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

sprinkler controller

Model No.: SPI

FCC ID: 2AQXA-SPI

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.	:	ATE20191379
Date of Test	:	Sep. 24, 2019-Sep. 25, 2019
Date of Report	:	Sep. 26, 2019

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Test Report Certification

Applicant	:	Libre Home Inc
Address	:	13 Crestview Ter. Montvale, New Jersey, United States 07645
Product	:	sprinkler controller
Model No.	:	SPI
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, Engineer)
Approved & Authorized Signer :	(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	sprinkler controller
Model Number	:	SPI
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	:	1901175

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

Step-down transformer

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 (ISEDC) 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

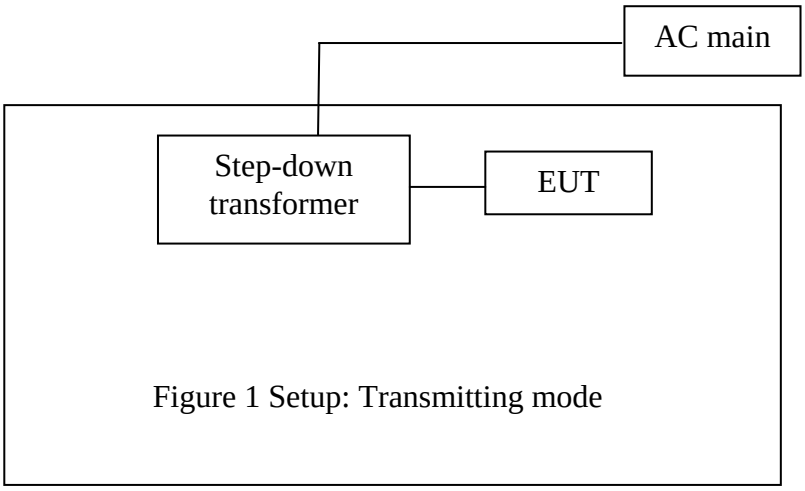


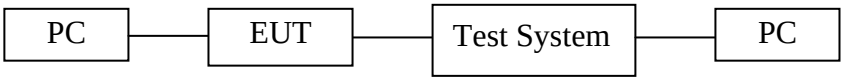
Figure 1 Setup: Transmitting mode

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant
Section 15.247(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.

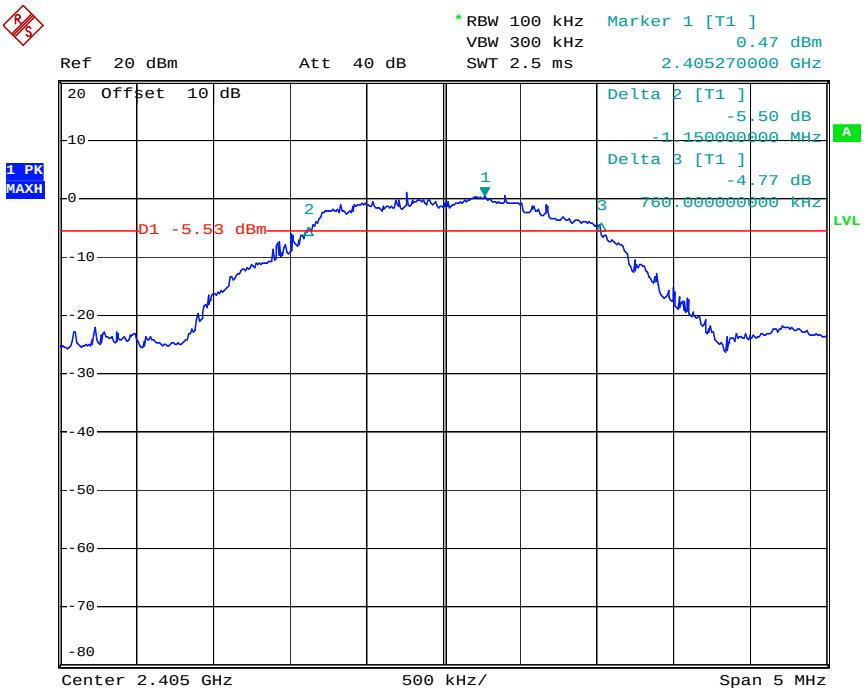
5.6.Test Result

The test data of zigbee:

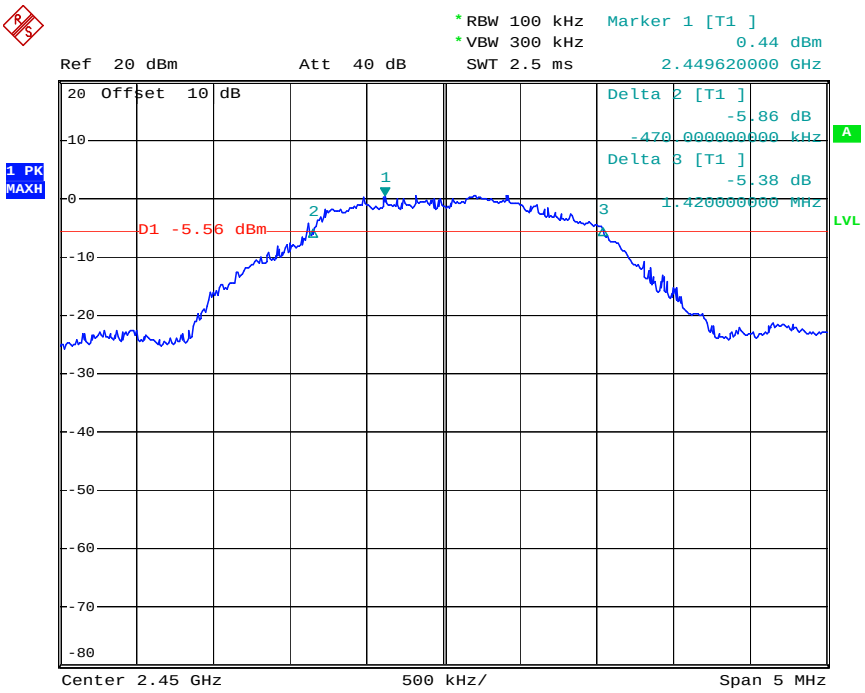
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit(MHz)	PASS/FAIL
11	2405	1.910	0.5	PASS
20	2450	1.890	0.5	PASS
26	2480	1.880	0.5	PASS

The spectrum analyzer plots are attached as below.

channel 11



channel 20



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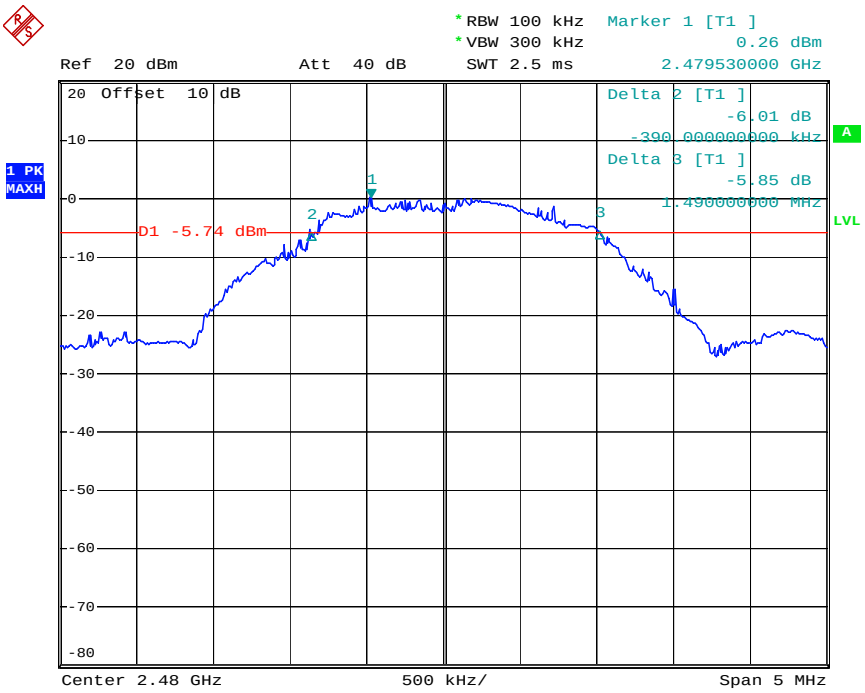
channel 26



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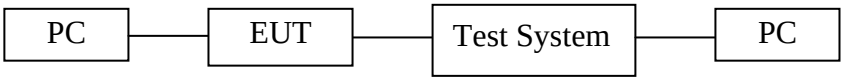
6. MAXIMUM PEAK OUTPUT POWER

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.

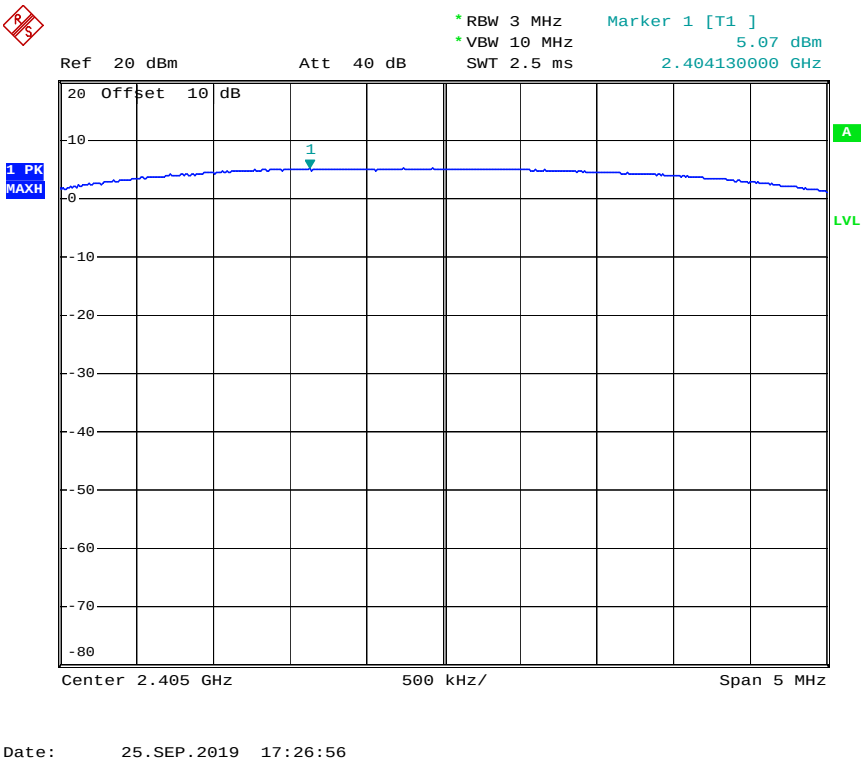
6.5.3.Measurement the maximum peak output power.

6.6.Test Result

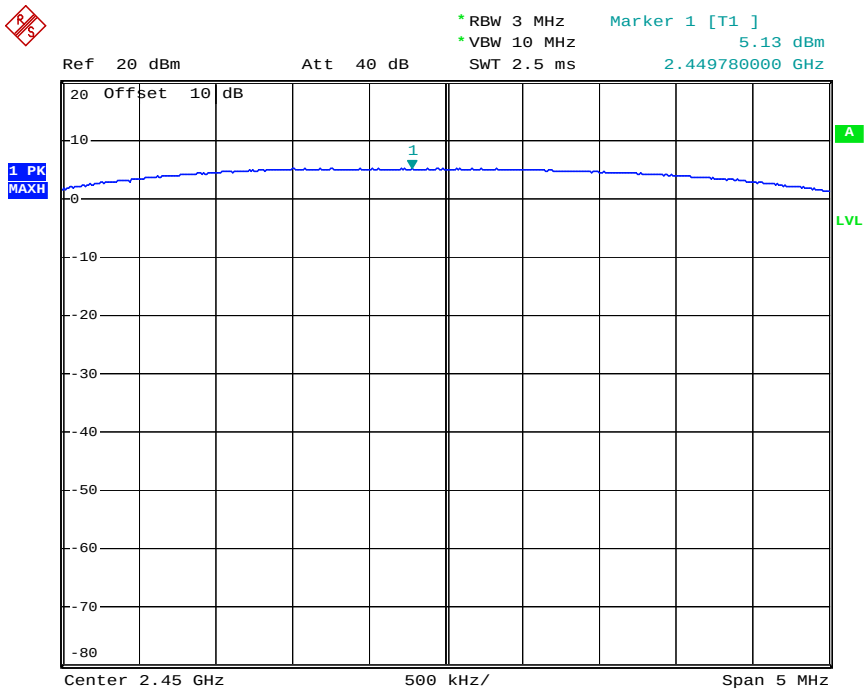
Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
11	2405	5.07	30	PASS
20	2450	5.13	30	PASS
26	2480	4.61	30	PASS

The spectrum analyzer plots are attached as below.

channel 11



channel 20



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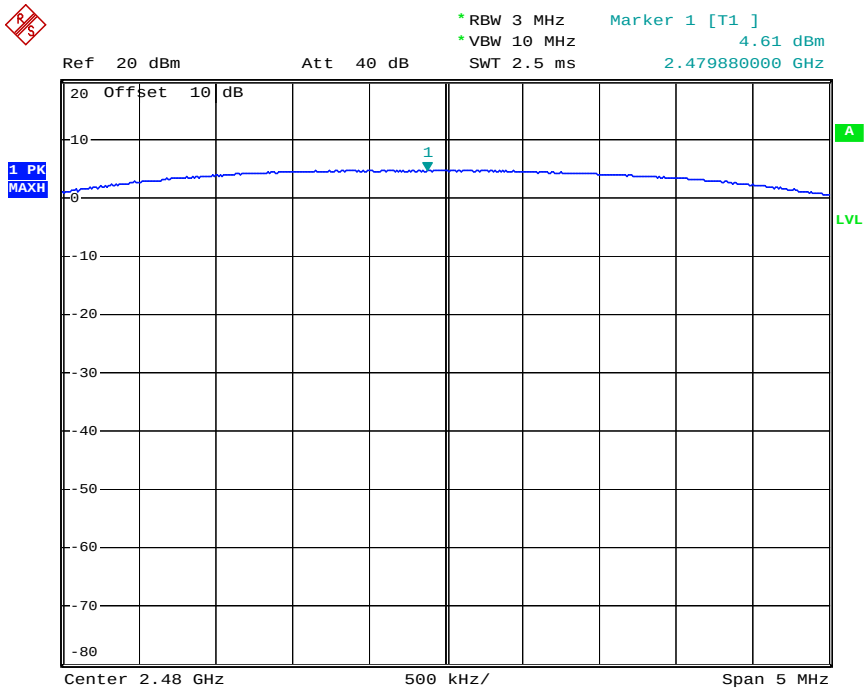
channel 26



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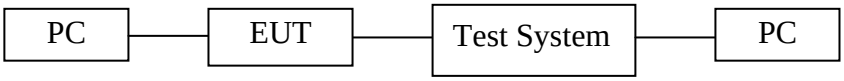
7. POWER SPECTRAL DENSITY MEASUREMENT

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 kHz ≤ RBW ≤ 100 kHz.

4. Set the VBW ⩾ 3 x 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.

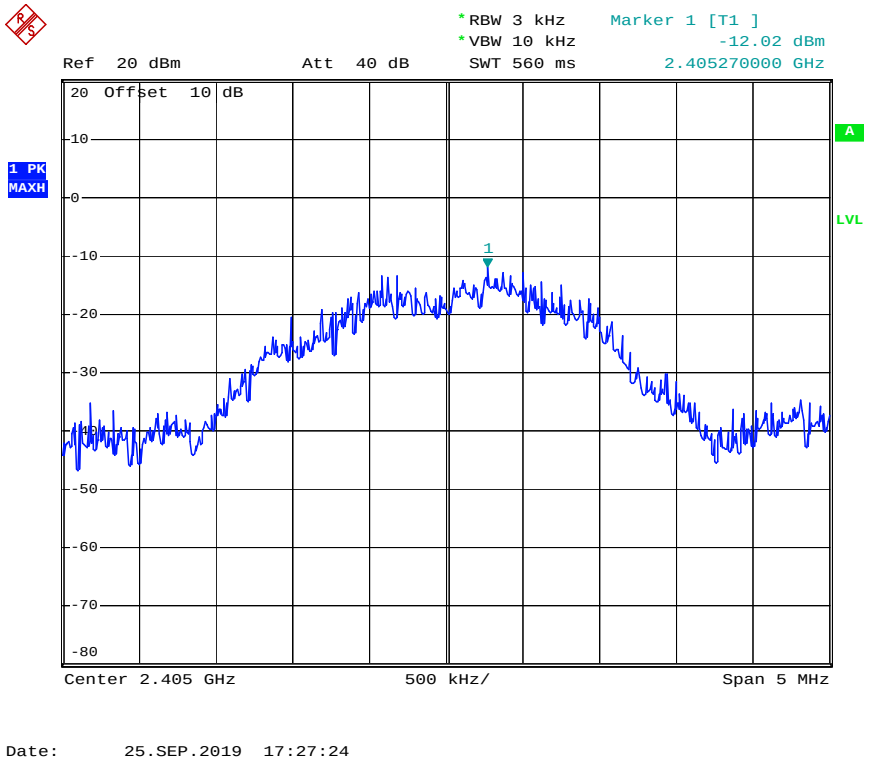
7.5.4.Measurement the maximum power spectral density.

7.6.Test Result

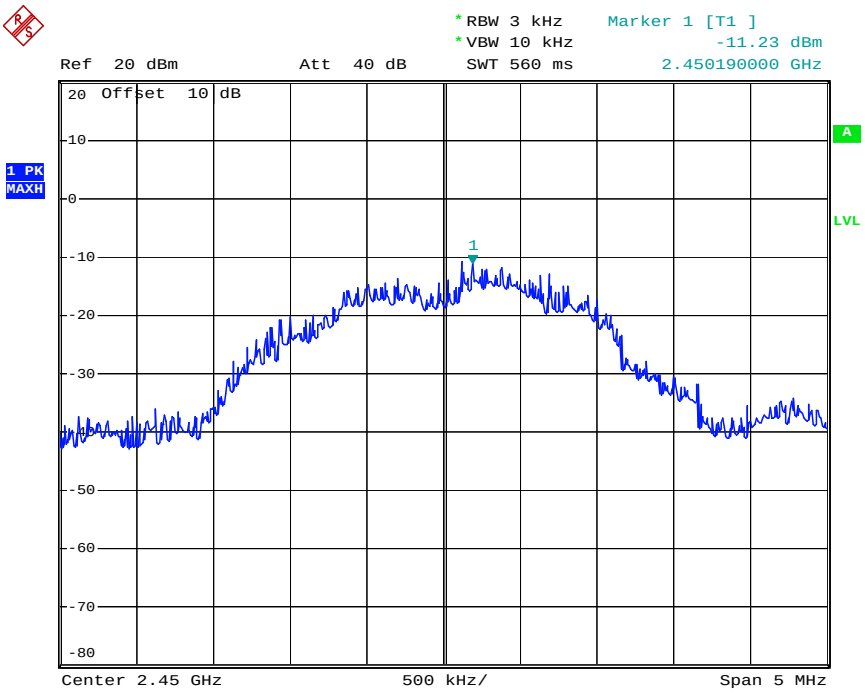
CHANNEL NUMBER	FREQUENCY (MHz)	PSD (dBm/3KHz)	LIMIT (dBm/3KHz)	PASS/FAIL
11	2405	-12.02	8	PASS
20	2450	-11.23	8	PASS
26	2480	-10.97	8	PASS

The spectrum analyzer plots are attached as below.

channel 11



channel 20



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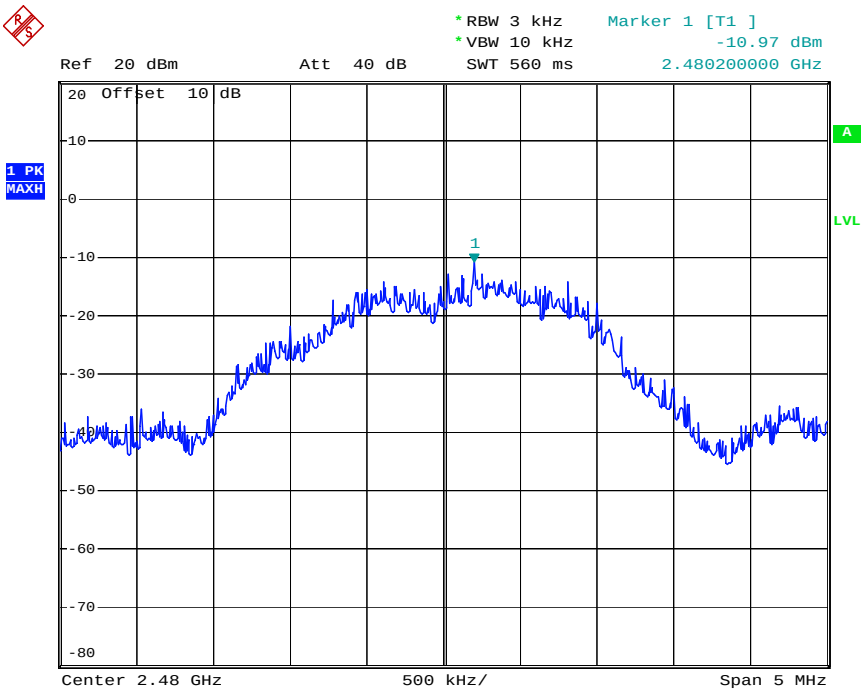
channel 26



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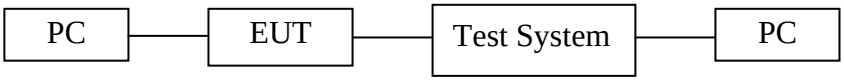
8. BAND EDGE COMPLIANCE TEST

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

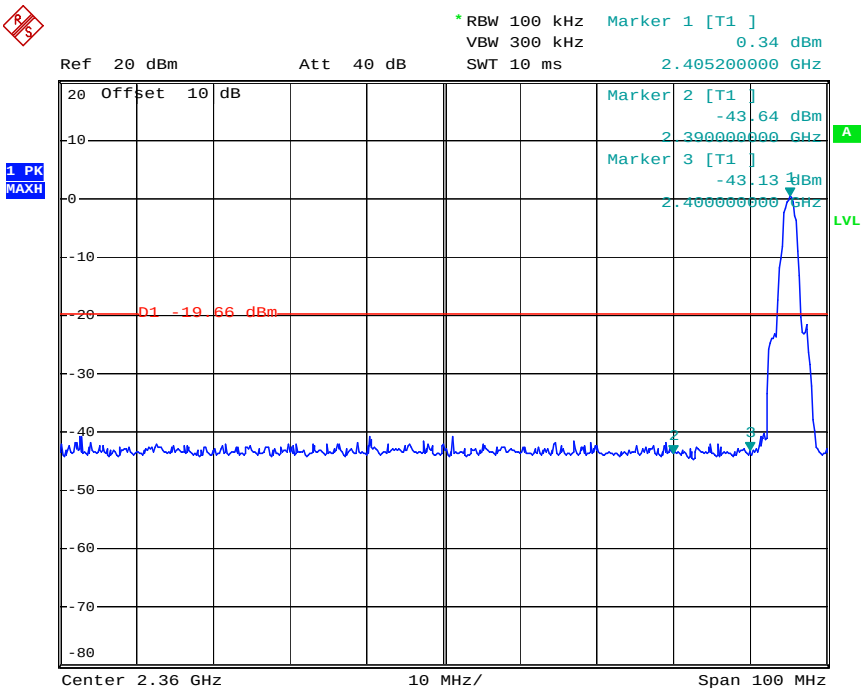
8.5.9.The band edges was measured and recorded.

8.6.Test Result

Pass

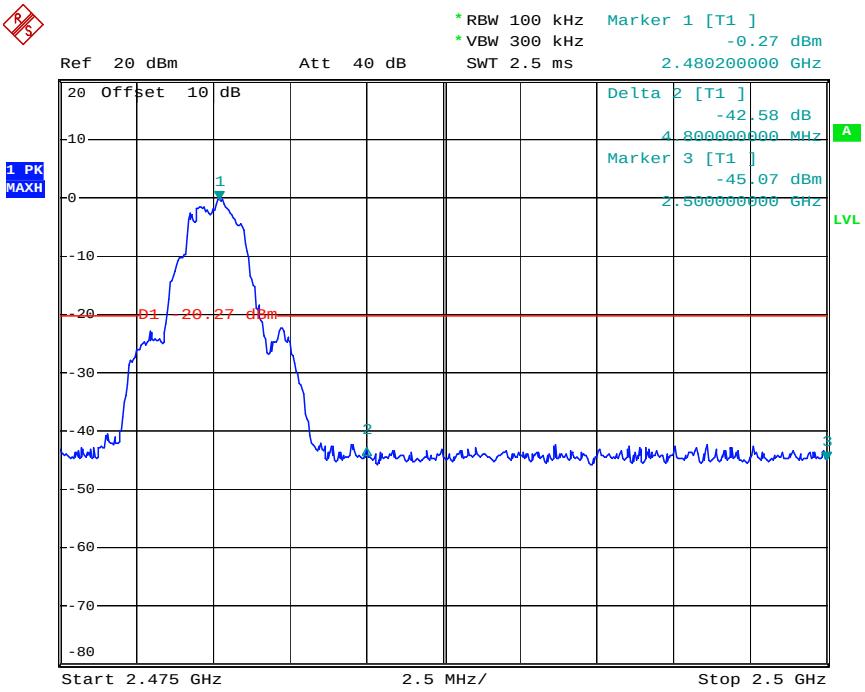
Frequency	Delta peak to band emission	Limit(dBc)
2.4GHz	43.47	20
2.4835GHz	42.31	20

channel 11



Date: 25.SEP.2019 17:26:12

channel 26



Date: 25.SEP.2019 17:34:53

Radiated Band Edge Result

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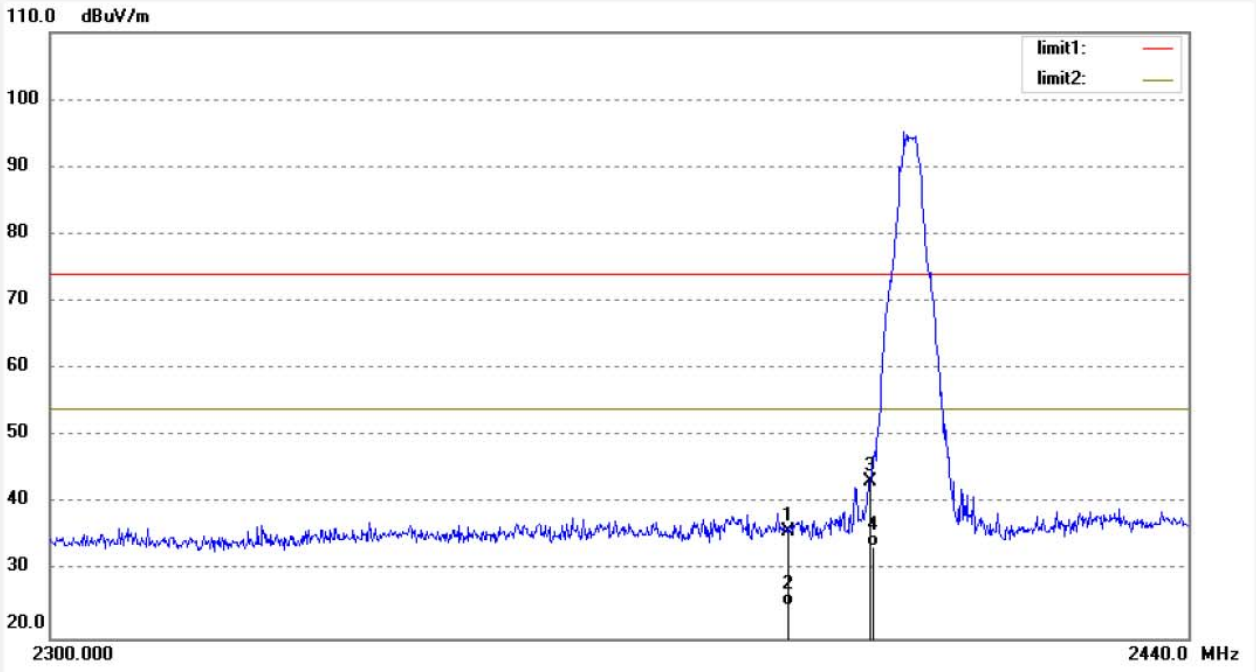
Fax:+86-0755-26503396

Job No.: FRANK2019 #1553	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: 10/44/53
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2405MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



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	42.09	-6.32	35.77	74.00	-38.23	peak	200	82	
2	2390.000	31.15	-6.32	24.83	54.00	-29.17	AVG	250	211	
3	2400.000	49.51	-6.27	43.24	74.00	-30.76	peak	200	93	
4	2400.000	39.89	-6.27	33.62	54.00	-20.38	AVG	250	147	

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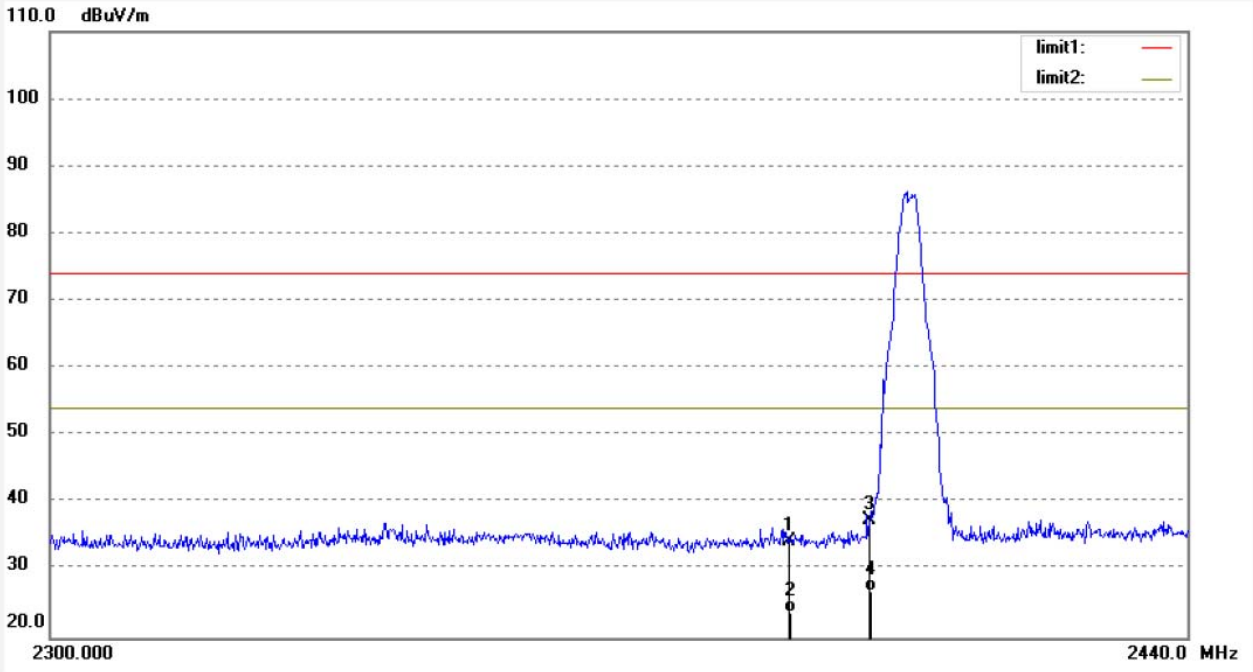
Job No.: FRANK2019 #1554
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2405MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Vertical
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 10/46/08
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



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	40.52	-6.32	34.20	74.00	-39.80	peak	150	211	
2	2390.000	30.13	-6.32	23.81	54.00	-30.19	AVG	150	332	
3	2400.000	43.73	-6.27	37.46	74.00	-36.54	peak	150	96	
4	2400.000	33.24	-6.27	26.97	54.00	-27.03	AVG	150	104	

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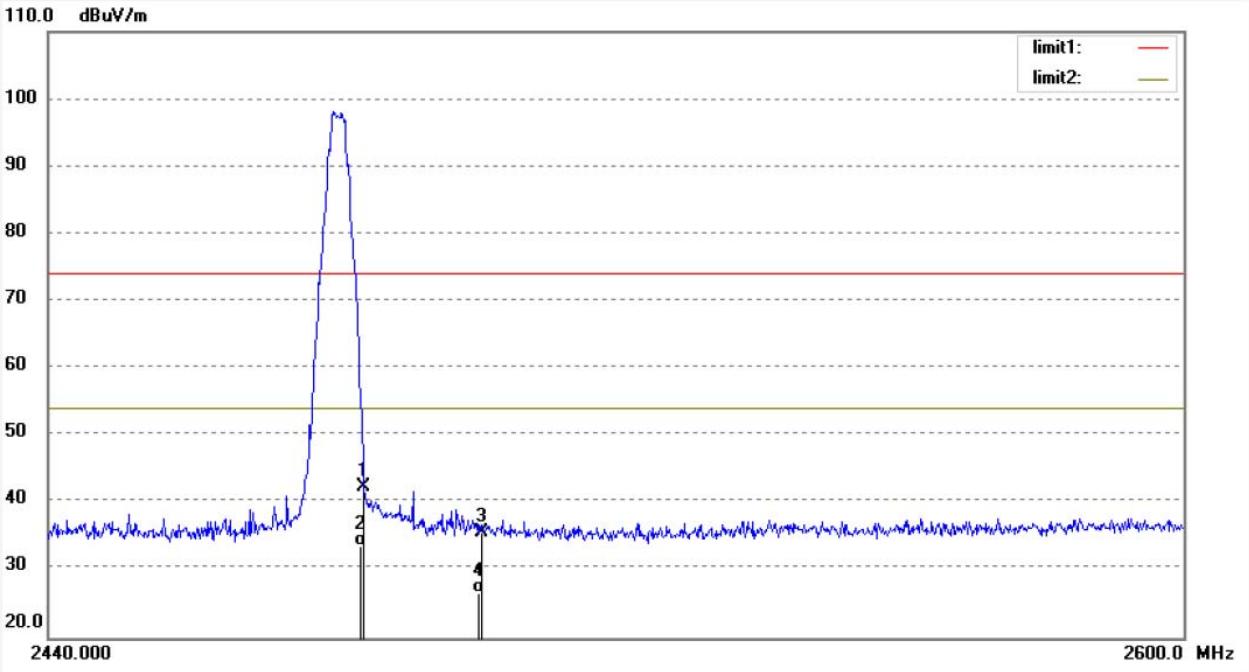
Job No.: FRANK2019 #1556	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/50/36
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



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	48.33	-5.89	42.44	74.00	-31.56	peak	250	82	
2	2483.500	39.49	-5.89	33.60	54.00	-20.40	AVG	200	115	
3	2500.000	41.55	-5.81	35.74	74.00	-38.26	peak	200	65	
4	2500.000	32.42	-5.81	26.61	54.00	-27.39	AVG	250	193	

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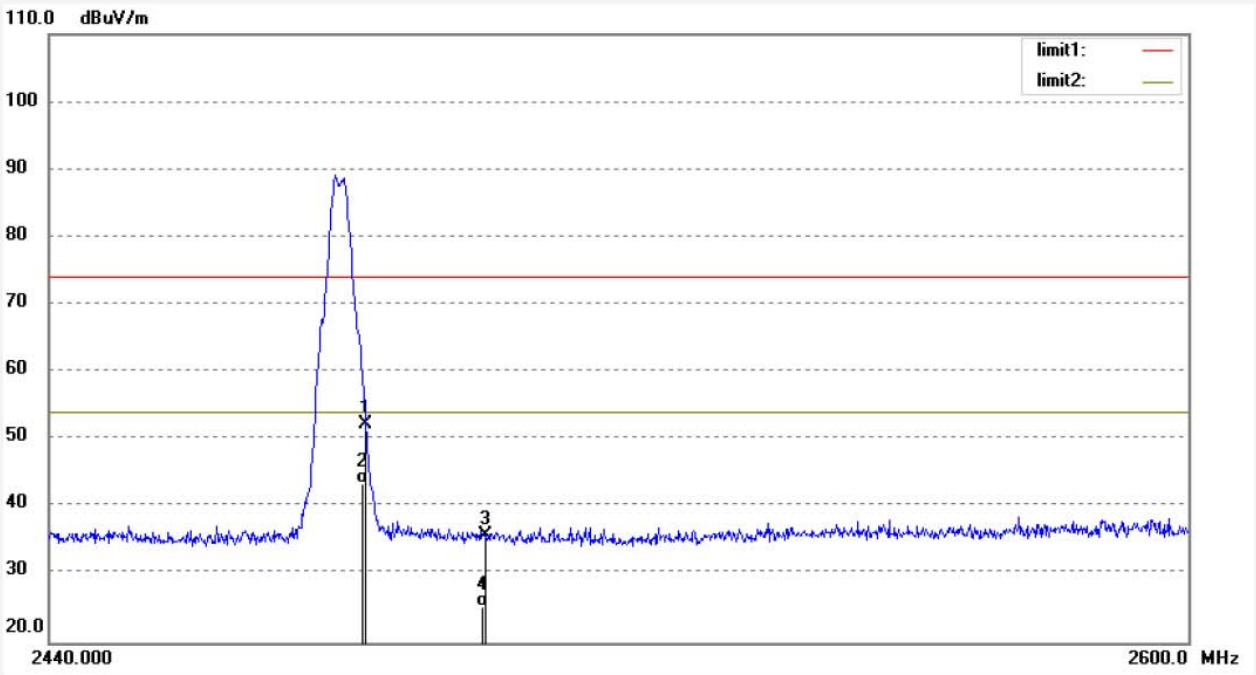
Job No.: FRANK2019 #1555	Polarization: Vertical
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/48/47
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



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	58.29	-5.89	52.40	74.00	-21.60	peak	150	89	
2	2483.500	49.46	-5.89	43.57	54.00	-10.43	AVG	150	121	
3	2500.000	41.78	-5.81	35.97	74.00	-38.03	peak	150	33	
4	2500.000	31.20	-5.81	25.39	54.00	-28.61	AVG	150	193	

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:

   Result = Reading + 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

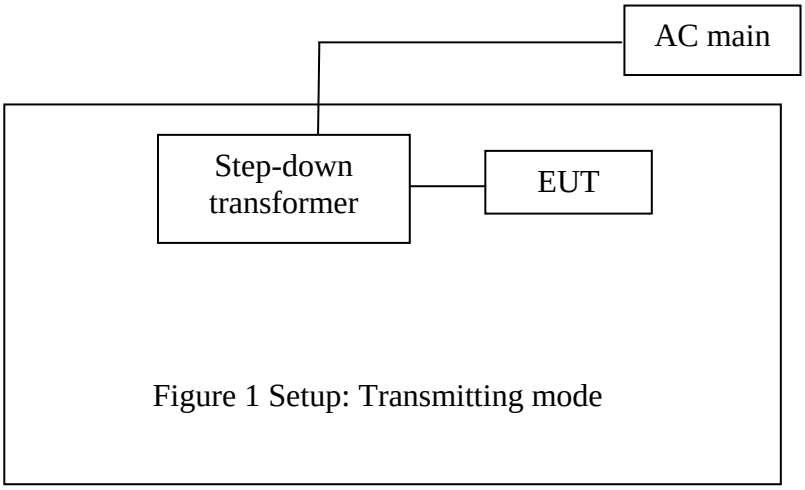
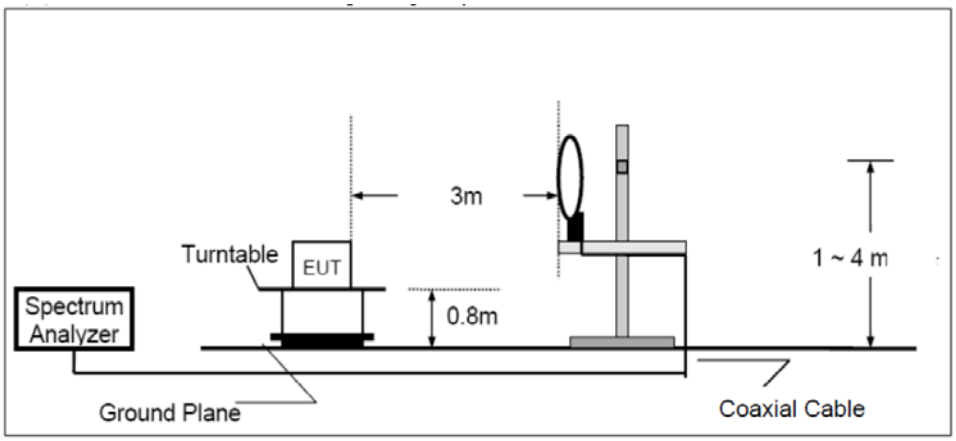


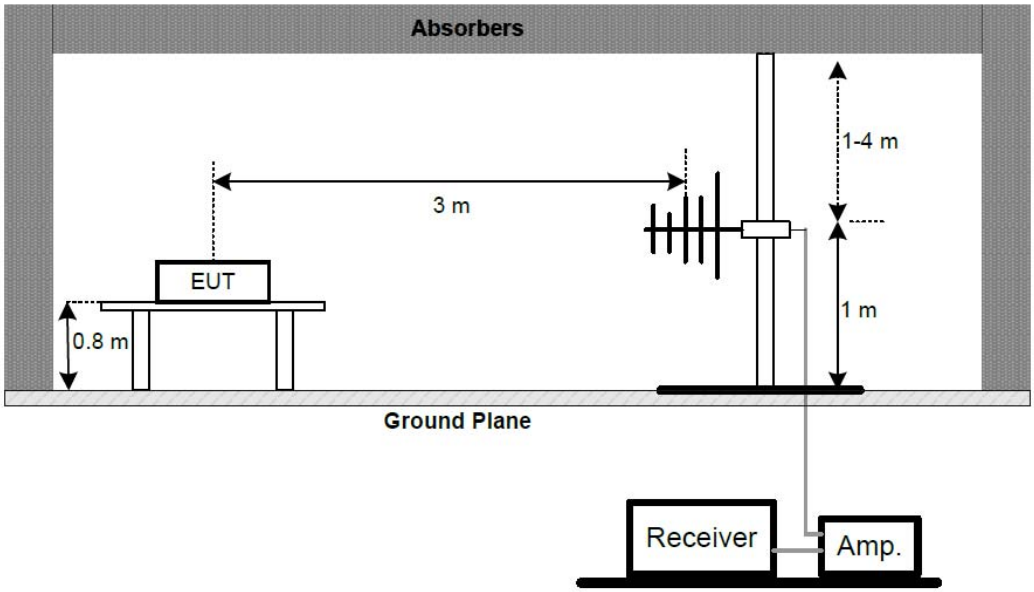
Figure 1 Setup: Transmitting mode

9.1.2.Semi-Anechoic Chamber Test Setup Diagram

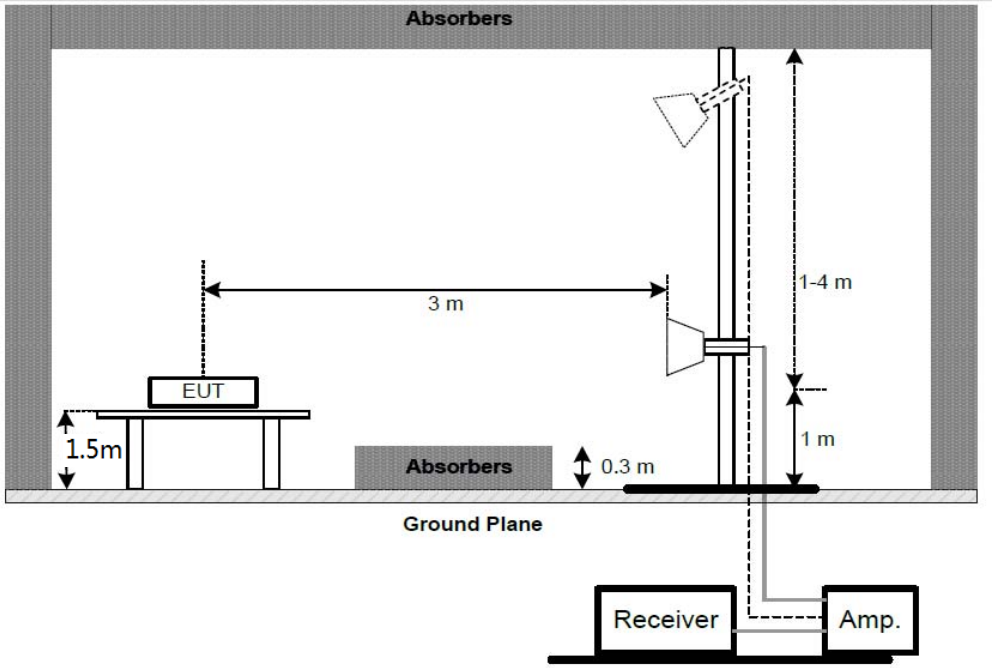
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 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
[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			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]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 Section15.209 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 (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
X.XX	28.66	-15.19	13.47	40.0	-26.53	QP

Frequency(MHz) = Emission frequency in MHz
Reading(dBμv) = Uncorrected Analyzer/Receiver reading
Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain
Result(dBμv/m) = Reading(dBμv) + Factor(dB/m)
Limit (dBμv/m) = Limit stated in standard
Margin (dB) = Result(dBμv/m) - Limit (dBμv/m)
QP = Quasi-peak Reading

Calculation Formula:
Margin(dB) = Result (dBμV/m)–Limit(dBμV/m)
Result(dBμV/m)= Reading(dBμV)+ 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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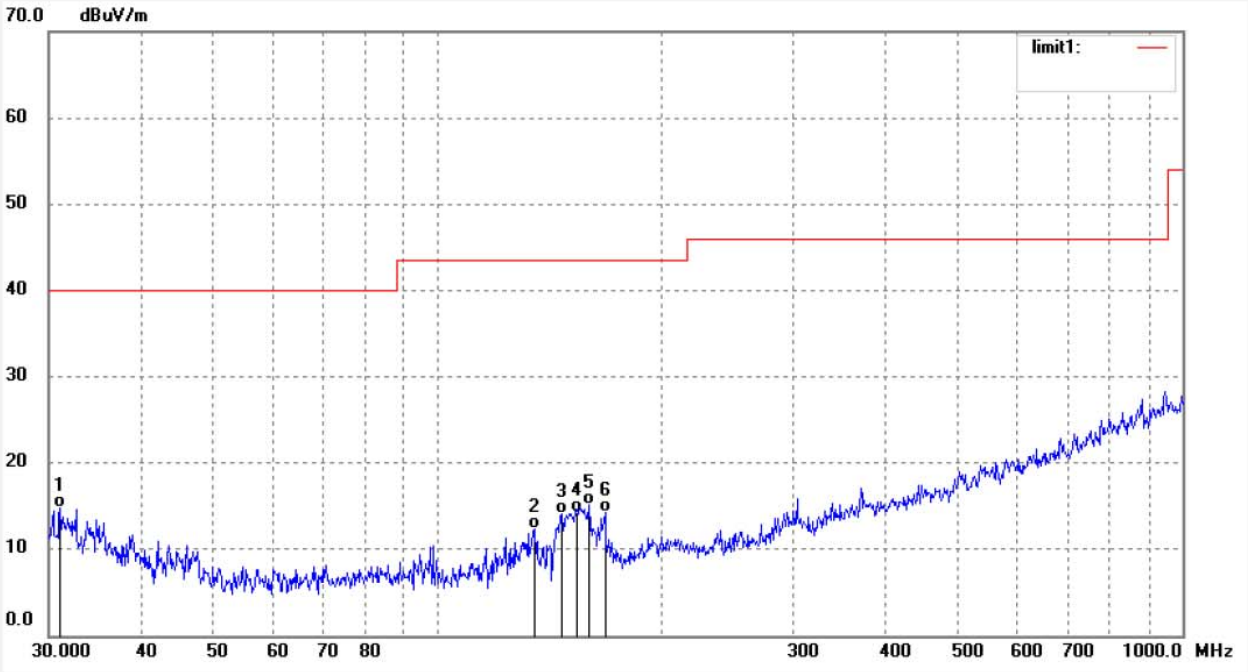
Job No.: FRANK2019 #1528	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/58/34
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2405MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



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	35.19	-20.47	14.72	40.00	-25.28	QP	200	92	
2	134.9643	40.21	-27.85	12.36	43.50	-31.14	QP	200	116	
3	146.8392	42.09	-28.06	14.03	43.50	-29.47	QP	200	320	
4	153.1627	42.12	-27.77	14.35	43.50	-29.15	QP	200	118	
5	159.7586	42.30	-27.09	15.21	43.50	-28.29	QP	200	92	
6	167.8136	40.56	-26.23	14.33	43.50	-29.17	QP	200	166	

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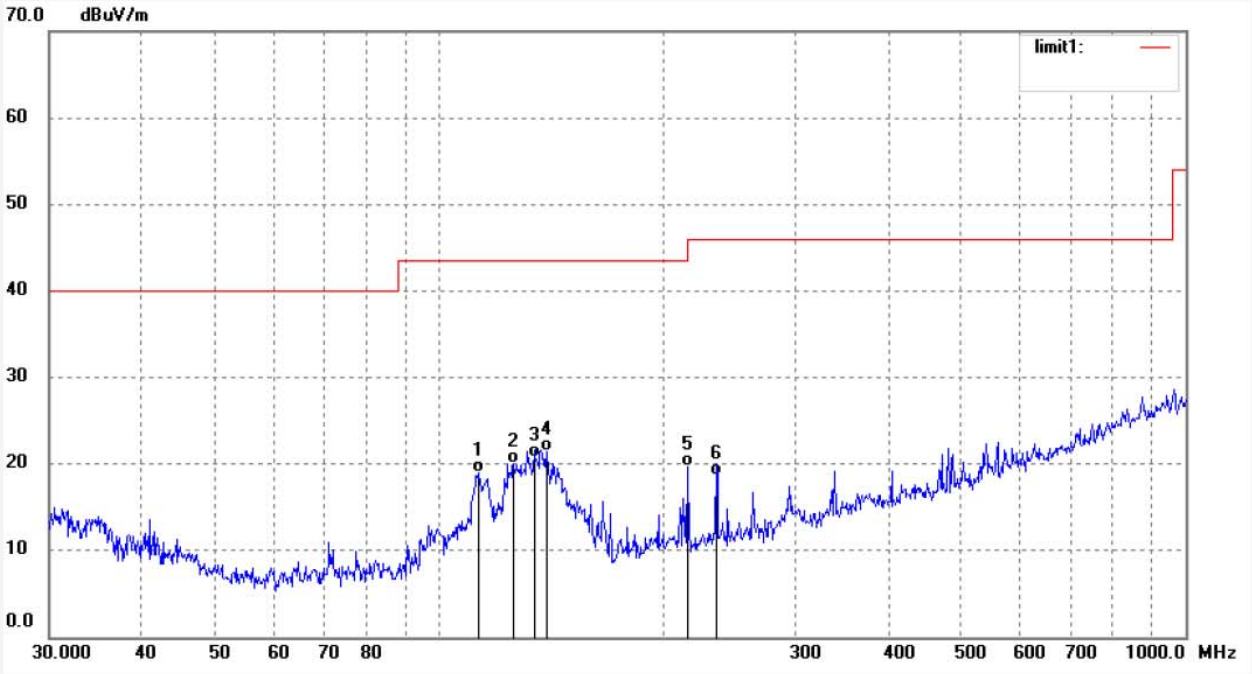
Job No.: FRANK2019 #1527
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2405MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Vertical
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 9/56/21
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	112.8229	46.28	-27.32	18.96	43.50	-24.54	QP	100	193	
2	125.8058	47.56	-27.60	19.96	43.50	-23.54	QP	100	221	
3	134.0193	48.65	-27.83	20.82	43.50	-22.68	QP	100	98	
4	139.3006	49.43	-27.94	21.49	43.50	-22.01	QP	100	221	
5	215.3616	43.68	-24.05	19.63	43.50	-23.87	QP	100	63	
6	235.1346	42.49	-23.79	18.70	46.00	-27.30	QP	100	210	

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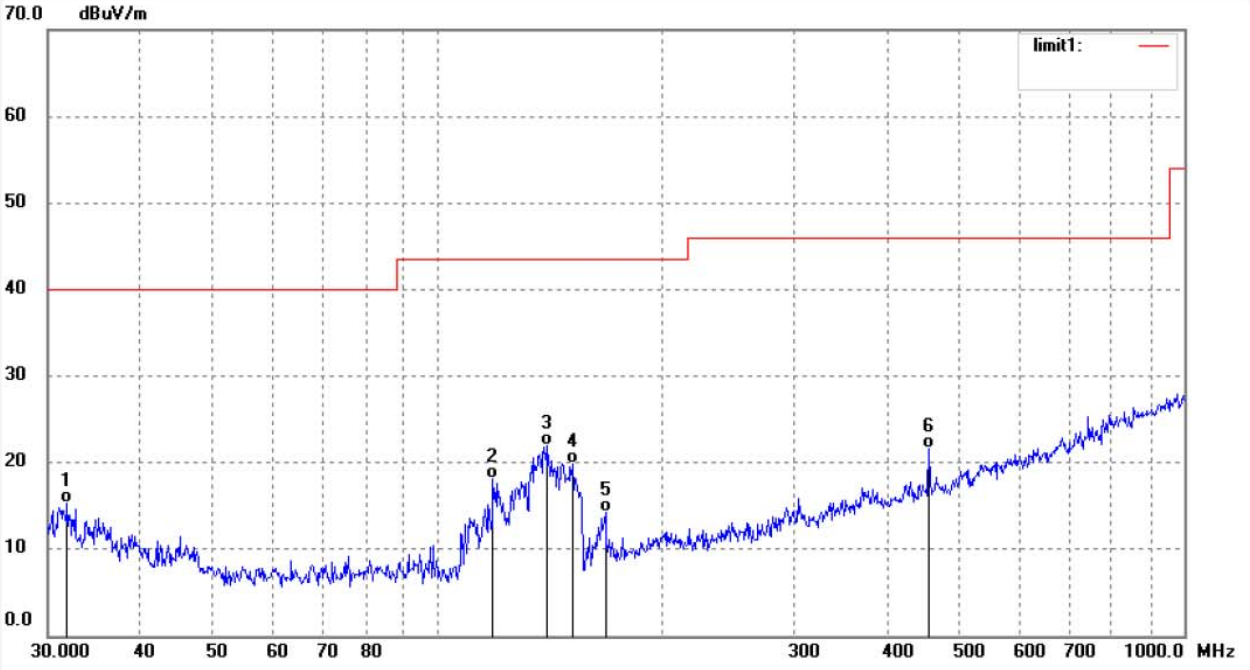
Job No.: FRANK2019 #1529
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2450MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Horizontal
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 9/59/08
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.8464	35.93	-20.66	15.27	40.00	-24.73	QP	200	162	
2	118.5113	45.44	-27.41	18.03	43.50	-25.47	QP	200	11	
3	139.7908	49.92	-27.94	21.98	43.50	-21.52	QP	200	63	
4	151.5567	47.78	-27.92	19.86	43.50	-23.64	QP	200	269	
5	167.8136	40.56	-26.23	14.33	43.50	-29.17	QP	200	221	
6	455.1888	38.68	-17.11	21.57	46.00	-24.43	QP	200	163	

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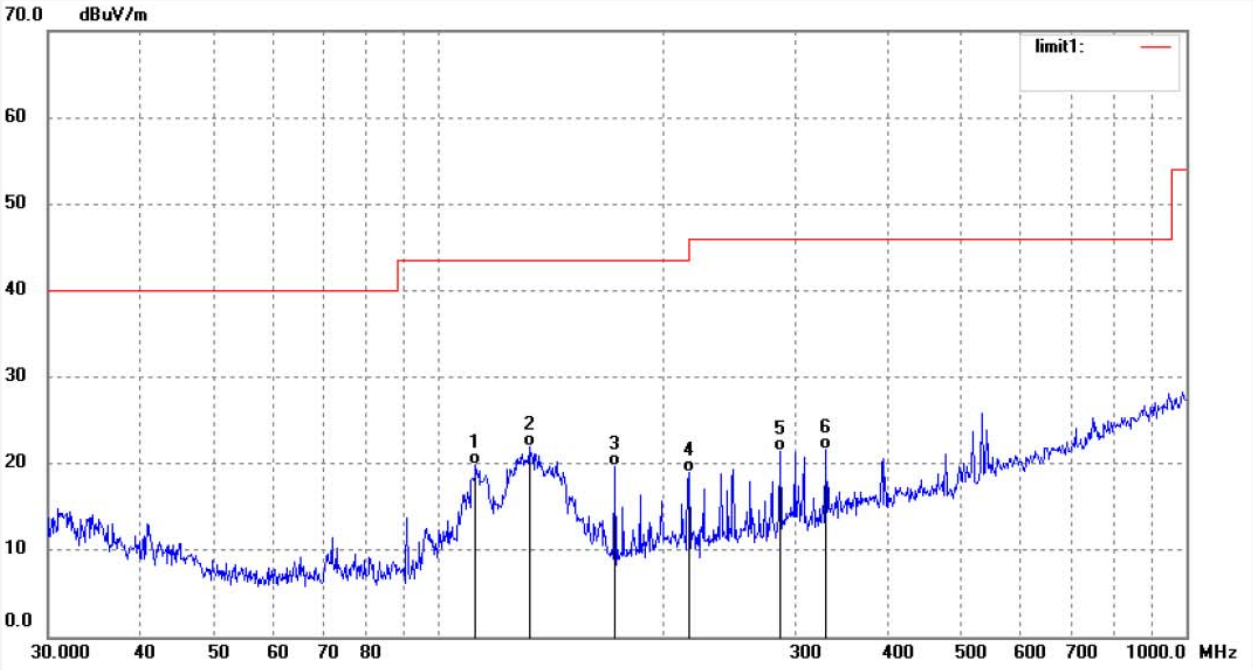
Job No.: FRANK2019 #1530
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2450MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Vertical
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 10/00/34
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	112.0327	47.13	-27.30	19.83	43.50	-23.67	QP	100	195	
2	132.1489	49.65	-27.77	21.88	43.50	-21.62	QP	100	63	
3	171.9920	45.81	-26.20	19.61	43.50	-23.89	QP	100	82	
4	216.1195	42.96	-24.05	18.91	46.00	-27.09	QP	100	216	
5	286.2653	43.23	-21.83	21.40	46.00	-24.60	QP	100	320	
6	329.4624	41.77	-20.19	21.58	46.00	-24.42	QP	100	116	

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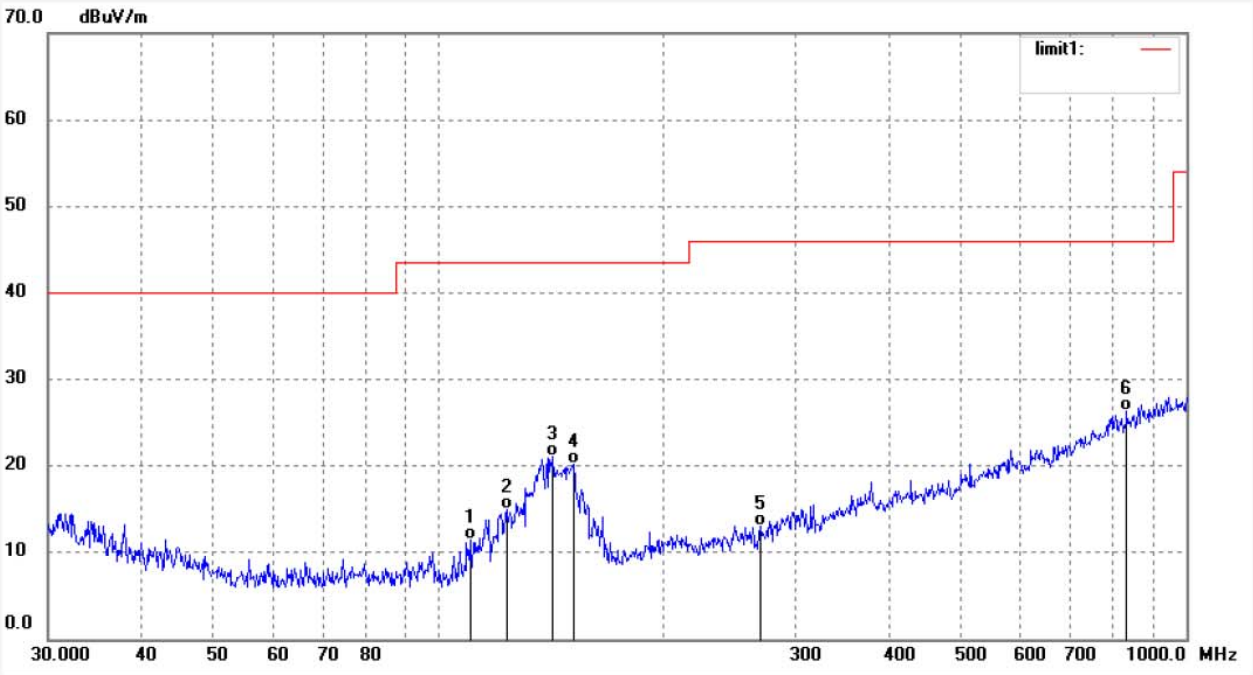
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019 #1532
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2480MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Horizontal
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 10/03/05
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	110.0818	38.74	-27.27	11.47	43.50	-32.03	QP	200	172	
2	123.1814	42.49	-27.53	14.96	43.50	-28.54	QP	200	63	
3	142.2684	49.05	-27.99	21.06	43.50	-22.44	QP	200	331	
4	151.5567	48.07	-27.92	20.15	43.50	-23.35	QP	200	221	
5	269.6669	35.57	-22.57	13.00	46.00	-33.00	QP	200	99	
6	833.0126	34.75	-8.33	26.42	46.00	-19.58	QP	200	311	

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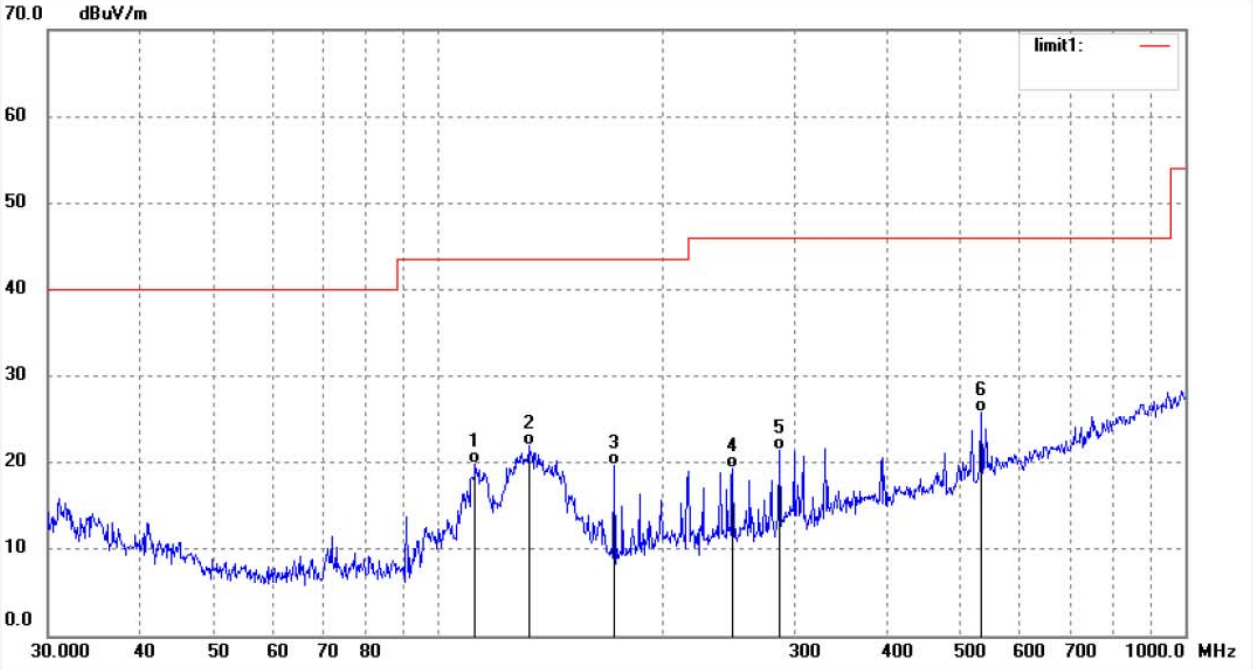
Job No.: FRANK2019 #1531
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2480MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Vertical
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 10/00/52
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	112.0327	47.13	-27.30	19.83	43.50	-23.67	QP	100	321	
2	132.1489	49.65	-27.77	21.88	43.50	-21.62	QP	100	221	
3	171.9921	45.81	-26.20	19.61	43.50	-23.89	QP	100	82	
4	247.8594	43.02	-23.65	19.37	46.00	-26.63	QP	100	155	
5	286.2653	43.23	-21.83	21.40	46.00	-24.60	QP	100	66	
6	533.1611	41.15	-15.29	25.86	46.00	-20.14	QP	100	193	

Above 1GHz

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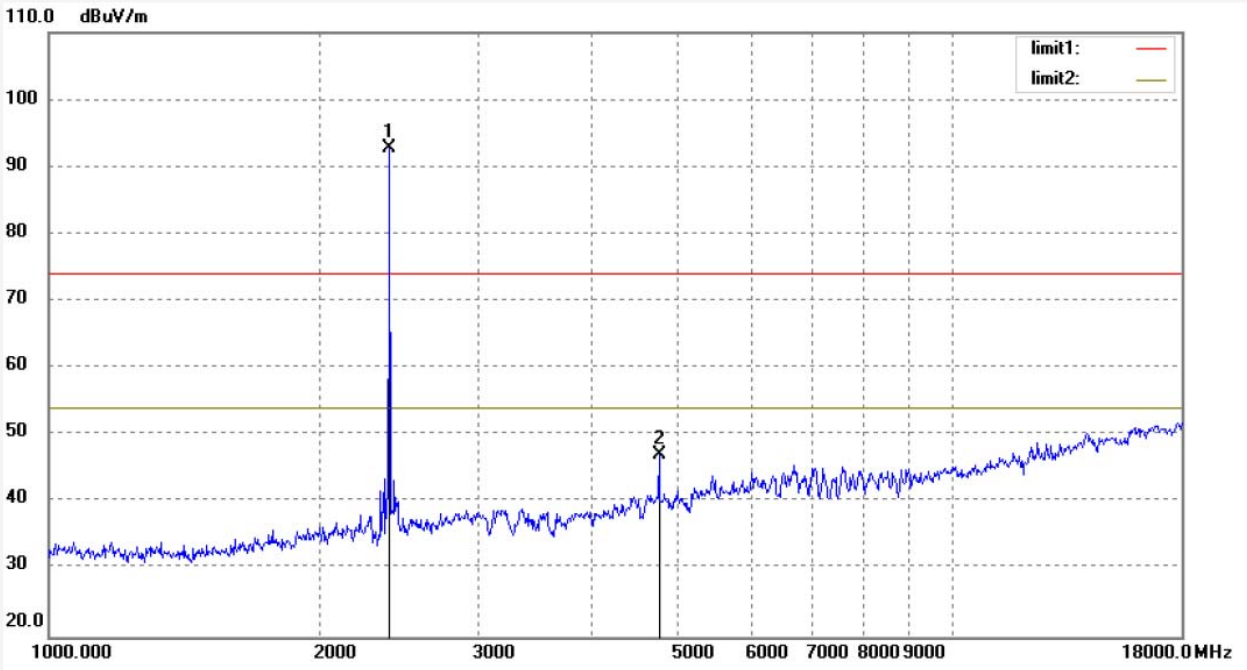
Job No.: FRANK2019 #1552	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/42/25
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2405MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2405.359	99.07	-6.33	92.74			peak	250	74	
2	4810.751	46.32	0.76	47.08	74.00	-26.92	peak	200	189	

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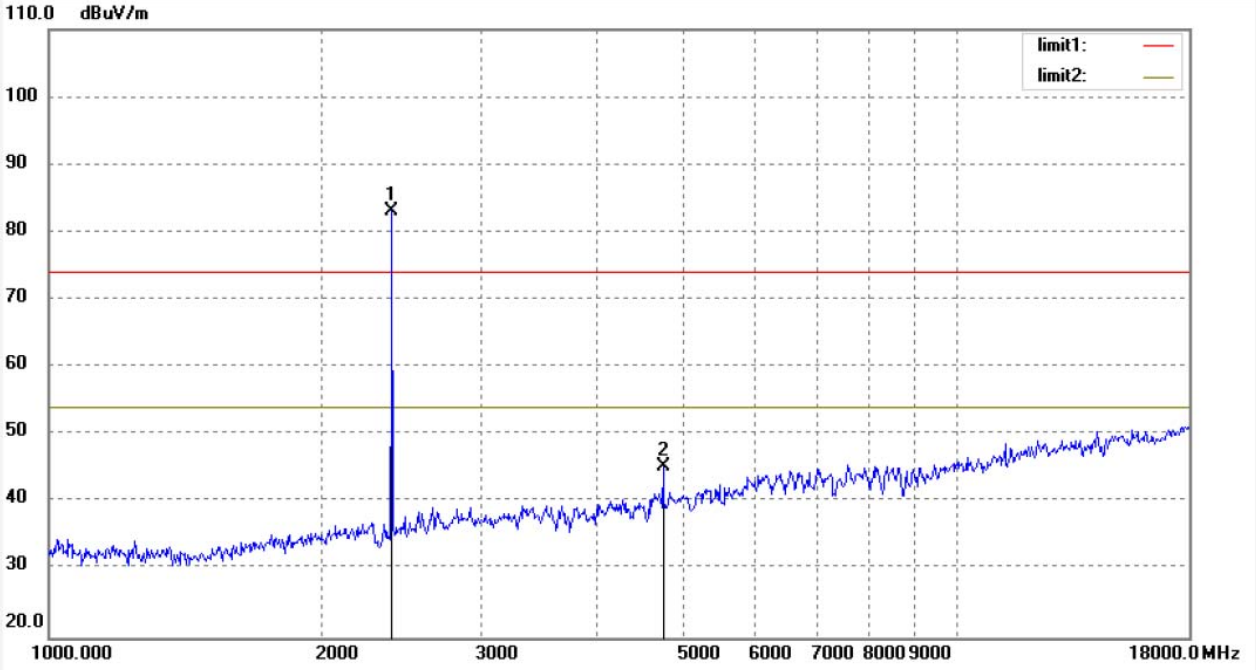
Job No.: FRANK2019 #1551	Polarization: Vertical
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/40/35
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2405MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2405.359	89.41	-6.33	83.08			peak	150	96	
2	4810.751	44.54	0.76	45.30	74.00	-28.70	peak	150	166	

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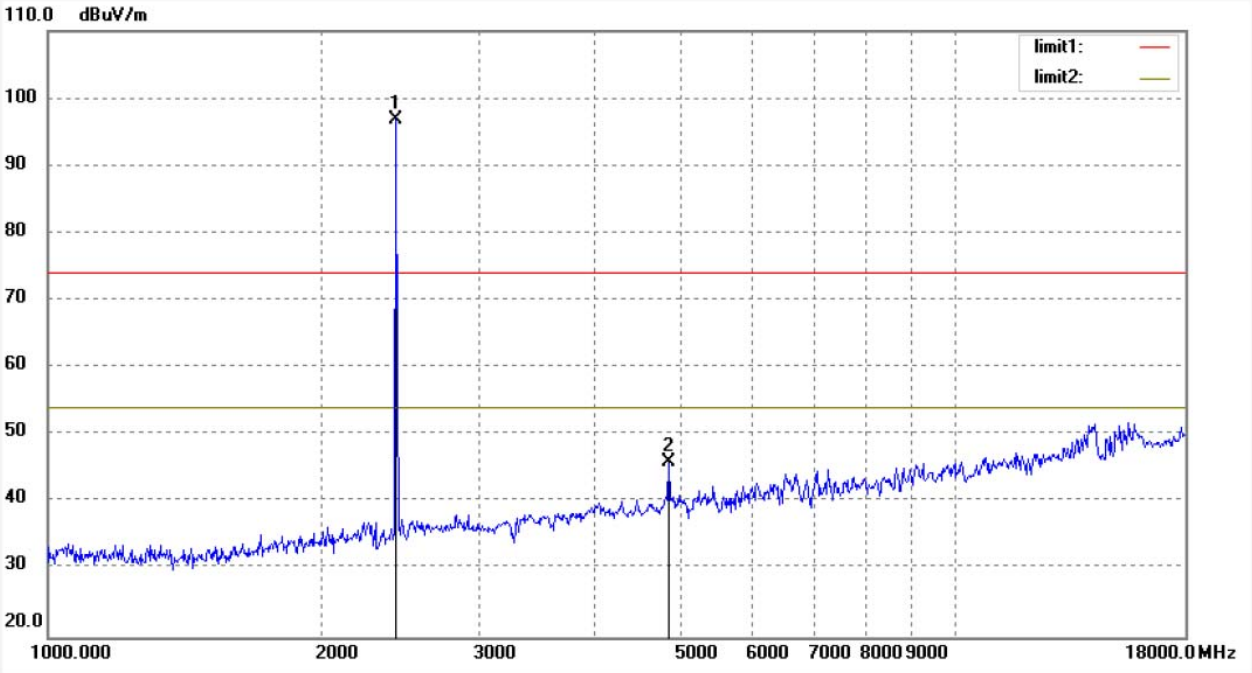
Job No.: FRANK2019 #1549	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/34/41
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2450MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



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	102.93	-6.17	96.76			peak	250	144	
2	4900.438	44.78	1.19	45.97	74.00	-28.03	peak	250	103	

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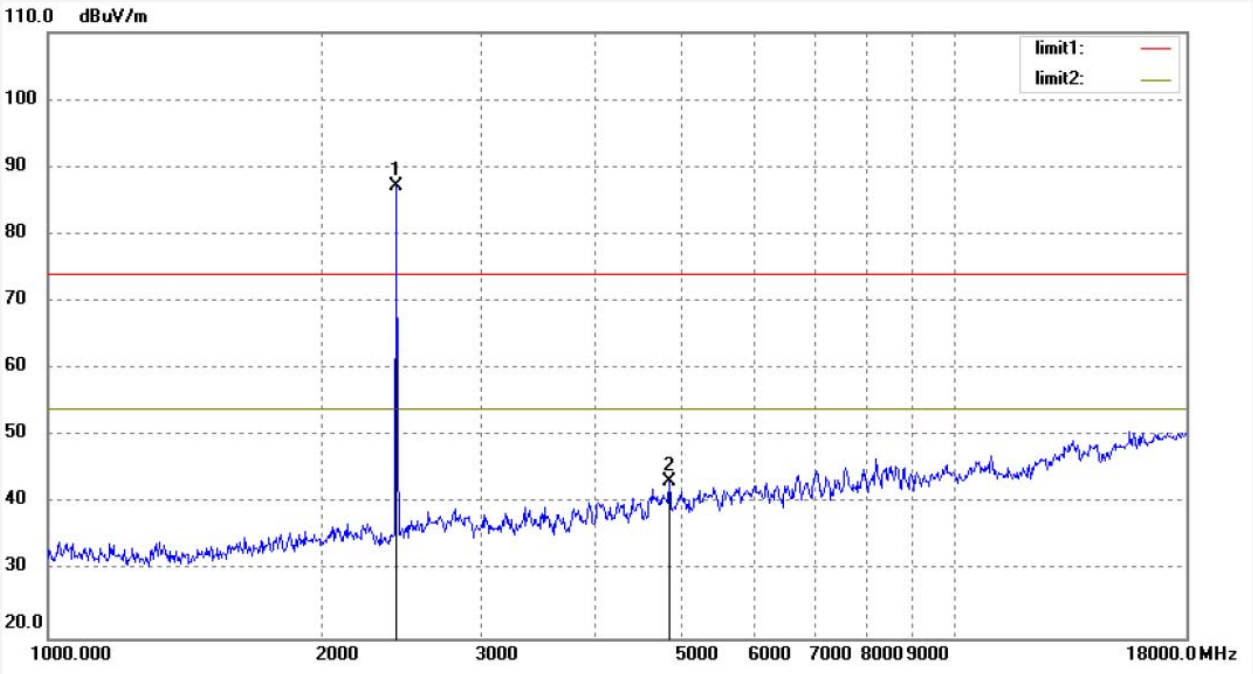
Job No.: FRANK2019 #1550
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: sprinkler controller
Mode: TX 2450MHz
Model: SPI
Manufacturer: Libre Home Inc

Polarization: Vertical
Power Source: AC 24V/60Hz
Date: 19/09/24/
Time: 10/38/12
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20191379



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	93.25	-6.17	87.08			peak	150	96	
2	4900.438	42.17	1.19	43.36	74.00	-30.64	peak	150	178	

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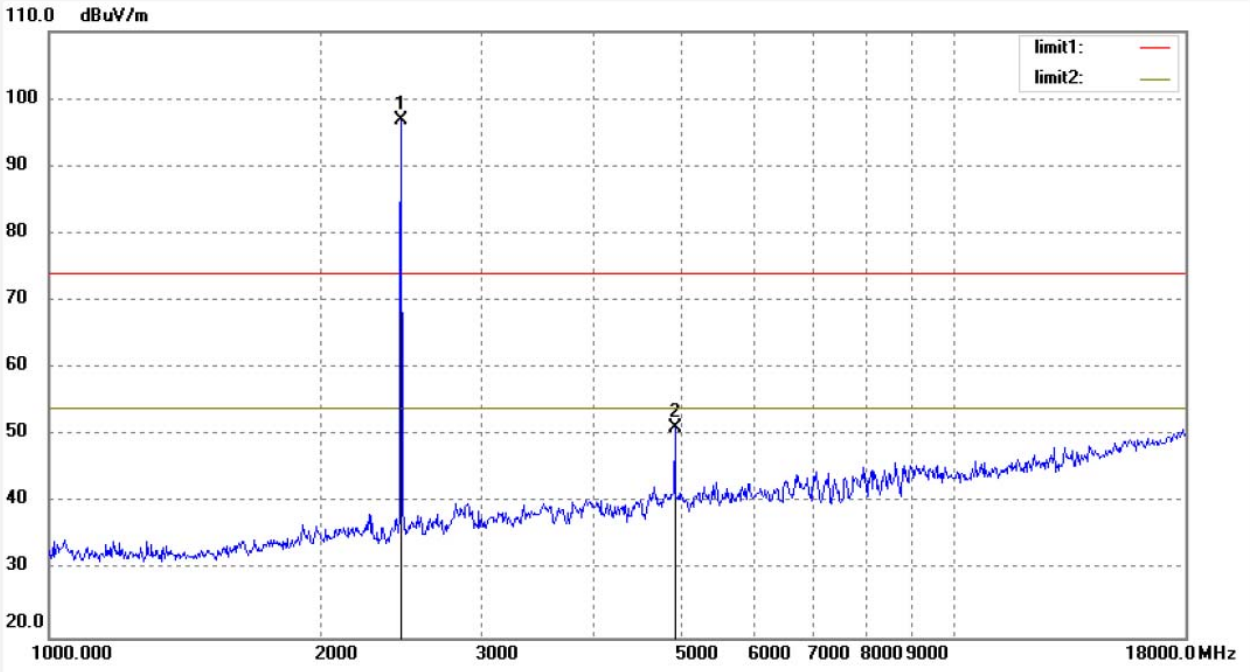
Job No.: FRANK2019 #1557	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/53/05
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

Note: Report NO.:ATE20191379



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	102.88	-6.04	96.84			peak	200	82	
2	4960.444	49.68	1.50	51.18	74.00	-22.82	peak	250	116	

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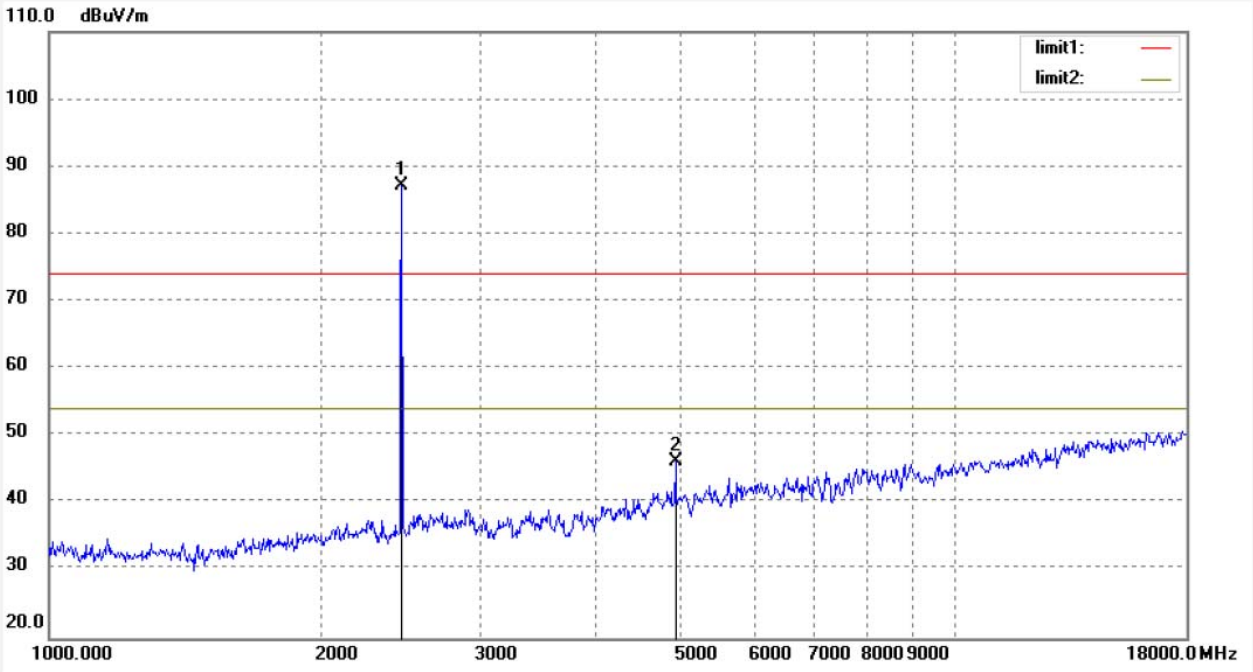
Job No.: FRANK2019 #1558	Polarization: Vertical
Standard: FCC PK	Power Source: AC 24V/60Hz
Test item: Radiation Test	Date: 19/09/24/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 10/54/46
EUT: sprinkler controller	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: SPI	
Manufacturer: Libre Home Inc	

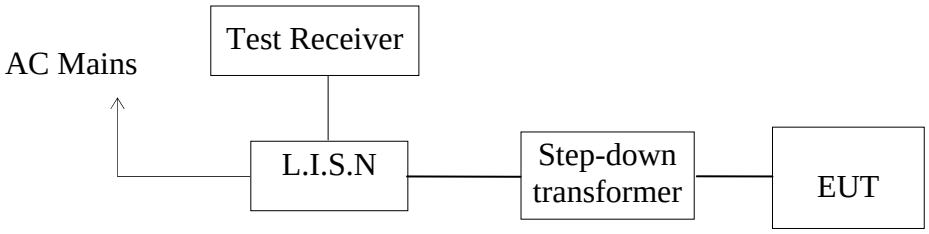
Note: Report NO.:ATE20191379



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	93.24	-6.04	87.20			peak	150	96	
2	4960.444	44.77	1.50	46.27	74.00	-27.73	peak	150	175	

10.POWER LINE CONDUCTED MEASUREMENT

10.1.Block Diagram of Test Setup



(EUT: sprinkler controller)

10.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	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 (dBμv)	Average Level (dBμv)	Transducer value (dB)	QuasiPeak Result (dBμv)	Average Result (dBμv)	Quasi Peak Limit (dBμv)	Average Limit (dBμv)	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.

Test mode : Zigbee operation (worse case)
Test Voltage: 120V/60Hz

MEASUREMENT RESULT: "F-1379-1C_fin"

2019-9-24 9:32

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.158000	33.60	10.8	66	32.0	QP	N	GND
0.762000	20.90	11.1	56	35.1	QP	N	GND
1.504000	24.00	11.2	56	32.0	QP	N	GND
2.170000	19.40	11.3	56	36.6	QP	N	GND
5.990000	9.50	11.5	60	50.5	QP	N	GND
14.415000	0.70	11.6	60	59.3	QP	N	GND

MEASUREMENT RESULT: "F-1379-1C_fin2"

2019-9-24 9:32

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.286000	17.30	10.9	51	33.3	AV	N	GND
0.776000	21.20	11.1	46	24.8	AV	N	GND
1.800000	20.10	11.2	46	25.9	AV	N	GND
2.150000	14.30	11.3	46	31.7	AV	N	GND
6.030000	5.50	11.5	50	44.5	AV	N	GND

MEASUREMENT RESULT: "F-1379-2C_fin"

2019-9-24 9:35

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.158000	33.80	10.8	66	31.8	QP	L1	GND
0.776000	25.10	11.1	56	30.9	QP	L1	GND
1.542000	23.80	11.2	56	32.2	QP	L1	GND
2.175000	19.30	11.3	56	36.7	QP	L1	GND
5.620000	9.50	11.5	60	50.5	QP	L1	GND
29.445000	2.00	11.8	60	58.0	QP	L1	GND

MEASUREMENT RESULT: "F-1379-2C_fin2"

2019-9-24 9:35

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	26.60	10.8	56	29.4	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
2.215000	13.60	11.3	46	32.4	AV	L1	GND
6.305000	3.90	11.5	50	46.1	AV	L1	GND

Emissions attenuated more than 20 dB below the permissible value are not reported.
The spectral diagrams are attached as below.

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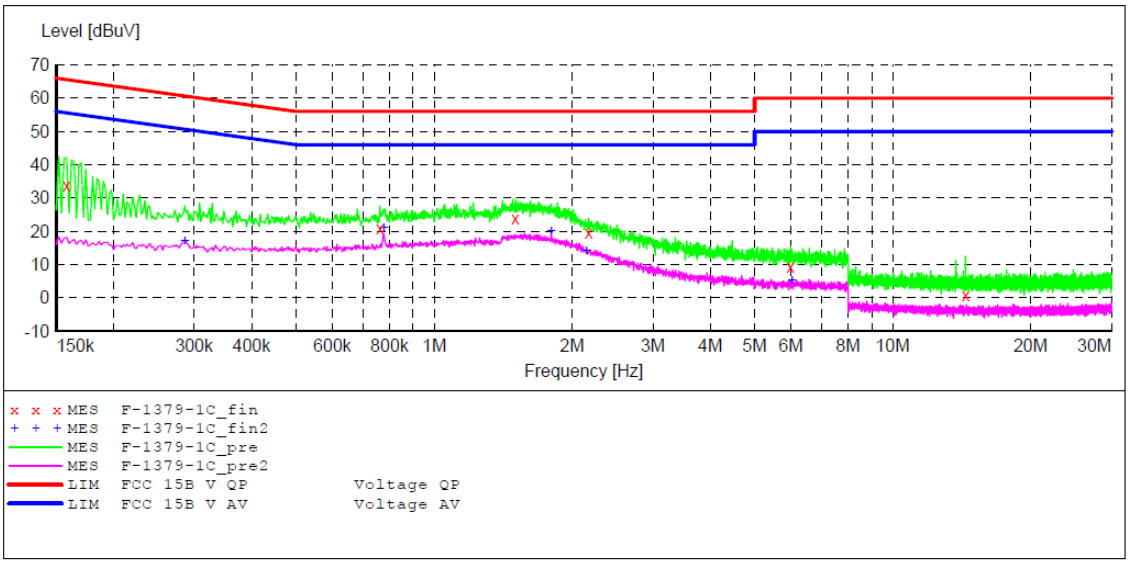
CONDUCTED EMISSION STANDARD FCC PART 15B

```
EUT:                  sprinkler controller M/N:SPI
Manufacturer:         Libre Home Inc
Operating Condition:  Zigbee OPERATION
Test Site:            2#Shielding Room
Operator:             Frank
Test Specification:   N   120V/60Hz
Comment:              Report NO.:ATE20191379
Start of Test:        2019-9-24 / 9:31:09
```

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

Short Description: _SUB_STD_VTERM2 1.70

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-1379-1C_fin"

2019-9-24 9:32

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.158000	33.60	10.8	66	32.0	QP	N	GND
0.762000	20.90	11.1	56	35.1	QP	N	GND
1.504000	24.00	11.2	56	32.0	QP	N	GND
2.170000	19.40	11.3	56	36.6	QP	N	GND
5.990000	9.50	11.5	60	50.5	QP	N	GND
14.415000	0.70	11.6	60	59.3	QP	N	GND

MEASUREMENT RESULT: "F-1379-1C_fin2"

2019-9-24 9:32

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.286000	17.30	10.9	51	33.3	AV	N	GND
0.776000	21.20	11.1	46	24.8	AV	N	GND
1.800000	20.10	11.2	46	25.9	AV	N	GND
2.150000	14.30	11.3	46	31.7	AV	N	GND
6.030000	5.50	11.5	50	44.5	AV	N	GND

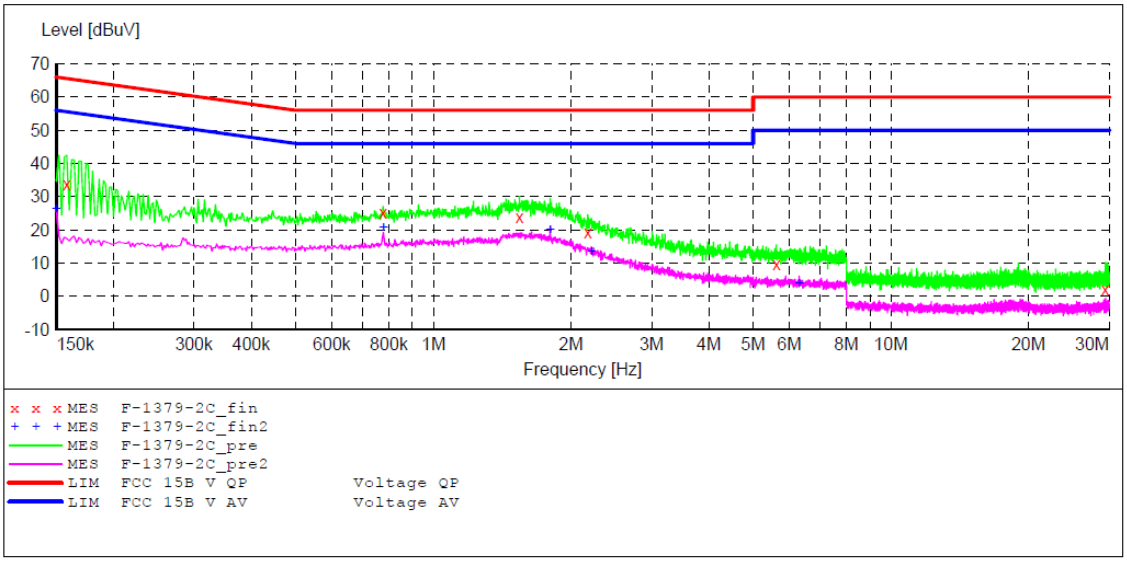
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

```
EUT:                    sprinkler controller M/N:SPI
Manufacturer:           Libre Home Inc
Operating Condition:    Zigbee OPERATION
Test Site:              2#Shielding Room
Operator:               Frank
Test Specification:     L   120V/60Hz
Comment:                Report NO.:ATE20191379
Start of Test:          2019-9-24 / 9:33:25
```

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-1379-2C_fin"

2019-9-24 9:35

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.158000	33.80	10.8	66	31.8	QP	L1	GND
0.776000	25.10	11.1	56	30.9	QP	L1	GND
1.542000	23.80	11.2	56	32.2	QP	L1	GND
2.175000	19.30	11.3	56	36.7	QP	L1	GND
5.620000	9.50	11.5	60	50.5	QP	L1	GND
29.445000	2.00	11.8	60	58.0	QP	L1	GND

MEASUREMENT RESULT: "F-1379-2C_fin2"

2019-9-24 9:35

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	26.60	10.8	56	29.4	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
2.215000	13.60	11.3	46	32.4	AV	L1	GND
6.305000	3.90	11.5	50	46.1	AV	L1	GND

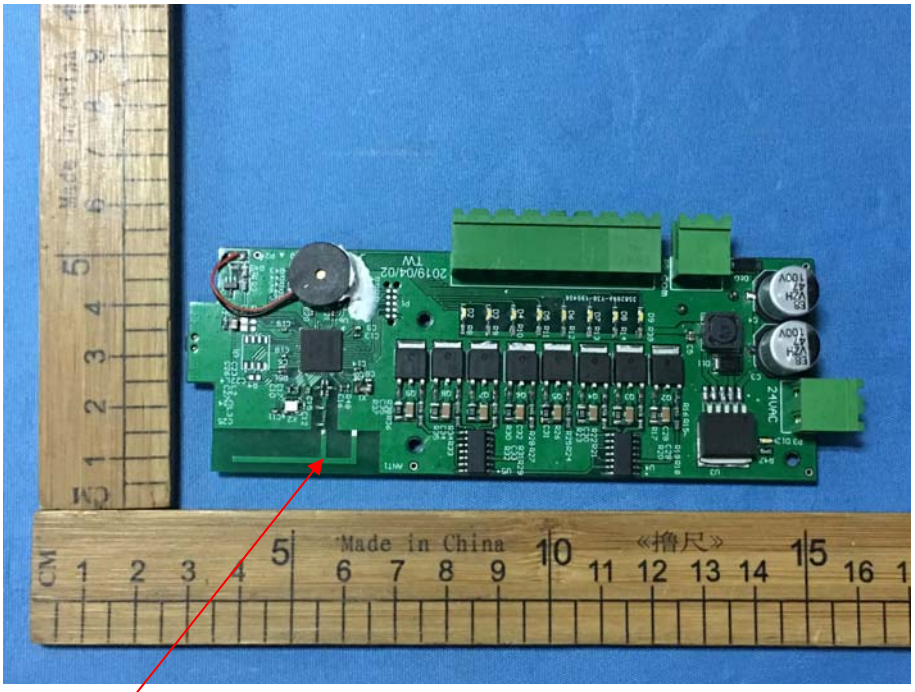
11. ANTENNA REQUIREMENT

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