

APPLICATION CERTIFICATION FCC Part 15C

On Behalf of
Libre Home Inc

Hub
Model No.: Librehub

FCC ID: 2AQXA-LIBREHUB

Prepared for : Libre Home Inc
Address : 13 Crestview Ter. Montvale, New Jersey, United States 07645

Prepared by : Shenzhen Accurate Technology Co., Ltd.
Address : 1/F., Building A, Changyuan New Material Port, Science & Industry
Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Tel: (0755) 26503290
Fax: (0755) 26503396

Report No. : ATE20190024
Date of Test : January 21-March 29, 2019
Date of Report : March 30, 2019

TABLE OF CONTENTS

Description	Page
Test Report Certification	
1. GENERAL INFORMATION	5
1.1. Description of Device (EUT).....	5
1.2. Carrier Frequency of Channels	5
1.3. Special Accessory and Auxiliary Equipment	5
1.4. Description of Test Facility	6
1.5. Measurement Uncertainty	6
2. MEASURING DEVICE AND TEST EQUIPMENT	7
3. OPERATION OF EUT DURING TESTING	8
3.1. Operating Mode	8
3.2. Configuration and peripherals	8
4. TEST PROCEDURES AND RESULTS	9
5. 6DB BANDWIDTH TEST.....	10
5.1. Block Diagram of Test Setup.....	10
5.2. The Requirement For Section 15.247(a)(2).....	10
5.3. EUT Configuration on Test	10
5.4. Operating Condition of EUT	10
5.5. Test Procedure	10
5.6. Test Result	11
6. MAXIMUM PEAK OUTPUT POWER TEST	13
6.1. Block Diagram of Test Setup.....	13
6.2. The Requirement For Section 15.247(b)(3).....	13
6.3. EUT Configuration on Test	13
6.4. Operating Condition of EUT	13
6.5. Test Procedure	13
6.6. Test Result	14
7. POWER SPECTRAL DENSITY TEST.....	16
7.1. Block Diagram of Test Setup.....	16
7.2. The Requirement For Section 15.247(e).....	16
7.3. EUT Configuration on Test	16
7.4. Operating Condition of EUT	16
7.5. Test Procedure	17
7.6. Test Result	17
8. BAND EDGE COMPLIANCE TEST	20
8.1. Block Diagram of Test Setup.....	20
8.2. The Requirement For Section 15.247(d)	20
8.3. EUT Configuration on Test	20
8.4. Operating Condition of EUT	20
8.5. Test Procedure	21
8.6. Test Result	21
9. RADIATED SPURIOUS EMISSION TEST	27
9.1. Block Diagram of Test Setup.....	27
9.2. The Limit For Section 15.247(d)	28
9.3. Restricted bands of operation	29
9.4. Configuration of EUT on Test.....	29

9.5.	Operating Condition of EUT	30
9.6.	Test Procedure	30
9.7.	Data Sample.....	31
9.8.	Test Results.....	31
10.	AC POWER LINE CONDUCTED EMISSION TEST	44
10.1.	Block Diagram of Test Setup.....	44
10.2.	Test System Setup.....	44
10.3.	Test Limits	45
10.4.	Configuration of EUT on Test.....	45
10.5.	Operating Condition of EUT	45
10.6.	Test Procedure	45
10.7.	Data Sample.....	46
10.8.	Test Results.....	46
11.	ANTENNA REQUIREMENT.....	51
11.1.	The Requirement	51
11.2.	Antenna Construction	51

Test Report Certification

Applicant : Libre Home Inc
Address : 13 Crestview Ter. Montvale, New Jersey, United States 07645
Product : Hub
Model No. : Librehub
Trade Mark : Libre Home

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

The EUT was tested according to DTS test procedure of August 24, 2018 KDB558074 D01 DTS Meas Guidance v05 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : January 21-March 29, 2019
Date of Report : March 30, 2019

Prepared by :

Stan Yang

(Stan Yang, Engineer)

Approved & Authorized Signer :


(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Hub
Model Number	:	Librehub
Modulation Type	:	OQPSK (ZigBee)
Frequency Range	:	2405-2480MHz
Number of Channels	:	16
Channel Spacing	:	5MHz
Antenna Gain	:	3dBi
Antenna Type	:	External Antenna
Power Supply	:	DC 12V---2.5A

1.2. Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	17	2435	23	2465
12	2410	18	2440	24	2470
13	2415	19	2445	25	2475
14	2420	20	2450	26	2480
15	2425	21	2455		
16	2430	22	2460		

1.3. Special Accessory and Auxiliary Equipment

Description	Manufacturer	Model	S/N
AC Adapter (provided by manufacturer)	DELTA ELECTRONICS, INC.	EADP-72KBA	N/A

1.4. Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5. Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 05, 2019	One Year
EMI Test Receiver	Rohde&Schwarz	ESR	101817	Jan. 05, 2019	One Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 05, 2019	One Year
Pre-Amplifier	Compliance Direction	RSU-M2	38322	Jan. 05, 2019	One Year
Pre-Amplifier	Agilent	8447D	294A10619	Jan. 05, 2019	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 05, 2019	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 05, 2019	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 05, 2019	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 05, 2019	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 05, 2019	One Year
Conducted Emission Measurement Software: ES-K1 V1.71					
Radiated Emission Measurement Software: EZ_EMV V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 2405MHz

Middle Channel: 2450MHz

High Channel: 2480MHz

Its duty cycle setting is greater than 98%.

3.2.Configuration and peripherals

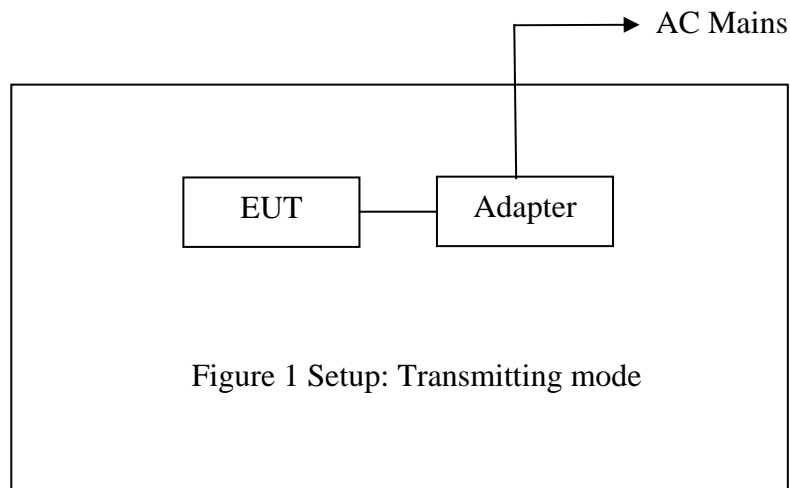


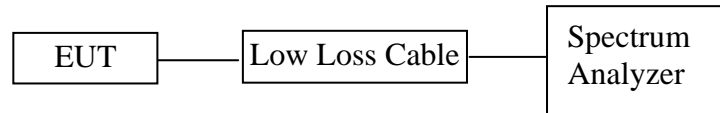
Figure 1 Setup: Transmitting mode

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.247(d) Section 15.209	Radiated Spurious Emission Test	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 6DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.3. EUT Configuration on Test

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2405-2480MHz. We select 2405MHz, 2450MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

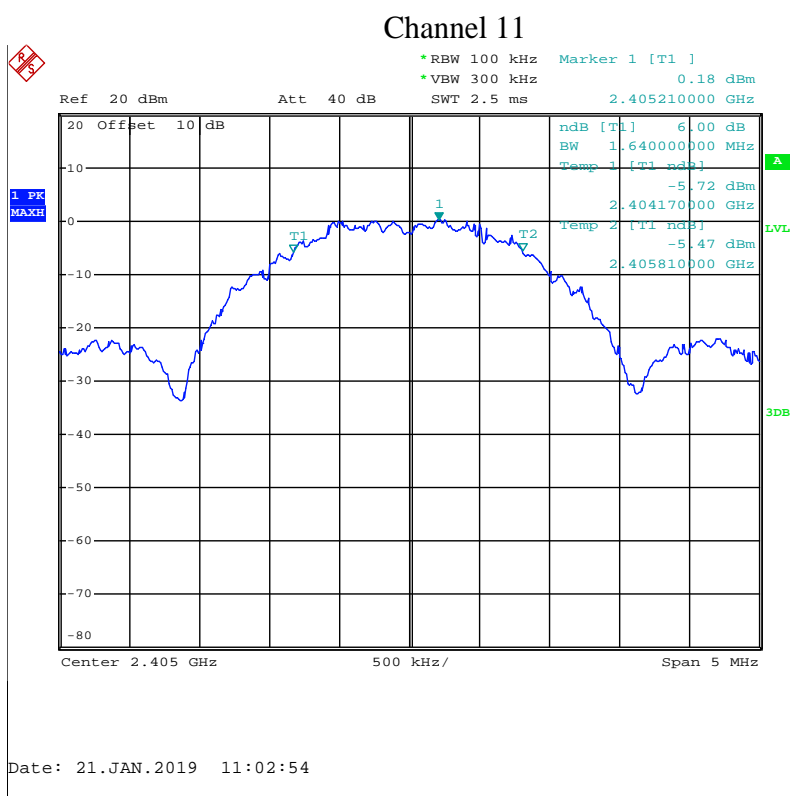
5.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

5.5.3. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

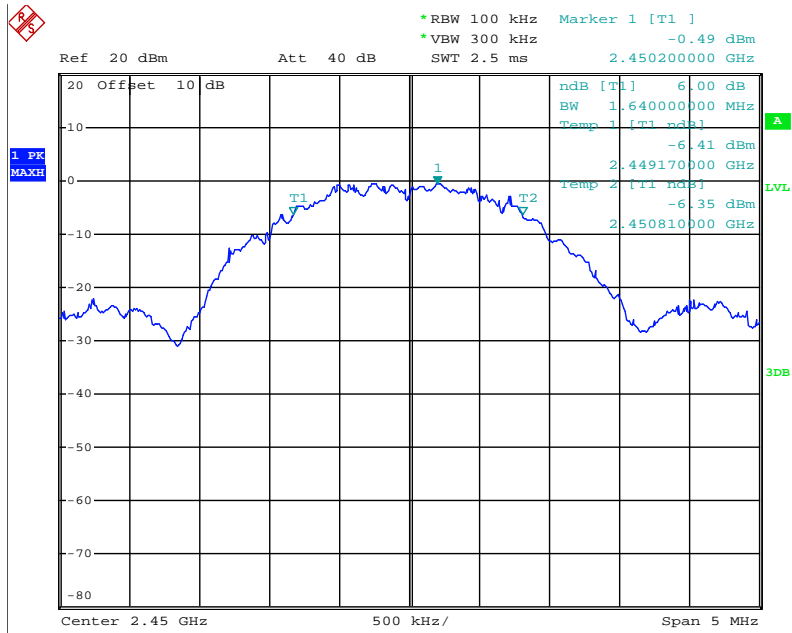
5.6.Test Result

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit(MHz)	Result
11	2405	1.640	0.5	Pass
20	2450	1.640	0.5	Pass
26	2480	1.650	0.5	Pass

The spectrum analyzer plots are attached as below.

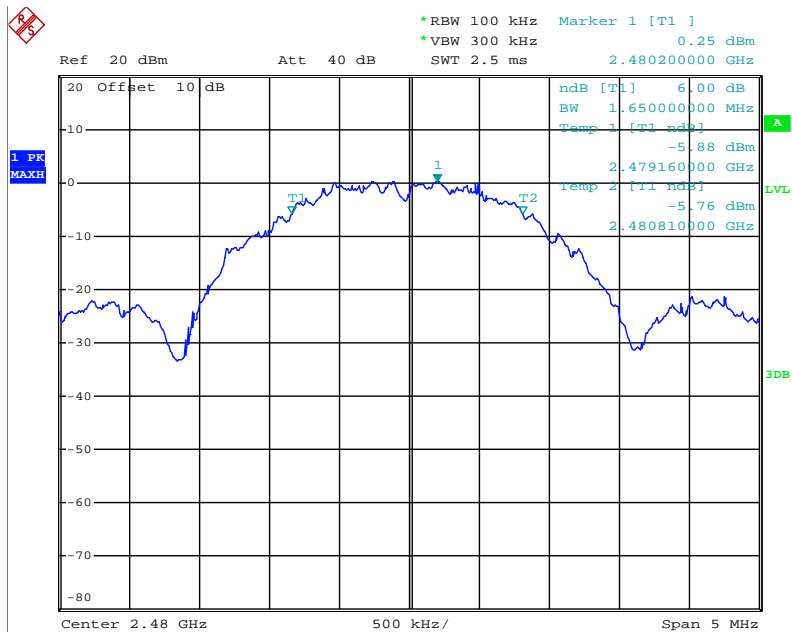


Channel 20



Date: 21.JAN.2019 11:20:23

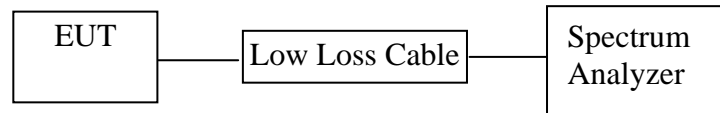
Channel 26



Date: 21.JAN.2019 11:13:12

6. MAXIMUM PEAK OUTPUT POWER TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

6.3. EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2405-2480MHz. We select 2405MHz, 2450MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

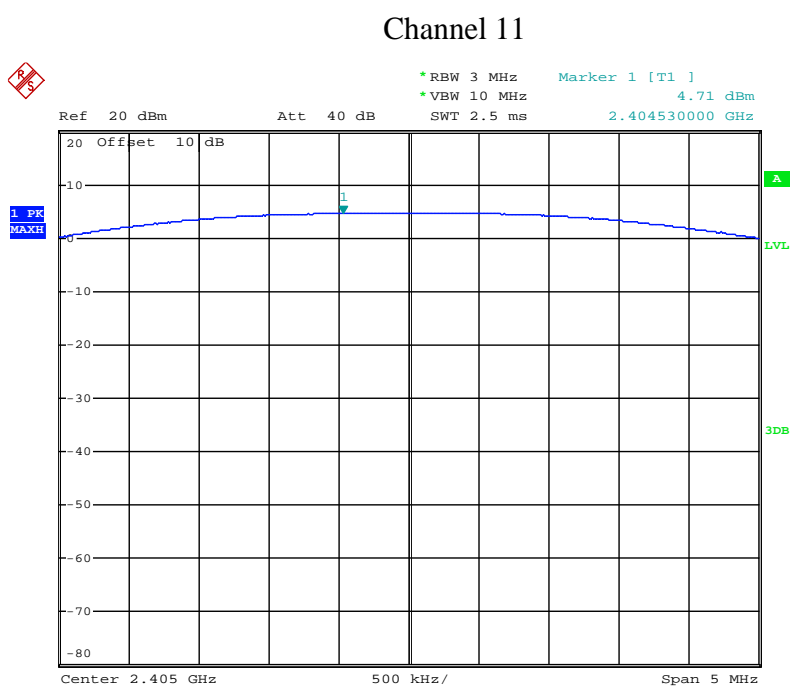
6.5.2. Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz.

6.5.3. Measurement the maximum peak output power.

6.6. Test Result

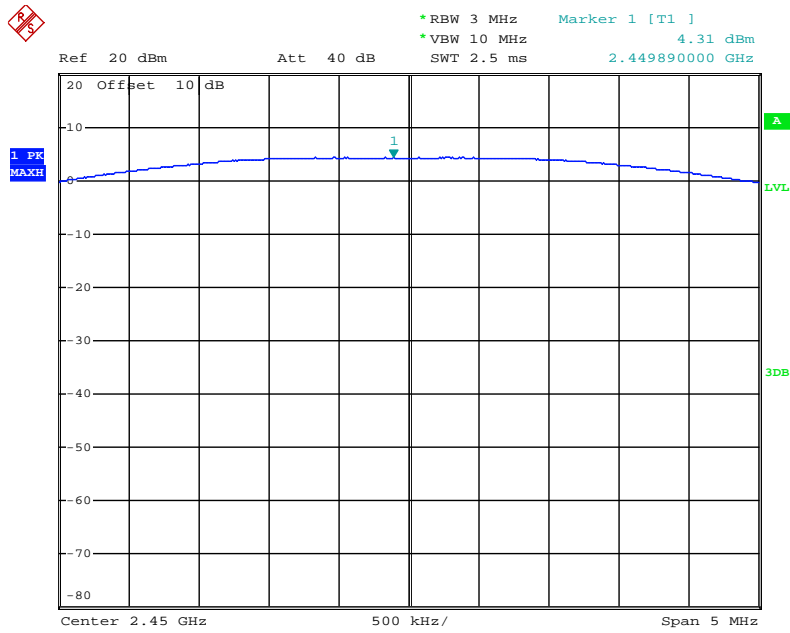
Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Result
11	2405	4.71	30	Pass
20	2450	4.31	30	Pass
26	2480	5.10	30	Pass

The spectrum analyzer plots are attached as below.



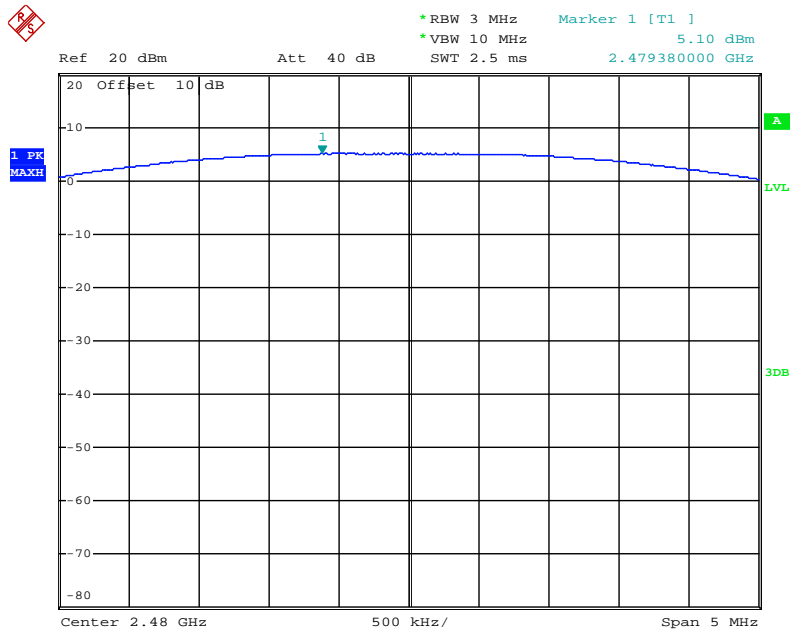
Date: 21.JAN.2019 11:07:42

Channel 20



Date: 21.JAN.2019 11:18:11

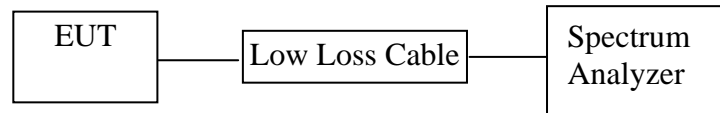
Channel 26



Date: 21.JAN.2019 11:14:48

7. POWER SPECTRAL DENSITY TEST

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.3. EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2405-2480MHz. We select 2405MHz, 2450MHz, and 2480MHz TX frequency to transmit.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Measurement Procedure PKPSD:

7.5.3. This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS Channel center frequency.
2. Set the span to 1.5 times the DTS Channel bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3kHz) and repeat.

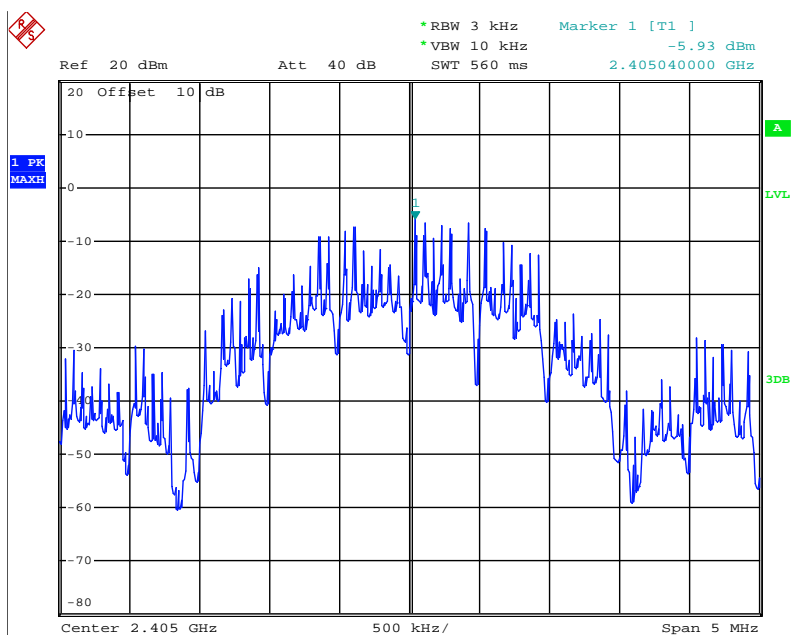
7.5.4. Measurement the maximum power spectral density.

7.6. Test Result

Channel	Frequency (MHz)	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
11	2405	-5.93	8	Pass
20	2450	-6.01	8	Pass
26	2480	-5.59	8	Pass

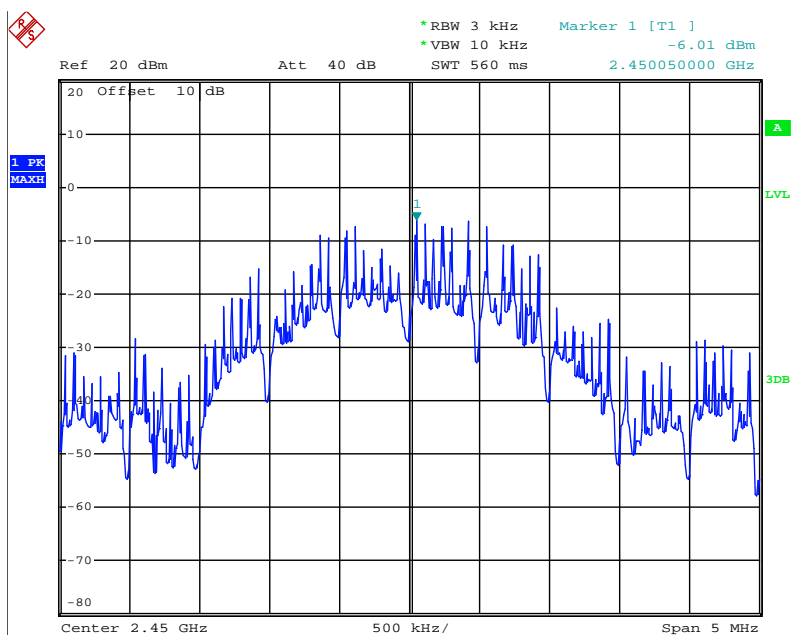
The spectrum analyzer plots are attached as below.

Channel 11



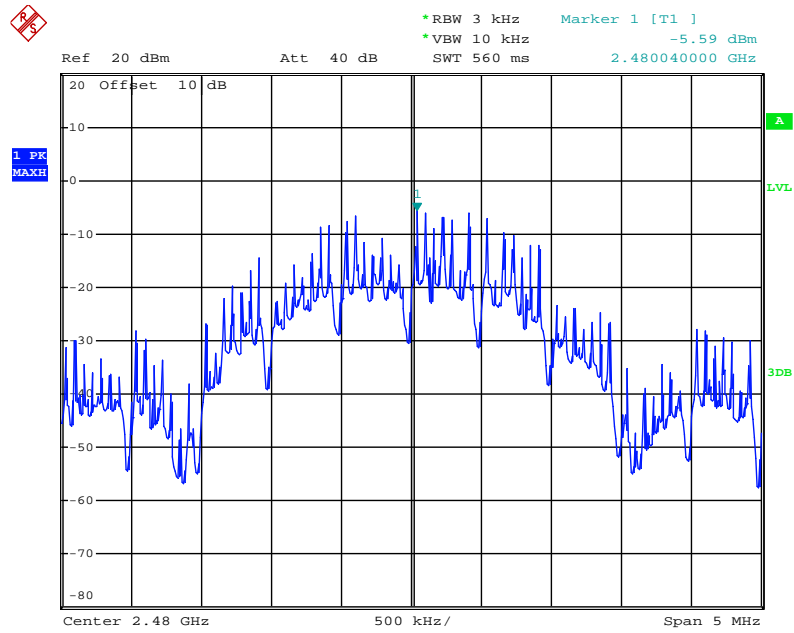
Date: 21.JAN.2019 11:06:50

Channel 20



Date: 21.JAN.2019 11:17:34

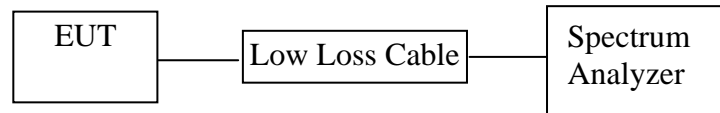
Channel 26



Date: 21.JAN.2019 11:16:08

8. BAND EDGE COMPLIANCE TEST

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(d)

Section 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

8.3. EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2405-2480MHz. We select 2405MHz, 2480MHz TX frequency to transmit.

8.5. Test Procedure

Conducted Band Edge:

8.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

8.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

Radiate Band Edge:

8.5.3. The EUT is placed on a turntable, which is 1.5m above the ground plane and worked at highest radiated power.

8.5.4. The turntable was rotated for 360 degrees to determine the position of maximum emission level.

8.5.5. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

8.5.6. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

8.5.7. RBW=1MHz, VBW=1MHz

8.5.8. The band edges was measured and recorded.

8.6. Test Result

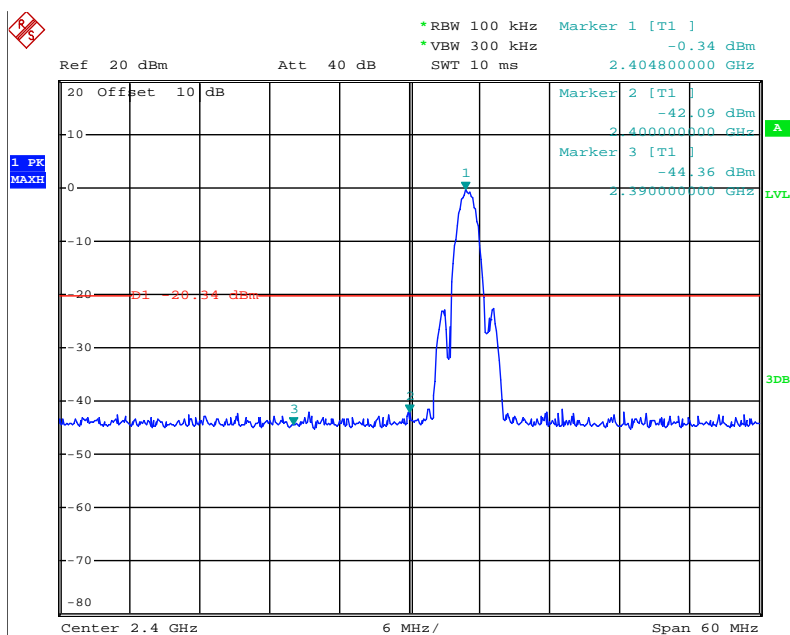
Pass.

Conducted Band Edge Result

Channel	Frequency	Delta peak to band emission	Limit(dBc)
11	2405MHz	41.75	>20
26	2480MHz	42.74	>20

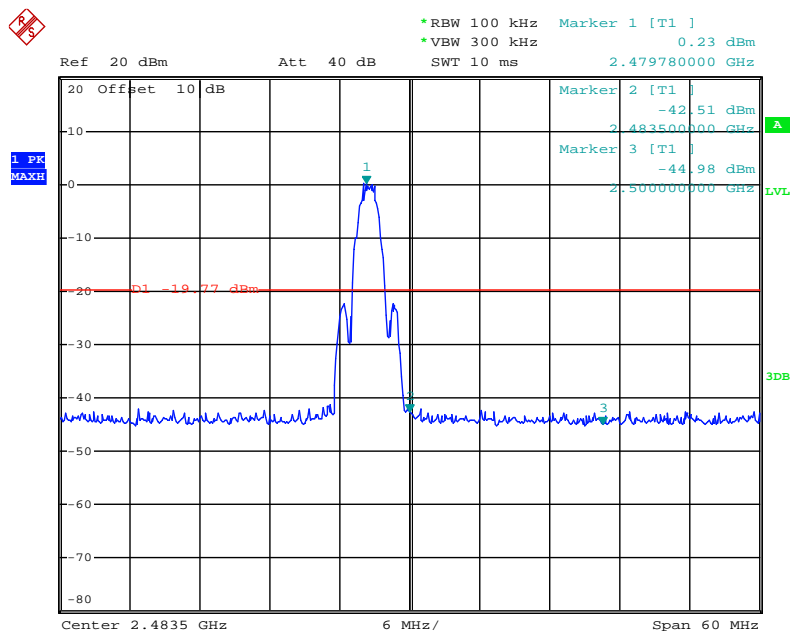
The spectrum analyzer plots are attached as below.

Channel 11



Date: 21.JAN.2019 11:08:45

Channel 26



Date: 21.JAN.2019 11:10:24



Radiated Band Edge Result

ACCURATE TECHNOLOGY CO., LTD.

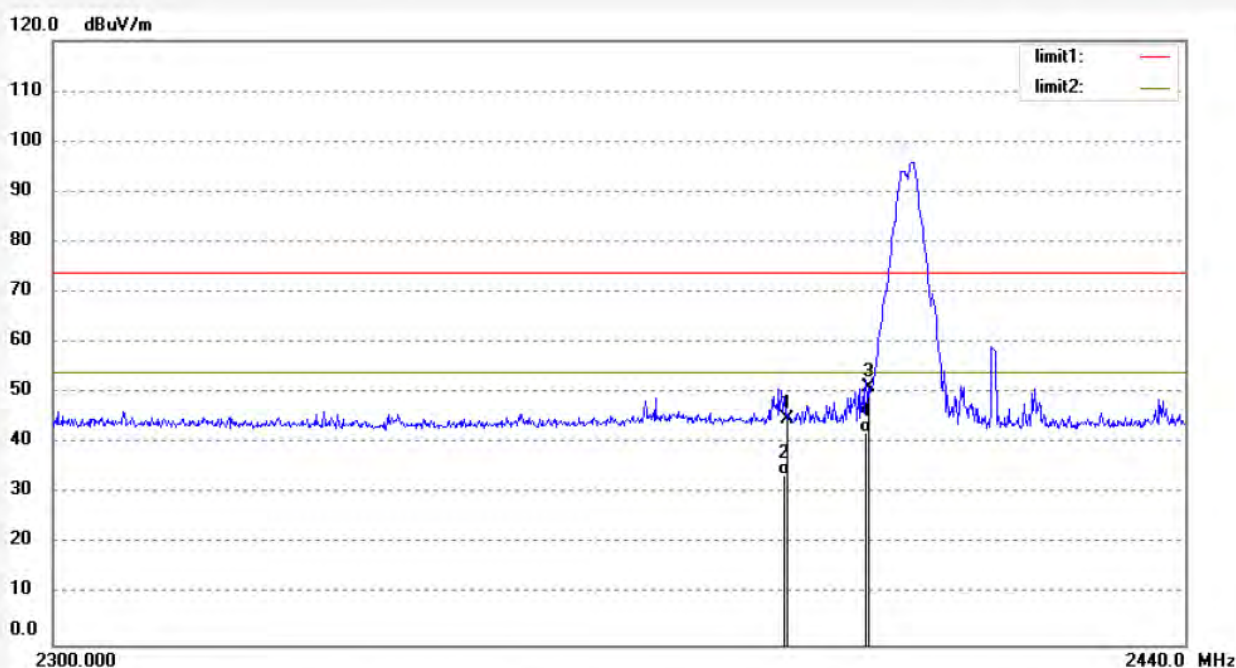
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: star2016 #2904
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Hub
Mode: TX 2405MHz
Model: Librehub
Manufacturer: Libre Home Inc

Polarization: Horizontal
Power Source: DC 12V
Date: 2019/03/29
Time: 15:38:36
Engineer Signature: star
Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	44.00	0.79	44.79	74.00	-29.21	peak	200	145	
2	2390.000	32.95	0.79	33.74	54.00	-20.26	AVG	200	139	
3	2400.000	50.32	0.88	51.20	74.00	-22.80	peak	200	255	
4	2400.000	41.15	0.88	42.03	54.00	-11.97	AVG	200	136	

Job No.: star2016 #2905

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2405MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

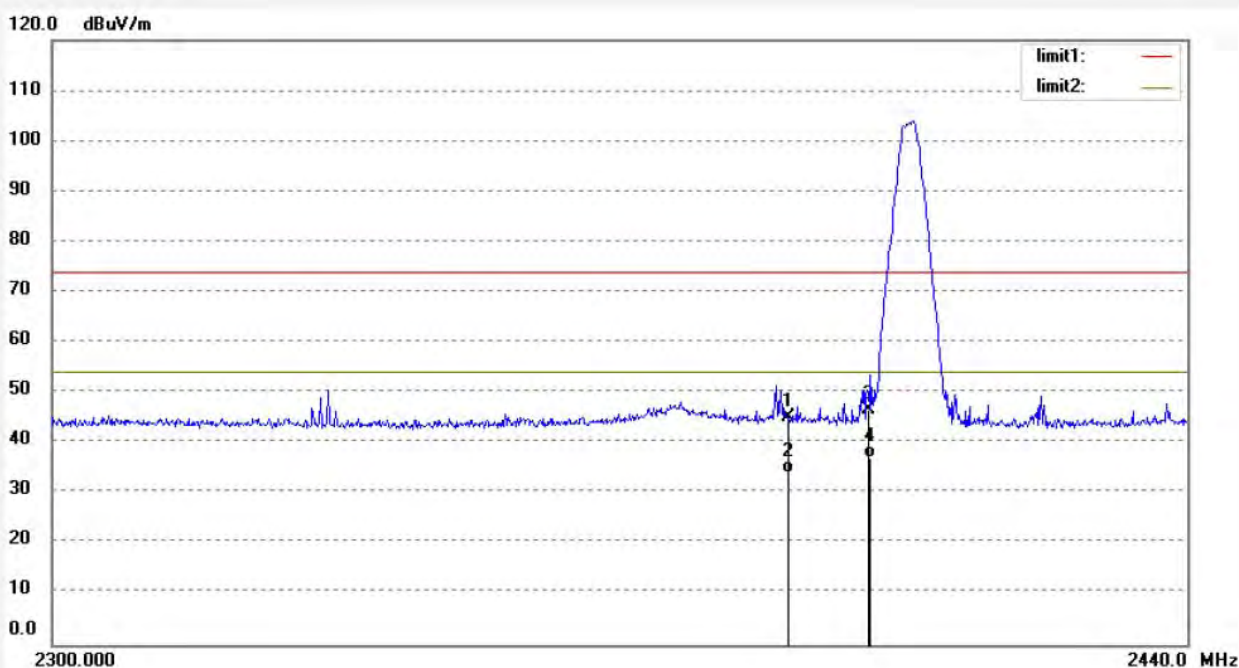
Date: 2019/03/29

Time: 15:39:29

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	44.47	0.79	45.26	74.00	-28.74	peak	150	111	
2	2390.000	33.20	0.79	33.99	54.00	-20.01	AVG	150	238	
3	2400.000	45.76	0.88	46.64	74.00	-27.36	peak	150	246	
4	2400.000	36.17	0.88	37.05	54.00	-16.95	AVG	150	168	

Job No.: star2016 #2907

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2480MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

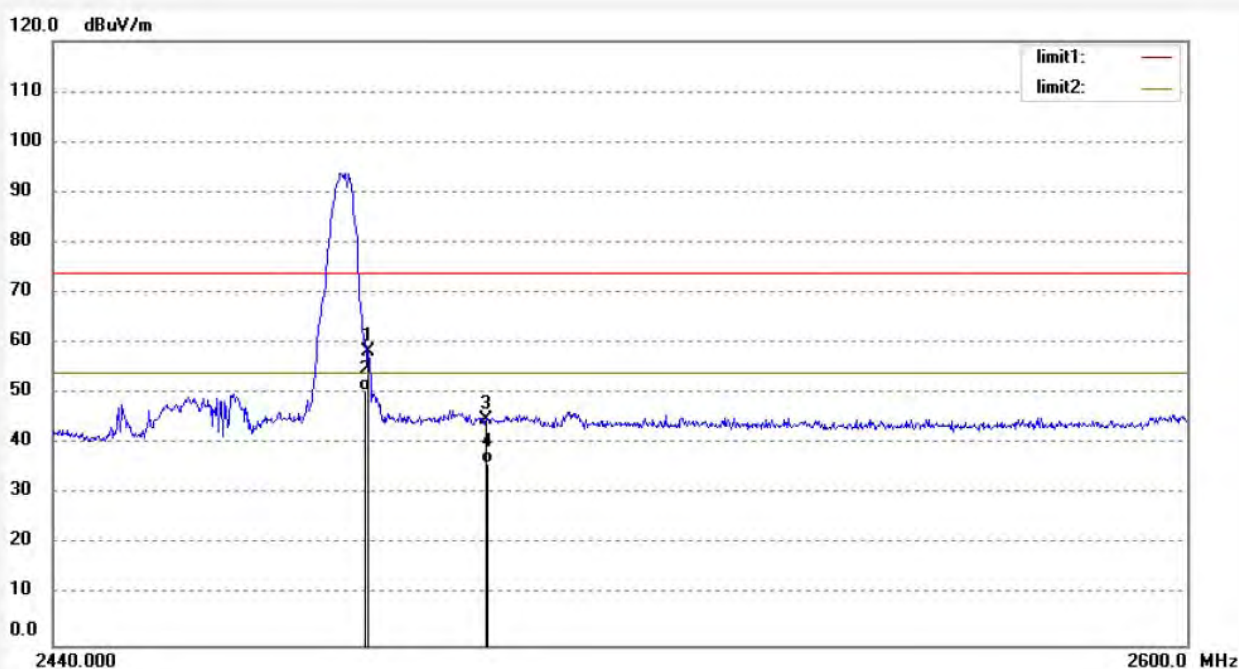
Date: 2019/03/29

Time: 15:42:47

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024

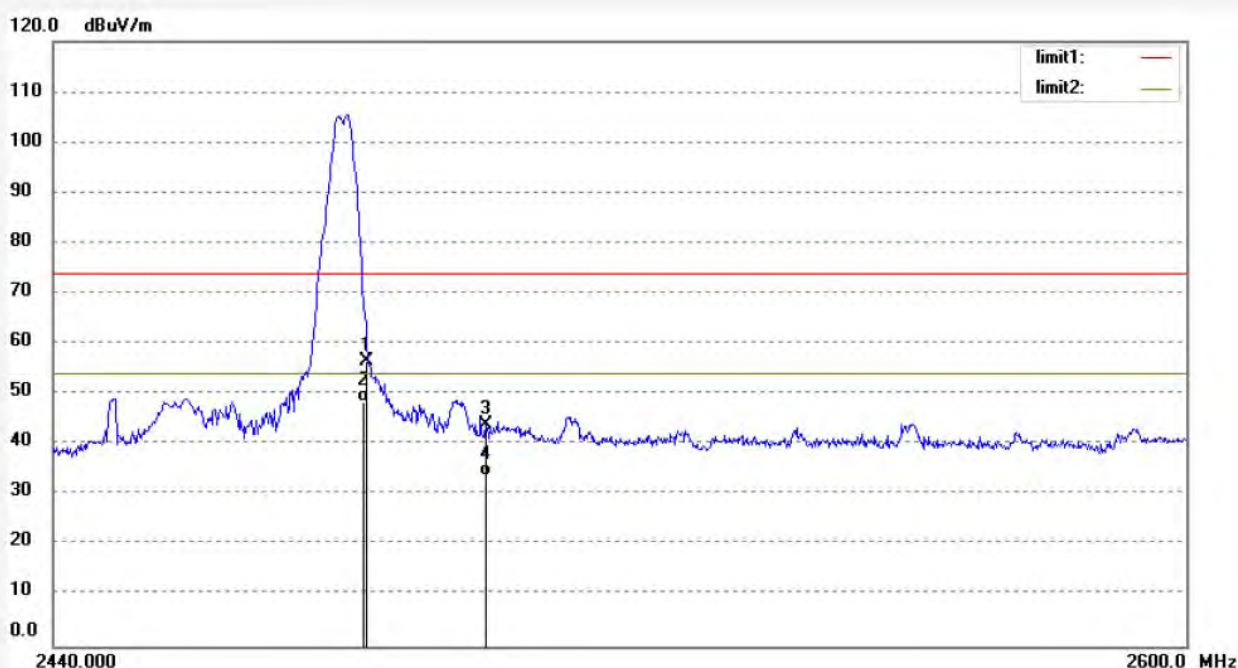


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	57.40	1.10	58.50	74.00	-15.50	peak	200	147	
2	2483.500	49.57	1.10	50.67	54.00	-3.33	AVG	200	123	
3	2500.000	43.73	1.10	44.83	74.00	-29.17	peak	200	203	
4	2500.000	35.17	1.10	36.27	54.00	-17.73	AVG	200	159	

Job No.: star2016 #2906
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Hub
Mode: TX 2480MHz
Model: Librehub
Manufacturer: Libre Home Inc

Polarization: Vertical
Power Source: DC 12V
Date: 2019/03/29
Time: 15:41:51
Engineer Signature: star
Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	55.41	1.10	56.51	74.00	-17.49	peak	150	247	
2	2483.500	47.36	1.10	48.46	54.00	-5.54	AVG	150	301	
3	2500.000	42.92	1.10	44.02	74.00	-29.98	peak	150	156	
4	2500.000	32.69	1.10	33.79	54.00	-20.21	AVG	150	55	

Note:

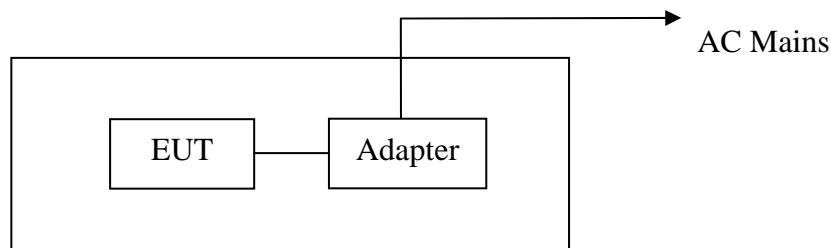
1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

9. RADIATED SPURIOUS EMISSION TEST

9.1. Block Diagram of Test Setup

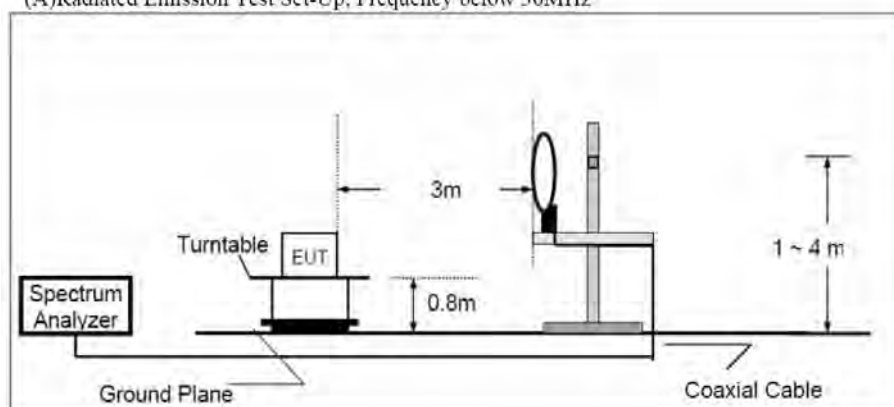
9.1.1. Block diagram of connection between the EUT and peripherals



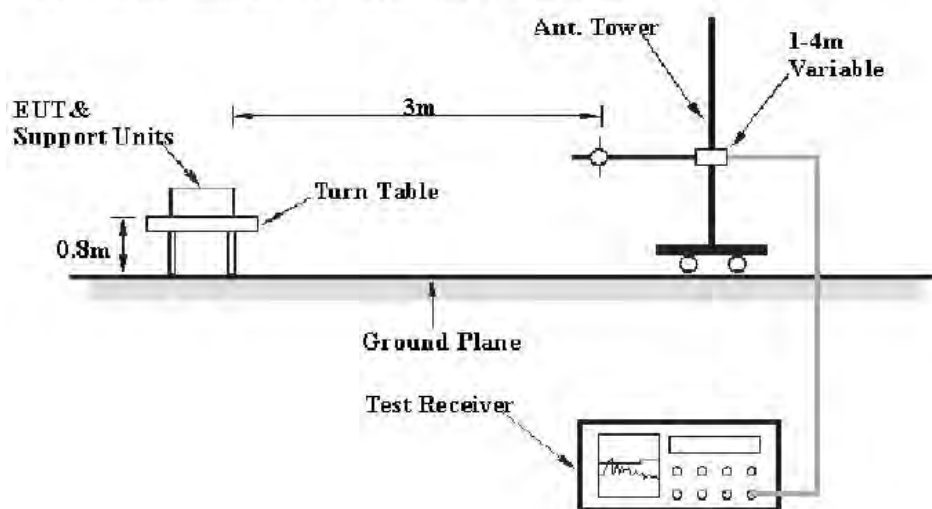
Setup: Transmitting mode

9.1.2. Semi-Anechoic Chamber Test Setup Diagram

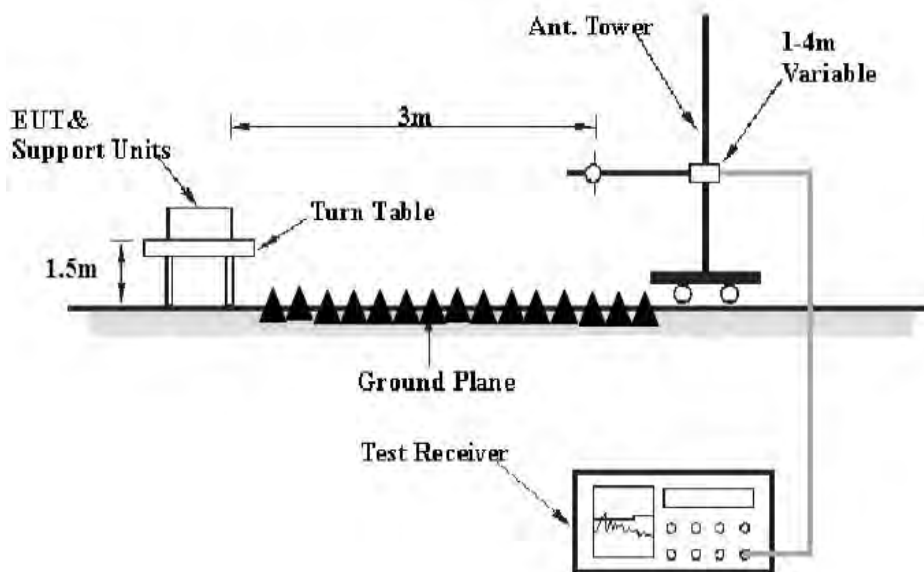
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



9.2.The Limit For Section 15.247(d)

Section 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

9.3. Restricted bands of operation

9.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

9.4.Configuration of EUT on Test

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.5. Operating Condition of EUT

9.5.1. Setup the EUT and simulator as shown as Section 9.1.

9.5.2. Turn on the power of all equipment.

9.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2405-2480MHz. We select 2405MHz, 2450MHz, and 2480MHz TX frequency to transmit.

9.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground (Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground (Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector. The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading.

9.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	43.85	-22.22	21.63	43.5	-21.87	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

9.8.Test Results

Pass.

The frequency range from 9kHz to 26.5GHz is checked.

The radiation emissions from 9kHz-30MHz and 18-26.5GHz are not reported, because the test values lower than the limits of 20dB.

The spectrum analyzer plots are attached as below.

Below 1GHz



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2016 #2890

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2405MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

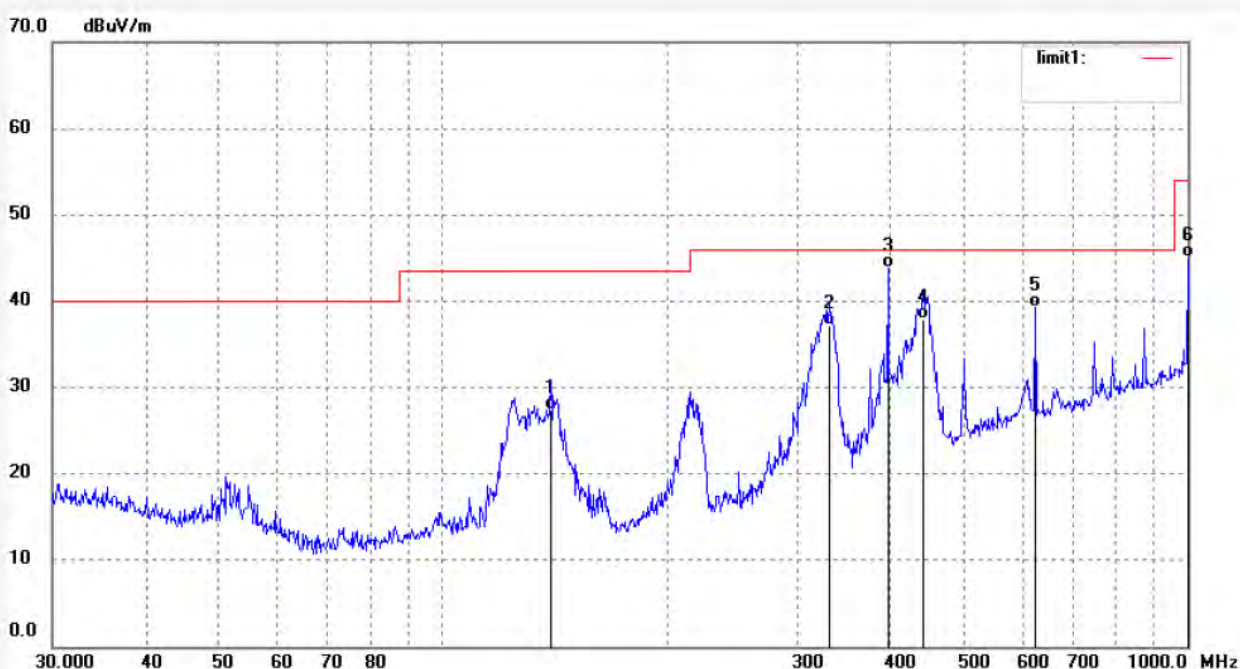
Date: 19/03/28/

Time: 8/37/54

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	139.8507	42.46	-15.09	27.37	43.50	-16.13	QP	200	146	
2	331.3546	45.19	-8.01	37.18	46.00	-8.82	QP	200	201	
3	396.2414	50.41	-6.59	43.82	46.00	-2.18	QP	200	222	
4	441.7425	43.36	-5.46	37.90	46.00	-8.10	QP	200	306	
5	625.0779	41.34	-2.00	39.34	46.00	-6.66	QP	200	310	
6	1000.0000	41.26	3.84	45.10	54.00	-8.90	QP	200	325	

Job No.: star2016 #2889

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2405MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

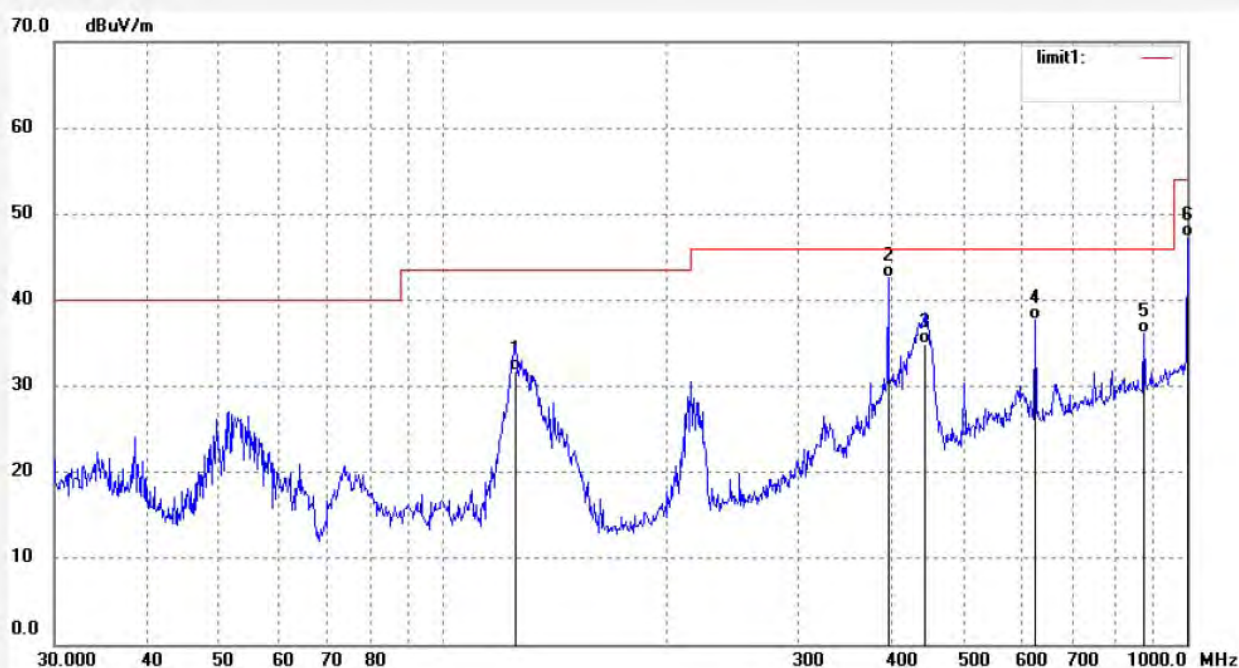
Date: 19/03/28/

Time: 8/39/01

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	125.0066	45.32	-13.63	31.69	43.50	-11.81	QP	100	87	
2	396.2414	49.18	-6.59	42.59	46.00	-3.41	QP	100	102	
3	444.8514	40.39	-5.43	34.96	46.00	-11.04	QP	100	145	
4	625.0779	39.68	-2.00	37.68	46.00	-8.32	QP	100	246	
5	875.2469	34.10	1.98	36.08	46.00	-9.92	QP	100	233	
6	1000.0000	43.44	3.84	47.28	54.00	-6.72	QP	100	342	

Job No.: star2016 #2892

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2450MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

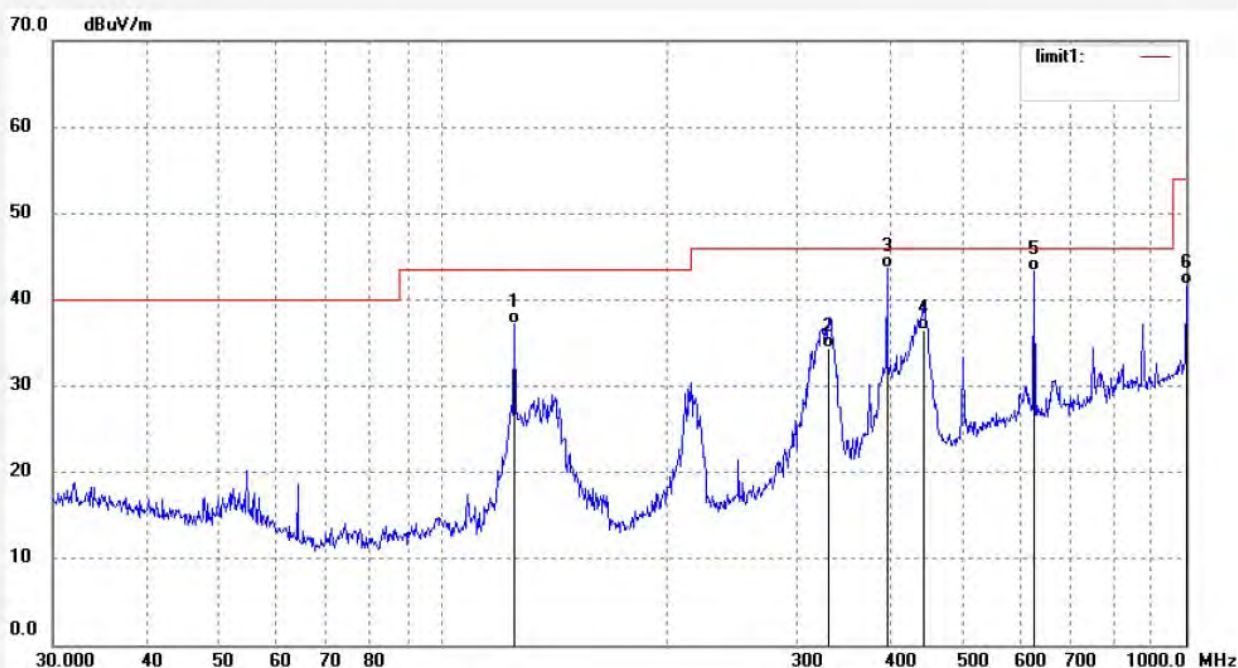
Date: 19/03/28/

Time: 8/43/51

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	125.0066	50.81	-13.63	37.18	43.50	-6.32	QP	200	139	
2	330.1949	42.36	-8.03	34.33	46.00	-11.67	QP	200	102	
3	396.2414	50.18	-6.59	43.59	46.00	-2.41	QP	200	320	
4	443.2943	41.97	-5.44	36.53	46.00	-9.47	QP	200	154	
5	625.0779	45.34	-2.00	43.34	46.00	-2.66	QP	200	228	
6	1000.0000	37.96	3.84	41.80	54.00	-12.20	QP	200	233	

Job No.: star2016 #2891

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2450MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

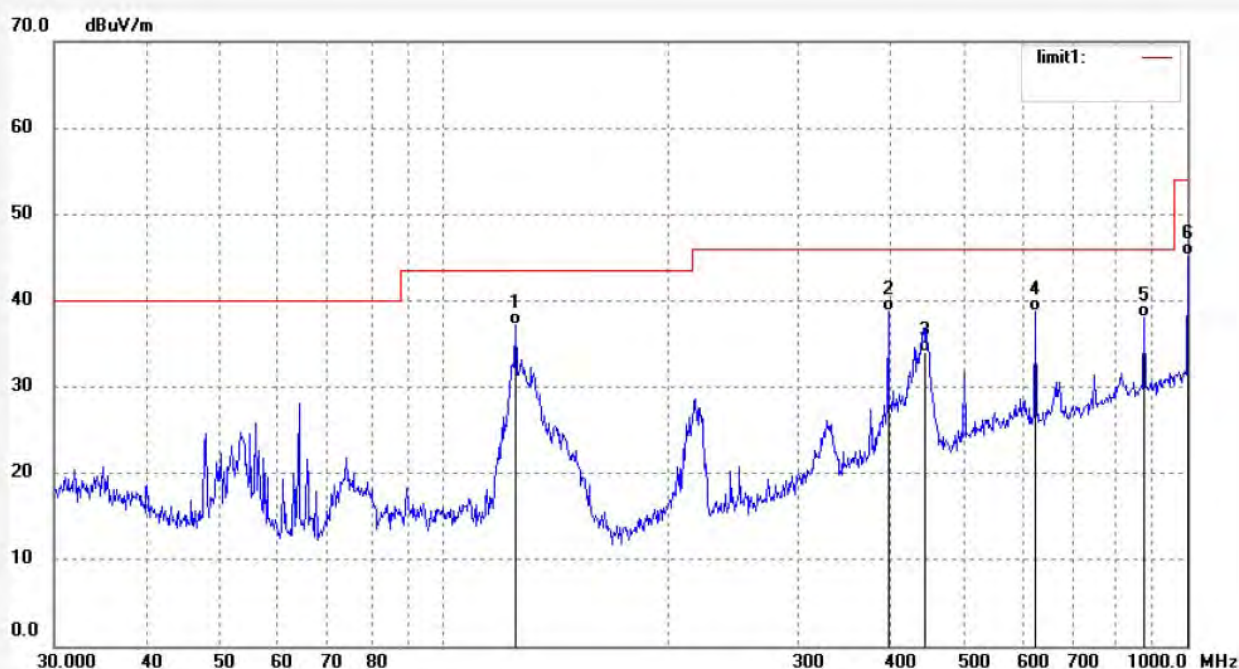
Date: 19/03/28/

Time: 8/42/03

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	125.0066	50.75	-13.63	37.12	43.50	-6.38	QP	100	42	
2	396.2414	45.41	-6.59	38.82	46.00	-7.18	QP	100	130	
3	444.8514	39.46	-5.43	34.03	46.00	-11.97	QP	100	213	
4	625.0779	40.70	-2.00	38.70	46.00	-7.30	QP	100	255	
5	875.2469	36.00	1.98	37.98	46.00	-8.02	QP	100	136	
6	1000.0000	41.36	3.84	45.20	54.00	-8.80	QP	100	36	

Job No.: star2016 #2893

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2480MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

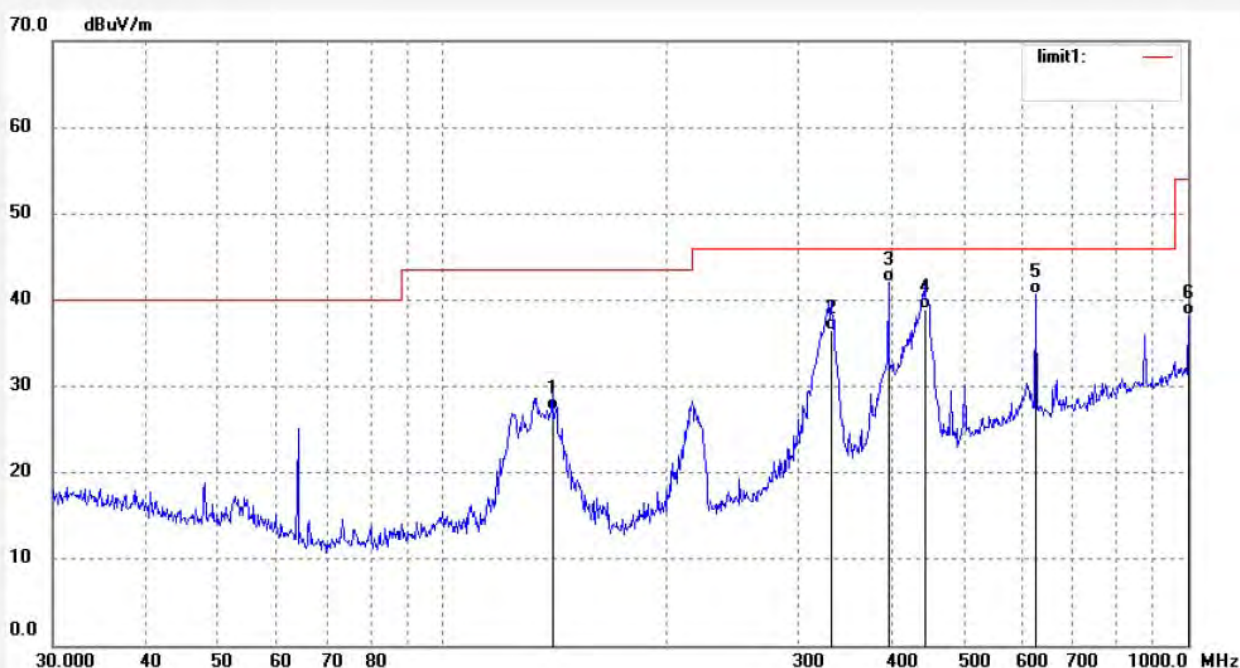
Date: 19/03/28/

Time: 8/47/45

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	140.3420	42.34	-15.13	27.21	43.50	-16.29	QP	200	148	
2	332.5187	44.48	-7.99	36.49	46.00	-9.51	QP	200	62	
3	396.2414	48.75	-6.59	42.16	46.00	-3.84	QP	200	78	
4	443.2943	44.38	-5.44	38.94	46.00	-7.06	QP	200	102	
5	625.0779	42.69	-2.00	40.69	46.00	-5.31	QP	200	132	
6	1000.0000	34.46	3.84	38.30	54.00	-15.70	QP	200	144	

Job No.: star2016 #2894

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2480MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

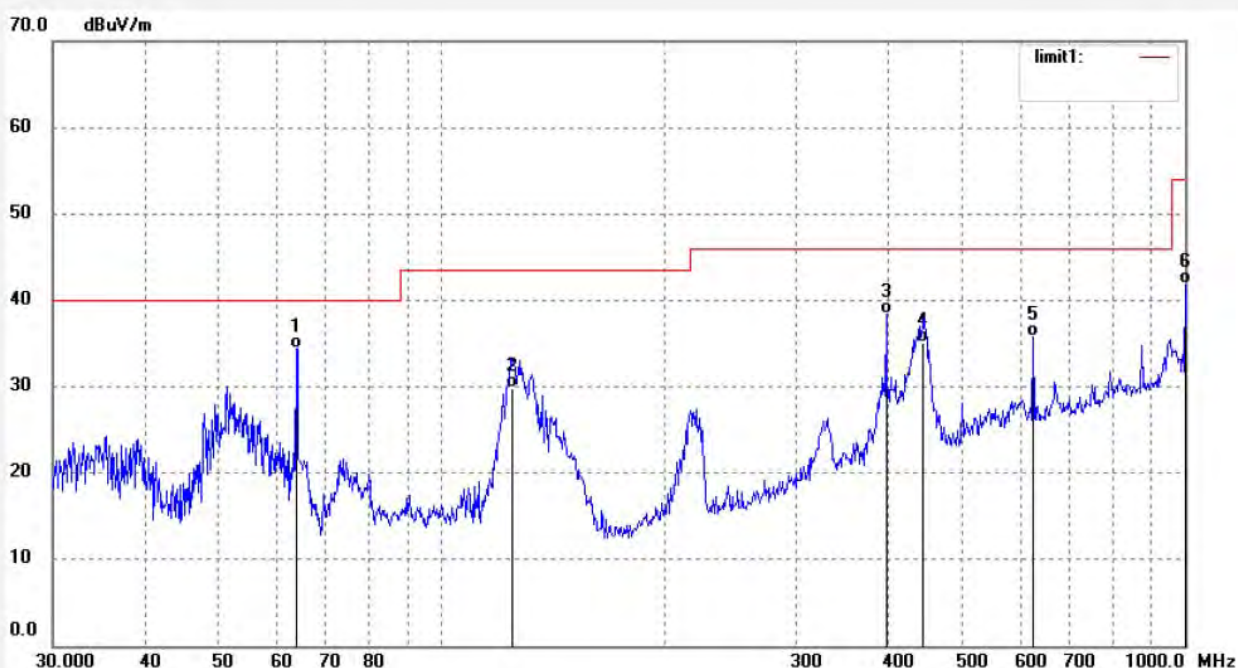
Date: 19/03/28/

Time: 8/48/42

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	63.7588	49.72	-15.26	34.46	40.00	-5.54	QP	100	99	
2	124.5690	43.48	-13.58	29.90	43.50	-13.60	QP	100	110	
3	396.2415	45.04	-6.59	38.45	46.00	-7.55	QP	100	145	
4	444.8514	40.55	-5.43	35.12	46.00	-10.88	QP	100	168	
5	625.0780	37.84	-2.00	35.84	46.00	-10.16	QP	100	172	
6	1000.0000	38.07	3.84	41.91	54.00	-12.09	QP	100	246	

Above 1GHz



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2016 #2897

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2405MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

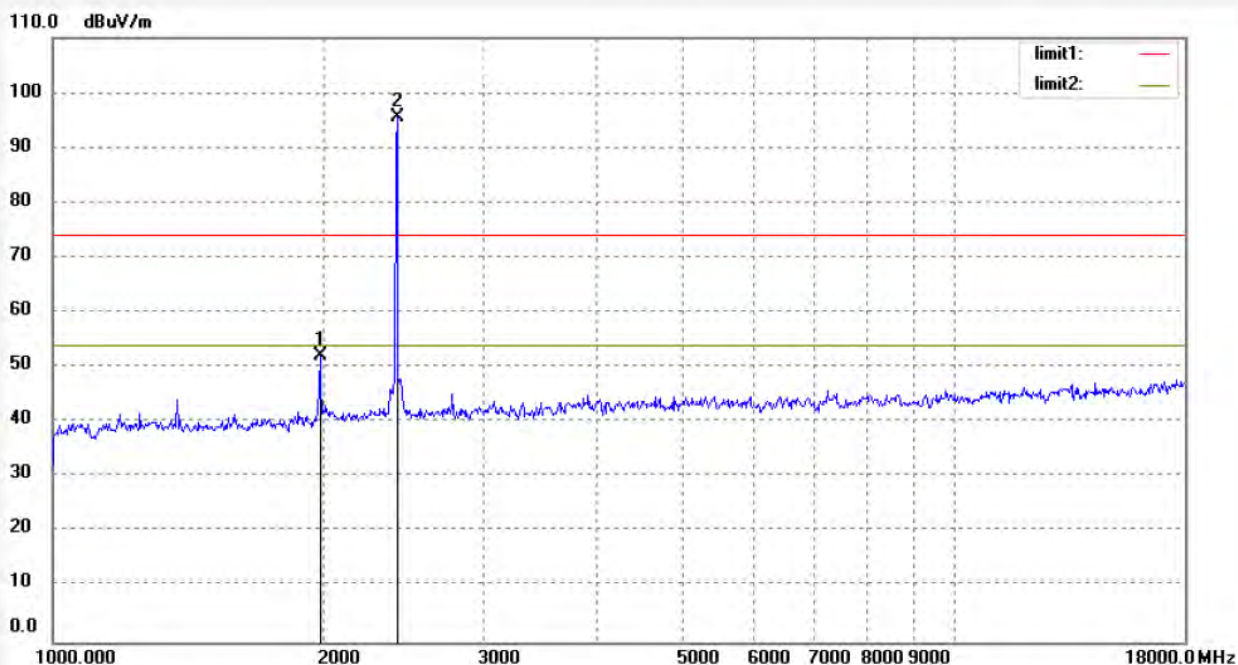
Date: 19/03/28/

Time: 8/59/12

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1978.082	53.21	-1.20	52.01	74.00	-21.99	peak	200	193	
2	2405.003	94.79	0.91	95.70	/	/	peak	200	203	

Job No.: star2016 #2898

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2405MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

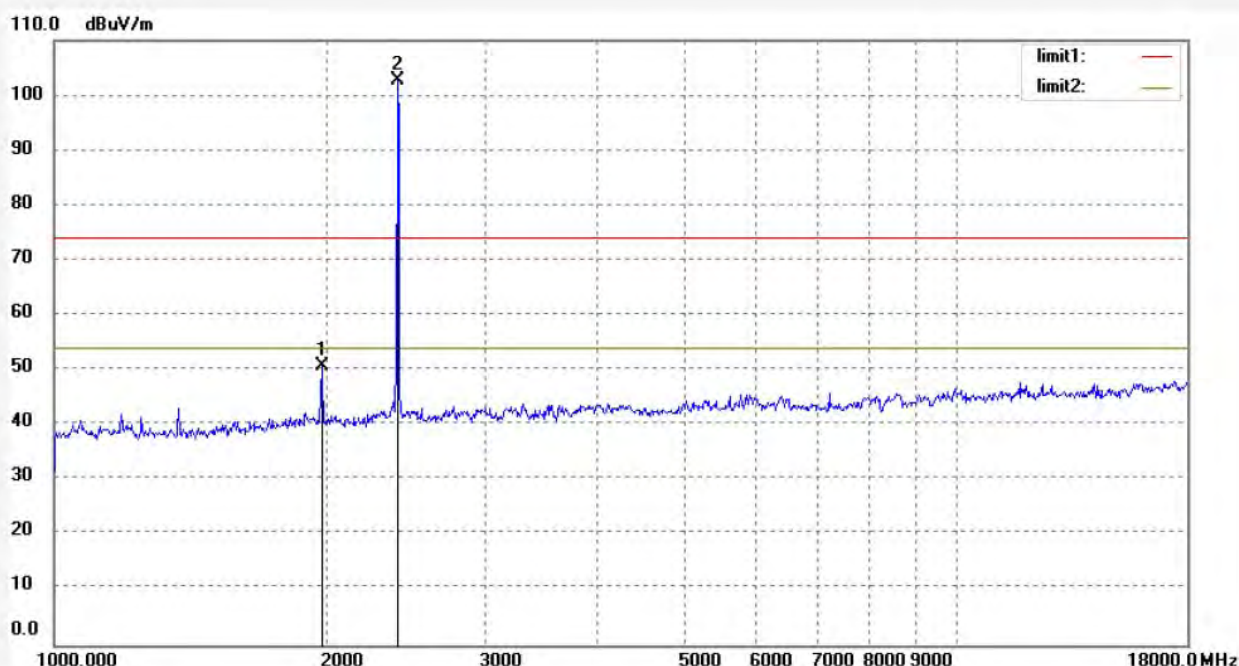
Date: 19/03/28/

Time: 9/00/54

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1978.082	52.03	-1.20	50.83	74.00	-23.17	peak	150	255	
2	2405.053	101.72	0.88	102.60	/	/	peak	150	304	

Job No.: star2016 #2900

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2450MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

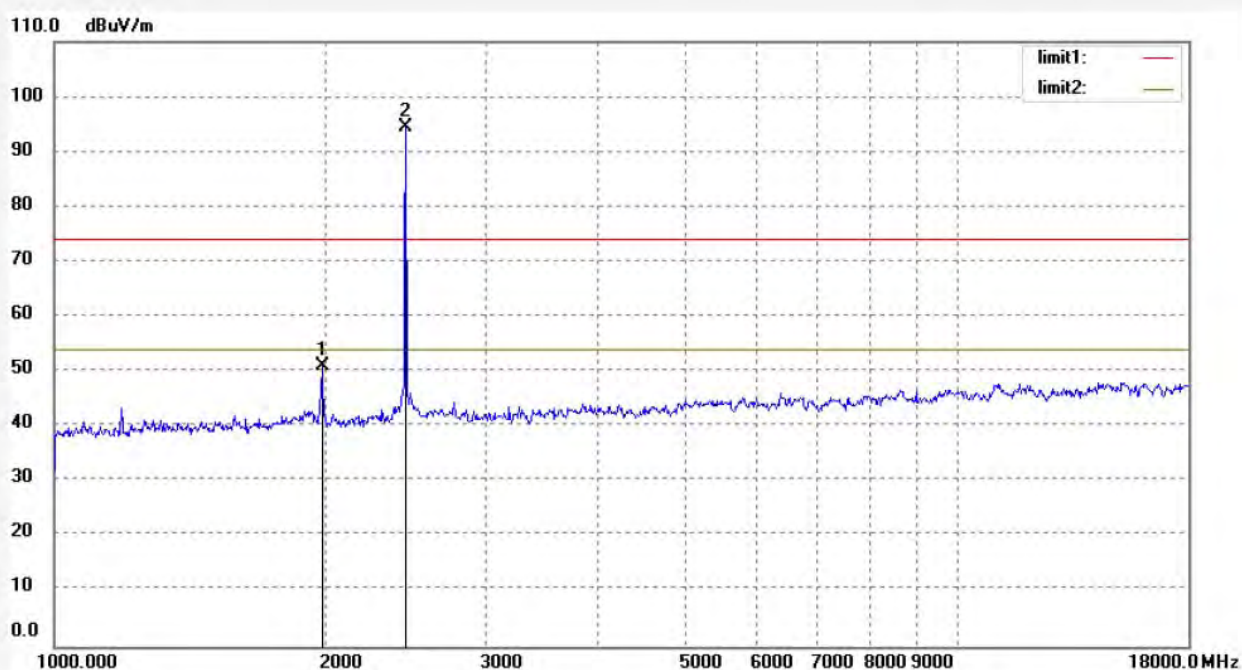
Date: 19/03/28/

Time: 9/06/45

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1978.082	52.15	-1.20	50.95	74.00	-23.05	peak	200	271	
2	2450.022	93.41	1.09	94.50	/	/	peak	200	200	

Job No.: star2016 #2899

Standard: FCC Part 15C 3M RadiatedK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2450MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

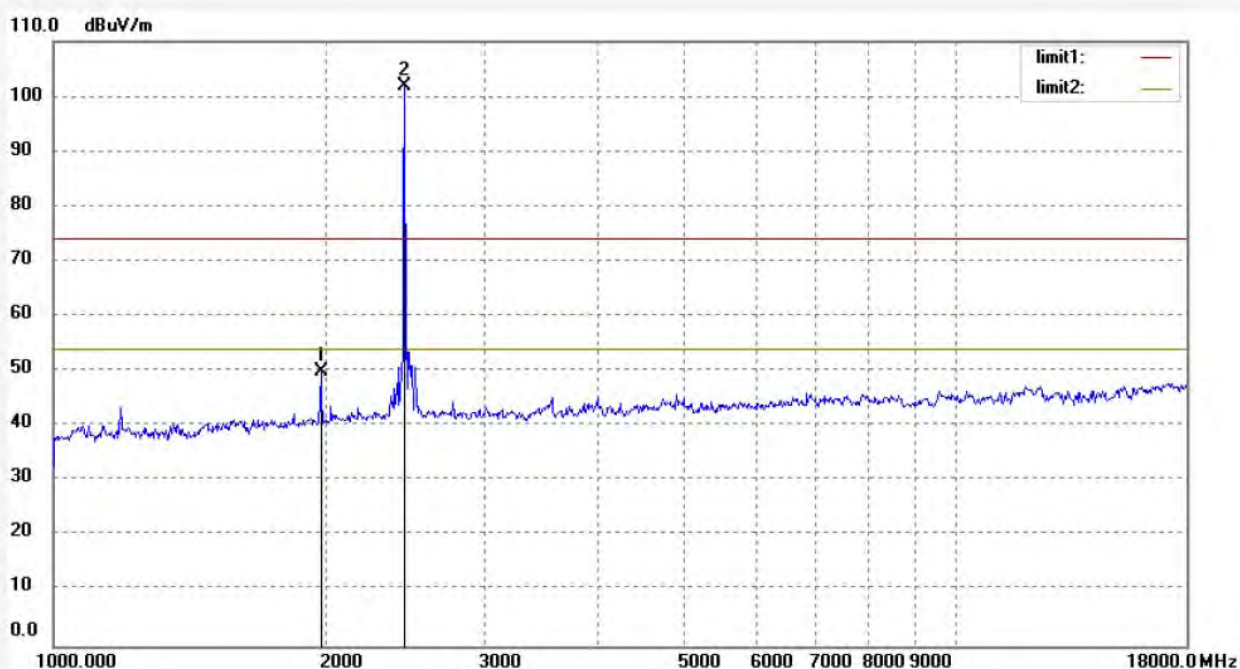
Date: 19/03/28/

Time: 9/05/29

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1978.082	51.25	-1.20	50.05	74.00	-23.95	peak	150	117	
2	2450.022	100.78	1.09	101.87	/	/	peak	150	246	

Job No.: star2016 #2901

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2480MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: DC 12V

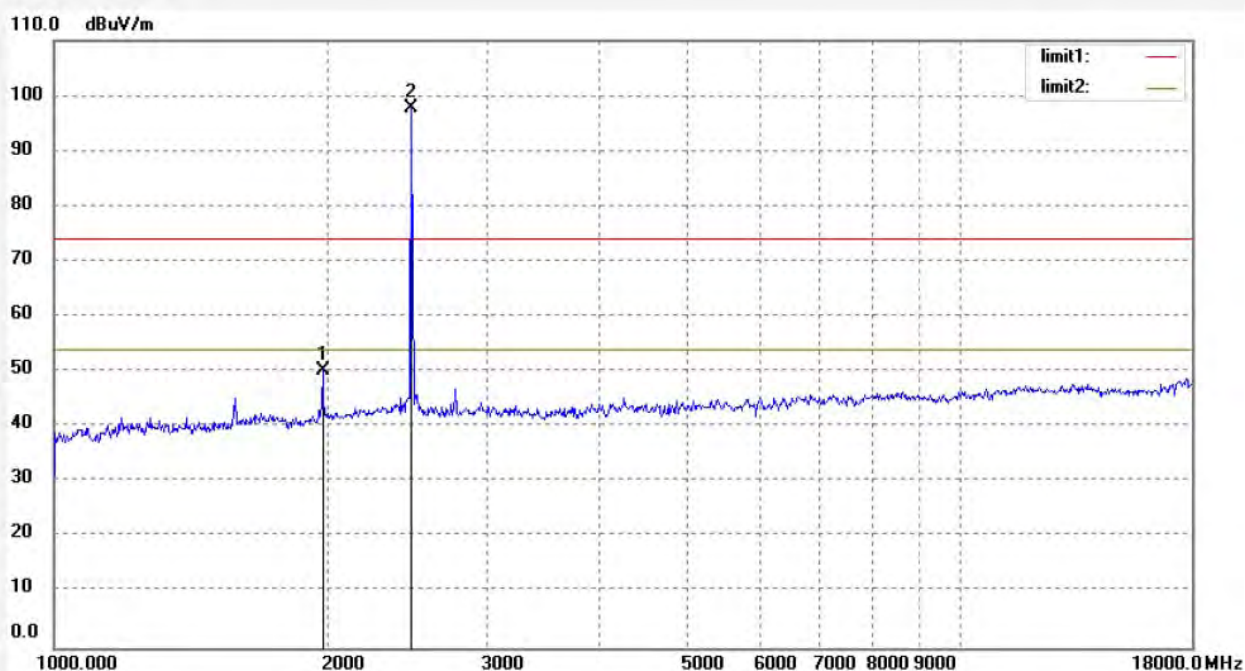
Date: 19/03/28/

Time: 9/10/37

Engineer Signature: star

Distance: 3m

Note: Report No.: ATE20190024



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1978.082	51.27	-1.20	50.07	74.00	-23.93	peak	200	68	
2	2480.010	96.57	1.09	97.66	/	/	peak	200	112	

Job No.: star2016 #2902

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Hub

Mode: TX 2480MHz

Model: Librehub

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: DC 12V

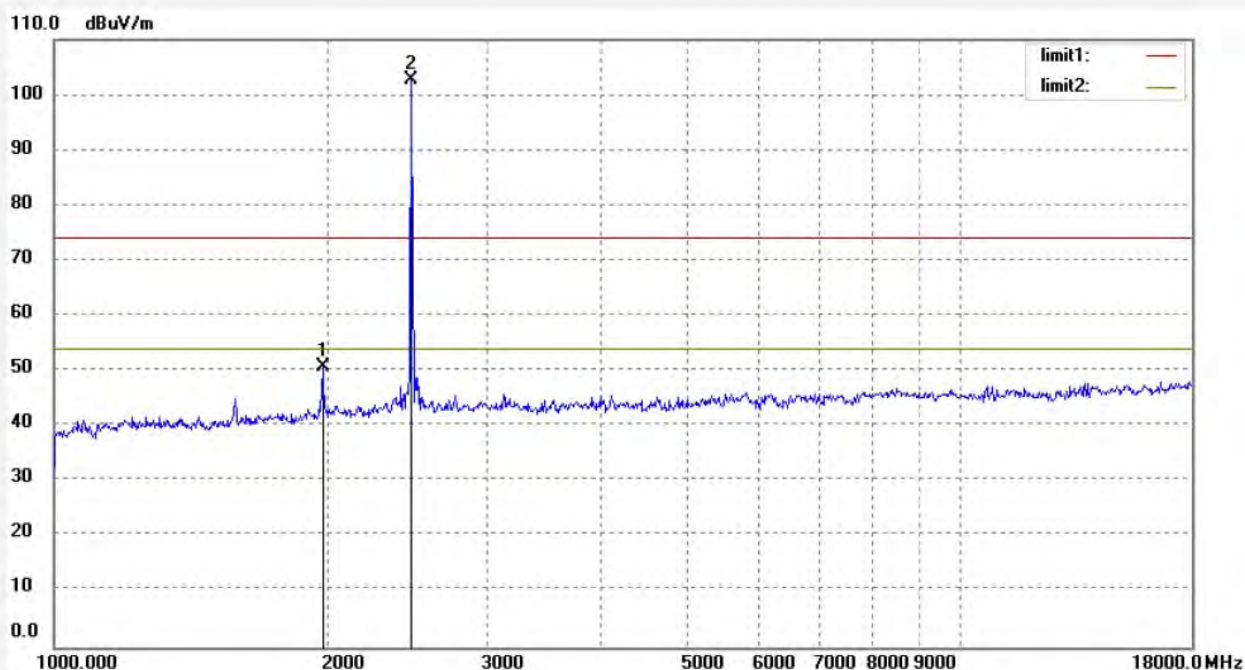
Date: 19/03/28/

Time: 9/12/26

Engineer Signature: star

Distance: 3m

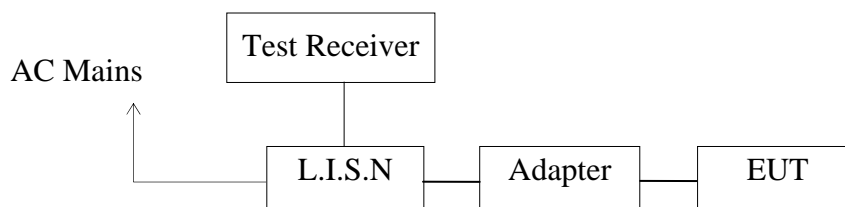
Note: Report No.: ATE20190024



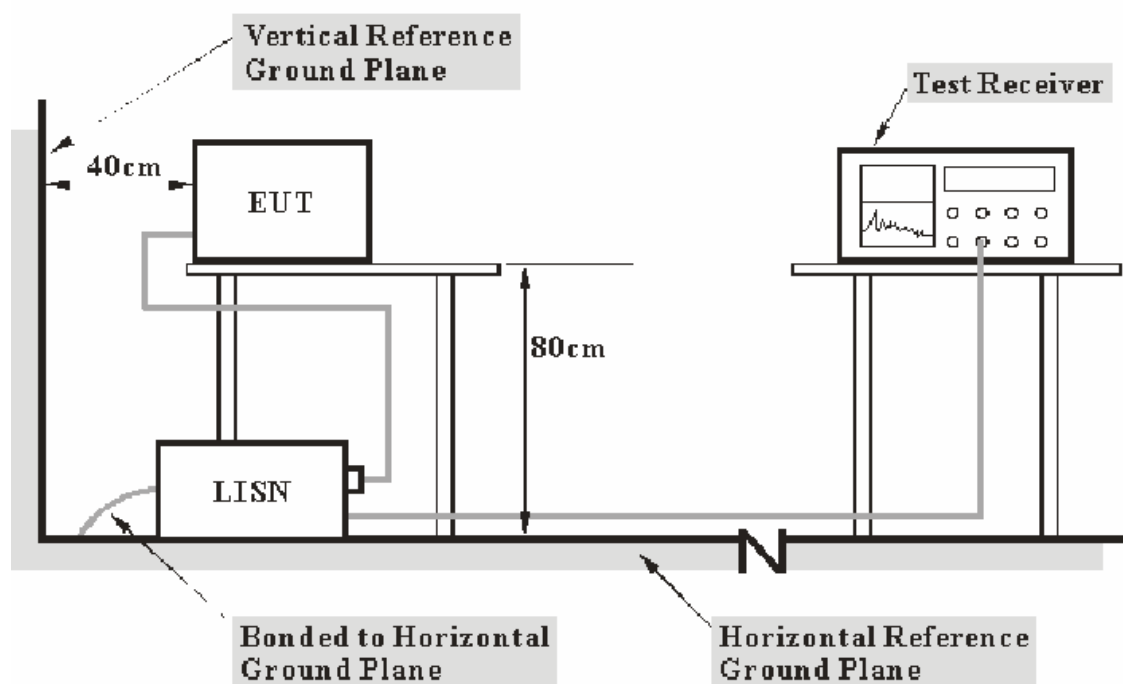
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1978.082	51.91	-1.20	50.71	74.00	-23.29	peak	150	214	
2	2480.010	101.64	1.09	102.73	/	/	peak	150	116	

10.AC POWER LINE CONDUCTED EMISSION TEST

10.1.Block Diagram of Test Setup



10.2.Test System Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

10.3.Test Limits

Frequency (MHz)	Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies.		
NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

10.4.Configuration of EUT on Test

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

10.5.Operating Condition of EUT

10.5.1.Setup the EUT and simulator as shown as Section 10.1.

10.5.2.Turn on the power of all equipment.

10.5.3.Let the EUT work in test mode and measure it.

10.6.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

10.7.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

10.8.Test Results

Pass.

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

We tested all channel and recorded the worst case data (26 channel) for all test channel.

The spectral diagrams are attached as below.

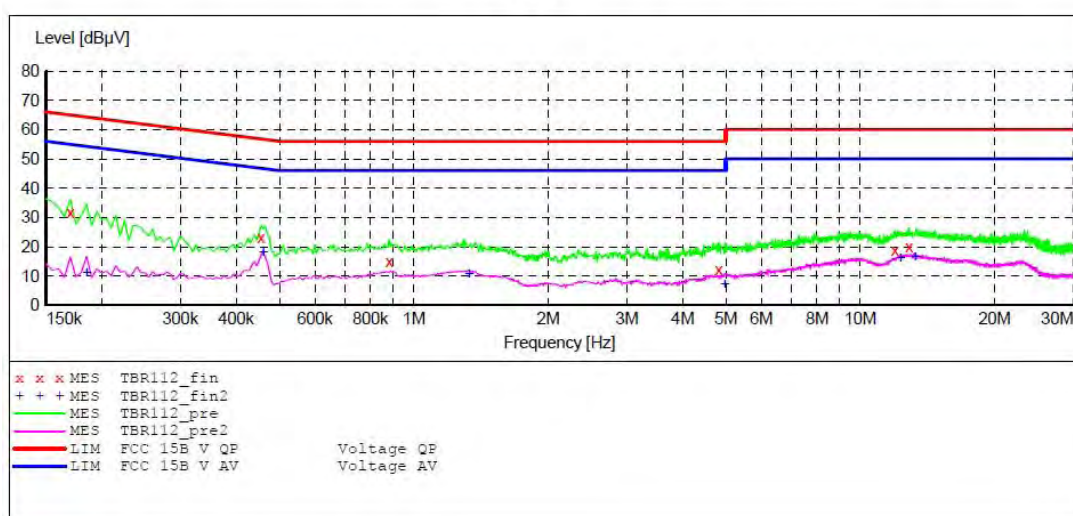
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Hub M/N:Librehub
 Manufacturer: Libre Home Inc
 Operating Condition: Wireless communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: L 120V/60Hz
 Comment: Report No.: ATE20190024
 Start of Test: 1/15/2019 / 2:59:01PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "TBR112_fin"

1/15/2019 3:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.170000	31.50	10.5	65	33.5	QP	L1	GND
0.455000	22.90	10.7	57	33.9	QP	L1	GND
0.880000	14.90	10.8	56	41.1	QP	L1	GND
4.820000	12.10	11.1	56	43.9	QP	L1	GND
11.950000	18.90	11.3	60	41.1	QP	L1	GND
12.865000	19.80	11.3	60	40.2	QP	L1	GND

MEASUREMENT RESULT: "TBR112_fin2"

1/15/2019 3:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.185000	10.90	10.5	54	43.4	AV	L1	GND
0.460000	18.00	10.7	47	28.7	AV	L1	GND
1.330000	10.70	10.9	46	35.3	AV	L1	GND
4.970000	7.20	11.2	46	38.8	AV	L1	GND
12.310000	15.90	11.3	50	34.1	AV	L1	GND
13.255000	16.30	11.3	50	33.7	AV	L1	GND

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CONDUCTED EMISSION STANDARD FCC PART 15 C

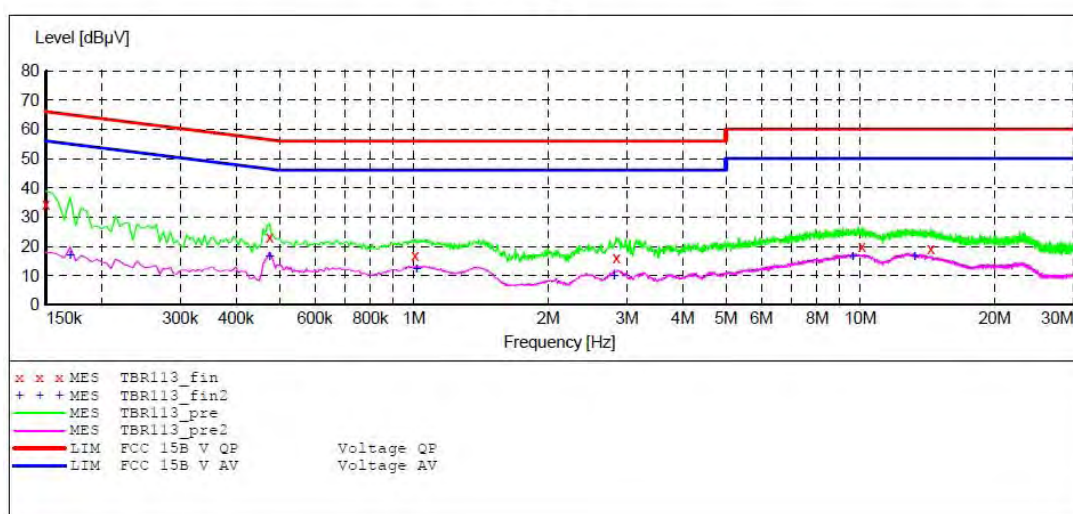
EUT: Hub M/N:Librehub
 Manufacturer: Libre Home Inc
 Operating Condition: Wireless communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report No.: ATE20190024
 Start of Test: 1/15/2019 / 3:03:16PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008

Average



MEASUREMENT RESULT: "TBR113_fin"

1/15/2019 3:06PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	34.50	10.5	66	31.5	QP	N	GND
0.475000	23.00	10.7	56	33.4	QP	N	GND
1.005000	16.70	10.8	56	39.3	QP	N	GND
2.840000	16.10	11.0	56	39.9	QP	N	GND
10.075000	20.00	11.3	60	40.0	QP	N	GND
14.380000	19.10	11.4	60	40.9	QP	N	GND

MEASUREMENT RESULT: "TBR113_fin2"

1/15/2019 3:06PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	16.80	10.5	55	38.2	AV	N	GND
0.475000	16.50	10.7	46	29.9	AV	N	GND
1.015000	12.20	10.8	46	33.8	AV	N	GND
2.810000	9.70	11.0	46	36.3	AV	N	GND
9.600000	16.40	11.3	50	33.6	AV	N	GND
13.240000	16.40	11.3	50	33.6	AV	N	GND

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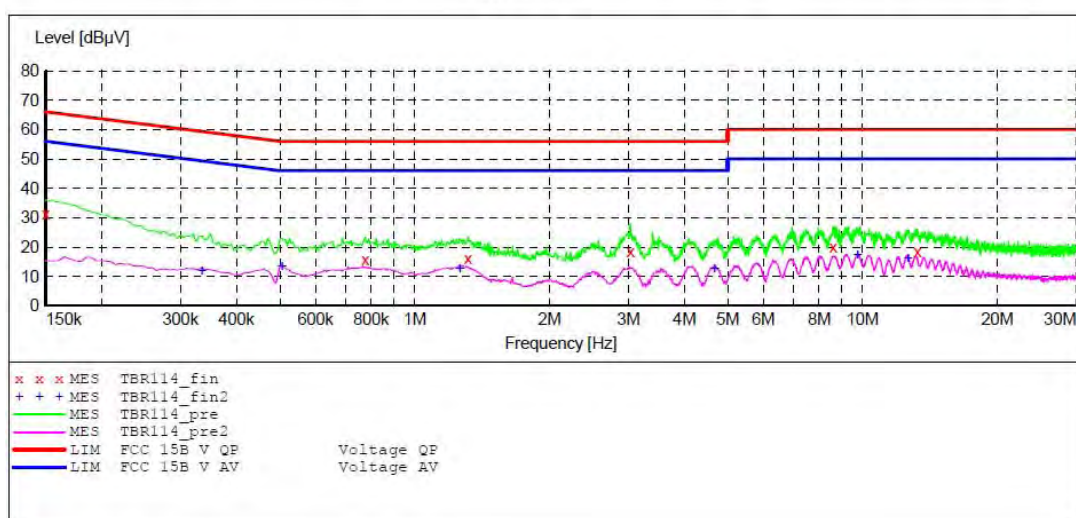
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Hub M/N:Librehub
 Manufacturer: Libre Home Inc
 Operating Condition: Wireless communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 240V/50Hz
 Comment: Report No.: ATE20190024
 Start of Test: 1/15/2019 / 3:07:22PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
			Average			
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
			Average			



MEASUREMENT RESULT: "TBR114_fin"

1/15/2019 3:10PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	31.40	10.5	66	34.6	QP	N	GND
0.775000	15.80	10.8	56	40.2	QP	N	GND
1.315000	16.00	10.9	56	40.0	QP	N	GND
3.030000	18.30	11.1	56	37.7	QP	N	GND
8.590000	19.90	11.3	60	40.1	QP	N	GND
13.270000	18.30	11.3	60	41.7	QP	N	GND

MEASUREMENT RESULT: "TBR114_fin2"

1/15/2019 3:10PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.335000	11.70	10.6	49	37.6	AV	N	GND
0.505000	13.20	10.7	46	32.8	AV	N	GND
1.260000	12.70	10.9	46	33.3	AV	N	GND
4.670000	12.60	11.1	46	33.4	AV	N	GND
9.750000	17.20	11.3	50	32.8	AV	N	GND
12.625000	16.20	11.3	50	33.8	AV	N	GND

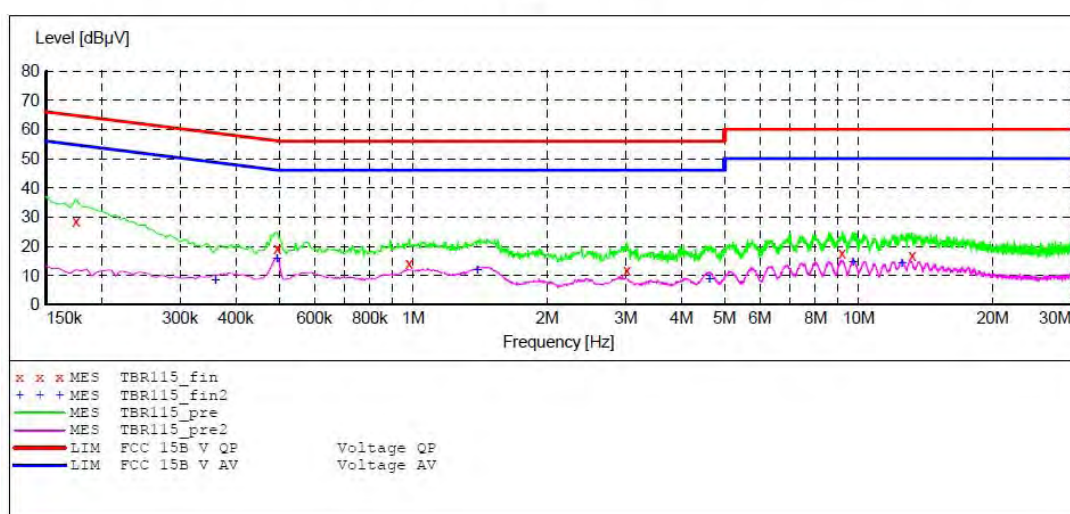
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Hub M/N:Librehub
 Manufacturer: Libre Home Inc
 Operating Condition: Wireless communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: L 240V/50Hz
 Comment: Report No.: ATE20190024
 Start of Test: 1/15/2019 / 3:11:30PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "TBR115_fin"

1/15/2019 3:15PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.175000	28.50	10.5	65	36.2	QP	L1	GND
0.495000	19.20	10.7	56	36.2	QP	L1	GND
0.980000	14.20	10.8	56	41.8	QP	L1	GND
3.020000	11.60	11.1	56	44.4	QP	L1	GND
9.180000	17.70	11.3	60	42.3	QP	L1	GND
13.195000	16.70	11.3	60	43.3	QP	L1	GND

MEASUREMENT RESULT: "TBR115_fin2"

1/15/2019 3:15PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.360000	8.30	10.6	49	40.4	AV	L1	GND
0.495000	15.80	10.7	46	30.3	AV	L1	GND
1.395000	11.60	10.9	46	34.4	AV	L1	GND
4.620000	8.70	11.1	46	37.3	AV	L1	GND
9.710000	14.40	11.3	50	35.6	AV	L1	GND
12.505000	14.10	11.3	50	35.9	AV	L1	GND

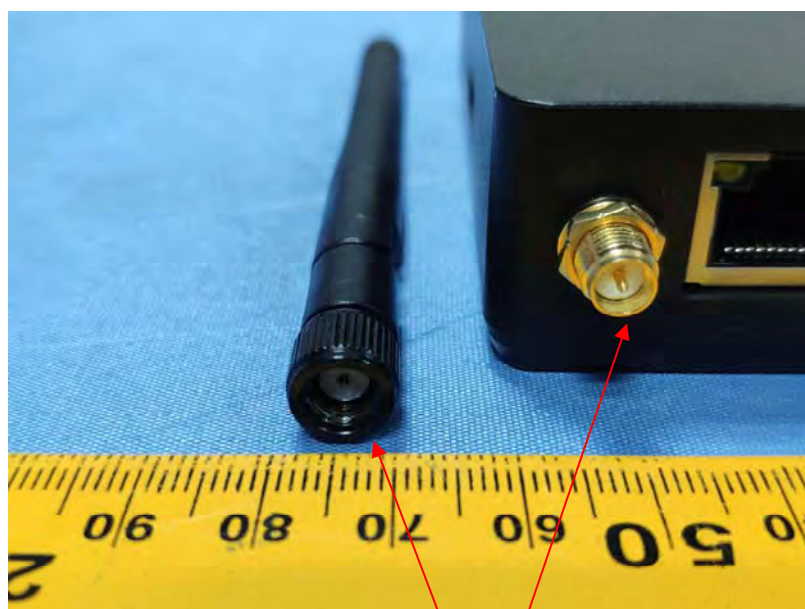
11.ANTENNA REQUIREMENT

11.1.The Requirement

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

11.2.Antenna Construction

Device is equipped with unique antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 3dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna

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