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YIBIN WEIHENG DIGITAL COMPANY LIMITED

TEST REPORT

SCOPE OF WORK
FCC TESTING–I101 , NOQB5, NOXQI

REPORT NUMBER
181220025SZN-002

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TEST REPORT

Intertek Report No.: 181220025SZN-002

YIBIN WEIHENG DIGITAL COMPANY LIMITED

Application
For
Certification

FCC ID: 2AR7L-I101

TABLET PC

Model: I101, NOQB5, NOXQI

Brand name: N/A

2.4GHz Transceiver

Report No.: 181220025SZN-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:

Joanna Jiao
Engineer

Approved by:

Kidd Yang
Technical Supervisor
Date: 08 January, 2019

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List of attached file

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

MEASUREMENT/TECHNICAL REPORT

TABLET PC

Model: I101

FCC ID: 2AR7L-I101

This report concerns (check one) Original Grant ___X___Class II Change ____

Equipment Type: DSS - Part 15 Spread Spectrum Transmitter

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

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 ___X___

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

Report prepared by:

Joanna Jiao
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EXHIBIT 1

SUMMARY OF TEST RESULTS

1.0 Summary of Test results

TABLET PC

Model: I101

FCC ID: 2AR7L-I101

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
20 dB Bandwidth	15.247(a)(1)	Pass
Number of Hopping Frequencies	15.247(a)(1)	Pass
Carrier Frequency Separation	15.247(a)(1)	Pass
Dwell Time	15.247(a)(1)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	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.

EXHIBIT 2

GENERAL DESCRIPTION

2.0 General Description

2.1 Product Description

The equipment under test(EUT) is a TABLET PC with BT4.0 (dual-mode) operating in 2402-2480MHz and 2.4G WIFI function operating in 2412-2462MHz, The EUT is powered by DC 5V 3A from adapter and DC 3.8V 5000mAh rechargeable Li-Ion Battery . Bluetooth and WiFi transmitters are share one antenna, but cannot transmit simultaneously. For more detail information pls. refer to the user manual.

Bluetooth Version: 4.0 (dual-mode)
Antenna Type: Integral antenna
Antenna Gain: 1.5 dBi Max
Modulation Type: GFSK, π/4-DQPSK and 8-DPSK

For electronic filing, the brief circuit description is saved with filename: Model I101 Operational Description.pdf.

The Models: NOQB5, NOXQI are the same as the Model : I101 in hardware and electrical aspect. The difference in model number serves as marketing strategy.

2.2 Related Submittal(s) Grants

This is an application for certification of transceiver for the TABLET PC which has Bluetooth function (classic Bluetooth mode), and for the BLE, WIFI mode were tested and demonstrated in report 181220025SZN-003, 181220025SZN-004.

2.3 Test Methodology

All measurements were performed according to the procedures in ANSI C63.10: 2013. 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. All other measurements were made in accordance with the procedures in part 15 of CFR 47.

2.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101/102, Building B, QiaoAn Scientific Technology Park, Shangkeng 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.

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. Only the worst case data was reported.

All packets DH1, DH3 & DH5 mode in modulation type GFSK, π/4-DQPSK and 8-DPSK were tested and 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 unit was placed at the center of turntable and the rear of unit was flushed with the rear of the styrene 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.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the styrene table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

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 Tool:

Description	Manufacturer	Name	Version
EMI Test Software	R&S	EMC32-ME+	V1.0

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 YIBIN WEIHENG DIGITAL COMPANY LIMITED 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.
IPhone (Provided by Intertek)	Apple	A1303
AC Adapter (Provided by Applicant)	CY-Power	CYHA050300VWUL Input: 100-240Vac 50/60Hz Output: DC 5V,3.0A
Mini DHMI cable (Provided by Intertek)	/	Unshielded, 1m
Headset cable (Provided by Intertek)	/	Unshielded, 0.5m
USB cable (Provided by Applicant)	/	Unshielded, 0.1m
USB Memory 1 (Provided by Intertek)	/	SDCZ36-002G-P36
USB Memory 2 (Provided by Intertek)	/	SSK SFD010
Test TV (Provided by Intertek)	SONY	KDL-24EX520

EXHIBIT 4

MEASUREMENT RESULTS

4.0 Measurement Results

4.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 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 + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor 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 + AV

Assume a receiver reading of 62.0 dBµV 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, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB

FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

4.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: 1830 Test Setup Photos. pdf.

4.1.3 Radiated Emissions- FCC section 15.209

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission

at 30.485 MHz

Judgement: Passed by 4.1 dB

TEST PERSONNEL:

Sign on file

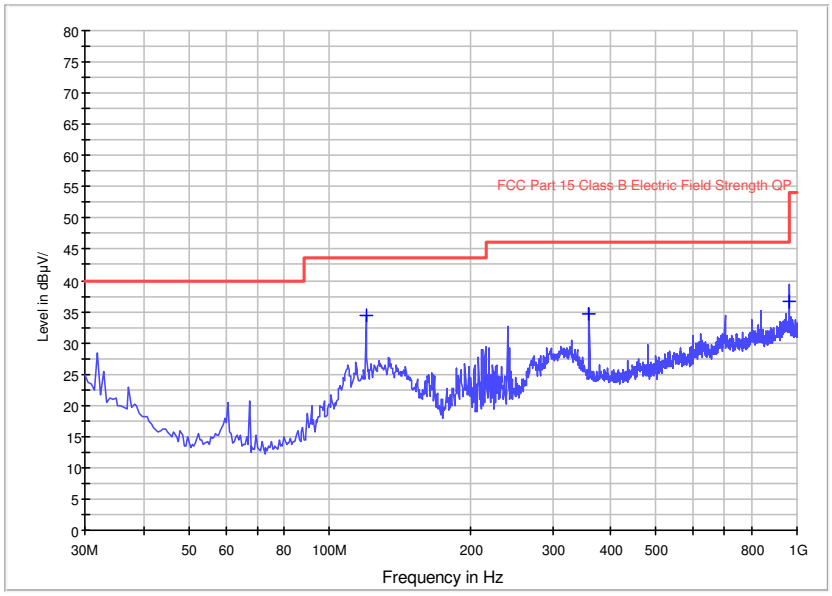
Joanna Jiao, Engineer
Typed/Printed Name

December 25, 2018
Date

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: December 25, 2018 Model: I101
Worst Case Operating Mode: Transmitting(2402MHz)

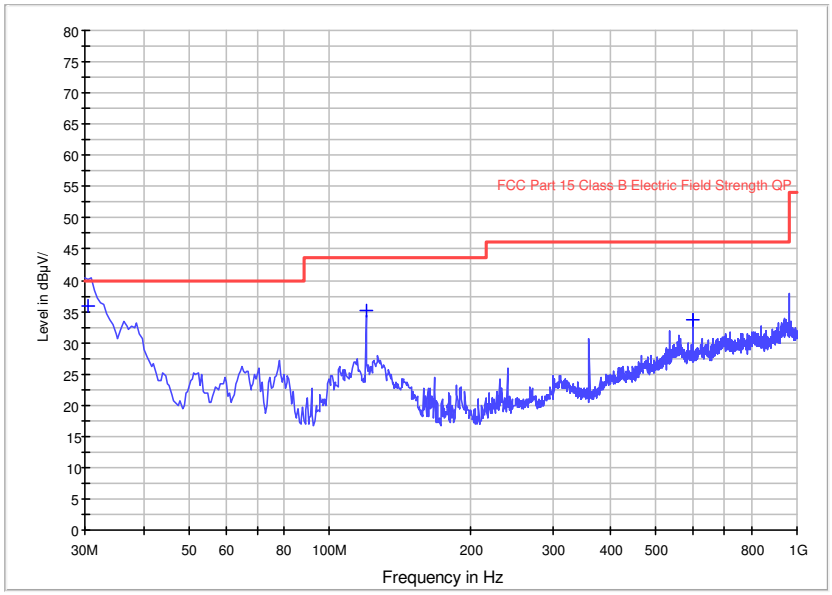
ANT Polarity: Horizontal

FCC Part 15



ANT Polarity: Vertical

FCC Part 15



Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: December 25, 2018 Model: I101
Worst Case Operating Mode: Transmitting(2402MHz)

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	120.000000	43.0	20.0	11.3	34.3	43.5	-9.2
Horizontal	359.800000	43.7	20.0	10.9	34.6	46.0	-11.4
Horizontal	960.230000	45.1	20.0	11.4	36.5	54.0	-17.5
Vertical	30.485000	40.6	20.0	15.3	35.9	40.0	-4.1
Vertical	119.725000	29.9	20.0	25.3	35.2	43.5	-8.3
Vertical	600.360000	27.1	20.0	26.6	33.7	46.0	-12.3

NOTES:
1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.
5. The spurious emissions were very low against the limit in the frequency range 9KHz to 30MHz. The amplitude of spurious emissions that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: December 27, 2018 Model: I101
Worst Case Operating Mode: Transmitting(2402MHz)

4.1.4 Transmitter Spurious Emissions (Radiated) - FCC section 15.209

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission

at 7323.000 MHz

Judgement: Passed by 11.4 dB

TEST PERSONNEL:

Sign on file

Joanna Jiao, Engineer
Typed/Printed Name

December 27, 2018
Date

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: December 27, 2018 Model: I101
Worst Case Operating Mode: Transmitting (2402MHz)

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	**2402.000	107.2	36.7	28.1	98.6	--	--
Horizontal	*4804.000	48.3	36.7	35.5	47.1	74.0	-26.9
Horizontal	*2388.500	43.2	36.1	36.5	43.6	74.0	-30.4

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	**2402.000	105.2	36.7	28.1	96.6	--	--
Horizontal	*4804.000	38.7	36.7	35.5	37.5	54.0	-16.5
Horizontal	*2388.500	35.8	36.1	36.5	36.2	54.0	-17.8

Notes: 1. RBW=1MHz/VBW=3MHz was used for peak measurements and Average measurements were made with measurement instrumentation employing an average detector function using a minimum resolution bandwidth of 1 MHz.

2. All measurements were made at 3 meters.

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 and RSS Gen (issue 4) - 8.10. The corresponding limit as per 15.209 and RSS Gen (issue 4) - 8.9 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.

** Fundamental emission was measured for determining band-edge compliance of using delta measurement technique.

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: December 27, 2018 Model: I101
Worst Case Operating Mode: Transmitting (2441MHz)

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	*4882.000	48.1	36.7	35.5	46.9	74.0	-27.1
Horizontal	*7323.000	52.6	36.1	36.5	53.0	74.0	-21.0

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	*4882.000	38.1	36.7	35.5	36.9	54.0	-17.1
Horizontal	*7323.000	42.2	36.1	36.5	42.6	54.0	-11.4

Notes: 1. RBW=1MHz/VBW=3MHz was used for peak measurements and Average measurements were made with measurement instrumentation employing an average detector function using a minimum resolution bandwidth of 1 MHz.

2. All measurements were made at 3 meters.

3. Negative value in the margin column shows emission below limit.

3. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205 and RSS Gen (issue 4) - 8.10. The corresponding limit as per 15.209 and RSS Gen (issue 4) - 8.9 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: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: December 27, 2018 Model: I101
Worst Case Operating Mode: Transmitting (2480MHz)

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	**2480.000	104.9	36.7	28.1	96.3	--	--
Horizontal	*4960.000	47.5	36.7	35.5	46.3	74.0	-27.7
Horizontal	*7440.000	51.1	36.1	36.5	51.5	74.0	-22.5

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	**2480.000	104.0	36.7	28.1	95.4	--	--
Horizontal	*4960.000	37.5	36.7	35.5	36.3	54.0	-17.7
Horizontal	*7440.000	42.0	36.1	36.5	42.4	54.0	-11.6

Notes: 1. RBW=1MHz/VBW=3MHz was used for peak measurements and Average measurements were made with measurement instrumentation employing an average detector function using a minimum resolution bandwidth of 1 MHz.

2. All measurements were made at 3 meters.

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 and RSS Gen (issue 4) - 8.10. The corresponding limit as per 15.209 and RSS Gen (issue 4) - 8.9 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.

** Fundamental emission was measured for determining band-edge compliance of using delta measurement technique.

4.2 Conducted Emission at Mains Terminal

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

Worst Case Conducted Configuration

at 0.442 MHz

Judgement: Passed by 9.0 dB margin

TEST PERSONNEL:

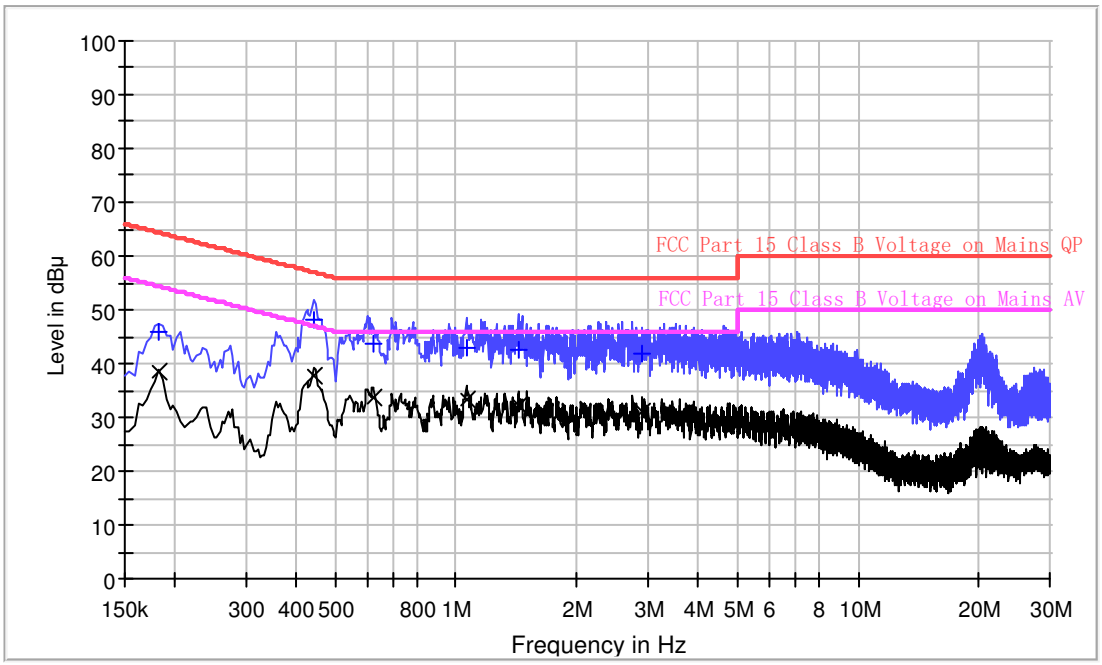
Sign on file

Joanna Jiao, Engineer
Typed/Printed Name

December 25, 2018
Date

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Model: I101
Worst Case Operating Mode: Charging+BT Link
Phase: Live

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB¦ÌV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB¦ÌV)
0.182000	46.0	9.000	L1	9.6	18.4	64.4
0.442000	48.0	9.000	L1	9.6	9.0	57.0
0.620000	43.7	9.000	L1	9.7	12.3	56.0
1.062000	42.9	9.000	L1	9.7	13.1	56.0
1.434000	42.7	9.000	L1	9.7	13.3	56.0
2.910000	41.8	9.000	L1	9.7	14.2	56.0

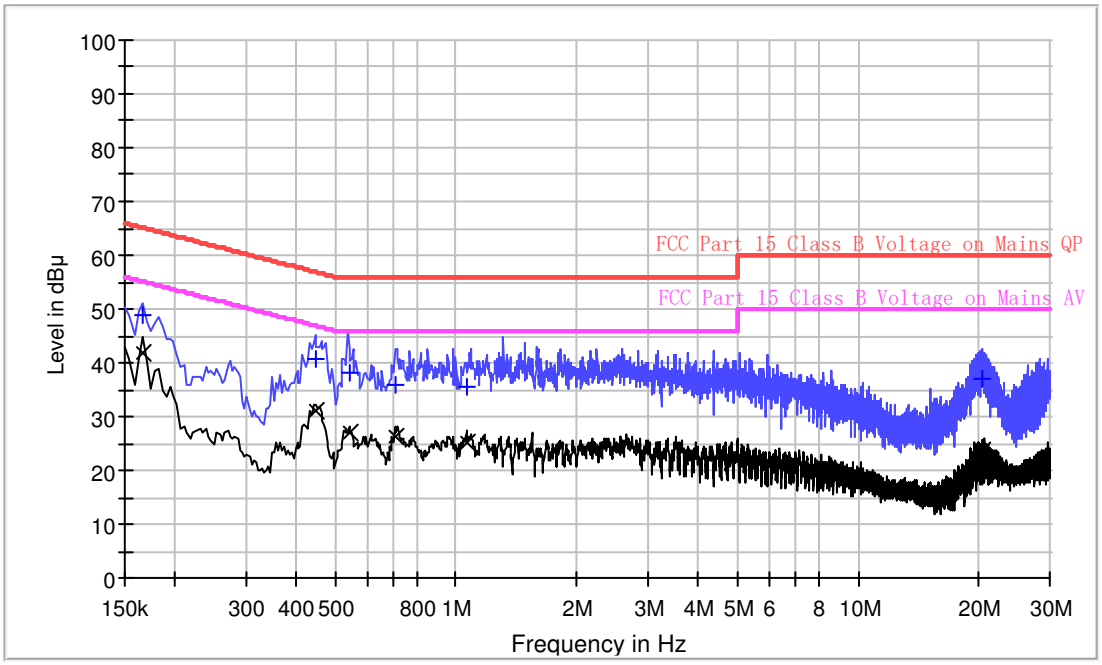
Result Table AV

Frequency (MHz)	Average (dB¦ÌV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB¦ÌV)
0.182000	38.5	9.000	L1	9.6	15.9	54.4
0.442000	38.0	9.000	L1	9.6	9.0	47.0
0.620000	33.9	9.000	L1	9.7	12.1	46.0
1.062000	33.2	9.000	L1	9.7	12.8	46.0
1.434000	32.4	9.000	L1	9.7	13.6	46.0
2.910000	31.1	9.000	L1	9.7	14.9	46.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Model: I101
Worst Case Operating Mode: Charging+BT Link
Phase: Neutral

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB¦ÌV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB¦ÌV)
0.166000	49.0	9.000	N	9.6	16.2	65.2
0.446000	40.8	9.000	N	9.6	16.1	56.9
0.542000	38.1	9.000	N	9.7	17.9	56.0
0.710000	36.1	9.000	N	9.7	19.9	56.0
1.066000	35.6	9.000	N	9.7	20.4	56.0
20.254000	37.1	9.000	N	10.2	22.9	60.0

Result Table AV

Frequency (MHz)	Average (dB¦ÌV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB¦ÌV)
0.166000	41.8	9.000	N	9.6	13.4	55.2
0.446000	31.3	9.000	N	9.6	15.6	46.9
0.542000	26.9	9.000	N	9.7	19.1	46.0
0.710000	26.2	9.000	N	9.7	19.8	46.0
1.066000	25.2	9.000	N	9.7	20.8	46.0
20.254000	23.7	9.000	N	10.2	26.3	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

4.3 Peak Power

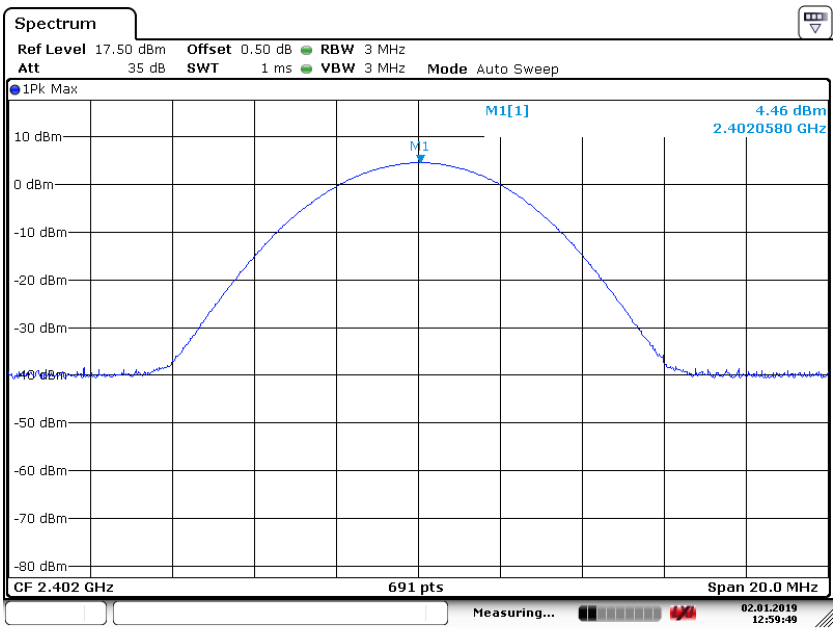
Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1).
The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW > 20dB bandwidth and power was read directly in dBm.
For antenna with gains of 6dBi or less, and frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, the systems operate with an output power no greater than 125 mW.

Worst case result:

Antenna Gain = 1.5dBi			
Modulation Type	Frequency (MHz)	Output Power (Peak Reading) (dBm)	Output Power (mW)
GFSK	2402	4.46	2.79
	2441	4.77	3.00
	2480	4.83	3.04

Cable loss, external attenuation has been included in OFFSET(0.5dB) function.

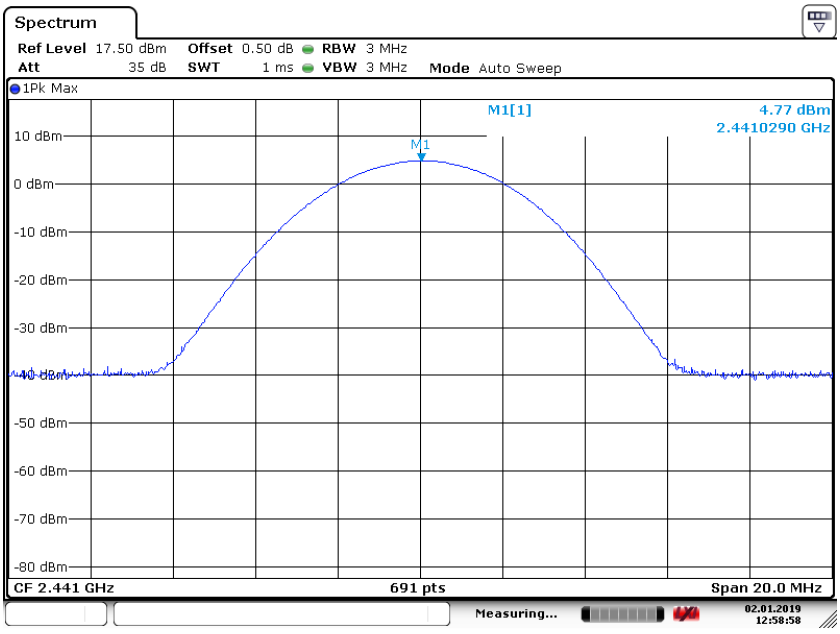
Power Plot
2402MHz:



Date: 2.JAN.2019 12:59:49

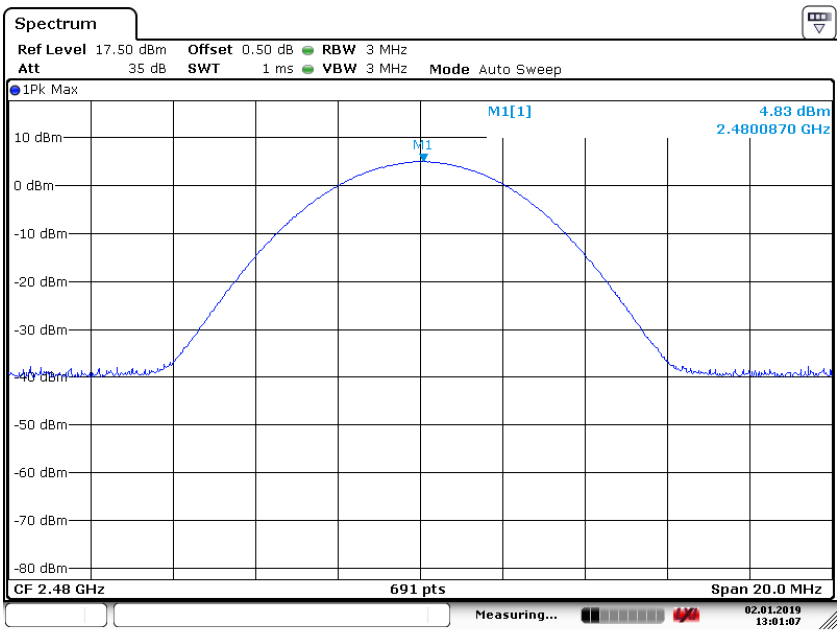
Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

2441MHz



Date: 2.JAN.2019 12:58:59

2480MHz:



Date: 2.JAN.2019 13:01:08

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

4.4 20dB Bandwidth

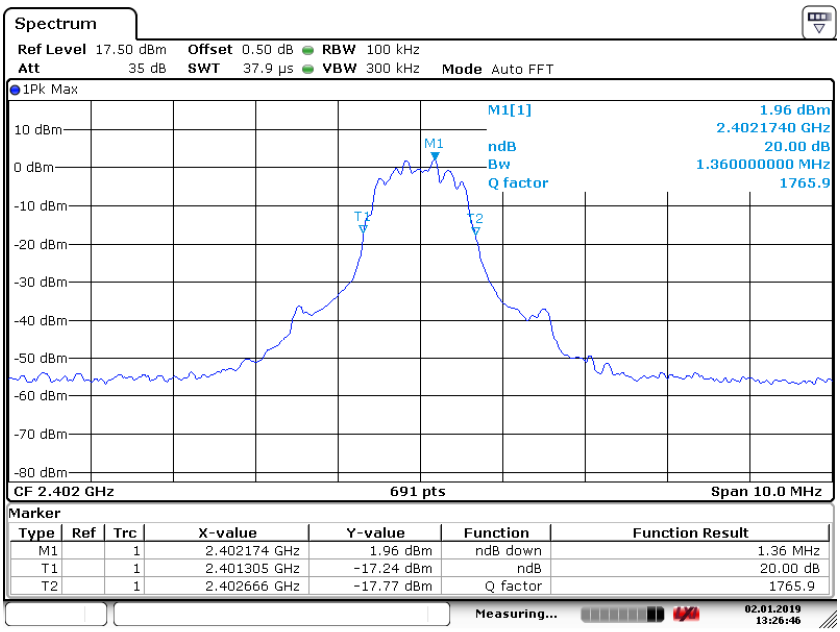
Maximum 20dB RF Bandwidth, FCC Rule 15.247(a) (1):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

Frequency (MHz)	20 dB Bandwidth (MHz)
2402	1.36
2441	1.36
2480	1.36

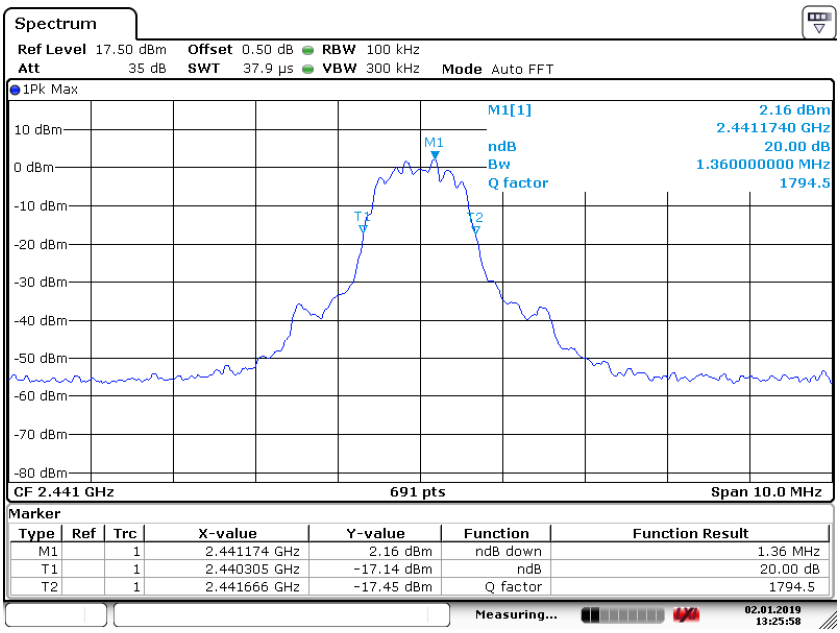
Worst Case Modulation Type: 8DPSK

CH00



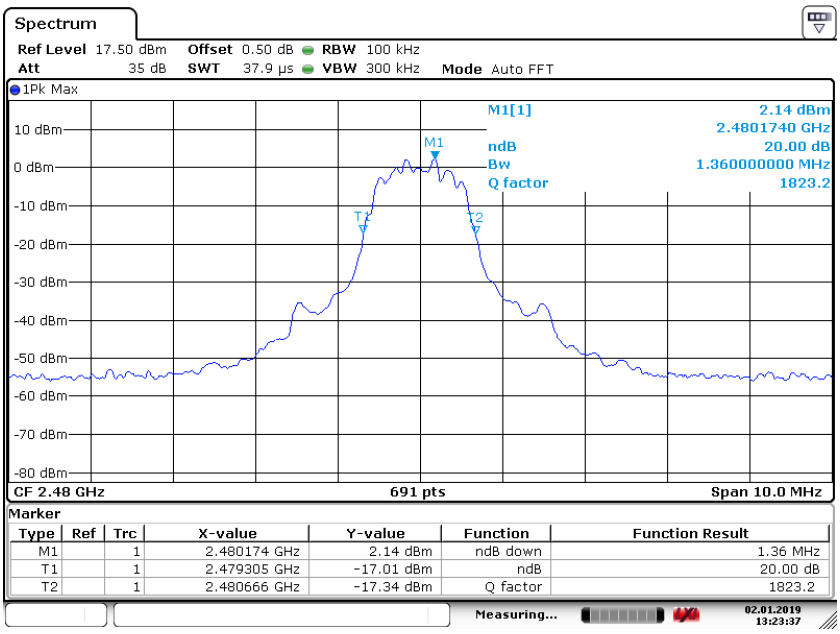
Date: 2.JAN.2019 13:26:46

CH39



Date: 2.JAN.2019 13:25:58

CH78



Date: 2.JAN.2019 13:23:37

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

4.5 Channel Number (Number of Hopping Frequencies)

Minimum Number of Hopping Frequencies, FCC Rule 15.247(a) (1) (iii):

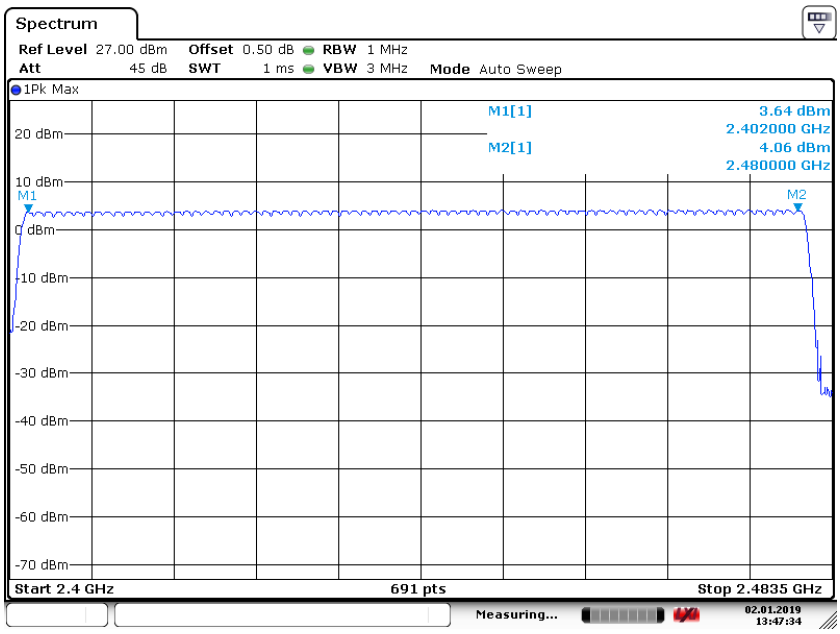
The RF passband of the EUT was divided into 3 approximately equal bands. With the analyzer set to MAX HOLD readings were taken for 2-3 minutes. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

Number of hopping channels =	79

Note: In AFH mode, this device operates using 20 channels and it's satisfied the requirement of limit of minimum of 15 hopping channels.

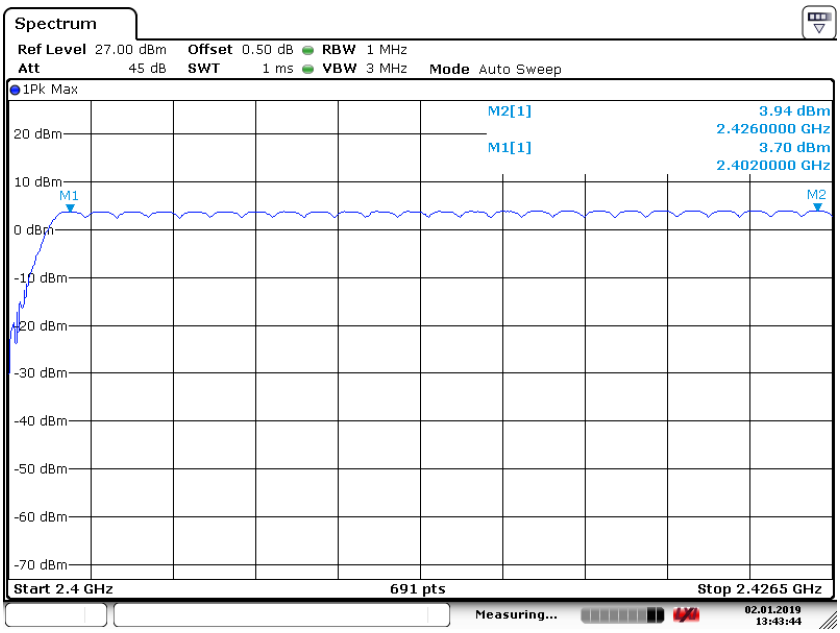
Worst Case Modulation Type: GFSK

CH00-CH78



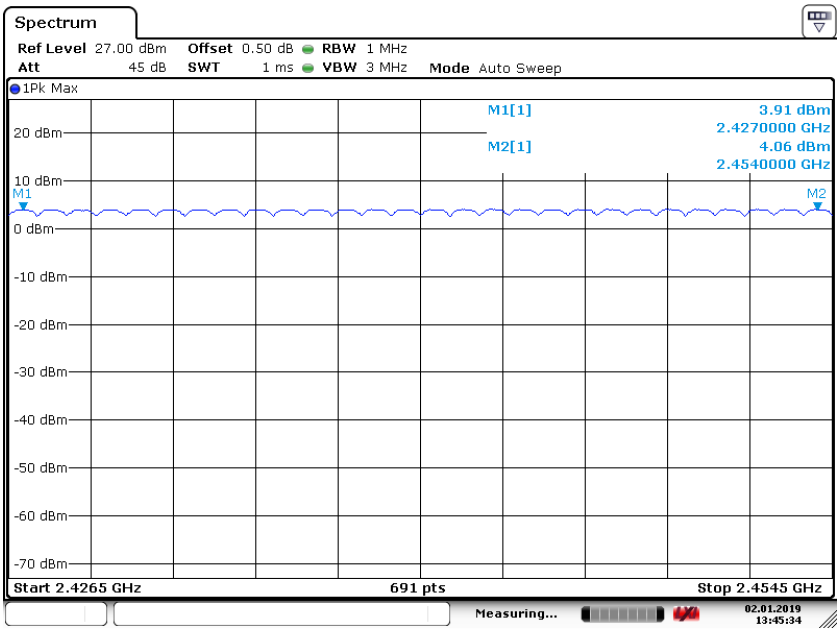
Date: 2.JAN.2019 13:47:33

CH00-CH24



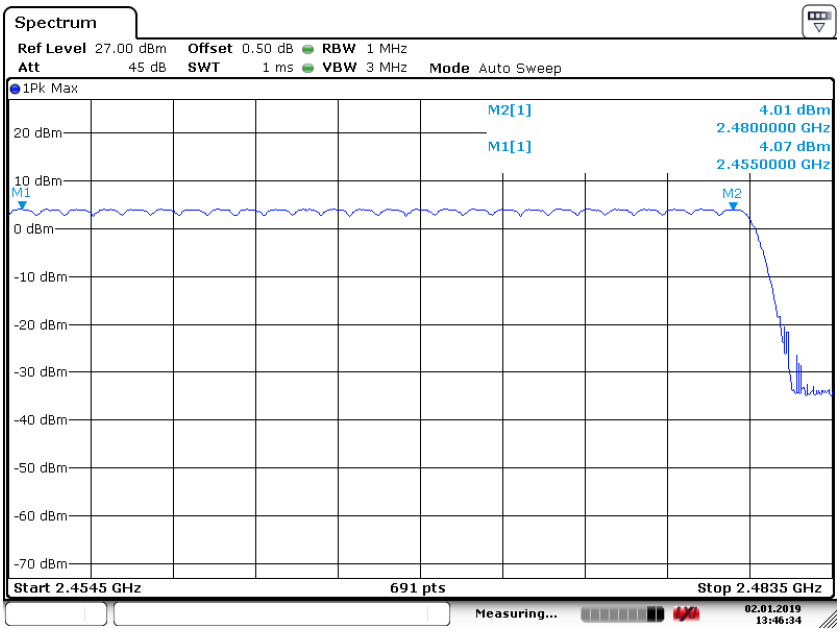
Date: 2.JAN.2019 13:43:45

CH25-CH52



Date: 2.JAN.2019 13:45:34

CH53-CH78



Date: 2.JAN.2019 13:46:34

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

4.6 Channel Separation (Carrier Frequency Separation)

Minimum Hopping Channel Carrier Frequency Separation, FCC Ref: 15.247(a)(1):

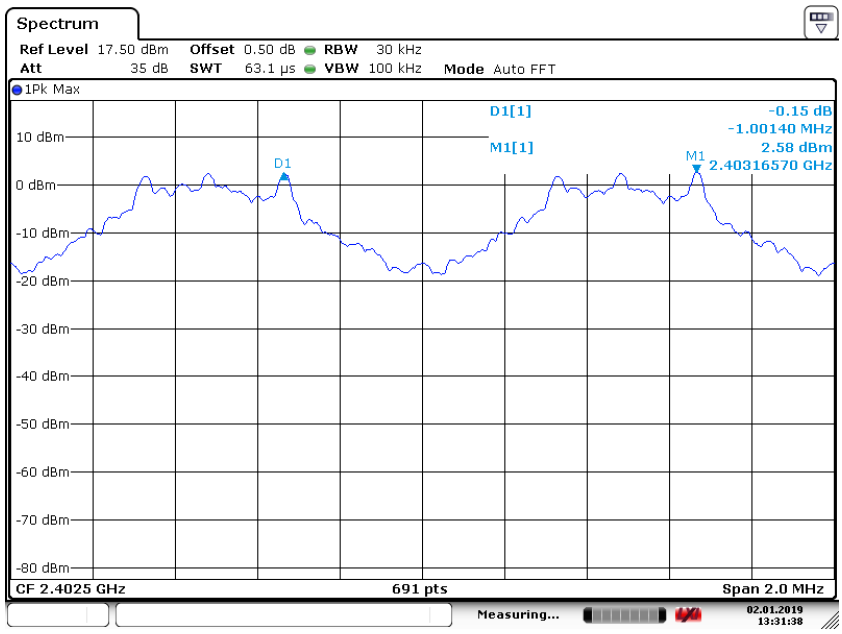
Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and compared against the limit:

Not less than 2/3 of 20dB bandwidth of hopping channel: 1.36 x 2/3 = 0.907MHz

Minimum Channel Separation	1.001 MHz

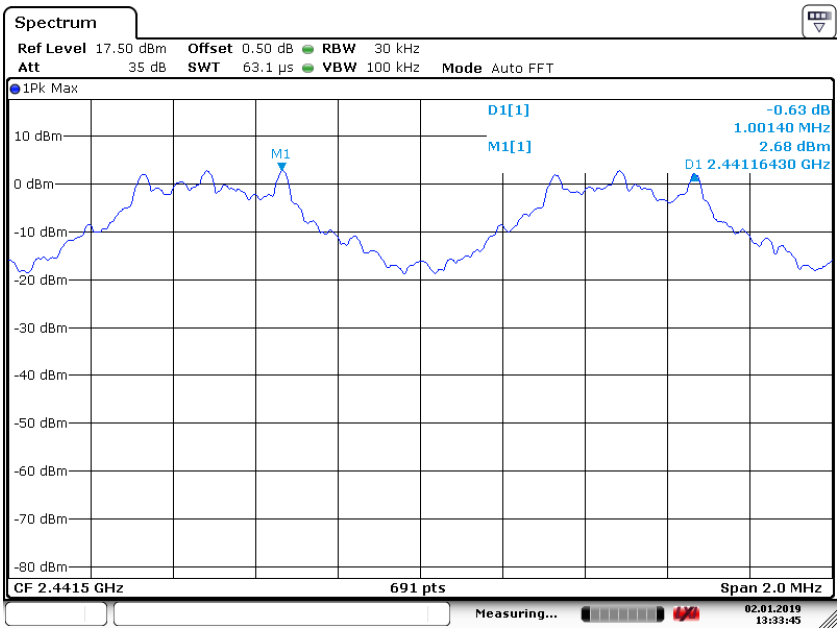
Worst Case Modulation Type: 8DPSK

Low Channel



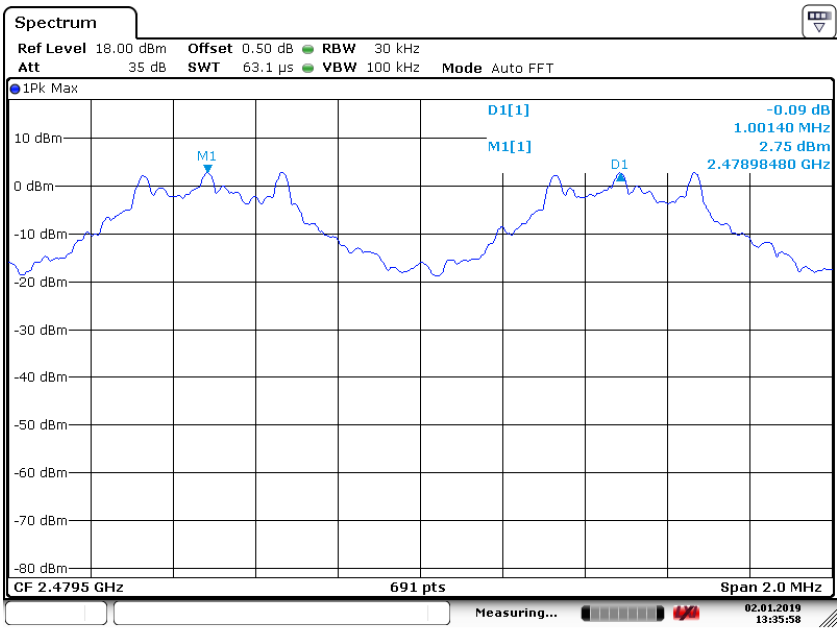
Date: 2.JAN.2019 13:31:39

Middle Channel



Date: 2.JAN.2019 13:33:45

High Channel



Date: 2.JAN.2019 13:35:58

4.7 Dwell Time (Time of Occupancy)

Average Channel Occupancy Time, FCC Ref: 15.247(a) (1)(iii):

The spectrum analyzer center frequency was set to one of the known hopping channels with a longer sweep time to show two successive hops on a channel; the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. RBW shall be ≤channel spacing and where possible RBW should be set >>1/T, where T is the expected dwell time per channel. The time duration of the transmissions so captured was measured with the MARKER DELTA function.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Different modes of operation were performed and only the worst case data was reported.

Worst Test Result:

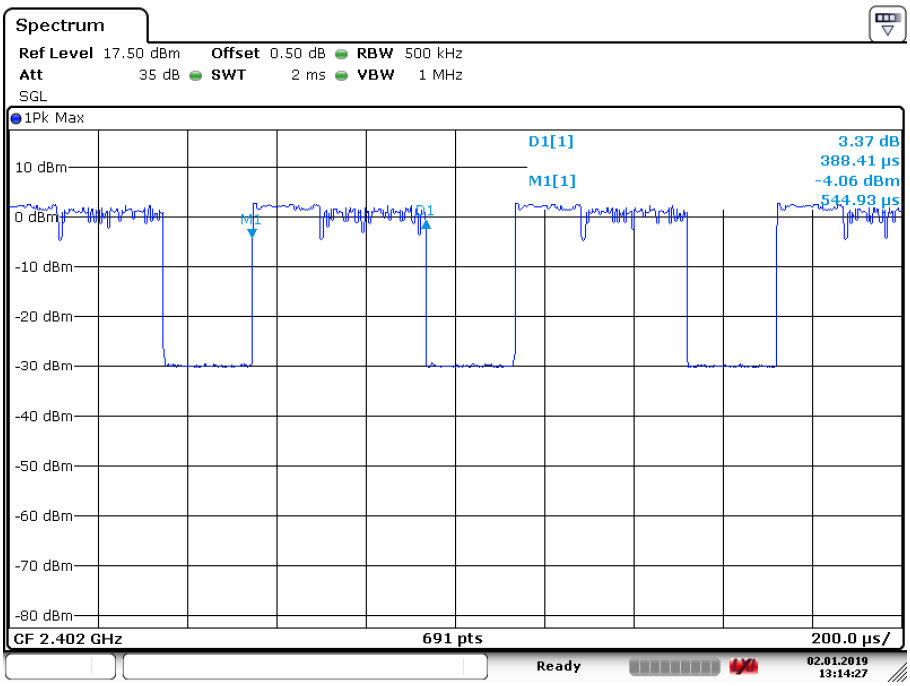
Normal hopping mode

Modulation Type	Packet	Max Dwell Time	Limit (s)	Result
8DPSK	3DH1	0.388ms * 105= 40.740ms	0.4	Pass
	3DH3	1.641ms * 101 = 165.741ms	0.4	Pass
	3DH5	2.887ms * 93 = 268.491ms	0.4	Pass

AFH mode:

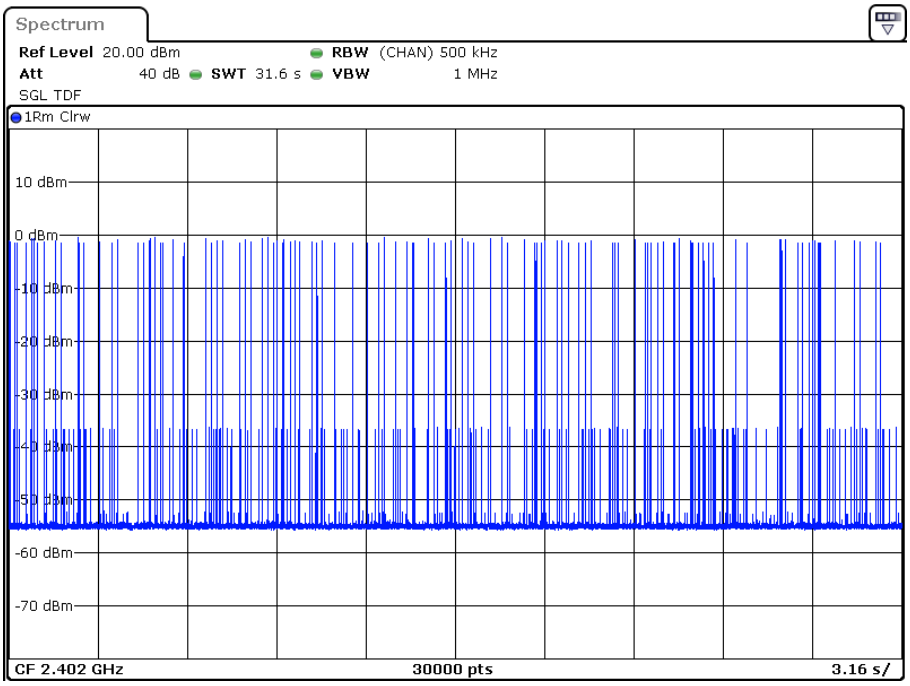
Modulation Type	Packet	Max Dwell Time	Limit (s)	Result
8DPSK	3DH1	0.388ms * 74 = 28.712ms	0.4	Pass
	3DH3	1.641ms * 77 = 126.357ms	0.4	Pass
	3DH5	2.887ms * 71= 204.977ms	0.4	Pass

Worst Case Modulation Type: 8DPSK
Packet: 3DH1



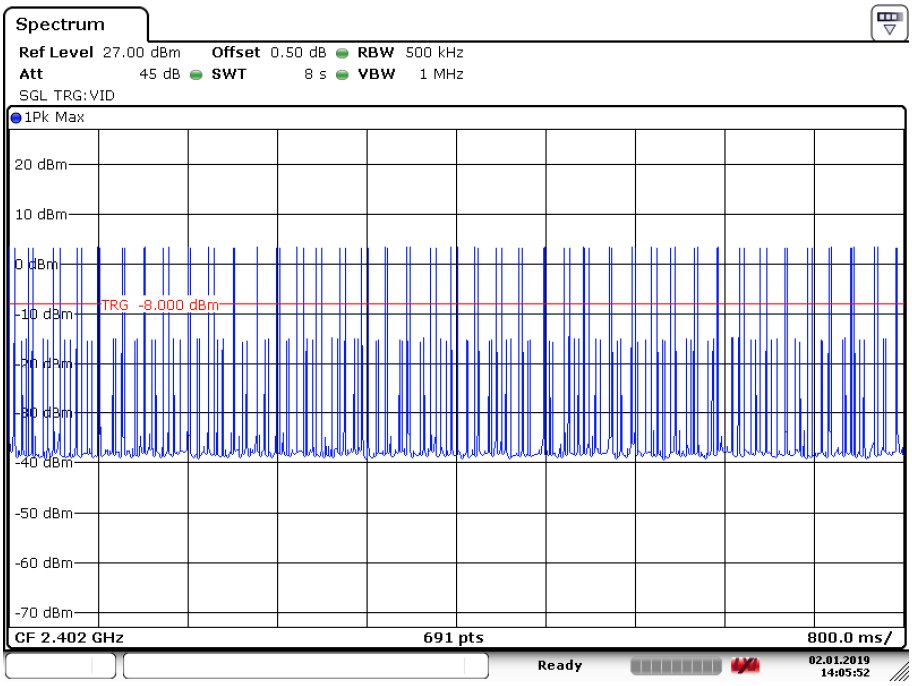
Date: 2.JAN.2019 13:14:28

Number of hops (Normal hopping mode)



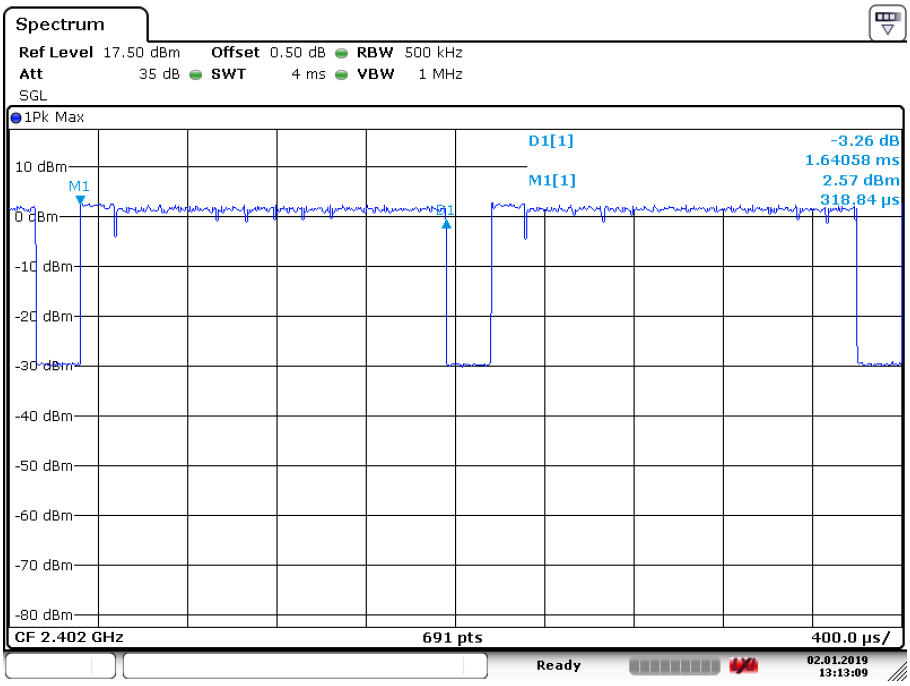
Date:2.JAN.2019 16:05:10

Number of hops (AFH mode)



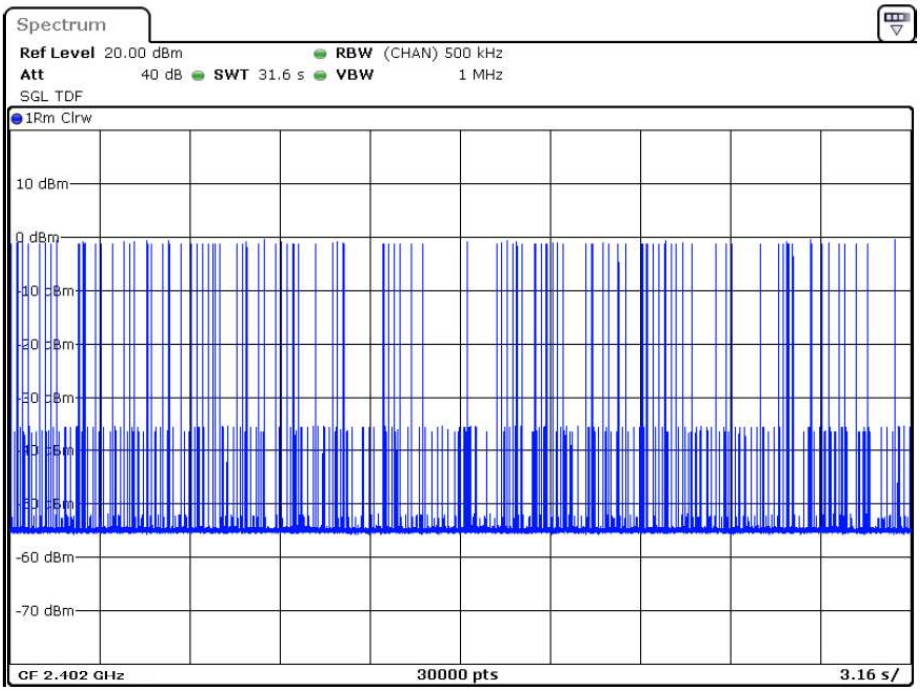
Date: 2.JAN.2019 14:05:52

Packet: 3DH3



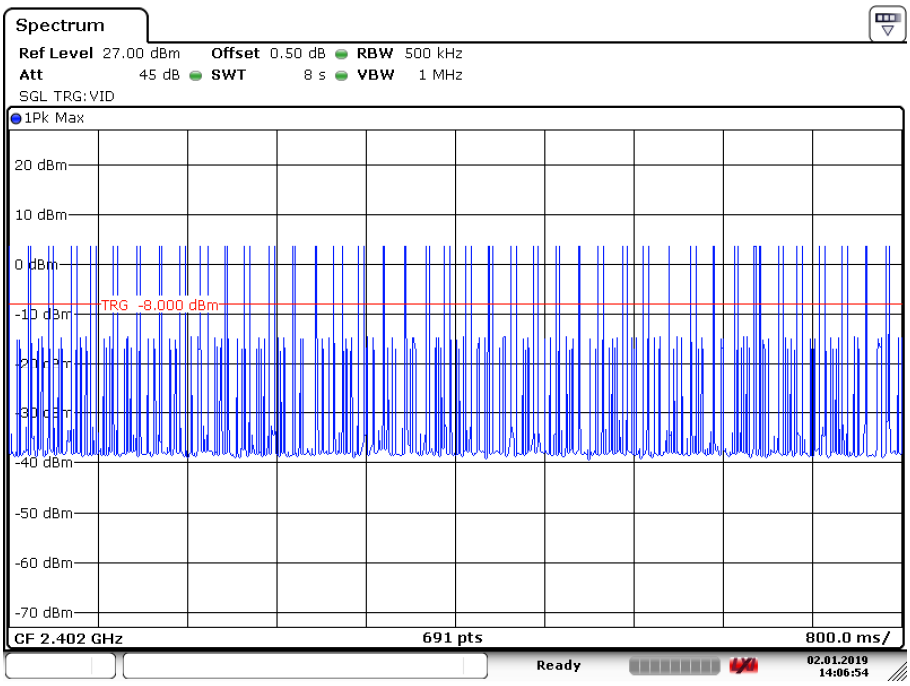
Date: 2.JAN.2019 13:13:09

Number of hops (Normal hopping mode)



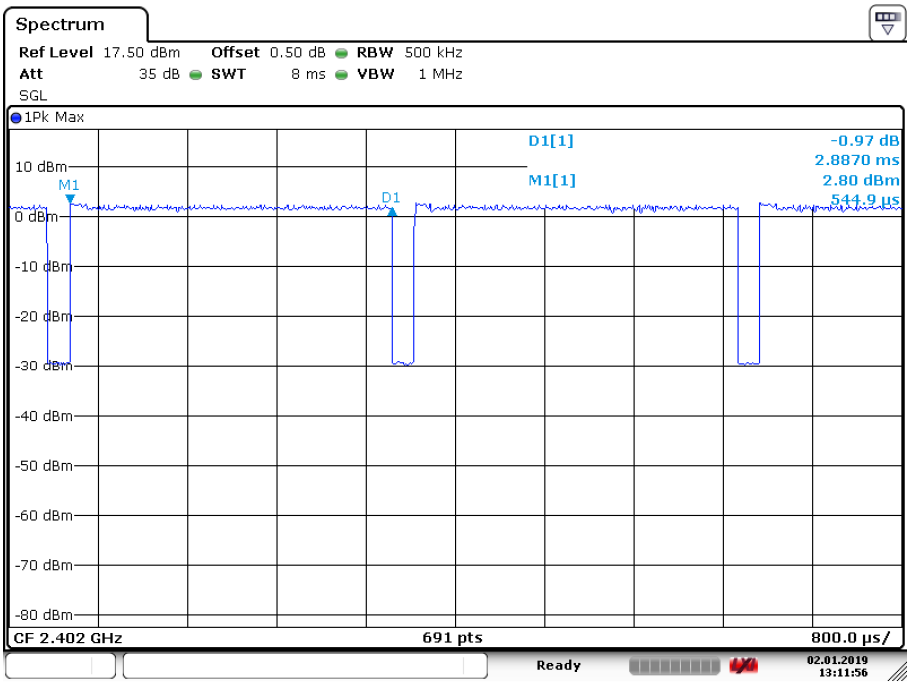
Date: 2.JAN.2019 16:10:52

Number of hops (AFH mode)



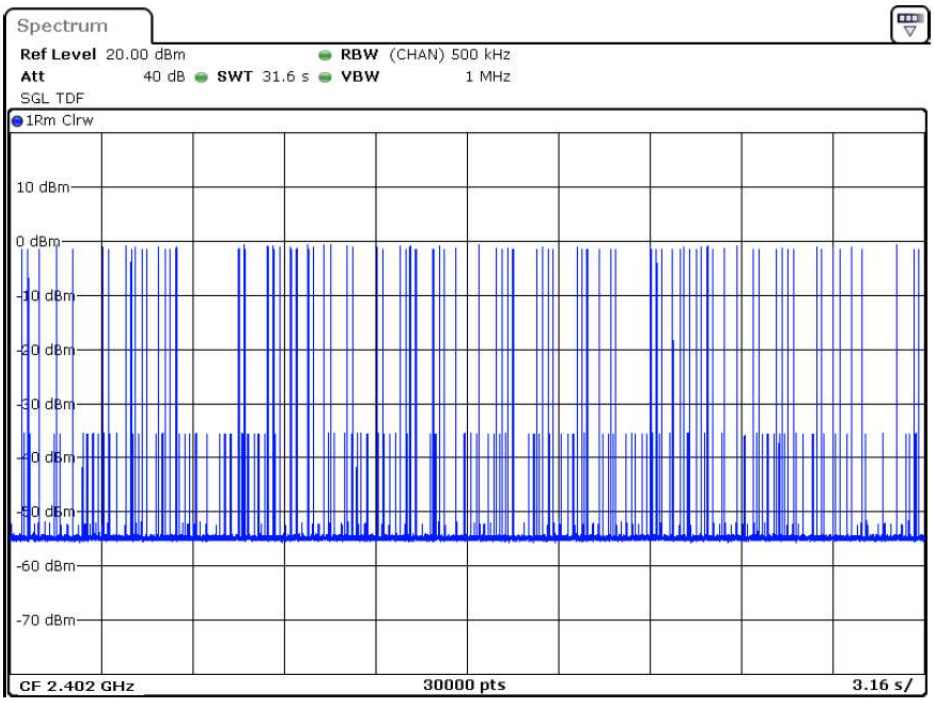
Date: 2.JAN.2019 14:06:54

Packet: 3DH5



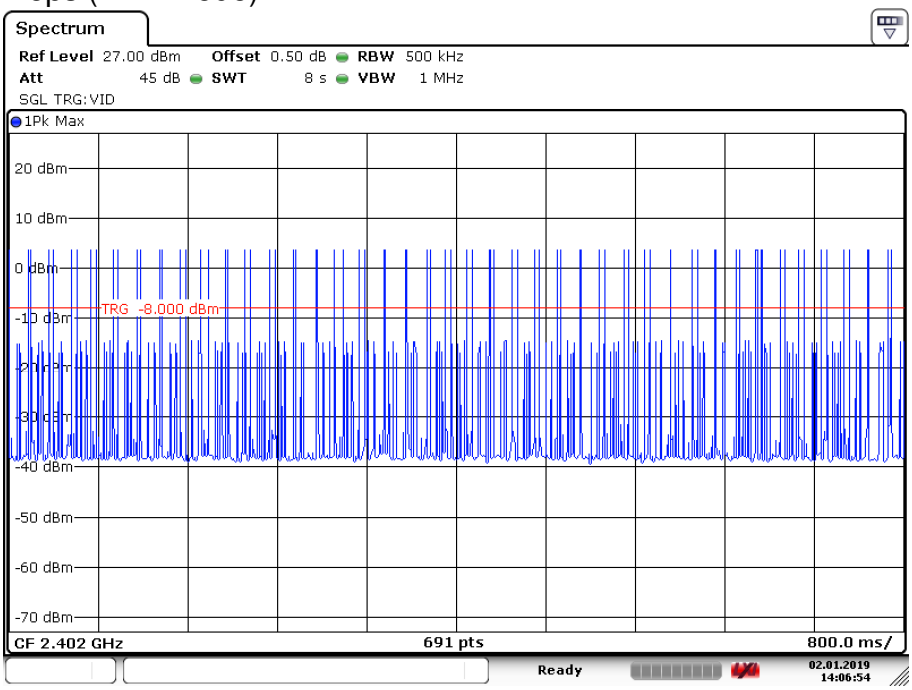
Date: 2.JAN.2019 13:11:56

Number of hops (Normal hopping mode)



Date:2.JAN.2019 16:16:27

Number of hops (AFH mode)



Date: 2.JAN.2019 14:06:54

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

4.8 Band Edge

Out of Band Conducted Emissions, FCC Rule 15.247(d):

In any 100 KHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

Furthermore, delta measurement technique for measuring bandage emissions was shown as below:

(i) Lower channel 2402MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot
= 98.6dBμv/m-46.3dB
= 52.3dBμv/m

Average Resultant field strength = Fundamental emissions (Average value) – delta from the bandedge plot
= 96.6dBμv/m-46.3dB
= 50.3dBμv/m

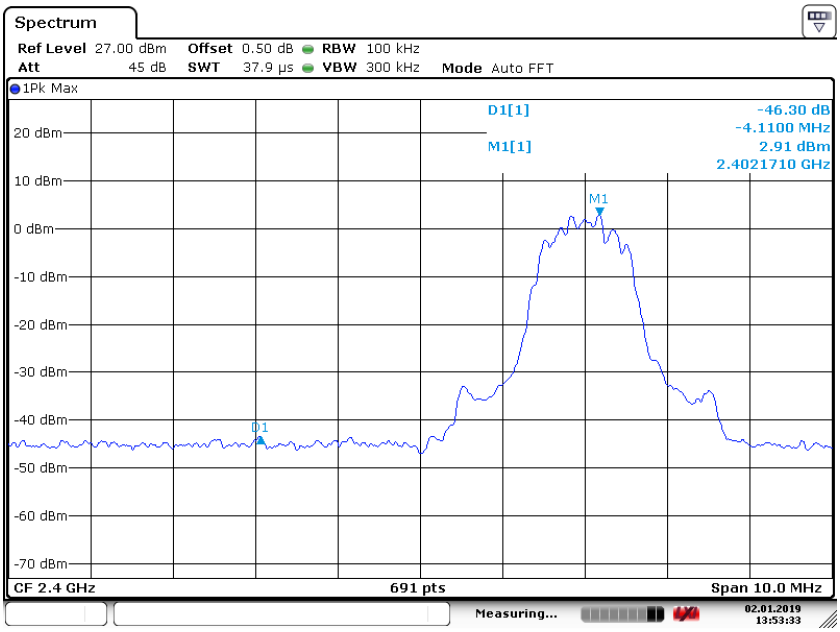
(ii) Upper channel 2480MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot
= 96.3dBμv/m-47.5dB
= 48.8dBμv/m

Average Resultant field strength = Fundamental emissions (Average value) – delta from the bandedge plot
= 95.4dBμv/m-47.5dB
= 47.9dBμv/m

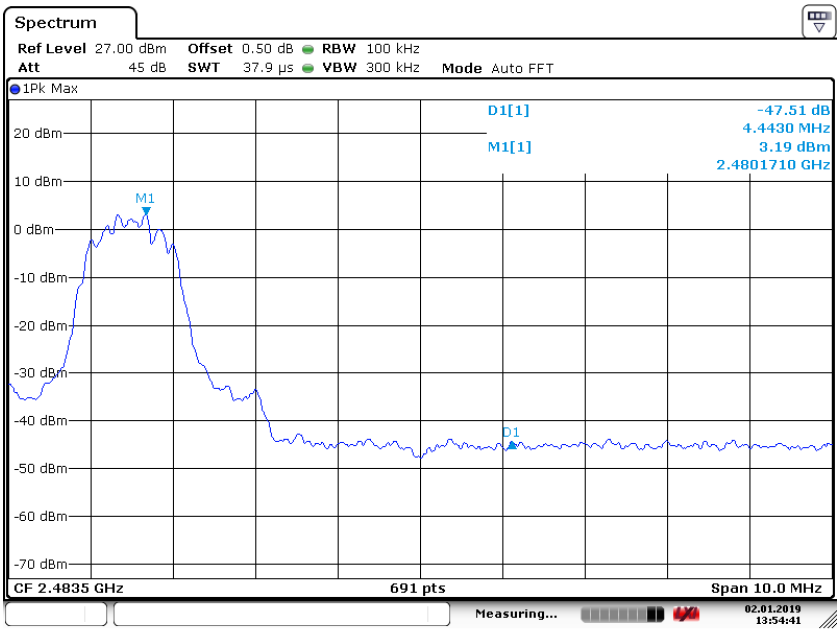
The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dBμv/m (Peak Limit) and 54dBμv/m (Average Limit).

Worst Modulation Type: 8DPSK
Single Channel



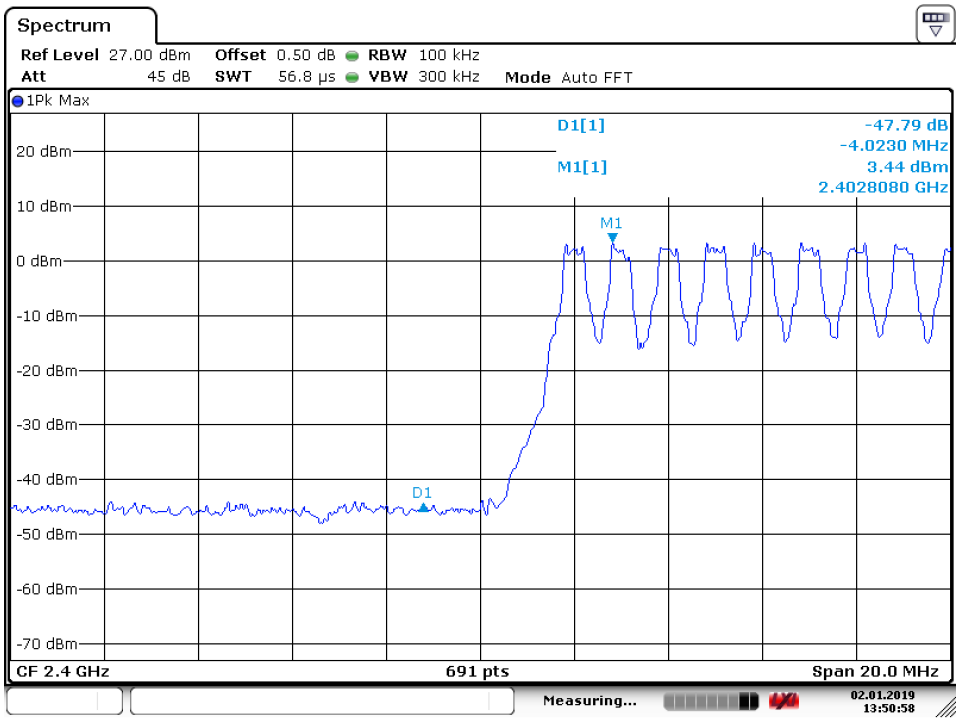
Date: 2.JAN.2019 13:53:33

Single Channel



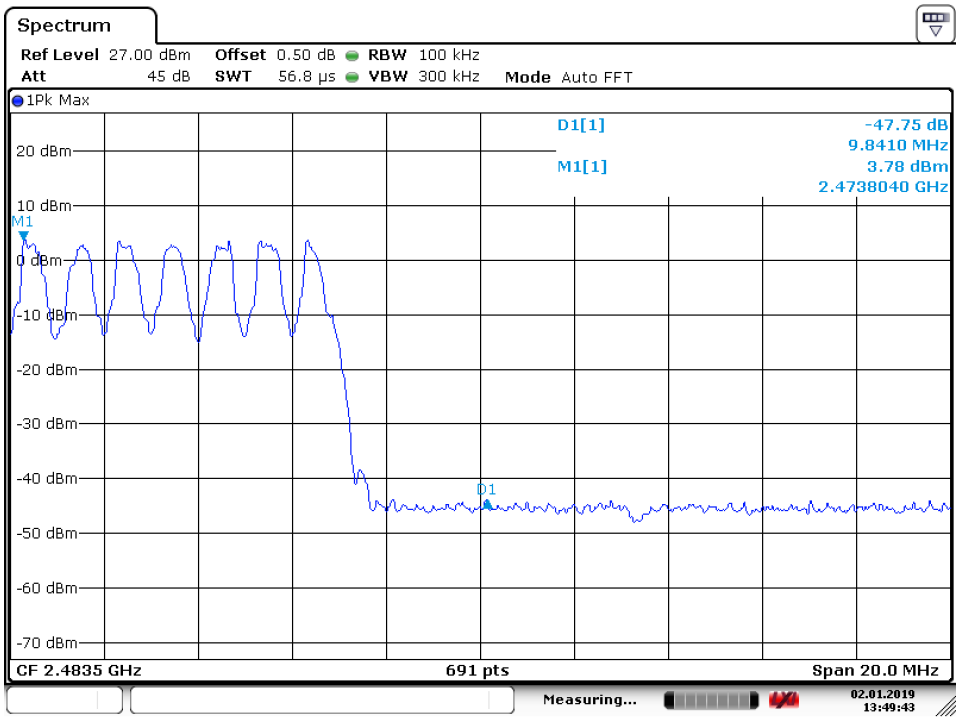
Date: 2.JAN.2019 13:54:42

Hopping



Date: 2.JAN.2019 13:50:59

Hopping



Date: 2.JAN.2019 13:49:44

Applicant: YIBIN WEIHENG DIGITAL COMPANY LIMITED
Date of Test: Jan. 02, 2019 Model: I101

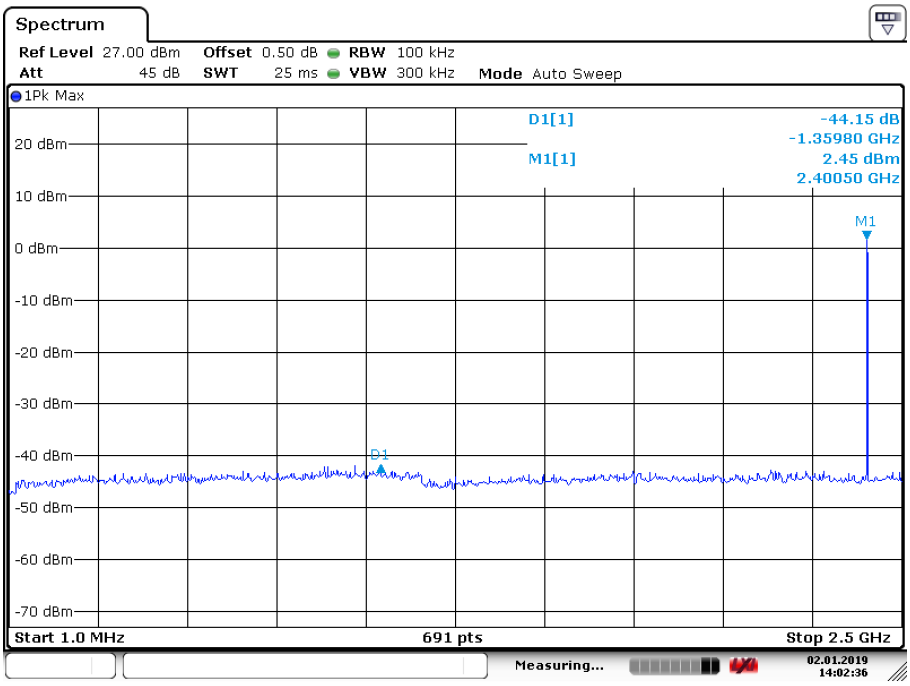
4.9 Transmitter Spurious Emissions (Conducted)

Out of Band Conducted Spurious Emissions, FCC Rule 15.247(d):

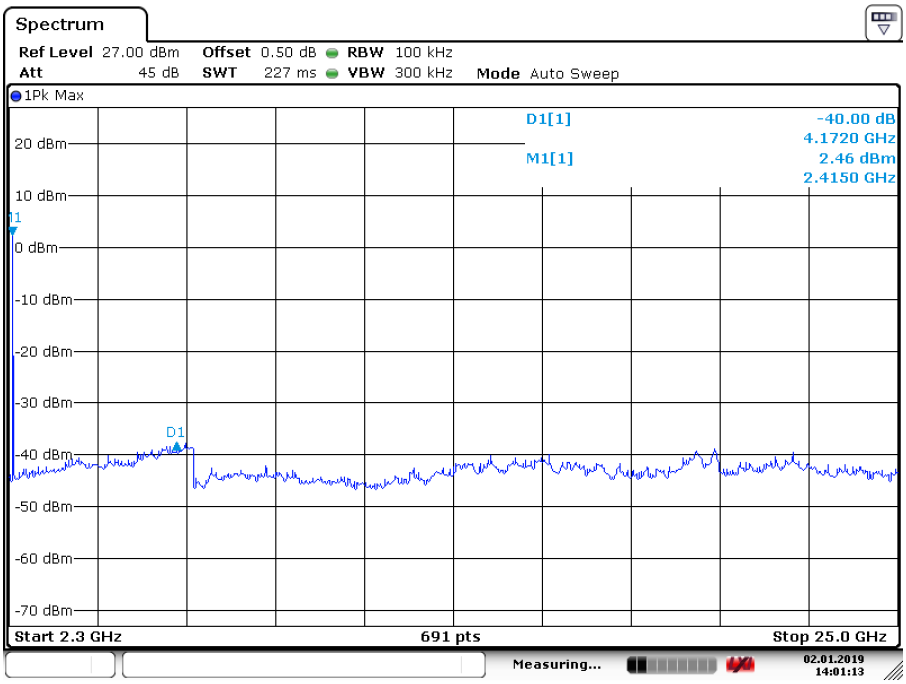
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

Worst Case Modulation Type: GFSK

CH00

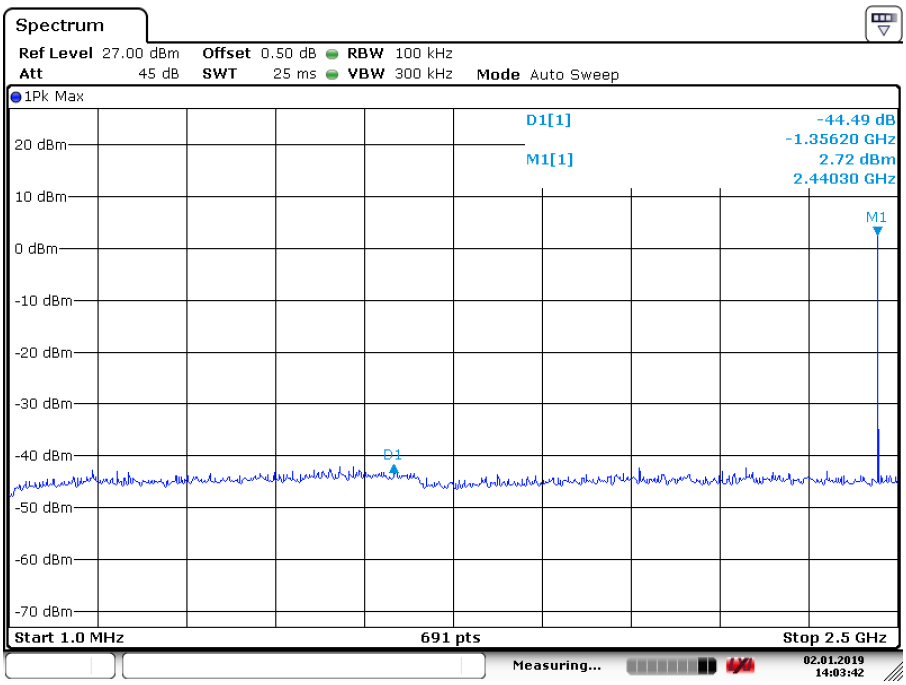


Date: 2.JAN.2019 14:02:36

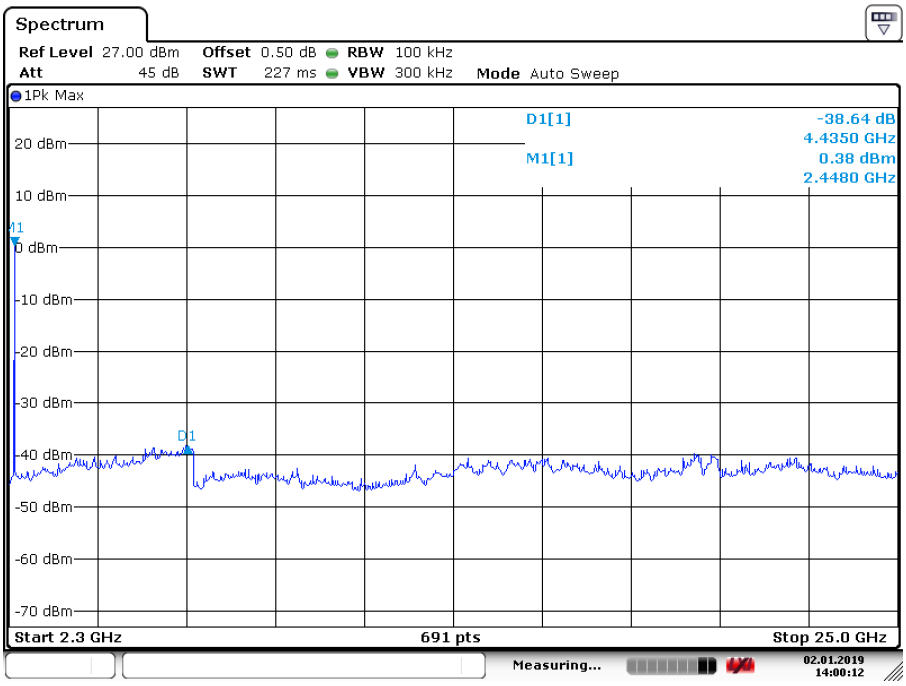


Date: 2.JAN.2019 14:01:13

CH39

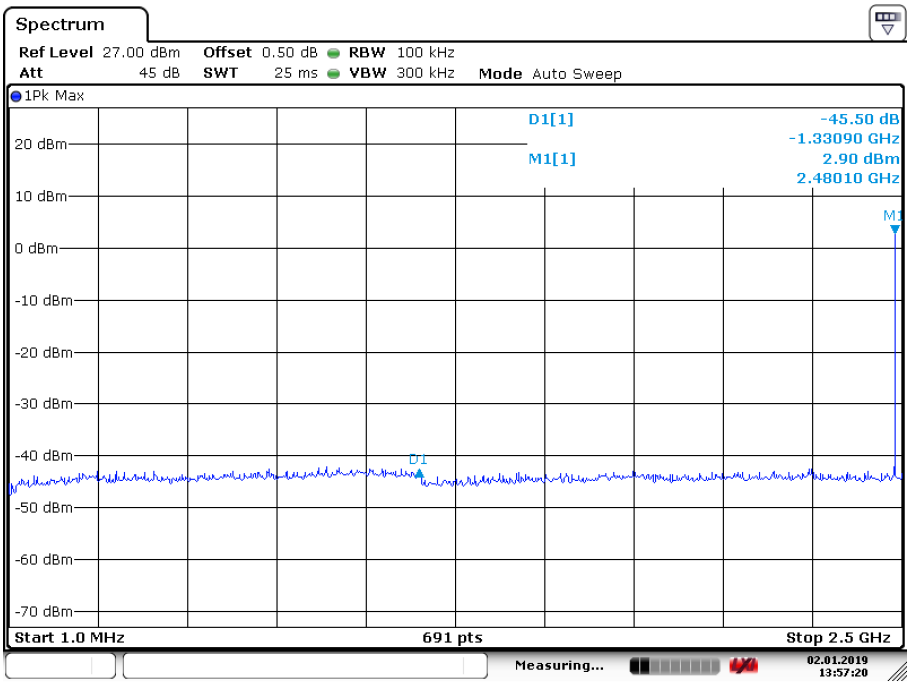


Date: 2.JAN.2019 14:03:42

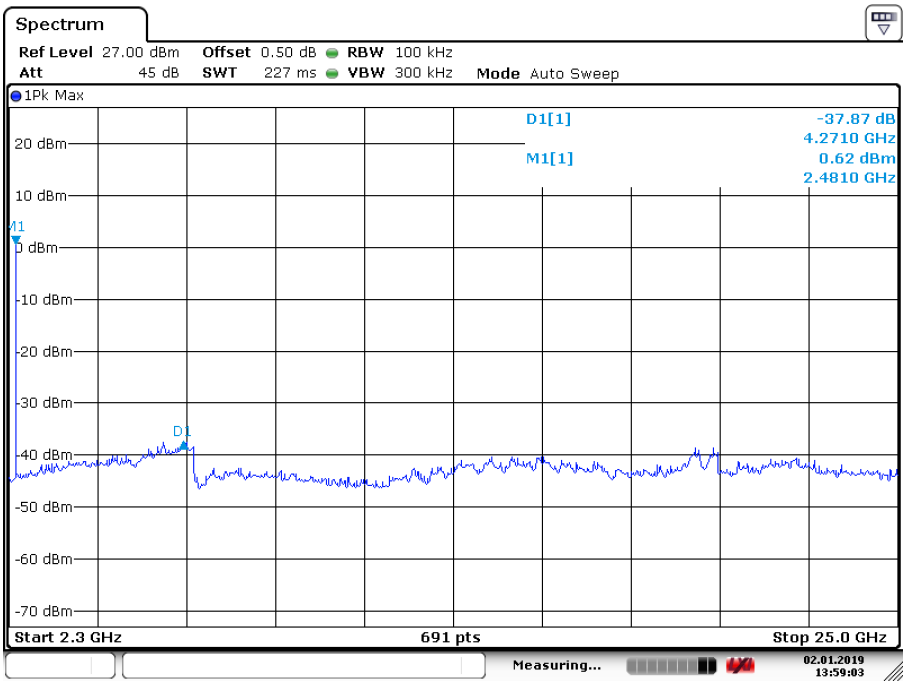


Date: 2.JAN.2019 14:00:12

CH78



Date: 2.JAN.2019 13:57:20



Date: 2.JAN.2019 13:59:03

EXHIBIT 5

EQUIPMENT PHOTOGRAPHS

5.0 Equipment Photographs

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

EXHIBIT 6

PRODUCT LABELLING

6.0 Product Labelling

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

EXHIBIT 7

TECHNICAL SPECIFICATIONS

7.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT 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

MISCELLANEOUS INFORMATION

9.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, the test procedure and calculation of factor such as pulse desensitization.

9.1 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (T_{eff}) is approximately 625µs for Bluetooth. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

9.2 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10: 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter, up to 1GHz 0.8m and above 1GHz 1.5m in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjust through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz with RBW 9KHz used.

9.2 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.10: 2013.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used (RBW 3MHz used for fundamental emission).

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

EXHIBIT 10

CONFIDENTIALITY REQUEST

10.0 Confidentiality Request

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

EXHIBIT 11

TEST EQUIPMENT LIST

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	14-Sep-2018	14-Sep-2019
SZ185-01	EMI Receiver	R&S	ESCI	100547	24-Jan-2018	24-Jan-2019
SZ061-08	Horn Antenna	ETS	3115	00092346	14-Sep-2018	14-Sep-2019
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	17-Mar-2018	17-Mar-2019
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	05-Jun-2018	05-Jun-2019
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	05-Jun-2018	05-Jun-2019
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	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	--	02-Jun-2018	02-Jun-2019
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	02-Jun-2018	02-Jun-2019
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	02-Jun-2018	02-Jun-2019
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	05-Jun-2018	05-Jun-2019
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	26-Oct-2018	26-Oct-2019
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	26-Oct-2018	26-Oct-2019
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	04-Jul-2018	04-Jul-2019
SZ188-03	Shielding Room	ETS	RFD-100	4100	16-Jan-2017	16-Jan-2019

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