

Shantou City Hengdi Industry Co., Ltd

# TEST REPORT

**SCOPE OF WORK**

FCC TESTING–DRO 004

**REPORT NUMBER**

GZHH00289263-002

**ISSUE DATE**

SEP 28, 2018

**[REVISED DATE]**

[-----]

**PAGES**

77

**DOCUMENT CONTROL NUMBER**

FCC ID 247\_b

© 2017 INTERTEK



**Shantou City Hengdi Industry Co., Ltd**

Application  
For  
Certification

**FCC ID: 2AALAHD18C24GR****Drone Lunar 14.4inch With Camera Streaming With Virtual Reality****Model: DRO 004****2.4GHz Wi-Fi Transceiver**

Report No.: GZHH00289263-002

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-17]

**Prepared and Checked by:****Approved by:**

Sign on file

**Terry Tang  
Senior Engineer**

---

**Kidd Yang  
Technical Supervisor  
Date: Sep 28, 2018**

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

**Intertek Testing Service Shenzhen Ltd. Longhua Branch**

101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China  
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

## LIST OF EXHIBITS

### *INTRODUCTION*

<i>EXHIBIT 1:</i>	Summary of Tests
<i>EXHIBIT 2:</i>	General Description
<i>EXHIBIT 3:</i>	System Test Configuration
<i>EXHIBIT 4:</i>	Measurement Results
<i>EXHIBIT 5:</i>	Equipment Photographs
<i>EXHIBIT 6:</i>	Product Labeling
<i>EXHIBIT 7:</i>	Technical Specifications
<i>EXHIBIT 8:</i>	Instruction Manual
<i>EXHIBIT 9:</i>	Confidentiality Request
<i>EXHIBIT 10:</i>	Miscellaneous Information
<i>EXHIBIT 11:</i>	Test Equipment List

**MEASUREMENT/TECHNICAL REPORT**

**Drone Lunar 14.4inch With Camera Streaming With Virtual Reality**

**Model: DRO 004**

**FCC ID: 2AALAHD18C24GR**

This report concerns (check one) Original Grant  Class II Change

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes  No

If yes, defer until : \_\_\_\_\_  
date

Company Name agrees to notify the Commission by: \_\_\_\_\_  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes  No

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-17] Edition] provision.

Report prepared by:

**Terry Tang**  
**Intertek Testing Services Shenzhen Ltd.**  
**Longhua Branch**  
101, 201, Building B, No. 308 Wuhe Avenue,  
Zhangkengjing Community GuanHu Subdistrict,  
LongHua District, Shenzhen, People's Republic of  
China  
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

## Table of Contents

<b>1.0</b>	<b>Summary of Test results</b> .....	<b>7</b>
<b>2.0</b>	<b>General Description</b> .....	<b>9</b>
2.1	Product Description .....	9
2.2	Related Submittal(s) Grants .....	9
2.3	Test Methodology.....	9
2.4	Test Facility .....	9
<b>3.0</b>	<b>System Test Configuration</b> .....	<b>11</b>
3.1	Justification .....	11
3.2	EUT Exercising Software.....	11
3.3	Special Accessories .....	12
3.4	Measurement Uncertainty .....	12
3.5	Equipment Modification .....	12
3.6	Support Equipment List and Description.....	12
<b>4.0</b>	<b>Measurement Results</b> .....	<b>14</b>
4.1	Maximum Conducted Output Power at Antenna Terminals .....	14
4.2	Minimum 6 dB RF Bandwidth .....	15
4.3	Maximum Power Density Reading.....	22
4.4	Out of Band Conducted Emissions .....	29
4.5	Out of Band Radiated Emissions .....	48
4.6	Transmitter Radiated Emissions in Restricted Bands.....	49
4.7	Field Strength Calculation.....	50
4.8	Radiated Spurious Emission.....	51
4.9	Radiated Emissions from Digital Section of Transceiver .....	62
4.10	Transmitter Duty Cycle Calculation and Measurements .....	63
<b>5.0</b>	<b>Equipment Photographs</b> .....	<b>65</b>
<b>6.0</b>	<b>Product Labelling</b> .....	<b>67</b>
<b>7.0</b>	<b>Technical Specifications</b> .....	<b>69</b>
<b>8.0</b>	<b>Instruction Manual</b> .....	<b>71</b>
<b>9.0</b>	<b>Confidentiality Request</b> .....	<b>73</b>
<b>10.0</b>	<b>Discussion of Pulse Desensitization</b> .....	<b>75</b>
<b>11.0</b>	<b>Test Equipment List</b> .....	<b>77</b>

## List of attached file

Exhibit type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidentiality Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

**EXHIBIT 1**

**SUMMARY OF TEST RESULTS**

## 1.0 Summary of Test Results

### Drone Lunar 14.4inch With Camera Streaming With Virtual Reality

Model: DRO 004

FCC ID: 2AALAHD18C24GR

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.



**EXHIBIT 2**

**GENERAL DESCRIPTION**

## 2.0 General Description

### 2.1 Product Description

The Equipment Under Test (EUT) is a Drone Lunar 14.4inch With Camera Streaming With Virtual Reality with Wi-Fi function operating at 2412-2462MHz for 802.11b/g/n-HT20, 11 channels with 5MHz channel spacing. The EUT is powered by DC 3.7V rechargeable battery. The EUT can't operate while charging. For more detailed features description, please refer to the user's manual.

Type of Modulation: CCK, BPSK, QPSK, 16QAM, 64QAM.

Antenna Type: Integral Antenna

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

### 2.2 Related Submittal(s) Grants

This is an application for certification of:

DTS- Part 15 Digital Transmission Systems (2.4GHz Wi-Fi transmitter portion).

Remaining portions are subject to the following procedures:

1. Receiver portion of WiFi: exempt from technical requirement of this Part.
2. Other Digital Function: Subject to FCC Part 15B SDOC.
3. The Corresponding transmitter is in the process of being filed under the FCC ID: 2AALAHD18C24G.

### 2.3 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.10: 2013 and KDB 558074 D01 v05. Radiated emission measurement was performed in semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

### 2.4 Test Facility

The Semi-anechoic chamber used to collect the radiated data is **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).

**EXHIBIT 3**

**SYSTEM TEST CONFIGURATION**

## 3.0 System Test Configuration

### 3.1 Justification

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, all cables were manipulated to produce worst case emissions. The EUT was powered by DC 3.7V rechargeable battery during the test. Only the worst case mode is shown in the report.

On 802.11b/g/n-HT20 mode, only one antenna is used, and all data rate were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. 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.

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 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The unit was operated standalone and placed at the center of table.

Radiated emission measurement were performed 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.

### 3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

### 3.3 Special Accessories

N/A.

### 3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

### 3.5 Equipment Modification

Any modifications installed previous to testing by Shantou City Hengdi Industry Co., Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

### 3.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
iPod (Provided by Intertek)	Apple	A1421

**EXHIBIT 4**

**MEASUREMENT RESULTS**

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

## 4.0 Measurement Results

### 4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter have a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

IEEE 802.11b (Antenna Gain = 2 dBi) (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	13.4	21.9
Middle Channel: 2437	13.1	20.4
High Channel: 2462	13.6	22.9

IEEE 802.11g (Antenna Gain = 2 dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	12.5	17.8
Middle Channel: 2437	12.1	16.2
High Channel: 2462	12.8	19.1

IEEE 802.11n-HT20 (Antenna Gain = 2 dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	10.8	12.0
Middle Channel: 2437	10.9	12.3
High Channel: 2462	10.5	11.2

Cable loss: 1.0 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 13.6dBm

EUT max. E.I.R.P = 13.6dBm + 2dBi = 15.6dBm = 36.3mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

#### 4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	9.334
2437	10.507
2462	10.072

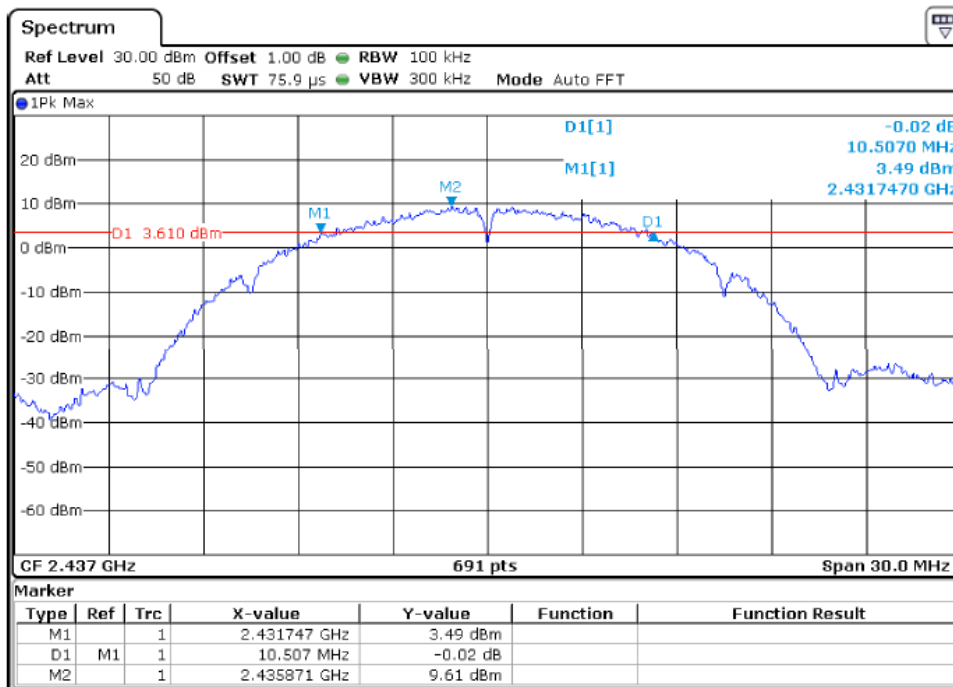
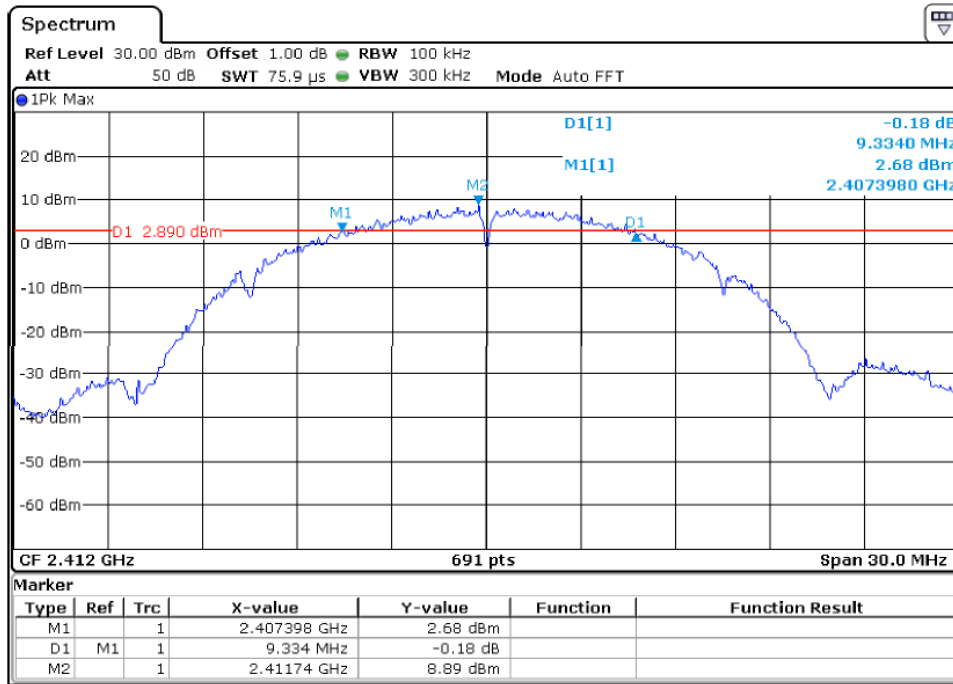
IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	16.454
2437	16.498
2462	16.498

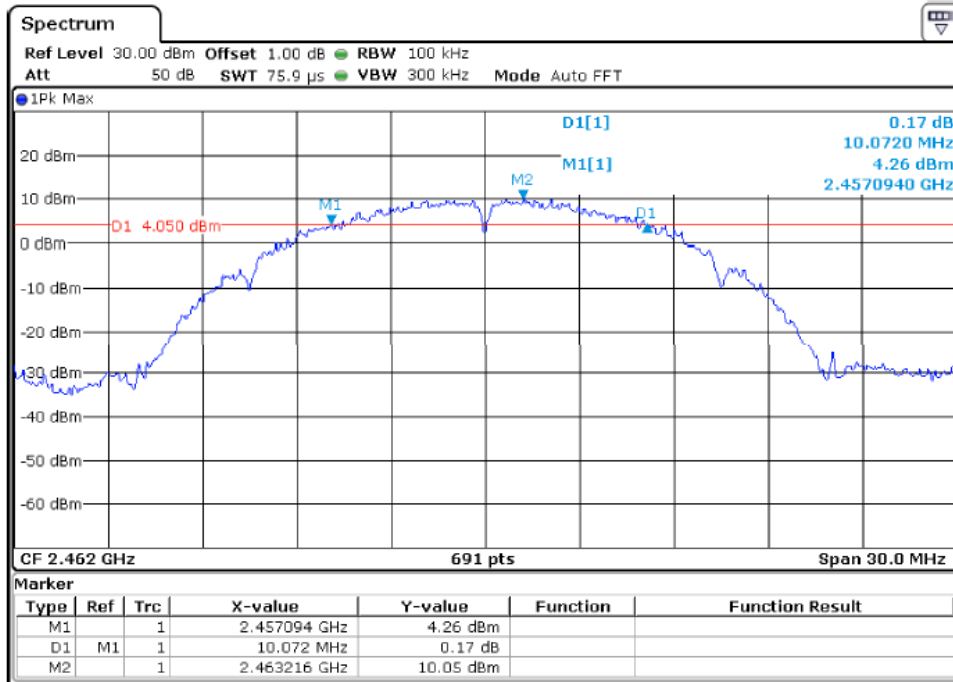
IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	17.627
2437	17.670
2462	17.627

The test plots are attached as below.

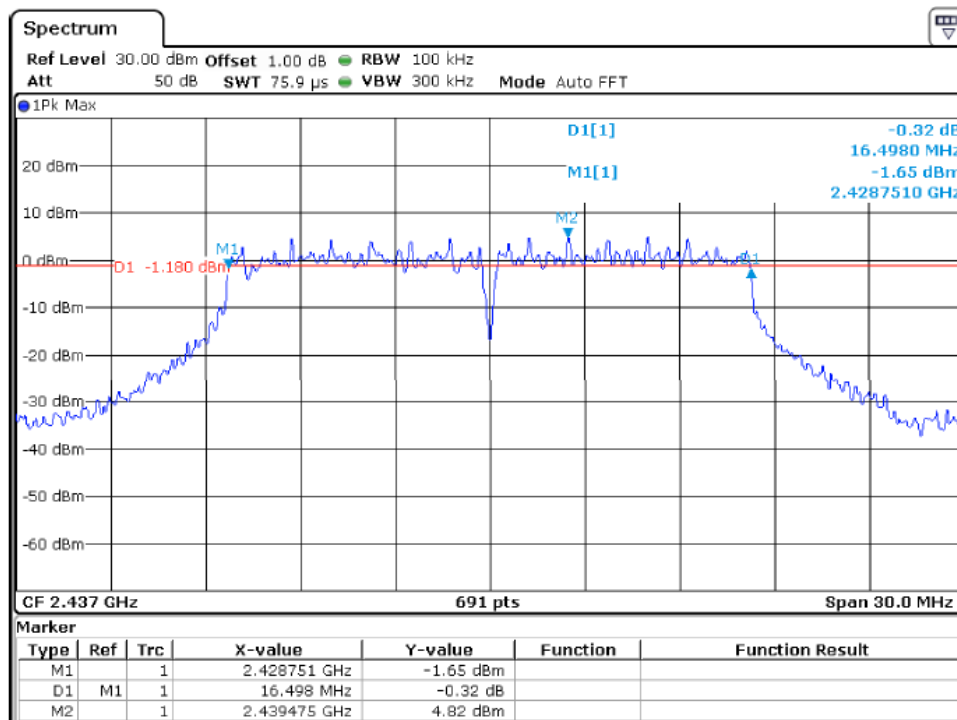
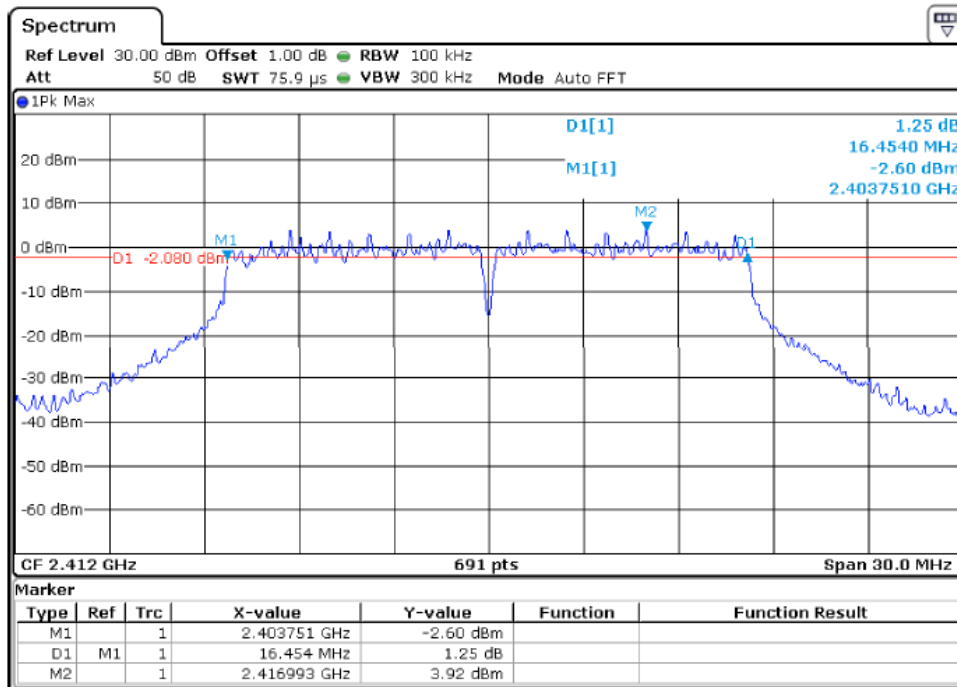


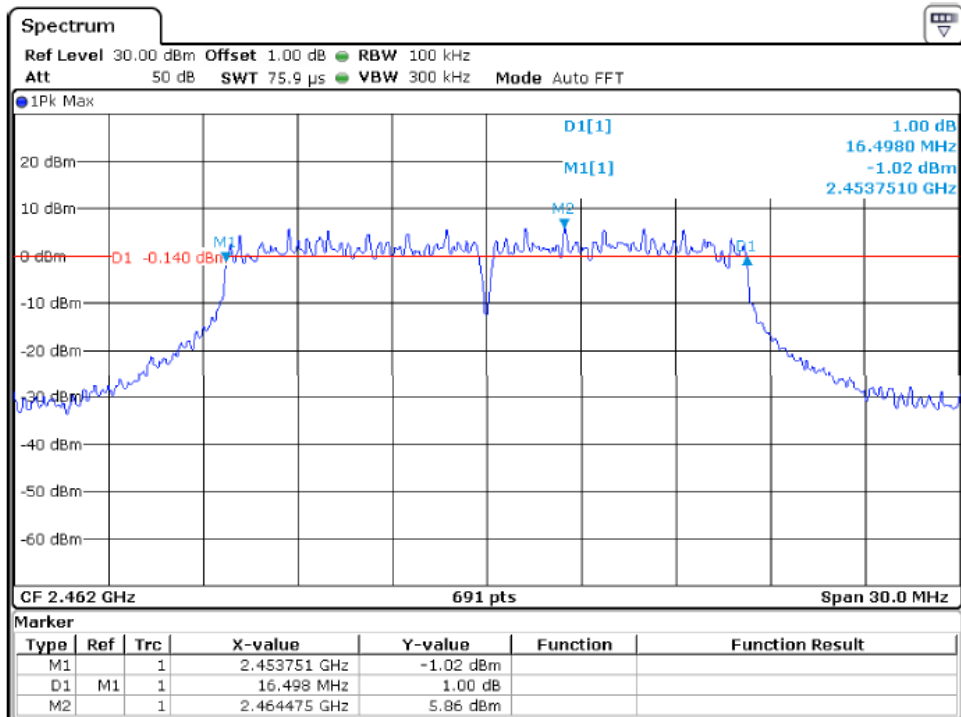
802.11b



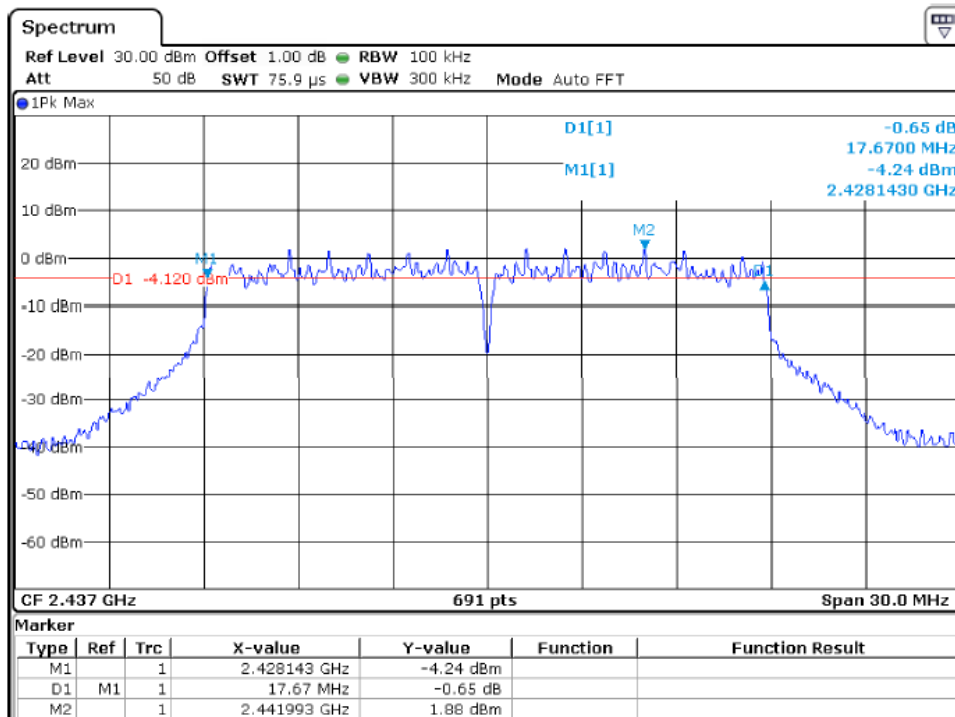
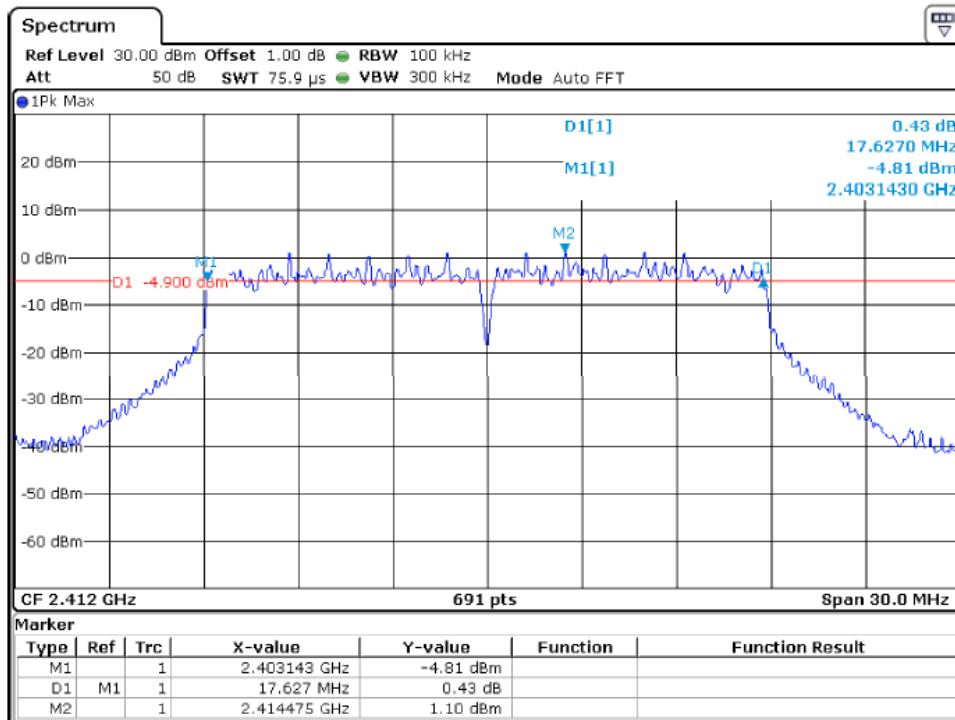


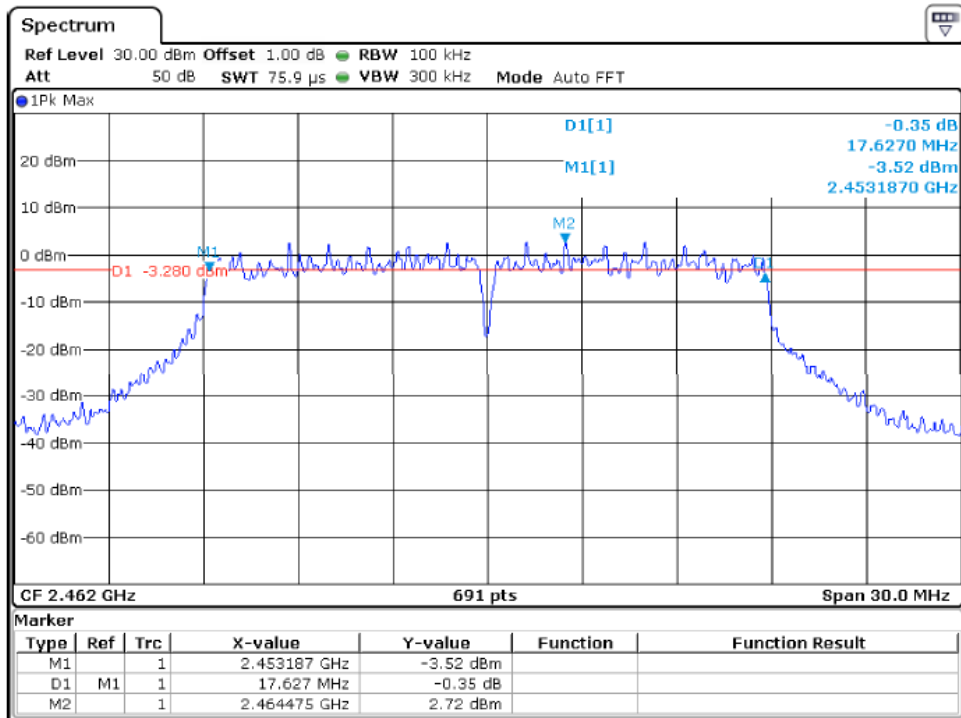
802.11g





802.11n-HT20





Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

#### 4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

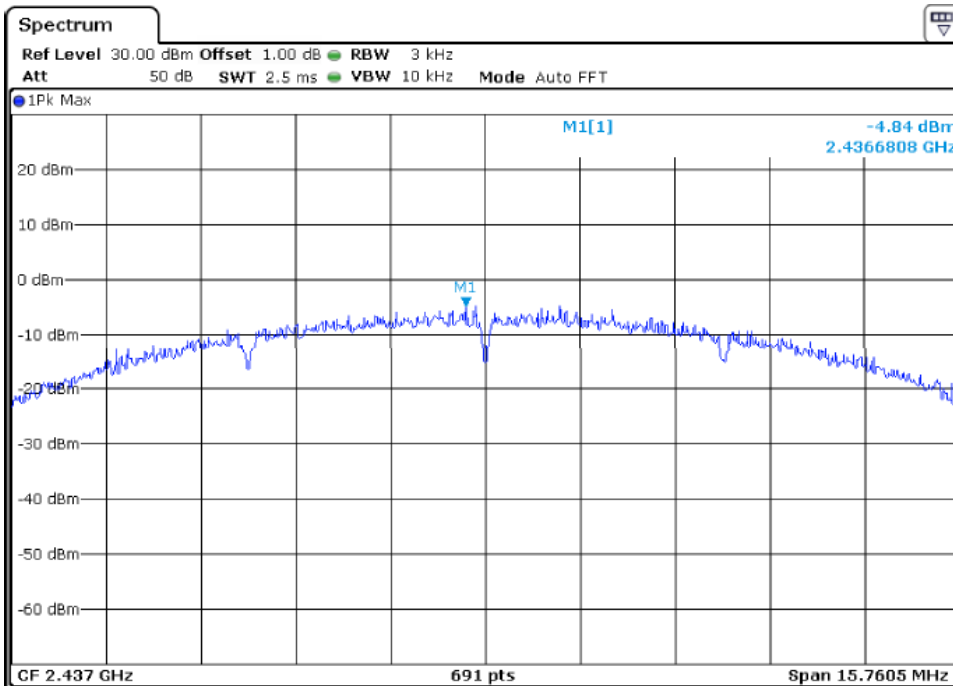
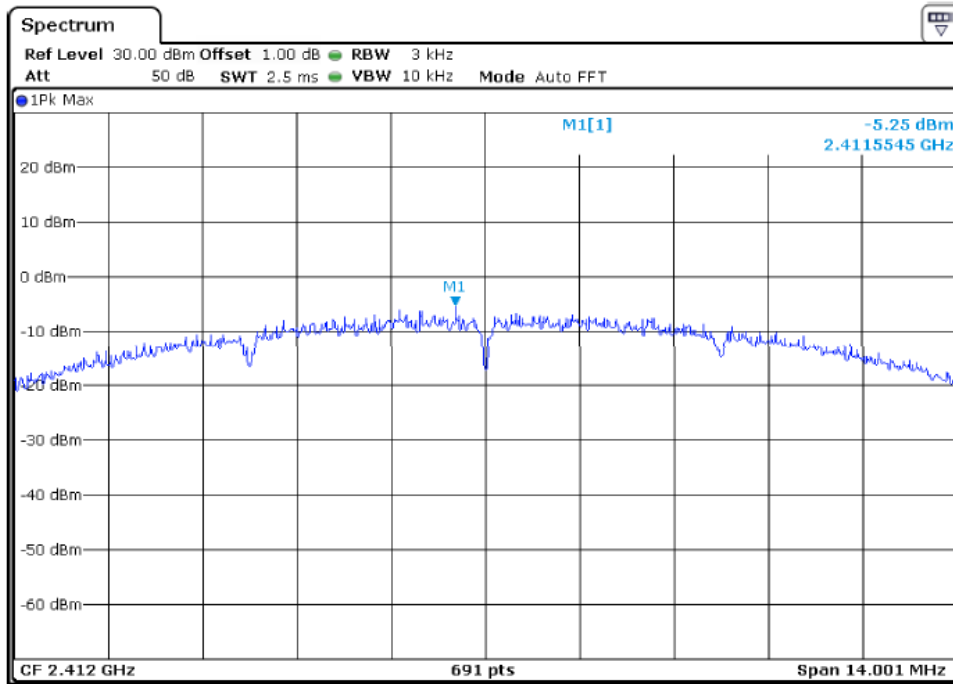
IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	Power Density with RBW 3KHz
2412	-5.25
2437	-4.84
2462	-3.94

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 3KHz
2412	-10.86
2437	-10.63
2462	-10.01

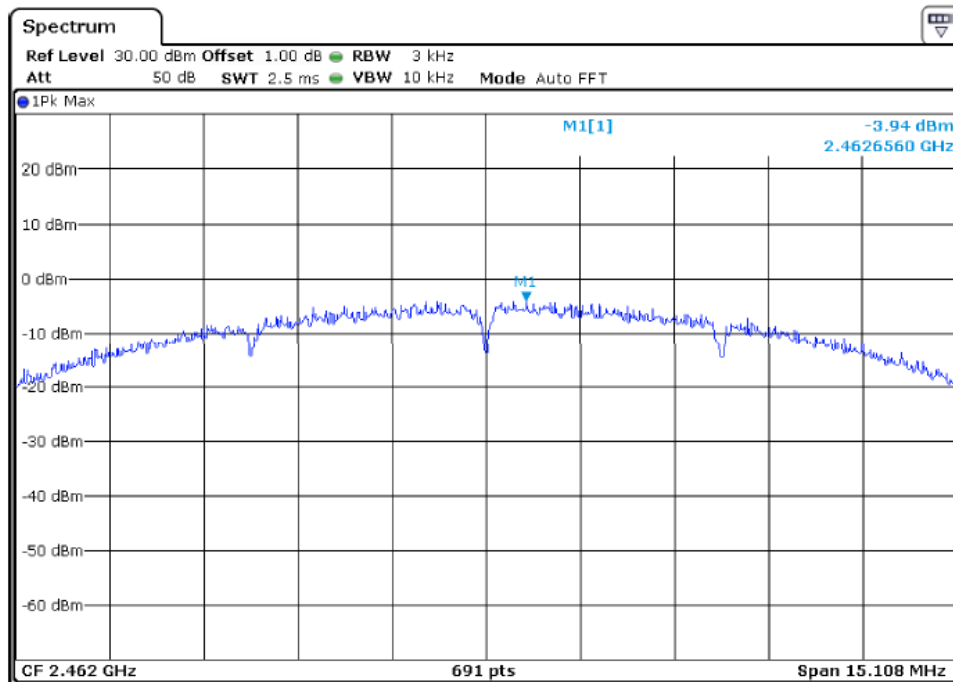
IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 3KHz
2412	-13.10
2437	-13.82
2462	-13.01

The test plots are attached as below.

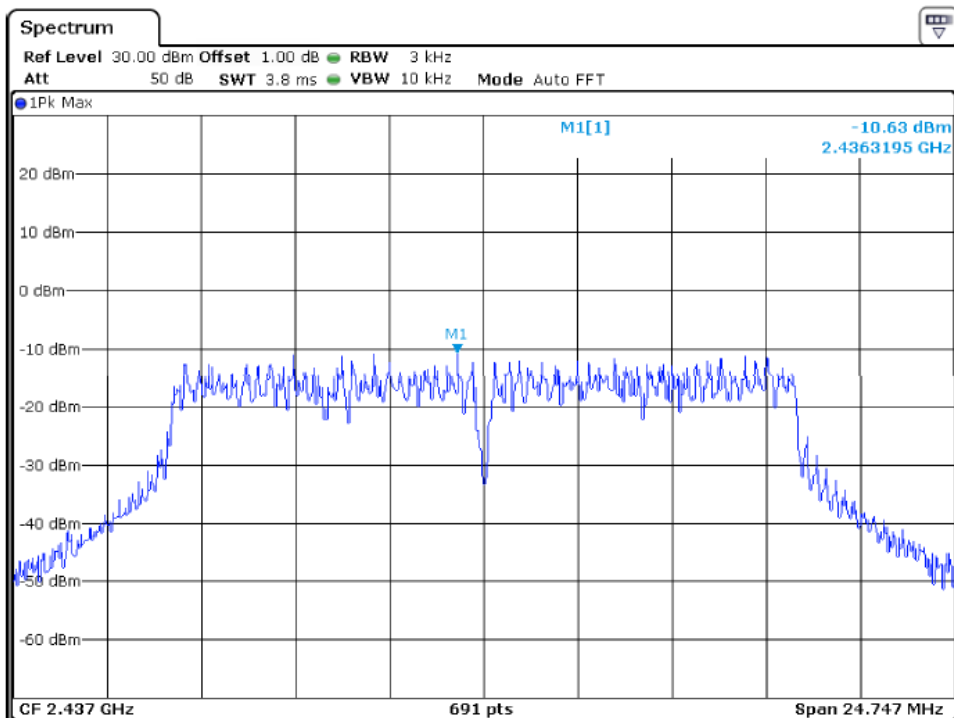
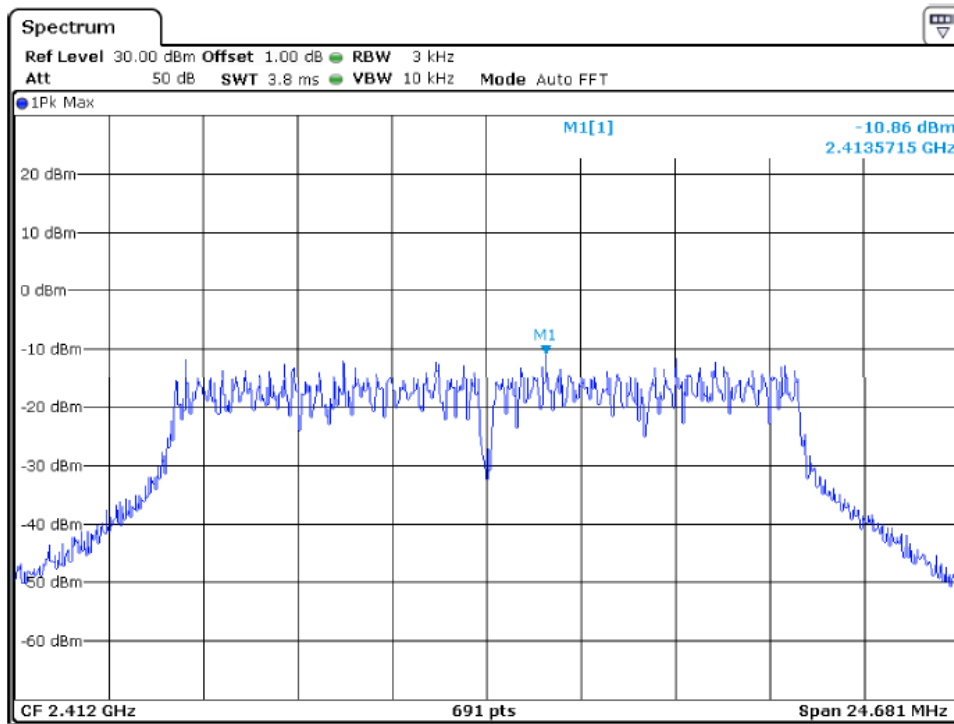
802.11b

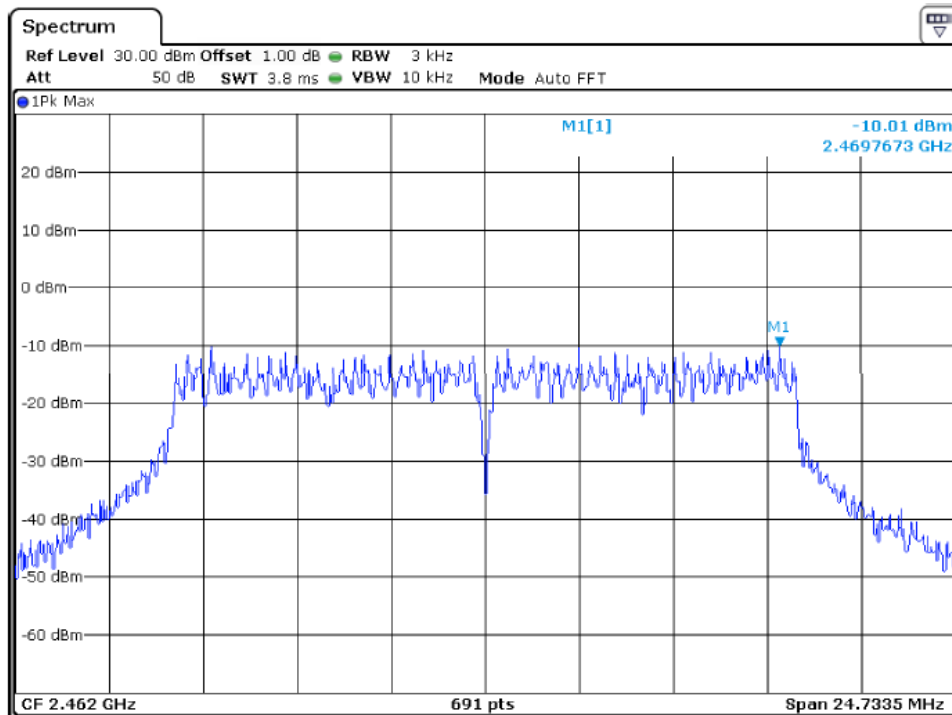




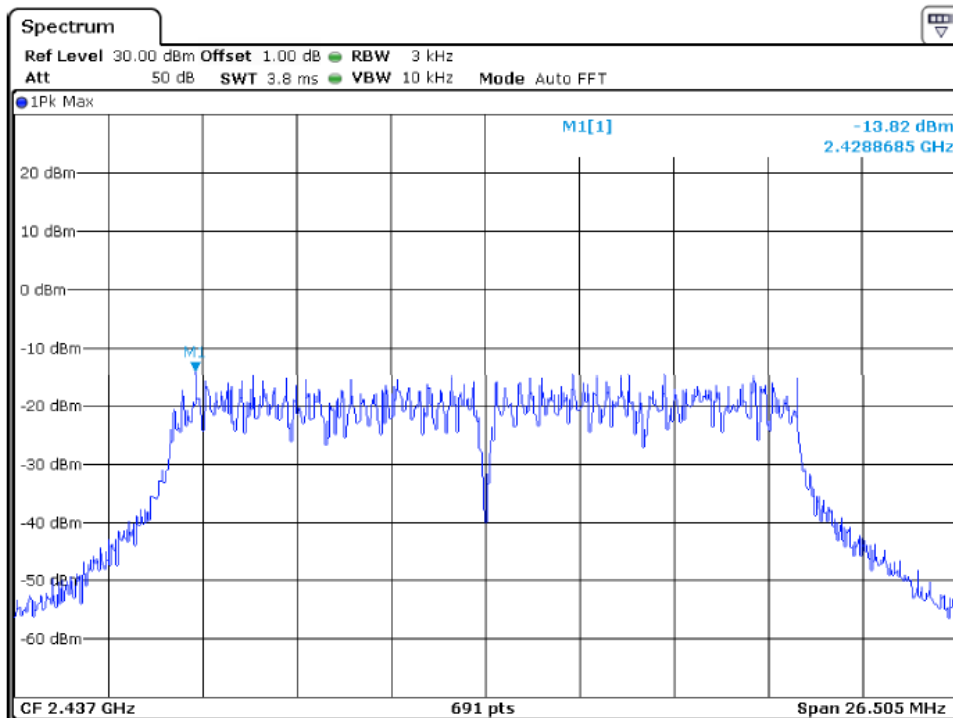
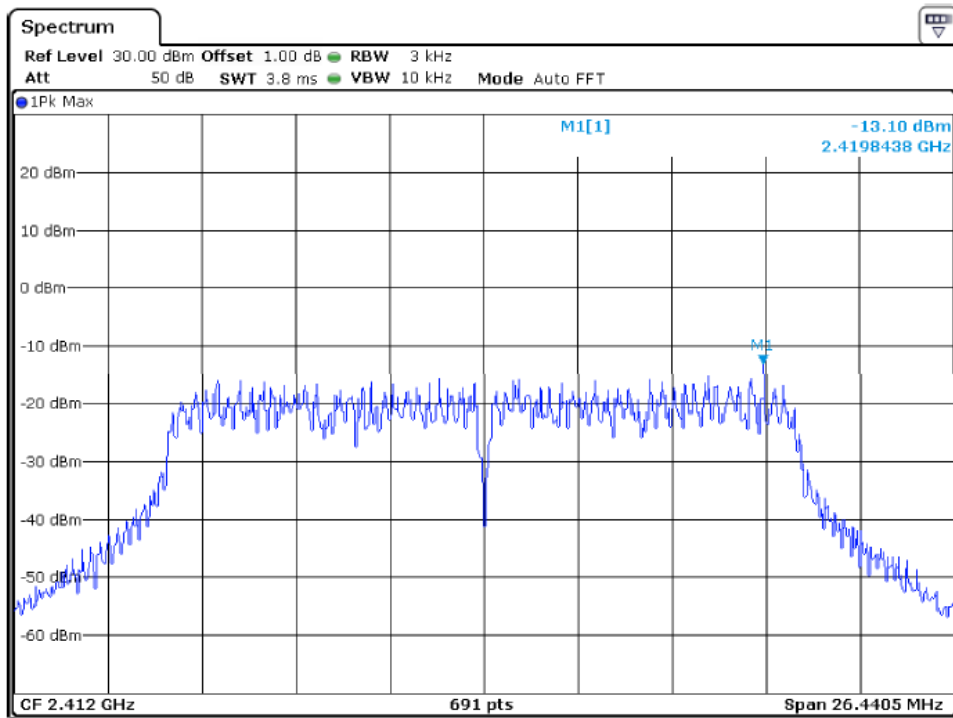


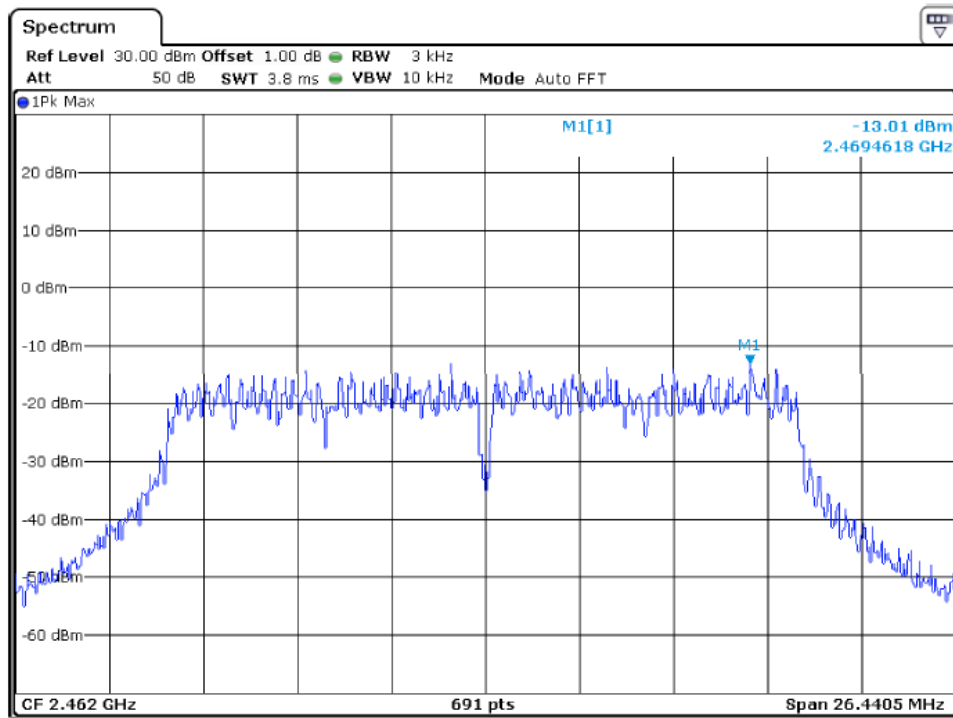
802.11g





802.11n-HT20





Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

#### 4.4 Out of Band Conducted Emissions, FCC Rule 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. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05.

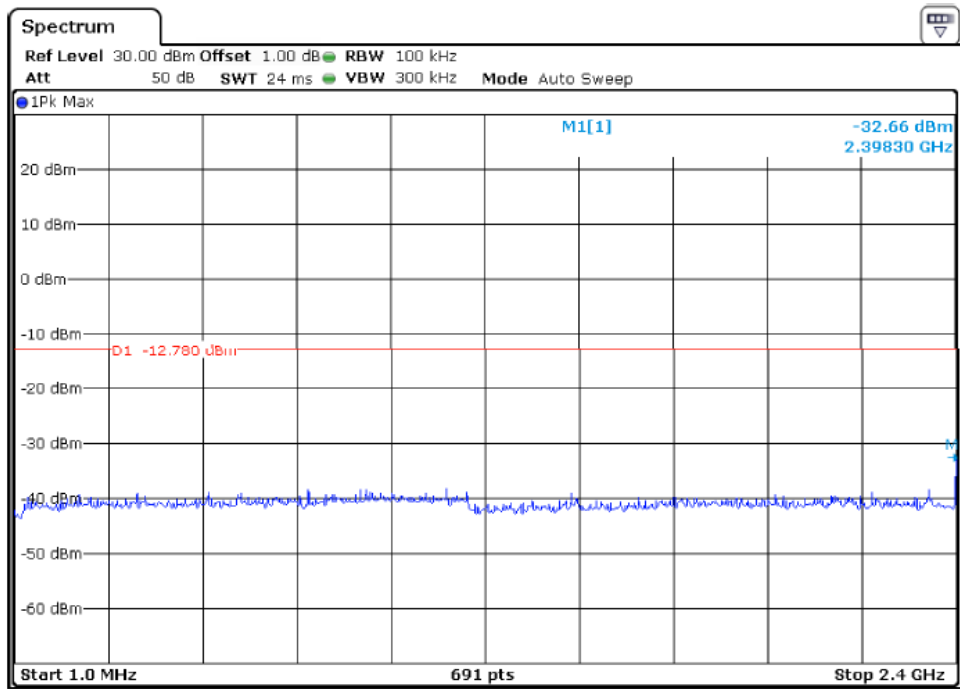
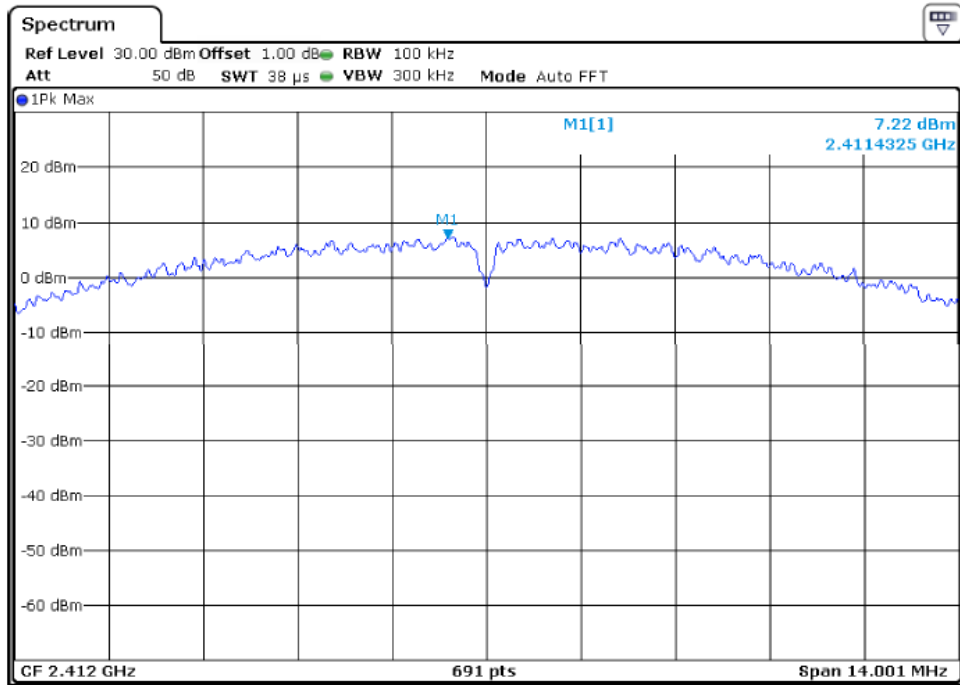
All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

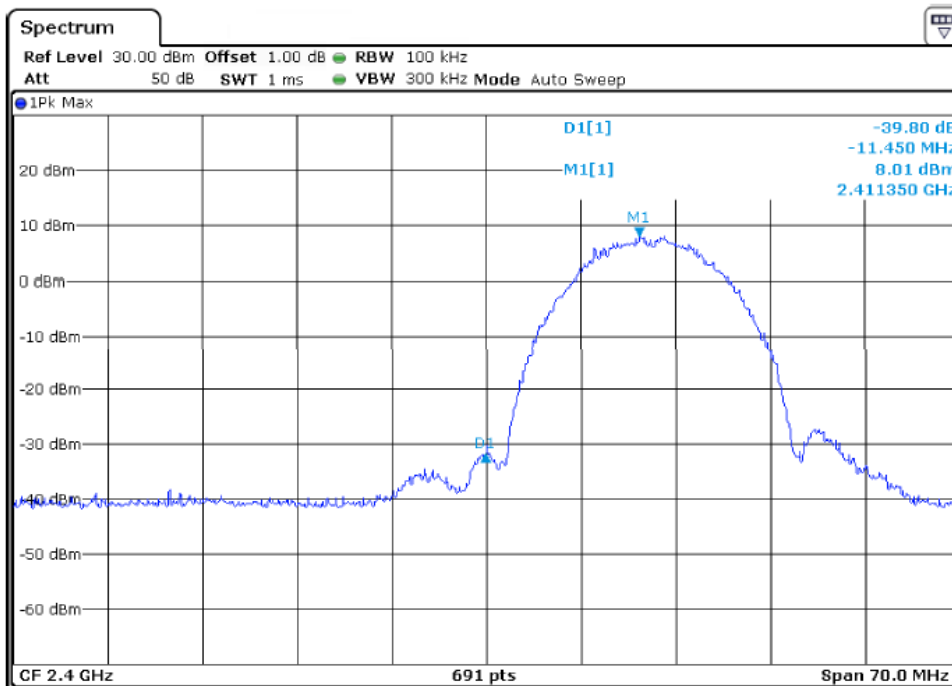
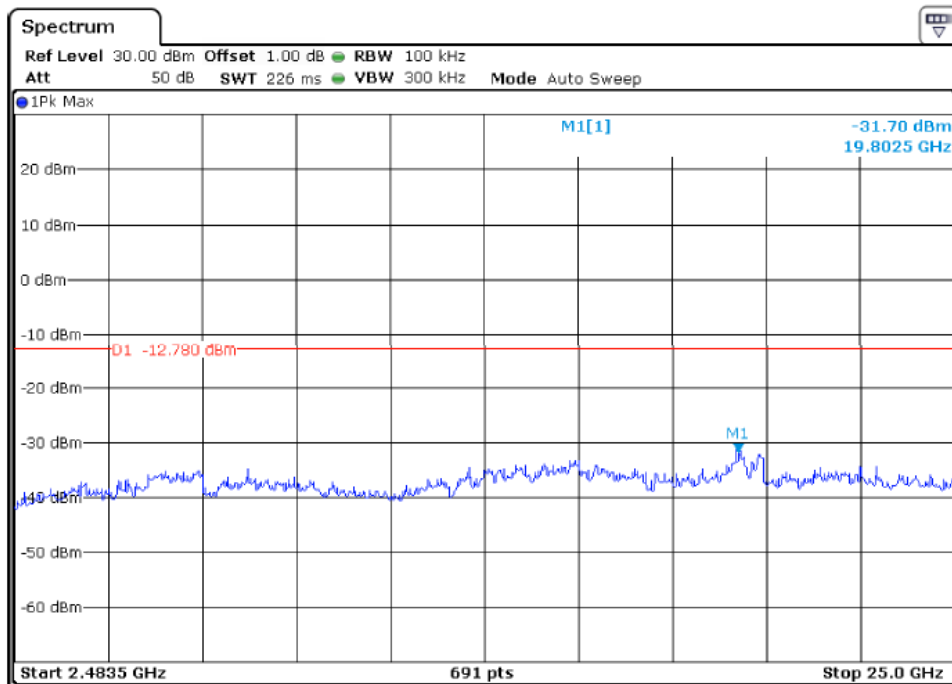
Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20.

The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

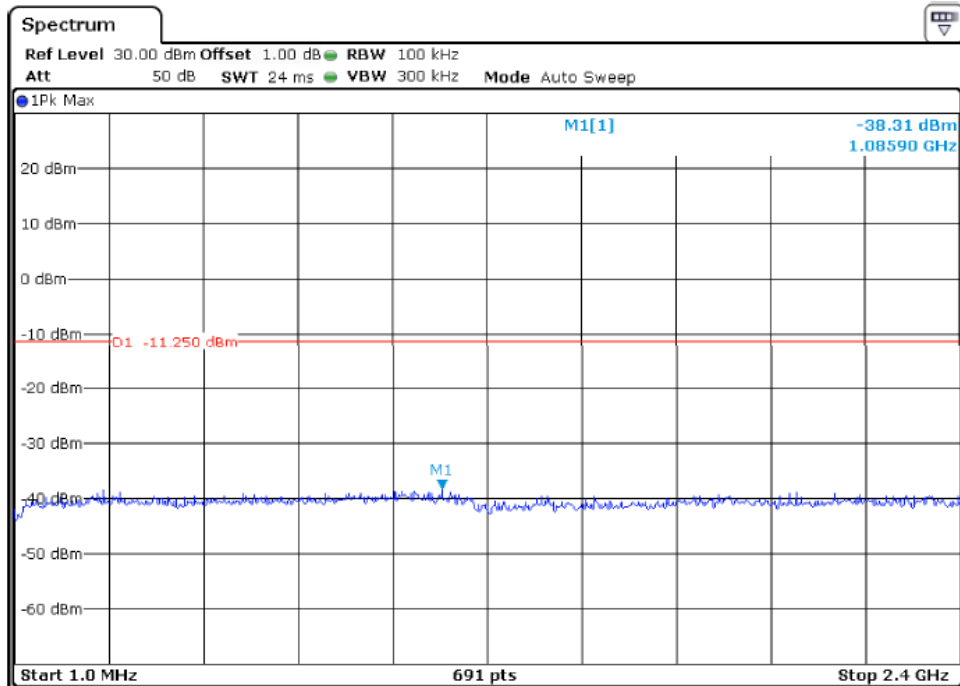
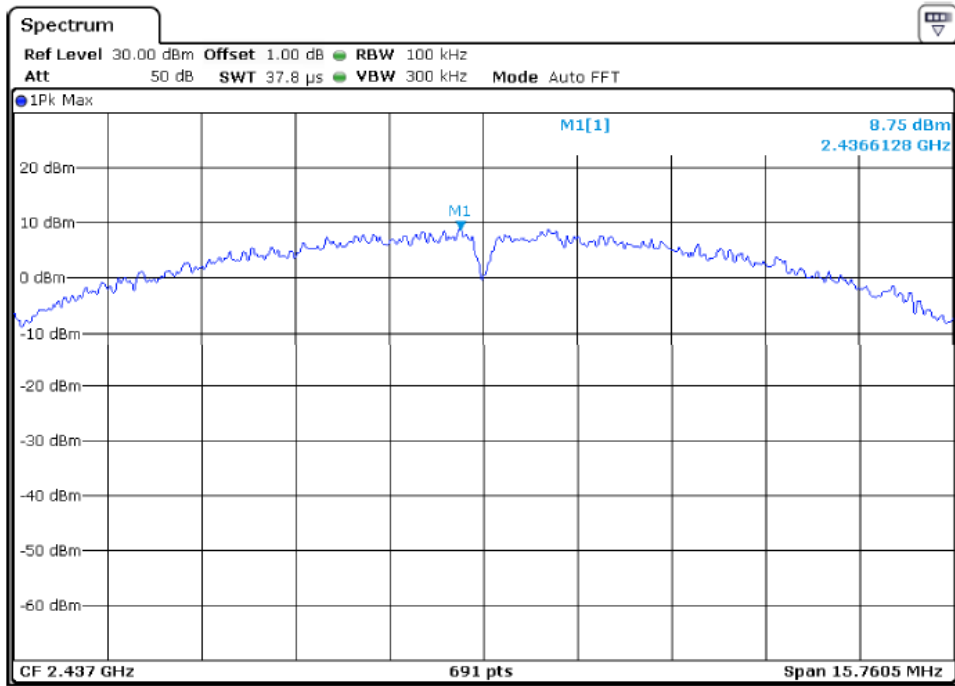
802.11b  
Channel 01 (2412MHz) Reference Level: 7.22dBm

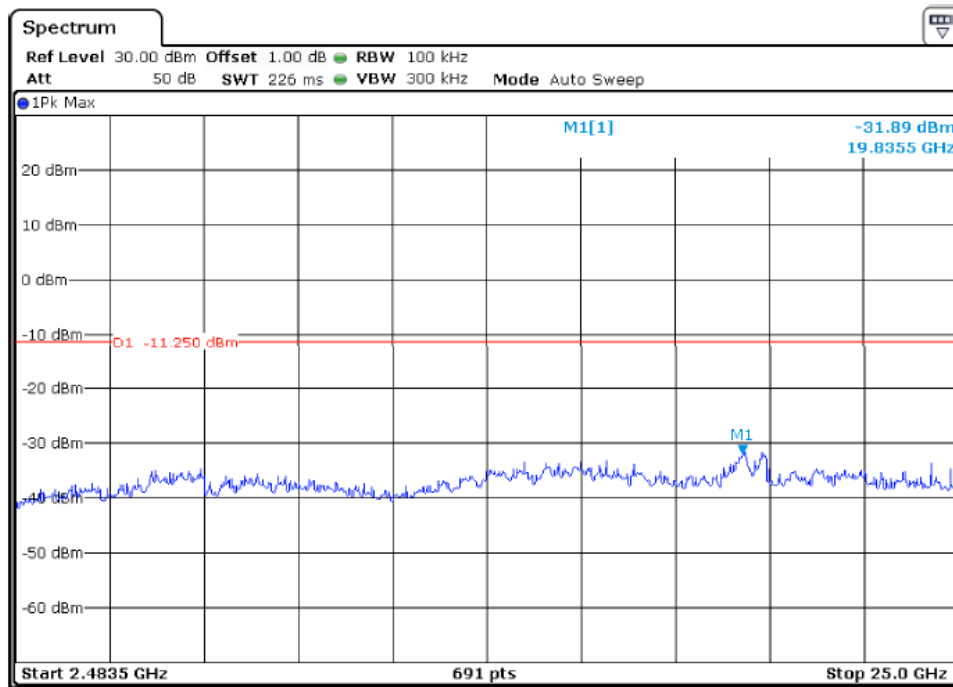




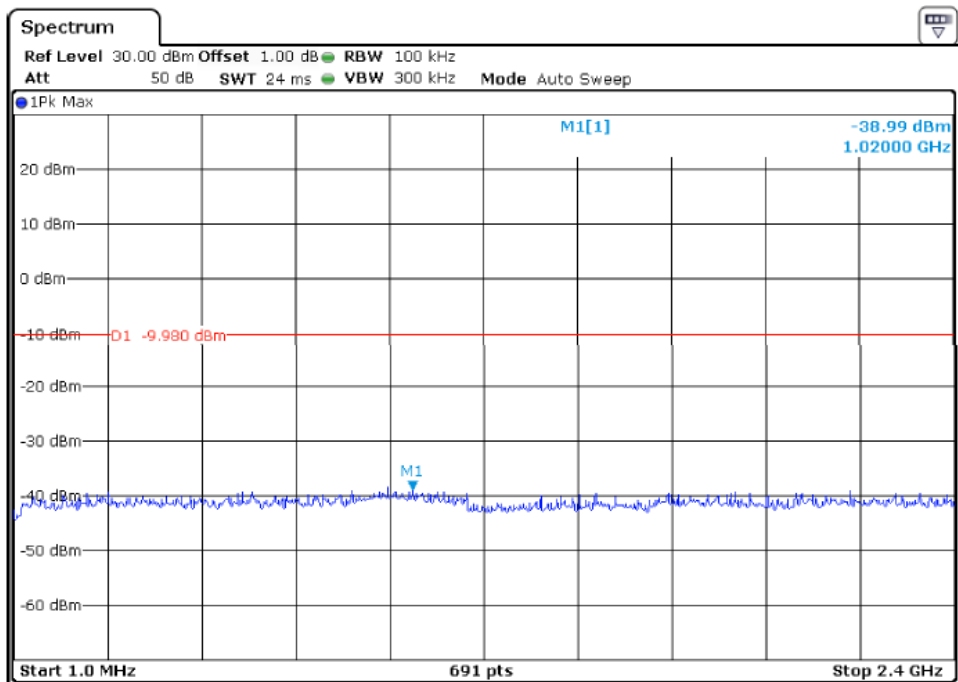
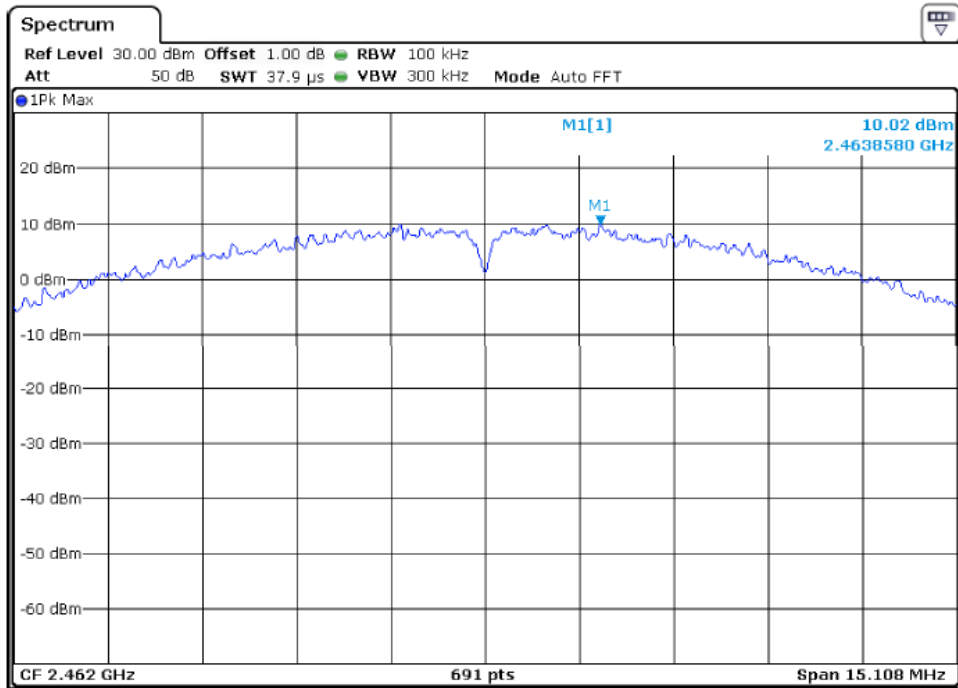


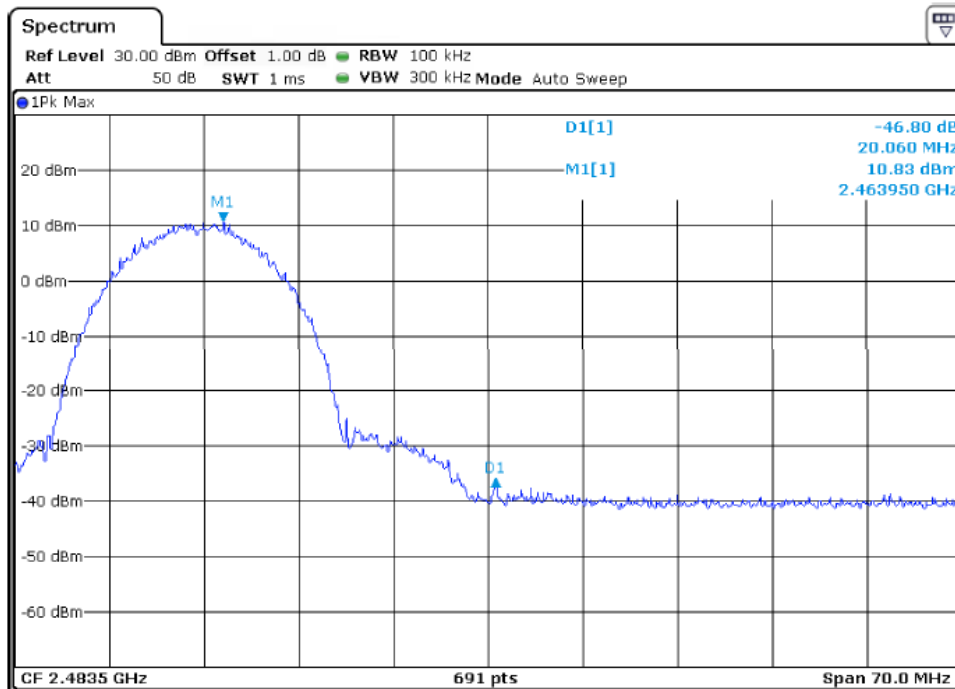
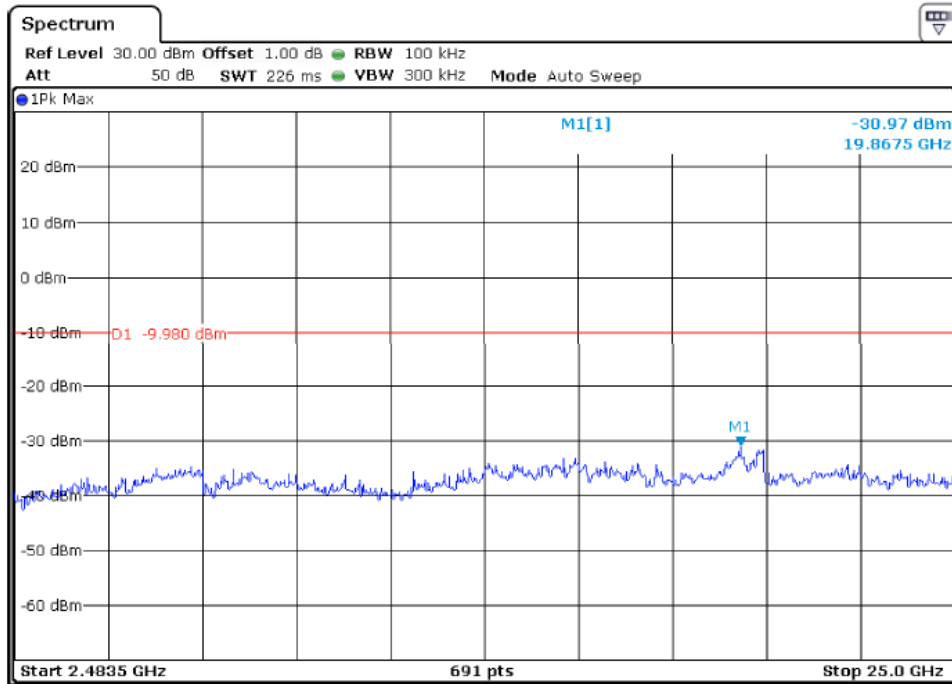
## Channel 06 (2437MHz) Reference Level: 8.75dBm



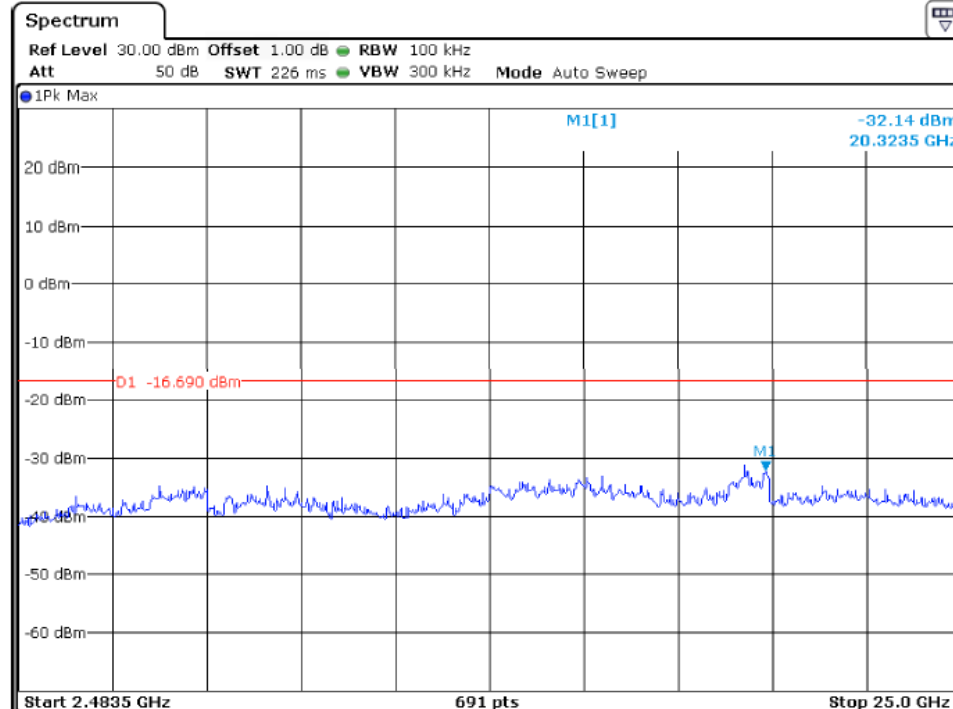
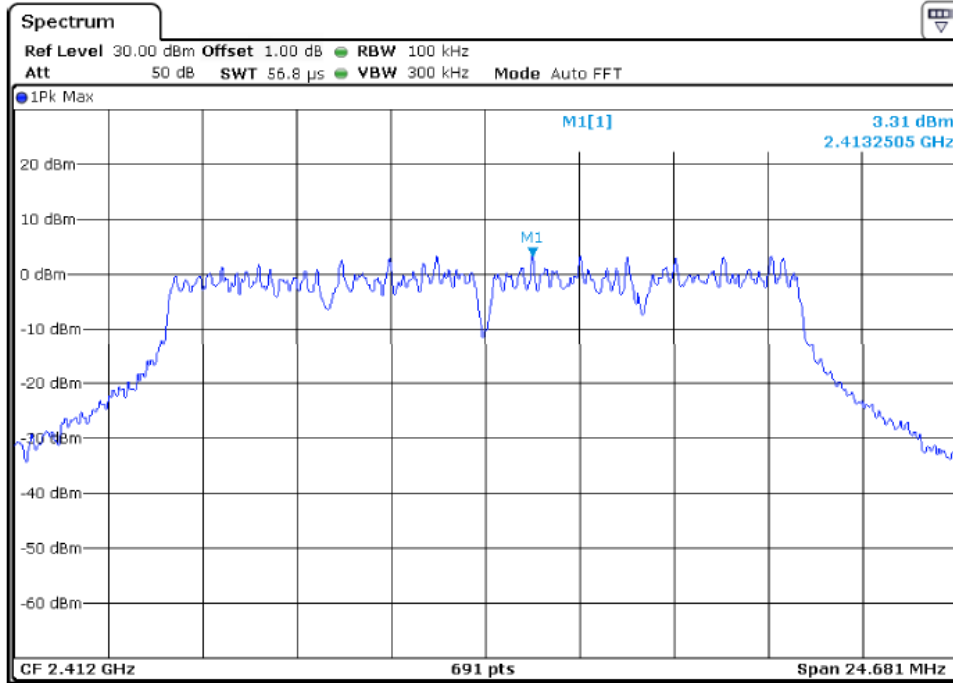


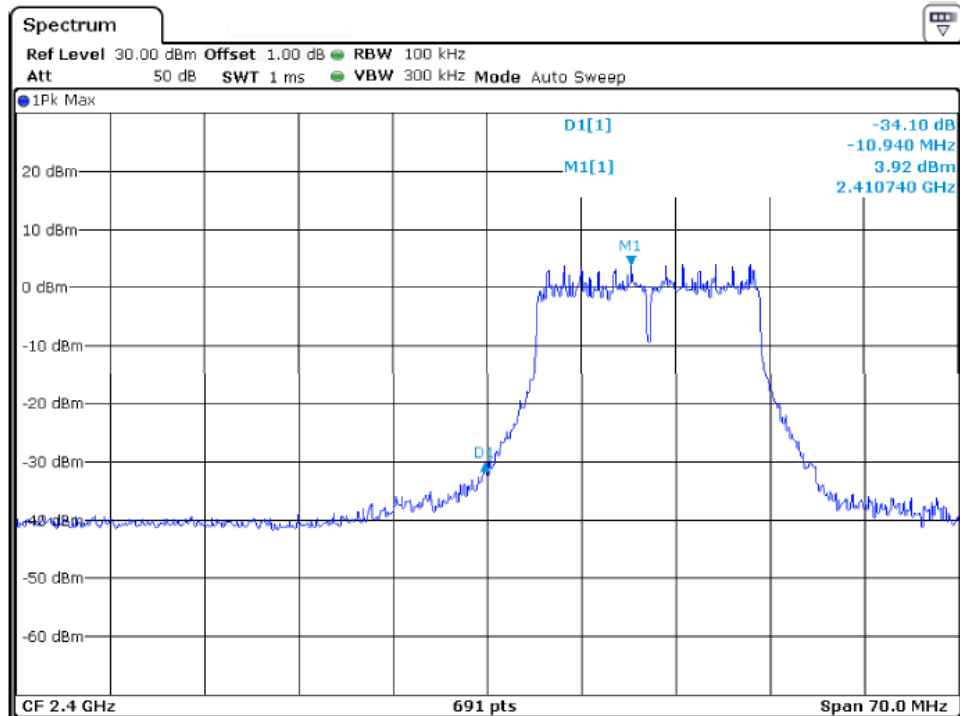
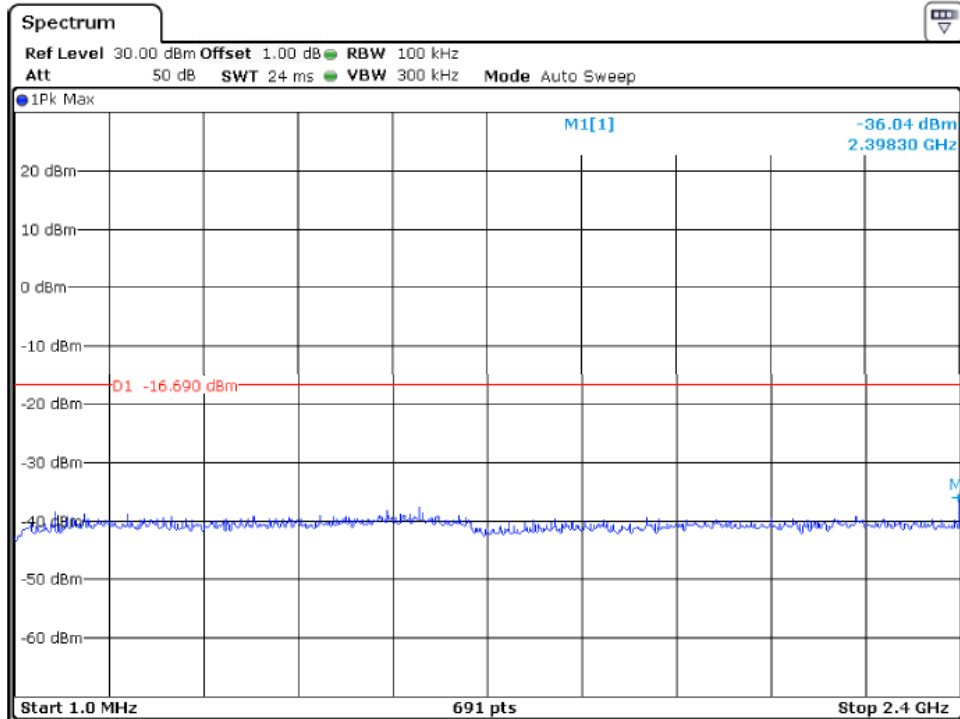
## Channel 11 (2462MHz) Reference Level: 10.02dBm



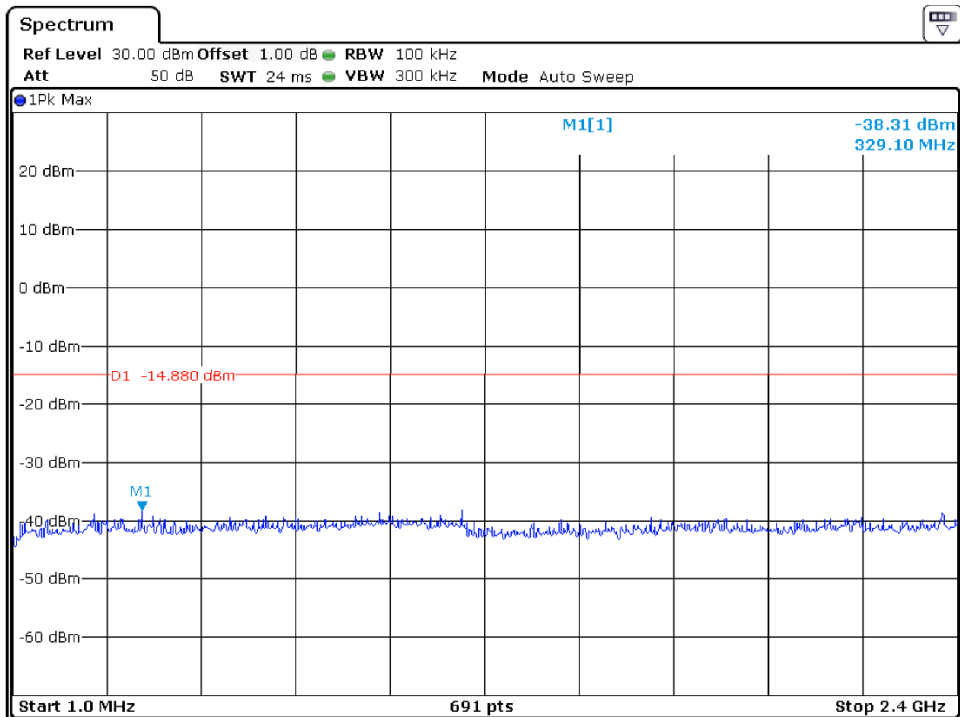
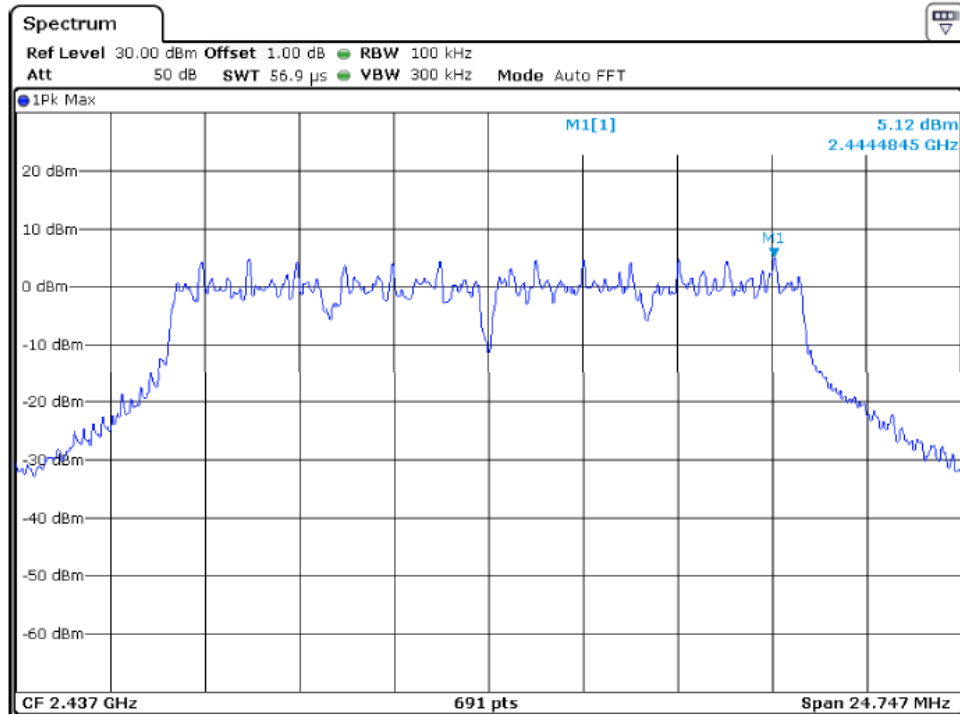


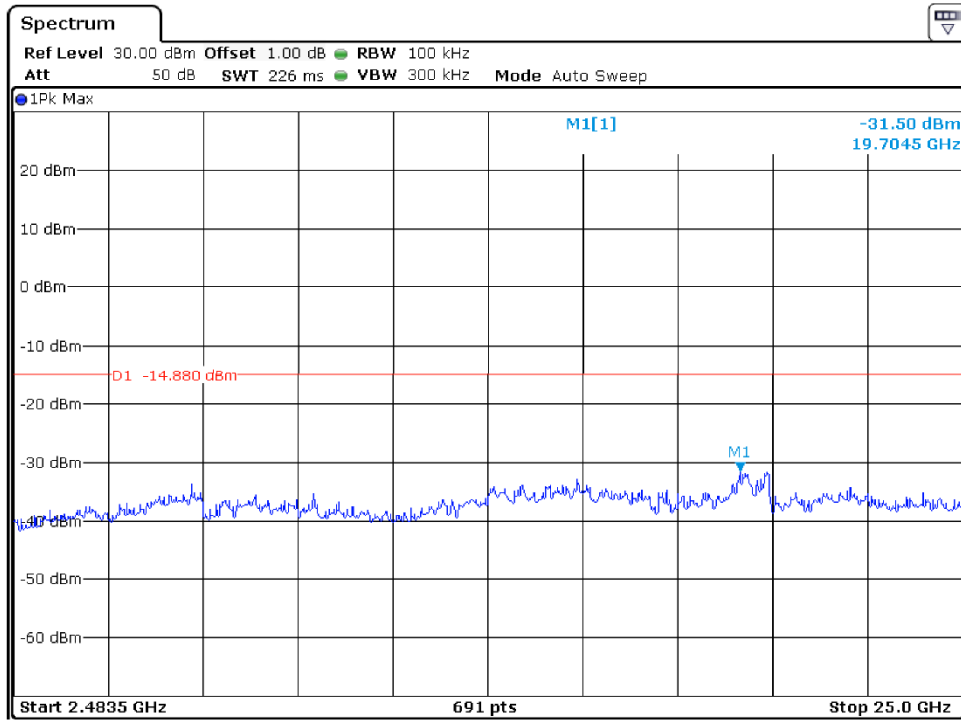
802.11g  
Channel 01 (2412MHz) Reference Level: 3.31dBm





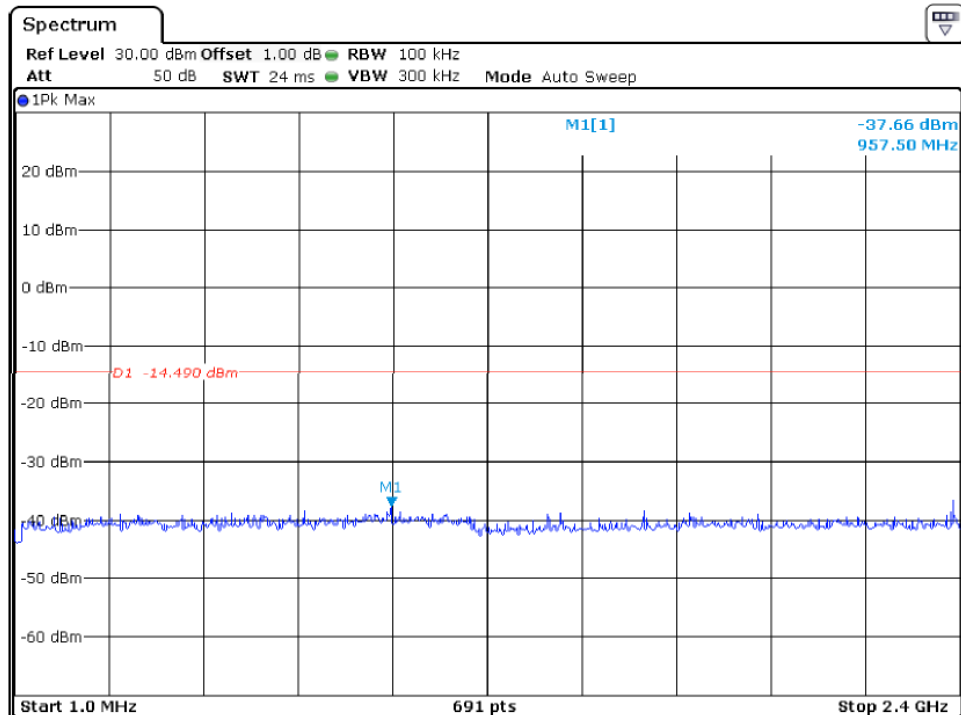
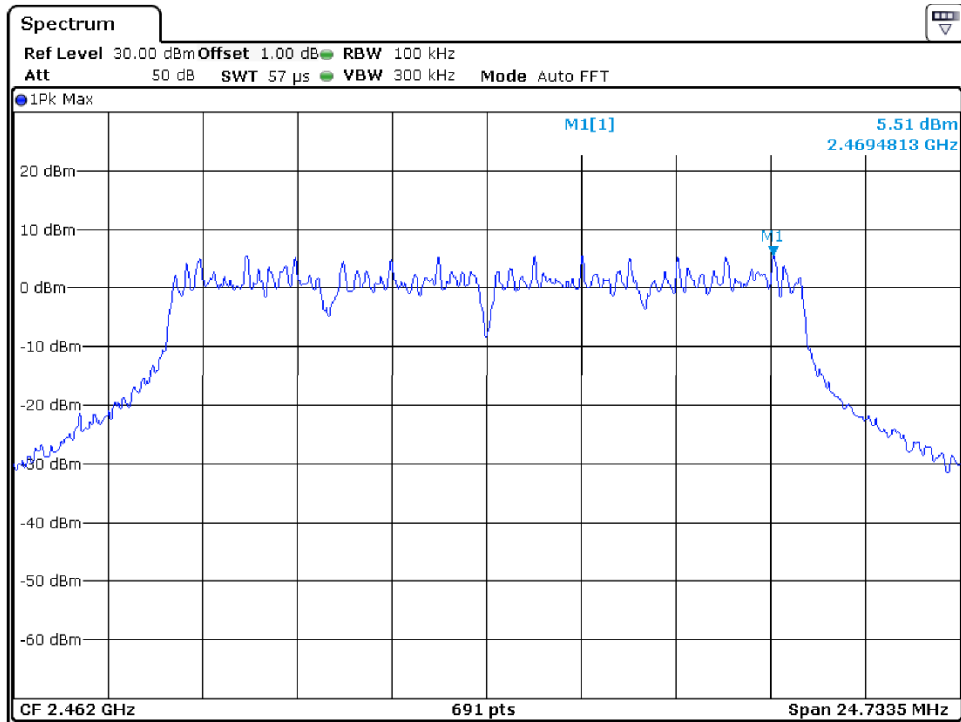
## Channel 06 (2437MHz) Reference Level: 5.12dBm

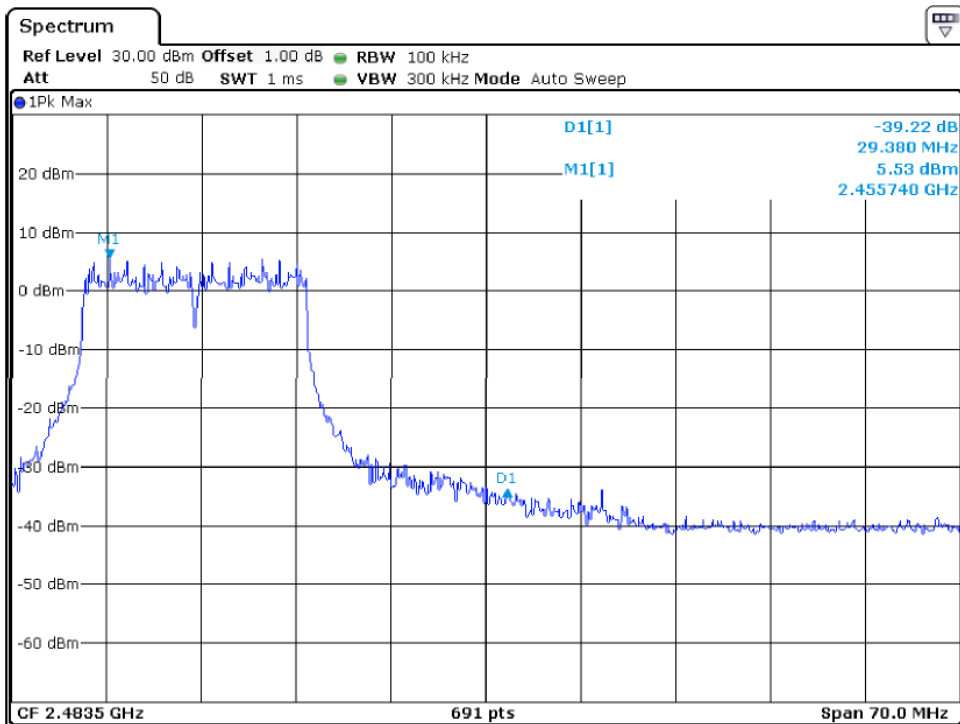
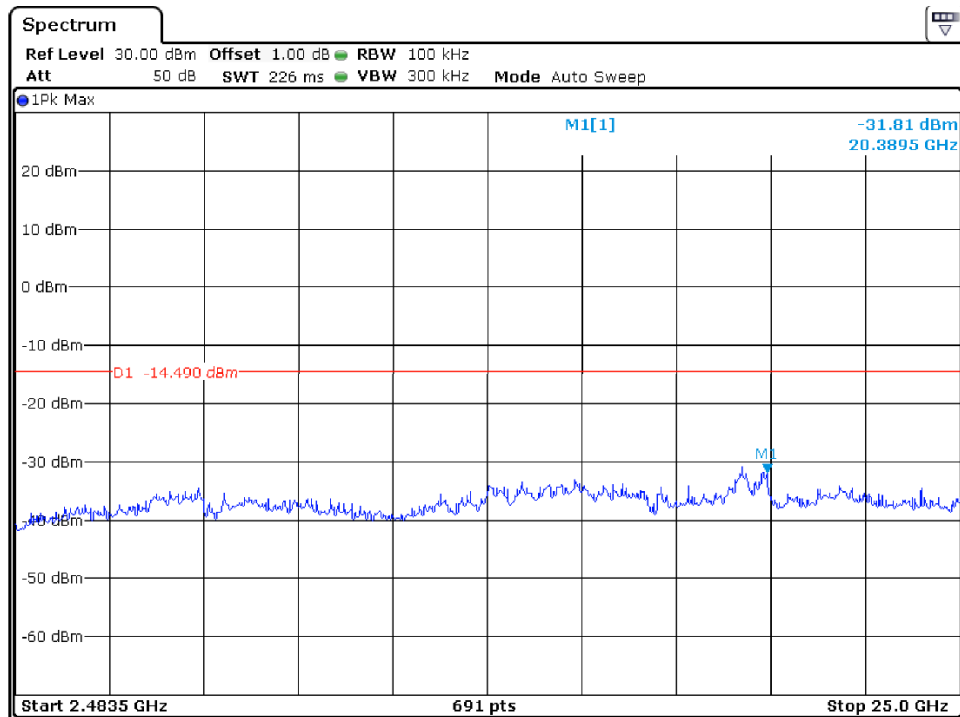




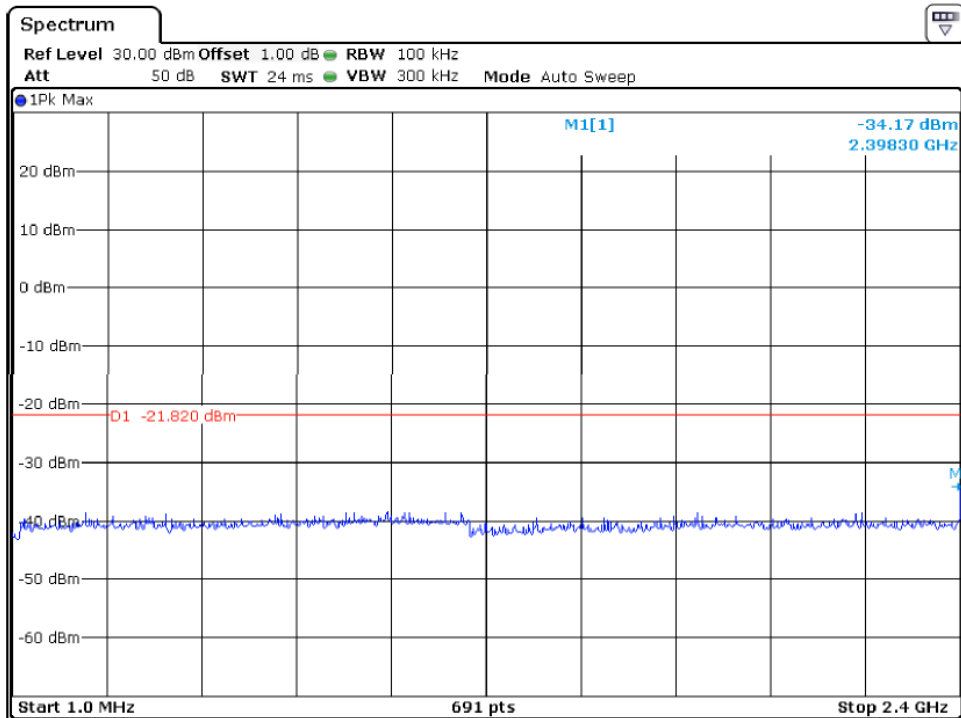
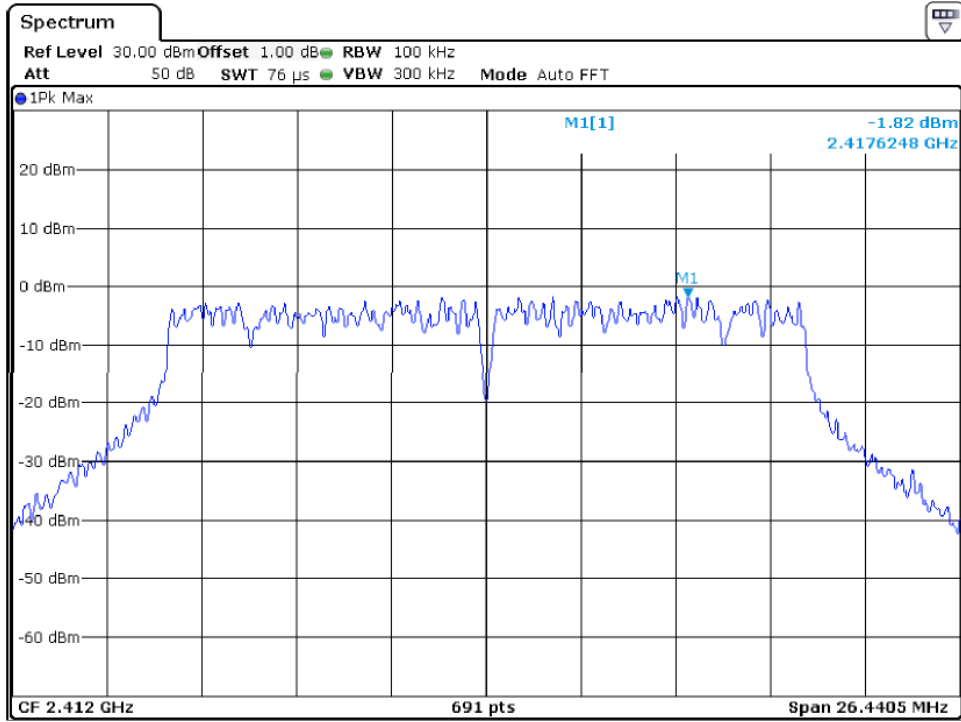


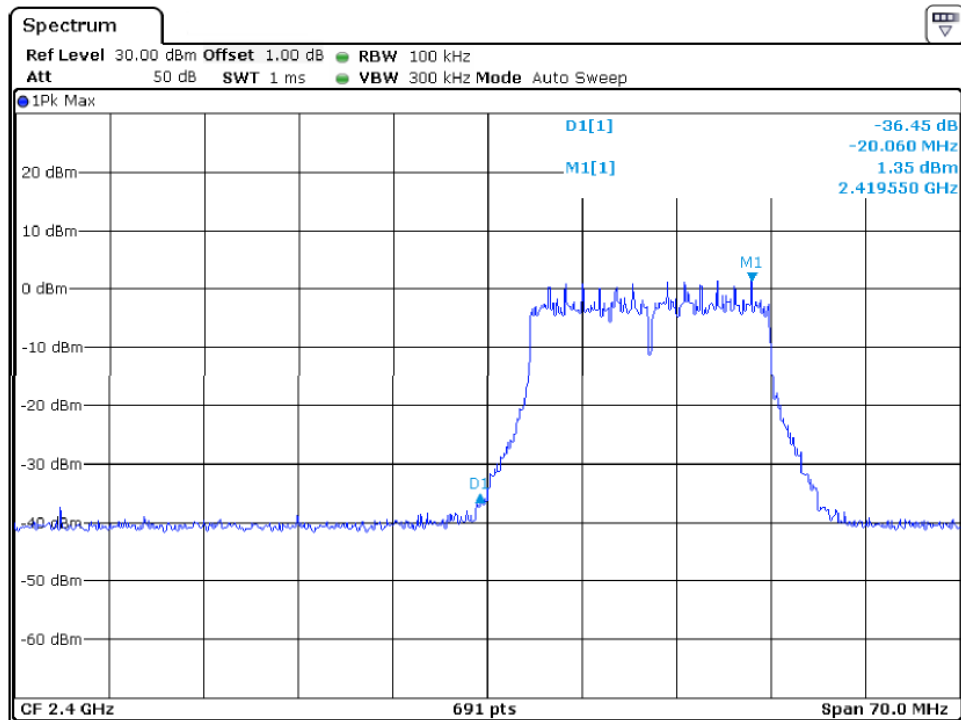
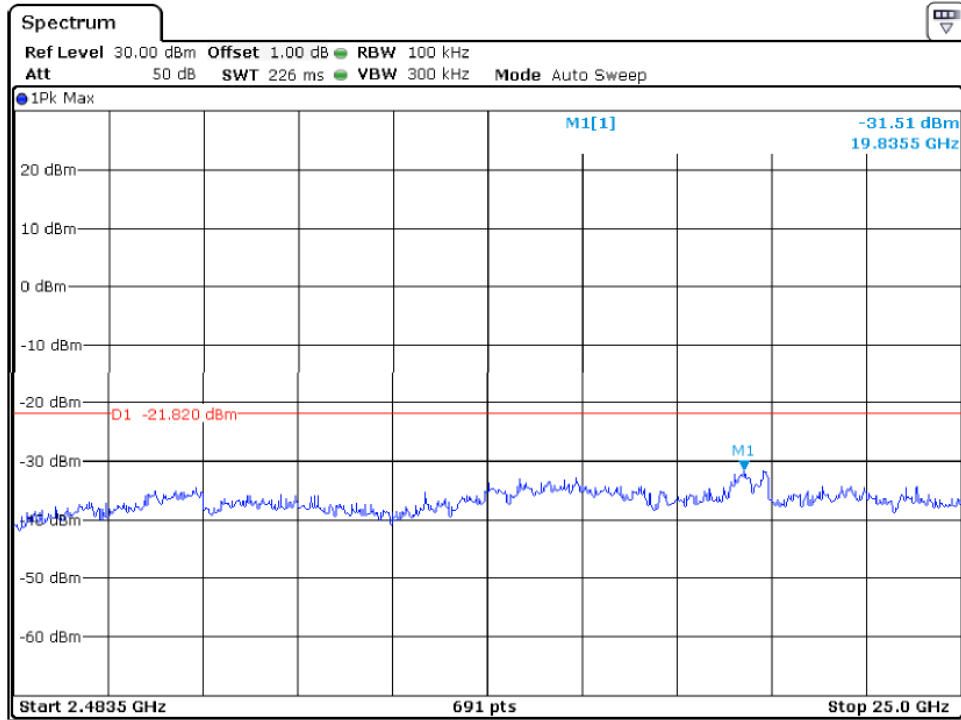
## Channel 11 (2462MHz) Reference Level: 5.51dBm



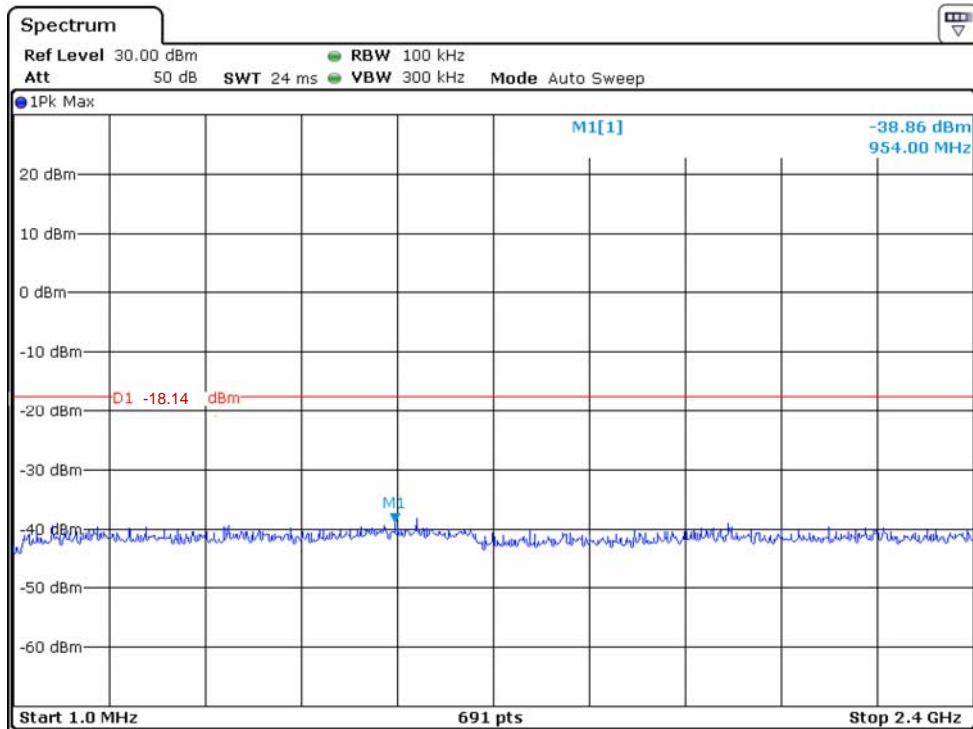
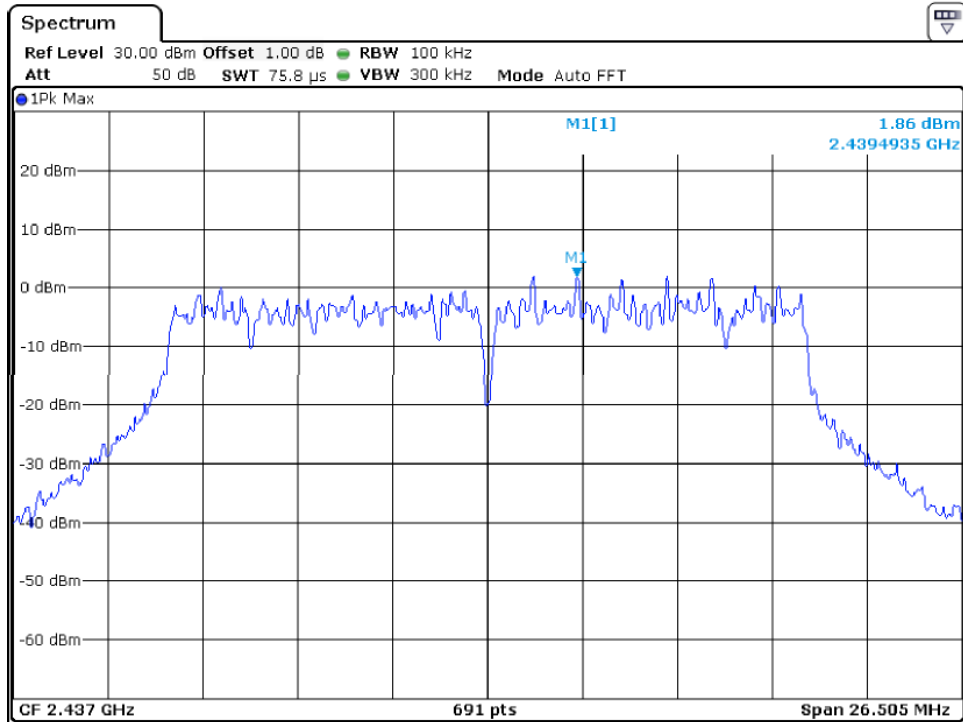


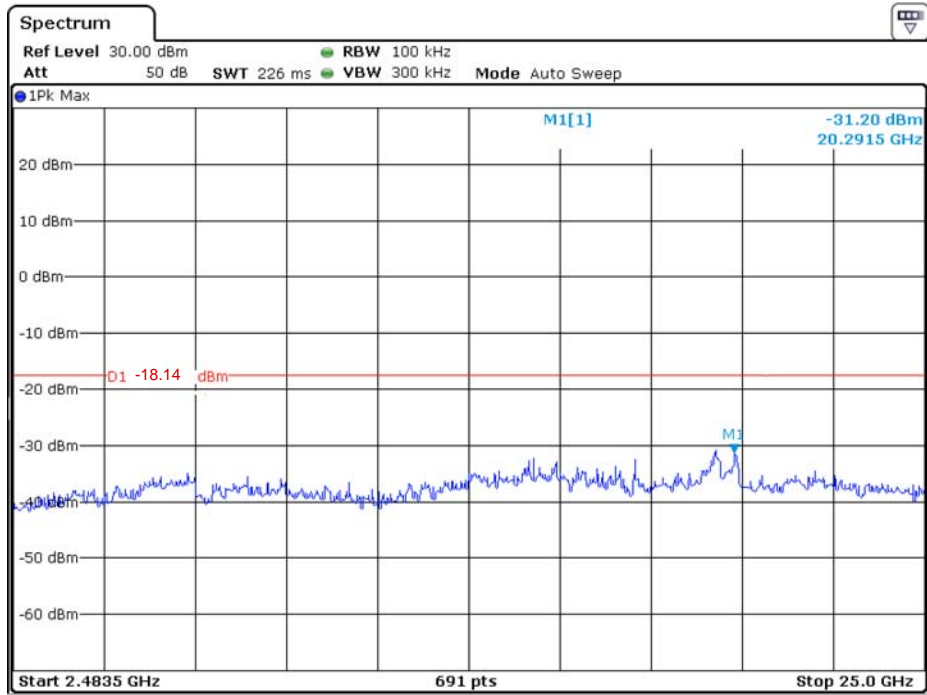
802.11n-HT20  
Channel 01 (2412MHz) Reference Level: -1.82dBm



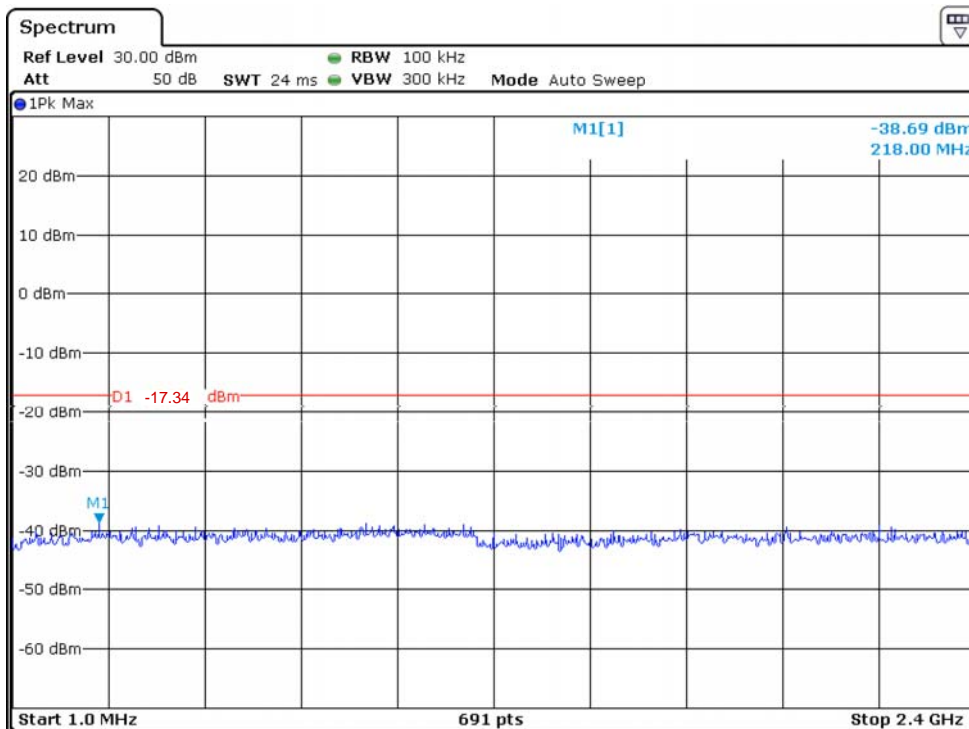
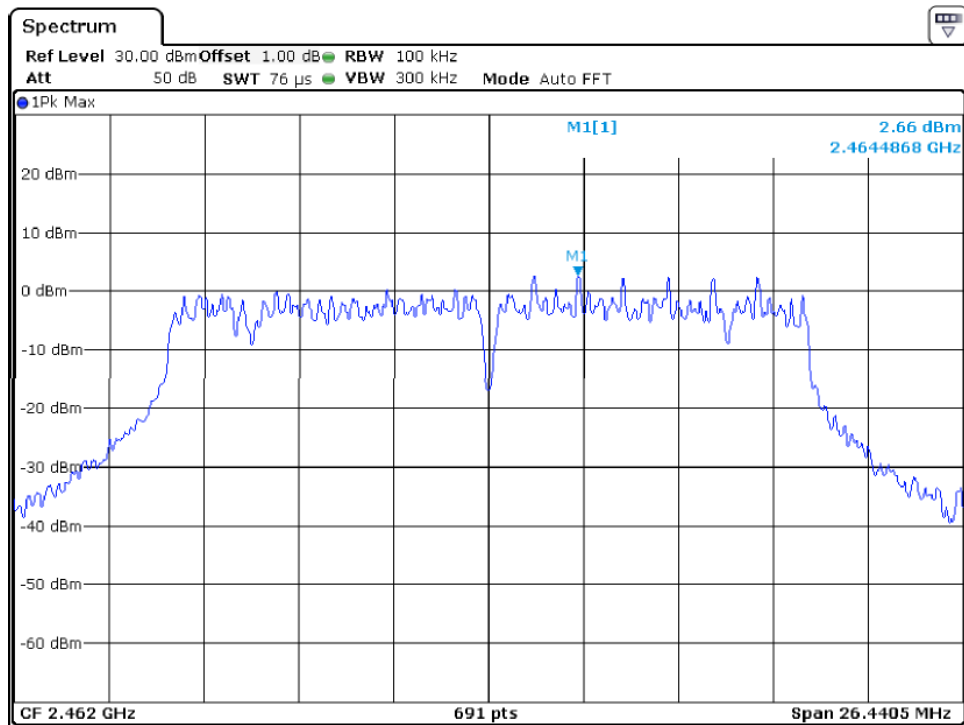


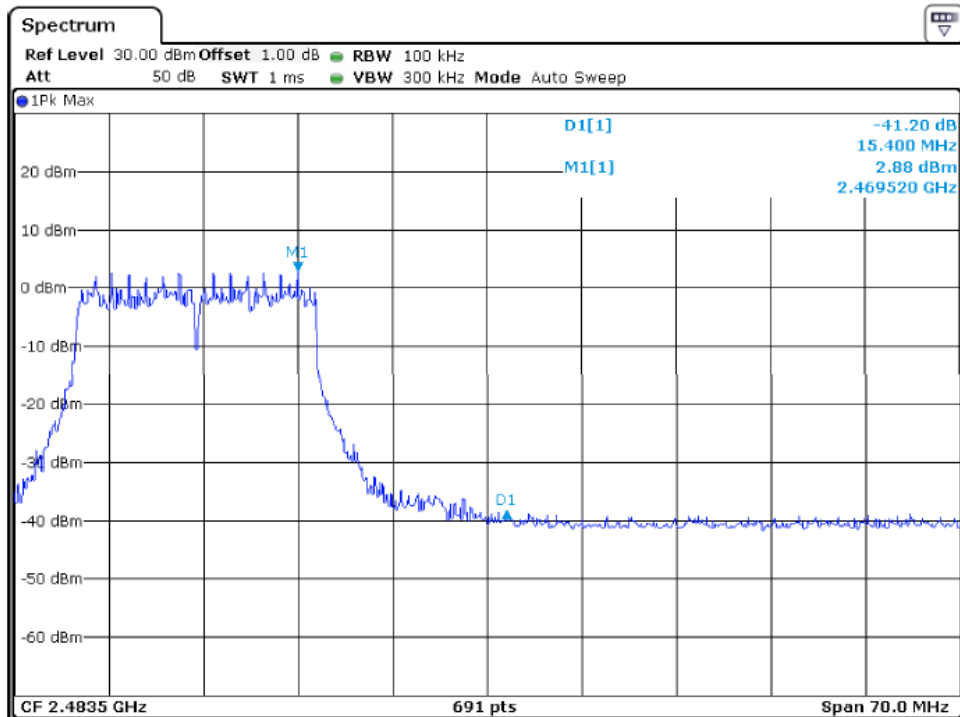
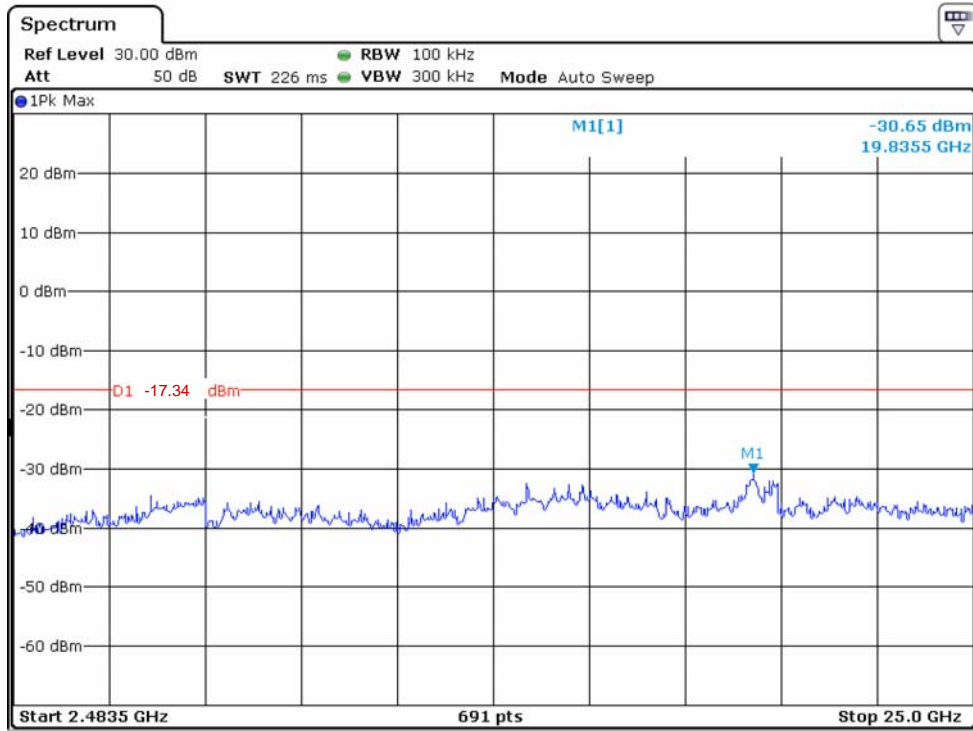
Channel 06 (2437MHz) Reference Level: 1.86dBm





## Channel 11 (2462MHz) Reference Level: 2.66dBm







Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

#### 4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

- Not required, since all emissions are more than 20dB below fundamental
- See attached data sheet

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

#### 4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

## 4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD$$

### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ PD &= 0 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m} \end{aligned}$$

Level in mV/m = Common Antilogarithm [(42 dB $\mu$ V/m)/20] = 125.9  $\mu$ V/m

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

## 4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (802.11b-Channel 06)

at

4874.000MHz

Judgement: Passed by 5.3dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Worst Case Operating Mode: Transmitting (802.11b-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	361.465	36.4	20.0	15.5	31.9	46.0	-14.1
Horizontal	409.941	31.7	20.0	20.4	32.1	46.0	-13.9
Horizontal	439.800	25.5	20.0	27.6	33.1	46.0	-12.9
Vertical	439.970	27.2	20.0	20.6	27.8	46.0	-18.2
Vertical	600.100	23.8	20.0	22.4	26.2	46.0	-19.8
Vertical	808.525	22.5	20.0	27.6	30.1	46.0	-15.9

- NOTES:
1. Quasi-Peak detector is used for frequency below 1GHz.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Operating Mode: Transmitting (802.11b-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	58.7	36.1	34.2	56.8	74.0	-17.2
Horizontal	*2382.778	54.6	34.7	33.1	53.0	74.0	-21.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	47.8	36.1	34.2	45.9	54.0	-8.1
Horizontal	*2382.778	38.6	34.7	33.1	37.0	54.0	-17.0

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Operating Mode: Transmitting (802.11b-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	57.9	36.1	34.6	56.4	74.0	-17.6
Horizontal	*7311.000	52.5	35.6	37.1	54.0	74.0	-20.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	50.2	36.1	34.6	48.7	54.0	-5.3
Horizontal	*7311.000	35.6	35.6	37.1	37.1	54.0	-16.9

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd  
 Date of Test: June 11, 2018 Model: DRO 004  
 Operating Mode: Transmitting (802.11b-Channel 11)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	57.8	36.1	34.6	56.3	74.0	-17.7
Horizontal	*2484.500	52.4	35.6	37.2	54.0	74.0	-20.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	49.3	36.1	34.6	47.8	54.0	-6.2
Horizontal	*2484.500	39.5	35.6	37.2	41.1	54.0	-12.9

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: Shantou City Hengdi Industry Co., Ltd  
 Date of Test: June 11, 2018 Model: DRO 004  
 Operating Mode: Transmitting (802.11g-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	59.3	36.1	34.2	57.4	74.0	-16.6
Horizontal	*2381.278	54.6	34.7	33.1	53.0	74.0	-21.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	47.8	36.1	34.2	45.9	54.0	-8.1
Horizontal	*2381.278	38.6	34.7	33.1	37.0	54.0	-17.0

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Operating Mode: Transmitting (802.11g-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	59.2	36.1	34.6	57.7	74.0	-16.3
Horizontal	*7311.000	52.6	35.6	37.1	54.1	74.0	-19.9

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	47.6	36.1	34.6	46.1	54.0	-7.9
Horizontal	*7311.000	37.6	35.6	37.1	39.1	54.0	-14.9

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Operating Mode: Transmitting (802.11g-Channel 11)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	59.1	36.1	34.6	57.6	74.0	-16.4
Horizontal	*2487.500	49.5	35.6	37.2	51.1	74.0	-22.9

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	47.8	36.1	34.6	46.3	54.0	-7.7
Horizontal	*2487.500	39.6	35.6	37.2	41.2	54.0	-12.8

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Operating Mode: Transmitting (802.11n-HT20-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	58.0	36.1	34.2	56.1	74.0	-17.9
Horizontal	*2385.218	54.7	34.7	33.1	53.1	74.0	-20.9

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	49.2	36.1	34.2	47.3	54.0	-6.7
Horizontal	*2385.218	38.7	34.7	33.1	37.1	54.0	-16.9

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

Operating Mode: Transmitting (802. 11n-HT20-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	57.7	36.1	34.6	56.2	74.0	-17.8
Horizontal	*7311.000	52.5	35.6	37.1	54.0	74.0	-20.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	48.9	36.1	34.6	47.4	54.0	-6.6
Horizontal	*7311.000	37.7	35.6	37.1	39.2	54.0	-14.8

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd  
 Date of Test: June 11, 2018 Model: DRO 004  
 Operating Mode: Transmitting (802. 11n-HT20-Channel 11)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	58.0	36.1	34.6	56.5	74.0	-17.5
Horizontal	*2488.500	49.4	35.6	37.2	51.0	74.0	-23.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	48.8	36.1	34.6	47.3	54.0	-6.7
Horizontal	*2488.500	39.4	35.6	37.2	41.0	54.0	-13.0

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

4.9 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

Not required - No digital part

Test results are attached

Included in the separated report.

Applicant: Shantou City Hengdi Industry Co., Ltd

Date of Test: June 11, 2018

Model: DRO 004

#### 4.10 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.



**EXHIBIT 5**

**EQUIPMENT PHOTOGRAPHS**

## 5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

**EXHIBIT 6**  
**PRODUCT LABELLING**

## 6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

**EXHIBIT 7**

**TECHNICAL SPECIFICATIONS**

## 7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

**EXHIBIT 8**  
**INSTRUCTION MANUAL**

## 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.



**EXHIBIT 9**

**CONFIDENTIALITY REQUEST**

## 9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

**EXHIBIT 10**

**MISCELLANEOUS INFORMATION**

## 10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

**EXHIBIT 11**  
**TEST EQUIPMENT LIST**

### 11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	1-Jun-2018	1-Jun-2019
SZ182-02-01	Power Sensor	Anritsu	MA2411B	1207429	1-Jun-2018	1-Jun-2019
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	20-Sep-2017	20-Sep-2018
SZ185-01	EMI Receiver	R&S	ESCI	100547	24-Jan-2018	24-Jan-2019
SZ061-08	Horn Antenna	ETS	3115	00092346	20-Sep-2017	20-Sep-2018
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-May-2018	11-May-2019
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	1-Jun-2018	1-Jun-2019
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	2-Jun-2018	2-Jun-2019
SZ181-04	Preamplifier	Agilent	8449B	3008A0247 4	24-Jan-2018	24-Jan-2019
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	16-Jan-2017	16-Jan-2019
SZ062-02	RF Cable	RADIALL	RG 213U	--	16-Mar-2018	16-Sep-2018
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	16-Mar-2018	16-Sep-2018
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	16-Mar-2018	16-Sep-2018
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	2-Jun-2018	2-Jun-2019