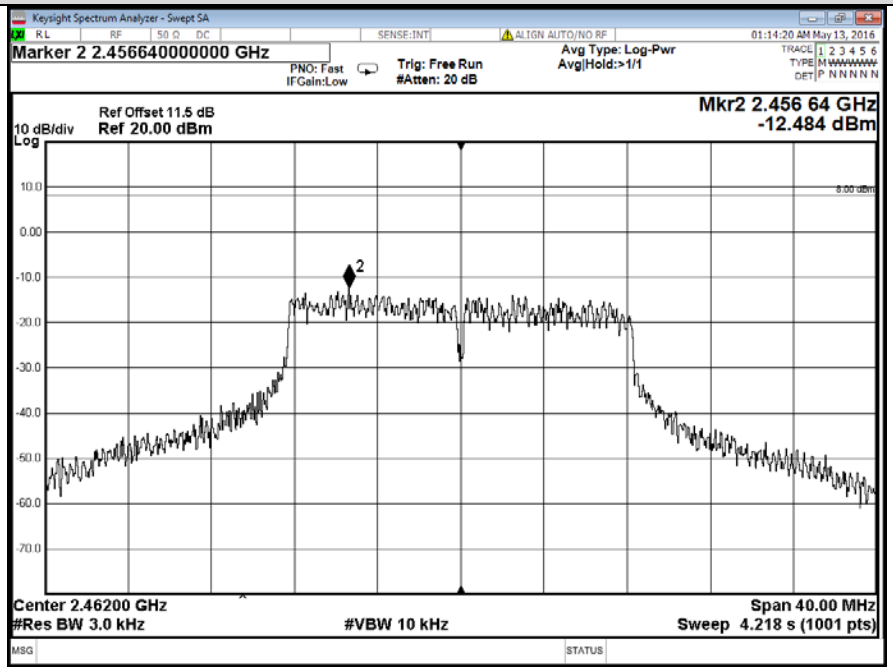


Chain 1

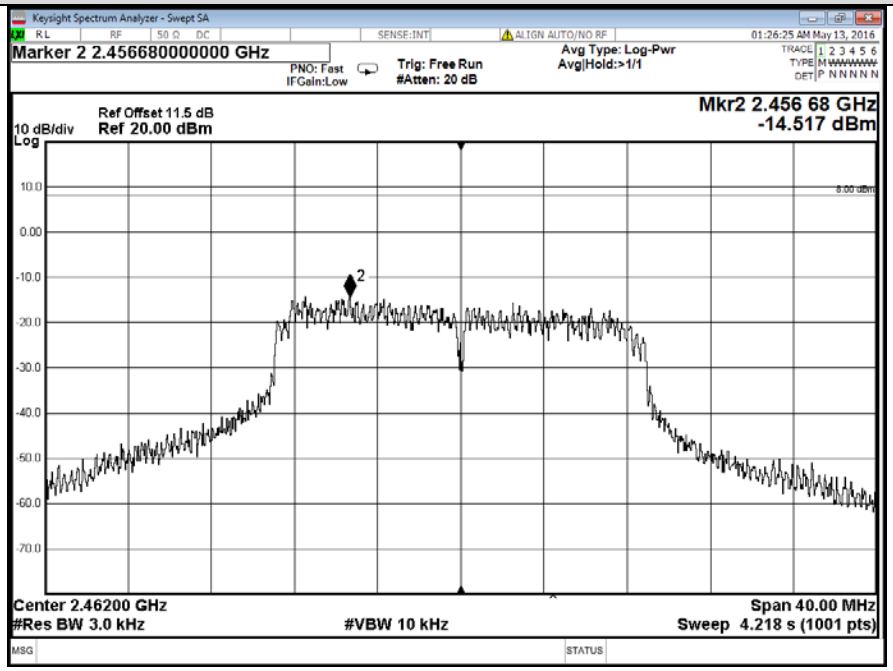


Test Mode: 802.11g_2462MHz

Chain 0

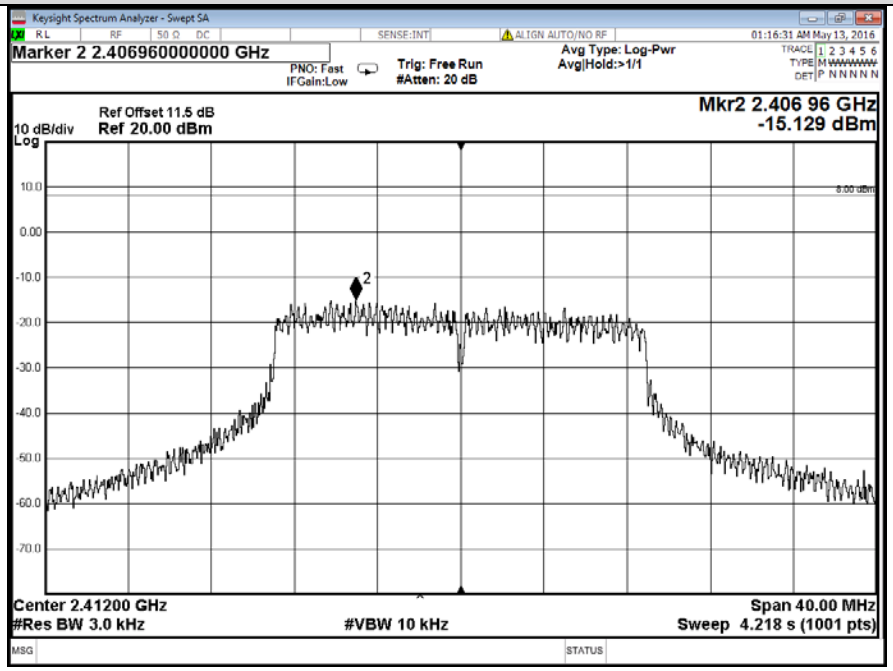


Chain 1

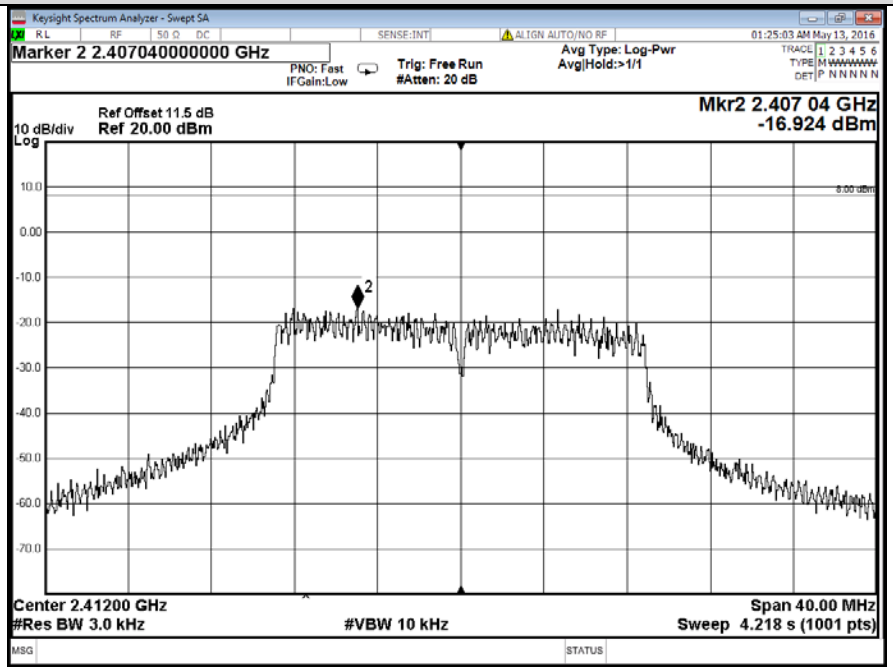


Test Mode: 802.11n(HT20)_2412MHz

Chain 0

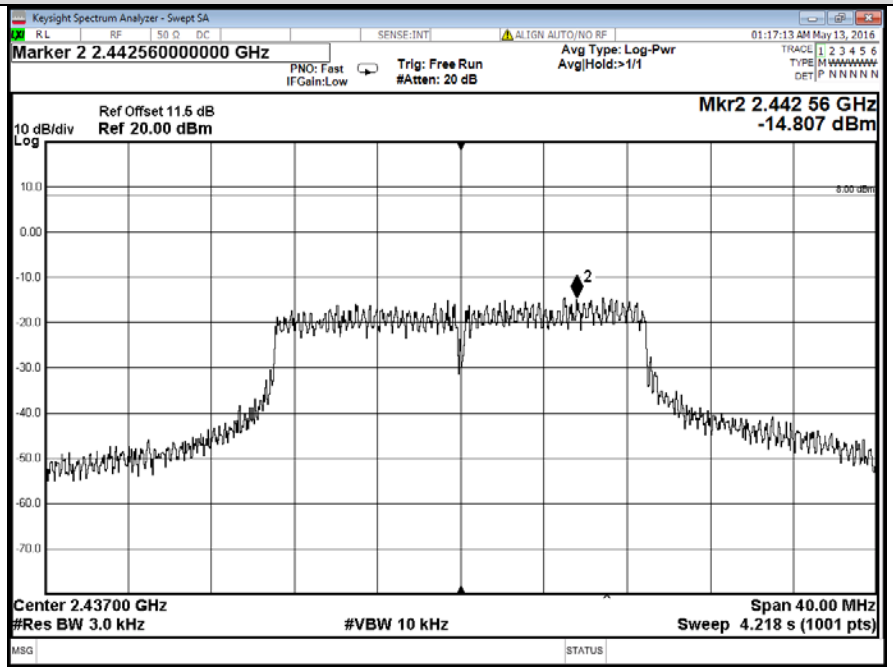


Chain 1

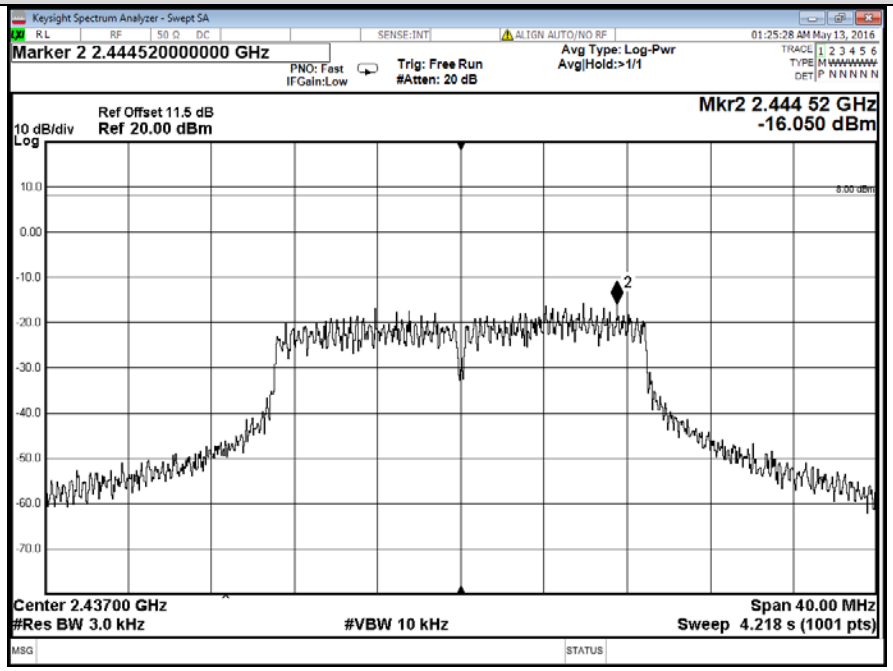


Test Mode: 802.11n(HT20)_2437MHz

Chain 0

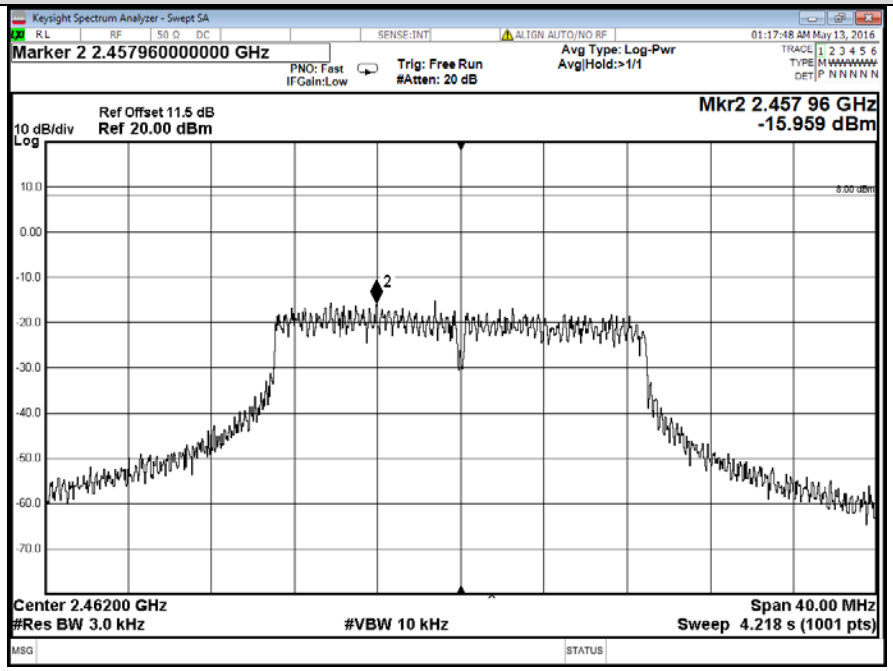


Chain 1

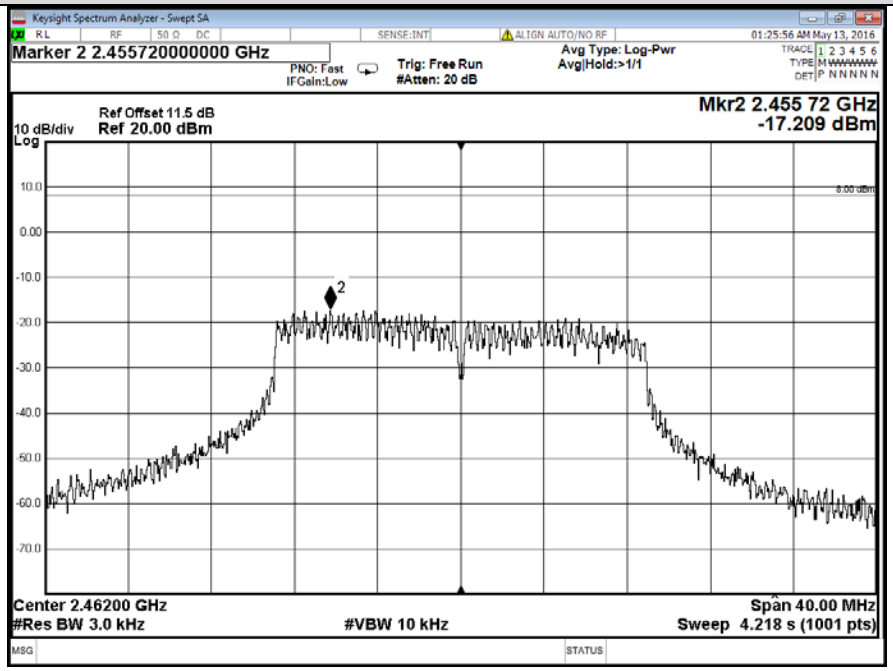


Test Mode: 802.11n(HT20)_2462MHz

Chain 0

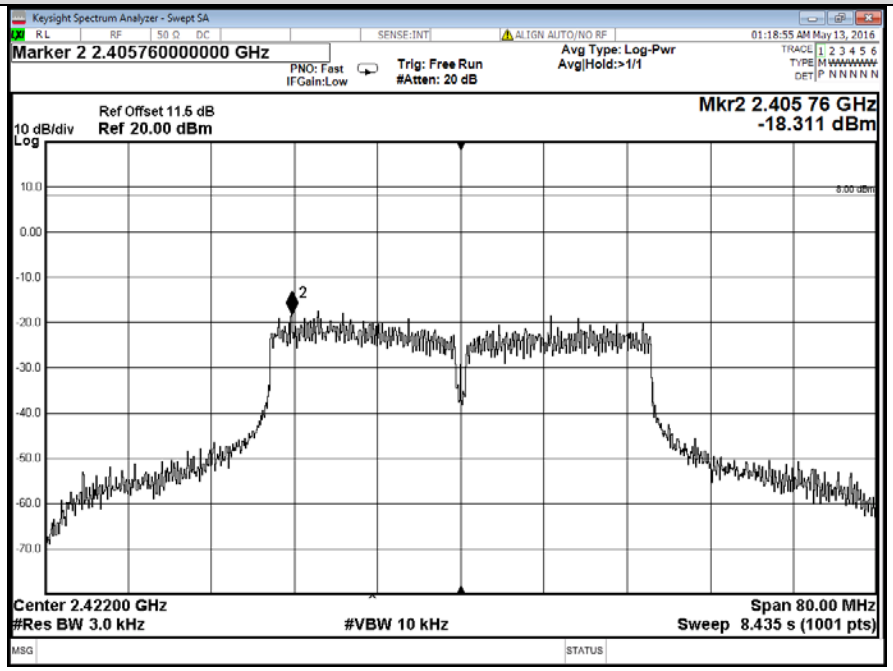


Chain 1

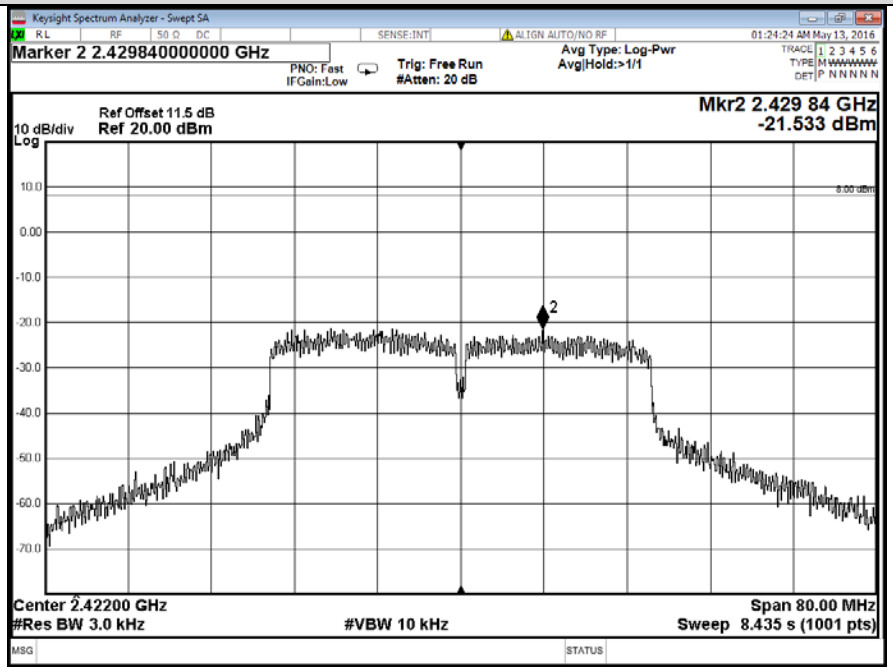


Test Mode: 802.11n(HT40)_2422MHz

Chain 0

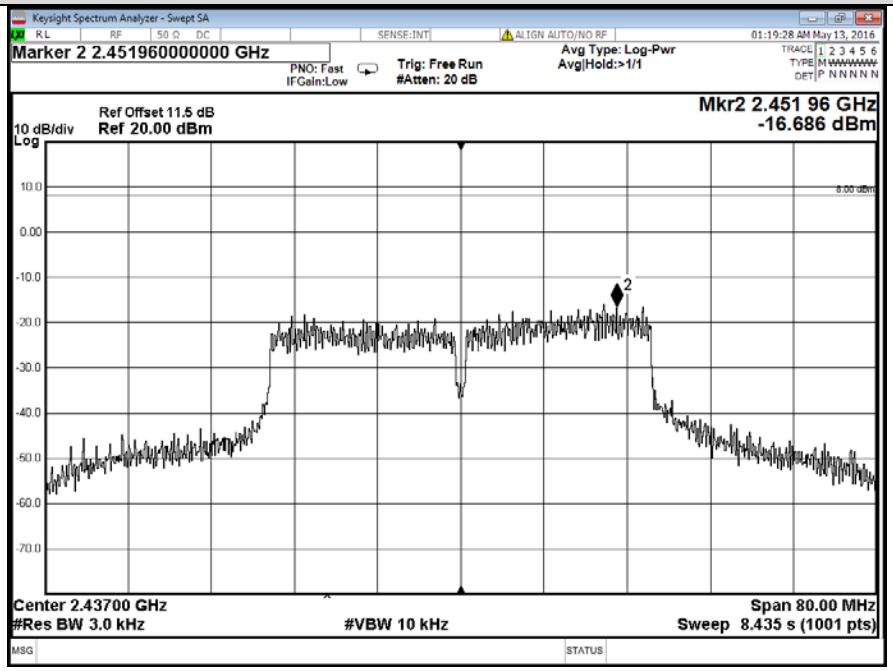


Chain 1

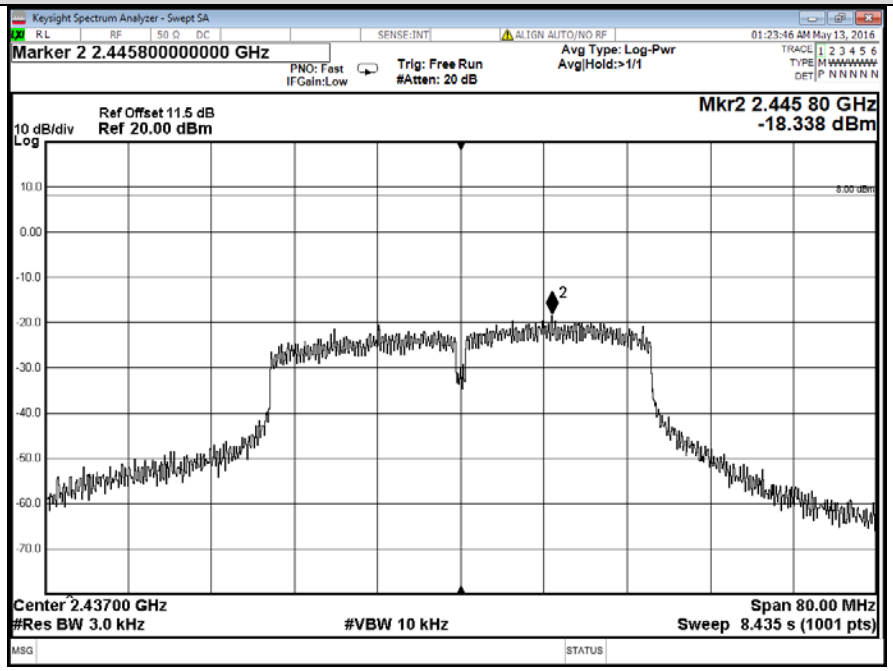


Test Mode: 802.11n(HT40)_2437MHz

Chain 0

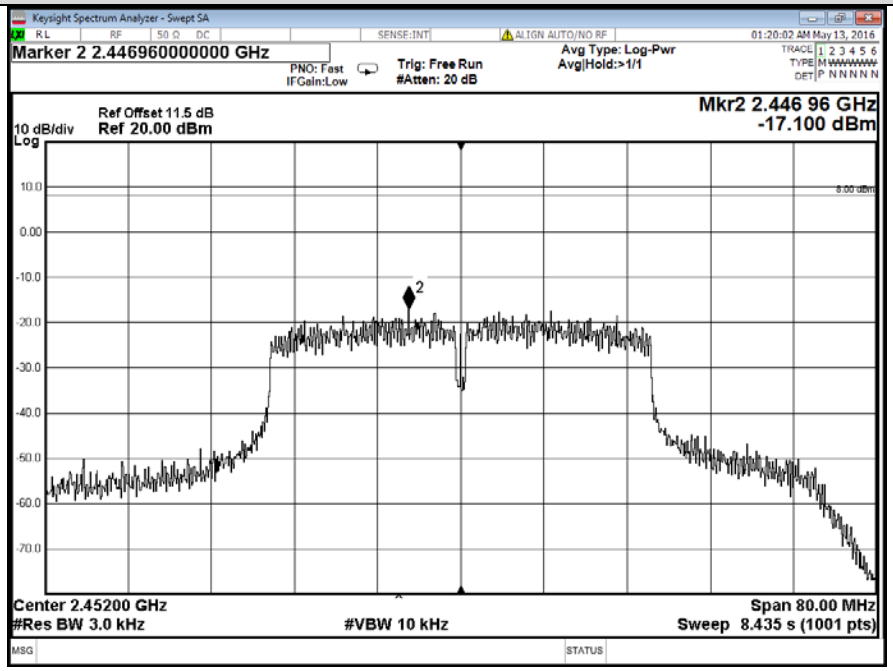


Chain 1

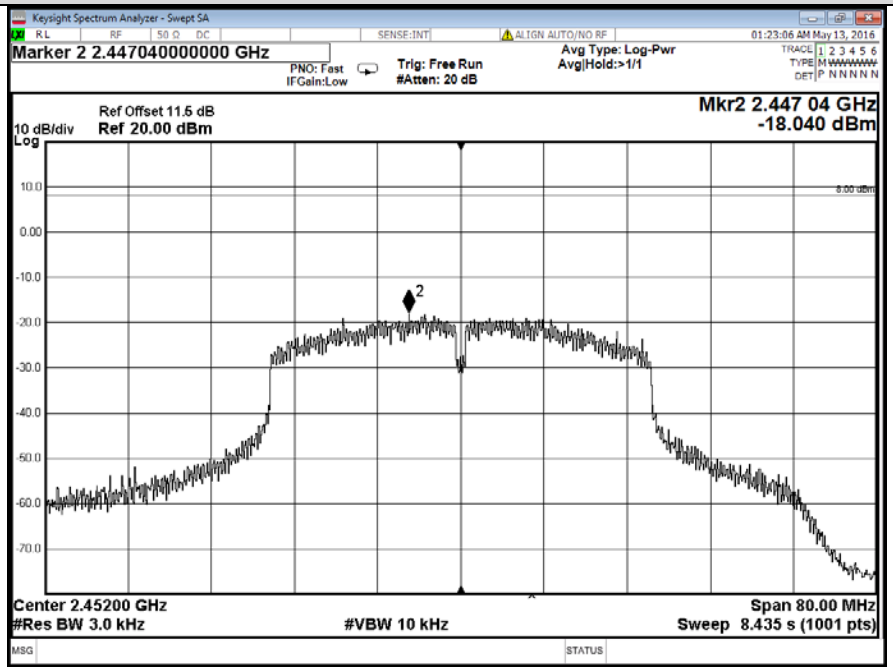


Test Mode: 802.11n(HT40)_2452MHz

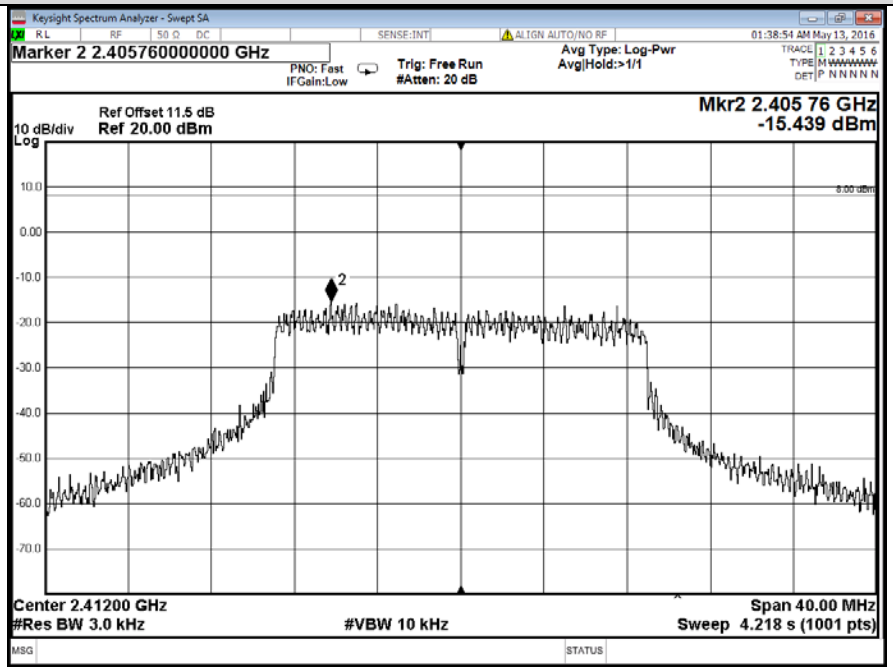
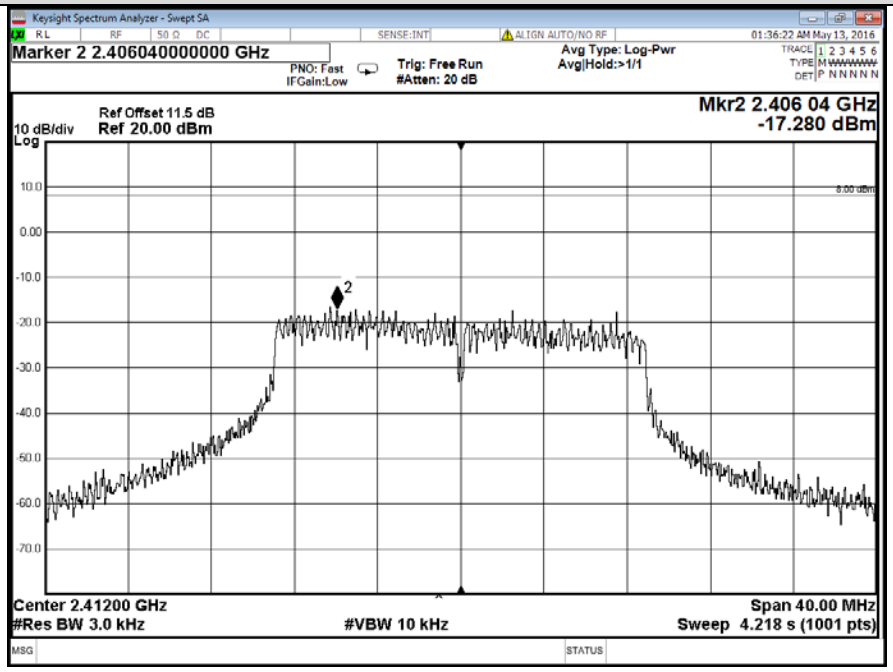
Chain 0



Chain 1

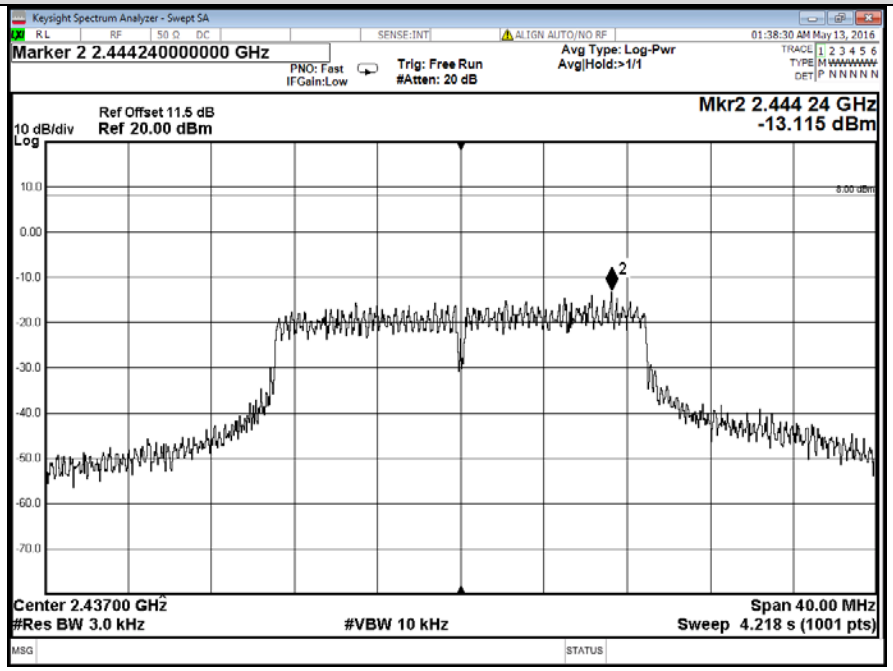


MIMO Mode-Test Data

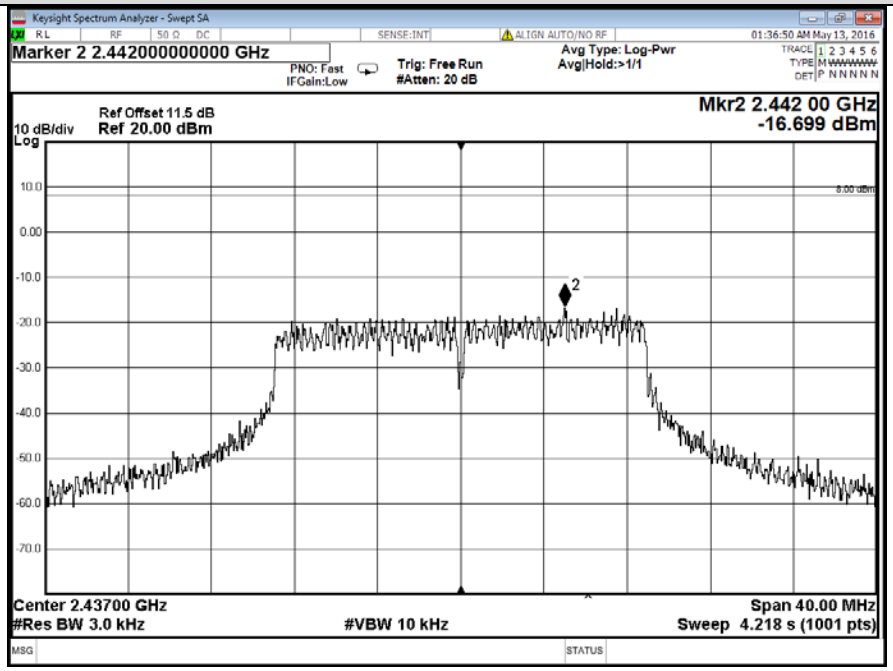
Test Mode: 802.11n(HT20)_2412MHz
Chain 0

Chain 1


Test Mode: 802.11n(HT20)_2437MHz

Chain 0

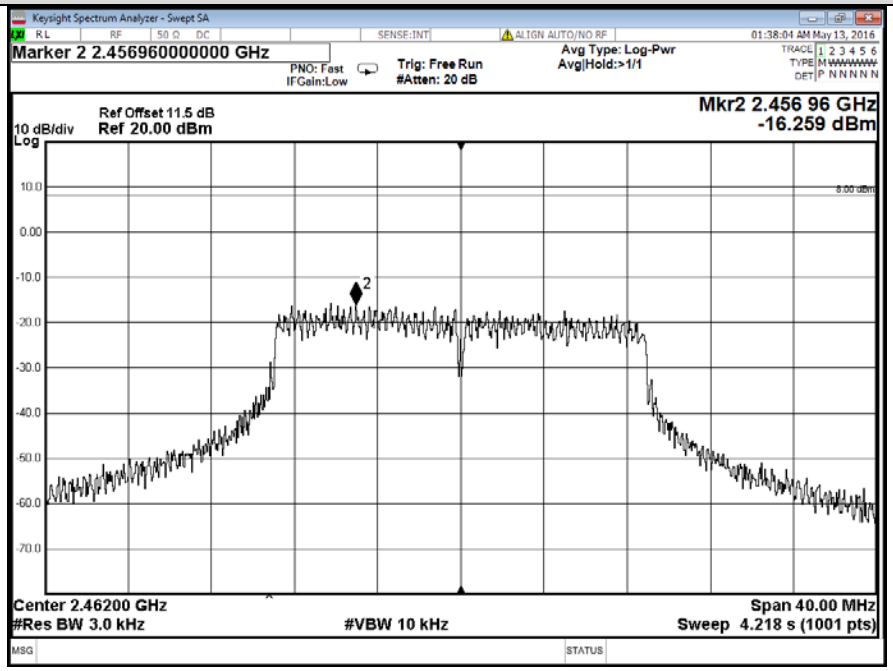


Chain 1

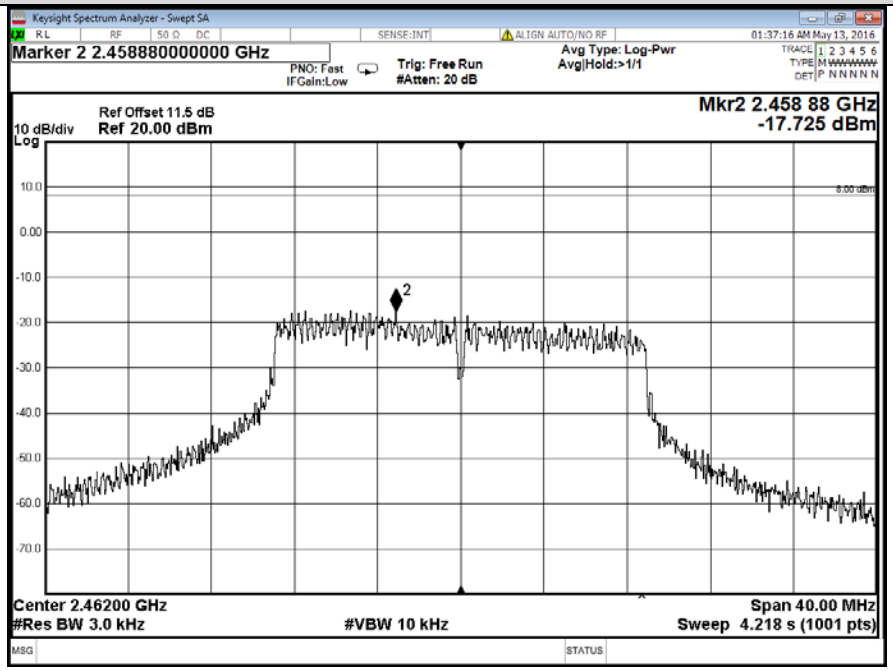


Test Mode: 802.11n(HT20)_2462MHz

Chain 0

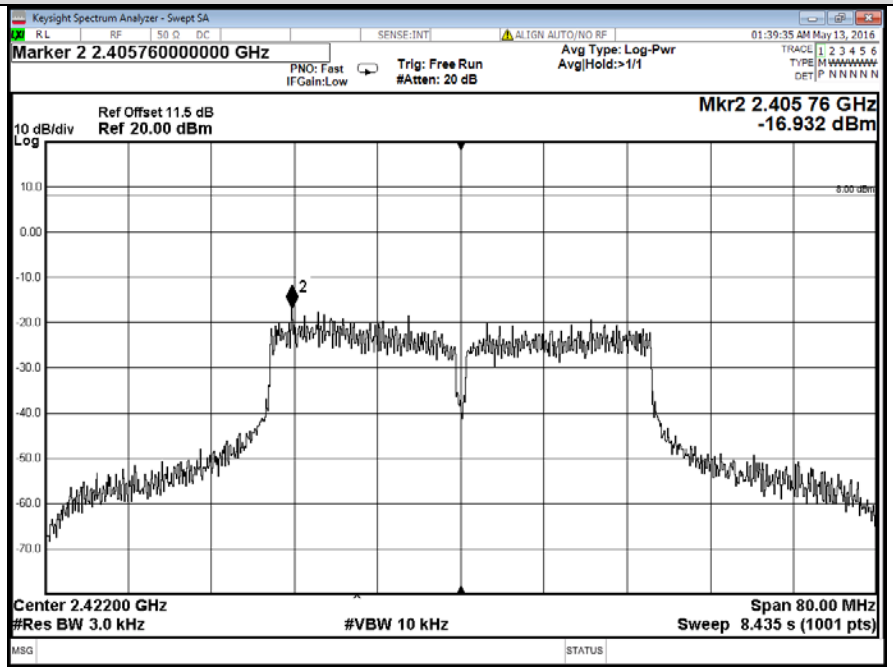


Chain 1

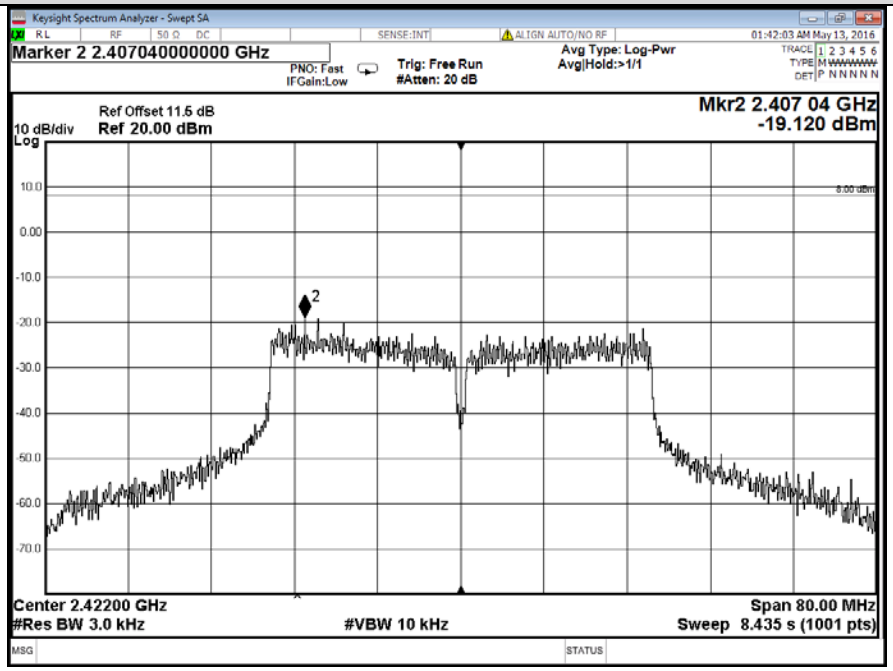


Test Mode: 802.11n(HT40)_2422MHz

Chain 0

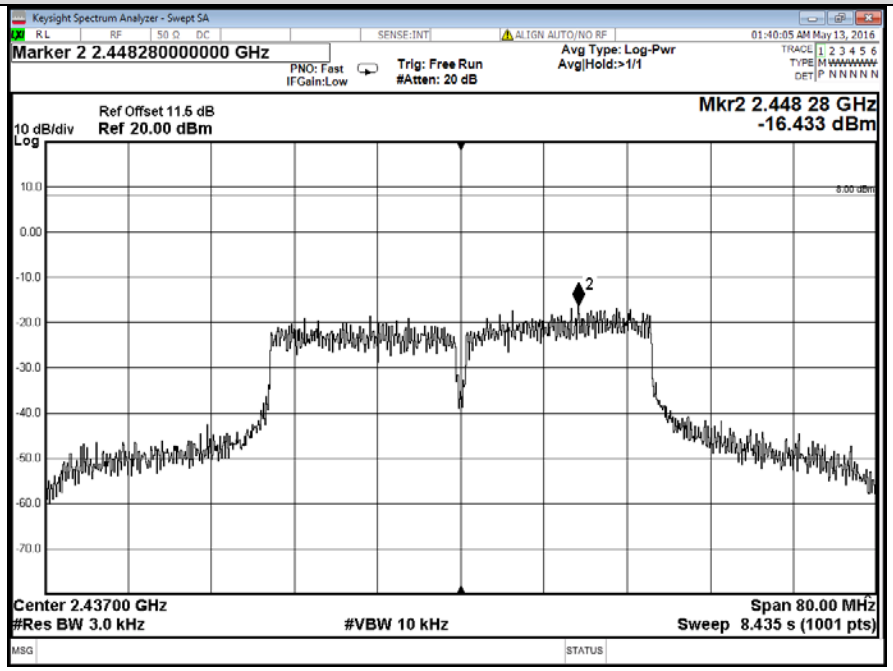


Chain 1

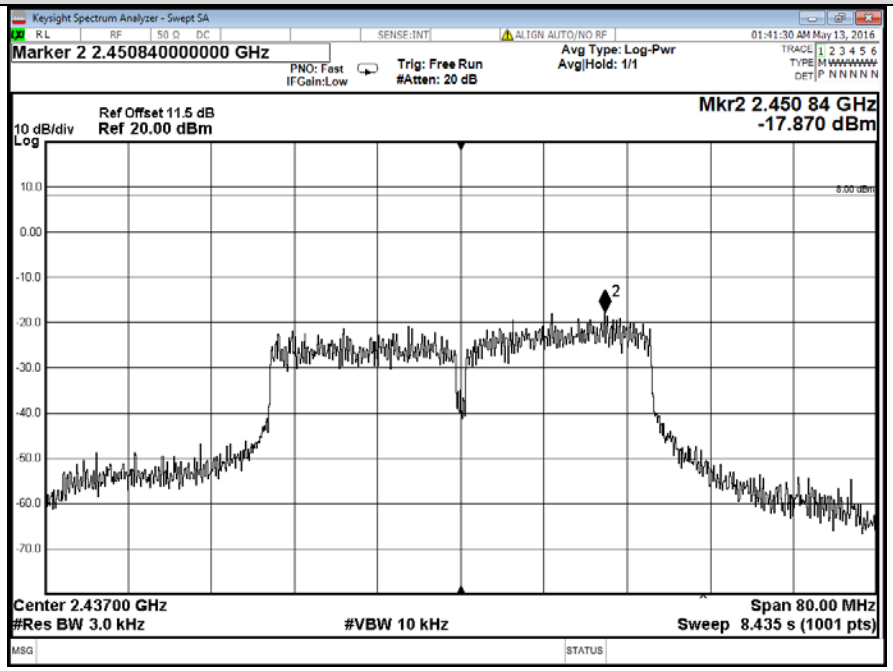


Test Mode: 802.11n(HT40)_2437MHz

Chain 0

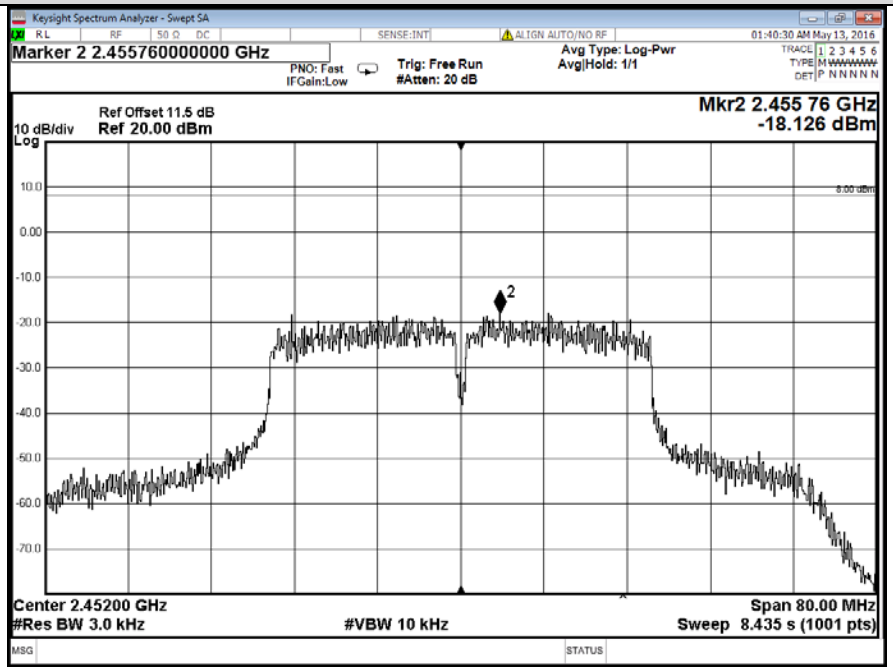


Chain 1

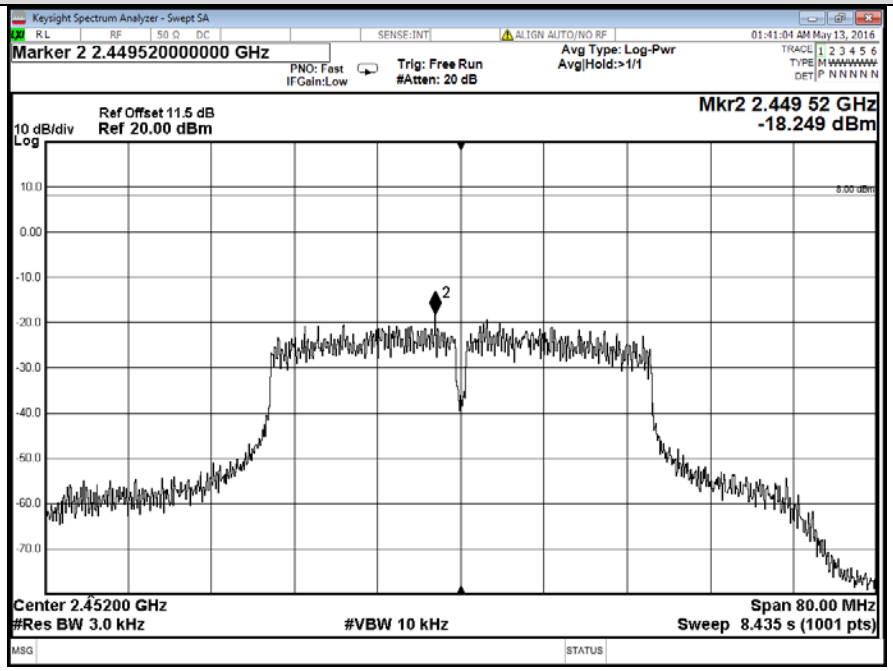


Test Mode: 802.11n(HT40)_2452MHz

Chain 0



Chain 1



6.3 Occupied Bandwidth

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

6.3.1 Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

6.3.2 Test Procedure (KDB 558074 D01 v03r05, Section 8.1)

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 x RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

6.3.3 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.

6.3.4 Test Data

The EUT complied with the FCC Part 15.247 Occupied bandwidth requirements.

Table 8 provides the test results for Occupied bandwidth. (all the data attached was use the worst case data rate)

6.3.5 Areas of Concern

None.

Table 8: Occupied Bandwidth

SISO Mode-Test Data

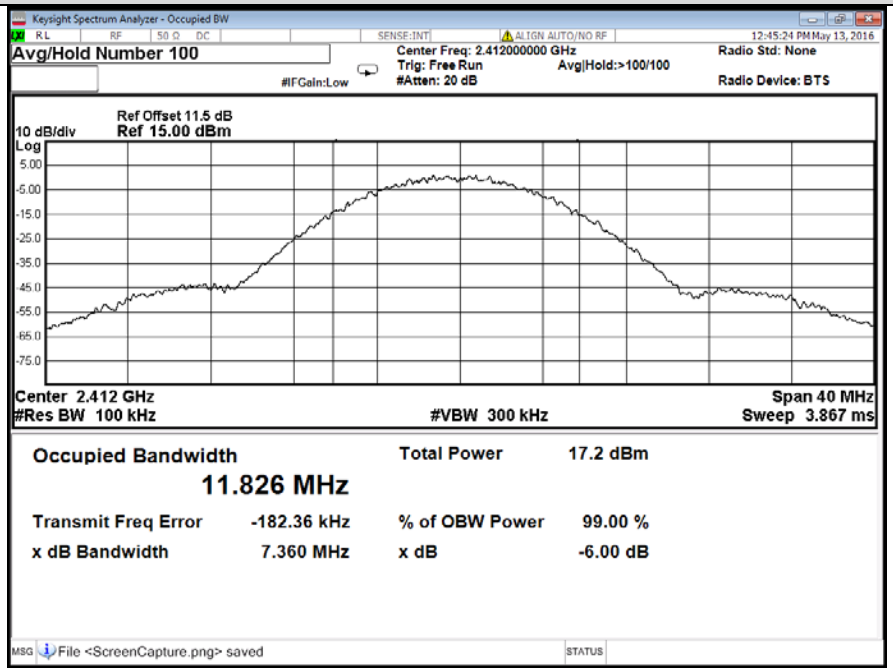
Mode	Channel Frequency (MHz)	Antenna Port	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limit	Result (Pass / Fail)
802.11b	1 (2412)	Chain 0	7.360	11.826	> 500 kHz	Pass
		Chain 1	7.096	11.914	> 500 kHz	Pass
	6 (2437)	Chain 0	7.449	12.365	> 500 kHz	Pass
		Chain 1	7.324	11.963	> 500 kHz	Pass
	11 (2462)	Chain 0	7.076	11.833	> 500 kHz	Pass
		Chain 1	7.328	11.795	> 500 kHz	Pass
802.11g	1 (2412)	Chain 0	16.47	16.405	> 500 kHz	Pass
		Chain 1	16.50	16.455	> 500 kHz	Pass
	6 (2437)	Chain 0	16.52	16.557	> 500 kHz	Pass
		Chain 1	16.51	16.477	> 500 kHz	Pass
	11 (2462)	Chain 0	16.50	16.440	> 500 kHz	Pass
		Chain 1	16.49	16.442	> 500 kHz	Pass
802.11n (HT20)	1 (2412)	Chain 0	17.68	17.607	> 500 kHz	Pass
		Chain 1	17.70	17.643	> 500 kHz	Pass
	6 (2437)	Chain 0	17.72	17.695	> 500 kHz	Pass
		Chain 1	17.69	17.652	> 500 kHz	Pass
	11 (2462)	Chain 0	17.72	17.628	> 500 kHz	Pass
		Chain 1	17.65	17.626	> 500 kHz	Pass
802.11n (HT40)	3 (2422)	Chain 0	36.47	36.293	> 500 kHz	Pass
		Chain 1	36.49	36.209	> 500 kHz	Pass
	6 (2437)	Chain 0	36.43	36.339	> 500 kHz	Pass
		Chain 1	35.78	36.026	> 500 kHz	Pass
	9 (2452)	Chain 0	35.80	36.027	> 500 kHz	Pass
		Chain 1	32.88	35.583	> 500 kHz	Pass

MIMO Mode-Test Data

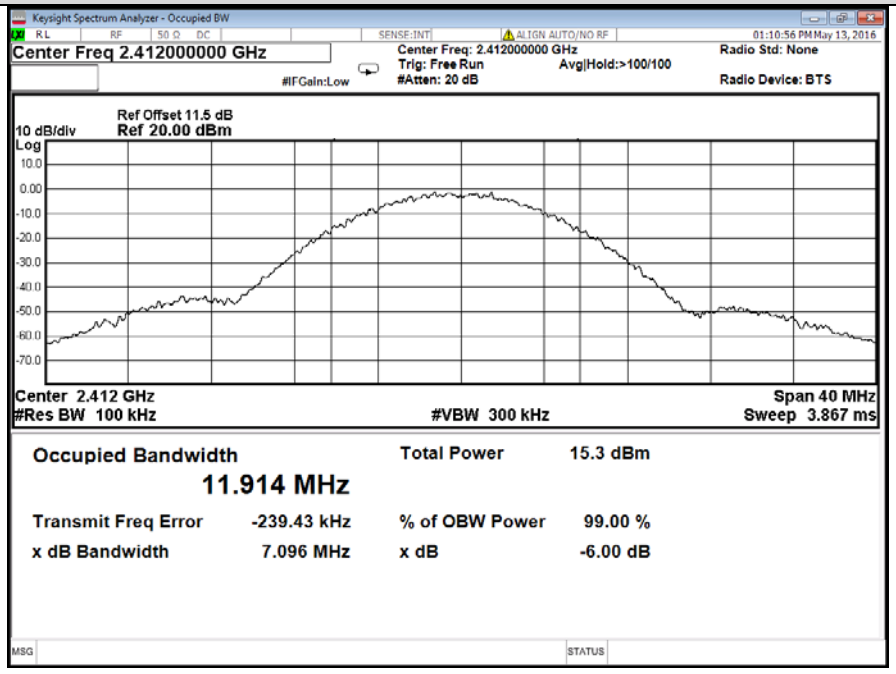
Mode	Channel Frequency (MHz)	Antenna Port	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limit	Result (Pass / Fail)
802.11n (HT20)	1 (2412)	Chain 0	17.67	17.608	> 500 kHz	Pass
		Chain 1	17.69	17.633	> 500 kHz	Pass
	6 (2437)	Chain 0	17.72	17.698	> 500 kHz	Pass
		Chain 1	17.71	17.637	> 500 kHz	Pass
	11 (2462)	Chain 0	17.70	17.619	> 500 kHz	Pass
		Chain 1	17.66	17.612	> 500 kHz	Pass
802.11n (HT40)	3 (2422)	Chain 0	36.44	36.281	> 500 kHz	Pass
		Chain 1	36.47	36.325	> 500 kHz	Pass
	6 (2437)	Chain 0	36.37	36.332	> 500 kHz	Pass
		Chain 1	35.81	36.247	> 500 kHz	Pass
	9 (2452)	Chain 0	35.67	36.057	> 500 kHz	Pass
		Chain 1	35.81	36.247	> 500 kHz	Pass

SISO Mode-Test Data

Test Mode: 802.11b_2412MHz
Chain 0

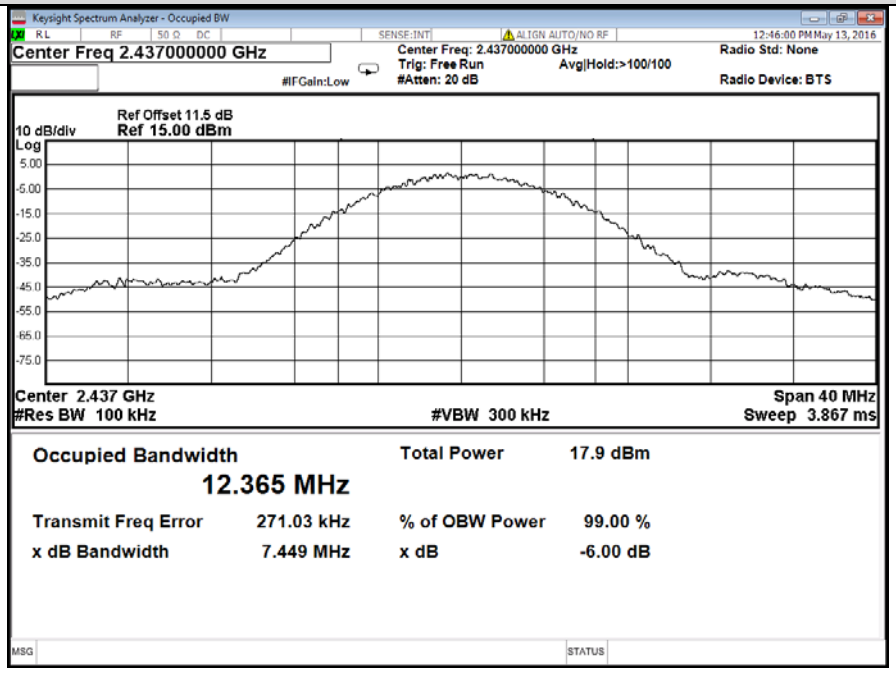


Chain 1



Test Mode: 802.11b_2437MHz

Chain 0



Chain 1