

ABEEWAY

TEST REPORT

SCOPE OF WORK
FCC TESTING—U310

REPORT NUMBER
200731014SZN-003

ISSUE DATE **[REVISED DATE]**
October 14, 2020 [-----]

PAGES
34

DOCUMENT CONTROL NUMBER
FCC ID 247_b
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Intertek Report No.: 200731014SZN-003

ABEEWAY

Application
For
Certification

FCC ID: 2AOSP-U310

SMART BADGE

Model: U310
Lora Transceiver

Report No.: 200731014SZN-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 [10-1-19]

Prepared and Checked by:

Approved by:

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Engineer

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Technical Supervisor
Date: October 14, 2020

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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 [10-01-19] Edition] provision.

Report prepared by:

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1.0 Summary of Test results

Applicant: Abeeway

Applicant Address: Les Algorithmes Aristote A, 2000 Route des Lucioles BIOT 06410 France

Manufacturer: Abeeway

Manufacturer Address: Les Algorithmes Aristote A, 2000 Route des Lucioles BIOT 06410 France

Model: U310
FCC ID: 2AOSP-U310

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 an SMART BADGE employs multi-technology geolocation, combining Bluetooth BLE, GPS, LPGPS, GNSS, WIFI and LoRaWAN™ technologies. GPS, LPGPS, GNSS and WIFI functions are only used for position determination and can't transmit signals. The LoRaWAN™ can be operated in the frequency bands of 902.3-914.9MHz and 903-914.2MHz with different technologies. The EUT is powered by DC 3.7V by rechargeable battery. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna

Antenna Gain: 0 dBi

Modulation: CSS

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 SMART BADGE which has LoRaWAN™ Digital function. For the LoRaWAN™ Hopping function is recorded in the test report: 200731014SZN-005. The Bluetooth BLE function is recorded in the test report: 200731014SZN-002 and the other functions are recorded in the test report: 200731014SZN-001.

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

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by DC 3.7V fully rechargeable battery and charged by DC 5V from a laptop during the test. Only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Section 4.

The rear of unit was flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn 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.

3.3 Special Accessories

N/A.

3.4 Measurement Uncertainty

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

3.5 Equipment Modification

Any modifications installed previous to testing by ABEEWAY 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.
Laptop (Provided by Intertek)	Lenovo T420	T420
Laptop (Provided by Intertek)	Dell	Latitude 3480
USB cable (Provided by applicant)	ABEEWAY	unshielded, 1m

Applicant: ABEEWAY

Date of Test: September 22, 2020

Model: U310

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).

Antenna Gain = 0dBi		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 903	17.94	62.23
Middle Channel: 907.8	17.80	60.26
High Channel: 914.2	17.80	60.26

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function.

EUT max. output level = 17.94dBm

EUT max. E.I.R.P = 17.94dBm = 62.23mW

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

Applicant: ABEEWAY

Date of Test: September 17, 2020 – October 12, 2020

Model: U310

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

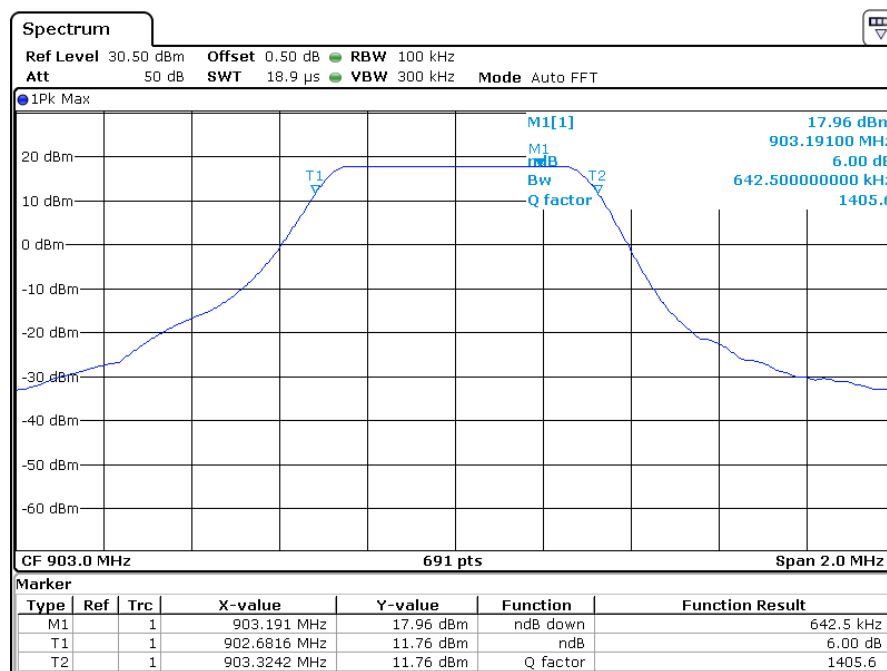
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a 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.

Modulation: CSS(DSSS)	
Frequency (MHz)	6 dB Bandwidth (kHz)
903.0	642.5
907.8	628.1
914.2	628.1

The test plots are attached as below.

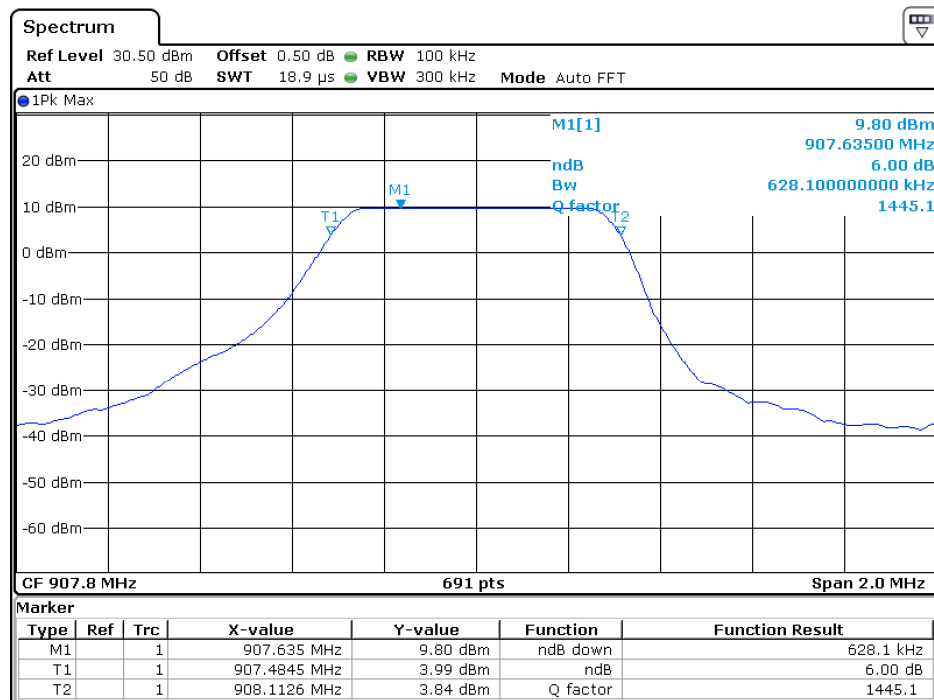
CH00



P

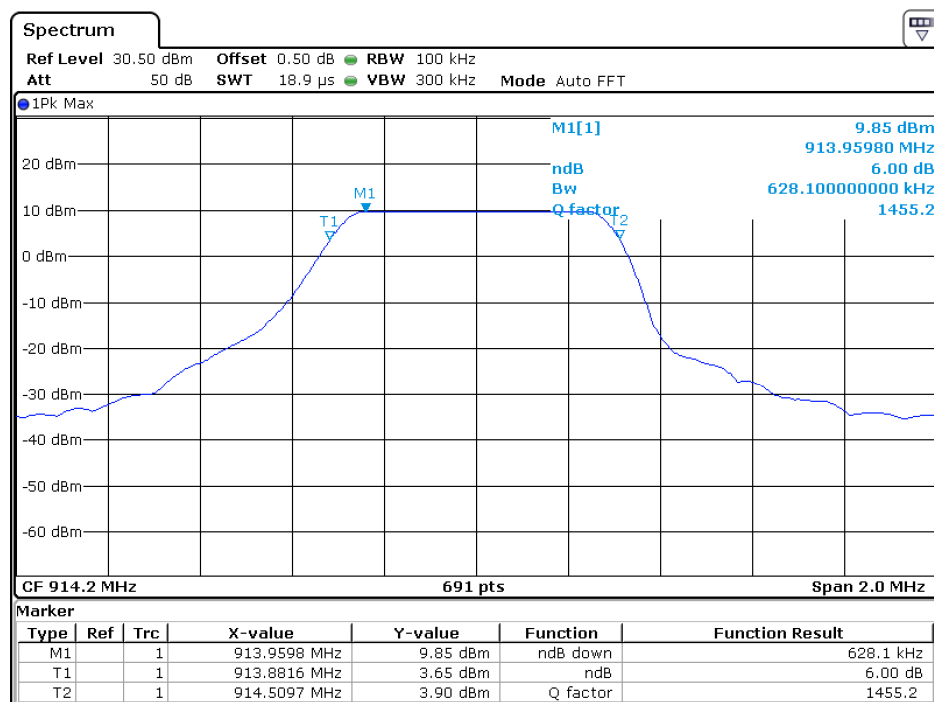
Date: 17_SEP_2020 17:09:03

CH03



Date: 12.OCT.2020 11:38:46

CH07



Date: 12.OCT.2020 11:35:58

Applicant: ABEEWAY

Date of Test: September 17, 2020 – September 22, 2020 Model: U310

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.

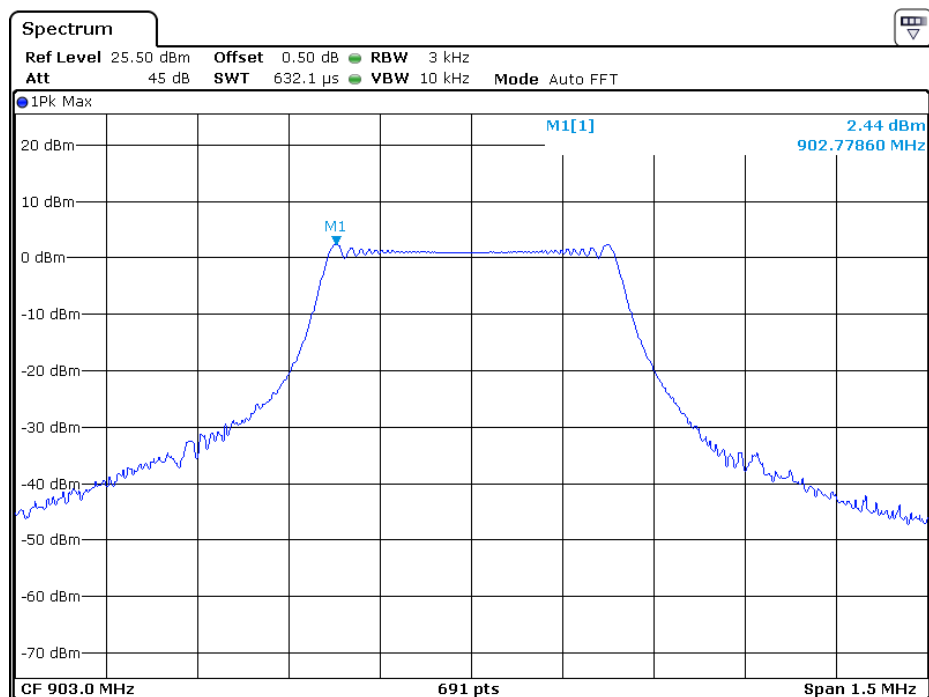
Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

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

Modulation: CSS(DSSS)	
Frequency (MHz)	Power Density with RBW 3KHz
903.0	2.44
907.8	2.46
914.2	2.67

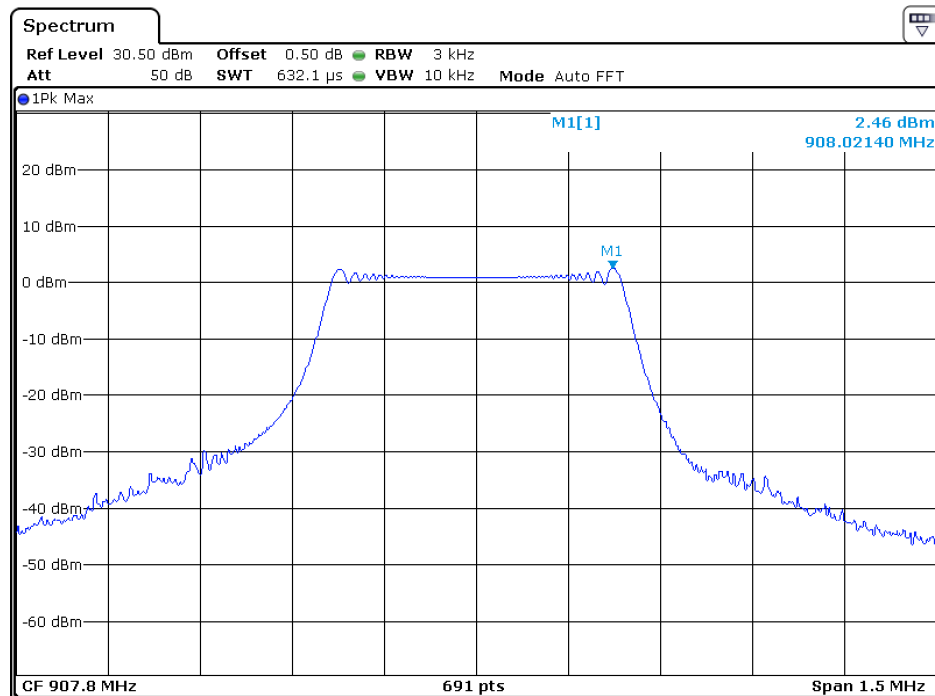
The test plots are attached as below.

CH00



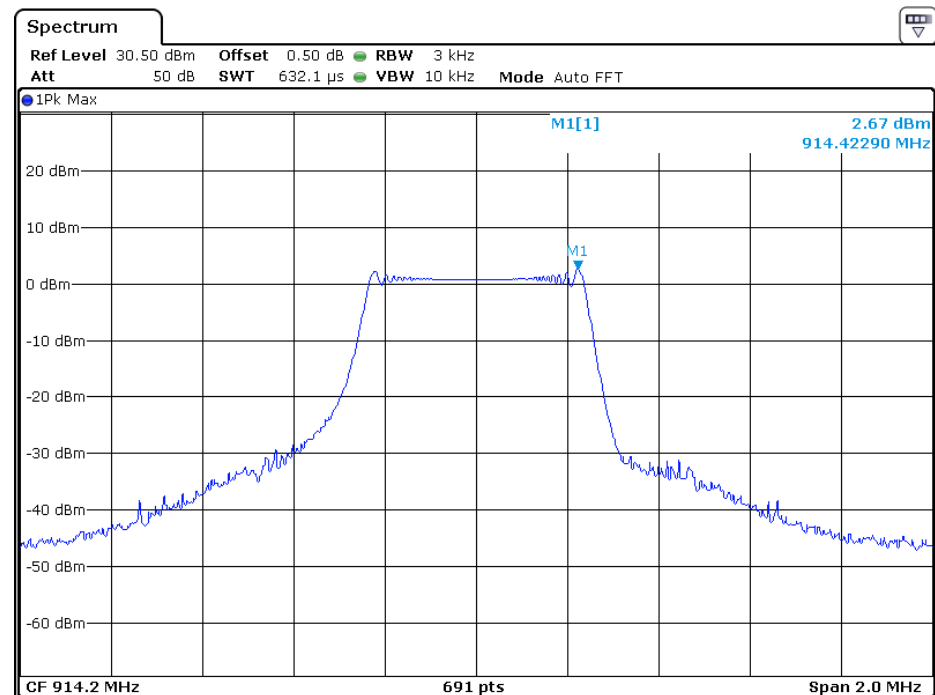
Date: 17 SEP 2020 17:06:50

CH03



P
Date: 22.SEP.2020 14:55:40

CH07



P
Date: 17.SEP.2020 17:19:05

Applicant: ABEEWAY

Date of Test: September 17, 2020 – September 22, 2020

Model: U310

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

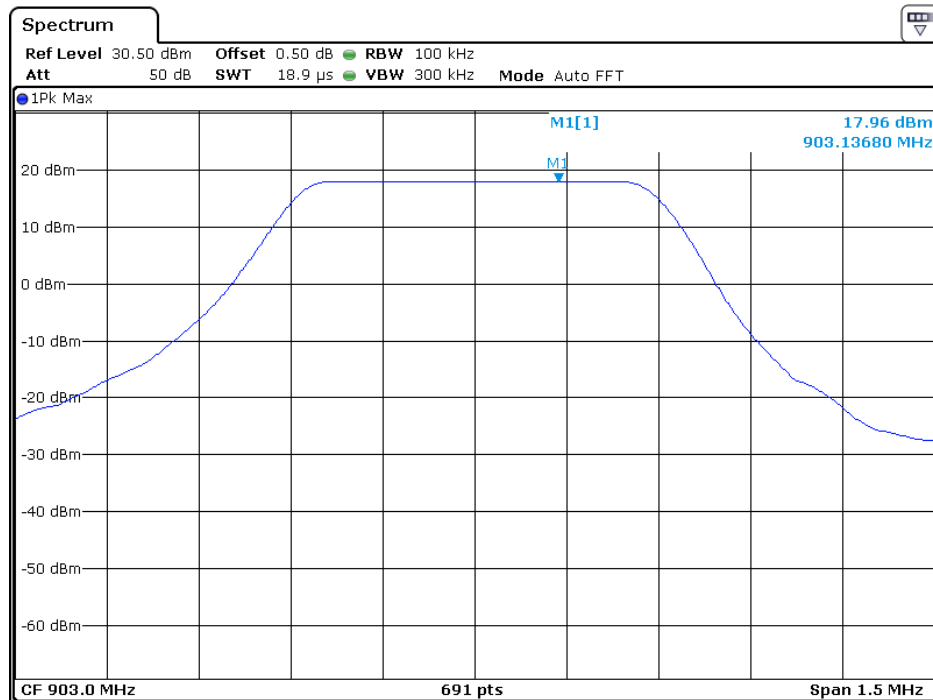
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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.

All other types 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.

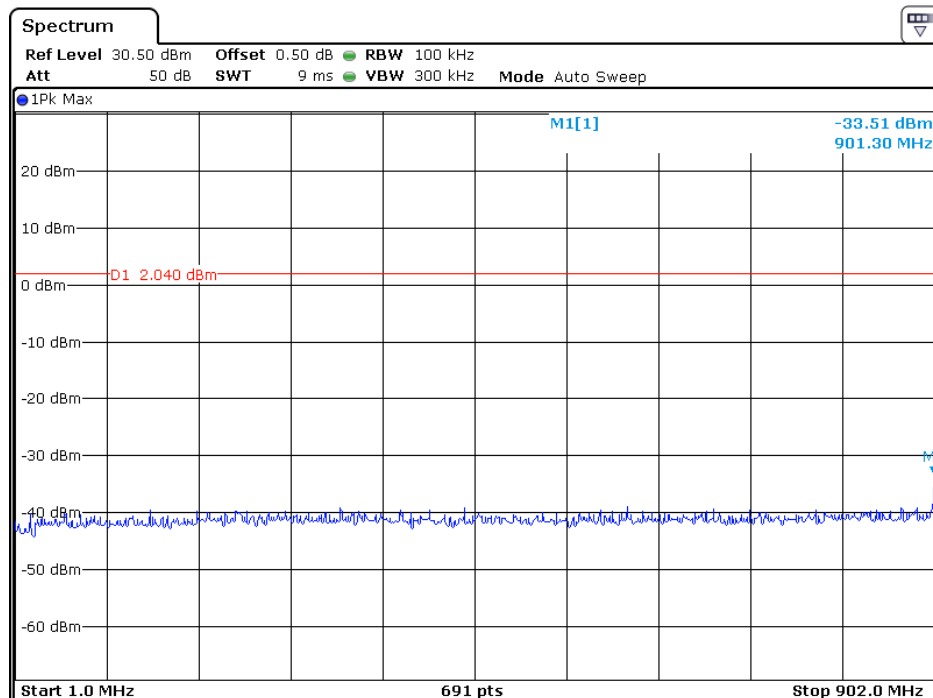
The test plots are attached as below.

CH00 Reference Level: 17.96dBm



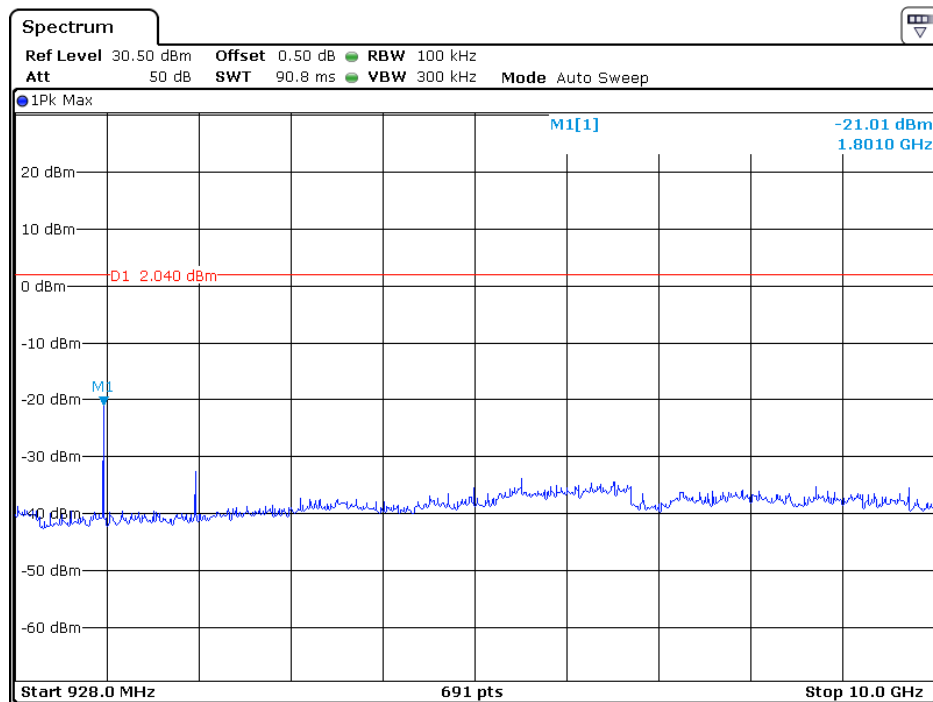
P

Date: 17 SEP 2020 17:09:42



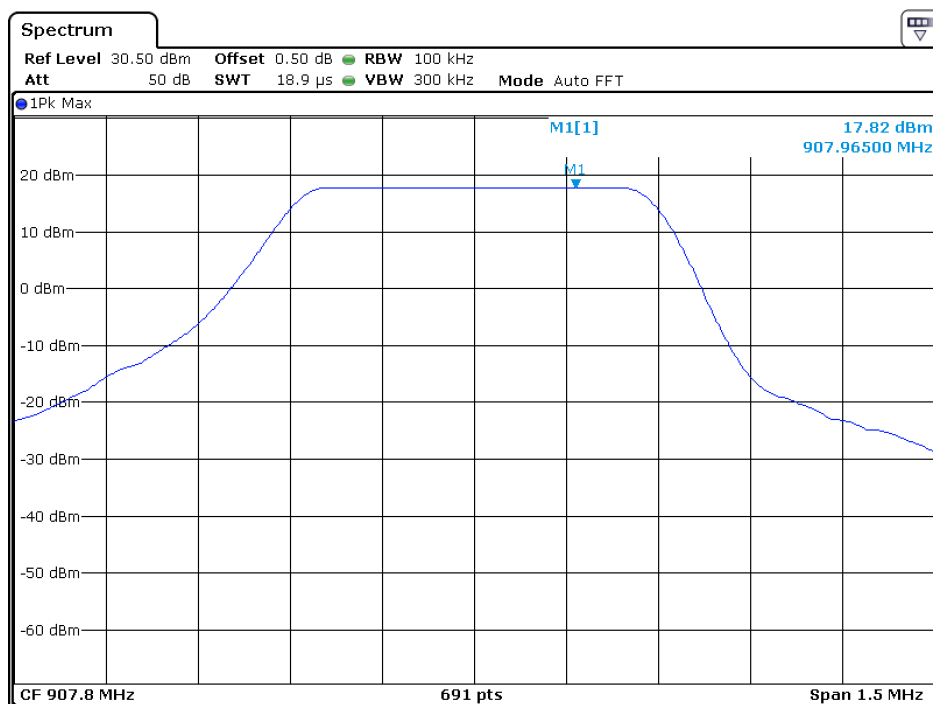
P

Date: 17 SEP 2020 17:10:20

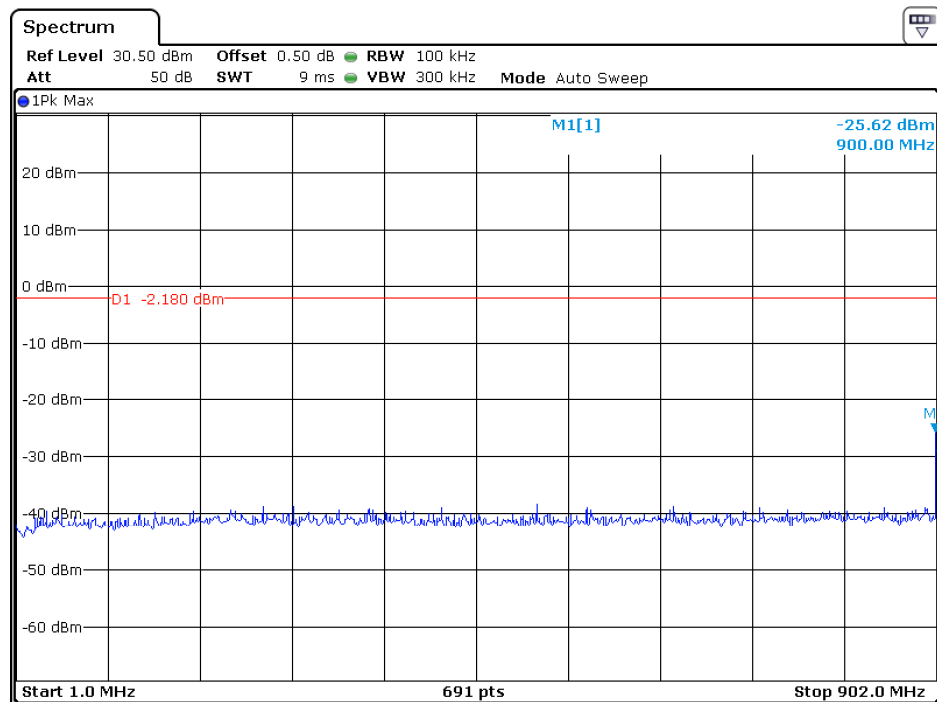


P
Date: 17 SEP 2020 17:11:03

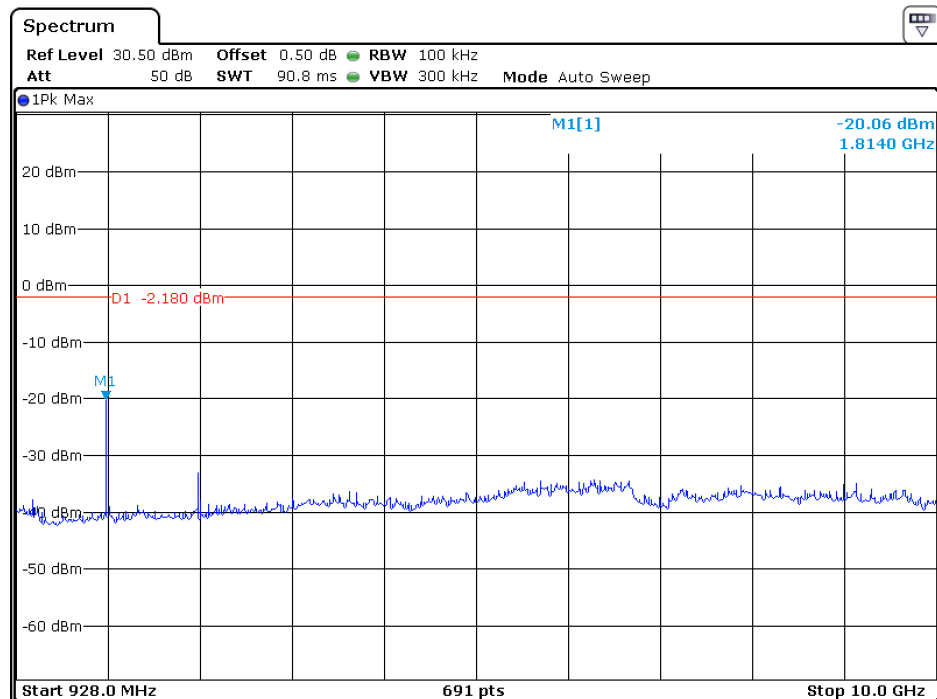
CH03 Reference Level: 17.82dBm



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Date: 22 SEP 2020 14:55:15

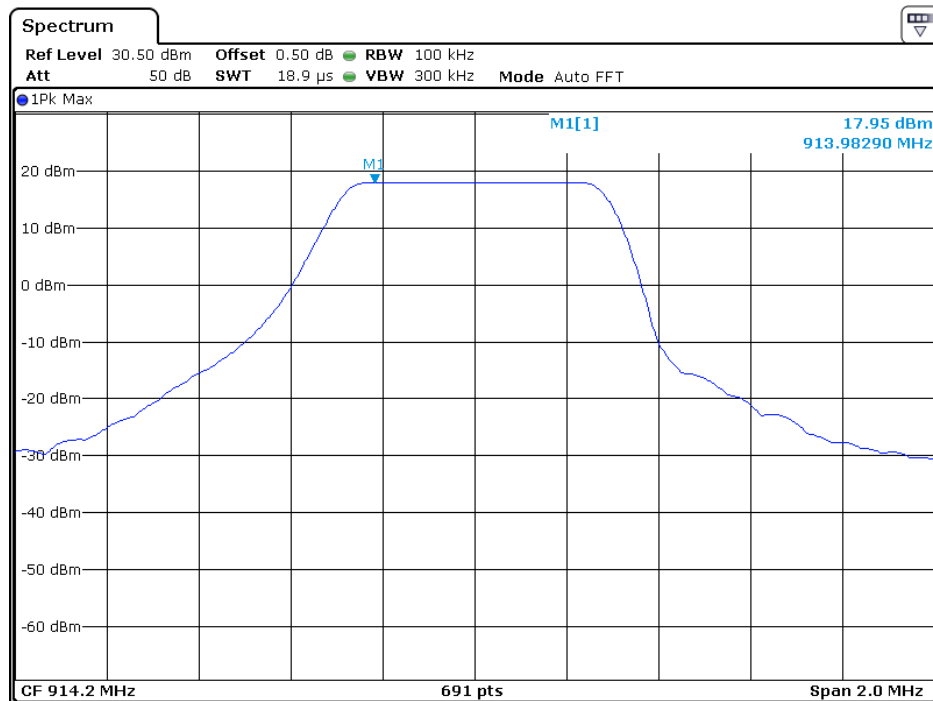


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Date: 22.SEP.2020 14:56:21

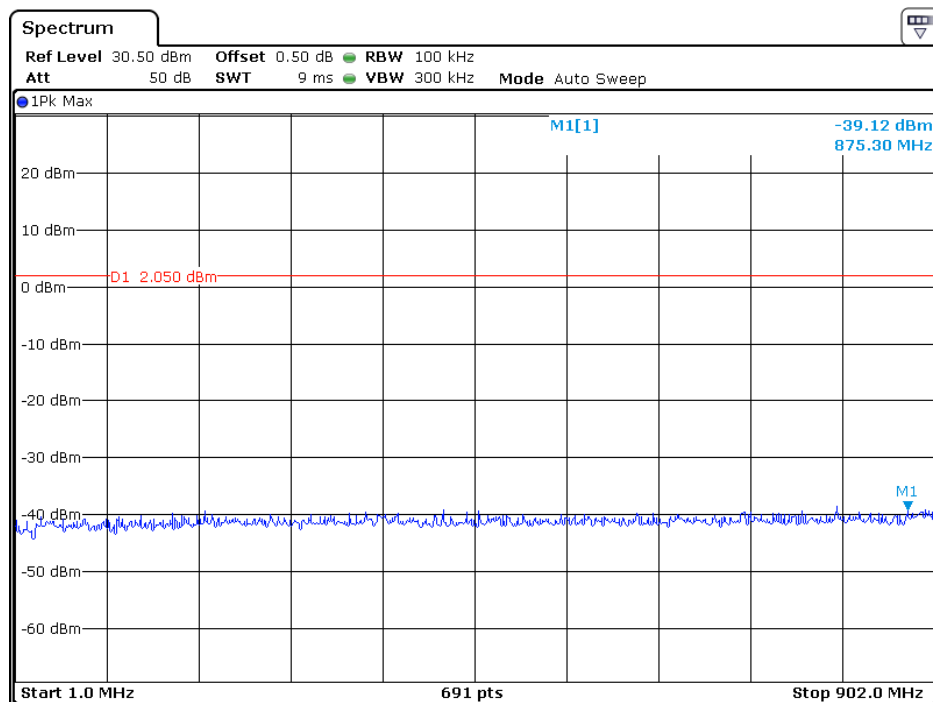


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Date: 22.SEP.2020 14:56:53

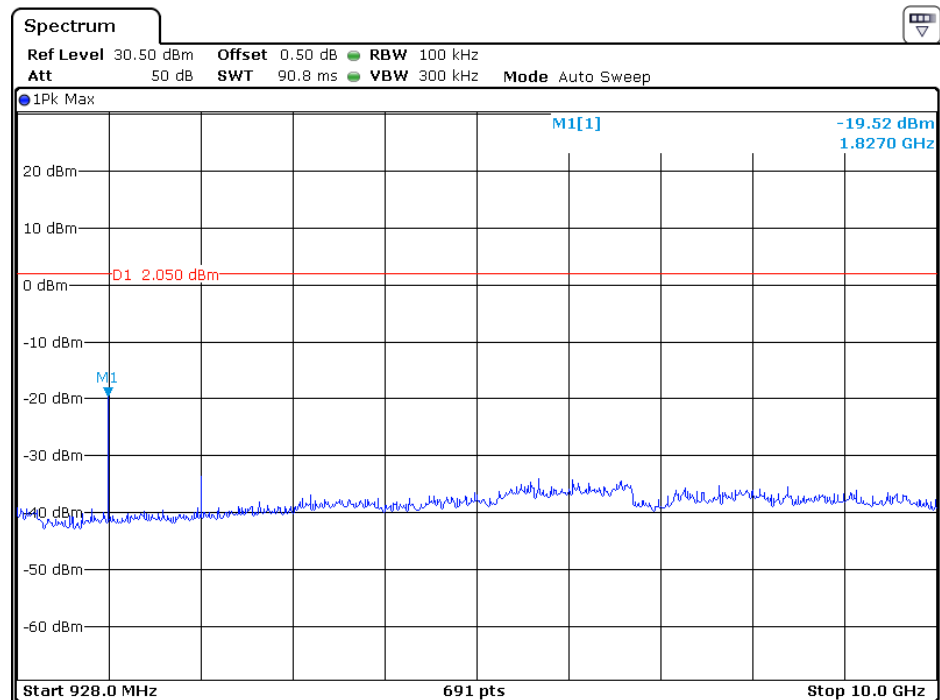
CH07 Reference Level: 17.95dBm



P
Date: 17 SEP 2020 17:18:41



P
Date: 17 SEP 2020 17:19:44



P

Date: 17_SEP_2020 17:20:19

Applicant: ABEEWAY

Date of Test: September 22, 2020

Model: U310

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: ABEEWAY

Date of Test: 15 August 2020

Model: U310

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: ABEEWAY

Date of Test: 15 August 2020

Model: U310

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.

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

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

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

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

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

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

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

Applicant: ABEEWAY

Date of Test: 15 August 2020

Model: U310

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission
at 71.96MHz
is passed by 1.5dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf. Simultaneous transmission was considered during the test.

Applicant: ABEEWAY

Date of Test: 15 August 2020

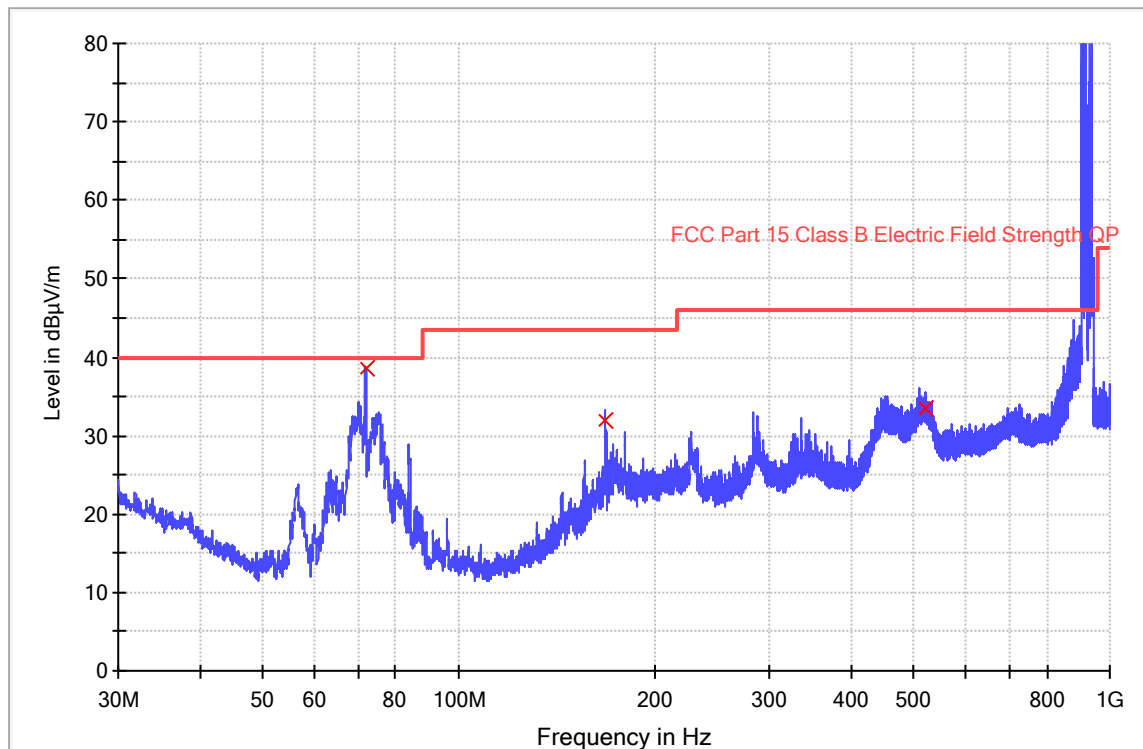
Worst Case Operating Mode:

Model: U310

Simultaneous transmission

ANT Polarity: Horizontal

FCC Part 15



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
71.960000	38.5	1000.0	120.000	0.0	H	8.9	1.5	40.0
167.901667	31.9	1000.0	120.000	0.0	H	11.9	11.6	43.5
520.044000	33.4	1000.0	120.000	0.0	H	22.2	12.6	46.0

Remark:

1. Corr. = 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: ABEEWAY

Date of Test: 15 August 2020

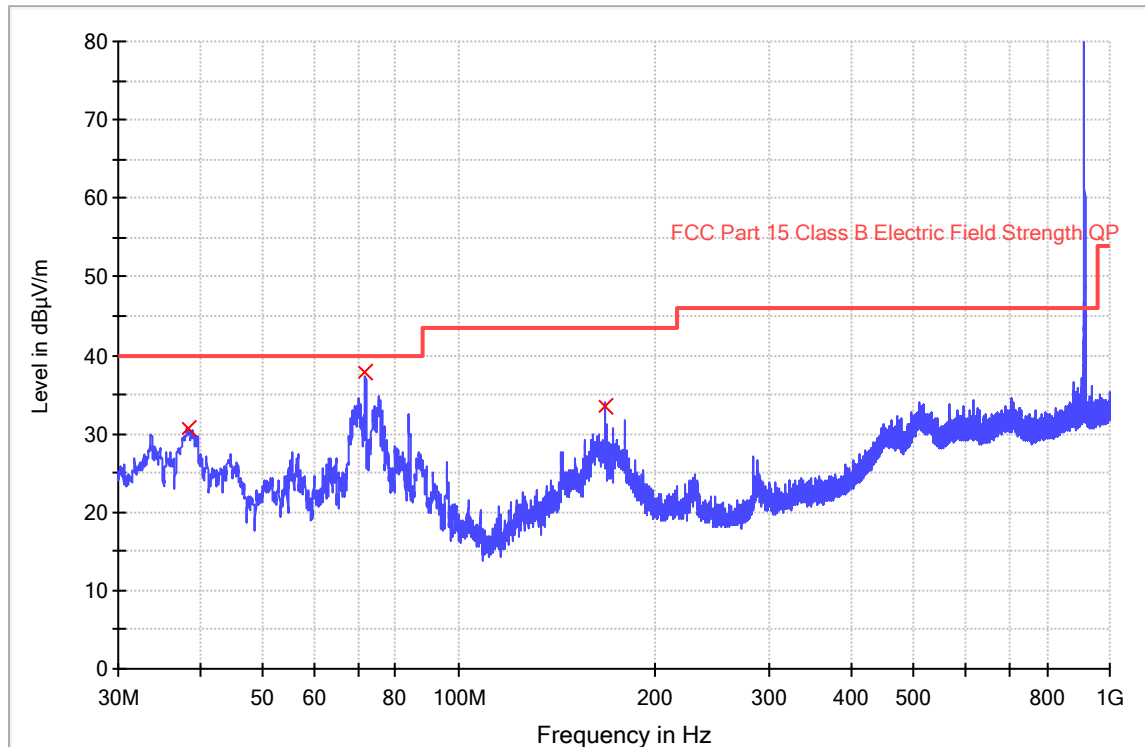
Worst Case Operating Mode:

Model: U310

Simultaneous transmission

ANT Polarity: Vertical

FCC Part 15



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
38.503667	30.7	1000.0	120.000	0.0	V	14.3	9.3	40.0
71.840000	37.7	1000.0	120.000	0.0	V	8.9	2.3	40.0
168.095667	33.4	1000.0	120.000	0.0	V	11.9	10.1	43.5

Remark:

1. Corr. = 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: ABEEWAY

Date of Test: 15 August 2020

Worst Case Operating Mode:

Model: U310

Transmitting

Radiated Emissions (above 1GHz)

(903.0MHz)

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	**903.000	120.4	36.7	28.1	111.8	--	--
Horizontal	*2709.000	49.8	35.6	39.5	53.7	74.0	-21.3

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	**903.000	108.8	36.7	28.1	100.2	--	--
Horizontal	*2709.000	33.3	35.6	39.5	37.2	54.0	-16.8

- 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: ABEEWAY

Date of Test: 15 August 2020

Worst Case Operating Mode:

Model: U310

Transmitting

Radiated Emissions (above 1GHz)

(907.8MHz)

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	*2723.400	57.6	36.1	37.2	58.7	74.0	-15.3

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	*2723.400	33.6	36.1	37.2	34.7	54.0	-19.3

- 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: ABEEWAY

Date of Test: 15 August 2020

Worst Case Operating Mode:

Model: U310

Transmitting

Radiated Emissions (above 1GHz)

(914.2MHz)

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	**914.200	117.9	36.7	28.1	109.3	--	--
Horizontal	*2742.600	59.2	36.1	37.2	60.3	74.0	-13.7

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	**914.200	111.0	36.7	28.1	102.4	--	--
Horizontal	*2742.600	35.1	36.1	37.2	36.2	54.0	-17.8

- 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: ABEEWAY

Date of Test: August 15, 2020

Model: U310

4.9 Conducted Emission

Worst Case Conducted Emission
at 0.177MHz
is passed by 13.7dB margin.

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

Applicant: ABEEWAY

Date of Test: August 15, 2020

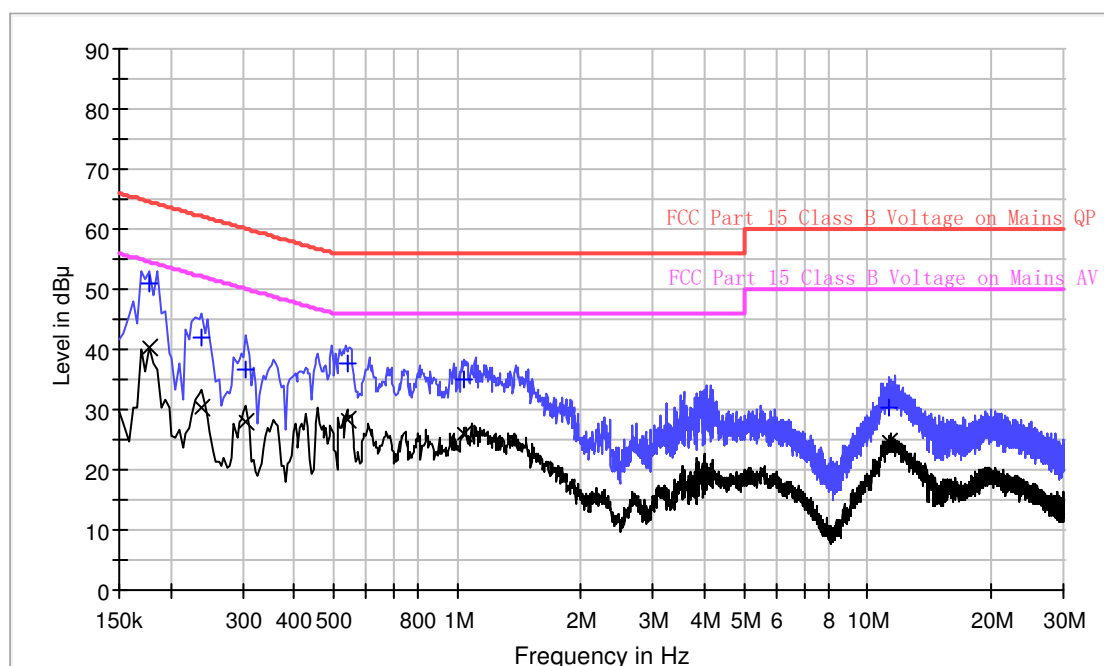
Model: U310

Worst Case Operating Mode: Simultaneous transmission

Phase: Live

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement



Result Table QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.177000	50.9	9.000	L1	9.7	13.7	64.6
0.238000	41.9	9.000	L1	9.7	20.3	62.2
0.306000	36.7	9.000	L1	9.7	23.4	60.1
0.538000	37.8	9.000	L1	9.7	18.2	56.0
1.042000	35.0	9.000	L1	9.7	21.0	56.0
11.294000	30.2	9.000	L1	10.0	29.8	60.0

Result Table AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.177000	40.4	9.000	L1	9.7	14.2	54.6
0.238000	30.5	9.000	L1	9.7	21.7	52.2
0.306000	27.9	9.000	L1	9.7	22.2	50.1
0.538000	28.4	9.000	L1	9.7	17.6	46.0
1.042000	26.1	9.000	L1	9.7	19.9	46.0
11.294000	24.8	9.000	L1	10.0	25.2	50.0

Applicant: ABEEWAY

Date of Test: August 15, 2020

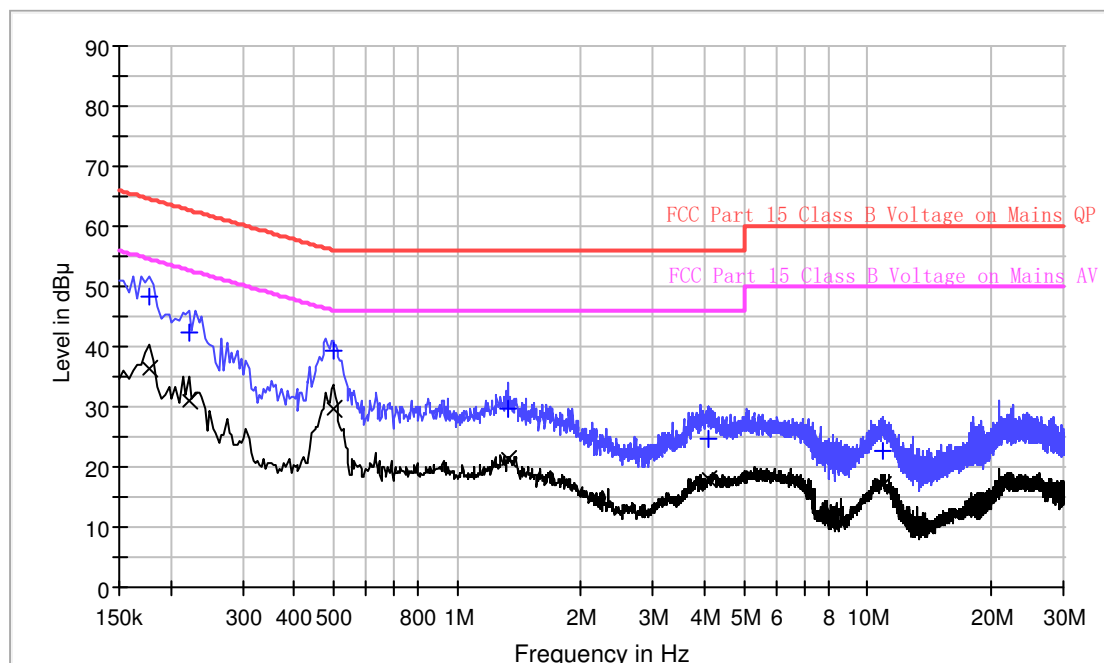
Model: U310

Worst Case Operating Mode: Simultaneous transmission

Phase: Neutral

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement



Result Table QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.177000	48.3	9.000	N	9.7	16.3	64.6
0.222000	42.2	9.000	N	9.7	20.5	62.7
0.498000	39.2	9.000	N	9.7	16.8	56.0
1.330000	29.6	9.000	N	9.7	26.4	56.0
4.090000	24.6	9.000	N	9.8	31.4	56.0
10.878000	22.5	9.000	N	10.0	37.5	60.0

Result Table AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.177000	36.5	9.000	N	9.7	18.1	54.6
0.222000	31.0	9.000	N	9.7	21.7	52.7
0.498000	29.8	9.000	N	9.7	16.2	46.0
1.330000	21.4	9.000	N	9.7	24.6	46.0
4.090000	18.0	9.000	N	9.8	28.0	46.0
10.878000	17.0	9.000	N	10.0	33.0	50.0

Applicant: ABEEWAY

Date of Test: August 15, 2020

Model: U310

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: ABEEWAY

Date of Test: August 15, 2020

Model: U310

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
SZ011-01	Power Meter	Qingdao Qingzhi	8776AT	1302005	2019-10-10	2021-10-10
SZ182-01-01	Power Sensor	BOONTON	51011-EMC	1207429	2019-01-05	2021-01-05
SZ061-03	Biconilog Antenna	ETS	3142C	00078828	2019-05-24	2021-05-24
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2019-05-24	2021-05-24
SZ061-08	Horn Antenna	ETS	3115	00092346	2019-09-07	2021-09-07
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2019-08-13	2021-08-13
SZ056-03	Spectrum Analyzer	R&S	FSP30	101148	2020-05-27	2021-05-27
SZ185-01	EMI Receiver	R & S	ESCI	100547	2019-12-24	2020-12-24
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2020-05-27	2021-05-27
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2018-12-15	2020-12-15
SZ062-02	RF Cable	RADIAL	RG 213U	--	2020-06-12	2020-12-12
SZ062-05	RF Cable	RADIAL	0.04-26.5GHz	--	2020-06-24	2021-02-24
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	2020-06-24	2021-02-24
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2020-05-27	2021-05-27
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2019-10-29	2020-10-29
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	2020-05-27	2021-05-27
SZ188-03	Shielding Room	ETS	RFD-100	4100	2020-01-07	2023-01-07

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