

SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Application
For
Certification

FCC ID: 2AKFA00001

Professor Einstein

Model: 0001

2.4GHz Wi-Fi Transceiver

Report No.: SZHH01117833-001

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 [10-1-15]

Prepared and Checked by:

Approved by:

Sign on file

Terry Tang
Senior Engineer

Jimmy Wen
Assistant Supervisor
Date: July 11, 2017

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

TRF no.: FCC 15C_Tx_c

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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

INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Professor Einstein

Model: 0001

FCC ID: 2AKFA00001

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 [10-01-15] Edition] provision.

Report prepared by:

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Table of Contents

1.0	Summary of Test results	2
2.0	<u>General Description</u>	4
2.1	Product Description	4
2.2	Related Submittal(s) Grants	4
2.3	Test Methodology.....	4
2.4	Test Facility	4
3.0	<u>System Test Configuration.....</u>	6
3.1	Justification	6
3.2	EUT Exercising Software	6
3.3	Special Accessories	7
3.4	Measurement Uncertainty	7
3.5	Equipment Modification	7
3.6	Support Equipment List and Description	7
4.0	<u>Measurement Results</u>	9
4.1	Maximum Conducted Output Power at Antenna Terminals.....	9
4.2	Minimum 6 dB RF Bandwidth	10
4.3	Maximum Power Density Reading	17
4.4	Out of Band Conducted Emissions.....	24
4.5	Out of Band Radiated Emissions.....	40
4.6	Transmitter Radiated Emissions in Restricted Bands	41
4.7	Field Strength Calculation	42
4.8	Radiated Spurious Emission	43
4.9	Radiated Emissions from Digital Section of Transceiver.....	54
4.10	Transmitter Duty Cycle Calculation and Measurements	55
5.0	<u>Equipment Photographs</u>	57
6.0	<u>Product Labelling.....</u>	59
7.0	<u>Technical Specifications</u>	61
8.0	<u>Instruction Manual</u>	63
9.0	<u>Confidentiality Request</u>	65
10.0	<u>Discussion of Pulse Desensitization</u>	67
11.0	<u>Test Equipment List.....</u>	69

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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

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EXHIBIT 1

SUMMARY OF TEST RESULTS

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1.0 Summary of Test results

Professor Einstein

Model: 0001

FCC ID: 2AKFA00001

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

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2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a Professor Einstein 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 two rechargeable batteries (DC 4.8V) which can be charged by adaptor. 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).

2.3 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.10: 2013 and KDB 558074 D01 v04. 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 **EMTEK (Shenzhen) Co., Ltd.** and located at Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052, China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 406365).

EXHIBIT 3

SYSTEM TEST CONFIGURATION

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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 two fully 4.8V rechargeable batteries during the test.

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 centre 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.

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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 SHAO GUAN EARLY LIGHT INTERNATIONAL 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. Guangzhou 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 client)	Apple	A1421

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EXHIBIT 4

MEASUREMENT RESULTS

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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 = 0dBi) (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	11.8	15.1
Middle Channel: 2437	11.4	13.8
High Channel: 2462	11.0	12.6

IEEE 802.11g (Antenna Gain = 0dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	16.7	46.8
Middle Channel: 2437	17.4	55.0
High Channel: 2462	16.2	41.7

IEEE 802.11n-HT20 (Antenna Gain = 0dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	17.8	60.3
Middle Channel: 2437	18.0	63.1
High Channel: 2462	16.8	47.9

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 18.0dBm

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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 v04. 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	9.074
2437	9.074
2462	9.074

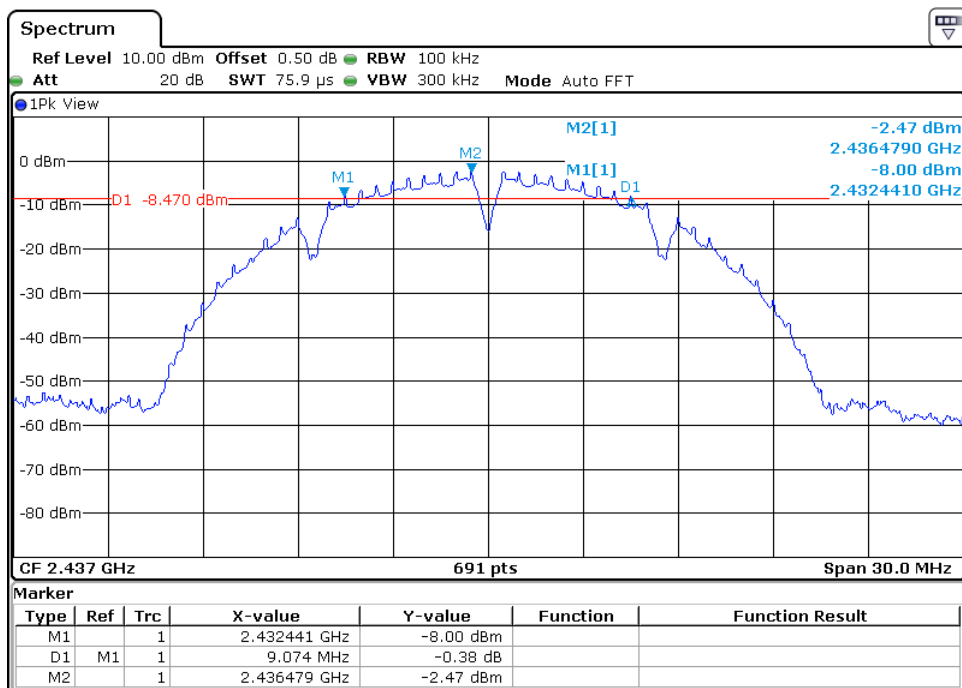
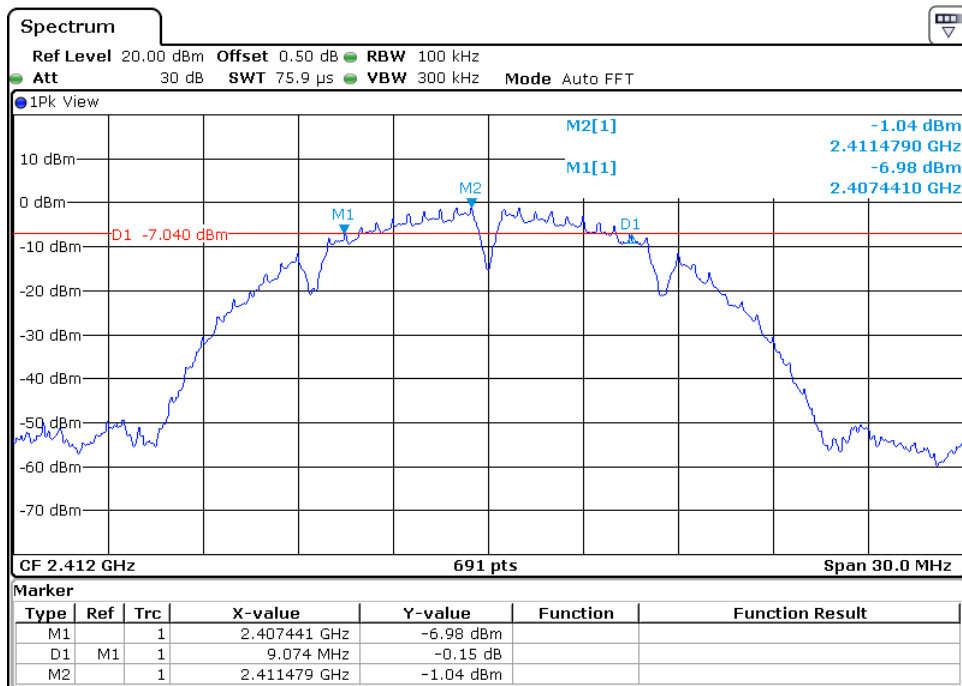
IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	16.585
2437	16.585
2462	16.585

IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	17.800
2437	17.757
2462	17.800

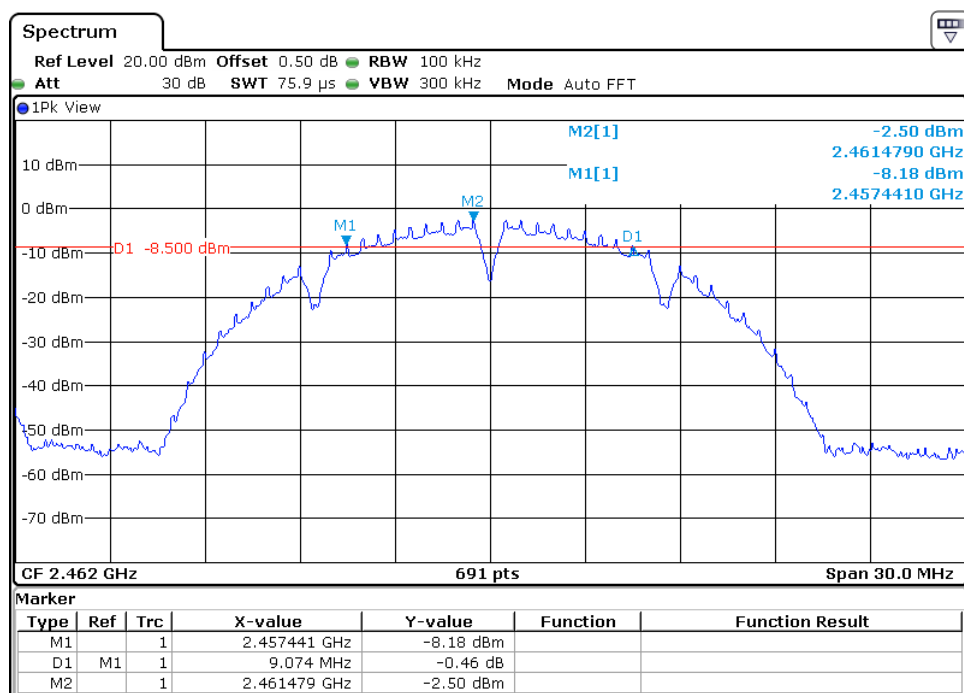
The test plots are attached as below.

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802.11b

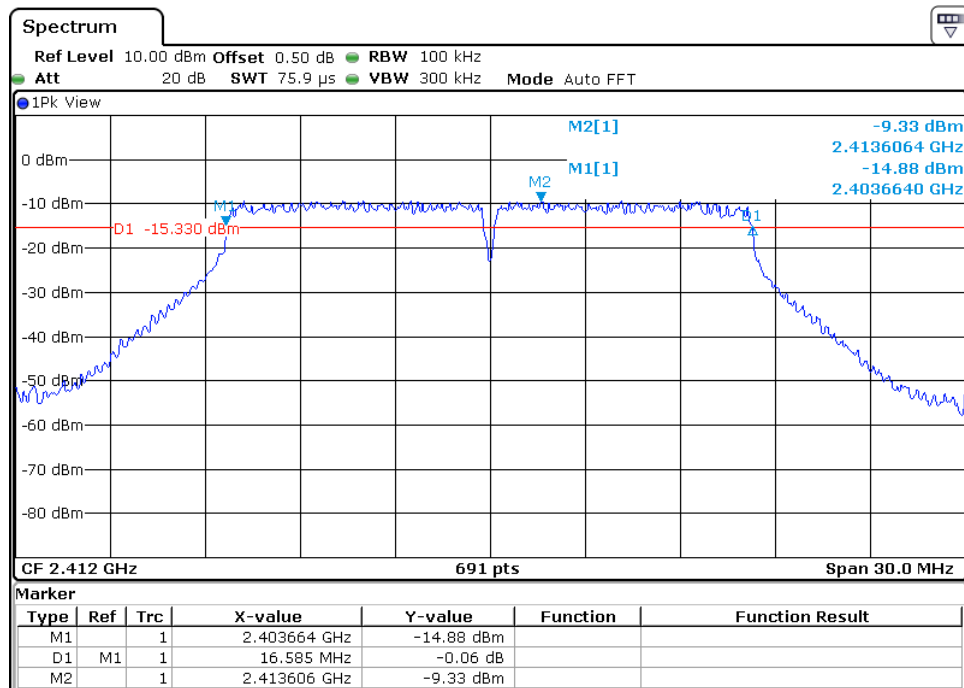
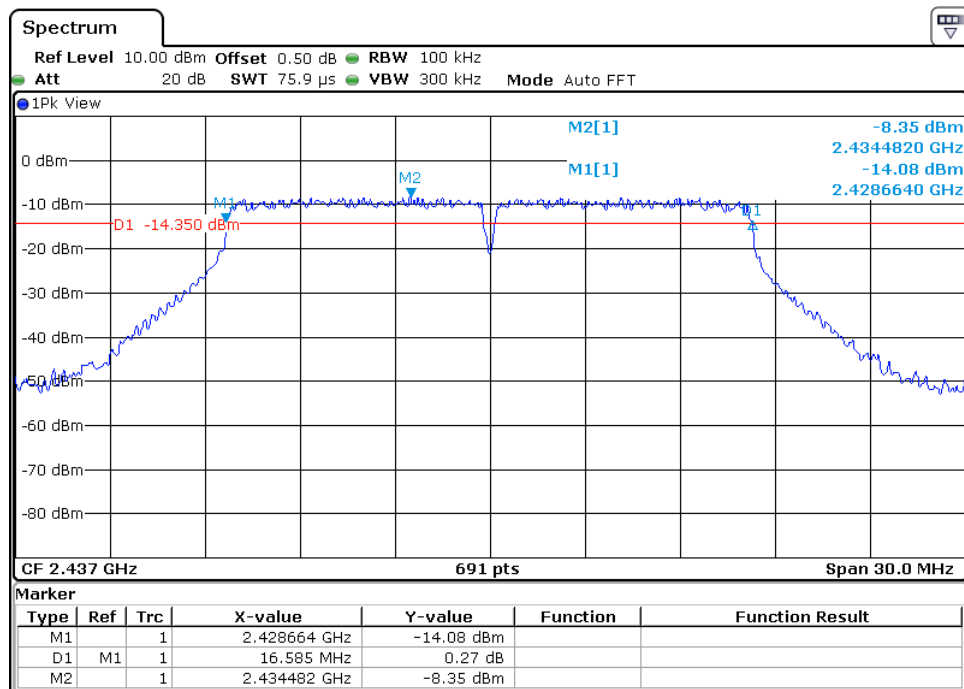


INTERTEK TESTING SERVICES

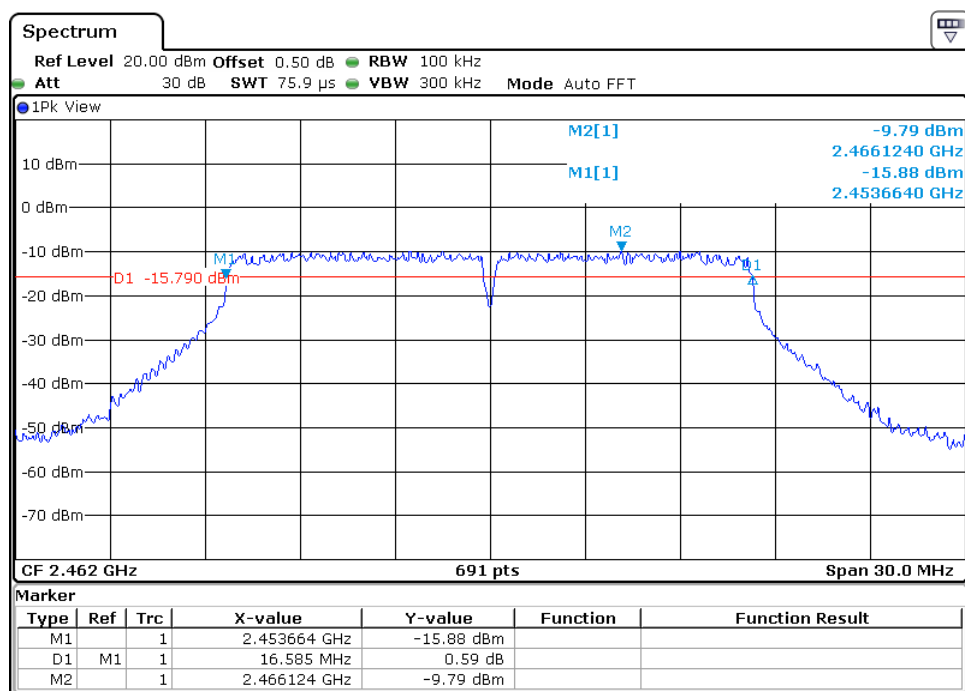


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802.11g

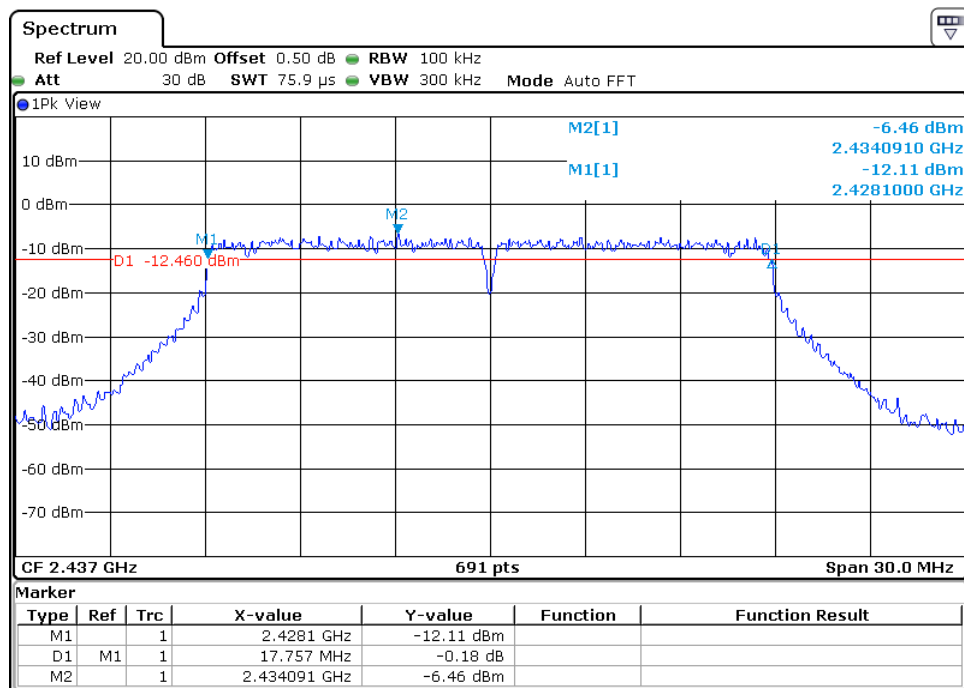
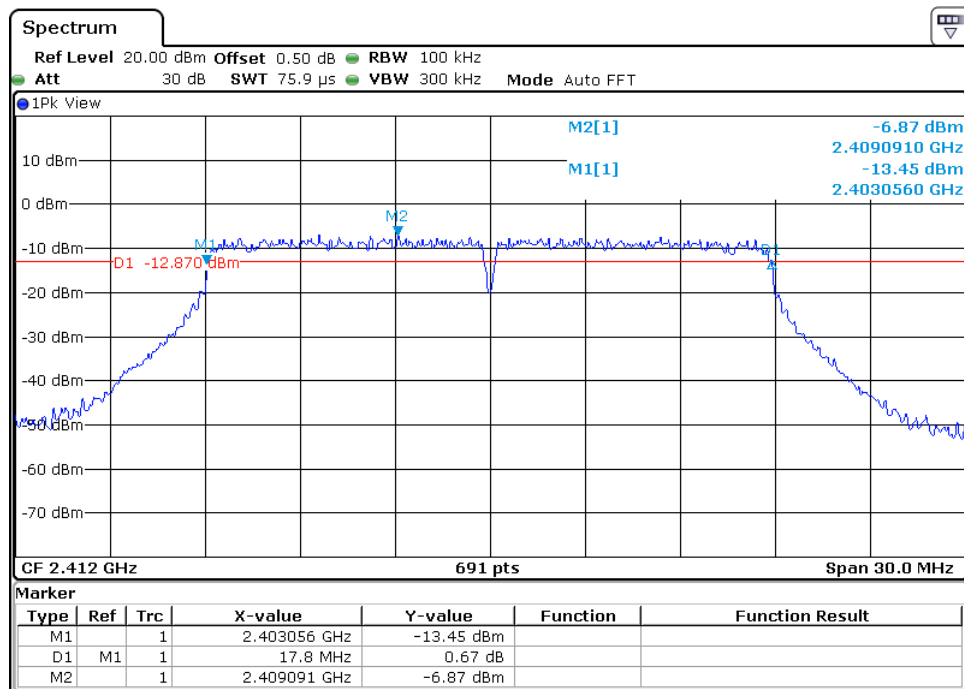


INTERTEK TESTING SERVICES

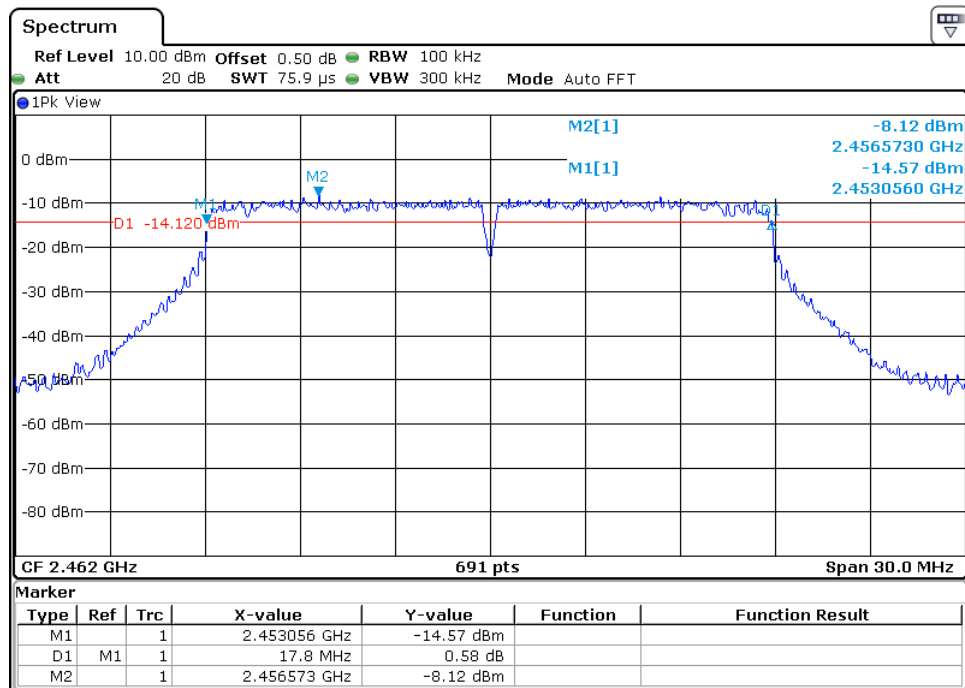


INTERTEK TESTING SERVICES

802.11n-HT20



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INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v04.

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 100KHz
2412	-1.58
2437	-2.14
2462	-2.85

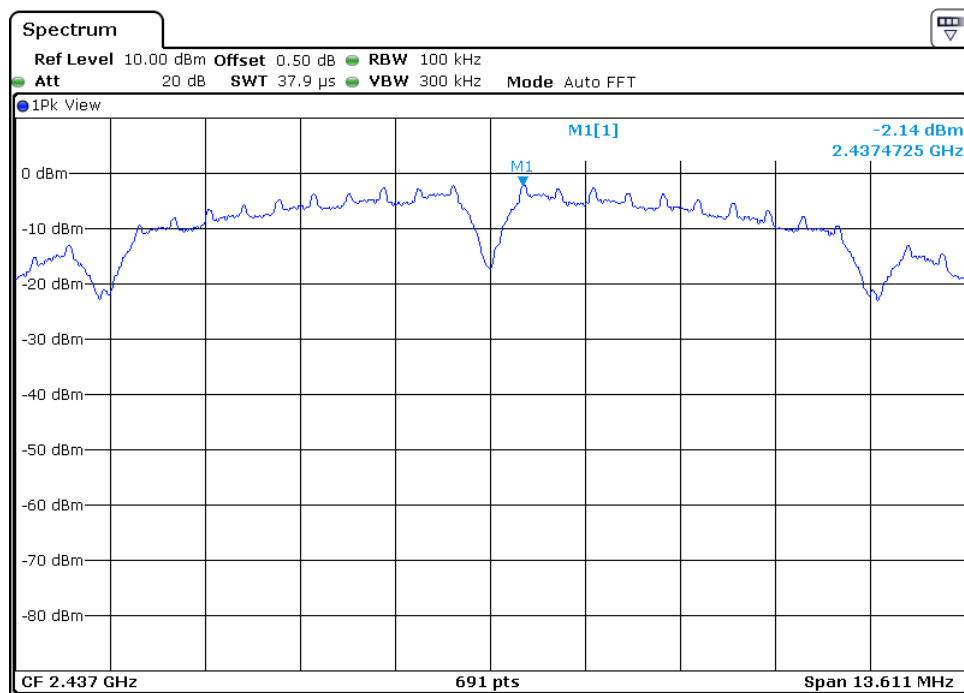
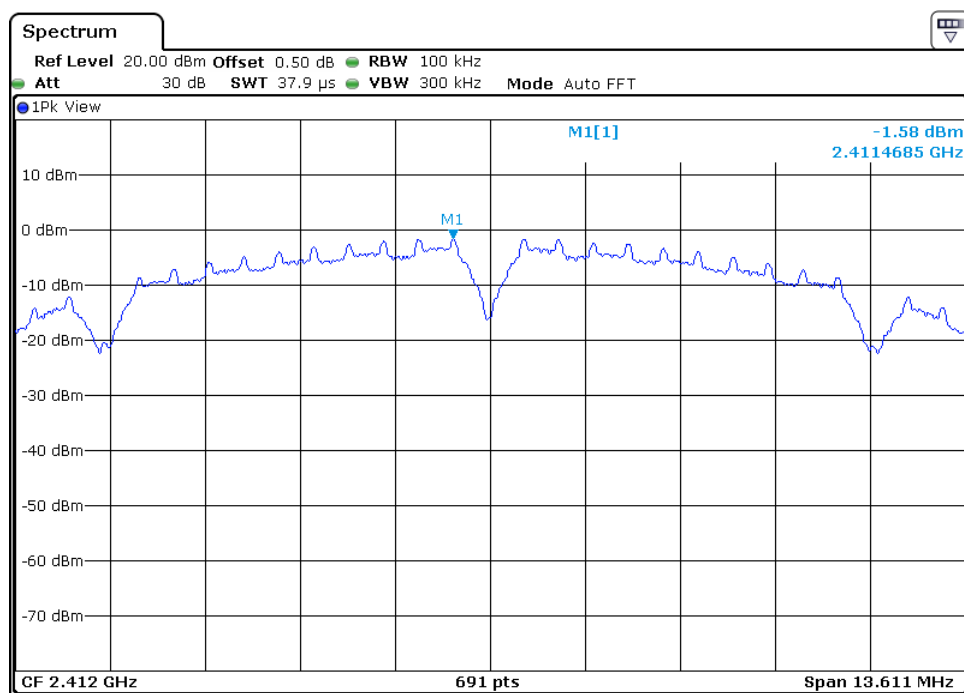
IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-9.28
2437	-8.78
2462	-9.95

IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-6.99
2437	-6.82
2462	-8.27

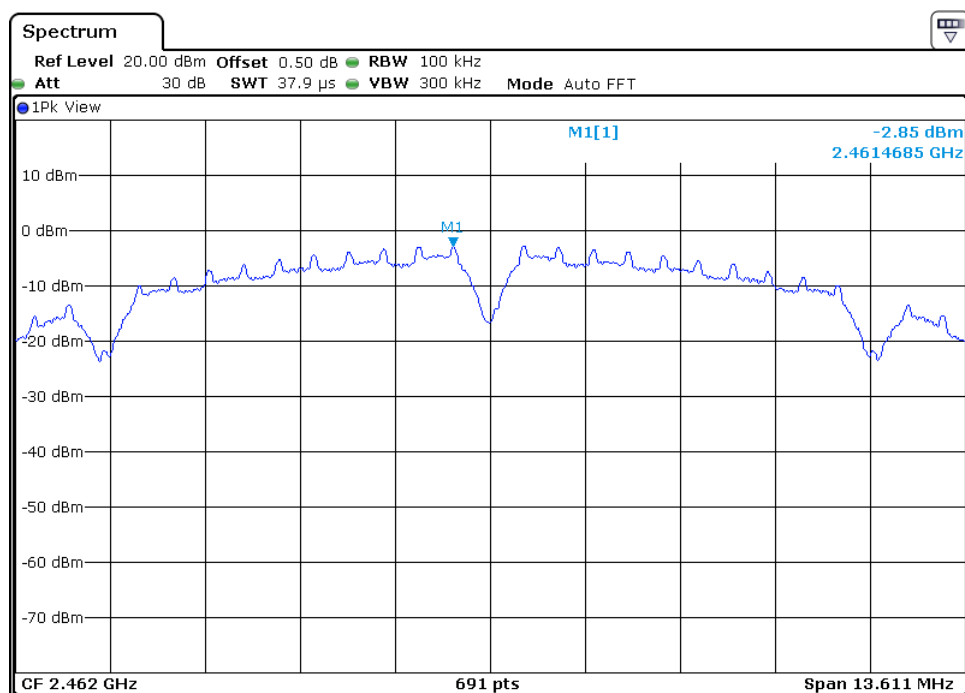
The test plots are attached as below.

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802.11b

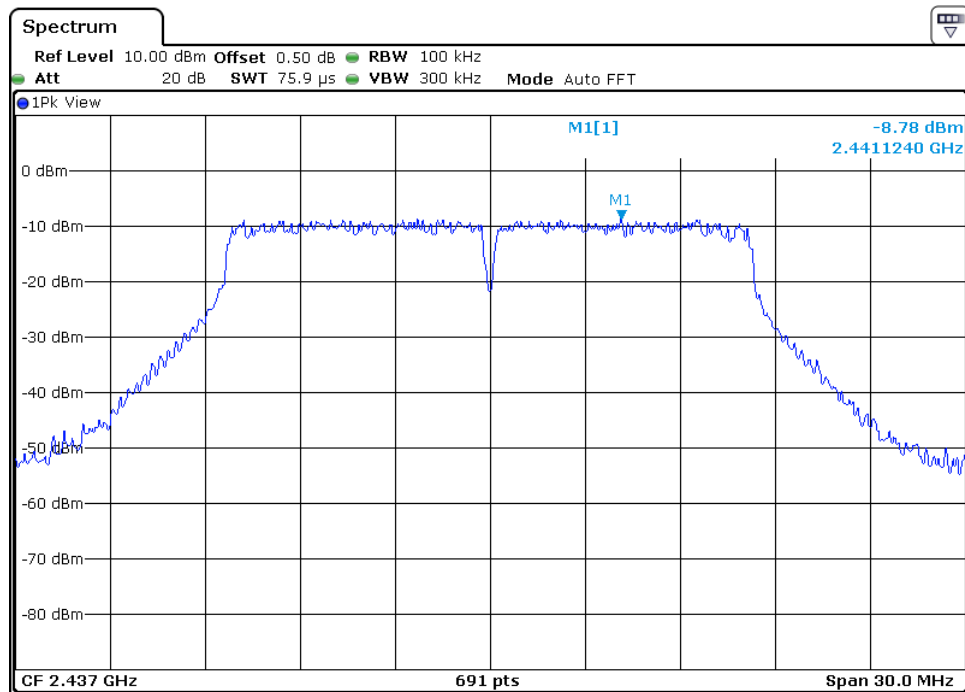
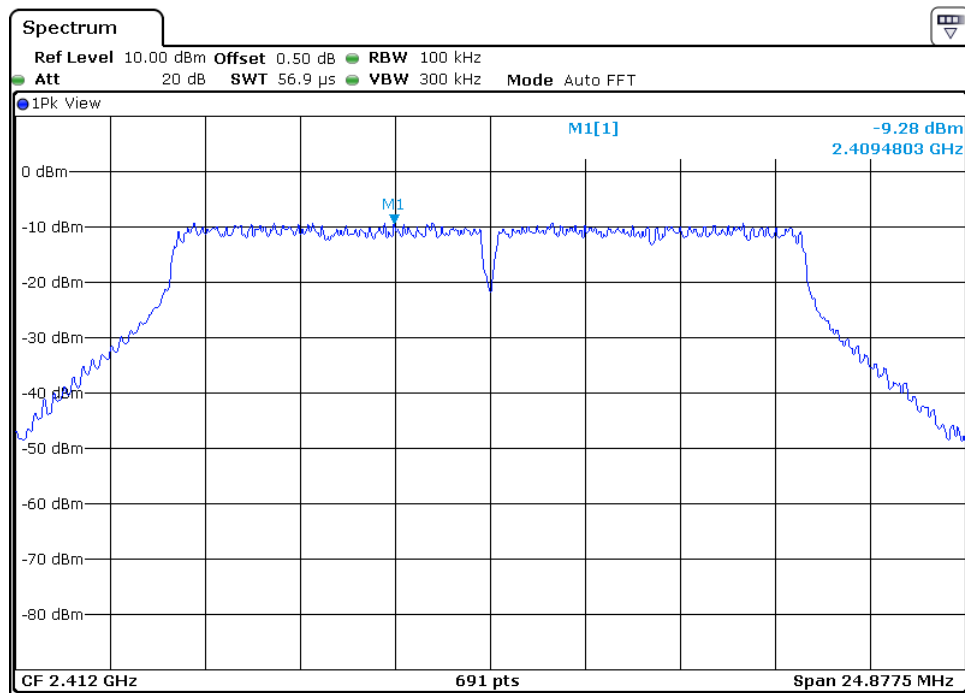


INTERTEK TESTING SERVICES

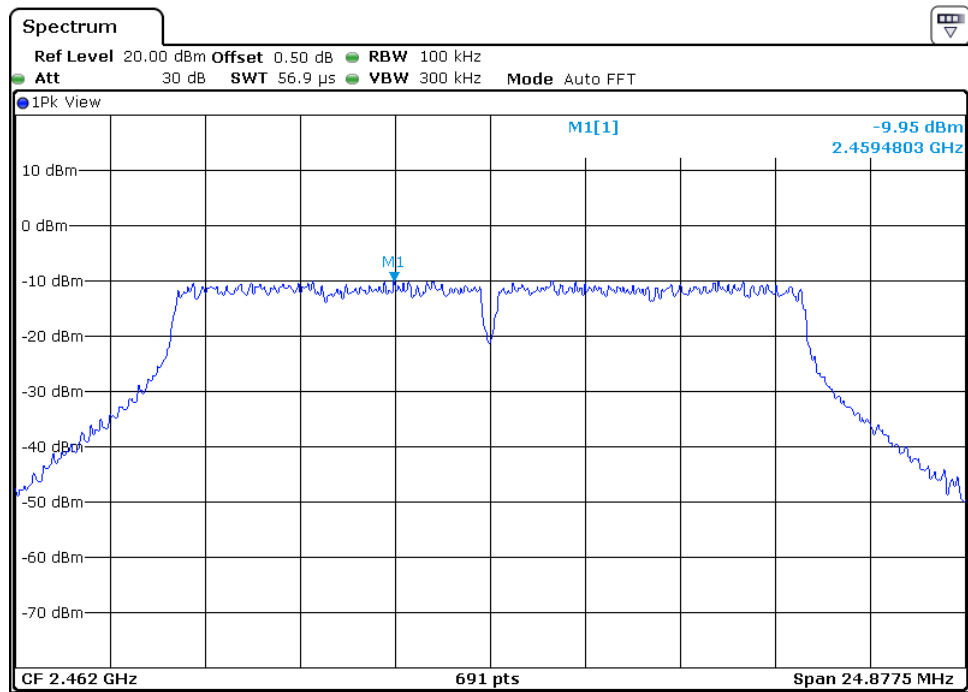


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802.11g

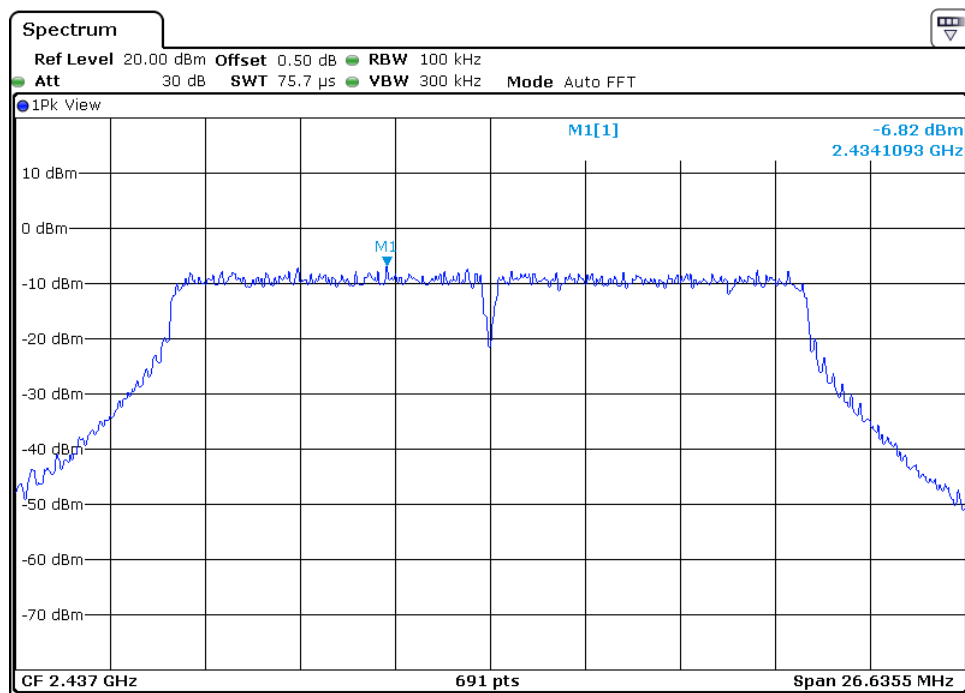
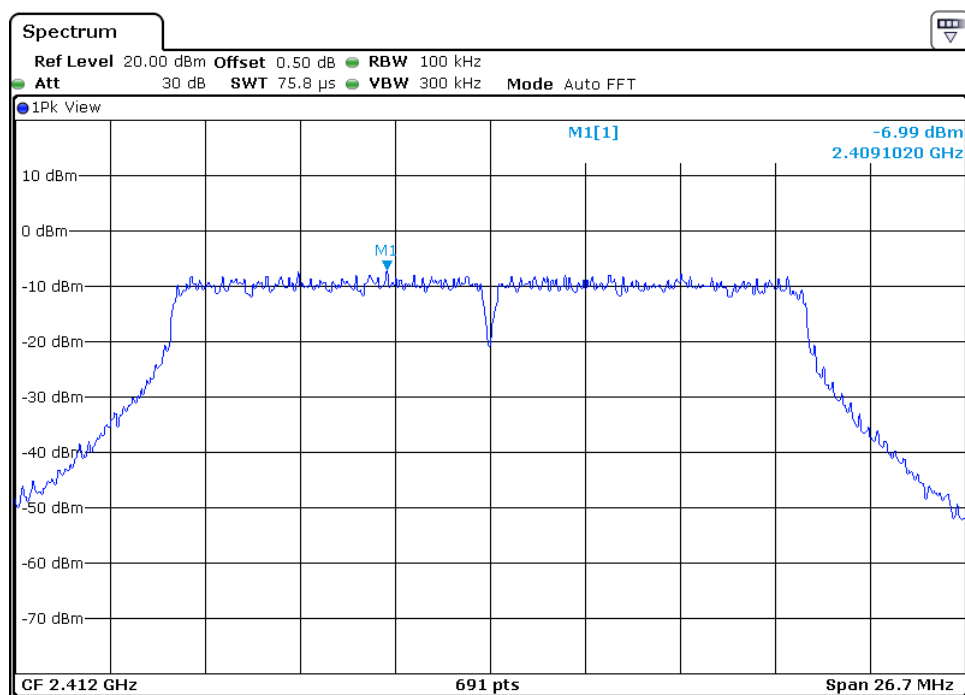


INTERTEK TESTING SERVICES

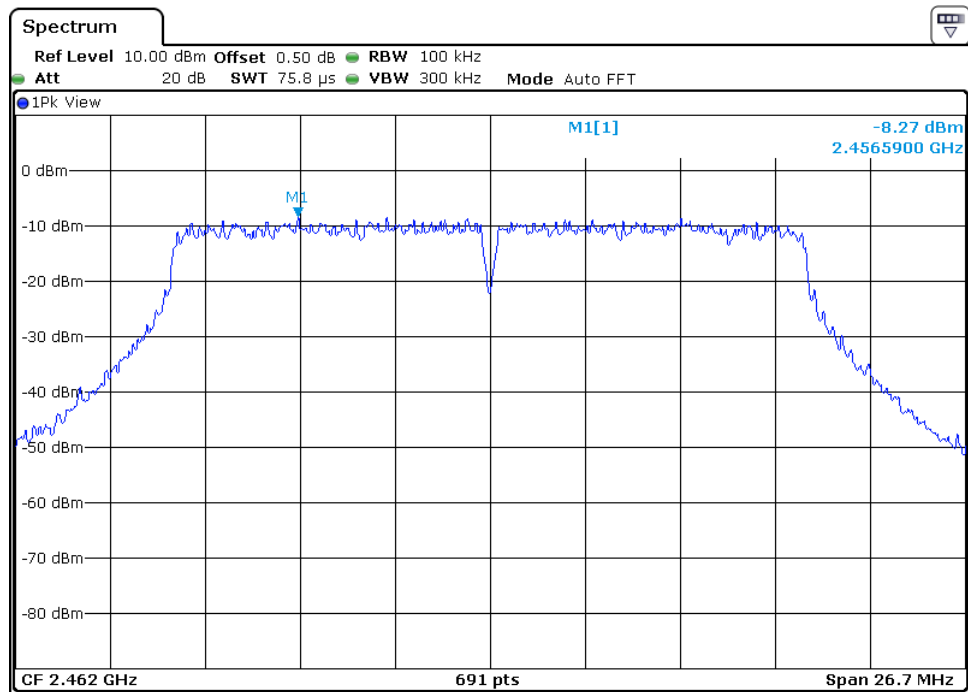


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802.11n-HT20



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INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD
Date of Test: January 4, 2017
Model: 0001

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 v04.

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.

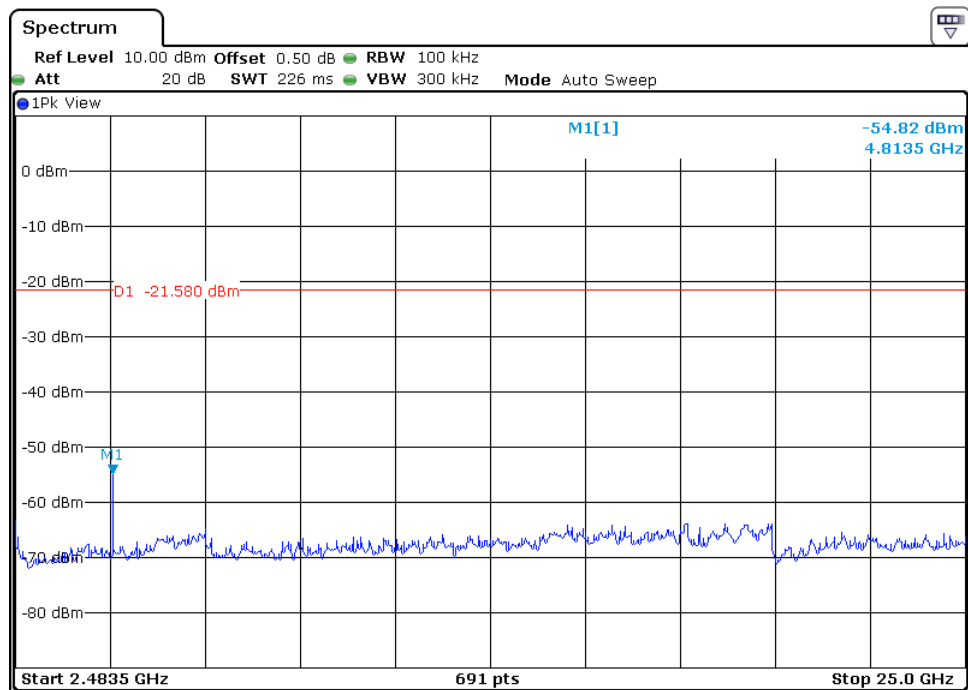
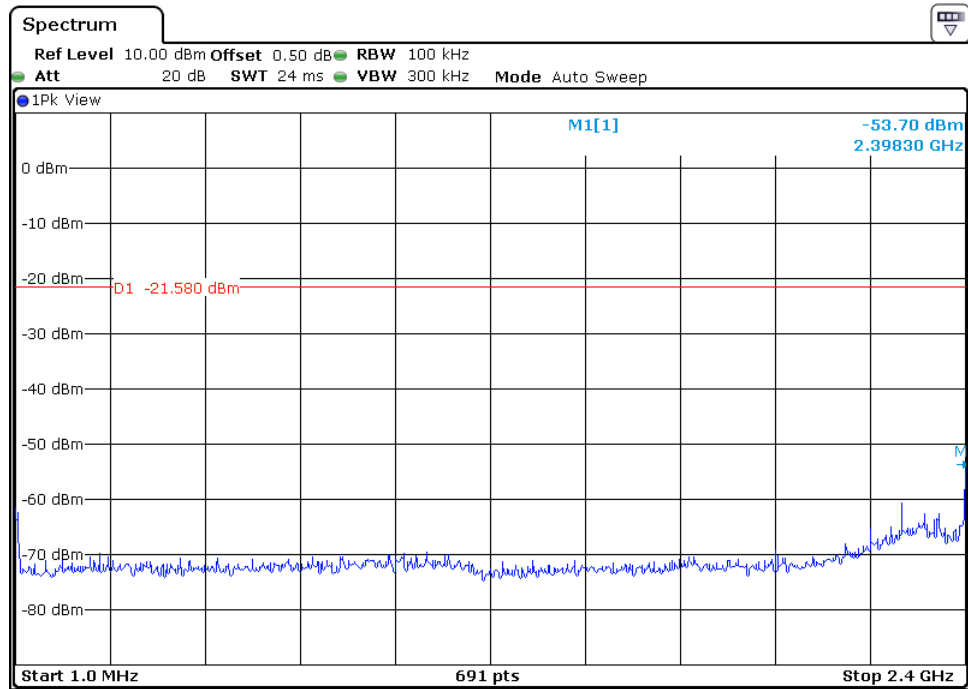
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

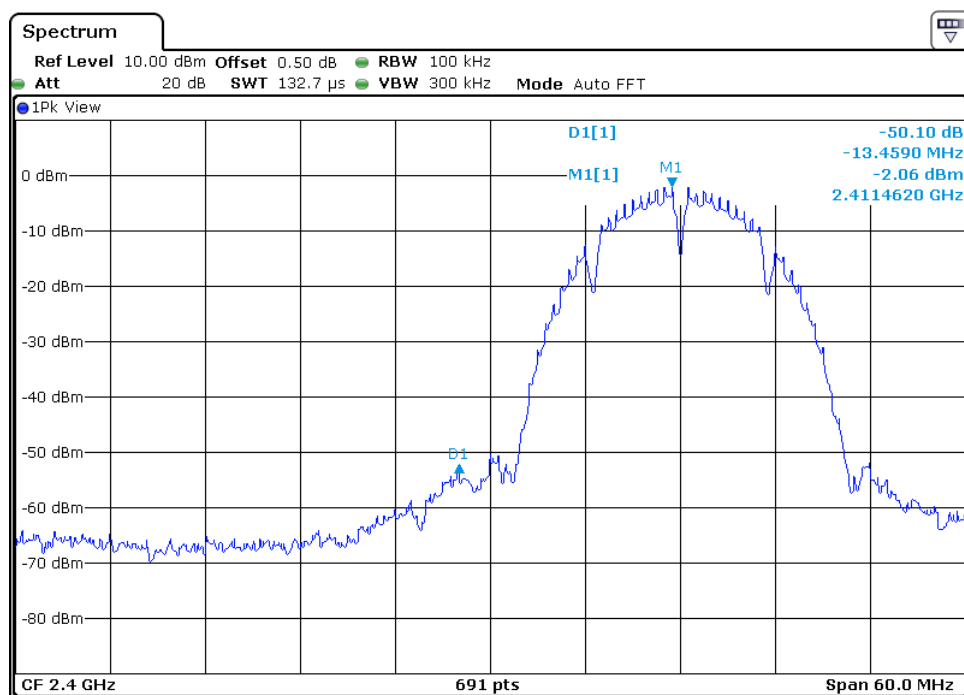
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802.11b

Channel 01 (2412MHz) Reference Level: -1.58dBm

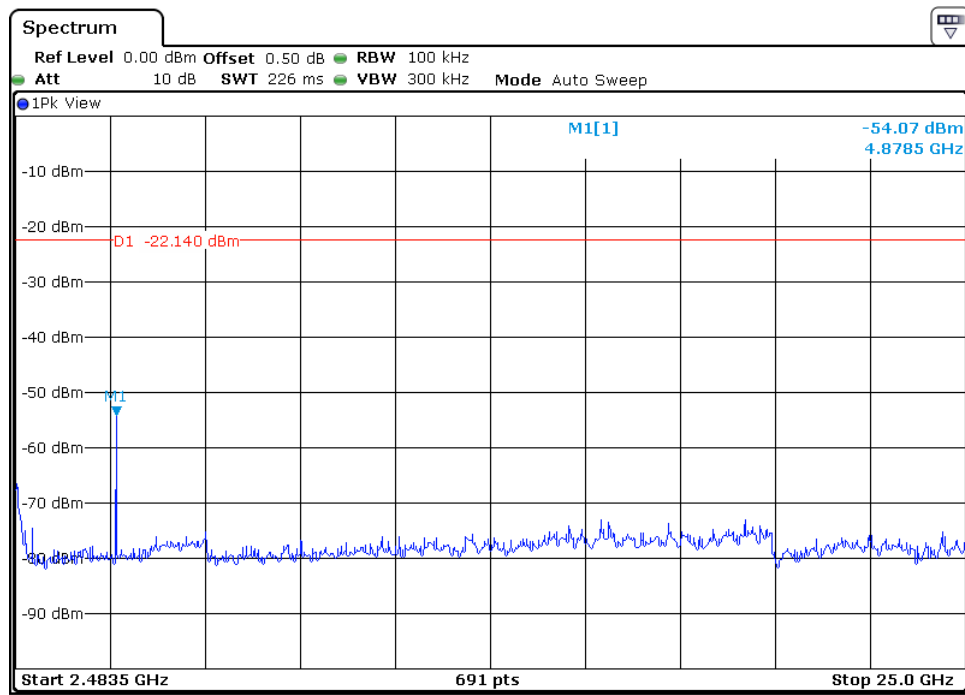
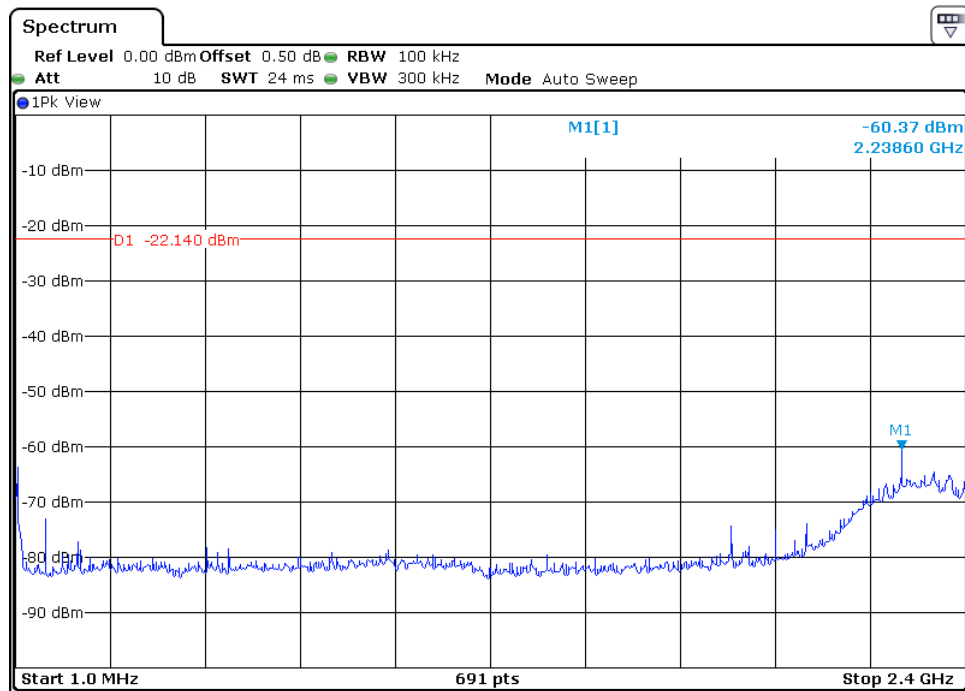


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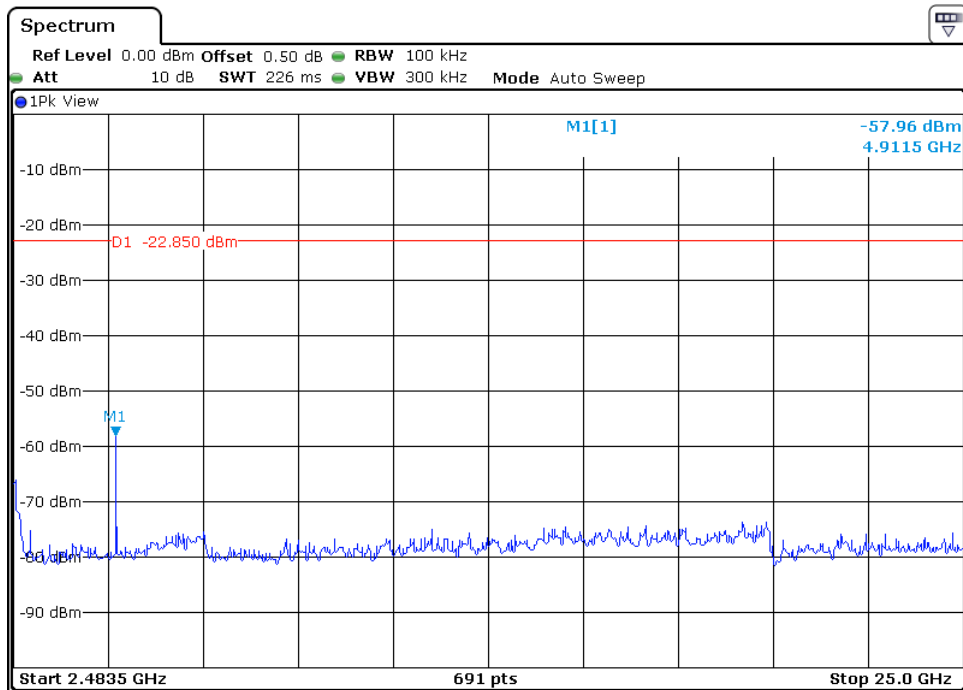
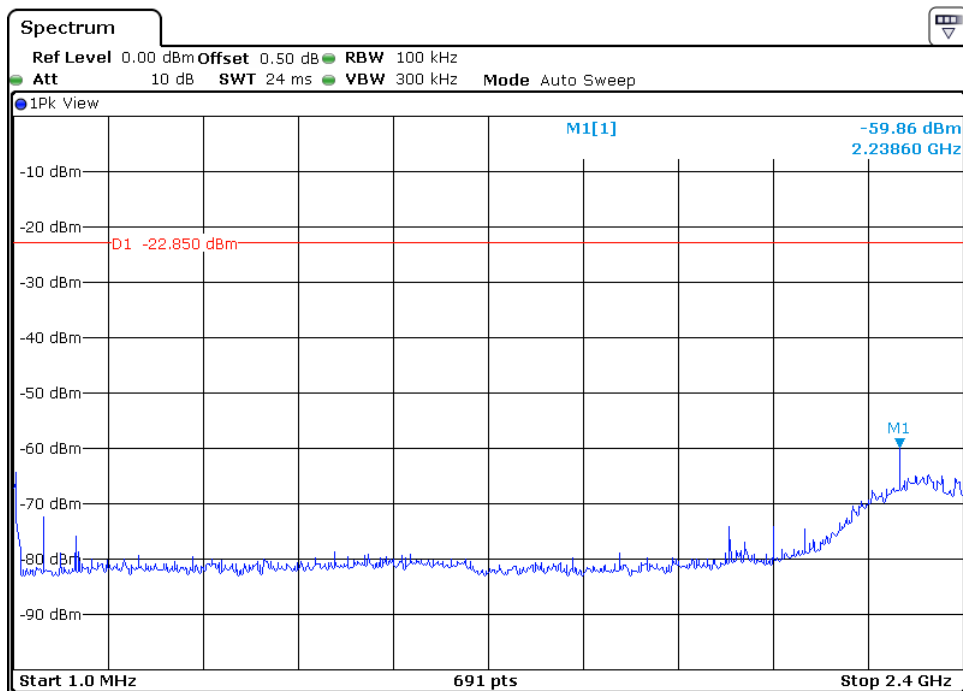
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Channel 06 (2437MHz) Reference Level: -2.14dBm

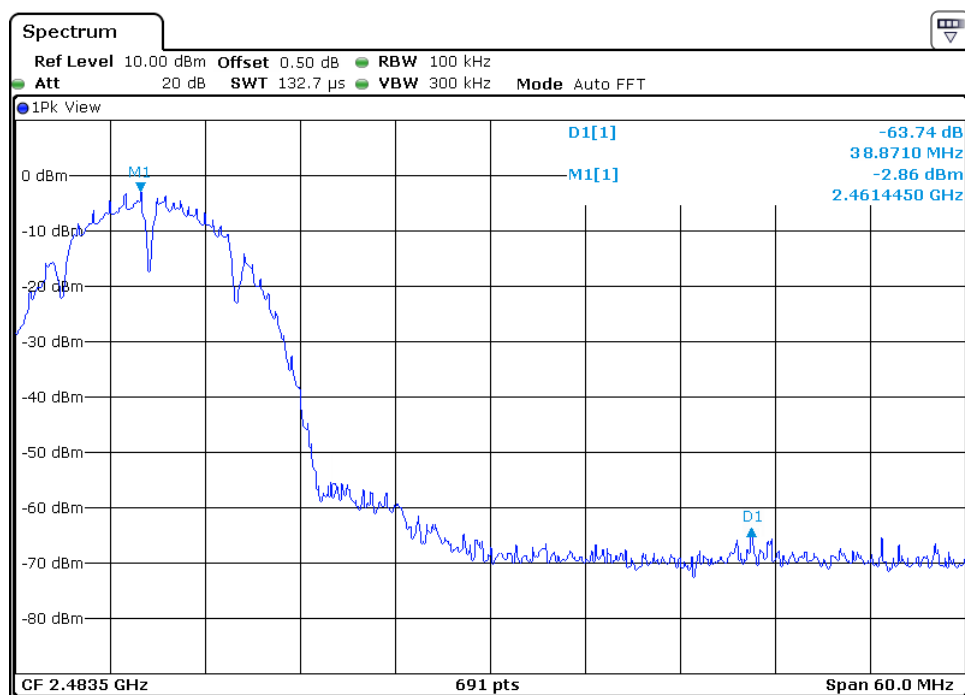


INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -2.85dBm



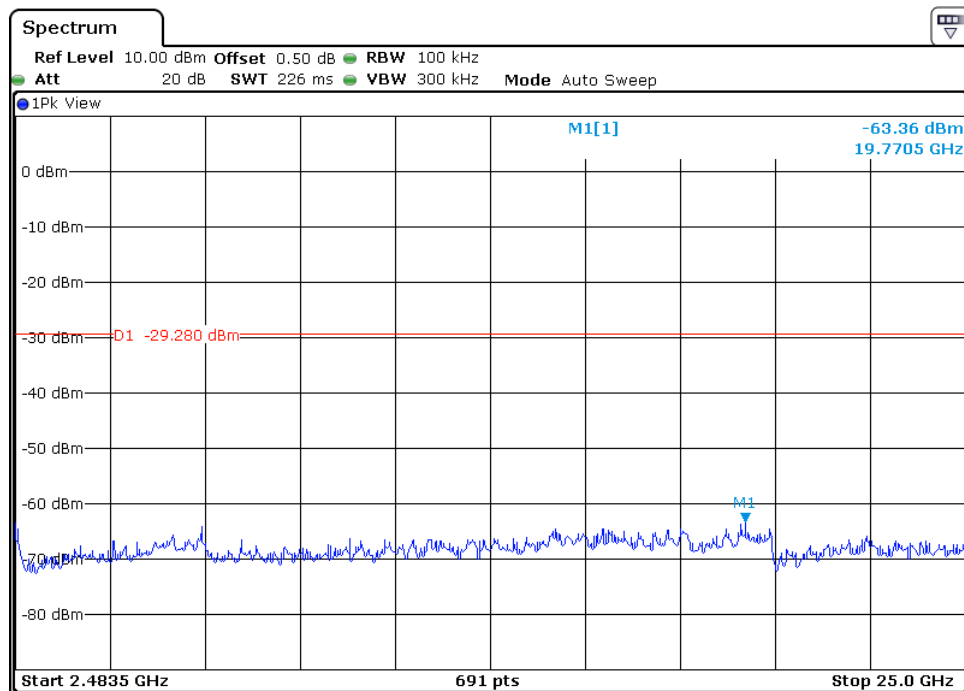
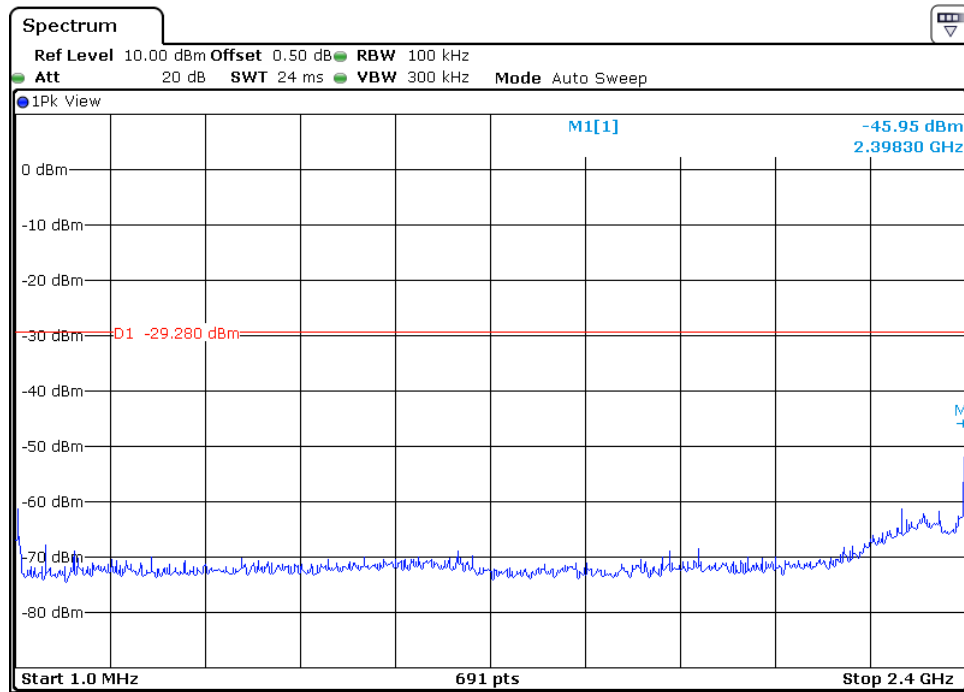
INTERTEK TESTING SERVICES



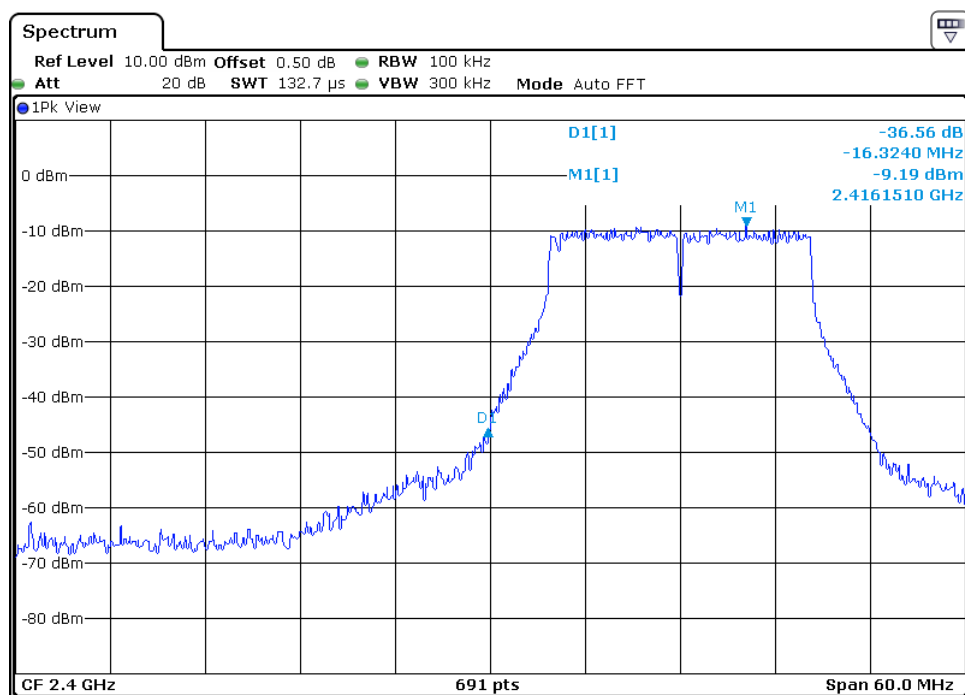
INTERTEK TESTING SERVICES

802.11g

Channel 01 (2412MHz) Reference Level: -9.28dBm

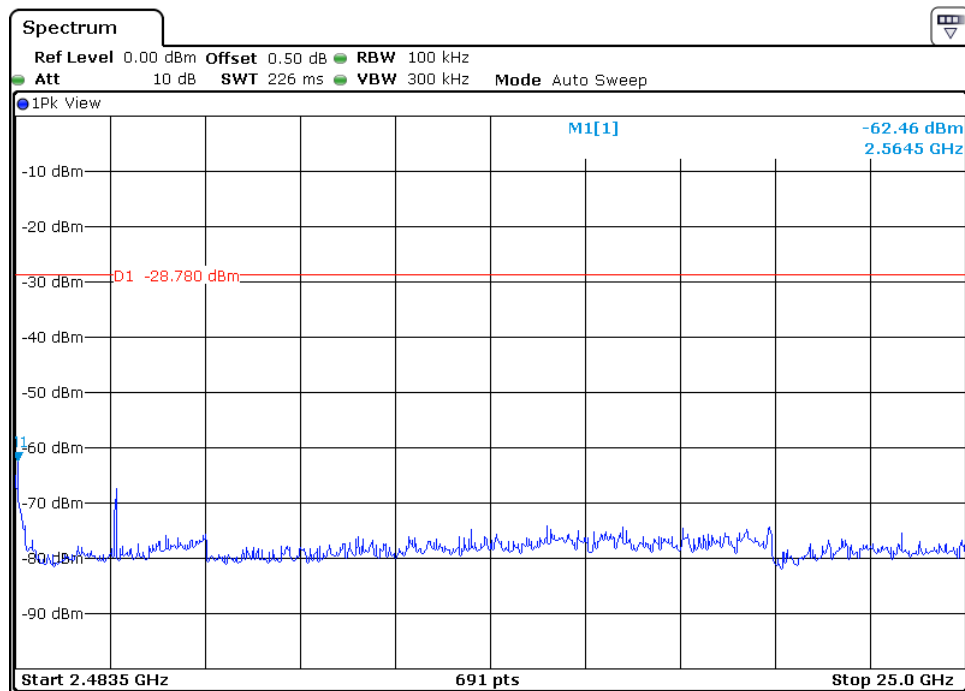
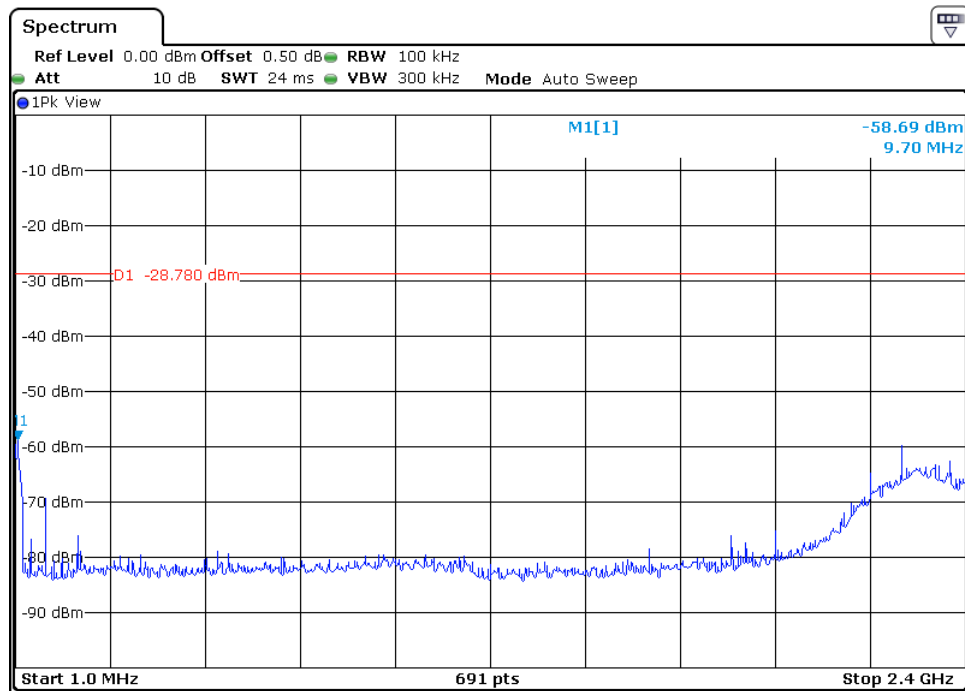


INTERTEK TESTING SERVICES



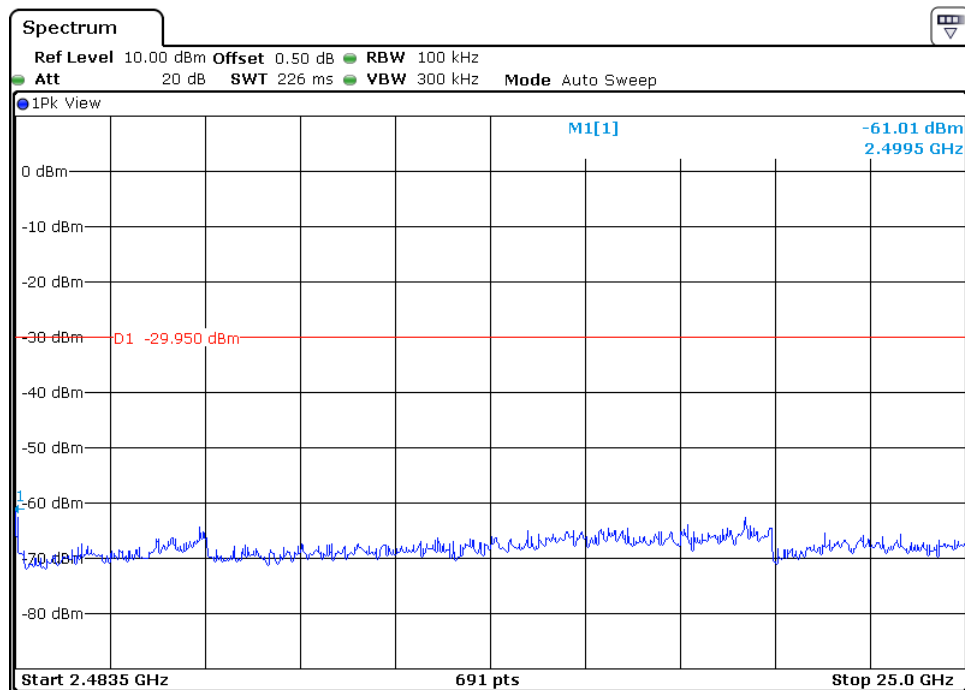
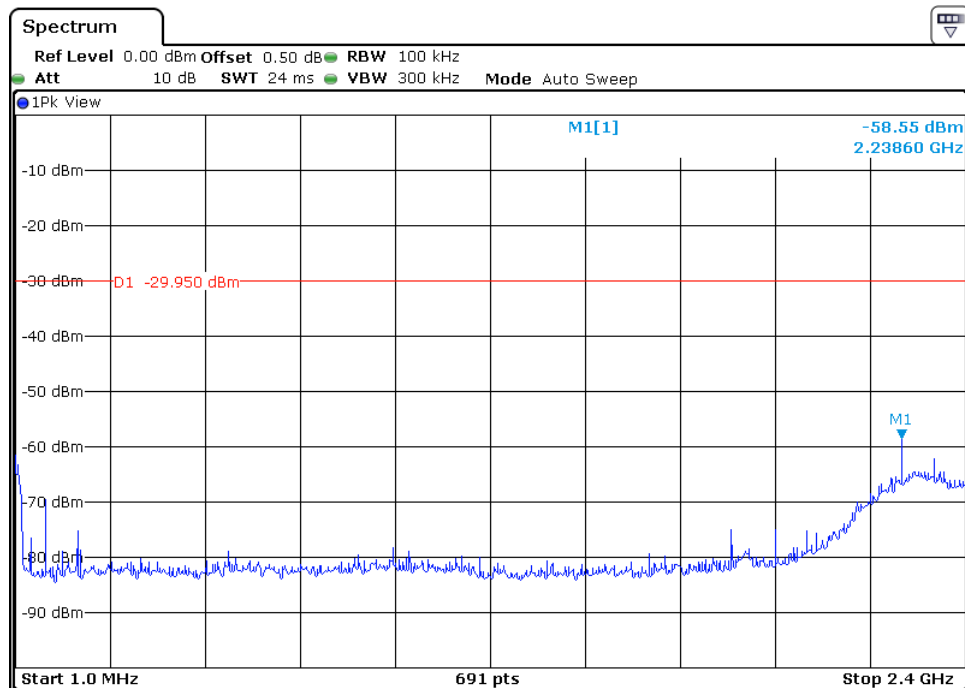
INTERTEK TESTING SERVICES

Channel 06 (2437MHz) Reference Level: -8.78dBm

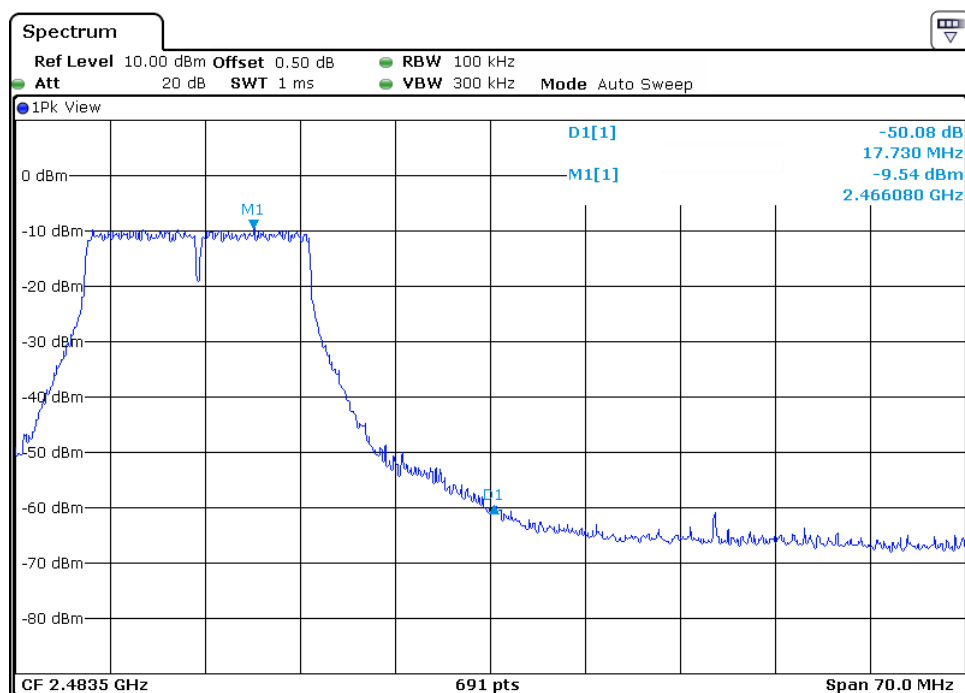


INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -9.95dBm



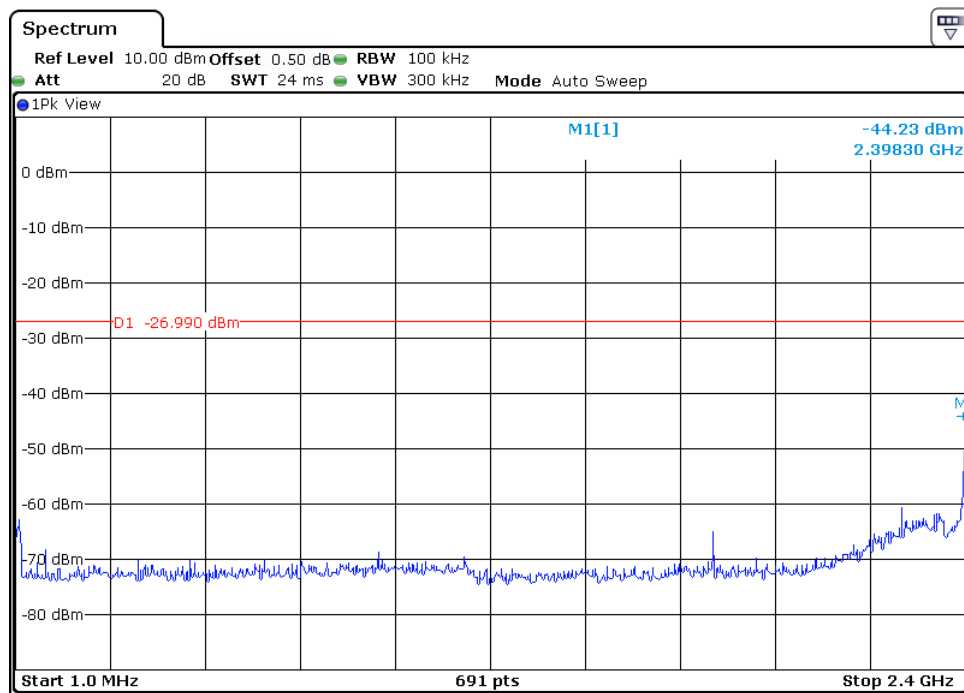
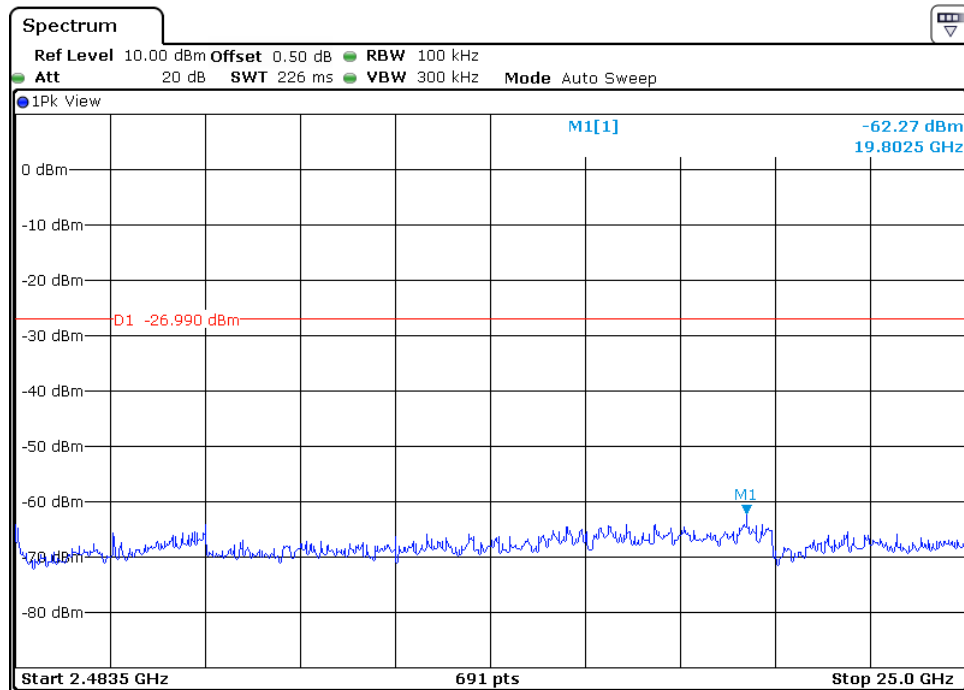
INTERTEK TESTING SERVICES



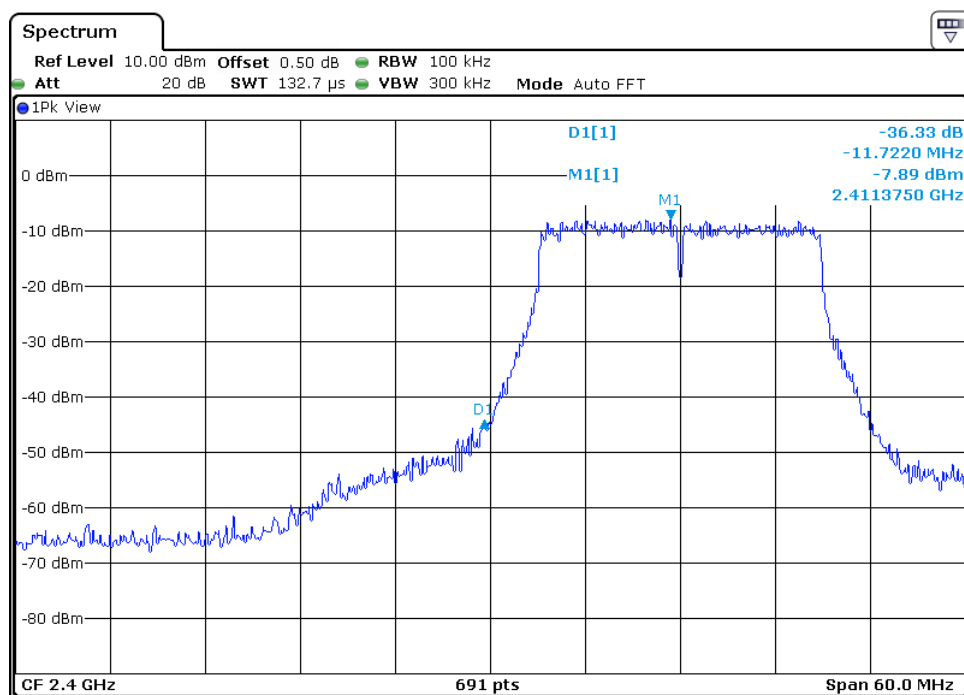
INTERTEK TESTING SERVICES

802.11n-HT20

Channel 01 (2412MHz) Reference Level: -6.99dBm

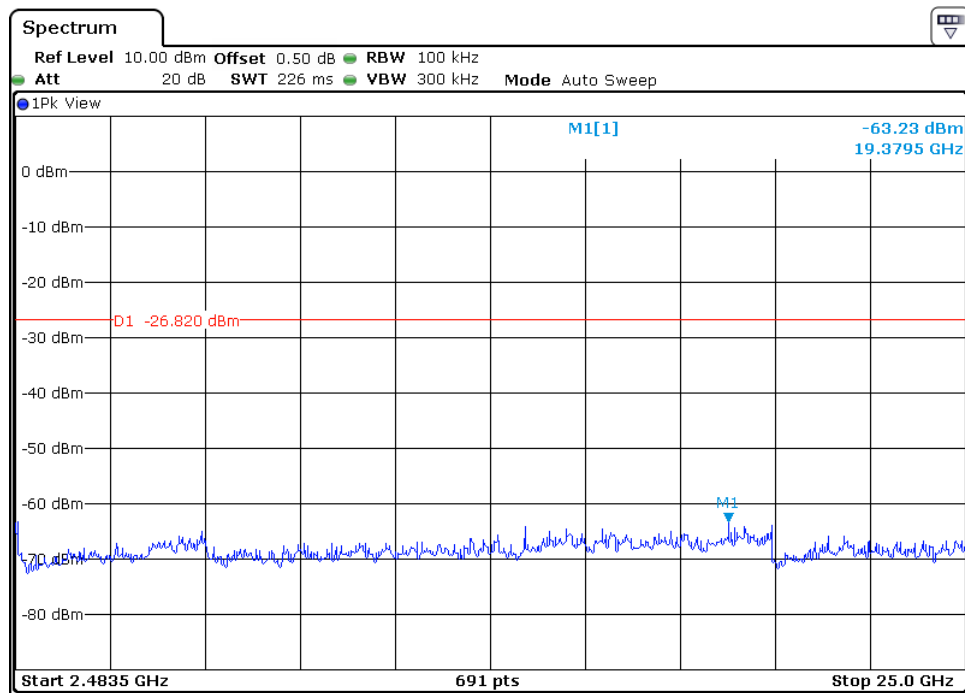
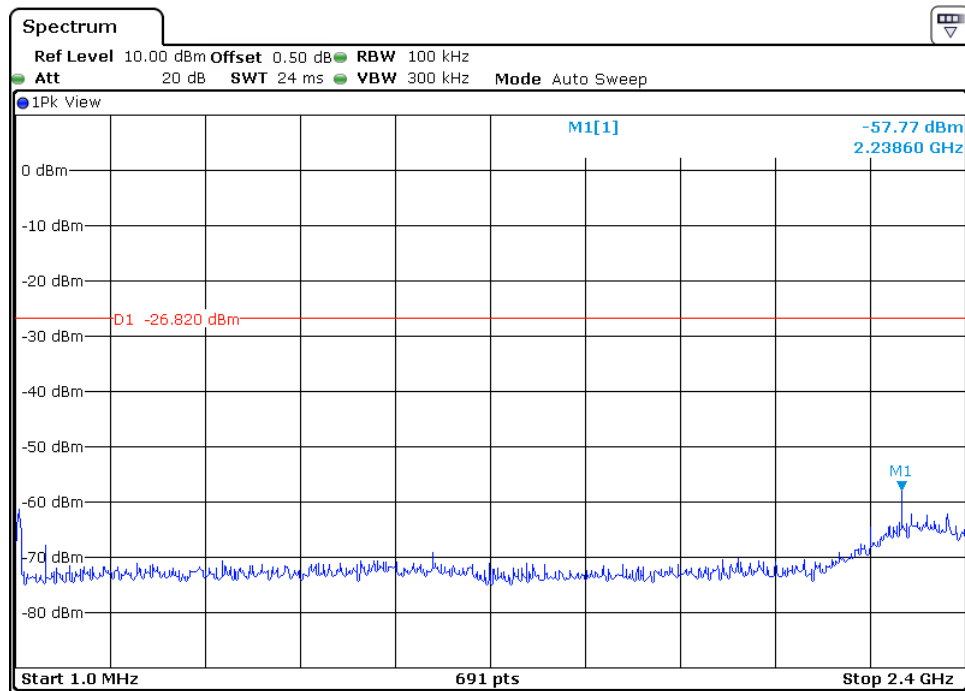


INTERTEK TESTING SERVICES



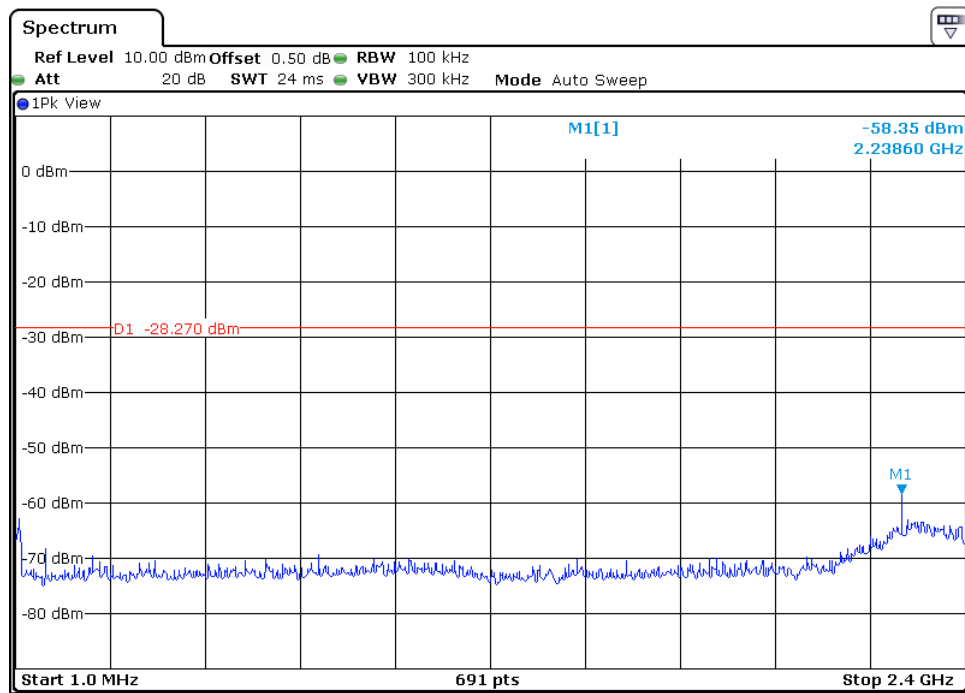
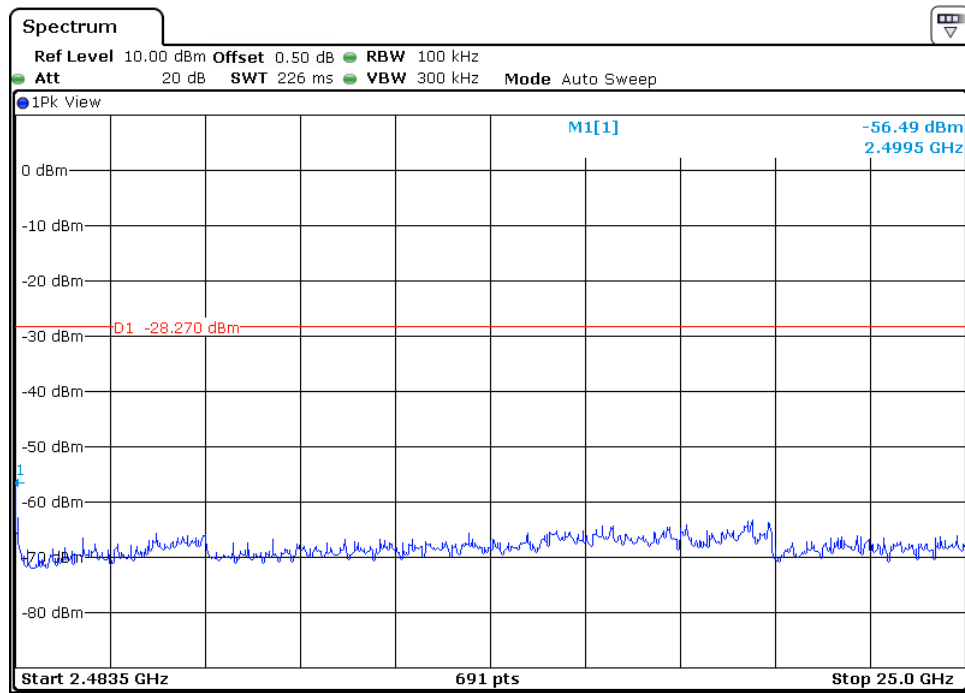
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Channel 06 (2437MHz) Reference Level: -6.82dBm

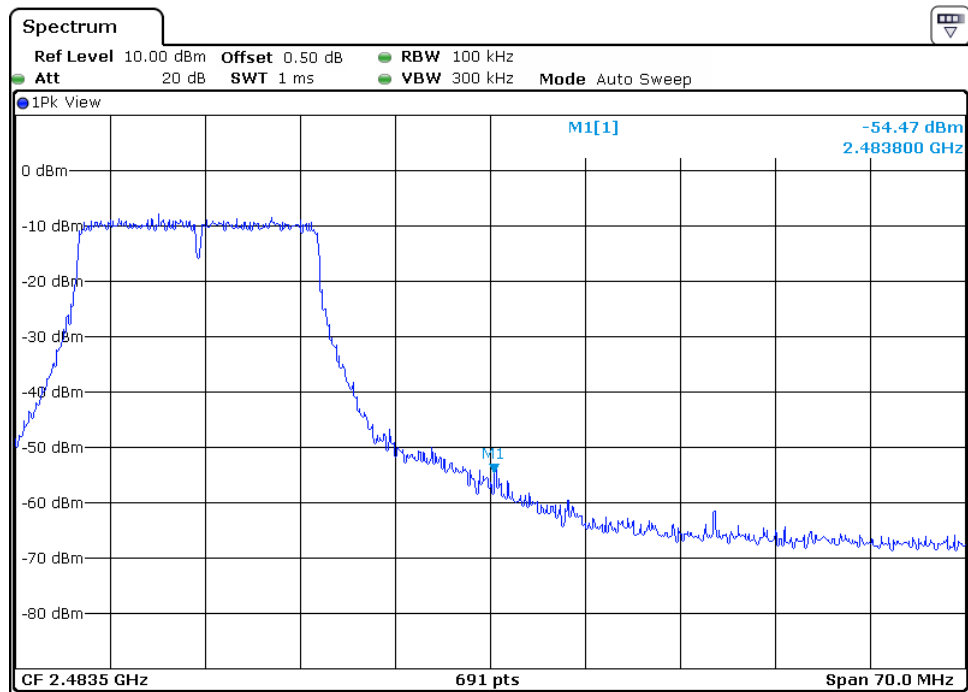


INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -8.27dBm



INTERTEK TESTING SERVICES



INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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 μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ 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 μ 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 μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

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

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

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (802.11b-Channel 01)

at 189.020MHz

is passed by 3.4dB margin.

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

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	290.930	31.7	20.0	11.0	22.7	46.0	-23.3
Horizontal	357.840	29.5	20.0	13.5	23.0	46.0	-23.0
Horizontal	675.050	34.8	20.0	14.4	29.2	46.0	-16.8
Vertical	189.020	49.1	20.0	11.0	40.1	43.5	-3.4
Vertical	191.990	43.5	20.0	14.7	38.2	43.5	-5.3
Vertical	945.195	40.7	20.0	18.9	39.6	46.0	-6.4

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	54.3	36.1	34.2	52.4	74.0	-21.6
Horizontal	*2390.000	58.5	36.7	28.3	50.1	74.0	-23.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	38.7	36.1	34.2	36.8	54.0	-17.2
Horizontal	*2390.000	38.6	36.7	28.3	30.2	54.0	-23.8

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

Worst Case Operating Mode: Transmitting (802.11b-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	56.8	36.1	34.6	55.3	74.0	-18.7
Horizontal	*7311.000	49.9	35.6	37.1	51.4	74.0	-22.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	38.2	36.1	34.6	36.7	54.0	-17.3
Horizontal	*7311.000	30.9	35.6	37.1	32.4	54.0	-21.6

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

Worst Case Operating Mode: Transmitting (802.11b-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	55.2	36.1	34.6	53.7	74.0	-20.3
Horizontal	*7386.000	56.0	35.6	37.2	57.6	74.0	-16.4
Horizontal	*2483.500	60.7	36.7	28.1	52.1	74.0	-21.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4924.000	38.4	36.1	34.6	36.9	54.0	-17.1
Horizontal	*7386.000	42.6	35.6	37.2	44.2	54.0	-9.8
Horizontal	*2483.500	48.9	36.7	28.1	40.3	54.0	-13.7

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	57.3	36.1	34.2	55.4	74.0	-18.6
Horizontal	*2390.000	59.0	36.7	28.3	50.6	74.0	-23.4

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4824.000	36.1	36.1	34.2	34.2	54.0	-19.8
Horizontal	*2390.000	38.8	36.7	28.3	30.4	54.0	-23.6

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

Worst Case Operating Mode: Transmitting (802.11g-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	57.3	36.1	34.6	55.8	74.0	-18.2
Horizontal	*7311.000	50.6	35.6	37.1	52.1	74.0	-21.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4874.000	37.2	36.1	34.6	35.7	54.0	-18.3
Horizontal	*7311.000	30.4	35.6	37.1	31.9	54.0	-22.1

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

Worst Case Operating Mode: Transmitting (802.11g-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	56.4	36.1	34.6	54.9	74.0	-19.1
Horizontal	*2483.500	59.4	36.7	28.1	50.8	74.0	-23.2

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	36.7	36.1	34.6	35.2	54.0	-18.8
Horizontal	*2483.500	39.4	36.7	28.1	30.8	54.0	-23.2

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	56.1	36.1	34.2	54.2	74.0	-19.8
Horizontal	*2390.000	59.1	36.7	28.3	50.7	74.0	-23.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	37.5	36.1	34.2	35.6	54.0	-18.4
Horizontal	*2390.000	39.6	36.7	28.3	31.2	54.0	-22.8

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

Worst Case Operating Mode: Transmitting (802.11n-HT20)-Channel 06

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	55.6	36.1	34.6	54.1	74.0	-19.9
Horizontal	*7311.000	49.2	35.6	37.1	50.7	74.0	-23.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	36.8	36.1	34.6	35.3	54.0	-18.7
Horizontal	*7311.000	28.9	35.6	37.1	30.4	54.0	-23.6

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

Worst Case Operating Mode: Transmitting (802.11n-HT20)-Channel 11

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	57.2	36.1	34.6	55.7	74.0	-18.3
Horizontal	*2483.500	59.3	36.7	28.1	50.7	74.0	-23.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	36.9	36.1	34.6	35.4	54.0	-18.6
Horizontal	*2483.500	39.5	36.7	28.1	30.9	54.0	-23.1

- 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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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.

INTERTEK TESTING SERVICES

Applicant: SHAO GUAN EARLY LIGHT INTERNATIONAL CO., LTD

Date of Test: January 4, 2017

Model: 0001

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.

INTERTEK TESTING SERVICES

EXHIBIT 5

EQUIPMENT PHOTOGRAPHS

INTERTEK TESTING SERVICES

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

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

EXHIBIT 9

CONFIDENTIALITY REQUEST

9.0 Confidentiality Request

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

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

EXHIBIT 11

TEST EQUIPMENT LIST

INTERTEK TESTING SERVICES

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
EE089	EMI Test Receiver	Rohde & Schwarz	ESU	1302.600 5.26	17-May-2016	17-May-2017
EE040	Pre-Amplifier	HP	8447F	2944A07 999	17-May-2016	17-May-2017
EE043	Bilog Antenna	Schwarzbeck	VULB916 3	142	17-May-2016	17-May-2017
EE147	Cable	Schwarzbeck	AK9513	ACRX1	17-May-2016	17-May-2017
EE169	Cable	Rosenberger	N/A	FP2RX2	17-May-2016	17-May-2017
EE168	Cable	Schwarzbeck	AK9513	CRPX1	29-May-2016	29-May-2017
EE170	Cable	Schwarzbeck	AK9513	CRRX2	29-May-2016	29-May-2017
EE096	Pre-Amplifier	A.H.	PAM- 0126	1415261	17-May-2016	17-May-2017
EE094	Horn Antenna	Schwarzbeck	BBHA 9120	707	29-May-2016	29-May-2017
EE097	Cable	H+B	0.5M SF104- 26.5	289147/4	29-May-2016	29-May-2017
EE100	Cable	H+B	3M SF104- 26.5	295838/4	29-May-2016	29-May-2017
EE101	Cable	H+B	6M SF104- 26.5	295840/4	29-May-2016	29-May-2017
EE095	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA917 0399	17-May-2016	17-May-2017
EE343	EMI Test Receiver	Rohde & Schwarz	FSV40	132.1- 3008K39- 100967- AP	29-May-2016	29-May-2017
EE240	Pre-Amplifier	Lunar EM	LNA26G4 0-40	J1013131 028001	17-May-2016	17-May-2017
EE234	Horn Antenna	AHS/USA	SAS-573	184	17-May-2016	17-May-2017
EE099	Power Sensor	Boonton	51011	453	17-May-2016	17-May-2017
EE098	Power meter	Boonton	4232A	452	17-May-2016	17-May-2017
EE312	Cable	A.H	SAC- 40G-1	414	17-May-2016	17-May-2017
EE313	Cable	A.H	SAC- 40G-1	413	17-May-2016	17-May-2017