

Guoguang Electric Co.,Ltd

TEST REPORT

SCOPE OF WORK

FCC TESTING—U3120G, U312B, TS3120, TS3121

REPORT NUMBER

220328030SZN-003

ISSUE DATE

[REVISED DATE]

18 April 2022 [-----]

PAGES

43

DOCUMENT CONTROL NUMBER

FCC ID 247_b

© 2017 INTERTEK



Guoguang Electric Co.,Ltd

Application
For
Certification

FCC ID: 2AAP8U3120GSW**3.1.2CH Soundbar with Wireless Subwoofer, Wireless Subwoofer****Model: U3120G, U312B, TS3120, TS3121****Brand name: Hisense, TOSHIBA****2.4GHz Transceiver****Report No.: 220328030SZN-003**

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 [10-1-20]

Prepared and Checked by:**Approved by:****Mandy Chen**
Engineer

Peter Kang
Senior Technical Supervisor
Date: 18 April 2022

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 Services Shenzhen Ltd. Longhua Branch

101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.

Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

MEASUREMENT/TECHNICAL REPORT

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

Equipment Type: DTS - Part 15 Digital Transmission Systems

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 [10-01-20] Edition] provision.

Report prepared by:

Mandy Chen
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue,
Zhangkengjing Community, GuanHu Subdistrict, LongHua
District, Shenzhen, P.R. China.
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6661

Table of Contents

1.0	<u>Summary of Test results</u>	4
2.0	<u>General Description</u>	5
2.1	Product Description	5
2.2	Related Submittal(s) Grants	5
2.3	Test Methodology	5
2.4	Test Facility	5
3.0	<u>System Test Configuration</u>	6
3.1	Justification	6
3.2	EUT Exercising Software	6
3.3	Special Accessories	6
3.4	Measurement Uncertainty	7
3.5	Equipment Modification	7
3.6	Support Equipment List and Description	7
4.0	<u>Measurement Results</u>	8
4.1	Maximum Conducted Output Power at Antenna Terminals	8
4.2	Minimum 6 dB RF Bandwidth	9
4.3	Maximum Power Density Reading	13
4.4	Out of Band Conducted Emissions	17
4.5	Out of Band Radiated Emissions	28
4.6	Transmitter Radiated Emissions in Restricted Bands	29
4.7	Field Strength Calculation	30
4.8	Radiated Spurious Emission	31
4.9	Conducted Emission	37
4.10	Radiated Emissions from Digital Section of Transceiver	40
4.11	Transmitter Duty Cycle Calculation and Measurements	41
5.0	<u>Equipment Photographs</u>	42
6.0	<u>Product Labelling</u>	42
7.0	<u>Technical Specifications</u>	42
8.0	<u>Instruction Manual</u>	42
9.0	<u>Confidentiality Request</u>	42
10.0	<u>Discussion of Pulse Desensitization</u>	42
11.0	<u>Test Equipment List</u>	43

1.0 Summary of Test results

Applicant: Guoguang Electric Co.,Ltd
 Address: No.8 Jinghu Road, Xinhua Street, Huadu Reg, Guangzhou, China
 Manufacturer: Guoguang Electric Co.,Ltd
 Address: No.8 Jinghu Road, Xinhua Street, Huadu Reg, Guangzhou, China

Model: U3120G

FCC ID: 2AAP8U3120GSW

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), 15.209, FCC 15.205	Pass
AC Conducted Emission	15.207	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.

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a 3.1.2CH Soundbar with Wireless Subwoofer, Wireless Subwoofer with 2.4G function operating at 2404-2476MHz. The EUT is powered by AC 100-240V~ 50/60Hz. For more detail information pls. refer to the user manual.

Type of Modulation: GFSK

Antenna Type: Integral Antenna

Antenna Gain: 2.95dBi

The Model: U312B, TS3120, TS3121 are the same as the Model: U3120G in hardware and electrical aspect. The differences in model number and trademark serves as packaging and marketing purpose only.

The EUT had two antennas, both of which were tested.

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 transceiver for the 3.1.2CH Soundbar with Wireless Subwoofer, Wireless Subwoofer which has 2.4GHz Transmitter Function. Other digital functions were reported in the verification report: 220328030SZN-004.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013) and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. 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.

2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are **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, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

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 AC 100-240V~ 50/60Hz during the test. Only the worst data was reported in this 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 EUT and transmitting antenna was centered on the turntable.

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.

Test Software: EVB_Tool

3.3 Special Accessories

No special accessory attached.

3.4 Measurement Uncertainty

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

Measurement Uncertainty	Uncertainty
Channel Bandwidth	$\pm 3.46\%$
RF Output Power	$\pm 0.31\text{dB}$
Power Density	$\pm 3.0\text{dB}$
Conducted Unwanted Emission	$\pm 0.55\text{dB}$
Spurious emission (Above 18GHz)	$\pm 5.3\text{dB}$
Spurious emission (6GHz to 18GHz)	$\pm 5.1\text{dB}$
Radiated emission (1GHz to 6GHz)	$\pm 4.8\text{dB}$
Radiated emission (Up to 1GHz)	$\pm 4.8\text{dB}$
AC Conducted emission	$\pm 3.6\text{ dB}$
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$

3.5 Equipment Modification

Any modifications installed previous to testing by Guoguang Electric 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

Description	Manufacturer	Model No.
AC power cord	N/A	Unshielded, Length 150cm

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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 has 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 2.95 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

ANT A

GFSK		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2404	2.75	1.88
Middle Channel: 2441	3.83	2.42
High Channel: 2476	4.31	2.70

Cable loss: 4 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level (ANT A) = 4.31dBm

EUT max. E.I.R.P(ANT A) = 4.31dBm + 2.95dBi = 7.26dBm = 5.32mW

ANT B

GFSK		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2404	2.59	1.82
Middle Channel: 2441	3.57	2.28
High Channel: 2476	4.30	2.69

Cable loss: 4 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level (ANT B) = 4.30dBm

EUT max. E.I.R.P(ANT B) = 4.30dBm + 2.95dBi = 7.25dBm = 5.31mW

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

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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 v05r02. 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.

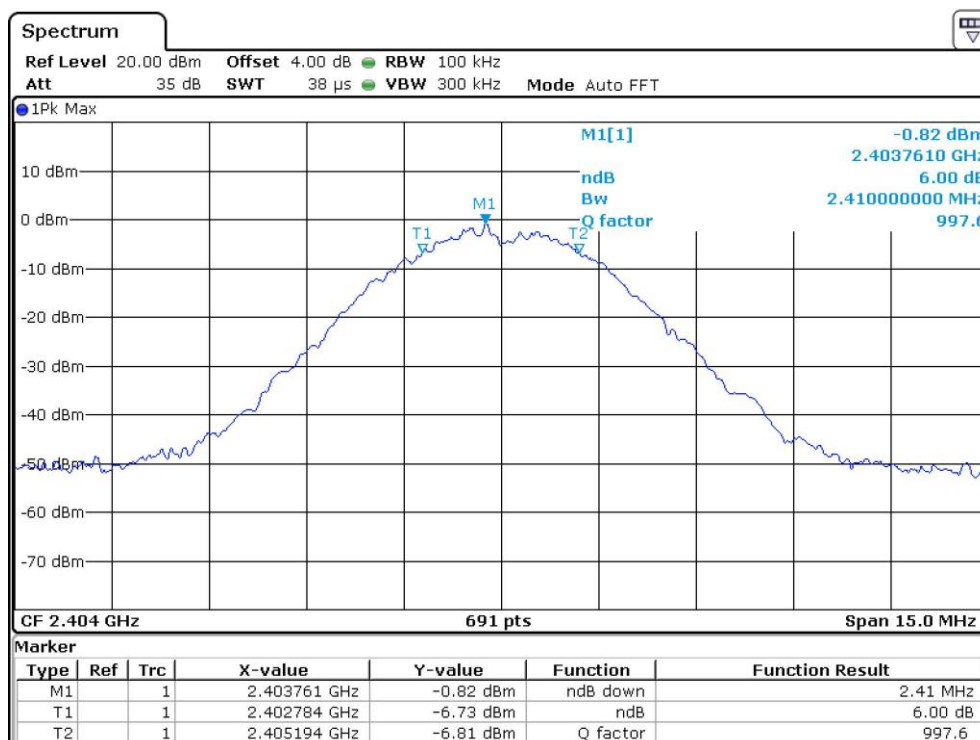
Limit: The 6 dB Bandwidth is at least 500 kHz.

ANT A

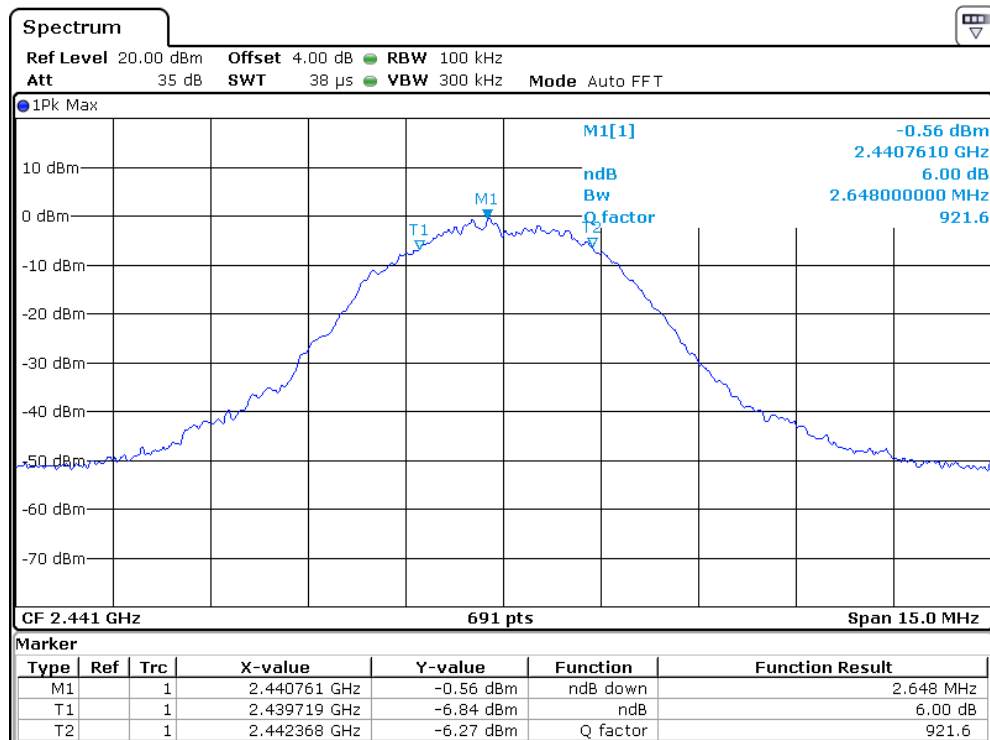
GFSK	
Frequency (MHz)	6 dB Bandwidth (MHz)
2404	2.410
2441	2.648
2476	2.670

The test plots are attached as below.

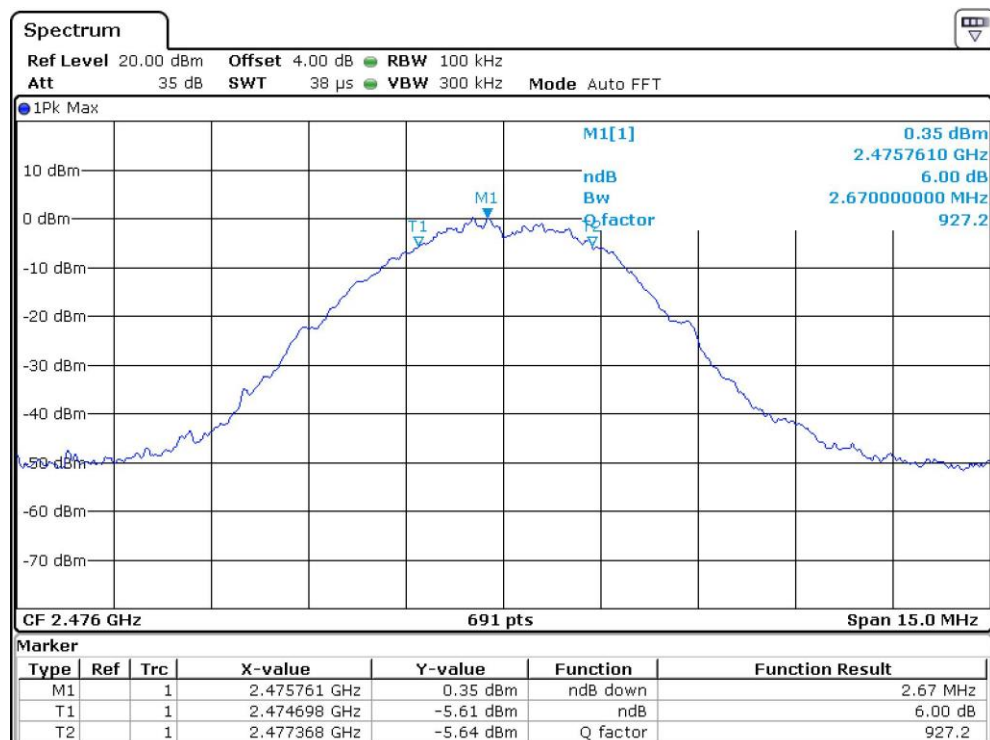
2404MHz:



2441MHz:



2476MHz:

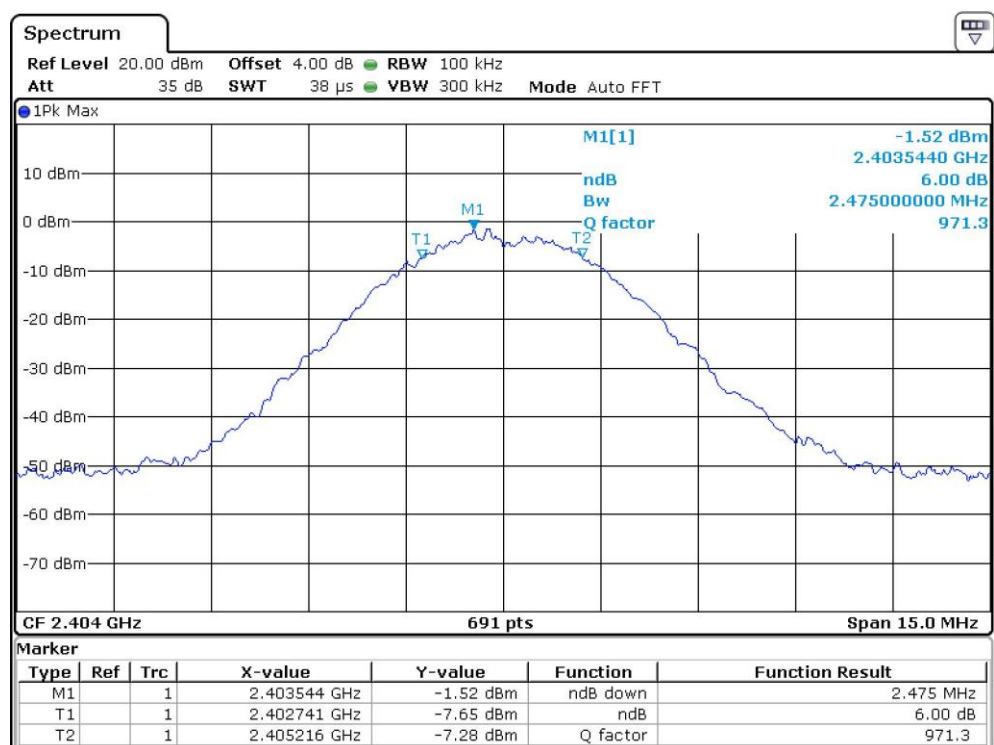


ANT B

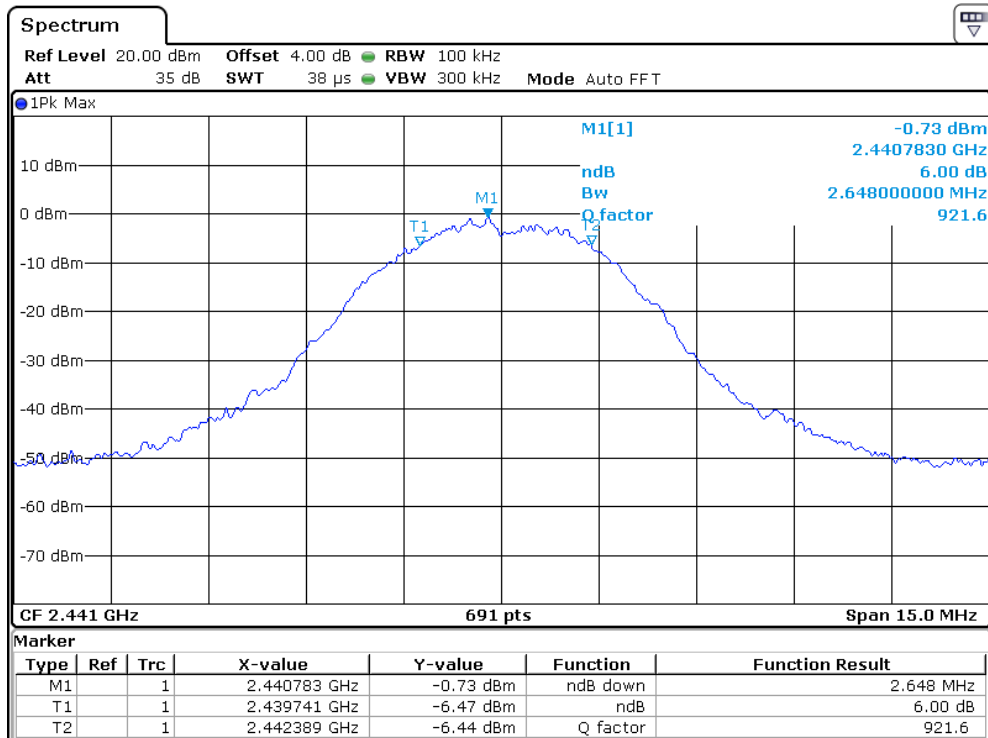
GFSK	
Frequency (MHz)	6 dB Bandwidth (MHz)
2404	2.475
2441	2.648
2476	2.627

The test plots are attached as below.

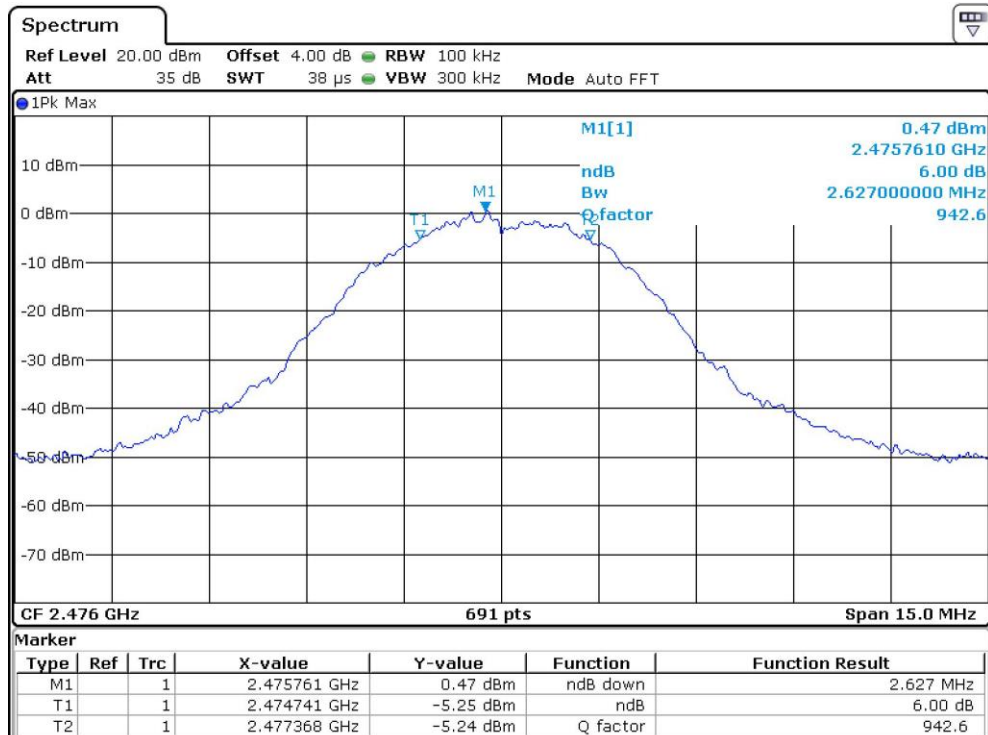
2404MHz:



2441MHz



2476MHz:



Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

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.

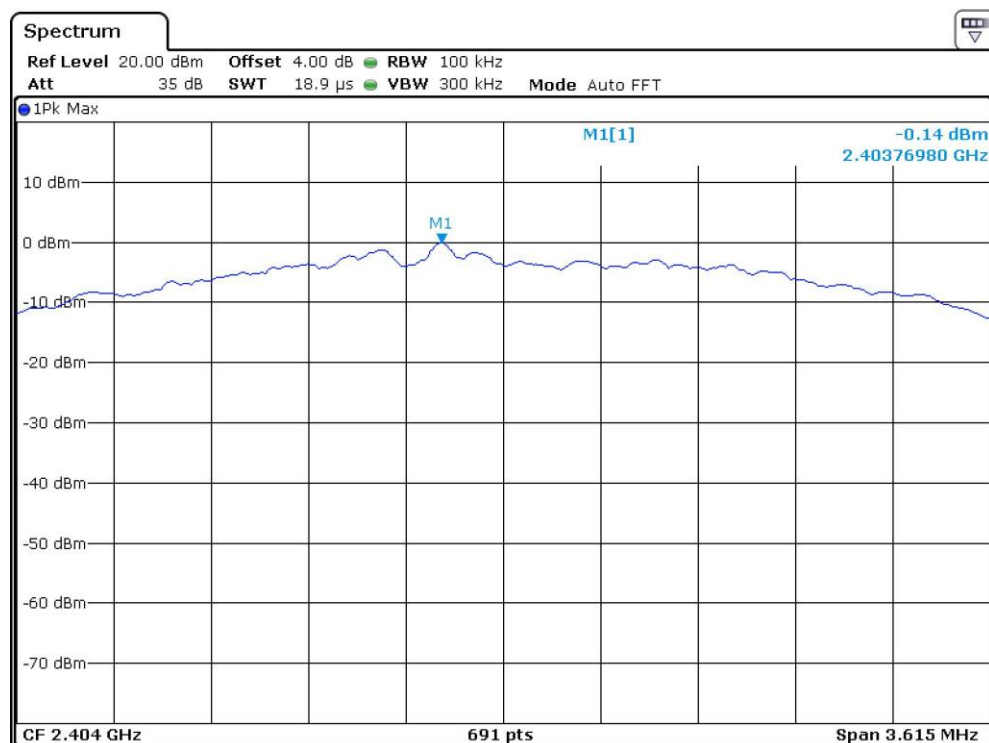
Limit: The Power Density does not exceed 8dBm/3 kHz.

ANT A

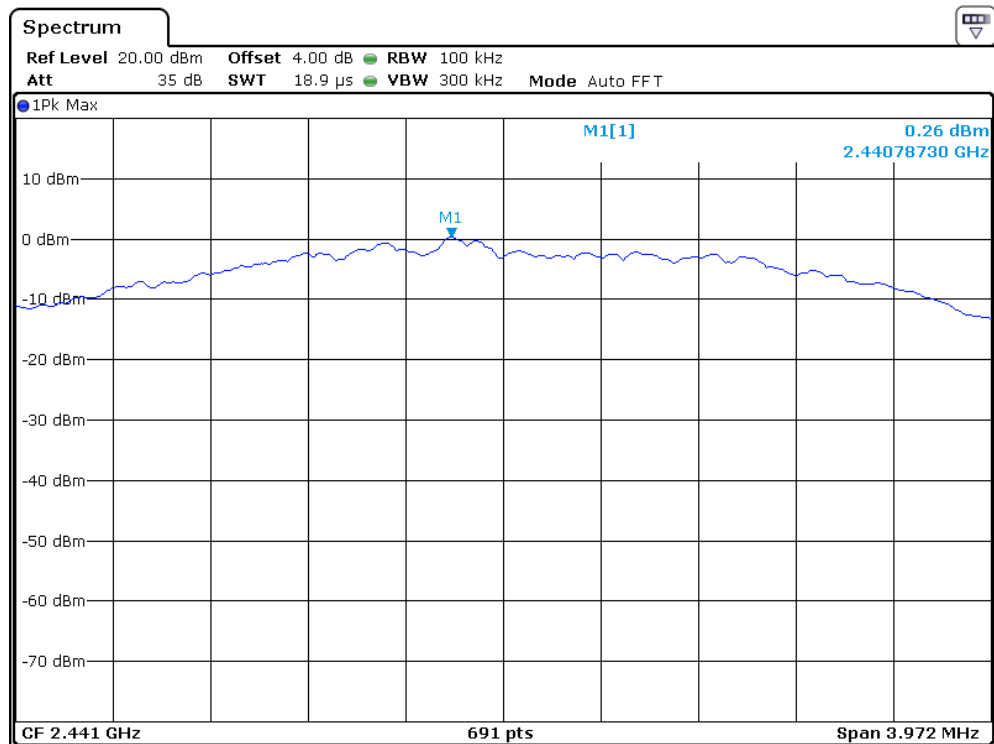
GFSK	
Frequency (MHz)	Power Density with RBW 100KHz
2404	-0.14
2441	0.26
2476	1.40

The test plots are attached as below.

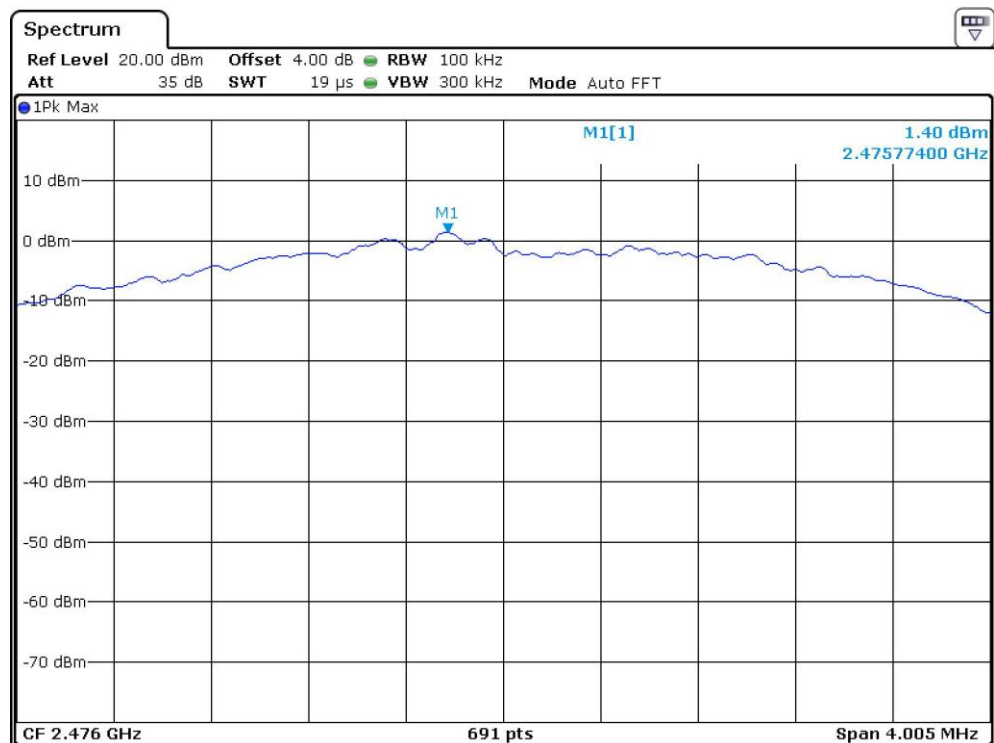
2404MHz:



2441MHz:



2476MHz:

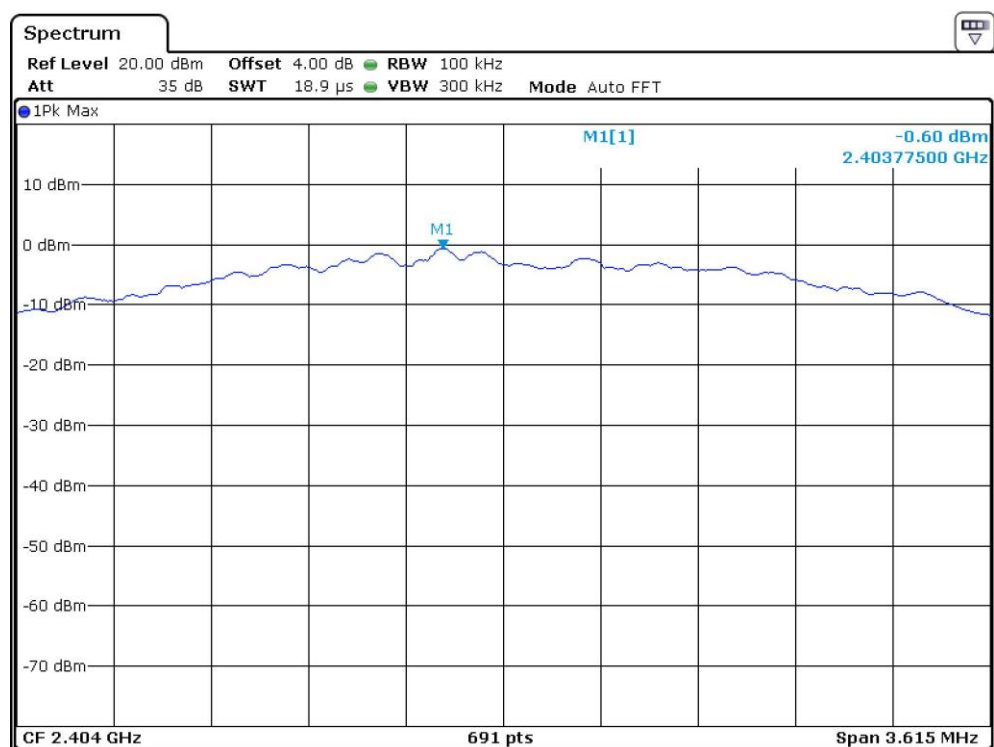


ANT B

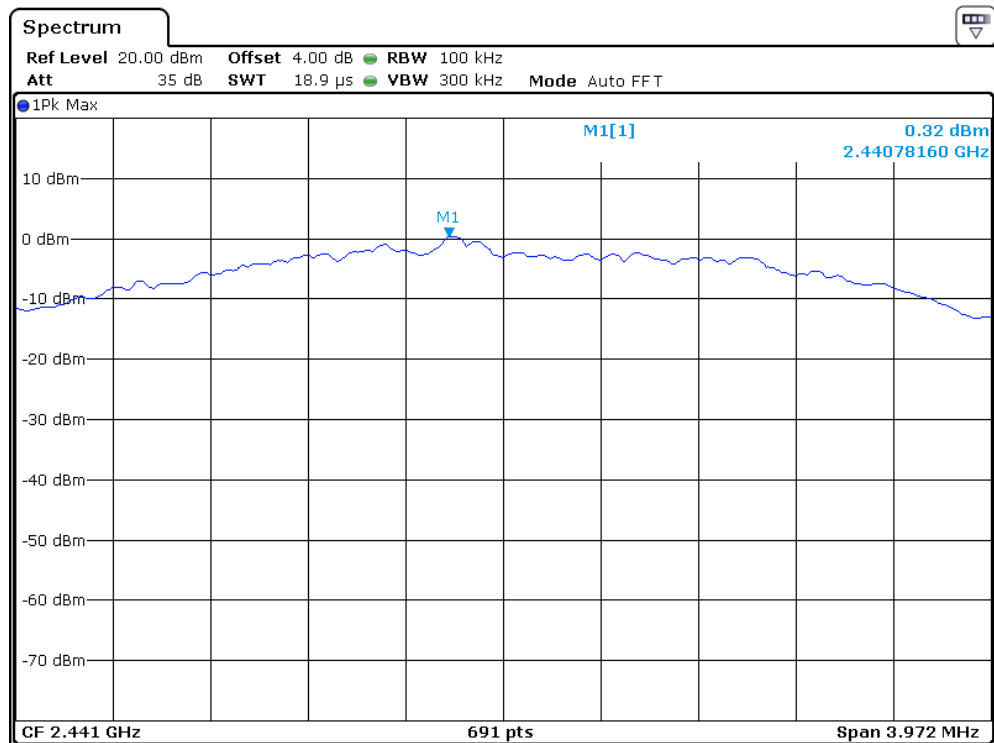
GFSK	
Frequency (MHz)	Power Density with RBW 100KHz
2404	-0.60
2441	0.32
2476	0.90

The test plots are attached as below.

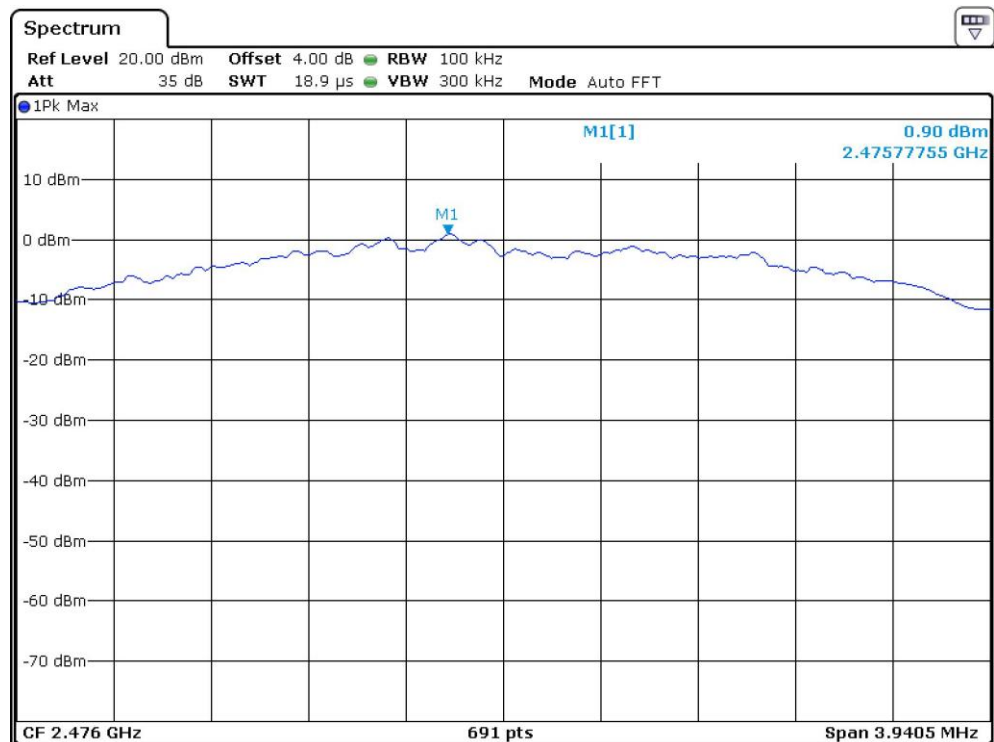
2404MHz:



2441MHz:



2476MHz:



Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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 v05r02.

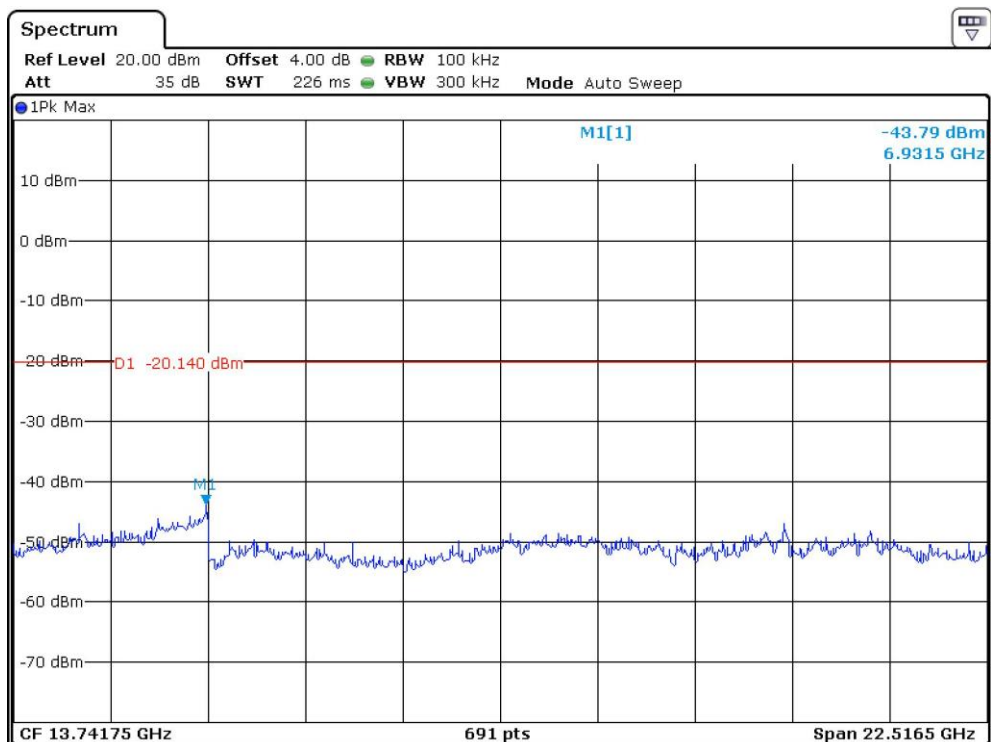
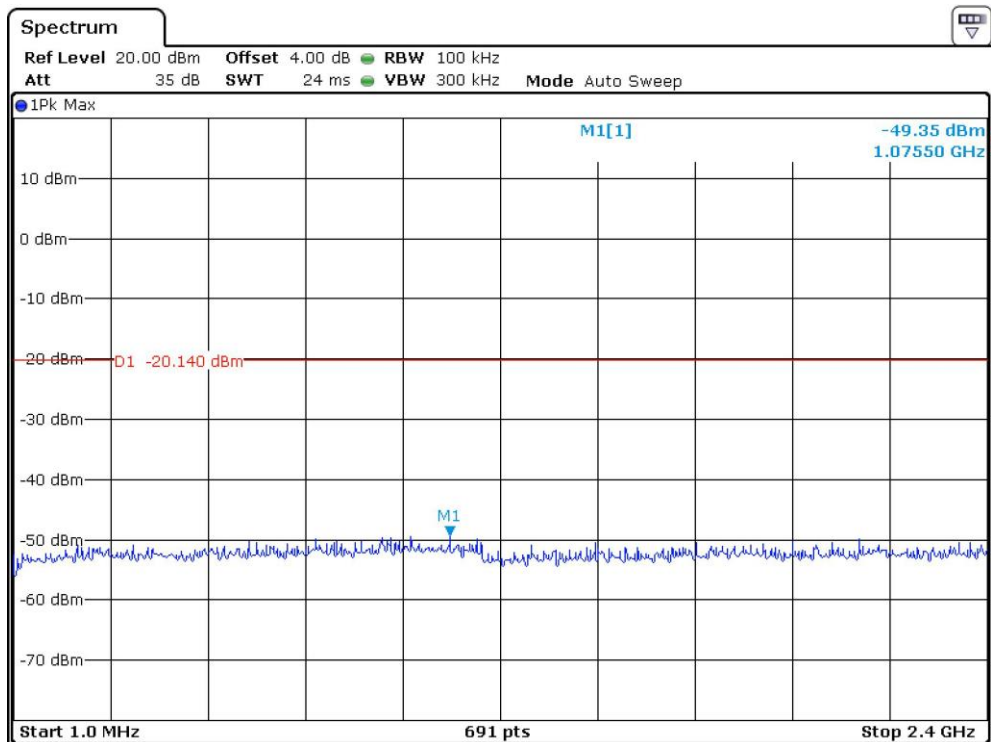
The type of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

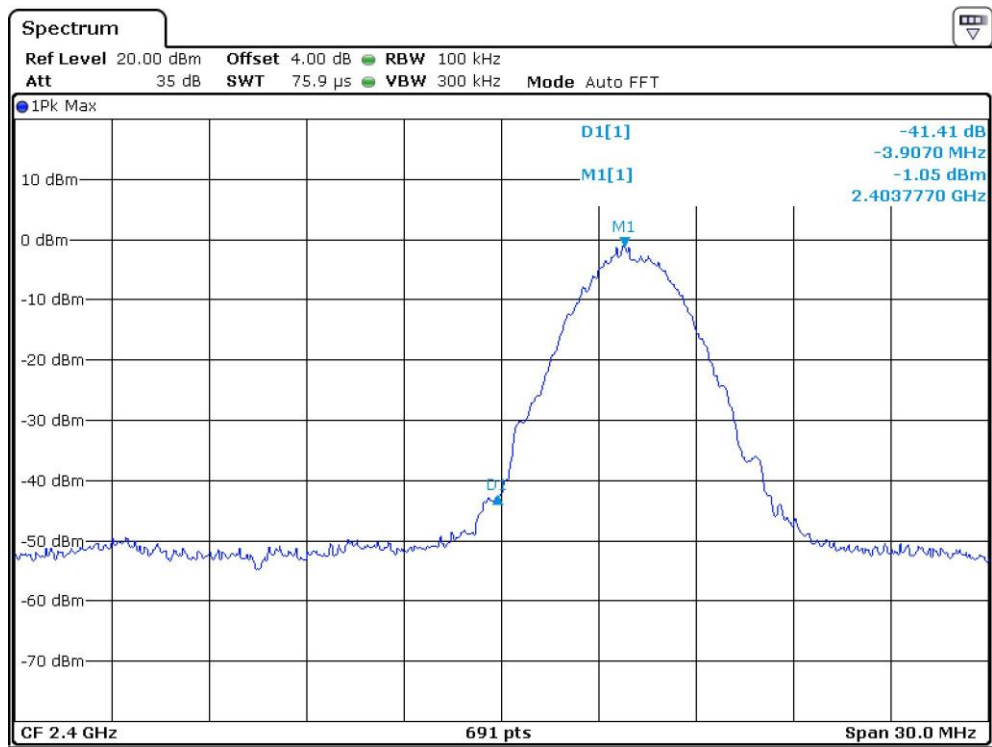
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

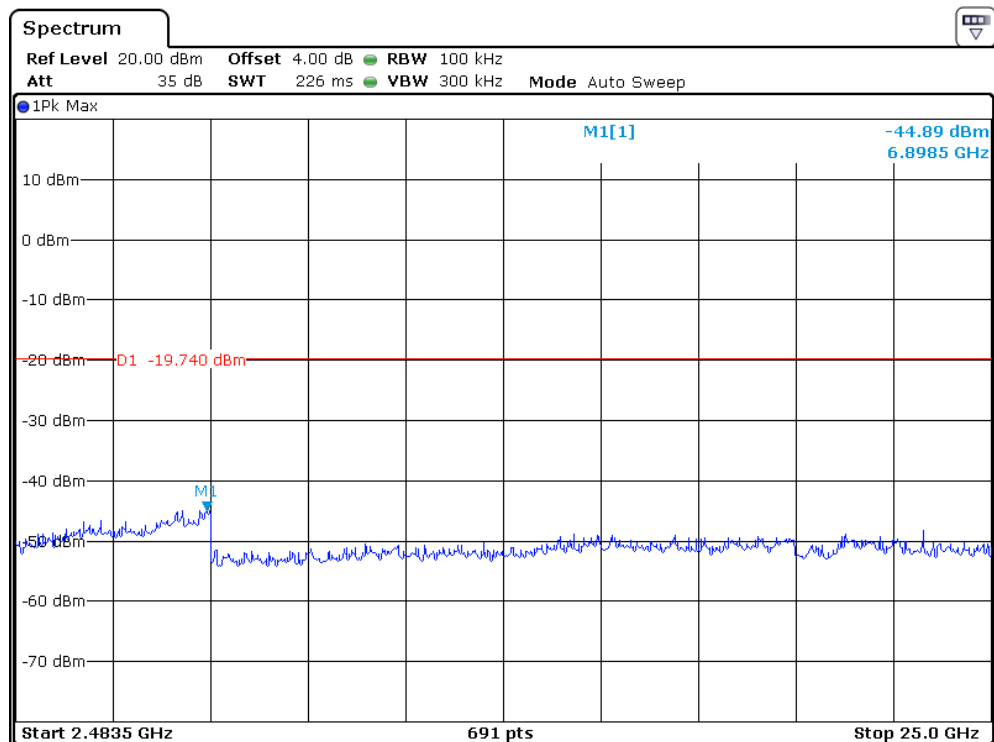
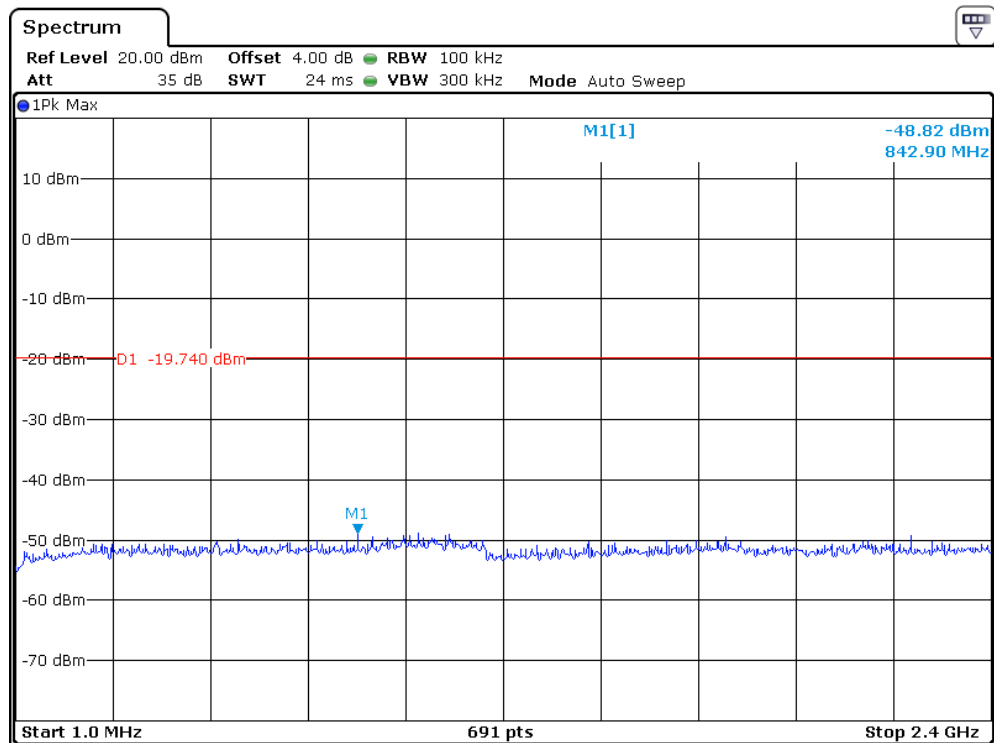
ANT A

2404MHz Reference Level: -0.14dBm

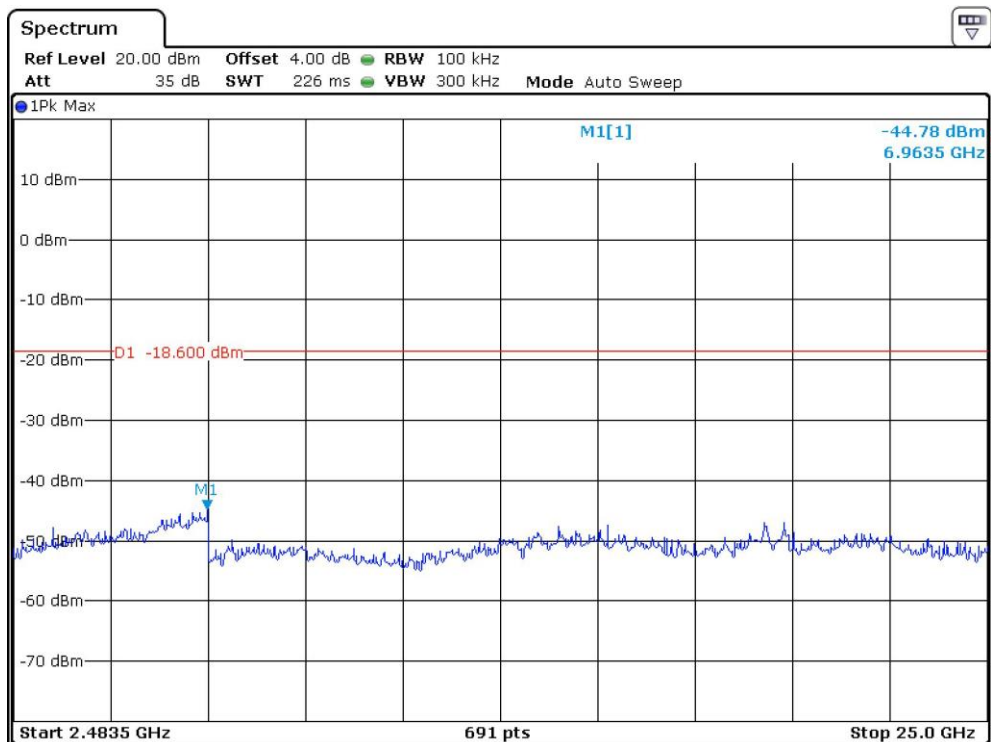
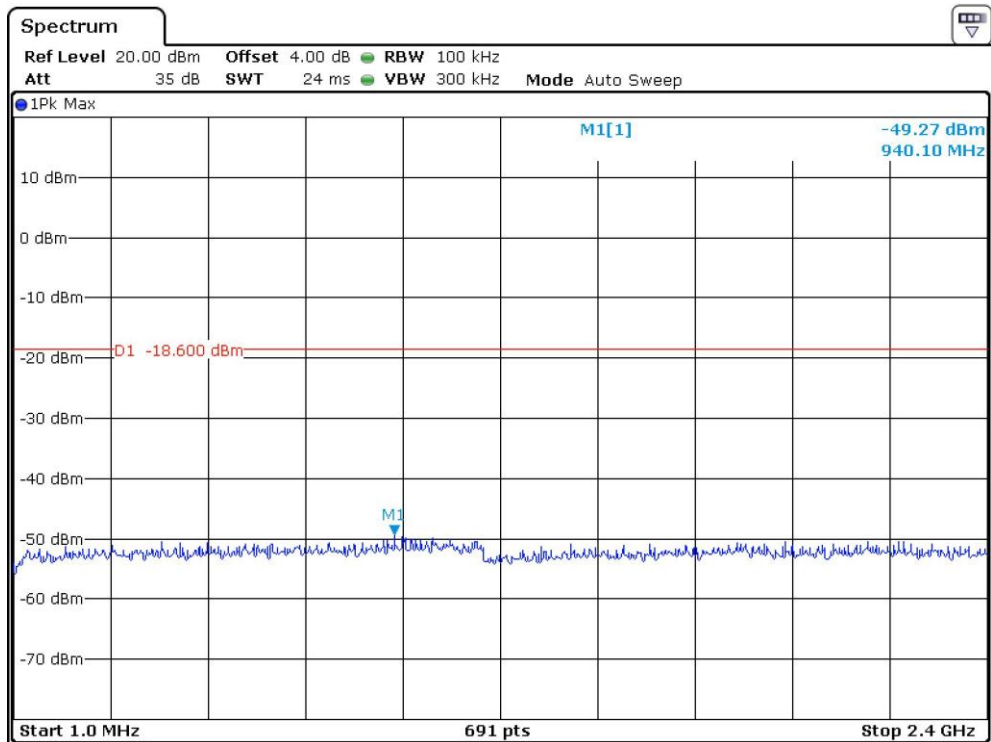


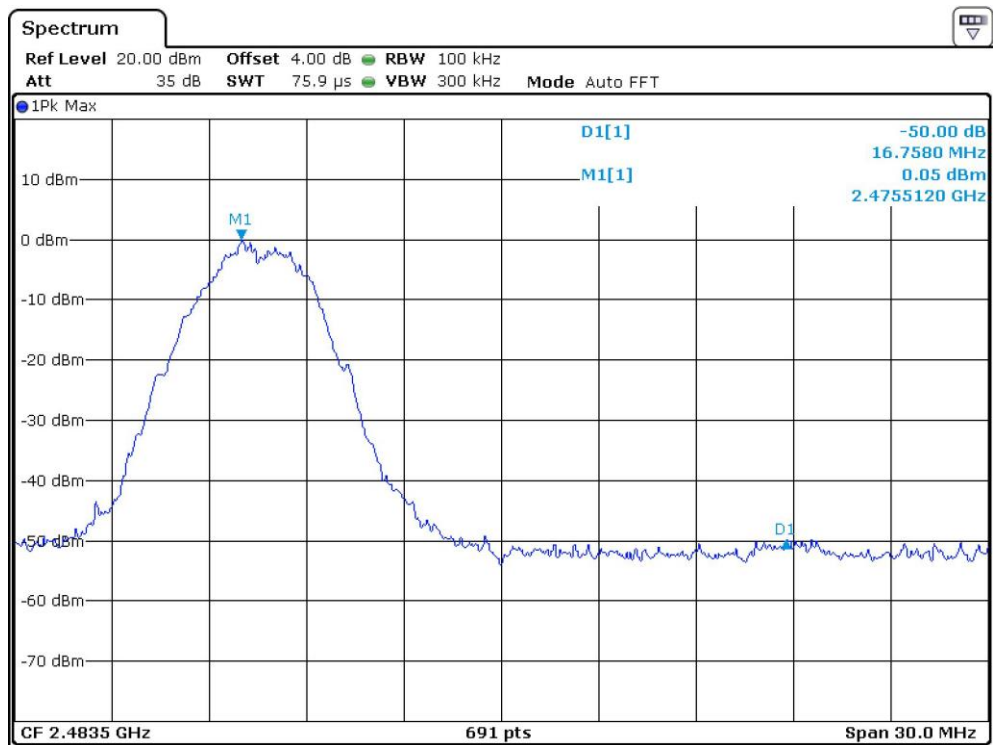


2441MHz Reference Level: 0.26dBm



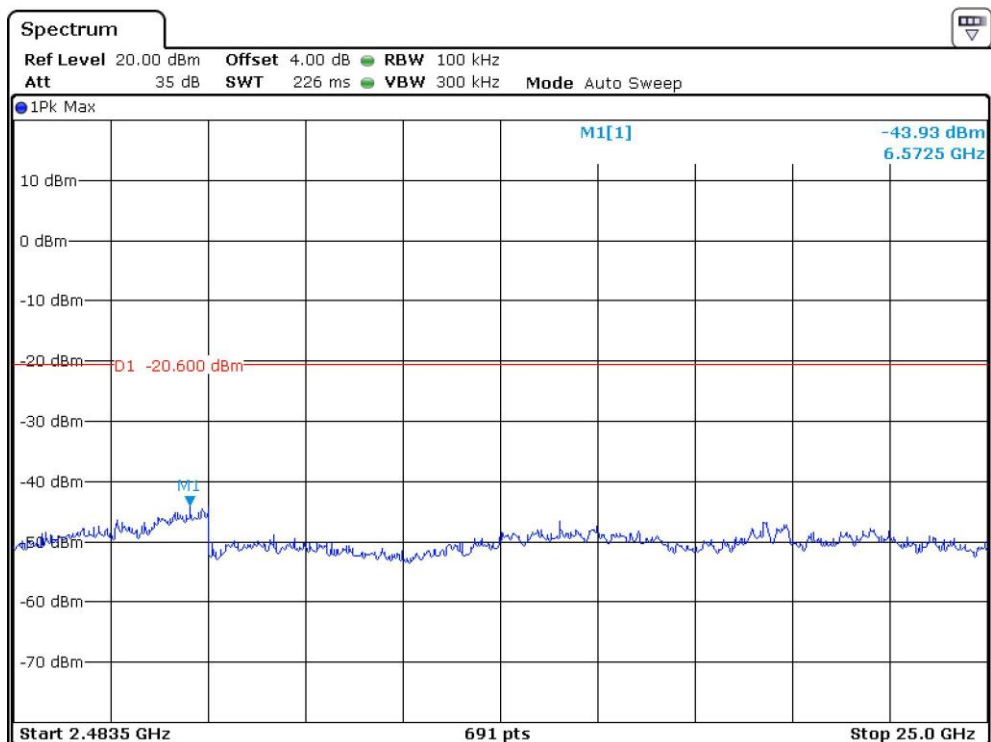
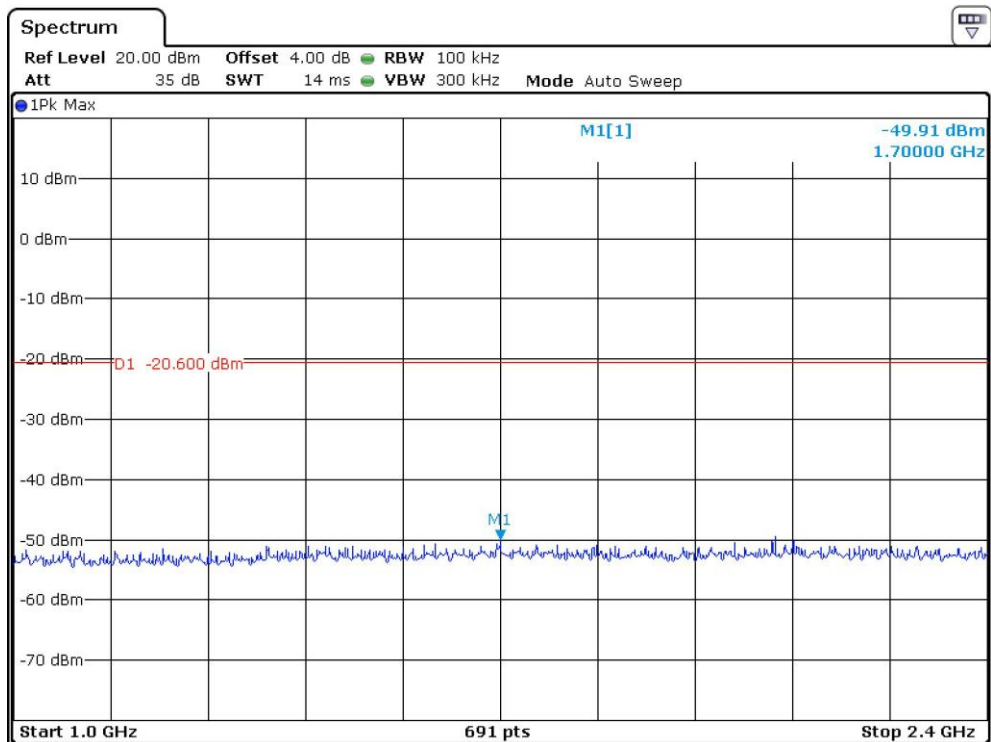
2476MHz Reference Level: 1.40dBm

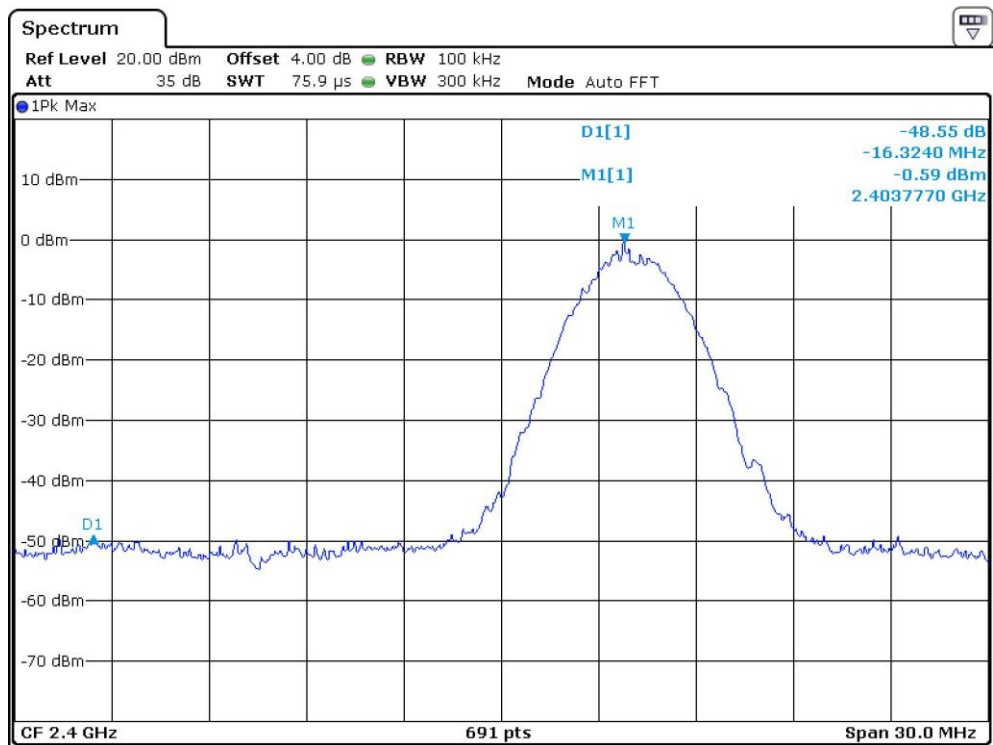




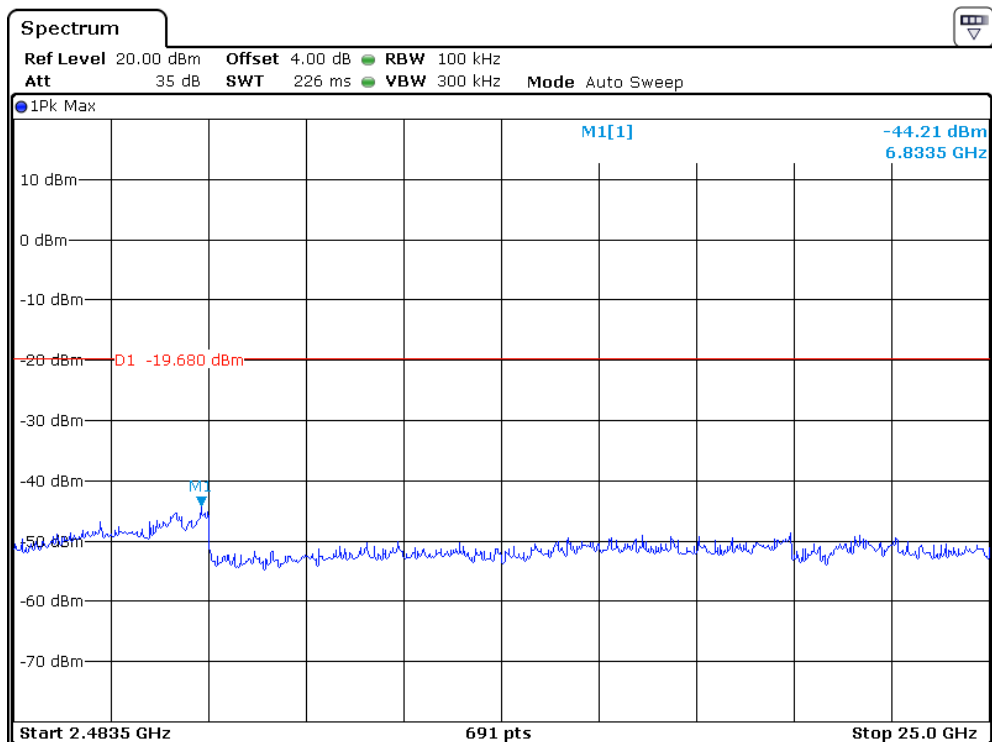
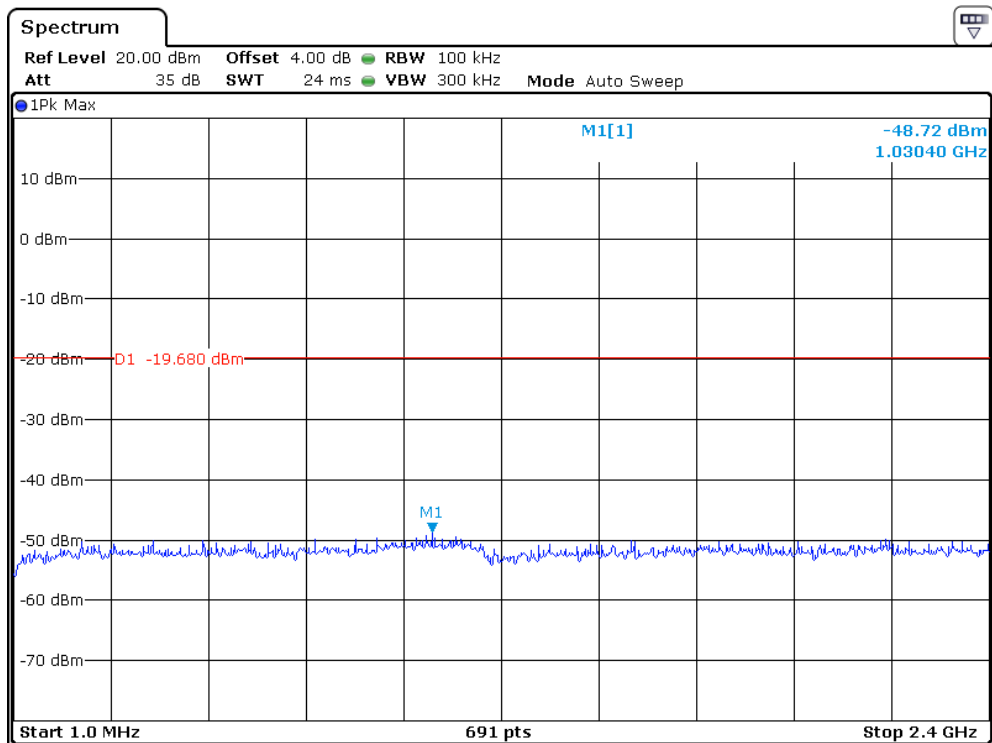
ANT B

2404MHz Reference Level: -0.60dBm

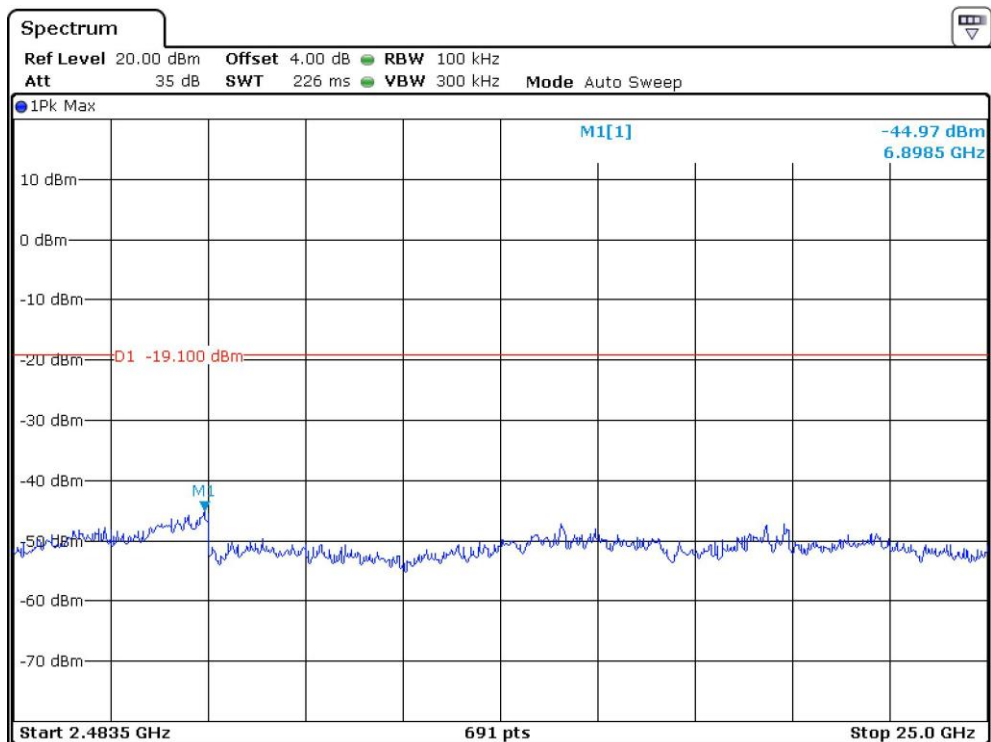
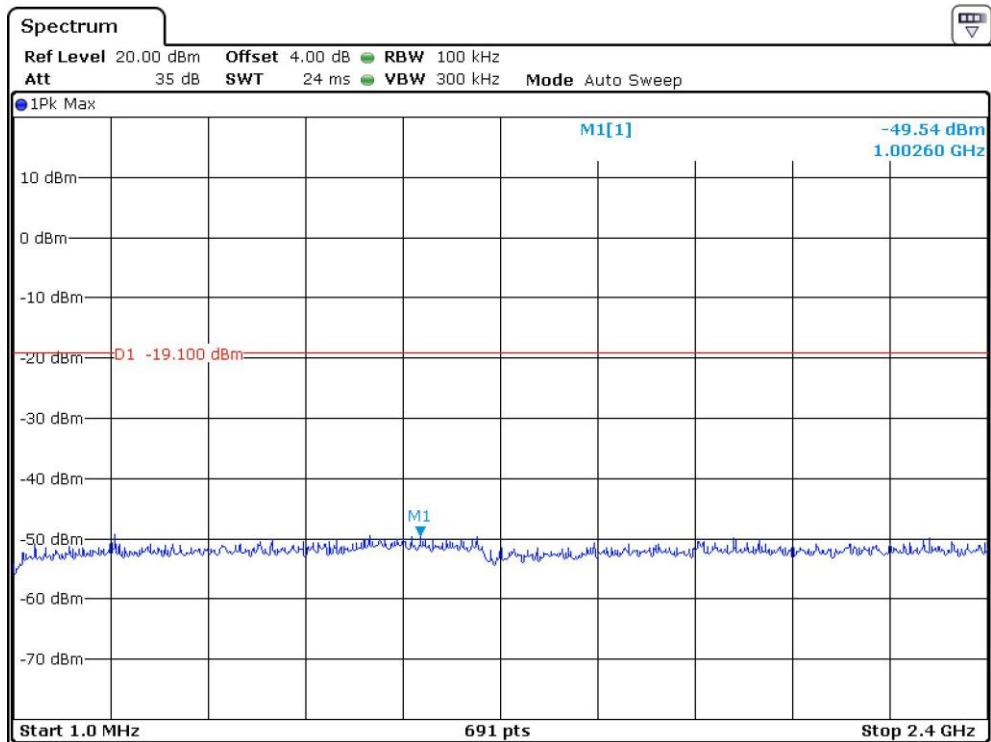


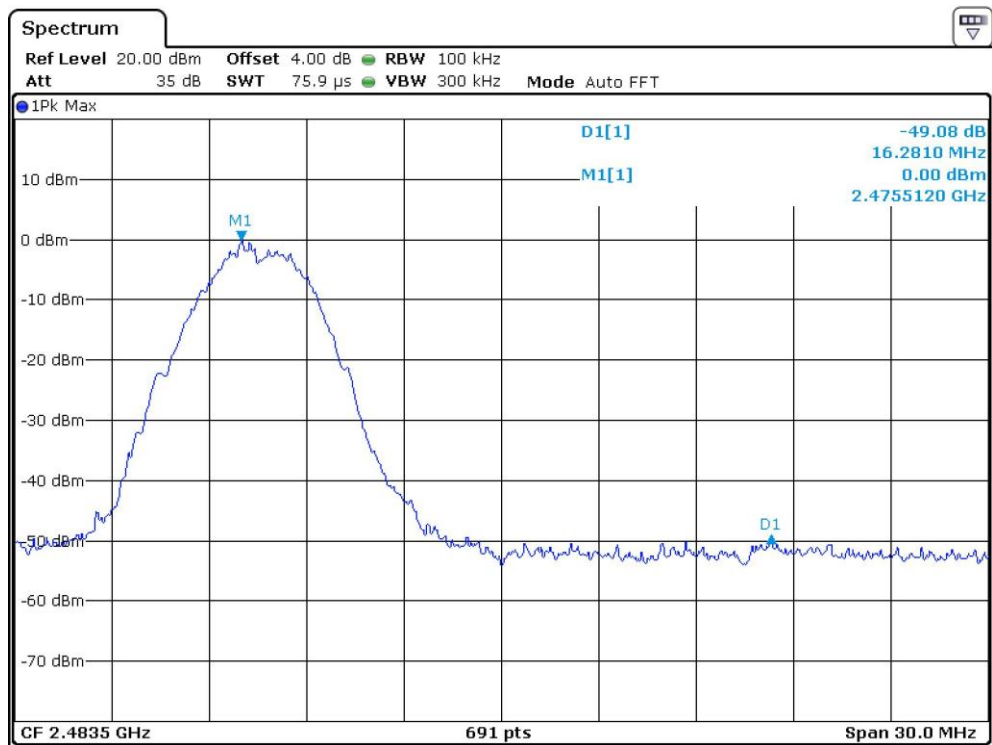


2441MHz Reference Level: 0.32dBm



2476MHz Reference Level: 0.90dBm





Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

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/m
- 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/m 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.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB/m}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m}$$

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

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (2.4G Transmission)
at 64.435000MHz
is passed by 10.4dB margin.

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

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

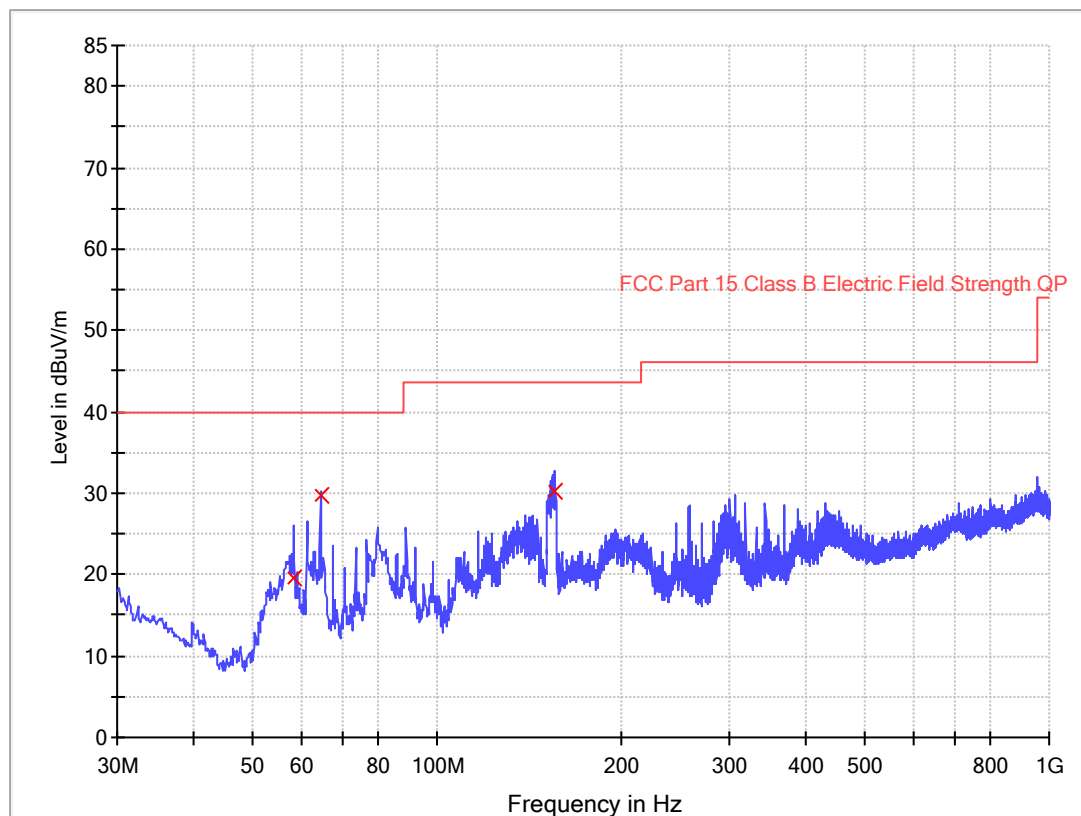
Worst Case and Operating Mode:

Model: U3120G

2.4G Transmission

ANT Polarity: Horizontal

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
58.251250	19.5	1000.0	120.000	100.0	H	8.2	20.5	40.0
64.435000	29.6	1000.0	120.000	100.0	H	8.1	10.4	40.0
155.372500	30.2	1000.0	120.000	100.0	H	11.8	13.3	43.5

Remark:

1. Corr. (dB/m)= Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Limit Line(dBuV/m) – Level (dBuV/m)

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

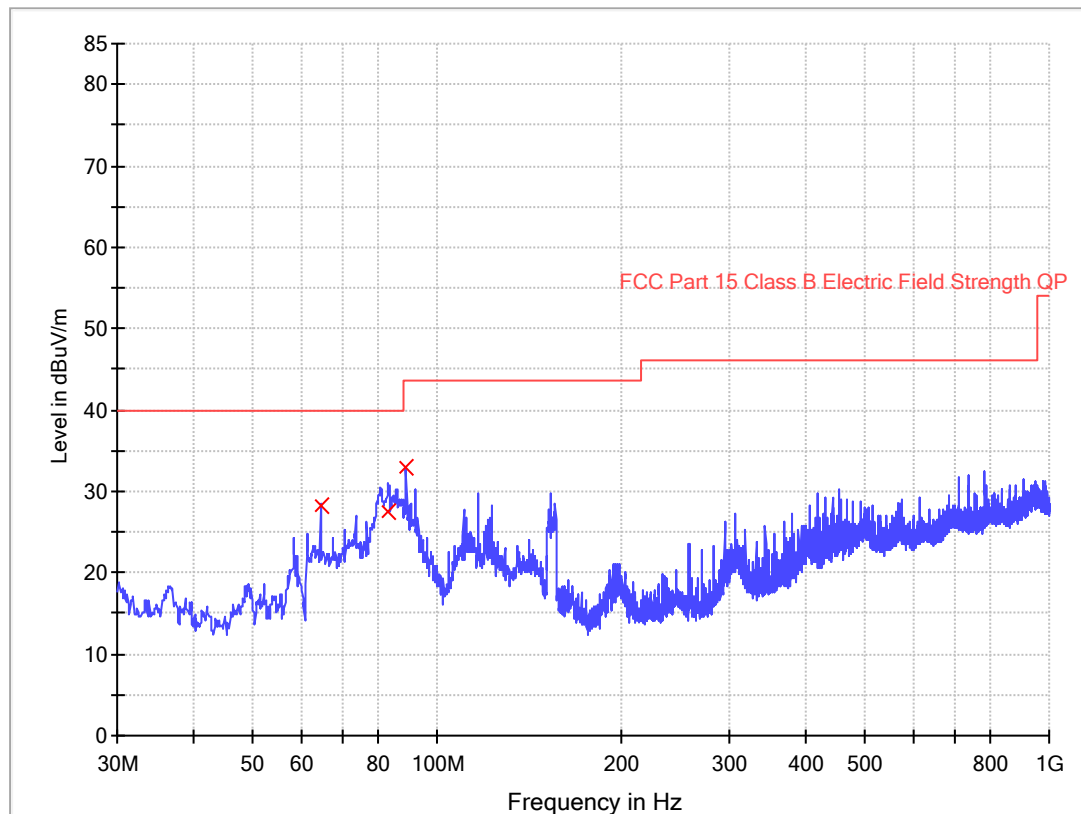
Worst Case and Operating Mode:

Model: U3120G

2.4G Transmission

ANT Polarity: Vertical

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
64.435000	28.2	1000.0	120.000	100.0	V	8.1	11.8	40.0
83.228750	27.5	1000.0	120.000	100.0	V	9.3	12.5	40.0
89.048750	33.0	1000.0	120.000	100.0	V	9.7	10.5	43.5

Remark:

1. Corr. (dB/m)= Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
3. Margin (dB) = Limit Line(dBμV/m) – Level (dBμV/m)

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Worst Case and Operating Mode:

Model: U3120G

Transmitting (ANT A 2404MHz)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4808.000	40.0	36.8	33.5	36.7	74.0	-37.3
Horizontal	*7212.000	48.7	36.4	29.1	41.4	74.0	-32.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4808.000	35.3	36.8	33.5	32.0	54.0	-22.0
Horizontal	*7212.000	45.5	36.4	29.1	38.2	54.0	-15.8

- 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: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Worst Case and Operating Mode:

Model: U3120G

Transmitting (ANT A 2441MHz)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4882.000	41.1	36.7	33.4	37.8	74.0	-36.2
Horizontal	*7323.000	46.0	36.6	35.8	45.2	74.0	-28.8

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4882.000	36.1	36.7	33.4	32.8	54.0	-21.2
Horizontal	*7323.000	40.0	36.6	35.8	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: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Worst Case and Operating Mode:

Model: U3120G

Transmitting (ANT A 2476MHz)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4952.000	40.5	36.8	33.3	37.0	74.0	-37.0
Horizontal	*7428.000	50.2	36.5	29.3	43.0	74.0	-31.0

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	*4952.000	34.3	36.8	33.3	30.8	54.0	-23.2
Horizontal	*7428.000	43.9	36.5	29.3	36.7	54.0	-17.3

- 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: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

4.9 Conducted Emission

Worst Case Conducted Emission
at 0.310000MHz
is passed by 11.4dB margin.

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

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

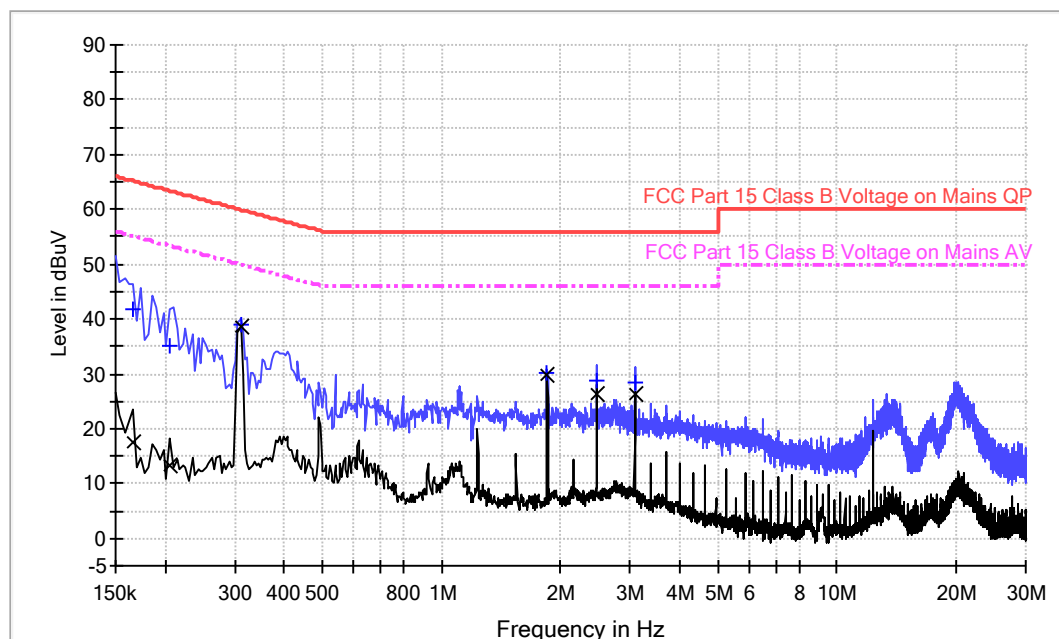
Worst Case and Operating Mode: 2.4G Transmission

Test Voltage: AC 120V/60Hz

Phase: Live

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.166000	41.7	9.000	L1	9.6	23.5	65.2
0.206000	35.1	9.000	L1	9.6	28.3	63.4
0.310000	39.0	9.000	L1	9.6	21.0	60.0
1.850000	30.1	9.000	L1	9.6	25.9	56.0
2.470000	28.6	9.000	L1	9.7	27.4	56.0
3.086000	28.6	9.000	L1	9.7	27.4	56.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.166000	17.6	9.000	L1	9.6	37.6	55.2
0.206000	13.3	9.000	L1	9.6	40.1	53.4
0.310000	38.6	9.000	L1	9.6	11.4	50.0
1.850000	29.9	9.000	L1	9.6	16.1	46.0
2.470000	26.5	9.000	L1	9.7	19.5	46.0
3.086000	26.4	9.000	L1	9.7	19.6	46.0

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

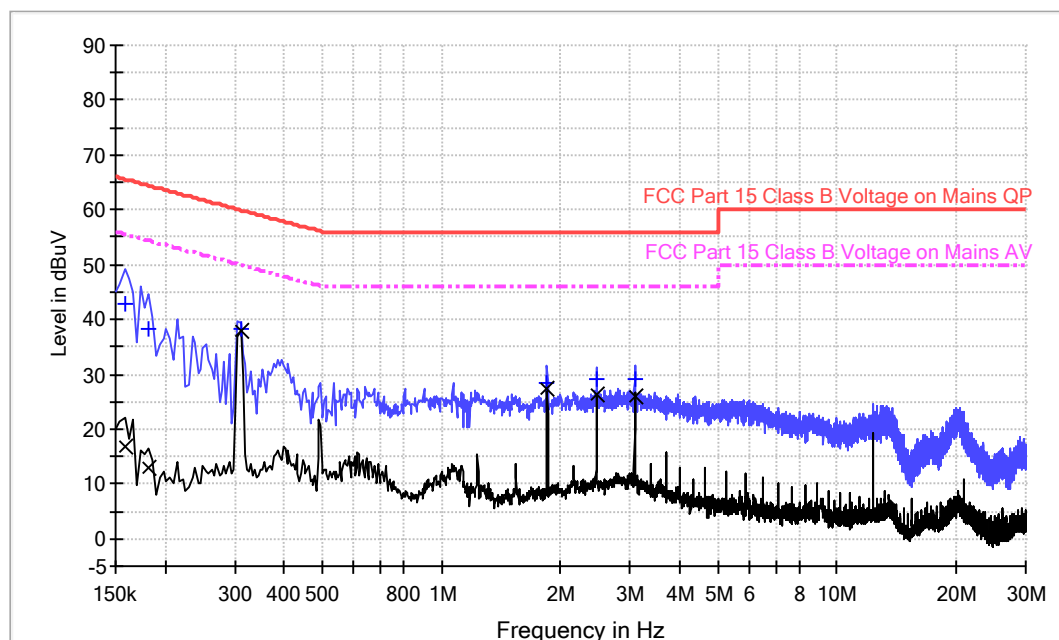
Test Voltage: AC 120V/60Hz

Worst Case and Operating Mode: 2.4G Transmission

Phase: Neutral

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	43.0	9.000	N	9.5	22.6	65.6
0.182000	38.2	9.000	N	9.5	26.2	64.4
0.310000	38.4	9.000	N	9.5	21.6	60.0
1.850000	28.3	9.000	N	9.5	27.7	56.0
2.470000	29.3	9.000	N	9.5	26.7	56.0
3.086000	29.1	9.000	N	9.5	26.9	56.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	16.8	9.000	N	9.5	38.8	55.6
0.182000	13.1	9.000	N	9.5	41.3	54.4
0.310000	38.0	9.000	N	9.5	12.0	50.0
1.850000	27.4	9.000	N	9.5	18.6	46.0
2.470000	26.1	9.000	N	9.5	19.9	46.0
3.086000	26.0	9.000	N	9.5	20.0	46.0



Total Quality. Assured.

TEST REPORT

Intertek Report No.: 220328030SZN-003

Applicant: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

4.10 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: Guoguang Electric Co.,Ltd

Date of Test: 09 April 2022

Model: U3120G

4.11 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.

5.0 Equipment Photographs

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

6.0 Product Labeling

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

7.0 Technical Specifications

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

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.

9.0 Confidentiality Request

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

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.

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	04-Aug-2021	04-Aug-2024
SZ185-03	EMI Receiver	R&S	ESR7	101975	20-Dec-2021	20-Dec-2022
SZ061-08	Horn Antenna	ETS	3115	00092346	05-Sep-2021	05-Sep-2024
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	18-May-2021	18-May-2023
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	10-May-2021	10-May-2022
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	20-Dec-2021	20-Dec-2022
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	10-May-2021	10-May-2022
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	12-Dec-2021	12-Dec-2024
SZ062-23	RF Cable	RADIAL	SF104PE	--	26-Oct-2021	26-Oct-2022
SZ062-35	RF Cable	RADIAL	A50-3.5M3.5M-8M	--	26-Oct-2021	26-Oct-2022
SZ062-30	RF Cable	RADIAL	A50-3.5M3.5M-4.5M	--	26-Oct-2021	26-Oct-2022
SZ062-31	RF Cable	RADIAL	A50-3.5M3.5M-1M		26-Oct-2021	26-Oct-2022
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	11-May-2021	11-May-2022
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	12-Jul-2021	12-Jul-2022
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	02-Nov-2021	02-Nov-2022
SZ187-02	Two-Line V-Network	R&S	ENV216	100072	12-May-2021	12-May-2022
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	26-Oct-2021	26-Oct-2022
SZ188-03	Shielding Room	ETS	RFD-100	4100	07-Jan-2020	07-Jan-2023

***** End of Report*****