

APPLICATION CERTIFICATION FCC Part 15C  
On Behalf of  
Libre Home Inc

thermostat

Model No.: TMO

FCC ID: 2AQXA-TMO

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

Prepared by : Shenzhen Accurate Technology Co., Ltd.  
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Report No. : ATE20191380  
Date of Test : Sep. 24, 2019-Sep. 25, 2019  
Date of Report : Sep. 26, 2019

## TABLE OF CONTENTS

Description	Page
Test Report Certification	
<b>1. GENERAL INFORMATION .....</b>	<b>5</b>
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
<b>2. MEASURING DEVICE AND TEST EQUIPMENT .....</b>	<b>7</b>
2.1. For Radiated Emission Measurement .....	7
2.2. The Equipment Used to Measure Conducted Disturbance (L.I.S.N).....	8
<b>3. OPERATION OF EUT DURING TESTING .....</b>	<b>9</b>
3.1. Operating Mode .....	9
3.2. Configuration and peripherals .....	9
<b>4. TEST PROCEDURES AND RESULTS .....</b>	<b>10</b>
<b>5. 6DB BANDWIDTH MEASUREMENT.....</b>	<b>11</b>
5.1. Block Diagram of Test Setup.....	11
5.2. The Requirement For Section 15.247(a)(2).....	11
5.3. EUT Configuration on Measurement .....	11
5.4. Operating Condition of EUT .....	11
5.5. Test Procedure .....	11
5.6. Test Result .....	12
<b>6. MAXIMUM PEAK OUTPUT POWER .....</b>	<b>14</b>
6.1. Block Diagram of Test Setup.....	14
6.2. The Requirement For Section 15.247(b)(3).....	14
6.3. EUT Configuration on Measurement .....	14
6.4. Operating Condition of EUT .....	14
6.5. Test Procedure .....	14
6.6. Test Result .....	15
<b>7. POWER SPECTRAL DENSITY MEASUREMENT.....</b>	<b>17</b>
7.1. Block Diagram of Test Setup.....	17
7.2. The Requirement For Section 15.247(e).....	17
7.3. EUT Configuration on Measurement .....	17
7.4. Operating Condition of EUT .....	17
7.5. Test Procedure .....	17
7.6. Test Result .....	18
<b>8. BAND EDGE COMPLIANCE TEST .....</b>	<b>20</b>
8.1. Block Diagram of Test Setup.....	20
8.2. The Requirement For Section 15.247(d) .....	20
8.3. EUT Configuration on Measurement .....	20
8.4. Operating Condition of EUT .....	20
8.5. Test Procedure .....	21
8.6. Test Result .....	21
<b>9. RADIATED SPURIOUS EMISSION TEST .....</b>	<b>27</b>
9.1. Block Diagram of Test Setup.....	27
9.2. The Limit For Section 15.247(d) .....	29

9.3.	Restricted bands of operation .....	29
9.4.	Configuration of EUT on Measurement .....	30
9.5.	Operating Condition of EUT .....	30
9.6.	Test Procedure .....	30
9.7.	Data Sample .....	31
9.8.	The Field Strength of Radiation Emission Measurement Results .....	31
<b>10.</b>	<b>POWER LINE CONDUCTED MEASUREMENT .....</b>	<b>44</b>
10.1.	Block Diagram of Test Setup.....	44
10.2.	Power Line Conducted Emission Measurement Limits.....	44
10.3.	Configuration of EUT on Measurement .....	44
10.4.	Operating Condition of EUT .....	44
10.5.	Test Procedure .....	45
10.6.	DATA SAMPLE .....	45
10.7.	Power Line Conducted Emission Measurement Results .....	46
<b>11.</b>	<b>ANTENNA REQUIREMENT.....</b>	<b>49</b>
11.1.	The Requirement .....	49
11.2.	Antenna Construction .....	49

## Test Report Certification

Applicant : Libre Home Inc  
Address : 13 Crestview Ter. Montvale, New Jersey, United States 07645  
Product : thermostat  
Model No. : TMO  
Trade name : 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 April 02, 2019 KDB558074 D01 DTS Meas Guidance v05r02 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 : Sep. 24, 2019-Sep. 25, 2019  
Date of Report: Sep. 26, 2019

Prepared by :

Tim Zhang  
(Tim Zhang, Engineer)

Approved & Authorized Signer :

Sean Liu  
(Sean Liu, Manager)



# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

EUT : thermostat

Model Number : TMO

Radio device : Zigbee

Frequency Range : 2405MHz-2480MHz

Number of Channels : 16

Antenna Gain : 2dBi

Antenna type : PCB Antenna

Power Supply : AC 24V/60Hz

Modulation mode : OQPSK

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

Date of sample received : Sep. 12, 2019

Date of Test : Sep. 24, 2019-Sep. 25, 2019

Sample Number : 1901176

## 1.2. Carrier Frequency of Channels

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

## 1.3. Special Accessory and Auxiliary Equipment

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 (Mains ports, 9kHz-30MHz)	=	2.72dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	2.66dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.28dB, k=2
Radiated emission expanded uncertainty (1G-18GHz)	=	4.98dB, k=2
Radiated emission expanded uncertainty (18G-26.5GHz)	=	5.06dB, k=2

## 2. MEASURING DEVICE AND TEST EQUIPMENT

### 2.1. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan.05, 2019	1 Year
2.	Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan.05, 2019	1 Year
3.	Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan.05, 2019	1 Year
4.	Test Receiver	Rohde& Schwarz	ESPI	100396/003	Jan.05, 2019	1 Year
5.	Test Receiver	Rohde& Schwarz	ESPI	101526/003	Jan.05, 2019	1 Year
6.	Test Receiver	Rohde& Schwarz	ESR	101817	Jan.05, 2019	1 Year
7.	Bilog Antenna	Schwarzbeck	VULB9163	9163-194	Jan.05, 2019	1 Year
8.	Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan.05, 2019	1 Year
9.	Log.-Per.Antenna	Schwarzbeck	VUSLP 9111B	9111B-074	Jan.05, 2019	1 Year
10.	Biconical Broad Band Antenna	Schwarzbeck	VHBB 9124+BBA 9106	9124-617	Jan.05, 2019	1 Year
11.	Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan.05, 2019	1 Year
12.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan.05, 2019	1 Year
13.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan.05, 2019	1 Year
14.	Vertical Active Monopole Antenna	Schwarzbeck	VAMP 9243	9243-370	Jan.05, 2019	1 Year
15.	RF Switching Unit+PreAMP	Compliance Direction	RSU-M2	38322	Jan.05, 2019	1 Year
16.	Pre-Amplifier	Agilent	8447D	294A10619	Jan.05, 2019	1 Year
17.	Pre-Amplifier	Rohde&Schwarz	CBLU11835 40-01	3791	Jan.05, 2019	1 Year
18.	50 Coaxial Switch	Anritsu Corp	MP59B	6200237248	Jan.05, 2019	1 Year
19.	50 Coaxial Switch	Anritsu Corp	MP59B	6200506474	Jan.05, 2019	1 Year
20.	RF Coaxial Cable	Schwarzbeck	N-5m	No.1	Jan.05, 2019	1 Year
21.	RF Coaxial Cable	Schwarzbeck	N-1m	No.6	Jan.05, 2019	1 Year
22.	RF Coaxial Cable	Schwarzbeck	N-1m	No.7	Jan.05, 2019	1 Year
23.	RF Coaxial Cable	SUHNER	N-3m	No.8	Jan.05, 2019	1 Year
24.	RF Coaxial Cable	RESENBERGER	N-3.5m	No.9	Jan.05, 2019	1 Year
25.	RF Coaxial Cable	SUHNER	N-6m	No.10	Jan.05, 2019	1 Year
26.	RF Coaxial Cable	RESENBERGER	N-12m	No.11	Jan.05, 2019	1 Year
27.	RF Coaxial Cable	RESENBERGER	N-0.5m	No.12	Jan.05, 2019	1 Year
28.	RF Coaxial Cable	SUHNER	N-2m	No.13	Jan.05, 2019	1 Year
29.	RF Coaxial Cable	SUHNER	N-0.5m	No.15	Jan.05, 2019	1 Year
30.	RF Coaxial Cable	SUHNER	N-2m	No.16	Jan.05, 2019	1 Year
31.	RF Coaxial Cable	RESENBERGER	N-6m	No.17	Jan.05, 2019	1 Year
Radiated Emission Measurement Software: EZ EMC V1.1.4.2						

## 2.2.The Equipment Used to Measure Conducted Disturbance (L.I.S.N)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	100307	Jan.05, 2019	1 Year
2.	Test Receiver	Rohde & Schwarz	ESPI3	100396/003	Jan.05, 2019	1 Year
3.	Test Receiver	Rohde & Schwarz	ESPI3	101526/003	Jan.05, 2019	1 Year
4.	L.I.S.N.	Schwarzbeck	NLSK8126	8126431	Jan.05, 2019	1 Year
5.	L.I.S.N.	Rohde & Schwarz	ESH3-Z5	100305	Jan.05, 2019	1 Year
6.	L.I.S.N.	Rohde & Schwarz	ESH3-Z5	100310	Jan.05, 2019	1 Year
7.	L.I.S.N.	Rohde & Schwarz	ESH3-Z6	100132	Jan.05, 2019	1 Year
8.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100305	Jan.05, 2019	1 Year
9.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100312	Jan.05, 2019	1 Year
10.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100815	Jan.05, 2019	1 Year
11.	50Ω Coaxial Switch	Anritsu Corp	MP59B	6200283936	Jan.05, 2019	1 Year
12.	50Ω Coaxial Switch	Anritsu Corp	MP59B	6200283933	Jan.05, 2019	1 Year
13.	50Ω Coaxial Switch	Anritsu Corp	MP59B	6200506474	Jan.05, 2019	1 Year
14.	VOLTAGE PROBE	Schwarzbeck	TK9416	N/A	Jan.05, 2019	1 Year
15.	RF CURRENT PROBE	Rohde & Schwarz	EZ-17	100048	Jan.05, 2019	1 Year
16.	8-Wire Impedance Stabilisation Network	Schwarzbeck	CAT5 8158	8158-0035	Jan.05, 2019	1 Year
17.	RF Coaxial Cable	SUHNER	N-2m	No.2	Jan.05, 2019	1 Year
18.	RF Coaxial Cable	SUHNER	N-2m	No.3	Jan.05, 2019	1 Year
19.	RF Coaxial Cable	SUHNER	N-2m	No.14	Jan.05, 2019	1 Year
Conducted Emission Measurement Software: ES-K1 V1.71						



### 3. OPERATION OF EUT DURING TESTING

#### 3.1. Operating Mode

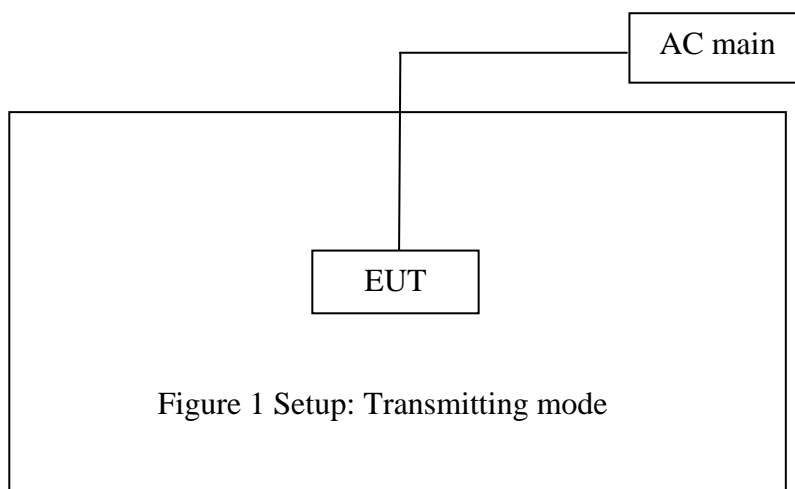
The mode is used: **Transmitting mode**

Low Channel: 2405MHz

Middle Channel: 2450MHz

High Channel: 2480MHz

#### 3.2. Configuration and peripherals



#### 4. TEST PROCEDURES AND RESULTS

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

## 5. 6DB BANDWIDTH MEASUREMENT

### 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 Measurement

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.

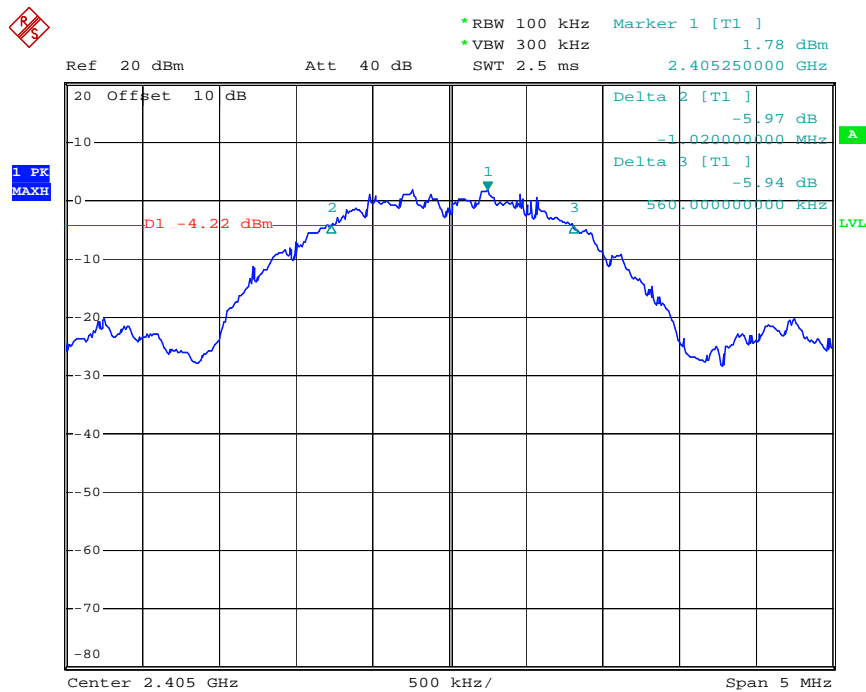
### 5.6. Test Result

The test data of zigbee:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit(MHz)	PASS/FAIL
11	2405	1.580	0.5	PASS
20	2450	1.580	0.5	PASS
26	2480	1.690	0.5	PASS

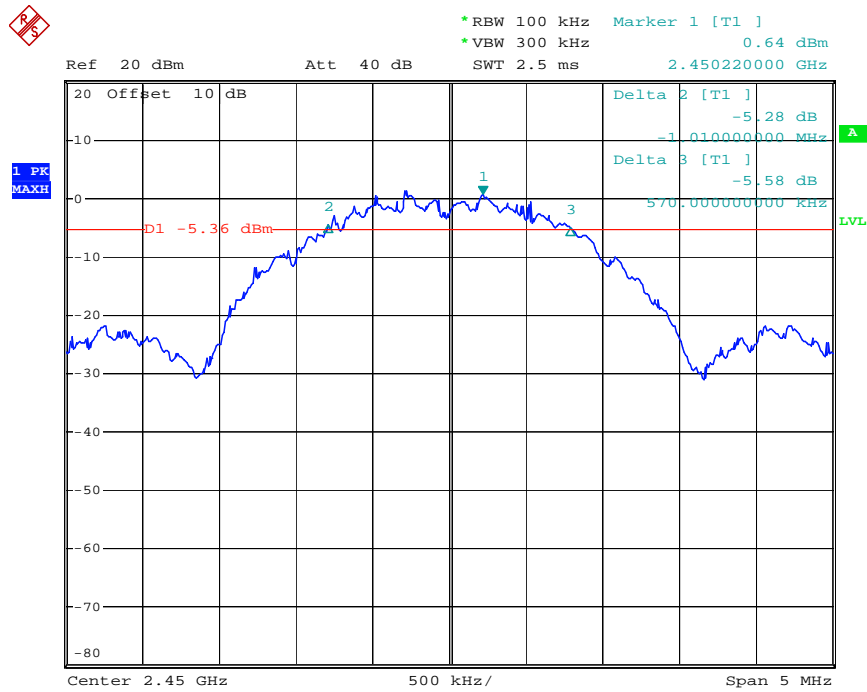
The spectrum analyzer plots are attached as below.

*channel 11*



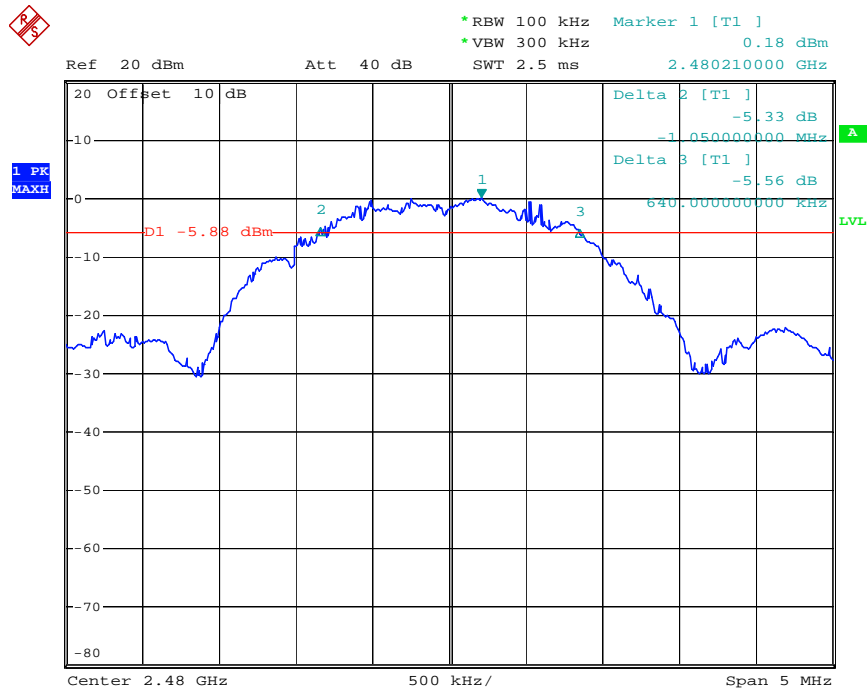
Date: 25.SEP.2019 17:46:07

## channel 20



Date: 25.SEP.2019 17:48:26

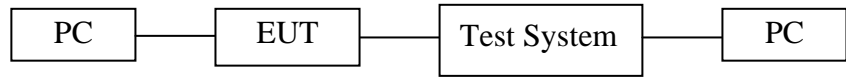
## channel 26



Date: 25.SEP.2019 17:54:36

## 6. MAXIMUM PEAK OUTPUT POWER

### 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 Measurement

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.

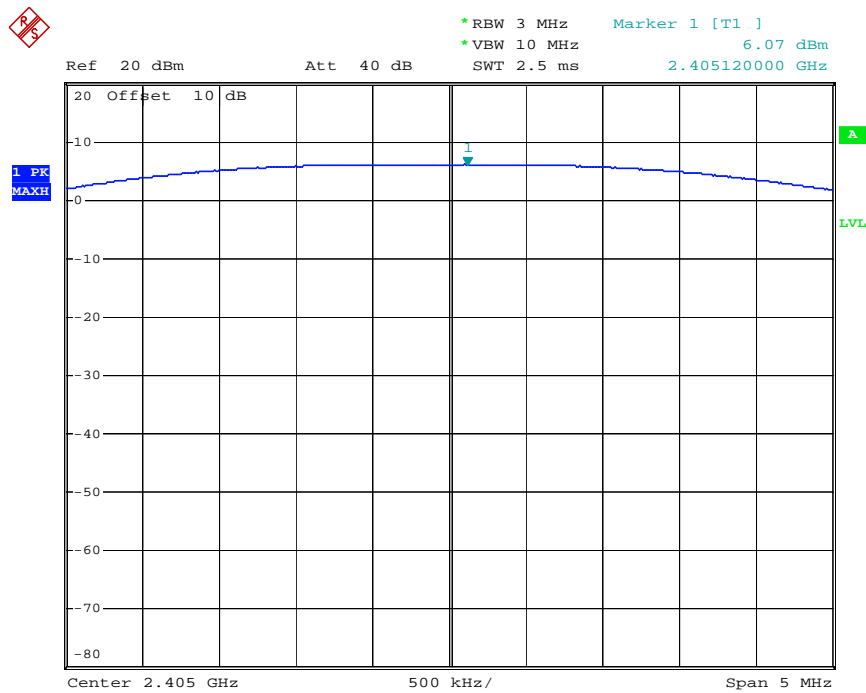
6.5.3. Measurement the maximum peak output power.

### 6.6. Test Result

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
11	2405	6.07	30	PASS
20	2450	4.91	30	PASS
26	2480	4.61	30	PASS

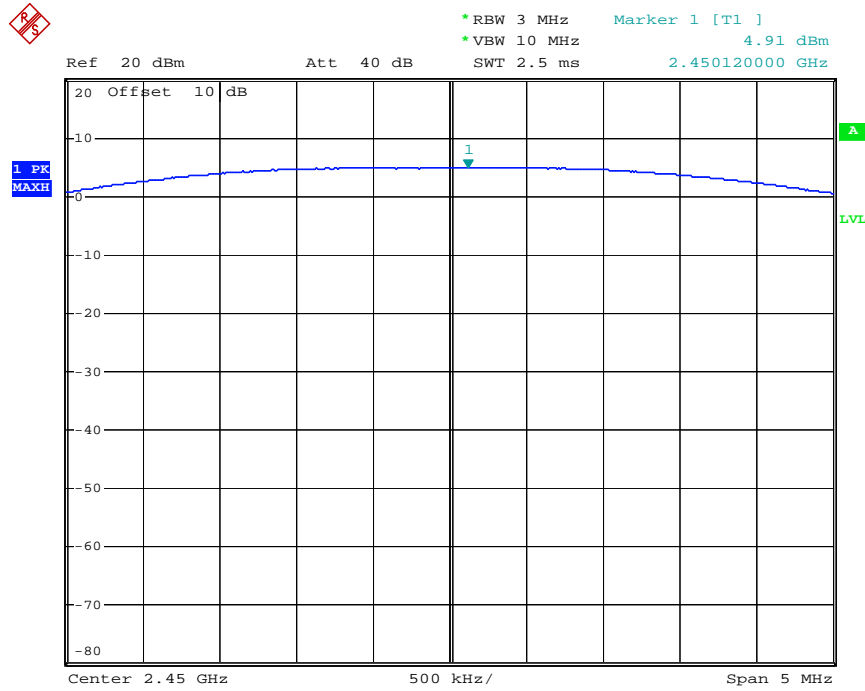
The spectrum analyzer plots are attached as below.

*channel 11*



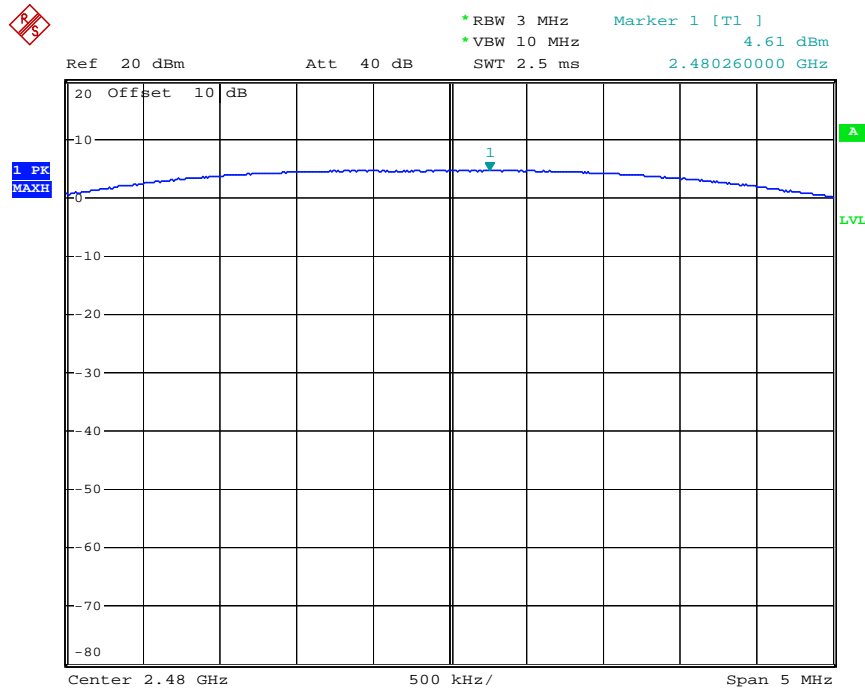
Date: 25.SEP.2019 17:39:06

*channel 20*



Date: 25.SEP.2019 17:49:39

*channel 26*



Date: 25.SEP.2019 17:50:51



## 7. POWER SPECTRAL DENSITY MEASUREMENT

### 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 Measurement

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  $\geq 3 \times$  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.

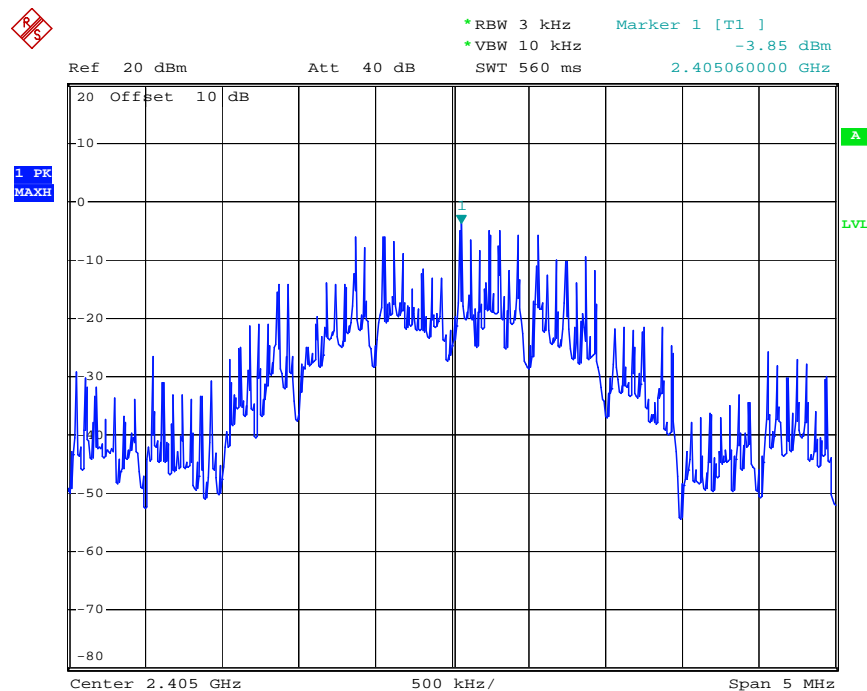
7.5.4.Measurement the maximum power spectral density.

### 7.6.Test Result

CHANNEL NUMBER	FREQUENCY (MHz )	PSD (dBm/3KHz)	LIMIT (dBm/3KHz)	PASS/FAIL
11	2405	-3.85	8	PASS
20	2450	-4.97	8	PASS
26	2480	-5.78	8	PASS

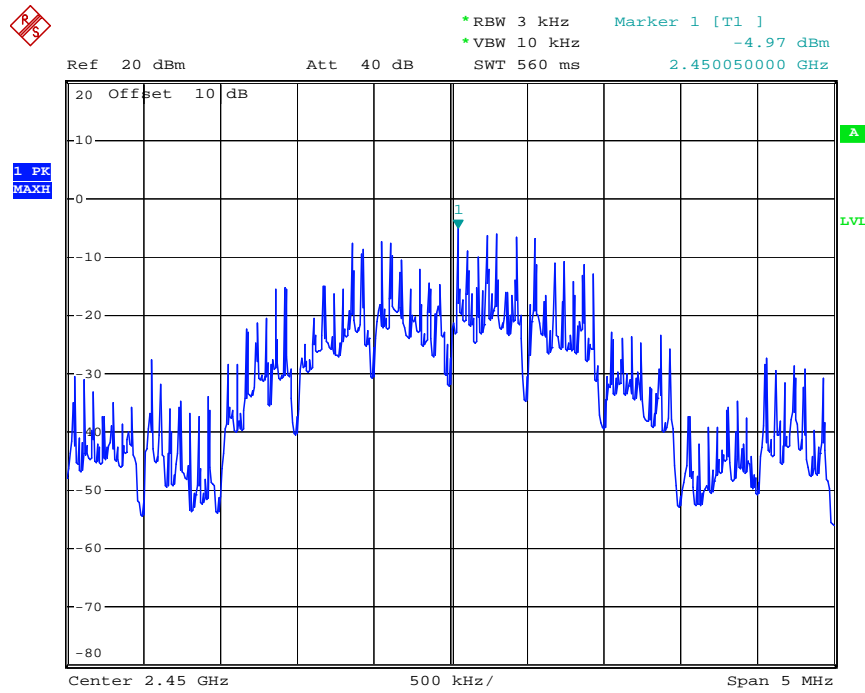
The spectrum analyzer plots are attached as below.

*channel 11*



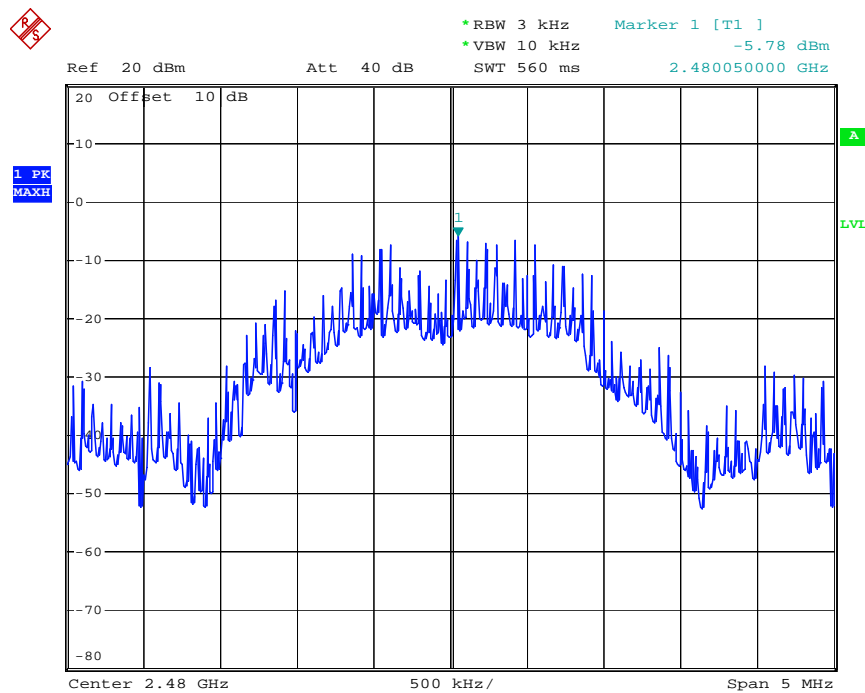
Date: 25.SEP.2019 17:38:28

*channel 20*



Date: 25.SEP.2019 17:49:17

*channel 26*



Date: 25.SEP.2019 17:51:39

## 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 Measurement

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.

8.5.3. Radiate Band Edge:

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

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

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

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

8.5.8. RBW=1MHz, VBW=1MHz

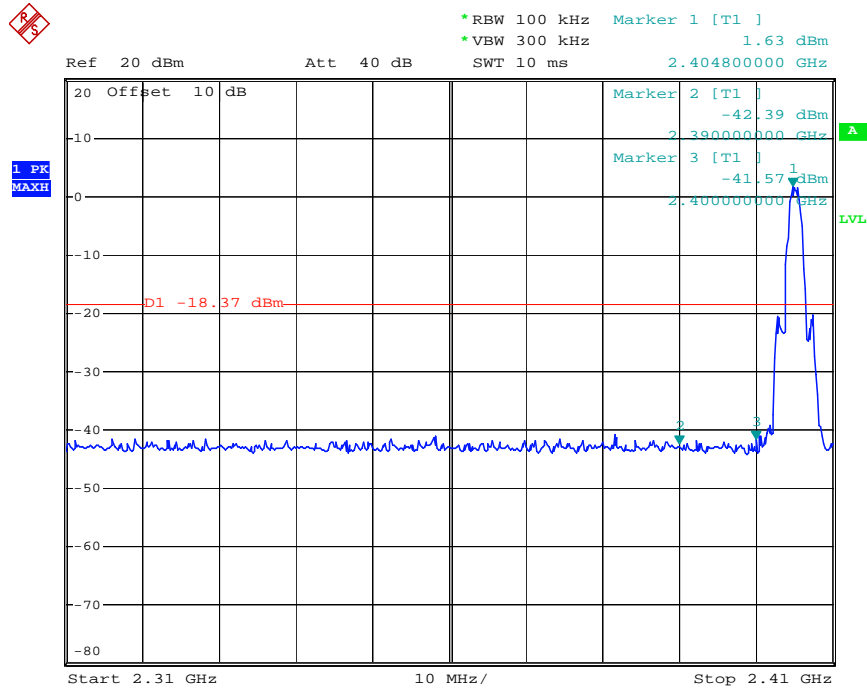
8.5.9. The band edges was measured and recorded.

## 8.6. Test Result

### Pass

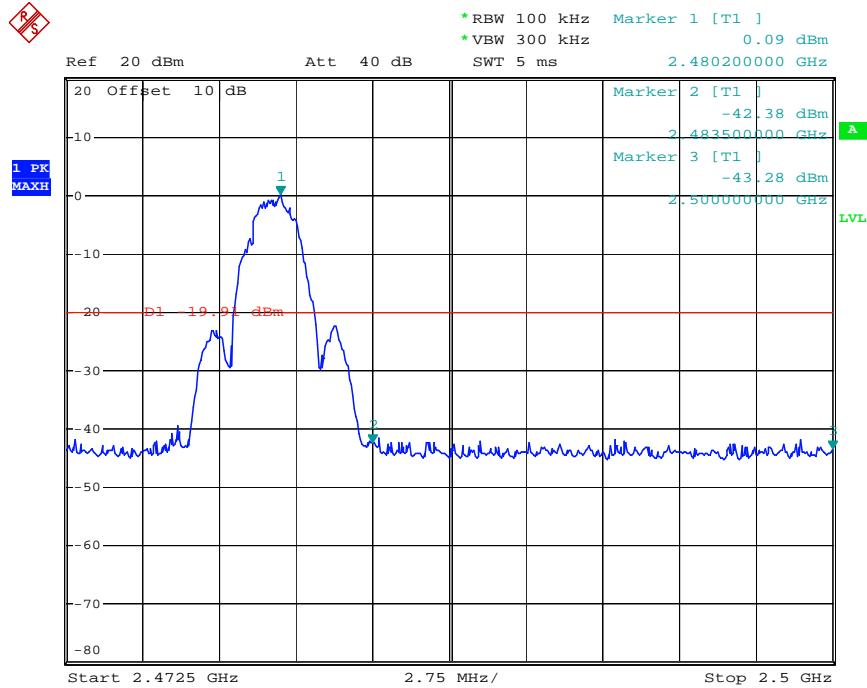
Frequency	Delta peak to band emission	Limit(dBc)
2.4GHz	43.20	20
2.4835GHz	42.47	20

### channel 11



Date: 25.SEP.2019 17:44:41

### channel 26



Date: 25.SEP.2019 17:52:54

### 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: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019 #1541

Standard: FCC PK

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: thermostat

Mode: TX 2405MHz

Model: MTO

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: AC 24V/60Hz

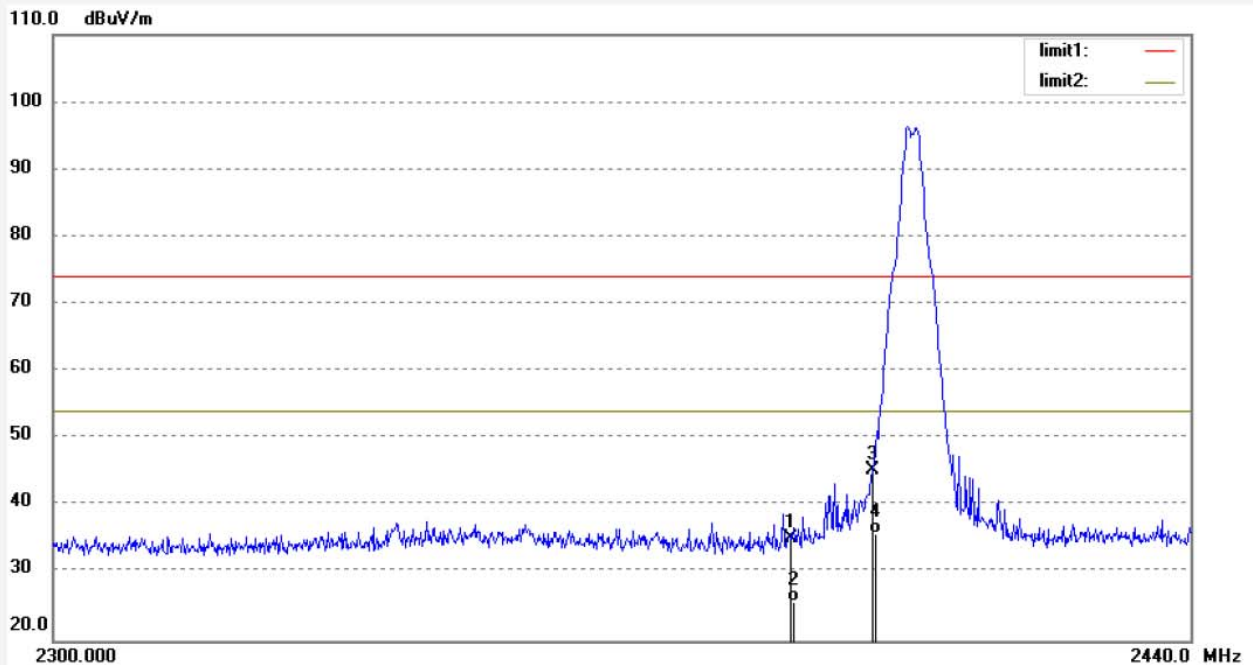
Date: 19/09/24/

Time: 10/20/12

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20191380

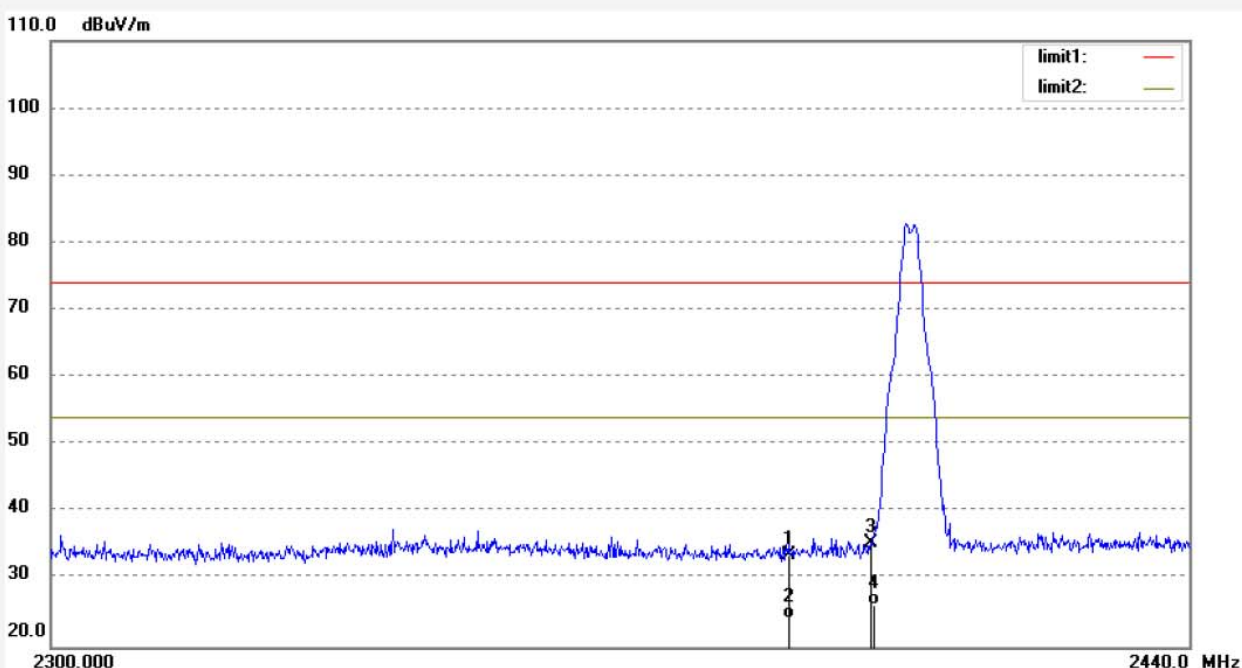


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.57	-6.32	35.25	74.00	-38.75	peak	200	98	
2	2390.000	32.15	-6.32	25.83	54.00	-28.17	AVG	200	121	
3	2400.000	51.59	-6.27	45.32	74.00	-28.68	peak	200	33	
4	2400.000	42.23	-6.27	35.96	54.00	-18.04	AVG	200	186	

Job No.: FRANK2019 #1542  
 Standard: FCC PK  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2405MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Vertical  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/21/11  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380



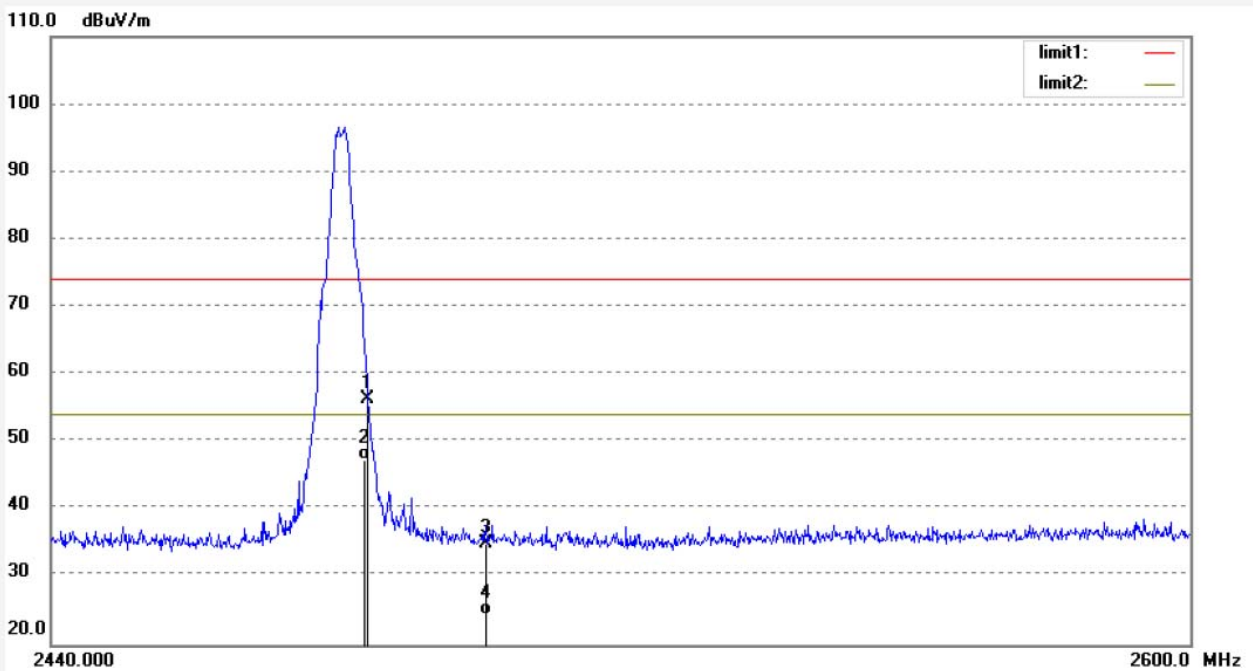
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	39.95	-6.32	33.63	74.00	-40.37	peak	150	63	
2	2390.000	30.42	-6.32	24.10	54.00	-29.90	AVG	150	55	
3	2400.000	41.70	-6.27	35.43	74.00	-38.57	peak	150	174	
4	2400.000	32.49	-6.27	26.22	54.00	-27.78	AVG	150	169	



Job No.: FRANK2019 #1544  
 Standard: FCC PK  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2480MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Horizontal  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/24/46  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380

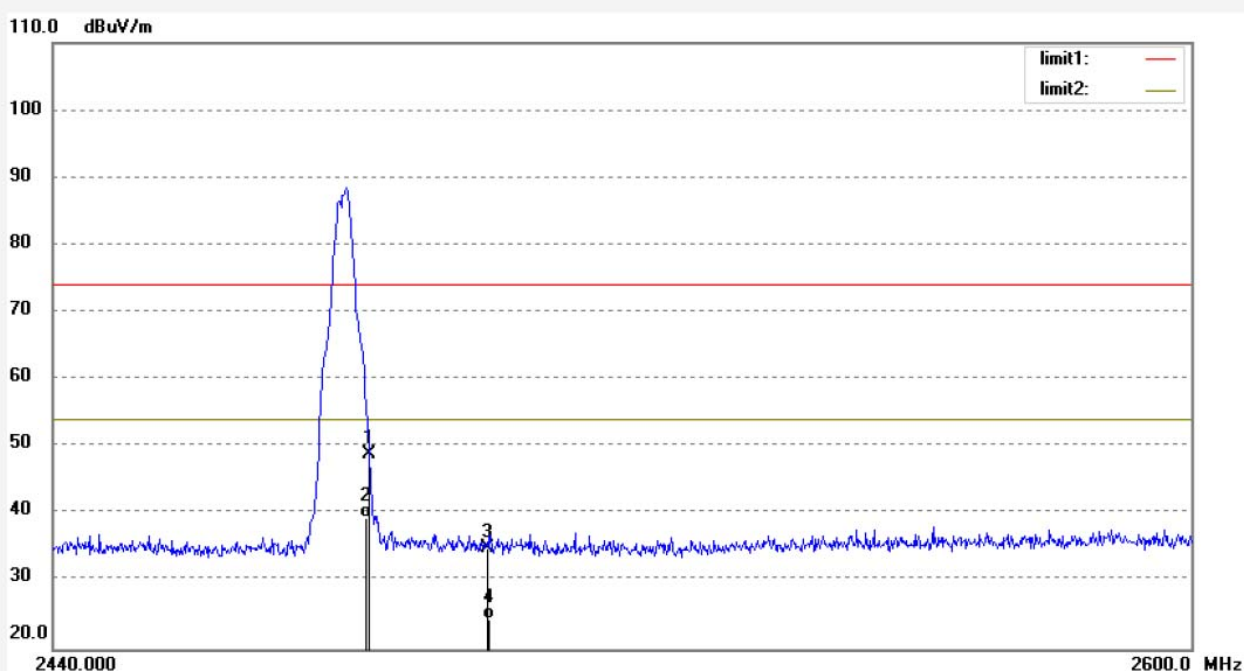


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	62.13	-5.89	56.24	74.00	-17.76	peak	200	82	
2	2483.500	53.22	-5.89	47.33	54.00	-6.67	AVG	200	216	
3	2500.000	40.72	-5.81	34.91	74.00	-39.09	peak	200	63	
4	2500.000	30.17	-5.81	24.36	54.00	-29.64	AVG	250	109	

Job No.: FRANK2019 #1543  
 Standard: FCC PK  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2480MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Vertical  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/23/12  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380



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	54.87	-5.89	48.98	74.00	-25.02	peak	150	93	
2	2483.500	45.32	-5.89	39.43	54.00	-14.57	AVG	150	99	
3	2500.000	40.82	-5.81	35.01	74.00	-38.99	peak	150	221	
4	2500.000	30.18	-5.81	24.37	54.00	-29.63	AVG	150	120	

Note:

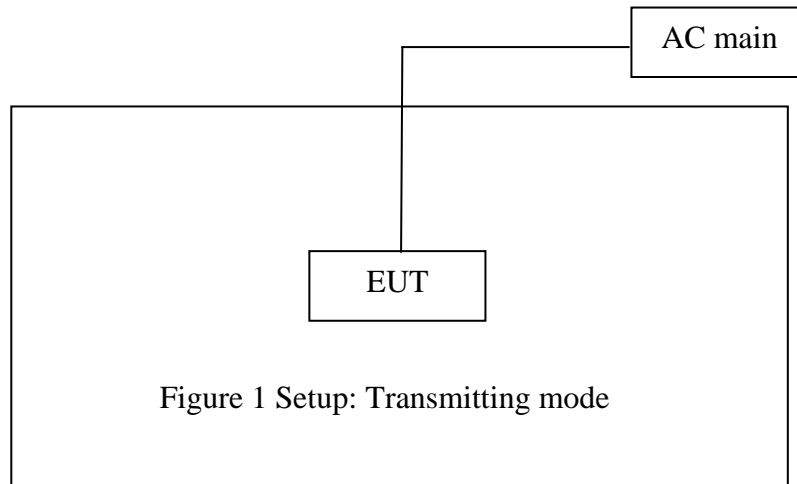
1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is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

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

## 9. RADIATED SPURIOUS EMISSION TEST

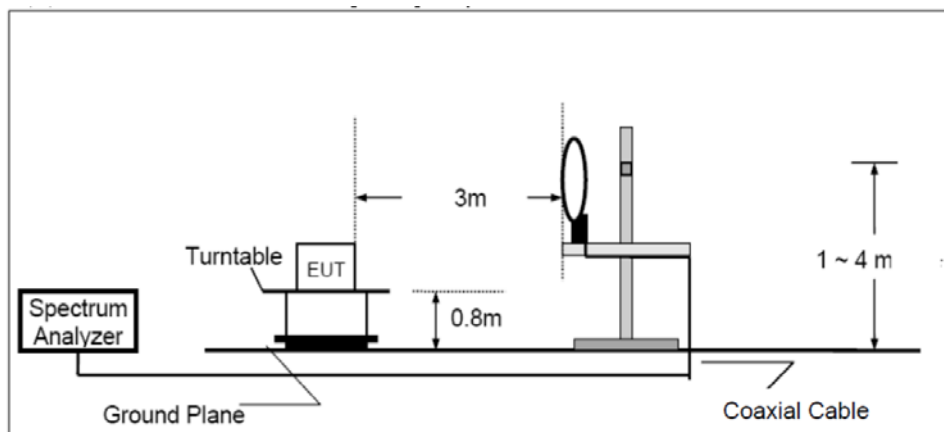
### 9.1. Block Diagram of Test Setup

#### 9.1.1. Block diagram of connection between the EUT and peripherals

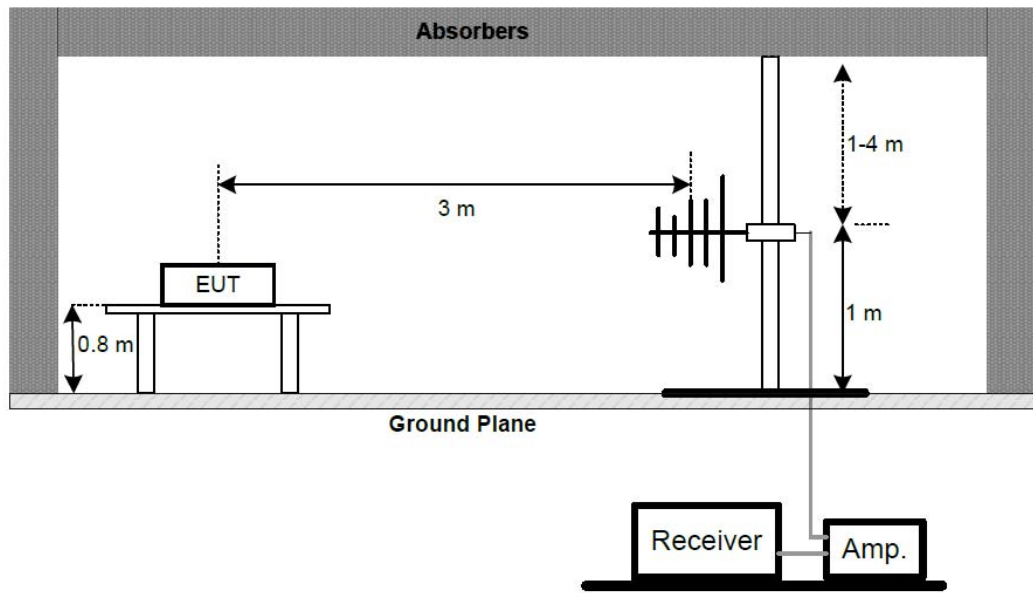


#### 9.1.2. Semi-Anechoic Chamber Test Setup Diagram

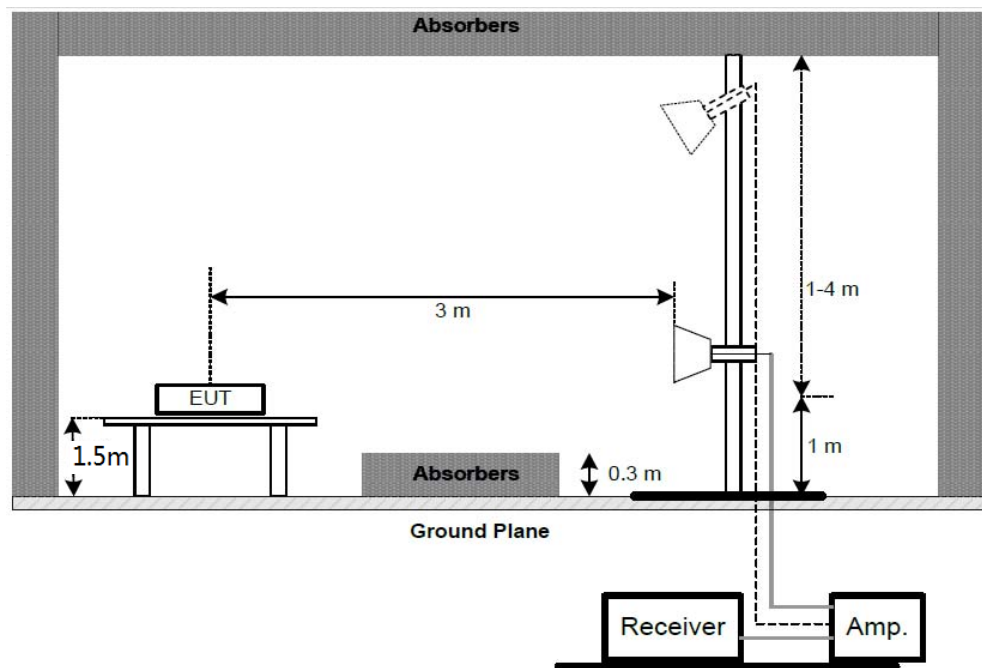
##### (A) Radiated Emission Test Set-Up, Frequency below 30MHz



## (B) Radiated Emission Test Set-Up, Frequency below 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
<sup>1</sup> 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	( <sup>2</sup> )
13.36-13.41			

<sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510

<sup>2</sup>Above 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 Measurement

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. The EUT was tested in 3 orthogonal planes.

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 frequency range from 9 kHz to 25GHz is checked.

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. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain



### 9.7.Data Sample

Frequency (MHz)	Reading (dB $\mu$ v)	Factor (dB/m)	Result (dB $\mu$ v/m)	Limit (dB $\mu$ v/m)	Margin (dB)	Remark
X.XX	28.66	-15.19	13.47	40.0	-26.53	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB $\mu$ v) = Uncorrected Analyzer/Receiver reading

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

Result(dB $\mu$ v/m) = Reading(dB $\mu$ v) + Factor(dB/m)

Limit (dB $\mu$ v/m) = Limit stated in standard

Margin (dB) = Result(dB $\mu$ v/m) - Limit (dB $\mu$ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB $\mu$ V/m)–Limit(dB $\mu$ V/m)

Result(dB $\mu$ V/m)= Reading(dB $\mu$ 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.The Field Strength of Radiation Emission Measurement Results

PASS.

**Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.**

**2. \*: Denotes restricted band of operation.**

**3. The radiation emissions from 9kHz-30MHz and 18-25GHz are not reported, because the test values lower than the limits of 20dB.**

Below 1GHz



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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

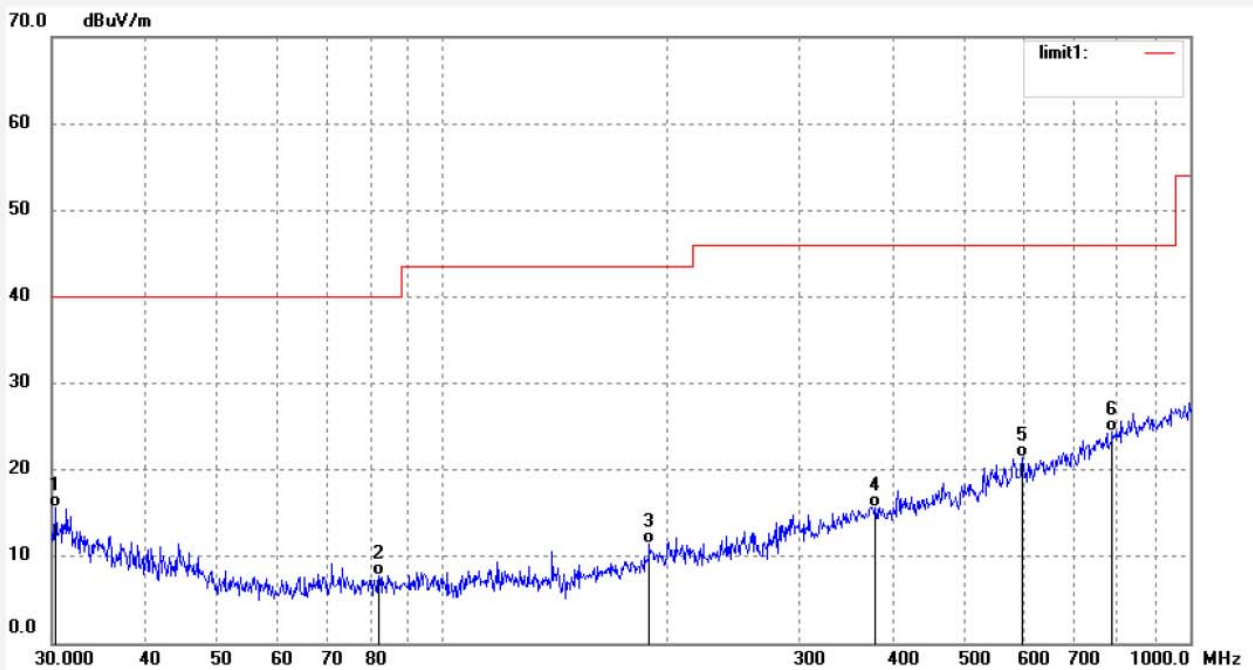
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019 #1533  
Standard: FCC Class B 3M Radiated  
Test item: Radiation Test  
Temp.( C)/Hum.(%) 25 C / 55 %  
EUT: thermostat  
Mode: TX 2405MHz  
Model: MTO  
Manufacturer: Libre Home Inc

Polarization: Horizontal  
Power Source: AC 24V/60Hz  
Date: 19/09/24/  
Time: 10/05/53  
Engineer Signature:  
Distance: 3m

Note: Report NO.:ATE20191380



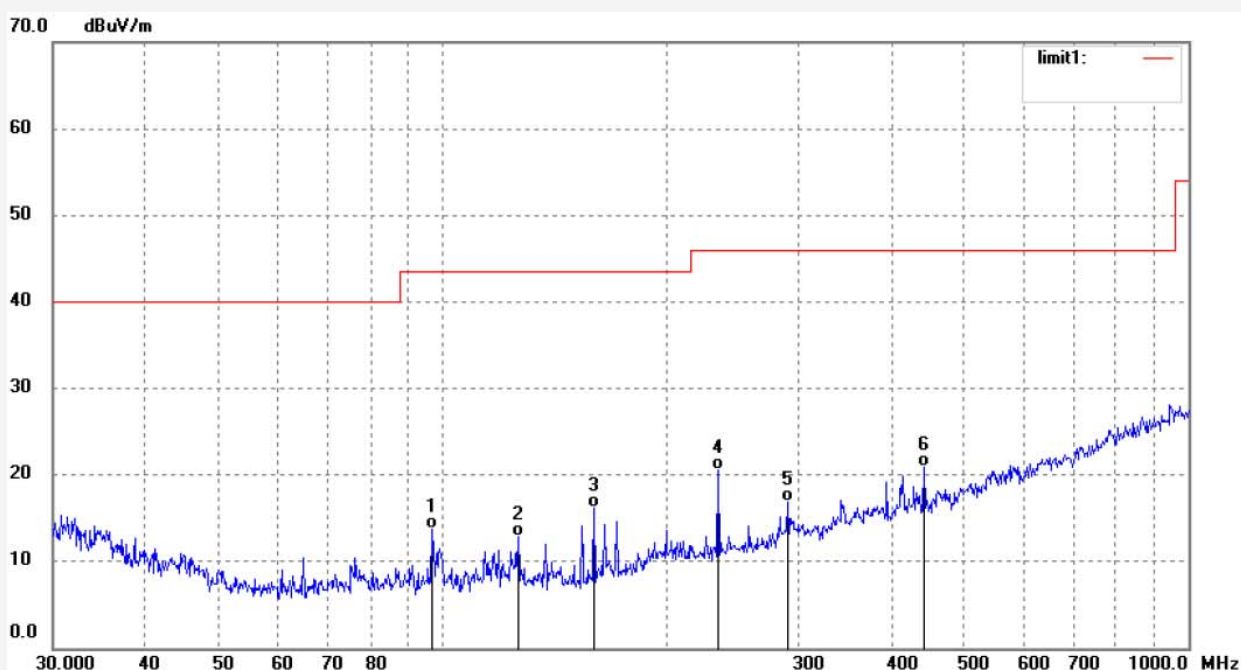
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	30.3179	35.90	-20.28	15.62	40.00	-24.38	QP	200	93	
2	82.2362	35.27	-27.43	7.84	40.00	-32.16	QP	200	219	
3	189.1075	36.65	-25.19	11.46	43.50	-32.04	QP	200	26	
4	379.1779	34.36	-18.64	15.72	46.00	-30.28	QP	200	96	
5	596.6068	35.19	-13.76	21.43	46.00	-24.57	QP	200	221	
6	787.4749	33.69	-9.33	24.36	46.00	-21.64	QP	200	163	



Job No.: FRANK2019 #1534  
 Standard: FCC Class B 3M Radiated  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2405MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Vertical  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/07/09  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380

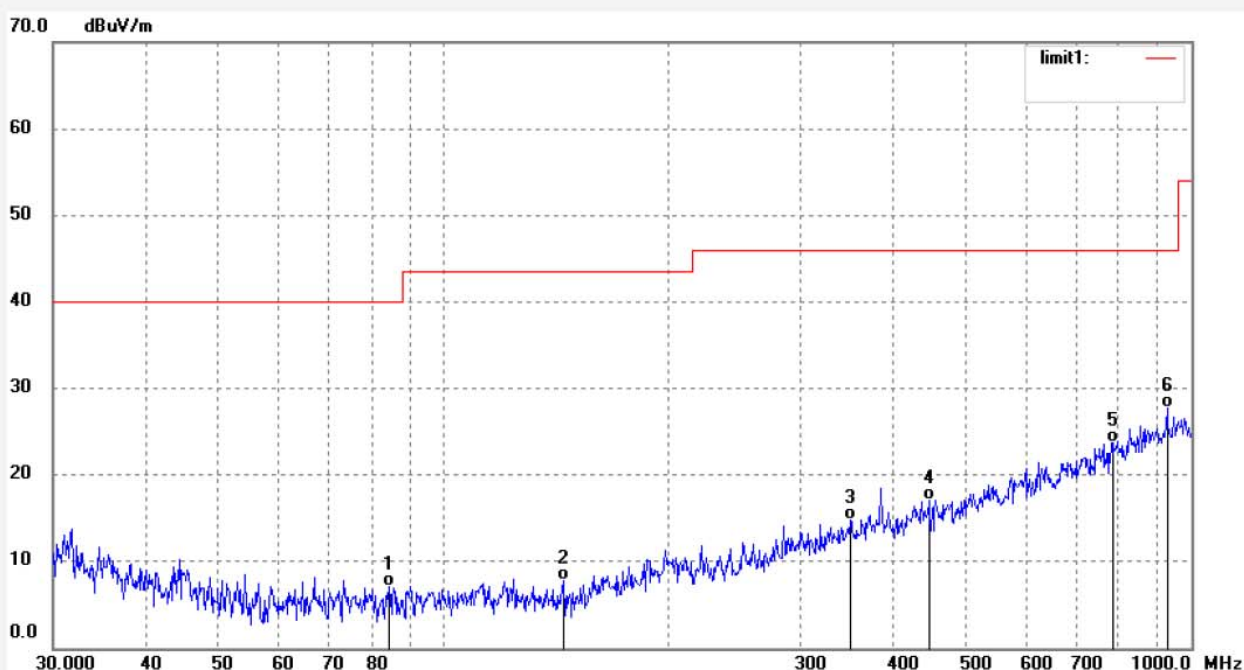


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	96.6620	41.40	-27.62	13.78	43.50	-29.72	QP	100	193	
2	126.2485	40.53	-27.62	12.91	43.50	-30.59	QP	100	152	
3	159.7586	43.25	-27.09	16.16	43.50	-27.34	QP	100	62	
4	234.3097	44.36	-23.81	20.55	46.00	-25.45	QP	100	331	
5	290.3170	38.49	-21.65	16.84	46.00	-29.16	QP	100	208	
6	442.5722	38.42	-17.45	20.97	46.00	-25.03	QP	100	146	

Job No.: FRANK2019 #1536  
 Standard: FCC Class B 3M Radiated  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2450MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Horizontal  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/07/49  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380

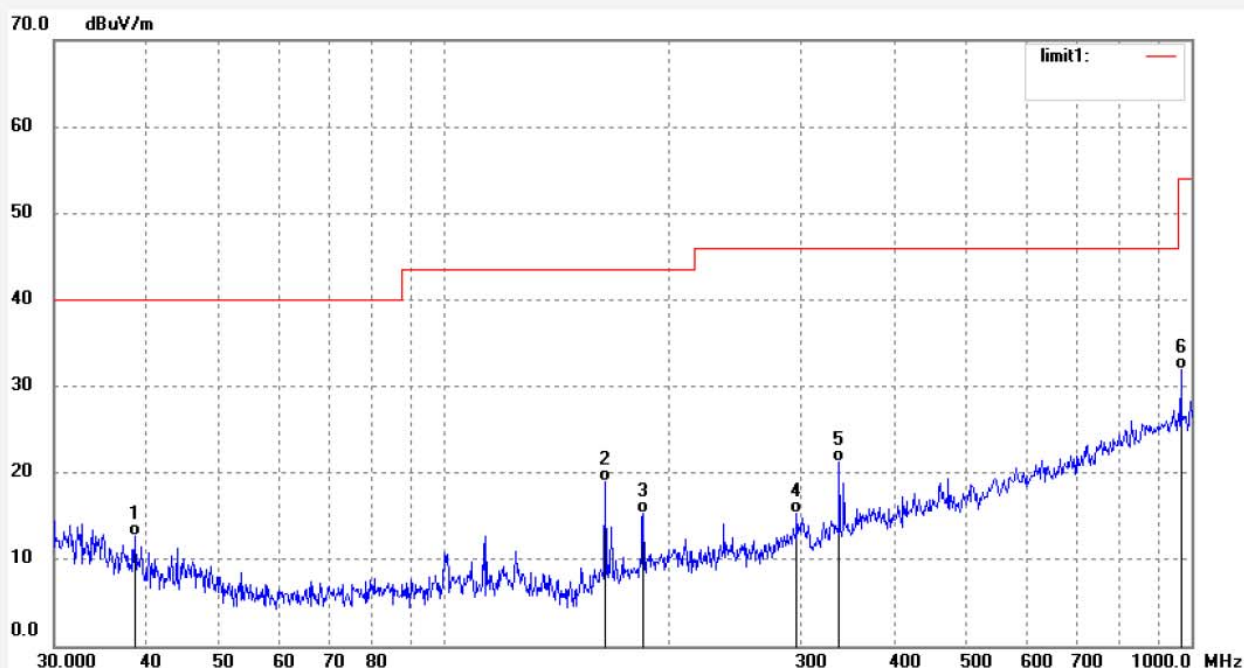


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	84.5806	34.50	-27.45	7.05	40.00	-32.95	QP	200	112	
2	144.7898	35.78	-28.05	7.73	43.50	-35.77	QP	200	92	
3	349.7411	34.04	-19.32	14.72	46.00	-31.28	QP	200	96	
4	445.6931	34.45	-17.35	17.10	46.00	-28.90	QP	200	315	
5	781.9605	33.14	-9.47	23.67	46.00	-22.33	QP	200	63	
6	928.8710	34.38	-6.71	27.67	46.00	-18.33	QP	200	102	

Job No.: FRANK2019 #1535  
 Standard: FCC Class B 3M Radiated  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2450MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Vertical  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/07/27  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380



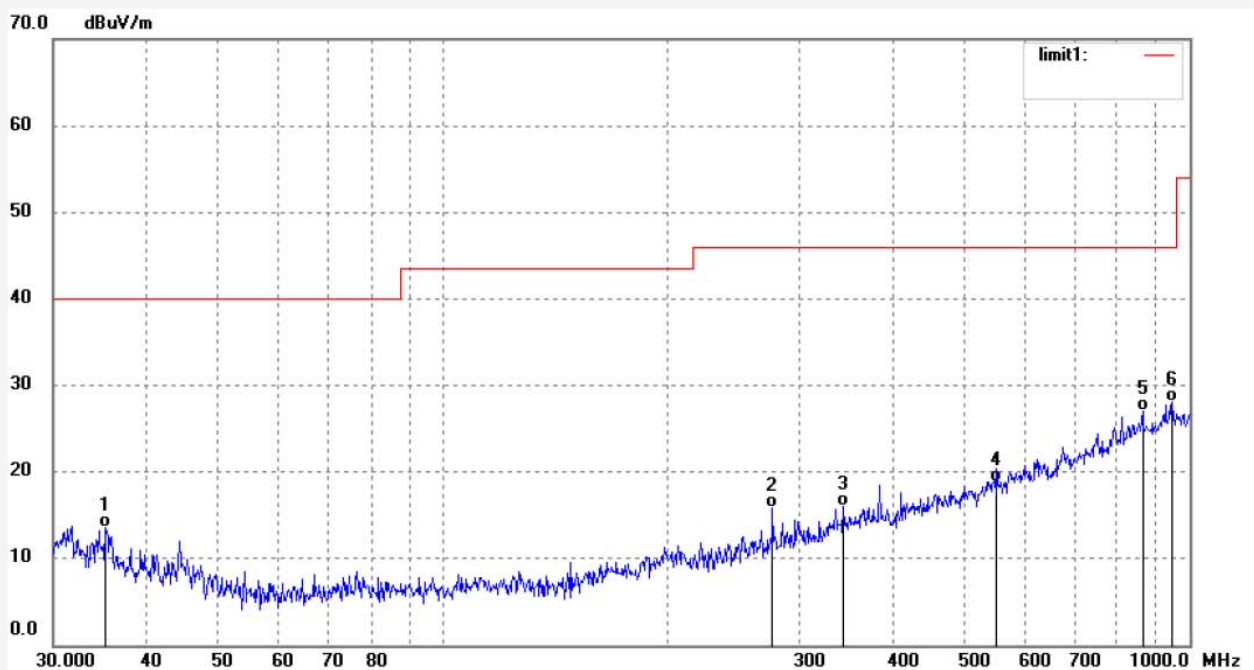
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	38.5001	35.60	-22.95	12.65	40.00	-27.35	QP	100	145	
2	164.3129	45.55	-26.61	18.94	43.50	-24.56	QP	100	157	
3	184.5132	40.89	-25.59	15.30	43.50	-28.20	QP	100	93	
4	296.5022	36.76	-21.36	15.40	46.00	-30.60	QP	100	221	
5	337.6659	41.01	-19.81	21.20	46.00	-24.80	QP	100	201	
6	968.8723	37.70	-5.84	31.86	54.00	-22.14	QP	100	136	



Job No.: FRANK2019 #1537  
 Standard: FCC Class B 3M Radiated  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2480MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Horizontal  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/08/02  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380

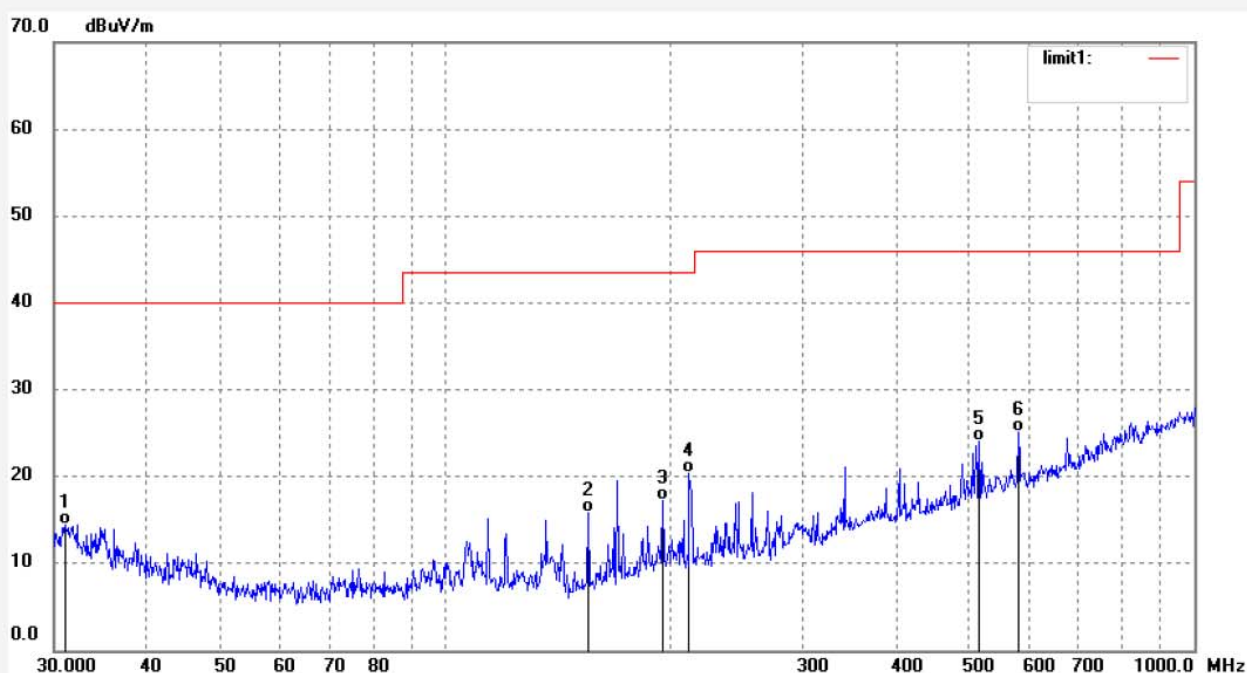


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.2625	35.14	-21.55	13.59	40.00	-26.41	QP	200	140	
2	276.3817	38.24	-22.33	15.91	46.00	-30.09	QP	200	221	
3	343.6505	35.59	-19.58	16.01	46.00	-29.99	QP	200	93	
4	546.4366	33.79	-14.92	18.87	46.00	-27.13	QP	200	321	
5	865.8383	34.82	-7.75	27.07	46.00	-18.93	QP	200	219	
6	948.6609	34.42	-6.35	28.07	46.00	-17.93	QP	200	95	

Job No.: FRANK2019 #1538  
 Standard: FCC Class B 3M Radiated  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2480MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Vertical  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/09/26  
 Engineer Signature:  
 Distance: 3m

Note: Report NO.:ATE20191380



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.0728	34.91	-20.47	14.44	40.00	-25.56	QP	100	185	
2	155.3305	43.50	-27.58	15.92	43.50	-27.58	QP	100	226	
3	195.1830	41.91	-24.62	17.29	43.50	-26.21	QP	100	332	
4	211.6111	44.49	-24.09	20.40	43.50	-23.10	QP	100	148	
5	516.5651	39.79	-15.80	23.99	46.00	-22.01	QP	100	92	
6	582.1122	39.15	-14.08	25.07	46.00	-20.93	QP	100	120	

## Above 1GHz


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Fax:+86-0755-26503396

Job No.: FRANK2019 #1540

Standard: FCC PK

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: thermostat

Mode: TX 2405MHz

Model: MTO

Manufacturer: Libre Home Inc

Polarization: Horizontal

Power Source: AC 24V/60Hz

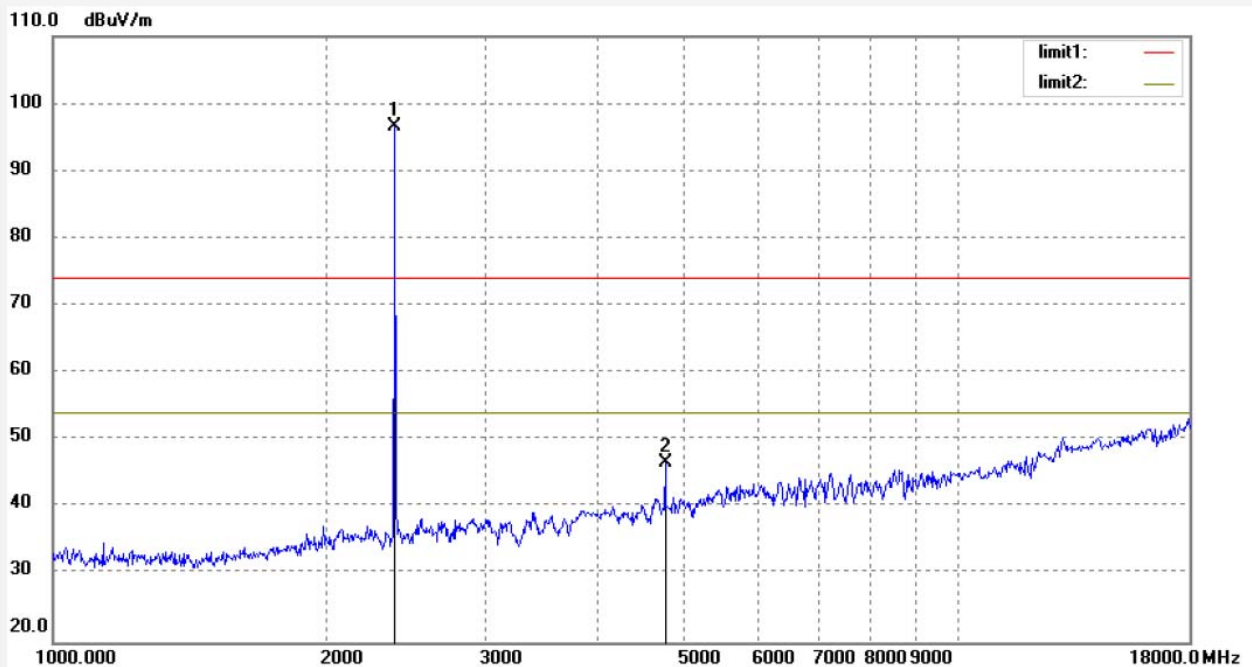
Date: 19/09/24/

Time: 10/15/28

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20191380

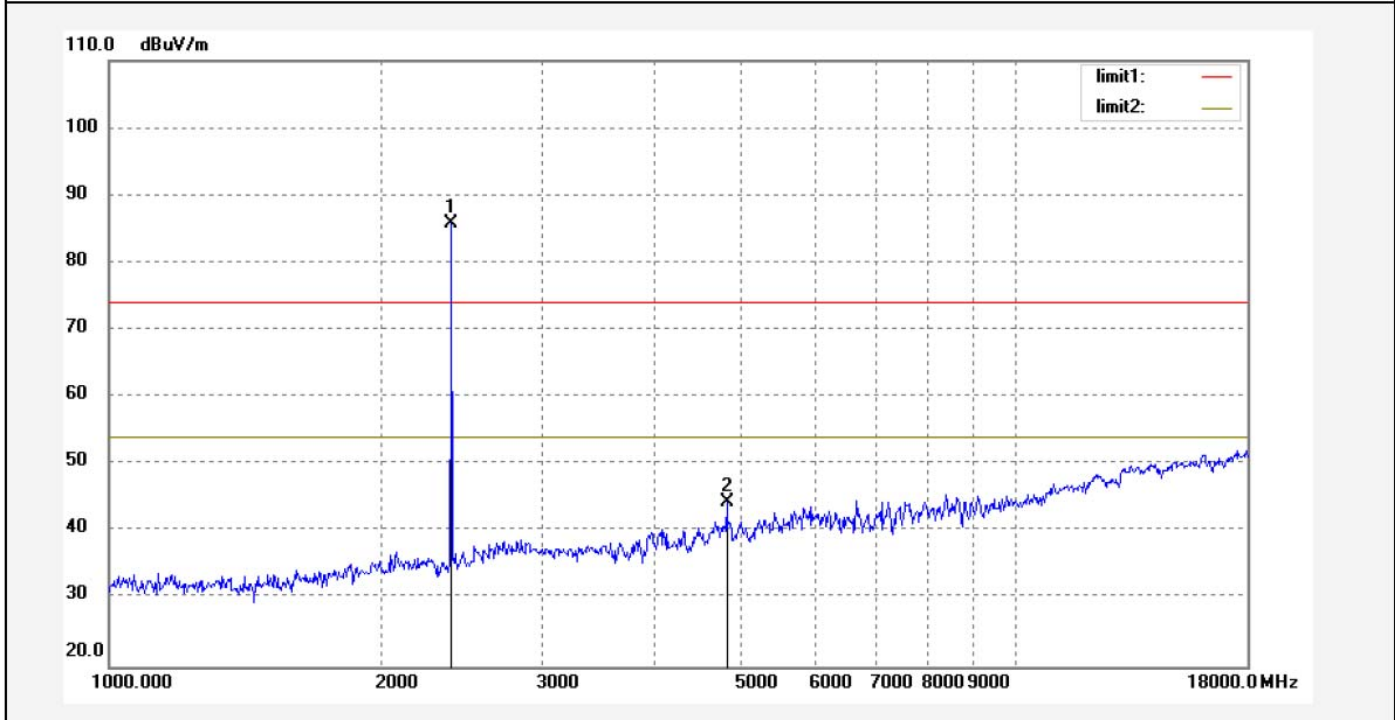


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2405.159	102.88	-6.33	96.55			peak	250	63	
2	4810.328	45.80	0.76	46.56	74.00	-27.44	peak	200	178	



Job No.: FRANK2019 #1539	Polarization: Vertical
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.( C)/Hum.(%) 25 C / 55 %	Time: 10/13/56
EUT: thermostat	Engineer Signature:
Mode: TX 2405MHz	Distance: 3m
Model: MTO	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191380



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2405.159	92.10	-6.33	85.77			peak	150	221	
2	4810.328	43.37	1.00	44.37	74.00	-29.63	peak	150	193	

Job No.: FRANK2019 #1548

Polarization: Horizontal

Standard: FCC PK

Power Source: AC 24V/60Hz

Test item: Radiation Test

Date: 19/09/24/

Temp.( C)/Hum.(%) 25 C / 55 %

Time: 10/32/20

EUT: thermostat

Engineer Signature:

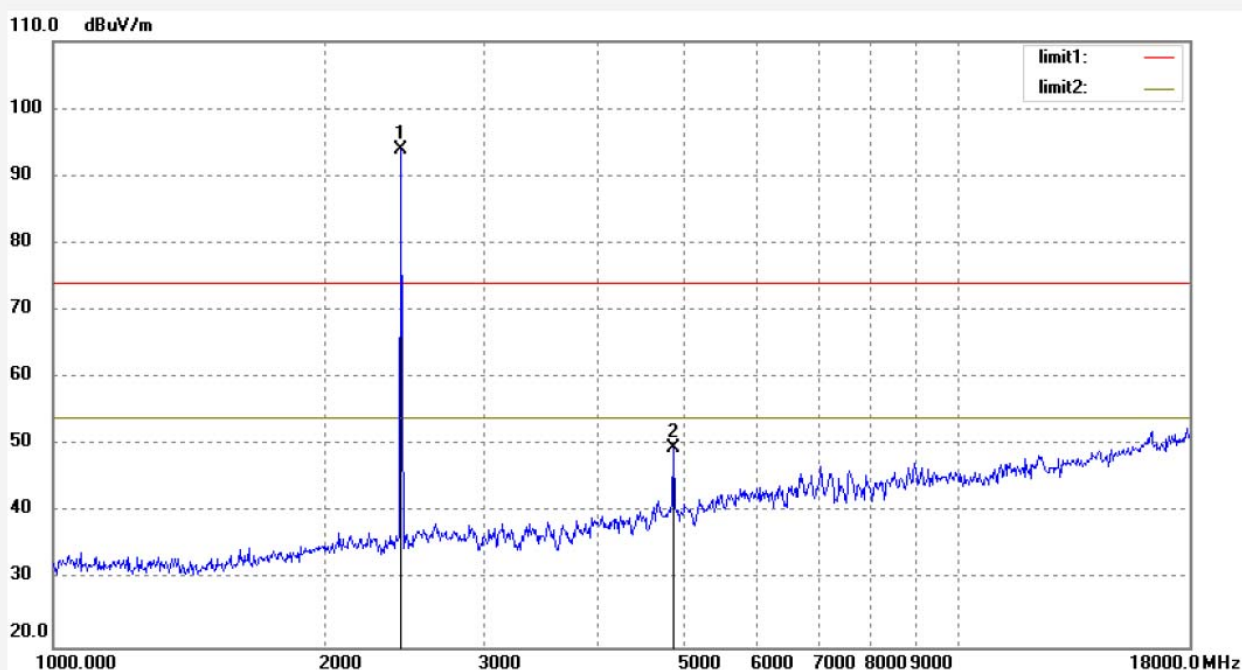
Mode: TX 2450MHz

Distance: 3m

Model: MTO

Manufacturer: Libre Home Inc

Note: Report NO.:ATE20191380



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2450.262	100.09	-6.17	93.92			peak	250	93	
2	4900.438	48.44	1.19	49.63	74.00	-24.37	peak	300	187	



Job No.: FRANK2019 #1547

Standard: FCC PK

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: thermostat

Mode: TX 2450MHz

Model: MTO

Manufacturer: Libre Home Inc

Polarization: Vertical

Power Source: AC 24V/60Hz

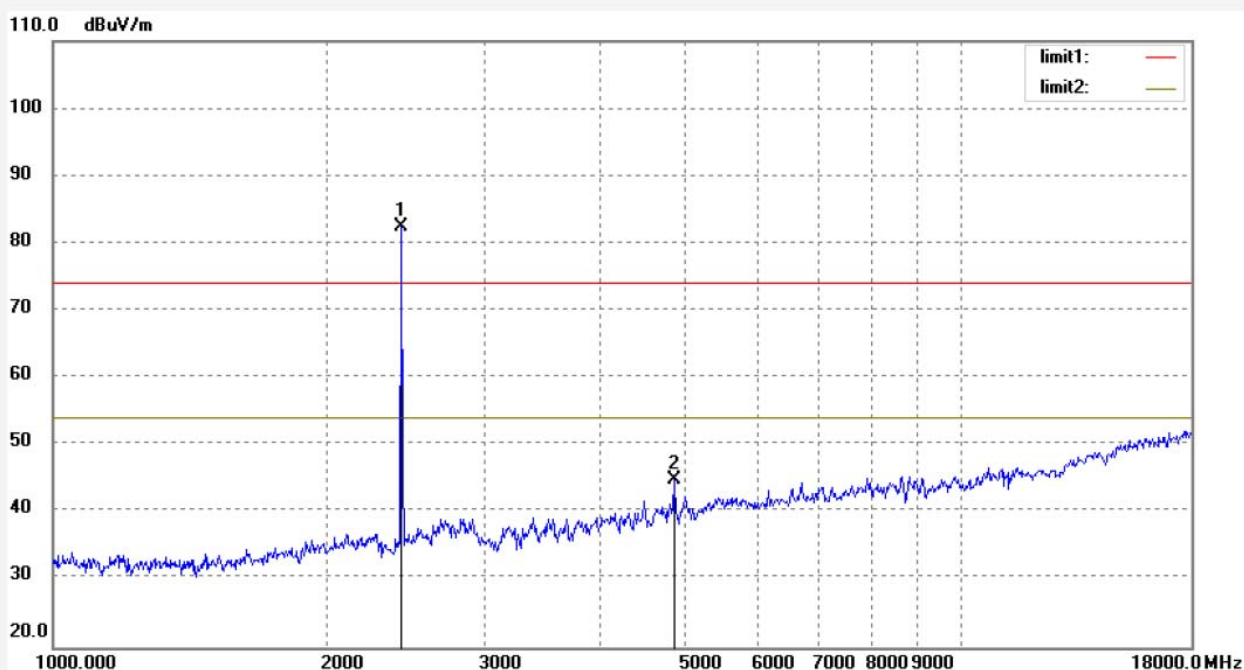
Date: 19/09/24/

Time: 10/30/28

Engineer Signature:

Distance: 3m

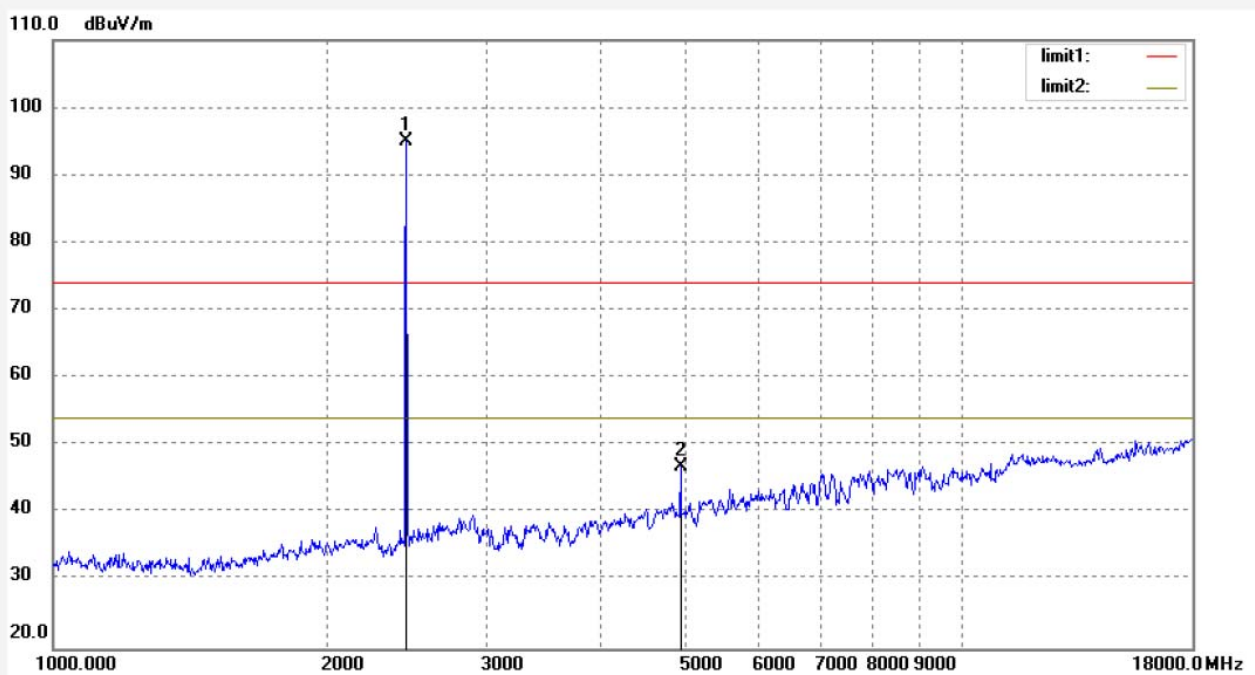
Note: Report NO.:ATE20191380



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2450.262	88.53	-6.17	82.36			peak	150	182	
2	4900.438	43.61	1.19	44.80	74.00	-29.20	peak	150	93	

Job No.: FRANK2019 #1545	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.( C)/Hum.(%) 25 C / 55 %	Time: 10/26/46
EUT: thermostat	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MTO	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191380

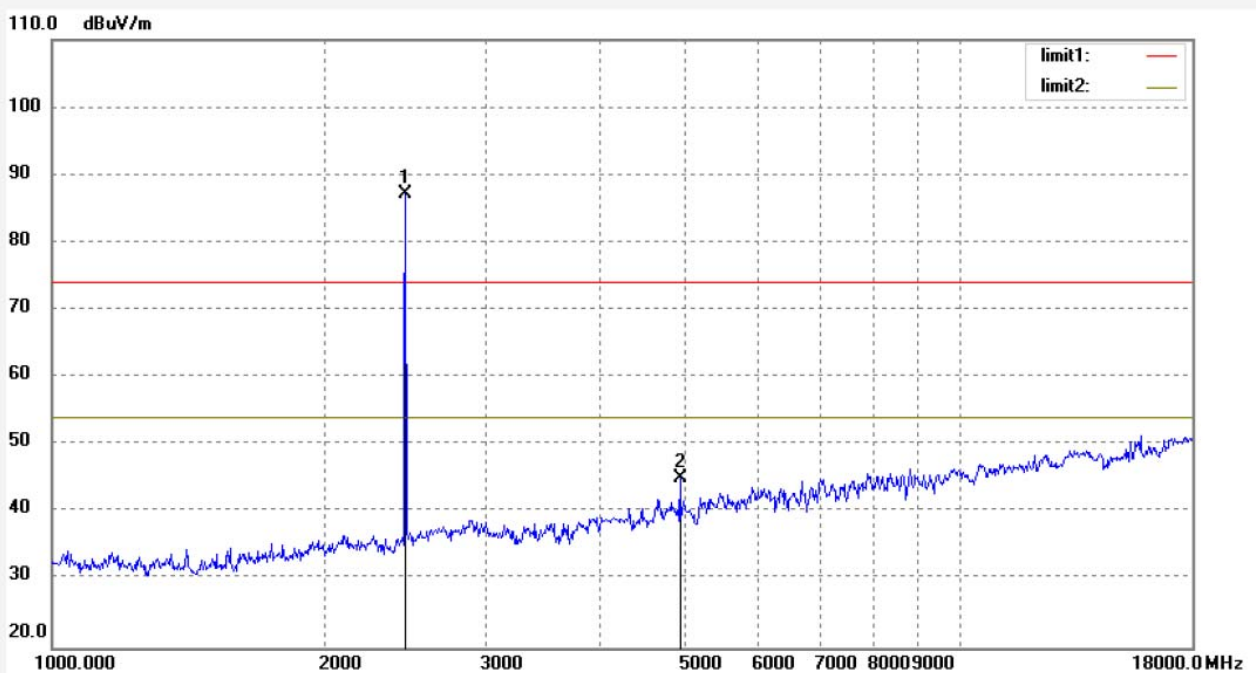


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.234	101.01	-6.04	94.97			peak	200	22	
2	4960.444	45.35	1.50	46.85	74.00	-27.15	peak	250	193	

Job No.: FRANK2019 #1546  
 Standard: FCC PK  
 Test item: Radiation Test  
 Temp.( C)/Hum.(%) 25 C / 55 %  
 EUT: thermostat  
 Mode: TX 2480MHz  
 Model: MTO  
 Manufacturer: Libre Home Inc

Polarization: Vertical  
 Power Source: AC 24V/60Hz  
 Date: 19/09/24/  
 Time: 10/28/19  
 Engineer Signature:  
 Distance: 3m

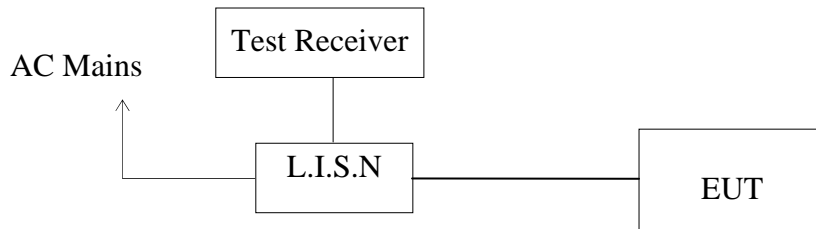
Note: Report NO.:ATE20191380



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.234	93.13	-6.04	87.09			peak	150	66	
2	4960.444	43.64	1.50	45.14	74.00	-28.86	peak	150	187	

## 10. POWER LINE CONDUCTED MEASUREMENT

### 10.1. Block Diagram of Test Setup



(EUT: thermostat)

### 10.2. Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB( $\mu$ 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.

### 10.3. Configuration of EUT on Measurement

The following 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.

### 10.4. Operating Condition of EUT

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

10.4.2. Turn on the power of all equipment.

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

### 10.5. Test Procedure

The EUT is put on the plane 0.8 m 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.

### 10.6. DATA SAMPLE

Frequency (MHz)	Quasi Peak Level (dB $\mu$ V)	Average Level (dB $\mu$ V)	Transducer value (dB)	QuasiPeak Result (dB $\mu$ V)	Average Result (dB $\mu$ V)	Quasi Peak Limit (dB $\mu$ V)	Average Limit (dB $\mu$ V)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	29.4	18.3	11.1	40.5	29.4	56.0	56.0	15.5	16.6	Pass

Transducer value = Insertion loss of LISN + Cable Loss

Result = Quasi-peak Level/Average Level + Transducer value

Limit = Limit stated in standard

Calculation Formula:

Margin = Limit – Reading level value – Transducer value



### 10.7. Power Line Conducted Emission Measurement Results

**PASS.**

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

<b>Test mode : Zigbee operation (worse case)</b> <b>Test Voltage: 24V/60Hz</b>								
<b>MEASUREMENT RESULT: "F-1380-2_fin"</b>								
2019-9-24 9:29								
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	
MHz	dBuV	dB	dBuV	dB				
0.154000	32.40	10.8	66	33.4	QP	N	GND	
0.778000	24.90	11.1	56	31.1	QP	N	GND	
1.800000	25.20	11.2	56	30.8	QP	N	GND	
2.265000	18.60	11.3	56	37.4	QP	N	GND	
5.955000	9.30	11.5	60	50.7	QP	N	GND	
<b>MEASUREMENT RESULT: "F-1380-2_fin2"</b>								
2019-9-24 9:29								
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	
MHz	dBuV	dB	dBuV	dB				
0.150000	26.50	10.8	56	29.5	AV	N	GND	
0.776000	21.00	11.1	46	25.0	AV	N	GND	
1.800000	20.10	11.2	46	25.9	AV	N	GND	
2.150000	14.20	11.3	46	31.8	AV	N	GND	
5.620000	5.40	11.5	50	44.6	AV	N	GND	
<b>MEASUREMENT RESULT: "F-1380-1_fin"</b>								
2019-9-24 9:26								
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	
MHz	dBuV	dB	dBuV	dB				
0.156000	32.00	10.8	66	33.7	QP	L1	GND	
0.778000	25.10	11.1	56	30.9	QP	L1	GND	
1.524000	24.10	11.2	56	31.9	QP	L1	GND	
2.145000	19.90	11.3	56	36.1	QP	L1	GND	
5.735000	9.30	11.5	60	50.7	QP	L1	GND	
<b>MEASUREMENT RESULT: "F-1380-1_fin2"</b>								
2019-9-24 9:26								
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	
MHz	dBuV	dB	dBuV	dB				
0.288000	16.70	10.9	51	33.9	AV	L1	GND	
0.778000	20.80	11.1	46	25.2	AV	L1	GND	
1.800000	20.10	11.2	46	25.9	AV	L1	GND	
2.155000	14.30	11.3	46	31.7	AV	L1	GND	
5.465000	6.50	11.5	50	43.5	AV	L1	GND	

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

The spectral diagrams are attached as below.

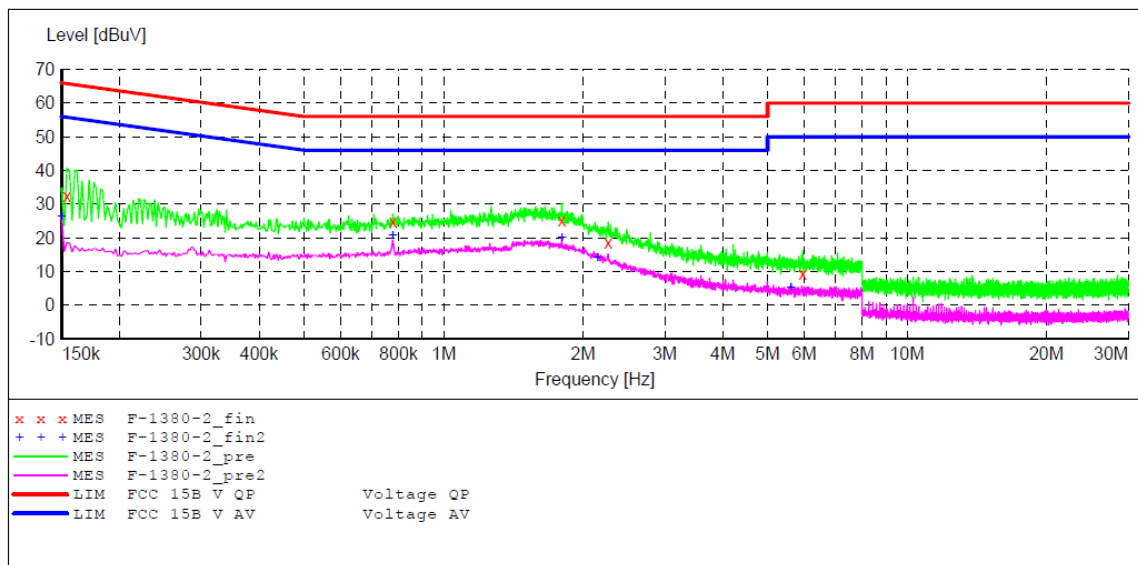
**ACCURATE TECHNOLOGY CO., LTD**

**CONDUCTED EMISSION STANDARD FCC PART 15B**

EUT: thermostat M/N:TMO  
 Manufacturer: Libre Home Inc  
 Operating Condition: Zigbee OPERATION  
 Test Site: 2#Shielding Room  
 Operator: Frank  
 Test Specification: N 24V/60Hz  
 Comment: Report NO.:ATE20191380  
 Start of Test: 2019-9-24 / 9:27:46

**SCAN TABLE: "V 150K-30MHz fin"**

Short Description: \_SUB\_STD\_VTERM2 1.70  
 Start Stop Step Detector Meas. IF Transducer  
 Frequency Frequency Width Time Bandw.  
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008  
 Average



**MEASUREMENT RESULT: "F-1380-2\_fin"**

2019-9-24 9:29

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.154000	32.40	10.8	66	33.4	QP	N	GND
0.778000	24.90	11.1	56	31.1	QP	N	GND
1.800000	25.20	11.2	56	30.8	QP	N	GND
2.265000	18.60	11.3	56	37.4	QP	N	GND
5.955000	9.30	11.5	60	50.7	QP	N	GND

**MEASUREMENT RESULT: "F-1380-2\_fin2"**

2019-9-24 9:29

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	26.50	10.8	56	29.5	AV	N	GND
0.776000	21.00	11.1	46	25.0	AV	N	GND
1.800000	20.10	11.2	46	25.9	AV	N	GND
2.150000	14.20	11.3	46	31.8	AV	N	GND
5.620000	5.40	11.5	50	44.6	AV	N	GND

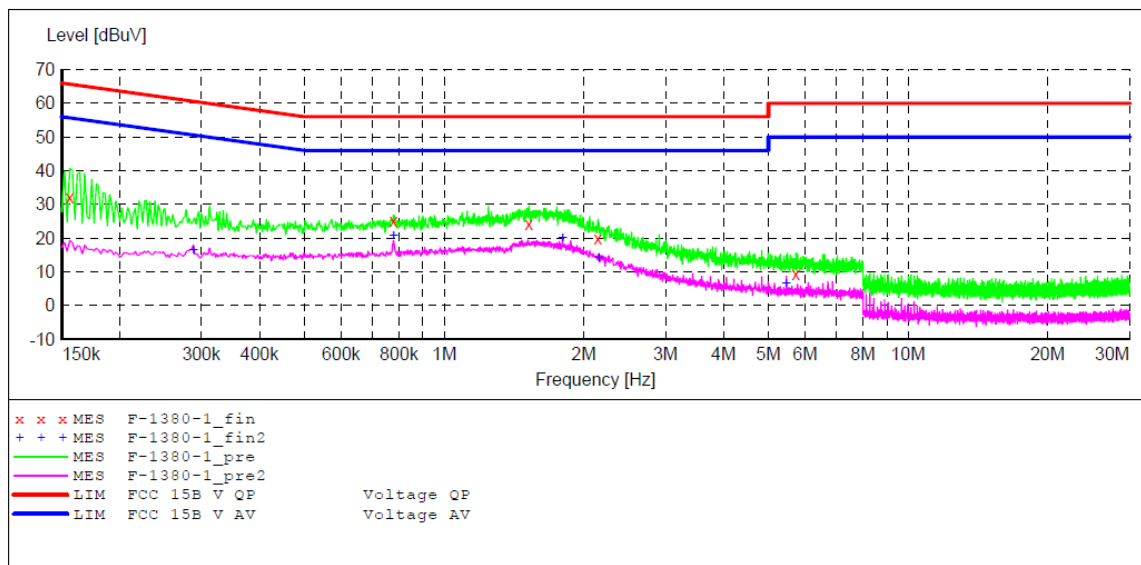
**ACCURATE TECHNOLOGY CO., LTD**

**CONDUCTED EMISSION STANDARD FCC PART 15B**

EUT: thermostat M/N:TMO  
 Manufacturer: Libre Home Inc  
 Operating Condition: Zigbee OPERATION  
 Test Site: 2#Shielding Room  
 Operator: Frank  
 Test Specification: L 24V/60Hz  
 Comment: Report NO.:ATE20191380  
 Start of Test: 2019-9-24 / 9:24:39

**SCAN TABLE: "V 150K-30MHz fin"**

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



**MEASUREMENT RESULT: "F-1380-1\_fin"**

2019-9-24 9:26

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.156000	32.00	10.8	66	33.7	QP	L1	GND
0.778000	25.10	11.1	56	30.9	QP	L1	GND
1.524000	24.10	11.2	56	31.9	QP	L1	GND
2.145000	19.90	11.3	56	36.1	QP	L1	GND
5.735000	9.30	11.5	60	50.7	QP	L1	GND

**MEASUREMENT RESULT: "F-1380-1\_fin2"**

2019-9-24 9:26

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.288000	16.70	10.9	51	33.9	AV	L1	GND
0.778000	20.80	11.1	46	25.2	AV	L1	GND
1.800000	20.10	11.2	46	25.9	AV	L1	GND
2.155000	14.30	11.3	46	31.7	AV	L1	GND
5.465000	6.50	11.5	50	43.5	AV	L1	GND



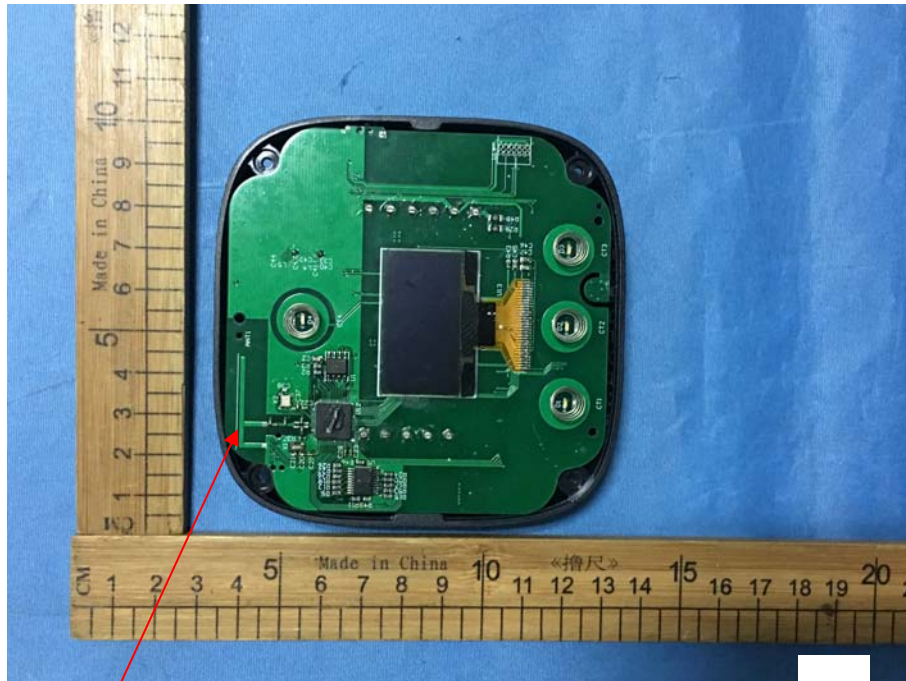
## 11. ANTENNA REQUIREMENT

### 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 permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 2dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



**Antenna**